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New saxicolous species and new records of *Buellia sens. lat.* and *Rinodinella* (Ascomycota, Physciaceae) in Australia

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New saxicolous species and new records of *Buellia sens. lat.* and *Rinodinella* (Ascomycota, Physciaceae) in Australia

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Abstract: The taxa *Buellia bogongensis* Elix, *B. kimberleyana* Elix, *B. psoromica* Elix and *Rinodinella halophila* var. *hypostictica* Elix are described as new to science. New state and territory records and synonyms are recorded for eight additional taxa. The new combination *Buellia spuria* (Schaer.) Anzi var. *amblyogona* (Müll.Arg.) Elix is made.

Buellia sens. str. [formerly *Hafellia* Kalb, H.Mayrhofer & Scheid.] is one of the few well-delimited groups within *Buellia sens. lat.* (Bungartz *et al.* 2007). It is characterized by the *Callispora*-type ascospores, bacilliform conidia, often by a strongly oil-inspersed hymenium and the presence of norstictic acid, diploicin and atranorin or 4,5-dichlorolichexanthone (Elix 2009b). For nomenclatural reasons, the generic name *Hafellia* must be regarded as a synonym of *Buellia sens. str.*, because *B. disciformis*, the listed type of *Buellia*, shares all the typical characters of "*Hafellia*". A proposal by Moberg *et al.* (1999) suggested changing the listed type of *Buellia* from *B. disciformis* to *B. aethalea*. However, *Buellia disciformis* was chosen as the type of *Buellia* when the generic name was conserved over *Gassicurtia*. That listing would have had to be changed if the proposal by Moberg *et al.* (1999) had been accepted, and would have been the first case in the history of the Botanical Code in which a conserved type was replaced by another type. Such a procedure was not recommended by the Committee for Fungi, which voted against it (Gams 2004). The decision to reject the proposal of Moberg *et al.* (1999) was accepted by general vote at the XVII Botanical Congress in Vienna in 2005. Therefore, the species formerly included in "*Hafellia*" must now be regarded as *Buellia sens. str.* Other species of *Buellia sens. lat.* which are not closely related must now be excluded from *Buellia sens. str.*, but precise generic circumscription must await the results of molecular investigations. The saxicolous species described in this paper belong to *Buellia sens. lat.* Chemical constituents were identified by thin-layer chromatography (Elix & Ernst-Russell 1993), high-performance liquid chromatography (Elix *et al.* 2003) and comparison with authentic samples.

The new taxa

Buellia bogongensis Elix, sp. nov. Fig. 1
Sicut *Buellia mexicana* sed hypothecio brunneus, medulla amyloideus et ascosporis angustioribus differt.

Type: Australia. *Victoria*: Alpine National Park, Mt McKay, Bogong High Plains, 16 km SSE of Mt Beauty, 36°52′S, 147°14′E, 1840 m, on exposed gneiss boulders in exposed subalpine grassland, *J.A. Elix 40609 & H. Streimann* 18.ii.1994 (CANB – holotype).

Thallus crustose, thin to moderately thick, ±continuous, epilithic, areolate, whitish to grey-white or grey, up to 4 cm wide and 0.8 mm thick; hypothallus conspicuous, black, surrounding the thallus, *c.* 0.2 mm wide, also growing among the areoles; upper surface shiny or matt, epruinose, phenocorticate; areoles 0.2–2.0 mm wide, angular, ±flat; phenocortex 25–30 μm thick; algal layer 75–125 μm thick, algal cells 7–15 μm wide; medulla white, lacking calcium oxalate (H_2SO_4–), 95–400 μm thick, IKI+ intense blue-purple. *Apothecia* lecideine, 0.3–0.6 mm wide, numerous, crowded and agglomerated, round to angular-distorted, immersed within the thallus or among the areoles, level with the thallus or slightly protruding; proper margin thin, black, almost entirely reduced when immersed in the thallus; disc black, epruinose, flat.

Excipulum 50–75 μm thick, *aethalea*-type, differentiated into a broad, greenish black outer part (*cinereorufa*-green, N+ red-violet) and a paler central part which intergrades into the hypothecium. Epihymenium 7–10 μm thick, dark greenish blue to greenish black due to the pigmented caps of paraphyses, K– or weak blue-green, N+ red-violet (*cinereorufa*-green); hymenium not inspersed, 75–100 μm high, colourless in the central part, blue-green in the upper part and brown in the lower part; hypothecium 50–75 μm high, dark brown (*leptoclinoides*-brown, N+ orange-brown). Paraphyses simple to moderately branched, 1.7–2.0 μm wide, with slightly broadened, dark green pigmented caps 2.5–4 μm wide. Asci 8-spored, *Bacidia*-type. *Ascospores* soon brown, submuriform, with 3 transverse septa and usually one longitudinal septum on either side of the median septum, 4–6-celled, elongate-ellipsoid, 15–23 × 7–10 μm. *Pycnidia* not seen.
Chemistry: Cortex K+ yellow, P+ yellow, C–, UV–; medulla K+ yellow then red, P+ orange-red, C–, UV–; containing atranorin (minor), chloroatranorin (minor), norstictic acid (major), connorstictic acid (minor).

Etymology: The specific epithet is derived from the Latin *-ensis* (place of origin) and the type locality in the Bogong High Plains.

Notes: Chemically and anatomically, *B. bogongensis* closely resembles *B. mexicana* J. Steiner (Nordin 2000, Bungartz *et al.* 2007), both being characterized by areolate thalli, immersed and often angular apothecia, *cinereorufa*-green in the epihymenium and excipulum and in containing atranorin, norstictic and connorstictic acids. The two species differ in their medullary reactions with iodine (amyloid in *B. bogongensis* but non-amyloid in *B. mexicana*) and in the colour of the hypothecium (dark brown in *B. bogongensis* but dark blue-green and N+ red-violet in *B. mexicana*). Currently *B. mexicana* is only known from northern Mexico and Arizona (Bungartz *et al.* 2007).

At present *B. bogongensis* is known from only the type collection. Associated species include *Diploschistes scruposus* (Schreb.) Norman, *Lecanora polytropa* (Hoffm.) Rabenh., *Lecidea lapicida* (Ach.) Ach. var. *lapicida*, *L. lygomma* Nyl. ex Cromb., *Parmelia signifera* Nyl., *Rhizocarpon geographicum* (L.) DC., *Tephromela atra* (Huds.) Hafellner, *Toninia bullata* (Meyen & Flot.) Zahlbr., *Tremolechia atrata* (Ach.) Hertel and several *Umbilicaria* species.

Buellia kimberleyana Elix, sp. nov. Fig. 2
Sicut *Buellia spuria* sed superfice ochraceus vel brunneus, medulla nonamyloideus et atranorinum deficiens differt.

Type: Australia. *Western Australia*: Lake Argyle Road, 31 km SE of Kununurra, 15°59′S, 128°56′E, 160 m, on sandstone rocks along escarpment with *Eucalyptus*, *Xanthostemon* and *Buchanania*, *J.A. Elix 27791, H.T. Lumbsch & H. Streimann*, 8.vii.1991 (PERTH – holotype).

Thallus crustose, thin, ±continuous, epilithic, areolate, yellowish grey to ochre or dark brown, up to 3 cm wide and 0.3 mm thick; hypothallus conspicuous or not, black, surrounding the thallus, *c.* 0.2 mm wide, rarely growing among the areoles; upper surface matt, epruinose, phenocorticate; areoles 0.3–0.8 mm wide, angular, ±flat to weakly convex; phenocortex 20–25 μm thick; algal layer 20–25 μm thick; algal cells 7–14 μm wide; medulla white, lacking calcium oxalate (H_2SO_4–), 95–170 μm thick, IKI–. *Apothecia* lecideine, 0.1–0.5 mm wide, scattered, round, immersed then adnate or rarely becoming ±sessile with age; proper margin thin, persistent, rarely excluded with age, black or masked by a necrotic thalline veil; disc brown-black to black, epruinose, flat, rarely becoming slightly convex with age. *Excipulum* 35–65 μm thick, poorly differentiated, *aethalea*-type. Epihymenium 7–20 μm thick, olive-brown due to the pigmented caps of paraphyses, K–, N+ weak red-brown (*elachista*-brown and *cinereorufa*-green); hymenium colourless, not inspersed, 50–55 μm high; hypothecium *c.* 40 μm high, pale brown to reddish brown (*leptoclinoides*-brown). Paraphyses simple

to weakly branched, 1.7–2.5 μm wide, with weakly broadened, brown-pigmented caps to 3.5 μm wide. Asci 8-spored, *Bacidia*-type. *Ascospores* brown, *Buellia*-type, ellipsoid, not constricted at the septum, 10–16 × 4.5–5.5 μm. *Pycnidia* not seen.
Chemistry: Upper surface K+ yellow then red, P+ yellow, C–, UV–; medulla K+ yellow then red, P+ yellow, C–, UV–; containing norstictic acid (major), connorstictic acid (minor).

Etymology: The specific epithet refers to the Kimberley region of Western Australia where the species is common.

Notes: The development of the apothecia in this new species closely resembles that observed in *B. spuria* (Schaer.) Anzi, where the orbicular apothecia are immersed at first but then become sessile with age and have a proper margin commonly masked by the remains of necrotic thalline material (often termed a thalline veil). However, the upper surface is white to grey-white in *B. spuria* and the medulla amyloid, and the cortex contains atranorin, whereas in *B. kimberleyana* the thallus varies from yellow-brown to dark brown, the medulla is non-amyloid and the cortex lacks atranorin. Chemically *B. kimberleyana* is identical to *B. aethalea* (Ach.) Th.Fr., but the apothecia of the latter species are angular to deformed (comma-shaped) and remain immersed rather than being orbicular and becoming sessile as in *B. kimberleyana*, and the ascospores are broader (11–17 × 6–10 μm *versus* 10–16 × 4.5–5.5 μm). Whereas *Buellia aethalea* is a cosmopolitan species known from Europe, North America, South America, southern Africa, Australia and New Zealand (Bungartz *et al.* 2007, Galloway 2007), *B. kimberleyana* seems to be an Australian endemic.

At present this new species is known from a number of localities in the Kimberley region of Western Australia and adjacent areas of the Northern Territory where it is relatively common on sheltered sandstone rocks. Commonly associated species include *Australiaena streimannii* Matzer, H. Mayrhofer & Elix, *Buellia polyxanthonica* Elix, *B. spuria* (Schaer.) Anzi, *Caloplaca leptozona* (Nyl.) Zahlbr., *Dimelaena elevata* Elix, Kalb & Wippel, *D. tenuis* (Müll.Arg.) H. Mayrhofer & Wippel, *Diploschistes actinostomus* (Pers.) Zahlbr., *Lecanora austrosorediosa* (Rambold) Lumbsch, *Lepraria coriensis* (Hue) Sipman, *Parmotrema praesorediosum* (Nyl.) Hale, *Pertusaria remota* A.W.Archer and *Tephromela arafurensis* Rambold.

SPECIMENS EXAMINED
Western Australia: • King Leopold Range, 22 km NE of Lennard River Crossing on the Gibb River Road, 17°15′S, 124°54′E, 150 m, on metamorphic rocks in *Triodia*-dominated grassland, *J.A. Elix 22160, 22162, H. Streimann & D.J. Galloway*, 13.v.1988 (CANB, PERTH); • March Fly Glen, King Leopold Range, 66 km NE of Lennard River Crossing on the Gibb River Road, 17°10′S, 125°18′E, 370 m, on sheltered rocks with SW aspect in small gorge along *Melaleuca*-dominated stream, *J.A. Elix 22229, 22263, H. Streimann & D.J. Galloway*, 14–16.v.1988 (CANB, PERTH); • Along road to Mt Joseph Yard, 25 km E of Lennard River Crossing on the Gibb River Road, 17°23′S, 125°00′E, 100 m, on schistose rocks in *Triodia*-dominated grassland, *J.A. Elix 22286, H. Streimann & D.J. Galloway*, 17.v.1988 (CANB, PERTH); • Lake Argyle Road, 35 km SE of Kununurra, 16°01′S, 128°59′E, 140 m, on sandstone rocks on SW escarpment in savannah scrub with large shrubs, *J.A. Elix 22476, 22477 & H. Streimann*, 22.v.1988 (CANB); • Lake Argyle Road, 31 km SE of Kununurra, 15°59′S, 128°56′E, 160 m, on sandstone rocks along escarpment with *Eucalyptus, Xanthostemon* and *Buchanania*, *J.A. Elix 27792, 27796, 27807, H.T. Lumbsch & H. Streimann*, 8.vii.1991 (CANB); • Gibb River Road, 54 km NNE of Karunjie Station, 15°51′S, 127°25′E, 270 m, on sandstone rocks in *Eucalyptus* woodland, *J.A. Elix 27864, H.T. Lumbsch & H. Streimann*, 10.vii.1991 (CANB); • Gibb River Road, 74 km SW of Wyndham, 15°49′S, 127°31′E, 300 m, on sandstone rocks in *Eucalyptus*-dominated grassland, *J.A. Elix 27885, H.T. Lumbsch & H. Streimann*, 11. vii.1991 (B, CANB); • Jacks Water Hole, Durack River, 55 km NE of Karunjie Station, 15°50′S, 127°25′E, 260 m, on sandstone rocks along escarpment with *Eucalyptus,*

Xanthostemon, Glochidion and *Melaleuca*, *J.A. Elix 27913, H.T. Lumbsch & H. Streimann*, 12.vii.1991 (CANB); • Gibb River Range, Gibb River Road, 38 km NE of Gibb River Station, 16°06′S, 126°36′E, 480 m, on sandstone rocks in *Eucalyptus*-dominated grassland, *J.A. Elix 27932, H.T. Lumbsch & H. Streimann*, 13.vii.1991 (B, CANB); • King Edward River, 54 km NNW of King Edward River Station (Doongan Station), 14°54′S, 126°12′E, 280 m, on sandstone rocks in *Eucalyptus-dominated* grassland, *J.A. Elix 27961, 27969, H.T. Lumbsch & H. Streimann*, 14.vii.1991 (CANB); • Gibb River Road, 18 km W of Ellenbrae Station, 15°58′S, 126°54′E, 380 m, on sandstone rocks in *Eucalyptus*-dominated grassland, *J.A. Elix 28044, 28055, H.T. Lumbsch & H. Streimann*, 16.vii.1991 (B, CANB); • Gibb River Road, 45 km SSE of Wyndham, 15°53′S, 128°14′E, 140 m, on sandstone rocks in *Eucalyptus*-dominated grassland, *J.A. Elix 28071, H.T. Lumbsch & H. Streimann*, 16.vii.1991 (B, CANB).
Northern Territory: • Native Gap, Hann Range, 114 km N of Alice Springs, 22°49′S, 133°25′E, 700 m, on protected rock ledge with S aspect, *J.A. Elix 11196 & L. Craven*, 12.ix.1983 (CANB); • Pinkerton Range, Bullo River Road, 16 km NW of West Baines River Crossing on Victoria Highway, 15°49′S, 129°40′E, 200 m, on sheltered rocks on top of escarpment, *J.A. Elix 22069 & H. Streimann*, 9.v.1988 (CANB); • Victoria Highway, 37 km NE of Willaroo Homestead, between Timber Creek and Katherine, 15°01′S, 131°47′E, 200 m, on lateritic rocks on escarpment in dry sclerophyll forest, *J.A. Elix 22504 & H. Streimann*, 23.v.1988 (CANB).

Buellia psoromica Elix, sp. nov. Fig. 3
Sicut *Buellia spuria* sed ascosporis latioribus et acidum psoromicum, acidum subpsoromicum et acidum 2′-*O*-demethylpsoromicum continente differt.

Type: Australia. *Western Australia*: Beverley–Mawson road, 26 km NE of Beverley, 32°00′29″S, 117°08′38″E, 270 m, on laterite rocks in remnant *Eucalyptus* woodland, *J.A. Elix 31780*, 22.iv.2004 (PERTH — holotype).

Thallus crustose, thin, ±continuous, epilithic, areolate, whitish to grey-white or grey, up to 5 cm wide and 0.4 mm thick; hypothallus conspicuous, black, surrounding the thallus, *c.* 0.2 mm wide, also ±growing among the areoles; upper surface shiny or matt, epruinose, phenocorticate; areoles 0.3–1.1 mm wide, angular, ±flat to weakly convex; phenocortex 20–25 μm thick; algal layer 20–25 μm thick; algal cells 5–13 μm wide; medulla white, lacking calcium oxalate (H_2SO_4–), 95–110 μm thick, IKI+ intense purple. *Apothecia* lecideine, 0.2–0.6 mm wide, numerous, round, immersed to adnate or rarely becoming ±sessile with age; proper margin thin, persistent, rarely excluded with age, black or masked by a necrotic thalline veil; disc black, epruinose, flat, rarely becoming slightly convex with age. *Excipulum* 45–55 μm thick, poorly differentiated, *aethalea*-type. Epihymenium 7–10 μm thick, dark greenish due to the pigmented caps of paraphyses, K–, N+ red-violet (*cinereorufa*-green); hymenium colourless, not inspersed, 35–45 μm high; hypothecium *c.* 50 μm high, reddish brown (*leptoclinoides*-brown). Paraphyses simple to weakly branched, 1.7–2.5 μm wide, with distinctly broadened, dark green-pigmented caps to 5 μm wide. Asci 8-spored, *Bacidia*-type. *Ascospores* brown, with apical wall thickenings when young, ellipsoid, ±constricted at the septum, 11–16 × 6–9 μm. *Pycnidia* not seen.
Chemistry: Cortex K+ yellow, P+ yellow, C–, UV–; medulla K–, P+ yellow, C–, UV–; containing psoromic acid (major), atranorin (major or minor), chloroatranorin (minor), 2′-*O*-demethylpsoromic acid (minor), subpsoromic acid (trace).

Etymology: The specific epithet refers to the presence of psoromic acid in this species.

Notes: Morphologically this new species closely resembles *B. spuria*, in that both are characterized by whitish to grey-white thalli, a conspicuous black hypothallus, an amyloid medulla, cortical atranorin and a dark green-pigmented epihymenium (*cinereorufa*-green) and a reddish brown hypothecium (*leptoclinoides*-brown). *Buellia spuria* differs in having somewhat narrower ascospores (9–15 × 5–7 μm *versus* 11–16 ×

6–9 μm), and in containing stictic acid as a major secondary metabolite. Whereas *Buellia spuria* is a cosmopolitan species known from Europe, North America, South America, southern Africa, Australia and New Zealand (Bungartz *et al.* 2007, Galloway 2007), *B. psoromica* seems to be an Australian endemic.

At present, this new species is known from Western Australia, Northern Territory and the Australian Capital Territory where it is uncommon on various siliceous rocks. Associated species include *Buellia substellulans* Zahlbr., *Caloplaca cinnabarina* (Ach.) Zahlbr., *Diploschistes thunbergianus* Lumbsch & Vězda, *Lecanora farinacea* Fée, *L. pseudistera* Nyl., *Lecidea capensis* Zahlbr., *Paraporpidia leptocarpa* (C.Bab. & Mitt.) Rambold & Hertel, *Ramboldia petraeoides* (Nyl. ex C.Bab. & Mitt.) Kantvilas & Elix, *Xanthoparmelia subprolixa* (Nyl. ex Kremp.) O.Blanco, Crespo, D.Hawksw., Lumbsch & Elix, *X. taractica* (Kremp.) Hale and *X. tasmanica* (Hook.f. & Taylor) Hale.

SPECIMENS EXAMINED
Australian Capital Territory: • along the Murrumbidgee River, 1 km downstream from Casuarina Sands, 35°19′S, 148°57′E, 530 m, on porphyry boulders on rocky hillside, *J.A. Elix 918 p.p.*, 13.vi.1975 CANB).
Northern Territory: • MacDonnell Range, 1 km N of Glen Helen Tourist Camp near Alice Springs, 24°41′S, 132°41′E, 640 m, on sandstone rocks with a southerly aspect in mulga scrub, *J.A. Elix 11260 & L.A. Craven*, 16.ix.1983 (CANB).

Rinodinella halophila var. **hypostictica** Elix, var. nov. Fig. 4
Sicut *Rinodinella halophila* sed acidum hyposticticum et acidum hyposalazinicum continente differt.

Type: Australia. *New South Wales*: Tuross Heads, 36°04′S, 150°08′E, 1 m, on rocks along the foreshore, *J.A. Elix 2086*, 24.iv.1976 (CANB – holotype).

Thallus crustose, thin to thick, ±continuous, epilithic, areolate, pale fawn to ochre, up to 3 cm wide, 0.3–1.0 mm thick, becoming chinky and then lifting off the substratum; hypothallus not apparent; upper surface matt, epruinose, granular, ±phenocorticate; areoles contiguous or scattered, 0.3–1.0 mm wide, ±subrectangular, flat to convex; algal layer 75–100 μm thick; algal cells 7–15 μm wide; medulla white, calcium oxalate present (H_2SO_4+), 0.2–0.8 mm thick, IKI–. *Apothecia* lecideine, 0.1–0.6 mm wide, numerous, round, immersed but soon adnate to sessile; proper margin thin, persistent, rarely excluded with age, black; disc black, epruinose, flat or concave. *Excipulum* 50–70 μm thick, well-defined, not distinctly differentiated into an inner and outer part, dull black-brown throughout, becoming ±carbonized, *aethalea*-type. Epihymenium dark olive-green to brown due to the pigmented caps of paraphyses, 5–10 μm thick, K–, N+ purple-brown (*cinereorufa*-green); hymenium colourless, not inspersed, 45–60 μm high; hypothecium *c.* 50 μm high, medium brown to reddish brown (*leptoclinoides*-brown). Paraphyses simple to moderately branched, *c.* 2 μm wide, with distinctly broadened, brown-pigmented caps to 5–6 μm wide. Asci 8-spored, *Bacidia*-type. *Ascospores* olive-grey to brown, ellipsoid, *Rinodinella*-type, ±constricted at the septum, 10–15 × 5–8 μm. *Pycnidia* not seen.
Chemistry: Cortex K–, P–, C–, UV–; medulla K+ weak yellow then pale red, P–, C–, UV–; containing hypostictic acid (major), hyposalazinic acid (minor or trace).

Etymology: The varietal name derives from the occurrence of hypostictic acid in this taxon.

Notes: This taxon is characterized by the areolate, pale fawn to ochre thallus which ultimately becomes chinky and flakes off the substratum, the dark olive-green pigmented epihymenium that reacts N+ purple-brown (due to the *cinereorufa*-green pigment), the non-amyloid medulla containing calcium oxalate, the *Rinodinella*-type ascospores and the presence of hypostictic and hyposalazinic acids. This new variety is morphologically identical to *R. halophila* (Müll.Arg.) H.Mayrhofer var. *halophila*, but the latter differs chemically in containing norstictic and connorstictic acids (Mayrhofer 1984a, b).

At present, *R. halophila* var. *hypostictica* is known from several coastal localities in New South Wales where it occurs on siliceous littoral rocks just above the high tide zone. Commonly associated species include *Buellia aeruginosa* A.Nordin, Owe-Larsson & Elix, *Caloplaca bermaguiana* S.Kondr. & Kärnefelt, *C. kiamae* S.Kondr. & Kärnefelt, *C. rexfilsonii* S.Kondr. & Kärnefelt, *Rinodina blastidiata* Matzer & H.Mayrhofer, *R. cacaotina* Zahlbr., *Parmotrema reticulatum* (Taylor) Hale, *Pertusaria xanthoplaca* Müll.Arg., *Rinodinella halophila* var. *halophila*, *Tylothallia pahiensis* (Zahlbr.) Hertel & Kilias, *Xanthoparmelia scabrosa* (Taylor) Hale and *Xanthoria ligulata* (Körb.) P.James.

SPECIMEN EXAMINED
New South Wales: • Broken Head Beach, Cocked Hat Rock, *c.* 5 km S of Byron Bay, 28°42′S, 153°37′E, 0–10 m, on coastal siliceous rocks in xeric supralittoral zone, *H.T. Lumbsch 11017a & A. Dickhäuser*, 26.x.1994 (CANB).

New State and Territory Records

1. **Buellia aethalea** (Ach.) Th.Fr., *Lichenogr. Scand.* **2**, 604 (1874)
This species has been reported from Europe, North America, New Zealand, and Antarctica (Bungartz *et al.* 2007, Galloway 2007), and in Australia from Queensland (McCarthy 2009).

SPECIMENS EXAMINED
Western Australia: • Kalbarri National Park, Murchison River Gorge, Hawkshead Lookout, 42.5 km ENE of Kalbarri township, 27°47′20″S, 114°28′05″E, 150 m, on sandstone above rocky gorge with dwarf *Eucalyptus* and *Acacia*, *J.A. Elix 33737*, 3.v.2004 (CANB).
New South Wales: • Goobang National Park, Ten Mile Creek, 1.5 km SSW of Gingham Gap, on sandstone in *Eucalyptus-Callitris* woodland, *J.A. Elix 39357*, 4.viii.2008 (CANB).
South Australia: • Kangaroo Island, Scotts Cove Lookout, 3 km E of Cape Borda, on quartz rocks in cliff-top heath, *J.A. Elix 19724 & L.H. Elix*, 29.x.1985 (CANB).

2. **Buellia halonia** (Ach.) Tuck., *Lich. Californ.*, 26 (1866)
This species was previously known from North America, South America, and South Africa, and in Australia from South Australia (Bungartz *et al.* 2004, Bungartz *et al.* 2007).

SPECIMENS EXAMINED
New South Wales: • South Coast, Merimbula, 36°53′S, 149°54′E, 2 m, on rocks along foreshore, *J.A. Elix 238*, 12.v.1974 (CANB); • Camel Rock, 5 km N of Bermagui, 2 m, on rocks on seaside cliffs, *J.A. Elix 4569*, 4.iii.1978 (CANB); • Burrewarra Point, 13 km S of Batemans Bay, 35°50′S, 150°14′E, 1 m, on rocks along foreshore, *J.A. Elix 9142*, 5.x.1981 (CANB).

3. **Buellia mamillana** (Tuck.) W.A.Weber, *Mycotaxon* **27**, 493 (1986)
Synonym: *Buellia australica* Räsänen, *Ann. Bot. Soc. Zool.-Bot. Fenn. "Vanamo"* **20**, 14 (1944) *fide* Bungartz *et al.* (2007).
This species was previously known from North, Central and South America, and South Africa, and in Australia from Queensland and Norfolk Island (Bungartz *et al.* 2004, Bungartz *et al.* 2007, Elix 2008).

SPECIMENS EXAMINED
Northern Territory: • Wangi Falls, Litchfield National Park, 74 km SW of Batchelor, 13°09′48″S, 130°41′00″E, 60 m, on sandstone in monsoon forest at foot of falls, *J.A. Elix 38028*, 5.viii.2005 (CANB); • Tabletop Range, Litchfield National Park, 56 km SW of Batchelor, 13°11′54″S, 130°42′48″E, 140 m, on sandstone on rocky plateau with

Eucalyptus, Terminalia, Ficus and *Calytrix*, *J.A. Elix 38713*, 6.viii.2005 (CANB); • Umbrawarra Gorge, 22 km SW of Pine Creek, 13°57′56″S, 131°41′52″E, 210 m, on sheltered sandstone crevice in steep-sided rocky gorge, *J.A. Elix 38851*, 8.viii.2005 (CANB).
New South Wales: • Grassy Head, 5 km N of Stuarts Point, 30°48′S, 153°00′E, 6 m, on exposed coastal rocks, *J.A. Elix 21819A*, 24.i.1988 (CANB).

4. **Buellia marginulata** (Müll.Arg.) Zahlbr., *Cat. Lich. Univ.* **7**, 464 (1931)
This endemic species was previously known from South Australia and Western Australia (McCarthy 2009).

SPECIMENS EXAMINED
Northern Territory: • MacDonnell Ranges, Wigleys Waterhole, 22 km N of Alice Springs, 23°37′S, 133°54′E, 620 m, on granite rocks on arid, grassy ridge with a southerly aspect, *J.A. Elix 11137& L.A. Craven*, 11.ix.1983 (CANB); • MacDonnell Ranges, along the Stuart Highway, 10 km N of Alice Springs, 23°37′S, 133°53′E, 820 m, on granite rocks in mulga scrub, *J.A. Elix 11344 & L.A. Craven*, 18.ix.1983 (CANB).

5. **Buellia spuria** (Schaer.) Anzi var. **amblyogona** (Müll.Arg.) Elix, comb. nov.
Basionym: *Buellia amblyogona* Müll.Arg., *Bull. Herb. Boissier* **3**, 641 (1895)
Type: Australia. *Queensland*: Thursday Island, *C. Knight s.n.* (G! – holotype).

Previously this taxon was included in *B. spuria sens. lat.* as the norstictic acid-containing race (Bungartz *et al.* 2007). However, in Australia *B. spuria sens. str.* (containing stictic acid) has a different distribution, and the two taxa are given varietal status here.

SPECIMENS EXAMINED
Western Australia: • Lake Argyle Road, 35 km SE of Kununurra, 16°01′S, 128°59′E, 140 m, on sandstone rocks on SW escarpment in savannah scrub with large shrubs, *J.A. Elix 22470 & H. Streimann*, 22.v.1988 (CANB); • Lake Argyle Road, 31 km SE of Kununurra, 15°59′S, 128°56′E, 160 m, on sandstone rocks along escarpment with *Eucalyptus, Xanthostemon* and *Buchanania*, *J.A. Elix 27800, H.T. Lumbsch & H. Streimann*, 8.vii.1991 (CANB).
Northern Territory: • Surprise Creek Falls, Litchfield National Park, 17 km N of Daly River Road, 13°24′17″S, 130°47′06″E, 210 m, on sandstone above remnant monsoon forest at head of falls, *J.A. Elix 39255*, 9.viii.2005 (CANB).
New South Wales: • Bare Bluff, 20 km N of Coffs Harbour, 30°09′S, 153°12′E, 4 m, on coastal rocks, *J.A. Elix 3538, 3539*, 1.vii.1977 (CANB).

6. **Buellia spuria** (Schaer.) Anzi var. **spuria**, *Cat. Lich. Sondr.*: 87 (1860)
Synonyms:
Buellia krempelhuberi Zahlbr., *Cat. Lich. Univ.* **7**, 374 (1931)
= *Lecidea exilis* Kremp.
= *Buellia exilis* (Kremp.) Müll.Arg., *Flora* 70, 61 (1887) [*nom. illegit.*] *fide* Bungartz *et al.* (2007).
Buellia lactea (A. Massal.) Körb., *Parerga Lichenol.*, 183 (1860) *fide* Bungartz *et al.* (2007).

In Australia, this cosmopolitan species was previously reported from Queensland, South Australia and Western Australia (Bungartz *et al.* 2007, McCarthy 2009).

SPECIMENS EXAMINED
Northern Territory: • Umbrawarra Gorge, 22 km SW of Pine Creek, 13°57′56″S, 131°41′52″E, 210 m, on sheltered sandstone crevice in steep-sided rocky gorge, *J.A. Elix 38848, 38866, 38871*, 8.viii.2005 (CANB).

7. **Buellia vioxanthina** Elix, *Australas. Lichenol.* **64**: 32 (2009)
This Australian endemic was previously reported from Queensland and the Northern Territory (Elix 2009a).

SPECIMEN EXAMINED
Western Australia: • King Edward River, 54 km NNW of King Edward River Station (Doongan Station), 14°54′S, 126°12′E, 280 m, on sandstone rocks in *Eucalyptus*-dominated grassland, *J.A. Elix 27958, H.T. Lumbsch & H. Streimann*, 14.vii.1991 (CANB).

8. **Rinodinella halophila** (Müll.Arg.) H.Mayrhofer var. **halophila**, *Lichenologist* **12**, 301 (1980)
This species was previously known from southern Africa, and in Australia from Victoria and South Australia (Mayrhofer 1984, McCarthy 2009).

SPECIMEN EXAMINED
New South Wales: • Baragoot Point, 3.5 km S of Bermagui, 36°27′S, 150°04′E, 6 m, on rock and soil of coastal headland, *J.A. Elix 4586*, 4.iii.1978 (CANB); • Bermagui Bay, 36°24′S, 150°04′E, 2 m, on rock of coastal headland, *J.A. Elix 28824*, 22.vi.2005 (CANB).

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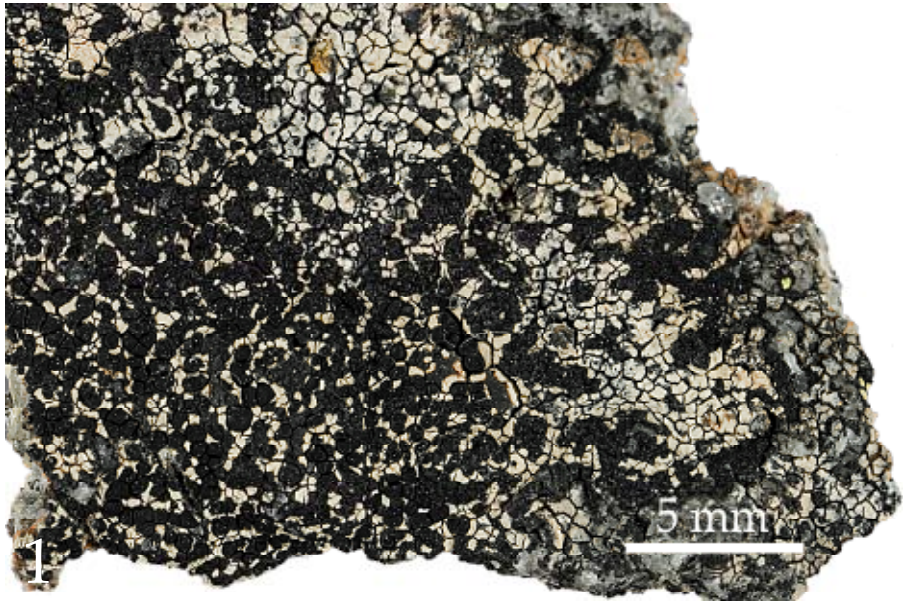


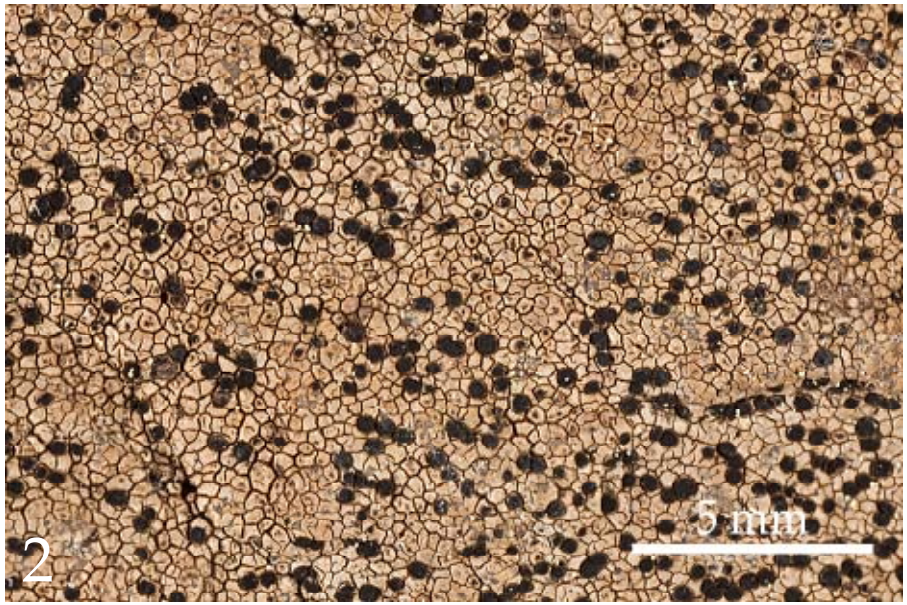
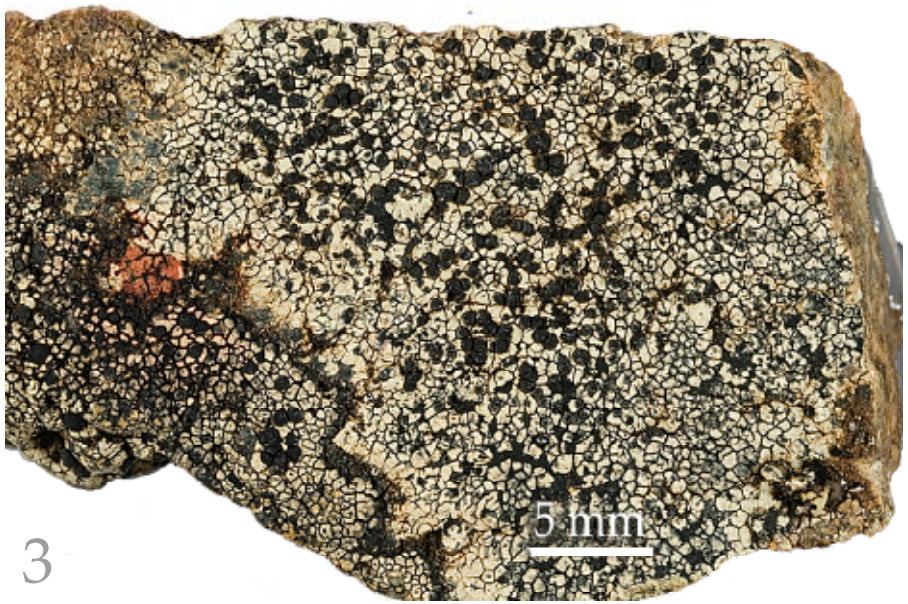
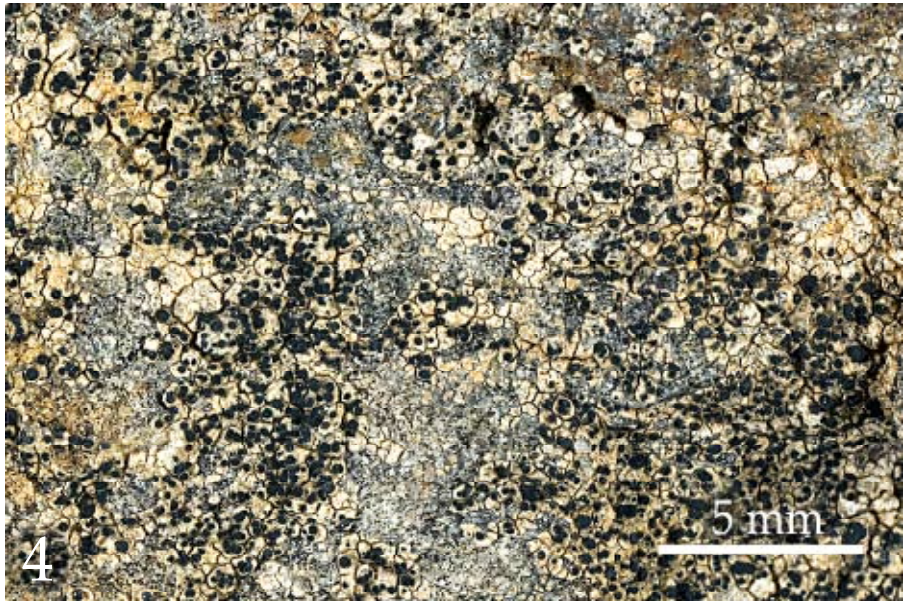


Fig. 1. *Buellia bogongensis* (holotype in CANB); Fig. 2. *Buellia kimberleyana* (*J.A. Elix 27864* in CANB)





3. *Buellia psoromica* (*J.A. Elix 918 p.p.* in CANB); 4. *Rinodinella halophila* var. *hypostictica* (holotype in CANB).