

Observations on some calcicolous species of *Lecania* A.Massal. (lichenised Ascomycetes: Ramalinaceae) in southern Australia

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Abstract

Four species of *Lecania* A.Massal. occurring on calcareous substrata in southern Australia are treated. *Lecania maritima* Kantvilas & van den Boom is described as new to science and is recorded from Kangaroo Island and Flinders Island. *Lecania polycarpa* (Müll.Arg.) Kantvilas & van den Boom, comb. nov., is an Australian endemic, known from Kangaroo Island, Flinders Island and the Victorian coast. Two further species are widely distributed, chiefly in temperate areas of the world: *L. inundata* (Hepp ex Körb.) M.Mayrhofer and *L. turicensis* (Hepp) Müll.Arg. are both reported for Tasmania for the first time; the former is also a new record for Victoria. The salient features of these four taxa are compared.

Keywords: biodiversity, *Catillaria*, lichens, new taxa, Kangaroo Island, Tasmania, Victoria.

Introduction

This paper continues the investigation of the lichens of Kangaroo Island in anticipation of a checklist for the island; earlier contributions to this project include Elix & Kantvilas (2013a, b), Kantvilas & Elix (2014), Kantvilas & Kondratyuk (2013), Kantvilas & van den Boom (2013), Kantvilas & Wedin (2015) and McCarthy & Kantvilas (2013a, b). This paper deals with *Lecania* A.Massal., a genus of crustose lichens in the family Ramalinaceae that contains about 40 described species (Kirk et al. 2001), including eight that have been recorded for Australia (McCarthy 2015).

Lecania is characterised by a green, coccoid photobiont, biatorine to lecanorine apothecia, *Bacidia*-type asci and hyaline, non-halonate, ± ellipsoid, trans-septate ascospores. Identification and delimitation of species of *Lecania* is generally regarded as difficult (Fletcher et al. 2009), especially due to highly variable attributes of the thallus and apothecial margin. As a result of this last feature in particular, species can be confused with the unrelated genus *Catillaria* A.Massal., which shares with *Lecania* 1-septate, hyaline ascospores, but has different excipular and hymenial anatomy, including markedly different asci (*Catillaria*-type; Hafellner 1984). There are several regional, Northern Hemisphere treatments of the genus (e.g. Mayrhofer 1988, Fletcher et al. 2009, van den Boom & Ryan 2004) that greatly assist in the identification of Australian collections. A synopsis of the species recorded for Australia has also been published (van den Boom & Mayrhofer 2007).

Species of *Lecania* are found mostly in temperate to subtropical latitudes and occur on a wide range of

substrata, including rocks, bark, wood, soil, shell or bone fragments, and man-made materials such as concrete. Four calcicolous, Australian taxa are documented in the present study.

Methods

The study is based chiefly on collections of the first author, housed in the Tasmanian Herbarium (HO) with duplicates distributed to the State Herbarium of South Australia (AD), the Australian National Herbarium (CANB), herb. van den Boom (Netherlands) and elsewhere, and on comparison with herbarium material from the Northern Hemisphere. The descriptions are based exclusively on the Australian material studied, and significant deviations from existing descriptions (essentially from Northern Hemisphere studies) are highlighted. Hand-cut sections of the thallus and ascocmata were mounted in water, 15% KOH (K), Lugols Iodine after pretreatment with K (IKI), ammoniacal erythrosin and 50% HNO₃ (N) for examination by high-power light microscopy. Dimensions of asci and ascospores are based on 20 and at least 50 observations respectively. The latter are presented in the format: 5th percentile–average–95th percentile; outlying extreme values are given in parentheses. Nomenclature of asci follows Hafellner (1984); that of pigments follows Meyer & Printzen (2000).

Taxonomy

1. *Lecania inundata* (Hepp ex Körb.) M.Mayrhofer

Biblioth. Lichenol. 28: 66 (1988).

Thallus crustose, areolate, often minutely papillate,

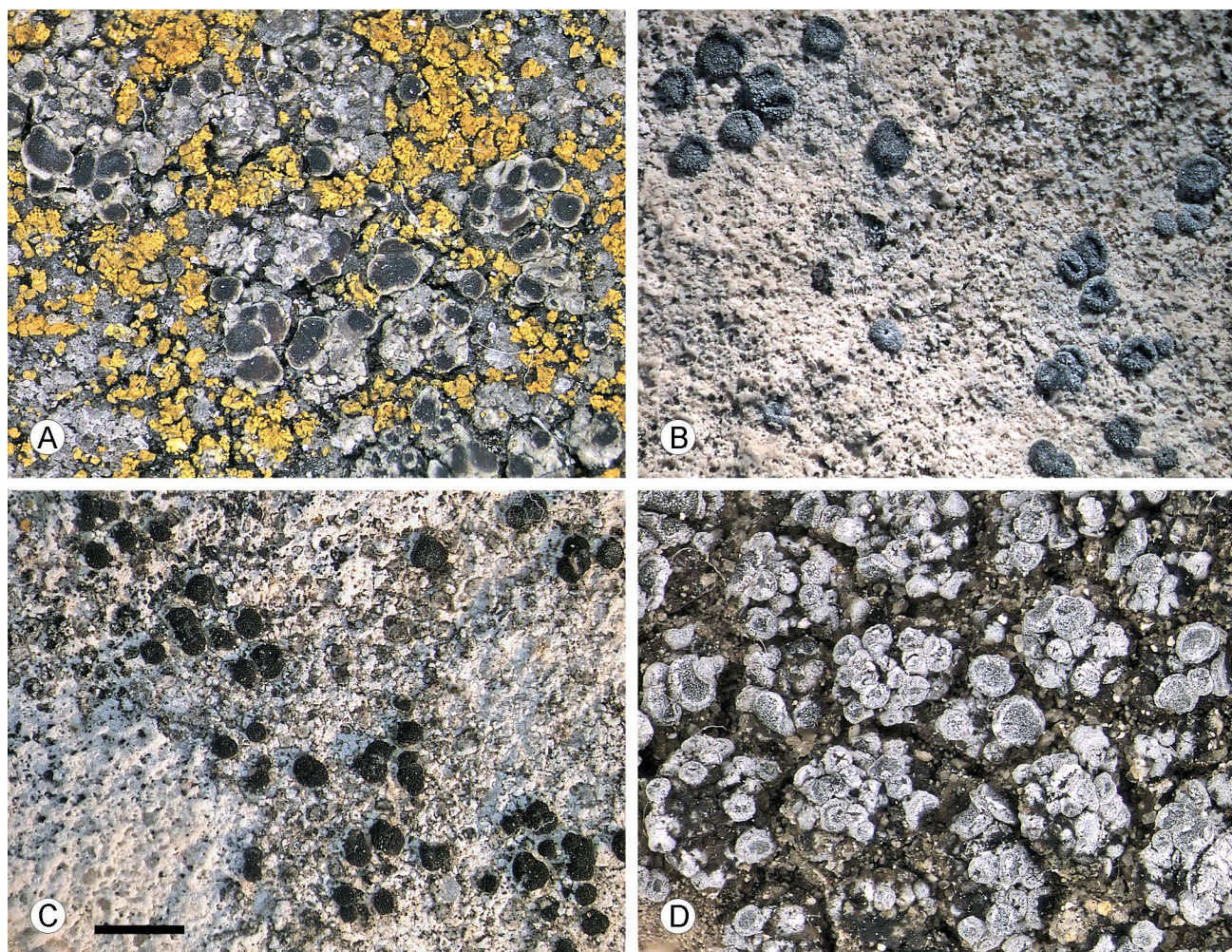


Fig. 1. Habit of calcicolous *Lecania* species. **A** *L. inundata* (Kantvilas 270/13); **B** *L. maritima* (holotype, Kantvilas 281/13); **C** *L. polycarpa* (Kantvilas 307/13); **D** *L. turicensis* (Kantvilas 304/13). — Scale: 1 mm.

yellowish brown to grey-brown or dark brown, epruinose, not delimited by a prothallus; individual areoles contiguous or dispersed, loosely attached to the substratum, to 0.6 mm thick, with a cortex to c. 50 μ m thick, sometimes becoming granular, rarely very sparse and the thallus then dominated by apothecia; photobiont cells broadly ellipsoid to \pm globose, 7–23 \times 5–20 μ m. *Apothecia* lecanorine, superficial, basally constricted, to 0.8 mm diam., typically very numerous, scattered or crowded together and \pm obscuring the thallus; disc pale brown, orange-brown to dark brown, sometimes mottled, rarely grey-pruinose, plane at first, soon becoming convex; thalline excipulum pale grey to pale grey-brown, entire, crenulate or radially fissured, epruinose, becoming inapparent and excluded in more convex apothecia, in section (40–) 70–100 μ m thick, cupular, densely packed with photobiont cells, usually with a hyaline outer layer 10–20 μ m thick, becoming reflexed in more convex apothecia. *Hypothecium* 50–80 μ m thick, hyaline to pale yellowish, not inspersed. *Hymenium* 55–70 μ m thick, hyaline, not inspersed, overlain with an orange-brown to purple-brown epihymenial layer to 10–20 μ m thick, K–, N \pm orange-

brown. *Asci* 8-spored, 40–50 \times 12–15 μ m, clavate, of the *Bacidia*-type, with a prominent amyloid tholus and a conical, weakly amyloid masse axiale; ocular chamber lacking or weakly developed. *Paraphyses* simple, 2.5–3 μ m wide; most apices prominently enlarged to 3–7 μ m, with the terminal cells coated with pigment. *Ascospores* ellipsoid, hyaline, thin-walled, non-halonate, (10–) 11–13.6–17 (–19) \times (4–) 4.5–5.2–6 (–7) μ m, (0–) 1-septate. *Pycnidia* not found. *Chemistry*: no substances detected by t.l.c. **Fig. 1A, 2C.**

Remarks. *Lecania inundata* is widely distributed in the Northern Hemisphere [for example, see Fletcher et al. (2009) and van den Boom & Ryan (2004), who also provide descriptions]. In Australia, van den Boom & Mayrhofer (2007) record this species for South Australia and New South Wales; it is recorded here for Tasmania and Victoria for the first time. It is characterised by a pale greyish or brownish, areolate, rather nodular, epruinose thallus with minute papillae, and by the usually clustered, epruinose apothecia that are initially lecanorine but at length become strongly convex and with an excluded margin. The individual papillae are

Table 1. Comparison of salient features of calcicolous *Lecania* species.

	<i>L. inundata</i>	<i>L. maritima</i>	<i>L. polycarpa</i>	<i>L. turicensis</i>
thallus	areolate, minutely papillate, yellowish brown to grey-brown, epruinose	endolithic, inapparent	endolithic, inapparent	granular-areolate, grey to brown, pruinose
apothecia	lecanorine, to 0.8 mm diam.	biatorine, to 0.8 mm diam.	biatorine, to 0.6 mm diam.	lecanorine, to 1 mm diam.
apothecial margin	pale greyish, epruinose, 40–100 µm thick, becoming excluded	black, pruinose, 50–80 µm thick, opaque in section, persistent	black, mostly epruinose, 30–80 µm thick, translucent in section, becoming excluded	grey-brown, pruinose, 70–100 µm thick, persistent or becoming excluded
apothecial disc	pale to dark brown, rarely pruinose	black, pruinose	black to brown-black, mostly epruinose	red-brown to dark brown, pruinose
ascospores	10–19 × 4–7 µm, (0–) 1-septate	10–16 × 4.5–6 µm, (0–) 1-septate	10–15 × 4–6 µm, (0–) 1-septate	10–20 × 4–6 µm, (0–) 1-septate

larger than blastidia, have a smooth upper surface and well-developed, algal-free zone that can in part be transformed into a layer of dead cells (Mayrhofer 1988). There are several related or at least superficially similar species with which it can be confused, as discussed by Fletcher et al. (2009) and van den Boom & Ryan (2004) in their accounts of the genus in Britain and North America, respectively. Of these, two have been recorded for Australia (van den Boom & Mayrhofer 2007): *L. erysibe* (Ach.) Mudd, which differs from *L. inundata* by its blastidiate thallus, and *L. rabenhorstii* (Hepp) Arnold, which has a thallus of smooth areoles. When poorly developed, these three taxa can be difficult to distinguish. Salient features that distinguish *L. inundata* from the other species studied are summarised in Table 1.

Lecania inundata grows on naturally-occurring or man-made calcareous substrata including concrete, mortar and asbestos tiles, as well as on more acidic rocks in nutrient-enriched habitats. Some of the specimens studied here (*Kantvilas* 270/13, 333/13) are from coastal sites affected by eutrophication from birds. Others are from old concrete in urban areas (*Kantvilas* 161/98, *Stajsic* 6203). The species with which the specimens studied were associated included typical calciphiles or nitrophiles, including *Buellia albula* (Nyl.) Müll.Arg., *Caloplaca cranfieldii* S.Y.Kondr. & Kärnefelt, *C. mereschkowskiana* S.Y.Kondr. & Kärnefelt, *Candelariella aurella* (Hoffm.) Zahlbr., *Lecanora dispersa* (Pers.) Sommerf., *Physcia adscendens* (Fr.) H.Olivier, *Rinodina williamsii* H.Mayrhofer and *Xanthoria ligulata* (Körb.) P.James. Although the type collection of this species comes from inundated granite blocks along the Neckar River (Germany), *L. inundata* is predominantly a species of drier habitats.

Specimens examined:

SOUTH AUSTRALIA. **Kangaroo Island:** northern end of Antechamber Bay, 35°46'S 138°04'E, 5 m alt., 22 Sep. 2013, *G. Kantvilas* 270/13 (herb. v.d. Boom, HO); the old Cannery, American R., c. 1 km SW of Ballast Head, 35°46'S 137°48'E,

2 m alt., 14 Sep. 2013, *G. Kantvilas* 333/13 & *B. de Villiers* (herb. v.d. Boom, HO).

TASMANIA. Cascades, Hobart, 42°54'S 147°17'E, 130 m alt., 6 Sep. 1998, *G. Kantvilas* 161/98 (herb. v.d. Boom, HO); Maria Island, Fossil Cliffs, 42°34'S 148°05'E, 5 m alt., 15 May 2000, *G. Kantvilas* 189/00 (herb. v.d. Boom, HO).

VICTORIA. South Yarra, Royal Botanic Gardens, 37°49' 52"S 144°58'37"E, 28 June 2011, *V. Stajsic* 6203 (HO, MEL).

NEW SOUTH WALES: Sydney, Aug. 1988, *J. MacDonald* s.n. (HO).

2. *Lecania maritima* Kantvilas & van den Boom, sp. nov.

Thallo endolithico inconspicuoque, apotheciis pruinosis, biatorinis, excipulo proprio persistenti, in sectione opace rubro-brunneo, cellulas algarum destituto, ascis typo Bacidiae pertinentibus et ascosporis uniseptatis, 10–16 µm longis, 4.5–6 µm latis distinguibilis.

Mycobank no.: MB814786

Typus: SOUTH AUSTRALIA. Kangaroo Island, near Pelican Lagoon, summit of hill above the Tiger Simpson memorial, 35°50'S 137°49'E, 60 m alt., on limestone outcrops in pasture, 19 Sep. 2013, *G. Kantvilas* 281/13 (holo: HO; iso: AD, herb. v.d. Boom).

Thallus endolithic, inapparent, undelimited, not causing any discoloration of the substratum, rarely very thin, scurfy and discontinuous, whitish and concolorous with the substratum; photobiont cells globose to ellipsoid, 7–13 × 8–18 µm. *Apothecia* biatorine, superficial, basally constricted, 0.3–0.6 (–0.8) mm diam., scattered; disc black, at first plane to concave, then plane to undulate, sometimes becoming markedly convex, mostly lightly grey-pruinose, rarely epruinose; proper excipulum concolorous with the disc, grey pruinose, inrolled and ± obscuring the disc when young, mostly remaining prominent and persistent through later stages of development, becoming obscure only in very convex apothecia, in section 50–80 µm thick, ± annular but sometimes almost continuous beneath the hymenium, entirely opaque reddish brown at the sides, somewhat paler reddish brown centrally beneath the hymenium, unchanged or somewhat purplish brown

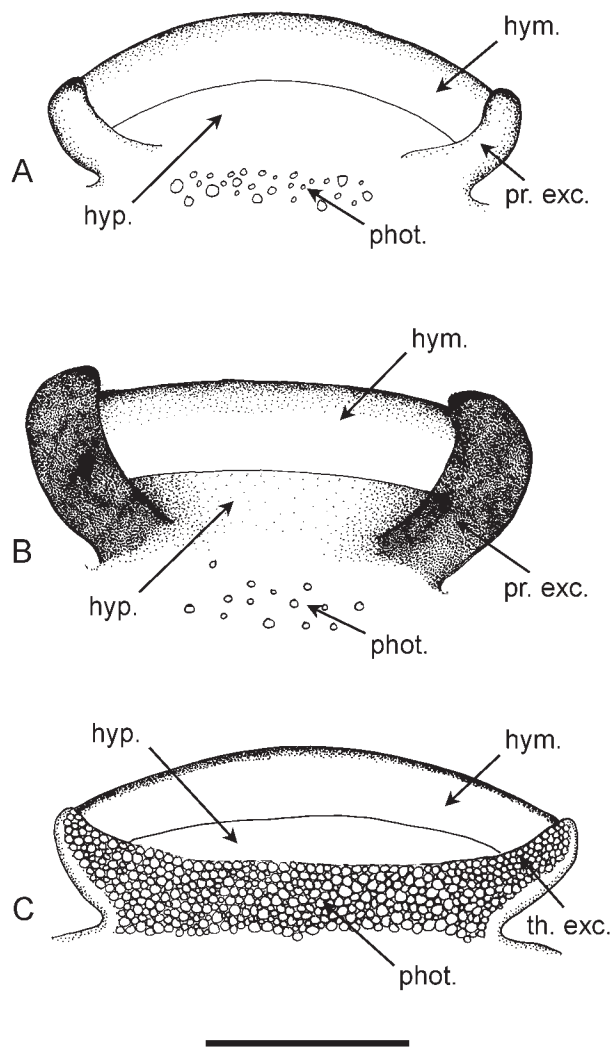


Fig. 2. Anatomy of the apothecia of *Lecania* species (schematic). **A** biatorine (*L. polycarpa*); **B** biatorine and heavily pigmented (*L. maritima*); **C** lecanorine (*L. inundata* and *L. turicensis*). — Scale: 300 μm . Abbreviations: hym.: hymenium; hyp.: hypothecium; phot.: photobiont cells; pr. exc.: proper excipulum; th. exc.: thallose excipulum.

in K, N⁺ orange-brown, composed of a reticulum of highly branched hyphae 2.5–3.5 μm wide, entirely lacking any photobiont cells. *Hypothecium* 20–50 μm thick, poorly differentiated, hyaline or, more often, discoloured at least in part by adjacent excipular and hymenial pigments, occasionally interspersed with scattered oil droplets. *Hymenium* 60–75 μm thick, not interspersed, coherent in water and KOH, mostly hyaline but overlain with an olive-grey epihymenial layer c. 10 μm thick, K⁻, N⁺ rather fleetingly crimson, the coloration often diffusing through the entire hymenium. *Asci* 8-spored, 40–55 \times 10–17 μm , clavate, of the *Bacidia*-type, with a prominent amyloid tholus and a conical, weakly amyloid masse axiale; ocular chamber lacking or weakly developed. *Paraphyses* simple, 1.5–2.5 (–3) μm wide; apices prominently enlarged to 3–6 μm , with

the terminal cells coated with pigment, sometimes also internally pigmented. *Ascospores* ellipsoid, hyaline, thin-walled, non-halonate, 10–12.5–15 (–16) \times 4.5–5.3–6 μm , (0–) 1-septate. *Pycnidia* minute, speck-like, immersed in shallow pits in the substratum; conidia strongly curved, 10–20 \times 1 μm . *Chemistry*: no substances detected by t.l.c. **Fig. 1B, 2B, 3D–F.**

Etymology. The specific epithet alludes to the lowland, coastal habitat of the new taxon.

Remarks. *Lecania maritima* is best characterised by the combination of an inconspicuous, endolithic thallus and biatorine, pruinose apothecia with a mostly persistent proper excipulum that is opaque red-brown in section. It bears many similarities with *L. polycarpa* (Tab. 1), which has a \pm identical thallus and habit but which has an internally hyaline or only dilutely pigmented proper excipulum that becomes excluded early in development. Although overlapping in size, the conidia of *L. polycarpa* are also marginally shorter. With their persistent, prominent margin, the pruinose apothecia of *L. maritima* are also reminiscent of *L. turicensis*, but in that species the apothecial margin is clearly thallose and, when viewed in section, is packed with photobiont cells (Fig. 2C). In contrast, photobiont cells are completely absent from the excipulum of *L. maritima* (and *L. polycarpa*).

The epithelial pigments in these three species also differ. Pigments and their disposition provide a useful taxonomic character in *Lecania* (viz. Mayrhofer 1998), but they have not been formally characterised in the manner of, for example, Meyer & Printzen (2000). The epihymenium of *L. maritima* is olive-grey and reacts N⁺ crimson. This pigment is not the same as the greenish, N⁺ crimson pigments seen in *Megalaria*, *Mycoblastus* and other genera because it has no hint of green, and the N-reaction fades rather quickly. The pigment also occurs in the upper, outer edges of the excipulum. In contrast, *L. turicensis* contains a reddish brown pigment that reacts N⁺ orange-brown. In *L. polycarpa*, the predominant pigment is the same N⁺ orange-brown one as in *L. turicensis*, although traces of the olive *maritima*-pigment can be present as well, because a fleeting, patchy N⁺ crimson reaction can sometimes be observed in addition to the predominant N⁺ orange-brown.

Interpretation of the excipular and hypothecial tissues in this new taxon is somewhat equivocal. In some sections, the opaque excipular layer is continuous or almost so beneath a clearly paler, but rather thin hypothecial layer. In other sections, the central area beneath the hypothecium is a more dilute red-brown, and it can be hard to distinguish a clear boundary between excipulum and hypothecium. The key character for this species, however, namely the opaque excipulum at the sides, is unambiguous.

The new species has been recorded from coastal limestone on Kangaroo Island and Flinders Island. Specimens from the latter locality are included under *L.*

maritima with some reservation. They concur anatomically with the typical Kangaroo Island collections, yet their apothecia tend to be at the larger end of the range (commonly up to 0.8 mm wide, whereas KI specimens rarely exceed 0.6 mm), and epruinose apothecia with a convex disc and a reduced margin are also more common.

On Kangaroo Island, *L. maritima* is locally common on outcrops and large boulders of limestone in rough, stony pasture near the coast, whereas on Flinders Island it was recorded on outcrops in coastal heathland. The species is part of a rich calcicolous association that includes *Buellia albula*, *Caloplaca yorkensis* S.Y.Kondr. & Kärnefelt, *C. johnwhinrayi* S.Y. Kondr. & Kärnefelt, *C. kantvilasii* S.Y.Kondr. & Kärnefelt, *C. mereschowskiana* and *Sarcogyne meridionalis* P.M.McCarthy & Kantvilas. It is common to see orange apothecia of *Caloplaca* species scattered amongst the black apothecia of the *Lecania*.

Specimens examined:

SOUTH AUSTRALIA. **Kangaroo Island:** Stokes Bay, 35°37'S 137°13'E, 60 m alt., 29 Sep. 2013, *G. Kantvilas* 302/13, 303/13 & *B. de Villiers* (AD, herb. v.d. Boom, HO); Red House Bay, 35°49'S 138°06'E, 15 m alt., 17 Sep. 2013, *G. Kantvilas* 310/13 p.p. (HO); Pelican Lagoon, 35°48'S 137°48'E, 20 m alt., 27 Sep. 2012, *G. Kantvilas* 414/12 & *B. de Villiers* (herb. v.d. Boom, HO).

TASMANIA. **Flinders Island:** The Dock, 39°48'S 147°52'E, 10 m alt., 21 Mar. 2014, *G. Kantvilas* 310/14, 306/14 (herb. v.d. Boom, HO); Trousers Point, 40°13'S 148°02'E, 5 m alt., 23 Mar. 2014, *G. Kantvilas* 344/14, 347/14 (CANB, herb. v.d. Boom, HO).

3. *Lecania polycarpa* (Müll.Arg.) Kantvilas & van den Boom, *comb. nov.*

Mycobank no.: MB814787

Patellaria polycarpa Müll.Arg., Bull. Herb. Boissier 1: 48 (1893); *Catillaria polycarpa* (Müll.Arg.) Zahlbr., Catal. Lich. Univ. 4: 63 (1926). — **Type:** Victoria: ad saxa calcarea prope Warnambool, *F.R.M. Wilson* 640 (holo: G!; iso: HO!, MEL, NSW!)

Thallus endolithic, inapparent, undelimited, not causing any discoloration of the substratum; photobiont cells globose to ellipsoid, 7–17 × 6–15 µm. *Apothecia* biatorine, superficial, basally constricted, 0.2–0.6 mm diam., typically very abundant and ± evenly scattered; disc black to brown-black, more rarely brown or piebald when in shade, plane to convex, often very markedly so, epruinose or with a light, rather discontinuous grey pruina; proper excipulum concolorous with the disc, inrolled and crenulate when young but soon becoming inconspicuous and excluded, sometimes pruinose in very young apothecia, in section 30–80 µm thick, annular, brown to reddish brown at the outer edge, colourless or very dilute brownish within, composed of a reticulum of highly branched hyphae 2.5–4 µm wide, entirely lacking any photobiont cells. *Hypothecium* 50–100 µm thick, mostly hyaline or very pale yellowish, occasionally interspersed with scattered oil droplets,

poorly differentiated from the subapothecial medulla. *Hymenium* 55–70 µm thick, hyaline, not interspersed, highly coherent in water and KOH, overlain with a brown to reddish brown epihymenial layer to 10–15 µm thick consisting of the uppermost, pigmented cells of the paraphyses, K– or ± intensifying purplish brown, N+ orange-brown or crimson-orange. *Asci* 8-spored, 40–50 × 11–15 µm, clavate, of the *Bacidia*-type, with a prominent amyloid tholus and a conical, weakly amyloid masse axiale; ocular chamber lacking or weakly developed. *Paraphyses* simple, 1.2–2.5 µm wide; apices prominently enlarged to 3–7 µm wide, with the terminal cells coated with pigment as well as internally pigmented. *Ascospores* ellipsoid, hyaline, thin-walled, non-halonate, 10–12.3–14.5 (–15) × 4–4.9–5.5 (–6) µm, (0–) 1-septate. *Pycnidia* immersed, minute, speck-like, uncommon; conidia strongly curved, 10–12 × 1 µm. **Chemistry:** no substances detected by t.l.c. **Fig. 1C, 2A, 3A–C.**

Remarks. This species is characterised by the numerous black scattered apothecia, at most with a sparse, discontinuous grey pruina, which stand out starkly against the white limestone substratum, the complete lack of any detectable thallus, and, anatomically, by the complete absence of photobiont cells in the apothecial margin (Tab. 1). It is probably best compared to the European *L. sylvestris* (Arnold) Arnold, which was recorded for Australia (W.A.) by van den Boom & Mayrhofer (2007), but which differs by having paler, orange to dark brown apothecial discs and an apothecial margin that contains photobiont cells at the base (Fletcher et al. 2009).

Lecania polycarpa occurs on rather dry, exposed, relatively soft limestone rocks in lowland and coastal areas. Associated species include *Buellia albula*, *Caloplaca yorkensis*, *Placynthium* cf. *nigrum* (Huds.) S.F.Gray and *Sarcogyne meridionalis*. It has been recorded from Victoria (the type), Kangaroo Island and Flinders Island. On Kangaroo Island, it is particularly common on limestone boulders and outcrops in roughly cleared pasture, whereas on Flinders Island it is common on coastal calcarenite. Both habitat types are common across southern Australia, suggesting that this species is likely to be more widely distributed.

Specimens examined:

SOUTH AUSTRALIA. **Kangaroo Island:** Red House Bay, 35°49'S 138°06'E, 15 m alt., 17 Sep. 2013, *G. Kantvilas* 307/13 (AD, herb. v.d. Boom, HO); near Pelican Lagoon, 35°50'S 137°49'E, 60 m alt., 19 Sep. 2013, *G. Kantvilas* 285/13 (herb. v.d. Boom, HO); Point Ellen, 36°00'S 137°11'E, 5 m alt., 26 Sep. 2013, *G. Kantvilas* 215/13 (HO).

TASMANIA. **Flinders Island:** The Dock, 39°48'S 147°52'E, 10 m alt., 21 Mar. 2014, *G. Kantvilas* 304/14, 305/14 (CANB, herb. v.d. Boom, HO); Cave Beach, 40°01'S 147°53'E, 2 m alt., 23 Mar. 2014, *G. Kantvilas* 233/14 (HO); Trousers Point, 40°13'S 148°02'E, 5 m alt., 23 Mar. 2014, *G. Kantvilas* 361/14 (CANB, HO).

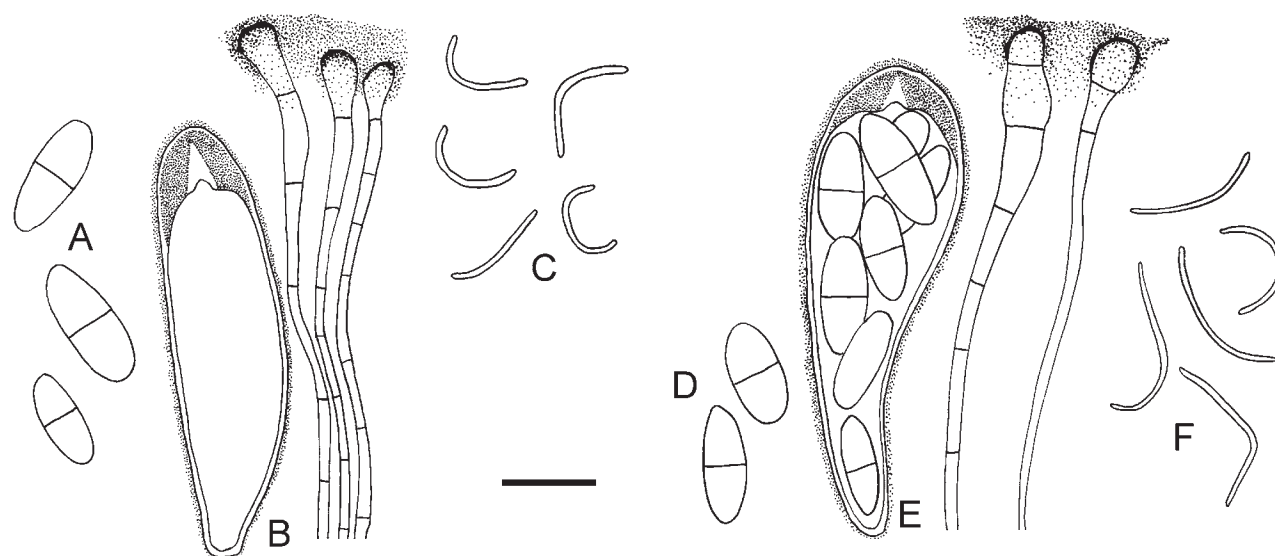


Fig. 3. Ascospores, asci (with amyloid parts stippled), paraphyses and conidia of *Lecania* species. A–C *L. polycarpa* (isotype, F.R.M. Wilson 640, HO); D–F *L. maritima* (holotype, G. Kantvilas 281/13). — Scale: 20 μm .

4. *Lecania turicensis* (Hepp) Müll.Arg.

Mém. Soc. Phys. Hist. Nat. Genève 16: 386 (1862).

Thallus crustose, granular-areolate, often rather gnarled, grey to dull brown, frequently pale grey-pruinose entirely or in patches, undelimited; individual areoles contiguous or dispersed and separated by deep cracks, loosely attached to the substratum, to 0.6 mm thick, with a cortex c. 15–20 μm thick; photobiont cells globose to ellipsoid or oblong, 6–20 \times 5–17 μm . *Apothecia* lecanorine, superficial, basally constricted, 0.3–1 mm diam., typically numerous, crowded together and rather mis-shapen; disc red-brown to dark brown to blackish, commonly grey-pruinose, plane at first, soon becoming undulate to convex; thalline excipulum initially prominent and entire, often grey-pruinose, becoming inapparent and excluded in more convex apothecia, in section 70–100 μm thick, cupular, densely packed with photobiont cells, with a hyaline or reddish brown outer layer, 15–20 μm thick. *Hypothecium* 50–100 μm thick, hyaline, interspersed with scattered oil droplets. *Hymenium* (50–) 55–75 μm thick, hyaline, not interspersed, overlain with a reddish brown epihymenial layer to 10–15 μm thick, K–, N \pm orange-brown. *Asci* 8-spored, 45–55 \times 10–15 μm , clavate, of the *Bacidia*-type, with a prominent amyloid tholus and a conical, weakly amyloid masse axiale; ocular chamber lacking or weakly developed. *Paraphyses* simple, 1.5–2.5 μm wide; apices prominently enlarged to 5–7 μm , with the terminal cells coated with pigment. *Ascospores* ellipsoid, hyaline, thin-walled, non-halonate, (10–) 11.5–14.4–17 (–20) \times (4–) 4.5–5.0–5.5 (–6) μm , 1-septate. *Pycnidia* not seen. *Chemistry*: no substances detected by t.l.c. **Fig. 1D, 2C.**

Remarks. *Lecania turicensis* is a widespread species that has been recorded for most continents and regions of the

world, excluding Antarctica [see Fletcher et al. (2009) and van den Boom & Ryan (2004), who also provide descriptions]. In Australia, van den Boom & Mayrhofer (2007) record this species for South Australia, Western Australia and New South Wales; it is recorded here for Tasmania (Flinders Island) for the first time. It is characterised chiefly by its lecanorine apothecia with greyish-pruinose discs and a pale, grey-pruinose margin (Tab. 1). The species has been reported from a wide range of natural and man-made calcareous substrata. The collections studied here have somewhat longer ascospores than reported in the literature. Northern Hemisphere workers, for example Fletcher et al. (2009), report ascospores 10.5–13 μm long, although these accounts perhaps simply re-iterate the dimensions given by Mayrhofer (1988) in her study of the genus in Europe. An examination of two European specimens found that one (*A. Vězda, Lich. Sel. Exsicc. 2411*) had ascospores of the same dimensions as those of Australian material.

Australian specimens studied occurred on dry limestone outcrops in coastal heathland and roughly cleared pasture. Associated species included such typical calciphiles as *Buellia albula* and a diverse range of *Caloplaca* species, including *C. yorkensis*, *C. johnwhinrayi*, *C. cranfieldii*, *C. kantvilasii* and *C. mereschkowskiana*.

Specimens examined:

SOUTH AUSTRALIA. **Kangaroo Island:** Red House Bay, 35°49'S 138°06'E, 15 m alt., 17 Sep. 2013, *G. Kantvilas 311/13* (herb. v.d. Boom, HO); Cape Willoughby, 35°51'S 138°08'E, 10 m alt., 24 Sep. 2013, *G. Kantvilas 244/13, 245/13* & *B. de Villiers* (AD, herb v.d. Boom, HO); Stokes Bay, 35°37'S 137°13'E, 60 m alt., 29 Sep. 2013, *G. Kantvilas 304/13* & *B. de Villiers* (herb. v.d. Boom, HO); Windmill Bay, 35°51'S 138°07'E, 20 m alt., 17 Sep. 2012, *G. Kantvilas 477/12* (herb. v.d. Boom, HO); Penneshaw near Frenchmans

Rock, 35°43'S 137°57'E, 2 m alt., 30 Sep. 2013, *G. Kantvilas* 193/13 (herb. v.d. Boom, HO).

TASMANIA. **Flinders Island:** Trousers Point, 40°13'S 148°02'E, 5 m alt., 23 Mar. 2014, *G. Kantvilas* 366/14 (CANB, HO).

Acknowledgements

We thank Jean Jarman for the photographs that illustrate this paper, and for preparing the line drawings for publication. Some of the material studied in this project was collected during a Bush Blitz survey co-funded by the Australian Government and BHP Billiton. Laboratory work was supported in part by an Australian Biological Resources Study Tactical Taxonomy Grant to the first author.

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