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A new species of *Solenopsora* from Tasmania

Gintaras KANTVILAS

Abstract: The new species, *Solenopsora tasmanica* Kantvilas, is described and its distinguishing characteristics are discussed. The new species is the first record for the genus for Tasmania and occurs on montane, acidic soils, an unusual habitat for *Solenopsora*. It also contains the compounds brialmontin 1 and brialmontin 2, recorded from *Solenopsora* for the first time.

Key words: brialmontin, *Catillariaceae*, lichens, *Solenopsora*, Tasmania

Introduction

The genus *Solenopsora* A. Massal. comprises approximately 13 published species (Kirk *et al.* 2001), widespread in many regions of the world and typically occurring on rocks and soil in open, sunny habitats. Species of *Solenopsora* display a wide range of thalline and apothecial morphology, ranging from essentially crustose with immersed to emergent apothecia, as for example in *S. candicans* (Dicks.) J. Steiner, to squamulose or small foliose with ± substipitate apothecia, as seen in *S. holophaea* (Mont.) Samp. (=*S. requienii* A. Massal., the type species of the genus). Despite the broad range of gross morphology, all species of *Solenopsora* are united in having eight-spored, *Catillaria*-type asci (that is, with a prominent, amyloid tholus lacking any internal differentiation such as an axial body), simple, rather lax paraphyses with internally brown-pigmented, clavate apices, and hyaline, 1-septate, non-halonate ascospores. On the basis of these anatomical characters, the genus is placed in the family *Catillariaceae* (Verdon & Rambold 1998; Eriksson *et al.* 2003). The delimitation of *Solenopsora* and the related genus *Catillaria* A. Massal. s. str. requires further study; as presently understood, the latter differs chiefly in having an exclusively crustose thallus and apothecia with a proper margin only.

Three species of *Solenopsora* have been recorded from Australasia (McCarthy 2003): the widespread *S. candicans*, recorded from New South Wales, the relatively recently described *S. elixiana* Verdon & Rambold, known from Queensland, La Réunion (Verdon & Rambold 1998) and Taiwan (Aptroot *et al.* 2002), and *S. vulturiensis* A. Massal., recorded from Western Australia (Richardson & Richardson 1982) and also known from Europe and Macaronesia (Purvis & James 1992). In addition, *Haematomma sordidum* Dodge, described from coastal rocks in New Zealand, is regarded by Kalb & Staiger (1995) as a *Solenopsora*, although these authors do not formally propose a new combination. A further species has now been collected at high elevations in Tasmania, and this is described below as new.

Methods

The work is based on collections and field observations made by the author in Tasmania, and on comparative studies of reliably identified reference material held in BM and HO. Anatomical observations and measurements were made on hand-cut sections mounted in water and 10% KOH. Observations of asci were also

G. Kantvilas: Tasmanian Herbarium, Private Bag 4, Hobart, Tasmania 7001, Australia.

conducted on sections mounted in Lugol's Iodine after pretreatment with KOH. Measurements of the size ranges of asci and ascospores given below are based on 30 and 50 observations respectively. The identification of the chemical composition of the new species was undertaken by Prof. J. A. Elix, Canberra, using high-performance liquid chromatography (Feige *et al.* 1993).

Selected reference material examined:

Lecania brialmontii (Vain.) Zahlbr.: **South Shetland Islands:** *Deception Island*: 50 m altitude, 1 i 1991, *W.O. van der Knaap* 96-11 (BM); Goudier Islet, Port Lockroy, 25 m altitude, 28 xii 1944, *I. M. Lamb* (Operation Tamarind 2099) (BM).

Solenopsora cesatii (A. Massal.) Zahlbr. var. *cesatii*: **Jordan:** Ajloun, 31 x 1985, *A. El-Oglah* (BM).

S. elixiana Verdon & Rambold: **Australia:** *Queensland*: Mt Tinbeerwah, 250 m altitude, 4 ix 1993, *J. A. Elix* 35549 (HO).

S. holophaea (Mont.) Samp.: **Spain:** *Canary Islands*: Gran Canaria, 500–600 m altitude, 15 ii 1993, *A. Vězda* (A. Vězda: *Lich. Rar. Exs.* 70) (BM, HO).—**Italy:** *Sardinia*: distr. Cagliari, 950 m altitude, 30 vii 1989, *P. L. Nimis et al.* (A. Vězda: *Lich. Sel. Exs.* 2369) (BM, HO).—**Great Britain:** *Wales*: **V. C. 45** Pembrokeshire, Strumble Head, 20 iv 1973, *P. W. James* (BM).

S. marina (Zahlbr.) Zahlbr.: **Montenegro**: *Petrovac distr.*: 30 m altitude, 12 vii 1968, *A. Vězda* (A. Vězda: *Lich. Sel. Exs.* 710) (BM).

S. montangnei (Fr.) M. Choisy & Werner var. *calcarea* Schaer.: **Israel:** Mt Carmel, 10 xii 1966, *M. Galun* (BM).

S. vulturiensis A. Massal. **France:** *Corsica*: near Coti Chiavari, 100 m altitude, 5 vii 1969, *Y. Rondon & A. Vězda* (A. Vězda: *Lich. Sel. Exs.* 839) (BM).—**Great Britain:** *Scotland*: **V. C. 92** South Aberdeenshire, by Girdleness Lighthouse near Aberdeen, 27 iv 1968, *P.B. Topham & U. Duncan* (BM).

The Species

Solenopsora tasmanica Kantvilas sp. nov.

Species solum acidum incolens, aliquantum similis *Solenopsorae holophaeae* et *S. elixianaeque* sed thallo compactiore, squamulis parvioribus et substantiam chemicaliam brialmontinum continenti differt.

Typus: Australia, Tasmania, summit of Table Mountain, 42°14′S 147°08′E, 1095 m altitude, on moist soil in crevices of alpine dolerite boulders, 6 October 2001, *G. Kantvilas* 930/01 (HO—holotypus).

(Figs 1 & 2)

Thallus dingy pale to dark grey-brown or olive-brown, forming irregular patches or clumps 10–30 mm wide, composed of densely imbricate, sometimes fused, minutely lobed squamules, *c.* 0·05–0·15 mm wide, 240–450 µm thick, attached to the substratum by irregular projections from the lower cortex; rhizines absent; isidia and soredia absent; cortex 20–40 µm thick, composed of irregularly interwoven hyphae. *Photobiont* cells *Trebouxia*-like, roundish, 8–15 µm diam.

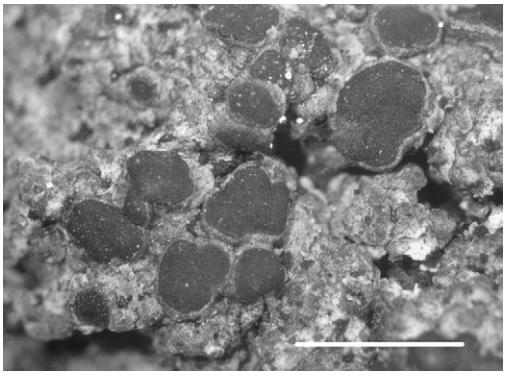

FIG. 1. *Solenopsora tasmanica* (holotype), habit showing squamulose thallus and apothecia with a thin thalline margin. Scale = 2 mm.

Apothecia numerous, scattered to crowded, 0·3–1·5 mm diam., round or irregularly roundish, ± immersed and urceolate when very young, soon emergent, adnate and eventually basally constricted, sessile, not stipitate; proper margin well developed, persistent, black-brown, elevated slightly above the level of the disc; thalline margin rather poorly developed even in younger apothecia, later generally incomplete and enveloping only the lower sides of the proper margin, eventually excluded ± completely; disc black-brown, matt, ± persistently plane and becoming undulate and convex only in very old apothecia. *Exciple* in section 50–75 µm thick at the sides, colourless within, with a dark brown outer edge to *c.* 10 µm thick, unchanged in KOH. *Hypothecium* colourless, 100–200 µm thick, densely inspersed with oil droplets insoluble in KOH. *Hymenium* (40–)45–50(–55) µm thick, colourless, I+ deep blue, sparsely inspersed with oil droplets in the lower part, with a brown epithecial layer 8–10 µm thick, unchanged in KOH, composed of the pigmented apices of the paraphyses. *Asci*

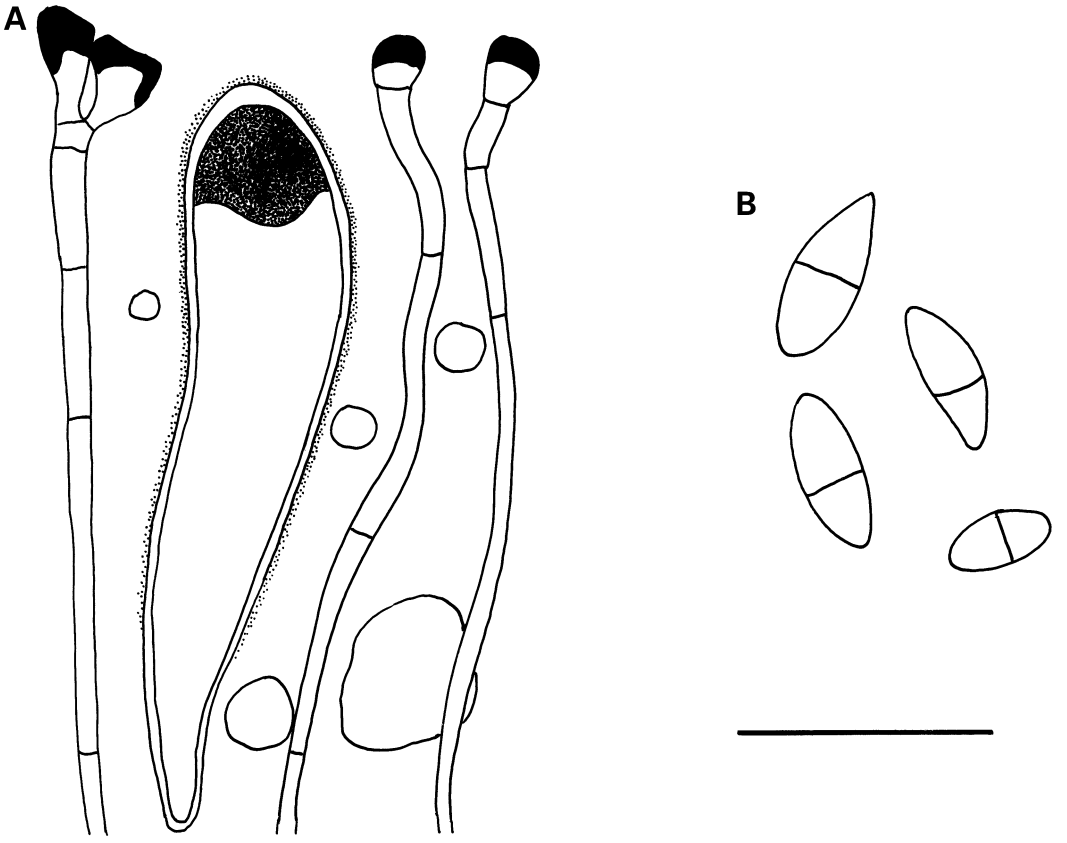

FIG. 2. *Solenopsora tasmanica* (holotype). A, paraphyses, asci (with amyloid parts stippled), and oil droplets; B, ascospores. Scale=20 μm.

clavate, (35–)40–45(–48) × 10–12(–15) μm. *Paraphyses* simple, rather lax in KOH, 1·5–2 μm thick; apices clavate, internally brown-pigmented, 3–5 μm thick. *Ascospores* 1-septate, very rarely 2-septate, (9–)10–15 × 4–5 μm, ellipsoid, typically with rather pointed apices.

Pycnidia occasional, immersed in slight bulges in the thallus surface, resembling incipient apothecia, flask-shaped, to *c.* 180 μm wide; wall not pigmented; ostiole slightly blackened; conidia fusiform-ellipsoid, 3–4 × 1 μm.

Chemistry. Brialmontin 1 and brialmontin 2; thallus K−, KC−, C−, P−, UV−. These rather uncommon lichen substances appear on TLC plates as pale orange spots with relatively high Rf values.

Distribution and ecology. Solenopsora tasmanica is known only from Tasmania where it appears to be very uncommon or overlooked. Hitherto it is known only from three localities, all on mountains of relatively low elevation in the Jurassic dolerite provenance that dominates the drier, eastern half of Tasmania. The species occurs in very sheltered microhabitats, such as in crevices on cliffs and amongst boulders where it overgrows thin, acidic soil rich in decomposing organic matter. It is typically associated with bryophytes.

Discussion

A survey of the known species of *Solenopsora*, both in the literature and of available

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herbarium material, indicates that *S. tasmanica* is a very distinctive lichen. Most species of the genus have a crustose to subsquamulose-bullate thallus and, in addition to very clear-cut features of gross morphology (e.g. lobe shape, presence or absence of pruina on the lobes or apothecia, presence or absence of soredia), also differ chemically from the new taxon. Furthermore, the majority occur on calcareous substrata, essentially in Mediterranean climates; for example, see the accounts of Galun (1970) for Israel, Nimis (1993) for Italy, and Ryan & Timdal (2002) for the Sonoran Region of North America. The habitat of *S. tasmanica* alone (montane, acidic soil) makes this species rather unusual.

The closest relatives of *S. tasmanica* appear to be *S. holophaea* and *S. elixii*, and a comprehensive discussion of the features of these two species is provided by Verdon & Rambold (1998). It is noteworthy that, like *S. tasmanica*, these two taxa also occur in non-calcareous habitats on soil and/or siliceous rocks. Although all three species have an essentially squamulose, brownish thallus, that of *S. tasmanica* is far more compact and the squamules are smaller and form often subcrustose clumps. In contrast, the thalli of *S. holophaea* and *S. elixiana* are best described as small foliose, with lobes that are elongate, separate and at least in part free of the substratum and displaying a sparsely rhizinate, tomentose underside. Furthermore, in *S. tasmanica*, the apothecia do not become substipitate, and may retain a vestigial thalline margin for some time into their maturation whereas, for example, in *S. elixiana*, the development of a 'stipe' soon leaves the apothecial margin totally devoid of any thalline tissue. The dense inspersion of the hypothecium of *S. tasmanica* with insoluble oil droplets was not observed in any other species studied and also appears to be a further distinguishing character. With respect to spore size and shape, all three species are very similar. All specimens of the new species yielded relatively few, mature, well developed ascospores, making a detailed comparative assessment of spore shape difficult.

The chemical composition of *S. tasmanica* is unique for the genus. The brialmontin compounds appear on develped TLC plates as pale yellow-orange spots with high Rf values. The compound is generally uncommon and occurs also in *Lecania brialmontii* (Vain.) Zahlbr. (Elix & Ernst-Russell 1993), an Antarctic endemic that has at times been included in the genera *Thamnolecania* Gyeln. (e.g. Dodge 1973) and *Stereocaulon* (Schreb.) Hoffm. (Lewis Smith & Øvstedal 1991). Unfortunately no fertile material of this enigmatic lichen was available in the course of the present work and hence its precise taxonomic affinities remain uncertain.

Additional specimens examined. **Australia:** *Tasmania*: summit of Mt St John, altitude 778 m, 1999, *G. Kantvilas* 317/99 (HO); Platform Peak, altitude 965 m, 1993, *G. Kantvilas* 75/93 (BM, HO).

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