

Lecanora subtecta, an Australian species in the *Lecanora symmicta* group (Lecanorales)

G. Kantvilas^a and S. LaGreca^{b,c}

^aTasmanian Herbarium, Private Bag 4, Hobart, Tasmania 7001, Australia

^{b,c}Department of Botany, Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom. Current address: Farlow Herbarium of Cryptogamic Botany, Harvard University, 22 Divinity Avenue, Cambridge, MA 02138, United States; e-mail: g.kantvilas@tmag.tas.gov.au, s.lagreca@yahoo.co.uk

Abstract

The new combination *Lecanora subtecta* (Stirt.) Kantvilas & LaGreca is introduced for an Australian member of the *L. symmicta* (Ach.) Ach. group. The species is described and illustrated, and features that distinguish it from other members of the complex are discussed.

Muelleria 26(2): 72–76 (2008)

Introduction

Lecanora symmicta is a widespread species in temperate latitudes in the Northern Hemisphere, where it grows on bark, wood and worked timber. It is described and/or illustrated in a wide range of European and American floras (e.g. Brodo *et al.* 2001; Hawksworth & Dalby 1992; Nimis 1993; Ryan *et al.* 2004; Wirth 1995) although all authors agree that it represents a complex of poorly understood species that require considerable study (LaGreca *et al.* 2000; Printzen & May 2002; Sliwa & Wetmore 2000). Some progress with regards to species circumscription within the group has been made—for example, the segregation of *L. brucei* Printzen (Ryan *et al.* 2004)—but much work remains to be done.

The species has been recorded in Australasia (Galloway 1985, 2007; Lumbsch & Elix 2004) where similar problems of delimitation and taxonomy are recognised. Whilst the name *Lecanora symmicta* is in use in regional checklists (e.g. McCarthy 2008), it is likely that ultimately this name will have more limited geographical and taxonomic application.

Study of types of early Australian lichens has revealed a name for one of the entities of the complex which is frequently encountered in Tasmania. The appropriate nomenclatural change is introduced here.

Material and methods

The study is based on material housed in the Tasmanian Herbarium (HO) and comparative material in BM. Anatomical investigations were conducted on hand-cut sections of thalli and apothecia mounted in water, 10% KOH, concentrated HNO₃, lactophenol cotton blue and Lugol's iodine. Measurements of ascospores are based on at least 70 observations and are presented in the format: lowest value–mean–highest value. Chemical constituents were identified routinely by thin-layer chromatography using standard methods (solvents A, B', and C: Culberson & Ammann 1979; Culberson & Johnson 1982); selected analyses were also undertaken by Prof J.A. Elix (Canberra) using high-

performance liquid chromatography (Feige *et al.* 1993). Nomenclature of ascus types follows Hafellner (1984). Nomenclature of apothecial pigments follows Meyer and Printzen (2000).

Taxonomy

***Lecanora subsecta* (Stirt.) Kantvilas & LaGrecia**
comb. nov.

Lecidea subsecta Stirt., *Trans. Glasgow Soc. Field Naturalists* 4: 93 (1876).

Type: TASMANIA: "ad ligna decorticata in Tasmania", *H. Paton* (lectotype, *vide* D.J. Galloway *ined.*–BM000022188!).

Thallus crustose, ecorticate, not delimited, effuse to immersed in the substratum and \pm inapparent, or pale glaucous grey, rimose-areolate and rather scurfy, or \pm granular, with the granules 0.05–0.1 mm wide; soredia absent; photobiont *Trebouxia*-like, with individual cells irregularly globose, 10–24 μ m wide.

Apothecia biatorine, 0.12–0.5 mm wide, roundish to irregularly rhomboid, scattered or, more typically, crowded together and rather misshapen, occasionally fusing in irregular, cerebriform clusters to 2 mm

wide; disc pale orange-pink, orange-yellow to yellow, sometimes piebald greenish grey, plane at first, soon becoming convex or undulate, usually sparsely to densely beset with a coarse lemon-yellow pruina; margin very thin, usually very soon excluded and not evident. *Excipulum* in section colourless, 10–40 μ m thick at the sides, mostly becoming excluded, poorly differentiated from the hymenium, composed of conglutinated, radiating, branched and anastomosing, loosely interwoven hyphae 1–1.5(–2) μ m thick, lacking photobiont cells. *Hypothecium* hyaline, 40–100 μ m thick, composed of loosely interwoven, anastomosing hyphae *c.* 0.6 μ m thick, subtended by a \pm continuous band of photobiont cells. *Hymenium* 42–50 μ m thick, mostly hyaline but in the upper part usually overlain or interspersed with golden granules that fluoresce pale to vivid yellow in polarised light and dissolve in KOH, very rarely with traces of 'cinereorufa-green' pigment, K \pm greenish intensifying, N+ crimson. *Asci* clavate, eight-spored, 30–42 \times 9–14 μ m, of the *Lecanora*-type, with a well-developed amyloid tholus penetrated entirely by a cylindrical, weakly amyloid masse axiale with \pm parallel flanks; ocular chamber blunt. *Paraphyses* 1–1.5 μ m thick, simple to occasionally branched, rather

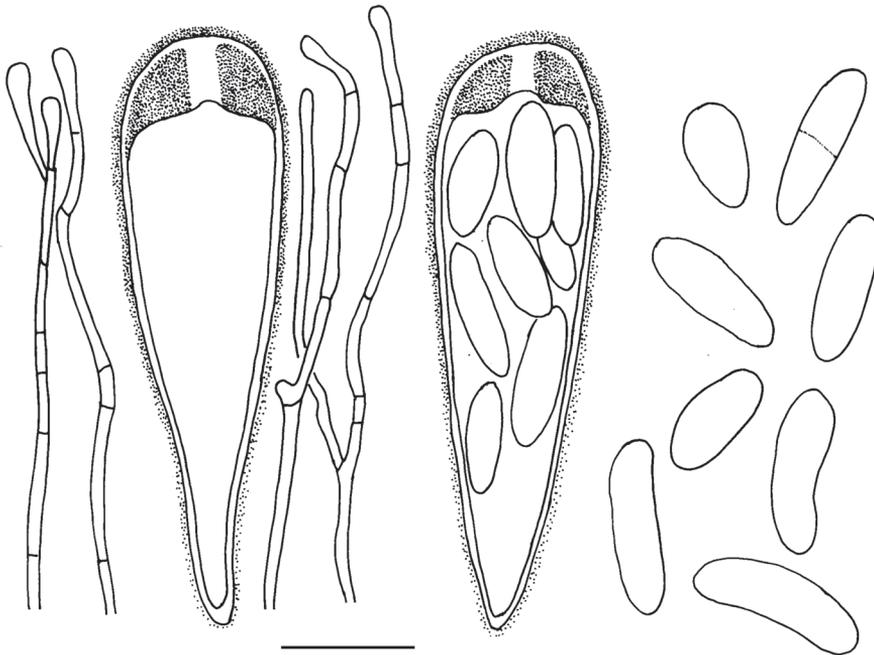


Figure 1. *Lecanora subsecta* (Kantvilas 132/06, HO): asci with amyloid parts stippled, paraphyses and ascospores. Scale = 10 μ m.

indistinct in water and KOH, with apices 1.5–2.5 μm thick, rarely (in the case of piebald apothecia) internally greenish pigmented. *Ascospores* hyaline, thin-walled, ovate to oblong-ellipsoid, rarely somewhat fabiform, simple but rarely with a plasma bridge and appearing spuriously 1-septate, 8–11.7–15 \times 3–4.4–5(–5.5) μm . *Pycnidia* not observed. (Fig. 1)

Chemistry: usnic acid (major) and zeorin (major or minor), both detected by routine TLC; minor quantities of 2,5,7-trichloro-3-O-methylnorlichexanthone and isoarthothelin detected by HPLC.

Remarks: This tiny, inconspicuous lichen is best characterised by its yellow to orange, biatorine, \pm immarginate apothecia that are usually densely covered with a coarse, vivid yellow pruina, the *Lecanora*-type asci and small, simple ascospores. In older apothecia, the pruina may become sparse or abraded, but some evidence of it can usually be detected with careful examination. Whilst clearly closely allied to *L. symmicta* as widely applied in the literature, that name (on the basis of the material examined and literature consulted) clearly has a very broad application. In our opinion, it makes little sense to broaden its definition still further to include a distinct Australian entity for which the valid name *L. subtecta* exists. Specimens examined of *L. symmicta* from the Northern Hemisphere differ most obviously by having more orange-brown to pinkish apothecia; where the apothecia are yellowish they nevertheless lack the vivid yellow pruina of *L. subtecta*. Similar pruina may be observed in the North American species *L. cupressi* Tuck., but that species differs from *L. subtecta* and *L. symmicta* by having apothecia with a thick, persistent thalline margin. Other characters of *L. symmicta*, such as ascospore size, thickness of paraphyses and thallus chemistry vary widely (on the basis of material examined and descriptions by Brodo *et al.* 2001; Hawksworth & Dalby 1992; Ryan *et al.* 2004; and Sliwa & Wetmore 2000) and simply emphasise the fact that a complex of taxa is involved.

Although we believe that *Lecanora subtecta* is a valid name for application in Australia, its re-instatement in no way resolves all the local problems within the *L. symmicta* group. There are several entities represented by Australian herbarium specimens that are not *L. subtecta* and must remain under the general label of '*L.*

symmicta sensu lato' pending further study, a study that of necessity will involve examination of material from other parts of the world. For example, the descriptive data for *L. symmicta* in Australia provided by Lumbsch and Elix (2004) indicate that their concept does not include *L. subtecta*: the thallus contains usnic acid only, and the ascospores are longer and broader. The sole specimen of *L. subtecta* from mainland Australia (Elix 38306) has bright yellow, \pm epruinose apothecia, and is included under *L. subtecta* with some misgivings. In Victoria, there is a taxon occurring on eucalypt lignin which has brownish to orange-brown epruinose apothecia, generally broader, ellipsoid ascospores (11–15 \times 6–7 μm) and lacks substances detectable by TLC. From Queensland, also from eucalypt lignin, we have studied a taxon containing usnic acid and zeorin which has epruinose, yellow-orange apothecia with a persistent margin containing photobiont cells, and ascospores 10–16 \times 3–4.5 μm . Also present in Tasmania is a minute species from *Nothofagus* twigs which has a very reduced to \pm absent thallus (possibly containing traces of zeorin) and waxy, epruinose, yellow apothecia to 0.3 mm wide, with a persistent margin containing photobiont cells and \pm globose ascospores, 7–9 \times 6–7 μm ; this taxon displays some similarities to *L. varia* (Hoffm.) Ach. from the Northern Hemisphere and to the widespread saxicolous species, *L. polytropa* (Hoffm.) Rabenh.

Past authors (e.g. Printzen & May 2002; Kantvilas & Elix 2007) have compared the *Lecanora symmicta* group to the genus *Ramboldia*. Certain characters of *L. subtecta*, such as the lignicolous habitat, the biatorine apothecia that become \pm immarginate and the narrowly ellipsoid, relatively small ascospores, are reminiscent of *Ramboldia*, but there the similarities end. In the *L. symmicta* group, the asci have a distinctly cylindrical masse axiale with \pm parallel flanks, whereas in *Ramboldia* the flanks of the masse axiale are divergent. The exciple of *Ramboldia* is far better differentiated and composed of densely-packed, radiating hyphae, whereas in *L. symmicta* it is relatively poorly differentiated and the constituent hyphae are loosely interwoven. Furthermore, the hymenium of *Ramboldia* species tends to be more lax in KOH, and it is generally overlain by a brownish ephymenial layer that becomes \pm olive in KOH; nor are any species

of *Ramboldia* pruinose. Neither usnic acid nor zeorin, the diagnostic substances for the *L. symmicta* group, have been recorded in *Ramboldia*, which typically has a chemistry dominated by depsides and depsidones, or anthraquinone pigments (Kalb *et al.* 2008).

Distribution and ecology: This species is easily overlooked in the field, being tiny and growing in habitats that are generally depauperate or uninteresting for lichens, notably on eucalypt lignin. Stirton's type is from a piece of bleached wood, with *Ramboldia stuartii* (Hampe) Kantvilas & Elix and *Caloplaca* species. Most recent collections are from the cut surfaces of old eucalypt stumps in regenerating logging coupes. Here *Leccanora subsecta* is a member of a species-rich association of pioneer lichens which includes species of *Buellia* and *Caloplaca*, *Candelariella xanthostigmoides* (Müll. Arg.) R.W. Rogers, *Menegazzia subpertusa* P. James & D.J. Galloway, *Micarea intersociella* (Stirt.) Coppins, *Parmelina pseudorelicina* (Jatta) Kantvilas & Elix, *Ramboldia soreliata* Kalb, *Rinodina asperata* (Shirley) Kantvilas, *Trapeliopsis flexuosa* (Fr.) Coppins & P. James and *Usnea inermis* Motyka.

Specimens examined: AUSTRALIA: TASMANIA. c. 1.5 km N of Little Baldy, 41°45'S 147°56'E, 720 m alt., 17.v.1999, G. Kantvilas 210/99 (HO); W of Tahune Bridge in the Warra SST, 43°06'S 146°41'E, 180 m alt., 23.v.2006, G. Kantvilas 233/06 (BM, HO); same locality, G. Kantvilas 132/06, 217/04, 156/06 (all HO); Loila Pinnacle, 41°25'S 148°11'E, 300 m alt., 1995, F. Duncan s.n. (HO). **NEW SOUTH WALES.** top swimming hole, Boonoo Boonoo Falls, 28°47'51"S 152°10'00"E, 4.v.2005, J.A. Elix 38306 (CANB, HO).

Specimens of *L. symmicta sens. lat.* examined:
AUSTRALIA: VICTORIA. Brighton, Jim Willis Reserve, 37°55'23"S 144°59'14"E, 6.vi.2006, V. Stajsic 4061 pp (HO, MEL). **QUEENSLAND.** Bunya Mtns, Saddle Tree Creek, 26°52'S 151°32'E, 660 m alt., 24.xi.1995, G. Kantvilas 179/95 (BRI, HO). **TASMANIA.** Yarlinton Tier, 42°32'S 147°18'E, 620 m alt., 28.x.1987, G. Kantvilas 144/87 (HO).

Comparative material of *L. symmicta* examined:
AUSTRIA: STEIERMARK. Admonter Kaibling, 47°33'N 14°31'E, 2180 m alt., 23.viii.1990, H. Mayrhofer & G. Kantvilas 549/90 (HO); Sparafeld, 47°33'N 14°31'E, 2240 m alt., 23.viii.1990, H. Mayrhofer & G. Kantvilas 574/90 (HO); Pözlalm, 47°40'N 14°31'E, c. 760 m alt., 18.x.1994, G. Böttger *et al.* s.n. (HO). **CANADA: ONTARIO.** Dundas Co., 24.vii.1973, P.Y. Wong 1231 (CANL). **ITALY:** Vincenza, Sett Comuni, 45°58'N 11°29'E,

1835 m alt., G. Rambold 2742 (H. Hertel: Lecideaceae Exsicc. 244) (HO). **GERMANY: RHEINLAND-PFALZ.** Eifel, 08.v.1997, H.T. Lumbsch & G.B. Feige Lec. Lich. Exs. no. 93 (BM); **UNITED KINGDOM: ENGLAND: YORKSHIRE.** near Easby, 1835, J. Ward s.n. (BM, barcode no. BM000763883). **UNITED STATES OF AMERICA: MAINE.** Knox Co., Rockland, 10.x.1909, G.K. Merrill's Lich. Exs. no. 115 (BM, FH); **MASSACHUSETTS.** Worcester Co., Princeton, Wachusett Mountain, 11.vii.1997, P. May 3379 (FH).

Acknowledgements

We thank the referees and Jack Laundon for comments on the manuscript, Jack Elix for undertaking critical HPLC analyses and providing us with the specimen from N.S.W., and Jean Jarman for scanning the line drawing.

References

- Brodo, I.M., Sharnoff, S.D. and Sharnoff, S. (2001). *Lichens of North America*. Yale University Press: New Haven & London.
- Culberson, C.F. and Amman, K. (1979). Standardmethode zur Dünnschichtchromatographie von Flechtensubstanzen. *Herzogia* **5**, 1–24.
- Culberson, C.F. and Johnson, A. (1982). Substitution of methyl *tert*-butyl ether for diethyl ether in the standardized thin-layer chromatographic method for lichen products. *Journal of Chromatography* **128**, 253–259.
- Feige, G.B., Lumbsch, H.T., Huneck, S. and Elix, J.A. (1993). Identification of lichen substances by a standardized high-performance liquid chromatographic method. *Journal of Chromatography* **646**, 417–427.
- Galloway, D.J. (1985). *Flora of New Zealand Lichens*. Government Printer: Wellington.
- Galloway, D.J. (2007). *Flora of New Zealand Lichens*. Revised Second Edition. Volume One. Manaaki Whenua Press: Lincoln.
- Hafellner, J. (1984). Studien in Richtung einer natürlicheren Gliederung der Sammelfamilien Lecanoraceae und Lecideaceae. *Beiheft zur Nova Hedwigia* **79**, 241–371.
- Hawksworth, D.L. and Dalby, D.H. (1992). '*Leccanora* Ach. (1810)' in O.W. Purvis, B.J. Coppins, D.L. Hawksworth, P.W. James and D.M. Moore (eds), *The Lichen Flora of Great Britain and Ireland*, pp. 292–318. Natural History Museum Publications: London.
- Kalb, K., Staiger, B., Elix, J.A., Lange, U. and Lumbsch, H.T. (2008). A new circumscription of the genus *Ramboldia* (Lecanoraceae, Ascomycota) based on morphological and molecular evidence. *Nova Hedwigia* **86**, 23–42.
- Kantvilas, G. and Elix, J.A. (2007). The genus *Ramboldia* (Lecanoraceae): a new species, key and notes. *Lichenologist* **59**, 135–141.
- LaGreca, S., Greene, D. and Lumbsch, H.T. (2000). 'Systematic studies of the *Leccanora symmicta* complex in New England

- and adjacent Canada' in *Fourth IAL Symposium, Progress and Problems in Lichenology at the Turn of the Millenium. Abstracts*. p 12. Universita de Barcelona: Barcelona.
- Lumbsch, H.T. and Elix, J.A. (2004). *Lecanora*. *Flora of Australia* **56A**, 12–62.
- McCarthy, P.M. (2008). *Checklist of the Lichens of Australia and its Island Territories*. Version 31 January 2008, <http://www.anbg.gov.au/abrs/lichenlist/introduction.html>. ABRS: Canberra.
- Meyer, B. and Printzen, C. (2000). Proposal for a standardized nomenclature and characterization of insoluble lichen pigments. *Lichenologist* **32**, 571–583.
- Nimis, P.L. (1993). *The Lichens of Italy. An annotated catalogue*. Monografia XII. Museo Regionale di Scienze Naturali: Torino.
- Printzen, C. and May, P. (2002). *Lecanora ramulicola* (Lecanoraceae, Lecanorales), an overlooked lichen species from the *Lecanora symmicta* group. *Bryologist* **105**, 63–69.
- Ryan, B.D., Lumbsch, H.T., Messuti, M.I., Printzen, C., Sliwa, L. and Nash, T.H. III (2004). *Lecanora* in T.H. Nash III, B.D. Ryan, P. Diederich, C. Gries and F. Bungartz (eds), *Lichen Flora of the Greater Sonoran Desert Region, Vol. 2*, pp. 176–286. Lichens Unlimited: Tempe, Arizona.
- Sliwa, L. and Wetmore, C.M. (2000). Notes on the *Lecanora varia* group in North America. *Bryologist* **103**, 475–492.
- Wirth, V. (1995). *Die Flechten Baden-Württembergs. 1*. Eugen Ulmer: Stuttgart.