# THE LICHEN FAMILY HYMENELIACEAE IN TASMANIA, WITH THE DESCRIPTION OF A NEW SPECIES

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Kantvilas, G., 2014. The lichen family Hymeneliaceae in Tasmania, with the description of a new species. *Kanunnah 7*: 127–140. ISSN 1832-536X. The family Hymeneliaceae in Tasmania comprises three species: the widespread *Tremolecia atrata* (Ach.) Hertel and *Hymenelia lacustris* (With.) M. Choisy, and *Hymenelia gyalectoidea* Kantvilas, a new endemic species described from alpine altitudes where it is confined almost exclusively to dolerite. All taxa are described and illustrated from Tasmanian collections. The enigmatic generic position of the new lichen is discussed.

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## INTRODUCTION

The family Hymeneliaceae is a small group of lichens, characterised chiefly by a crustose thallus containing a green photobiont (either trebouxioid or *Trentepohlia*), usually aspicilioid apothecia immersed in the thallus surface, and mostly weakly amyloid or non-amyloid asci containing eight, simple, colourless ascospores. Many species have an attractive, bright orange thallus. The composition of the family has varied over the years. Eriksson (2006) included *Aspicilia* A.Massal., *Eiglera* Hafellner, *Hymenelia* Kremp., *Ionaspis* Th.Fr., *Lobothallia* (Clauzade & Cl. Roux) Hafellner, *Melanolecia* Hertel and *Tremolecia* M.Choisy, and thus subsumed the families Aspiciliaceae, Eigleraceae and Tremoleciaceae within the Hymeneliaceae. More recently, Lumbsch & Huhndorf (2010) included *Aspicilia* and *Lobothallia* in the Megasporaceae (see also Nordin *et al.* 2010) but retained the other genera in the Hymeneliaceae. *Tremolecia* is a monotypic genus that was re-instated by Hertel (1977) and is widely applied without controversy. Separation of *Hymenelia* and *Ionaspis* on the other hand has been regarded as problematic (Lutzoni

& Brodo 1995) and depended in the past chiefly on the photobiont: trebouxioid in the former and *Trentepohlia* in the latter. Taxonomic treatments of these genera are few and include the monograph of *Ionaspis* by Magnusson (1933) and various regional accounts, for example Jørgensen (1989), Galloway (2007), Owe-Larsson & Nordin (2007) and Fletcher *et al.* (2009a, b).

Hafellner (1984) examined and described the ascus structure of several genera in the family, but the problem of generic delimitation was not tackled in depth until Lutzoni & Brodo (1995) devised a new classification, based on new typifications of the genera and cladistic analysis of a broad suite of characters. Thus *Hymenelia* is typified by *H. prevostii* [see discussion and lectotypification by Lutzoni & Brodo (1995)] whereas *Ionaspis* is typified by *I. chrysophana* (= *I. suaveolens*) (Lutzoni & Brodo 1994, 1995). In these authors' concept, the photobiont is a minor character, and the genera are separated chiefly by epihymenial pigments and their reaction in dilute $HNO_3$ and KOH. Furthermore, *Hymenelia* tends to have wider ascospores and a thicker hymenium, and, unlike *Ionaspis*, includes many calcicolous and endolithic species. As a result of this work, many of the described species effectively 'swapped' genera. Subsequently Lumbsch (1997) investigated the ontogeny of *Eiglera* and compared it with, amongst other taxa, that of *Hymenelia* and *Ionaspis*.

Unfortunately, I have found aspects of this new classification difficult to apply, and a brief survey of a wide range of herbarium material of many species did not, in my opinion, support a clear distinction between those taxa now placed in *Hymenelia* and those in *Ionaspis*. Nor, for that matter, was the previous, photobiont-based arrangement much better. All taxa studied share an essentially identical ascus type and general morphology, whereas other details such as excipular structure, morphology of the paraphyses and ascospore size vary across the whole complex. Lutzoni & Brodo (1995) stressed the occurrence of epihymenial pigments, but these are also variable, within species, populations and specimens. Indeed in this author's experience, the distribution of pigments in many groups of lichens, for example, *Megalaria* and *Mycoblastus*, is potentially fickle, even at species level, and its application as a taxonomic character needs to be approached with extreme caution (Kantvilas 2008, 2009). Furthermore, pigmentation is often linked to other morphological, anatomical and ecological characters and thus specimens from exposed habitats may have more intense pigmentation, a thicker thallus, and a more robust apothecial margin.

In this paper, the three Tasmanian species of the family Hymeneliaceae are treated. In addition to the widespread *Tremolecia atrata*, these include two species classified here in *Hymenelia*. Of these, one is probably amongst the most common and conspicuous lichens found at alpine elevations, and is new to science. Due to the complexities discussed above, I have elected to use the older generic name *Hymenelia* for this species. Clearly the problem of generic classification in the Hymeneliaceae requires further investigation and perhaps adopting a conservative (or controversial position) in this paper may hasten such a study.

## MATERIAL AND METHODS

The study is based on collections of the author, housed in the Tasmanian Herbarium (HO), and on comparative material in other herbaria, chiefly in London's Natural History Museum (BM) and the National Herbarium of Victoria (MEL). Anatomical and morphological observations were undertaken using light microscopy, with thin hand-cut sections mounted in water, 10% KOH, 50% $HNO_3$, Lactophenol Cotton Blue, ammoniacal erythrosin and Lugol's Iodine, with and without pretreatment with KOH. Ascospore measurements are based on at least 50 observations and are presented in the format: 5$^{th}$ percentile–*average*–95$^{th}$ percentile, with outlying values given in parentheses. Chemical composition was investigated by thin-layer chromatography using standard methods (Orange *et al.* 2001). Nomenclature of ascus types essentially follows Hafellner (1984).

### Selected comparative material examined

***Eiglera flavida*** (Hepp) Hafellner. **SWEDEN:** SE of Mt Skarsen, 62°44'N 12°17'E, 8.viii.1998, *R. Santesson* 32468 (*Lich. Sel. Exsicc. Upsal.* 57) (BM). **SLOVAKIA:** Velký Stoh, 17.vi.1965, *I. Pišút & A. Vězda* (*A. Vězda: Lich. Sel. Exsicc*. 407) (BM).

***Hymenelia arctica*** (Lynge) Lutzoni. **SWEDEN:** in River Ljusnan, 62°41'N 112°24'E, 8.viii.1994, *R. Santesson* 33668 (*Lich. Sel. Exsicc. Upsaliensis* 125) (BM).

***Hymenelia carnulosa*** (Arnold) Lutzoni **FRANCE:** Naodabfall der Chaine de la Sainte Baume, Plan d'Aups, vi.1978, *Y. Rondon* (*G Follman: Lich. Exsicc. Sel.* 306) (BM); Sainte Baume, 19.ix.1967, *J. Asta, G. Cauzade, J.M. & Y. Rondon* (*A. Vězda: Lich. Sel. Exsicc.* 657) (BM) [both as *H. coerulea* (DC.) A. Massal.]. **GERMANY:** Lohbachgraben an der Kampenwand bei Aschau, vii.1895, *Schnabl* (BM).

***Hymenelia cyanocarpa*** (Anzi) Lutzoni. **SWEDEN:** in River Ljusnan, 62°41'N 112°24'E, 8.viii.1994, *R. Santesson* 33669 (*Lich. Sel. Exsicc. Upsal.* 126) (BM); Limön Island in Lake Långban, 59°50'N 14°17'E, 14.viii.1984, *L.-E. Muhr* 7650 (*Lich. Sel. Exsicc. Upsal.* 7) (BM).

***Hymenelia epulotica*** (Ach.) Lutzoni. **FRANCE:** Provence, near Apt, 8.i.1965, *G. Clauzade* (*A. Vězda: Lich. Sel. Exsicc.* 337) (BM). **UNITED KINGDOM:** East Perth, Glen Shee, 7.vii.1964, *P.W. James* (BM).

***Hymenelia heteromorpha*** (Kremp.) Lutzoni. **UNITED KINGDOM:** Cumbria, Westmorland, Great Dun Fell, above Knock, vi.1993, *O.L. Gilbert & A.M. Fryday* (BM). **SARDINIA:** Monte Albo, 900 m alt., 25.vii. 1985, *P.L. Nimis & J. Poelt* (HO).

***Hymenelia prevostii*** (Duby) Kremp. **UNITED KINGDOM:** North Somerset, Cheddar Gorge, 11.iv.1981, *P.W. James* (BM). **NORWAY:** near Mosterhavn, viii.1912, *J.J. Havaas* (*J.J. Havaas: Lich. Norv. Occid.* 73) (BM).

***Hymenelia rhodopsis*** (Sommerf.) Lutzoni. **SWEDEN:** shore of Lake Älvlången, 59°26'N 14°48'E, *L.-E Muhr* 13632 (*Lich. Sel. Exsicc. Upsal.* 127) (BM).

***Ionaspis ceracea*** (Arnold) Hafellner & Turk. **ITALY:** (*Anzi: Lich. rar. Langob.* 76) (BM). **GERMANY:** Westl. Höhenwälder (*M. Britzelmayr: Lichenes Bavariae Exsiccati* 381) (BM).

***Ionaspis chrysophana*** (Körb.) Th. Fr. **AUSTRIA:** Bremmer, 11.viii.1871, *F. Arnold* 458 (BM); **GERMANY:** Sperrbache bei Oberstdorf im Altgäu, 1859, *Rehm* (BM). **UNITED KINGDOM:** Cairngorm summit, 6.viii.1968, *P.W. James* (BM).

***Ionaspis (Hymenelia) lacustris*** (With.) Lutzoni. **U.S.A.:** North Carolina, White Water Gorge, *W.L. Culberson & B. Nebel* 10117 (BM). **NORWAY:** Hordaland, 1937, *J.J. Havaas* (*J.J. Havaas: Lich. Norv. Occid.* 169) (BM). **UNITED KINGDOM:** Mid Ebudes, Tiree, SE Balephuil Bay, 10.iv.1983, *P.W. James* (BM); Lake District, Coniston, by Simons Nick, 29.iv.1984, *O.W. Purvis* (BM). **IRELAND:** Co. Galway, Connemara, Doughruagh Mtns, *H. Hertel* 39600 (*H. Hertel: Lecideaceae Exsicc.* 343) (HO).

***Ionaspis odora*** (Ach.) Th. Fr. **CZECH REPUBLIC:** Mumlava, 28.vii.1960, *A. Vězda* (*A. Vězda: Lich. Sel. Exsicc.* 53) (BM). **SLOVAKIA:** Žiarska dolina, 14.ix.1966, *I. Pišút* (*Lich. Slov. Exsicc.* 129) (BM). **POLAND:** Pańszczyca Valley, 29.viii.1971, *J. Nowak* (*Lich. Pol. Merid. Exsicc.* 112) (BM). **GREENLAND:** Romer Sø, 80°59'N 19°29'W, 27.vii.1995, *E.S. Hansen* (*Lich. Groenl. Exsicc.* 580) (BM).

***Ionaspis ventosa*** P.M. Jørg. & R. Sant. **SWEDEN:** Mt Stora Mittåkläppen, 62°43'N 12°21'E, 14.viii.1989, *R. Santesson* 32679 (*Lich. Sel. Exsicc. Upsal.* 85) (BM).

***Tremolecia atrata*** (Ach.) Hertel. **PRINCE EDWARD ISLAND:** Kents Crater, 46°37'S 37°54'E, 170 m alt., 1982, *H. Hertel* (*H. Hertel: Lecideaeae Exsicc.* 100) (HO).

## TAXONOMY

### *Hymenelia gyalectoidea* Kantvilas sp. nov.

Mycobank No. MB810701

Species insignis, saxorum alpinorum apricorum incola, thallo ferrugineo, algas chlorococcaleas continenti, apotheciis urceolatis vel gyalectoideis, 0.2–0.35 µm latis, ascis egregiis tholo amyloideo, et ascosporis halonatis, hyalinis, 12–21 µm longis, 7–14 µm latis designata.

**TYPE:** Australia, Tasmania: Hartz Mtns, near start of track to Arve Falls, 43°13'S 146°46'E, 790 m alt., on dolerite plates in subalpine heathland, 25 July 2007, *G. Kantvilas* 280/07 (HO–holotype; BM, MSC–isotypes).

*Thallus* pale to bright rusty orange, sometimes bleached a little pale greyish here and there, forming extensive, continuous, irregular, undelimited patches up to many 10s of cms wide, lacking a prothallus, deeply cracked, 200–750 µm thick, ecorticate but with a diffuse outer layer to *c.* 50–100 µm thick that is orange, unchanged in K or N; medulla white, I–, K/I–; photobiont a unicellular green alga with individual cells globose to subglobose, rarely ± oblong, 6–10 x 5–10 µm, occurring singly or occasionally in pairs. *Apothecia* scattered, typically uncommon and inconspicuous, 0.2–0.35 mm wide, round or irregularly deformed-roundish, hemiangiocarpic, at first immersed in the thallus, at maturity usually adnate, urceolate to gyalectoid; disc pale orange to ± colourless and translucent, concave, eventually excavate and eroded; proper

**Fig. 1.** Habitat of *Hymenelia gyalectoidea*, with numerous extensive orange thalli colonising an alpine dolerite boulder field.

excipulum at first rather ragged and dentate, incurved, prominently extending above the level of the disc and thallus and ± obscuring the former, later becoming ± erect to recurved and abraded, concolorous with the thallus or paler and ± translucent, sometimes in part with a sparse orange pruina, in section ± cupulate, rather poorly differentiated from adjacent tissues, 10–50(–60) µm thick at the sides, colourless to pale orange, unchanged in K and N, composed of branched and anastomosed hyphae 1–2 µm thick, radiating from beneath the hypothecium. *Hypothecium* colourless, 40–70 µm thick, typically inspersed with oil droplets. *Hymenium* 70–90(–110) µm thick, I+ grubby blue-green, K/I+ intense blue, colourless throughout or sometimes overlain by a continuous or patchy, granular, orange epithecial layer 20–40 µm thick, intensifying orange in K. *Asci* 60–85 x 12–30 µm, clavate, approximating a modified Hymeneliaceae-type: tholus well-developed, mostly ± non-amyloid except for a diffuse, thin, intensely amyloid, inner cap; ocular chamber not developed. *Paraphyses* 1–2 µm thick, sparingly branched and anastomosed, not moniliform; apices neither pigmented nor enlarged. *Ascospores* broadly ellipsoid to ovate, sometimes almost subglobose, hyaline or occasionally pale orange when post-mature, thin-walled, typically with a prominent halo, 12–*15.3*–20(–21) x (7–)8–*10.0*–13(–14) µm. *Pycnidia* occasional, scattered, immersed in the thallus, visible

**Fig. 2.** Habit of *Hymenelia gyalectoidea*. The orange crustose thallus forms colourful mosaics with other species, in this case the yellow thallus of *Cameronia pertusarioides* and black tufts of the moss, *Andreaea*.

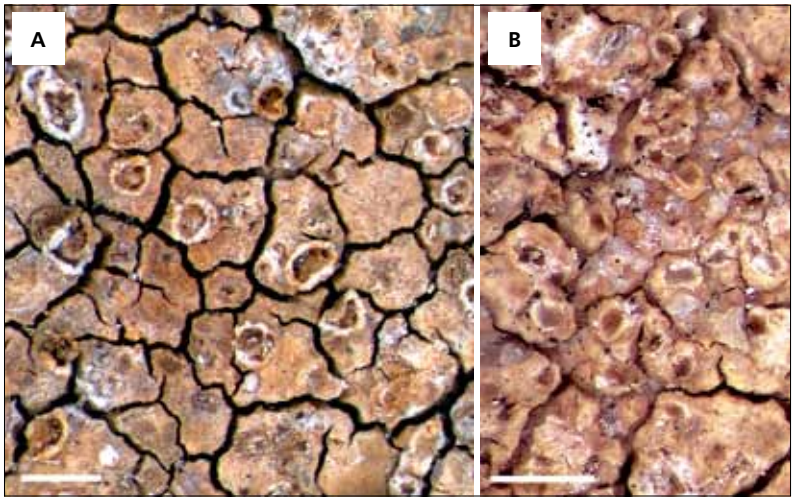


**Fig. 3.** Habit of *Hymenelia gyalectoidea* (detail).
**A.** gyalectoid apothecia (*Kantvilas* 2/97); **B.** pycnidia (*Kantvilas* 256/12).
Scale = 0.5 mm

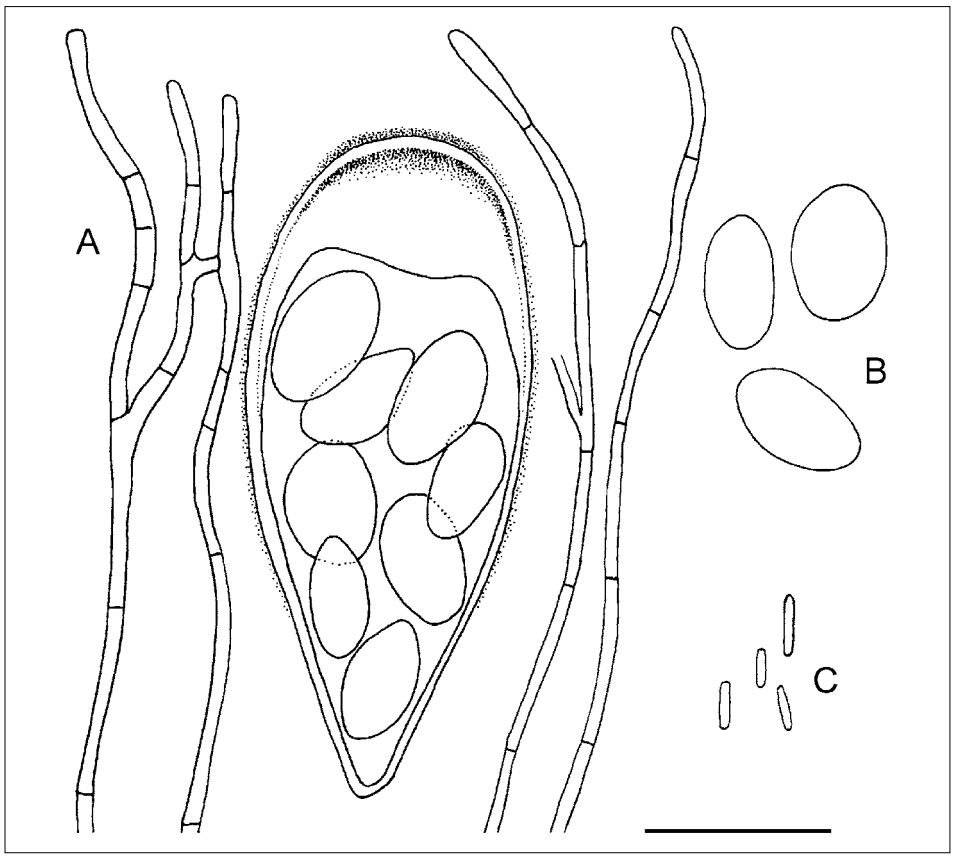


**Fig. 4.** Anatomy of *Hymenelia gyalectoidea* (semi-schematic).
**A.** asci, ascopores and paraphyses, with amyloid parts stippled; **B.** ascospores; **C.** conidia.
Scale = 20 µm

as slightly more heavily orange-pigmented specks, pierced by a minute hole, sometimes gaping a little and resembling incipient apothecia. *Conidia* bacilliform, 3–6 x 0.8–1 µm. *Chemistry*: no substances detected. (**Figs 1–4**)

**etymology:** the specific epithet refers to the distinctive form of the apothecia.

**ecology and distribution:** *Hymenelia gyalectoidea* is one of the most common and eye-catching saxicolous, crustose lichens found in sunny, exposed aspects at alpine and subalpine elevations in Tasmania. That it has gone unidentified and un-named for so long is entirely due to the rarity of fertile material and the inconspicuousness of its tiny, often immersed fruiting bodies. It is found almost exclusively on Jurassic

dolerite, and hence occurs mainly in central and eastern parts of Tasmania. Although also recorded on other substrata such as Triassic sandstone, Devonian granite and Precambrian quartzite, these occurrences are rare and usually restricted to sites where dolerite occurs in close proximity. The orange thallus of the new species is largely responsible for the orange-brown patterns that are characteristic of the alpine dolerite provenance, and it has featured (un-named) in many Tasmanian wilderness photographs that are disseminated via calendars and other media. Its colour should not be confused with the brightly orange-coloured lichens of coastal habitats, which belong to the unrelated family Teloschistaceae; the pigment of these coastal species reacts K+ purple.

Alpine dolerite is a very favourable substratum for lichens and and its hard, weathering-resistant surface is typically colonised in its entirety by extensive communities of crustose, foliose and fruticose species. The orange thallus of the new *Hymenelia* tends to form very attractive mosaics with other brightly coloured crustose lichens, such as *Cameronia pertusarioides* Kantvilas and *Poeltiaria coromandelica* (Zahlbr.) Rambold & Hertel (pale yellow), *Lecanora demersa* (Kremp.) Hertel & Rambold and *Rimularia albotesselata* Kantvilas (white), *Trapelia lilacea* Kantvilas & Elix (pale purplish), *Rhizocarpon geographicum* (L.) DC. (green) and *Ramboldia petraeoides* (Nyl. ex C.Bab. & Mitt.) Kantvilas & Elix (brown), as well as black tufts of the moss *Andreaea*.

**SELECTED SPECIMENS EXAMAINED:** Tasmania: Mt Wellington summit peaks, 42°54'S 147°14'E, 1963, *P.W. James* (BM, HO); Mount Hartz, 43°15'S 146°46'E, 1290 m alt., 1966, *G.C. Bratt* 3083a *& F. Lakin* (HO); Mt Victoria, western slopes, 41°20'S 147°50'E, 1000 m alt., 1997, *G. Kantvilas* 2/97 (E, HO); Forty Lakes Peak, 41°44'S 146°26'E, 1350 m alt., 2006, *G. Kantvilas* 384/06 (HO); Wylds Craig, 42°28'S 146°23'E, 1335 m alt., 2007, *G. Kantvilas* 10/07 (HO); Snowdrift Tarns, 42°55'S 146°39'E, 1270 m alt., 2009, *G. Kantvilas* 437/09 (HO); Mt Byron, 42°02'S 146°04'E, 1370 m alt., 2011, *G. Kantvilas* 164/11 (HO); Mt Sprent, saddle N of peak, 42°47'S 145°58'E, 910 m alt., 2012, *G. Kantvilas* 73/12 (HO); Mt Rufus at the Gingerbread Hut, 42°08'S 146°06'E, 1260 m alt., 2012, *G. Kantvilas* 256/12 (HO); Skullbone Plains, 42°02'S 146°21'E, 970 m alt., 2012, *G. Kantvilas* 719/12 (HO); Lake Skinner, 42°56'S 146°41'E, 975 m alt., 2013, *G. Kantvilas* 415/13 (HO); Smiths Monument, Mount Wellington, 42°55'S 147°13'E, 1140 m alt., 2014, *G. Kantvilas* 11/14 (HO).

**REMARKS:** This distinctive species is characterised by the combination of the rusty orange thallus, the chlorococcoid photobiont, the tiny, gyalectoid apothecia, the distinctive Hymeneliaceae-like asci, and the relatively large, halonate ascospores. Within the Tasmanian lichen flora there are no taxa with which it could be confused. Most crustose lichens with an orange thallus belong to the genus *Caloplaca* and are easily macroscopically distinguished, not least by the presence of anthraquinone pigments that react K+ purple. Some members of the Lecideaceae (including Porpidiaceae), especially species of *Porpidia s. lat.*, may have an orange thallus but are distinguished by their dark apothecia and different ascus

types. The only other species of *Hymenelia* known from Tasmania is *H. lacustris*, but this occurs in semi-aquatic habitats, has aspicilioid apothecia with a smooth margin and *Hymenelia*-type asci. *Tremolecia atrata*, another member of the Hymeneliaceae, has a dull reddish brown thallus, black, carbonised apothecia with greenish pigments, and non-halonate ascospores.

There is one further *Hymenelia*-like taxon in Tasmania that remains unidentified. It occurs in habitats akin to those of *H. gyalectoidea*, and is known from several collections from the drier eastern side of the Central Plateau. It has a somewhat duller orange thallus and scattered, apothecia-like structures with a glossy brown 'disc'. No hymenial tissue has been located despite extensive sectioning, and so, although the photobiont and anatomical arrangement suggest it is either an unusual, sterile form of *H. gyalectoidea* or a further taxon of *Hymenelia*, the status of this material is unresolved.

The combination of diagnostic characters of *H. gyalectoidea* is unique within the family as a whole. However, the generic placement of the species is uncertain and I include it in *Hymenelia*, the older of the two generic names available, with great reservations, my main aim being to bring this taxon to the attention of the broader scientific community and highlight it as a subject for further investigation. Under the scheme proposed by Lutzoni & Brodo (1995), this taxon would perhaps be better placed in *Ionaspis* on account of its lack of epihymenial pigments that react in N and its siliceous habitat. It also displays certain superficial similarities to several taxa currently placed in *Ionaspis*, notably *I. ceracea*, *I. lacustris*, *I. obtecta* and *I. odora*. These taxa have an epilithic thallus that is often orange and generally lack any epithecial pigments. However, in each case their apothecia are aspicilioid, with a relatively robust, entire excipulum, and their asci are of the *Hymenelia*-type (**Fig. 5**C), with a well-developed weakly or non-amyloid tholus. In contrast, the asci of the new species are enigmatic: their overall shape is *Hymenelia*-like, but there is a distinct, weakly amyloid diffuse cap in the uppermost part of the tholus (**Fig. 4**A). Hints of this structure were observed in some preparations of asci of other taxa from the *Hymenelia-Ionaspis* complex. This observation led to a re-examination of the genus *Eiglera*, which differs from *Ionaspis* and *Hymenelia* by having an intensely and entirely amyloid tholus (**Fig. 5**A). The faintly amyloid 'cap' in *H. gyalectoidea* could perhaps be interpreted as a trend towards an *Eiglera*-type ascus. Further anatomical and morphological similarities between the two taxa are that both have generally small, superficial, rather urceolate apothecia with a poorly developed excipulum and a disc that becomes easily eroded, pockmarked and rather excavate. However, there is no evidence to suggest that the new species is better placed in *Eiglera*. The asci of *Tremolecia* (**Fig. 5**B) are different again.

***Hymenelia lacustris* (With.) M. Choisy** *Bull. Mens. Soc. linn. Lyon* 18: 145 (1949); ***Ionaspis lacustris*** (With.) Lutzoni, *Syst. Bot.* 20: 253 (1995); *Lichen lacustris* With., *Arr. Brit. pl. ed.* 3, 4: 21 (1796).

*Thallus* rusty or pale orange to cream or pale fawn-brown in deep shade, effuse, usually deeply cracked, to *c.* 300 µm thick, forming

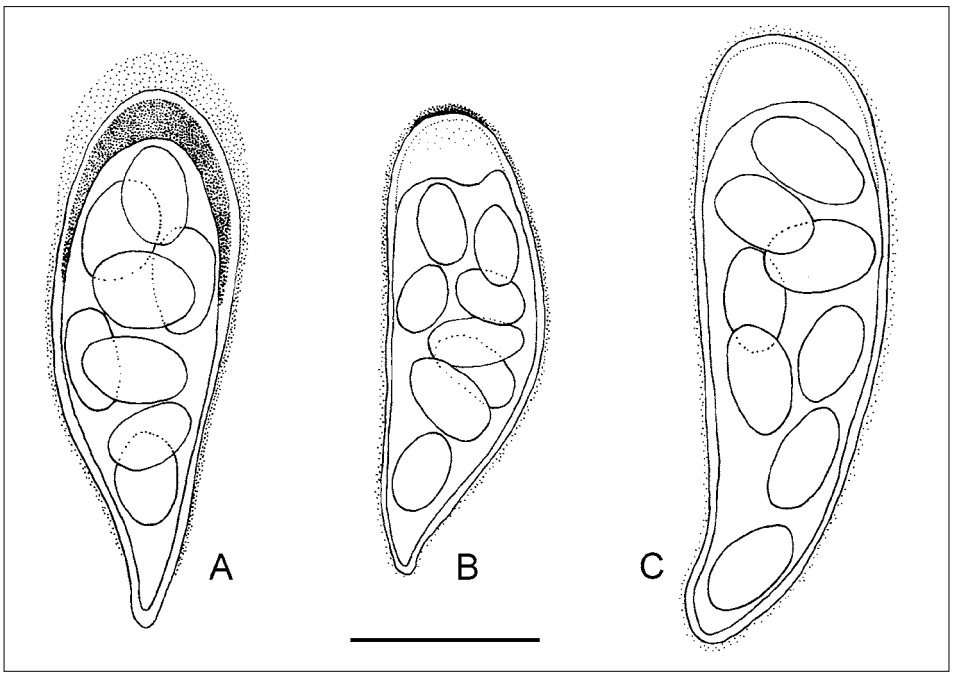


**Fig. 5.** Asci and ascospores (semi-schematic) of the genera of Hymeneliaceae, with amyloid parts stippled. **A.** *Eiglera*-type (*Eiglera flavida*). **B.** *Tremolecia*-type (*Tremolecia atrata*). **C.** *Hymenelia*-type (*Hymenelia lacustris*).
Scale = 20 µm

irregular patches, often in mosaics with other lichens, undelimited or with a thin, greyish marginal prothallus; medulla white, I–, K/I–; photobiont a unicellular green alga with individual cells globose to subglobose, 7–14 x 6–12 µm. *Apothecia* 0.1–0.5 mm wide, round, scattered or clustered, aspicilioid and sunken in the thallus; disc pale orange-pink to ± translucent pale greyish, widely exposed, smooth, persistently concave; proper excipulum entire, extending slightly above the level of the disc and thallus and forming a collar, concolorous with the thallus or a little darker at the inner edge, in section ± cupulate, poorly differentiated from adjacent tissues, 20–50 µm thick at the sides, colourless but frequently densely inspersed with orange-brown granules that do not dissolve in K, especially at the edges, lacking photobiont cells. *Hypothecium* colourless, 40–60(–140) µm thick, not inspersed. *Hymenium* 60–90 µm thick, colourless but typically overlain by a granular, orange epithecial layer *c.* 10 µm thick; no blue-green pigments present. *Asci* 50–75 x 15–20 µm, clavate, of the *Hymenelia*-type with a non-amyloid, well-developed tholus and lacking an ocular chamber. *Paraphyses* 1.5–2.5 µm thick, simple, with apices mostly not enlarged

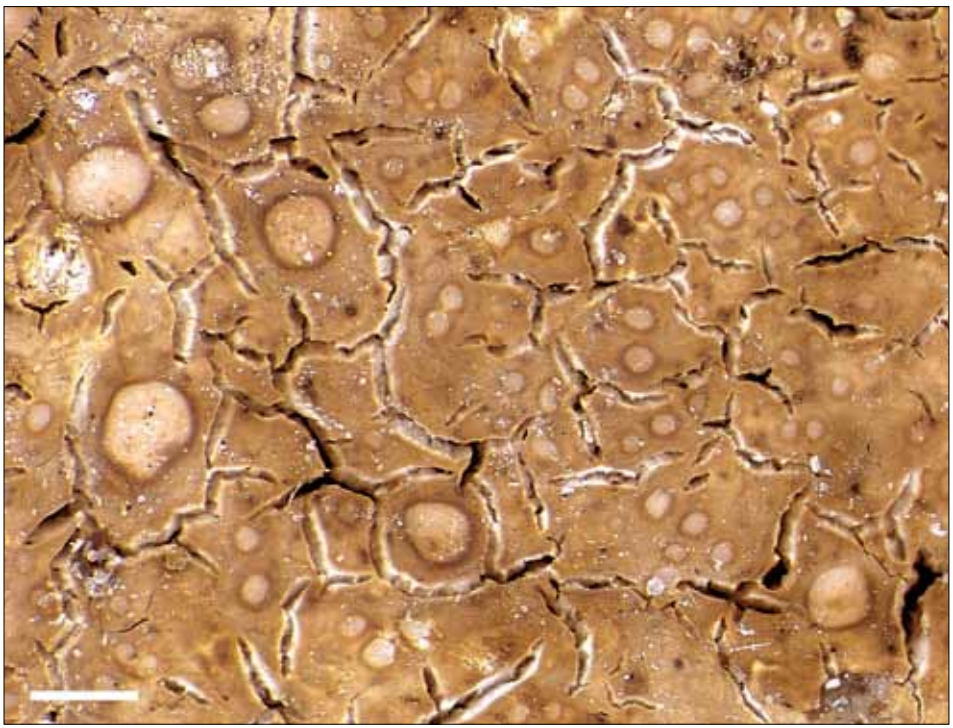

**Fig. 6.** *Hymenelia lacustris* habit.
Scale = 0.5 mm

but the apical cell sometimes 3–4 µm wide. *Ascospores* ellipsoid, hyaline, thin-walled, halonate, (9–)10–*13*.3–16(–17) x 5–*6.8*–8 µm. *Pycnidia* occasional, scattered, immersed in the thallus, visible as slightly more heavily orange-pigmented specks resembling incipient apothecia. *Conidia* bacilliform, 4–6 x 1 µm. *Chemistry*: no substances detected. (**Figs 5**C & **6**)

**REMARKS:** This lichen is intimately associated with aquatic habitats, occurring on siliceous rocks in flowing streams where it is seasonally inundated. It is poorly represented in herbarium collections but is possibly widespread, although not common, in Tasmania. The species is recognised by the pale to bright orange thallus, which forms extensive patches or mosaics with other lichens on large cobbles and bedrock in rivers, and its aspicilioid apothecia that resemble a shallow, pale crater with a distinct rim. The former character must be considered with caution, however, as several other taxa in the same habitat may have an orange thallus when growing in or near flowing water. The species most likely to be confused with *H. lacustris* is *Poeltiaria tasmanica* Fryday with which it forms mosaics. When growing

in water, this species has a bright orange thallus and develops rather immersed apothecia with a reduced excipulum. It differs in that its apothecial disc is dark brown to black and is frequently gyrose or umbonate, and it has *Porpidia*-type asci.

**SPECIMENS EXAMAINED:** Tasmania: Arve River above Arve Falls, 43°13'S 146°46'E, 1993, *P.M. McCarthy* 613 *& G. Kantvilas* (MEL); Meander River, 41°42'S 146°42'E, 1993, *P.M. McCarthy* 660, 661 *& G. Kantvilas* (MEL); Huon River at Tahune picnic area, 43°06'S 146°44'E, 1993, *P.M. McCarthy* 622 *& G. Kantvilas* (MEL); Huon River near Riveaux Rapids, 43°06'S 146°40'E, 60 m alt., 2003, *G. Kantvilas* 74/03 (HO); Macquarie River at Colonels Marsh, 42°10'S 147°49'E, 370 m alt., 2009, *G. Kantvilas* 25/09 (HO); Huon River near confluence with Picton River, 43°06'S 146°43'E, 50 m alt., 2013, *G. Kantvilas* 4/13 (HO).

### ***Tremolecia atrata* (Ach.) Hertel**

*Ergebn. Forsch. Unternehmens Nepal Himal.* 6: 351 (1977); *Gyalecta atrata* Ach., *Kongl. Vetensk. Akad. Nya Handl.* 29: 229 (1808); *Lecidea dicksonii* auct.

*Thallus* dark orange-red to rusty red-brown, areolate, deeply cracked, to *c.* 250 µm thick, undelimited or with a thin, black marginal prothallus, forming irregular patches to *c.* 1 cm wide, often coalescing or forming mosaics with other lichens; medulla white, I–, K/I–; photobiont a unicellular green alga with individual cells globose to subglobose, 7–14 x 6–13 µm. *Apothecia* 0.2–0.5 mm wide, round to rather angular or lobate when crowded together, sunken in the thallus and ± aspicilioid, rarely sessile; disc black, widely exposed, smooth, persistently concave; proper excipulum entire, extending slightly above the level of the disc and thallus, black or in part rusty red and concolorous with the thallus, in section cupulate, 40–70(–90) µm thick at the sides, opaque dark brown, sometimes a little paler within. *Hypothecium* colourless to pale brown, 10–40 µm thick. *Hymenium* 70–90 µm thick, colourless, typically with a grey-green epithecium *c.* 10 µm thick, K+ intensifying greenish, N+ crimson. *Asci* 42–60 x 11–21 µm, clavate, of the *Tremolecia*-type with a very weakly amyloid, well-developed tholus with a thin, external amyloid cap, and lacking an ocular chamber. *Paraphyses* 1.5–2 µm thick, sparsely branched and anastomosing; apices neither enlarged nor pigmented. *Ascospores* ellipsoid, hyaline, thin-walled, non-halonate, (9–)9.5–*12.8*–15(–16) x (5–)5.5–*6.5*–7.5(–8) µm. *Pycnidia* not found in Tasmanian specimens; *conidia* reported as bacilliform, 3–6 x 1–1.5 µm. *Chemistry*: no substances detected. (**Figs 5**B & **7**)

**REMARKS:** The combination of a rusty red thallus, black aspicilioid apothecia and the unique *Tremolecia*-type asci with eight, hyaline ascospores makes this species very easily recognisable. It has a typical bipolar world distribution, occurring in the Arctic, the Antarctic and in intervening alpine areas spanning temperate and tropical latitudes. Consequently, supplementary descriptive data for the species can be found in the lichen accounts of many regions, for example, Hertel (2004), Galloway (2007) and Fletcher & Hawksworth (2009). In Tasmania, it is restricted to the highest peaks and has been recorded from the Central Plateau, the Ben Lomond Plateau and Mt Wellington. *Tremolecia atrata* grows on rather

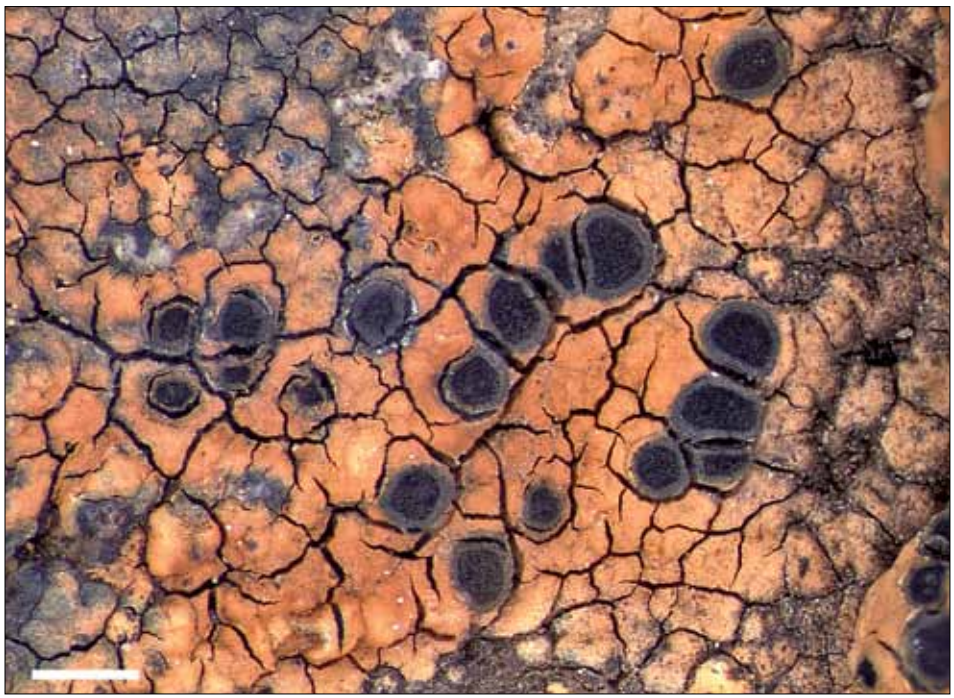

**Fig. 7.** *Tremolecia atrata* habit.
Scale = 0.5 mm

smooth, hard, very exposed rocks, and has only been collected from dolerite. It is part of a rich association of crustose lichens, dominated by *Rhizocarpon geographicum* and including *Carbonea vorticosa* (Flörke) Hertel, *Lecanora polytropa* (Ehrh.) Rabenh., *Ramboldia petraeoides* and species of *Porpidia*.

**specimens examained:** Tasmania: South Wellington Gap track, 42°55'S 147°14'E, 1000 m alt., 1964, *G.C. Bratt* 1507 *& J.A. Cashin* (HO); Mt Mawson, South Peak, 42°42'S 146°35'E, 1200 m alt., 1965, *G.C. Bratt* 2944b (HO); Ben Lomond, northern plateau, 41°36'S 147°40'E, 1972, *J. Adams* 72/1184 (HO); Mt Wellington, 42°54'S 147°14'E, 1260 m alt., 1984, *G. Kantvilas* 301/84b *& P. James* (HO); Lake Augusta Rd near Liawenee Canal. 41°53'S 146°37'E, 1140 m alt., 1999, *G. Kantvilas* 437/99 (HO); Goulds Sugarloaf, 42°04'S 146°00'E, 1425 m alt., 2005, *G. Kantvilas* 85/05 (HO); Blue Peaks, northern summit, 41°43'S 146°22'E, 1350 m alt., 2006, *G. Kantvilas* 529/06 (HO); Brown Mtn, 42°36'S 147°31'E, 780 m alt., 2007, *G. Kantvilas* 230/07 (HO); Adams Peak, 41°44'S 146°41'E, 1300 m alt., 2009, *G. Kantvilas* 8/09 (HO).

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