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Standard Paper

Imsharria orangei (*Ascomycota, Lecideaceae*), a new genus and species, and a new species of *Porpidia*, from the Falkland Islands

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Abstract

The new genus *Imsharria* is proposed for a crustose species found on or near mountain summits on the Falkland Islands. It is separated from other genera of *Lecideaceae* by a combination of *Porpidia*-type asci, halonate ascospores, immersed apothecia and a hyaline hypothecium, and forms a distinct branch in the phylogenetic analysis using the markers nrITS and mtSSU. The single species, *I. orangei*, is characterized by its innate apothecia with a brown disc and a thallus containing norstictic acid and an amyloid (I+ violet) medulla. In addition, *Porpidia imshaugii* is described for a species from the Falkland Islands resembling *P. skottsbergiana* but with larger ascospores, and *Porpidia navarina* is shown to belong in the genus *Poeltiaria*, with the new combination *Poeltiaria navarina* being made. A key to the *Lecideaceae* on the Falkland Islands is provided.

Keywords: *Amygdalaria*; *Immersaria*; lichen; phylogenetic analysis; *Poeltiaria*; porpidioid genera; *Schizodiscus*; southern subpolar region; *Xenolecia*

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Introduction

The family *Lecideaceae* Chevall. (Chevallier 1826; as '*Lecideae*') was originally erected for all crustose lecideoid genera but now includes only those genera with simple hyaline ascospores and a *Lecidea* or *Porpidia*-type ascus structure. The genera having an ascus with an amyloid tube structure (*Porpidia*-type), halonate ascospores, and branched and anastomosing paraphyses were formerly included in the family *Porpidiaceae* Hertel & Hafellner (Hafellner 1984). However, Buschbom & Mueller (2004) showed that '*Porpidiaceae*' was not monophyletic unless *Lecideaceae* was also included and, as *Lecideaceae* is the earlier name, they included *Porpidiaceae* in the synonymy of *Lecideaceae*. This synonymy was confirmed by Miadlikowska *et al.* (2006), who also demonstrated that the family should be removed from *Lecanorales* and included it in *Lecanoromycetidae* without being assigned to an order. Schmull *et al.* (2011) resurrected the order *Lecideales* Vain. within the *Lecanoromycetidae* for the family and this has been accepted by subsequent authors (Miadlikowska *et al.* 2014; Lücking *et al.* 2017; Wijayawardene *et al.* 2020).

Lecideaceae currently includes *c.* 30 genera. Lücking *et al.* (2017) list 28 but omit *Porpidinia* Timdal and include *Mycobilimbia* Rehm, which belongs in *Ramalinaceae* C. Agardh., whereas Wijayawardene *et al.* (2020) list 29 but include *Eremastrella* Vogel, which belongs in *Psoraceae* Zahlbr. In addition, the recently described *Cyclohymenia* McCune & M. J. Curtis also belongs in the family (McCune *et al.* 2017). Most of these genera, however, contain only a small number of species, with 10 genera being monotypic, and only *Lecidea* Ach. and *Porpidia* Körb. containing more than 15 species. Several of the monotypic genera were established by Hertel (1984) for species known only from the Southern Hemisphere (e.g. *Rhizolecia* Hertel, *Stephanocyclos* Hertel, *Notolecidea* Hertel) and the distinctness of some of these has been questioned (e.g. Fryday & Hertel 2014). Conversely, there is little doubt that *Lecidea* and *Porpidia*, and possibly other genera, are not monophyletic and some infrageneric groups within them should be recognized as distinct genera (e.g. the *L. auriculata*/*L. tessellata* group; Ruprecht *et al.* 2020). In addition, several genera were shown to lie outside the *Lecideaceae* by Schmull *et al.* (2011) or Miadlikowska *et al.* (2014) (e.g. *Bryobilimbia* Fryday *et al.*, *Clauzadea* Hafellner & Bellem., *Lecidoma* Gotth. Schneid. & Hertel, *Romjularia* Timdal, etc.) but are retained in the family pending further work; others display characters that do not confirm to the circumscription of the family (e.g. *Catarrhospora* Brusse, with submuriform ascospores, and *Poeltidea* Hertel, with pigmented ascospores) and it is possible that these genera also do not belong in *Lecideaceae*.

Here we describe another monotypic genus (*Imsharria*) from the southern subpolar region with a suite of characters that does not coincide with those of any known genus, and the distinctness of which was supported by molecular data. We also describe a new species of *Porpida*, make a new combination in

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Poeltiaria and include newly generated sequences of the genera *Amygdalaria* Norman, *Farnoldia* Hertel, *Poeltiaria* Hertel, *Schizodiscus* Brusse and *Xenolecia* Hertel.

Materials and Methods

This study is based upon material collected by Henry Imshaug and Richard Harris on the Falkland Islands in the austral summer of 1968–1969 and supplemented by collections made by the first author in 2015, along with additional specimens from various herbaria (Table 1).

Morphological analyses

Gross morphology was examined with a Leica MZ125 dissecting microscope and apothecial characteristics using a Leica DMLB compound microscope with a polarizing light filter on hand-cut sections mounted in water, 10% KOH (K), 50% HNO_3 (N), 50% HNO_3 with the subsequent addition of Indian ink (N/ink), or Lugol's reagent (1.5% aqueous IKI). The presence/absence of birefringent crystals is noted as POL+/POL−, respectively. Thallus sections were investigated in water, K and Lugol's reagent. Ascospore measurements of the new species are given as (minimum–)*mean* ± standard deviation(–maximum), where *n* is the number of measurements. Photomicrographs were taken with a Sony Cyber-shot DSL HX100V camera attached to the phototube of either the dissecting or compound microscope. Thalline chemistry was investigated by standard spot tests and by thin-layer chromatography following the methods of Orange *et al.* (2001). Nomenclature of apothecial pigments follows Meyer & Printzen (2000).

DNA-amplification, sequencing and phylogenetic analyses

Total DNA was extracted from individual thalli using the DNeasy Plant Mini Kit (Qiagen) following the manufacturer's instructions. The lichen material (*c.* 2–3 mm^2) was scraped off with a sterilized scalpel from the centre of the thallus and included apothecia.

The internal transcribed spacer regions of mycobiont nuclear ribosomal DNA (nrITS) and the mitochondrial small subunit (mtSSU) were amplified and sequenced using the following primers: ITS1F (Gardes & Bruns 1993), ITS1 and ITS4 (White *et al.* 1990) for nrITS, and CU6 (https://nature.berkeley.edu/brunslab/tour/primers.html), mrSSU1 (Zoller *et al.* 1999), mtSSU for2 and mtSSU rev2 (Ruprecht *et al.* 2010) for mtSSU. PCR conditions followed Ruprecht *et al.* (2020). The PCR mix contained 0.5 units of GoTaq DNA polymerase, 0.2 nM of each of the four dNTPs, 0.3 µM of each primer and *c.* 1 ng genomic DNA. The unpurified PCR products were sent to Eurofins Genomics/Germany for sequencing (single direction).

In order to be able to phylogenetically distinguish the new genus *Imsharria*, sequences of the closest related genera based on the phylogeny of Ruprecht *et al.* (2020), *Amygdalaria*, *Cyclohymenia*, *Farnoldia*, *Poeltiaria*, *Poeltidea*, *Porpidia* and *Xenolecia*, were downloaded from GenBank or obtained from other researchers (see Table 1, Supplementary Material Table S1 (available online) and Acknowledgements). The genus *Lecidea* was reduced to species necessary to distinguish the main infrageneric groups. Two members of the *Lecanorales*, *Carbonea vorticosa* (Flörke) Hertel and *Rhizoplaca macleanii* (C. W. Dodge) Castello, were chosen as outgroup.

The sequences of both regions were edited using Geneious Pro v. 6.1.8 (www.geneious.com), aligned both before and after concatenation with MAFFT v. 7.017 (Katoh *et al.* 2002) using preset settings (algorithm, auto select, scoring matrix, 200PAM/k = 2; gap open penalty, 1.34–0.123) on the alignment used in Ruprecht *et al.* (2020). The single nrITS and mtSSU trees were visually checked for incongruency using a bootstrap value of > 85%.

The final data matrix of the phylogeny comprised 54 concatenated sequences of the markers nrITS (54) and mtSSU (37) with a length of 1269 characters. The phylogenetic tree inferences were carried out in two partitions (nrITS: 1–570, mtSSU: 571–1269) using a maximum likelihood (ML) approach on the IQ-TREE web server (Trifinopoulos *et al.* 2016) with default settings (ultrafast bootstrap analyses, 1000 BT alignments, 1000 max. iterations, min. correlation coefficient: 0.99, SH-aLRT branch test with 1000 replicates). The best-fit models for each partition were selected with the implemented model finder (Kalyaanamoorthy *et al.* 2017) of the program IQ-TREE according to BIC. The best models were TIM2e + I + G4 for nrITS and TPM2 + F + I + G4 for mtSSU. Phylogenetic relationships were also inferred using a Bayesian approach as implemented in the software MrBayes v. 3.2. (Ronquist & Huelsenbeck 2003). The analysis was also performed in two partitions assuming the general time reversible model of nucleotide substitution, including estimation of invariant sites and a discrete gamma distribution with six rate categories (GTR + I + Γ; Rodriguez *et al.* 1990). Two runs with 2 million generations (standard deviation of split frequencies: 0.0082), each starting with a random tree and employing four simultaneous chains, were executed. Every 1000th tree was saved into a file. Subsequently, the first 25% of trees was deleted as the 'burn-in' of the chain. A consensus topology with posterior probabilities for each clade was calculated from the remaining 1501 trees.

Both phylogenetic approaches retrieved similar topologies, therefore only the Bayesian tree was visualized with the program FigTree v. 1.4.3 (Rambaut 2014).

Results

Phylogenetic analyses

The backbone of the phylogeny is not supported, but several main groups/branches can be recognized (Fig. 1). Most of the species of the genus *Lecidea* form one well-supported group, whereas another well-supported group is formed by the genus *Xenolecia*, represented by the type species *Xenolecia spadicomma* (Nyl.) Hertel, together with newly generated sequences of the genus *Poeltiaria* (*P. coromandelica* (Zahlbr.) Rambold & Hertel, *P. navarina* (U. Rupr. & Türk) U. Rupr. & Fryday and *Poeltiaria* sp., an undescribed species from Tasmania). *Poeltiaria tasmanica* Fryday, which was described in *Poeltiaria* because of its hyaline hypothecium but which differs from the other three species of the genus included here in having innate, ±gyrose apothecia, is separated in an unresolved position. Unfortunately, fresh material of the type species of *Poeltiaria* (*P. turgescens* (Körb.) Hertel) was not available for sequencing. Another well-supported and heterogeneous group is dominated by species of the genus *Porpidia*. This includes the *Porpidia speirea* group, which is presumed to represent *Porpidia* s. str. (see 'Discussion' below) but also includes the species *Lecidea auriculata* Th. Fr, *L. tessellata* Flörke and *Cyclohymenia epilithica*

Table 1. Voucher information of taxa in *Lecideaceae* for the newly generated sequences of the markers nrITS and mtSSU.

Species name	Voucher ID	Country	Region	Area	Coordinates	Altitude (m a.s.l.)	Determiner	Collection date	Herbarium	Sequence ID	ITS	mtSSU
Amygdalaria consentiens (Nyl.) Hertel, Brodo & Mas.Inoue	*Svensson* 3572	Sweden	Torne Lappmark	Rohččevárri	68.45664°N, 18.13707°E	525	M. Svensson	2019-07-31	UPS	Svensson_3572	OR889960	OR889988
A. pelobotryon (Wahlenb. ex Ach.) Norman	*Nordin* 8002	Sweden	Jämtland	Åre	63.4105°N, 12.93491°E	—	A. Nordin	2016-08-23	UPS	UPSL796400	OR889959	OR889987
Cyclohymenia epilithica McCune & M. J. Curtis	*McCune* 37673	Canada	British Columbia	Quadra Is.	50.21931°N, 125.154W	68	B. McCune	2018-06-20	OSC	McCune_37673	OR889961	OR889990
Farnoldia sp.	*Wheeler* 5730	USA	Montana	Fergus Co.	46.857899°N, 109.5130036°W	1555	T. Wheeler	2012-04-23	hb. Wheeler	TW005	OR889973	—
Imsharria orangei Fryday & U. Rupr. sp. nov. (holotype)	*Fryday* 11384	Falkland Is.	West Falkland	Mt Adam	52.5745°S, 60.0738°W	620	A. Fryday	2015-11-07	MSC	AF11384	OR889969	OR889996
Lecidea lapicida (Ach.) Ach.	UR00402	Austria	Salzburg	Hexenküche	47.13045°N, 12.81416799°E	2080	U. Ruprecht	2016-06-28	SZU	UR00402	OR889965	OR889993
L. silacea (Hoffm.) Ach.	UR00271	Austria	Salzburg	Ferleiten	47.16603°N, 12.81459°E	1169	U. Ruprecht	2016-06-27	SZU	UR00271	OR889966	OR889994
Poeltiaria coromandelica (Zahlbr.) Rambold & Hertel	*Kantvilas* 13/20	Australia	Tasmania	Mt Ophel	41°49’S, 146°18’E	1350	G. Kantvilas	2020-08-01	HO	Kantvilas_13/20	OR889968	—
P. tasmanica Fryday	*Kantvilas* 04/19	Australia	Tasmania	Platform Peak	42°42’S, 147°03’E	970	G Kantvilas	2019-02-10	HO	Kantvilas_04/19	OR889967	OR889995
Poeltiaria sp.	*Kantvilas* 44/16	Australia	Tasmania	Snowy Range	42°56’S, 146°40’E	1180	G. Kantvilas	2016-04-24	HO	Kantvilas_44/16	OR889970	—
Porpidia carlottiana Gowan	*Fryday* 11199	USA	Alaska	Mitkof Is.	56.5673°N, 132.5884°W	27	A. Fryday	2015-07-12	MSC	AF11199	OR889963	OR889991
P. cf. *diversa* (J. Lowe) Gowan	*Fryday* 10698	USA	Alaska	Mitkof Is.	56.588°N, 132.809° W	710	A. Fryday	2014-09-02	MSC	AF10698	OR889958	OR889986
P. macrocarpa (DC.) Hertel & A. J.Schwab	UR00254	Austria	Salzburg	Ferleiten	47.16603°N, 12.81459°E	1169	R. Türk	2016-06-27	SZU	UR00254	OR889964	OR889989
P. tuberculosa (Sm.) Hertel & Knoph	*Fryday* 11080	Falkland Is.	East Falkland	Lafonia	51.990196°S, 59.278492°W	5	A. Fryday	2015-02-02	MSC	AF11080	OR889962	OR889992
Schizodiscus afroalpinus Brusse (isotype)	*Brusse* 4523	South Africa	Kwa-Zulu/ Natal	Mont-aux-Sources	28.760°S, 28.885°E	3080	F. Brusse	1986-01-21	UPS	Brusse_4523	OR889972	—
S. afroalpinus Brusse	*Brusse* 4593	South Africa	Eastern Cape	Naude’s Nek	30.730°S, 28.135°E	2500	F. Brusse	1986-01-26	UPS	Brusse_4593	OR889971	—

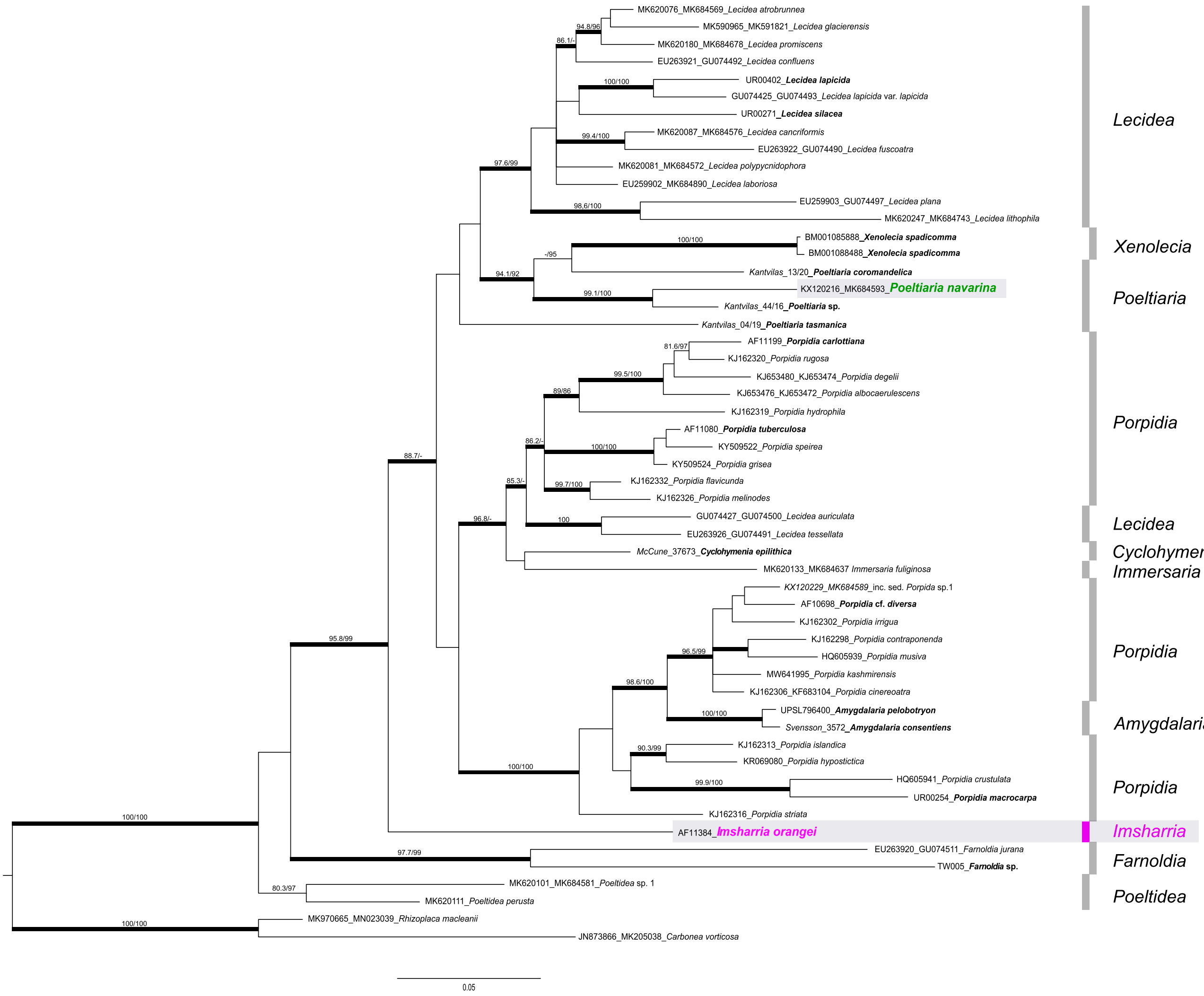

Figure 1. Phylogeny of concatenated nrITS and mtSSU sequences including the genera *Amygdalaria*, *Cyclohymenia*, *Farnoldia*, *Immersaria*, *Lecidea, Poeltiaria*, *Poeltidea*, *Porpidia* and *Xenolecia* (*Lecideaceae*), with the newly described genus/species *Imsharria orangei* (shaded box, marked in pink). *Poeltiaria navarina* (formerly *Porpidia navarina*) is marked in green (shaded box). The labels of the newly added sequences are in bold. The bootstrap values (ML analyses: SH-aLRT ≥ 80%/UFboot ≥ 95%) were directly mapped onto the Bayesian tree; branches with posterior probability values ≥ 0.95 are depicted in bold. In colour online.

McCune & M. J. Curtis, as well as *Immersaria fuliginosa* Fryday. The specimen from which the *I. fuliginosa* sequence was obtained was previously erroneously identified as *Lecidea kalbii* Hertel by Ruprecht *et al.* (2020). Also highly supported is another heterogeneous group formed by the remaining species currently included in *Porpidia*, with two species of the genus *Amygdalaria* nested within them. The new genus *Imsharria* forms a distinct lineage basal to the aforementioned groups, with the genera *Farnoldia* and *Poeltidea* Hertel & Hafellner at the base of the phylogeny.

Taxonomy

Imsharria Fryday & U. Rupr. gen. nov.

MycoBank No.: MB 852049

Distinguished from other genera of *Lecideaceae* by its *Porpidia*-type asci, hyaline hypothecium, halonate, thick-walled ascospores and its distinct, isolated phylogenetic position (nrITS and mtSSU).

Type species: *Imsharria orangei* Fryday & U. Rupr.

As this is a monotypic genus, the description below constitutes the generic description.

Etymology. The name commemorates Henry Imshaug and Richard Harris who, in the austral summer of 1968–1969, made the largest ever collection of lichens from the Falkland Islands, including several specimens of the new genus described here. Although all the collections were given Imshaug collection numbers, Imshaug's collection books, which are preserved at MSC, indicate that both Imshaug and Harris each collected several specimens of the new genus.

Imsharria orangei Fryday & U. Rupr. sp. nov.

MycoBank No.: MB 852050

Similar to *Lecidea lygomma* Nyl. in having innate apothecia, a thallus containing norstictic acid, and simple ascospores, but differing in the *Porpidia*-type asci, branched and anastomosing paraphyses, hyaline hypothecium, thick-walled halonate ascospores, and an amyloid (I+ violet) medulla.

Type: Falkland Islands, West Falkland, Hill Cove, Mt Adam, 51.5752°S, 60.0750°W, 620 m, stone run above tarn in SW cirque, 7 November 2015, *Fryday* (11384) & *Orange* (MSC—holotype; E—isotype).

(Figs 2 & 3)

Thallus effuse, thin (0.1–0.2 mm thick), white to blue-grey, the peripheral 0.5–1.0 mm usually paler than the rest of the thallus, areolate on a black prothallus, marginal prothallus distinct, black, 0.1–0.2 mm wide; *areoles* 0.1–0.3 mm across, flat to slightly concave; *upper cortex c.* 50–60 µm thick, hyaline except for the upper 12–20 µm which is pigmented blue-black (N+ red, Cinereorufa-green), composed of vertically aligned septate hyphae 2.0–2.5 µm wide, swelling at the surface to 4–5 µm wide with the upper *c.* 5 µm of each hypha pigmented blue-black (N+ red, Cinereorufa-green); all parts POL+; *medulla* composed of loosely interwoven hyaline hyphae, 25–100 µm deep, extending up into the photobiont layer, I+ violet. *Photobiont* chlorococcoid, cells 9–15 µm diam. with thick hyaline walls, not forming a continuous layer, arranged in clumps 25–50 µm across.

Apothecia lecideine, deeply immersed (below the thallus surface) with a concave brown disc usually surrounded by a crack 0.5–0.8 mm wide separating it from the thallus, occasionally the area adjacent to the apothecium also including some thallus, initially ±orbicular (0.4–0.6 mm diam.) becoming irregular to elongate in outline and sometimes even slit-like (0.6–0.7 × 0.1–0.3 mm); *proper margin* thin and raised, 0.03–0.05 mm wide, black or grey, becoming slightly inrolled over the disc with a white inner edge. In section, *proper exciple* very thin, 20–30 µm wide, composed of swollen, vertically aligned hyphae 4–5 µm wide, inner part (adjacent to the hymenium) hyaline, outer part and surface cells dark blue-back (N+ red, Cinereorufa-green), the amount of pigment directly correlated with the degree of exposure, upper cells overlain by a thin epinecral layer of dead hyaline cells 5–10 µm thick, annular, extending vertically down into the medulla. *Hymenium* 100–125 µm tall, merging into the hypothecium; *paraphyses c.* 2.0–2.5 µm wide, sparingly branched and anastomosing, septate, sometimes constricted at the septum, slightly swollen at the apex to 3.0 µm wide with a brown cap, occasionally moniliform; *epihymenium* brown (K−, N+ red-brown), 15–20 µm tall; *subhymenium* absent. *Hypothecium* hyaline, 70–150 µm tall, composed of randomly aligned hyphae, not easily distinguishable from the hymenium; POL−. *Ascus Porpidia*-type, cylindrical, *c.* 70–90 × 15–20 µm becoming clavate (25 µm wide) when mature; *ascospores* simple, ellipsoid, thick walled (*c.* 1 µm), hyaline, with an inconspicuous perispore in water or K but swelling to up to 5 µm in N, (11–)*14.25* ± 2.379 (−20) × (6–)*8.50* ± 1.314(−10) µm, l/w ratio *1.70* ± 0.273 ($n = 12$).

Conidiomata not observed.

Chemistry. K+ red (needle-shaped crystals in section), C−, Pd+ yellow; norstictic acid by TLC.

Etymology. The specific epithet commemorates the British lichenologist Alan Orange, who visited the Falkland Islands on three occasions, describing several new species and making many other important contributions to our knowledge of the lichen biota of the islands. Alan loved the wild, untamed solitude of the islands and his premature death in early 2023 was a tragic loss.

Distribution and ecology. The new genus is so far known only from the Falkland Islands, where it occurs on siliceous rock stone runs and feldmark, usually at or near mountain summits (Fig. 4).

Remarks. The new species is characterized by its thallus containing norstictic acid and with an amyloid (I+ violet) medulla, innate, brown apothecia, *Porpidia*-type asci and a hyaline hypothecium. Macroscopically, it resembles *Lecidea lygomma* but that species usually has a paler thallus and black apothecia. In the field it is readily separated from other crustose species by its sunken apothecia with a brown disc and the grey thallus having a conspicuous paler zone at the margin (Fig. 2D).

Additional specimens examined (all MSC). **Falkland Islands:** *East Falkland*: Darwin, Mt Usborne, 1968, *Imshaug* (39924, 39936, 39938, 39939, 40008, 40097) & *Harris*; Stanley, Mt Kent, 1968, *Imshaug* (40438) & *Harris*. *West Falkland*: Port Howard, Mt Maria, 1969, *Imshaug* (41371, 41415, 41423) & *Harris*; Hill Cove, Mt Adam, 2015, *Fryday* (11383) & *Orange* (topotype).

Porpidia imshaugii Fryday sp. nov.

MycoBank No.: MB 852051

Similar to *P. skottsbergiana* but with larger (*c.* 20 ×10 µm) ascospores.

Type: Falkland Islands, West Falkland, Port Howard, outcrops on pass SW of Mt Maria summit, 1968, *Imshaug* (41289) & *Harris* (MSC0015300—holotype).

(Fig. 5)

Thallus effuse, thick, 0.1–0.2 mm, white, often oxidated orange, areolate; *areoles* contiguous, irregular, 0.3–0.5 mm across, flat to slightly convex; *medulla* I−. *Photobiont* chlorococcoid, cells 9–12 µm diam.

Apothecia black lecideine, sessile, not or only very slightly constricted below in mature apothecia, 0.7–0.9 mm diam.; *proper margin* smooth, persistent and slightly raised, 0.1 mm wide; *disc* grey pruinose in young apothecia with inner edge of margin remaining slightly pruinose in mature apothecia. *Proper exciple* cupular, *c.* 100 µm wide, but poorly developed below the hypothecium, composed of radiating cellular hyphae *c.* 4–5 µm wide; *cortex c.* 10–15 µm thick, orange-brown pigmented (N+ red-brown); *cortical cells* 5 µm diam.; *medulla* pale brown to almost hyaline, becoming darker brown towards the hypothecium. *Hymenium* 110–120 µm; *paraphyses* slender, *c.* 1 µm wide, sparingly branched and anastomosing, distinctly swollen at the apex, 5–7 µm wide, conglutinate at epihymenium; *epihymenium* diffuse, dilute brown (N+ orange-brown) with minute granules, 10–15 µm tall; *subhymenium* hyaline, 25–35 µm tall. *Hypothecium* dark orange-brown, 75–100 µm tall, composed of randomly orientated hyphae, merging into the cupular exciple below. *Ascus Porpidia*-type, cylindrical, *c.* 80–90 × 10–25 µm, becoming clavate and 25–35 µm wide when mature; *ascospores* simple, hyaline, distinctly halonate, perispore swelling in K to 5 µm thick (16–)*19.33* ± 2.146(−23) × (9–)*9.67* ± 0.778(−11) µm, l/w ratio 1.71 ± 1.12.

Conidiomata not observed.

Chemistry. K−, C−, KC−, Pd−, UV+ dull white; no substances detected by TLC.

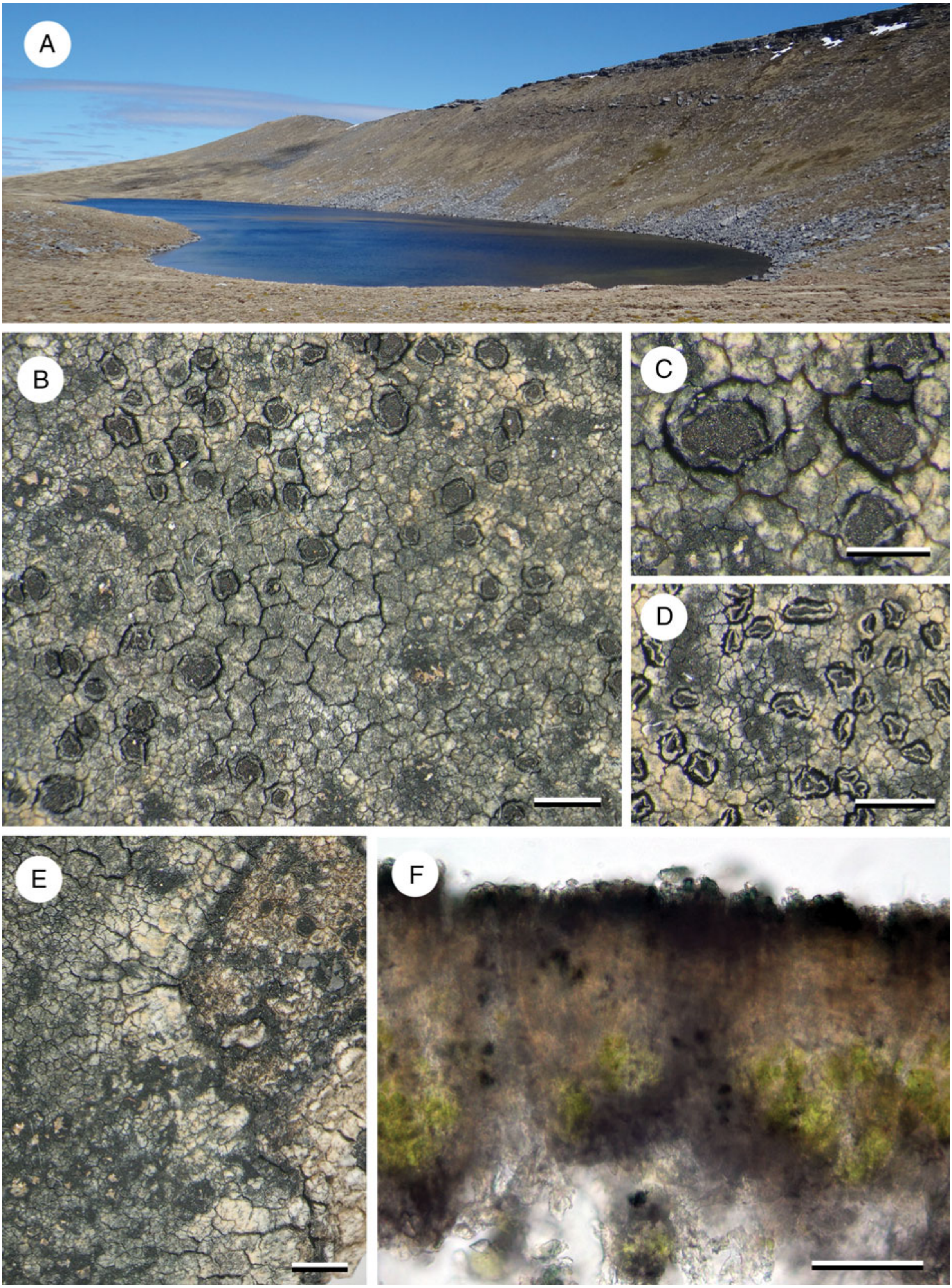

Figure 2. Habitat and thallus characters of *Imsharria orangei* (A–C, E & F, holotype; D, *Imshaug* 39924). A, locality of the holotype collection; *Imsharria orangei* was collected from rocks to the right of the lake. B, thallus and apothecia. C, round apothecia. D, elongate apothecia (*Imshaug* 39924). E, thallus margin showing paler zone and black prothallus. F, thallus section showing interrupted algal layer. Scales: B, D & E = 1 mm; C = 0.5 mm; F = 100 μm. In colour online.

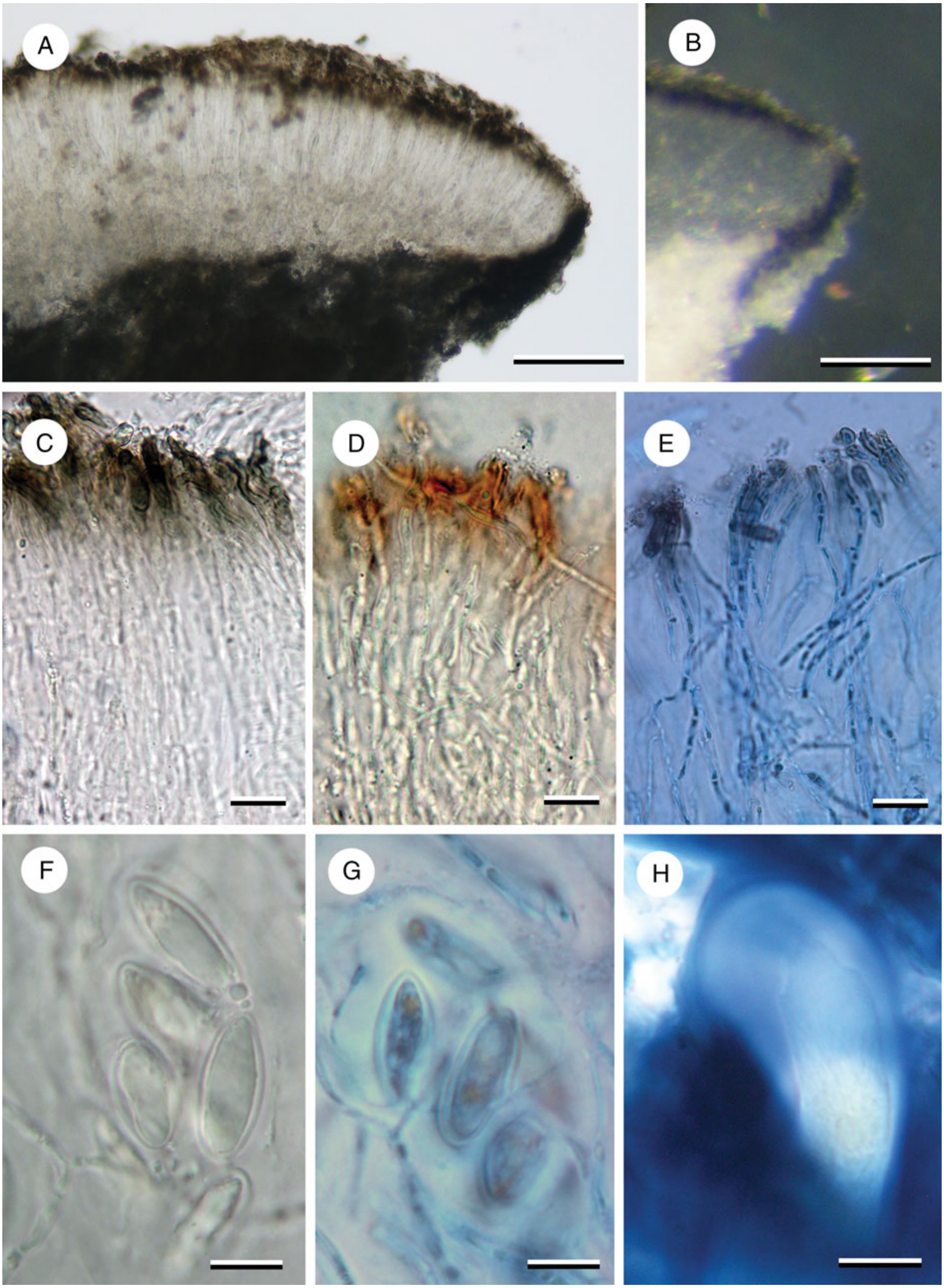

Figure 3. Apothecial characters of *Imsharria orangei* (A & B, D–H, *Imshaug* 40008; C, holotype). A, apothecium section. B, apothecium section under incident light showing annular exciple. C–E, paraphyses (C in water; D in N; E in N/ink). F & G, ascospores (F in water; G in N/ink showing perispore). H, ascus in IKI. Scales: A & B = 100 μm; C–H = 10 μm. In colour online.

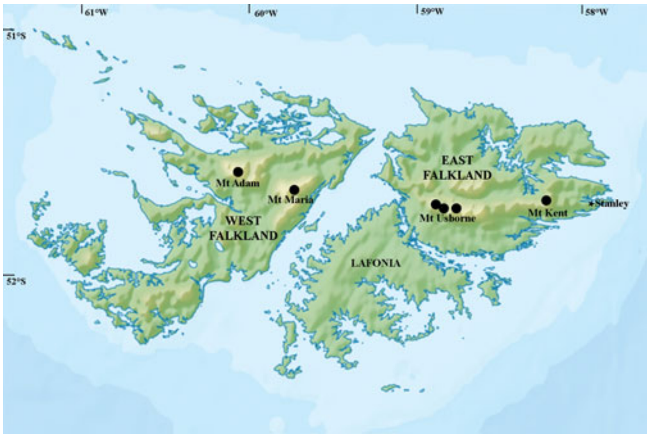

Figure 4. Distribution of *Imsharria orangei* (black filled circles). In colour online.

Etymology. Named in honour of Dr Henry Imshaug, who collected lichens extensively on the Falkland Islands.

Distribution and ecology. Known only from the Falkland Islands, where it is reported only from near the summit of Mt Maria on West Falkland. No other lichens are present on the single collection of the new species but collected from the same locality were *Cladia aggregata* (Sw.) Nyl., *Lithographa graphidioides* (Cromb.) Imshaug ex Coppins & Fryday, *Pertusaria salacinifera* Messuti & A. W. Archer, *Thamnolia vermicularis* (Sw.) Schaer. and *Topeliopsis macrocarpa* (C. W. Dodge) Mangold.

Remarks. Closely related to *P. skottsbergiana* Hertel, which has smaller ascospores (13–)*15.0* ± 1.13(–17) × (6–)*7.16* ± 1.03(–9) µm. The new species and *P. skottsbergiana* are anomalous within *Porpidia* for their ascospores with a thick perispore and the orange-brown hypothecium. They possibly represent a distinct genus but unfortunately molecular data are not available because of the age of the specimens.

A lichenicolous fungus with abundant paraphyses and (1–)3-septate, hyaline ascospores *c.* (12–)15 × 4–5 µm is present on the thallus of the holotype. It probably represents an undescribed species of *Sagediopsis* close to *S. dissimilis* Triebel, which was described growing on *Paraporpidia leptocarpa* (Nyl.) Rambold & Hertel in Australasia (Triebel 1993) and has 0–1-septate ascospores, (7.5–)8–10.5(–12) × (4–)4.5–6(–6.5) µm.

Comparative collections of P. skottsbergiana *examined.* **South Georgia:** Cumberland Bay, 500 m a.s.l, 1902, *C. Skottsberg* 92 (S—holotype).—**Falkland Islands:** *East Falkland*: Mt Usborne, on windward side of Mt Usborne 1 summit, [−51.694, −58.83467], 2300 ft, 1968, *Imshaug* 39957 (MSC0111547).

Poeltiaria navarina (U. Rupr. & Türk) U. Rupr. & Fryday comb. nov.

MycoBank No.: MB 852051

Basionym: *Porpidia navarina* U. Rupr. & Türk, in Ruprecht *et al.*, *Herzogia* **29**(2/1), 606 (2016); type: Chile, Tierra del Fuego, Isla Navarino, Cerro Bandera, 54.973165°S, 67.642288°W, 671 m a.s.l., 1 February 2015, *U. Ruprecht* UR00020 (SZU—holotype).

Remarks. As mentioned above, *Porpidia navarina* was included in the *Poeltiaria* clade of our phylogeny and so it is transferred here to *Poeltiaria*. In fact, *P. navarina* is morphologically very similar to *Poeltiaria corralensis* (Räsänen) Hertel, differing primarily in the secondary metabolites produced: stictic acid chemosyndrome in *P. navarina* (Ruprecht *et al.* 2016), no substances or porphyrilic acid in *P. corralensis* (Rambold 1989).

Discussion

The newly described genus is clearly distinguished from other genera of the heterogeneous family *Lecideaceae* by both morphological and phylogenetic characters (Figs 1–3). Specimens of this genus were initially provisionally assigned to the monotypic South African genus *Schizodiscus* (Brusse 1988): the two genera are similar in having *Porpidia*-type asci, an unpigmented hypothecium and, in some specimens of *Schizodiscus*, ascospores with a very thin or non-existent perispore. Brusse (1988) originally described *Schizodiscus* as having non-halonate ascospores but later (Brusse 1991) amended his description of the genus to include specimens with halonate ascospores. The only collections of this genus available for molecular study were isotypes of the type species, *S. afroalpinus* Brusse, which were collected in 1986 (Brusse 1988). Fortunately, our colleague Björn Owe-Larsson was able to obtain an ITS sequence from the isotype held in the herbarium of the Uppsala Museum of Evolution (UPS). The two sequences (ITS) of the genera *Imsharria* and *Schizodiscus* have a sequence similarity of 75% and are therefore not closely related. However, important morphological characters such as the *Porpidia*-type ascus and a hyaline hypothecium are shared not only by *Imsharria* and *Schizodiscus* but also by species of the genus *Poeltiaria*, although species of this genus can be distinguished morphologically by their sessile apothecia and ascospores with a well-developed, conspicuous perispore. Several recent collections of this genus from Tasmania were made available to us by Gintaras Kantvilas and the inclusion of sequences from these specimens in our phylogeny showed that our new species was unrelated to *Poeltiaria* (Fig. 1).

As mentioned above, previous phylogenies (e.g. Buschbom & Mueller 2004; Miadlikowska *et al.* 2006) have often shown species of *Lecidea* nested within *Porpidia*, or the two genera intermixed (e.g. Schmull *et al.* 2011; Miadlikowska *et al.* 2014), resulting in *Porpidiaceae* being reduced to synonymy with the *Lecideaceae*. However, our phylogeny indicates that the vast majority of *Lecidea* species (including the type species, *Lecidea fuscoatra* (L.) Ach.) form a strongly supported clade distinct from species of *Porpidia* and other genera with a *Porpidia*-type ascus (e.g. *Amygdalaria*, *Immersaria* Rambold & Pietschm., *Poeltiaria*, *Xenolecia*), with only two *Lecidea* species (*L. auriculata* Th. Fr. and *L. tessellata* Flörke) resolving with a group of *Porpidia* species that includes the clade that presumably represents *Porpidia* s. str. The type species of *Porpidia* is *P. trullisata* (Kremp.) Körb., a rare species for which sequence data are unavailable but which is morphologically very similar to *P. speirea*. Our phylogeny also indicates that *Porpidia* is not monophyletic. There are two large clades containing *Porpidia* species that are separated in the phylogeny with at least two other genera, *Cyclohymenia* and *Immersaria*, included in one clade and *Amygdalaria* in the other, making this clade paraphyletic.

Backbone support for our phylogeny is currently low and loci are absent for several important genera and species. We are continuing our investigation of *Lecideaceae* but are conscious of the first section of the preamble to the International Code of Nomenclature for Algae, Fungi and Plants (ICNafp), which states:

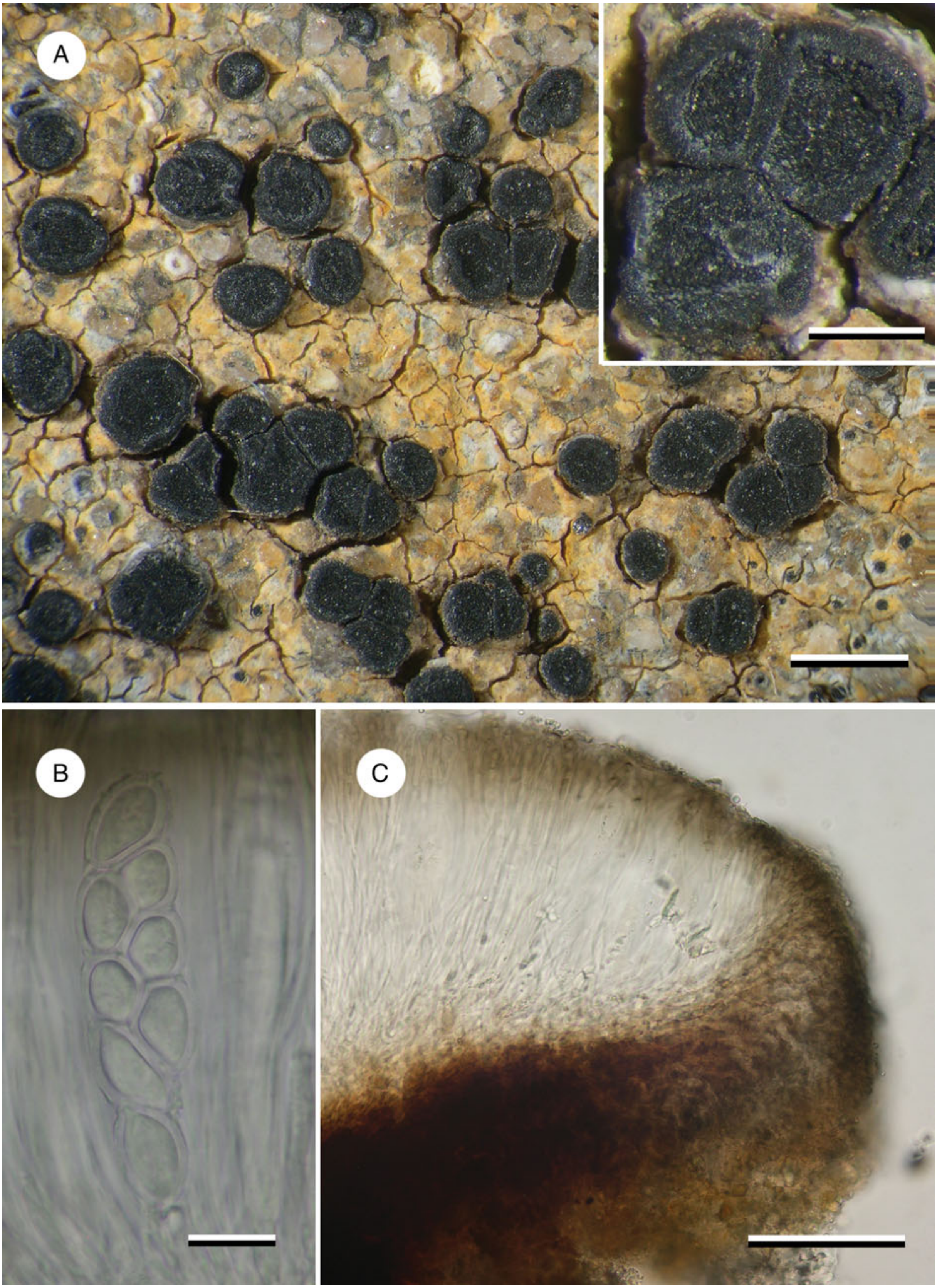

Figure 5. *Porpidia imshaugii* (holotype). A, thallus with apothecia. B, ascospores. C, exciple and hypothecium. Scales: A = 1 mm (insert = 0.5 mm); B = 20 μm; C = 50 μm. In colour online.

'This Code aims at the provision of a stable method of naming taxonomic groups, avoiding and rejecting the use of names that may cause error or ambiguity or throw science into confusion. Next in importance is the avoidance of the useless creation of names'. Consequently, to propose any further taxonomic changes on the basis of the current work would be irresponsible, almost certainly damaging to nomenclatural stability and contrary to the expressed purpose of the code.

Key to *Lecideaceae* on the Falkland Islands

Lecidea s. str. and *Porpidia* s. lat. are not keyed out to species because there are several, apparently undescribed species in these genera that will be treated elsewhere.

1 Terricolous; thallus thick, white; apothecia black, contorted . . . . **Bryobilimbia australis**
Saxicolous; thallus various but rarely thick; apothecia rarely contorted 2

2(1) Thallus with punctiform soralia, containing confluentic acid and with an amyloid (I+ violet) medulla . . . . **Porpidia tuberculosa**
Thallus not sorediate; apothecia present 3

3(2) Ascospores pigmented 4
Ascospores hyaline 5

4(3) Thallus atrobrunnea-type . . . . **Poeltidea perusta**
Thallus ±endolithic, not atrobrunnea-type . . . . **Poeltidea inspersa**

5(3) Thallus composed of brown areoles (atrobrunnea-type) on a black powdery hypothallus (thalloconidia); apothecia immersed . . . . **Immersaria fuliginosa**
Thallus otherwise; apothecia immersed or sessile 6

6(5) Apothecia immersed with thin proper margin; ascus *Porpidia*-type and hypothecium hyaline; thallus containing norstictic acid; medulla I+ violet . . . . **Imsharria orangei**
Apothecia usually sessile; if immersed then either ascus *Lecidea*-type or hypothecium dark brown 7

7(6) Ascus of *Lecidea*-type; ascospores < 15 µm long, lacking a perispore; apothecia often with a thin, flexuose margin . . . . **Lecidea**
Ascus of *Porpidia*-type; ascospores > 15 µm long, perispore present; apothecia usually ±orbicular with a thick margin . . . . **Porpidia**

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