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Validation of Henry Imshaug's "*Ochrolechia alectoronica*" (lichenised Ascomycetes, Pertusariales), with notes on *O. weymouthii* Jatta and a key to the genus *Ochrolechia* in Tasmania

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Abstract: Two species of the lichen genus *Ochrolechia* from cool temperate latitudes of the Southern Hemisphere are described and illustrated: *O. alectoronica* Imshaug ex Kantvilas & Fryday *sp. nov.*, validated on a type from Campbell Island and also occurring in Tasmania and the Auckland Islands; and *O. weymouthii* Jatta, widespread in Tasmania and the southern mainland of Australia. Both taxa are characterised by an esorediate thallus containing alectoronic acid. The southern South American species *O. blandior* (Nyl.) Darb. is a synonym of *O. weymouthii*. A key to the seven species of *Ochrolechia* occurring in Tasmania is provided.

Keywords: alectoronic acid, lichens, Southern Hemisphere, Australia, New Zealand

Introduction

In a recent review of Tasmanian collections of the large, cosmopolitan crustose lichen genus *Ochrolechia*, the first author encountered a saxicolous taxon which, at first glance and on study of the available literature, appeared to be undescribed. However, further perusal of herbarium collections revealed that this same species had been previously collected by Henry Imshaug and Richard Harris from Campbell Island and the Auckland Islands in the Southern Ocean, and distributed to various herbaria under the unpublished name "*O. alectoronica* Imshaug". This species appeared to be most similar to a corticolous taxon, originally described by the Italian lichenologist Antonio Jatta (Jatta 1910) from a specimen collected from Tasmania by resident botanist William Anderson Weymouth, better known for his contributions to bryology, and named in his honour as *O. weymouthii* Jatta. Because the type specimen of this species had been generally unavailable for study, this name was not taken up by lichenologists, nor placed into synonymy with any other species. However, we are now able to provide the first detailed description of *O. weymouthii*, based on a comprehensive range of collections. We also validate Imshaug's "*O. alectoronica*". Both taxa are considered in the context of the genus in Tasmania and an identification key is provided for Tasmanian taxa.

Materials and methods

The study is based on collections housed in the Tasmanian Herbarium, Hobart (HO) and the herbarium of Michigan State University, Lansing (MSC), with reference to selected specimens, including types, from other herbaria as indicated in the text. Anatomical observations and measurements are based on thin, hand-cut sections of the thallus and apothecia, mounted in water, 10% KOH (K), Lugol's Iodine, ammoniacal erythrosin and/or Lactophenol Cotton Blue. Calcium oxalate was detected by eluting thin-sections of the thallus and apothecia with 25% H_2SO_4 under high power magnification. Ascospore measurements are presented in the format 5th percentile–*average*–95th percentile, with outlying values in brackets and *n* signifying the number of observations. Ascospores in *Ochrolechia* can sometimes span remarkable size ranges, depending on age, and it was not uncommon to find very old, deformed spores lacking contents, or extremely thick-walled, over-mature, discoloured ascospores. Consequently, measurements were restricted to seemingly mature, well-formed ascospores with a well-defined wall to c. 2 µm thick. Chemical analyses were undertaken by thin-layer chromatography (TLC) using standard methods (Orange *et al.* 2010). Alectoronic acid, the principal compound in the two species studied, is easily detected on TLC plates when they are painted with 10% H_2SO_4 but *not* heated, showing up as a vividly

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Key to *Ochrolechia* in Tasmania

1. Thallus granular crustose to subfruticose, composed of entangled, ± terete strands and spinules which subtend or protrude from ± globose granules, containing gyrophoric acid (thallus C+ red); usually overgrowing terricolous or saxicolous bryophytes . . . . . ***O. frigida***

1: Thallus crustose, lacking strands and spinules, with or without gyrophoric acid (C+ red or C–); usually corticolous or saxicolous

2. Thallus sorediate, containing gyrophoric acid (medulla C+ red)

3. Thallus uneven, verruculose to bullate; soralia usually becoming confluent; ± exclusively alpine, scrambling over bryophytes on rocks, on the ground, or on the bases of trees . . . . . ***O. androgyna s.l.***

3: Thallus mostly smooth and even, with the soralia mostly discrete; on bark and wood from lowland to highland elevations . . . . . ***O. gyrophorica***

2: Thallus not sorediate, containing gyrophoric or alectoronic acid (medulla C+ red or C–)

4. Apothecia immersed in subglobose, thalline warts that open by 1–5 terminal pores; disc obscured; confined to highland elevations . . . . . ***O. xanthostoma***

4: Apothecia discoid and the disc exposed from an early stage; occurring across all elevations

5. Thallus saxicolous

6. Medulla of thallus and apothecial margin C+ red (containing gyrophoric acid); confined almost exclusively to coastal rocks . . . . . ***O. apiculata***

6: Medulla of thallus and apothecial margin C–, KC+ orange-pink (containing alectoronic acid); occurring in the hinterland in eucalypt woodland and heathland . . . . . ***O. alectoronica***

5: Thallus corticolous or lignicolous

7. Medulla of thallus and apothecial margin C+ red (containing gyrophoric acid as the major compound); thallus verruculose to coarsely granular; apothecia with a ± coronate margin and usually with the proper exciple visible; confined to lowland and coastal areas . . . . . ***O. africana***

7: Medulla of thallus and apothecial margin C–, KC+ orange-pink (containing alectoronic acid); thallus and apothecial margin generally smooth and the proper exciple obscured; ranging from lowland to highland elevations . . . . . ***O. weymouthii***

fluorescent, purple-blue spot. This reaction is not seen after the plate is heated.

Henry Imshaug's lichens

Henry A. Imshaug (1925–2010) is regarded as one of North America's most outstanding lichenologists (Brodo 2011). He spent most of his working life as the curator of the cryptogamic herbarium at the Michigan State University herbarium (MSC), where he assembled a major collection that, at the time of his retirement in 1990, numbered over 145,000 fully accessioned specimens, with an additional 200,000 unmounted specimens in separate research collections. The vast majority of these collections were lichens. Although his published output was meagre, his legacy is instead founded on this superb collection and the graduate students he trained in lichenology. These included the lichenologists Clifford Wetmore, Irwin Brodo and Richard Harris, and the bryologist John Engel, all of whom made enormous, globally significant scientific contributions in their specialist topics.

Imshaug's exploration of the southern subpolar region began on the Juan Fernandez Islands in 1965, included the Falkland Islands, southern Chile and Argentina (including Isla de los Estados and Tierra del Fuego), Campbell Island and Îles Kerguelen, and ended on the Auckland Islands in 1972–73. In this remarkable burst of sustained collecting, he (along with his students and co-workers, Richard Harris, Karl Ohlsson and the Tasmanian Geoff Bratt) made c. 18,000 collections of lichens (Fryday & Prather 2001). These collections are often the major, if not the only, resource of lichens from these difficult to reach areas, and it is to Imshaug's credit that his collections are superb, usually comprising a large piece of rock or bark with a well-developed specimen of the species in question. Wherever possible he also made multiple collections, many of which have been distributed to other herbaria as duplicates.

For those who have had the privilege of studying Imshaug's collections, the impression is inevitably one of amazement at how accurate many of his determinations are, often from crustose lichen groups that were poorly known at the time globally, let alone in the austral zone. He displayed a remarkable ability to uncover the correct names for his specimens, or to at least ascribe them to the names of best fit for the era. He also clearly had a unique eye for detecting novelties, giving herbarium names to over 100 taxa that have since been either validated or described as new by others (e.g., Messuti & Archer 1999; Kantvilas 2009; Fryday 2019). Validation here of his *Ochrolechia alectoronica* continues this trend.

Taxonomy

Ochrolechia alectoronica Imshaug ex Kantvilas & Fryday, ***sp. nov.***

Species saxicola, Ochrolechiae apiculatae *Verseghy similis, sed acidum alectoronicum continenti differt*.

Holotypus: New Zealand, Campbell Island: on marine and seashore rocks at base of Mt Honey, across from Beeman Station, [52.558°S 169.155'E], 31 Dec. 1969, *R.C. Harris 4974* (HO317745). **Isotypi:** MSC 0000880, OSC142473.

Mycobank number: MB841108

Thallus creamish white, bullate-papillate, with the papillae densely congested and overlapping, to c. 1 mm tall and 1.5 mm wide, or with the papillae highly reduced to almost absent, granular and rather dispersed, to 0.3 mm wide, esorediate; prothallus not developed; calcium oxalate absent or present only in very minor amounts in the medulla or apothecial pruina. Apothecia 1–2.5 mm diam., scattered; disc concave to plane, pale pink to orange-brown, thinly whitish grey pruinose; thalline margin 0.2–0.8 mm thick, inrolled, smooth to crenulate, sometimes a little radially cracked, in section hyaline, 250–650 µm thick at the sides; proper exciple highly reduced and not visible externally, in section 40–60 µm thick. Hypothecium 40–80 µm thick, hyaline. Hymenium 270–300 µm thick, sometimes inspersed with scattered oil droplets, overlain by a greyish brown, crystalline epithecial layer to 40 µm thick, sometimes transiently pale yellowish and partly dissolving in K. Asci initially 8-spored, usually with as many as 4 spores aborted at maturity, 240–300 × 40–65 µm. Ascospores (50–) 56–*67.6*–82 (–84) × (26–) 30–*38.6*–50 µm (*n* = 80), broadly ellipsoid to ovate; wall 1–2 µm thick. **Fig. 1.**

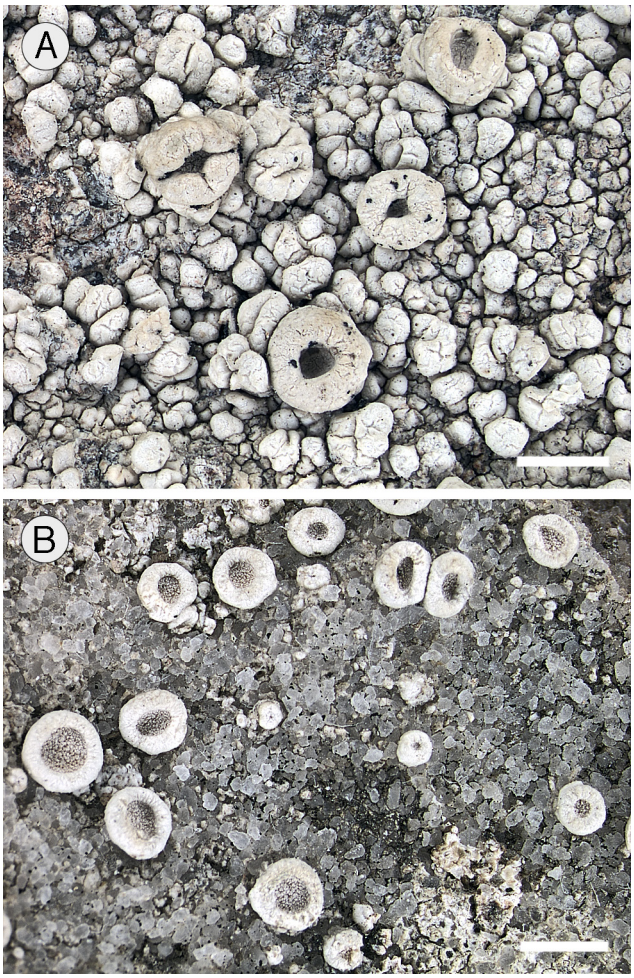

Fig. 1. ***Ochrolechia alectoronica*** habit. **A** Holotype, Campbell Island, with a highly papillate-bullate thallus and the apothecial disc partially obscured by the inrolled margin. **B** *Kantvilas 323/14* (Tasmania), with the thallus highly reduced and the apothecial disc exposed. Scales = 2 mm.

Chemistry: Alectoronic acid in the thallus and apothecial margin (medulla K–, KC+ orange-pink, C–, P–, UV+ white); gyrophoric and lecanoric acids in the apothecial disc (K–, KC+ red, C+ red, P–, UV± bluish white).

Etymology. Imshaug's specific epithet refers to the chemical composition of the species.

Remarks. *Ochrolechia* is primarily a corticolous or lignicolous genus, or occurs on organic substrata such as bryophytes and humus, and there are relatively few species that grow directly on rock; for example, see Verseghy (1962), Galloway (2007) and Kukwa (2011). In the Australasian region, the most common and widespread saxicolous taxon is *O. apiculata* Verseghy (McCarthy *et al.* 2017), which differs from *O. alectoronica* in its chemistry (gyrophoric acid, medulla C+ red) and somewhat smaller ascospores [(34–) 41–*56.5*–72 (–80) × (24–) 26–*33.5*–44 (–48) µm; this study]. In addition, calcium oxalate, which is very abundant in the thallus of *O. apiculata*, is absent or found in only very minor, scattered quantities in *O. alectoronica*. A further saxicolous taxon in Australia is the Kangaroo Island endemic, *O. insularis* Kantvilas & Elix (see Lumbsch *et al.* 2011), but this too differs from *O. alectoronica* by containing gyrophoric acid in the thallus. Galloway (2007) records two saxicolous Northern Hemisphere species from New Zealand, but almost certainly in error: *O. tartarea* (L.) A.Massal., which he incorrectly considered to be an earlier name for *O. apiculata* (McCarthy *et al.* 2017), and *O. parella* (L.) A.Massal., which occupies the same ecological niche as *O. apiculata*, but differs by containing variolaric acid in the cortex of the thallus and apothecial margin, and reacts C+ yellow (Kukwa 2011). Ertz *et al.* (2016) showed that specimens from South America identified as this species were only distantly related to *O. parella* and its occurrence in the Southern Hemisphere is very doubtful.

The type collection of *O. alectoronica* is from littoral rocks, but the range of collections from Campbell Island indicates that it also occurs on rock outcrops in *Dracophyllum*-dominated scrub and peat bogs, and in tussock grassland on mountain summits. In Tasmania, *O. alectoronica* is found only in the hinterland, colonising large outcrops and bluffs of sandstone and quartzite in heathland and open eucalypt forest, whereas *O. apiculata* is confined strictly to the coast.

The thallus of *O. alectoronica* can be quite variable. The type collection has a very markedly congested, bullate-papillate thallus with the apothecial margin very thick and inrolled, almost obscuring the disc (Fig. 1A). Other collections, however, range from such a morphology through to a more reduced, ± granular thallus, to ones where the thallus is almost absent and consists of widely scattered small granules, and the apothecial disc is widely exposed (Fig. 1B). One collection (*GK 150/86*) displays this entire range of morphology. All nevertheless display the salient feature of containing alectoronic acid.

The most similar species to *O. alectoronica*, at least with respect to chemical composition and ascospore size, is *O. weymouthii*, which is exclusively corticolous or lignicolous. This species has a generally thin, smooth thallus that ± follows the texture of the substratum, at most becoming rimose or verruculose but never papillate or granular.

Selected additional specimens examined

AUSTRALIA, TASMANIA. Grass Tree Hill, 42°47'S 147°22'E, 400 m, 14 Aug. 1981, *G. Kantvilas 704/81 & P. James* (BM, HO); Sisters Hills, 6 June 1986, *G. Kantvilas 150/86* (HO); Mt Wellington, Crocodile Rock, 42°53'S 147°15'E, 725 m, 17 Aug. 2014, *G. Kantvilas 323/14* (HO); *ibid.*, 1 Jan. 2018, *G. Kantvilas 3/18* (HO); Hungry Flats Road, 42°31'S 147°28'E, 420 m, 17 Aug. 2021, *G. Kantvilas 330/21* (HO).

NEW ZEALAND, CAMPBELL ISLAND. Summit ridge of St Col Peak, 52.54°S 169.13°E, 22 Dec. 1969, *H.A. Imshaug 45941*, *46000* (MSC); N side of Perseverance Harbour at base Mt Lyall, 52.54°S 169.17°E, 22 Dec. 1969, *R.C. Harris 4306* (MSC); Filhol-Honey saddle, 52.58°S 169.15°E, 23 Dec. 1969, *H.A. Imshaug 46011* (MSC); summit ridge of Beeman Hill, 52.55°S 169.15°E, 24 Dec. 1969, *R.C. Harris 4536*, *4555* (MSC); E side of Tucker Cove, 52.55°S 169.15°E, 24 Dec. 1969, *R.C. Harris 4523* (MSC); N side of Beeman Hill, 52.54°S 169.15°E, 26 Dec. 1969, *R.C. Harris 4608*, *4612*, *4618* (MSC); summit of Menhir Peak, 52.55°S 169.04°E, 28 Dec. 1969, *H.A. Imshaug 46280* (MSC); between Mt Azimuth and Courrejolles Peninsula, 52.49°S 169.16°E, 30 Dec. 1969, *H.A. Imshaug 46340* (MSC); Mt Lyall pyramid, 52.54°S 169.17°E, 2 Jan. 1970, *H.A. Imshaug 46443* (MSC); summit of Filhol Peak, 52.58°S 169.13°E, 4 Jan. 1970, *R.C. Harris 5096* (MSC); stream NE of Mt Sorenson, 52.50°S 169.18°E, 6 Jan. 1970, *R.C. Harris 5102*, *5108* (MSC); E of Mt Sorenson, 52.50°S 169.18°E, 7 Jan. 1970, *R.C. Harris 5146* (MSC); W side of Monument Harbour, 52.54°S 169.17°E, 8 Jan. 1970, *H.A. Imshaug 46695* (MSC); E side of Tucker Cove, 52.55°S 169.15°E, 9 Jan. 1970, *H.A. Imshaug 46747* (MSC); W shore of Garden Cove, 52.56°S 169.13°E, 11 Jan. 1970, *R.C. Harris 5236* (MSC); summit of Moubray Hill, 52.55°S 169.23°E, 12 Jan. 1970, *H.A. Imshaug 46933* (MSC); Erebus Point and half-mile N, 52.54°S 169.17°E, 12 Jan. 1970, *R.C. Harris 5268*, *5272* (MSC); summit of Beeman Hill, 52.55°S 169.15°E, 14 Jan. 1970, *H.A. Imshaug 47040* (MSC); above Venus Cove on lower part of W slope of Mt Honey, 52.57°S 169.15°E, 15 Jan. 1970, *H.A. Imshaug 47097* (MSC); W of Camp Cove, 52.56°S 169.13°E, 15 Jan. 1970, *R.C. Harris 5412* (MSC); S side of Perseverance Harbour, 1 mile W of South Point, 52.54°S 169.17°E, 16 Jan. 1970, *R.C. Harris 5447* (MSC); N side of W end of Lyall ridge, 52.53°S 169.16°E, 18 Jan. 1970, *R.C. Harris 5557*, *5562* (MSC); near Bull Rock, 52.54°S 169.17°E, 19 Jan. 1970, *H.A. Imshaug 47274*, *47283* (MSC).

NEW ZEALAND, THE AUCKLAND ISLANDS. Rose Island, bay on N side of Lucas Head, E shore of island, 50.52°S 166.25°E, 14 Dec. 1972, *H.A. Imshaug 56398* (MSC); Auckland Island, S side of inner part of Musgrave Inlet, 19 Dec. 1972, *H.A. Imshaug 56594*, *56600* (MSC); Auckland Island, NW end of North Arm, Carnley Harbour, N of Figure of Eight Island, 28 Dec. 1972, *H.A. Imshaug 56999* (MSC); Adams Island, W end of Bollons Bay, 50.88°S 166.08°E, 31 Dec. 1972, *H.A. Imshaug 57141* (MSC).

According to the Consortium of North American Lichen Herbaria website (CNALH 2021), additional duplicates are also housed in the following herbaria: CANB, DUKE, F, MIN & US.

Ochrolechia weymouthii Jatta

Boll. Soc. Bot. Ital. 1910: 255 (1911) [1910]. — **Holotype:** Tasmania, ad Sassafrages in monte Wellington, alt 600 p [180 m elev.], *W.A. Weymouth s.n.* (NAP!).

Ochrolechia blandior (Nyl.) Darb., *Lich. Swed. Antarct. Exped.* 50 (1912). — *Lecanora parella* * *blandior* Nyl., *Lich. Fueg. Patag.* 8 (1888). — **Holotype:** Argentina, Tierra del Fuego, Ushuwaia super corticem *Fagi antarcticae* (H-Nyl.!).

Thallus greyish white, typically smooth and following the texture of the substratum, or becoming rimose or verruculose, continuous to rather patchy, 50–200 (–250) µm thick, esorediate; prothallus not developed; calcium oxalate absent or only occasionally detected. Apothecia 0.8–2.6 mm diam., scattered or crowded together; disc concave to plane, pale pink to orange, thinly whitish grey pruinose or occasionally epruinose; thalline margin 0.15–0.5 mm thick, inrolled, smooth and entire, or becoming verruculose and crenulate, especially along the inner edge, occasionally radially cracked and rather scabrid, in section hyaline, 150–280 µm thick at the sides; proper exciple highly reduced and not visible externally, in section 20–40 µm thick. Hypothecium 35–50 µm thick, hyaline to pale yellowish, intensifying yellow in K. Hymenium 230–350 µm thick, moderately to densely inspersed with oil droplets, overlain by a diffuse greyish brown, crystalline epithecial layer to 50–60 µm thick, transiently pale yellowish and partly dissolving in K. Asci up to 8-spored but occasionally with 2–6 spores aborted at maturity, 215–290 × 58–70 µm. Ascospores (50–) 54–*69.1*–82 (–86) × (26–) 28–*36.2*–44 (–45) µm (*n* = 80), broadly ellipsoid to ovate; wall 0.5–2 µm thick. **Fig. 2.**

Chemistry: alectoronic acid in the thallus and apothecial margin, sometimes only detectable by TLC (medulla K–, KC+ orange-pink, C–, P–, UV+ white); gyrophoric acid in the apothecial disc (K–, KC+ red, C+ red, P–, UV+ bluish white).

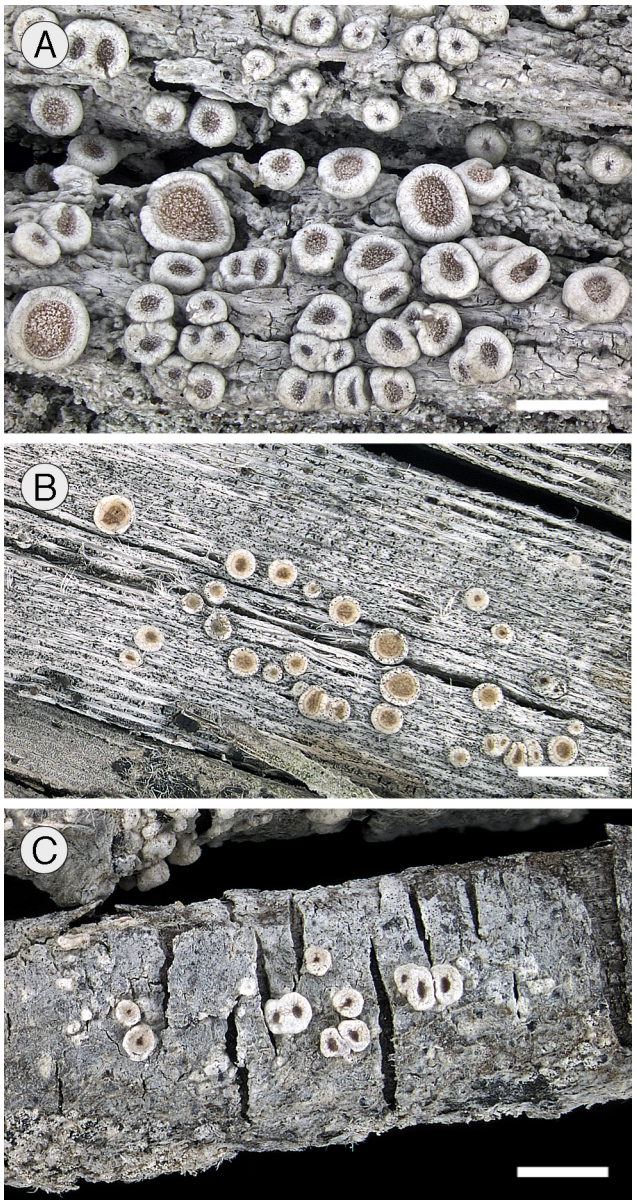

Fig. 2. ***Ochrolechia weymouthii*** habit. **A** *Kantvilas 204/21* (Tasmania); a typical, prominent thallus growing on a rotting log, with large apothecia. **B** *Kantvilas 69/21* (Tasmania); a thin thallus with small apothecia, growing on the dead leaves of *Richea pandanifolia*. **C** *James s.n.* (Tasmania); a very thin, patchy thallus with immature apothecia, growing on canopy twigs. Scales = 2 mm.

Remarks. *Ochrolechia weymouthii* is a very distinctive lichen, characterised by a corticolous or lignicolous habitat, a smooth, esorediate thallus containing alectoronic acid, apothecia with an entire thalline margin that entirely obscures the proper exciple, and a C+ red disc. It was first recorded for Australia (Victoria) by Elix (2009) and from Tasmania by de Salas *et al.* (2014) under its synonym, *O. blandior*, which is based on a type from southern South America.

The type specimen of *Ochrolechia weymouthii* is a tiny specimen, insufficient for chemical analysis or sectioning, but nevertheless enough to reveal its salient features. The provenance of the specimen and its habitat have been well-explored lichenologically, and only one species of *Ochrolechia* with the same characters as the type is known to occur there and has been collected multiple times. The above description is based chiefly on these and other Tasmanian specimens.

In older literature and in herbarium collections, this taxon has been referred to as *O. pallescens* (L.) A.Massal. and, in fact, Messuti & Lumbsch (2000) considered *O. blandior* as a synonym of that species. We do not accept this view but concur with Brodo (1991), Elix (2009) and Kukwa (2011), who all considered that *O. pallescens* was distinct and characterised by the presence of variolaric acid. The two taxa were also maintained as distinct by Verseghy (1962), distinguished by the smooth thallus (in *O. blandior*) versus granular-verruculose (in *O. pallescens*), and a putative, but unconfirmed (by us) ascospore size difference. *Ochrolechia pallescens* is widespread in the Northern Hemisphere and has been recorded from Isla de los Estados, Argentina (Brodo 1991). Although recorded for all Australian states and the A.C.T. by McCarthy (2020), no authentic specimens have been seen during the present study and its occurrence there, as well as in New Zealand (Galloway 2007) is considered doubtful.

Ochrolechia weymouthii is widespread and common in Tasmania where it occurs on bark and wood, particularly in forests at higher elevations. It is a highly variable species. On rotting logs, it forms conspicuous, widespreading colonies, with a thick, almost verruculose thallus and abundant, large, crowded apothecia with an exposed disc (Fig. 2A). In high alpine habitats, it may be found on the dead retained leaves of the arborescent heath, *Richea pandanifolia*. Here the thallus is extremely thin, the apothecia are small (Fig. 2B), and the species occurs in rather small patches, often amongst other lichens, including the superficially similar *Lecanora caesiorubella* Ach. On twigs, the thallus of O. weymouthii is very thin and patchy with relatively small, scattered apothecia with an inrolled margin (Fig. 2C). Every intermediate form can also be seen. The degree of inspersion of the hymenium appears to be environmentally influenced, and is most extreme in specimens from alpine areas.

Although *O. weymouthii* frequently occurs in the same forest sites as *O. gyrophorica* (A.W.Archer) A.W.Archer & Lumbsch, the two species are unlikely to be confused. The latter differs by having a sorediate thallus and contains gyrophoric acid, with the medulla of the thallus and apothecial margin, and the soredia reacting C+ red (see Archer 1992, as *Pertusaria gyrophorica*); it also has a different ecology. In such forests, *O. weymouthii* is most common on horizontal logs and is only rarely seen on standing trunks, whereas *O. gyrophorica* is restricted to the basal stockings of rotting bark on standing, ± vertical trees. Indeed, *O. weymouthii* is most similar to the saxicolous *O. alectoronica*, which differs chiefly by its substratum and granular to papillate-bullate thallus (see above). Future work using DNA sequence data may well show that these two taxa are conspecific, as

substratum preference is not a taxonomic character, even if it serves as a useful field spotting character. However, for the present, we consider the difference in thallus morphology sufficient to retain these taxa as distinct.

Selected specimens examined

AUSTRALIA, TASMANIA. Lake Esperance, 43°14'S 146°46'E, 980 m, 29 Mar. 1963, *P. James s.n.* (BM, HO); Milles Track, Mt Wellington, 42°55'S 147°14'E, 800 m, 16 May 1964, *G.C. Bratt & J.A. Cashin 1282* (HO); Lake Dobson, 42°41'S 146°35'E, 1030 m, 13 Aug. 1981, *G. Kantvilas 648/81 & P. James* (BM, HO); Quamby Bluff, 41°39'S 146°42'E, 1000 m, 10 Aug. 1985, *G. Kantvilas 199/85* (HO); Standard Hill, 30 km WSW of Deloraine, 41°33'S 146°18'E, 440 m, 28 Nov. 1988, *J.A. Curnow 2211* (B, CANB, HO, UPS); Bermuda Road, 43°04'S 146°57'E, 440 m, 25 Oct. 1990, *G. Kantvilas 587/90 & J. Jarman* (HO, K); southern slopes of Gunners Quoin, 42°46'S 147°20'E, 350 m, 28 Apr. 1992, *G. Kantvilas 197/92 & J.A. Elix* (HO); South Sister, near summit, 41°32'S 148°10'E, 800 m, 10 Nov. 2004, *G. Kantvilas 332/04* (HO); lake SE of Rim Lake, 42°01'S 146°11'E, 1140 m, 17 Jan. 2012, *K. Felton s.n.* (HO); Lost World, Mount Wellington, 42°53'S 147°14'E, 980 m, 30 May 2020, *G. Kantvilas 83/20* (HO); Twisted Tarn, 42°39'S 146°34'E, 1120 m, 8 Mar. 2021, *G. Kantvilas 69/21* (HO); Flat Rock Reserve, Western Lookout, 42°36'S 147°17'E, 500 m, 27 June 2021, *G. Kantvilas 204/21* (H, HO, MSC, UPS).

AUSTRALIA, VICTORIA. Cumberland River, 38°34'S 143°54'E, 13 Aug. 1972, *G.C. Bratt 72/714 & R.C. Weeks* (HO); Cement Creek, 37°42'S 145°44'E, 23 Oct. 1993, *G. Kantvilas 106/93, P.M. McCarthy & S. Louwhoff s.n.* (HO); Mt Donna Buang, 37°42'S 145°41'E, 16 June 1994, *S. Louwhoff 302* (HO); The Beeches, 37°20'S 145°50'E, Nov. 1996, *S. Louwhoff s.n.* (HO).

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