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*Anisomeridium disjunctum* (Monoblastiaceae), a new lichen species from Tasmania, with a key to the genus in Australia

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***Anisomeridium disjunctum* (Monoblastiaceae), a new lichen species from Tasmania, with a key to the genus in Australia**

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**Abstract**

*Anisomeridium disjunctum* sp. nov. (Monoblastiaceae) is described from *Callitris* wood and *Leucopogon* bark in eastern, north-eastern and north-western Tasmania. It has a very thin, whitish to pale grey thallus that is UV+ pale yellow, small, perithecioid ascomata with a comparatively thick ascomatal wall, 1(–3)-septate ascospores (12–21 × 4.5–7.5 µm), macroconidia 5–8 × 2.5–4 µm, and exceptionally minute microconidia (0.8–1.5 × 0.7–1.1 µm). A preliminary key is provided to the 18 species of *Anisomeridium* currently known from Australia.

The pyrenocarpous lichen genus *Anisomeridium* (Müll.Arg.) M.Choisy (Monoblastiaceae) is nearly cosmopolitan in its distribution, with almost 100 species worldwide, the majority occurring in the wet tropics and subtropics. Most of the 17 species currently known from Australia are corticolous in eastern Queensland and in coastal and hinterland areas of the Northern Territory, but several, *A. anisolum* (Müll.Arg.) Aptroot, *A. austroaustraliense* P.M.McCarthy & Kantvilas, *A. biforme* (Borrer) R.C.Harris, *A. carinthiacum* (J.Steiner) R.C.Harris and *A. polypori* (Ellis & Everh.) M.E.Barr, have been reported from the cool-temperate south-east (McCarthy 2018).

In this paper, *Anisomeridium disjunctum* is described and illustrated from *Callitris* wood, at the type locality near Little Swanport in eastern Tasmania; it was also collected from the bark of *Leucopogon parviflorus* in north-western Tasmania and on Deal Island in the eastern Bass Strait. The holotype of this species was just one of several novel lichens gathered in the course of a multidisciplinary biological collecting expedition undertaken by the Tasmanian Museum and Art Gallery (to be reported elsewhere), targeting poorly documented and under-collected areas of Tasmania.

**Methods**

Observations and measurements of photobiont cells, ascomatal and pycnidial anatomy, asci, ascospores and conidia were made on hand-cut sections mounted in water and 10% KOH (K). Asci were also observed in Lugol's Iodine (I), with and without pretreatment in K, while pycnidial contents were also examined in ammoniacal erythrosin.

***Anisomeridium disjunctum* P.M.McCarthy & Kantvilas, sp. nov.** Figs 1, 2  
Mycobank No.: **MB826785**

Characterized as follows: thallus effuse to determinate, off-white to very pale grey, immersed to thinly superficial, UV+ pale yellow; photobiont *Trentepohlia*; ascomata perithecioid, 0.22–0.51 mm diam., semi-immersed to 2/3 immersed in the substratum, with a brown-black (K+ greenish black) ascomatal wall 40–60(–70) µm thick and a ± apical ostiole; pseudoparaphyses anastomosing; asci narrowly clavate, narrowly or broadly cylindrical or cylindroclavate, 60–88 × 12–17 µm, with a tuberculate to broadly convex or inconspicuous ocular chamber; ascospores (4–)8 per ascus, uniseriate to irregularly biseriate, (1–)3-septate, 12–21 × 4.5–7.5 µm; micropycnidia semi-immersed to almost completely immersed in the substratum, with broadly ellipsoid, subglobose, obovoid or obpyriform microconidia, 0.8–1.5 × 0.7–1.1 µm; macroconidia subglobose, broadly ellipsoid or oblong-ellipsoid, 5–8 × 2.5–4 µm.

*Type:* Australia, Tasmania, Little Swanport, Wind Song property, Callitris Gully, 42°21'S, 147°55'E, alt. 40 m, on dry, bleached wood of *Callitris* in *C. rhomboidea* woodland, *G. Kantvilas* 404/17, 24.x.2017 (holotype — HO 591834).

*Thallus* crustose, immersed in to thinly superficial on the substratum, effuse to determinate, forming contiguous colonies to c. 1 cm wide, off-white to very pale grey or slightly cream-coloured, continuous to very sparingly rimose, to 20–50 µm thick, ecorticate, UV+ pale yellow (containing lichexanthone). *Photobiont* *Trentepohlia*; cells sparse (in thalli that are 20–30 µm thick) or abundant (in thicker thalli), forming clusters or short filaments, 8–18 × 7–14 µm; interstitial hyphae 2.5–3.5 µm thick; thin areas of thallus, with few or no photobiont cells, are dominated by a compact reticulum of hyaline hyphae 2.5–3.5 µm thick. *Prothallus* not apparent. *Ascomata* numerous, perithecioid, semi-immersed to 2/3 immersed in the substratum, mostly solitary, occasionally paired or in clusters of 3 or 4, dull black, circular to elliptic in outline, moderately to strongly convex, or almost hemispherical, the surface smooth or becoming irregularly fissured after maturity, (0.22–)0.36(–0.51) mm wide [*n* = 90]; apex rounded, but often becoming plane or slightly excavate with age. *Ostiole* apical or slightly off-centre, inconspicuous or in a shallow, concave depression 30–50 µm wide. *Ascomatal wall* 40–60(–70) µm thick near the apex and laterally, 60–80(–90) µm thick towards the base, brown-black in section, K+ greenish black, elongate-cellular in medial section (cells 4–7 × 2–4 µm) and, when growing on wood, incorporating long, loose lignin fibres, extending down to excipulum-base level, contiguous with the excipulum or diverging a little at the base, not or scarcely overgrown by the thallus. *Excipulum* consisting of elongate, periclinal hyphae, 15–20 µm thick and brown-black laterally, 8–15 µm thick, pale to medium or dark brown and poorly delimited at the base. *Centrum* depressed-ovate, to 0.38 mm wide. *Hymenium* non-amyloid, KI–, not interspersed or with sparse oil globules; ascoplasma KI+ orange-brown. *Subhymenium* hyaline, 25–50 µm thick, KI+ pale yellow-brown; hyphae 1.5–2.5(–3.5) µm wide, interspersed with minute granules and oil globules. *Pseudoparaphyses* 1–1.5(–2) µm wide, long-celled, with abundant, mainly distal anastomoses; apices not swollen; contents clear or with numerous minute oil globules. *Asci* narrowly clavate, narrowly or broadly cylindrical or cylindroclavate, usually 8-spored, occasionally with up to 4 aborted, 60–88 × 12–15(–17) µm [*n* = 20]; apex rounded; ocular chamber of immature asci tuberculate, at maturity remaining short-tuberculate, becoming broadly convex, or almost disappearing. *Ascospores* hyaline, narrowly ellipsoid to oblong-ellipsoid or shorter and obovate or broadly ellipsoid, 1(–3)-septate (fewer than 10 percent of mature propagules with 2 or 3 septa), occasionally slightly constricted at the single or primary septum, straight or slightly bent, overlapping-uniseriate, obliquely uniseriate, proximally uniseriate and distally massed, or irregularly biseriate in the ascus, (12–)16(–21) × (4.5–)6(–7.5) µm [*n* = 120]; spore-wall uniformly thin (< 1 µm), smooth, lacking a perispore; septum usually medial, occasionally slightly submedial, rarely strongly submedial, very rarely suprasedial; distal apex rounded to subacute; proximal apex more commonly subacute or acute; contents usually clear, occasionally guttulate. *Micropycnidia* sparse to numerous, outwardly black, semi-immersed to almost completely immersed in the substratum, 0.08–0.12 mm wide, circular to elliptic in outline; pycnidial wall brown-black above, K+ green-black, 15–25 µm thick, anatomically identical with the ascomatal wall; basal wall hyaline, 5–8 µm thick, of periclinal hyphae 1.5–2 µm wide; conidiophores unbranched, 8–15 × 1–1.5(–2) µm, ± of uniform thickness from base to apex. *Microconidia* colourless, simple, budding from the tips of conidiophores, broadly ellipsoid, subglobose, obovoid or obpyriform, 0.8–1.2(–1.5) × 0.7–1.1 µm [*n* = 40]. *Macropycnidia* sparse (seen only in HO 561068), very similar to micropycnidia in size, shape and immersion in the substratum; conidiophores 8–13 × 2–3 µm. *Macroconidia* colourless, simple, subglobose, broadly ellipsoid or oblong-ellipsoid, 5–8 × 2.5–4 µm [*n* = 20].

*Etymology:* The epithet *disjunctum* (L, distinct, separate) alludes to the considerable difference in size between the exceptionally small microconidia and the comparatively massive macroconidia.

## Remarks

The highly distinctive *A. disjunctum* is doubly unusual in having a significant minority of 3-septate ascospores, along with exceptionally minute microconidia. These attributes, in conjunction with the UV+ thallus, the size of the ascomata and the thickness of the ascomatal wall, the dimensions and shape of the asci and the arrangement of ascospores therein, as well as the shape of ascospores and the position of the septum at or below the middle of 1-septate propagules, confirm the novelty of the new species.

Perhaps surprisingly, 3-septate ascospores tend to be shorter and slightly narrower than 1-septate individuals. Indeed, the former are more likely to occur in  $\pm$  biseriate arrangement in comparatively short, broad asci, while the longest and most elongate ascospores, 17–21  $\mu$ m long, are invariably 1-septate. The widely occurring and corticolous *A. polypori* includes more abundant 3-septate ascospores, but second and third septa develop late in their ontogeny. Moreover, that species has considerably smaller ascomata (0.15–0.25 mm diam.), microconidia with a beaked apex and larger, more ellipsoid microconidia (2–3  $\times$  1–1.3  $\mu$ m; Harris 1995; Coppins *et al.* 2009). *Anisomeridium tuckeriae* (R.C.Harris) R.C.Harris, from south-eastern U.S.A., also contains lichexanthone in the thallus and has ascospores of similar size to those of *A. disjunctum*, but the ascospores are invariably 1-septate and have more pointed ends, and the microconidia are either ellipsoid or subglobose but larger (Tucker & Harris, 1980; Harris 1995).

The substratum of the type specimen is also somewhat anomalous, i.e. dry, bleached wood of *Callitris*, which provides a spongy, yielding surface for the developing lichen, so that loose lignin fibres are readily incorporated into the walls of ascomata and pycnidia. By contrast, most corticolous *Anisomeridium* species rarely have bark cells intruding into fruiting structures, other than near the base. Indeed, the two corticolous specimens of *A. disjunctum* examined differ principally from the type only in having slightly thicker and firmer thalli, and an almost carbonized ascomatal wall that does not incorporate bark cells.

The type specimen of *A. disjunctum* was collected in eastern Tasmania, where it grew in a relict corridor of open woodland dominated by *Callitris rhomboidea*. Although this tree is widespread and abundant in eastern Tasmania, contiguous stands of mature trees are relatively unusual and typically support a diverse range of lichens not found in surrounding vegetation (usually eucalypt-dominated, dry sclerophyll woodland). This particular locality was no exception, supporting a rich array of species, especially on mature *Callitris* trunks and fallen logs. The new species grew directly on the dead wood of a standing, mature tree. Associated taxa included *Buellia* cf. *extenuatella* Elix & Kantvilas, *Mycocalicium victoriae* (C.Knight ex F.Wilson) Nád., *Rinodina obscura* Müll.Arg., *Schismatomma occultum* (C.Knight & Mitt.) Zahlbr. and *S. cf. dirinellum* (Nyl.) Zahlbr.

Two additional collections are from coastal scrub where they grew on the twigs and small branches of *Leucopogon parviflorus*. Whilst on the face of it, this appears a habitat vastly different from that of the type specimen, the two vegetation communities share many vascular species as well as epiphytic lichens that are typical of sunny exposed woodlands at low elevation in low rainfall areas. Lichens associated with the new species on *Leucopogon* included *Chlostomum griffithii* (Sm.) Coppins, *Lecanora flavopallida* Stirt., *Lecidella destituta* Kantvilas & Elix, *Ochrolechia africana* Vain. and *Porina decrescens* P.M.McCarthy & Kantvilas, as well as such widespread macrolichens as *Flavoparmelia rutidota* (Hook.f. & Taylor) Hale and *Menegazzia subpertusa* P.James & D.J.Galloway.

## ADDITIONAL SPECIMENS EXAMINED

*Tasmania*: ● Bass Strait, Kent Group, Deal Island, 165 m due W of head of East Cove (Browns Bay), 39°28'S, 147°21'E, 5 m alt., on bark of *Leucopogon parviflorus*, *J.S. Whinray s.n.*, 11.xii.1971 (HO 561068; duplicate in MEL 1012603, *n.v.*); ● West Point, W of Marawah, 40°57'S, 144°37'E, 10 m alt., on bark of *Leucopogon parviflorus* in coastal heathland, *G. Kantvilas 480/11*, 30.xi.2011 (HO 563957).

## Preliminary key to the species of *Anisomeridium* in Australia

[Based on Harris (1975, 1995); McCarthy (1992, 1993); McCarthy & Johnson (1995); Aptroot *et al.* (1995, 1997); Coppins *et al.* (2009); McCarthy & Kantvilas (2016). For authors, publication details, distribution and additional references, see McCarthy (2018)]

- 1 Thallus growing on leaves ..... **A. follicola**
- 1: Thallus growing on rock, bark or wood ..... 2
- 2 Thallus growing on rock ..... 3
- 2: Thallus growing on bark or wood ..... 5
- 3 Ascospores 3-septate, 21–36  $\times$  7.5–13  $\mu$ m ..... **A. australiense**
- 3: Ascospores 1-septate ..... 4
- 4 Ascomata 0.18–0.27 mm diam.; ascospores 9–15  $\times$  4.5–6.5  $\mu$ m ..... **A. carinthiacum**
- 4: Ascomata 0.2–0.44 mm diam.; ascospores 12–23  $\times$  5–10  $\mu$ m ..... **A. laevigatum**
- 5 Ascospores 1–3-septate ..... 6
- 5: Ascospores persistently 1-septate ..... 7
- 6 Ascomata 0.15–0.25 mm diam.; microconidia 2–3  $\times$  1–1.3  $\mu$ m; thallus UV– **A. polypori**
- 6: Ascomata 0.22–0.51 mm diam.; microconidia 0.8–1.5  $\times$  0.7–1.1  $\mu$ m; thallus UV+ pale yellow ..... **A. disjunctum**
- 7 Ostiole markedly eccentric; ascospores granular-ornamented ..... 8
- 7: Ostiole apical or slightly off-centre; ascospores usually smooth ..... 9
- 8 Ascospores 19–27(–30)  $\times$  5.5–8  $\mu$ m ..... **A. terminatum**
- 8: Ascospores 26–35(–42)  $\times$  7.5–12  $\mu$ m ..... **A. americanum**
- 9 Ascospores 9–18(–24)  $\mu$ m long ..... 10
- 9: Ascospores 23–34  $\mu$ m long ..... 15
- 10 Ascospores 9–15  $\times$  4–5  $\mu$ m; microconidia 3–4  $\times$  1.5–2  $\mu$ m ..... **A. albidum**
- 10: Most ascospores more than 15  $\mu$ m long ..... 11
- 11 Asci slender, cylindrical or narrowly clavate, 9–12  $\mu$ m wide ..... 12
- 11: Asci broadly cylindrical or clavate, 10–17  $\mu$ m wide ..... 14
- 12 Microconidia ellipsoid, 2.5–4  $\times$  *c.* 2  $\mu$ m ..... **A. subprostans**
- 12: Microconidia globose, *c.* 2  $\mu$ m diam ..... 13
- 13 Ascospores 10–18  $\times$  4.5–6(–7)  $\mu$ m, uniseriate or irregularly biseriate in the asci ..... **A. bifforme**
- 13: Ascospores 15–22(–24)  $\times$  4.5–5.5(–6)  $\mu$ m, biseriate in the asci ..... **A. tamarindi**
- 14 Ascospore septum median; spore wall evenly thickened; ascomata 0.18–0.35 mm diam. .... **A. austroaustraliense**
- 14: Ascospore septum markedly submedian; spore wall unevenly thickened; ascomata 0.4–0.7 mm diam. .... **A. anisolobum**
- 15 Thallus UV+ yellow ..... **A. consobrinum**
- 15: Thallus UV– ..... 16

- 16 Ascospores 8.5–11.5  $\mu\text{m}$  wide ..... **A. subnexum**  
 16: Ascospores 12–18  $\mu\text{m}$  wide ..... 17
- 17 Ascospores smooth, biseriata in the asci ..... **A. subnectendum**  
 17: Ascospores granular-ornamented, uniseriate in the asci ..... **A. adnexum**

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Figure 1. *Anisomeridium disjunctum* (holotype). Scales: 1 mm.

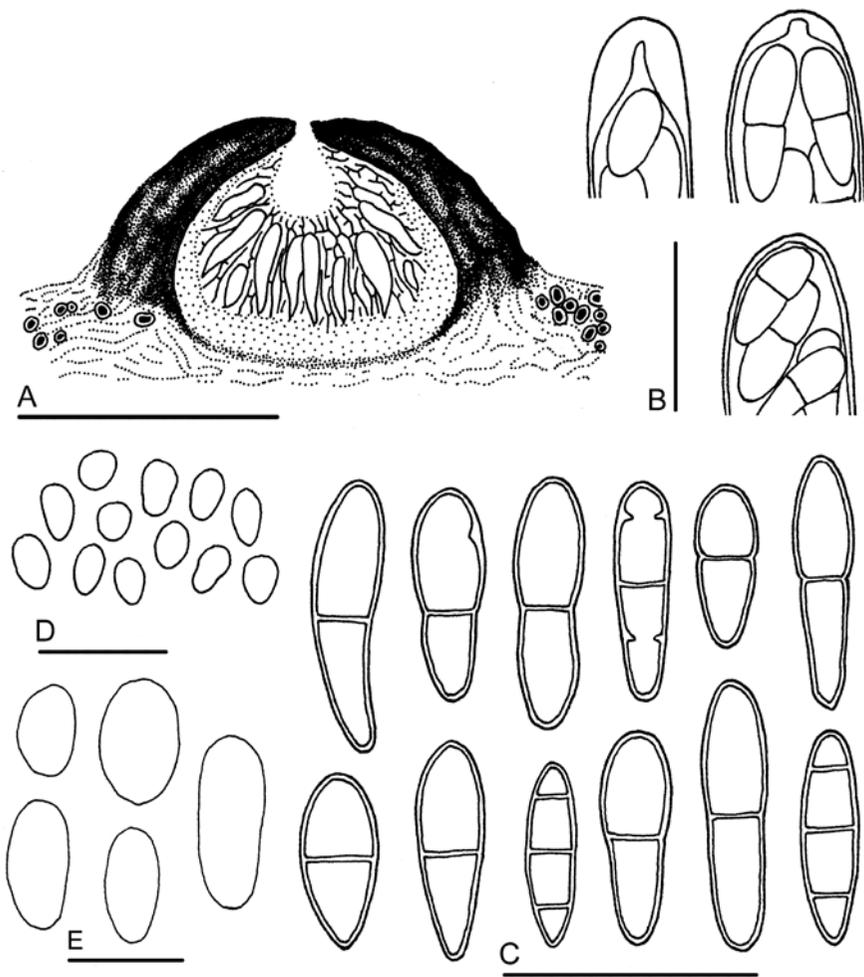


Figure 2. *Anisomeridium disjunctum* (A–D, holotype; E, HO 561068). **A**, Sectioned ascoma, with adjacent thallus and substratum (semi-schematic); **B**, Immature (upper left) and mature ascus apices; **C**, Mature ascospores; **D**, Microconidia; **E**, Macroconidia. Scales: A = 0.2 mm; B, C = 20 μm; D, E = 5 μm.