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Two new species of *Rinodina* (Physciaceae, Ascomycota) from southern Australia

John A. Elix, Gintaras Kantvilas & Patrick M. McCarthy

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John A. Elix

Research School of Chemistry, Building 137
Australian National University, Canberra, A.C.T. 2601, Australia
e-mail: John.Elix@anu.edu.au

Gintaras Kantvilas

Tasmanian Herbarium, PO Box 5058 UTAS LPO,
Sandy Bay, Tasmania 7005, Australia
e-mail: Gintaras.Kantvilas@tmag.tas.gov.au

Patrick M. McCarthy

64 Broadsmith St, Scullin, A.C.T. 2614, Australia
e-mail: pmcc2614@hotmail.com

Abstract

Rinodina argopsina Elix & P.M.McCarthy, characterized by the presence of argopsin and zeorin, and *R. teniswoodiorum* Elix & Kantvilas, containing zeorin and arthothelin, are described as new to science from southern New South Wales and eastern Tasmania, respectively.

The saxicolous species of *Rinodina* (Ach.) S.F.Gray in Australia are relatively well known following the initial treatment by Mayrhofer (1984), further additions by Mayrhofer *et al.* (1990), Matzer & Mayrhofer (1994), Matzer *et al.* (1998) and Trinkaus *et al.* (1999), and the more recent revisions by Kaschik (2006) and Elix (2011); also the description of two additional species (Elix & Giralt 2015; Mayrhofer & Elix, 2018). In this paper we describe two further new saxicolous species of *Rinodina*, one from New South Wales and the other from Tasmania.

Methods

Observations and measurements of photobiont cells, thalline and apothecial anatomy, asci and ascospores 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. Medullary sections were treated with 10% sulfuric acid (H₂SO₄) and apothecial sections with 50% nitric acid (N). Chemical constituents were identified by thin-layer chromatography (Elix 2014) and comparison with authentic samples. Nomenclature of ascospore types and their ontogeny follows that of Kaschik (2006).

The new species

Rinodina argopsina Elix & P.M.McCarthy, sp. nov.
Mycobank number: **MB 828250**

Figs 1, 2

Similar to *Rinodina reagens* Matzer & H.Mayrhofer and *R. murrayi* H.Mayrhofer, but differs in having an interspersed hymenium and in containing atranorin and argopsin.

Type: Australia, New South Wales, Southern Tablelands, South-East Forests National Park, Rutherfords Creek Picnic Area, 19 km SE of Nimmitabel, 36°34'29"S, 149°26'36"E, 850 m alt., temperate rainforest, on shaded, seasonally inundated granite boulder in stream bed, *J.A. Elix 46514*, 4.xi.2017 (holotype – CANB).

Thallus crustose, up to 50 mm wide, continuous, rimose, to 0.15 mm thick; upper surface pale whitish green to yellow-green, smooth, shiny or matt; prothallus marginal, dark brown, very thin, arachnoid; vegetative propagules absent; medulla thin, white, I–, lacking crystals; photobiont cells 7–10 µm diam. *Apothecia* 0.2–0.7 mm wide, lecanorine, immersed at first, then

broadly adnate or sessile and constricted at the base; disc brown to brown-black, epruinose, plane or weakly convex; thalline margin concolorous with the thallus, entire, prominent, persistent, in section 60–120 µm thick; proper margin thin, not prominent, concolorous with the disc. *Epihymenium* 15–25 µm thick, pale brown to brown, K–, N–. *Hypotheorium* 70–110 µm thick, colourless to pale yellow-brown, K+ yellow-orange. *Hymenium* 100–110 µm thick, colourless, interspersed with oil droplets; paraphyses 1–1.7 µm wide, simple to sparsely branched, capitate, with brown apices 3–3.5 µm wide. *Asci* of the *Lecanora*-type, with 8 or fewer spores. *Ascospores* 1-septate, olive-brown then brown, ellipsoid, *Teichophila*-type (with internal wall thickenings grading from *Pachysporaria*- to *Milvina*-, *Physcia*- and *Mischoblastia*-types at different stages of development), 18–[23.9]–30 × 10–[11.9]–17 µm, not constricted at the septum, with ontogeny of type-A; torus present in mature ascospores only; outer spore-wall smooth. *Pycnidia* rare, immersed; conidia bacilliform, 3–5.5 × 1–1.5 µm. *Chemistry:* Thallus K+ yellow, P+ pale yellow; containing atranorin (major) and argopsin (major).

Etymology: The species is named for its unique chemistry.

Remarks

This is the first report of the depsidone argopsin from the genus *Rinodina*. However, the closely related depsidone pannarin is known from a number of species, including the Australasian *R. murrayi* H.Mayrhofer (Kaschik 2006) and nine species from North America (Sheard 2010). *Rinodina murrayi* is also morphologically similar to *R. argopsina* in having ascospores of the *Milvina*-type grading into *Physcia*-type, but those are smaller, 16–22 × 10–13 µm; furthermore, this species lacks an interspersed hymenium. The ascospores of *R. argopsina* are most similar to those of *R. reagens*, but that species lacks lichen substances and an interspersed hymenium. *Rinodina fimbriata* Körb., from Europe and North America, also grows on irrigated rocks, but it differs in having *Mischoblastia*-type ascospores and in lacking an interspersed hymenium and secondary chemistry (Mayrhofer & Poelt 1979; Mayrhofer & Moberg 2002; Sheard 2010).

At present the new species is only known from seasonally inundated granite at the type locality in south-eastern New South Wales. Associated species include *Halecania subsquamosa* (Müll.Arg.) van den Boom & H.Mayrhofer, *Porina leptalea* (Durieu & Mont.) A.L.Sm., *Porpidia albocaerulescens* (Wulfen) Hertel & Knoph var. *albocaerulescens* and *Rinodina oxydata* (A.Massal.) A.Massal.

ADDITIONAL SPECIMEN EXAMINED

New South Wales: ● type locality, on seasonally inundated granite rocks in stream bed, *P.M. McCarthy 4688*, 4.xi.2017 (CANB).

Rinodina teniswoodiorum Elix & Kantvilas, sp. nov.
Mycobank number: **MB 828251**

Figs 3, 4

Similar to *Rinodina thiomela* (Nyl.) Müll.Arg., but differs in having smaller ascospores, 19–27 × 10–14 µm, and in containing arthothelin as the major xanthone present.

Type: Australia, Tasmania, Windsong Property, Ronnies Spur, 42°21'14"S, 147°55'01"E, 30 m alt., on rocks in dry sclerophyll forest, *G. Kantvilas 255/17*, 25.x.2017 (holotype – HO).

Thallus crustose, up to 30 mm wide, continuous, verrucose-areolate to subsquamulose; areoles 0.1–0.4 mm wide, rounded or irregular, up to 0.15 mm thick; upper surface pale yellow to yellow-green, matt, smooth or becoming granular; prothallus marginal and black or absent; vegetative propagules absent; medulla thin, pale yellow, I–, lacking crystals of calcium oxalate; photobiont cells 7–12 µm diam. *Apothecia* 0.2–1 mm wide, lecanorine, broadly adnate then sessile and constricted at the base; disc brown to brown-black, epruinose, weakly concave then plane; thalline margin concolorous with the thallus, prominent, entire but soon dentate, in

section 80–125 µm thick; proper margin prominent in older apothecia, concolorous with the disc, in section 40–50 µm thick, brown to dark brown. *Epihymenium* 10–15 µm thick, pale brown to olive-brown K–, N–. *Hypothecium* 80–100 µm thick, colourless to pale yellow-brown, K–. *Hymenium* 80–100 µm thick, colourless, with prominent oil paraphyses 4–6 µm wide; regular paraphyses 1–1.7 µm wide, simple to sparsely branched, capitate, with pale brown apices 2.5–3 µm wide. *Asci* of the *Lecanora*-type, with 8 or fewer spores. *Ascospores* 1-septate, pale brown then brown, ellipsoid to citriform, with internal wall thickenings, grading from *Pachysporaria*-type to *Milvina*-type at different stages of development, 19–[21.7]–27 × 10–[12.3]–14 µm, not constricted at the septum; ontogeny of type-A; torus present in mature ascospores only; outer spore-wall smooth. *Pycnidia* rare, immersed; conidia bacilliform, 3.5–5 × 1 µm.

Chemistry: Thallus K–, C+ orange, P–, UV+ yellow; containing 2,5- and 4,5-dichlorolichexanthone (minor), arthothelin (major), zeorin (major), 4,5-dichloronorlichexanthone (trace), thiomelin (trace), ± lichexanthone (trace).

Etymology: The species is named for Tom and Jane Tenniswood, owners of the property where the type material was collected.

Remarks

This is the first report of dichlorolichexanthones from the genus *Rinodina*. However, the presence of arthothelin and zeorin is also observed in *R. fijiensis* Elix & Giralto from the Fiji Islands, but that species differs in lacking the dichlorolichexanthones and in having smaller, *Pachysporaria*-type ascospores, 15–21 × 8–12 µm (Elix & Giralto 2015). In many respects the new species closely resembles the common *R. thiomela*. Both have adnate to sessile, lecanorine apothecia, *Pachysporaria*-type ascospores and prominent oil paraphyses, and they contain zeorin and xanthones. However, *R. thiomela* lacks 2,5-dichlorolichexanthone, and it contains thiomelin and satellites rather than arthothelin, as well as having somewhat larger ascospores, 20–34 × 11–17 µm (Elix 2011).

At present this new species is only known from the type locality in eastern Tasmania, where it grows on low rock outcrops in a very open, dry sclerophyll forest with widely scattered *Eucalyptus globulus* and *E. viminalis* and virtually devoid of shrubs and lesser trees. The rock type at the site is very unusual for Tasmania, being a deep reddish, very coarsely gritty, remnant tertiary laterite containing alluvial quartz pebbles, fragments of petrified wood and pisolitic ironstone (M. de Salas, pers. comm.). It supports a rich association of chiefly crustose lichens, with the most common species being *Acarospora veronensis* A.Massal., *Buellia homophyllia* (C.Knight) Zahlbr., *Caloplaca rexfilsonii* S.Y.Kondr. & Kärnefelt, *L. farinacea* Fée, *Lecidella sublapicida* (C.Knight) Hertel, *Parapropidia leptocarpa* (C.Bab. & Mitt.) Rambold & Hertel, *Ramboldia blastidiata* Kantvilas & Elix, *R. plicatula* (Müll.Arg.) Kantvilas & Elix and *Tephromela atra* (Huds.) Hafellner.

ADDITIONAL SPECIMEN EXAMINED

Tasmania: • type locality, on rocks in dry sclerophyll forest, *G. Kantvilas 240/17*, 4.xi.2017 (CANB).

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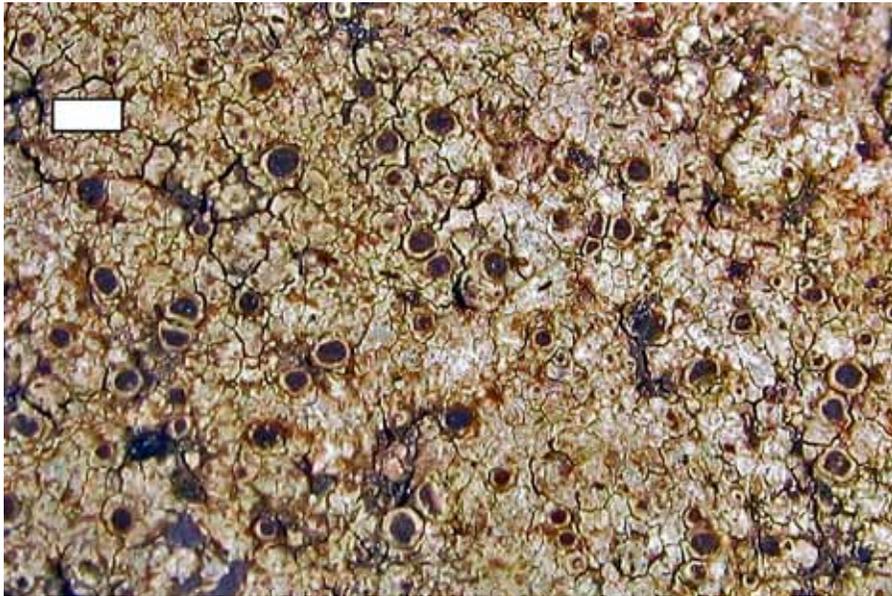


Figure 1. *Rinodina argopsina* (holotype in CANB). Scale = 1 mm.



Figure 3. *Rinodina teniswoodiorum* (holotype in HO). Scale = 1 mm.



Figure 2. Ascospore ontogeny of *R. argopsina*. Scale = 10 μ m

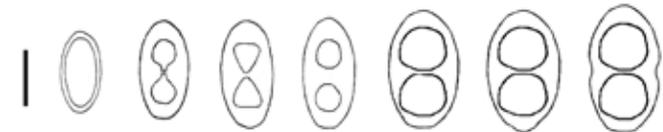


Figure 4. Ascospore ontogeny of *R. teniswoodiorum*. Scale = 10 μ m