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A further new species of *Rinodina*
(Physciaceae, Ascomycota) from eastern Australia

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**A further new species of *Rinodina*
(Physciaceae, Ascomycota) from eastern Australia**

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Abstract

Rinodina arthomelina U.Grube, H.Mayrhofer & Elix, characterized by the presence of thiomelin, arthothelin and zeorin, is described as new to science. A key is provided to the Australasian species of *Rinodina* containing xanthonones and zeorin.

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), as well as four additional species (Elix & Giralt 2015; Mayrhofer & Elix 2018; Elix *et al.* 2019). Of particular focus in the present work are those species containing zeorin and xanthonones, which include *Rinodina fijiensis* Elix & Giralt, *R. michaelae* H.Mayrhofer & Elix, *R. teniswoodiorum* Elix & Kantvilas, *R. thiomela* (Nyl.) Müll.Arg. and *R. xanthomelana* Müll.Arg. In this paper we describe a new saxicolous species of *Rinodina* from eastern Australia which contains thiomelin, arthothelin and zeorin. Methods are as described in the papers cited above.

New species

Rinodina arthomelina U.Grube, H.Mayrhofer & Elix, sp. nov.
Mycobank No.: **MB 830141**

Figs 1, 2

Similar to *Rinodina thiomela*, but differs in containing arthothelin as the major xanthone present.

Type: Australia, New South Wales, Blue Mountains National Park, near Glenbrook, c. 60 km W of Sydney, on rock, *M. Mayrhofer* 3279, ix.1981 (GZU – holotype).

Thallus to 35 mm wide, crustose, areolate or granular; individual areoles 0.05–0.3 mm wide, to 0.15 mm thick, papillate and isidia-like to flattened and becoming imbricate to form a secondary crust up to 0.5 mm thick; upper surface matt, smooth, esorediate, pale yellow-green to pale yellow-brown; prothallus black, marginal and \pm between adjacent areoles; medulla white, lacking calcium oxalate ($H_2SO_4^-$), I–; photobiont cells 7–12 μ m diam. *Apothecia* 0.1–0.7 mm wide, scattered, lecanorine to cryptolecanorine, broadly adnate to usually sessile and basally constricted; disc brown to black, epruinose, plane to weakly concave; thalline exciple thick and raised above the disc at first, becoming thinner and excluded in older apothecia; proper excipulum greenish black, persistent, thick, in section 65–75 μ m thick; outer zone brown to dark brown, K–, N–; inner zone paler brown. *Epihymenium* 10–20 μ m thick, brown, K–, N–. *Hypotheцийum* 100–120 μ m thick, colourless, K+ yellow solution, N–. *Hymenium* 90–130 μ m thick, colourless, not interspersed; paraphyses 1.5–2.5 μ m wide, simple to branched, capitate, with apices 3–3.5 μ m wide and brown caps, with scattered oil paraphyses 4–6 μ m wide. *Asci* of the *Lecanora*-type, 8-spored or with fewer spores. *Ascospores* *Teichophila*-type (with internal wall thickenings transitioning from *Pachysporaria*- to *Buellia*-, *Milvina*- or *Mischoblastia*-types at different stages of development), 1-septate, brown, broadly ellipsoid, 17–[21.5]–32 \times 11–[13.9]–20 μ m, not constricted at the septum; ontogeny of type-A; outer

spore-wall finely ornamented. *Pycnidia* pyriform, immersed, brown to brown-black; conidia bacilliform, 3.5–5 \times 1–1.5 μ m.

Chemistry: Thallus K+ pale yellow, C+ orange, P–, UV+ orange; containing zeorin (major), arthothelin (major), 4,5-dichloronorlichexanthone (minor), thiomelin (minor or trace).

Etymology: The species is named after its unusual chemistry, the presence of arthothelin and thiomelin, two biosynthetically unrelated xanthonones.

Remarks

In many respects the new species closely resembles the well-known *R. thiomela*. Both have adnate to sessile, lecanorine to cryptolecanorine apothecia and similar-sized ascospores, and contain zeorin and xanthonones. However, *R. thiomela* contains thiomelin and satellites rather than arthothelin, the major xanthone present in *R. arthomelina*. Further, both species have *Teichophila*-type ascospores where the spores transition from mainly *Pachysporaria*-type to *Mischoblastia*-, *Milvina*- or *Buellia*-types at different stages of development. However, they differ in the colour of their upper surface, *R. thiomela* varying from intense mustard-yellow to shiny yellow-green with a metallic lustre, whereas *R. arthomelina* varies from pale yellow-green to dull yellow-brown. *Rinodina teniswoodiorum* is also very similar to *R. arthomelina*, but differs in having somewhat narrower ascospores, 10–14 μ m wide, which become constricted with age, and in containing additional 2,5-dichlorolichexanthone, 4,5-dichlorolichexanthone and \pm lichexanthone. In *R. arthomelina*, the ascospores do not become constricted with age and are 11–20 μ m wide, and the species lacks dichlorolichexanthones and lichexanthone. Chemically, *R. arthomelina* is identical to *R. fijiensis*, although the latter species was initially reported to contain additional atranorin. That was an error — the atranorin observed was a contaminant that obscured the trace amounts of thiomelin present (Elix & Giralt 2015). *Rinodina fijiensis* differs from *R. arthomelina* in having immersed apothecia and smaller ascospores, 15–21 \times 8–12 μ m.

At present, the new species is known from hinterland regions of Victoria, New South Wales and Queensland. Associated lichens include *Heterodermia speciosa* (Wulfen) Trevis., *Lepra subventosa* (Malme) I.Schmitt & Lumbsch var. *subventosa*, *Pertusaria xanthoplaca* Müll.Arg. and numerous *Xanthoparmelia* species.

SPECIMENS EXAMINED

Queensland: ● Carnarvon National Park, Salvator Rosa section, Nooga River campground, 24°48'S, 147°12'E, 450 m alt., on sandstone escarpment, *B. Barnsley* 1670, 16.viii.1992 (CANB); ● between Breakneck and Quandong Creeks, 24 km WSW of Proserpine, 20°29'S, 148°22'E, 150 m alt., on weathered basalt rocks in *Eucalyptus-Planckonia*-dominated woodland, *J.A. Elix* 21161 & *H. Streimann*, 2.vii.1986 (CANB); ● Carnarvon National Park, track to Baloon Cave, 91 km NNW of Injune, 25°04'S, 148°15'E, 460 m alt., on sandstone rocks in *Eucalyptus* woodland, *J.A. Elix* 34122, 19.viii.1993 (CANB); ● Dawson Highway, Staircase Range, 18 km SE of Springsure, 24°13'S, 148°13'E, 380 m alt., on weathered granite rocks in *Eucalyptus* woodland, *J.A. Elix* 34278, 23.viii.1993 (CANB); ● Expedition National Park, Robinson Gorge, 73 km NW of Taroom, 25°17'S, 149°09'E, 400 m alt., on sandstone rocks in steep gorge with palms and *Melaleuca* shrubs, *J.A. Elix* 35250, 35255, 1.ix.1993 (CANB, GZU); ● Carnarvon National Park, Mickey Creek, 91 km NNW of Injune, 25°04'S, 148°14'E, 450 m alt., on rock outcrops in open *Eucalyptus* woodland, *H. Streimann* 52213, 21.viii.1993 (CANB).

New South Wales: ● Morton National Park, Pidgeon House Mountain, 35°21'S, 150°15'E, 720–750 m alt., on sandstone rocks near summit, *U. Trinkaus s.n.*, 21.x.1999 (GZU, seven collections); ● North Coast, Toonumbor State Forest, 29 km W of Kyogle, 150 m from Coxes Road, 28°29'S, 152°45'E, 200 m alt., on volcanic rocks in disturbed rainforest, *D. Verdon* 3944., 18.x.1978 (CANB).

Victoria: ● Brisbane Ranges, Little River Gorge, c. 25 km S of Bacchus Marsh, 37°51'S, 144°22'E, on rock, *R. Filson* & *H. Mayrhofer* 2928, 3007, 18.x.1981 (GZU).

Key to Australasian species of *Rinodina* containing xanthenes and zeorin

- 1 Hypothecium brown to deep yellow-brown; 6-*O*-methylarthothelin present; Australia (N.S.W., southern Qld)..... **R. michaelae**
 1: Hypothecium colourless to pale yellow-brown; arthothelin and/or thiomelin present.... 2
- 2 Thiomelin (major) present; arthothelin absent..... 3
 2: Arthothelin (major) present; thiomelin present in minor or trace amounts 4
- 3 Apothecia immersed; ascospores 14–21 × 7–11 µm; subtropical to mainly tropical, Australia (W.A., Qld, N.S.W.), Papua New Guinea, SE Asia, Jamaica
 **R. xanthomelana**
 3: Apothecia adnate to sessile at maturity; ascospores 20–34 × 11–17 µm; temperate (to subtropical) Australia, New Zealand..... **R. thiomela**
- 4 Apothecia immersed; ascospores 15–21 × 8–12 µm; Fiji..... **R. fijiensis**
 4: Apothecia adnate to sessile at maturity; ascospores 17–32 × 10–20 µm; Australia 5
- 5 2,5-Dichlorolichexanthone, 4,5-dichlorolichexanthone ± lichexanthone present; ascospores 10–14 µm wide; Tas..... **R. teniswoodiorum**
 5: Dichlorolichexanthenes and lichexanthone absent; ascospores 11–20 µm wide; eastern Australia **R. arthomelina**

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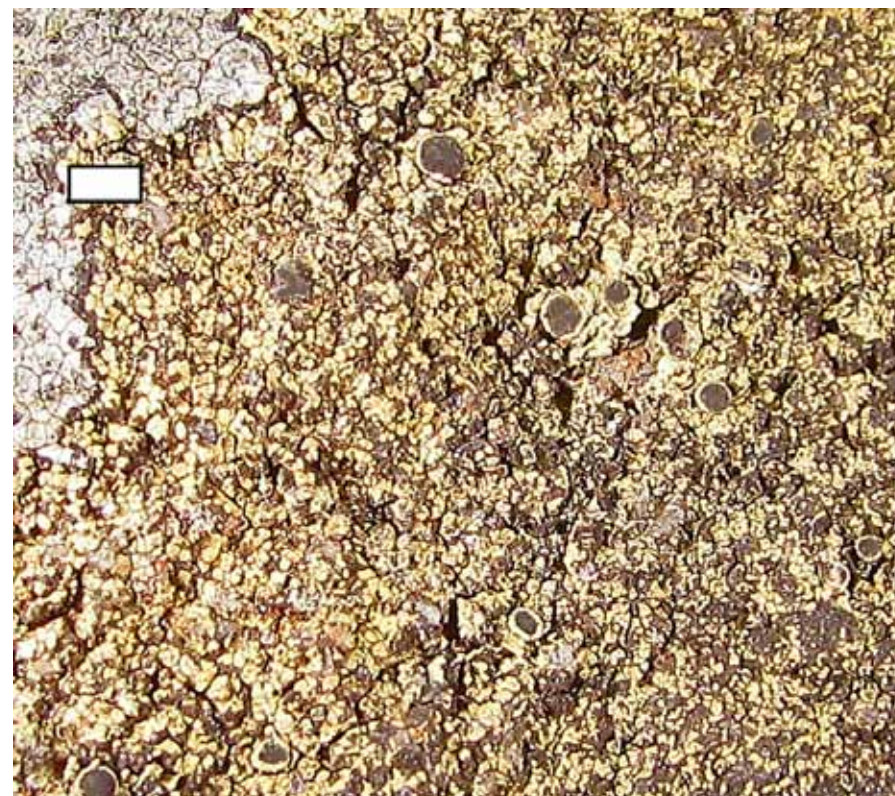


Figure 1. *Rinodina arthomelina* (holotype in GZU). Scale = 1 mm.



Figure 2. Ascospore ontogeny of *R. arthomelina*. Scale = 10 µm.