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 xanthones 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 xanthones, which include *Rinodina fijensis* Elix & Giralt, *R. michaeleae* 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. Figs 1, 2 MycoBank No.: MB 830141

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 isidial-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 ± between adjacent areoles; medulla white, lacking calcium oxalate (H2SO4–), ±; photobiont cells 7–12 µm diam. Apothecium 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 excurrent 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 µm thick; outer zone brown to dark brown, K–, N–; inner zone paler brown. *Epithecium* 10–20 µm thick, brown, K–, N–; *Hypothecium* 100–120 µm thick, colourless, K–, N–; *Pycnothecium* 150–200 µm thick, colourless, K–, N–; *Epihymenium* 10–20 µm thick, colourless, not inspersed; paraphyses 1.5–2.5 µm wide, simple to branched, capitate, with apices 3–3.5 µm wide and brown caps, with scattered oil paraphyses 4–6 µm wide. *Asci* of the *Lecanora*-type, 8-spored or with fewer spores. Ascospores *Teichophila*-type (with internal wall thickenings transition from *Pachyspora*– to *Buellia*–, *Milvina*– or *Mischoblastia*-types at different stages of development), ± bacilliform, 3.5–5 × 1–1.5 µm.

**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 xanthones.

**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 xanthones. 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 *Pachyspora*-type to *Mischoblastia*-, *Milvina*- or *Buellia*-type 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 µm wide, which become constricted with age, and in containing additional 2,5-dichlorolichexanthone, 4,5-dichlorolichexanthone and ± lichexanthone. In *R. arthomelina*, the ascospores do not become constricted with age and are 11–20 µm wide, and the species lacks dichlorolichexanthones and lichexanthone. Chemically, *R. arthomelina* is identical to *R. fijensis*, although the latter species was initially reported to contain additional atranorin. That was an error – to contain atranorin was observed to be a contaminant that obscured the trace amounts of thiomelin present (Elix & Giralt 2015). *Rinodina fijensis* differs from *R. thiomela* in having immersed apothecia and smaller ascospores, 15–21 × 8–12 µm.

The present, the new species is known from hinterland regions of Victoria, New South Wales and Queensland. Associated lichens include *Heterodermia speciosa* (Wulfén) Trev., *Lepra subventosa* (Malme) L.Schmitt & Lumbsch var. *subventosa*, *Pertussaria 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*-Planchonia-dominated woodland, J.A. Elix 21161 & H. Streimann, 2.vii.1986 (CANB); • Carnarvon National Park, track to Baloon Cave, 91 km NW of Injune, 25°04’S, 148°15’E, 460 m alt., on sandstone rocks in *Eucalyptus* woodland, J.A. Elix 34278, 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.vii.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.x.1993 (CANB, GIZU); • Carnarvon National Park, Mackey, 91 km NW of Injune, 25°04’S, 148°14’E, 450 m alt., on rock outcrops in open *Eucalyptus* woodland, H. Streimann 323213, 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°20’S, 152°45’E, 200 m alt., on volcanic rocks in disturbed rainforest, D. Verdorn 3944, 18.x.1978 (CANB).

**Victoria**: • Brisbane Ranges, Little River Gorge, c. 25.5 km S of Bacchus Marsh, 37°51’S, 144°22’E, on rock, R. Fillson & H. Mayrhofer 2928, 3007, 18.x.1981 (GZU).
Key to Australasian species of *Rinodina* containing xanthones and zeorin

1 Hypothecium brown to deep yellow-brown; 6-O-methylarthothelin present; Australia (N.S.W., southern Qld)……………………………………………………………... **R. michaelae**

2 Thiomelin (major) present; arthothelin and/or thiomelin present…………………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. thiomelina**

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; Fiji…………………………………….. **R. teniswoodiorum**

5: Dichlorolichexanthones and lichexanthone absent; ascospores 11–20 µm wide; eastern Australia……………………………………………………………………………………………………………………………………... **R. arthomelina**

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References


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

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