

## RINODINA

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*Rinodina* (Ach.) S.F.Gray, *Nat. Arr. Brit. Pl.* 1: 448 (1821)

From the Greek *rinos* (a shield), and a suffix without apparent meaning, in reference to the shape of the apothecia.

*Lecanora* [unranked] *Rinodina* Ach., *Lichenogr. Universalis* 344 (1810).

Type: *R. sophodes* (Ach.) A.Massal.

Thallus crustose to subsquamulose, rarely squamulose or lobate, superficial, thin, thick or evanescent, continuous, rimose or areolate, occasional granular, verrucose or bullate, corticate or not, occasionally immersed and inconspicuous. Soredia, isidia and blastidia present or absent. Prothallus a thin dark brown or black marginal line, or not apparent. Upper surface pale to dark grey, yellow, yellow-brown or dark brown. Medulla present; lower cortex absent. Ascomata apothecial, discoid, immersed to sessile, lecanorine, pseudolecanorine, biatorine or rarely lecideine; disc brown to black, rarely pruinose, plane to convex; margin concolorous with the thallus, occasionally partially developed or absent, entire, rarely crenulate or flexuose, usually persistent, becoming excluded in convex apothecia; thalline exciple usually present, concolorous with the disc or thallus, entire or crenulate, persistent or more rarely excluded at maturity, with or without a distinct cortex; excipulum usually colourless, rarely brown. Epihymenium brown, red-brown or blue-black; hymenium colourless, rarely brownish, inspersed or not, amyloid; hypothecium colourless, rarely brown to dark brown. Paraphyses septate, simple or with short branches near the apices, apices expanded, brown-capped. Asci *Lecanora*-type, clavate, (4–) 8-spored; tholus with a strongly amyloid lateral part, a non-amyloid broadly diverging axial mass with a thick non-amyloid cap above, and a weakly amyloid outer layer. Ascospores olive-green or pale or dark brown, 1–5-septate, mainly double-walled, the walls variously thickened, ellipsoidal; septa well developed at maturity; outer wall smooth to strongly ornamented; torus present or absent; ontogeny type-A or B. Conidiomata pycnidial, usually immersed; conidiophores of types I, II, V or VI (Vobis, 1980). Conidia bacilliform.

*Rinodina* is a cosmopolitan genus currently thought to contain about 300 species, 33 of which occur in Australia. Species grow on calcareous and siliceous rocks, on bark, wood and on other lichens.

The structure and distribution of the thickenings of the ascospore walls are diagnostic for various species of *Rinodina*. Furthermore, special care must be taken to examine a range of spores from each specimen as immature or overmature spores can give misleading information. For discussion and other illustrations of spore types in *Rinodina*, see Mayrhofer & Moberg (2002), Kaschik (2006) and Giavarini *et al.* (2009).

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### Key

1	Thallus growing on rock .....	2
1:	Thallus growing on bark, wood or soil .....	29
2	Thallus lichenicolous .....	3
2:	Thallus autonomous .....	4
3	Ascospores 18–25 × 11–15 µm, <i>Milvina</i> -type .....	17. <b>R. milvinodes</b>
3:	Ascospores 13–21 × 7.5–11.5 µm, <i>Pachysporaria</i> -type .....	32. <b>R. williamsii</b>
4	Thallus yellow or yellowish .....	5
4:	Thallus grey or brown .....	6
5	Apothecia immersed; ascospores 14–21 × 7.5–10.5 µm .....	33. <b>R. xanthomelana</b>
5:	Apothecia adnate or sessile at maturity; ascospores 20–34 × 11–17 µm .....	31. <b>R. thiomela</b>
6	Thallus on calcareous rocks .....	7
6:	Thallus on silicolous rocks .....	12
7	Apothecia immersed; hymenium not interspersed with oil globules .....	15. <b>R. immersa</b>
7:	Apothecia not immersed; hymenium interspersed with oil globules or not .....	8
8	Ascospores <i>Physconia</i> -type .....	24. <b>R. peloleuca</b>
8:	Ascospores not <i>Physconia</i> -type .....	9
9	Ascospores <i>Bischoffii</i> -type; hymenium interspersed with oil globules .....	4. <b>R. bischoffii</b>
9:	Ascospores not <i>Bischoffii</i> -type; hymenium not interspersed .....	10
10	Ascospores <i>Bicineta</i> -type .....	16. <b>R. luridata</b>
10:	Ascospores not <i>Bicineta</i> -type .....	11
11	Ascospores <i>Teichophila</i> -type; spore walls finely scabrid .....	27. <b>R. reagens</b>
11:	Ascospores <i>Tunicata</i> -type or <i>Physcia</i> -type; spore walls striate .....	28. <b>R. stratitunicata</b>
12	Thallus K+ yellow; atranorin present .....	13
12:	Thallus K- or endolithic; atranorin absent .....	19
13	Ascospores <i>Physcia</i> -type .....	7. <b>R. confragosa</b>
13:	Ascospores not <i>Physcia</i> -type .....	14
14	Ascospores <i>Milvina</i> -type or <i>Physcia</i> -type .....	15
14:	Ascospores not <i>Milvina</i> -type nor <i>Physcia</i> -type .....	16
15	Ascospores 16–22 × 10–13 µm .....	19. <b>R. murrayi</b>
15:	Ascospores 11–16 × 5.5–9.0 µm .....	21. <b>R. occulta</b>
16	Ascospores <i>Pachysporaria</i> -type .....	30. <b>R. substellulata</b>
16:	Ascospores <i>Mischoblastia</i> -type .....	17
17	Apothecia lecanorine to pseudolecanorine or lecideine .....	23. <b>R. oxydata</b>
17:	Apothecia lecanorine .....	18
18	Ascospores 15–21 × 9–11 µm; gyrophoric acid present .....	14. <b>R. gyrophorica</b>
18:	Ascospores 18–27 × 10.0–14.5 µm; gyrophoric acid absent .....	18. <b>R. moziana</b>
19	Apothecia lecanorine .....	20
19:	Apothecia lecideine .....	28

20	Thallus blastidiate .....	<b>5. R. blastidiata</b>
20:	Thallus not blastidiate .....	21
21	Thallus thick, subsquamulose to finely lobate .....	<b>29. R. subcrustacea</b>
21:	Thallus thin, not subsquamulose or finely lobate .....	22
22	Ascospores <i>Dirinaria</i> -type .....	<b>22. R. oleae</b>
22:	Ascospores not <i>Dirinaria</i> -type .....	23
23	Ascospores <i>Physconia</i> -type .....	<b>24. R. peloleuca</b>
23:	Ascospores not <i>Physconia</i> -type .....	24
24	Ascospores <i>Pachysporaria</i> -type .....	25
24:	Ascospores not <i>Pachysporaria</i> -type .....	26
25	Ascospores 13–21 µm long; spore ontogeny type-A .....	<b>32. R. williamsii</b>
25:	Ascospores 17–27 µm long; spore ontogeny type-A and type-B .....	<b>26. R. ramboldii</b>
26	Ascospores <i>Physcia</i> -type to <i>Milvina</i> -type .....	<b>6. R. cacaotina</b>
26:	Ascospores <i>Tunicata</i> -type .....	27
27	Ascospores <i>Tunicata</i> -type to <i>Physcia</i> -type; spore wall striate .....	<b>28. R. stratitunicata</b>
27:	Ascospores <i>Tunicata</i> -type to <i>Pachysporaria</i> -type; spore wall finely ornamented .....	<b>8. R. confragosula</b>
28	Thallus K+ yellow; atranorin present; ascospores <i>Pachysporaria</i> -type; torus indistinct or absent .....	<b>30. R. substellulata</b>
28:	Thallus K–; atranorin absent; ascospores <i>Tunicata</i> -type; torus well developed .....	<b>8. R. confragosula</b>
29	Thallus on soil .....	<b>11. R. conradii</b>
29:	Thallus on bark or wood .....	30
30	Ascospores 4-celled .....	31
30:	Ascospores 2-celled .....	32
31	Lumina of immature 2-celled ascospores bone-shaped; spore ontogeny of type A .....	<b>10. R. connectens</b>
31:	Lumina of immature 2-celled ascospores subcircular; spore ontogeny of type B .....	<b>11. R. conradii</b>
32	Most ascospores > 22 µm long; thallus thick, well developed, areolate to subsquamulose .....	33
32:	Most ascospores < 22 µm long; thallus usually thin .....	35
33	Ascospores <i>Physcia</i> -type, lacking inclusions .....	<b>13. R. elixii</b>
33:	Ascospores <i>Pachysporaria</i> -type or <i>Mischoblastia</i> to <i>Pachysporaria</i> -type, with or without inclusions ..	34
34	Ascospores <i>Pachysporaria</i> -type; ascospore inclusions present .....	<b>12. R. dolichospora</b>
34:	Ascospores <i>Mischoblastia</i> to <i>Pachysporaria</i> -type; ascospore inclusions absent .....	<b>2. R. australiensis</b>
35	Ascospores <i>Physconia</i> -type .....	<b>25. R. pyrina</b>
35:	Ascospores <i>Pachysporaria</i> -, <i>Mischoblastia</i> - or <i>Physcia</i> -type .....	36
36	Thallus absent or not apparent; apothecia initially immersed, often lecideine; ascospores of <i>Physcia</i> -type .....	<b>20. R. obscura</b>
36:	Thallus persistent; apothecia adnate to sessile, always lecanorine; ascospores <i>Pachysporaria</i> -, <i>Mischoblastia</i> - or <i>Physcia</i> -type .....	37
37	Thallus rimose-areolate or verrucose; ascospores <i>Pachysporaria</i> -type .....	<b>1. R. asperata</b>
37:	Thallus areolate to subsquamulose, becoming lobulate, granular or microphylline; ascospores <i>Mischoblastia</i> - or <i>Physcia</i> -type .....	38
38	Ascospores <i>Mischoblastia</i> -type; torus indistinct .....	<b>2. R. australiensis</b>
38:	Ascospores <i>Physcia</i> -type; torus distinct .....	39
39	Thallus K+ yellow; atranorin and zeorin present .....	<b>3. R. austroleprosa</b>
39:	Thallus K–; no lichen substances present .....	<b>9. R. confusa</b>

**1. *Rinodina asperata* (Shirley) Kantvilas, *Pap. & Proc. Roy. Soc. Tasmania* 122: 65 (1988)**

*Buellia polysora* var. *asperata* Shirley, *Pap. & Proc. Roy. Soc. Tasmania* 1893: 218 (1894). T: Fork Creek, Tas., on bark, *W.A. Weymouth 144*; holotype: BRI n.v.; iso: G n.v.

Illustrations: H. Mayrhofer, G. Kantvilas & K. Ropin, *Muelleria* 12: 175, fig. 4 (1999).

Thallus crustose, usually thick, rimose-areolate or verrucose, rarely thin and smooth; areolae contiguous or dispersed, 0.1–0.3 mm wide, ±plane; prothallus absent. Upper surface dull olive-green to brownish grey, matt, at times ±abraded. Apothecia 0.25–1.2 mm wide, lecanorine, numerous, scattered or crowded, sessile or adnate; thalline margin prominent, concolorous with the thallus, smooth and entire to crenulate or verruculose, generally

persistent; disc brown to black-brown, plane to convex or uneven with age. Epihymenium 10–15 µm thick, brown to olive-brown, K–; hymenium 70–100 µm thick, colourless; hypothecium 60–100 µm thick, colourless to pale yellowish brown. Paraphyses 1.5–2.0 µm wide, simple to branched, with apices 3–5 µm wide and brown to olive-brown caps; oil paraphyses occasionally developed. Asci 8-spored. Ascospores *Pachysporaria*-type, 1-septate, pale olive-green to brown, ellipsoidal, 15–22 × 7–12 µm; ontogeny of type-A; outer wall smooth; torus indistinct. Pycnidia not seen.

**Chemistry:** Thallus K–, C–, P–, UV–; no lichen substances detected.

Common and widespread endemic on bark in open woodland and dry-sclerophyll forest in southern and eastern Australia (W.A., S.A., Qld, N.S.W., A.C.T., Vic. and Tas.).

W.A.: Albany Hwy, 2 km S of Beaufort, S of Arthur R., *D., M. & H. Mayrhofer 8553* (GZU, HO, PERTH). S.A.: Fred Rattei's Scrub, 7 km W of Springton, *M. & H. Mayrhofer 6657* (GZU). Qld: Sedgley Park, Newmarket, *R.W. Rogers & C. Scarlett 4784* (BRI). N.S.W.: Ingalba Nature Reserve, 9 km W of Temora, *J.A. Curnow 1594* (CANB). A.C.T.: Molonglo Gorge Reserve, 14 km SE of Canberra, *H. Mayrhofer 10991, 10993* (GZU). Vic.: road from Kaniva to Edenhope, 20 km S of Kaniva, Little Desert, *R.B. Filson 17078* (MEL). Tas.: Cape Contrariety, *G. Kantvilas 183/98* (HO).

This species is characterised by the dull olive-green to brownish grey, crustose thallus, and the small *Pachysporaria*-type ascospores with an indistinct torus.

## 2. *Rinodina australiensis* Müll.Arg., *Hedwigia* 32: 123 (1993)

T: by seaside, [probably Port Phillip Bay], Vic., on *Banksia serrata*, 1892, *F.R.M. Wilson 368*; lecto: *G n.v.*, *vide* H. Mayrhofer, G. Kantvilas & K. Ropin, *Muelleria* 12: 177 (1999).

[*Rinodina colobinoides* auct. non (Nyl.) Zahlbr.: J. Müller, *Bull. Herb. Boissier* 1: 40 (1893)]

Illustrations: H. Mayrhofer, G. Kantvilas & K. Ropin, *op. cit.* 178, fig. 6.

Thallus crustose, thick and areolate to subsquamulose; areolae contiguous or discrete, 0.1–0.5 mm wide, convex to verruculose or minutely lobulate; prothallus absent. Upper surface dull olive-grey to brownish grey, ±becoming granular and blastidiate. Apothecia 0.3–1.0 mm wide, lecanorine, scattered or crowded, initially immersed, becoming adnate or sessile; thalline margin prominent, concolorous with the thallus, entire or incomplete, smooth to crenulate, generally persistent but becoming thin and partially excluded with age; disc reddish brown to dark brown or brown-black, initially plane, strongly convex at maturity. Epihymenium 7–10 µm thick, brown, K–; hymenium 100–120 µm thick, colourless; hypothecium 50–100 µm thick, pale yellowish brown, K–. Paraphyses 1.0–1.5 µm wide, simple or rarely branched, with apices 3–5 µm wide and brown caps; oil paraphyses common, 4.0–6.5 µm wide. Asci 8-spored at first, later 4–6-spored. Ascospores initially *Mischoblastia*-type, becoming *Pachysporaria*-type, 1-septate, brown, ellipsoidal, 18–33 × 9–16 µm; ontogeny of type-A; outer wall smooth to finely ornamented; torus absent. Pycnidia immersed, found mainly at base of apothecia; conidia bacilliform, 3–4 × 1 µm.

**Chemistry:** Thallus K–, C–, P–, UV–; no lichen substances detected.

Scattered on bark in coastal and lowland sclerophyll forest in southern and eastern Australia (W.A., S.A., N.S.W., Vic. and Tas.); also in Namibia.

W.A.: Boxer Is., Recherche Archipeligo, 9 Nov. 1950, *J.H. Willis* (MEL). S.A.: Fred Rattei's Scrub, 7 km W of Springton, *M. & H. Mayrhofer 2702* (GZU). N.S.W.: Buckenbowra R. estuary, 7.5 km WNW of Batemans Bay, *J.A. Elix & K. Kalb 18246* (Herb. Kalb). Vic.: Cribb Pt, Westernport Bay, 15 May 1978, *N. Stevens* (BRI). Tas.: Tunbridge, *G. Kantvilas 160/98* (HO).

This species is characterised by the olive-grey to brownish grey, areolate to subsquamulose thallus that often becomes granular and blastidiate, and by the large, initially *Mischoblastia*-type, but subsequently *Pachysporaria*-type ascospores that lack a torus.

## 3. *Rinodina austroleprosa* Elix, *Australas. Lichenol.* 62: 38 (2008)

*Rinodina leprosa* Elix, *Australas. Lichenol.* 61: 22 (2007), *nom. illeg.* T: Reef Hills State Park, 7 km SSW of Benalla, Vic., 36°36'53"S, 145°56'03"E, alt. 155 m, on base of *Eucalyptus* in open *Eucalyptus* woodland, 5 May 2006, *J.A. Elix 37189*; holo: MEL; iso: CANB, GZU.

Illustration: J.A.Elix, *Australas. Lichenol.* 61: 25, fig. 3 (2007), as *R. leprosa*.

Thallus crustose, initially thin and smooth, becoming ±entirely blastidiate and forming a ±continuous leprose-granulose crust; prothallus absent. Upper surface dull pale blue-grey to whitish grey; sorediate granules 30–50 µm diam.; consoredia to 125 µm wide. Apothecia 0.4–1.2 mm wide, uncommon, lecanorine, scattered, adnate or sessile; thalline margin concolorous with the thallus, thin, entire in immature apothecia, becoming flexuose, densely blastidiate-sorediate, finally completely excluded; disc dark brown to brown-black, plane before becoming markedly convex. Epithymenium 7–10 µm thick, brown, K–; hymenium 75–125 µm thick, colourless; hypothecium 75–110 µm thick, pale yellow. Paraphyses 1.5–2.0 µm wide, simple or rarely branched, with apices 3–5 µm wide and dark brown caps. Asci 8-spored. Ascospores *Physcia*-type, 1-septate, brown, ellipsoidal, 15–20 × 10–13 µm; ontogeny of type-A; outer wall smooth; torus present. Pycnidia not seen

*Chemistry*: Thallus K+ yellow, C–, P+ yellow; containing atranorin (major), chloroatranorin (major), zeorin (major).

This very rare endemic is known only from bark at the type locality.

This species is characterised by the thin thallus, the small, dense blastidia forming a ±continuous leprose-granulose crust, the *Physcia*-type ascospores and the presence of atranorin, chloroatranorin and zeorin.

#### 4. *Rinodina bischoffii* (Hepp) A.Massal., *Framm. Lichenogr.* 26 (1855)

*Psora bischoffii* Hepp, *Flecten Europas* 81 (1853). T: Zürich, [Switzerland], an Kalk u. Nagelfluhfelsen, Hepp, *Flecten Europas* No. 81; lecto: G n.v., fide H.Mayrhofer & R.Moberg, *Nordic Lichen Fl.* 2: 72 (2002).

For further synonymy, see Mayrhofer & Moberg (2002).

Illustrations: V.Wirth, *Die Flechten Baden-Württembergs*, 2nd edn 828 (1995); H.Mayrhofer & R.Moberg, *op. cit.* 101; M.Kaschik, *Biblioth. Lichenol.* 93: 27, fig. 4 (2006).

Thallus crustose, endolithic to epilithic, consisting of scurfy granules, rarely thin and rimose-areolate; prothallus absent. Upper surface pale grey to grey-brown or yellow-brown. Apothecia 0.4–1.0 mm wide, lecanorine to pseudolecanorine and biatorine, scattered or contiguous, sessile; thalline margin initially concolorous with the thallus, later concolorous with the disc, entire, occasionally thick and crenate, persistent or becoming excluded; disc dark brown to black, plane to convex, epruinose. Epithymenium 15–35 µm thick, medium to dark brown or pale red-brown; hymenium 80–135 µm thick, colourless, interspersed with oil globules; hypothecium 80–180 µm thick, colourless, interspersed with oil globules, K–. Paraphyses 1.5–2.5 µm wide, usually simple, rarely branched, with broadened apices, 3.0–6.5 µm wide, and dark brown caps. Asci 8-spored. Ascospores *Bischoffii*-type, 1-septate, brown, with a heavily pigmented band around the central part, ellipsoidal, 15–21 × 9–13 µm; ontogeny of type-A; outer wall finely ornamented; torus absent. Pycnidia immersed; conidia bacilliform, 4–5 × 1 µm.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Common on limestone in southern W.A., S.A., N.S.W., A.C.T., Vic. and Tas.; also in Europe, North America, Africa, Asia and New Zealand.

W.A.: Yanchep S.F., picnic area N of Yanchep Natl Park, *H.Mayrhofer 8034* (CANB, GZU, PERTH). S.A.: Koonamore Vegetation Reserve, NW of Yunta, *R.D.Seppelt 2354* (MEL). N.S.W.: Careys Cave, 4.5 km NNE of Wee Jasper, *H.Mayrhofer 8020*, *J.A.Elix*, *J.Johnston* & *H.Streimann* (CANB, GZU, UPS). A.C.T.: Cotter Reserve, near junction of Cotter R. and Paddy R., 17 km WSW of Canberra, *D.Verdon 8951* (CANB). Vic.: 5 km E of Buchan, *G.Rambold 3293* (MEL). Tas.: Mole Creek, *P.W.James* & *G.Kantvilas 460/84* (GZU).

This species is characterised by having *Bischoffii*-type ascospores and an interspersed hymenium.

**5. *Rinodina blastidiata* Matzer & H.Mayrhofer, *Acta Bot. Fenn.* 150: 110 (1994)**

T: Henderson Pt, Falmouth, S of Scamander, Tas., 41°30'S, 148°16'E, on granite coastal rocks, 6 Aug. 1992, *H.Mayrhofer 10907* & *E.Hierzer*; holo: HO *n.v.*, iso: CANB; iso: BM, GZU, HO, MEL, UPS, WELT *n.v.*

[*Rinodina teichophiloides auct. non* (Stizenb.) Zahlbr.: *H.Mayrhofer, Pl. Graec. Lich.* 434 (1989)]

Illustrations: M.Matzer & H.Mayrhofer, *op. cit.* 112, fig. 2; 113, figs 4–7 (1994); M.Kaschik, *Biblioth. Lichenol.* 93: 33, fig. 7 (2006).

Thallus crustose to weakly squamulose, epilithic, rimose to areolate, continuous or of discrete squamules or areolae; areolae and squamules, 0.2–0.5 mm wide; prothallus marginal, dark brown, often evanescent. Upper surface greenish grey, pale grey, yellow-brown, brown or dark brown, usually blastidiate; blastidia somewhat segmented, with clavate to globose sections. Apothecia 0.2–1.2 mm wide, usually lecanorine, rarely lecideine, frequent, rare or absent, adnate to sessile; thalline margin concolorous with the thallus, entire, crenate or blastidiate, persistent; disc dark reddish brown, dark brown to brown-black, plane to convex, epruinose. Epithymenium 10–15 µm thick, reddish brown, K–; hymenium 75–130 µm thick, colourless; hypothecium 80–150 µm thick, colourless to yellowish, K–. Paraphyses 1–4 µm wide, simple or rarely branched, with slightly broadened apices to 5 µm wide, and dark brown caps; occasionally with enlarged oil-cells to 7 µm wide [oil-paraphyses]. Asci with 8 or fewer ascospores. Ascospores *Teichophila*-type, 1-septate, brown, ellipsoidal, 16–32 × 9–15 µm; ontogeny of type-A; outer wall smooth to finely ornamented; torus absent. Pycnidia immersed; conidia bacilliform, 3–4 × 1.0–1.5 µm.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

This species is common on siliceous coastal rocks in south-eastern S.A., N.S.W., Vic. and Tas. Also in South America, the Falkland Islands and New Zealand.

S.A.: Pt Ellen, 2 km S of Vivonne Bay, Kangaroo Is., *J.A.Elix 19597* & *L.H.Elix* (CANB). N.S.W.: Nundera Pt, 1 km NE of Kioloa, *J.A.Elix 22949* (CANB). Vic.: Whisky Bay, Wilsons Promontory, *H.Mayrhofer 10680* & *E.Hierzer* (GZU, HO, MEL). Tas.: Granville Harbour, *P.W.James* & *G.Kanvilas 485/84* (BM, GZU, HO).

This lichen is characterised by the *Teichophila*-type ascospores, the blastidiate upper surface and by the presence of oil paraphyses.

**6. *Rinodina cacaotina* Zahlbr., *Akad. Wiss. Wien, Math.-Naturwiss. Kl. Denkschr.* 104: 377 (1941)**

T: Anawhata Bay, Auckland, North Island, New Zealand, *J.S.Cranwell 183*; holo: W *n.v.*

*Rinodina tibellii* H.Mayrhofer, *Lichenologist* 15: 280 (1983). T: Mount Herbert Forest, 8.2 km S of Diamond Harbour, Banks Penin., Canterbury, New Zealand, 43°42'S, 172°45'E, alt. 450–530 m, on sandstone outcrop, *L.Tibell 9374*; holo: UPS *n.v.*

Illustrations: H.Mayrhofer, *Lichenologist* 15: 271, fig. 11; 277, fig. 21 (1983), as *R. tibellii*; M.Kaschik, *Biblioth. Lichenol.* 93: 39, fig. 11 (2006).

Thallus crustose, epilithic, membranaceous or rimose-areolate to warted or squamulose, often associated with small cyanophilic lichens, areolae 0.1–0.3 mm wide; prothallus absent. Upper surface dirty white to pale grey or brown. Medulla occasionally containing an insoluble orange pigment. Apothecia 0.2–0.8 mm wide, lecanorine, subimmersed to adnate or sessile, scattered to contiguous; thalline margin concolorous with the thallus, entire, thin to thick or subrenate, usually persistent, rarely becoming excluded; disc brown-black, weakly concave to plane or convex, epruinose; ±with a brown proper margin that is visible as a thin line. Epithymenium 10–15 µm thick, brown to dark brown, ±with granular epipsamma, K–; hymenium 70–110 µm thick, colourless; hypothecium 80–150 µm thick, colourless, K–. Paraphyses 1.0–1.5 µm wide, simple, with apices to 5 µm wide and brown caps. Asci 8-spored. Ascospores *Physcia*-type, grading into *Milvina*-type and *Tunicata*-type (internal wall thickenings of *Physcia*-type), 1-septate, brown, ellipsoidal, 15–23 × 7.0–12.5 µm; ontogeny of type-A; outer wall finely ornamented; torus well developed. Pycnidia immersed; conidia bacilliform, 3.5–4.0 × 1 µm.

**Chemistry:** Thallus K–, C–, P–, UV–; no lichen substances detected.

Scattered on siliceous and calcareous rocks in western and south-eastern Australia (W.A., S.A., N.S.W., Vic. and Tas.); also in New Zealand and on the Juan Fernández Islands, south-eastern Pacific Ocean.

W.A.: along road to Mount Joseph Yard, 25 km E of Lennard River crossing, along the Gibb River Rd, *J.A.Elix* 22264 & *H.Streimann* (GZU). S.A.: Kapunda Reservoir, 8 km NW of Kapunda, *H.Mayrhofer* 2778 & *M.Mayrhofer* (GZU). N.S.W.: Guerilla Bay, near Malua Bay, *M.Lambauer* 0003 (GZU). Vic.: Stoney Rises, 8 km W of Colac, *R.B.Filson* 15737 (MEL). Tas.: Springbeach, S of Orford, *H.Mayrhofer* 11267 & *E.Hierzer* (BRI, CANB).

Characterised by The *Physcia*-type ascospores grading into *Milvina*-type and *Tunicata*-type, combined with a very well-developed torus, are diagnostic for *R. cacaotina*.

### 7. *Rinodina confragosa* (Ach.) Körb., *Syst. Lich. German.* 125 (1855)

*Parmelia confragosa* Ach., *Methodus* 33 (1803). T: Suecia [Sweden]; lecto: H-ACH 1030A *n.v.*, *vide* H.Mayrhofer & R.Moberg, *Nordic Lichen Fl.* 2: 72 (2002).

For further synonymy, see Mayrhofer & Moberg (2002).

Illustrations: V.Wirth, *Die Flechten Baden-Württembergs*, 2nd edn 831 (1995); H.Mayrhofer & R.Moberg, *op. cit.* 101; M.Kaschik, *Biblioth. Lichenol.* 93: 45, fig. 15 (2006).

Thallus crustose to squamulose, epilithic, thin to thick, continuous to rimose or areolate, or composed of discrete warts, occasionally minutely squamulose; areolae 0.3–0.7 mm wide; prothallus brown to black or not apparent. Upper surface dirty white to pale grey or yellow-brown. Apothecia 0.5–1.5 mm wide, lecanorine, usually sessile, rarely adnate, crowded or contiguous; thalline margin concolorous with the thallus, entire, persistent; disc brown to black, plane or convex, epruinose, ±with a proper margin. Epithymenium 5–20 µm thick, brown, K–; hymenium 80–110 µm thick, colourless; hypothecium 120–200 µm thick, colourless, K–. Paraphyses 1.0–2.5 µm wide, simple, with broadened apices, 3–5 µm wide, and brown caps. Asci 8-spored. Ascospores *Physcia*-type, 1-septate, brown, ellipsoidal, 15–27 × 8–13 µm; ontogeny of type-A; outer wall finely ornamented; torus developed. Pycnidia immersed; conidia bacilliform, 4.0–5.5 × 1 µm.

**Chemistry:** Thallus K+ yellow, C–, P– or P+ faint yellow, UV–; containing atranorin (major), chloroatranorin (minor), ±zeorin (major).

Very rare on granite in alpine Vic.; also in Europe, Macaronesia, Africa, Asia and North and South America.

Vic.: Langford West Aqueduct, Middle Ck, Bogong High Plains, *H.Mayrhofer* 15485, *H.Hertel* & *R.B.Filson* (GZU).

This lichen is characterised by its *Physcia*-type ascospores and by the presence of atranorin.

### 8. *Rinodina confragosula* (Nyl.) Müll.Arg., *Rev. Mycol. (Toulouse)* 9: 79 (1887)

*Lecanora confragosula* Nyl., in J.M.Crombie, *J. Linn. Soc., Bot.*: 15: 172 (1876). T: Table Mtn, Cape of Good Hope, Western Cape, South Africa, Sept. 1874, *A.E.Eaton s.n.*; lecto: BM *n.v.*, *vide* H.Mayrhofer, *J. Hattori Bot. Lab.* 55: 400 (1984); isolecto: BM *n.v.*

*Rinodina filsonii* H.Mayrhofer, *Beih. Nova Hedwigia* 79: 517 (1984). T: c. 2 km E of Callington, S.A., 35°07'S, 139°02'E, alt. c. 250 m, 11 Aug. 1981, *H.Mayrhofer* 2755 & *M.Mayrhofer*; holo: GZU *n.v.*

[*Rinodina kozukensis* *auct. non* (Vain.) Zahlbr.: H.Mayrhofer, *Beih. Nova Hedwigia* 79: 518 (1984)]

Illustrations: H.Mayrhofer, *Beih. Nova Hedwigia* 79: 513, fig. 7; 519, fig. 13; 536, figs 22, 23 (1984), as *R. filsonii*; M.Matzer & H.Mayrhofer, *Bothalia* 26: 15, fig. 1D (1996); M.Kaschik, *Biblioth. Lichenol.* 93: 48, fig. 17 (2006).

Thallus crustose, epilithic, thin to rather thick, rimose to areolate, occasionally minutely squamulose; areolae 0.2–0.6 mm wide; prothallus black or not apparent. Upper surface dirty white to pale grey. Cortex, excipulum and pycnidia often containing a blue-green (N+ reddish) pigment, while an insoluble orange pigment can be present in the medulla.

Apothecia 0.2–0.8 mm wide, lecanorine or becoming lecideine, subimmersed to adnate, discrete, scattered or contiguous; thalline margin concolorous with the thallus, entire, persistent; disc dark brown to black, weakly concave to plane or subconvex, epruinose. Epithymenium 10–30 µm thick, red brown to brown or blue-green, N– or N+ reddish; hymenium 70–120 µm thick, colourless; hypothecium 180–250 µm thick, colourless, K–. Paraphyses 1.0–1.5 µm wide, simple, with apices 3–6 µm wide and brown caps. Asci with 8 or fewer spores. Ascospores *Tunicata*-type (internal wall thickenings of *Pachysporaria*-type grading into *Milvina*-type), 1-septate, brown, ellipsoidal, 14–25 × 7.5–16.0 µm; ontogeny of type-A; outer wall finely ornamented; torus well developed. Pycnidia immersed; conidia bacilliform, 3–5 × 0.7–2.0 µm.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Scattered on siliceous rocks in pasture and dry-sclerophyll forest in all States and Territories; also in South Africa, New Caledonia and New Zealand.

W.A.: Yilliminning Rock, 20 km E of Narrogin on road to Harrismith, *N.Sammy* 840856 (PERTH). N.T.: 1 km W of Ochre Pits beside Namatjira Drive, Macdonnell Ra., *G.Rambold* 5007 (M). S.A.: Saunders Ck, 6.5 km E of Springton, Southern Lofty Ra., *J.A.Elix* 23498 (CANB). Qld: Millstream Falls, Millstream Falls Natl Park, SW of Ravenshoe, *H.Mayrhofer* 11781 & *E.Hierzer* (CANB). N.S.W.: Great Yambbla Ridge, 17 km SSE of Culcairn, *H.Streimann* 38874 (CANB). A.C.T.: Molonglo Gorge Reserve, 14 km SE of Canberra, *H.Mayrhofer* 10977 & *J.A.Elix* (GZU). Vic.: c. 64 km N of Ouyen–Pinnaroo Hwy, 16 Nov. 1971, *R.B.Filson* (MEL). Tas.: W shore of St. Pauls R., Fingal Valley, Avoca, *H.Mayrhofer* 12079 & *E.Hierzer* (GZU).

This lichen is characterised by *Tunicata*-type ascospores grading into *Pachysporaria*-type and *Milvina*-type, and a well-developed torus, and the common occurrence of the blue-green pigment (N+ reddish) in the epithymenium and excipulum.

### **9. *Rinodina confusa*** H.Mayrhofer & Kantvilas, in H.Mayrhofer, G.Kantvilas & K.Ropin, *Muelleria* 12: 180 (1999)

T: Fred Rattei's Scrub, 7 km W of Springton, S.A., on bark of *Casuarina stricta*, alt. 500–530 m, 12 Aug. 1981, *M.* & *H.Mayrhofer* 2700; holo: GZU *n.v.*; iso: HO *n.v.*

Illustration: H.Mayrhofer, G.Kantvilas & K.Ropin, *op. cit.* 181, fig. 8.

Thallus crustose, thick, areolate to subsquamulose; areolae dispersed or contiguous, 0.1–0.4 mm wide, ±plane or becoming abraded, lobulate, granular or microphylline, ±blastidiate; prothallus absent. Upper surface dingy olive-grey to olive-brown. Apothecia 0.2–0.8 mm wide, lecanorine or becoming lecideine, sessile, scattered to clustered; thalline margin usually poorly developed, incomplete, smooth or more commonly nodulose, becoming excluded with age; proper margin usually distinct, concolorous with the disc; disc reddish brown to blackish brown, plane to convex, epruinose. Epithymenium 10–15 µm thick, red-brown to dark brown, K–; hymenium 90–110 µm thick, colourless; hypothecium 45–55 µm thick, colourless, K–. Paraphyses 1.5–2.0 µm wide, predominantly simple, but branched near apices, with 3–4 µm wide and brown caps. Asci 8-spored. Ascospores initially *Physcia*-type, then *Pachysporaria*-type, 1-septate, brown to dark brown, ellipsoidal, 16–20 × 8.0–10.5 µm; ontogeny of type-A; outer wall smooth; torus well developed. Pycnidia not seen.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

This rare endemic species is known only from the type locality in S.A.

Characterised by the variable ascospores, initially *Physcia*-type then *Pachysporaria*-type, and a well-developed torus.

### **10. *Rinodina connectens*** Malme, *Bih. K. Svenska Vetensk-Akad. Handl.* 28(3/1): 25 (1902)

T: Santo Angelo, near Cachoeira, Rio Grande do Sul, Brazil, 9 Jan. 1893, *G.O.A.Malme* 878; holo: S *n.v.*

Illustration: H.Mayrhofer, G.Kantvilas & K.Ropin, *Muelleria* 12: 173, fig. 3B (1999).



Thallus crustose, thin, effuse, continuous to weakly rimose-areolate, smooth; prothallus absent. Upper surface whitish to grey-white. Apothecia 0.5–0.8 mm wide, lecanorine, sessile to adnate, scattered to crowded; thalline margin thin to thick, concolorous with the thallus, smooth and entire, persistent; disc brown to black-brown or black, plane but soon convex, epruinose. Epihymenium 10–15 µm thick, dark brown, K–; hymenium 120–150 µm thick, colourless; hypothecium 50–100 µm thick, colourless, K–. Paraphyses 1.5–2.0 µm wide, predominantly simple, with broadened apices 3–4 µm wide, and red-brown caps; oil paraphyses frequent, 4.5–6.0 µm wide. Asci 8-spored. Ascospores *Physcia*-type, initially 1-septate, 3-septate at maturity, brown, ellipsoidal, 20–30 × 9.5–14.0 µm; lumina of immature 2-celled spores bone-shaped; ontogeny of type-A; outer wall smooth; torus indistinct. Pycnidia not seen.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Very rare on bark in montane rainforest in north-eastern Qld: also in south-eastern Brazil.

Qld: Mt Lewis, Atherton Tableland, 18 Apr. 1968, *W.A. Weber* (COLO).

This species is characterised by juvenile ascospores having bone-shaped lumina, but which are 3-septate at maturity.

### **11. *Rinodina conradii* Körb., *Syst. Lich. German.* 123 (1855)**

T: locality unknown, “Typenherbar Körber”; lecto: L n.v., *fide* H.Mayrhofer, G.Kantvilas & K.Ropin, *Muelleria* 12: 182 (1999).

Illustrations: H.Mayrhofer, G.Kantvilas & K.Ropin, *Muelleria* 12: 173, fig. 3A; 182, fig. 9a–c (1999).

Thallus crustose, thin and evanescent to rather thick and well developed, rarely areolate, finely verrucose to granular; prothallus absent. Upper surface cream-coloured to grey-brown or brown. Apothecia 0.2–1.0 mm wide, lecanorine, sessile to adnate, scattered or crowded; thalline margin prominent, concolorous with the thallus, smooth and entire, persistent; disc reddish brown to black-brown or black, plane, but soon convex, epruinose. Epihymenium 10–15 µm thick, red-brown, K–; hymenium 120–150 µm thick, colourless; hypothecium 50–100 µm thick, colourless, K–. Paraphyses 1.5–2.0 µm wide, mainly simple, with apices 3–4 µm wide and red-brown caps; oil paraphyses frequent, 4.5–6.0 µm wide. Asci 8-spored. Ascospores *Physcia*-type, initially 1-septate, 3-septate when mature, brown, ellipsoidal, 23–30 × 10–13 µm, lumina of immature 2-celled spores subcircular; ontogeny of type-B; outer wall smooth; torus indistinct. Pycnidia not seen.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Occurs on bark and lignum in south-western W.A. and Tas.; also in Europe, Asia, North and South America and New Zealand.

W.A.: Layman Rd, near Wonnerup House, Busselton, 31 Dec. 1981, *N.Sammy s.n.* (PERTH). Tas.: Farewell Hill near Kettering, *G.Kantvilas 428/81* (HO).

Characterised by the juvenile, *Physcia*-type that which become 4-celled when mature.

### **12. *Rinodina dolichospora* Malme, *Bih. K. Svenska Vetensk-Akad. Handl.* 28(3/1): 30 (1902)**

T: Morro Grande, Santo Antonio, Matto Grosso, Brazil, 20 Dec. 1893, *G.O.A.Malme 2159*; lecto: S n.v., *fide* H.Mayrhofer, G.Kantvilas & K.Ropin, *Muelleria* 12: 183 (1999).

Illustrations: H.Mayrhofer, G.Kantvilas & K.Ropin, *Muelleria* 12: 184, fig. 10a–d (1999).

Thallus crustose, occasionally thin and effuse, more frequently rather thick, areolate to subsquamulose; areolae contiguous to discrete and ±dispersed, 0.3–1.0 mm wide, plane to weakly convex or concave with ascending margins, somewhat microphylline or lobulate; prothallus black, thin, ±evident between areolae. Upper surface pale olive-grey to olive-brown. Apothecia 0.2–1.0 mm wide, lecanorine, sessile, scattered; thalline margin prominent to coronate or incomplete, concolorous with the thallus, surrounding a distinct pale brown to brown proper margin; disc dark brown to black-brown or black, plane to undulate, rarely

convex, epruinose. Epihymenium 10–15 µm thick, orange-brown to dark brown, K–; hymenium 100–130 µm thick, colourless; hypothecium 100–120 µm thick, colourless to pale yellow, K–. Paraphyses 1.5–2.0 µm wide, usually simple or ±branched subapically, with apices 3–4 µm wide and dark brown caps; oil paraphyses absent. Asci 6–8-spored. Ascospores *Pachysporaria*-type, 1-septate or rarely simple, brown, ellipsoidal, 24–31 × 12.5–16.0 µm, frequently with minute granular or globular inclusions; ontogeny of type-A; outer wall smooth; torus indistinct. Pycnidia immersed; conidia bacilliform, 4.5–6.0 × 1.5 µm.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Occurs on bark in coastal N.S.W.; also in South America and western North America.

N.S.W.: Buckenbowra R. estuary, 7.5 km WNW of Batemans Bay, *H.Streimann 35824* & *J.A.Curnow* (CANB); Red Rock, Corindi Ck, N of Coff's Harbour, *G.Kantvilas 129/98* (GZU, HO).

This is characterised by the olive-grey to olive-green, areolate to subsquamulose thallus, the large, *Pachysporaria*-type ascospores that lack a torus but contain minute, granular or globular inclusions.

### 13. *Rinodina elixii* H.Mayrhofer, Kantvilas & Ropin, *Muelleria* 12: 185 (1999)

T: Copi Flats, S side of Wyperfeld Natl Park, Vic., on *Callitris* sp., 18 Aug. 1981, *M. & H.Mayrhofer 4710*; holotype: GZU *n.v.*; isotype: HO, UPS *n.v.*

Illustrations: H.Mayrhofer, G.Kantvilas & K.Ropin, *op. cit.* 186, fig. 11a–d (1999).

Thallus crustose, thick and areolate to subsquamulose; areolae contiguous and coalescing, 0.2–0.5 mm wide, plane, tightly adnate, occasionally rather abraded and lobulate; prothallus absent. Upper surface pale olive-grey to olive-green. Apothecia 0.4–1.0 mm wide, lecanorine, at first immersed in the thallus, soon emerging through ragged fissures, rather sunken, adnate to sessile when mature, scattered to crowded; thalline margin ragged initially, derived from adhering thalline fragments, becoming ±smooth and entire, ultimately thin or absent; proper margin thin or not apparent, concolorous with the disc; disc brown-black, initially plane or concave, becoming undulate to markedly convex, epruinose. Epihymenium 10–20 µm thick, brown, K–; hymenium 130–150 µm thick, colourless; hypothecium 100–150 µm thick, colourless to yellow-brown, K–. Paraphyses 1.0–1.5 µm wide, predominantly simple or ±branched subapically, with 3–5 µm wide and brown caps; oil paraphyses sometimes present, 5–6 µm wide. Asci 4–8-spored. Ascospores *Physcia*-type, 1-septate, dark brown, ellipsoidal, 23–30 × 12.5–16.0 µm; ontogeny of type-A; outer wall minutely ornamented; torus distinct. Pycnidia immersed; conidia bacilliform, 4–5 × 1 µm.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

A rare endemic species on bark in inland areas of N.S.W. and Vic.

N.S.W.: Carbonne, c. 5 km S of Molong, *D., M. & H.Mayrhofer 8589* (GZU).

This lichen is characterised by the thick, pale olive-grey to olive-green, areolate to subsquamulose thallus, the erumpent apothecia and the large, *Physcia*-type ascospores with a distinct torus.

### 14. *Rinodina gyrophorica* Kaschik, *Biblioth. Lichenol.* 93: 55 (2006)

T: SE of Taylors Pt, Trinity Beach, NE of Cairns, Qld, 16°47'S, 145°42'30"E, on seashore granite, 7 Aug. 1993, *H.Mayrhofer 11830* & *E.Hierzer*; holotype: GZU *n.v.*; isotype: BRI *n.v.*

Illustration: M.Kaschik, *op. cit.* 56, fig. 23.

Thallus crustose, epilithic, continuous to rimose and areolate; areolae 0.1–0.5 mm wide; prothallus black or not apparent. Upper surface dirty white to pale grey. Medulla occasionally containing an insoluble orange pigment. Apothecia 0.2–0.5 mm wide, common, lecanorine, subimmersed to adnate, contiguous; thalline margin concolorous with the thallus, entire, persistent or becoming excluded with age; disc black, weakly concave to plane, epruinose. Epihymenium 10–20 µm thick, brown to blue-green, usually N+ reddish, rarely N–; hymenium 60–75 µm thick, colourless; hypothecium 60–80 µm thick, colourless, K–.

Paraphyses 1.5–2.0 µm wide, simple, with apices 4–5 µm wide and dark brown caps. Asci 8-spored. Ascospores *Mischoblastia*-type grading into *Pachysporaria*-type or *Physcia*-type, 1-septate, brown, ellipsoidal, 15–21 × 9–11 µm; ontogeny of type-A; outer wall smooth; torus indistinct or absent. Pycnidia not seen.

*Chemistry*: Thallus K<sup>+</sup> pale yellow, C<sup>+</sup> red, P<sup>-</sup>, UV<sup>-</sup>; containing atranorin (minor), gyrophoric acid (major).

A scattered endemic species on coastal, siliceous rocks in eastern Qld.

Qld: SE end of Island Pt, Port Douglas, *H.Mayrhofer 11408* & *E.Hierzer* (GZU); N end of Sunshine Beach, SE of Noosa Heads, *H.Mayrhofer 11647* & *N.Stevens* (GZU).

Characterised by the combination of small apothecia, the *Mischoblastia*-type ascospores, the common occurrence of the blue-green pigment (N<sup>+</sup> reddish) in the epihymenium and excipulum and the presence of atranorin and gyrophoric acid in the thallus.

### 15. *Rinodina immersa* (Körb.) Arnold, *Flora* 67: 319 (1884)

*Rinodina bischoffii* var. *immersa* Körb., *Parerga Lichenol.* 75 (1859). T: Ad lapides calcareos (Solnhofen formation) montium strilium prope Eichstätt, [Bavaria, Germany], *F.Arnold* (Körber, *Lich. Sel. Germ. Exs.* No. 127); lecto: ZT *n.v.*, *fide* H.Mayrhofer & R.Moberg, *Nordic Lichen Flora* 2: 72 (2002).

Illustrations: V.Wirth, *Die Flechten Baden-Württembergs*, 2nd edn 831 (1995); H.Mayrhofer & R.Moberg, *op. cit.* 104; M.Kaschik, *Biblioth. Lichenol.* 93: 60, fig. 27 (2006).

Thallus crustose, usually endolithic, rarely very thinly epilithic, finely granular; prothallus absent. Upper surface whitish to pale grey. Apothecia 0.3–1.0 mm wide, pseudolecanorine to lecideine, immersed in depressions in the substratum, with scattered groups of photobiont cells in the margin, or lecideine with a brown amphithecium; proper margin entire, concolorous with the disc or thallus, persistent; disc brown to black, plane to convex, epruinose or white-pruinose. Epihymenium 15–20 µm thick, dark brown; hymenium 75–100 µm thick, colourless, not interspersed; hypothecium 45–130 µm thick, colourless, ±interspersed with oil globules, K<sup>-</sup>. Paraphyses 1.5–2.5 µm wide, usually simple, rarely branched, with apices 4.5–5.0 µm wide and dark brown caps. Asci 8-spored. Ascospores *Bischoffii*-type, 1-septate, brown, with a heavily pigmented band around the central part, ellipsoidal, 13–18 × 8–12 µm; ontogeny of type-A; outer wall finely ornamented; torus absent. Pycnidia not seen.

*Chemistry*: Thallus K<sup>-</sup>, C<sup>-</sup>, P<sup>-</sup>, UV<sup>-</sup>; no lichen substances detected.

Very rare on limestone in south-eastern N.S.W.; also in Europe, North America, Africa, Asia and New Zealand.

N.S.W.: 12 km SE of Cooma, *G.Rambold 3684* (M).

*Rinodina immersa* is characterised by the usually endolithic thallus, immersed, pseudolecanorine to lecideine apothecia and *Bischoffii*-type ascospores.

### 16. *Rinodina luridata* (Körb.) H.Mayrhofer, Scheid. & Sheard, *Biblioth. Lichenol.* 38: 346 (1990)

*Buellia luridata* Körb., *Parerga Lichenol.* 188 (1860). T: Bissingen im Oberamt Ulm, [Germany, Bavaria], *Kemmler*; *holo: L n.v.*

For further synonymy, see Mayrhofer & Moberg (2002).

Illustrations: H.Mayrhofer, C.Scheidegger & J.W.Sheard, *Biblioth. Lichenol.* 38: 347, figs 7–11 (1990); H.Mayrhofer & R.Moberg, *Nordic Lichen Fl.* 2: 105 (2002); M.Kaschik, *Biblioth. Lichenol.* 93: 65, fig. 32 (2006).

Thallus crustose, epilithic, rarely endolithic, rimose-areolate; areolae contiguous, 0.5–0.8 mm wide; prothallus absent. Upper surface yellow-brown to grey or black; an insoluble orange pigment can be present in the upper medulla. Apothecia 0.3–0.7 mm wide, common, lecanorine, immersed to adnate, usually 1 per areole; thalline margin entire, concolorous with the thallus, persistent or becoming excluded; disc dark brown to black, plane to weakly convex, often sparingly pale grey-pruinose. Epihymenium 10–15 µm thick, reddish brown;

hymenium 110–150 µm thick, colourless, not interspersed; hypothecium 70–100 µm thick, colourless to pale yellow-brown, K–. Paraphyses 1.5–3.0 µm wide, simple or rarely branched, with apices 5–7 µm wide and dark brown caps. Asci 8-spored. Ascospores *Bicincta*-type, 1-septate, brown, broadly ellipsoidal, 11–15 × 6.5–10.5 µm; ontogeny of type-A; outer wall not ornamented; torus absent. Pycnidia not seen.

*Chemistry*: Thallus K–, C–, P–, UV–; containing zeorin.

Scattered on limestone in inland areas of south-eastern N.S.W. and Vic.; also in Europe, North America, Africa, Asia and New Zealand.

N.S.W.: London Bridge, Googong Dam Foreshore Reserve, 18 km S of Queanbeyan, *H.Mayrhofer 11307 & J.A.Elix* (CANB, GZU, M, NY, UPS). Vic.: Limestone Ck, Limestone S.F., E of Benambra, *H.Mayrhofer 7181, H.Hertel & R.Filson* (GZU, MEL).

This species is characterised by the yellow-brown to grey or black thallus, the immersed, lecanorine apothecia (often with grey-pruinose discs), the small *Bicincta*-type ascospores and the presence of zeorin.

### 17. *Rinodina milvinodes* H.Mayrhofer, *Beih. Nova Hedwigia* 79: 518 (1984)

T: Mount Monster Conservation Park, 12 km S of Keith on Dukes Hwy, S.A., 36°12'S, 140°19'E, 15 Aug. 1981, *M. & H.Mayrhofer 3026*; holo: GZU *n.v.*; iso: MEL.

Illustrations: H.Mayrhofer, *op. cit.* 513, fig. 3; 525, fig. 15 (1984); M.Kaschik, *Biblioth. Lichenol.* 93: 69, fig. 35 (2006).

Thallus crustose, lichenicolous on *Aspicilia* sp., rimose-areolate to verrucose or bullate, insular to spreading over the host thallus; areolae contiguous, 0.5–0.8 mm wide; prothallus black. Upper surface medium to dark brown. Excipulum and medulla often containing a blue-green (N+ reddish) pigment; an insoluble orange pigment can also be present in the medulla. Apothecia 0.35–0.50 mm wide, common, lecanorine, scattered to contiguous, adnate to sessile; thalline margin entire, concolorous with the thallus, persistent; disc dark brown to black, plane to weakly convex, epruinose, often with a black proper margin. Epithymenium 10–15 µm thick, reddish brown to brown; hymenium 70–90 µm thick, colourless, not interspersed; hypothecium 100–150 µm thick, colourless, K–. Paraphyses 1.0–1.5 µm wide, usually simple, rarely branched, with apices 3–5 µm wide and brown caps. Asci 8-spored. Ascospores *Milvina*-type grading into *Pachysporaria*-type, 1-septate, brown, broadly ellipsoidal, 18–25 × 11–15 µm; ontogeny of type-A; outer wall ornamented; torus well developed. Pycnidia not seen.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

This rare endemic is lichenicolous on a saxicolous *Aspicilia* sp. in inland areas of S.A. and Vic.

Vic.: Basalt Hill near Falls Creek, Bogong High Plains, *H.Mayrhofer 15318, 15319, H.Hertel & R.Filson* (GZU).

This species is characterised by its lichenicolous habit, the *Milvina*-type ascospores grading into *Pachysporaria*-type, a well-developed torus, and the common occurrence of a blue-green pigment (N+ reddish) in the medulla and excipulum.

### 18. *Rinodina moziana* (Nyl.) Zahlbr., *Cat. Lich. Univ.* 7: 544 (1931)

*Lecanora moziana* Nyl., *Lich. Japon.* 40 (1890). T: Mitso [Mozi], Japan, 20 Oct. 1879, *S.Almquist*: lecto: H-NYL 28851 *n.v.*, *fide* H.Mayrhofer, *J. Hattori Bot. Lab.* 55: 441 (1984).

*Rinodina tasmanica* H.Mayrhofer, *Beih. Nova Hedwigia* 79: 526 (1984). T: 2 km W of New Norfolk, N of Hobart, Tas., 48°16'S, 152°21'E, alt. c. 50 m, on basalt boulders in pasture, 22 Oct. 1981, *J.Hafellner 3330 & G.Kantvilas*; holo: GZU *n.v.*

[*Rinodina compensata* *auct. non* (Nyl.) Zahlbr.: H.Mayrhofer, *Pl. Graec. Lich.* 331 (1985)]

For further synonymy, see Mayrhofer (1984a).

Illustrations: H.Mayrhofer, *J. Hattori Bot. Lab.* 55: 441 fig. 66 (1984); H.Mayrhofer, *Beih. Nova Hedwigia* 79: 513, fig. 6; 525, fig. 17 (1984), as *R. tasmanica*; M.Kaschik, *Biblioth. Lichenol.* 93: 71, fig. 37 (2006).

Thallus crustose, epilithic, rimose or areolate, rarely somewhat warty or bullate; areolae  $\pm$ contiguous, 0.5–0.8 mm wide; prothallus black. Upper surface yellow-brown to pale grey or brown. Excipulum occasionally with a blue-green (N+ reddish) pigment; an insoluble orange pigment can also be present in the medulla. Apothecia 0.2–0.6 mm wide, common, lecanorine, immersed to adnate, contiguous; thalline margin entire, concolorous with the thallus, persistent or becoming excluded; disc brown to black, plane, epruinose. Epihymenium 10–15  $\mu$ m thick, brown; hymenium 70–110  $\mu$ m thick, colourless, not interspersed; hypothecium 50–100  $\mu$ m thick, colourless, K–. Paraphyses 1–3  $\mu$ m wide, simple or rarely branched, with apices 3.5–5.0  $\mu$ m wide and dark brown caps. Asci 8-spored. Ascospores *Mischoblastia*-type grading into *Pachysporaria*-type, 1-septate, brown, ellipsoidal, 18–27  $\times$  10.0–14.5  $\mu$ m; ontogeny of type-A; outer wall not ornamented; torus present or absent. Pycnidia not seen.

*Chemistry*: Thallus K+ yellow, C–, P– or P+ faint yellow, UV–; containing atranorin (major), chloroatranorin (trace).

Common on siliceous rocks (and often associated with cyanobacteria), in coastal and inland areas of W.A., N.T., Qld, N.S.W., Vic. and Tas.; also in Japan, New Zealand and on the Juan Fernández Islands, south-eastern Pacific Ocean.

W.A.: beside Duncan Hwy, 2.5 km SE of Kununurra, *G.Rambold* 5220 (M). N.T.: The Olgas (Kata Tjuta), walk to the Valley of the Winds, c. 1.5 km from car park, Uluru-Kata Tjuta Natl Park, *B.Owe-Larsson* 6230, 6235 (UPS). Qld: Millstream Falls, SW of Ravenshoe, Millstream Falls Natl Park, *H.Mayrhofer* 11743 & *E.Hierzer* (CANB, GZU). N.S.W.: Putty Rd, Boggy Swamp Ck, *M.Lambauer* 0084 (BRI, CANB, GZU). Vic.: path to river via Bluff Lookout, Mitchell River Natl Park, *R.Moberg* A51:17 & *B.Owe-Larsson* (UPS). Tas.: New Norfolk, *H.Mayrhofer* 10659, *E.Hierzer* & *G.Kantvilas* (GZU).

This species is characterised by the yellow-brown to pale grey or brown thallus, immersed to adnate, lecanorine apothecia, *Mischoblastia*-type ascospores grading into *Pachysporaria*-type, and by the presence of atranorin.

### 19. *Rinodina murrayi* H.Mayrhofer, *Lichenologist* 15: 273 (1983)

T: 2 km N of Lee Stream School, Lee Stream Valley, SW of Dunedin, Otago, South Island, New Zealand, 46°46'S, 170°06'E, alt. c. 490 m, on basaltic boulders in pasture, 23 Sept. 1981, *H.Mayrhofer* 2199; holo: GZU *n.v.*; iso: CHR, OTA, Herb. Mayrhofer *n.v.*

Illustrations: H.Mayrhofer, *op. cit.* 275, fig. 15; M.Kaschik, *Biblioth. Lichenol.* 93: 79, fig. 43 (2006).

Thallus crustose, epilithic, rimose-areolate to granular-verrucose; areolae dispersed, 0.1–0.5 mm wide; prothallus blackish or not apparent. Upper surface whitish, yellowish or pale grey-brown. Apothecia 0.4–0.8 mm wide, common, lecanorine, adnate to sessile, scattered or contiguous; thalline margin entire, concolorous with the thallus, subcrenate, persistent; disc black, plane to convex, weakly white-pruinose. Epihymenium 10–15  $\mu$ m thick, pale brown, P+ red-orange (pannarin); hymenium 90–110  $\mu$ m thick, colourless, not interspersed; hypothecium 100–150  $\mu$ m thick, colourless, K–. Paraphyses c. 1  $\mu$ m wide, often branched, with broadened apices 2–4  $\mu$ m wide and dark brown caps. Asci 8-spored. Ascospores *Milvina*-type grading into *Physcia*-type, 1-septate, brown, ellipsoidal, 16–22  $\times$  10–13  $\mu$ m; ontogeny of type-A; outer wall finely ornamented; torus well developed. Pycnidia not seen.

*Chemistry*: Thallus K+ yellow, C–, P+ red-orange, UV–; containing atranorin (major), pannarin (major).

Uncommon on siliceous rocks in south-eastern Australia (N.S.W., A.C.T., Vic. and Tas.); also in New Zealand.

N.S.W.: 10 km NW of Crookwell on road to Binda, *H.Mayrhofer* 10997 & *E.Hierzer* (GZU). A.C.T.: Mt Aggie, 43 km WSW of Canberra, *V.Wirth* 11083, *H.Streimann* & *D.Verdon* (STU). Vic.: end of Hogans Track, Lerderberg Gorge, Blackwood, *B.Fuhrer* 1027077 (MEL). Tas.: Cockatoo Gully Rd, Harry Walker Tier, 6.5 km W of Dysart, *J.A.Elix* 40339 & *G.Kantvilas* (CANB).

Characterised by the whitish, yellowish or pale grey-brown thallus, the sessile to adnate, lecanorine apothecia, *Milvina*-type ascospores grading into *Physcia*-type, and the presence of atranorin and pannarin. *Rinodina occulta* differs in having smaller apothecia and ascospores and in lacking pannarin.

## 20. *Rinodina obscura* Müll.Arg., *Bull. Herb. Boissier* 1: 40 (1893)

T: Oakleigh, Vic., 1892, *F.R.M. Wilson* 745; holo: G n.v.

Illustration: H.Mayrhofer, G.Kantvilas & K.Ropin, *Muelleria* 12: 187, fig. 12 (1999).

Thallus crustose, very thin and effuse to moderately thick and areolate; areolae scattered or contiguous, 0.1–0.3 mm wide; prothallus absent. Upper surface dull olive-grey to olive-brown, rarely pale grey. Apothecia 0.2–1.0 mm wide, lecanorine, at first immersed in the thallus, soon emerging and adnate to sessile, scattered; thalline margin initially ragged, derived from adhering thalline fragments, becoming  $\pm$ smooth to abraded, ultimately thin or excluded with age; proper margin very thin, dark brown to black, occasionally not apparent; disc black, plane or undulate to convex, epruinose. Epihymenium 10–20  $\mu$ m thick, dark brown, K–; hymenium 80–100  $\mu$ m thick, colourless; hypothecium 40–150  $\mu$ m thick, colourless to yellow-brown, K–. Paraphyses 1.5–2.0  $\mu$ m wide, agglutinated, branched subapically, with apices 2.5–4.0  $\mu$ m wide and brown caps; oil paraphyses sometimes present, 6–7  $\mu$ m wide. Asci 8-spored. Ascospores *Physcia*-type, 1-septate, dark brown, ellipsoidal, 16–20  $\times$  6–9  $\mu$ m; ontogeny of type-A; outer wall smooth; torus distinct. Pycnidia immersed; conidia bacilliform, 3.5–4.5  $\times$  1.5  $\mu$ m.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

A scattered endemic species on bark in south-eastern Australia (S.A., N.S.W., Vic., Tas.).

S.A.: c. 5 km W of Oodla Wirra, *R.W.Rogers* 1625 (BRI). N.S.W.: between Sandy Hollow and Hollydeen, W of Muswellbrook, *D., M. & H.Mayrhofer* 8853 (GZU, HO). Vic.: Copi Flats, S side of Wyperfeld Natl Park, 125 km N of Horsham, *M. & H.Mayrhofer* 4624 (GZU, MEL). Tas.: 7 km E of L. Leake, 22 May 1996, *G.Kantvilas* (HO).

The dull olive-grey to olive-brown or rarely pale grey thallus, erumpent apothecia and the small, *Physcia*-type ascospores with a distinct torus are diagnostic. *Rinodina elixii* differs in having a thicker and more well-developed thallus and larger ascospores with finely ornamented walls.

## 21. *Rinodina occulta* (Körb.) Sheard, *Lichenologist* 3: 349 (1967)

*Buellia occulta* Körb., *Parerga Lichenol.* 186 (1860). T: Wolfsschlucht, Kynast, Poland, *Körber* (*Lich. Sel. Germ. Exs.* No 34): lecto: M n.v., *vide* H.Mayrhofer & R.Moberg, *Nordic Lichen Fl.* 2: 72 (2002).

For further synonymy, see Mayrhofer & Moberg (2002).

Illustrations: H.Mayrhofer & R.Moberg, *Nordic Lichen Fl.* 2: 106 (2002); M.Kaschik, *Biblioth. Lichenol.* 93: 85, fig. 48 (2006).

Thallus crustose, epilithic, thin, verrucose to areolate, the areolae usually contiguous, 0.2–0.7 mm wide; prothallus blackish or not apparent. Upper surface pale grey to yellow-brown or brown; an insoluble orange pigment can be present in the medulla. Apothecia 0.1–0.3 mm wide, common, lecanorine and subimmersed or pseudolecanorine and adnate to sessile, scattered or contiguous; thalline margin entire, concolorous with the thallus, persistent or occasionally excluded; proper margin persistent or becoming excluded; disc dark brown to black, plane to weakly convex, epruinose. Epihymenium 10–15  $\mu$ m thick, brown; hymenium 50–85  $\mu$ m thick, colourless, not interspersed; hypothecium 10–60  $\mu$ m thick, colourless, K–. Paraphyses 1.5–2.0  $\mu$ m wide, branched subapically, with apices 3–6  $\mu$ m wide and dark brown caps. Asci 8-spored. Ascospores *Milvina*-type grading into *Physcia*-type, 1-septate, brown, ellipsoidal, 11–16  $\times$  5–9  $\mu$ m; ontogeny of type-A; outer wall smooth; torus  $\pm$ well developed. Pycnidia not seen.

*Chemistry*: Thallus K+ pale yellow, C–, P+ pale yellow or P–, UV–; containing atranorin.

Uncommon on siliceous rocks in south-eastern Australia (N.S.W., A.C.T., Vic. and Tas.); also in Europe, Asia and Subantarctic islands.

N.S.W.: walking track from Neates Glen via Grand Canyon to Evans Lookout, 4 km SE of Blackheath, Blue Mtns, *H.Mayrhofer* 6710 & *A.W.Archer* (GZU). A.C.T.: trail to Booroomba Rocks, 11 km SW of Tharwa, *J.A.Elix* 4037 p.p. (MEL). Vic.: Mount Arapiles Forest Park, 35 km W of Horsham, *M. & H.Mayrhofer* 2859, 2935 (GZU). Tas.: Grass Tree Hill, N of road from Risdon Vale to Richmond, NE of Hobart, *H.Mayrhofer* 3301 & *G.Kantvilas* (GZU).

This lichen is characterised by the pale grey to yellow-brown or brown thallus, the very small apothecia, small *Milvina*-type ascospores grading into *Physcia*-type, and the presence of atranorin. *Rinodina murrayi* differs in having larger apothecia and ascospores and in containing additional pannarin.

## 22. *Rinodina oleae* Bagl., *Mem. Acad. Sci. Torino*, ser. 2, 17: 403 (1857)

T: Granarolo, Liguria, Italy, 1854, *F.Baglietto*; lecto: MOD *n.v.*, *fide* M.Kaschik, *Biblioth. Lichenol.* 93: 86 (2006).

*Rinodina gennarii* Bagl., *Comment. Soc. Crittog. Ital.* 1: 17 (1861). T: Mt Faiallo nell'Apennino di Voltri, Liguria, Italy, *F.Baglietto*; lecto: MOD *n.v.*, *fide* H.Mayrhofer & R.Moberg, *Nordic Lichen Fl.* 2: 72 (2002).

*Lecanora subexigua* Nyl., *Flora* 57: 308 (1874); *Rinodina subexigua* (Nyl.) H.Olivier, *Mém. Soc. Sci. Nat. Cherbourg* 37: 170 (1909). T: Penzance, Cornwall, England, 1873, *W.Curnow*; holotype: H-NYL 28868 *n.v.*

For further synonymy, see Mayrhofer & Moberg (2002).

Illustrations: W.M.Malcolm & D.J.Galloway, *New Zealand Lichens*[:] *Checklist, Key, and Glossary* 109, 111, 126 (1997), as *R. gennarii*; U.Trinkaus, H.Mayrhofer & M.Matzer, *Australas. Lichenol.* 45: 19, figs 1–5 (1999), as *R. gennarii*; M.Kaschik, *Biblioth. Lichenol.* 93: 87, fig. 50; 90, figs 54, 55 (2006).

Thallus crustose, immersed to superficial, thin, rimose, but often with discrete scabrid or well-developed areolae 0.2–0.7 mm wide; prothallus absent. Upper surface whitish, pale to dark grey or yellow-brown; sometimes the medulla with an insoluble orange pigment. Apothecia 0.2–0.6 mm wide, common, lecanorine or rarely biatorine, adnate to sessile, contiguous; thalline margin entire, concolorous with the thallus, persistent or rarely excluded; disc dark brown to black, plane to convex, epruinose. Epithemium 5–15 µm thick, brown; hymenium 60–110 µm thick, colourless, not interspersed; hypothecium 50–150 µm thick, colourless, K–. Paraphyses 1.5–2.0 µm wide, branched subapically, with apices 3–6 µm wide and dark brown caps. Asci 8-spored. Ascospores *Dirinaria*-type grading into *Physconia*-type, 1-septate, brown, ellipsoidal, 11.0–18.5 × 6–11 µm; ontogeny of type-A or type-B; outer wall smooth or finely ornamented; torus indistinct or absent. Pycnidia immersed; conidia bacilliform, 3–5 × 1 µm.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Common on siliceous rocks or, more rarely, on concrete, bark or wood in southern and eastern Australia (W.A., Qld, N.S.W., A.C.T., Vic. and Tas.); also in Europe, Asia, Africa, North and South America, New Zealand and the Pacific.

W.A.: Yallingup, 66 km SW of Bunbury, *L.Tibell 13938* (GZU). S.A.: Kanmantoo, 40 km SE of Adelaide, *H.Mayrhofer 2801* & *M.Mayrhofer* (GZU). Qld: Mt Cordeaux, Cunninghams Gap National Park, *J.Hafellner 15340, 15363* & *R.W.Rogers* (GZU). N.S.W.: Camel Rock, 5 km N of Bermagui, *H.Lambauer 0009* (GZU). A.C.T.: Molonglo Gorge, 5 km N of Queanbeyan, *M.Lambauer 0097* & *J.A.Elix* (GZU). Vic.: Mount Arapiles Forest Park, 35 km W of Horsham, *M. & H.Mayrhofer 2860* (GZU). Tas.: Cascades, Hobart, *G.Kanvilas 166/98* (GZU, HO).

*Rinodina oleae* is characterised by the whitish, pale to dark grey or yellow-brown thallus, the *Dirinaria*-type ascospores and the absence of lichen substances.

## 23. *Rinodina oxydata* (A.Massal.) A.Massal., *Geneac. Lich.* 19 (1854)

*Mischoblastia oxydata* A.Massal., *Ric. Auton. Lich. Crost.* 42 (1852). T: in oppido Lavagno, Verona, Italy *A.Massalongo*; holotype: VER *n.v.*

*Rinodina pachyspora* Müll.Arg., *Bull. Herb. Boissier* 1: 40 (1893). T: Kew, Vic., on sandstone, *F.R.M.Wilson 1385*; holotype: G *n.v.*; iso: NSW.

[*Rinodina compensata* auct. non (Nyl.) Zahlbr.: H.Mayrhofer, *Pl. Graec. Lich.* 331 (1985)]

For further synonymy, see Mayrhofer & Moberg (2002).

Illustrations: H.Mayrhofer & M.Matzer, *Bothalia* 26: 21, fig. 7B, C (1996); H.Mayrhofer & R.Moberg, *op. cit.* 106; M.Kaschik, *Biblioth. Lichenol.* 93: 95, fig. 56 (2006).

Thallus crustose, epilithic, often thin, cracked or composed of discrete to contiguous areolae; areolae 0.3–0.6 mm wide; prothallus black or not apparent. Upper surface pale grey to yellow-brown or brown. Excipulum sometimes containing a blue-green (N+ reddish)

pigment; an insoluble orange pigment can be present in the medulla. Apothecia 0.3–0.8 mm wide, common, lecanorine, pseudolecanorine or lecideine, immersed to adnate or sessile, contiguous or scattered; thalline margin entire, concolorous with the thallus, persistent or becoming excluded; proper margin entire, persistent; disc brown to blackish, plane to weakly convex, epruinose. Epithymenium 10–20 µm thick, brown; hymenium 70–115 µm thick, colourless, not interspersed; hypothecium 20–100 µm thick, colourless, K–. Paraphyses 1–2 µm wide, branched subapically, with apices 3–6 µm wide and dark brown caps. Asci 8-spored or with fewer spores. Ascospores *Mischoblastia*-type, grading into *Pachysporaria*-type, 1-septate, brown, ellipsoidal, 11–25 × 7–14 µm; ontogeny of type-A; outer wall smooth; torus present. Pycnidia immersed; conidia bacilliform, 3–5 × 1–5 µm.

*Chemistry*: Thallus K+ pale yellow, C–, P+ pale yellow or P–, UV–; containing atranorin.

Common on siliceous rocks in northern and eastern Australia (W.A., N.T., Qld, N.S.W., A.C.T., Vic. and Tas.); also in Europe, Asia, Africa, North and South America and New Zealand.

W.A.: Gibb River Rd, 51 km NNE of Karunjie Stn, *H.Streimann 48415* (CANB). N.T.: Victoria R., 1 km W of Victoria River Inn, *G.Rambold 5205, 5213* (M). Qld: Northan Gorge, Cabbagtree Crossing, *R.W.Rogers 7847* (BRI). N.S.W.: Cape Byron, ENE of Byron Bay, *R.Moberg A94:6* & *B.Owe-Larsson* (UPS). A.C.T.: Condor Ck, c. 25 km W of Canberra, *H.Mayrhofer 3150, 3151* (GZU). Tas.: Springs Beach, S of Orford, *H.Mayrhofer 11248* & *E.Hierzer* (GZU).

Characterised by the pale grey to yellow-brown or brown thallus, *Mischoblastia*-type ascospores grading into *Pachysporaria*-type, and the presence of atranorin.

#### 24. *Rinodina peloleuca* (Nyl.) Müll.Arg., *Nuovo Giorn. Bot. Ital.* 23: 125 (1891)

*Lecanora peloleuca* Nyl., *Flora* 48: 338 (1865). T: Dunedin, Otago, South Island, New Zealand, on columnar basalt, Oct. 1861, *L.Lindsay*; lecto: H-NYL 28504 *n.v.*, *vide* H.Mayrhofer, *Lichenologist* 15: 276 (1983); isolecto H-NYL 2900 *n.v.*

For further synonymy, see Matzer *et al.* (1998).

Illustrations: H.Mayrhofer, *Lichenologist* 15: 268, fig. 1; 275, fig. 18 (1983); M.Matzer, H.Mayrhofer & J.A.Elix, *New Zealand J. Bot.* 36: 177, fig. 1; 178, fig. 2 (1998); M.Kaschik, *Biblioth. Lichenol.* 93: 102, fig. 60 (2006).

Thallus crustose, epilithic, membranaceous to rimose-areolate; areolae 0.3–0.9 mm wide; prothallus black or absent. Upper surface dirty white to pale grey, rarely brownish. Medulla containing skyrin and an unknown yellow pigment. Apothecia 1.0–1.3 mm wide, common, usually lecanorine, rarely biatorine, immersed to adnate, contiguous; thalline margin entire, concolorous with the thallus, persistent or becoming excluded; proper margin usually visible as a thin brown line; disc dark brown to black, plane to weakly convex, epruinose. Epithymenium 15–35 µm thick, brown or yellow-brown, often covered by a colourless epipsamma; hymenium 100–115 µm thick, colourless, not interspersed; hypothecium 100–170 µm thick, colourless to pale yellow, K+ yellow intensifying. Paraphyses 1–3 µm wide, unbranched, with apices 4–6 µm wide and dark brown caps. Asci 8-spored. Ascospores *Physconia*-type, 1-septate, brown, ellipsoidal, 12–27 × 8–15 µm; ontogeny of type-A; outer wall finely ornamented; torus indistinct or absent. Pycnidia immersed; conidia bacilliform, 4–5 × 1–2 µm.

*Chemistry*: Thallus K–, C–, P–, UV–; medulla K+ red-violet, C–, P–; containing skyrin, triterpenes including an isomer of zeorin.

Common on coastal siliceous rocks in south-eastern Tas.; also in South America, the Falkland Islands, South Georgia, Heard Island, New Zealand and Macquarie Island, and on other Subantarctic and Antarctic islands.

Tas.: Surprise Bay, *A.Blackman 74/291, 74/292* (HO); Clifton Beach, *G.C.Bratt & J.A.Cashin 1555* (HO); Mayfield Beach, Mayfield Bay Coastal Reserve, c. 14 km S of Swansea, *H.Mayrhofer 12048* (GZU, HO, UPS).

*Rinodina peloleuca* is characterised by the dirty white to pale grey or brownish thallus, the *Physconia*-type ascospores, the yellow-orange pigmented medulla (K+ red-violet) and the presence of skyrin.



**25. *Rinodina pyrina* (Ach.) Arnold, *Flora* 64: 196 (1881)**

*Lichen pyrinus* Ach., *Lichenogr. Suec. Prodr.* 52 (1798). T: *s. loc.*, collector unknown; lecto: BM-ACH *n.v.*, fide K.Ropin & H.Mayrhofer, *Herzogia* 9: 815 (1993).

For further synonymy, see Mayrhofer & Moberg (2002).

Illustrations: K.Ropin & H.Mayrhofer, *Herzogia* 9: 785, fig. 14 (1993); M.Giralt & H.Mayrhofer, *Biblioth. Lichenol.* 57: 133, fig. 4C (1995); H.Mayrhofer, G.Kantvilas & K.Ropin, *Muelleria* 12: 189, fig. 14 (1999).

Thallus crustose, thin and effuse to moderately thick and areolate, often scabrid and mealy; areolae minute, 0.1–0.3 mm wide, ±dispersed and discontinuous at the thallus margin, contiguous in the centre; prothallus absent. Upper surface pale grey to dingy olive-grey. Apothecia 0.1–0.6 mm wide, common, lecanorine, at first immersed in the thallus, soon emerging and eventually sessile, scattered; thalline margin well developed, thin, entire, occasionally abraded, persistent; disc brown to black, usually plane, rarely convex, matt, usually somewhat scabrid. Epiphygium 5–10 µm thick, brown to dark brown, K–; hymenium 60–70 µm thick, colourless, not interspersed; hypothecium 50–60 µm thick, colourless, K–. Paraphyses 1.5–2.0 µm wide, simple or branched subapically, with apices 4–6 µm wide and dark brown caps; oil paraphyses not seen. Asci 8-spored. Ascospores *Physconia*-type or *Buellia*-type, 1-septate, pale to dark brown, ellipsoidal, often slightly curved, 15–17 × 5–7 µm; ontogeny of type-A; outer wall smooth; torus present or absent. Pycnidia not seen.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Occurs on bark of exotic trees and on wood in S.A., A.C.T. and Tas. Also in Europe, North America and New Zealand.

S.A.: Eudunda–Morgan road, 6 km E of Mount Mary, *M. & H.Mayrhofer* 2718, 2741 (GZU). A.C.T.: Hawker, 10 km NW of Canberra, *H.Streimann* 10358 (CANB). Tas.: Mount Stuart Rd, Hobart, *G.Kantvilas* 734/84 (HO); Tunbridge, *G.Kantvilas* 158/98 (HO).

This lichen is characterised by the corticolous habit, pale grey to dingy olive-grey thallus, and mature ascospores that lack any apical wall-thickenings and the median thickenings are so reduced as to appear *Physconia*-type or *Buellia*-type.

**26. *Rinodina ramboldii* Kaschik, *Biblioth. Lichenol.* 93: 105 (2006)**

T: beside walking track from Katherine Gorge Campground to Butterfly Gorge, 23 km NE of Katherine, N.T., 14°19'S, 132°25'E, alt. 180 m, on sandstone boulders, 20 Mar. 1986, *G.Rambold* 5094; holo: M *n.v.*; iso: CANB.

Illustration: M.Kaschik, *op. cit.* 106, fig. 64.

Thallus crustose, endolithic to thinly epilithic to areolate-squamulose; areolae and squamules contiguous to dispersed, 0.3–0.7 mm wide; prothallus not apparent. Upper surface olive-brown to yellow-brown or brown. Excipulum occasionally with a blue-green (N+ reddish) pigment; an insoluble orange pigment can also be present in the medulla. Apothecia 0.15–0.60 mm wide, scattered, lecanorine, immersed to adnate; thalline margin entire, concolorous with the thallus, persistent or rarely excluded; proper margin often visible as a thin brown line; disc dark brown to black, plane to convex, epruinose. Epiphygium 15–20 µm thick, pale brown; hymenium 100–140 µm thick, colourless, not interspersed; hypothecium 100–180 µm thick, colourless, K–. Paraphyses 2–3 µm wide, unbranched, with apices 4–5 µm wide and brown caps. Asci 8-spored. Ascospores *Pachysporaria*-type, 1-septate, brown, ellipsoidal, 17–27 × 8–15 µm; ontogeny of type-A or type-B; outer wall smooth; torus indistinct or absent. Pycnidia not seen.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Scattered on siliceous rocks in northern Australia (N.T. and Qld) and in Vic.; also on the Juan Fernández Islands in the south-eastern Pacific Ocean.

Qld: Rocky Pt, SE of Bramstons Beach, N of Innisfail, *H.Mayrhofer* 11693, 11694 (GZU); Wagooroo Ck, Carnarvon Natl Park, 94 km NNW of Injune, *H.Streimann* 52167 (CANB). Vic.: Marmers Lookout, Apollo Bay, 6 July 1986, *W.Ewers* (MEL).

Characterised by an endolithic to olive-brown, yellow-brown or brown epilithic thallus, the *Pachysporaria*-type ascospores, a spore ontogeny of type-A and/or (occasionally in the same apothecium) type-B and the absence of lichen substances.

**27. *Rinodina reagens* Matzer & H.Mayrhofer, *Ann. Bot. Fenn.* 150: 116 (1994)**

T: Clifden, N of Tuatapere, Waiau River Valley, Southland, South Island, New Zealand, 46°02'S, 167°42'E, 22 Sept 1981, *H.Mayrhofer 2186*; holo: GZU *n.v.*; iso: CHR, M *n.v.*

Illustrations: M.Matzer & H.Mayrhofer, *op. cit.* 111, fig. 1; 112, fig. 3; 114, figs 10, 11 (1994); M.Kaschik, *Biblioth. Lichenol.* 93: 106, fig. 64 (2006).

Thallus crustose, epilithic, thick, rimose-areolate to subsquamulose, contiguous or of discrete areolae; areolae 0.2–0.6 mm wide; prothallus evanescent or absent. Upper surface yellow-brown or brown. The *Arceutina*-yellow pigment (K+ yellow-orange) can be present in the epihymenium, hypothecium and pycnidia. Apothecia 0.5–1.7 mm wide, lecanorine, immersed to adnate, scattered to contiguous; thalline margin entire, concolorous with the thallus, subcrenate, persistent; proper margin occasionally visible as a thin brown line; disc reddish brown, dark brown or black, plane to convex, epruinose. Epihymenium 10–30 µm thick, brown or yellowish brown; hymenium 100–150 µm thick, colourless, not interspersed; hypothecium 100–180 µm thick, colourless to partly or entirely yellow-green, K+ yellow-orange. Paraphyses 1.5–2.0 µm wide, unbranched, with apices 4–6 µm wide and pale brown caps. Asci 8-spored. Ascospores *Teichophila*-type, 1-septate, brown, ellipsoidal, 22–31 × 10–19 µm; ontogeny of type-A; outer wall finely ornamented; torus absent. Pycnidia immersed; conidia bacilliform, 3.5–5.5 × 1.5–2.0 µm

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Very rare on calcareous rocks in S.A.; also in South Africa and New Zealand.

S.A.: Pt Turton, Yorke Penin., 14 Jan. 1974, *M.A.C.Stidson* (MEL).

This species is characterised by the yellow-brown to brown thallus, the presence of a yellow-green (K+ yellow-orange) pigment in the hypothecium, epihymenium and pycnidia, large, *Teichophila*-type ascospores and the absence of lichen substances.

**28. *Rinodina striatitunicata* Matzer & H.Mayrhofer, *Bothalia* 26: 24 (1996)**

T: Oudtshoorn–Prince Albert road, near Ombinda Karambi, 7.5 km NW of Cango Cabes, Oudtshoorn, Western Cape, South Africa, 32°23'30"S, 22°98'45"E, alt. c. 740 m, 20 Feb. 1992, *J.Hafellner & A.Hafellner 30650*; holo: GZU *n.v.*

Illustrations: M.Matzer & H.Mayrhofer, *Bothalia* 26: 20, fig. 5C; 24, fig. 8B (1996); M.Kaschik, *Biblioth. Lichenol.* 93: 112, fig. 70 (2006).

Thallus crustose, epilithic, thin to verrucose-areolate; areolae 0.1–0.4 mm wide; prothallus absent. Upper surface grey to brown; an insoluble orange pigment can be present in the medulla. Apothecia 0.2–0.7 mm wide, lecanorine, immersed to adnate, scattered to contiguous; thalline margin entire, concolorous with the thallus, persistent; disc brown to black, plane to convex, epruinose. Epihymenium 10–20 µm thick, pale brown; hymenium 70–120 µm thick, colourless, not interspersed; hypothecium 70–150 µm thick, colourless, K–. Paraphyses 1.5–2.0 µm wide, unbranched, with apices 3–5 µm wide and pale brown caps. Asci 8-spored. Ascospores *Tunicata*-type and *Physcia*-type, 1-septate, brown, ellipsoidal, 19–25 × 10–15 µm; ontogeny of type-A; outer wall striate; torus present. Pycnidia not seen.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

Rare on calcareous and siliceous rocks in N.S.W.; also in Europe, South Africa.

N.S.W.: Carbonne, roadside between Canowindra and Cargo, *H.Mayrhofer 7980*, D. & *M.Mayrhofer* (GZU); near Wellington Caves, Mitchell Hwy, S of Wellington, *H.Mayrhofer 8221*, D. & *M.Mayrhofer* (GZU).

*Rinodina striatitunicata* is characterised by the grey to brown thallus, lecanorine apothecia, *Tunicata*-type ascospores with internal wall-thickenings of the *Physcia*-type, striate spore wall ornamentation and the absence of lichen substances.

## 29. *Rinodina subcrustacea* (Müll.Arg.) Zahlbr., *Cat. Lich. Univ.* 7: 567 (1931)

*Physcia subcrustacea* Müll.Arg., *Bull. Herb. Boissier* 1: 33 (1893). T: Kilmore, Vic., on moss on rock, 31 Aug. 1885, *F.R.M. Wilson* 758; holo: G n.v.

Illustrations: H.Mayrhofer, *Beih. Nova Hedwigia* 79: 513, fig. 4; 525, fig. 16 (1984); M.Kaschik, *Biblioth. Lichenol.* 93: 114, fig. 72 (2006).

Thallus crustose, epilithic, thick, rimose to squamulose-verrucose or finely lobate, contiguous to dispersed,  $\pm$ loosely attached to rock; verrucose squamules 0.2–0.5 mm wide; prothallus blackish brown. Upper surface yellow-brown, grey-brown to dark brown. Medulla blackish brown, often containing an insoluble orange pigment. Apothecia 0.3–1.0 mm wide, lecanorine, sessile, scattered to contiguous; thalline margin entire, concolorous with the thallus or grey,  $\pm$ thick and crenate, persistent; disc brown to blackish brown, weakly concave to plane, often finely pale grey-pruinose. Epithymenium 10–20  $\mu$ m thick, reddish brown; hymenium 70–90  $\mu$ m thick, colourless, interspersed with oil globules; hypothecium 70–100  $\mu$ m thick, colourless, K–. Paraphyses 1.5–2.0  $\mu$ m wide, unbranched, with apices 4–6  $\mu$ m wide and red-brown caps. Asci usually with 8 ascospores, often only 4 or 6. Ascospores *Physcia*-type, 1-septate, brown, ellipsoidal, 21–28  $\times$  10–16  $\mu$ m; ontogeny of type-A; outer wall smooth; torus present. Pycnidia immersed; conidia bacilliform, 6–8  $\times$  1  $\mu$ m.

*Chemistry*: Thallus K–, C–, P–, UV–; no lichen substances detected.

A scattered endemic lichen on siliceous rocks and overgrowing mosses in W.A., S.A., N.S.W., Vic. and Tas.

W.A.: Mira Flores Hut, Porongurups Natl Park, 18 km ESE of Mt Barker, *L.Tibell* 14120 (UPS). S.A.: Fred Rattei's Scrub, 7 km W of Springton, *H.Mayrhofer* 2678 & *M.Mayrhofer* (GZU). N.S.W.: Camel Rock, 5 km N of Bermagui, *J.A.Elix* 4572 (CANB, MEL). Tas.: Curtis Is., Bass Str., *R.B.Filson* 12238 (MEL); Old Beach Rd., opposite Cadburys, *P.W.James* & *G.Kantvilas* 287/84 (BM, GZU).

Characterised by the rimose to squamulose-verrucose or finely lobate, yellow-brown, grey-brown or dark brown thallus, the lecanorine apothecia, the large, *Physcia*-type ascospores, a blackish brown medulla and the absence of lichen substances.

## 30. *Rinodina substellulata* Müll.Arg., *Proc. Roy. Soc. Edinburgh* 11: 461 (1882)

T: Wadi Keschin, Socotra, [Yemen], alt. 650 m, 1881, *Schweinfurth s.n.*; holo: G n.v.

[*Rinodina minutula* auct. non Müll.Arg.: J.Müller, *Nuovo Giorn. Bot. Ital.* 23: 390 (1891)]

For further synonymy, see Mayrhofer (1984a); Matzer & Mayrhofer (1996).

Illustrations: H.Mayrhofer, *J. Hattori Bot. Lab.* 55: 464, fig. 91 (1984); M.Kaschik, *Biblioth. Lichenol.* 93: 112, fig. 70 (2006).

Thallus crustose, epilithic, thin, areolate or effuse; prothallus blackish or not apparent. Upper surface pale yellow to pale yellowish brown. Apothecia 0.2–0.6 mm wide, lecanorine or lecideine, adnate to sessile, scattered; thalline margin entire, concolorous with the thallus, soon becoming excluded; proper margin black; disc brown, dark reddish brown to black, plane to strongly convex, epruinose. Epithymenium 10–20  $\mu$ m thick, brown or greenish black (then N+ reddish); hymenium 90–110  $\mu$ m thick, colourless, interspersed; hypothecium 90–200  $\mu$ m thick, colourless, K–. Paraphyses 1–3  $\mu$ m wide, unbranched or sparingly branched subapically, with apices 4–6  $\mu$ m wide and brown caps. Asci with 8 or with fewer spores. Ascospores *Pachysporaria*-type, occasionally grading into and *Milvina*-type, 1-septate, brown, ellipsoidal, 14–20  $\times$  7–12  $\mu$ m; ontogeny of type-A; outer wall finely ornamented; torus indistinct or absent. Pycnidia immersed; conidia bacilliform, 4–6  $\times$  0.5–0.7.

*Chemistry*: Thallus K+ yellow, C–, P– or P+ faint yellow, UV–; containing atranorin (major).

Very rare on siliceous rocks in south-eastern Qld; also in Central America, West Africa, South Africa and Indonesia.

Qld: Brisbane, *F.M.Bailey* 1878 (G).

*Rinodina substellulata* is characterised by its pale yellow to pale yellowish brown thallus, lecanorine or lecideine apothecia, *Pachysporaria*-type ascospores and the presence of atranorin.

### 31. *Rinodina thiomela* (Nyl.) Müll.Arg., *Flora* 64: 515 (1881)

*Lecanora thiomela* Nyl., *Flora* 64: 515 (1881). T: Dunedin, Otago, South Island, New Zealand, on basaltic rocks, W.L.Lindsay; lecto: E *n.v.*, fide H.Mayrhofer, *Lichenologist* 15: 278 (1983); isolecto: H-NYL 29088 *n.v.*

*Buellia citrina* H.Magn., *Svensk Bot. Tidskr.* 37: 280 (1943). T: Lake Harris Saddle, Otago, South Island, New Zealand, on rocks in alpine grassland, 1927, G.E. & G. Du Rietz; holo: UPS *n.v.*

Illustrations: H.Mayrhofer, *Lichenologist* 15: 268, fig. 4; 277, fig. 20 (1983); H.Mayrhofer, *Beih. Nova Hedwigia* 79: 513, fig. 5 (1984); W.M.Malcolm & D.J.Galloway, *New Zealand Lichens[:]* Checklist, Key, and Glossary 109, 111 (1997).

Thallus crustose, epilithic, thick, continuous, granular, rimose-areolate; areolae 0.1–0.4 mm wide; prothallus blackish. Upper surface sulfur-yellow to yellow-green. Apothecia 0.2–0.5 mm wide, lecanorine or cryptolecanorine, immersed to adnate or sessile, uncommon to frequent; thalline margin entire, concolorous with the thallus, persistent; disc dark brown to blackish brown or black, weakly concave to plane, epruinose. Epihymenium 10–20 µm thick, reddish brown; hymenium 120–150 µm thick, colourless, not inspersed; hypothecium 120–200 µm thick, colourless, K–. Paraphyses 1.0–1.5 µm wide, unbranched or sparingly branched subapically, with apices 2–4 µm wide and pale brown caps. Asci with 8 (occasionally 4 or 6) spores. Ascospores *Pachysporaria*-type, 1-septate, brown, ellipsoidal, 20–34 × 11–17 µm; ontogeny of type-A; outer wall smooth; torus weakly developed. Pycnidia immersed; conidia bacilliform, 5–6 × 1 µm.

**Chemistry:** Thallus K–, C+ yellow-orange, P–, UV+ orange; containing zeorin, thiomelin, 8-*O*-methylthiomelin, 2-dechlorothiomelin, 4-dechlorothiomelin, 2-dechloro-8-*O*-methylthiomelin, 4-dechloro-8-*O*-methylthiomelin, northiomelin, 5,7-dichloro-2,8-dihydroxy-1,3-dimethyl-9*H*-xanthene-9-one.

Common on siliceous rocks throughout Australia (W.A., N.T., S.A., Qld, N.S.W., A.C.T., Vic. and Tas.); also in New Zealand.

W.A.: Castle Rock, Porongurup Ra., *G.C.Bratt* 67/421 (HO). N.T.: Western Walk, Keep River Natl Park, *K.Ralston* 355 (MEL). S.A.: Hindmarsh Falls, Hindmarsh R., 12 km NNW of Victor Harbor, *H.Streimann* 54844A (CANB). Qld: Jourama Falls, Paluma Range Natl Park, 23 km S of Ingham, *J.A.Elix* 37205A (CANB). N.S.W.: along Reedy Ck, Marble Arch, 48 km S of Braidwood, *J.A.Elix* 4414 (CANB). A.C.T.: Molonglo Gorge Reserve, 14 km SE of Canberra, *J.A.Elix* 11784 (CANB). Vic.: Lederberg Gorge, 4 km N of Bacchus Marsh, *H.Mayrhofer* 3035 & *R.Filson* (GZU). Tas.: Stony Pt, Montague, *G.Kantvilas* 372/81 (HO).

This species is characterised by the thick sulfur-yellow to yellow-green thallus, the lecanorine to cryptolecanorine apothecia, the large *Pachysporaria*-type ascospores, the dark brown to blackish brown or black discs and the presence of zeorin and numerous xanthenes.

### 32. *Rinodina williamsii* H.Mayrhofer, *Beih. Nova Hedwigia* 79: 528 (1984)

T: Parlour Mtn area, 35 km NE of Armidale, New England, N.S.W., alt. c. 1000 m, 11 Oct. 1981, *H.Mayrhofer* 3487 & *J.Williams*; holo: GZU *n.v.*; iso: MEL, UPS *n.v.*

Illustrations: H.Mayrhofer, *op. cit.* 531, fig. 19; 536, fig. 25; M.Kaschik, *Biblioth. Lichenol.* 93: 119, fig. 77 (2006).

Thallus crustose, rarely endolithic, usually epilithic and growing autonomously between other crusts, rarely ±lichenicolous; prothallus absent. Upper surface olive-green to grey-brown or dark brown. Medulla colourless to brown, occasionally containing an insoluble orange pigment. Apothecia 0.15–0.40 mm wide, lecanorine, sessile, scattered; thalline margin entire, concolorous with the thallus, persistent or becoming excluded; disc black, plane to convex, epruinose. Epihymenium 15–20 µm thick, brown; hymenium 80–100 µm thick, colourless, not inspersed; hypothecium 80–150 µm thick, colourless, K–. Paraphyses 1.0–1.5 µm wide, agglutinated, with clavate apices 3–5 µm wide and brown caps. Asci 8-spored. Ascospores *Pachysporaria*-type grading into *Milvina*-type, 1-septate, brown, ellipsoidal, 13–21 × 7.5–11.5 µm; ontogeny of type-A; outer wall smooth; torus present. Pycnidia not seen.

**Chemistry:** Thallus K–, C–, P–, UV–; no lichen substances detected.

Scattered on siliceous rocks in southern and eastern Australia (W.A., Qld, N.S.W. and Tas.); also on the Juan Fernández Islands in the south-eastern Pacific Ocean.

W.A.: South Coast Hwy, 30 km W of Denmark, *J.A.Elix* 41258, *H.T.Lumbsch* & *H.Streimann* (CANB). Qld: Mimosa Creek Camping Area, Blackdown Tablelands Natl Park, *R.W.Rogers* 7874 (BRI, GZU). N.S.W.: Morton Natl Park, 8 km E of Nerriga, *G.Rambold* 3891 (M). Tas.: New Norfolk, *H.Mayrhofer* 10658, *E.Hierzer* & *G.Kantvilas* (GZU).

This lichen is characterised by its olive-green to grey-brown or dark brown thallus forming 'islands' between other crusts, rarely  $\pm$ lichenicolous on *Ramboldia petraeoides* and *Rhizocarpon* sp., and also by the colourless to brown medulla, the *Pachysporaria*-type grading into *Milvina*-type ascospores, type-A spore ontogeny and the absence of lichen substances.

### 33. *Rinodina xanthomelana* Müll.Arg., *Nuovo Giorn. Bot. Ital.* 23: 390 (1891)

T: *s. loc.*, Qld, 1889, *F.M.Bailey* 709; holo: G n.v.

*Buellia geographica* Räsänen, *Ann. Bot. Soc. Zool.-Bot. Fenn. "Vanamo"* 20: 15 (1944). T: Korunda [Kuranda], near Cairns, Qld, July 1893, *F.R.M.Wilson*; holo: H; iso: G n.v.

Illustration: *H.Mayrhofer*, *Beih. Nova Hedwigia* 79: 531, fig. 20 (1984).

Thallus crustose, epilithic, thin, membranaceous or rimose, rarely areolate; prothallus blackish or not apparent. Upper surface sulfur-yellow to yellow-green. Apothecia 0.1–0.3 mm wide, cryptolecanorine, immersed, scattered or contiguous; thalline margin entire, concolorous with the thallus, persistent; disc blackish brown, concave to plane, epruinose. Epihymenium 10–20  $\mu$ m thick, reddish brown; hymenium 80–100  $\mu$ m thick, colourless, not interspersed; hypothecium 60–100  $\mu$ m thick, colourless, K–. Paraphyses 1.0–1.5  $\mu$ m wide, unbranched or sparingly branched subapically, with apices 2–4  $\mu$ m wide and dark brown caps. Asci 8-spored. Ascospores *Pachysporaria*-type, 1-septate, brown, ellipsoidal, 14–21  $\times$  7.5–10.5  $\mu$ m; ontogeny of type-A; outer wall smooth; torus developed. Pycnidia immersed; conidia bacilliform, 5–6  $\times$  1  $\mu$ m.

*Chemistry*: Thallus K–, C+ yellow-orange, P–, UV+ orange; containing zeorin, thiomelin, 8-*O*-methylthiomelin, 2-dechlorothiomelin, 4-dechlorothiomelin, 2-dechloro-8-*O*-methyl-thiomelin, 4-dechloro-8-*O*-methylthiomelin, northiomelin, 5,7-dichloro-2,8-dihydroxy-1,3-dimethyl-9*H*-xanthene-9-one.

Apparently very rare on siliceous rocks in northern Australia (W.A. and Qld); also in Indonesia and Taiwan.

W.A.: Lake Argyle road, 35 km SE of Kununurra, *J.A.Elix* 22484 & *H.Streimann* (CANB). Qld: between Airlie Beach and Shute Harbour, Whitsunday Coast near Proserpine, *M.Mayrhofer* 3209 (GZU).

This species is characterised by the membranaceous to rimose, sulfur-yellow to yellow-green thallus, the cryptolecanorine apothecia, small *Pachysporaria*-type ascospores, the immersed, blackish brown discs and the presence of zeorin and numerous xanthenes in the thallus. *Rinodina thiomela* differs in having larger ascospores, lecanorine apothecia and a thicker thallus.