

Rhizoplaca Zopf
(LECANORALES: PARMELIACEAE? LECANORACEAE?)

After various authors, including Ryan, unpublished

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Thallus foliose, umbilicate, shield-form to deeply lobed, monophyllous to polyphyllous, often closely crowded and then almost columnar and appearing dwarf fruticose in stands, or appearing squamulose. Upper surface yellowish green to whitish or brownish green. Umbilicus robust. Underside often black-blue stained. Thallus with a definite cortex on both sides. medulla with very loose hyphae to almost hollow. Photobiont trebouxoid. Nonpored epicortex present. Pseudocyphellae absent. Upper cortex prosoplectenchymatous. Cell walls containing isolichenan. Rhizines absent.

Apothecia almost sunken to broadly protruding to strongly constricted sessile, lecanorine. Thalloid margin often with 2 algal layers. Paraphyses capitate thickened at the ends. ASCi amyloid with a definite amyloid tholus. Spores 8, simple, colorless, \pm ellipsoid (8-13 x 4-7.5 μ m), or larger and globose (*R. marginalis*) or curved (*R. glaucophana*). Pycnidia laminal, immersed; pycnospores filiform, usually curved (20-25 x 1 μ m).

Upper cortex with usnic acid or partly also closely related compounds (placodiolic or pseudoplacodiolic acids), or sometimes pseudoplacodiolic acid only. Medulla with β -orcinol depsidones, aliphatic acids, triterpenes. On mostly lime poor rocks, nitrophilous.

Although the few currently recognized species are usually quite easily distinguished, the *R. chrysoleuca*/*R. subdiscrepans* complex, *R. melanophthalma* complex, and *R. haydenii*/*R. baranowii* complexes are total, utter, complete nightmares unless you just want to "pull a Weber" and lump like crazy (crazy being what my attempts to do otherwise are making me, if I wasn't that way already!). This version is a condensed, oversimplified one, but you don't really want to see my other versions at this stage.

1. Upper surface yellowish brown, C+ orange (xanthones), usually completely covered by large (to 2 mm or more) apothecia; discs dark brown, epruinose. On nutrient-rich rocks in coastal areas, Arctic.
Arctopeltis thuleana Poelt

1. Upper surface greenish yellow, brownish yellow, or whitish, C- or C+ yellow (without xanthones; with usnic acid or related substances), usually only partly covered by small to large apothecia; discs various. On rock or soil, Inland areas, temperate to Arctic. *Rhizoplaca* s.l. 2

2. Upper surface distinctly whitish throughout, C+ yellow;

thallus to 1.5 cm across. Apothecia mostly marginal; discs dark brown to blackish, often pruinose. Containing only pseudoplacodiolic acid. Spores rather large, and either globose or curved. Often on vertical to overhanging surfaces; not nitrophilous. California (to Baja California), rather rare. Group I. (Rhizoplaca marginalis/R. glaucophana group)

2. Upper surface usually greenish yellow to yellowish brown, or sometimes pale grayish or partly rather densely white pruinose, but with the true color showing in cracks, and always C-. Apothecia mostly laminal; discs variously colored, usually either pale or else bluish black. Spores smaller, \pm ellipsoid (to partly globose in R. peltata), not curved. Containing usnic or placodiolic acids (by themselves or together), or pseudoplacodiolic acid but then always in addition to usnic acid. Mostly on horizontal to sloping tops of rocks, less often on vertical to overhanging surfaces, \pm nitrophilous. Widely distributed and very common. Rhizoplaca Zopf s. str. 3

3. Growing firmly attached to rock. Group II-A

3. Growing loose on soil. Group II-B

Group I
R. marginalis/R. glaucophana group

- 1. Spores narrow, curved. Thallus mostly to 5 mm across. Apothecia to 1 mm across; discs often only weakly pruinose.** Often somewhat sheltered steep or overhanging surfaces of boulders.
Rhizoplaca glaucophana (Nyl. ex Hasse) W. Weber
- 1. Spores globose. Thallus and apothecia mostly larger; discs densely pruinose.** On exposed, steep or overhanging cliff faces.
Rhizoplaca marginalis (Hasse) W. Weber

Group II-A. Firmly attached to rock.

1. Thallus clearly umbilicate. Arctic-boreal, south to Mexico in the west. 2

1. Thallus stipitate-squamulose. Distribution various; partly in the temperate east.

2. Thallus containing usnic acid, zeorin, and (in N. America) almost always pannarin (medulla P+ orange). Upper surface often brownish, especially in herbarium. Apothecia often long immersed; discs yellowish to reddish brown, epruinose. Underside of thallus usually strongly cracked. On rocks usually containing or exposed to some calcium, sometimes (but not primarily) on highly calcareous rocks. Temperate to subarctic areas, western. Rhizoplaca peltata (Ram.) Leuck. & Poelt

2. Thallus without zeorin and pannarin (medulla P- or P+ yellow); often with various other substances. Apothecia usually soon sessile to substipitate; discs variously colored, either pruinose or bluish black. Underside of thallus cracked or not. Usually on siliceous rocks, with or without some calcium content or exposure, but usually not on highly calcareous rocks. Both of the following taxa are absolutely, incredibly variable, with distinct "morphs" and "color phases" sometimes growing side by side; after repeated attempts to make sense out of the variation, for the moment I have given up and lumped everything. 3

3. Discs almost always at least partly pruinose and distinctly reddish or orangish, or becoming yellowish (due to dense pruina; orangish underneath, with the hymenium and epihymenium orangish, N-); paraphyses tips not capitate nor green-black. Cortex often with placodiolic or pseudoplacodiolic acid. Upper surface usually pale, whitish, yellowish, or greenish. Medulla usually P-, without substances, rarely P+ yellow (psoromic acid) in the southwest. Edges of thallus, when blackened, always smooth, without thallospores. Rhizoplaca chrysoleuca (Sm.) Zopf s.lato

3. Discs epruinose and blue-black, to greenish, brownish, or + yellow (due to dense pruina; greenish, brownish or blackish underneath, with the hymenium hyaline with a greenish, N+ reddish epihymenium); paraphyses tips often capitate and green to black. Cortex without pseudoplacodiolic or placodiolic acids. Upper surface usually fairly deep grayish yellowish green, but occasionally more whitish or yellowish. Medulla very often (but by no means always) P+ yellow (psoromic acid). Edges of thallus, when blackened, not infrequently granular (thallospores). Forms with pale discs have been called v. subpeltata, and forms with thick thalli and thick apothecial margins (and often P+ medulla) have been called v. obscura. Rhizoplaca

melanophthalma (Ram.) Leuck. & Poelt s.lato

4. Squamules mostly convex throughout the thallus, often somewhat sinuous-plicate, usually pale greenish yellow, often with grayish tone, without orangish or brownish tinge, matt, with faintly powdery appearance. Discs as in R. chrysoleuca s. lato (at least partly pruinose, reddish to yellowish) or rarely at least partly blue-black and epruinose; spores often rather narrowly ellipsoid. Cortex often containing placodiolic or pseudoplacodiolic acids. 5

4. Squamules usually at least partly concave to plane, especially towards margin of thallus, not sinuous-plicate, usually deeper in color, often tinged with orange or brown, usually slightly glossy (but sometimes with patchy, rather coarse pruina). Discs pruinose or not, variously colored; spores more or less broadly ellipsoid. 6

5. Discs always pruinose and reddish, orangish, or yellowish (to somewhat grayish, occasionally blackened by parasites). With usnic and/or placodiolic acid, or with usnic and pseudoplacodiolic acid; **medulla fairly often P+ yellow (psoromic acid) even in the north (in contrast to R. chrysoleuca).** Very common and widespread. [If discs epruinose and brownish, and thallus more yellowish to brownish or orange, with placodiolic acid and usually various medullary substances other than psoromic acid, see Lecanora opiniconensis in boreal-temperate areas and L. crustacea in the arctic;]. Most authors lump this under R. chrysoleuca sensu lato, but I rarely have any trouble distinguishing this complex from that one, because of the growth form and lack of bluish or greenish color on the edges or underside. However, this complex is also a mess. Material from eastern North America always contains pseudoplacodiolic acid, and has ellipsoid spores, while western material usually contains placodiolic acid and has narrower, \pm oblong spores; unfortunately this correlation between spore shape and chemistry is exactly opposite in Eurasia!. Rhizoplaca subdiscrepans (Nyl.) R. Sant. sensu lato

5. Discs at least partly epruinose and blue-black. Usually with placodiolic acid, never with pseudoplacodiolic acid, nor psoromic acid; spores narrow, \pm oblong. Rare, with a very scattered distribution in the arctic and the west, and in Eurasia. This has been called the placodiolic acid strain of R. melanophthalma, and is also probably what has been reported as "hybrids" between "R. chrysoleuca" and that species. R. ocrinaeta Ryan ined.

6. Squamules mostly pale-edged (never strongly blackened and granular), convex towards thallus center on fertile thalli, thinner, plane and imbricate on sterile thalli; lower cortex poorly developed; upper cortex thin; discs mostly pale, never blue-black; apothecia broadly sessile; margin thin, scarcely

raised. Mostly in the Rocky Mountains, eastward to Ontario (material from British Columbia that may belong here is especially problematic). As I currently understand this species, it is a lot more widespread and variable than I thought when I first published it, and it includes a P+ yellow (psoromic acid strain), making it even more difficult to distinguish from R. melanophthalma. [If discs epruinose and medulla containing terpenoids, see L. chlorophaeodes]. Lecanora weberi Ryan s. l.

6. Squamules mostly black-edged (sometimes strongly so, and granular, with thallospores), plane to concave throughout on both fertile and sterile thalli; lower cortex often well developed; upper cortex thicker; discs pale or blue-black; apothecia becoming substipitate; margin often thick and raised. Mostly in the Pacific Northwest (material from the central Rockies that may belong here is especially problematic). Medulla P+ yellow or P-. 7

7. Thallus usually distinctly substipitate-squamulose, the squamules tiny to large, often with ascending and crenate-incised margins, and always with a well developed lower cortex, usually forming pulvinate clumps, or if scattered or forming extensive patches then squamules usually very thin, with narrow, smooth blackened edges; edges granular with thallospores, or not. Apothecia often abundant, but sometimes few or absent, extremely variable in form and color, as is the thallus. Very widespread and common throughout the arctic and especially western temperate N. America. Rhizoplaca melanophthalma s. lato

7. Thallus (in the holotype) of contiguous, coarse, thick, areoles with \pm entire, appressed, margins and poorly developed lower cortex (only near the edge), forming \pm extensive flattened patches, but other specimens from near the type locality, and elsewhere, show transitions towards being more scattered and distinctly squamulose and corticate below); edges (at least at or near the type locality) very thick and densely granular with thallospores. Apothecia rare, often absent, never abundant, large, with thick, raised margins and blue-black (to somewhat paler and pruinose). Known with certainty only from the upper Naches River valley on the east side of the Cascades in Washington State; most material previously called by this name is R. melanophthalma, and I'm not terribly convinced there's a real difference. Lecanora nigromarginata

ADD?:

Thallus somewhat similar to L. nigromarginata, but forming small (to ca. 1 cm) convex mounds; squamules smaller; margins plane, thin, smooth, often becoming strongly crenate-incised. Apothecia smaller; margin thin and level. Lecanora sp. (undescribed).

Thallus areolate-squamulose, with thick upper cortex containing only usnic acid, and solid, chalky medulla. Rather rare. Squamarina (Petroplaca) spp.

Group II-b. Growing loose on soil.

(With the exception of R. haydenii, all of the "taxa" are undescribed, but have been given herbarium names for the present mainly for convenience; much more study, especially in the field, is necessary before the taxonomic significance of these morphotypes can be established; this version is very simplistic, but unless you're collecting in south-central Idaho you won't have to worry about it anyway)

1. Thallus with yellowish cortex on all sides, compressed-globular, with projecting, more or less branched, flattened to terete lobes, often with whitish nodules or phyllidia on the margins or tips. Lobes spreading, at first flat then becoming more narrow and dissected, in cross-section becoming subangular to round, usually richly branched. Lobe margins and morphological underside persistently pale, smooth to rough but not arachnoid or tomentose; lacking veins and rhizines. White nodules terminal or marginal. Medullary hyphae not strongly granular. Lower cortex well-developed, similar to upper one. Algae often in clumps and not confined to one layer.

Apothecia extremely rare and tiny, R. melanophthalma type. Rather common and widely distributed on gravelly calcareous soils in windy steppes in the intermontane areas (to alpine) in the west, Wyoming, Montana, Idaho, south to Utah. The typical form has flattened, scarcely branched lobes, but a very common form especially in Idaho (v. arbuscula Rosentreter & Ryan ined.) has terete, highly branched lobes. Rhizoplaca haydenii (Tuck.) Follm.

1. Thallus with bluish black cortex or ecorticate areas at least partly exposed, compressed-globular to tubular or irregular, with or without projecting lobes, with or without whitish nodules or phyllidia. 2

2. Thallus forming compact, solid, brain-like, \pm regular, spheroidal masses, with morphological underside completely enclosed. Distribution various; only R. cerebriformis occurs in south-central Idaho. Bases of lobes joined at center of thallus; lobe tips dilated, crowded together to form an almost continuous outer surface of the thallus. Without whitish nodules or phyllidia. 3

2. Thallus looser, tubular to irregular, or sphaeroidal but then \pm branched and irregular with morphological underside usually at least partly exposed, or thallus hollow. Very common in a few areas in south-central Idaho, but unknown elsewhere.

Thallus mostly over 2 cm diameter. Tips of lobes attenuated or about the same width as the bases. Apothecia, if present, R. melanophthalma type. Although a number problematic morphs and apparent intermediates among these morphs and between them and R. melanophthalma occur, and all are undoubtedly derivatives

(evolutionarily or ecologically) of R. melanophthalma sensu lato, but large, rather uniform clonal populations of the more common morphs treated below can be easily distinguished, and at least some are probably genetically distinct, since they have lost sexual reproduction. All of these morphotypes can be found growing together, but are segregated to some extent by microhabitat. 5

3. Thallus at least partly with blackened lobe edges and rather smooth surface. Medulla P- (Chem: usnic only). Growing at high elevations or latitudes..... 4

3. Thallus without blackened lobe edges; surface smooth. Medulla P+ yellow (psoromic acid) or P-. Growing at low to moderate elevations, south-central Idaho. Apothecia unknown; though not common enough to cause much problem in recognizing this morph, there are occasional transitions to "erratic" morphs that are obviously derived from R. melanophthalma s. lato. R. cerebriformis Ryan & Rosentreter ined.

4. Thallus mostly over 2 cm diameter, with at least some lobes \pm free and flattened; very variable in form and degree of blackening, but without undulating edges or depressed lobe tips. Apothecia occasionally present, R. melanophthalma type. Alpine areas of northern Rocky Mountains and Sierra Nevadas of North America. This is "R. cf. baranowii" sensu Weber, but it is not related to Eurasian R. baranowii, which is (according to Golubkova) derived from the R. chrysoleuca complex. Rosentreter and I disagree on whether this morph should be recognized as a species distinct from R. melanophthalma; certainly, as Weber as argued, there are many transitions from attached, umbilicate morphs; there are also occasionally what appear to be transitions towards R. haydenii. R. polyphylla Ryan ined.

4. Thallus under 1.5 cm diameter, very compact, without free or flattened lobes; constant in appearance, with strongly blackened, undulating lobe edges and depressed lobe tips; Apothecia unknown. Lobes shiny, margins strongly blue-black. Saskatchewan. Possibly derived from R. chrysoleuca complex. Associated with Xanthoparmelia athabasca Ryan ined. which has discrete, tiny lobes with a few rhizines. R. pisoidea Ryan ined.

5. Lobes not strongly downturned, at least partly narrow (under 5 mm diam.), flattened to often partly swollen in section, sometimes branched; forming irregular masses, which can be \pm solid, hemispherical to globular, with partly "crisped" lobe margins, or somewhat tubular but with partly projecting lobes, which are sometimes subtubular and corniculate, opening into the center of the thallus. "Lower surface" (derived from the lower side of umbilicate thalli) often partly exposed, often blackend, smooth to

rough, but usually \pm corticate, not appearing arachnoid-tomentose. Lobes about 1000-1500 μ m thick. Medulla P+ yellow (psoromic acid) or P-. Apothecia occasionally present, sometimes large, often with thick, raised margins and often with \pm pale, pruinose discs. Extremely variable in morphology and color, with or without whitish nodules or phyllidia; showing many transitions from mostly thickish, \pm polyphyllous morphs of umbilicate thalli. Although some of the morphs included here are quite common and relatively distinctive, we have attempted to name and describe the numerous variations, there are too many anomalous ones and apparent intermediates; at present we cannot find enough reliable characters to let us make a definitive, workable treatment that we can both agree on. "erratic" (relatively recently derived, not yet stabilized) environmental modifications of R. melanophthalma (mostly cf. v. obscura)

5. Lobes strongly downturned, broad (5-10 mm or more), persistently \pm flat in cross-section, rarely branched; forming rather regular, hollow, tubular or compressed-globose thalli, with few if any branches or projections. "Lower surface" of lobes rarely exposed, usually pale, ecorticate, appearing arachnoid-tomentose. Lobes to about 500 (750) μ m thick. Medulla P-, or rarely P+ in rare anomalous specimens tentatively assigned to R. cavicola. Apothecia absent (or, in rare anomalous forms tentatively assigned to R. cavicola) extremely rare and tiny, with thin, level margins and black epruinose discs. Relatively constant in morphology and color, rarely transitional to other forms, but probably derived a long time ago from thin, monophyllous morphs of umbilicate thalli of R. melanophthalma (presently undescribed and unnamed varieties) 6

6. Thallus regularly tubular (like a loosely rolled roll of paper, rarely partly unrolled and exposing a partly corticate lower surface), with the edges exposed only at the ends. Usually with white nodules and phyllidia on surface of lobes as well as on the margins. A few rare forms show possible transitions to the typical variety of R. haydenii. R. tubulosa Rosentreter & McCune ined.

6. Thallus usually compressed globular and hollow (like an irregularly rounded, inflated pillow), with no exposed edges. Without nodules or phyllidia. Rare anomalous forms tentatively included here can be elongated, with somewhat thickish lobes, or \pm globular but strongly and irregularly plicate and distorted. R. cavicola Rosentreter & Ryan ined.

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