

Key to *Dermatocarpon* of the Pacific Northwest

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The objective of this key is to incorporate *D. meiophyllizum*, which has been overlooked in North America (Glavich & Geiser 2004), into the Pacific Northwest lichen flora. This key is based on a combination of the following works: Goward et al. (1994), Heiðmarsson (2001), McCune & Geiser (1997), and McCune & Goward (1995).

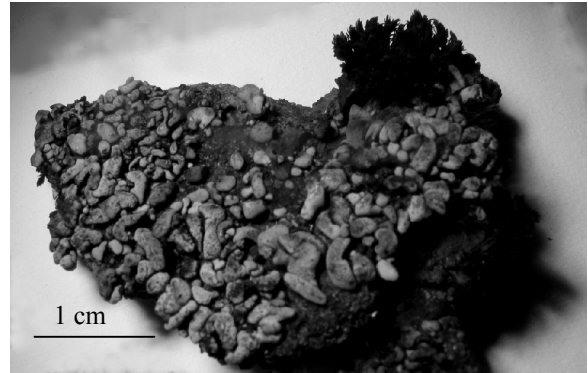
Members of the genus *Dermatocarpon* are foliose chlorolichens that, although some species are found in dry habitats, are defined by their habitat of aquatic or semi-aquatic environments (stream channel rocks, seeps, lake margins, etc). Thalli range from small squamulose (< 3 mm) to larger 50 mm wide foliose lobes; upper surface is usually smooth and range from grayish to brown (some green when wet); the grey upper surface is due to inflated epinecreal hyphae and dense pruina on some thalli is usually due to a thick layer of inflated epinecreal hyphae (Heiðmarsson 1996); lower surface smooth, granular, veined, or rhizinate. Many species are umbilicate and single-lobed with a single holdfast, while some are multi-lobed and attached to the substrate by multiple holdfasts. Ascocarps are immersed perithecia. Substrate mostly rock though some found on soil. The use of the term 'pruinose' in this key refers mainly to the appearance of the upper surface caused by the epinecreal hyphae and not the traditional definition of a an upper surface with calcium oxalate.

- 1a. Lower surface rhizinate.....*D. moulinsii*
- 1b. Lower surface not rhizinate.....2
- 2a. Medulla I (Melzer's Reagent) + Red.....*D. luridum*
- 2b. Medulla I (Melzer's Reagent) –..... 3
- 3a. Upper surface brownish (sometimes green when wet) and almost never appearing pruinose.....4
 - 4a. Thallus small (lobe size generally < 15 mm) and lower surface smooth or finely granulose.....*D. meiophyllizum*
 - 4b. Thallus large (lobe size generally >15 mm) and lower surface distinctly reticulate.....*D. rivulorum*
- 3b. Upper surface usually grey and often appear pruinose.....5
 - 5a. Thallus squamulose (lobes ≤ 3 mm).....*D. lorenzianum*
 - 5b. Thallus not squamulose (lobes > 3 mm).....6
 - 6a. Thallus multilobed or cushion forming with multiple holdfasts on the lower

surface.....	7
7a. Thallus margins not strongly downrolled.....	<i>D. miniatum</i> var. <i>complicatum</i>
7b. Thallus margins strongly downrolled and usually cushion forming.....	<i>D. intestiforme</i>
6b. Thallus more or less umbilicate, single to few lobed and large (> 20 mm).....	8
8a. Lower surface distinctly granular.....	<i>D. reticulatum</i>
8b. Lower surface usually smooth but occasionally rugose or slightly reticulate.....	<i>D. miniatum</i> var. <i>miniatum</i>

***Dermatocarpon intestiforme* (Körb.) Hasse**

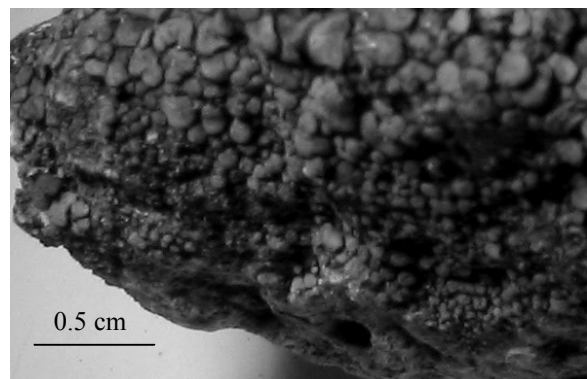
Dermatocarpon intestiforme is characterized by its “pruinose” multi-lobed thallus with lobe margins usually strongly downrolled and its ‘preference’ for dry rocky habitats. Spores are subspherical to elliptical, 9-15 x 7-9 µm. This species can be differentiated from the “pruinose”, multilobed *D. miniatum* var. *complicatum* by its more compact, cushion forming thallus growing in exposed areas. The multilobed thalli of *D. miniatum* var. *complicatum* tend to exhibit a more loose habit and occur in damp microsites. *Dermatocarpon intestiforme* has been found in western Oregon: Horse Rock Ridge Research Natural Area (McCune 2003).



Dermatocarpon intestiforme

***Dermatocarpon lorenzianum* Anders**

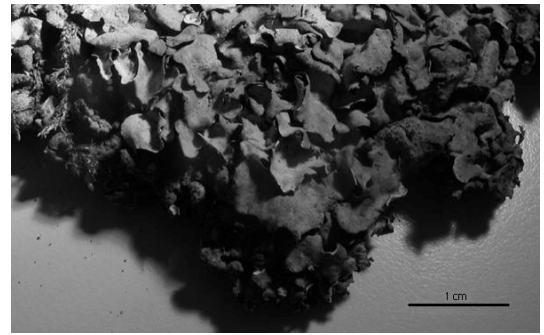
Dermatocarpon lorenzianum is characterized by its squamulose, sometimes areolate crustose morphology and occurring in dry, exposed rocky habitats. The tiny, closely packed lobe morphology is distinctive enough to differentiate this species from other exposed, dry site dwellers, such as *D. intestiforme*.



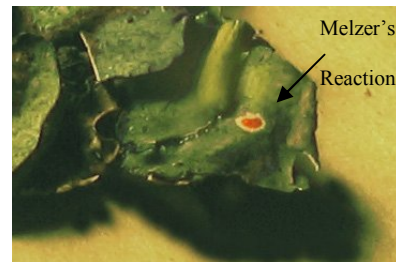
Dermatocarpon lorenzianum

Dermatocarpon luridum (With.) Laundon

Dermatocarpon luridum is characterized by its multilobed thallus with multiple holdfasts, restriction to aquatic environments, and a medulla reactive to Melzer's Reagent (I + Red). Spores 13.5 to 18 μm long. Upper surface epruinose, light to dark brown or occasionally grayish; lobe not wide, generally 6 – 13 mm; usually green when wet; both compressed and inflated epinecreal hyphae. This species has been mistaken for other lichens in the Pacific Northwest, including *D. meiophyllizum* and *D. miniatum*, and there is yet to be a verified specimen from the area. Verifiable *D. luridum* does occur in the U.S. (Wisconsin [27517 WTU]; Vermont [2041 WTU]; Virginia [95113 OSC]) and could possibly exist in the Pacific Northwest. The multilobed thallus of *D. luridum* distinguishes it from other non-multilobed *Dermatocarpon* sp., such as *D. meiophyllizum*. The quick definitive character, distinguishing *D. luridum* from all other *Dermatocarpon* species in the Pacific Northwest, is the Melzer's + Red reaction; at this time, *D. luridum* would be the only *Dermatocarpon* species in the Pacific Northwest strongly reactive to Melzer's Reagent.



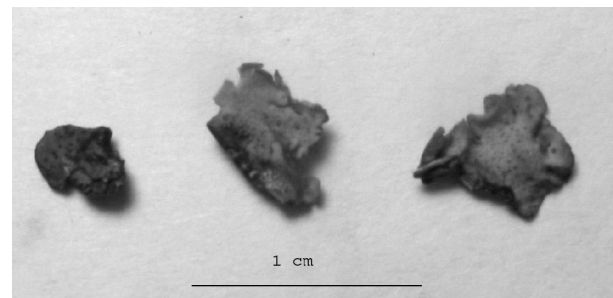
Typical multilobed thallus of *D. luridum*



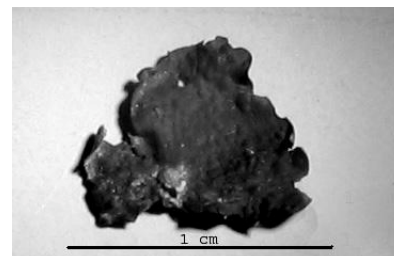
Deep red medullary reaction of *D. luridum* to Melzer's Reagent

Dermatocarpon meiophyllizum Vain.

Dermatocarpon meiophyllizum is defined by its umbilicate, epruinose, brownish (sometimes green when wet) upper surface, single lobed, small thallus (< 15 mm) with a generally smooth (sometimes finely granulose), dark brown lower surface. Spores 14 to 18 μm long. Thalli thick (0.39 – 0.64 mm) for small size. The epruinose appearance of *D. meiophyllizum* is due to compressed hyphae in the epinecreal layer. This species inhabits both aquatic and semi-aquatic zones of stream channels (Glavich 2006). Populations of tightly packed, overlapping lobes of *D. meiophyllizum* can sometimes appear multilobed. However, upon closer inspection, small, umbilicate individual thalli can be seen. The other epruinose *Dermatocarpon* species in the Pacific Northwest is *D. rivulorum*, but the latter species is generally larger and has a distinctly reticulate lower surface.



Typical range of *D. meiophyllizum* thalli

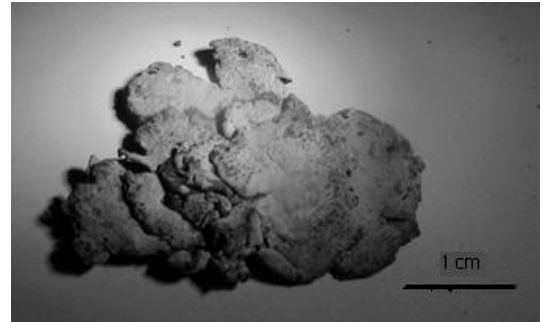


Typical lower surface of a *D. meiophyllizum* thallus

***Dermatocarpon miniatum* (L.) W. Mann var.**

Dermatocarpon miniatum* var. *miniatum

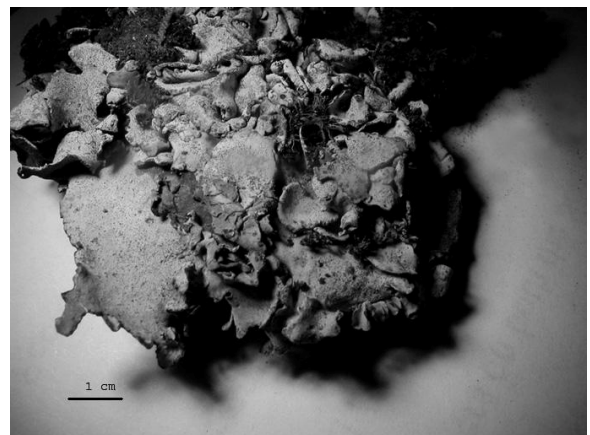
Dermatocarpon miniatum var. *miniatum* is characterized by its grey and usually pruinose upper surface, large (13 – 50 mm) single to few lobed, umbilicate thalli that often form rosettes. Dry thallus thickness 0.32 - 0.56 mm, ascospores 10 – 14 μm .



Dermatocarpon miniatum

***Dermatocarpon miniatum* var. *complicatum* (Lightf.) Th. Fr.**

Dermatocarpon miniatum var. *complicatum* is characterized by its grey and usually pruinose upper surface, multilobed thallus with multiple holdfasts scattered over the lower surface—never having a central holdfast. The pruinose appearance is due to inflated hyphae in the epinecral layer. Lobes are usually 5 – 15 mm wide, dry thallus thickness 0.42 – 1.78 mm, ascospores 9 – 13 μm .



Typical multilobed thallus of *D. miniatum* var. *complicatum*

***Dermatocarpon moulinsii* (Mont.) Zahlbr.**

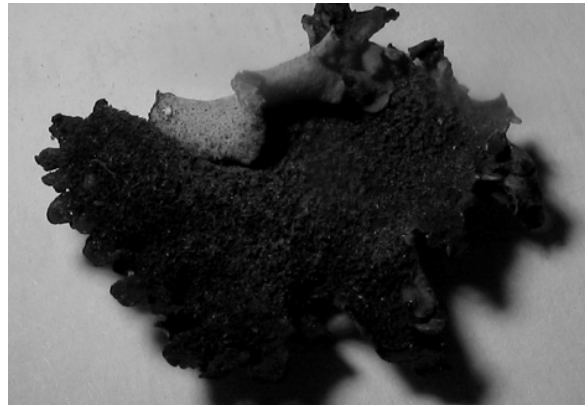
Dermatocarpon moulinsii is characterized by rhizines on the lower surface. Thalli of *D. moulinsii* are typically large (lobes > 15 mm) and occur in dry environments. Much of the material observed resembled the description of *D. vellereum* Zsch. (McCune & Goward 1995). The relationship of these species may not be well understood in North America, and the issue is not treated here. This species can be confused with *Umbilicaria* ssp., but members of the genus *Umbilicaria* have apothecia rather than perithecia.



Rhizinate lower surface of *D. moulinsii*

Dermatocarpon reticulatum H. Magn.

Dermatocarpon reticulatum is characterized primarily by its finely papillose lower surface giving a granular appearance. Thalli are generally large (lobes > 15 mm), pruinose, umbilicate, and has an ascospore size of 12 – 15 μ m.

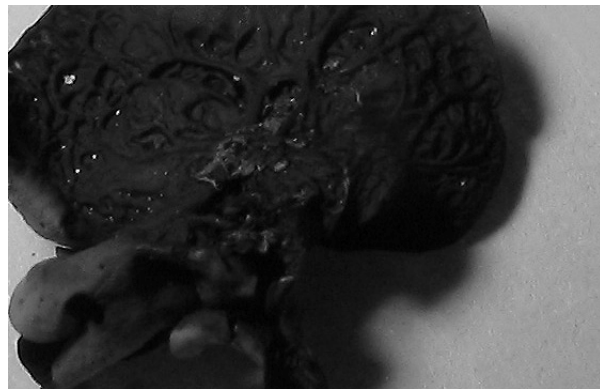


Granular appearance of *D. reticulatum* thallus due to fine papillae

Dermatocarpon rivulorum (Arn.) Dalla Torre & Sarnth.

Dermatocarpon rivulorum is characterized by its large (lobes > 15 mm), brown colored, epruinose thalli with a distinctly reticulate lower surface. Spores 14 – 22 μ m; pycnidia sometimes in wart-like structures; dry thallus thickness 0.24 – 0.42 mm. Thalli are relatively thin but often have a variable thickness giving the upper surface a bulging appearance.

Dermatocarpon bachmanii Anders, which may have recently been found in the Pacific Northwest (Heiðmarsson 2003), also has long spores and a distinctly reticulate lower surface but is grey and has an epinecreal layer consisting of air filled hyphae.



Reticulate lower surface of *D. rivulorum*

Summary

The genus *Dermatocarpon* has been better defined in recent time, but still remains a morphologically plastic group, especially in the *D. miniatum* complex (Heiðmarsson 2001; 2003). However, some species can be readily identified. If *D. luridum* is found in the Pacific Northwest, it can be easily identified by its reaction to Melzer's reagent. *Dermatocarpon meiophyllizum* is a strongly defined species (Heiðmarsson 2003), and most specimens can be identified by its small, umbilicate, brownish colored thalli. The obligately aquatic 'lifestyle' defines the habitat of *D. luridum* and *D. rivulorum* (Heiðmarsson 2001), but some *D. meiophyllizum* populations appear to occur in the long-term submerged condition (Glavich 2006). Aside from gross, external morphological features, spore size is important for identifying *D. meiophyllizum*. As of now, there are only two long spored (spores > 15 µm long) *Dermatocarpon* species in the Pacific Northwest: *D. meiophyllizum* and *D. rivulorum*. Both have a brown upper surface, but *D. meiophyllizum* thalli are small and *D. rivulorum* are relatively large and have a reticulate lower surface.

Acknowledgements

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Glossary

Areolate. A strongly appressed lichen growth form, divided up by cracks, appearing almost crustose.

Apothecia. External disc or cup-shaped ascocarps.

Ascocarp. The fruiting body produced by the lichen ascomycete fungal partner.

Ascospore. Spores produced by the lichen ascomycete fungal partner.

Chlorolichen. A lichen with a green algal partner.

Crustose. A crust-like lichen growth form.

Epinecreal Hyphae. A layer of dead fungal hyphae cells on the upper surface of a lichen thallus.

Epruinose. Lacking pruina.

Foliose. A lichen growth form of dorsiventral lobes, with an upper and lower surface.

Melzer's Reagent. A reagent consisting of potassium iodide, iodine, and chloral hydrate.

Papillose. The condition of having papillae (small bumps).

Perithecia. Ascocarps that are immersed in the lichen thallus and appear as small black dots on the upper surface.

Pruina. Whitish coating on the upper surface a lichen thallus, which is usually a calcium oxalate deposit

Pruinose. The condition of having pruina.

Pycnidia. Asexual fungal spore producing structures, usually immersed in the thallus and appear as tiny black dots on the upper surface.

Rhizinate. The condition of having rhizines.

Rhizines. Multicellular root-like structures on the lower surface for substrate attachment.

Squamulose. A lichen thallus made up of small, scale-like lobes.

Thalli. Plural of thallus.

Thallus. Body of the lichen.

Umbilicate. A thallus with a central attachment holdfast.