

Xanthoria and *Xanthomendoza*

in the Pacific Northwest
B. McCune – 26 July, 2006

Thallus foliose, small (generally < 10 cm, often < 1 cm), appressed to ascending or minutely fruticose; lobes narrow (generally < 1(3) mm); upper surface some shade of yellow or orange, occasionally greenish or tan or even white in shaded sites; both surfaces corticate; soredia or blastidia (rounded propagules produced by budding, often partly corticate) present or not; lower surface white, yellow, or orange, rhizinate or with hapters; apothecia lecanorine, laminal, sessile; spores polarilocular, 1-septate, hyaline; pycnidia generally immersed in thalloid warts, producing minute whitish exudate containing ellipsoidal or rod-shaped pycnosporos (= conidia or spermatia, depending on inferred function); upper cortex K+ purple or R (parietin and other anthraquinones); photobiont *Trebouxia*; on a wide range of substrates

1a Soredia (generally blastidia) present

2a Soredia laminal, isidia-like or breaking down into soredia, laminal; usually on rock. Thallus appressed, foliose, to 4 cm broad; lower surface whitish, with sparse, coarse rhizines; apothecia generally lacking; usually on exposed nutrient-enriched calcareous rock, occasionally on shaded vertical rock faces, also on antlers, rarely on bark; widespread; occasional throughout western and boreal North America

Xanthoria sorediata (Vainio) Poelt

2b Soredia usually terminal, marginal, or below the lobe tips, fine or granular; on bark or rock

3a Thallus dwarf fruticose, steeply ascending to erect; spermatia ellipsoidal, ca 2.3-3 x 1-1.3 µm (almost always present, section thallus-colored or darker warts on upper surface). Thallus lobate to lacerate when well developed; blastidia produced on the underside, and strongly proliferating as smaller lobes, except in stressed forms; lobes initially ± dorsiventral but becoming radially structured with proliferations on all sides; lobes attached at the base to the substrate with sparse, very short hapters; apothecia sunken in the surface of the term branches; thalline margin of apothecia often with lobules and soredia; on various substrates, most common on sheltered rock surfaces, also occasional on bark or wood; widespread; occasional, but very frequently old literature reports are other species

Xanthoria candelaria (L.) Th. Fr.

3b Thallus always dorsiventral, not erect fruticose, appressed at least near the base; spermatia ± rod-shaped or both rod-shaped and elliptical within the same pycnidium, the rod-shaped spermatia ca 2.5 x 0.5 µm (thin section or squash mount of small reddish warts)

4a Substrate rock (sometimes terricolous); lobes turned upward and ascending from the substrate, but with the lobe tips rolled under or downturned; soredia produced from the lower surface; thallus ± pruinose, often forming stands of erect or suberect lobes rather than discrete rosette-forming thalli

5a Soredia similar in color to the upper surface, ± corticate (blastidia), irregular in shape; pycnidia immersed, forming reddish spots; lower surface white and ± shiny. On both calcareous and noncalcareous rock, on the ground among bryophytes, and on antlers and bones, often where nutrient-enriched. So far known in N Am only from the Arctic

Xanthomendoza borealis (R. Sant. & Poelt) Søchting et al.

[*Xanthoria borealis* R. Sant. & Poelt]

5b Soredia usually paler than the upper surface (yellowish to greenish yellow), ecorticate, spherical; pycnidia immersed to protruding but similar in color to the upper surface; lower surface grayish, matte. Apothecia unknown; spermatia bacilliform; on noncalcareous rock, usually steep faces where shaded, occasionally on bryophytes over rock; widespread in western North America, including both continental and suboceanic climates, often at high elevations, but so far not known from the Coast Ranges or the immediate coast

Xanthomendoza mendozae (Räsänen) Kondratyuk & Kärnefelt

Xanthoria mendozae Räsänen

4b Substrate rock, bark, or wood; lobes semi-erect to horizontal, the lobe tips various; soredia marginal, submarginal, or from the lower surface; thallus not pruinose, often forming discrete rosettes

6a Lobes narrow, usually < 0.6 mm wide

7a Lobes ± parallel to the substrate; soralia marginal

Xanthomendoza oregana (see below)

[Narrow-lobed but otherwise typical forms of *X. oregana* will key here]

7b Lobes soon ascending to erect; soralia apical and on the lower side of the lobes

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8a Lobes mostly < 0.6 mm wide; lobe tips narrow to fan shaped, somewhat convex to flat or reflexed, with terminal soralia on the lower surface, but seldom helmet shaped; apothecia occasional and pycnidia usually present, the pycnidia often relatively conspicuous, redder than the surrounding thallus. Thallus to 9 mm diameter; lobes 0.2-0.6 mm wide; spermatia bacilliform; pycnidia sparse but almost always present; pycnidia orange to red; uppermost cells of paraphyses usually with oil droplets; rhizines usually sparse, sometimes abundant. On bark, wood, and rock (both calcareous and noncalcareous) in both semi-open and shaded sites; common east of the Cascades in the coastal states and provinces as well as the Rocky Mountains (and eastward), but rare west of the Cascades and absent on the immediate coast

Xanthomendoza fulva (Hoffm.) Söchting et al.

Xanthoria fulva (Hoffm.) Poelt & Pet.

[*X. fulva* can resemble *X. galericulata* when fan-shaped lobe tips are present. But in *X. fulva* the tips vary from slightly hooded to flat or splayed back. Furthermore, pycnidia are common in *X. fulva*.]

8b Lobes commonly > 0.6 mm wide; lobe tips becoming helmet-shaped with soredia on the lower surface; apothecia and pycnidia unknown

Xanthomendoza galericulata (see below)

6b Lobes wider, typically 0.8-1.4 mm wide; soredia marginal to submarginal; pycnidia orange to light orange; cells of paraphyses without oil droplets; rhizines usually abundant, sometimes sparse

9a Soredia produced in marginal crescent-shaped slits that are bordered with the remaining upper and lower cortex, the soralia often broadening to half moons or almost circular ("bird nests"); soredia often paler (yellowish or greenish yellow) than the upper surface; spermatia bacilliform. Marginal lobes ± appressed, the tips often ± downcurved, thickish, to 7 mm long and 1.5 mm broad, yellow orange; margins of older apothecia occasionally breaking open into soralia; generally on bark (especially *Populus* and other broad-leaved spp), occasionally on rock (both calcareous and noncalcareous); widespread, common, usually in dry, nutrient-enriched habitats

Xanthomendoza fallax (Hepp) Söchting et al.

Xanthoria fallax (Hepp) Arn.

[Small individuals in compact growth forms can resemble *X. fulva*. According to Lindblom (1997), *X. fulva* "has distinctly narrower lobes with soredia produced from the lower surface, the pycnidia appear larger, and the colour of the pycnidia is darker orange to red, and the rhizines are less frequent."]

9b Soredia marginal or produced below the lobe tips, soredia similar in color to the upper surface; lobes horizontal to suberect; spermatia bacilliform or variable

10a Rhizines frequently visible from above; spermatia bacilliform. Thallus often forming largish rosettes (to 32 mm); soralia marginal to submarginal, often laminal on well-developed thalli; usually on bark, occasionally on wood or rock; abundant in the Great Lakes region but rare and widely scattered in western N Am

Xanthomendoza ulophylloides (Räs.) Söchting et al.

Xanthoria ulophylloides Räs.

10b Rhizines rarely visible from above; spermatia ellipsoid to bacilliform or irregular, often variable within a single pycnidium

11a Soralia marginal and submarginal. Thallus small to medium sized (to 30 mm diam), forming ± flat to imbricate, loosely appressed rosettes; lobes typically horizontal to undulate or wrinkled; soralia marginal to submarginal, never laminal on the upper surface; apothecia rare; usually on bark and wood, rarely on rock; widespread and common in the coastal states and provinces (type specimen from a maple in Corvallis!)

Xanthomendoza oregana (Gyelnik) Söchting et al.

Xanthoria oregana Gyelnik

11b Soralia initially on the underside and margin of the lobe tips, eventually lining distinctly hood-shaped lobe tips, similar to *Physcia adscendens*. Individual thalli small, but coalescing to cover large areas with ascending or suberect lobes,

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yellow orange to deep orange; apothecia and pycnidia unknown; mainly in arid to semi-arid areas with a continental to suboceanic climate;

Xanthomendoza galericulata Lindblom

[Lindblom (2004, 2006) resolved confusion between her earlier concepts of *X. fulva* and *X. oregana* by describing *X. galericulata*. This removed the forms of *X. oregana* with helmet shaped lobe tips and the broad-lobed forms of *X. fulva*.]

1b Soredia lacking

12a Lower cortex absent

13a On bark and wood; California. Thallus and lobes flat, lobate-crustose; lobes appressed; lower cortex absent except under the lobe tips. Usually on twigs, also on trunks and wood, generally on angiosperms in open to semi-open habitats, oak savanna and coastal scrub; Sacramento Valley, foothills and Coast Ranges of California, south to Baja; not yet known from our area but to be sought in the dry valleys of SW Oregon.

[*Xanthoria tenax* Lindblom]

13b On rock; widespread

Caloplaca

12b Lower cortex present

16a Thallus medium sized, often > 20 mm diam; lobes usually > 1 mm broad and up to 3 mm broad

17a Lobes concave to plane, mostly 1-3 mm broad. Thallus forming rosettes to 10 cm diam; apothecia usually present; spermatia ellipsoidal; lower surface with sparse, short hapters; spores (12)13-16(17.5) x (5)6-9(10) µm; septum 4-8 µm wide; in our area most common on river bottom cottonwoods, occasional in urban and suburban areas and cemeteries; most frequent on hardwood bark, especially small branches of *Populus* near rivers, occasional on many other substrates, including rock, tombstones, roofing materials, and fiberglass panels; sparsely scattered in the coastal states and provinces, from Vancouver, BC to Baja;

Xanthoria parietina (L.) Th. Fr.

17b Lobes convex, mostly 0.5-1.5 mm broad. Thallus to 5 cm broad; apothecia frequent; spermatia ellipsoidal; lower surface white, corticate, with short, sparse hapters; spores (11)12-16(17.5) x (5.5)6-8(8.5) µm; septum 1.5-4.5 µm wide; on both noncalcareous and calcareous rock, moss over rock, alpine sod, bone, antlers, and roofing materials, rarely on bark; widespread; common

Xanthoria elegans (Link) Th. Fr.

16b Thallus small to medium, usually < 20 mm diam; lobes < 1 mm broad

18a Rhizines absent, the thallus attached with short hapters (short, broad, peg-like attachments rather than slender root-like structures). Thallus small, typically about 1 cm diam, rarely up to 25 mm diam, cushion-like with convex or flat lobes; lobes to 0.7 mm wide, convex or flat, appressed to suberect; lower cortex present; spermatia ellipsoidal; spores (10)11-15(16.5) x (4)5.5-8(9) µm; septum (2)3-6(7) µm; most common on twigs in open to semi-open nutrient-enriched habitats, but also on other bark surfaces, on both angiosperms and conifers, infrequently on rock (mainly seashore rock) and wood; widespread; common in the coastal states and provinces inland to western Montana and Yellowstone NP, but not known from the Great Basin, central or southern Rocky Mountains, or the SW deserts.

Xanthoria polycarpa (Hoffm.) Rieber

[West of the Cascade crest *X. polycarpa* often cohabits twigs with *X. hasseana*. Growing together, *X. hasseana* has distinctly broader lobes and the rhizines can be seen peeking out from beneath the lobes. *Xanthomendoza concinna* (Thomson & Nash) Søchting et al., known from Mexico and Texas, is similar to *X. polycarpa* but white-pruinose and with bacilliform spermatia. It occurs on twigs in dry habitats.]

18b Rhizines present

19a Spores ellipsoidal; septum wide (5.5-7.5 µm); upper surface yellow to orange. Thallus small to medium, to 3 cm diam, forming rosettes but often coalescing; rhizines frequent; apothecia almost always present; spores 15.5-20 x 7.5-9.5 µm; pycnidia common, darker than the surrounding thallus; on bark (esp. *Populus*, *Quercus*, and other hardwoods), occasionally on wood or rock; in semi-open to open, nutrient-rich habitats; common in the coastal states and provinces, inland to Montana and across the boreal forest to northeast US, but apparently absent from the Great Basin and central and southern Rockies

Xanthomendoza hasseana (Räs.) Søchting et al.

Xanthoria hasseana Räs.

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19b Spores cylindrical to ellipsoidal; septum narrow (1.5-3 µm); upper surface light orange to dark orange. Thallus small to medium, to 3 cm diam, forming rosettes that often coalesce; lobes 0.2-0.5 mm wide; rhizines frequent; apothecia almost always present; spores 13-15.5 x 5-7.5 µm; pycnidia fairly common, darker than the surrounding surface; on bark (both hardwoods and conifers), occasionally on wood, usually in fairly open, dry habitats; by far the most common esorediate corticolous *Xanthoria* in the central and southern Rockies, with more scattered localities north into Canada and west to the Willamette - Puget trough

Xanthomendoza montana (Lindblom) Søchting et al.

Xanthoria montana Lindblom

Table 1. Distributional summary of primarily corticolous *Xanthoria* and *Xanthomendoza* species in western North America (C = common, O = occasional, U = uncommon, R = rare).

	Coastal States	Mediterranean	N Rockies	C & S Rockies	Great Basin	Boreal
Sorediate						
<i>Xanthoria candelaria</i>	C	C	C			R
<i>Xanthomendoza fallax</i>	C	C	O	C	C	C
<i>Xanthomendoza fulva</i>	C	O	C	O	O	
<i>Xanthomendoza galericulata</i>	O	O	C	C	C	
<i>Xanthomendoza mendozae</i>	O	O	O	O	O	
<i>Xanthomendoza oregana</i>	C	C	?			
<i>Xanthomendoza ulophyllodes</i>	R	R		R		R
Esorediate						
<i>Xanthomendoza hasseana</i>	C	C	O			C
<i>Xanthomendoza montana</i>	O		O	C	C	
<i>Xanthoria parietina</i>	U	U				
<i>Xanthoria polycarpa</i>	C	C	C			U
<i>Xanthoria tenax</i>	C					

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Søchting, U., I. Kärnefelt & S. Kondratyuk. 2002. Revision of *Xanthomendoza* (Teloschistaceae, Lecanorales) based on morphology, anatomy, secondary metabolites and molecular data. Mitt. Inst. Allg. Bot. Hamburg 30-32: 225-240.