

Xanthoria (Fr.) Th. Fr. in the Pacific Northwest

B. McCune – 26 March, 2000

Revised key based largely on Lindblom (1997)

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 pycnospores (= 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

X. sorediata (Vain.) Poelt

2b Soredia usually terminal or marginal, 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 \pm 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

X. candelaria (L.) Th. Fr.

- 3b Thallus always dorsiventral, not erect fruticose, appressed at least near the base; spermatia \pm 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 \pm pruinose, often forming stands of erect or suberect lobes rather than discrete rosette-forming thalli

- 5a Soredia similar in color to the upper surface, \pm corticate (blastidia), irregular in shape; pycnidia immersed, forming reddish spots; lower surface white and \pm 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

[*X. 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 siliceous 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

X. 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, < 0.5 mm wide

7a Lobes \pm parallel to the substrate; soralia marginal

X. 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

8a Spermata bacilliform; pycnidia sparse but almost always present; thallus to 9 mm diameter; lobes 0.2-0.6 mm wide. 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

X. fulva (Hoffm.) Poelt & Pet.

8b Spermata variable in the same pycnidium, ellipsoid to bacilliform or irregular; pycnidia rare to common; thallus to 30 mm diam; lobes 0.4-1.0 mm wide, \pm wrinkled; coastal and inland

X. oregana (see below)

[The second, atypical form of *X. oregana* described by Lindblom will key here]

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; spermata bacilliform. Marginal lobes \pm appressed, the tips often \pm 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

X. fallax (Hepp) Arn.

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

10a Rhizines frequently visible from above; spermata 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

X. ulophyllodes Räs.

10b Rhizines rarely visible from above; spermata ellipsoid to bacilliform or irregular, variable within a single pycnidium. Thallus small to medium sized (to 30 mm diam), forming \pm flat rosettes; lobes typically horizontal but in one form suberect with helmet shaped lobe tips; soralia marginal to submarginal or from the lower side of the lobe apices, never laminal on the upper surface. apothecia very rare; usually on bark and wood, occasionally on rock or soil; widespread and common in the coastal states and provinces (type specimen from a maple in Corvallis!), also frequent in the intermountain region and the Rocky Mountains

X. oregana Gyelnik

(Lindblom 1997: "*Xanthoria oregana* is morphologically variable and difficult to characterize in a clear-cut and simple way. However, it is the only species... which has spermatia with various shapes in the pycnidia. The morphological variation ranges from rather appressed yellow thalli with wrinkled lobes and marginal-submarginal soredia (corresponding to the type specimen) to orange thalli with semi-erect to erect, wrinkled-smooth lobes and soredia produced from the almost helmet-shaped lobe apices.")

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.

[*X. tenax* Lindblom]

13b On rock; widespread

14a Upper surface rough and granular; always on calcareous rock, esp bird perches. Widespread but infrequent, in hot dry habitats

Caloplaca trachyphylla (Tuck.) Zahlbr.

14b Upper surface smooth or finely pr; on both calcareous and noncalcareous rock. Widespread and abundant; often covering large areas of rock faces

Caloplaca saxicola (Hoffm.) Nordin

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; 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;

X. 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; on both siliceous and calcareous rock, moss over rock, alpine sod, bone, antlers, and roofing materials, rarely on bark; widespread; common

X. 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. 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.

X. polycarpa (Hoffm.) Rieber

[*X. concinna* Thomson & Nash, known from Mexico and Texas, is similar 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

X. hasseana Räs.

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

X. montana Lindblom

Table 1. Distributional summary of primarily corticolous *Xanthoria* 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>candelaria</i>	C	C	C			R
<i>fallax</i>	C	C	O	C	C	C
<i>fulva</i>	C	O	C	O	O	
<i>mendozae</i>	O	O	O	O	O	
<i>oregana</i>	C	C	O	O	O	
<i>ulophyllodes</i>	R	R		R		R
Esorediate						
<i>hasseana</i>	C	C	O			C
<i>montana</i>	O		O	C	C	
<i>parietina</i>	U	U				
<i>polycarpa</i>	C	C	C			U
<i>tenax</i>	C					

Lindblom, L. 1997. The genus *Xanthoria* (Fr.) Th. Fr. in North America. Journal of the Hattori Botanical Laboratory 83:75-172.

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