

Physcia (Schreber) Michaux
(LECANORALES: PYXINACEAE)

After Thomson (1963),
with considerable modifications from other sources;
Still has a lot of bugs in it; need more info. from Moberg

Rev. 4/96

Thallus foliose, lobed, often orbicular in outline with radiating lobes, tightly to loosely adnate; lobes short to elongate, mostly under 3 mm wide, irregularly or dichotomously branched; upper side plane or convex; upper cortex paraplectenchymatous or of \pm periclinial hyphae; lower cortex prosoplectenchymatous (lumina under 2.5 μ m wide) or pseudoparenchymatous (lumina 4-7 μ m diam.); upper surface white to pale or dark gray, sometimes bluish or brownish, matt or slightly glossy, sometimes with white flecks (maculae) owing to breaks in the algal zone, occasionally white-pruinose; with or without marginal cilia; lower surface white to pale brown, pale gray, pinkish or sometimes yellow-spotted; attached to substrate by few to many, simple to irregularly furcate, pale or dark rhizines. Soredia or isidia present in many species.

Apothecia laminal, sessile or short-stalked; disk round; thalloid exciple well developed, without rhizines on lower surface (or sometimes with them according to Galloway); disk brown or black, often white-pruinose; thalline exciple present; hypothecium hyaline; hymenium hyaline; epihymenium pale brown; paraphyses unbranched or somewhat branched (forked above); apices clavate, pale brown with a thin, dark brown cap; asci cylindrical-clavate to cylindrical, *Lecanora*-type, unitunicate, I+ blue; tholus I+ blue; spores 8, ellipsoid, 1-septate, brown, thick walled towards the apices.

Pycnidia immersed, with colorless walls except for dark ostiolar region (seen as black dots on lobe surface); conidiogenous cells arranged in branched chains, short, cylindrical, enteroblastic, acrogenous or pleurogenous (endobasidial according to Rogers); pycnosporous simple, cylindrical, \pm bacilliform, short (4-10 μ m long). Upper cortex and often medulla with atranorin; medulla with zeorin, leucotylin, or other terpenoids. Photobiont *Trebouxia*. On bark or rock.

The genus is a very difficult one, and is still a mess in the West, especially in California.

Group I (Section Physcia [P. tenella Group]).
Lobes \pm ascending, with long marginal cilia.
Thallus 1-3 cm. diameter; lobes to 1 mm wide;
Lower cortex pale, proso- or paraplectenchymatous;
Medulla K-; without zeorin.

1. Without soredia. Apothecia abundant when mature, to 3 mm diam.; discs usually thinly pruinose. Thalli often orbicular, rosette-forming; lobes generally long and rather narrow (< 1 mm), occasionally shorter and broader; upper surface whitish gray to dark gray, sometimes distinctly white-spotted; cilia concolorous with thallus but with darker tips; lower surface pale gray to pale brown, sparsely rhizinate. Apothecia stipitate. Spores 15-22 x 9-10 μ m. On bark (conifers) or rock, in moist, sheltered forests, at lower elevations, mostly coastal or near streams and lakes, northern and western U.S. and Canada; British Columbia to New Mexico. Apparently rare. P. leptalea

1. With soredia on the lobe tips. Apothecia usually rare.2

2. Soredia on interior of underside of helmet-shaped or hood-shaped inflated lobe tips, or in cup-like structures on lobe tips. Spores 15-18 x 7-9 μ m. Lobes \pm erect, to 1 mm wide; upper side pale gray-white to dark gray, occasionally brownish tinged (darker thalli in exposed habitats), lobe tips mostly much darker, sometimes with a white pruina; surface without hairs. Upper cortex gradually becoming paraplectenchymatous toward outside. Cilia 1-2 mm long, pale to black, always black in the outer part. Lobes to 2 mm broad, usually ca. 1 mm, about the same in length but sometimes much longer; crowded. Thallus adnate, 2-4 cm across, mostly irregular with confluent thalli. Soralia usually abundant, starting as holes just beneath the lobe tips. Lower surface white to grayish or pale brown, sparsely to moderately rhizinate; rhizines white to black. Lower cortex paraplectenchymatous. Apothecia usually rare, < 2 mm diam. Pycnidia sparse. Medulla K-. Atranorin. Common on base-rich bark (deciduous or sometimes conifer) in exposed areas and along roadsides, and on rock (siliceous or calcareous), or concrete; especially near the ocean or in riparian areas, but also well away from water, low to mid elevations. Northern (throughout boreal Canada), SE to Great Lakes states and Appalachians, and throughout the areas west of the Rockies except Great Basin, S to California. The species is rather variable, and sometimes difficult to distinguish from P. tenella, but the latter tends to have narrower, more appressed lobes, as well as the different type of soralia. P. adscendens (Fr.) Oliv.

2. Soredia on underside of \pm reflexed, lip-shaped lobe tips. Spores 9-10 μ m wide.
3

3a. Upper side with white to black hairs. Sonoran Desert. P. tenellula

3a. Upper side without hairs. Distribution otherwise. 3b

3b. Upper side pale gray-white to bluish gray. On bark or inland rocks. Cilia \pm pale. Upper cortex only partly paraplectenchymatous, the hyphae rather thin-walled. Thallus forming rosettes (sometimes coalescing). Lobes to 0.5-1 mm wide. Thallus orbicular to irregular, to 2 cm diam. Upper side usually not white spotted, epruinose. Lower side white to dark gray or brownish, with sparse white to brown or occasionally blackened rhizines. Soralia apical, labriform. Apothecia rare or sometimes \pm common, generally immersed. Without zeorin.

On bark (e.g., alders, willows and birches) or nutrient-enriched rocks (basaltic and other siliceous), in open to somewhat sheltered, mostly coastal, sites, northern and especially western; British Columbia to California, widespread but infrequent east to the northern

Rockies. P. tenella ssp. tenella

3b. Upper side pale to dark gray or blackish. Upper cortex \pm distinctly paraplectenchymatous, the hyphae rather thick-walled. On maritime rocks. cilia almost black. Thallus scattered or forming small "furry-looking" cushions. Lobes to 0.5 mm wide. Thallus small to middle-sized, with the marginal lobes loosely low lying and the central lobes \pm upright. Lobes 0.2-0.5 mm wide, irregularly branching, the branches also rising; tips sorediate with labriform soralia and the tips then more upright or flexed; margins with pale to dark cilia; upper surface epruinose, matt; lower surface white. Lobes narrow, 0.3-0.8 mm broad; lower surface distinctly corticate throughout. Apothecia laminal, sessile or short pedicellate, to 2 mm broad; margin entire to crenulate, concolorous with thallus or paler in dark thalli; disk flat, brown, bluish pruinose; spores 15-18 x 9-10 μ m; lumina hour-glass shaped. Pycnidia laminal. On moss or rock, sometimes in rainwater depressions on sea cliffs, California, eastern Canada, and Greenland. P. tenella ssp. marina

Group II-A.
Without marginal cilia
(do not confuse with rhizines projecting from below);
without soredia or isidia.

1. Upper side \pm uniformly densely pruinose, often yellowish or brownish at tips, matt. Underside and rhizines often yellowish in places. Lobes to 3 mm wide. (If upper side K- and rhizines squarrosely branched, see *Physconia*). The pruina is sometimes thin and spotty at least in places, making it difficult to distinguish from the "white-spotting" characteristic of some epruinose species.2

1. Upper side epruinose (or slightly pruinose in some forms of *P. aipolia* and *P. stellaris*); underside not yellowish.4

2. Medulla K+ yellow (atranorin; be careful to remove enough cortex so that its K+ reaction does not spread to the medulla).3

2. Medulla K-. Upper cortex prosoplectenchymatous (according to Thomson; paraplectenchymatous according to Moberg). Lower cortex prosoplectenchymatous or indistinctly paraplectenchymatous in lower part. Lobes \pm flat., to 3 mm wide but usually narrower, distinctly widening and slightly ascending at tips. Thallus orbicular to irregular, closely adnate, to 3-4 cm broad; lobes 1(-2) mm wide, crowded, \pm imbricate; upper surface gray to brownish gray or cream-colored, usually with a dense crystalline pruina; lower surface pale tan, whitish to brownish, with scattered white to dark gray rhizines. Apothecia common, to 2.5 mm diam. but usually smaller; disc black, usually white pruinose; margin often crenulate when young; spores *Physcia*-type, *Pachyosporaria*-type, or intermediate, (13-)15-18.5(-20.5)(-28?) x 6.5-8.5(-11)(-13?) μ m (15-18 x 5-8 μ m according to McCune & Goward, 1995), not ornamented. Pycnidia numerous. Without zeorin. On bark (oak, pine, and other trees) or sometimes rock (in British Columbia it occurs mainly on rock, but elsewhere it seems to be at least as common on bark); in open semi-arid intermontane sites at lower elevations. Southwestern (western Texas to California, south in Mexico); N to British Columbia. Very common at least in California, where it is quite variable and often difficult to distinguish from *P. stellaris*, although forms with quite broad lobes are distinctive. Morphologically similar to *P. magnussonii*, which has a K+ medulla.*P. biziana*

3. On rock. Upper cortex paraplectenchymatous. Medulla partly K+ dingy rose or orange (in discolored areas). Apothecia to 3 mm diameter. Pacific NW. Lobes usually short and broad, 0.8-2(-3) mm wide, \pm flat. Spores fusiform to narrowly ellipsoid, with faint but distinct ornamentation when mature, 14-24 x 6-9 μ m. Thallus to 6 cm diam., irregular and mostly confluent. Upper surface grayish with a brownish or yellowish tinge, mostly with a distinct pruina. Lower side white to brownish with a pinkish tinge; rhizines sparse, usually pale, simple or tufted at the end. Apothecia common, mostly abundant and crowded, short stiptitate; disk white pruinose; margin entire or becoming strongly crenate. On nutrient-enriched basaltic or other siliceous rocks, and also on mossy rocks, sometimes on vertical to overhanging surfaces; also on soil over rock. Washington, Oregon, Idaho, S to Colorado; possibly elsewhere.*P. magnussonii*

3. On bark. Upper cortex prosoplectenchymatous. Lobes to 1 mm wide, \pm convex.

Without K+ rose areas in medulla. Apothecia to 1 mm diameter. Southwestern and Mexico. Thallus 5-6 cm broad; upper surface very white; extreme tips darker fawn colored at the edges; lower surface smooth, white or very pale brown, rhizine to the margin, the rhizines simple or slightly furcate, pale brown to blackish. Apothecia sessile, becoming adnate, dispersed; disc black, very strongly pruinose; margin quite thick, entire to very slightly crenulate, concolorous with thallus but underside darkened; spores \pm fabaceous (bean-shaped?), 18-24 x 7-11 μ m; lumina rounded. Lobes sub-dichotomous or pinnate, closely adnate, somewhat *Placodium*-like. Texas, Mexico.P. mexicana

4a. Upper surface with opaque hairs. Sonoran Desert.P. villosula

4a. Upper surface without hairs. 4b

4b. Lobes very broad (ca. 2 mm), lobe margin very prominent. Sonoran Desert. P. tretiachii

4b. Lobes narrower, lobe margins not prominent. 4c

4c. Medulla K+ yellow (atranorin). 5

4c. Medulla K- (be careful to remove enough cortex to avoid contamination from its K+ reaction). 14

5. Upper cortex with conspicuous white spots (best seen when wet) on the lobe tips as well as center. This is a variable character; it is caused by irregular thickening of the upper cortex. 6

5. Upper cortex lacking white spots, or with white spots only towards the center. 10

6. Upper surface of thallus white to gray-white. 7

6. Upper surface of thallus bluish-, violaceous- or ashy-gray. Lobes \pm convex, usually under 1(-2) mm wide, radiating, closely appressed. Underside whitish to dark gray or brownish, with pale to black rhizines. Thallus orbicular, to 5 cm diam. Lower cortex prosoplectenchymatous. Apothecia generally present and often abundant, usually small (< 2 mm) and crowded; margins crenulate; discs epruinose. Spores 16-18(-22) x 5-9 μ m. Containing zeorin. Rather common (at least in the east), usually on sheltered, \pm nutrient enriched basaltic or gneissic rocks in open woods or other exposed areas, generally in partial shade. South-central to southeast Canada, south to the Great Lake states and the Appalachians and Ozarks, and throughout western U.S. (apparently absent from Nevada, but this may be due to undercollecting in that state) and SW Canada to Alaska; low to moderate elevations. Similar to P. cascadiensis, which is paler and not conspicuously white-spotted. Sometimes difficult to distinguish from P. aipolia (spores averaging longer in that species, but overlapping), but that species is almost always corticolous. P. phaea (Tuck.) Thoms.

7. On rock. Spores *Pachysporaria*- to *Physcia*-type, mostly 16-19 x 9-11 μ m. Containing zeorin and other terpenoids. Lobes to 1 mm wide. Arizona (?) (see P. convexa)

7. Usually on bark. Spores and chemistry various. 8

8. Spores Pachysporaria-type, 20-23 x 8-11 um. Apothecial margin with white rhizines on back. Lobes at most weakly white spotted. Zeorin absent; other terpenes present. Thallus to 4 cm across, pale gray; lobes plane to slightly convex, mostly not confluent, 0.5-1.0 mm across; central lobes more convex and even crowded and appearing verrucose; underside pale; lower cortex prosoplectenchymatous.

Apothecia to 1.5 mm across; margin level with disk; disk moderately white pruinose.

Southeastern, west to Oklahoma. P. neogaea R. C. Harris

8. Spores Physcia-type. Apothecial margin without rhizines. Lobes strongly white spotted, including lobe ends. Zeorin present. 9

9. Lobes narrow, to 0.5 mm across, often convex, not confluent, very irregularly branched, often crowded and appearing verrucose in the center. Lower side pale. Lower cortex prosoplectenchymatous. Apothecia to 2 mm across; disk not or only weakly pruinose; margin thin, smooth, not crenate, not or only slightly raised; cortex thin, even, of 4-5 rows of "cells".

Spores 15-17 x 6-7.5 um. Southeastern, west to Oklahoma. P. pumilior R. C. Harris

9. Lobes usually over 1 mm wide [except in var. alnophila (Vainio) Lynge], ± concave, ± loosely appressed, radiating, often overlapping or confluent; branching nearly dichotomous. Thallus to 6(-10) cm diam., usually ± orbicular, to irregular, ± closely adpressed, thicker than in P. stellaris. Upper surface whitish to pale gray or dark gray, often bluish tinged, rarely brownish gray, at most weakly pruinose; bullate warts or small secondary lobes sometimes at center of thallus and on margins of all apothecia. Lobes to 2 mm wide, flat to convex.

Underside whitish to pale tan or pale gray or dark lead-colored, with numerous, simple to irregularly forked, whitish to dark brown or gray rhizines sometimes protruding beyond the margins. Lower cortex prosoplectenchymatous, becoming paraplectenchymatous in the lowermost part. Apothecia to 2.5(-3) mm diam., usually abundant, often crowded; discs normally heavily pruinose; margin thick, often becoming crenulate, usually strongly raised. Spores (15-)18-25(-26) x (7-)8-10(-13) um, varying from Physcia-type to Pachysporaria-type, (19-)21-25(-28) x 9-11(-13) um. Zeorin present, rarely also other triterpenes. Pycnidia frequent; pycnospores 4-6 um long. Usually on base-rich deciduous trees and shrubs bark (in the east, especially on elms and poplars), in exposed areas (often on planted trees in smaller cities), usually towards the base of trees (rather than on small branches in the canopy); rarely also on rock; in open sites at lower elevations. Throughout at least southern Canada, and throughout the U.S. except the perhaps the southeasternmost part (reports from Florida, at least, are misidentifications), south into Mexico, N to Alaska. Material with apothecia present almost to lobe tips, gradually larger towards thallus center, and spores usually less than 22 um long, is v. alnifolia (Vainio) Lynge, which has been reported from British Columbia. (If spores Pachysporaria-type, 19-20 x 8-9 um and zeorin absent or trace, growing in Florida = P. sp. of Harris, 1990) P. aipolia (Ehrh. ex Hampe) Fűrnr.

10. Lobes 0.2-0.5(-1) mm wide. On rocks. 11

10. Lobes (0.7-)1 mm or more wide. On bark or rock. Medulla lax, not paraplectenchymatous. 12

11. Medulla hard, paraplectenchymatous. Medulla K- according to Moberg, 1995. Lower cortex paraplectenchymatous. Lobes mostly discrete, appressed. Thallus orbicular, strongly adnate; upper surface ashy-glaucous. Lobes adpressed, convex, narrow, linear, discrete, 0.2-0.5

mm wide, repeatedly furcate or subpinnate, the angles acute; upper surface epruinose; lower surface white or pale brown; rhizines few, short, concolorous with lower surface. Apothecia cidspersed, 0.5-1 mm diam., sessile; margin persistent, entire, concolorous with thallus; disc plane, epruinose, dark brown or black; spores 11-14 x 6.5-8 μ m; cells angular. Eastern (mainly Ozarks and southern Appalachians) and Arizona. [Note: *P. subtilis* is virtually identical except for having soredia, which are often sparse and may be overlooked]. (*P. halei*)

11. Medulla lax, not paraplectenchymatous. Thallus orbicular to irregular, firmly adnate, sometimes imbricate, to 3 cm across. Upper surface whitish gray to gray, shiny, white-maculate, lobe tips often brownish (particularly in old herbarium material). Lobes convex to plane, to 1 mm broad, \pm truncate. Underside white to brownish or pinkish yellow, shiny with few concolorous rhizines; lower cortex paraplectenchymatous, sometimes indistinctly. Apothecia \pm abundant, to 2 mm diam; margins thick, disc black. Spores *Pachysporaria*- to *Physcia*-type, (15-)16-19(-21) x (8-)9-11(-14) μ m. Pycnidia common. Containing zeorin and unknown terpenoids. On rocks in exposed habitats (desert). Arizona. Report from Florida is erroneous. *P. convexa*

12a. Lobes flat, white, to 1 mm wide, appressed. On trees and logs. Southeastern U.S. 13

12a. Lobes slightly convex, dull gray to bluish gray or gray-violet, 1-3 mm wide, loosely adherent. On rock. Western U.S., Mexico. Thallus cartilaginous; lobes irregularly branched, short; upper surface epruinose; lower surface pale with short pale rhizines. Apothecia to 2 mm diam.; disc black, \pm pruinose; margin entire or crenulate; spores 17-20 x 6.5-8 μ m; cells angular. California to British Columbia; Colorado and New Mexico; Mexico (?). Resembling and possibly just a variant of *P. phaea*, with a paler upper surface and at most inconspicuous white-spotting. *P. cascadenis*

13. Lower surface dark brown to black except for the outermost lobe tips. Lobes 1(-2) mm broad (to 3 mm according to Thomson), flat, contiguous to often imbricate; tips rounded, sometimes with the inner parts dissected into small lobes. Rhizines abundant, black. Thallus orbicular to irregular, to 5 cm across, sometimes confluent, \pm closely adnate; upper surface whitish to gray, usually shiny, particularly in the outer parts of the thallus, without maculae (according to Aptroot) or sometimes with them (according to Moberg). Upper and lower cortex distinctly paraplectenchymatous. Apothecia usually abundant (but rare in saxicolous specimens), to 2 mm across; disc dark brown, sometimes white pruinose; spores *Pachysporaria*-type, often germinated, leaving cavities in spore wall, 18-27 x 8-12 μ m. Pycnidia abundant. Medulla with zeorin and unidentified triterpens. On tree trunks and less often on rocks, in open situations. Common in southeastern U.S., and also reported from Arizona, Texas, and California. Not listed by Esslinger & Egan, but Moberg recently identified material from N. America in ASU as being this species. *P. integrata* Nyl. (synonym? [some doubt expressed by Aptroot] *P. alba* v. *obsessa*; cited as "*P. integra*" by Egan, but as "*P. integrata*" by Aptroot, 1987 and Moberg, 1986)

13. Lower surface pale. Lobes to 1(-1.5) mm wide. Spores 20-25 x 8-11 μ m. Zeorin absent, but other terpenes present. Upper surface not white spotted, or if white spotted then only in the older parts, not on lobe ends. Apothecia to 1.5 mm across, with white rhizines on the back; margin level with disc; disk moderately white pruinose. Spores *Pachysporaria*-type. Thallus to 4 cm across, pale gray. Marginal lobes plane to slightly convex, mostly not confluent, 0.5-1.0 mm

across; central lobes more convex and even crowded and appearing verrucose. Lower side pale. Lower cortex prosoplectenchymatous. Southeastern, west to Oklahoma. P. neogaea R. C. Harris

14a. Lower cortex paraplectenchymatous. Medulla hard, paraplectenchymatous. Medulla K- according to Moberg, 1995. Lower cortex paraplectenchymatous. Lobes mostly discrete, appressed. Thallus orbicular, strongly adnate; upper surface ashy-glaucous. Lobes adpressed, convex, narrow, linear, discrete, 0.2-0.5 mm wide, repeatedly furcate or subpinnate, the angles acute; upper surface epruinose; lower surface white or pale brown; rhizines few, short, concolorous with lower surface. Apothecia cidspersed, 0.5-1 mm diam., sessile; margin persistent, entire, concolorous with thallus; disc plane, epruinose, dark brown or black; spores 11-14 x 6.5-8 μ m; cells angular. Eastern (mainly Ozarks and southern Appalachians) and Arizona. [Note: P. subtilis is virtually identical except for having soredia, which are often sparse and may be overlooked]. P. halei

14a. Lower cortex prosoplectenchymatous. (Need to check on P. albinea).
14b

14b. On bark, rarely on rock. Thallus not cartilaginous, to 3(-6) cm across, \pm orbicular, \pm closely adpressed. Lobes 0.5-1.5 mm wide, radiating, \pm separate, rather slender, with the tips rounded. Upper surface matt, white-gray to darkish, not or indistinctly white-flecked, not pruinose; bullate warts or secondary lobules sometimes at center of thallus and on apothecial margins. Underside whitish to pale brown-white or pale gray, with numerous simple or branched, whitish to dark brown or gray rhizines that often protrude beyond the lobe margins. Lower cortex prosoplectenchymatous. Apothecia 1-2(-4) mm diam., abundant, often crowded; disc sometimes pruinose. Spores 15-22 x 7-11 μ m. Pycnidia frequent; pycnosporos 4-6 x 1 μ m. On roadside trees (usually deciduous; in the east, especially elms) or in open woods; often in the canopy on small branches. Throughout most of U.S. and at least southern Canada (including British Columbia) and northern Mexico. P. stellaris

14b. On rock. Thallus thick, cartilaginous, small to middle-sized; lobes 0.5-1 mm wide; tips crenulate; upper surface shiny. Thallus orbicular, small to middle-sized, appressed; lobes irregularly pinnate, convex but not strongly so; tips fan-shaped; upper surface white or gray-white, epruinose, generally not white-spotted; lower surface pale with short, pale to brownish rhizines. Apothecia sessile to short pedicillate; disc flat to slightly convex, black, pruinose or not; margins entire to crenulate; spores 16-19 x 7.5-8 μ m, the lumina \pm hourglass-shaped. In dry areas, at higher elevations. Western (California to New Mexico, Colorado; Mexico). P. albinea

Group II-B.

Thallus without cilia; with soredia or isidia or both.

1. Thallus isidiate, the isidia bursting at the tips into granular soredia, without discrete soralia. Thallus small (to 3 cm), the lobes thin and soft, small, not plicate. Medulla K+ yellow. Underside pale to brownish. Hypothecium hyaline. Two unidentified terpenoids. On bark, California. Very similar in appearance to Diploicia canescens, with which it sometimes grows. P. clementei

1. Thallus sorediate (the soredia in the case of P. tribacia forming non-corticate pseudoisidia). 2

2a. Underside black or dark brown (paler towards tips); rhizines black. 2b

2a. Lower surface white or pale. ADD: P. nashii, P. neglecta, P. undulata, P. sinuosa, P. poncinsii, P. rolffii. 3

2b. Soralia laminal, crateriform. Sonoran Desert. P. erumpens

2b. Soralia marginal. Rhizines moderately abundant. Soralia marginal (according to Moberg; mostly laminal according to Hale), small and delimited, round, often pustular, often best developed in lobe angles, occasionally becoming capitate; soredia coarse. Lower cortex paraplectenchymatous. Zeorin present. Upper surface whitish gray to gray, shining or rarely pruinose, usually \pm distinctly white maculate (but rarely so in N. American material). Thallus closely adnate, 2-4(-5) cm broad; lobes crowded, usually imbricate, ca. 1(-2) mm wide, usually widest near the tips. Apothecia rare, to 2 mm diam; margins crenulate or sometimes sorediate; disc black, with or without pruina; spores Pachysporaria-type, (17-)20-26(-28) x 9-11(-12) μ m. Pycnidia rare. Medulla K+ yellow. On bark (oak and other hardwoods) in open areas, and occasional on rocks, southeast coastal plain (south Carolina to eastern Texas). P. sorediosa (Vainio) Lynge

3. Soralia laminal, and capitate, crateriform or punctiform. Underside pale; medulla K+ yellow; lobes not plicate; hypothecium hyaline. 4

3. Soralia mostly marginal and labriform, or margins becoming granular sorediate. 5

4. Thallus usually finely white spotted above, cartilaginous; lobes radiate, mostly 0.5-1 mm wide, deeply incised toward periphery of thallus; lower cortex prosoplectenchymatous with lowermost part gradually forming rounded, isodiametric cells. Upper surface gray to dark gray. Lobes to 3 mm wide, usually narrower, sometimes overlapping, sometimes distinctly separated. Lower side white to dark gray with dark, sometimes black rhizines. Soralia distinct, to 2 mm diam., whitish or blue-gray, either laminal and markedly convex to hemispherical (sometimes eroded and crater-like), or apical on short lobe branches and then capitate or \pm lip-shaped, sometimes marginal and lip-shaped ("P. vainoi", which looks quite different but according to Moberg is just a modification). Thallus orbicular to irregular, closely adnate, 4-8 cm across; lower surface white to buff, moderately rhizinate; rhizines brown to black, simple, occasionally projecting cilia-like from near the margins. Containing zeorin and sometimes also unidentified triterpenes. Apothecia rare, sessile, < 1.5 mm. Usually on boulders, cliffs or

sloping outcrops (acidic according to Moberg; but also especially calcareous or ultramafic, and often associated with nutrient-enrichment from birds or other sources, in fairly exposed areas, including on the seashore), rarely on bark or wood. Northern (across most of southern Canada, south to the Great Lakes states and northeast U.S., and western (Pacific NW south to northern California, Rocky Mountains south to Mexico; N to Alaska). Extremely variable. Some material from the SW that seems to key out here is probably a distinct species. Esslinger & Egan accept P. vainoi as a separate species, but Moberg lumps it. P. caesia (Hoffm.) Fűrnr.

4. Thallus usually lacking distinct white spots above, soft; lobes fan-shaped broadened at the tips; lower cortex paraplectenchymatous. Lower side pale, white to pale creamy buff, matt. Zeorin absent; unknown triterpene present. Soredia coarsely granular, white to bluish gray, erupting in circular patches through upper cortex, sometimes becoming confluent, never near the lobe tips. Common in open deciduous forests, on bark (especially white oak and ash) and sometimes rock. Throughout the eastern U.S. except southern Florida. P. americana Merr. in Evans & Meyrow

5. Lobes convex, narrow, 0.1-0.3 mm wide, ± separated, with terminal labriform soralia and ± distinct warty soralia on the upper surface. On rock. 6

5. Lobes broader, more contiguous; soralia spreading ± over the margins, or soredia occurring on underside of tips of lobes. 7

6. Thallus prosoplectenchymatous above and paraplectenchymatous below; lobes flat or slightly convex, 0.1-0.2 mm wide; medulla K+ yellow; soredia apical on marginal granules or superficial; spores 8.5-13 x 6.5 um. Medulla dense, K+ yellow. Thallus orbicular, 0.5-1.0 cm across, often coalescing into larger colonies, thin (to 0.1 mm), strongly adnate; upper surface white or gray-green (greener wet), smooth, epruinose; lobes discrete, elongate, sublinear, multifid, repeatedly furcate or pinnate, crenate or almost entire. Soredia frequently sparse, ca. 50 um diam., concolorous with thallus, isidioid, often in chains. Lower surface pale (white), sparsely rhizinate. Apothecia sparse, sessile, ca. 0.5 mm diam; disc brown to brown-black, epruinose, matt, smooth; thalline margin rather thick, concolorous with thallus, entire or slightly granulose. On siliceous rocks (especially on granitic boulders or sandstone), in exposed situations. Eastern (Appalachians, Great Lakes area), and southwestern (SW Colorado to southern California and northern Baja California). P. subtilis

6. Medulla and lower cortex prosoplectenchymatous; lobes 0.2-0.3 mm wide, much divided or not, moderately convex to almost terete (and then grooved concave below); warty soralia conspicuos or not; spores 16-25 x 7-11 um. Medulla K+ yellow or K-. Usually on non-calcareous rocks. Northern (Great Lakes area) and western. ("P. teretiuscula" form of P. dubia)

7. Medulla K+ yellow or yellow then red. 8

7. Medulla K- (be sure to remove enough cortex to avoid contamination from its K+ reaction). 12

8. Upper surface of lobes with ± distinct white spots; lobes flat to convex; medulla K+ yellow. Thallus irregular to orbicular, ± loosely adnate, to 5 cm across; lobes usually

overlapping. Upper side whitish gray to gray, shining or sometimes pruinose. Lobes with rounded tips, to 2 mm wide, usually broadest near the tips. Soralia marginal, sometimes becoming laminal, small and delimited or larger and capitate to (rarely) crateriform, occasionally confluent, often becoming granular; sometimes true marginal isidia are developed. Underside black, in part dark gray; lobe tips even paler; rhizines black. Upper and lower cortices paraplectenchymatous. Apothecia uncommon, to 2 mm across; margin crenulate or sometimes dissolved into soredia; disk black, with or without white pruina. Spores Pachysporaria-type, 21.5-28 x 9.5-12 μ m. With zeorin. On tree trunks, rarely on rocks. Florida; Sonoran Desert. P. solediosa (if on rock, also see P. caesia ("P. vainoi form"))

8. Upper surface lacking white spots, but sometimes pruinose. 9

9. Underside brown to black and usually striate (more distinctly so near tips), outermost part white or pale gray. Lobe margins pruinose especially at tips. Thallus orbicular to irregular, to 7 cm diam., sometimes confluent and forming a larger aggregate. Upper surface whitish gray, shiny to matt, mostly with a pruinose or "frosted" coating on the lobe margins. Lobes to 2 mm wide, usually narrower, short and rounded, margins sometimes crenulate, the tips usually ascending. Soralia marginal, mainly on inner parts of lobes, often best developed in the sinuses. Rhizines gray to black or brown. Lower cortex prosoplectenchymatous but short-celled. Apothecia uncommon, to 2 mm across; margin crenulate and/or sorediate. Spores Pachysporaria-type (21-)23-26(-28) x (8-)10-12(-13) μ m. Pycnidia rare. With zeorin and unknown terpenes. On tree trunks in rather open places, and on rocks. Very common in Florida (Moberg, pers. comm.) P. atrostriata Moberg

9. Underside not striate, mostly pale. Lobe margins not pruinose. [add P. solistella]. 10

10. Soralia distinctly labriform; margins of lobes often reflexed.

..... 11

10. Soredia under the downrolled margins of the lobes, not labriform; lobes convex, pale gray, sometimes white-spotted. Thallus adnate, 2-6 cm broad, forming delicate rosettes, the colonies often coalescing; lobes 1-2 mm broad, the margins becoming finely dissected, with scattered soredia; lower surface white, moderately rhizinate. Apothecia rare. Common on base-rich rock outcrops in exposed to somewhat sheltered semi-arid areas at low elevations, southwestern (California and Colorado to Arizona and New Mexico; Mexico), rare northward to British Columbia. P. callosa

11. Lobes flat or concave, broad, 1-2 mm wide. Lower side white at the margin but turning blackish at the center; lower cortex absent, moderately rhizinate; rhizines pale. Containing zeorin. Thallus adnate, fragile, 4-6 cm broad; lobes linear; margins white rimmed, becoming sorediate. Upper side whitish gray, rarely with a faint pruina. Soralia mostly marginal (in part apical) and linear. Apothecia rare. Usually on the bases of trees in mature woods, coastal plain of southeastern U.S. [N. American records of P. albicans are based on this taxon; discrepancies in descriptions indicate that N. American material is not true P. crispa as described by Moberg, which has a paraplectenchymatous lower cortex and lacks zeorin and atranorin in the medulla, among other differences--see excluded spp.]. Many old records are actually P. atrostriata. P. crispa auct.

11. Lobes flat or convex, narrow, 0.3-1.0 mm wide. Thallus rather loosely adnate, 3-8 cm broad; upper surface whitish gray, faintly white-spotted. Soralia terminal and marginal on the lower surface, labriform with lobe tips turning up, mostly irregular, not strongly crescent shaped; soredia rather sparse and granular. Apothecia unknown. Containing zeorin. On mossy rocks in open oak forests in the Southern Appalachian region (e.g., W. Virginia), somewhat uncommon.P. pseudospeciosa

12. Thallus \pm thick (0.2-1.5 mm). Lower cortex \pm distinct and thick (ca. 50 μ m), paraplectenchymatous. Lobes with distinct labriform soralia in addition to granular soredia. Upper cortex paraplectenchymatous, 30-70 μ m thick. On bark (Umbellularia and Cupressus). Fog belt of central coastal California. Thallus rather coarse, rather loosely adnate; upper surface green-gray, smooth; lobes ascending, flexuose, broader towards tips, to 2.0 mm wide; towards margins minutely lobate. Lobes with marginal crenulations or horizontal lobules, the apices of which often dissolve into granular soredia. Medulla K-. Lower surface white, sparsely rhizinate; rhizines white. Apothecia sparse, sessile, to 1 mm diam.; disc epruinose, reddish; margin thick, inflexed, concolorous with thallus, slightly crenulate. Spores oblong, 7-10 x 18-20 μ m; wall \pm equally thickened. Pycnidia sparse, minute, immersed, reddish; pycnosporos bacilliform, straight, 4-5 x 1 μ m. Without zeorin. P. duplicorticata

12. Thallus thin (0.1-0.3 mm). Lower cortex prosoplectenchymatous, or if paraplectenchymatous, then usually thin and indistinct. Upper cortex usually thinner. Eastern, or if western then often on rock; not in coastal fog belt. 13

13. Thallus usually densely pruinose throughout; soralia mainly marginal (absent from lobe tips), linear, rarely slightly labriform, usually granular, sometimes covering smaller or larger parts of the upper surface. Lower cortex prosoplectenchymatous, 5-10 μ m thick. Upper cortex paraplectenchymatous, 20-30 μ m thick. Underside gray to brownish with gray and simple rhizines. Thallus 0.2-0.3 mm thick, loosely attached, to 4(-5) cm across; lobes 1-3(-4) mm broad; tips crenate. Upper surface gray to gray-blue or slightly brownish. Apothecia rare (description after McCune & Goward, 1995): < 1 mm diam., sessile; disk black but lightly pruinose; margin entire to crenate or sorediate; spores 18-20 x 6-7 μ m. Without terpenoids. On bark (especially Juniperus and Artemisia, or other shrubs) or moss over rock, in open to somewhat sheltered sites at lower elevations in semi-arid intermontane areas. Montana, N. Dakota; California to British Columbia. Very common in California, but difficult to recognize when the pruina is thin.P. dimidiata

13. Thallus at most weakly pruinose; soralia usually at least partly labriform (at least when soredia abundant). Lower cortex para- or proso-plectenchymatous. 14

14. Soralia usually distinctly labriform and produced at apex of side lobes, but extremely variable, sometimes laminal and crateriform; soredia ecorticate, becoming coherent and conglomerate. Usually on rock, most common in the West. Lower cortex prosoplectenchymatous. Underside pale (white to buff); rhizines rather sparse, whitish to brown, mostly simple. Thallus 2-5 cm diam., \pm orbicular, or irregular in outline, \pm closely adpressed (and difficult to remove from rock), but sorediate lobes often \pm ascending; lobes 0.2-1(-2) mm wide, usually radiating, very short and crowded to

slender and distinctly separate. Upper surface gray-white to darkish gray, not or only faintly white-flecked, matt (\pm shiny according to McCune & Goward, 1995), occasionally weakly pruinose. Soredia whitish to dark gray. Apothecia and pycnidia very rare; apothecia to 2 mm, generally with sorediate margins. Pycnosporos 2-4 μ m long. No medullary substances. Usually on exposed rocks or open talus slopes, occasionally on roadside trees. Northeastern (Eastern Canada, south to the Great Lakes states and rare south to the Appalachians) and western (Alaska and western Canada, south to California, and south in the Rocky Mountains to Arizona and New Mexico; apparently very common in the west. Moberg says no other species in cold temperate areas could be confused with it!--this may be true in S. America, but not in N. America in my experience; it is extremely variable and often poorly developed, and I find myself wanting to add "cf." to most of the identifications I make of this species. P. dubia (Hoffm.) Lettau

14. Soralia often only weakly or indistinctly labriform, very much divided, by which the granules become spread over the margins; soredia isidioid, often corticate. On bark or less often rock, mostly eastern. 15

15. Thallus 1-2 cm broad but fusing into larger colonies. Upper surface greenish gray to gray-white. Lower cortex prosoplectenchymatous, indistinct and very thin. On bark of roadside trees (especially elm, poplar and ash), and in open woods, only occasionally on rock; relatively pollution tolerant. Medulla rather loose. Soralia marginal, partly sublabriform, sorediate especially below; soredia ca. 50 μ m diam., often sparse and dispersed. Thallus membranaceous, \pm prostrate, adnate to closely or somewhat loosely attached, usually smooth; lobes relatively short and broad, ascending, often flexuous, broader towards tips (to ca. 2 mm wide), often rather deeply and densely lobate, towards margin often branched. Lower surface white, sparsely rhizinate. Medulla K-. Thallus 0.1-0.15(-0.2) mm thick. Apothecia rare, rather sparse, sessile, 1-2.5 mm diam., dispersed to slightly aggregated; discs usually densely pruinose, black under the pruina; thalline margin rather thick, concolorous with thallus, entire. Spores (10.5-)13-19(-23.5) x 6.5-8.5 μ m. Pycnosporos 4-5 μ m long. Eastern (Southeastern Canada and Great Lakes area, and southward except Florida and immediate gulf coastal areas), very common, and California (probably introduced on nursery stock from the East). P. millegrana

15. Thallus usually larger. Upper surface whitish gray to dark gray or cream-colored, sometimes bluish gray, but without greenish tinge, with darker margins, shiny and epruinose. Lower cortex paraplectenchymatous (according to Degelius and according to Moberg; prosoplectenchymatous according to Thomson), distinct. Mainly on exposed rocks, often at higher elevations. Soralia marginal, usually terminal, starting on the lower side of the lobe tips, eroding the tip and sometimes also the lower surface, not labriform (according to Weber; however, when soredia development is abundant \pm lip-shaped soralia may be formed, usually when on rocks; mainly lip-shaped according to Moberg). Thallus thin (0.1-0.2 mm), orbicular to usually irregular in outline, to 3 cm across; lobes not distinctly radiating, 0.5-1(-1.5) mm wide, usually appearing \pm flattened, sometimes scale-like, with margins mostly crenulate when soralia are not present. Underside whitish to gray-brownish or with faint pinkish or creamy yellow tinge, distinctly corticate; rhizines rather sparse, mostly simple, white to pale brown. Apothecia rare, to 1.5 mm, to 2 mm diam.; margins partly sorediate; discs dark brown to black, without pruina; spores intermediate between Physcia- and Pachyosporaria-types, (17-)18-

21(-23) x (8-)9-11(-12) um. Pycnidia usually numerous. P. tribacia

ADD:

P. convexella Moberg

Thallus irregular to orbicular, to 2 cm diam., often confluent, upper surface white to grayish, often with a darker zone near lobe tips, weakly maculate and usually shiny, sometimes with a white pruina, lobes to 1 mm wide, flat to convex, usually broadest and flattened at the tips, rarely longer than 5 mm, soralia absent, underside white with a rose tinge, rhizines concolorous, few and scattered, upper cortex paraplectenchymatous, lower cortex pale, prosoplectenchymatous.

Apothecia abundant, to 2 mm, with thick, crenulate margins; spores *Physcia*- to *Pachysporaria*-type, 15-18 x 7.5-8.5 μ m.

Pycnidia common.

Upper cortex K+ yellow, medulla K-. Atranorin.

On open rocks. Southern part of Sonoran Desert, Mexico.

P. erumpens Moberg

Thallus orbicular to irregular, to 3 cm across, usually firmly adnate also at the lobe tips, upper side shining to dull, whitish gray to weakly brownish gray, occasionally with a white pruina, lobes overlapping to separate, to 1 mm wide, \pm truncate, soralia laminal and crateriform, sometimes \pm capitate, starting as cracks in the upper cortex, underside black, except for the tips, with black rhizines, upper and lower cortex paraplectenchymatous, the lower dark brown to black.

Apothecia and pycnidia rare.

Upper cortex and medulla K+ yellow. Atranorin and zeorin.

Sonoran Desert.

P. nashii Moberg

Thallus orbicular to irregular, to 1 cm diam., often confluent, upper surface white to grayish, often with a darker zone near lobe tips, weakly maculate, dull to shiny, sometimes with a white pruina, lobes to 1 mm wide, convex to flat, usually broadest at the downwardly bent lobe tips, soralia marginal on lobe tips, sometimes big and reflexed or subcapitate, soredia \pm granular, underside white with a rose tinge, rhizines concolorous or darker than the underside, few and scattered, upper cortex paraplectenchymatous, lower cortex pale, prosoplectenchymatous, often labyrinthiform in the lower parts.

Apothecia rare, to 2 mm, margins \pm sorediate, spores *Pachysporaria*-type, (14-)14.5-18.5(-20.5) x 7.5-9(-9.5) μ m.

Pycnidia and pycnospores as for the genus.

Upper cortex K+ yellow, medulla K- or K+. Atranorin major; sometimes traces of triterpenes (but not zeorin)

On \pm exposed, acid rocks, 50-1200 m, Sonoran desert.

P. neglecta Moberg

Thallus orbicular to irregular, to 2 cm diam., usually confluent, \pm loosely adnate, whitish gray to dark gray, \pm shiny and without pruina, lobes flat to weakly concave, to 1.5 mm wide, usually ca. 1 mm, sparsely branched with \pm spreading, truncate lobes, soralia marginal in inner parts, delimited, with granular, almost isidiate soredia, underside whitish with few, robust, pale

rhizines, upper and lower cortex paraplectenchymatous.

Apothecia not common, spores sparsely developed, Pachysporaria type, 18-22 x 9-11 um.

Pycnidia and pycnoconidia as for the genus.

Upper cortex and medulla K+ or K-. Atranorin only.

On rocks, Sonoran Desert.

P. poncinsii Hue

Thallus orbicular to irregular, very variable in size, to 5 cm diam., lobes sometimes imbricate, sometimes distinctly separated, \pm closely adnate to the substrate, upper surface white to dark gray, sometimes maculate, with or without pruina, some specimens on rocks with shiny upper surface and darker gray margins, lobes very variable in width, to 2 mm, but specimens on twigs and rocks not exceeding 1 mm, the tips usually truncate, saxicolous material with convex lobes, soralia mainly laminal, crateriform to almost capitate, usually orbicular, starting as cracks in the upper cortex, some material has predominantly marginal soralia which may develop into rounded patches at angles of lobes, underside white to weakly brownish gray with white to dark gray rhizines, upper cortex paraplectenchymatous, lower cortex of a type between proso- and paraplectenchymatous.

Apothecia rare, to 15. mm diam., sometimes with sorediate margins. Spores Pachysporaria-type, (16-)19-24.5(-26) x (7.5-)8.5-10(-11) um.

Pycnidia rare.

Cortex and medulla K+ yellow. Atranorin, zeorin, unknowns.

On rock, Sonoran Desert and vicinity.

P. rolffii Moberg

Thallus irregular to orbicular, to 5 cm diam., \pm firmly adnate, gray to dark gray, usually white maculate and \pm pruinose, lobes mostly narrow, convex and distinctly discrete, sometimes broader and overlapping, to 2 mm wide but usually c. 1 mm, soralia marginal but well delimited and situated in the lobe sinuses, semiorbicular to upwardly curved or labriform, sometimes more or less helmet-shaped, underside white to graphite gray or brownish, rhizines few, of same color or darker than underside, upper cortex paraplectenchymatous, lower cortex proso- to indistinctly paraplectenchymatous, pale.

Apothecia \pm abundant, usually to 1 mm, rarely larger, margins sometimes dissolved into soredia; disc often with a whitish pruina, spores Pachysporaria-type, (16-)19.5-24(-25) x (7.5-)8.5-11(-14) um.

Pycnidia not common; pycnospores typical for the genus.

Upper cortex and medulla K+ yellow. Atranorin, zeorin, unknown triterpenes.

On trees, Sonoran Desert.

P. sinuosa Moberg

Thallus orbicular to irregular, to 2 cm diam. or bigger when confluent, \pm loosely adnate, upper surface whitish gray to cream colored, mostly without pruina, lobes radiating, flat to slightly convex, narrow, to 1 mm but rarely exceeding 0.5 mm, sinuous and truncate, soralia marginal, situated at some distance from the lobe tips, prominent, delimited, lipshaped to semicapitate, sometimes abundant, underside white to grayish, rarely brownish, with few pale rhizines, upper cortex paraplectenchymatous, lower cortex proso- to indistinctly paraplectenchymatous with thick walled cells, thinner thalli frequently have the

paraplectenchymatous type.

Apothecia \pm common, to 1 mm, disc sometimes pruinose, margins usually dissolved into soredia, spores Pachysporaria-type, 15-19 x 6.5-7.5 μ m.

Pycnidia few, pycnospores as for the genus.

Upper cortex and medulla K+ yellow. Atranorin, zeorin, unknown triterpene.

On rock, Sonoran Desert.

P. tenellula Moberg

Thallus irregular, rarely orbicular, to 1 cm diam., \pm loosely adnate, rarely confluent, upper side gray to dark gray or brownish, without pruina, with white to black hairs, lobes \pm ascending, narrow, to 1 mm, but usually ca. 0.5 mm, sometimes widening at tips, margins rarely having gray to black cilia, soralia terminal to marginal, often making the lobe tip widen, occasionally covering the whole underside of the lobe, underside white to brownish with few white to black rhizines, upper cortex paraplectenchymatous, lower cortex prosoplectenchymatous.

Apothecia rare, spores Pachysporaria-type, (15-)16.5-21(022.5) x (7.5)8-10.5(-12) μ m.

Pycnidia and pycnospores as for the genus.

Upper cortex K+ yellow. Atranorin.

On rocks and trees, coastal Sonoran Desert.

P. tretiachii Moberg

Thallus orbicular to irregular, loosely attached, to 5 cm diam., gray to bluish gray, pruinose, usually with a white "frosty" rim along the lobe margins, lobes flat to concave, broad, to 4 mm wide with rounded tips, margins often prominent because of the white rim, soralia absent, underside white to pale brownish with few concolorous rhizines, upper cortex paraplectenchymatous, lower cortex prosoplectenchymatous to labyrinthine, usually well delimited.

Apothecia usually abundant, short stalked, to 5 mm diam. with prominent and crenulate margin, spores Pachysporaria-type, (17-)18.5-22(-22.5) x (8.5-)9-10.5(-11) μ m.

Pycnidia abundant, pycnospores as for the genus.

Cortex K+ yellow, medulla only weakly K+ yellow. Atranorin, unknown triterpene (not zeorin).

On trees and shrubs, coastal part of Sonoran Desert, Mexico.

P. undulata

Thallus irregular to orbicular, to 4 cm diam., usually loosely adnate, upper surface gray to dark gray and "frosted", lobes thin, usually less than 150 μ m thick, loosely adnate to ascending, to 2 mm wide, tips rounded, soralia marginal, giving the margins an undulate appearance, usually not reaching the outermost parts of the lobes, sometimes eroded, underside whiteish gray to brownish with concolorous or darker rhizines.

Apothecia and pycnidia uncommon, spores intermediate between Physcia and Pachysporaria-type, (15-)18-27(-33) x (7-)8-11(-13) μ m.

Upper cortex and medulla K+ yellow. Atranorin, zeorin, unknown triterpenes.

On bark, coastal part of Sonoran Desert.

P. villosula Moberg

Thallus orbicular, rarely bigger than 1.5 cm diam., sometimes confluent, lobes 3 mm long, mostly less than 0.5 mm wide, with short, white to black hairs on the upper side, upper surface whitish gray to dark gray with darker lobe tips, sometimes pruinose, soralia not present, underside white to gray brownish, with concolorous or darker rhizines, upper cortex paraplectenchymatous, lower cortex prosoplectenchymatous.

Apothecia usually abundant and shortly stalked, very variable in size, to 2 mm diam., with thick margins, disc dark brown to black, without pruina., spores *Physcia*-type, (14-)15-18(-21.5) x (6.5-)7.5-9.5(-11) μ m.

Pycnidia usually numerous, pycnosporangia as for the genus.

Upper cortex K+ yellow, medulla K-. Atranorin.

On boojum trees and desert shrubs, Baja California.

P. solistella Essl. & Egan

Thallus foliose, to 6-7 cm diam., \pm orbicular, but often coalescing into larger colonies; lobes rounded-crenate, appressed, \pm contiguous to somewhat overlapping, (0.5-)1.0-2.0 mm wide, mostly flat to weakly convex; upper surface gray to gray-white, sometimes with faint whitish pruina on lobes, becoming weakly maculate in older regions; blastidia first forming on somewhat upturned lobe margins at some distance from thallus periphery, growing upright, 50-90 μ m broad, proliferating and becoming more dense in older regions of thallus, some expanding into blastidiate laciniae and often virtually covering center of well developed thalli; medulla white; lower surface white to pale tan (especially centrally), rhizines simple, rather sparse, \pm concolorous with lower surface or occasionally somewhat darkened.

Apothecia frequent and sometimes common, sessile, concave, disc black but often gray-pruinose, exciple entire then often becoming irregularly crenate and sometimes also blastidiate; hymenium 125-150 μ m; spores 19-25(-28) x 8-11 μ m, mostly *pachysporaria*-type when mature.

Thallus 180-280 μ m thick, upper cortex paraplectenchymatous-leptodermatous, 17-45 μ m thick, lower cortex mostly paraplectenchymatous-mesodermatous, but its upper region with some elongate hyphae and intergrading with the medulla, 20-30 μ m thick.

Upper cortex K+ yellow; medulla K+ yellow, at least in the upper region, at least in some areas.

On bark, eastern Texas.

Resembling *P. millegrana* but medulla K+ yellow, lower cortex mostly paraplectenchymatous, spores larger, individual thalli generally larger, blastidia usually larger.

ADD:

P. cinerea Moberg

Thallus narrow-lobed, orbicular to irregular, to 3 cm diam., firmly adnate, upper surface gray to very dark gray, not or weakly white-spotted, lobes to 1 mm but rarely exceeding 0.5 mm, convex and adnate to the tips, usually distinctly discrete and deeply divided, underside white to brownish with concolorous or darker, more or less abundant rhizines, upper cortex paraplectenchymatous, lower cortex pale, paraplectenchymatous with thick-walled, partly irregular cells, the cortex distinctly delimited from the medulla. Apothecia usually abundant, to 1.5 mm diam., margins crenulate, disc dark brown to black, epruinose, spores *Pachysporaria*-type, (15-)19-24(-28) x (7.5-)9.5-12.5(14) μ m.

Pycnidia \pm abundant.

Upper cortex and medulla K+ yellow. Atranorin, zeorin, and triterpenes.

On \pm exposed rocks or on mosses on rocks, Baja California Sur and Sonora.

ADD?:

Thallus forming rosettes to ca. 2 cm diam., deeply lobed; lobes contiguous, variously divided, 0.4-0.5 mm wide; tips slightly recurved. Upper surface bluish ashy, matt, without soredia or isidia. Lower surface brown, covered with rhizines to the tips; rhizines gray to blackish, simple, straight, numerous. Medulla white. Thallus K-, C-, KC-. On non-calcareous rocks, British Columbia. [Type not found; according to the description it appears to be a Phaeophyscia, close to "P. endococcinea f. lithodes".] P. columbiana B. de Lesd.

New Mexico. P. montana B. de Lesd. Type not found?

Lobes flat or concave, broad, 1(-4) mm wide, scarcely elongated; Medulla K-. Lower side pale; lower cortex paraplectenchymatous, sparsely rhizinate; rhizines pale. Soralia linear, not pustular; soredia fine. Zeorin absent. Thallus loosely adnate, thin, 3-4 cm broad, or coalescing; soralia well-developed in inner parts, particularly at lobe angles; lobe tips ascending and usually crenulate, with small protrusions towards margins becoming isidia-like and breaking into soredia. Upper side gray to cream colored, rarely with a pruina. Apothecia rare, to 2 mm diam.; margins sorediate; disc pale brown to brown, epruinose. Spores Pachysporaria-type, (18-)20-25(-27) x (8-)9-11(-13) μ m. Pycnidia rare. P. crispa Nyl. non auct.

Descriptions

P. adscendens

THALLUS adnate, 2(-4?) cm across, mostly irregular with confluent thalli. **Lobes** \pm erect, to 2 mm long, sometimes much longer, to 2 mm broad, usually ca. 1 mm, about the same in length but sometimes much longer; crowded. **upper side** pale gray-white to dark gray, occasionally brownish tinged (darker thalli in exposed habitats), lobe tips mostly much darker, sometimes with a white pruina; surface without hairs. **Cilia** 1-2 mm long, pale to black, always black in the outer part. **Soralia** usually abundant, starting as holes just beneath the lobe tips. Soredia on interior of underside of helmet-shaped or hood-shaped inflated lobe tips, or in cup-like structures on lobe tips. Lower surface white to grayish or pale brown, sparsely to moderately rhizinate; rhizines white to black. **Upper cortex** gradually becoming paraplectenchymatous toward outside. **Lower cortex** paraplectenchymatous.

APOTHECIA usually rare, < 2 mm diam. Spores 15-18 x 7-9 μ m.

PYCNIIDIA sparse.

CHEMISTRY: Medulla K-. Atranorin.

ECOLOGY AND DISTRIBUTION: Common on base-rich bark (deciduous or sometimes conifer) in exposed areas and along roadsides, and on rock (siliceous or calcareous), or concrete; especially near the ocean or in riparian areas, but also well away from water, low to mid elevations. Northern (throughout boreal Canada), SE to Great Lakes states and Appalachians, and throughout the areas west of the Rockies except Great Basin, S to California.

NOTES: The species is rather variable, and sometimes difficult to distinguish from P. tenella, but the latter tends to have narrower, more appressed lobes, as well as the different type of soralia.

Excluded

Thallus orbicular to irregular, sometimes confluent with other thalli, to 5 cm diam., \pm loosely adnate; upper side whitish gray to cream-colored, without pruina, occasionally with a weak maculation. thallus usually less than 150 μ m thick and fragile. Lobes radiating, flat to almost concave, truncate and sinuous, to 1.5 m wide but usually narrower, distinctly separate or sometimes overlapping, tips often ascending. Soralia absent. underside white to pale graphite gray, rhizines concolorous. Upper cortex paraplectenchymatous, lower cortex prosoplectenchymatous, in lower parts turning \pm paraplectenchymatous and thick-walled, usually well delimited from the medulla. Apothecia abundant, variable in size, to 2 mm diam. but usually ca. 1 mm, margin \pm thick (c. 0.2 mm) and weakly crenulate; disc brown to black, rarely pruinose. Spores Pachysporaria-type, (19.5-)22-27.5(-32) \times (8.5-)10-13(-16) μ m. Pycnidia sparse to common. Medulla K+ yellow. Zeorin, occasionally also leucotylin or other triterpenes. Mainly corticolous, in open forests or on solitary trees; also on rocks in \pm exposed sites. South America.

Literature

Coppins, B. J. 1992. Physcia. In: Purvis, et al., Lichen Flora of Great Britain and Ireland.

Esslinger, T. L. and R. S. Egan. 1996. A new species of the lichen genus Physcia (lichen-forming Ascomycota) from Texas. The Bryologist 99: 331-334.

Rogers, 19 . Genera of Australian Lichens.

Thomson, J. W. 1963. Physcia in N. America.

etc. (see bibliography with key to segregate genera)