

**Phaeophyscia** Moberg  
(LECANORALES: PYXINACEAE)

After Esslinger (1978)

Rev. 5/94

Thallus foliose, lobed, to  $\pm$  fruticose; loosely adnate; lobes often radiating, short or usually elongate, mostly under 1.5 mm wide; upper surface usually rather dark or deeply pigmented,  $\pm$  brown (grayish to greenish or blackish), or sometimes whitish to gray but cortex always K (without atranorin), usually epruinose, matt, not or only weakly maculate, without marginal cilia, sometimes with hyaline cortical hairs on upper surface. Upper and lower cortex paraplectenchymatous (lumina rounded, ca. 37  $\mu$ m wide), lobes (0.05)0.21.5 mm wide, mostly readily detached from substratum; lower surface often dark brown to black, or if pale then thallus loosely attached and often  $\pm$  shrubby; attached to substrate by simple rhizines; rhizines dark or pale, sometimes very abundant, sometimes projecting beyond the margins. Soredia or isidia often present.

Apothecia laminal,  $\pm$  sessile; disk round; thalloid exciple well developed, often with rhizines on lower surface; disk black or brown, epruinose; thalline exciple smooth, rarely lobulate; hypothecium hyaline; hymenium colorless; epihymenium brown; paraphyses unbranched or somewhat branched (forked above), slender; apices clavate, pale brown with a thin dark brown cap; asci cylindrical to cylindrical-clavate, unitunicate, I+ blue; tholus I+ blue, Lecanoratype; spores 8, ellipsoid, 1-septate, brown, thickwalled.

Pycnidial immersed or partly immersed; wall colorless except for brown zone around ostiole; conidiogenous cells arranged in branched chains, short cylindrical, enteroblastic, acrogenous or pleurogenous (endobasidial according to Rogers); pycnospores minute (under 4  $\mu$ m long), ellipsoid.

Cortex K, without atranorin; some species with yellow to orangered K+ purple pigments (skyrin), or zeorin, leucotylin, or emodin. Photobiont Trebouxia. On bark, soil or rock, on nutrient-rich or enriched substrata in well-lit situations.

Differs from Physcia in that the upper cortex is  $\pm$  brown, without atranorin, conidia are ellipsoid and shorter, excipular cortex usually with rhizines, thallus often with hairs, and lower side more often dark and always with a paraplectenchymatous lower cortex.

1. Lobes mostly 24(5.5) mm broad, flat to more often somewhat concave, especially near the upturned lobe tips; thalli relatively large, at least 24 cm across (sometimes to 1014 cm), usually with numerous, long (often 2 mm or more) black rhizines on the lower surface and projecting outward and often upward from the margin; with or without soredia or isidia. Soralia, if present, round, capitate and submarginal (ssp. hispidula) or marginal and granular to isidioid or lacking (ssp. limbata Poelt); also sometimes laminal. Lower surface black. Upper surface greenish mineral gray to graybrown or brown, usually matt. Thallus adnate, orbicular to irregular. No substances. Apothecia rare, to 2 mm diam.; spores 2227 x 813 um, Physciatype. Pycnidia rare; pyncospores 24 x 1 um. Usually on trees, in open forests, less often on mossy rocks. Rather rare in the east (Great Lakes area to New England); common in the western states (Arizona and New Mexico, north in the Rockies to western S. Dakota); also present in southern Alberta and SW British Columbia. ....P. hispidula

1. Lobes mostly less than 1.5 mm broad (rarely to 3 mm), more or less flat or occasionally somewhat concave; thalli relatively small (mostly less than 5 cm, rarely up to 10 cm), lower surface with few to many rhizines (mostly 1 mm or less) which are seldom conspicuous from above (exceptions: P. pusilloides, P. kairamoi). .....2

2. Thallus without soredia, isidia or lobules, primarily sexual (fertile) species. .... Key I.

2. Thallus bearing soredia, isidia or lobules, primarily asexual (sterile) species. .... Key II.

I. Without soredia, isidia or lobules

1. Lower surface dark brown to black, with fairly numerous black rhizines. .... 2

1. Lower surface white to pale tan or very pale brown, with sparse concolorous rhizines. .... 7

2. Apothecial margin and tips of margins of lobes with small, pale (rarely darkening) cortical hairs. Lobes 0.4-1.5 mm wide; upper surface dark graygreen to brownish gray, often verrucose. Apothecia usually present. On bark or wood (very rarely on rock). Great Lakes area to Appalachians and Ozarks, west to New Mexico and N.

Dakota. .... P.  
hirtella

2. Apothecial margin and lobe margins without pale cortical hairs (but dark rhizines often present around base of apothecia). .... 5

5. Medulla at least partly red-orange, K<sup>+</sup> red-violet (skyrin), and zeorin. .... 6

5. Medulla white, usually without zeorin (except in P. decolor). .... 8

6. Ascospores with rounded to elongate lumina and relatively thick walls (Pachysporariatype). Thallus irregular to orbicular, ± adpressed; upper surface gray brown to ± dark brown, ± shining. Lobes radiating, 0.3-0.5(1) mm wide, plane or weakly convex, ± overlapping. Underside black except for the pale extreme lobe tips, with black rhizines which slightly project beyond the lobe margins. Medulla loosely interwoven. Apothecia ± abundant, to 1.5 mm diam.; margins crenulate or lobulate. Spores 2228 x 913 um. Pycnidia ± abundant; pycnosporangia 24 x 1 um. On rocks and mosses over rocks, SE Arizona, rare. .... P.  
endococcinodes

6. Ascospores with angular to somewhat rounded (but generally broader than long) lumina and thinner side walls (Physciatype). .... 7

7. Amphithecial cortex of smaller cells, 37(10) um in diameter; lobes flat, ca. 1 mm broad, gray or graybrown; on bark or on mosses over rock. Spores 2025(28) x 9/512(13) um. .... P. erythrocardia

7. Amphithecial cortex of larger cells, 612(15) um in diameter; lobes flat to weakly convex, mostly 0.5 mm broad or less, ± dark brown. On rock. Spores 1824 x 812 um. Not in N. America. (All N.

American material is P. decolor (see below) or misidentifications of P. endococcinodes) ..... [P. endococcina s. str.]

**8. Amphithecial cortex of smaller cells, 36(8) um in diameter; lobes flat, mostly 0.5-1.5 mm broad (some forms only ca. 0.2-0.3 mm); upper surface gray or gray brown, to dark graygreen; on bark or mosses over rock, rarely on rock. Thallus often verrucose. Apothecia usually present.** On deciduous trees (especially aspens), in open woods and along roads. Mostly eastern (southcentral to southeastern Canada, southward except in the coastal plain), and southwestern (southern Arizona and New Mexico). ..... P. ciliata (Hoffm.) Moberg

**8. Amphithecial cortex of large cells, 610(12) um in diameter; lobes flat to weakly convex, mostly 0.5 mm broad or less; upper surface usually dark brown; on rock. Thallus not verrucose. Apothecia common (according to Hale; absent in most of the material I have seen).** Containing zeorin. Spores 1824 x 812 um. On rocks in fairly exposed areas (but often in rather shaded crevices in my experience) at higher elevations. Apparently very common in the West (SW Canada south to California, and in the Rocky Mountains south to Arizona and New Mexico), but seems to be often small and depauperate and one cannot always be sure if it is identified correctly. (Moberg lumps this under P. endococcina, but Esslinger and Hale accept it as a separate species, and I am inclined to also accept it, at least as a subspecies, partly because it seems to have a different distribution than the orange medulla form) ..... P. decolor

**9. Thallus of numerous, crowded ("turflike"), long and narrow, mostly ascending lobes (thallus as a whole adnate to loosely attached); generally on soil or mosses in arctic or alpine localities.** Thallus 37 cm broad; lobes 11.5 mm wide; lower surface tan to buff; marginal rhizines sometimes projecting out from upturned lobe tips. Upper surface light brownish gray. Apothecia rare. No substances. In open areas, Alberta south to eastern Oregon and NW Colorado. .... P. constipata

**9. Thallus prostrate and adnate; generally on bark, at lower latitudes or altitudes.**

.....10

**10. Lower cortex paraplectenchymatous; eastern.** Lobes rather elongate, strapshaped; upper surface faintly but distinctly maculate throughout; lower surface pale. Apothecia short stipitate; margin entire to weakly crenate, without lobules; excipular rhizines few. Spores Physciatype, 1823 x 810.5 um. On

bark, very rare, southern Ohio and

Illinois. .... P. leana

**10. Lower cortex prosoplectenchymatous; western.**

Rare. .... (Physciella nepalensis)

## II. With Soredia, Isidia, or Lobules

1. Medulla usually bright redorange, K+ violet, with skyrin (rhodophyscin) but some lobes can have a white medulla. Lobes less than 1 mm broad; soredia marginal, apical, or less frequently laminal. Upper surface light greenish gray, or more commonly light grayish brown to light or medium grayish yellowish brown. Lower surface shiny black and not fibrous; lower surface of lobe tips sometimes brownish. Common on tree bark of all kinds, eastern (Great Lakes area). ..... P. rubropulchra (Degel.) Essl.

1. Medulla white. .... 2

2. Thallus with many small, ± erect, rounded or irregular lobules, primarily on the lobe margins. Lobes rounded, irregular, somewhat imbricate. Upper surface shiny or becoming white pruinose in part, usually gray or greenish gray, but can be slightly brownish. Lower surface dark at center, whitish toward tips, densely rhizinate. Thallus adnate, 48 cm broad. No substances. Apothecia rare. On mossy rocks or on trees (especially bases, and over moss), in mature forests, common. Eastern (Great Lakes area eastward and southward, except coastal plain). [If the lobules are poorly developed it might be mistaken for P. ciliata, which has a black lower surface and is more appressed. .... P. imbricata

2. Thallus with soredia, isidioid soredia or isidia. .... 3

3. Thallus with small, pale (or occasionally darkening) cortical hairs, especially on young lobe tips, on apothecial margins or (in P. kairamoi) on the isidia or soredia. .... 4

3. Thallus without cortical hairs. .... 6

4. Soralia mainly marginal, with very granular isidioid soredia, isidia or lobules, which bear sparse pale or darkening hairs. Thallus irregular, ± loosely adnate; lobes radiating, very variable in width (to 3 mm). Upper side brown to dark brown. Underside black with long, black rhizines which often project several mm beyond lobe margins. On ± dry, calcareous soils (loess), or on basalt rocks having some visible influence of guano or nutrient dust, usually growing over and among mosses and other lichens, including other physcioids. Alberta to SE Canada, south to Great Lakes states and S. Dakota, with disjunct in SE Arizona. .... P. kairamoi

4. Soralia marginal or terminal, the soredia more finely granular, not isidioid and lacking hairs (with hairs in P.

**hirsuta** according to Hale & Cole). . . . . 5

**5. Soralia labriform, mostly terminal on somewhat upright lobes, occasionally also marginal.** Thallus closely adnate, 24 cm broad; lobes short and narrow, 0.51 mm wide, sorediate on margins and lower surface of tips; upper surface brownish mineral gray. Lower surface black, densely rhizinate. Apothecia rare, ca. 1 mm diam., with hairs around the rim. No substances or occasional trace of zeorin. On bark (e.g., oaks), North Dakota to New Mexico, and California to Texas, south in Mexico, sea level to 1000 ft. . . . . P. hirsuta

**5. Soralia strictly or mostly marginal, not labriform, usually distinctly elongate, rather inconspicuous.** Lobes narrow, ca. 1 mm across. Soredia coarsely granular. Upper surface light brownish to mineral gray. Thallus closely adnate, to 6 cm broad. Lower surface black, the rhizines not projecting out. Apothecia rare, the rim with hairs. No substances. On mossy rocks, or (usually?) on bark (sometimes over mosses) of hardwoods (ash, aspen, elm) and juniper, in open areas. Mostly eastern (Great Lakes area eastward and southward, except coastal plain, west to Arizona in the south). Often mixed with P. pusilloides. . . . . P. cernohorskyi (Ndv.) Essl.

**6. Lower surface dark brown to black throughout or at least in the older, central parts, sometimes very pale marginally; lower cortex paraplectenchymatous (see also P. nigricans and P. insignis, below).** . . . . . 7

**6. Lower surface white to tan or very pale brownish.** . . . . . 10

**7. Thallus with abundant, darkened, marginal or occasionally laminal or terminal, strongly isidioid soredia or isidia; lobes narrow, mostly less than 0.5(1) mm broad, appressed.** Thallus to 25 cm diam., often confluent, closely adnate (difficult to remove), radiating and rosetteforming, not at all shrubby. Upper surface dark to blackish mineral gray or brownish gray (often inconspicuous against the substrate), sometimes becoming white pruinose. Lower surface black, moderately rhizinate; rhizines black, rarely projecting beyond margins. Lobes ± flat. Apothecia rare. No substances. Usually on ± manured, exposed rocks (siliceous or ultramafic), especially near lakes and streams or on the seashore; also on moss over rock. Great Lakes area to SE Canada and New England; Pacific NW south in the Rockies to Arizona and New Mexico. . . . . P. sciastra

**7. Thallus with finely granular to weakly isidioid soredia;**

lobes mostly broader than 0.5 mm. .... 8

8. *Soralia capitate*, small, orbicular, primarily terminal on main lobes or on small lateral lobes, often appearing distinctly stipitate due to the ascending nature of the lobes, forming dark olive or yellowblack, almost spherical, farinose patches. Lobe margins and apothecia often ciliate or with fringes of projecting whitetipped rhizines. Thallus closely adnate, 13 cm broad; lobes ca. 0.5(1) mm wide, separate. Lower surface black and densely rhizinate. Apothecia rare. No substances. On bark or wood of hardwood trees in open woods. Eastern (southcentral to southeastern Canada, southward except in coastal plain), very common. .... *P. pusilloides* (Zahlbr.) Essl. 8. *Soralia marginal*, laminal or terminal, but not strongly capitate or stipitate. .... 9

9. *Soralia* primarily laminal and submarginal, + orbicular, rather discrete, the soredia mostly finely granular. Thallus + firmly adnate, 13 cm across, orbicular to irregular; lobes 12 mm wide, radiating. Lower surface brown to black; rhizines black. Upper surface greenish to brownish gray. On oaks and other broadleaf trees, and on + manured rocks, from near sea level to 5500 ft. Rather uncommon, in the western states (California to Washington) and east to Michigan. .... *P. orbicularis*

9. *Soralia* primarily terminal and marginal (but sometimes becoming rather diffuse on lobe surface and margins), the soredia coarsely granular to isidioid. Lobes 0.6-1.5 mm across, concave at tips; upper surface rather shiny and smooth, light greenish to brownish mineral gray. Thallus adnate, 36 cm broad. Lower surface black, densely rhizinate. Apothecia rare. No substances. Common at base of trees and on mossy rocks in closed woods. Eastern (Great Lakes area to New England, southward except coastal plain. .... *P. adiastrum*

10. Lobes very narrow and linear, mostly less than 0.3(0.4) mm broad, ascending, with sparse granular soredia or isidia on some lobe tips or margins; lower cortex paraplectenchymatous. Thallus to 1(2) cm diam., often + shrubby, usually confluent, loosely adnate. Upper surface graybrown. No substances. Apothecia infrequent, small; spores *Physciatype*, 16.5-20 x 7-10  $\mu$ m. In herbarium material lobe tips may be broken, making the specimens difficult to identify. Lower surface pale or brown, never black. Mainly corticolous (*Populus* or other broadleaved trees), but occasionally (e.g., in Greenland) on gneissic or more frequently basaltic rocks, + influenced by guano, usually in somewhat moist

situations. North Dakota to Colorado. .... P. nigricans

**10. Lobes broader, mostly over 0.4 mm broad, with discrete laminal, marginal or terminal soralia. .... 11**

**11. Lower cortex paraplectenchymatous.** Thallus orbicular, to 1(2) cm diam., often coalescing; upper surface gray to graybrown. Lobes flat, to 0.5 mm broad, ± appressed. Soralia laminal, usually round and weakly capitate, commonly as broad as or even slightly broader than the lobes (0.31 mm); soredia finely granular, 3050 µm diam. (dry). Lower surface ± pale, almost white in part to pale brown, occasionally darkening in part to almost black, with sparse, ± concolorous or darkening rhizines. Apothecia apparently rare, to 1 mm diam.; spores 1824 x 811 µm. Pycnidia rare. No substances. On bark and rock, Kentucky, Maryland, Missouri, South Carolina. .... P. insignis

**11. Lower cortex prosoplectenchymatous. ....** (see Physciella chloantha and Physciella melanchra)

## Literature

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

Esslinger, T. 19 . Phaeophyscia.

Galloway, D. 1985. Flora of New Zealand Lichens.

Rogers, 19 . Genera of Australian Lichens.