

Melanelia Essl.
(LECANORALES: PARMELIACEAE)

After Esslinger

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Thallus foliose, dorsiventral, heteromerous, lobed, radiate, loosely to moderately adnate; rhizines simple or rarely branched towards tips; lobes short and rotund or elongate, 0.4-11.0 mm broad, \pm flat; cortex paraplectenchymatous, brown; upper surface olive green to brown or almost black, N-, commonly sorediate or isidiate. Nonpored epicortex present; pseudocyphellae punctiform on upper surface (often on papillae or tips of isidia) or absent. Cell walls containing isolichenan.

Apothecia laminal, sessile to substipitate, eperforate; disk concave, round; margin thalloid, entire, flexuose at first, entire to variously notched and incised or crenulate with age, concolorous with thallus; hypothecium pale; paraphyses branched; asci clavate, unitunicate, I+ blue; tholus I+ blue; spores 8 (rarely more--M. multispora), ellipsoid (7-13 x 4-7 μ m), simple, hyaline, thin walled.

Pycnidia immersed; fulcrum endobasidial; pycnospores bifusiform, cylindrical-bacilliform, or fusiform (6-10 x 1 μ m). Cortex K-, KC-, without acetone-soluble substances; medulla with orcinol depsides, β -orcinol depsidones, aliphatic acids, anthraquinones. Photobiont Trebouxia. On bark, wood, soil, or rock, on bark or rock, or sometimes overgrowing mosses. Temperate to boreal-arctic. Type species: M. substygia.

A segregate from Parmelia, characterized by the brown upper cortex (N-) which is commonly pseudocyphellate in part or bears cortical hairs, and the isolichenan in the cell walls. Neofuscelia differs in having an N+ blue-green (or violet) cortex, lacking isolichenan, and lacking pseudocyphellae.

I. Thallus with isidia
(sometimes pustular and fragmenting into soredioid masses)
Medulla K- or very faint.

1. Medulla P+ red-orange, with fumarprotocetraric and protocetraric acids. Thallus appressed or sometimes reflexed at periphery, loosely adnate, 1-5(-8) cm diam.; lobes 1-4(-6) mm broad, \pm flat, short and rounded to somewhat elongate, contiguous or imbricate; upper surface olive brown to darker reddish brown, \pm smooth to weakly and irregularly pitted or wrinkled, especially on lobe ends, dull to slightly shiny especially near periphery, commonly pruinose. Soralia laminal, punctiform, often very small, scattered and distinct or becoming \pm confluent in central parts of some thalli; soralia granular to strongly isidioid, brown to dark brown

or black-brown (sometimes abraded and then appearing whitish), occasionally virtually as single, strongly isidioid soredia. Lower surface dark brown to blackish, smooth to lightly wrinkled, dull or often rather shiny, especially at periphery; moderately rhizinate; rhizines \pm concolorous, to 0.5 mm long. Apothecia rare. Usually on bark. Alaska to Alberta.M. olivaceoides

1. Medulla P-.2

2. Medulla C+ red (lecanoric acid). Upper cortex without hairs. Lower surface moderately rhizinate. Northern and western U.S. and Canada, S to California.3

2. Medulla C-.4

3. Isidia fine, 0.1-0.25(-0.4) mm long and 0.02-0.06 mm diam., seldom branched, easily abraded, leaving a white area when rubbed; soredia also usually present. Without other substances; medulla white, K-. Thallus rather closely adnate, 4-8 cm broad; upper surface chestnut brown with a white cast; lower surface light brown or blackening. Soredia diffuse over most of upper surface. Apothecia rare. Usually on bark or wood. Very common, in open forests and along roads. Great Lakes to New England and Appalachians, SW Canada to California, Idaho, Montana. M. subaurifera

3. Isidia larger, mostly 0.2-1 mm long and 0.05-0.1 mm diam., often branched; soredia never present (but cortex sometimes eroded around the isidia and resembling soralia). With unknown TE-12; medulla often with orange areas containing rhodophyscin (K+). Thallus appressed throughout or somewhat reflexed at periphery, loosely to moderately adnate, 2-7(-10) cm broad; upper surface pale olive green, olive brown, reddish brown, dark brown or blackening; lower surface dark brown to black, somewhat paler near periphery. Apothecia frequent. On bark or rock, southern coastal Alaska to southern California, east to S. Dakota and Colorado; Great Lakes to new England, S to N. Carolina. M. fuliginosa

4. Isidia cylindrical.5

4. Isidia not distinctly cylindrical when mature (see also M. subelegantula).7

5. Isidia arising as small conical to hemispherical papillae with (sometimes obscure) pseudocypbellae at the tips, when mature often with lateral branches. Thallus adnate, 3-8 cm broad; upper side of thallus often pruinose (appearing slightly bluish); lower surface brown or blackening. Apothecia rare. On bark, \pm sheltered rock, or mosses or soil over rock. Boreal, arctic and montane areas throughout much of N. AmericaM. elegantula

5. Isidia arising as small spherical to hemispherical papillae without

pseudocyphellae at the tips, when mature simple or \pm isotomically branched. 6

6. Isidia 0.2-1(-2) mm long and 0.07-0.12 mm diam., upright or prostrate but not at all dorsiventral. On rock. Thallus \pm appressed throughout, moderately to loosely adnate, 2-7(-10 cm diam.; lobes 1-4(-6) mm broad, 60-125(-180) μ m thick, \pm flat to slightly convex, short and rounded or rather frequently rather elongate and slightly sinuous, discrete to contiguous or subimbricate. Upper surface pale olive green to more often dark red-brown, occasionally somewhat blackish, smooth and flat to shallowly and irregularly pitted, usually rather dull, occasionally distinctly shiny, especially on lobe ends, frequently somewhat pruinose; sparsely to somewhat densely isidiate. Lower surface often dark brown to black, generally paler near lobe ends, sometimes mottled throughout, smooth or irregularly wrinkled or weakly trabeculate, often appearing weakly channelled (due to turned down lobe margins), dull to slightly shiny in part, moderately to sparsely rhizinate; rhizines concolorous or paler, to ca. 1(-1.5) mm long. Apothecia unknown. On rock. Arctic-boreal, S to Colorado, S. Dakota, Great Lakes reigon, and New England.M. infumata

6. Isidia 0.1-0.3 mm long and 0.03-0.07 mm diam., in older parts often growing into distinctly dorsiventral lobules. Almost always on bark. Thallus \pm appressed throughout or slightly raised at periphery, loosely to moderately adnate, 3-7(-9.5) cm diam.; lobes 1-3 mm broad, 50-90 μ m thick, \pm flat, short to somewhat elongate, subdiscrete to \pm imbricate, often lacinate. Upper surface olive brown or often rather reddish brown, usually distinctly paler and more olive green at periphery, \pm smooth to weakly and irregularly pitted on lobe ends, inward becoming somewhat rugulose; rather shiny at periphery, \pm dull inward, sometimes lightly pruinose. Lower surface dark brown or black, paler at periphery, \pm smooth to irregularly wrinkled, dull to rather shiny, moderately rhizinate; rhizines concolorous or pale, to almost 1 mm long. Apothecia infrequent. Temperate, western (southern Alberta and British Columbia to central California).

.....M. subelegantula

7. "Isidia" arising near the thallus periphery as small spherical papillae, sometimes elongating slightly but very soon growing into small, loosely to often very tightly imbricate lobules and \pm covering the thallus. On rock. Forms with elongate, finger-like lobules on upper surface closely resemble Allantoparmelia almquistii, which has a pale lower surface without rhizines and a C+ rose or red medulla (olivetic acid). Boreal-arctic, S to California. M. panniformis

7. Isidia not growing into imbricate lobules. Mostly on

bark.8

8. Isidia mostly compressed-clavate to spatulate, inflated; P- (no substances). Thallus adnate, 3-6 cm broad; upper surface shiny, plane; lower surface black, moderately rhizinate. Apothecia rare. On trees in open woods and on sheltered rocks. Northern and western, SW Canada to California and central Rockies; northern Great Lakes area.M. exasperatula

8. "Isidia" ± granular, mostly strongly darkened and clustered (isidioid soredia), P+ or P- (with or without fumarprotocetraric & protocetraric acids). Alaska to Alberta. (see M. olivaceoides)

II. Thallus with soredia or with both soredia and isidia.

1. **Medulla C+ rose or red.**2

1. **Medulla C-.**5

2. Soralia marginal and strongly labriform. Thallus appressed throughout or somewhat reflexed at periphery, moderately to loosely adnate, 3-9 cm diam.; lobes 2-4 mm broad, 100-220 μ m thick, \pm flat, short and rounded to slightly elongate, discrete to subimbricate. Upper surface olive brown to darker reddish brown, smooth to weakly pitted at periphery, inward often becoming coarsely rugose; dull or often rather shiny near lobe ends, occasionally with scattered cortical hairs, especially on lobe margins; soralia numerous; soredia granular, whitish to brown and becoming slightly isidioid; lower surface black, generally paler toward periphery, \pm smooth to weakly rugulose, mostly dull, moderately rhizinate; rhizines concolorous, to 1.2 mm long. Apothecia unknown. Containing lecanoric acid. Usually on bark of deciduous trees. West-central Canada S to Colorado and Minnesota.M. albertana

2. Soralia laminal or both laminal and marginal, not strongly labriform.3

3. Upper surface usually with distinctive, prominent pseudocyphellae. With gyrophoric acid and unknowns WG-1 & WG-2.

Thallus closely adnate, 3-8 cm broad; upper surface shiny, dark brown; lower surface black, sparsely rhizinate. Apothecia rare. Usually on boulders or rock outcrops, rarely on wood, in open areas. Western N. America (SW Canada to California, and south through the Rockies to Mexico; western Great Lakes Region.M. substygia

3. Upper surface without pseudocyphellae or with only very obscure pseudocyphellae (little more than slightly roughened spots on the cortex). With lecanoric acid only. Primarily on bark. Apothecia rare.4

4. Soralia laminal, arising from flat areas (small, obscure pseudocyphellae, or dissolving parts of cortex); soredia farinose to granular or isidioid, often with true isidia developing within and between soralia; cortical hairs absent; upper surface rarely pruinose. Northern and western, S to California.

..... (M. subaurifera)

4. Soralia laminal and marginal, the laminal ones arising largely from small, slightly protruding, \pm hemispherical pustules (by dissolving of cortex); soredia granular or isidioid, no true isidia present; cortical hairs usually present at least on some lobe ends; upper surface commonly \pm abundantly

pruinose at least on some lobe margins or ends. Thallus adnate, 6-12 cm broad; lobes rotund; upper surface chestnut brown to olive brown (or sometimes paler and grayish, at least in occasional forms on shaded rock); lower surface with moderate to dense rhizines. Rather common on trees in open woods and swamps, less so on rocks. Western (British Columbia to California, Arizona and New Mexico; absent in Great Basin), east to western Great Lakes Region.M. subargentifera

5. Medulla P+ red (fumarprotocetraric and protocetraric) or P- (no substances); lobes without pseudocyphellae; soralia laminal, punctiform. Almost always on bark. Alaska to Alberta. (M. olivaceoides)

5. Medulla P-, with perlatoric and stenosporic acids; almost always on rock. 6

6. Upper surface often rather shiny, with obscure to distinctive submarginal pseudocyphellae; soralia laminal and submarginal, punctiform to rather strongly capitate and stipitate, arising in part from the pseudocyphellae. Lobes usually rather short and crowded to imbricate, often broadened and flabellate at the tip, 100-240 um thick. Thallus closely adnate, 2-4 cm broad; lobes 0.5-1 mm wide, crowded; soralia mostly toward center of thallus; lower surface dark brown to black. Apothecia lacking. Common on rocks, ledges, and stone walls in open woods. Northern and western, SW Canada S to California and Arizona and New Mexico (absent from Great Basin); Great Lakes area to New England.M. granulosa

6. Upper surface usually rather dull, without pseudocyphellae; soralia primarily terminal on the primary lobes and/or on small, often \pm erect, lateral branches, arising by gradual dissolution of the cortex. Lobes usually \pm linear or sublinear and discrete, seldom broadened at tip, 75-130 um thick. Thallus closely adnate, 2-4 cm broad; lobes ca. 0.5 mm wide; upper surface dark brown, weakly foveolate, matt; lower surface dark brown. Apothecia lacking. Common on acidic rocks in ledges and stone walls. Boreal. Great Lakes area to New England; British Columbia to California and central Rockies.M. soredata

III. Thallus without isidia or soredia.

1. Medulla P+ orange (if lower cortex without rhizines, see *Allantoparmelia alpicola*).2

1. Medulla P-.6

2. Medulla K+ yellow then red, with norstictic acid. Lobes 0.5-1.5 mm broad, brown; lower side with distinct trabeculae (plates) and strong veins \pm throughout, giving a reticulate appearance. Spores mostly 16-32 per ascus. Thallus appressed to slightly pulvinate, moderately to loosely adnate, 1-7 cm diam.; lobes 0.5-1.5 mm broad, (60-)80-140(-200) μ m thick, flat to slightly convex, somewhat elongate and irregular, contiguous to imbricate or loosely entangled. Upper surface gray brown to olive brown or rather dark brown, smooth or weakly pitted or wrinkled, occasionally rather strongly papillate and/or lobulate; dull to distinctly shiny, sometimes somewhat pruinose; papillae sometimes well developed and resembling isidia prior to development into lobules; pseudocyphellae usually present on papillae but not elsewhere. Lower surface very pale tan to dark brown or black, darkening especially between the veins, dull to somewhat shiny; moderately rhizinate; rhizines \pm concolorous, to 1.2 mm long. Apothecia common, sessile to very short stipitate, concave or flattening to irregularly convex, to 4(-7) mm diam.; margin entire, soon crenate to rather strongly papillate or tuberculate. On bark, boreal, across Canada and Alaska.*M. trabeculata*

2. Medulla K- or K+ dingy orange or reddish brown; with fumarprotocetraric and/or protocetraric acids. Lower side without trabeculae. Spores 8 per ascus.3

3. On exposed rocks. Lobes with rather numerous, distinctive, usually prominent, pseudocyphellae; upper cortex thick (30-50 μ m) and somewhat cartilaginous. Thallus adnate, 4-7 cm broad; upper surface shiny, dark brown; lower surface dark brown to black, with sparse laminal and/or marginal rhizines. Containing both fumarprotocetraric and protocetraric acids. Apothecia not common. Can be confused with occasional non-sorediate forms of *P. substygia*, which can be distinguished by their C+ rose, P- medullary reactions (gyrophoric acid). Arctic-boreal and alpine, south to Washington, Idaho and Montana in the west, to southern Appalachians in the east.*M. stygia*

3. Primarily on bark. Lobes without pseudocyphellae or with numerous small and \pm flecklike pseudocyphellae; upper cortex thinner (less than 30 μ m) and not cartilaginous.4

4. Medulla usually K+ yellow turning dingy orange or reddish brown (K-, with fumarprotocetraric acid, according to Hale, 1979!). Upper surface of thallus often becoming warted and

lobulate. Spores 15-20 x 8-12.5 um. Thallus closely adnate, 3-6 cm broad; lobes rather narrow and becoming dissected or lobulate, ca. 1 mm wide; upper surface shiny, becoming wrinkled with age; lower surface dark brown to black, sparsely rhizinate. Apothecia common, small. Common on hardwoods, especially maple, in open woods. Northeastern (Great Lakes to New England), S to Tennessee; frequent in the Appalachians.M. halei

4. Medulla usually K- (rarely K+ dingy orange), with fumarprotocetraric acid. Upper surface of thallus smooth to rugose, seldom lobulate. Spores 9-16 x 5.5-9 um.
.....5

5. Lower surface black. Thallus large, 2-9(-14) cm diam.; lobes mostly 2-6 mm broad, often with numerous pseudocyphellae; apothecia mostly central, up to 9 mm diam.; margin thick; hymenium 52-72 um thick, subhymenium 36-80 um thick; spores mostly 11-16 x 6-9 um. Thallus adnate, 3-7 cm broad; upper surface brown to greenish olive brown; lower surface sparsely rhizinate. Apothecia very common. Common on deciduous trees and conifers in open woods, especially in the northern Great Lakes area; also east to New England, and in Alaska.M. olivacea

5. Lower surface tan to light brown, rarely darkening. Thallus smaller, 1-5(-7) cm diam.; lobes mostly 1-3 mm broad; pseudocyphellae usually sparse or absent; apothecia often common up to thallus periphery, up to 3(-5) mm diam.; margin thin; hymenium 52-78 um thick; subhymenium 8-35(-45) um thick; spores mostly 9-13 x 5.5-8.5 um. Thallus closely adnate, 2-6 cm broad; upper surface brown to olive or greenish brown; lower surface moderately rhizinate. Apothecia numerous. Common on trees (especially alder, birch and aspen, in open woods. Arctic, SE to Great Lakes area (where it is especially common) and New England.

.....M. septentrionalis

6. Medulla C+ red, with lecanoric acid. Upper surface of lobes without pseudocyphellae, or in M. glabra sometimes with pseudocyphellae on scattered tubercles; without orange areas and rhodophyscin in medulla; cortical hairs present or absent (if rhizines absent, see Allantoparmelia almquistii).7

6. Medulla C-, KC- or faint dingy rose; not subcrustose; rhizines present. [Note: pollution-damaged specimens of M. glabra from southern California may have a weak or spotty reaction with C and thus key out here]. 8

7. Almost always on bark. Cortical hairs usually present, at least on lobe ends and apothecial margins. Lobes smooth to irregularly pitted; thallus usually ± rosette forming; apothecia common. Thallus

adnate, 4-7 cm broad; lobes rather broad, 2-4 mm wide, sometimes hidden by apothecia; upper surface chestnut brown (paler and greenish in pollution-damaged forms in southern California); lower surface dark brown or blackening. Very common on oaks and alders, in California.M. glabra

7. On rock. Without cortical hairs. Lobes often rather strongly reticulately ridged and pitted; thallus often much divided and irregularly pulvinate; apothecia rare. Thallus appressed to pulvinate, moderately to loosely adnate, 2-8(-11) cm diam.; lobes 2-3(-5) mm broad; upper surface olive green to brown or reddish brown; lower surface generally black, sometimes paler on lobe ends. Rather rare. Western U.S. (California, Colorado, Washington).

.....M. glabroides

8. Thallus (at least in center) bearing numerous small, ± tightly packed and regularly imbricate lobules or folioles; pseudocyphellae absent or very obscure (if pseudocyphellae conspicuous, see M. stygia). Lower surface black; lobules usually distinctly longer than broad, ± linear. With perlatic and stenosporic acids. Boreal-Arctic, S to California.M. panniformis

8. Thallus not regularly lobulate or foliolate; not panniform; appressed to somewhat pulvinate.9

9. Upper surface with numerous small, ± conical papillae evenly distributed over the upper surface and bearing pseudocyphellae at the tip. Thallus closely adnate, 2-4 cm broad; upper surface dark brown; lower surface dark brown to black, moderately rhizinate. Apothecia common; margins with warty papillae like those on thallus. On branches and trunks of trees in open woods, widespread but never abundant, throughout Eastern temperate N. America, most frequent in the SE but absent from the SE coastal plain.M. exasperata

9. Upper surface smooth or irregularly papillate or rugose.10

10. On rock. Pseudocyphellae conspicuous. Containing fatty acids. [If medulla C+ rose, see M. substygia]. (P- strain of M. stygia)

10. On bark. Pseudocyphellae absent or obscure. Thallus moderately to loosely adnate, sometimes somewhat raised at periphery. Apothecia common. Although the next two species can often be distinguished by external appearance when well developed, determining spore number is usually necessary.11

11. Spores 12-32 per ascus. Thallus rather thin, 60-120(-180) um thick, rather closely appressed often with few to many lobules developing in older parts, 1-7 cm diam.; lobes 1-3(-4) mm broad, flat,

short and rounded to somewhat elongate and angular, discrete to contiguous or subimbricate; upper surface olive-brown to dark reddish brown, smooth to weakly rugose or pitted at periphery, inward usually more so, occasionally with scattered papillae or tubercles, dull throughout or slightly shiny at periphery, occasionally pruinose in scattered areas; sometimes with pseudocyphellae on the occasional tubercles. Lower surface dark brown to black, sometimes pale tan at periphery or rarely throughout, smooth to distinctly rugulose or weakly trabeculate, usually somewhat shiny, moderately to densely rhizinate; rhizines \pm concolorous, to 1.2 mm long. Apothecia sessile, concave to flat or somewhat convex with age, to 4 mm diam.; margin entire to tuberculate, the tubercles usually pseudocyphellate. California to Alaska.M. multispora

11. Spores 8 per ascus. Thallus thicker, (60-)80-170(-250) μ m, closely adnate (but less so than in M. multispora), without lobules, 2-8(-11) cm broad; lobes (1-)2-6(-10) mm broad, \pm flat, short and rounded, \pm contiguous to imbricate; upper surface olive-brown to dark brown (paler and greenish in pollution-damaged forms in southern California), smooth to weakly rugose near periphery, inward becoming more strongly rugose and often grossly so, sometimes with isidioid papillae or tubercles, these verging on true isidia in extreme cases, matt throughout or somewhat shiny on lobes; pseudocyphellae occasionally rather numerous but even then small and rather obscure, but often distinctive when occurring on tubercles; lower surface dark brown to black, pale brown to tan at periphery or occasionally \pm throughout, smooth to rugulose, dull to rather shiny, moderately to rather densely rhizinate; rhizines concolorous or paler, to 1 mm long. Apothecia common, sessile to short stipitate, concave to flattening or sometimes convex, to 5 mm diam.; margin entire to more often crenate or tuberculate, often with rather numerous pseudocyphellae, especially on the tubercles. Very common on conifers and other trees in open woods and along roads. Western N. America (SW Canada throughout most of U.S. west of Rockies, to Mexico), and Michigan. M. subolivacea

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