

Lobothallia (Clauz. & Roux) Hafellner

After various authors

[especially Zahlbruckner (1930), Lindau (1923), Poelt (19)]

Rev. 5/94

This is a segregate from Aspicilia, characterized by the distinctly lobed thallus, simple (and always nonmoniliform) paraphyses, usually brown, N epihymenium, and small spores. Although some species presently retained under Aspicilia have some of the same features, none of them are distinctly lobate, and the species of Aspicilia that are distinctly lobate have a green, N+ green epihymenium and branched, often monilliform paraphyses.

Although potentially a lot less hopeless than Aspicilia itself (especially if you assume that there are only four species in N. America, as I've done in this preliminary version), at present it is a mess.

THALLUS crustose, thick, more or less clearly lobate at margin (to squamulosesubfruticose in one species), usually thick; **thallus center** continuous to usually distinctly rimoseareolate, areolate or verrucoseareolate, without papillae, not chalky; **lobes** plane to convex, broadly attached or almost free and becoming stipitate, crowded and squamulelike; **upper surface** pure gray to whitish, brownish, or blackish, or yellowish brown to clay colored; **upper cortex** composed of thinwalled, mostly distinctly celllike hyphae; **medulla** hyphae more or less thinwalled, but strongly swollen; **lower cortex** absent, or present in cases where lobes are ascending and lifted off the substrate.

APOTHECIA immersed to appressed sessile, rarely constricted sessile; Discs often reddish brown, to black; **hymenium** mediumhigh to high; alphoplacatype or melanaspistype; **paraphyses** mostly lax, alphoplacatype or melanaspistype; almost always unbranched, not moniliform, the cells convex only in the upper part; tips pigmented; **epihymenium** diffuse brownish green to reddish brown, N or N+ slightly greenish, rarely N+ more intense green, not interspersed; **asci** long clavate to cylindrical; **spores** short ellipsoid to long ellipsoid, small (1015 x 68 um), thinwalled.

SPERMOGONIA Cladoniatype; **spermatia** short bacilliform.

SPOT TESTS AND CHEMISTRY: Thallus often K+ red; **cortex** with norstictic acid or without lichen substances; **medulla** with norstictic acid, or without lichen substances; terpenes absent.

DISTRIBUTION AND ECOLOGY: On calcareous or siliceous

rocks. Eurasia; western North America; etc.

Key to Species

1. Apothecia sunken; discs at first almost urceolate, then plane. Lobes confluent, forming a radiateplicat margin. Discs brownish black to almost black, mostly densely crowded in thallus center; margin thin, entire. Spores 1115 x 6.58.5 um. Thallus tightly attached throughout, orbicular, confluent, often very large, in the center wartyrimose; upper surface gray or graywhite; lobes rounded, plane or convex. Apothecia rather small. On limestone or siliceous stones and walls, rarely on wood. Extremely variable; numerous infraspecific taxa and segregate "species" have been described from Europe. Reports from N. American need to be confirmed. L. radiosa (incl. f. subcircularataK+ red)

1. Apothecia entirely sessile; discs plane, rarely somewhat convex. Lobes mostly distinct from each other and set off from the substrate. The next choice is often very difficult to make. 2

2. Lobes separated but not loose, convex to convexflattened, solid, closely appressed to sometimes somewhat imbricated; upper surface usually brownish gray. Apothecial margin often darkened; discs epruinose, often redbrown. Usually on rocks exposed to or containing some calcium. Usually K+ red, but sometimes K. Widely distributed and very common in arid or semiarid areas of western North America at low to moderate elevations. Extremely variable; numerous infraspecific taxa and segregate "species" have been described from Europe. L. praeradiosa s. lato

2. Lobes distinctly defined, convex, strongly swollen and + hollow, and well set off from the substrate, attached to it only by a few hapters; upper surface whitegray to dark gray, but often with cinnamon or ochraceousrosy tinges. Apothecial margin usually pale; discs pruinose or not, usually blackish. Usually on acidic rocks. Distribution various. 2

3. On wet (or at least periodically inundated) rocks. Thallus somewhat thin, upper surface ashy, gray or lead gray, much greener when wet, K. Apothecia small (0.81.5 mm); discs almost black, epruinose, plane to at least finally somewhat convex. Lobes much divided, swollen. Thallus almost orbicular, confluent, areolate or roughwarty in the center, at the margin radiatelobate. sessile, crowded in thallus center, the margins entire; spores 1113 x 810 um. Bchen, Alps, Arctic, rare. L. melanaspis

3. On dry, not inundated, rocks. Thallus somewhat thicker; upper surface usually whitish gray, unchanged when wet, K+ yellow then red; apothecia to 2.5 mm or more diameter, almost always gray or bluish pruinose, plane to convex. Otherwise the same as L. melanaspis. L. alphoplaca s. lato

Descriptions of Species

Lobothallia alphoplaca (Wahlenb. ex Ach.) Hafellner

Description compiled from the European literature

THALLUS rather irregularly and indistinctly rosetted, 0.50.7 mm or more thick; **thallus center** areolate; areoles to 1 mm diameter, more or less wrinkled, becoming verrucose on nitrogenrich rocks, often mixed with more or less elongated lobes; **lobes** usually very distinctly radiating, separate, very loosely attached to the substrate only by a few "haftpunkt", sometimes ascending, more or less imbricate, elongated, strongly convex or almost cylindrical (according to Migula, and Poelt), or plane or slightly convex? (according to ?), more or less richly incisedlobed; **prothallus** (according to Hoffman, et al., 1974) black; **upper surface** whitegray, ashy gray to grayrose or grayish brown, often somewhat ochrerosy, sometimes blackish at least toward center, much more rarely chalk white, never pruinose nor tinted green or yellow at the periphery (according to ?), sometimes white pruinose on margins (Hoffman, et al., 1974), not turning green when wet, smooth to wrinkled, sometimes shagreenlike (clayeybranny), knobby; **lower surface** darker or more brownish than upper surface.

APOTHECIA usually very numerous and crowded in thallus center, deformed by mutual compression, 0.41.5 mm diameter, semiimmersed (when youngHoffman, et al., 1974), soon sessile, becoming somewhat stalked (Migula, Poelt), or not projecting? (according to ?), to 2.5 mm or more in diameter; **discs** plane or convex, dark brown or black, often (usually?) pruinose, or sometimes epruinose (according to ?); **margin** entire, often rosy colored next to disc; **hypothecium** 3040 um (Hoffman, et al., 1974), hyaline; **hymenium** 7075 um (Hoffman, et al., 1974), alphoplacatype; **epihymenium** almost hyaline, or brown, N+ lightly greenish brown (without Aspiciliagreen); **paraphyses** alphoplacatype, 4.56 um thick [at least at tips?], distinctly moniliform, with somewhat swollen, oblong or subglobose cells; **asci** oblong; **spores** 8 per ascus, 1115 x 58 um (Ozenda & Clauzade).

SPERMOGONIA spermatia bacilliform, 67 um x 1 um (Migula, 19 ; Reichert & Galun, 19). **fulcra** sterigmata almost simple.

SPOT TESTS AND CHEMISTRY: thallus C; medulla K+ red, P+ orange. Norstictic acid reported by Asahina (1958b) from specimen from Japan, and mentioned by Hale (1957b); also reported by Hermann, et al. (1973) from Italy, Switzerland, Tirol, and the Karakorum RAnge, by TLC. Norstictic acid and constictic acid

(methylethersalazinic acid) reported by Eigler & Poelt (1965), from specimen from Tirol, by paper chromatography. Salazinic acid, two unidentified colorless substances (Zopf, 1907); salazinic acid also reported by Brieger (1923), Hesse (1912), Thies (1932) and Zopf (1907).

DISTRIBUTION AND ECOLOGY: On siliceous rock, dry, more or less manured, occasionally spreading onto mosses. Europe (northern Scandinavia to middle and southern countries), central Asia (Mongolia, Himalayas, etc.), North America (reported from California, Montana, Utah, Nevada, South Dakota), Greenland, Argentina. The report from limestone in Kansas (Tuckerman, 1882) is dubious.

LITERATURE REPORTS: Wetmore (1967); Eigler & Poelt (1965)

Variations

1. **Thallus center areolate; lobes radiating, elongated, narrow; surface gray (to blackish, or rarely whitish). Apothecia soon sessile, discs dark brown or black; 0.42.5 mm diameter; spores 1115 x 58 um. alphoplaca**

1. **Thallus center squamulose; squamules crowded, convex, swollen, crenate; lobes narrow, convex; margins wavy; surface dull brownish to yellowish. Apothecia immersed to adnate; discs reddish brown to black; 0.82.5 mm diameter; margin thick, concolorous with thallus, becoming flexuous; spores ovoidellipsoid, 915 x 57.5 um.**
thamnoplaca

Lecanora thamnoplaca Tuck., Gen. Lich. 113 (1872). **TYPE:** NEVADA. Humboldt, Bolander, s.n. (FH).

THALLUS thallus center squamulose; squamules rough, crumbling, crowded, convex and swollen; **upper surface** dull brownish to yellowish; **lobes** narrow, convex, wavy margined.

APOTHECIA 0.82.5 mm diameter, immersed to adnate; **disc** slightly concave to plane, reddish brown to black; **margin** thick, becoming flexuous, concolorous with thallus; **spores** ovoidellipsoid, 915 x 57.5 um.

Lobothallia melanaspis (Ach.) Hafellner

THALLUS little adherent to substrate, thin; **thallus center; lobes; surface** glaucous whitish gray, ashy gray, grayish green, (often with cinnamon shade according to Kopazevskaia, et al., 1971 may be based on L. alphoplaca) greener when wet; edges concolorous with rest.

APOTHECIA 0.8-1.5 mm; **discs** epruinose, dark cinnamon, brownblack to black, finally convex; **hymenium** melanaspitype; **paraphyses** melanaspitype; **epihymenium** N.

SPERMOGONIA

SPOT TESTS AND CHEMISTRY: Cortex and medulla K, or K+ yellow then red. Atranorin, placodin (reported by Brieger, 1923, Hesse, 1912, Thies, 1932, and Zopf, 1907; mentioned by Eigler & Poelt, 1965). Norstictic acid (Wetmore, 1967), from Europe. Norstictic acid and placodin both in variable concentrations, sometimes not detectable (Hermann, et al., 1973, from Europe and Baffin Island, by TLC). Placodin is a greenish brown pigment.

DISTRIBUTION AND ECOLOGY: On siliceous rocks, wet.

LITERATURE REPORTS: Th. Fries (18); Migula (19); Rsnen (Laatokka). Tuckerman (1882) stated that the North American specimens he saw belonged to f. alphoplaca (= Lobothallia alphoplaca). However, it is possible that true L. melanaspis does occur in N. America.

Lobothallia praeradiosa (Nyl.) Hafellner,

THALLUS large (35 cm across), 0.25 mm thick; **thallus center** areolategranulose or verrucose; verrucae contiguous to more or less scattered or densely imbricate; **lobes** more or less linear, separated/lifted off but not loosened, sometimes somewhat imbricated, slightly convex (never terete nor swollenhollow), almost equally wide (0.50.6 mm), discrete to subdiscrete, towards tips partly broadened or slightly revolute; **upper surface** yellowish white (Nylander, 1884) or brownish gray, reddish gray, gray, graywhite to pale grayish brown (or yellowbrown in N. America!).

APOTHECIA numerous, to 12 mm diameter, soon sessile and well elevated; **discs** plane (Nylander, 1884) or commonly convex, pale testaceous (Nylander, 1884) or brown to brownblack, winered to black; **margin** entire, peristent, often dark (appearing as a distinct "proper margin"; **hymenium** 50 um, I+ blue then greenish then red; **epihymenium** brown; **paraphyses** pliant, articulated; **spores** 8 per ascus, ovoid or subglobose, 913 x 79.5 um.

SPERMOGONIA

SPOT TESTS AND CHEMISTRY: Cortex and medulla usually both K+ yellow then red. Norstictic and constictic acid (methylethersalazinic acid) reported by Eigler & Poelt (1965), from Upper Adige, by paper chromatography. Norstictic acid usually in high concentrations, occasionally absent (Hermann, et al., 1973, from Algeria, Europe, the Himalayas, Karkoram Range, USSR and USA (Colorado); Huneck & Poelt, 1977.

DISTRIBUTION AND ECOLOGY: Europe, Nepal, North America. On siliceous rocks exposed to or containing some calcium, in dry, very sunny sites. On silicatecarbonate rocks (silica content almost equal to that of calcium or magnesium), rarely on marl.

DISCUSSION: Lobothallia praeradiosa is in many ways intermediate between the L. radiosa group and the L. alphoplaca group.

Variations

1. Thallus yellowish brown. Discs often reddish brown. f. bogdoensis and f. "americana"
1. Thallus brownish gray. Discs pale testaceous or brown to brownblack. 2
2. Verrucae in thallus center loose, rather sparse; upper surface of lobes epruinose. Apothecia round; thalline margin commonly entire, at most flexuous. v. nykensis
2. Verrucae in thallus center dense. 3

3. Lobes pruinose, at least towards tips. 4
3. Lobes epruinose. 5
4. Thallus center without adventitious verrucae; lobes almost cylindrical, well separated from one another.
- f. farkasvoelgyensis 4. Thallus center with large, irregular, adventitious verrucae; lobes at most moderately convex and weakly separated. f. praeradiosa (incl. f. budensis)
5. Apothecia usually round, with entire margins. Thallus verrucae large. v. sashegyensis
5. Apothecia irregularly polygonal to stellate, with crenulate margins. Thallus verrucae small. f. mtyshegyensis
- f. budensis Gyelnik

ADD:

f. farkasvoelgyensis Gyelnik

Lobothallia radiosa (Ach.) Hafellner s. lato

v. radiosa s. lato

THALLUS orbicular, confluent, often very large (to 8 cm across), tightly adherent throughout (or somewhat loose when mature, according to Kopaczewskaja, et al., 1971), at the margin radiate-plicate; **thallus center** wartyrimose to wartyareolate or areolate; areoles more or less plane, confluent; **lobes** rounded, plane or (somewhat) convex, confluent; tips crenate; lobes at least at the tips plane and broadened, sometimes more or less imbricate; **upper surface** more or less pruinose, ashy gray, graywhite, blackish gray, greenish gray, or grayish brown, paler at the periphery, unchanged wet.

APOTHECIA usually numerous, mostly densely crowded in thallus center, rather small, immersed (to adnate in type of L. circinnatus), 0.5-1.5 mm diameter, often angular from crowding; **discs** at first almost urceolate, then plane, brownish black to almost black; **margin** thin, entire, scarcely raised; **hypothecium** hyaline; **hymenium** I+ persistently blue; **epihymenium** brown; **paraphyses** rather thick, often distinctly articulate but not constricted, tightly compacted (Kopaczewskaja, et al., 1971); **asci** 8-spored; **spores** ellipsoid, 11-15 x 6.8-8.5 μ m.

SPERMOGONIA immersed; ostioles blackish brown, little prominent; **spermatia** bacilliform, 7.9 x 1 μ m.

SPOT TESTS AND CHEMISTRY: Unidentified substance C (Eigler & Poelt, 1965, by paper chromatography). Psoromic acid (sometimes as parellic acid) and salazinic acid: Briger (1923), Hesse (1912), Thies (1932), Zopf (1907). Norstictic acid in variable concentrations (Hermann, et al., 1973, from Europe and Israel). Calcium oxalate (Seitz & Schade, 1976). K or indistinctly brown, P, C, I.

DISTRIBUTION AND ECOLOGY: On limestone or siliceous stones and walls, on silicate-carbonate rocks (silica content almost equal to that of calcium or magnesium), rarely on marl. sometimes on serpentine (Steiner, Persia), rarely on wood, to 3000 m elevation; Europe (central Germany, Böhmen, Bayern, Alpen; France; Mediterranean); Russia; Asia (Iran).

LITERATURE REPORTS and ILLUSTRATIONS: Ozenda & Clauzade (1970); Kopaczewskaja, et al. (1971), Feige & Kremer (1979)

Key to Variations in L. radiosa s. lato
Highly Condensed, Simplistic Version!

1. Thallus (cortex, medulla, or both) K+ red (norstictic acid) v. subcircinata s. lato
1. Thallus K or K+ yellowish to indistinctly brown.
v. radiosa s. lato

v. subcircinata s. lato

THALLUS rather thin; **thallus center** rimoseareolate to areolate; areoles contiguous, confluent; **lobes** contiguous (rarely more or less imbricate); plane or slightly convex (plane and broadened at least towards tips of lobes), rather short, linear; **upper surface** grayish, grayish brown, greenish gray, sometimes blackish (entirely or at least towards the center), usually paler on the marginal lobes, sometimes partly whitish (mealy pruinose).

APOTHECIA small, rather crowded in thallus center, more or less immersed; **discs** concave when young, brown to brownblack, bluegray pruinose; **paraphyses** rather thick, submonilliform above; tips thickened, yellowish; **spores** ellipsoid, 1015 x 69 um.

SPERMOGONIA (Steiner, griechischen Festlandes) **spermatia** 47 x 1.51.8 um; **sterigmata** simple to branched.

SPOT TESTS AND CHEMISTRY: norstictic acid (Huneck, 1963b, from Germany, by extraction; Schindler, 1936); salazinic acid (Galun & Lavee, 1966, from Israel, by microcrystal test; corrected to norstictic acid by Galun, 1970). **cortex** K+ or K; **medulla** K+ red.

DISTRIBUTION AND ECOLOGY: usually on calciumhigh rocks or walls, on silicatecarbonate rocks (silica content almost equal to that of calcium or magnesium), rarely on marl. often near water, more orophilous (= ?) than the typical variety; central Europe; British Isles; Israel.

LITERATURE

Anderson, R. 1962.

Asahina, Y. 1958b. Lichenologische Notizen (137139). J. Jap. Bot. 33: 6569.

Baglietto and Carestia. 1880. Lich. della Valsesia.

Brieger, W. 1923. Synthetische Versuche auf dem Gebiete der Flechtenstoffe und ihrer Bausteine. Pp. 205438 in: Aberhalden, E. (ed.), Handbuch der biochemischen Arbeitsmethoden, Abteilun I: Chemische Methoden, Teil 10. Urban & Schwarzenberg, Berlin.

Clauzade, G. and C. Roux. 1984. Les genres Aspicilia et Bellemeria Hafellner et Roux. Bulletin de la Socit botanique du CentreOuest, n. s. 15: 127141.

Deschutes & Werner. 19 .

Egea, and Llimona. 1981. Lazaroa 3: 269287.

Eigler, 1969. Studien zur Gliederung der Flechtengattung Lecanora. Dissert. bot. 4.

Eigler, G. & J. Poelt. 1965. Flechtenstoffe und Systematik der lobaten Arten der Flechtengattung Lecanora in der Holarktis. sterr. Bot. Z. 112: 285294.

Feige, . and Kremer. 1979. FlechtenDoppelwesen.

Fink, B. 1935. Lichen Flora of the United States.

Fries, T. 18 . Lichenes Arctoi.

Fries, T. 1871. Lichenographia Scandinavica. Pars. I. Upsaliae.

Galloway, D. J. 1985. Flora of New Zealand. Lichens. P. D. Hasselberg, Wellington.

Galun, M. 1970. Lichens of Israel.

Galun, M. and H. Lavee. 1966. Lichens from Har Meron (Jebel Jemak), Upper Galilee. The Bryologist 69: 324333.

Gyelnik, V. 1931a. Lichenologische Substratstudien. (Squamaria radiosaGruppe). Hedwigia 71: 120132.

Gyelnik, V. 1931b. Squamariae nonnullae. Feddes Repert. 29: 4041.

Gyelnik, V. 1932. Enumeratio lichenum europaeorum novorum rariorumque. Ann. Mycologici 30: 442455.

Hafellner, J. 19 . Lobothallia.

Hale, M. E. Jr. 1954. Baffin Island.

Hale, M. E. Jr. 1957b. Lecture notes. Lichenology. West Virginia University, Morgantown.

Harmand, . 1913. Lich. de France.

Harris, R. C. 19 .

Hasse, . 19 . Additions to the lichen flora of southern California. 5.

Hasse, . 18 . Additions to the lichen flora of southern California. 7.

Hasse, . 19 . Lichen flora of southern California.

Hermann, S, C. Leuckert and J. Poelt. 1973. Zur Kenntnis der Flechtengruppe Lecanora radiosa s. ampliss. Willdenowia 7(1):

Hesse, O. 1912. Die Flechtenstoffe. Pp. 32144 in: Aberhalden, E. (ed.), Biochemisches Handlexicon. VII. Band. Julius Springer, Berlin.

Hoffman, et al. 1974.

Howard, G. 1950. Lichens of the State of Washington.

Huneck, S. 1963b. über ein weiteres Vorkommen von Norsticticure in Lecanora radiosa (Hoffm.) Schaer. var subcircinata (Nyl.) Zahlbruckner. Naturwissenschaften 50: 646.

Huneck, S. and J. Poelt. 1977.

Jatta, A. 19 . Flora Cryptogamica Italica.

Jatta, A. 19 .

Kopaczewskaja, et al. 1971.

Kusan. 1953.

Lettau, G. 1956.

Lindau, . 19 .

Looman, . 1962.

Magnusson, A. H. 1940. Lichens from central Asia.

Magnusson, A. H. 1944. Lichens from central Asia.

Migula, . 19 .

Nylander. W. 1873. Flora 56

Nylander, W. 1884.

Nylander, W. 18 . Add. to Lich. Jap. in Lich. Laban & Singapore.

Oxner, . 1939. Xurn. Inst. Bot. URSR. 20

Ozenda, P. and G. Clauzade. 1970. Les Lichens.

Persoon. 1794.

Poelt, J. 1958.

Poelt, J. 1961. Karakorum.

Poelt, J. 1966. Die lobaten Arten der Sammelgattung Lecanora. Khumbu Himal.

Poelt, J. 19 .

Poelt, J. 1969.

Rsnen, V. 1939. Argentina?

Rsnen, V. 19 . Laatokka.

Reichert and M. Galun. 19 .

Schindler, H. 1936. über das Vorkommen der Norstictinsäure in der Lungenflechte Lobaria pulmonaria (L.) Hoffm. Ber. Deut. Botan. Ges. 54: 240246.

Sedelnikova, N. V. 1972. Species nova lichenis generis Placodium (Ach.) Mll. Arg.

Smith, A. L. 19 . Monograph of the British Lichens.

Steiner, J. 1910. Persia.

Steiner, J. 19 . Prodrömus einer Flechtenflora des griechischen Festlandes.

Szatala, .

Thies, W. 1932. Systematische Verbreitung und Vorkommen der Flechtenstoffe (Flechtensuren). Pp. 429452 in: Klein, G. (ed.), Handbuch der Pflanzenanalyse. 3. Band, Spezielle Analyse. 2. Teil, Organische Stoffe II. Julius Springer, Wein.

Thomson, J. W. 1951. Lake Superior.

Thomson, J. W. 19 . Lichens of the Alaskan Arctic Slope.

Tomin, . 19 .

Tuckerman, E. 1882. Synopsis Part 1.

Weber, W. A. 1963. Chiricahuas.

Wetmore, C. W. 1967. Lichens of the Black Hills of South Dakota and Wyoming. Publ. Mus. Mich. State Univ., Biol. Ser. 3: 209464.

Zahlbruckner, A. 1930.

Zopf, W. 1907. Die Flechtenstoffe in chemischer, botanischer, pharmakologischer und technischer Beziehung. Gustaf Fischer, Jena.