

Sphaerophorus Pers.

(CALICIALES: SPHAEROPHORACEAE)

After Ohlsson (1973), Thomson (1984), and others

Rev. 5/94

Thallus fruticose or palmatefoliose, caespitose, often turflike, erect or \pm decumbent or subpendulous; branches \pm numerous, cylindrical to distinctly flattened, solid, often very brittle, commonly dimorphic, with fertile branches larger and thicker and sterile branches thin and often \pm richly branched; surface brownish to greenish, grayish or whitish (sterile branchlets often paler than main branches); cortex well developed, continuous and of equal thickness in terete species, or forming a markedly thicker upper layer and a thinner, lower layer in flattened, dorsiventral species, chondroid (paraplectenchymatous according to Rogers), the cells thickwalled, laterally fused, unoriented, with lumina 12 μ m diam.; medulla compact, of longitudinally oriented, colorless, thickwalled hyphae.

Apothecia terminal or subterminal, apical or subapical to ventral, in capitate, \pm globose swellings, initially closed, later opening (bursting irregularly) with a thin thalloid exciple irregularly torn from the center, exposing the almost globose hymenium (purpleblack to brownish black, dry spore mass); hypothecium blackish brown (hyaline according to Rogers); paraphyses fragile, threadlike; asci cylindrical to clavate, Calicium type, unitunicate, thin walled; spores 8; asci and paraphyses soon disintegrate, leaving paraphyses and spores in a mazaedium; spores globose to broadly ellipsoid, simple, colorless to usually gray or brown or purplish brown, with a dark, granular epispore (dense deposit of carbonaceous material).

Pycnidia terminal; fulcrum endobasidial; pycnospores bacilliform. Sphaerophorin (UV+ blue), \pm various other substances (fragilin, squamatic, stictic, constictic, isousnic, thamnolic, hypothamnolic, protocetraric). Photobiont trebouxoid, confined to a distinct layer between cortex and medulla, cells single, spherical, (5)6-12 μ m diam. On acidic rocks or acidic, leached, mossy bark, or on soil, in humid, usually cool to cold regions (arctic to borealtemperate or montane).

1. Medulla I. Branches not distinctly whitetipped. On soil or rock.2

1. Medulla I+ blue. Branches often whitetipped, terete, with sparse to numerous fibrillae (side branchlets).

.....3

2. Branches (at least the older ones) flattened, gray above, whitish below. Thallus 37 cm high, + decumbent, loosely divided digitately, pinnately or dichotomously, with sparse obtuse branchlets (fibrillae) and definite mainstems. Apothecia + common, subterminal on undersides of flattened branch tips. Medulla P+ orange, K+ yellow, KC, C (sphaerophorin, stictic acid). On mossy rocks, trees, and, occasionally, on soil, often in rather sheltered situations. S. melanocarpus

2. Branches terete, bluish gray, ashy gray or brown, glossy. Thallus 23 cm tall, erect, forming dense tussocks or tufts, divided sympodially to dichotomously (+ bifurcate), without a definite main stem; fragile; smooth, not pitted; without fibrillae. Apothecia rare, terminal. Medulla UV+ ice blue, K+ yellow, KC, P+ yellow (thamnolic acid) or (in European and Icelandic specimens) K+ purple, KC+ red, P (hypothamnolic acid), always containing sphaerophorin and fragilin, with accessory squamatic acid. Apothecia rare. On acidic rock (outcrops, scree, and boulders) in exposed places, Arcticalpineoceanic, south to New England and Washington state. S. fragilis

3. Thallus gray, often with brown or pinkish areas in strong light (especially towards base), sparsely branched sympodially or dichotomously; branches terete, + pitted (impressedfoveolate), otherwise smooth, short and stout. Spores 915 um diam. Medulla I+ dark blue. Apothecia rare (according to Thomson), or common (Pacific NW material on bark). Medulla UV+ bluewhite, K, KC, P, with sphaerophorin (and fragilin?) and squamatic acids or (at least in Europe) sometimes K+ yellow, P+ yellow (+ thamnolic and + hypothamnolic acids). Usually on soil, moss or rock and ArcticAlpine (according to Thomson), south to Pacific NW (where it is apparently sometimes also in lowland to montane areas on bark; the chemistry and spores of corticolous material from Pacific NW not studied yet [?see Ohlsson]; it grows with v. gracilis and may be more closely related to that taxon need to check Ohlsson for more info.). S. globosus v. globosus

3. Thallus whitish (olivaceous to rosy), less often gray or brown; usually with much more lateral branching and numerous slender whitish fibrillae; sometimes consisting entirely of a dense turf of whitish coralloid branchlets (?this may be a new species of Loxospora being described by Brodo, instead); surface of branches smooth. Spores 58 um diam. Medulla I+ weak blue.

Apothecia rare. Medulla UV+ ice blue, K+ yellow, P+ yellow (thamnolic acid) or (in Europe) K+ reddish purple (fading), P (hypothamnolic acid); with accessory squamatic acid. Thallus in shaded forests may be strongly greenish. On humus, moss or trees, boreal, especially in rainforest areas (but sometimes in relatively dry pine forests on the west side of the Cascades, lowland to montane or subalpine, Pacific NW. S. globosus v. gracilis (= S. tuckermanii according to Thomson)

Detailed descriptions (need to incorporate info. from the key):

S. fragilis (L.) Pers.

Thallus forming dense, pale graybrown tufts to 4 cm tall, usually without a redbrown tinge; branches \pm erect or partially decumbent, branching sparingly isotomicdichotomous, branches all of \pm similar width, 0.60.8 mm wide, main branches not differentiated; surface dull graybrown or gray, often somewhat roughened. Apothecia very rare, 12 mm wide, on \pm elevated branches, subglobose, terminal; dry spore mass soon exposed. Spores 810 μ m diam., deep violetblack. Medulla P, K, KC, C, I (sphaerophorin, \pm hypothamnolic and \pm squamatic acids). On mountain outcrops, scree, boulders, generally at higher elevations than S. globosus.

S. globosus (Huds.) Vainio

[Description of British and European material, presumably v. globosus]

Thallus tufted, 1.55(10) cm tall, \pm erect, forming spreading tufts or more often tufts or cushions, often richly but loosely, irregularly branched; main branches distinct, rather coarse, to 0.81.5 mm diam., rounded in xsection, branching anisotomicdichotomous, with few to very numerous, thinner (0.20.3 mm) side branches, often appearing coralloid, with blunt apices; surface gray (shade), pale brown to browngray, often tinged redbrown, smooth. Apothecia infrequent, 13 mm diam., terminal, at first immersed in swollen, stalked, branched apices, soon bursting apically to \pm expose a dry mass of dark brownblack ascospores, surrounded by a \pm torn thalline exciple. Spores 810 μ m diam., greenish to dark violetblueblack. Medulla P or \pm yellow, K or \pm yellow, KC, C, I \pm blue (sphaerophorin, squamatic, \pm thamnolic and \pm hypothamnolic acids; or occasionally psoromic acid). On rocks, often amongst other lichens and mosses, also on acidbarked, leached, mossy trees, more rarely on moorland soils.

S. melanocarpus (Sw.) DC. in Lam. & DC.

Thallus to 45 cm long, composed of numerous, crowded, smaller, sterile, \pm terete basal branches and less frequent, better developed fertile branches. Fertile branches erect to more often decumbent, markedly flattenedcompressed, to 3.0 mm wide, \pm overlapping, digitately divided into flat branchlets with scattered or crowded, obtuse, \pm terete lateral side branches, especially along the margins, 0.71.4 mm wide. Upper surface

subconvex, gray to grayish green, not isidiate, larger branches transversely annulatecracked, lower surface paler or white, sometimes redpurple towards base, plane to irregularly wrinkled, especially near apothecia, upper cortex in fertile branches 70100 um thick, lower cortex 4060 um thick. Algal layer 1530 um thick, continuous beneath upper cortex, occurring in isolated areas on lower side. Apothecia frequent or infrequent, 1.23.5 mm diam., subterminal, mazaedium subterminal to ventral, exposed at an early age of development by irregular rupture of enclosing receptacle, margin of receptacle fringed with small isidialike branchlets. Asci cylindrical, 4050 x 57 um. Ascospores gray, spherical, 5.58 um diam., often surrounded by dark, carbonaceous material.

Thallus K+ pale yellow or , P+ orange or , C, KC, I. Two chemodemes: 1) spherophorin, norstictic, constictic and stictic acids; 2) sphaerophorin only. On mossy rocks, trees, and, occasionally, on soil, often in rather sheltered situations.

Literature

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

Ohlsson, K. E. 1973. A Revision of the Lichen Genus Sphaerophorus. Ph.D. Dissertation. University Microfilms, Ann Arbor. 270 pp. [More info. from this needs to be incorporated].

Poelt, J. 1969. Bestimmungsschlssel europischer Flechten.

Purvis, O. W. 1992. Sphaerophorus. In: Purvis, et al., Lichen Flora of Great Britain and Ireland.

Thomson, J. W. 1984. American Arctic Lichens I. The Macrolichens. Columbia University Press, New York.

Rogers, 19 . Genera of Australian Lichens.