

Sarcogyne Flotow
(LECANORALES: ACAROSPORACEAE)

(after Magnusson)

(Rev. 5/89)

Thallus crustose, uniform, ecorticate, poorly developed, often immersed; prothallus absent; attached by medullary hyphae. Apothecia adnate, sessile or substipitate, or immersed in pits in substratum, red-black to black, sometimes pruinose; disk circular; true exciple thin, friable (brittle), black, becoming excluded or persistent and well developed and then in some species crenulate, composed of compacted radiating hyphae, colorless internally, tips swollen and dark brown at surface; hypothecium colorless to dark brown, often thick; hymenium colorless, I+ blue; epihymenium pale reddish brown to dark brown; paraphyses simple to sparsely branched, free, regularly septate, the end cells \pm swollen and sometimes brown-capitate; asci elongate-clavate to obclavate, often swollen in the lower third when mature, unitunicate, thick walled, strongly thickened at apex; outer wall coat I+ blue; tholus K/I- (I+ blue according to Rogers); spores many, narrowly ellipsoid to globose, simple, hyaline, thin walled, minute (mostly to 3-6 μ m long), lacking a distinct perispore.

Pycnidia immersed in thallus or in small, \pm multilocular warts; conidiogenous cells subcylindrical, enteroblastic, acrogenous (exobasidial); pycnosporos subglobose to ellipsoid (short-cylindrical according to Rogers), simple, colorless. No substances detected by TLC; "Lecanora-red" in the apothecia. Photobiont Dictyochloropsis, Myrmecia (+ ?Trebouxia). On siliceous or calcareous rocks.

Polysporina differs by the smaller and gyrose apothecia and in the branched and anastomosed paraphyses and ascus shape. The relationship to Biatorella is not clear to me at present.

The genus is still poorly known in N. America. Many of the species are known only from single collections, and many specimens do not key out.

1. Spores 7-8(-10) x 4-5 μ m, 30-50 per ascus. Epithecium carbonaceous, 20-35 μ m thick. Thallus immersed. Apothecia 0.5-0.8 mm diam., 0.2-0.3 mm thick, dispersed to grouped, broadly sessile, often somewhat constricted at base, round to irregular; disc subplane, rugose or gyrose, strongly uneven and roughened, sometimes semi-globose; distinct margin scarcely developed. Lateral exciple to 70 μ m thick, black, gradually paler inside, outside passing into the epithecium, lacking only at small fissure-like parts. Subhymenium to 50 μ m thick. Hymenium (excluding epithecium) 80-100 μ m thick, I+ pale greenish yellow. Paraphyses conglutinate, ca. 2 μ m thick in K; apices partly dark brown, 3.5 μ m wide (in

fissures 0 < partly concrescent and indistinct in the pithecium. ASci 75-80 x 20 um; apical wall very thick. Spores broadly ellipsoid to almost globose. On dry, exposed sandstone, 6000 ft. Utah. S. [Polysporina?] oligospora

1. Spores to 6 um long and 3 um wide, 100 or more per ascus.

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2. Exciple (and partly the epihymenium) K+ rusty crystals (norstictic acid); epithecium not carbonaceous. Thallus immersed.

Apothecia solitary to densely grouped in unevennesses of the stone, sessile, somewhat umbilicate, 0.8-1(-1.5) mm diam.; disc dark reddish brown, plane to concave, mostly irregular, surrounded by a swollen, often flexuose but smooth margin concolorous with disc. Foot of apothecia to 0.6 mm long, 0.4-0.5 mm thick, its tissue colorless throughout; hyphae 2-2.5 um thick, rather thin-walled, densely intricate with enclosed particles from the stone. Upper margin of exciple rather narrow, 50 um, the rest 100-150 um thick; exterior 10-15 um dark to blackish brown, the interior part paler, brownish, obscured by much enclosed air. Hypothecium 10-15 um thick, with parallel hyphae. Subhymenium 30-35*(-50) um thick, colorless, opaque. Hymenium 85-100 um, hyaline; epihymenium 10-15 um, \pm pale orange brown. Paraphyses 2-3 um thick, simple, with short joints, apices in K 4-5 um thick, brownish yellow, capitate; exterior cells 4-5 um long, constricted at septum. Asci 80-85 x 15-20 um, \pm broadly clavate; upper part of wall to 6 um thick. Spores ca. 200, ellipsoid, 4-6 x 1.7-2.2 um. On exposed granitic rock in open prairie. N. Dakota. S. dakotensis

2. Exciple K-. 3

3. Epithecium carbonaceous; surface of disc usually roughened; hymenium (85-)100-120(-200) um high.

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3. Epithecium not carbonaceous. Epilithic thallus very thin or lacking. 5

4. Thallus endolithic. Exterior stratum of exciple carbonaceous, distinctly limited; paraphyses anastomosing; hymenium I-; spores 3-4(-5) x 1.5 um. [Polysporina simplex]

4. Thallus epilithic, grayish white, irregularly rimose, subareolate, 0.2-0.4 mm thick. External or dark stratum of exciple indistinctly limited; hymenium I+ blue or green-blue; spores 2-3(-4) x 1 um. Thallus indeterminate, K-, C-, extensive; areoles 0.5-1 mm across, very irregular in shape, separated by distinct cracks; surface very uneven, matt; cortex indistinct; algal layer 50-90 um thick; algae 8-15 um diam. Apothecia numerous, with the base upon

prominent areoles, 0.5-1 mm diam., 0.25-0.3 mm deep, the hole lower side limited by a \pm brown exciple; at first immersed, then protruding, a narrow thalline margin visible for a long time around and below the black proper margin; disc black, rough, in older apothecia almost verrucose. Exciple dark towards center and 50-70 μ m thick, paler laterally and at upper margin, 15-17 μ m thick, internally indistinctly limited towards the subhymenium; subhymenium pale brown, 35-50 μ m thick. Hymenium 100-200 μ m, almost simple or divided through \pm dark brown strands from the epithecium into several (at least to 7) parts 100-150 μ m broad; brown strands widened at the top to \pm confluent, 20-30 μ m thick epithecium parts; simple epithecium 8-10 μ m thick, brown-yellow, interrupted by small, thicker, dark brown areas. Hymenium l+ greenish blue or blue. Paraphyses 1.4-1.7 μ m thick, coherent, especially the apices. Asci 85-100 x 15-18 μ m, clavate, with 2-3 μ m thick wall. Spores several hundreds, \pm cylindric. Pycnidia immersed, 60-70 μ m diam., with \pm brown wall; sterigmata simple, 8-10 μ m long; conidia 4.5 x 1-1.5 μ m, straight. On non-calcareous sandstone, southern California. S. [Polysporina?] bicolor

5. Apothecial margin ash-gray pruinose; apothecia often confluent [?--solitary according to description]; discs bare, brown-black. Spores 3-3.5 x 1.7-2.5 μ m. Thallus present only below apothecia, 0.2-0.4 mm thick. Apothecia with underlying thallus 0.4-0.6 mm thick, 0.6-1 mm diam., \pm solitary, irregular in shape, sessile, dark brown; disc 0.3-0.6 mm broad, circular or irregular, impressed, often 2-4 in one squamule giving it a gyropse appearance, dark or blackish brown, the surrounding prominent margin thick, ash-gray pruinose, irregularly flexuose. Exciple 100 μ m thick at margin, interior 70-80 μ m colorless, exterior 15-20 μ m dark brown, rather distinctly limited inwards, at the bottom colorless, 35-50 μ m thick, refracting often with a yellowish tinge, especially in K, hyphae closely packed, parallel, thin. Subhymenium indistinctly limited, 20-35 μ m. Hymenium 85-100(-125) μ m high, l+ dark blue; epihymenium 15-30 μ m, dark yellow brown or partly blackish brown. Paraphyses rather discrete, 1.6-1.9 μ m; lumina cylindric, ca. 0.5 μ m thick; septa indistinct; tips brown for 4-6 μ m, not swollen. Asci 75-85 x 20-30 μ m, swollen clavate. Spores ca. 200, broadly ellipsoid. On slightly calciferous sandstone. Texas. Resembles Acarospora glaucocarpa but lacks algae in the apothecial margin. S. bolleana

5. Apothecial margin dark, red-brown to black, bare; discs sometimes pruinose. 6

6. Discs pruinose (or not), deep black when wet, 0.5-1 mm wide, often strongly constricted at base. Spores 3-5(-6) x 1.5-1.7(-2) μ m. Thallus mostly endolithic, rarely thin, pale gray, whitish or ochraceous, farinose. Apothecia usually numerous and uniform, scattered or rarely grouped, at first often \pm sunk into the stone, usually sessile,

appressed, mostly regularly circular, 0.3-0.4 mm thick; discs plane or finally slightly convex, with a thin and lasting or occasionally excluded margin. Exciple 35-50 μ m thick laterally, disappearing below towards center; exterior 8-12(-17) μ m dark brown without distinct limit inwards; inner part gradually colorless, innermost stratum with \pm parallel hyphae, refracting. Subhymenium 20-35 μ m, Hymenium 80-90(-120) μ m, l+ dark blue; epihymenium dark reddish yellow brown to brown. Paraphyses firmly conglutinate, 1.5-2 μ m thick; apices swollen, 3-4.5 μ m. Asci 60-85 x 14-18 μ m, clavate. Spores 100-200, oblong, rarely ellipsoid or cylindric. Usually calcicolous, rarely on sandstone. Michigan, Iowa, Ohio, S. Carolina, Nebraska, Colorado, southern California, New Mexico; arctic (Alaska to Greenland); Mexico.S. regularis

6. Discs bare. 7

7. On calcareous rock. 8

7. On siliceous rock. 11

8. Discs with \pm distinct red tint (at least when wet); exciple with distinct, rounded cells. Thallus thin, yellowish. 9

8. Discs brown-black even when wet. 10

9. Spores 5-6 x 2.5 μ m; paraphyses 3-3.5 μ m thick. Thallus indeterminate, very thin, almost immersed. Apothecia partly dense-sitting, 0.8-1.5(-2) mm broad, impressed, ca. 0.3 mm thick; disc smooth, matt, red-brown (pale yellow brown when wet); margin reddish brown to brown black, somewhat shiny, thin, unchanged when moist. Thallus below apothecia 200-300 μ m thick. Exciple at upper margin 100-130(-150) μ m thick, dark brown to a depth of 50-70 μ m; apices of its hyphae well discernible, 7-8.5 μ m thick, rounded; cells \pm distinct, 5 x 3 μ m; lower part colorless, 60-70 μ m thick, with intricate hyphae, exterior 15-19 μ m brownish. Subhymenium 25-35 μ m. Hymenium 85-95 μ m. l+ dark blue; epihymenium 17 μ m, gradually brownish with a yellow-red shade. Paraphyses conglutinate; tips 3.5-4.5 μ m, pale brown. Asci 60-70 x 17-20 μ m, clavate. Spores ca. 200, oblong to ellipsoid. On calcareous sandstone, 1950 m. New Mexico.S. novomexicana

9. Spores 3.5-5 x 1-1.5 μ m; paraphyses to 2 μ m thick.(S. privigna)

10. Outer part of exciple dark only in its upper part; inner part of exciple diffusely limited; spores broadly ellipsoid, 3-4 x 1.7-2 μ m. Thallus thin to endolithic. Apothecia dispersed, 0.5-0.7(-1) mm diam.; center somewhat immersed in the stone; margins bent upwards and inwards so that pale exterior side becomes \pm visible; margin from the beginning not prominent, indistinctly separated from disc, confluent

with this and forming a shallow cup; outline often irregular; disc brown-black. Apothecia 100-150 μm thick. A dark exciple developed only at upper side of the 100-150 μm thick margin, there 25-30 μm thick, blackish brown; lower and interior part colorless. Hypothecium 10-15 μm thick. Subhymenium indistinctly delimited, 20-30 μm thick, colorless. Hymenium 75-85 μm high, I+ dark blue; epihymenium 9-18 μm , brown yellow to yellow brown. Paraphyses firmly conflutinated, 1.7 μm thick; tips hardly thickened. Asci 65-70 x 17 μm , clavate. Spores ca. 200 per ascus, broadly ellipsoid, 3-4 x 1.7-2 μm . On weathered calcareous rock. New Mexico. *S. integra*

10. Outer part of exciple darkened throughout; apothecial margin thin, persistent (according to Magnussoson) or becoming excluded (according to Hawksworth); spores 3-6 x 1.5-2 μm *S. regularis*

11. Exterior dark stratum of exciple carbonaceous, distinctly separated from inner part; apothecial discs blackish red, with thick, distinct black margin. 12

11. Exterior part of exciple not carbonaceous, not sharply delimited; apothecial discs brown-black. 13

12. Hymenium 60-85 μm high. Apothecia 0.5-1 mm wide, broadly sessile, often arranged in rows in depressions in the rock; margin often undulate, but not crenulate. Spores 3-3.5 x 1-1.5 μm ; hypothecium hyaline to pale brown. Thallus immersed. Pycnospores unknown. Apothecia solitary or grouped; disc plane, naked, blackish red (to blackish), circular or irregular; margin distinct, often very prominent, sometimes flexuose. Exciple 18-30(-50) μm thick, blackish, \pm far downwards developed, open at base or not; internally with a \pm colorless layer of hyphae radiating toward upper surface, parallel at the center. Epithecium 8-10 μm , pale brown orange. Hymenium I+ dark blue. Paraphyses 1.7-2 μm wide, simple, apices \pm clavate. Spores about 200, cylindric. On granitic rock. New Hampshire, Connecticut; New Mexico. *S. privigna*

12. Hymenium 85-125 μm high. Apothecia 1-3(-6) mm wide, generally narrowly sessile to substipitate; margin strongly warty-crenate and granular-rugulose. Spores 4-6 x 1-1.5 μm ; hypothecium brown (pale to almost hyaline in thin sections, dark in thick sections). Pycnospores 2-3.5 x 1-1.5 μm . Thallus immersed. Apothecia very scattered, often 0.7-1 mm thick; disc blackish red to black, plane, naked; margin very thick, prominent, later thinner. Exciple on sides and at bottom black, very unevenly thickened, often incised or verrucose, well limited towards the interior paler tissue which is often obscured by numerous oxalate crystals. Epithecium dark yellow-brown. Hymenium I+ blue. Paraphyses firmly coherent; tips in K narrowly clavate, ca. 3.5 μm thick. Spores 200 or more per

ascus, cylindric. On granitic stones mostly in moist places or on perpendicular or overhanging rocks, etc. Connecticut, New York, Alabama; California. S. clavus

13. Hymenium 60-65 um high. Exterior stratum of exciple yellow-brown; apothecial discs black, convex from beginning, with thin or disappearing margin; spores 4.5-5.5 x 1(-1.5) um; exciple of parallel hyphae. Thallus immersed. Apothecia 0.8-1(-1.5) mm diam., often two or few agglomerate, 0.3 or when pedicellate 0.6 mm thick; discs circular or \pm angular from crowding, matt. Exciple 35-50(-60) um thick at margin, visible beneath far inwards and up to 65 um thick, dark yellowish brown, somewhat darker in outer part, inwards rather distinctly limited; hyphae anticlinal, indistinct, ca. 6-7 um thick; interior part ca. 150 um thick, gray, with rather lax, 2-3.5 um thick, intricate hyphae, covered with granules dissolving in HCl. Subhymenium 30-35 um thick. Hymenium I+ dirty greenish yellow; epihymenium 20 um, dark reddish yellow-brown; paraphyses 1.7 um thick, apices thickened, firmly conglutinated, appearing minutely granular internally. Asci 55-65 x 13-15 um, clavate. Spores at least 200, cylindric, 4.5-5.5 x 1(-1.5) um, with lighter end spots. On granitic stone, Colorado. S. athroocarpa

13. Hymenium 85 um or higher. 14

14. Apothecial disc elongate or difform.
Biatorella plicata

14. Disc \pm circular. Apothecia solitary or grouped. 15

15. Apothecia immarginate, often aggregated into pulvinate and umbilicate groups. Medulla thick, with granules. Spores 3-4 x 1.5-2 um. Thallus immersed. Apothecia very convex, solitary, dispersed, and simple, to 1 mm diam., to often composite, forming groups to 7 mm diam. Exciple 100-110 um thick, visible almost only below the margin or sometimes to a length of 300 um on lower side but only 50 um thick with exterior 6-8 um dark brown; cells 3-4.5 x 2-2.5 um. Medulla below apothecium 500 um thick or more, opaque from granules, dissolving in HCl. Hypothecium 10-20 um thick, with parallel hyphae. Subhymenium ca. 20-35 um, pale yellow brownish to colorless. Hymenium ca. 100 um, I+ yellowish blue-green; epihymenium 20-30 um, very dark reddish yellow brown. Paraphyses \pm distinct, 1.7 um thick, conglutinate. Asci rare, 55-60 x 12-14 um, hardly fully developed; spores 100-200 per ascus, 3-4 x 1.5-2 um, not easily escaping. On non-calciferous sandstone. Southern California. S. californica

15. Apothecia marginate, solitary. 16

16. Spores (4-)5-6(-6.5) x 2.5-3 um, broadly ellipsoid; epithecium 10-15 um, yellow-brown; hymenium I+ blue; apothecial margin thick, smooth. Thallus very thin, whitish,

granular-farinose. Apothecia dispersed, 0.5-1(-1.5) mm broad, ca. 0.2 mm thick, widely attached with pale base, sessile, at first verruciform then dilated; disc blackish brown, plane, naked. Exciple 150 µm thick, almost only at the upper margin and laterally dark brown, otherwise \pm colorless, when visible below only 8-10 µm thick dark stratum, the apices of the hyphae 6-7 µm thick; inner part yellowish, 10-15 µm thick, indistinct. Subhymenium poorly developed, 10-30 µm thick. Hymenium 85-95 µm; epihymenium 10-15(-20) µm, dirty yellow-brown, gelatinous. Paraphyses \pm distinct, 1.5-1.7 µm; apices firmly conglutinate, olive yellowish, 3.5 µm wide, clavate, short celled, with angularly globose, distinct cells, lumina 2-2.5 µm broad, 3-3.5 µm long. Asci 65-70 x 12-15 µm; spores 100-200, with distinct lighter spots at apices. On siliceous rocks, New Mexico. S. magnussonii

16. Spores 4-6 x 1.5 µm, cylindrical; epithecium 20-30 µm, orangish to blackish brown; hymenium l- or pale green-blue; apothecial margin thin. Thallus immersed. Apothecia dispersed, 0.7-1.5 mm diam., appressed, broadly umbilicate, ca. 0.3 mm thick; disc brown-blackish, matt, plane, naked, often slightly rough; margin prominent, concolorous. Exciple at upper margin 65-100 µm thick, \pm brown, only exterior 6-10(-20) µm dark brown, visible far in below apothecia; hyphae radiate-intricate; exterior cells round, ca. 2 µm diam. Subhymenium 15-25(-35) µm thick. Hymenium 85-115 µm; epithecium 20-30 µm, dark, orange brown above, blackish brown above, surface uneven. Paraphyses quite free in lower part, 1.5 µm thick, firmly conglutinate in upper part and short celled. Asci 75-85 x 14-25 µm, clavate, very easily bursting. Spores 200 or more per ascus. On non-calcareous rocks, often sandstone. Connecticut, Maryland, Ohio, Iowa, S. Carolina; California. [Including f. convexa Magn., with apothecia 1-2 mm across, very convex with \pm excluded margin; exciple not or rarely visible at upper margin, on lower side 50-60 µm thick, dark brown. S. similis

ADD:

On sandy soil, Greenland. See Thomson 1997 for description. S. groenlandica H. Magn.

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