

"Squamarina sect. Petroplaca Poelt"

(LECANORALES: LECANORACEAE)

After Poelt, and Ryan, unpubl.

THALLUS mostly squamulose, usually forming rosettes or mounds, less often scattered, moderately to strongly thickened; **squamules** isodiametric, or marginal ones somewhat enlarged and divided or elongated; **upper cortex** well delimited, uniformly thickened, usually containing dead algal cells; structure often difficult to see because of heavy inspersion by calcium oxalate; **algal layer** uniform, continuous; **medulla** dense, strongly interspersed with grayish granules; **lower cortex** often present, but usually not well developed except near the edges.

APOTHECIA almost always common, immersed to adnate or more or less broadly sessile, to 12(3) mm diameter; **discs** variously colored, pruinose or not; **margins** mostly 0.1-0.2 mm wide, slightly raised then level, persistent or occasionally crowded back; **spores** (often?) rather thickwalled.

SPERMOGONIA immersed, globose; **spermatia** filiform, curved.

SPOT TESTS AND CHEMISTRY: **cortex** always with usnic acid, rarely also placodiolic acid, often with various K⁺ yellow, P⁺ orange or red substances; **medulla** with fatty acids or phenolic substances, very rarely with triterpenes.

DISTRIBUTION AND ECOLOGY: Usually on siliceous to weakly calcareous rocks, occasionally on sand, low to high elevations, often more or less nitrophilous, mostly on exposed horizontal to gently sloping surfaces.

1. Discs epruinose, greenochre to pale ochrebrown; spores 911 x 57 um; thallus K (usnic and roccellic acids only), the surface yellowgreen pruinose, at least at margins. More or less calcicolous, usually in pinyonjuniper communities. [If growing in the Sonoran Desert with ocotillo, palo verde, etc., see Lecanora kofae Ryan & Nash, in press] S. degelii Poelt

1. Discs more or less pruinose, yellowbrown to dark brown or ochregreenish; thallus K⁺ yellow or K. 2

2. Thallus K (?) (usnic, hypostictic and hyposalazinic acids); discs more or less yellowbrown to dark brown; spores 611 x 56 um. On slightly calcareous sandstone. Southwestern US. S. "americana" Ryan & Vnisk ined.

2. Thallus K⁺ yellow (usnic acid, unknown), P, the surface pruinose, ochrewhitish; discs ochregreenish; spores (8)911 x (4)56 um. Alberta. S. "albertae" Ryan in herb.

There are several other things that may belong here, but are presently known from only one or few specimens and I haven't studied them enough yet.

Detailed Descriptions

Squamarina degelii Poelt

[Description based on Poelt (1958), Poelt & Buschardt (1978), Timdal (1983), and my own notes on European and North American specimens, including the holotype; need to incorporate Poelt & Grube (1993)].

THALLUS: small to medium sized, 0.5(1.5) cm wide, 12 mm thick, forming irregular rosettes or mounds, often confluent, sometimes composed only of only a few squamules, rather closely appressed; **Thallus Center:** areolatesquamulose, mostly covered by apothecia, especially in old thalli; squamules small, short, 0.5(0.8) mm wide, broadly rounded, thick, subpeltate, fastened by a wide hyphal cluster, plane to slightly concave; edges often thickened; **Lobes:** separate, to 11.5(2) mm long, 0.5(1.5) mm wide, mostly somewhat longer than wide, ca. 0.3 mm thick, broadly rounded to coarsely crenate, plane to slightly convex, distinctly lifted off substrate, the margin often somewhat bent upwards; **Upper Surface:** sometimes somewhat rimose, epruinose to thinly whitish pruinose, pale greenish yellow (104) to grayish greenish yellow (105) or pale yellowish green (121), often paler and yellowish to whitish on edges of squamules or lobes, in herbarium yellowish gray (93) under pruina, to almost yellowish white (92) with pruina, sometimes becoming pinkish when growing on red sandstone; **Lower Surface:** white; **Upper Cortex:** uniform, 2540 μ m thick, strongly interspersed with coarse granules, strongly conglutinate, evenly thick to rather irregular, distinctly delimited, mostly without empty algal cells, the hyphae swollen; **Algal layer:** continuous, dense, distinctly differentiated, ca. 3040 μ m thick; algae 8(15) μ m diameter; **Medulla:** entirely filled with large roundish grayish granules (insoluble in K); **lower cortex** ca. 40 μ m thick, rather weakly conglutinate; hyphae more or less randomly oriented, ca. 3 μ m diameter, with threadlike lumina.

APOTHECIA: dispersed to usually numerous and aggregated, often arising on the tips of the lobes, first immersed, broadly emergent, then soon broadly sessile, finally constricted, to 1.5(2.5) mm diameter, at first rounded, later distorted and lobed; **Discs:** plane to moderately convex or undulate and deepened in the middle, epruinose, matt, light to medium olive brown (94-95), to deep yellowish brown (75), medium yellow (87), grayish yellow (90) or light to dark grayish olive (109, 111), usually (?) N, **Thalline margins:** thick (0.2-0.3 mm wide) then thin, at first somewhat projecting, becoming flexuous to irregularly

broadened, often crenate towards inside, then depressed (crowded back), pale yellow (89) to pale greenish yellow (104); **proper margin** sometimes visible when young, grayish greenish yellow (105) **Cortex:** 3050 um thick, inspersed with yellowish granules; hyphae irregularly anticlinal and branched, ca. 23 um diameter, with threadlike lumina; **Algal Layer:** present under hypothecium and in upper part of margin, continuous to interrupted, often irregular, ca. 5075 um thick; **Medulla; Excipulum:** conglutinate, hyaline; hyphae periclinal to randomly oriented, ca. 3 um diameter, the lumina mostly narrow, 12 um; **Hypothecium:** to 75100 um thick; **subhymenium** 20 um thick; **Hymenium:** (40)8090 um high, distinctly delimited; **epihymenium:** 1025 um thick, inspersed with fine brownish granules (soluble in KOH), sometimes the granules extending deeper into the hymenium, covered by thin surface layer; **Paraphyses:** simple to branched and often anastomosing, strongly conglutinate, cells elongated, ca. 5 um long, ca. 1.5 um thick below, the tips only weakly clavate thickened, to ca. 2.5 um thick, hyaline; **Asci: Spores:** small, ellipsoid to broadly ellipsoid (L:W = 1.42), (8)8.99.5(11) x (4)5.25.66.2(7) um.

SPERMOGONIA: Spermatia: Fulcra:

SPOT TESTS AND CHEMISTRY: Cortex: K, P, C, KC+ yellow (usnic acid); **Medulla:** K, P, C, KC (roccellic acid, or apparently no substances). TLC of holotype (by Vnsk?).

DISTRIBUTION: Europe (Norway, possibly Germany see maps in Poelt & Krger, 1970 and Timdal, 1983); Asia (Himalayas); southwestern United States (Arizona, Colorado, Nevada, New Mexico, Utah).

ECOLOGY: On more or less calcareous rock (calcareous slate, calcareous schist, limestone) in Europe, calcareous sandstone in N. America, mostly on horizontal to gently sloping (to 750), more or less smooth surfaces, in exposed to somewhat shaded sites but always in dry, open situations, usually on south to westfacing slopes, scattered, nitrophilous; in Europe found mainly near the sea or by large lakes, 01020 m, usually associated with in Asia... [see Poelt & Grube, 1993]; in N. America found in inland desert or steppe areas (not close to bodies of water) at 6102000 m elev. associated vascular plant communities include sagebrush and pinyonjuniper.

DISCUSSION: The cortex of this species is not developed to the normal Squamarina type [according to ?].

The presently known distribution of this species is very peculiar, and the ecology is quite different in the different areas from which it has been reported.

Squamarina americana Ryan & Vnsk, sp. nov.

TYPE: UTAH: Carbon Co.: 39°39'N, 110°57'W. N ("E") side of Consumer Road, 5.1 mi W of Hwy 6, between towns of Price and Helper, on 4560'W facing sandstone in Pinyon-Juniper community, 1950 m, 14 Aug. 1985, Ryan 18092, **Holotype** (ASU), **Isotypes** (BRY, CANL, COLO, GZU, US).

THALLUS: forming low moundlike rosettes 0.51(1.5) cm across, 12 mm thick, tightly adherent; submarginal area much raised. **Lobes:** to 12 mm long, 0.51(2) mm wide, ± overlapping, flat to slightly concave, crenate-incised towards tips, thin. **Thallus Center:** areolates squamulose; squamules 0.51 mm across, irregularly rounded, closely contiguous, flat, thick; edges slightly raised. **Upper Surface:** partly rimose, matt, slightly greener than pale greenish yellow (104) to pale yellowish green (121), in herbarium becoming dark grayish yellow (91) to grayish greenish yellow (105), with patchy, thin, smooth (fine) white pruina; sometimes blackened by fimbriate hyphae of a parasite; edges concolorous, or paler due to pruina; **Upper Cortex:** 2040 µm thick, inspersed with yellowish granules (soluble in K); cells distinct in K, 34 µm diam.; outer 810 µm inspersed with grayish granules insoluble in K. **Algal layer:** ca. 70 µm thick, ± continuous and even; algae 1012(15) µm diam.; **Medulla:** white, dense, chalky, filled with grayish granules (insoluble in K); hyphae 5 µm diam.

APOTHECIA: common towards thallus center, often clustered and crowded, rounded to often irregularly lobed or distorted by crowding, adnate to closely sessile or slightly constricted at base, 0.31.5 mm diam., borne submarginally 12 per areole. **Discs:** plane to ± convex, light to moderate olive brown (9495), light grayish yellowish brown (79), medium yellowish brown (77), medium yellow (87), or dark brown (59), pruinose, with pruina appearing pale yellowish green (121) to light grayish yellowish brown (79), sometimes blackened by fimbriate hyphae of a parasite; **Margins:** 0.10.2 mm wide, soon flexuous and becoming coarsely crenate towards inside, whitish pruinose, slightly raised then level with disk or often partly raised at least on one side; **Cortex:** ca. 30 µm thick, similar to that of thallus; **Algal Layer:** present in margin and below hypothecium, where it is penetrated by bundles of hyphae from above; **Excipulum:** **Hypothecium:** to ca. 5075 µm thick, hyaline, conglutinate, of hyphae ± distinctly periclinal to surface of disk, K+ yellowish mist; **Hymenium:** 6585 µm; **epihymenium** 1530 µm thick, inspersed with fine brownish granules (soluble in K), covered by 5 µm thick layer of coarser granules (insoluble in K); **Paraphyses:** ± simple; tips clavate-capitate, to

34 um thick, olive, K+ olive green; **Asci:** clavate, ca. 45 x 13 um; **Spores:** broadly ellipsoid to ovoid, (6.5)910(11) x (4)57 um.

SPERMOGONIA: immersed, 90 um wide, 130 um deep; wall hyaline; **Spermatia:** filiform, (13)1520(23) um long.

SPOT TESTS AND CHEMISTRY: **Cortex** KC+ yellow (unsic acid); **Medulla** K+ yellow (?according to Ryan 1989c, but my key says K; my original notes say K or K+ yellow) (hypostictic andhyposalazinic acids; unknown (?)), P, C.

DISTRIBUTION AND ECOLOGY: Western N. America (Utah), On sandstone, 45650Wfacing, exposed, 1950 m; associated vascular plant communities include pinyon juniper; associated lichens include Candelariella rosulans, Lecanora argopholis, L. garovaglii, Squamarina degelii, and Xanthoria elegans.

LITERATURE REPORTS: Ryan (1989c).

DISCUSSION: This species is not likely to be confused with any other lichen, except S. "albertae" (presently known only from a much higher latitude), and perhaps members of the Lecanora bipruinosa group, which usually have more extensive thalli and more distinct marginal lobes, and usually contain psoromic acid (P+ yellow). It differs from eurasian species with pruinose disks in chemistry and other features.

***S. albertae* Ryan, sp. nov. (= ? *S. magnussoni*)**

TYPE: CANADA: ALBERTA. Bird 18733, Holotype (UAC).

THALLUS: irregularly rosettiiform, to about 1 cm diameter, or confluent into larger masses to 3 cm wide, to 1.5 mm thick in center, thinning out strongly toward periphery; **Lobes:** isodiametric to slightly elongated, 0.5-1.5 mm wide and long, broadly rounded to very coarsely crenate; edges even to slightly swollen; **Thallus Center:** areolatesquamulose, mostly covered by apothecia; squamules 0.5-1 mm wide, thick, flat; **Upper Surface:** in center of squamules epruinose, along the edges densely white pruinose; color light yellow green (119) to pale yellow green (121) or light greenish yellow (101); edges of squamules black under pruina; **Upper Cortex:** 30-50 µm thick, interspersed with granules (insoluble in KOH); **Algal layer:** ca. 50 µm thick; algal cells ca. 10 µm diam.; **Medulla:** to 500 µm thick, interspersed with granules (insoluble in KOH); hyphae 6 µm wide.

APOTHECIA: numerous and crowded in thallus center, round to irregular, born on margins of squamules (away from tips of marginal lobes), to 1.5(2) mm diameter, broadly emergent, soon somewhat constricted sessile; **Discs:** light olive brown (94), medium yellow (87), dark olive brown (96), dark grayish olive (111); more or less yellow pruinose; **Margins:** slightly raised, or even with disc, 0.1-0.2 mm thick, entire to occasionally coarsely crenate, concolorous with thallus, epruinose; **Cortex:** ca. 25 µm thick; **Algal Layer:** ca. 50 µm thick, irregular, subcontinuous; **Excipulum:** **Hypothecium:** 50-75 µm thick, hyaline, conglutinate, the hyphae irregularly oriented, ca. 5 µm thick with lumina ca. 1 µm thick; **Subhymenium:** pale greyishbrownish, ca. 30 µm thick; **Hymenium:** 55 µm high; **epihymenium** 10-15 µm, olive, with granules (partly soluble in KOH) on surface; **Paraphyses:** tips capitate, green, K+ darker green; **Asci:** broadly clavate, 35 x 12 µm; **Spores:** more or less broadly ellipsoid, (8-)9-11 x (4-)5-6 µm, rather thickwalled.

SPERMOGONIA: Spermatia: Fulcra:

SPOT TESTS AND CHEMISTRY: Cortex KC+ yellow (usnic acid); **Medulla** K+ yellow (?) (zeorin; unknown).

DISTRIBUTION AND ECOLOGY: Canada (Alberta), on siliceous? rock.

LITERATURE REPORTS: Ryan (1989c).

DISCUSSION: This taxon needs further study, and I'd prefer to have more material before describing it.

Literature

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