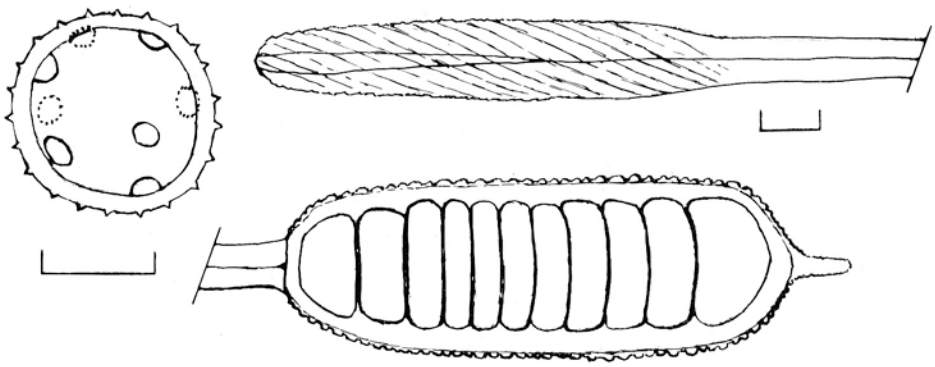
PHRAGMIDIUM FUSIFORME VAR. NOVI-BOREALE



Aeciospore (left) showing pores delimited under phase contrast by refractive hemispheric internal caps. Teliospore (right) showing relatively small warts and steep spiral in pedicel. Scales = 10μ.

Phragmidium fusiforme Schroet., Abh. Schles. Ges. Vaterl. Cult. Nat. Abt. 1869-72: 24. 1870, var. **novi-boreale** Savile var. nov.

A varietate *fusiformi* differt teliosporis plerumque brevioribus (55-)62-106(-112)μ long.; cellulis paucioribus (4-)6-11(-12)μ, cylindricis vel ellipsoideis nec fusiformibus; cellula apicali haud vere conica; verrucis valde parvioribus, ca. 0.5-1.0(-1.5)μ alt. × 0.8-2.5(-3.0)μ lat.; pedicellis saepe longioribus, usque ad 135(-145)((-180))μ long., prope basem leniter et gradatim ventricosis, striis dextrohelicalibus axem pedicelli transitantes ad angulum (5-)10-30(-40)°.

Typus: On *Rosa acicularis* Lindl. var. *bourgeauiana* Crépin: British Columbia: 8 km. NE of Clinton (1010 m.s.m.), 5 Sept. 1954, DAOM 147301 (Calder, Savile & Ferguson 15443; isotypi ad BPI, H, IMI, PRC, PUR, ZT).

PYCNIA applanate, small, inconspicuous, apparently generally epiphyllous, not seen in sori on other parts of plant. AECIA hypophyllous (to epiphyllous) and small if on leaf lamina, larger on mid-veins, petiolules and petioles, often to 1 cm. diam. on young stems or hypanthia, bright yellow when fresh; paraphyses generally few and weakly developed or none. AECIOSPORES 17-27(-29)((-32)) × 14.5-22.5((-25))μ; wall (1.0-)1.2-2.5(-2.8)μ, hyaline; echinulations 0.5-0.8μ high × 0.5-0.8(-1.0)μ diam.; germ pores (4-)6-9(-10), scattered, generally invisible except for hemispherical internal refringent caps ca. 1.0-1.8μ high × (2.5-)3.0-3.5(-4.5)μ diam., clearly visible with phase-contrast except in overmature material. UREDINIA hypophyllous, small, light yellow when fresh; with abundant incurved hyaline allantoid to subclavate paraphyses, ca. 35-65 × (6-)8-13(-15)μ, with wall (0.5-)0.7-1.0μ below, usually increasing on upper outer face and at apex to 1.5-2.5(-3.0)μ. UREDINIOSPORES 17-27(-28) × 14.5-23μ; wall 0.7-1.8(-2.0)μ, hyaline (or occasionally brownish in age); echinulations (0.5-)0.6-0.8μ high × 0.5-0.7μ diam.; germ pores apparently 6-9(-10) and scattered, but definitely locatable only when internal refringent caps ca. 0.5-1.0μ high × 2.0-3.0μ diam. are well developed. TELIA hypophyllous, small, black, with abundant paraphyses similar to those in uredinia. TELIOSPORES (4-)6-11(-12)((-13))-celled, (55-)62-106(-112)((-125)) × (23.5-)25-33(-35)μ, including apiculus and warts, cylindric to ellipsoid, never truly fusoid, basal cell truncate-rounded, apical cell rounded to subconic; apiculus (0-)2-11(-13)μ long, brownish and finely verrucose at base, grading to subhyaline and usually smooth at apex; wall, excluding warts, 2.7-5.0(-6.0)μ, chestnut except for thin outer yellow layer bearing round yellow warts ca. 0.5-1.0(-1.5)μ high × 0.8-2.5(-3.0)μ diam. or occasionally to 4.5μ long; germ pores 2(-3) in apical cell, regularly 3 in all other cells, approximately equatorial; pedicels (50-)70-135(-145)((-180))μ long, hyaline except brown adjacent to spore, swelling slightly and gradually in basal (1/2-)3/5-3/4, with steeply dextrorse-helical striae crossing axis of pedicel at (5-)10-30(-40)°.

HOSTS: *Rosa* spp., especially *R. acicularis* Lindl. (see Collections).

DISTRIBUTION: Yukon (N to Dawson), Mackenzie (N to Mackenzie Delta), British Columbia, Alberta, Saskatchewan, Manitoba, Ontario (E to Timagami).

COLLECTIONS: *Rosa acicularis* Lindl. var *bourgeauiana* Crépin: Yukon, 4 collns.; Mack., 8; B.C., 28; Alta., 7; Sask., 1; Man., 4; Ont., 3. *R. gymnocarpa* Nutt.: B.C.: Botanie Valley, ca. 50°15′N 121°35′W, DAOM 147424 (Krajina, ex DAO); Sorrento, NW Salmon Arm, 7977 (Woolliams). *R. nutkana* Presl var. *nutkana*: B.C.: Queen Charlotte Is.: Skidegate and Queen Charlotte City, Graham I., 147426, 147427 (Calder et al. 22450, 23015), Henslung Bay, Langara I., 147428 (Calder et al. 22569), Hotspring I., near Lyell I., 147425 (Calder et al. 22304); Squamish, NW of Vancouver, 766 (Boyce). *R. nutkana* var. *hispida* Fern.: B.C: near Chute L., E of Okanagan L., 147300 (Calder & Savile 10203); NW of Osoyoos L., 147303 (Calder & Savile 9853). *R. pisocarpa* A. Gray: B.C.: Cache Creek, 147430 (Rhodes 9007, ex DAO). *R. woodsii* Lindl. var. *ultramontana* (S. Wats.) Jeps.: B.C.: N of Clearwater, North Thompson R., 147431 (Calder et al. 19919); Sugar L., N of Cherryville, 75693 (Brown); Pillar L., W of Armstrong, 75694, 75695 (Brown); Swan L. near Vernon, 147295, 147296 (Calder & Savile 10959, 10960); Trinity Valley, E of Armstrong, 75696 (Brown); West Summerland, 26065 (Fitzpatrick & Woolliams); Goat R. Canyon, near Creston, 280 (McCallum 1132). *R. woodsii* var. *woodsii*: Alta.: S of Winterburn, near Edmonton, 105170 (Moss 5063); near Pincher Creek, 105169 (Moss 192 SSS).

NOTES: The above description is based on the cited Canadian collections plus several on *R. acicularis* and one on *R. nutkana* from Alaska, and several from the Rocky Mountain states south to Boulder Co., Colo., mainly on *R. acicularis*.

Phragmidium fusiforme was described on *Rosa alpina* L. from Dusziki Zdroj (Reinertz Bad) near Klodzko (Glatz) in southwest Poland close to the Czechoslovak border. Among seven available specimens on the type host is Fl. Exs. Austro-Hung. 360 II, collected at Vrbno (Karlsbrunn) in the Orlicke Mts., Czechoslovakia, very close to the Polish border, about 70 km. from the type location. This collection, Fl. Exs. Austro-Hung. 360 I (Tirol, Austria), Kunze F. Sel. Exs. 310 and Rabh. F. Eur. 2555, both near Zürich, are extremely similar; but two from western Switzerland and one from Haute Savoie, France, tend to have slightly shorter teliospores. A composite description of the teliospores follows: ((7-))(8-)9-12(-13)((-14))-celled, ((65-))75-120(-126) × 25-32μ, truly fusoid with basal cell truncate-conic and apical cell usually truly conic (often tapering to point without distinct apiculus), rarely cylindric in 2-3 central cells of long spores; apiculus 0-12(-14)μ long grading to subhyaline and smooth at apex; wall 2.7-5.0(-5.5)μ, light chestnut with thin outer yellow layer bearing warts ca. 0.8-2.2(-3.0)μ high × (1.0-)1.2-4.0(-4.5)μ wide (occasionally to 5.5μ long); pores 2(-3) in apical cell and 3 in other cells; pedicels (55-)80-125μ long, slightly to moderately and gradually to abruptly swollen in lower 1/2-2/3 with dextrorse-helical striae crossing axis of pedicel at (30-)40-45°. This rust is so different from the North American population in spore shape, warts and pedicel characters that the two taxa would be thought specifically distinct except for the fact that Finnish material is intermediate and variable in all these characters. It is thus necessary to treat the Finnish rust as a third variety: *Phragmidium fusiforme* Schroet. var. **rosae-acicularis** (Liro) Savile comb. nov. (*Ph. rosae-acicularis* Liro, Bidr. Kanned. Finl. Nat. Folk 65: 428. 1908).

The limits of var. *novi-boreale* are not fully understood. We have specimens on wild roses (probably mostly *R. blanda* Ait.) in Quebec that do not seem to be typical *Ph. americanum* (Peck) Diet. and possibly have introgressed with *novi-boreale*. The status of *Ph. montivagum* Arth. is also in doubt. Most of the hosts listed by Arthur (Manual of the Rusts, 1934) under various names are also hosts of var. *novi-boreale*. There may be two rusts involved: one with abruptly swollen pedicels; and one, mainly on *R. acicularis* (s. lat.) that is simply var. *novi-boreale* with spores slightly shorter than typical owing to hot and dry conditions, a growth modification often seen in *Phragmidium* spp. Incidentally, the type host of *Ph. montivagum* was stated to be *R. sayi*, now considered a synonym of *R. acicularis* var. *bourgeauiana*.

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