



Teliospore showing relatively thin wall, very irregular warts, pedicel moderately swollen for less than half length, and shallow pitch of striations. Scale = 20μ .

Phragmidium arcticum Lagh. ex Liro, Bidr. Känned. Finl. Nat. Folk, 65: 419. 1908 (Jan.).

≡ *Ph. arcticum* Lagh. in Vestergr., Micr. Rar. Sel. 856. 1905 (nom. nud).

≡ *Ph. arcticum* Lagh. ex Vleugel, Sv. Bot. Tidskr. 2: 137. 1908 (15 June).

PYCNIA not found, probably lacking. AECIA hypophyllous or sparingly epiphyllous, caeomoid, yellow when fresh; incurved paraphyses few to many, to 60μ long, $8-15\mu$ wide, with wall $0.5-1.0\mu$ thick below, increasing on convex side and at apex to $1.3-3(-5)\mu$. AECIOSPORES $(16-18-24(-26.5) \times 14-20(-21.5)\mu$; wall ca. $0.5-0.8\mu$ excluding warts, hyaline; warts flat-topped, irregular, labyrinthiform-tesselate, $0.5-0.8(-1.0)\mu$ high, $0.6-2.5(-3.0)\mu$ wide and $0.8-7\mu$ long; germ pores invisible but locations occasionally indicated by hemispherical refringent internal pore caps ca. $3.5-4.5\mu$ wide, scattered, probably 5-6. UREDINIA apparently scarce, hypophyllous. UREDINIOSPORES $16-23.5 \times (12.5-16-16.5\mu$; wall ca. $0.6-1.0\mu$, hyaline; echinulations ca. $0.6-0.8\mu$ high, $0.5-0.7\mu$ wide, at $1.0-2.2\mu$ spacing; internal refringent caps indicate pores to be ca. 5-6 scattered. TELIA hypophyllous, generally with no paraphyses. TELIOSPORES 5-9(-10)-celled, $65-140(-155) \times (22-23-28(-30)\mu$, including apiculus and warts, nearly cylindrical; apiculus $2-12(-14)\mu$ long; wall $2.2-3.5(-4)\mu$ excluding warts, bilaminate (to partly trilaminate), chestnut next lumen and yellow on outside; yellow warts very irregular, $0.5-2.5\mu$ high, $0.8-3.8(-4.5)\mu$ wide and occasionally to $6.5(-9.0)\mu$ long; germ pores (2-)3(-4) per cell, approximately equatorial; pedicels $50-154\mu$ long, swelling moderately in basal 1/3 to 1/2 with dextrorsely helical striae crossing axis at $40-60^\circ$.

HOSTS: *Rubus* sugenus *Cylactis*.

DISTRIBUTION: Cool-temperate and subarctic Mackenzie, Alberta and Quebec (also northern Eurasia).

COLLECTIONS: *Rubus acaulis* Michx.: Mack.: Browning Landing, between Fort Simpson and Fort Providence, ca. $61^\circ 30'N$, DAOM 5571 (Baxter ex MICH). Alta.: Mi. 97 Mackenzie Hwy., DAOM 25045 (Moss 9141); Fox Creek, NW of Whitecourt, $54^\circ 10'N$, DAOM 105154 (Moss 12705). Que.: Great Whale River (Poste de la Baleine), DAOM 23630, 23669 (Savile 374, 597).

NOTES: *Phragmidium arcticum* closely resembles *Ph. occidentale* in its aeciospores and urediniospores, but the aeciospore warts generally seem to be slightly smaller. The teliospores and their pedicels vary greatly in length, but this variation may be only phenotypic, for there is substantial uniformity in the relatively narrow spores, relatively thin walls, very irregular warts, and the pedicels swollen substantially in less than the basal half. All these characters separate this rust from *Ph. occidentale*. A limited amount of Finnish material on *Rubus arcticus* L. agrees closely in all the stable characters.

Rubus acaulis and *R. arcticus*, the two recorded hosts, are closely related, as is *R. stellatus* J.E. Sm., known to take a separate rust *Ph. alaskanum*. These three species hybridize on contact and have been treated as a single complex species by Boivin (Bull. Soc. Bot. France, 102: 234. 1955), who treats *R.*

acaulis as *R. arcticus* ssp. *stellatus* var. *acaulis*. The rust is to be sought in Alaska, Yukon, northern Saskatchewan and Manitoba, central Quebec and Newfoundland. *R. pubescens*, a more distantly related species of *Cylactis*, is not known to take any *Phragmidium*.

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