

Notes on the Alpine Flora of the St. Elias Mountains

Botanical exploration along the continental slope of the northern St. Elias Mountains¹ has revealed several floristic novelties. My 1965 collection from a nunatak in the Kaskawulsh Glacier (60°43'N., 139°19'W.) was examined by Dr. Eric Hultén, Museum of Natural History, Stockholm, and he has reported² and mapped³ this new locality for *Lewisia pygmaea* (Gray) Robins., *Arabis lemmonii* Wats., and *A. lyallii* Wats., far north of their previously known range. Neilson⁴ collected nearby and also found interesting taxa, in particular the only North American population of the Eurasian species *Artemisia rupestris* L.

Work has continued during subsequent summers (1966-1969) east from the nunatak along the Kaskawulsh Glacier-Slims River drainage, north to the vicinity of the Steele Glacier, and into the northernmost portion of the St. Elias Mountains on the south side of the upper White River valley. The following notes are offered for those botanists with an interest in the floristics of northern regions.

Unless otherwise stated, all specimens were collected by David F. and Barbara M. Murray, and vouchers are deposited at ALA and CAN.⁵

Rumex graminifolius Lamb. 2035, 2214.

These collections are from the vicinity of the Guerin (60°37'N., 141°05'W.) and Sheep (60°42'N., 141°39'W.) glaciers in the upper White River valley, Alaska. Hultén³ generalized the habitat of this species as "sandy places on tundra" and noted its occurrence in coastal areas from northernmost arctic Alaska south to the Alaska Peninsula. The St. Elias localities mark an extension of its range into the interior of Alaska. It is, however, restricted at these two sites to the extensive deposits of volcanic ash that are peculiar to southern Yukon Territory and particularly to the headwaters of the White River.⁶ The texture of the ash is much like that of coarse sand, and the redistribution of the ash has resulted in accumulations with distribution, size, and configuration similar to snowbanks.

Thirty species of vascular plants were noted growing on the ash surfaces. All but *R. graminifolius* and *Papaver alboroseum* (see below) were also found scattered on the surrounding tundra or among the peaks as much as 150 m. to 350 m. higher than the major ash deposits. The presence of such high alpine taxa as *Douglasia gormanii* Constance, *Polemonium boreale* Adams var.

villosissimum Hult., *Syntheris borealis* Pennell, and *Saussurea viscida* Hult. var. *yukonensis* (Pors.) Hult. on lower slopes at only 1,220 m. indicates considerable ecological amplitude and suggests that lack of competition in the ash from otherwise dominant tundra species is important in determining their presence there. Since the ash is found over a wide area, *R. graminifolius* may very well be more common there than present information would indicate.

Stellaria umbellata Turcz. 645.

This collection is from a high snowflush area at 2,000 m. on Observation Mountain (60°48'N., 138°43'W.) near the terminus of the Kaskawulsh Glacier, and it extends the range of the northern element of the North American populations from Alaska⁷ south into Yukon Territory. There is a second Yukon locality for this species at Trout Lake in the British Mountains (68°51'N., 138°42'W.; Calder 34333 DAO⁵). A large gap remains between these Yukon populations and those that extend from the Canadian Rocky Mountains southward.

Papaver alboroseum Hult. 2212, verified by Eric Hultén, 1969.

This species is known from its type locality in eastern Asia,⁸ and in Alaska from Seward⁹ and the vicinity of the Portage Glacier.¹⁰ Other reports of this species for Alaska and Yukon are disputed.

This collection is from the Sheep Glacier vicinity where it is limited to deposits of volcanic ash. Its habitat is characterized as "sandy, gravelly soil,"⁸ and the type collection is from an area of volcanic activity. As with *Rumex graminifolius* (see above), I suspect that there is a strong edaphic control on the distribution of this species.

The petals are white distally, tinged with pink (mother-of-pearl), with a bright yellow spot at the base. The colours, in particular the pink, fade with drying. Other species of poppy have white petals,¹¹ but lack the pink tinge and the yellow spot. Some species occur with yellow and white petals suffused with pink distally, but this colour variation occurs among the taller, erect, yellow poppies of Alaska. The *P. alboroseum* I have seen occurs consistently in dense clusters with several decumbent, curved scapes (compare the photographs in Hultén,⁸ Plate 3c, and Gjaerevoll,¹⁰ Plate I).

Aphragmus eschscholtzianus Andr. 3028.

Another locality for this rare crucifer has been found at Outpost Mountain (60°56'N., 138°22'W.) near the south end of Kluane

Lake. A luxuriant population was found in shallow meltwater channels on a high, sparsely vegetated mountain top at 2,100 m. Also occupying this site were *Phippsia algida* (Sol.) R. Br., a viviparous *Poa arctica* R. Br., and *Chrysosplenium wrightii* Fr. & Sav.

I have discovered an unreported specimen of *A. eschscholtzianus* in our Herbarium (ALA) from Rainbow Mountain on the Richardson Highway between Delta Junction and Summit Lake (63°68'N., 145°37'W.) (Parker RM-28). This is apparently the first collection of this species from the Alaska Range. This locality, the three in the St. Elias, and the one in the adjacent Wrangell Mountains⁷ indicate that this species is perhaps more widespread in the interior mountains wherever snow banks and glaciers provide a constant source of meltwater. In the continental, dry interior, such sites are usually found at the highest elevations from which vascular plants are known.¹² The remoteness of these areas makes collecting difficult; hence it will be some time before the extent of its range can be appreciated.

Braya purpurascens (R. Br.) Bunge 825, 1527.

These collections from the St. Elias Mountains between Sheep and Bullion creeks at the south end of Kluane Lake (61°01'N., 138°38'W.) provide an intermediate locality for this species between Alaska and the disjunct population discovered by John Packer in the mountains of southern Alberta (Packer, personal communication).

This is the first report for the Yukon, but I would expect it to be found on the arctic coast there. These plants were growing in relatively barren mineral soil that was highly disturbed by desiccation cracks and needle-ice activity.

Draba bellii Holm 927, 1528, 1818, 2267, 3031 (= *C. macrocarpa* Adams, fide G. A. Mulligan).

This species occurs in rock crevices and in the interstices of blocky talus above 1,670 m. and up to 2,100 m. Specimens were collected from the mountains between Sheep and Bullion creeks, in the vicinity of the Steele Glacier, at Outpost Mountain, Yukon, and in the vicinity of the Sheep Glacier in the upper White River valley, Alaska. The late Vin Hoeman brought me a fruiting specimen from c. 2,800 m. on a spur of King Peak overlooking the Quintino Sella Glacier (60°35'N., 140°39'W.). The specimen was cited by Hultén,^{3:530} but not included on the dot map. This is by far the highest point at so northern a latitude from which vascular plants have been collected.

Draba macounii Schulz 96, 796, 1084, 1101, 1385, 1539, 1599, 3030. (? *D. alpina* L. var. *nana* Hook. of Löve and Freedman¹¹ and Bakewell¹³).

This member of the *D. alpina* complex was found above 1,800 m. on the Kaskawulsh Nunatak, in the mountains between Sheep and Bullion creeks, on Outpost Mountain, and in the vicinity of the Steele Glacier. Cody and Porsild¹⁴ have cited specimens to document its distribution in the Mackenzie Mountains, Northwest Territories.

Draba ruaxes Payson & St. John 865, 1218, 1343, 1541, 1817, det. G. A. Mulligan.

This *Draba* (1343) was reported by me¹⁵ as *D. ventosa* Gray. However, G. A. Mulligan of the Plant Research Institute, Canada Department of Agriculture, Ottawa, has determined my material as *D. ruaxes* which he finds both morphologically and cytologically distinct from *D. ventosa*. A discussion of their taxonomy is being prepared by him.¹⁶

Draba ruaxes was described from material collected on a mountain top in Washington and has been known only from there and two peaks in British Columbia and one in Alaska.¹⁷ Fig. 1 is a distribution map for *Draba ruaxes* in Alaska and Yukon based on material at ALA and the published records of Hitchcock.¹⁷ Alaskan and Yukon material has been residing in herbaria under *D. bellii* and *D. macrocarpa*, and Hultén³ placed the Alaskan material representing this taxon under *D. exalata* Ekm.

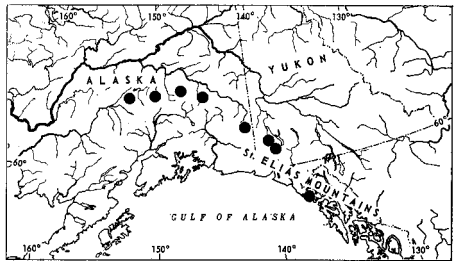


FIG. 1. Distribution map for *Draba ruaxes* in Alaska and Yukon.

In the St. Elias Mountains and the Alaska Range, *D. ruaxes* occurs on dry scree slopes at high elevations. Here it is the only *Draba* with numerous bright yellow flowers, sterile shoot apices with compact, ball-like leaf clusters, and large, orbicular, essentially glabrous siliques.

Smelowskia calycina (Steph.) C. A. Mey. ssp. *integrifolia* (Seem.) Hult. 2200.

Several plants were found at 1,800 m. in the vicinity of the Russell Glacier terminus

¹⁰Gjaerevoll, O. 1963. Botanical investigation at the base of bedrock outcroppings. This is a southern extension of the taxon which is otherwise known from arctic Alaska.

My material has basal leaves that are entire or with one to five lobes. The specimen of *S. calycina* ssp. *integrifolia* from the one interior Alaska locality mapped by Hultén³ differs by having entire basal leaves with only one or two shallow lobes at the apices.

The latter was treated as *S. calycina* var. *porsildii*¹⁸ and considered parallel to var. *integrifolia*, but has been reduced to a variant of *integrifolia* by Hultén (*S. calycina* ssp. *integrifolia* var. *porsildii*). Yurtsev¹⁹ on the other hand, has assigned it the rank of species (*S. porsildii*). The need for detailed population analysis is clear, and we will gather material from the Seward Peninsula and the Brooks Range, Alaska, during the next field season.

Oxytropis arctica R. Br. 522.

This collection came from an exposed ridge crest at 1,800 m. on Observation Mountain. This is an arctic species and has been collected previously in Yukon Territory, but at Herschel Island on the arctic coast.

Androsace alaskana Cov. & Standl. 3014.

This rare plant was found on Outpost Mountain (see *Aphragmus* above) in well-drained, dry sites with such species as *Draba stenopetala* Trautv., *Oxytropis huddelsonii* Pors., and *Saussurea viscida* var. *yukonensis*. This is the second report of the species for Yukon Territory.²⁰ See Gjaerevoll²¹ for a photograph and discussion of this taxon and its high alpine associates.

Polemonium boreale Adams var. *villosissimum* Hult. 1367, 1718, 2026, 2097, 2191, 2256, 3015. (? Mt. Harper and McKinley Park specimens of Gjaerevoll²¹).

With its capitate, densely white-villous inflorescence, this is a well-marked variety. It appears to be ecologically separated from var. *boreale* in that it occupies exposed scree

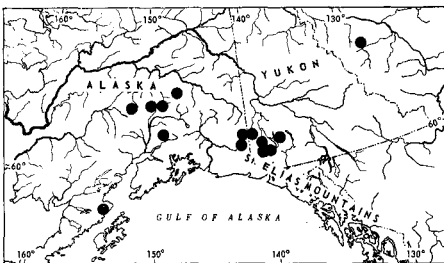


FIG. 2. Distribution map for *Polemonium boreale* var. *villosissimum*.

and ridge crest lithosols at higher elevations. Studies are in progress better to understand the relation of these two taxa. Fig. 2 is a distribution map based on specimens examined from the collections at ALA, CAN, DAO, US, WTU.⁵

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REFERENCES

- ¹Canadian National Topographic System: Mount St. Elias 115B & 115C and Kluane Lake 115G & 115F, 1: 250,000 sheets; U.S. Geological Survey 1: 250,000 Topographic Series, McCarthy, Alaska.
- ²Hultén, E. 1967. Comments on the flora of Alaska and Yukon. *Arkiv för Botanik*, 7: 1-147.
- ³Hultén, E. 1968. *Flora of Alaska and neighboring territories*. Stanford University Press, 1,008 pp.
- ⁴Neilson, J. E. 1968. New and important additions to the flora of the southwestern Yukon Territory, Canada. *The Canadian Field-Naturalist*, 82: 114-19.
- ⁵Lanjouw, J. and F. A. Stafleu. 1964. Index Herbariorum. Part 1, The Herbaria of the World, 5th edition. *Regnum Vegetabile*, vol. 31.
- ⁶Lerbekmo, J. F. and F. A. Campbell. 1969. Distribution, composition, and source of the White River Ash, Yukon Territory. *Canadian Journal of Earth Sciences*, 6: 109-16.
- ⁷Murray, D. F. 1968. A plant collection from the Wrangell Mountains, Alaska. *Arctic*, 21: 106-10.
- ⁸Hultén, E. 1928. Flora of Kamtchatka and the adjacent islands. *Kungliga Svenska Vetenskapsakademiens Handlingar*, Series 3, 5(2): 1-218.
- ⁹Hultén, E. 1945. *Flora of Alaska and Yukon, Part 5*. Lund: C. W. K. Gleerup. 1902 pp.

- ¹⁰Gjaerevoll, O. 1963. Botanical investigations in central Alaska especially in the White Mountains. Part II. *Det Kgl Norske Videnskabers Selskabs Skrifter*, 4. 115 pp.
- ¹¹Löve, D. and N. J. Freedman. 1956. A plant collection from SW Yukon. *Botaniska Notiser*, 109: 153-211.
- ¹²Viereck, L. A. 1967. Plants above 2,140 meters (7,000 feet) in the Alaska Range. *Bryologist*, 70: 345-347.
- ¹³Bakewell, A. 1943. Botanical collections of the Wood Yukon Expeditions of 1939-1941. *Rhodora*, 45: 305-316.
- ¹⁴Cody, W. J. and A. E. Porsild. 1968. Additions to the flora of continental Northwest Territories, Canada. *The Canadian Field-Naturalist*, 82: 263-275.
- ¹⁵Murray, D. F. 1971. Comments on the flora of the Steele Glacier region, Yukon Territory. Appendix C, in M. Fisher, ed. *Expedition Yukon*. Thomas Nelson and Sons (Canada) Limited, Toronto. pp. 178-81.
- ¹⁶Mulligan, G. A. 1971. Cytotaxonomic studies of *Draba* species of Canada and Alaska: *D. ventosa*, *D. ruaxes*, and *D. paysonii*. *Canadian Journal of Botany*, 49: 1455-1460.
- ¹⁷Hitchcock, C. L. 1941. A revision of the Drabas of western North America. *University of Washington Publications in Biology* 11. 132 pp.
- ¹⁸Drury, W. H. and R. C. Collins, 1952. The North American representatives of *Smelowskia* (Cruciferae). *Rhodora*, 54: 85-119.
- ¹⁹Yurtsev, B. A. 1969. News of the systematics of higher plants. *The Academy of Sciences of the U.S.S.R.*, 6: 302-320. Translation.
- ²⁰Porsild, A. E. 1966. Contributions to the flora of southwestern Yukon Territory. *National Museum of Canada Bulletin*, 216, Contributions to Botany, IV. 86 pp.
- ²¹Gjaerevoll, O. 1967. Botanical investigations in central Alaska, especially in the White Mountains. Part III. *Det Kgl Norske Videnskabers Selskabs Skrifter*, 10. 63 pp.

Thin Gravel Deposits on Wave-Eroded Cliffs Near Barrow, Alaska

INTRODUCTION

The beach southwest of Barrow, Alaska, is limited to a foreshore which is backed by wave-eroded cliffs of the Quaternary Gubick

Formation. These cliffs, which have an approximate elevation of 20 to 35 feet above mean sea level, are covered with a thin layer of coarse sand and gravel. This gravel unit ranges in thickness from a few inches to an intermittent covering of gravel. The unit extends inland about 10 feet in some places to about 300 feet in others.

A gravel deposit of these dimensions is of little or no importance to most scientific disciplines. However, its presence and method of formation are of extreme importance to the unravelling of the archaeological sequence along the coast of Northern Alaska.

The gravel units were first observed during the archaeological excavation of an Eskimo site at Walakpa, which is approximately 12 miles southwest of Barrow. At this location there is a sequence of gravel units interspersed throughout the stratigraphic column of the site. These gravel units were formed at the surface after a period of Eskimo occupation and then covered by a subsequent period of occupation, thus they served as a basis for separating one period of occupation from another either older or younger occupation level (Fig. 1).

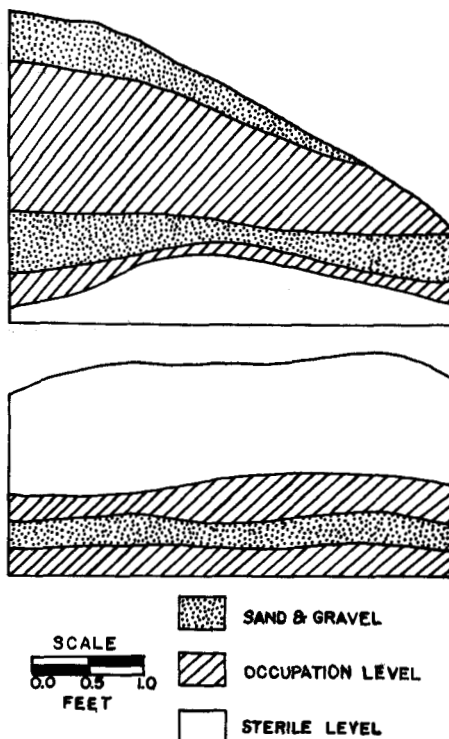


FIG. 1. Cross sections of the Walakpa site showing thin sand and gravel units.