

TAXONOMY OF *PAPAVER* SECT. *MECONELLA* (PAPAVERACEAE) IN BRITISH COLUMBIA

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ABSTRACT

Native and exotic North American species of *Papaver* sect. *Meconella* (Papaveraceae) are discussed, with a geographical focus on British Columbia, Canada. *Papaver alboroseum*, *P. lapponicum*, *P. macounii*, *P. nudicaule*, and *P. radicum* are found to be misapplied names in British Columbia, and of these, only *P. lapponicum* (subsp. *occidentale*) and *P. macounii* are found to occur North America. Species of *Papaver* sect. *Meconella* accepted for British Columbia are the exotic *P. croceum* and the native *P. hultenii*, *P. kluanense*, *P. pygmaeum*, and the novel species ***P. columbianum*** Fedde ex Björk, **sp. nov.**, ***Papaver luculentum*** Björk, **sp. nov.**, and ***Papaver roseoalbum*** Björk, **sp. nov.** One additional native, unnamed taxon is also discussed, referred to as *Papaver* "unknown 1." A key is presented to *Papaver* sect. *Meconella* of British Columbia. The neglected species *P. coloradoense* is also discussed.

The present paper is the first in a series of studies intended to clarify taxonomy of vascular plants in British Columbia (BC), Canada, toward a soon-to-be-published manual. This study focuses on Papaveraceae, especially the acaulescent arctic-alpine poppies, *Papaver* sect. *Meconella* Nutt. (Carolan et al. 2006). It accounts for all acaulescent arctic-alpine species of the genus and all of the species treated herein. Sect. *Meconella* poppies have been a long-standing challenge to taxonomists, due in part to the remote locations of most populations of the section. It is difficult and expensive to travel to the mostly tundra habitats in northern mountain ranges and in the arctic to study the plants in the field, and herbarium specimens are few and often of poor quality. Pressed specimens of sect. *Meconella* are not ideally revealing of phenotype, since leaf and petal colour do not preserve well and the petals usually fall quickly after collecting and are often absent. Confusion has also arisen from misinterpretations of type specimens or resulting from needs for lectotypification.

A taxonomic model can be greatly clarified by increasing the names available to apply to species in order to reduce the confusion that arises from misapplications using unsupportably broad species concepts. The present descriptions of new species and the resurrection of neglected names are intended in part to serve that purpose.

For the present study, all sect. *Meconella* specimens from the two main herbaria of British Columbia (UBC and V) were examined, as well as loan material of *Papaver alboroseum* from the herbarium ALA and high-resolution scans of types and other important early collections. Type specimen scans examined (ITHAKA 2016) are all shown with a ruler for scale and a colour swatch for hue calibration. All photographs shown are by the author. The species accepted for the British Columbia flora are listed first, in order of publication date. Species rejected from the British Columbia flora are presented in an annotated list, and notes on other related species of sect *Meconella* of western North America are provided.

***Papaver* sect. *Meconella* in British Columbia**

- 1. PAPAVER CROCEUM** Ledeb., Fl. Altaica 2: 271. 1830. **TYPE:** not seen. No specimens are cited in the protologue; lectotypified on an illustration in Dillenius (Hortus Elthamensis t. 224 f. 291), which in turn was based on a plant from the Altai Mountains.

This species is a core ancestor of cultivar lineages, giving us the so-called “Iceland poppy” sold in nurseries as a spring annual or short-lived perennial (Elven et al. 2018). Specimens and garden tags on these plants often bear the erroneous identification as *P. nudicaule* L., but *P. croceum* has been shown to be the correct name for the cultivated plants (Hanelt 1970). It occasionally escapes from cultivation or is deliberately seeded along roadsides or into meadows. It can be recognized by its lax growth form and large leaves and its large, bright yellow, orange or red petals.

- 2. PAPAVER PYGMAEUM** Rydb., Bull. Torrey Bot. Club 29: 159. 1902. *Papaver radicum* var. *pygmaeum* (Rydb.) S.L. Welsh, Great Basin Naturalist 46: 259. **LECTOTYPE** (designated here): **USA. Montana.** Mountain above Stanton Lake, 1 Aug 1894, *Williams 992* (NY 99719! [scan viewed online]). No holotype designated by Rydberg; Fedde used *Macoun 10269*, the second of three specimens cited by Rydberg, as the type of *P. nudicaule* subsp. *radicum* var. *pseudocorydalifolium*, which is clearly a superfluous taxon.

Papaver nudicaule subsp. *radicum* var. *pseudocorydalifolium* Fedde, Repert. Sp. Nov. Regni 7: 256. 1902. **TYPE: CANADA. Alberta.** Sheep Mountain, 1895, *Macoun 10269*, (US 99718! [scan viewed online]). No holotype designated by Fedde. Specimen cited by Rydberg in description of *P. pygmaeum*.

Plants scapose perennials from a tightly branched caudex, caespitose. **Leaves** dark green or somewhat glaucous, setose-hirsute or glabrate, blades ovate to ovate-deltate in outline, < or = petioles, most or all 2x pinnate, primary lobes in 2–3 pairs, obovate to oblanceolate, nearly or quite contiguous or even overlapping, apices mostly rounded to blunt, bristle-tipped or not. **Petiole bases** withering but persistent, dark brown or blackish. **Scapes** ascending to erect, 3–6(–12) cm, setose-hirsute, hairs mostly spreading, stramineous or light brown. **Sepals** caducous, densely setose-villous, hairs medium to dark brown. **Petals** caducous after anthesis, yellow, salmon or reddish orange, often bicoloured orange and (proximally) yellow, 6–10 mm, obovate-obdeltate to elliptic, ca. 1.5x ovary length. **Stamens** ca. 15–20, anthers yellow, aging to brown. **Stigmatic disc** conic, not umbonate, lobes 4–5, not winged. **Capsule** obovate to elliptic, 9–15 mm long, setose, hairs ascending-appressed, stramineous. **Seeds** not observed.

Papaver pygmaeum has unusual attributes among native North American members of sect. *Meconella*. Its combination of deep yellow, orange, or sometimes almost red flowers and its stramineous capsule hairs are unique among native British Columbia *Papaver*, and the comparatively dark green leaf colour and crowded, mostly obovate leaf lobes give an unusual appearance to the leaves of this species. It is very limited in distribution, being found in the Waterton/Glacier National Parks region in Alberta and Montana and rarely into British Columbia on the crest of the Rocky Mountains in the extreme southeast corner of the province. See also notes under *P. coloradense*, below.

Other specimens studied. CANADA. Alberta. Dorner Pass, 7500 ft, 16 Aug 1945, *Cowan s.n.* (UBC 47978!); Waterton Lakes Park, rock slide below Carthew Lake, 7500 ft, 8 Jul 1951, *Taylor 8677* (UBC 21855!). **British Columbia.** Akamina Ridge, 2440 m, 12 Aug 1976, *Pojar 760429* (V 94587!). **USA. Montana.** Open rocky slope, along the trail from Many Glacier Hotel to Piegan Pass, 1500–2600 m, 11 Aug 1919, *Standley 17496* (UBC 98245!, mounted photograph of specimen at DAO).

3. PAPAVER KLUANENSE D. Löve, Bot. Not. 109: 178. 1956. *Papaver radicum* subsp. *kluanense* (D. Löve) D.F. Murray, Novon 5: 294. 1995 (as subsp. *kluanensis*). **TYPE: CANADA. Yukon Territory.** North of Quill Creek Camp, alt. ca. 5000 ft, 20 mi W of Burwash Landing, 15 Jun 1953, *Freedman s.n.* (S S08-261! [scan of fragments and a photograph of the type]). Orthographic correction to the originally published name *Papaver kluanensis*. No holotype designated by Löve.

Papaver freedmanianum D. Löve, Bot. Not. 109: 184. 1956. **TYPE: CANADA. Yukon.** North of Upper Quill Creek, 20 mi W of Burwash Landing, 6000 ft, 18 Jun 1953, *Freedman s.n.* (S S-G-4525! [scan of fragments and a photograph of the type]). No holotype designated by Löve.

Papaver nigroflavum D. Löve, Bot. Not. 109: 180. 1956 (as *P. nigro-flavum*). **TYPE: CANADA. Yukon Territory.** North of Tetamagouche Pass, 20 mi W of Burwash Landing, ca. 5000 ft, 5 Jul 1953, *Freedman s.n.* (S S-G-4533! [scan viewed online]). No holotype designated by Löve.

Plants scapose perennials from a tightly branched caudex, caespitose. **Leaves** greyish green, blades ovate to elliptic in outline, < or = petioles, most or all 1x pinnate, segments usually 5, elliptic-oblongate to narrowly elliptic, nearly or quite contiguous, apices mostly acute. **Petiole bases** marcescent, light to medium brown. **Scapes** ascending to erect, 6-15(-20) cm, hirsute to setose-hirsute, hairs mostly erect or ascending, medium to dark brown. **Sepals** caducous upon anthesis, densely setose-villous, hairs medium to dark brown. **Petals** caducous at anthesis or sometimes irregularly withering around the ovary, creamy yellow, 6-7 mm, broadly obovate-obdeltate, 1.5-2x ovary length. **Stamens** ca. 25-30. **Stigmatic** disc low-convex, not umbonate, lobes 5-6, not winged. **Capsule** broadly obovate-elliptic to broadly obovate, 10-13 mm long, setose, hairs ascending-appressed, dark brown. **Seeds** not observed.

Papaver kluanense has been treated in a broad sense by Kiger & Murray (1997) and others. Reports of the species from the U.S. Rocky Mountains are all or mostly *P. coloradoense* (see notes, below). Some plants from the Beartooth Plateau of Montana and Wyoming may be *P. kluanense*, but the specimens from there are too few to address this question. See for example: Wyoming, Park County, Shoshone National Forest, Beartooth Plateau area just south of Montana border and west of highway 212 on switchbacks ca. 0.75 miles ENE of Beartooth Pass, 11 Jul 1990, *Henderson 7808* (ID 118551! [scan viewed online]).

Papaver columbianum (as *P. nudicaule* var. *columbianum*) occurs entirely within the range of *P. kluanense* and has long been treated as a synonym, despite its distinctive characteristics. The name *P. kluanense* has also been applied variously to other dissimilar species in British Columbia. The name should apply only to short, caespitose plants having all mostly 1x pinnate leaves with strongly ascending, closely spaced, acute segments, uniformly coloured and caducous petals, and more or less obovate capsules.

Selected specimens studied. CANADA. Alberta. Mount Southesk, 4 Aug 1943, *Cowan s.n.* (V 163300!); Banff National Park, Merlin Ridge, 31 Jul 1962, *Shulman 3483* (V 73676!); on the Whistler, Jasper Park, 2 Aug 1964, *Munday s.n.* (UBC 108946!). **British Columbia.** 8 Mile Creek, Toad River Lodge, Liard River, Alaska Highway, mile 437, 15 Jul 1959, *Zielger s.n.* (V 33851!); western slope of Mount Edziza, 12 Aug 1971, *Brayshaw s.n.* (V 58567!); upper plateau, S side of Birch Mountain, Teresa Island, Atlin Lake, 1 Aug 1974, *Buttrick 5509* (UBC 159538!); Potentilla Ridge, between Danihue Pass and the headwaters of Cullivan Creek, 10 Jul 1975, *Pojar s.n.* (UBC 155548!); Solifluction Ridge, Gladys Lake area, 11 Aug 1975, *Pojar s.n.* (UBC 155545!); Relay Creek Cabin, 23 Jul 1977, *Selby 540* (UBC 166293!); Kusawak Range, 25 Jul 1979, *Douglas 11440* (V 96282a! and b!); near summit of Bull Moose Mountain, NW of town of Tumbler Ridge, 28 Jul 1991, *Straley 6877* (UBC 226719!); ridge SW of Squaw Creek, Haines Triangle, 28 Jul 1992, *Pojar JP920212* (V 175944!). **Yukon Territory.** Deazdeash Mountains, Mt. Decoeli, 4 Jul 1943, *Brink s.n.*

(UBC 120982!); Mount St. Elias Quad, Outpost Mountain at S end of Kluane Lake, 18 Jul 1971, *Murray 3009* (V 136112!); Marble Creek (N of), ca. 26 mi SSW of Haines Junction, 27 Jul 1973, *Douglas 6494* (V 87571a! and b!).

4. PAPAVER HULTENII Knaben, Opera Bot. Čech. 3: 49. 1959. **TYPE: USA. Alaska.** Northern Coastal Plain, Meade River Village, 5-8 Aug 1960, *Stone s.n.* (DAO 336965! [scan viewed online]).

Plants scapose perennials from a simple root crown or somewhat branched caudex, tufted. **Leaves** greyish green, blades < or = petioles, 1x pinnate, or a few segments shallowly notched, segments 5-7, narrowly oblanceolate, narrowly lanceolate or almost linear, widely spaced, apices mostly acuminate. **Petiole bases** marcescent, medium brown. **Scapes** ascending to erect, (10-)20-40 cm, setose-hirsute to strigose, hairs mostly ascending to appressed, mostly dark brown. **Sepals** caducous, densely setose-villous, hairs dark brown. **Petals** caducous or withering irregularly around the capsule, apparently yellow, often bruising blue-black, 15-25 mm long, obovate-obdeltate, 2-2.5x long as ovary. **Stamens** ca. 30-40. **Stigmatic disc** conic, not distinctly umbonate, lobes 5-6, not winged. **Capsule** oblong-oblanceolate, 15-19 mm long, setose, hairs ascending-appressed, dark brown. **Seeds** not observed.

This tall species can be recognized by its usually long, lax petioles, narrow, widely spaced and usually simple leaf lobes, its oblong-oblanceolate capsules, and its mostly appressed, dark brown hairs on the scapes. Like *Papaver alaskanum*, *P. denalii*, *P. luculentum*, and *P. mcconnellii* (see below), it has marcescent petioles that cloak the caudex branches. But unlike those species, *P. hultenii* has a more lax, tufted growth unlike the densely caespitose growth form of the above species. It is also similar to *P. kluanense*, especially in the shape of the leaf lobes, but those lobes are more widely spaced, and the plants are taller and have a more laxly branched caudex. Perhaps most similar to *P. hultenii* is the Seward Peninsula form of *P. denalii*; they may be conspecific.

An arctic-alpine species, *Papaver hultenii* is apparently the only *Papaver* that occurs both in British Columbia and the Arctic. All British Columbia specimens known so far are from Pink Mountain, an alpine ridge in the eastern Rocky Mountain Front Ranges in the boreal northeast of the province.

Selected specimens examined. CANADA. British Columbia. Pink Mountain, Upper Halfway River, Jul 1957, *McLaughlin s.n.* (V 33163!); Summit of Pink Mountain, Alaska Highway, 28 Jul 1990, *Straley 6204* (UBC 202401!); Pink Mountain, Peace River District, 16 Sep 1980, *Rose AAR80436* (UBC 170125!); Pink Mountain lookout road near summit of Pink Mountain, 10 Aug 1993, *Lomer s.n.* (UBC 43835!); Pink Mountain, Peace River, 13 Jul 2009, *Roemer HR09010* (V 206445!). **Yukon Territory.** Ogilvie Mountains, mountain E of mile 50-54, 27 Jun 1966, *Porsild 19* (UBC 119334!); about 100 mi up Dempster Highway from Whitehorse to Dawson City Highway, 10 Jul 1976, *McComb s.n.* (UBC 160869!); British Mountains, tributary of Firth River, 7 Jul 1980, *Cody 27143* (UBC 213053!); Km 142, Dempster Highway, 17 Jul 1980, *Cody 27986* (UBC 213051!); Dawson Quad, Ogilvie Mountains, North Fork Pass and vicinity, Dempster Highway, 8 Jul 1984, *Parker 1190* (ALA 81044! scan). **USA. Alaska.** Harrison Bay Quad, National Petroleum Reserve, vicinity of Fish Creek test well 1, 27 Jul 1977, *Murray 6631* (ALA 78755! scan); near mile post 111-3 on Prudhoe Bay Road, 7 Aug 1980, *Ostler 2162* (V 137326!); Philip Smith Mountains Quad, Dalton Highway, mile 276, 30 Jul 1982, *Murray 8561* (ALA 76966!); Noatak Quad, Cape Krusenstern (Sealing Pt.), vic. 2-8 km N of VABM Krusenstern, 11 Jul 2002, *Parker 12040* (ALA 139600 scan); Eagle C6 Quad, middle fork of the Charley River, peak on ridge dividing east and middle forks, 16 Jul 2002, *Roland 5646* (ALA 149428 scan); White Mountains of interior Alaska, 12-Mile Summit, between Circle and Fairbanks, 23 Jun 2010, *Fulkerson 75* (SRP 47635! scan).

5. **PAPAVER COLUMBIANUM** Fedde ex Björk, **sp. nov.** **TYPE: CANADA. British Columbia.** Mountains at Kicking [Horse], [possibly Yoho National Park], 8000 ft, 14 Aug 1890, *Macoun s.n.* (holotype: US 99717! [scan viewed online]). Figures 1–2.

The name *Papaver columbianum* was first published illegitimately by Fedde as a nomenclatural synonym in his protologue of *P. nudicaule* var. *columbianum* Fedde, *Pflanzenr.* (Engler) 40: 378. 1909.

Species habitu et folia *Papaver kluanense* similis sed petala ad maturitatem fructus persistens et petalorum basis nigrescentibus differt.

Plants scapose perennials from a tightly branched caudex, caespitose. **Leaves** greyish green, blades < or = petioles, most or all 1x pinnate, segments usually 5, oblanceolate to elliptic-lanceolate, nearly or quite contiguous, apices mostly acute, petiole bases marcescent, medium brown. **Petiole bases** withering, not conspicuous. **Scapes** ascending to erect, to 3-10 cm, setose-hirsute, hairs mostly spreading, light (proximal) to dark (distal) brown. **Sepals** sometimes persistent, densely setose-villous, hairs medium to dark brown. **Petals** persistent past anthesis, apparently opening yellow, aging to bicolored black and whitish, 6-7 mm, obovate-obdeltate, < to = ovary. **Stamens** ca. 20. **Stigmatic disc** convex, not umbonate, lobes 4-5(-6?), not winged. **Capsule** broadly obovate, 8-10 mm long, setose, hairs ascending-appressed, dark brown. **Seeds** medium red-brown, ca. 0.7 mm, reticulate-ridged, ridges sinuous, demarcating irregularly polygonal pits.

Among western North American *Papaver*, this species is unusual in having petals that are persistent without withering and that are shorter than to equal to the ovary, and the sepals sometimes also persist into anthesis. All other native *Papaver* in the region have quickly caducous sepals (dropping by the onset of anthesis) and petals (dropping at the end of anthesis or sometimes irregularly withering around the ovary). It is also unusual among regional *Papaver* in that the petals (at least with age) become bicolored: black proximally and whitish distally. It may be most closely related to *P. kluanense*, sharing leaf characteristics and having similar geographical distribution and habitat.



Figure 1. Flowers of *Papaver columbianum*. Left, UBC 242379. Right UBC 222563). Scale bars = 3 mm.

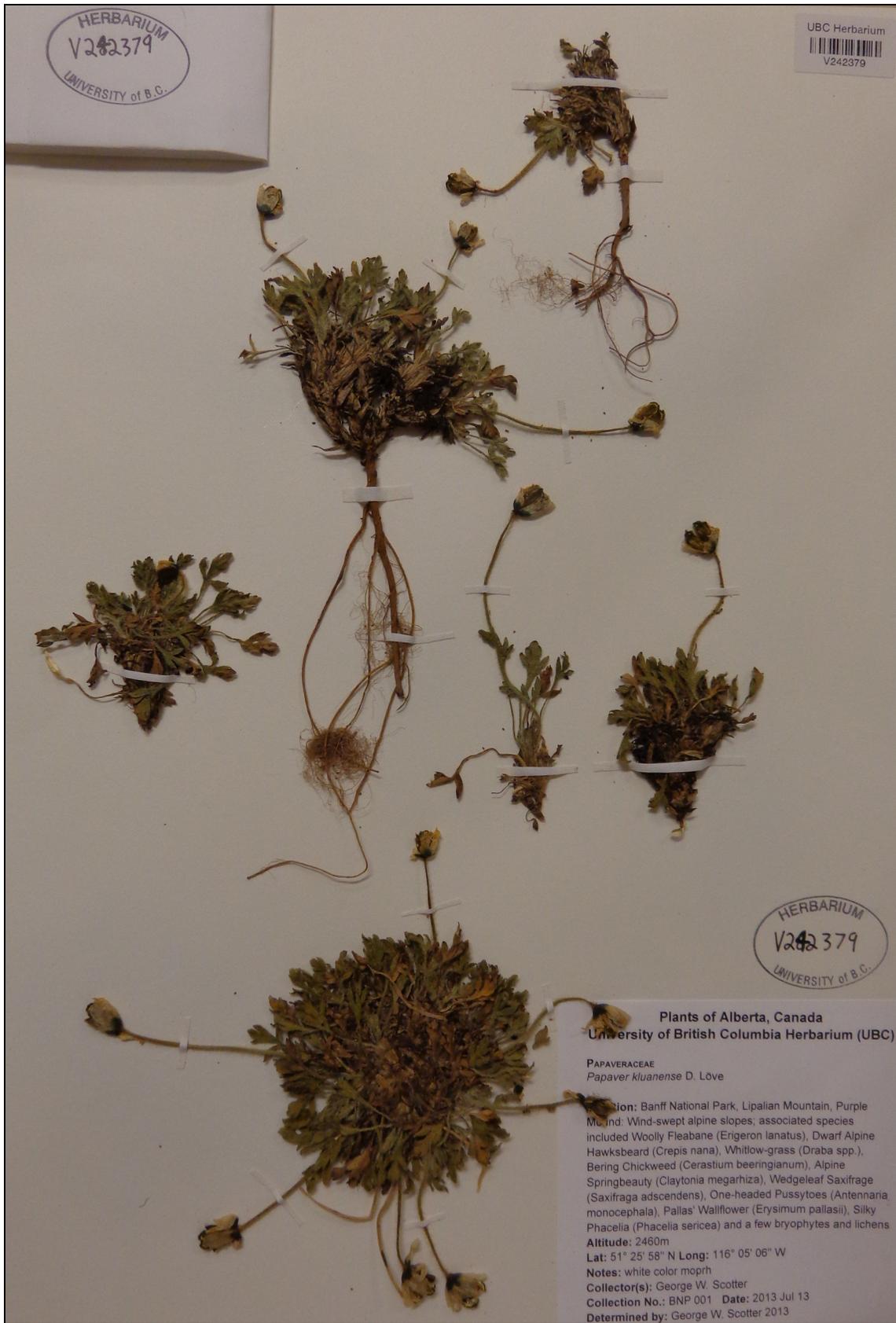


Figure 2. *Papaver columbianum* (UBC 242379).

Papaver columbianum may be rare; only three specimens are known besides the type. However, the widely separated localities and the remote, difficultly accessed intervening mountain ranges suggest that more populations may be expected. It is probably strictly alpine in its ecology. Associated species reported to occur with the Alberta population are *Antennaria monocephala*, *Askellia pygmaea* (Ledeb.) Sennikov, *Cerastium beeringianum*, *Claytonia megarhiza*, *Draba* spp., *Erigeron lanatus*, *Erysimum pallasii*, *Phacelia sericea*, and *Saxifraga adscendens*.

Other specimens examined. CANADA. Alberta. Banff National Park, Lipalian Mountain, Purple Mound, wind-swept alpine slopes, 2460 m, 13 Jul 2013, *Scotter BNP 001* (UBC 242379!). **British Columbia.** Redfern-Keily Provincial Park, Rocky Mountains, Muskwa Ranges, Redfern Mountain, 25 Jul 2014, *Marr 14-0083* (V 215119!). **Yukon Territory.** Sheep Mountain, near Kluane Lake, SW plateau, 6000-6327 feet, 18 Jul 1970, *Krajina s.n.* (UBC 222563!).

6. PAPAVER LUCULENTUM Björk, **sp. nov.** **TYPE: CANADA. British Columbia.** Boundary Ranges, ridge N of North Treaty Creek, near Bowser Lake, W of Bell Irving River, 56° 38'6.88"N 129° 52'13.18"W, on fine argillite gravel scree, windblown alpine ridge, 4 Jul 2013, *Björk 32373* (holotype: UBC!). Figures 3-4.

Species habitu cum *Papaver mcconnellii* sed differt fructuum subsphericis et umbo stigmatosum deficiens; differt a *Papaver denalii* foliis vere bipinnatis et petala minoribus.

Plants perennial, caespitose, slightly glaucous, hirsute and strigose, hairs white to brown, scape, (10-)15-25(-30) cm. **Leaf blades** ovate in outline, 2(-3)x pinnately lobed, segments ovate to oblong-elliptic, primary lateral segments 1(-2) pairs, apices mostly blunt, bristle-tipped. **Petiole bases** withering, not conspicuous. **Scapes** nodding in bud, decumbent or sinuous, apex abruptly widened, strigose with appressed, crisped ivory (mostly proximally) and dark brown more setose (mostly distally) hairs. **Sepals** caducous, hairy like the scapes. **Petals** pale yellow, sometimes with a pink blush (drying deeper yellow), 19-22 mm (longer when fresh), not bruising blue-black after handling and pressing. **Stamens** 30-42, filaments creamy yellow, anthers creamy yellow, aging to brown. **Stigmatic disc** convex, stigma lobes 6-8. **Capsules** broadly obovate to subspheric, 9-12 mm long (larger when fresh), previous years' capsules narrower, ascending to erect, obscurely ribbed, ribs becoming more distinct with fruit maturation, setose with ascending, brown hairs, hairs broadened proximally, but not pustular-based. **Seeds** medium reddish brown, ca. 1 x 0.6 mm, finely ridged longitudinally, not appendaged or winged.

Paratypes. CANADA. British Columbia. North Kitseguela Creek, Hazelton District, Jul-Aug 1952, *Harrison s.n.* (UBC 64942!); Spectrum Mountains, Cassiar, Jul 1957, *Harrison s.n.* (UBC 64928!); Focus Mountain, Taku River area, 12 Jul 1982, *Češka 12483* (V 167691!); Nimbus Mountain, Nakina Lake, N of summit, mountain W of lake, 6 Aug 2008, *Marr 08-1204* (V 203821!); Boundary Ranges, ridge N of North Treaty Creek, near Bowser Lake, W of Bell Irving River, 56° 39'9.4"N 129° 55'1.15"W, 7 Jul 2013, *Björk 32462, 32464, 32465* (UBC!).

Papaver luculentum is similar to the Alaskan species *P. alaskanum* and *P. denalii* Gjørevoll and the northern Yukon/Northwest Territories species *P. mcconnellii* Hultén. Like *P. luculentum*, all three are caespitose with a tightly branched caudex and with long-lasting marcescent petioles. *Papaver alaskanum*, known only from the Aleutian Islands, has darker green leaves with shorter hairs, and only dark brown hairs on the scapes. The type of *P. denalii* is representative of the numerous specimens at ALA (reviewed as scans) identified as that species and specimens collected from Denali National Park or elsewhere in the Alaska Range that are mididentified as *P. mcconnellii*. These differ from *P. luculentum* in having larger petals, mostly 1x lobed leaves, and sparser, more spreading hairs on the scapes. Plants identified as *P. denalii* or *P. mcconnellii* from the Seward Peninsula (west-central Alaska) further differ in having longer, almost linear leaf lobes. *Papaver*

mccconnellii, as applied only to plants from near the type locality on the Yukon/Northwest Territories border, differs from *P. luculentum* in having a sharp central umbo on the stigmatic disc, larger petals, more numerous stamens (ca. 50-60), and a narrower fruit shape (obovate). At least some specimens of *P. denalii* and *P. mccconnellii* also differ in having petals that bruise blue-black with handling.



Figure 3. Habit photo of *Papaver luculentum* at holotype location.

Some specimens of *Papaver luculentum* may resemble *P. roseoalbum* (see below), especially as the petals are similarly pale and sometimes pinkish. However, the bristles on the capsules of *P. luculentum* are medium to dark brown, not ivory, the hairs on the scapes lack the characteristic purplish and white coloration, and *P. roseoalbum* does not have long-lasting marcescent petioles or such a widely branched caudex as *P. luculentum*.



Figure 4. Upper: flowers and fruit of *Papaver luculentum*. Lower: detail of leaves, all from the type locality.

I know of *Papaver luculentum* only from the Cassiar and Boundary Ranges in the southern portions of northwest British Columbia, close to the border with Alaska, where it should be sought. I have not found this species during extensive alpine exploration in the Skeena Mountains, the range immediately east of the Cassiar/Boundary Ranges, nor in the Coast Ranges to the south. Other collectors' specimens are not numerous, and all are from the same region of northwest British Columbia. Hence, the species may be rare.

At the type locality, *Papaver luculentum* occurs on sparsely vegetated scree on windward (west to south) slopes of alpine ridges. Parent rock material is black argillite, which is almost ubiquitous at all elevations of that portion of the Boundary Ranges. The presence in the local flora of numerous calciphilic species and the high pH of nearby wetlands suggest the argillite is moderately calcareous. Winter snow accumulations are very high in the Boundary Ranges, but most likely the sites occupied by *P. luculentum* are less snow-covered than surrounding subalpine areas due to exposure to wind. Associated species are of the genera *Aconitum*, *Agoseris*, *Epilobium*, *Myosotis*, *Oxyria*, *Poa*, *Polemonium*, *Potentilla*, and *Saxifraga*.

Selected specimens of *P. denalii* s. str. studied, Alaska Range form. TYPE: USA. Alaska. Alaska Range, McKinley Park, Cathedral Mountain, in scree slopes, abundant, 20 Jul 1959, *Gjærevoll 2412* (TRH! photographs). **Others:** Norton Bay Quad, Nulato Hills, upper Unalakleet River valley, 3 Jul 1998, *Parker 8087* (ALA 125108! scan); Lime Hills Quad, Nushagak-Big River Hills, Lyman Hills, 7 km NW of VABM Utica, 1 Jul 1999, *Parker 8961* (ALA 128252! scan); Mount McKinley Quad, Alaska Range, ridge N of the W fork of the Herron Glacier, 9 Jul 1999, *Duffy MD99-46* (ALA 148286! scan); Mount Healy Quad, Alaska Range, Easy Pass on upper Bull River, 24 Jun 2000, *Duffy MD00-30* (ALA 147668 scan); Healy Quad, Alaska Range, W side of Easy Pass, 12 Jul 2000, *Duffy MD00-95* (ALA 147733 scan); Talkeetna Quad, Alaska Range, Shellabarger Pass, 2.2 km NE of ponds in pass, 1 Aug 2001, *Duffy MD01-126a* (ALA 148087! scan); Eagle D-4 Quad, Yukon-Charley Rivers National Preserve, ridge 2.4 km E of Mt. Sorenson, Yukon-Tanana Uplands, 30 Jun 2002, *Larson 02-1648* (ALA 83597! scan); Talkeetna Quad, Alaska Range, upper Tatina River Valley, 9 Jul 2002, *Duffy MD02-38* (ALA 148786! scan).

Selected specimens of *P. denalii* s. lat. examined, Seward Peninsula form. USA. Alaska. Hooper Bay Quad, Clarence Rhode NWR, 23 Jul 1975, *Boise 023* (ALA 66840! scan); Bering Strait District, hills adjacent to the Kukpuk River, Flint Mountain and surrounding hills, 15-16 Aug 1959, *Johnson 699* (ALA 9290! scan); Teller Quad, Seward Peninsula, N fork Grand Central Creek, 6 Jul 1996, *Murray 12192* (ALA 129001! scan); Solomon Quad, Seward Peninsula, Big Creek Valley, 23 Jul 1993, *Murray 11762* (ALA 158196! scan).

Selected specimens of *P. mcconnellii* s. str. examined. CANADA. Yukon Territory. Richardson Mountains, 6 Jul 1982, *Cody 30418* (ALA 103936! scan); Richardson Mountains, on N side of Dempster Highway, K465 (campground), 4 Jul 1982, *Cody 30152* (ALA 103941 scan!); Ogilvie and Wernecke Mountains, 12 mi NNE of Chapman Lake, W of Blackstone River, 8 Jul 1984, *Cody 33873* (ALA 102507! scan); Mackenzie Mountains, mountain E of Dempster Highway 414 km, 20 Aug 2003, *Solstad 03/0622* (ALA 154052! scan); Knorr Range, lakes at headwaters of Noisy Creek, 10 Jul 2005, *Bennett 05-0376* (ALA 157401! scan).

7. PAPAVER ROSEOALBUM Björk, sp. nov. TYPE: USA. Alaska. *Populus-Alnus* thicket, at mouth of small canyon, W of Portage Glacier, 12 Jul 1968, *Welsh 8146* (ALA 274045!). Figures 5-7.

Species americanas boreali quam *Papaver alboroseum* camtchatcensis affinis sed petala grandibus, pilorum longioris et albo-purpureis bicoloratis, foliis bipinnatifidis, et folia lobis pro parte maxime ellipticis vel oblanceolatis differt.

Plants perennial, apparently short-lived, caespitose, scapose, 8-25 cm, greyish green, strigose, setose and villous, hairs at apex of scape brown and spreading, those elsewhere on the scape and on the leaves bicolored white and brownish purple, 1-3 mm, those of the leaves mostly bicolored white and purple-brown, 0.5-1.5 mm. **Leaf blades** ovate in outline, at least some 2x bipinnatifid to bipinnate, segments mostly elliptic to oblanceolate, primary lateral segments mostly 2 pairs, apices mostly blunt, bristle-tipped. **Petiole bases** withering, not conspicuous. **Scapes** nodding in bud, decumbent or sinuous. **Petals** whitish pink to pink or apricot, drying yellowish, 11-20 mm, not or only obscurely bruising blue-black after handling and pressing. **Stamens** ca. 15-25, filaments creamy

yellow, drying sordid green, anthers creamy yellow, aging to brown. **Stigmatic disc** convex, umbo lacking, lobes 6-8. **Capsules** obovate to elliptic, (5-)8-11(-13) mm long, ascending to erect, obscurely ribbed, ribs becoming more distinct with fruit maturation, hairs firm, bristle-like, ivory to pale brown. **Seeds** medium reddish brown, reniform, ca. 0.8 mm, surface reticulate-pitted, demarcating longitudinally rectangular pits.

Etymology: Latin *roseo-* (pink) and *-album* (white), an anagram of the similar and probably related Russian species *Papaver alboroseum*. For a mnemonic, the species arrayed geographically with north at the top of the map, *P. alboroseum* on the left and *P. roseoalbum* on the right are also arrayed alphabetically.

Paratypes. CANADA. British Columbia. Crest of ridge at limit of vegetation, Spectrum Mts., Cassiar, 6000 ft, Jul 1957, *Harrison s.n.* (UBC 64929!); Exposed, S-facing, very fine scree slope, with no other vegetation, sub-alpine to high alpine, on mountain behind Kitchener Camp, ca. 6,500 ft, summer 1980, *Pojar s.n.* (UBC 193093!); Skeena Mountains, Spatsizi Plateau, Brothers Lake, NW of lake, 26 Jul 2009, *Marr 09-0770* (V 205481!); Nass River, Mount Beirnes, along SW ridge 1 km S of peak, 1977 m, 29 Jul 2005, *Marr 05-0360* (V 194657!). **USA. Alaska.** Ft. Richardson, 15 Jun 1948, *Spetzman s.n.* (ALA 201944!); between Rocky and Victor Creeks, Kenai Lake, Kenai Peninsula, 60° 21'N 149° 21'W, common in open gravel-shale areas by lake, flowers rose-white, 2 Jul 1951, *Calder 5575* (V 136128!); Portage Glacier, 15 Jun 1959, *Gjærevoll s.n.* (ALA 24989!); Portage Glacier flats, 9 Jul 1964, *Williams 749* (ALA 201945!); Portage, 7 Jul 1965, *Welsh 4560* (ALA 247976!); foot of Eklutna Glacier, 12 Jul 1965, *Welsh 4644* (ALA 201946!); W of Portage Glacier, 12 Jul 1968, *Welsh 8146* (ALA 274045!); Stikine Mountain Flora, immediately W of Kitchener Crag, SW of Kitchener Lake, Toadoggonne River Quadrangle, 27 Jun 1969, *Rigby 98* (ALA 62009!); Bonanza Ridge, Wrangell Mountains, 5 Jul 1976, *Schmitt 160* (ALA 77486!); Bonanza Ridge, Wrangell Mountains, 6 Jul 1976, *Schmitt 166* (ALA 77485!); Mt. McKinley Quad, W fork of Big Stoney Creek, 25 Jun 1977, *Hutson s.n.* (ALA 98639!); Lower Llewellyn Glacier, Camp 26 and Marble Mountain Nunataks, 13 Aug 1977, *Anderson 3123* (ALA 90117!); Mount McKinley Quad, W fork of Upper Big Stony Creek, Mount McKinley, 28 Jun 1979, *Carwile 79-143* (ALA 87886!); Chugach National Forest, 3/4 mi down road from Portage Visitor Center, 30 Jul 1980, *Helmstetter 80-328* (ALA 72337!); municipality of Anchorage, Chugach State Park, Eklutna Valley, 1/4 mi N of Eklutna Glacier, 18 Jul 1984, *Marvin 1699* (ALA 84409!); Mount Hayes Quad, Rainbow Ridge vicinity, 2 Aug 1985, *Parker 1710* (ALA 82188!); Anchorage Quad, Chugach Mountains, North Campbell Creek Canyon, SE of Campbell Lake, 19 Jul 1994, *Lichvar 8093* (ALA 119363!); Healy Quad, Alaska Range, Dunkle Mine area, 13 Jul 2000, *Duffy MD00-105* (ALA 147743!); Anchorage Quad, Chugach Mountains, Knik River drainage, upper Hunter Creek, 19 Jul 2002, *Barker 02-696* (ALA 142313!); Seldovia Quad, Kenai Peninsula, Upper Nuka River, valley, E side of river, across from Nuka Glacier, approx. 10 km SE of Bradley Lake, 30 Jul 2003, *Lipkin 03-304* (ALA 152760!); Seward Quad, Kenai Peninsula, Exit Glacier, Harding Icefield Trail, 31 Jul 2003, *Sturdy 03-1309* (ALA 150819!); McCarthy Quad, Wrangell-St. Elias National Park and Preserve, above Kennecott Mine on trail to Bonanza Ridge and Jumbo Mine, 30 Jun 2005, *Dillman 2005-183* (ALA 246067!); Bering Glacier Quad, Chugach Mountains, E slope of Carbon Mountain, 9 Aug 2005, *Barker BG05-153* (ALA 156855!); Kenai Quad, Cook Inlet, W side, Saddle Mountain, North Lenore Hill, 29 Jul 2005, *Carlson 2005-54* (ALA 156321!); Portage Valley Site A, along the road leading W from the visitor center and to the sewage lagoon (beyond the bunkhouse), 24 Aug 2010, *Stephens AS-1* (ALA 171202!); Portage Valley Site B, around a fenced enclosure along the road leading W from the visitor center (before reaching the bunkhouse), 24 Aug 2010 *Stephens AS-2* (ALA 171203!); Milk Glacier, Chugach Mountains, 1 Aug 2012, *Nawrocki 12-003* (ALA 248725!); base of the N face of Mount Ascension, 15 Aug 2012, *Nawrocki 12-010* (ALA 248726!).



Figure 5. Holotype of *Papaver roseoalbum* (ALA 274045).



Figure 6. *Papaver alboroseum* (left, ALA 110037), and *P. roseoalbum* (right, ALA 77486), comparing the hairs of the scape. Scale bars = 2 mm.

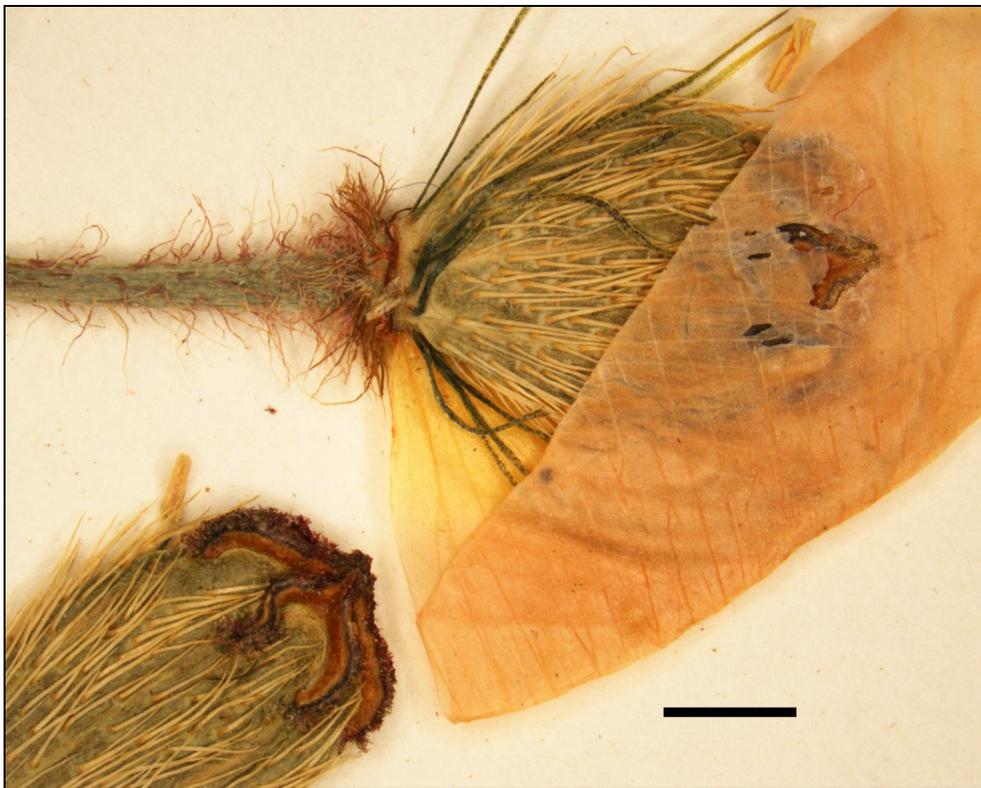


Figure 7. *Papaver roseoalbum*. Upper, immature capsules (ALA 82188), scale bar = 2 mm.

At first appearance, *Papaver alboroseum* and *P. roseoalbum* are similar, but they can be distinguished easily by two consistent characteristics that correlate to the Asian and North American geographical ranges. While *P. alboroseum* has short, monochrome brown hairs on the scapes and only once pinnate leaves, *P. roseoalbum* has longer, white and purple-brown hairs on the scapes and at least some bipinnatifid leaves. Generally, the petals of *P. roseoalbum* average longer, and the capsules may on average have a broader shape, but there is much variation in these characters.

Ecology and geographical range. *Papaver roseoalbum* grows at low to high elevations. Reported habitats include sandy, gravelly soil, scree, and glacier forelands, often on volcanic substrates. I have not seen the species in the field myself. The holotype and each of the paratypes were originally identified as *P. alboroseum*. These specimens were all identified consistently, and because the petal colour of *P. roseoalbum* and pale fruit bristles are unusual among North American *Papaver*. It is likely that specimens I have not seen originally identified as *P. alboroseum* are probably not confused with species other than *P. roseoalbum*, hence, its range can be outlined as that of the misreports of *P. alboroseum*: south-central Alaska, far southwest Yukon, and far northwestern British Columbia. It is considered (under the name *P. alboroseum*) a conservation-priority species in British Columbia (BC Conservation Data Centre 2016). Plants under the name *Papaver alboroseum* in the rock garden nursery trade may sometimes be that species, but at least some plants in the trade identify as *P. roseoalbum*.

PAPAVER UNKNOWN 1

Plants perennial, long-lived, more or less caespitose, with numerous, moderately long caudex branches, cloaked in marcescent petiole bases, scapose, 10-25 cm, medium (greyish?) green, strigose, setose and villous, hairs of the scape medium to dark brown and mostly spreading, 1.5-3 mm, those of the leaves shorter and paler, 0.5-2 mm. **Leaf blades** ovate to elliptic in outline, 1x pinnate or with one or both of the lowest segments lobed, segments mostly narrowly elliptic to oblanceolate, sinuses moderately wide, primary lateral segments in 2-4 pairs, apices mostly acute, bristle-tipped. **Petiole bases** withering, not conspicuous. **Scapes** apparently erect in bud, erect in flower and fruit, usually 3-4x long as the leaves. **Petals** apparently yellow, 15-23 mm, bruising blue-black after handling. **Stamens** ca. 25-30, filaments creamy yellow, drying sordid green, anthers creamy yellow, aging to brown. **Stigmatic disc** low-convex, umbo lacking, lobes 6-8. **Capsules** oblong-oblanceolate, ca. 18-20 mm long, erect, conspicuously ribbed, hairs firm, bristle-like, ivory to pale brown. **Seeds** not observed.

Papaver unknown 1 occurs in alpine sites in far northern British Columbia. It appears similar to the illustration of *Papaver lapponicum* subsp. *porsildii* Knaben in the Flora of Alaska (Hultén 1968), except that the leaves usually have more lobes. I have not seen the type of that taxon. Elven et al. 2018 tentatively placed it in synonymy under *P. lapponicum* subsp. *occidentale* (C.E. Lundstr.) Knaben. Hultén usually had type specimens used as the models for the *Papaver* illustrations in the Flora of Alaska. If that is the case for *P. lapponicum* subsp. *porsildii*, then placement by Elven et al. (2018) is probably incorrect, as the illustration shows a morphology that suggests other relationships.

Papaver unknown 1 is similar to *P. hultenii* but has shorter scapes with widely spreading hairs and shorter and closer leaf lobes that are more abruptly contracted at the apex. From *P. kluanense* it differs in having narrower fruits, taller scapes, more distant leaf lobes and usually a less tightly branched caudex. I refrain from naming it as a new species pending further study.

Specimens studied. CANADA. British Columbia. Toad River, Toad River Lodge area microwave tower, mile 428 SW part of second and third hill, 22 Jul 1982, Češka 13107 (V 167688!); Skeena Mountains, Klappan Mountain, along ridge 2 km W of Klappan Mountain summit, 4 Aug 2005, Marr 05-0772 (V 195126!); Rocky Mountains, Muskwa Ranges, Terminal Range, mountain 7

km W of Muncho Lake, 2 Aug 2007, *Marr 07-0469* (V 200362!); Stikine Ranges, Blue Sheep Lake, summit E of “Little Blue Sheep” Lake, 12 Aug 2007, *Marr 07-1680* (V 202013!).

Names misapplied in British Columbia

PAPAVER ALASKANUM Hultén, Fl. Aleutian Islands, 190. 1937. **TYPE: USA. Alaska.** Aleutian Islands, Unalaska, 2 Aug 1932, *Hultén 7197* (S S-G-4519! [scan viewed online]). No holotype designated by Hultén.

This name has been misapplied to specimens of various species in British Columbia, among which *Papaver luculentum* (see below) is the most similar, sharing with *P. alaskanum* the marcescent petioles and 2x pinnately lobed leaves. *Papaver alaskanum* differs in having deeper yellow petals, darker green leaves, and dark brown hairs on the scapes.

PAPAVER ALBOROSEUM Hultén, Kungl. Svensk. Vet. Acad. Handl. 5: 141. 1928. **TYPE: RUSSIAN FEDERATION. Kamtchatka Australis.** Avatcha Volcano, 675 m, 30 Jul 1920, *Hultén 508b* (GB 0048356! [scan viewed online]; S S-G-4522! [scan viewed online]). No holotype designated by Hultén.

Papaver alboroseum var. *elongatum* Hultén, Fl. Kamtch. 2:141. 1928. **SYNTYPES: RUSSIAN FEDERATION. Kamtchatka Australis.** Toporkof Island, Sarannaja Bay, 8 Aug 1920, *Hultén 789* (GB 48357! scan). **Kamtchatka Orientalis.** Lake Assabatch [?], 1-15 Aug 1920-1922, *Malaise s.n.* (S S-G-4523! scan).

This species name has long been misapplied in North America. The Russian and North American specimens all differ consistently in pubescence and leaf lobation, and the populations of the two forms are widely separated geographically. See further notes under *P. rosealbum*, above.

Other specimens studied. RUSSIAN FEDERATION. Kuril Islands, Sakhalin Oblast, Paramushir Island, mouth of Shimoiur River, 21 Jul 1979, *Barkalov s.n.* [or 3030?] (ALA 110037!); Kuril Islands, Paramushir Island, mouth of Shimoiur River, 21 Jul 1979, *Barkalov s.n.* [or 1676?] (ALA 80350!); Kamtchatskiy region, Karaginskiy District, vicinity of village Ossora, 14 Aug 1976, *Kharkevich s.n.*, *Plantae Vasculares Orientis Extremi Rossica Flora Exsiccata* 144 (ALA 129009!).

PAPAVER KEELEI A.E. Porsild, Bull. Natl. Mus. Canada 101: 20. 1945. **TYPE: CANADA. Northwest Territories.** Canol Road, Mackenzie Range, small tributary to Little Keele River, mile 51, 8 Sep 1944, *Porsild 11782* (S S-G-4528! scan). No holotype designated by Porsild.

Other specimens studied. CANADA. Yukon Territory. Ogilvie Mountains, W of and in view of Dempster Highway, two drainages S of Distincta Peak, 15 Aug 2016, *Björk 41466* (Hb. Björk).

This distinctive arctic and northern boreal species is easily identified by its almost linear ovary. Even at maturity, the capsule is markedly narrow. It also has a distinctly dark color on dried herbarium specimens. It is also unusual in its preference for wet, mossy ground. Though habitat information is lacking on the label of the type specimen, the moist, mossy habitat can be deduced by the presence about the bases of the plants on the type sheet of moist-habitat mosses such as *Tomentypnum nitens* (Hedw.) Loeske. The occurrence of *P. keelei* in the southern portions of the Yukon suggests that it should be sought in northern British Columbia. See also notes under *P. macounii*, below.

PAPAVER LAPPONICUM (Tolm.) Nordh., Berg. Mus. Årbok 2: 45. 1931. *Papaver radicum* subsp. *lapponicum* Tolm. **LECTOTYPE: RUSSIAN FEDERATION.** Murman area, Oz. Imandra, 1 Aug 1911, Pohle *s.n.* (LE, not seen).

Similarly to *Papaver radicum*, this species name was misapplied in northwestern North America (Solstad 2009; Elven et al. 2018). In the region, the name *P. lapponicum* has been applied to specimens of a variety of dissimilar species. In British Columbia, the name was generally applied to species that average taller in stature than those that were identified as *P. radicum*.

PAPAVER MACOUNII Greene, Pittonia 3: 247. 1897. **TYPE: USA. Alaska.** St. Paul Island, 23 Jul 1897, *Macoun s.n.* (C 10016380! scan, K 000653200! scan). No holotype designated by Greene.

Similar to *Papaver keelei*, *P. macounii* has a very narrow capsule, but it differs in its patent scape hairs and larger petals. Also, in comparison with *P. keelei* and with specimens of other North American *Papaver*, the leaves of *P. macounii* have a distinctly dark colour on herbarium specimens. This species has been applied to specimens of *P. hultenii* in British Columbia, which are similar to *P. macounii* in stature but with paler leaves and broader ovaries and capsules.

PAPAVER RADICATUM Rottb., Skr. Kiøbenhavnske Selsk. Laerd. Elsk. 10: 455. 1770. **EPITYPE** (designated by Nilsson & Elven in 2001) **ICELAND.** Bardastrandarsýsla, Brjánslæskur, 23 Jul 1962, J.A. Nannfeldt 17564 (UPS 207575, not seen).

The typification of *Papaver radicum* (discussed in Elven et al. 2018) clarified the species as one having a North Atlantic distribution. Even so, no taxonomic question in British Columbia was fully resolved by the typification, as the name *P. radicum* was applied only as a catch-all for any of the shorter-stature native *Papaver* except the morphologically highly dissimilar *P. pygmaeum* and *P. roseoalbum*.

Key to *Papaver* sect. *Meconella* of British Columbia

- 1. Petals 50–90 mm long; stigmatic disc with 9–19 lobes; short-lived plants of disturbed sites, garden escape **Papaver croceum**
- 1. Petals <50 mm long; stigmatic disc with 5–8 lobes; usually long-lived plants, always in wild sites, native.
 - 2. Capsule hairs ivory white throughout; leaf lobes mostly obovate.
 - 3. Petals mostly orange or red; far southeast **Papaver pygmaeum**
 - 3. Petals mostly white or pink; far northwest **Papaver roseoalbum**
 - 2. Capsule hairs medium to dark brown, at least in part; leaf lobes mostly elliptic, oblong, or (ob)lanceolate.
 - 4. Young capsules several times longer than wide, with a sharp, pronounced umbo; plants often or always on wet ground; to be sought in British Columbia [*Papaver keelei*]
 - 4. Young and mature capsules broader in shape.
 - 5. Leaves all or nearly all 2x pinnately lobed; lobe apices rounded to blunt **Papaver luculentum**
 - 5. Leaves all or nearly all 1x pinnate; lobe apices acute to acuminate.
 - 6. Petals black proximally with age, white or whitish distally, persistent after flowering, < to = ovary **Papaver columbianum**
 - 6. Petals lacking proximal black blotches or irregularly bruising blue-black, otherwise yellow to salmon, falling or irregularly withering around the ovary after anthesis, > ovary.

7. Leaf lobes mostly contiguous; plants densely tufted; capsules 1–1.5x long as wide
 **Papaver kluanense**
7. Leaf lobes mostly separated by wide sinuses; plants loosely tufted; capsules 1.5–2x long as wide.
8. Scapes mostly 20–40 cm, hairs mostly ascending to appressed; leaf lobes mostly acuminate **Papaver hultenii**
8. Scapes 10–25 cm, hairs widely spreading; leaf lobes mostly acute... **Papaver unknown 1**

Notes on other *Papaver* sect. *Meconella*

PAPAVER COLORADENSE (Fedde) Fedde ex Woot. & Standley, Contr. U.S. Natl. Herb. 19: 262. 1915. *Papaver nudicaule* subsp. *radicatum* var. *coloradense* Fedde, Repert. Sp. Nov. Regni 7: 256. 1902. **LECTOTYPE (designated here): USA. Colorado.** East of Middle Park, 1867, *Parry 147* (BM 574948! scan).
Papaver coloradense Fedde. Simultaneously and invalidly published in the prologue of *P. nudicaule* var. *coloradense* as “*P. coloradense* Fedde in sched. U.S. Nat. Herb.”
Papaver uintaense S.L. Welsh, Utah Flora, 475. 1987. **TYPE: USA. Utah.** Duchesne Co.: Anderson Pass, flank of Kings Peak, Uinta Mountains 12,450 ft, 15 Jul 1979, *Welsh, Neese, & Atwood 19005* (NY 500070! scan).

Alpine plants in Colorado and Utah, north to southern Montana are morphologically coherent and usually have been treated under the non-North American species *Papaver radicatum*. Alternately, they have been misidentified as *P. kluanense* or as *P. pygmaeum*. From *P. kluanense*, *P. coloradense* differs in its overall small size, smaller petals (8–13) mm, oblong-obovate to narrowly obovate capsules, greener leaves, and smaller, deeper yellow petals.

Like *Papaver pygmaeum*, plants of *P. coloradense* are distinctive among North American boreo-temperate *Papaver* in their small size, comparatively dark green leaves, more persistent petiole bases, rather richly coloured petals, and oblong-obovate to narrowly obovate capsules. In these regards, they differ from *P. kluanense*. I have verified leaf and petal colour by examining field photographs in (for example) Utah TES Plant Interagency Committee (1991) and Colorado Natural Heritage Program (2013). The leaf lobes of *P. coloradense* are often notched or secondarily lobed, but the majority of lobes are entire. By contrast, *P. pygmaeum* has obovate to suborbicular leaf lobes (oblong to oblong-oblancheolate in *P. coloradense*), the leaf lobes are more crowded and more often secondarily lobed, the petals tend to be orange and smaller (5–10 mm), and the capsules have thicker, entirely ivory-white hairs (brown or brown-tipped hairs in *P. coloradense*). Also the two species are geographically separated. *Papaver pygmaeum* reaches its southern extent in northwest Montana ca. 375 km north of the northernmost population of *P. coloradense*, which occurs in the Crazy Mountains in south-central Montana.

Other specimens studied. USA. Colorado. Gunnison Co.: Gothic, Rocky Mountain Biological Laboratory, White Mountain and Queen Basin, 12900–13200 feet, 13 Jul 2013, *Williams 963* (IDS 64374! scan). Park Co.: E face of Mt. Silverheels on steep ridge slope, Mosquito Range, Pike National Forest, 26 Jul 1991, *Kelso 91-60* (ALA 108461! scan). **Montana.** Carbon Co.: Beartooth Mountains, W-facing slope below Sundance Pass, 15 Aug 1981, *Lesica 1791* (MONT 67914! scan); Beartooth Mountains, NE-facing slope of Silver Run Peak, ca. 15 mi W of Red Lodge, 11 Aug 1987, *Lesica 4490* (MONTU 108440! scan). Park Co.: Crazy Mountain Range, ridge between Crazy Peak and Eddings Peak, 10,800 feet, 28 Jul 1996, *Luna MONTU-1996-6* (MONTU 120374! scan). **Utah.** Duchesne Co.: S of Kings Peak, Ashley National Forest, Uinta Mountains, head of Yellowstone drainage, 21 Aug 1991, *Atwood 16751* (ID 107080! scan); Ashley National

Forest, Uinta Mountains, pass below Wilson Peak, Garfield Basin, 22 Aug 1991, *Atwood 16774* (ID 107065 scan).

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