DRABA (BRASSICACEAE) OF CANADA AND ALASKA

Gerald A. Mulligan[1]

Abstract. Four new arctic species of *Draba* are described here. Of these, *D. airdii*, *D. shehbazii*, and *D. darbyshireii* are from Canada, and *D. catlingii* is from both Canada and Alaska. Two new species described by others, *D. adamsii* and *D. macrocarpa,* are also added. The chromosome numbers $n = 19$ and $2n = 36$ should be attributed to *D. grandis*, and $n = 8$ for *D. lonchocarpa* var. *kamtschatica* to *D. chamissonis*. *Draba kluanei* is now known to occur at a second location in Yukon. The six new *Draba* species added in this study bring the total number in Canada and Alaska to 65. A key to all of these species is presented.

Keywords: Alaska, Brassicaceae, Canada, *Draba*

Recent publications have added many new species and other information about the genus *Draba* L. (Brassicaceae) in Canada and Alaska (Al-Shehbaz, 2009, 2012, 2016; Al-Shehbaz and Mulligan, 2013; Elven and Al-Shehbaz, 2008; Mulligan, 1971a,b, 1974a,b, 1976, 1979, 2002; Mulligan and Findlay, 1970). The present study adds four new species and two described but unrecognized species. *Draba airdii* G.A. Mulligan, *D. shehbazii* G.A. Mulligan, *D. catlingii* G.A. Mulligan, and *D. darbyshireii* G.A. Mulligan are new and described here. The names *Draba adamsii* Ledebour and *D. macrocarpa* Adams were described by others but have not been used for plants of Canada and Alaska. The following key contains all 65 species presently known to occur in Canada and Alaska and some recent information about *D. bruce-bennettii* Al-Shehbaz, *D. chamissonis* G. Don, *D. grandis* Langsd. Ex DC., *D. mulliganii* Al-Shehbaz, and *D. novolympica* Payson & H. St. John.

New Species

1. Draba airdii G.A. Mulligan, *sp. nov.* TYPE: CANADA. Yukon, near Porcupine River, approx. 66˚02'N, 138˚44'W. Occasionally around ground squirrel burrows on uppermost ridge at about 3500 ft [1069 m]; flowers white, 29 June 1960 *J. A. Calder & J. M. Gillett 26104* (Holotype: DAO).

Perennial, cespitose herbs with a compacted *caudex*. *Stems* erect, few to many, 6–14 cm, with 2–4 cauline leaves; *basal leaves* persistent, abaxially with sparse to dense, fine, subsessile, 0.1- to 0.25-mm-wide, stellate trichomes. Petals white.

Eponymy: this species is named after Dr. Paul Leet Aird, born January 11, 1930, Professor Emeritus of forest conservation, University of Toronto, Canada.

Additional specimen examined: CANADA. Yukon, Almost Lake: 60˚28'N, 131˚05'W, 28 July–2 August 1984, Catherine Kennedy A-7 (DAO).

This is the only species of *Draba* in North America that has a minute sparse to dense, up to 0.15 mm, simple to few-branched puberulence on the surface of the fruit.

2. Draba catlingii G.A. Mulligan, *sp. nov.* TYPE: CANADA. Northwest Territories, Mackenzie District, Alvar A3, 37.77 km W of Enterprise, site 208, 60.7894˚N, 116.5913˚W, *P. M. Catling & B. Kostiuk 2007-08-07* (Holotype: DAO).

Perennial, cespitose, often pulvinate *herbs*; *caudex* compacted, covered with the persistent remains of previous seasons. Both surfaces of basal leaves pubescent with divergently rayed, short-stalked, less than 10-rayed, stellate trichomes 0.2–0.3(–0.4) mm. Stems 1–4(6), 10–30 cm high with (4–)7–10 cauline leaves. *Petals* white, 2–2.5 × 0.75 × 1.0 mm; *sepals* 1.5–2.0 mm. *Anthers* cordate to orbiculate, 0.15–0.20(–0.25) mm. *Stigmas* broadly ovate 0.3–0.4 mm. *Styles* (0.1–)0.2–0.3 mm long. Most fruiting pedicels appressed to rachis. Fruiting racemes subumbellate with apical flower buds usually aborting. Some of lower pedicels bracteate. *Fruit* elliptic to narrowly elliptic, surfaces with fine, divergently few-branched, substellate trichomes; fruit inflated proximally, some asymmetrical, none twisted. *Seeds* oval, brown, 0.75 × 0.05 mm.

Eponymy: this species is named after Dr. Paul M. Catling, a taxonomist with Agriculture Canada and a collector of the type material.

Additional specimens examined: UNITED STATES. Alaska: Valdez Quad. Chitina, confluence of China and Copper Rivers. Bluff on W bank of Copper River, 61˚30'N, 144˚25'W, 214 m, 8 July 1981, *A. P. Khokhryakov, B. A. Yurtsev, & D. F. Murray 6192* (DAO). CANADA. Yukon, 4 mi. E of junction of Kaskawulsh and Degadeash Rivers & ca. 8 mi. WSW of Haines Jct., in community dominated by *Artemisia* sp.; aspect S25E: slope 2%, 2000 ft [610 m]. *G. W. & G. G. Douglas 67C1*. (DAO). Mackenzie District, Northwest Territories. Reindeer Grazing Preserve: Campbell Lake 68˚08'N, 133˚27'W, rock outcrop, 3 August 1966, *G. W. Scotter 10335* (DAO): Reindeer Grazing Preserve, Eskimo Lakes 68˚54'N, 132˚41'W. Small knoll with moist depressions, 1 August 1966, *G. W. Scotter 10334* (DAO).

Draba catlingii seems most closely related to *D. cana* Rydberg, which usually has an open caudex; lower fruiting pedicels appressed to rachis, none genticulate; anthers (0.25–)0.30–0.40 mm; fruiting racemes elongated, with few or no apical flower buds aborting, the fruit not inflated and is often twisted. *D. catlingii* has a very compacted, pulvinate, caudex; most fruiting pedicels appressed to rachis, many genticulate; the fruiting racemes usually subumbellate with many apical flower buds aborting, fruit inflated proximally and not twisted; anthers 0.15–20 mm.

I am grateful to Stephen J. Mulligan for his assistance.

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Harvard Papers in Botany, Vol. 26, No. 1, 2021, pp. 189–195.

ISSN: 1938-2944, DOI: 10.3100/hpib.v26iss1.2021.n12, Published online: 30 June 2021

3. Draba darbyshireii G.A. Mulligan, *sp. nov*. TYPE: CANADA. Northwest Territories, Mackenzie District, Melville Hills Region, Bluenose Lake area, site 7, 68°33'N, 120°46'W, 490 m, 25 July 1990, *G. W. Scotter & S. Zoltai 90-263* (Holotype: DAO).

Stoloniferous basal leaves subopposite, not rosulate *herbs*. Abaxial surfaces of *basal leaves* pubescent with mostly fine, flaccid, short-stalked, symmetrical, 5- to 10(–12)-rayed stellate trichomes 0.1–0.2(–0.3) mm wide; fewer simple trichomes are present proximally and subdendritic ones distally and marginally. *Stems* 10–20 mm, erect, with 0–2 cauline leaves. *Petals* white 3–4 mm, 2 × length and width of *sepals*; *anthers* truncate, 0.3–0.4 mm. *Styles* terete, (0.30–)0.50–0.75 mm. *Fruit* not inflated, surfaces with fine, short-stalked, 4- to 8-rayed stellate trichomes 0.1–0.2 mm wide. *Fruiting raceme* open, 2- to 7(–9)-fruited; pedicels spreading-ascending to ascending, basally ebracteate. *Seeds* brown, 1.1–1.3 mm.

Eponymy: this species is named after a former colleague, Stephen Darbyshire.

Additional specimens examined: CANADA. Yukon, Useful Lake: 50 km SSW of Old Crow, 67°11'N, 140°26'W, limestone ridge, 12 July 1975, *L. C. Cwynar 262* (DAO). All Mackenzie District, Northwest Territories. Site 14:m. Dryas tundra polygonal community, 69°20'N, 125°54'W, 275 m, July 20, 1978, *G. W. Scotter & S. Zoltai 25903* (DAO). Site 9, 68°39'N, 121°15'W, 730 m, 6 July 1990, *G. W. Scotter & S. Zoltai 90-315* (DAO); Site 2, Hornaday Lake, 68°42'N, 120°48'W, 513 m, *G. W. Scotter 90-34*, *90-138*, and *90-152A*, 24 July 1990 (DAO); Site 7, 68°33'N, 120°46'W, 490 m, *G. W. Scotter & S. Zoltai 90-262*, 25 July 1990 (DAO); Croker River Canyon, 69°06'N, 119°30'W, 340 m, *G. W. Scotter & S. Zoltai 90-378*, 27 July 1990 (DAO); Site 17, 69°18'N, 119°56'W, 180 m, *G. W. Scotter & S. Zoltai 90-464*, 27 July 1990 (DAO); Site 26, 68°23'N, 120°06'W, 480 m, 30 July 1990, *G. W. Scotter & S. Zoltai 90-602* and *90-602a* (DAO); Site 37, 68°33'N, 121°05'W, 1 August 1990, *G. W. Scotter & S. Zoltai 90-745B* (DAO).

Draba darbyshireii is the only stoloniferous perennial in North America with mostly fine, flaccid, short-stalked, symmetrical, 5- to 10(–12)-rayed stellate trichomes.

4. Draba shehbazii G.A. Mulligan, *sp. nov*. TYPE: CANADA. Northwest Territories, Mackenzie District, Mackenzie River Delta: northeast side of Richards Island; Kidluit Bay, 69°31'N, 133°48'W, localized on moist sandy slope by small lake, 32 July 1957, *W. J. Cody & D. H. Ferguson 10186* (Holotype: DAO).

Perennial, cespitose, not pulvinate *herbs*; *caudex* loosely to tightly branched with the remains of previous seasons. Stems with 1–3(–4) cauline leaves, lowest 1–2 cm wide. *Caudex leaves* abaxially with short-stalked, asymmetrical, substellate trichomes (0.25–)0.30–0.40 mm wide. Petals white; proximally narrow, broad distally. Anthers orbiculate to broadly cordate, 0.20–0.25(–0.30) mm long. Fruit inflated, narrowly to broadly elliptic. Stigmas suborbiculate to ovate. *Fruit, racemes, and stems* sparely to densely pubescent with fine, short-stalked, divergent, few- to >10-rayed substellate trichomes 0.2–0.3 mm wide. *Fruiting pedicels* strongly ascending. *Fruit* often aborted or asymmetrical; basally with very prominent protruding and fused remnants of nectar glands. Possibly allogamous.

Eponymy: this species is named after Dr. Ihsan A. Al-Shehbaz, an authority on the systematics of plants of the family Brassicaceae.

Additional specimens examined: CANADA. Mackenzie District, Northwest Territories: Mackenzie River Delta: northeast side of Richards Island; Kidluit Bay, 69°31'N, 133°48'W, localized on moist sandy slope by small lake, flowers white, 32 July 1957, *W. J. Cody & D. H. Ferguson 10187* (Holotype: DAO). Mackenzie River Delta: North Point Richards Island, west of Hansen Harbour, 69°38'N, 134°20'W, lake bank, 12 July 1963, *W. J. Cody 12636* (DAO). Campbell Lake, 10 miles southeast of Inuvik, 68°14'N, 133°28'W, rare, shallow soil crevice of limestone talus slope, 14 July 1963, *W. J. Cody & F. Kehoe 12676* (DAO), *n* = 24 by G. A. Mulligan on plants grown from seeds taken from this collection. Reindeer Grazing Preserve, Bird Refuge, South Boundary Marker, west bank of Anderson River, few, July 17, 1965, *G. W. Scotter 7189* (DAO); *n* = 24 by *G. A. Mulligan* on plants grown from seeds taken from this collection. "BB" Lake, 3 miles SE of Indian Mountain Lake, 63°02'N, 110°57'W, very shallow soil over igneous rocky slope, 8 August 1966, *W. J. Cody 16017* (DAO). Pethei Peninsula, S of Talthrilei Narrows, 62°28'N, 111°37'W. Great Slave Lake. Very shallow soil on cliff ledges. 10 August 1966, *W. J. Cody 16058* (DAO), *n* = 24 by *G. A. Mulligan* on plants grown from seeds taken from this collection. Bluenose Lake Area, Melville Hills Region, 510 m, 68°17'N, 121°14'W, 26 July 1990, *G. W. Scotter & S. Zoltai 90-366* (DAO). Bluenose Lake Area, La Ronciere Falls, 215–275 m, 69°08'N, 122°52'W, 31 July 1990, *G. W. Scotter & S. Zoltai 90-691* (DAO).

Miscellaneous New Records And Information

1. ***Draba adamsii*** Ledebour, Fl. Ross. 1:147. 1871, *non Draba pauciflora* R. Brown, Chlor. Melvill., 266. 1823.

In Canada, *Draba adamsii* is a plant of the high arctic islands of Franklin District, from 73° to 81° N and in Alaska at 71° N. The name *D. pauciflora* is based on plant material collected by Parry on Iglooik Island that was deposited in K. However, Reider Elven searched in vain for material of the high arctic species in K in the 1990s and in 2006. He was only able to find Parry specimens of *D. microcarpa*. I have seen it and other material of *D. microcarpa* from Iglooik Island but no specimens of the high arctic plant that I call *D. adamsii*. I do not think that *D. adamsii* is present on Iglooik Island. I believe that *D. pauciflora* should be considered a synonym of *D. microcarpa*.

2. The chromosome numbers in Taylor and Mulligan (1968) of *n* = 19 and 2*n* = 36 for *Draba hyperborea* should be attributed to *D. grandis* Langsdorff and the number *n* = 8 for *D. lonchocarpa* var. *kamtschatica* to *D. chamissonis* G. Don.

3. ***Draba kluanei*** G.A. Mulligan was previously known only from the holotype collection: Canada, Yukon, Kluane

National Park, Hoge Creek, ca. 31 km SSW of Burwass Landing on rocky alpine slope: aspect SW, slope 25%, elev. ca. 1980 m, 61°17'N, 139°35'W, 8 July 1976, *G. W. Scotter, G. G. Douglas & L. Freese 9845* (DAO). It is now known to also occur at a nearby location: Canada, Yukon, Kluane National Park, Wade Mountain, 61°18'N, 139°33'W, alpine tundra, W-facing slope of 5 degrees, 100% vegetative cover, organic soil in seep, 28 June 2002, *P. Caswell 251* (DAO).

4. ***Draba macrocarpa*** Adams has been considered a synonym of *D. corymbosa* Brown *ex* DC (Al-Shehbaz et al. (2010). However, I feel that *D. macrocarpa* is a separate species quite distinct from *D. corymbos*a. The stigmas of *D. macrocarpa* are capitate to semicapitate, 0.40.5–(0.5) mm wide; styles are truncate and never winged; petals are gradually narrowed from above the middle; nectar glands are large, and fruit frequently abort and/or are asymmetrical. *Draba macrocarpa* may be allogamous. Both *D. macrocarpa* and *D. corymbosa* are cespitose perennials with rosettes of the year above old rosettes and rosette remnants. These form a long, closely subtended series in *D. macrocarpa* but not in *D. corymbosa*. The stigmas of *D. corymbosa* are (0.50–)0.65–0.90 mm wide and compressed parallel to septum; styles are broadly winged; petals are broadly obovate except for a short stalk proximally; nectar glands are smaller, and fruit are usually symmetrical and well formed. *Draba corymbosa*, like many species of *Draba*, is probably autogamous.

5. Al-Shehbaz et al. (2010) correctly pointed out that the *Draba paysonii* of Mulligan (1971b) should be attributed to *D. novolympica* Payson & St. John.

6. Two collections of a new species were discovered by Ihsan A. Al-Shehbaz during a study of specimens of Canadian *Draba* sent to him for determination. He named the new species *Draba bruce-bennettii* after one of the collectors (Al-Shehbaz, 2016). The two collections, both from southwestern Yukon, Canada, are: Langham Mountain, 19 July 2012, 62.25057°N, 138.04092°W, 1898 m, *B. A. Bennett & S. G. Cunnings 12-0195* (Holotype: MO 6598201; Isotype: BABY 8349); and Triptop Mountain, 62.21593°N, 137.51984°W, 1836 m, 19 July 2012, *B. A. Bennett & S. G. Cannings 12-0205* (MO 6598200).

Key to *Draba* of Canada and Alaska

1a. Annuals, winter annuals, biennials, or short-lived perennials (lacking rosette remnants of previous years) 2
1b. Long-lived perennials 7
2a. Annuals or winter annuals 3
2b. Biennials or short-lived perennials 5
3a. Stems scapose or with a single cauline leaf 4
3b. Stems with 3 or more cauline leaves. Sporadically naturalized . . . . . ***Draba nemorosa* L.**
4a. Petals white, deeply lobed. Fruit less than 3 × as long as wide . . . . . ***Draba verna* L.**
4b. Petals yellow, entire or slightly emarginated at apex. Fruit more than 4 × as long as wide . . . . . ***Draba reptans* (Lamark) Fernald**
5a. Surfaces of fruit with stellate and/or substellate trichomes. Fruit nearly terete. Petals white . . . . . ***Draba yukonensis* A.E. Porsild**
5b. Surfaces of fruit glabrous or with sparse simple trichomes. Fruit flattened. Petals yellow 6
6a. Abaxial surfaces of basal leaves with short-stalked 3- and 4-rayed trichomes 0.25–0.35 mm wide; occasionally glabrous. Petals yellow, often purple-tinged . . . . . ***Draba albertina* Greene**
6b. Abaxial surfaces of basal leaves glabrous or ciliate with soft, mostly simple trichomes up to 0.5 mm long. Petals pale yellow, not purple-tinged . . . . . ***Draba crassifolia* Graham**
7a. Plants stoloniferous 8
7b. Cespitose perennials 11
8a. Surfaces of fruit glabrous or with short, simple or few-branched trichomes 9
8b. Surfaces of leaves glabrous or pubescent with simple and/or few-branched trichomes; rayed trichomes absent . . . ***Draba oligiviensis* Hultén**
9a. Leaves abaxially with short-stalked cruciform trichomes. . . . . ***Draba juvenilis* Komarov**
9b. Leaves abaxially with stellate and/or substellate trichomes 10
10a. Leaves abaxially with substellate and few-branched trichomes . . . . . ***Draba ventosa* A. Gray**
10b. Leaves abaxially mostly with fine flaccid, short-stalked, symmetrical, 5- to 10(–12)-rayed stellate trichomes; with fewer simple ones proximally and subdendritic ones distally and marginally . . . . . ***Draba darbyshireii* G.A. Mulligan**
11a. Abaxial surfaces of caudex leaves glabrous. Cauline leaves absent 12
11b. Abaxial surfaces of caudex leaves sparsely to densely pubescent. Cauline leaves none to many 15
12a. Midveins on abaxial surfaces of caudex leaves prominent, raised, and long-persisting 13
12b. Midveins on abaxial surfaces of caudex leaves neither prominent nor long-persisting 14
13a. Petals white. Abaxial midveins thick . . . . . ***Draba lactea* Adams**
13b. Petals yellow. Abaxial midveins long-lanceolate . . . . . ***Draba pilosa* DC.**
14a. Short-lived perennial; remnants of old rosettes few or lacking. . . . . ***Draba crassifolia* Graham**
14b. Cespitose perennial with a compacted caudex of stemmed and stemless new rosettes above old rosettes and rosette remnants . . . . . ***Draba cayouettei* G.A. Mulligan & Al-Shehbaz**
15a. Pubescence on abaxial surfaces of caudex leaves distinctly crisped. 16
15b. Pubescence on abaxial surfaces of caudex leaves not crisped 17

KEY TO *DRABA* OF CANADA AND ALASKA CONT.

16a. Not pulvinate. Petals white. Anthers dehiscent . . . . . ***Draba puvirnituqii*** **G.A. Mulligan & Al-Shehbaz**

16b. Pulvinate. Petals pale yellow. Anthers indehiscent . . . . . ***Draba taylori*** **G.A. Mulligan & Al-Shehbaz**

17a. Perennial with fleshy caudex. Fruit (6–)10–25 mm long . . . . . ***Draba grandis*** **Langsdorff**

17b. Perennials, caudexes not fleshy. Fruit mostly less than 10 mm long, often much smaller 18

18a. Fruit mostly with rayed and/or subrayed trichomes 19

18b. Fruit glabrous or with simple and/or branched trichomes; stellate and/or substellate trichomes rare or absent. 32

19a. Petals yellow. Styles over 0.5 mm long. 20

19b. Petals white. Styles up to 0.5 mm long 22

20a. Anthers dehiscent. Abaxial surfaces of caudex leaves pubescent with short-stalked, 4-rayed (cruciform) trichomes. Stems with 10 or more cauline leaves . . . . . ***Draba aurea*** **Vahl *ex* Hornemann**

20b. Anthers indehiscent. Stems scapose or nearly so 21

21a. Abaxial surfaces of caudex leaves with long-stalked (3–)4(–5)-rayed stellate trichomes. Stems scapose. . . . . ***Draba paysonii*** **J.F. Macbr.**

21b. Abaxial surfaces of caudex leaves densely pubescent with tangle of medium to very long stalked 2- to 6(–9)-rayed stellate and substellate trichomes. Stems scapose or nearly so . . . . . ***Draba ventosa*** **A. Gray**

22a. Abaxial surfaces of basal leaves pubescent with simple and/or branched trichomes, at least marginally and distally; symmetrical stellate trichomes few or absent. 23

22b. Abaxial surfaces of basal leaves pubescent with stellate and/or substellate trichomes; simple or branched trichomes very few or absent . 25

23a. Short-lived perennial with 2–4 cauline leaves. Abaxial surfaces of caudex leaves pubescent with simple trichomes to 1 mm long or slightly longer. Fruit nearly terete . . . . . ***Draba yukonensis*** **A.E. Porsild**

23b. Long-lived perennials, stems with (0–)1 cauline leaf. Abaxial surfaces of caudex leaves pubescent with coarse, simple and/or branched trichomes, at least distally and marginally. Fruit flattened 24

24a. Abaxial surfaces of caudex leaves pubescent with coarse, simple and/or branched trichomes distally and marginally; elsewhere with stalked, divergently branched, substellate trichomes. Anthers broadly cordate. Fruit pubescent with (2–)5- to 12-rayed trichomes . . . . . ***Draba oblongata*** **R.Br. *ex* DC.**

24b. Abaxial surfaces of caudex leaves pubescent with coarse, simple and forked trichomes; rayed trichomes few or absent. Anthers broadly truncate. Fruit pubescent with mostly 3- and 4-rayed trichomes . . . . . ***Draba arctogena*** **(E. Ekman) E. Ekman**

25a. Perennial with (15–)22–54(–75) densely overlapping cauline leaves. . . . . ***Draba incana*** **L.**

25b. Perennials with 0–8(–16) cauline leaves; cauline leaves not overlapping 26

26a. Stems with (3–)4–8(–16) cauline leaves. Fruiting pedicels strongly ascending or appressed to rachis 27

26b. Stems with 0–3(–4) cauline leaves. Fruiting pedicels spreading, ascending to strongly ascending; none appressed to rachis 28

27a. Perennial, cespitose, often pulvinate. Fruiting raceme short; apical flower buds usually aborting. Fruit elliptic to narrowly elliptic, some asymmetrical; none twisted. Anthers broadly cordate to orbiculate, 0.15–0.20(–0.25) mm long. . . . . ***Draba catlingii*** **G.A. Mulligan**

27b. Perennial, rarely cespitose, never pulvinate. Fruiting raceme elongated; apical flower buds rarely aborting. Fruit lanceolate to broadly lanceolate, symmetrical; often twisted. Anthers broadly cordate, (0.25–)0.30–0.40 mm long. . . . . ***Draba cana*** **Rydberg**

28a. Stellate or substellate trichomes on abaxial surfaces of basal leaves mostly less than 3.0 mm wide 29

28b. Stellate or substellate trichomes on abaxial surface of basal leaves mostly 3.0 mm wide or wider 30

29a. Stoloniferous. Basal leaves subopposite; pubescent with fine, flaccid, short-stalked, symmetrical, 5- to 10(–12)-rayed stellate trichomes 0.1–0.2(–0.3) mm wide, fewer subdendritic ones marginally and distally . . . . . ***Draba darbyshirei*** **G.A. Mulligan**

29b. Not stoloniferous. Basal leaves rosulate. Fruit with a minute, sparse to dense, simple to few-branched puberulence. Abaxial surfaces of leaves with sessile substellate trichomes less than 0.25 mm wide . . . . . ***Draba airdii*** **G.A. Mulligan**

30a. Fruit inflated, narrowly to broadly elliptic. Fruit, racemes, and stems canescent with fine, short-stalked, divergent, few to more than 10-rayed substellate trichomes 0.2–0.3 mm wide. Fruit often aborted or asymmetrical, allogamous? Stigmas suborbiculate to ovate. Abaxial surfaces of caudex leaves with asymmetrical substellate trichomes (0.25–)0.30–0.40 mm wide. Possibly stoloniferous . . . . . ***Draba shehbazii*** **G.A. Mulligan**

30b. Fruit flattened 31

31a. Fruit trichomes coarse, cruciform to branched cruciform with spreading rays. Anthers truncate, 0.4–0.5 mm long. Abaxial surfaces of basal leaves with coarse, subsessile, spreading-rayed stellate trichomes. . . . . ***Draba arctica*** **J. Vahl s. l.**

31b. Fruit trichomes fine, substellate and asymmetrical. Anthers broadly cordate. Abaxial surfaces of basal leaves with short- to medium-stalked, divergently ascending, stellate trichomes . . . . . ***Draba cinerea*** **Adams s. l.**

32a. Abaxial surfaces of caudex leaves pubescent with symmetrical or asymmetrical stellate trichomes. 33

32b. Abaxial surfaces and/or margins of caudex leaves pubescent with simple and/or branched trichomes 63

33a. Abaxial surfaces of caudex leaves predominantly with symmetrical stellate trichomes 34

33b. Abaxial surfaces of caudex leaves predominantly with asymmetrical substellate trichomes. 59

34a. Symmetrical stellate trichomes on abaxial surfaces of caudex leaves stalkless (sessile) 35

34b. Symmetrical stellate trichomes on abaxial surfaces of caudex leaves stalked 36

35a. Perennial, cespitose; subpulvinate. Stems scapose. Petals yellow. Anthers indehiscent. . . . . ***Draba oligosperma*** **Hooker**

35b. Perennial, not cespitose. Stems with 4–10 cauline leaves. Petals white. Anthers dehiscent. . . . . ***Draba arabisans*** **Michaux**

36a. Symmetrical stellate trichomes on abaxial surfaces of caudex leaves predominantly long to very long stalked. 37

36b. Symmetrical stellate trichomes on abaxial surfaces of caudex leaves predominately short- and/or medium-stalked 38

KEY TO *DRABA* OF CANADA AND ALASKA CONT.

37a. Cespitose perennial; densely pulvinate. Rosette leaves 0.5–1.5 mm wide. Anthers usually indehiscent. Possibly apomictic . . . ***Draba novolympica*** **Payson & H. St. John**

37b. Cespitose perennial; not pulvinate. Rosette leaves 1.5–4.5 mm wide. Anthers dehiscent . . . ***Draba ruaxes*** **Payson & H. St. John**

38a. Symmetrical stellate trichomes on abaxial surfaces of caudex leaves 3- and/or 4-rayed . . . 39

38b. Symmetrical stellate trichomes on abaxial surfaces of caudex leaves mostly 5- or more rayed . . . 46

39a. Cespitose perennials . . . 40

39b. Biennials and/or noncespitose perennials . . . 42

40a. Pulvinate. Trichomes on abaxial surfaces of basal leaves 3- and 4-rayed. Valves of fruit inflated basally into pouch. Petals bright yellow . . . ***Draba bruce-bennettii*** **Al-Shehbaz**

40b. Not pulvinate. Trichomes on abaxial surfaces of basal leaves 4-rayed (cruciform). Valves of fruit flat. Petals white or, if yellow, often tinged with purple . . . 41

41a. Stems 9–30 cm tall with 1–3(–6) cauline leaves. Petals white, 3–5 mm long; styles 0.75–2.00 mm long, Fruit linear-lanceolate to narrowly elliptic. Racemes usually 10- or more fruited . . . ***Draba murrayi*** **G.A. Mulligan**

41b. Stems (0.5–)1.0–8.0 cm tall, scapose. Petals yellow, often purple-tinged; styles less than 0.25 mm long. Fruit elliptic to broadly elliptic. Racemes (2–)3- to 9-fruited . . . ***Draba adamsii*** **Ledebour**.

42a. Stems with more than 10 cauline leaves. Racemes proximally bracteate . . . ***Draba aurea*** **Vahl *ex* Hornemann**

42b. Stems with less than 10 cauline leaves. Racemes not bracteate . . . 43

43a. Petals white, 4–8 mm long. Fruit often twisted, some aborted. Cruciform trichomes on abaxial surfaces of caudex leaves often 1- to few-spurred . . . ***Draba borealis*** **DC.**

43b. Petals yellow, 2–4 mm long. Fruit neither twisted nor aborted. Cruciform trichomes on abaxial surfaces of caudex leaves never spurred . 44

44a. Caudex loosely branched. Styles 0.25–0.70 mm long. Basal leaves with very short stalked cruciform trichomes 0.25-0.50 mm wide. Anthers 0.4–0.5 mm long . . . ***Draba juvenilis*** **Komarov**

44b. Caudex not loosely branched. Styles shorter than 0.25 mm. Basal leaves with cruciform trichomes 0.20–0.35 mm wide. Anthers 0.15–0.40 mm long . . . 45

45a. Short-lived perennial. Abaxial surfaces of basal leaves glabrous or with 3- and 4-rayed trichomes 0.25 to 0.35 mm wide. Petals yellow, often purple-tinged, 2.0–2.5(–3.0) mm long . . . ***Draba albertina*** **Greene**

45b. Perennial with compacted caudex. Abaxial surfaces of rosette leaves with 3- and 4-rayed trichomes up to 0.2 mm wide. Petals yellow, (2.5–)3.5–4.0 mm long . . . ***Draba stenoloba*** **Ledebour**

46a. Biennial or short-leaved perennial, frequently lacking remnants of caudex leaves of previous years. Anthers less than 0.25 mm long. Petals creamy yellow, often fading to white . . . ***Draba praealta*** **Greene**

46b. Perennials with many remnants of caudex leaves of previous years. Anthers more than 0.25 mm long. Petals yellow or white . . . 47

47a. Symmetrical stellate trichomes on abaxial surfaces of basal leaves mostly more than 0.4 mm wide . . . 48

47b. Symmetrical stellate trichomes on abaxial surfaces of basal leaves mostly less than 0.4 mm wide . . . 51

48a. Petals white. Stems with (1–)2–17(–25) cauline leaves . . . 49

48b. Petals yellow. Stems usually scapose . . . ***Draba incerta*** **Payson**

49a. Symmetrical stellate trichomes on abaxial surfaces of basal leaves stalked. Fruit not twisted. Racemes rarely basally bracteate . . . 50

49b. Symmetrical stellate trichomes on abaxial surfaces of basal leaves sessile or nearly so. Fruit often twisted. Racemes usually basally bracteate . . . ***Draba arabisans*** **Michaux**

50a. Fruit flattened. Stems 15–25(–45) cm tall. Stellate trichomes on surfaces of basal leaves mostly 8- or more rayed, many with longer axes; cruciform trichomes rare or absent . . . ***Draba glabella*** **Pursh**

50b. Fruit strongly inflated. Stems 5–10 cm tall. Stellate trichomes on surfaces of basal leaves mostly 4-rayed (cruciform) . . . ***Draba pycnocarpa*** **Fernald & Knowlton**

51a. Stigmas 0.1 mm wide, markedly narrowed perpendicularly to septum and extending decurrently to base of style. Leaves, rachis, and stems pubescent with very flaccid symmetrical stellate trichomes . . . ***Draba caswellii*** **G.A. Mulligan & Al-Shehbaz**

51b. Stigmas much wider than 0.1 mm; not markedly narrowed perpendicularly to septum. Leaves rachis and stem lack flaccid stellate trichomes . . . 52

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53b. Petals white, usually tinged yellow proximally. Fruit narrowly elliptic, often aborting or asymmetrical. Symmetrical stellate trichomes on abaxial surfaces of basal leaves 0.15–0.35 wide . . . ***Draba palanderiana*** **Kjellman**

54a. Sepals, petals, and stamens long-persisting . . . ***Draba franktonii*** **G.A. Mulligan & Al-Shehbaz**

54b. Sepals, petals, and stamens caducous . . . 55

55a. Fruit not twisted . . . 56

55b. Some fruit twisted . . . 57

56a. Rachis, stems, and surfaces of rosette leaves densely pubescent with short-stalked, symmetrical, stellate trichomes 0.05–0.20 mm wide . . . ***Draba nivalis*** **Liljeblad**

56b. Rachis glabrous. Stems glabrous or sparsely pubescent proximally. Petiolar bases and proximal margins of rosette leaves ciliate with stiff, subsetiform, simple trichomes 0.3–0.6 mm long. Abaxial surfaces of rosette leaves pubescent with short-stalked 9- to 12-rayed stellate trichomes; rarely glabrous with trichomes confined to margins. Alaska: 300–1600 m . . . ***Draba mulliganii*** **Al-Shehbaz**

KEY TO *DRABA* OF CANADA AND ALASKA CONT.

57a. Fruit narrowly linear to linear, some twisted; fruiting pedicels appressed to rachis . . . . . ***Draba chamissonis* G. Don**
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59a. Asymmetrical substellate trichomes on abaxial surfaces of caudex leaves setaceous. Filaments greatly expanded below middle. Petals bright yellow . . . . . ***Draba healyi* G.A. Mulligan & Al-Shehbaz**
59b. Asymmetrical substellate trichomes on abaxial surfaces of caudex leaves not setaceous. Filaments not greatly expanded below middle. Petals either white or yellow 60
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