

NOTES ON THE *ARTEMISIA CAMPESTRIS* COMPLEX IN NORTHWESTERN NORTH AMERICA

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ABSTRACT

Taxonomy of the *Artemisia campestris* complex in North America is reassessed after reviewing type specimens of all known published names belonging to the complex or to related species in North America and Eurasia. This group is defined as herbaceous, perennial species of subgenus *Dracunculus*, having distinct basal rosettes for at least part of their growth cycle. The names *Artemisia borealis* and *A. campestris* are found to be misapplied in North America. Types of both are so dissimilar from North American taxa that no taxon on the continent should be treated as infrataxa under either of those names. No other Eurasian taxa are found to be identical with any from North America. Several North America names in widespread use are found to have no clear application or to be synonyms of older validly published names. An annotated list of accepted North American names in the complex is presented. This list includes *A. aleutica*, *A. canadensis*, *A. caudata*, *A. groenlandica*, *A. maccallae*, *A. pacifica*, *A. pycnocephala*, *A. ripicola*, and *A. spithamea*. No type specimen or potential lectotype was found for *Artemisia pacifica*, which has been applied inconsistently, so a neotype is selected and a strict definition given for that species. A list of rejected North American names is given. An annotated list of Eurasian taxa is also given, with notes to demonstrate that each of those Old World names is not applicable in North America.

The *Artemisia campestris* complex has long needed comprehensive taxonomic work in North America. Many names in the complex have been used without a clear understanding of the characteristics of the type specimens. This problem has resulted in misapplications, redundant names of only regional use, and incorrect assignment of synonyms. Species of the complex are exceedingly difficult to understand using only herbarium specimens, such that herbarium-based studies often give taxon delimitations that do not satisfactorily represent the plants as seen in the field. Most early published names in the complex are those of Wilibald Swibert Joseph Gottlieb von Besser (1784-1842). Besser, perhaps partly because he had no familiarity with living plants he named, raised many redundant North American names of ambiguous definition, often based on especially poor specimens. Also, his literature created nomenclatural knots that have been difficult to disentangle.

The *Artemisia campestris* complex is circumboreal in distribution, with the major center of diversity in Russia and adjacent central Asian nations. The North American taxa are mostly treated in recent literature as infraspecific taxa of either *A. borealis* Pallas (Fig. 16) or *A. campestris* L. I have examined high resolution scans of the types of both of those species. Neither species is represented among the North American specimens that I have reviewed, and both are so dissimilar from North American plants that they should not include any North American taxa as infrataxa. All photographs (Figs. 1-15) are by the author.

Although neither *Artemisia borealis* nor *A. campestris* can be said to be circumboreal, the possibility remains that other species in the complex may be distributed both in North America and Eurasia. Accordingly, all names in the complex (defined as perennial herbaceous members of subgenus *Dracunculus* (Besser) Rydb., having basal leaf rosettes for at least part of their annual growth cycle), must be considered for application to North American plants. The list of names in this complex is prodigious. Fortunately, high quality scans (ITHAKA 2016) can now be examined for nearly all names

in the complex. Presented here are three annotated lists: one of accepted North American names including synonyms, one of rejected North American names, and one of Eurasian names. Included are descriptive observations based on review of the type specimens and sometimes augmented with additional taxonomic and nomenclatural notes.

Possibly with the exception of *Artemisia violacea* (see below under list of Eurasian taxa), comparison of types revealed no taxa that can clearly be attributed to both North America and Eurasia. This simplifies the task of applying a workable taxonomy to North American plants. But it also means that the names *A. borealis* and *A. campestris*, in use in the New World for so long, should no longer be applied in North America. This, and clear and consistent morphological distinctions also make it necessary to treat at the level of species North American plants that have long been treated as infraspecific taxa of *A. borealis* or *A. campestris*.

***Artemisia campestris* complex in northwestern North America**

1. **ARTEMISIA CANADENSIS** Michx., Fl. Bor.-Amer. 2: 128. 1803. **TYPE: CANADA. Ontario or Québec.** Ad sinum Hudsonis, date unknown, *Michaux s.n.* (holotype: P 3306192! [scan viewed online]). Figures 1-2.
Artemisia peucedanifolia Juss. ex Besser, Bull. Soc. Imp. Naturalistes Moscou 8: 91. 1835. **TYPE: CANADA. Ontario or Québec.** Environ [illegible] Baye d'Hudson, *Vaillant 106.* (P 670408! [scan viewed online], no holotype was designated).
Artemisia forwoodii S.Watson, Proc. Amer. Acad. Arts 25: 133. 1890. **TYPE: USA South Dakota.** Black Hills, Sep 1887, *Forwood s.n.* (holotype: GH 2702! [scan viewed online]).
Artemisia bourgeauana Rydb., Bull. Torrey Bot. Club 37: 454. 1910. **TYPE: CANADA. Saskatchewan.** 1857-1859, *Bourgeau s.n.* (holotype: NY 158511! [scan viewed online]).
Artemisia caudata var. *calvens* Lunell, Amer. Midl. Naturalist 5: 68. 1917. **TYPE: USA. North Dakota.** Bottinaeu, Willow City, date unknown, *Lunell 1184* (holotype: MIN 1000266! [scan viewed online]).
Artemisia campestris var. *latisecta* Fernald, Rhodora 29: 93. 1927. **TYPE: CANADA. Newfoundland and Labrador.** French (or Tweed) Isl, date unknown, *Fernald 476* (isotypes: GH 2696!, PH 4359!, S S-G-634! [scans of all three viewed online]).
Artemisia canadensis f. *rupestris* J. Rousseau, Nat. Can. 71: 192. 1944. **TYPE: CANADA. Québec.** Comté de Rimouski: Cap à l'Original, 17 Aug 1930, *Victorin 45472.* (isotype: DAO 525016! [scan viewed online]).
Artemisia canadensis f. *pumila* J. Rousseau, Nat. Can. 71: 197. 1944. **TYPE: CANADA. Québec.** Gaspésie, Paspebiac, Comté de Bonaventure: sur les graviers secs et les sable du barchois, date unknown, *Victorin 33772* (isotype: DAO 464877! [scan viewed online]).
Artemisia caudata var. *majuscula* J. Rousseau, Nat. Can. 71: 199. 1944. **TYPE: Not seen. PARATYPE: CANADA. Québec.** Ile-Aux-Allumettes, Comté de Pontiac, Vallée de l'Ottawa, 15 Aug 1933, *Victorin 43926* (DAO 464881! [scan viewed online]).
Artemisia campestris var. *petiolata* S.L. Welsh, Rhodora 95: 397. 1993. **TYPE: USA. Utah.** Ashley National Forest, Uinta Mts, trail between Little Meadow and Moon Lk. elev., 25 Jul 1984, *S. Goodrich 21096* (isotype: BYU 22682! [scan viewed online]).



Figure 1. *Artemisia canadensis*, British Columbia, Coast Ranges, Bute Inlet, Southgate River.

Plants perennial, caudex usually densely branched; plants usually greyish green, less often dark green or silvery, lightly to densely sericeous. **Capitulescence stems** usually decumbent or ascending. **Sterile rosettes** usually present at flowering time. **Proximal leaves** 1-2x pinnate, mostly 40-80 mm long. **Capitulescence leaves** mostly not surpassing the capitulum clusters. **Capitulescences** narrowly lanceolate in outline (seldom linear on depauperate plants). **Capitula** spreading or nodding or a few ascending to erect, not secund, 1.7-3 mm and about as wide or slightly wider, hemispheric to subglobose. **Phyllaries** not strongly graduated, broadly elliptic-ovate to suborbicular, with broad scarious margins. **Corollas** yellowish or brown.

Small or young plants of *Artemisia canadensis* may sometimes appear similar to species treated below. The capitula of *A. groenlandica* are not nodding, and the capitulescence leaves of *A. canadensis* are more often lobed than those of *A. groenlandica*. *Artemisia pacifica* also may appear similar and often has nodding capitula, but usually is larger, has longer leaf lobes and narrower involucre, and grows on or near marine shores. No western North American populations of *A. canadensis* known to me occupy such habitat. *Artemisia mccallae* has usually narrower capitulescences and ascending to erect capitula and narrower phyllaries.

As delimited here, substantial variation occurs within *A. canadensis*. While the outline of the mature capitulescence is consistent among well-grown plants, the density of the capitulescence varies considerably, and leaf lobe size and shape and pubescence show variation that may correlate with geography. Of all members of the *A. campestris* complex in North America, this species appears to be the most widespread and common.

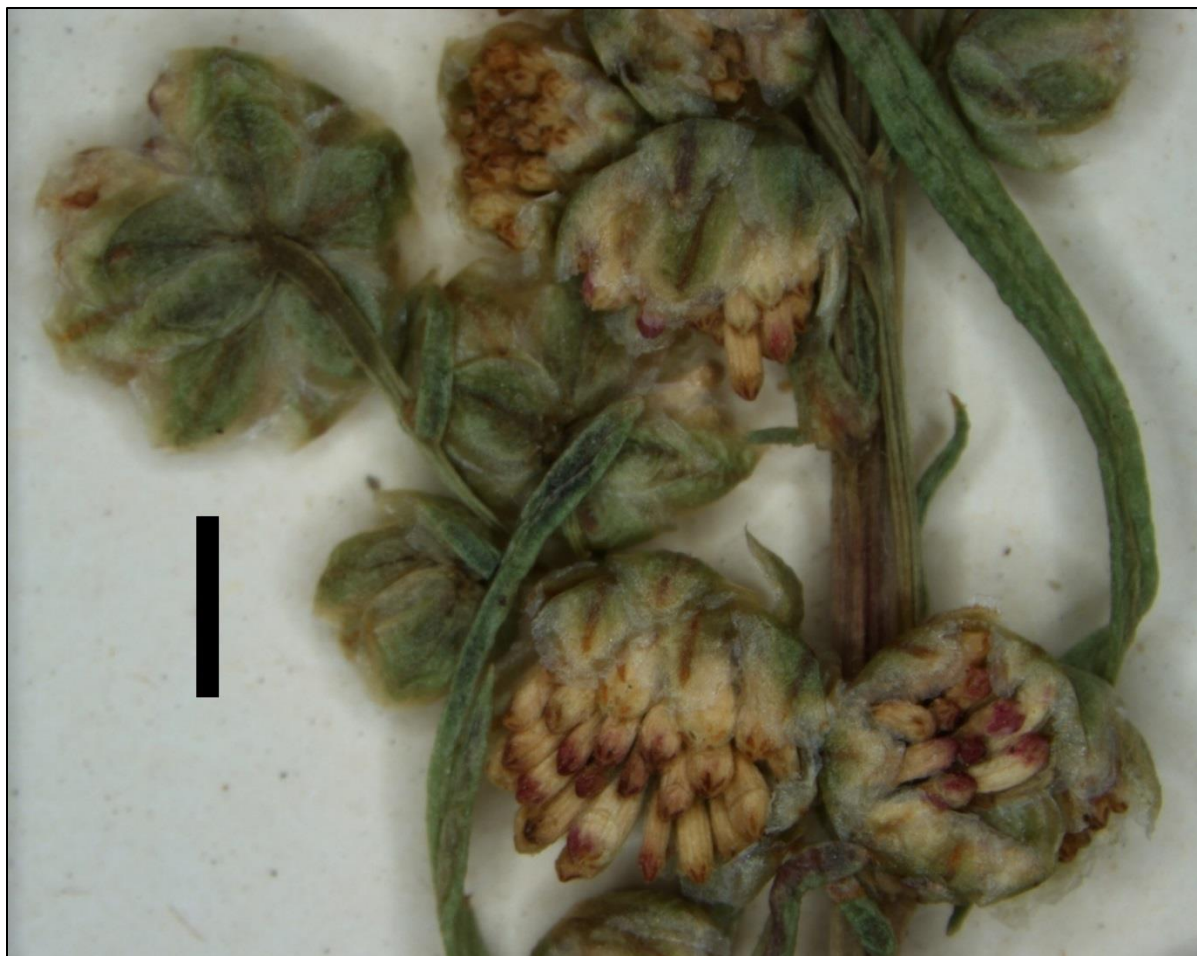


Figure 2. Capitula of *Artemisia canadensis* (UBC 59251). Scale bar = 2 mm.

Selected other specimens studied. CANADA. Alberta. District de Peace River, entre Grande Prairie et Wapiti, 10 Aug 1954, *Boivin 10586* (UBC 156005!); Waterton Lakes National Park, ca. 3 mi N of Waterton townsite, floodplain of Blakiston Ck, 14 Jul 1974, *Douglas 7711* (V 140238!); Jasper National Park, Talbot Lk, 24 Jul 1992, *van Dieren s.n.* (V 152679!). **British Columbia.** Okanagan, Armstrong, 1913, *Wilson s.n.*, (UBC 190799!); Clearwater R, 11 Jul 1943, *Cowan 16267* (V 16267!); Fort Fraser, 5 Jul 1944, *Eastham s.n.* (UBC 9271!); Kamloops, 17 Aug 1944, *Hardy s.n.* (V 17296!); Arrow Lk, Nakusp, 2 Sep 1944, *Hardy s.n.* (V 17237!); Azouzetta Lk, 26 Jun 1960, *Calverley 696* (V 47181!); Looncry Lk, Cassiar District, 2 Sep 1964, *Ritcey 2* (V 47151!); Liard Hot Springs Park, 18 Aug 1971, *Brayshaw s.n.* (V 59202!); Ca. 10 mi. SSW of Vanderhoof, 31 Jul 1974, *Krajina s.n.* (UBC 152751!); Mt. Robson Park, Lucerne, at Mt. Fitzwilliam view point area, 27 Aug 1975, *Chuang 75-599* (V 80105!); Wells Gray Park, White Horse Bluffs area, southern Wells Gray Park, 25 Jul 1979, *Goward 81-367* (UBC 170592!); Cariboo-Chilcotin, Tsuniah Lk, 2 Aug 1979, *Roemer 79-318* (V 200861!); Major Hart drainage, Cry Lk, 2 Aug 1980, *Clement LM8081* (V 110873!); Thompson-Okanagan, Savona, Kamloops Lk, approximately 1.5 km from the outlet, 28 Aug 1980, *Češka 4572* (V 184984!); Thompson-Okanagan, Shuswap Lk, 29 Aug 1980, *Češka 4661* (V 184985!); Peace R, Pine R Breaks, 8 km E of Chetwynd, 8 Jul 1981, *Roemer 81-307* (V 200961!); Invermere, ca. 1 km along Williamson Road, 13 Aug 1981, *Nicholson 81-1016* (V 128528!); N side of Ingenika R, Swannell R Jct, 8 Aug 2003, *Hebda KM5025* (V 190938!); Fraser Valley, 3.5 km SW of Agassiz, island in Fraser R, 1 km W of Agassiz Bridge 11 Aug 2007, *Lomer 6334* (UBC 233579!). **Northwest Territories.** Norman Wells, 6 Jun 1969, *Shewell 64* (V 140235!). **Ontario.** Thunder Bay District, Heron Bay, 24

Jul 1939, *Taylor 314* (UBC 9420!); Angler near Marathon on NW shore of Lk Superior, 5 mi off Rt. 17, 16 Aug 1969, *Wiehler 6950* (UBC 190800!). **Québec.** Ile du Bic, Comté de Rimouski, 4 Aug 1936, *Rousseau 50492* (V 51642!). **Saskatchewan,** Glenbush, 2 Aug 1950, *Brayshaw 50655* (UBC 52629!). **Yukon Territory.** Yukon R, 15 mi below Dawson, 11 Jul 1936, *Lohbrunner 12054* (V 12054!); Carmacks on Dawson-Whitehorse Road, 9 Aug 1960, *Calder 27978* (UBC 119732!); Carcross, 6 Jul 1982, *Češka 11740* (V 122003!). **Québec.** Ile du Bic, Comté de Rimouski, 4 Aug 1936, *Rousseau 50492* (V 51642!). **USA. Alaska.** Jarvis Ck bridge area of Richardson Highway just S of Delta Jct, 9 Jun 1965, *Harms 3586* (V 182966!).

2. ARTEMISIA CAUDATA Michx., Fl. Bor.-Amer. 2: 129. 1803. **TYPE: USA. Missouri.** Date unknown, *Michaux s.n.* (holotype: P2284278). The image of the type currently is not available on the specimen database at herbarium P. Though I have not seen the type, the concept of the species I am using complies with the original description and with most treatments and should result in the fewest re-identifications of herbarium specimens. Figure 3.

Plants short-lived, usually biennial, root apex usually simple or few branched, glabrous or sericeous. **Capitulescence stems** erect, often with 1 or more long branches. **Sterile rosettes** usually absent at flowering time. **Proximal leaves** mostly 3-pinnate, segments linear to filiform. **Capitulescence leaves** 1–2-pinnate, often surpassing the capitulum clusters. **Capitulescences** much branched, mostly narrowly pyriform. **Capitula** erect to nodding, not secund, shortly to longly pedunculate, doliform, 2–3 mm long. **Phyllaries** green, glabrous or nearly so, oblong to ovate. **Corollas** greenish or yellow-brown.



Figure 3. Capitula of *Artemisia caudata* (UBC 110273). Scale bar = 2 mm.

Artemisia caudata is distributed primarily in temperate central and eastern North America, rarely occurring west of the Rocky Mountains. It prefers sandy soil, often in disturbed sites. From other members of the complex, it can be distinguished by its biennial habit. It is generally monocarpic and plants in full flower usually do not produce perennating rosettes.

Other specimens studied. CANADA. Alberta. Craigmyle District, 2 Aug 1942, *Brinkman s.n.* (UBC 9283!); District of Vegreville, Bruderheim, 2 mi N, 18 Aug 1952, *Boivin 10198* [or *10193?*] (UBC 156006!); Scotford Sandhills, S side of N. Saskatchewan R., 8 mi NE of Ft. Saskatchewan, 23 Aug 1954, *McCalla 12308* (UBC 63882!). **British Columbia.** Oliver, Pasture, 28 Aug 1953, *Krajina 766* (UBC 79478!). **Ontario.** Thunder Bay District, C.P.R. tracks 1 1/2 mi E of shipyard crossing, Current R, Port Arthur, 24 Sep 1950, *Garton 1373* (UBC 27896!); Ontario, Chalk Bay, 13 Jul 1962, *Merriles s.n.* (UBC!). **Québec.** St-Gédéon, Cté Lac St-Jean, 14 Aug 1963, *Cinq-Mars 63-1159* (UBC 116098!). **USA. Illinois.** Rock Island Co.: near Silvis, 22 Sep 1962, *Chase 17119* (UBC 110273!). **South Carolina.** Aiken Co.: Sand hill, 0.3 mi E of jct US. 1-76 and SC. 254 on US. 1-76 (between North Augusta and Aiken), 27 Oct 1961, *Ahles 55100* (UBC 100885!).



Figure 4. *Artemisia spithamea*, Nunavut, Bathurst Inlet.

3. **ARTEMISIA SPITHAMEA** Pursh, Fl. Amer. Sept. 2: 522. 1813 [published as *spithamea*]. *Artemisia borealis* var. *purshii* Besser Fl. Bor.-Amer. 1: 326. 1833 (replacement name for *A. spithamea*). **TYPE: CANADA. Labrador.** Date unknown, *Hurlock s.n.* (PH 8424! [scan viewed online]). Figure 4.

Plants perennial, dark green, lightly sericeous to glabrate, root apex usually simple or apparently so. **Capitulescence stem** purple, 5-20 cm. **Sterile rosettes** often present at flowering time. **Proximal leaves** 1-2 x subpalmate to pinnate. **Capitulescence leaves** most or many not surpassing the capitula. **Capitulescence** linear or narrowly thyriform. **Capitula** doliform to subspheric, ca. 2.8-3.3 mm. **Phyllaries** broadly elliptic-ovate to elliptic-obovate, purple with a central green zone and narrow scarious margins, not or moderately graduated, glabrous or nearly so. **Corollas** reddish or yellowish brown.

This seldom observed species occurs on marine beaches along the Arctic Ocean and along the Labrador Coast. It is dark green, and distally glabrous or glabrate, and often heavily purplish pigmented. It is sometimes minute in stature. This species appears to be a relative of *A. groenlandica*, differing in habitat and by its small size, its green and glabrate leaves, stems and involucre, and its more or less simple, compact root crown.

Other specimens studied. CANADA. Northwest Territories or Nunavut. Arctic Sea, Franklin Expedition, *Richardson s.n.*, date unknown (E 369142! scan viewed online, plants in lower right of sheet). **Nunavut.** Chesterfield Inlet, Hudson Bay, 8-11 Aug 1928, *Malte 12713* (V 12713!); Bathurst Inlet, estuary of S-flowing creek at base of S-pointing peninsula on the W shore of the inlet near its southern end, 25 Jul 2012, *Björk 26848* (Hb. Björk!).

4. **ARTEMISIA GROENLANDICA** Wormsk., Fl. Dan. 9, fasc. 27: 6, t. 1585. 1818. (**LECTOTYPE**, here designated: GDC 460014! [scan viewed online]: **KALAALLIT NUNAAT (GREENLAND).** *Hornemann s.n.*; paratypes: *Hornemann s.n.*, GDC 460335!, 460378!, 460379! all on one sheet [scan viewed online]). Figures 5-6.

Artemisia desertorum var. *richardsoniana* Besser, Fl. Bor.-Amer. 1: 325. 1833. **TYPE: CANADA OR USA.** Arctic sea coast, *Richardson s.n.* (syntype: K 942013! [scan viewed online]). The type comprises plants 1 and 2 on a sheet mixed with *A. hyperborea*. The supposed holotype at GH (*Kellogg 232* accession number 2734! [scan viewed online]) is not a type; it was collected after the name *A. richardsoniana* was published, and the specimen is *A. arctica*.

Artemisia manca Rydb., N. Amer. Fl. 34: 256. 1916. **TYPE: USA. Alaska.** Cold Bay. 31, [8?] Jul, 1904, *Piper 4423* (isotype: S S-G-654! [scan of photo and fragments viewed online]).

Artemisia campestris var. *strutzae* S.L.Welsh, Great Basin Naturalist 28: 149. 1968 [published as *A. campestris* subsp. *borealis* var. *strutzae*]. **SYNTYPE** (first specimen cited): **USA. Alaska.** Roadside, ca. 2 mi E of Potter, near mi 112, Seward Highway, 7 Jul 1965, *Welsh 4524* (isosyntype: ISC V-56! [scan viewed online]).

Plants silvery, densely sericeous to villous throughout, long-lived, caudex densely branched. **Capitulescence stems** erect. **Sterile rosettes** usually present at flowering time. **Proximal leaves** (1-)2-3 x pinnately lobed. **Capitulescence leaves** exerted past the clusters of capitula. **Capitulescence** narrowly thyriform. **Capitula** mostly spreading to ascending, more or less glomerate, short-stalked to sessile, ca. 2.5-3 mm, hemispheric, densely hairy. **Phyllaries** broadly elliptic-obovate, scarious margins broad. **Corollas** reddish or purplish.

Prior to reviewing the types of *Artemisia groenlandica* and *A. richardsoniana*, I was prepared to describe a new species from mountainous regions of western North America. However, I can find no distinctions between these widespread western North American plants from the types of *A. groenlandica* or its synonyms listed above. The type of *A. richardsoniana* has somewhat more

spreading hairs in the capitulescence than do the other types considered here. However, this characteristic appears sporadically among other specimens, as with *Cronquist 7991* (V 51568!, cited below). Though I have not seen specimens in the intervening regions between western North America and Greenland, photographs posted on-line from, for example, Rankin Inlet, Nunavut (Aiken et al. 2011) help close the geographical gap. The name *A. borealis* var. *purshii* is frequently applied to this taxon but was published by Besser as a replacement name for *A. spithamea* (see above). See also *A. violacea*, in list of Eurasian taxa, below.

In western North America, *A. groenlandica* occurs mostly in rocky sites, especially on limestone and serpentine, and appears to be uncommon, though widespread. It is highly distinctive in its thyriform capitulescence, usually quite even in width throughout its length. The capitula are mostly in clusters and erect or spreading on short peduncles (or sessile), and characteristically the capitulescence leaves are mostly simple or few-lobed and protrude past the capitula. The plants are consistently densely hairy and are silvery.



Figure 5. Capitula of *Artemisia groenlandica* (UBC 155776). Scale bar = 2 mm.



Figure 6. *Artemisia groenlandica*, British Columbia, Columbia Mountains, near Vavenby.

Selected other specimens studied. CANADA. Alberta. Caw Ridge, approx. 20 mi NW of Grande Cache, 2 Aug 1975, *Češka s.n.* (V 184280!). **British Columbia.** Lazy Lk, Kimberley, Jun 1943, *Fodor 227* (UBC 47286!); Sinkut Mt., Vanderhoof, 18 Jul 1945, *Eastham 13618* (UBC 9268!). Above Elisabeth Mine, up Blue Ck, Lillooet area, 26 Jul 1961, *Beamish 610553* and *610554* (UBC 98520! and UBC 98519!); Valley SE of Big Dog Mt, Lillooet area, 30 Jul 1961, *Beamish 610640* (UBC 98518!); Noaxe Lk, 1 Aug 1961, *Beamish 610737* (UBC 98212!); Oxytropis Ridge, NE. of Rainbow Cabin, Gladys Lk area, 1 Jul 1975, *Pojar s.n.* (UBC 155776!); above Prentice Ck Trail overlooking Relay Ck, 24 Jul 1977, *Selby plot 65 #656* (UBC 169198!); 2 km W of Teepee Heart Ranch, 1320 m, 22 Jul 1978, *Jones 3-2b-1* (UBC 167571!); Cariboo-Chilcotin, Nine Mile Ridge, N of Yalakom R, 7 Jul 1980, *Roemer 80-223* (V 200904!); Cariboo-Chilcotin, Konni Mt, Jul 1981, *Roemer 81-374* (V 200978!); Talla Lk area, 14 km S of Talla Lk, ca. 900 m, 14 Jul 1981, *Goward 81-1497C* (UBC 187050!); Cariboo-Chilcotin, Clinton, Jesmond forest fire lookout, W part of Marble Range, 30 Jul 1981, *Češka 7024* (V184165!); Dil-Dil Plateau, Nadilla Lk, ca. 1.5 km NE of, 2264 m, 22 Jul 1993, *Douglas 12772* (UBC 211737!); Blue Ck, headwaters, above Elisabeth Mine, 2170 m, 27 Jun 1995, *Douglas 12964* (UBC 211731!). **Northwest Territories.** Sachs Harbour, Banks Isl, 91 m, 28 Jul 1965, *Krajina s.n.* (UBC 182614!); Sachs Harbour, Banks Isl, 2 m, 2 Aug 1965, *Krajina s.n.* (UBC 179274!); 10 km NW along the coast from Sachs Harbour on Banks Isl, 24 ft, 5 Aug 2003, *Pokiak 39* (UBC 220516!). **Yukon Territory.** about 7 mi E of Little Atlin Lk, 13 Aug 1943, *Raup 11245* (UBC 100476!); NW of Choooutla Lk, Carcross, 2 Jul 1968, *Beamish 681559* (UBC 190797!); Yukon Territory, near Tower Hill 8 km SE of Tagish, 2 Aug 1979, *Rosie 712* (V 98869!); Ivvavik National Park, Nunaluk Spit, mouth of the Firth R, 8 Aug 2005, *Bennett 05-0749* (UBC 222956!). **USA. Montana.** Carbon Co.: Beartooth Mts, immediately adjacent to the Wyoming state line, about 25 mi SW of Red Lodge, 27 Jul 1955, *Cronquist 7991* (UBC 51568!).

5. ARTEMISIA PYCNOCEPHALA (Less.) DC., Prodr. 6: 99. 1838 (1837). *Oligosporus pycnocephalus* Less., Linnaea 6: 524. 1831. Figure 7.

Artemisia pachystachya DC., Prodr. 6: 114: 1838 (1837). **TYPE: USA. California.**

Plants perennial, densely sericeous or villous, silvery throughout, caudex many-branched. **Capitulescence stems** ascending to erect. **Sterile rosettes** present at flowering time but elongating. **Proximal leaves** (2-)3 x pinnate, densely sericeous. **Capitulescence leaves** (except the distalmost) usually surpassing the capitula, lobes linear to narrowly oblanceolate. **Capitulescence** thyriform to narrowly pyriform. **Capitula** crowded, most in clusters, subsessile or short-stalked, hemispheric, ca. 2.5 mm. **Phyllaries** elliptic-ovate to elliptic-obovate. **Corollas** yellowish.

In transferring this species into *Artemisia*, de Candolle cited a Siberian provenance, and cited the Lessing publication incorrectly (as page 324). However, de Candolle's description does not disagree with the general understanding of *A. pycnocephala* or its description by Lessing, and there is no *Artemisia* of any species mentioned on the cited page 324 of Linnaea 6 (1831), so it can be assumed that he meant to recombine Lessing's *Oligosporus pycnocephalus*. Later in the same publication (pg. 114), de Candolle describes *A. pachystachya*, based on *Douglas s.n.*, California, date unknown (!K 891991 scan), which apparently he did not understand to be a later name for to what has long been understood to be Lessing's concept of *A. pycnocephala*. Evidently this mistake was based on de Candolle's erroneous belief in a Siberian origin of *A. pycnocephala*. However, Lessing did not specify a type for his *O. pycnocephala*, nor did he mention a geographical range. I was unable to find any Chamisso collection from California that could have been Lessing's type. If no candidate Chamisso collection can be found and demonstrated to be the specimen examined by Lessing, then *A. pachystachya* may be the correct name for the plants in question.



Figure 7. *Artemisia pycnocephala*. Samoa Dunes, Humboldt Co., California.

This distinctive, regionally endemic species of California and southern Oregon is unlikely to be confused with any other species. Among the species treated here, it has the most ephemeral basal rosettes, which become elevated on leafy stems, true even on sterile shoots. The cauline leaves are more complexly lobed than in other North American species of the complex.

6. ARTEMISIA PACIFICA Nutt., Trans. Amer. Philos. Soc., n. s. 7: 401. 1841. *Artemisia campestris* subsp. *pacifica* (Nutt.) Hall & Clem., Publ. Carnegie Inst. Wash. 326: 122. 1923. *Artemisia campestris* var. *pacifica* (Nutt.) Peck, Man. Pl. Oregon 768. 1941. *Oligosporus pacificus* (Nutt.) Poljakov, Trudy Inst. Bot. Akad. Nauk Kazakhst. SSR 11: 170. 1961. *Oligosporus campestris* subsp. *pacificus* (Nutt.) Weber, Phytologia 55: 9. 1984. **NEOYPE** (designated here): **CANADA. British Columbia.** Vancouver Island, N of Campbell River, Indian Reserve, 50° 02' N, 125° 16' W, 15 Aug 1968, *Krajina 68081515* (UBC 134535!). Figures 14-15.

Plants perennial, long-lived, green or grey, sparsely to moderately sericeous throughout, caudex more or less branched. **Capitulescence stems** long-decumbent to ascending. **Sterile rosettes** usually present at flowering time. **Proximal leaves** (1-)2-3 x pinnately lobed, mostly 70-140 mm long. **Capitulescence leaves** exerted well past the clusters of capitula. **Capitulescence** lanceolate in outline or diffuse. **Capitula** hemispheric, yellowish, more or less glossy, mostly nodding to ascending, usually more or less glomerate, short-stalked to sessile, seldom long-stalked, ca. 2.2-2.5(-3) mm. **Phyllaries** broadly elliptic-ovate, scarious margins broad. **Corollas** numerous, dull yellow.

There has never been a clearly representative description or consistent application of the name *Artemisia pacifica*. Nuttall's description leaves much doubt about which specimens should be identified as such. The entire protologue is shown here.

Artemisia **Pacifica*; herbaceous, soft, and canescently sericeous; leaves pseudopetiolate, bipinnately dissected, the segments often trifid, oblong or linear, acute; stem leaves pinnately dissected, pseudostipulate on the infertile shoots; stem and ovate, pedicellate capitulum, smooth.

HAB. Shores of the Pacific, at the outlet of the Oregon, in sandy places. Considerably allied to *A. canadensis*, but more tomentose, with broader and fewer segments to the leaves, the radical and lower leaves very much as in the last species. Perhaps *A. desertorum*, γ . *Scouleriana* of Hook. Flor. Bor. Am., p. 325.

Schultz (2006) defined the species (as *Artemisia campestris* var. *pacifica*) in a way that could be applied to any perennial North American member of the *A. campestris* complex over 20 cm tall. Peck (1941) differentiated *A. pacifica* from *A. spithamea* (as *A. campestris* var. *spithamea*) and *A. borealis* (as *A. campestris* var. *borealis*) by various characters that do not form consistent suites, and the characters do not correlate to those observed among specimens. Peck believed that *A. spithamea* is a tomentose plant with large, hemispheric capitula, and he attributed that name to coastal plants of the Columbia River northward to Alaska and Greenland, while he applied the name *A. pacifica* only to non-coastal plants east of the Cascade Mountains (despite Nuttall's cited location) and used an ambiguous set of characters to define it. Piper (1906) synonymized *A. pacifica* under *A. canadensis* and differentiated that species from *A. borealis* only on the basis of the number, size, and color of the capitula. Hitchcock et al. (1955) listed *A. pacifica* in synonymy under *A. campestris* var. *scouleriana*, which they defined as plants having taller stature, larger and more open capitulescences, and smaller capitula compared to plants they treated as *A. campestris* var. *borealis* and *A. campestris* var. *wormskioldii*. In commentary under *A. campestris*, Hitchcock & Cronquist (1955) referred to plants "particularly about Puget Sound" that they erroneously believed to be biennial and posited that they may be a comparatively hairy, western form of *A. caudata*. Plants of Puget Sound and adjacent coastal British Columbia instead are perennial and treated here as typical *A. pacifica*.

I was not able to identify any specimen that may have been the basis for Nuttall's description. A neotype had to be selected because Nuttall did not cite a specimen, and no candidate for lectotypification could be found. Hitchcock & Cronquist (1994) indicated that they saw a type at BM, a collection by Nuttall, but I was unable to locate any collection by Nuttall's or anyone else that could be interpreted as matching the location cited by Nuttall. Though *Artemisia campestris* could be rejected as a nomen confusum and synonymized under an older name of a different species, rescuing it with a neotype provides a name for the coastal plants of Washington and southwestern British Columbia that otherwise would have no name, and describing those plants as a novel species runs the risk of generating a superfluous name should it turn out that the type of *A. pacifica* (if ever found) truly represents them. The neotype is of sufficient quality to anchor the species without confusion over how the name should be applied. However, care must be taken not to apply the name as broadly (in morphology or geography) as has done in the past.

Artemisia campestris var. *scouleriana* has often been equated with *A. pacifica* (perhaps following Nuttall's suggestion) but it was not described in a way that the name can be clearly applied. It has no clearly identifiable type, or it may be homotypic with *A. ripicola*. See notes under *A. desertorum* var. *scouleriana* under rejected North America species, below.

Artemisia pacifica grows along the inner coast of southern British Columbia and Washington and likely occurs further south as well (if Nuttall was correct in citing the mouth of the Columbia as the source of the specimen he examined). It almost always grows on sandy marine beaches but also occurs along tidal-influenced river shores and on rocky sites shortly over marine shores.

Selected other specimens studied. CANADA. British Columbia. Beacon Hill, banks near seashore, 30 Aug 1898, *Anderson 304* [301? or 307?] (V 4972!); on Comox Spit, 24 Jul 1915, *Macoun s.n.* (V 4952!); Oak Bay, Victoria, 22 Jul 1920, *Newcombe s.n.* (V 5999!); Cowichan Head, Saanich, Vancouver Isl, 12 Aug 1928, *Newcombe s.n.* (V 8561!); Boundary Bay, 28 Aug 1937, *Eastham s.n.* (UBC 7282, UBC 9281!, UBC 9280!); Island View Beach, 6 Aug 1963, *Young 945* (UBC 108607!); Savary Isl, 17 Jul 1980, *Stanley B552* (V 116229!); North Pender Isl, Thieves Bay, 16 Sep 1981, *Janszen 2122* (V 113810!); Galiano Isl, Collinson Point, Active Pass, 30 Sep 1981, *Janszen 2128* (V 113853!); Vancouver Isl, Campbell River, Tye Spit, 18 Aug 1982, *Češka 13783* (UBC 214513!); Greater Vancouver, Surrey, ca. 1.3 km SSW of Pattullo Bridge, 100 m W of Timberland Rd., 1 Aug 1999, *Lomer 99-137* (UBC 234469!); Gulf Isls, Savary Isl, near W point of isl, 11 Apr 2000, *Roemer HR0007* (UBC 219476!); Chilliwack R, 850 m upstream from Vedder Rd. bridge, 36 m, 23 Aug 2008, *Lomer 6760* (UBC 227588!).



Figure 8. *Artemisia pacifica*. Washington, Redondo Beach along Puget Sound. These photos document the occurrence of *A. pacifica* in Washington, although specimens were not examined from that state.



Figure 9. Capitula of *Artemisia pacifica*, neotype. Scale bar = 2 mm.

Selected other specimens studied. CANADA. British Columbia. Beacon Hill, banks near seashore, 30 Aug 1898, *Anderson 304* [301? or 307?] (V 4972!); On Comox Spit, 24 Jul 1915, *Macoun s.n.* (V 4952!); Oak Bay, Victoria, 22 Jul 1920, *Newcombe s.n.* (V 5999!); Cowichan Head, Saanich, Vancouver Isl, 12 Aug 1928, *Newcombe s.n.* (V 8561!); Boundary Bay, 28 Aug 1937, *Eastham s.n.* (UBC 7282, UBC 9281!, UBC 9280!); Island View Beach, 6 Aug 1963, *Young 945* (UBC 108607!); Savary Isl, 17 Jul 1980, *Stanley B552* (V 116229!); North Pender Isl, Thieves Bay, 16 Sep 1981, *Janszen 2122* (V 113810!); Galiano Isl, Collinson Point, Active Pass, 30 Sep 1981, *Janszen 2128* (V 113853!); Vancouver Isl, Campbell River, Tyee Spit, 18 Aug 1982, *Češka 13783* (UBC 214513!); Greater Vancouver, Surrey, ca. 1.3 km SSW of Pattullo Bridge, 100 m W of Timberland Rd., 1 Aug 1999, *Lomer 99-137* (UBC 234469!); Gulf Isls, Savary Isl, near W point of isl, 11 Apr 2000, *Roemer HR0007* (UBC 219476!); Chilliwack R, 850 m upstream from Vedder Rd. bridge, 36 m, 23 Aug 2008, *Lomer 6760* (UBC 227588!).

7. ARTEMISIA RIPICOLA Rydb., N. Amer. Fl. 34: 256. 1916. **TYPE: USA. Oregon.** Sherman Co.: Biggs, *Heller 10117* (holotype: NY 158563! [scan viewed online]). Figure 8.

Artemisia borealis var. *wormskioldii* Besser, Fl. Bor.-Amer. (Hooker) 1: 327. 1833. **LECTOTYPE** (designated here): Presumably **USA.** NW America, date unknown, *Douglas s.n.* (K 891979! [scan viewed online]).

Syntypes: **USA. Oregon or Washington.** Sandy shores and islands of the Columbia, Plentiful on Menzies Isl, *Douglas s.n.*, date unknown (K 891980! [scan viewed online]). **Oregon or**

Washington. Columbia River, *Scouler s.n.*, date unknown (K 891981! scan). See notes under *A. desertorum* var. *scouleriana* under rejected North American names, below.

Plants perennial, densely sericeous, silver or darkish grey-green throughout, caudex usually few-branched. **Capitulescence stems** more or less erect. **Sterile rosettes** usually present at flowering time. **Proximal leaves** 1-2 x pinnate, densely sericeous. **Capitulescence leaves** (except the distalmost) usually surpassing the capitula, lobes linear to filiform. **Capitulescence** linear. **Capitula** distant or few in small clusters, subsessile or short-stalked, mostly solitary, hemispheric, ca. 2.4 mm. **Phyllaries** elliptic-obovate to elliptic-ovate. **Corollas** yellow or reddish.



Figure 10. *Artemisia ripicola*, Washington State, Columbia River shore, Wanapum Gap.

This species is rare and of conservation concern. It may have been common prior to the construction of the numerous hydroelectric dams on the Columbia River, which would have permanently inundated populations and their required habitats. The numerous early collections suggest that it was once more common. In nearly all taxonomic literature, this taxon is known as *Artemisia borealis* var. *wormskioldii* as it is in conservation literature; it will be necessary to adopt the new habit of calling them *A. ripicola* since this taxon is not a close relative of *A. borealis*.

The distinctions between this species and *Artemisia groenlandica* are not striking. The types of *A. ripicola* and *A. borealis* var. *wormskioldii* all show a linear capitulescence, with capitula solitary or in small or diffuse clusters, while *A. groenlandica* has a denser, broader capitulescence and capitula

more distinctly glomerate. In habitat, the two species are further distinguished. I have seen very few specimens of *A. groenlandica* from low elevation habitats, and none from shorelines. Also, *A. ripicola* is said to flower in spring, unusually early for an *Artemisia* and earlier than *A. groenlandica*. However, in the context of its late-thawing high elevation habitat, *A. groenlandica* also flowers early, sometimes in June. I know of no populations of *A. groenlandica* that approach the geographical range of *A. ripicola*.

Evidently, Besser confused the Lay & Collie paratype of *A. borealis* var. *wormskioldii* with a specimen of an unrelated species from “Kotzebue Sound,” which he cited as the provenance of the type (now paratype since another of Besser’s cited specimens was labeled as lectotype by Kenton Chambers in 1989). The specimens in question share a single sheet with additional specimens. On that sheet, the plants in the upper right are labeled “Kotzebue Sound,” also from the Beechy Voyage, but the identification of that specimen was as Besser’s *A. borealis* β . The determinavit of *A. borealis* γ *wormskioldii* is applied to the specimen from “Cape Krusenstern” [Alaska], to a single plant on the right side of the cluster of specimens on the left-center of the sheet. The Kotzebue plants appear to be *A. hyperborea* Rydb., while the plant from Cape Krusenstern appears to be *A. groenlandica*, though due to the poor quality of that specimen, it may not be possible to identify it with certainty. See also notes under *A. desertorum* var. *scouleriana* and *A. prescottiana* under rejected North American species, below.

8. ARTEMISIA MCCALLAE Rydb., N. Amer. Fl. 34: 254. 1916 [published as ‘*maccallae*]. **TYPE:** CANADA. Alberta. Vicinity of Banff, 16 Sep 1899, *McCalla 2016* (isotypes: K 891987!, NY 158539! S S-G-653! [scans viewed online]). Figures 9-13.

Artemisia desertorum var. *hookeriana* Besser, Fl. Bor.-Amer. (Hooker) 1: 325. 1833. **TYPE:** CANADA. Alberta or Saskatchewan. Carlton House [correct location possibly from further west], Amer. Bor., *Anon.* [probably *Douglas* or *Drummond*] (holotype: K 891992! [scan viewed online]). The identification of the specimen as *A. commutata* var. *hookeriana* is in Besser’s handwriting. The specimen was also named as *A. forwoodii* by Sereno Watson but is not the type of that species.

Artemisia caudata var. *rydbergiana* B. Boivin, Nat. Can. 82: 171. 1955. **TYPE:** CANADA. Yukon Territory. Miles Canyon on the Lewis River above Whitehorse, 15 Aug 1949, *Gillett & Mitchell 4486* (isotypes: DAO 464880!, GH 2699! [scans of both viewed online]).

Plants perennial, green to gray, sericeous or glabrate, caudex tightly few-branched or with a diffusely branched woody caudex. **Capitulescence stems** erect or ascending. **Sterile rosettes** usually present at flowering time. Proximal leaves mostly 2x pinnate, segments linear. **Capitulescence leaves** narrow, narrowly lanceolate in outline, mostly surpassing the capitula. **Capitulescence** linear to narrowly pyriform. **Capitula** erect or ascending, not secund; involucre broadly ovate to doliform, ca. 2.5 mm. **Phyllaries** moderately glossy, elliptic-obovate to elliptic-oblong, ca. 1.5x long as wide. **Corollas** yellowish or greenish.



Figure 11. *Artemisia mcallae*, dryland form, British Columbia, East Chopaka grasslands.

Two forms of *Artemisia mcallae* can be identified. These may be two distinct species, but because their distinctions are more obvious in the field than in the herbarium, I do not have sufficiently full characterizations of both in order to assess degree of character correlations. Also, as studied in the herbarium, *A. mcallae* specimens are sometimes intermediate in morphology. Hence, I refrain from distinguishing an additional species at this time pending further studies.

The two forms may be described as follows. One has silvery, densely sericeous leaves, a tightly branched caudex, more erect stems, and basal rosettes that at flowering time are usually faded or only just beginning to grow (Figure 9). On average, its involucre may be somewhat narrower in shape. This form is very common and widespread in interior regions of British Columbia, southernmost Yukon and the northern tier of the northwestern U.S., where it grows on sandy or gravelly soil in upland habitats. The other form has green, glabrous or glabrate leaves (occasional plants silvery with dense sericeous pubescence, Figure 13), a more divergently branched caudex, usually decumbent capitulescence stems, and basal rosettes that at flowering time are usually well formed and conspicuous (Figure 10). This form usually grows in interior British Columbia and southernmost Yukon, on rocky or gravelly shores of rivers and lakes, but it also grows in upland sites, usually where rocky. Flowering time seems to differ between the two forms: June-August for the dryland form; August-October for the shoreline form. However, plants of the shoreline form that grow in upland sites flower earlier.



Figure 12. *Artemisia mccallae*, shoreline form, British Columbia, Wells Gray Park.

Other specimens studied, dryland form. CANADA. Alberta. Muirhead, 15 Aug 1946, *MacDonald s.n.* (UBC 43530!). **British Columbia.** Tranquille Range, Jul 1936, *Tisdale 8694* (UBC 9273!); Penticton, 23 Sep 1939, *Eastham 6050* (UBC 9397!); Head of Loon Lk, 20 mi in from hwy, near Clinton, 26 Aug 1965, *Williams s.n.* (UBC 190796!); McAllister, 8 Jul 1967, *Beil 67-7-8-5* (UBC 190798!); Tranquille-Dew Drop, N side of Kamloops Lk, NW of Kamloops, 13 Aug 1970, *Krajina s.n.* (UBC 207328!); Vernon area, Aug/Sep 1975, *Wright s.n.* (UBC 168586!); Kluskus, 26 Aug 1975, *Storey BS-75-183* (V 112222!); Fish Lk, just W of Gladys Lk, 40 km NE of Atlin, 17 Aug 1977, *Pojar 770275* (V 96614!); W. part of Stikine Grand Canyon, 29 Aug 1979 *Češka 8959* (V 125124!); Ca. 7 km N of Osoyoos, 13 May 1981, *Nicholson 81-059c* (V 148937!); Kootenay, Wasa Lk, 24 Aug 1981, *Češka 7649* (V 183019!); road on SW facing slope of Tranquille River W of Watching Ck, 26 Sep 1981, *Lea T-81-138* (V 143356!); Osoyoos, Haynes Lease, 27 Jun 1988, *Pavlik 88-412* (V 154543!); Thompson-Okanagan, Hat Ck, along Hat Ck Road, 14 Sep 1989, *Pavlik 89-240* (V 184497!); Cariboo-Chilcotin, China Flats, Lower Alkali Ck, 13 Jun 1984, *Goward 94-81* (UBC 215460!); Cassiar Mts, French R, N side, beside Hwy 37, 7 Aug 2004, *Marr 04-1138* (V 193244!). **Yukon Territory.** 4 mi on road to Carcross from Alaska Highway, 15 Aug 1960 *Calder 28283* (UBC 119733!). **USA. Washington.** Wenatchee, between toll bridge, Columbia R, and Wenatchee, 10 Sep 1972, *Češka s.n.* (V 184275!).



Figure 13. Capitula of *Artemisia mccallae*, dryland form (UBC 101806). Scale bar = 2 mm.



Figure 14. Capitula of *Artemisia mcallae*, shoreline form (UBC 216143). Scale bar = 2 mm.



Figure 15. *Artemisia mcallae*, shoreline form showing adjacent green and grey forms, British Columbia, Clearwater River.

Other specimens studied, shoreline form. CANADA. British Columbia. Ind. Bridge, Bulkley R, Sep 1911, *Newcombe s.n.* (V 42945!); Along MacDonald Cr. about 3 mi. W of Summit Pass, 26 Aug 1943, *Raup 11554* (UBC 100475!); Kiskatinaw R near Taylor, Alaska Highway, 27 Aug 1964, *Beamish 640016* (UBC 115453!); Shuswap Lk near Canoe, 13 Sep 1966, *Bowers 1057* (UBC 148200!); near McBride R mouth, 7 Sep 1977, *Gorman 577* (UBC 177043!); Armstrong Point, Shuswap Lk, ca. 29 km nw or Rt. 1, N of Salmon Arm, 10 Oct 1977, *Straley 1691* (UBC 159250!); 10 km. N. of Clearwater Village, 427 m, 21 Aug 1980, *Goward 81-731* (UBC 170952!); Shuswap Area, Rosemond Lk, 5 Sep 1989, *Češka 26583* (V 170599!); Fraser Valley, Laidlaw, ca. 18 km W of Hope, 2 km N of Peters Rd., 20 m, 10 Jul 2001, *Lomer 4119* (UBC 235143!); Scud R Delta near confl of the Scud and Stikine Rs, 5 Sep 1980, *Haeussler S800062* (V 121165!). **Yukon Territory.** Dawson City, on the bank of the Klondike 200 m E of where it meets the Yukon R, 25 Aug 1998, *Williston PW98-564* (UBC 216143!).

9. ARTEMISIA ALEUTICA Hultén, Bot. Not. 1939: 829. 1939. **TYPE: USA. Alaska.** Aleutian Isls, Kiska, 21 Jun 1937, *Murie 2438* (holotype: S S-G-632! [scan viewed online]).

Plants very small and compact, silvery, densely sericeous, caudex branched, sometimes divergently and intricately so. **Capitulescence stems** erect to ascending, 3-10 (-15) cm. **Sterile rosettes** numerous at flowering time. **Proximal leaves** 1-2(-3)x pinnately to subpalmately lobed. **Capitulescence leaves** and indument more or less concealing the capitula except the florets, or involucre later more exerted. **Capitulescence** capitate or short-thyriform. **Capitula** hemispheric to subglobose, ca. 2.5 mm. **Phyllaries** elliptic-oblong; corollas red-brown. **Corollas** red-brown or purplish.

This highly distinctive regionally endemic species is not likely to be confused with any other North American species. It is among the smallest of our non-shrubby, perennial *Artemisia* species, often growing to only a few centimeters tall. Its involucre is usually fully concealed by the capitulescence leaves and tomentum, so that only the florets are exposed. See notes under *A. henriettae* in list of Eurasian taxa, below.

Key to western North American species

1. Involucre more or less concealed in thick tomentum and leaves; diminutive plants; Aleutian Islands **Artemisia aleutica**
1. Involucre not concealed; plant size various; not known from the Aleutian Islands.
 2. Sterile stems often elongated; leaves 2-3 x pinnate; sandy marine habitats in California and Oregon **Artemisia pycnocephala**
 2. Sterile stems not elongated; leaves mostly 1-2 pinnate; habitats and range various.
 3. Plants 5-20 cm, usually glabrate, caudex essentially unbranched; stems and involucre purple-red; arctic marine shores **Artemisia spithamea**
 3. Plants taller, usually not glabrate, caudex usually distinctly branched; stems and involucre green to brown; if marine, then not arctic.
 4. Plants biennial or short-lived perennial; capitulescence broadly diffuse; mostly eastern to central North America **Artemisia caudata**
 4. Plants perennial; capitulescence narrow or diffuse; mostly western North America.
 5. Capitula erect to ascending, usually distinctly longer than wide (or appearing wider when pressed) **Artemisia mccallae**
 5. Capitula mostly ascending to horizontal or even nodding, as long as wide or wider.

6. Capitulescence narrowly thyriform or linear, not or scarcely tapering upward.
7. Capitula mostly numerous in clusters; capitulescence leaves conspicuous, mostly far surpassing the capitulescence clusters; basal leaves 2-3 pinnate; plants of upland habitats **Artemisia groenlandica**
7. Capitula mostly solitary or few in clusters; capitulescence leaves mostly inconspicuous; basal leaves 1-2 pinnate; plants of receding shores of the Columbia River **Artemisia ripicola**
6. Capitulescence more or less lanceolate in outline, tapering upward.
8. Fertile stems mostly ascending to erect; cauline leaves comparatively few and small; not known from marine habitats **Artemisia canadensis**
8. Fertile stems mostly spreading; cauline leaves comparatively numerous and large; marine habitats **Artemisia pacifica**

Rejected North American names

Artemisia borealis var. *lanuginosa* [Hook. & Arn.?] Apparently not published. Supposed type: *Lay & Collie, Beechy's Voyage s.n.* Kotzebue Sound. (E 369142! [scan viewed online]). There is no indication of identification or type status on the sheet. The plants of concern are probably those forming the cluster in the upper right portion of the sheet. These and a plant on the right side of the left-middle cluster are *A. groenlandica*. The left two plants in the left-middle cluster are *A. hyperborea* (not a part of the *A. campestris* complex). The cluster in the lower right is *A. spithamea*.

Artemisia prescottiana Besser, Fl. Bor.-Amer. (Hooker) 1: 324. 1833. **TYPE: USA. Oregon.** Quick Sand R, Grand Rapids of the Columbia. 1825, *Douglas s.n.* (K 891993! [scan viewed online]). Though this specimen has been identified as *A. canadensis* by an unknown annotator, and though at first glance it may appear similar to members of the *A. campestris* complex, it is instead a synonym of *A. lindleyana* Besser, a member of the *A. ludoviciana* complex.

Artemisia desertorum var. *scouleriana* Besser, Fl. Bor.-Amer. 1: 325. 1833. *Artemisia scouleriana* (Besser) Rydb., Bull. Torrey Bot. Club 33: 157. 1906. *Artemisia campestris* var. *scouleriana* (Besser) Cronq., Leafl. W. Bot. 7: 20. 1953. The first specimen cited by Besser as: Northwest Coast of America, Fort Vancouver, and Straights of de Fuca, date unknown, *Scouler s.n.* The second specimen named by Besser is as follows: Rapids of the Columbia. Date unknown, *Douglas s.n.* The two specimens cited by Besser are perhaps the same as two of those he cited as *A. borealis* var. *wormskioldii*. I have found no specimens with labels that correspond exactly to Besser's cited locations under *A. desertorum* var. *scouleriana*, and no collector numbers or dates or any other useful label data are applied to the specimens or mentioned in Besser's citations. Further, the first of Besser's two citations under *A. borealis* var. *wormskioldii* gives a location (Columbia R and Islands, North-West America, Douglas, Dr. Scouler) similar both to the locations he cited for *A. desertorum* var. *scouleriana* and to the locations given on labels of the lectotype and syntypes of that taxon. For both *A. desertorum* var. *scouleriana* and *A. borealis* var. *wormskioldii*, he cited specimens of Douglas and Scouler. Note the combined citation of two collectors' specimens, implying paraphrasing of location, a frequent habit of Bessers' that makes it difficult to identify types for his names. Given all the above considerations, I feel it is likely that the original material of *A. desertorum* var. *scouleriana* and *A. borealis* var. *wormskioldii* were conflated by Besser and/or subsequently. All the plants in question are morphologically very dissimilar from *A. borealis*, *A. campestris* and *A. desertorum*, so should not be thus named or treated as an infraspecific taxon of any of those species. The situation can be resolved by restoring use of the name *A. ripicola* Rydb., because *A. scouleriana* (Besser) Rydb. cannot be clearly

associated with a type, and the name *A. scouleriana* has had a long history of use to refer variably to plants of *A. canadensis*, *A. mccallae*, and *A. pacifica*.

Artemisia desertorum var. *douglasiana* Besser, Fl. Bor.-Amer. 1: 325-326. 1833. Besser cited numerous specimens all within a single list for varieties *scouleriana*, *hookeriana*, *richardsoniana* and *douglasiana*, specifying which collections apply to the first three of these varieties (apparently erroneously for the first variety), but linked none of the specimens to var. *douglasiana*. Process of elimination does not result in a single possible type specimen from this list.

Artemisia borealis var. *besseri* Torr. & Gray, Fl. N. Amer. 2: 417. 1843. This name apparently was meant by Torrey & Gray to replace *A. borealis* var. *purshii*, which they listed as a synonym; their justification is not given, but the name is clearly superfluous.

Artemisia camporum Rydb., N. Amer. Fl. 34: 254. 1916. Rydberg published this as a homotypic synonym of *A. desertorum* var. *douglasiana*, which had no type specified nor specimens clearly cited, see above.

Artemisia caudata f. *pubera* J. Rousseau, Nat. Canad. 71: 199. 1944. Type not seen. Given the late date of publication and the author's specialization in Laurentian plants, assumed to be irrelevant to western North American members of the *A. campestris* complex. Further study needed.

Artemisia canadensis f. *dutillyanus* J. Rousseau ex Lepage., Nat. Canad. 77: 231. 1950. Type not seen. Given the late date of publication and the author's specialization in Laurentian plants, assumed to be irrelevant in the context of western North American taxonomy of the *A. campestris* complex.

Annotated list of herbaceous Eurasian taxa of the *Artemisia campestris* complex

Though *Artemisia campestris* and *A. borealis* clearly do not occur in North America, the possibility remains that another Eurasian name in the *A. campestris* complex may be applicable in North America. The following list includes all the members and potential members of the complex I could find. Notes are given on how these names are handled in Eurasia and how types or other specimens compare with North American plants. None of the following species is found to be applicable in North America.

Artemisia campestris L., Sp. Pl. 2: 846. 1753. **LECTOTYPE** (designated by Alavi in Jafri & El-Gadi, Fl. Libya 107: 184): Europe. *Anon* (LINN 988-16! [scan viewed online]). On the type specimen, the capitula (not fully mature) secund, ca. 1.8 x 1.8 mm. The inflorescence branches ascending about 45 deg., often sigmoid, or nodding near apex; phyllaries dull; pubescence appressed, proximal leaves with widely divergent lobes and linear segments. Though this name has long been applied to North American plants, no North American specimens I have examined exhibit the decidedly secund capitula of this species. That characteristic is also visible on the types of several other Eurasian members of the complex, see below.

Artemisia crithmifolia L., Sp. Pl. 2: 846. 1753. **LECTOTYPE** (designated by Ling in Jarvis & Tarland, Taxon 47: 353): S. Yber [?] prope mare in arena [?] cap [?] iope [?], *Löfling* 32, date unknown (LINN 988-19! [scan viewed online]). Plants dark green, leaves with widely divergent, linear, obtuse-tipped leaflets; capitula subsecund; involucre immature, broadly obovate, ca. 1.6 x 1.6 mm; phyllaries not glossy. Does not appear similar to any North American plant.



Figure 16. Type of *Artemisia borealis* (BM), © The Natural History Museum, London.

Artemisia borealis Pall., Reise Russ. Reich. 3: Anhang: 74. 1778. **TYPE:** Siberia. *Pallas s.n.*, date unknown (BM 1191633! Figure 16). Basal portions of plants not present on specimen; capitulescence leaves darkish green, pinnate to subpalmate; capitula large (involucre 3-4 mm long), solitary or few together, more or less secund; phyllaries oblong-elliptic (Figure 16). Similarly to *A. campestris*, the secund capitula on the type of *A. borealis* set those plants apart from any in North America. The large involucre size, and often subpalmate capitulescence leaves provide further distinctions.

Artemisia scoparia Waldst. & Kit., Descr. Icon. Pl. Hung. 1: 66, t 65. 1801. No type or image of type found. The numerous other specimens I have seen all appear to be short-lived, with tall stems and widely divergent primary branches, capitulescence branches linear or nearly so. Does not appear similar to any North American plant. Possibly not a part of the *A. campestris* complex.

Artemisia gallica Willd., Sp. Pl. ed. 4 [Willdenow] 3: 1834. 1803. Potential types, all *Anon* (K 891639!, K 891640!, K 891641! [scans viewed online]). Overall appearance similar to European plants that are often named as *A. campestris* var. *alpina* or misnamed as *A. borealis*, somewhat like *A. groenlandica*, but involucre glossy and capitula secund. Does not appear similar to any North American plant.

Artemisia campestris* var. *alpina DC., Fl. Franç. 4: 195. 1805. The potential type specimens reviewed, all *Anon*. (GDC 460263!, GDC 460278!, GDC 460280! [scan viewed online]) show a plant with a narrow capitulescence, branched caudex, short stature, capitula apparently subsecund, subspheric, ca. 1.8 x 1.8 mm, phyllaries slightly glossy. Does not appear similar to any North American plant.

Artemisia violacea Ledeb., Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 567. 1815. **TYPE:** Altai. *Ledebour s.n.* (HAL 110896! [scan viewed online]). Plant similar to *A. groenlandica*, but phyllaries with broader hyaline margins and less pubescence, and basal leaves with smaller ultimate lobes. Otherwise does not appear similar to any North American plant.

Artemisia lednicensis Rochel ex Spreng., Pl. Min. Cognit. Pug. 2: 77. 1815. **TYPE:** Lednicz ex Lövenstein, *Roemer s.n.* (BM 1025930! [scan viewed online]). Basal leaves and growth form like *A. campestris*; capitulescence diffuse, capitula doliform, involucre dull, sericeous, sessile or peduncles not yet elongated. Does not appear similar to any North American plant.

Artemisia pubescens Ledeb., Mém. Acad. Sci. Pétersb. 5: 568. 1815. Type not seen. Treated in the Flora of the USSR (Komarov 1985) as an eastern Siberian variety of *A. commutata*, wherein it is described as having “rather densely hairy leaves” with linear, lance-linear or linear-filiform lobes, a paniculate inflorescence, divergent to drooping capitula to 2 mm wide, and broadly elliptic to ovate, widely scarious-margined phyllaries. Specimens at P identified by Y.R. Ling (1986) appear dissimilar from North American plants in having narrow, nodding, greyish capitula (Manchuria, 1896, *Chaffanjou 1419* (P 3305840! and P 3305843! [scans viewed online])). Two other specimens at P (P 3305841! and P 3305842! [scans viewed online]) having illegible labels, possibly collected by Turczaninov, also have narrow, nodding, greyish capitula. A fifth specimen at P (P 3305844! [scan viewed online]) is a different species from the above, having hemispheric, secund capitula; that plant is also dissimilar to any in North America.

Artemisia variabilis Ten., Fl. Napol. App. 5 28. 1826. **TYPE?:** Italy, in collibus apricis et ad vias prope Neapolia ubique, 13 Sep 1875, *Levier s.n.* (BM 1025932! [scan viewed online]). Appears similar to *A. campestris* and dissimilar to any North American species.

Artemisia desertorum Spreng., Syst. Veg. [Sprengel] 3: 490. 1826. **TYPE:** Tatarica, *Anon* (B B-W15377-010! scan viewed online of possible type, no collector or location noted, but annotated by

Sprengel as a type). Apparently short-lived, leaves dark green, with long, linear segments; capitulescence moderately sparse, branches steeply ascending to erect, capitula mostly pedunculate and somewhat nodding; involucre doliform, ca. 2.7 x 2.5 mm, slightly glossy. Does not appear similar to any North American plants.

Artemisia bargusinensis Spreng., Syst. Veg. [Sprengel] 3: 493. 1826. **Syntype:** A Sibiriae in desertis Bargusinensibus, *Pallas s.n.* (HAL 111427! [scan viewed online]). Determined as *A. pallasii* by Willdenow. Appears to be similar to or even conspecific with *A. pallasii* and dissimilar to any North America plant. Eurasian floras generally recognize this species.

Artemisia pallasii Willd. ex Spreng., Syst. Veg. [Sprengel] 3: 493. 1826. **TYPE:** In desert Bargusinensibus 1772, *Pallas s.n.* (probable holotype: B B-W15342-010! [scan viewed online]). Caudex, not branched, plant darkish green, basal leaves closely 2x pinnate, cauline leaves 1-2x pinnate, inflorescence narrow, but branches distinct and somewhat spreading; capitula short-stalked or subsessile; involucre not particularly hairy, nor particularly glossy, hemispheric, ca. 2.5 x 3 mm, phyllaries ovate-elliptic. Treated in the Flora USSR (Komarov 1985) as a synonym of *A. bargusinensis*.

Artemisia marschalliana Spreng., Syst. Veg. [Sprengel] 3: 496. 1826. **TYPE:** Russia austr. ab Hieraso ad Volgam, *Anon s.n.* (P 712027! [scan viewed online]). Treated in the Flora USSR (Komarov 1985) as a variety of *A. campestris*. Does not appear similar to any North American plant.

Artemisia pycnorhiza Ledeb., Fl. Altaic. [Ledebour] 4: 79. 1833. **TYPE:** Altai, 1831, *Ledebour s.n.* (isotypes: P 711985! HAL 111438! [scans viewed online]). Plants small; caudex tightly branched, more or less button-like; plants greyish; leaf rosettes rather dense, blades 2-3x pinnate, lobes close, narrowly oblong-ob lanceolate; capitulescence dense, thyriform; involucre hemispheric, 1.3-1.5 x 1.5-1.8 mm. Appears similar to *A. groenlandica* but with more appressed hairs and more complexly lobed leaves.

Artemisia glutinosa J. Gay ex Besser, Bull. Soc. Imp. Naturalistes Moscou 8. 27. 1835. **LECTOTYPE** (annotated as a lectotype by J. Valles-Xirau): Dans les sables de la Méditerranée, entre Maguelonne et le Grande Salavas, 10 Sep 1821, *Gay s.n.* (K 891977! [scan viewed online]). Leaves dark green, capitulescence with steeply ascending, long branches, capitula-bearing branchlets with subsessile capitula, involucre glossy, broadly elliptic to hemispheric, ca. 1.4 x 1.3, evidently glutinous. Appears dissimilar to any North American plant.

Artemisia tschernieviana Besser, Bull. Soc. Imp. Naturalistes Moscou 8. 37. 1835. **TYPE:** Russia. *Anon* [presumably Tschaerniev] (possible type: E 573651! [scan viewed online]). Has been equated with *A. arenaria*. Does not appear similar to any North American plant.

Artemisia ledebouriana Besser, Bull. Soc. Imp. Naturalistes Moscou 8. 37. 1835. **TYPE?:** Russia, in glareosis ad torrentem Kudum, 1829, *Turczaninov s.n.* (GDC 460939! [scan viewed online]). Basal leaves and cauline leaves below the lowest capitula 2x pinnate, the lobes moderately widely divergent, giving the blade a broad outline; grey-green; plants probably moderately short-lived, caudex narrowly branched; capitulescence rather diffuse, branches ascending, capitula short-stalked to subsessile, not secund; involucre doliform, pale brown, glossy, ca. 2.7 x 2.5 mm. Does not appear similar to any North American plant.

Artemisia campestris var. *gmeliniana* Besser, Bull. Soc. Imp. Naturalistes Moscou 8: 45. 1835. Possible types: Ukraine. Ad Borythenem Kairi, date unknown, *Anon* (H 1649252! [scan viewed online]); Molotschna, date unknown, *Anon* (H 1754736! [scan viewed online]). Appears similar to *A. campestris* and dissimilar to any North American species.

Artemisia commutata Besser, Bull. Soc. Imp. Naturalistes Moscou 8: 70. 1835. Type not seen, and no specimen cited by Besser except for non-nominal varieties he places under this species.

Artemisia commutata var. *gebleriana* Bess., Bull. Soc. Imp. Naturalistes Moscou 8: 72. 1835. **SYNTYPE:** Russia, in rupibus ad Golourtnam Ircutia, 1835, *Turczaninov s.n.* (isotype: GDC 460017! [scan viewed online]). Plants grey-green, apparently short-lived, caudex simple, basal leaves long-petiolate, 2x pinnate, apices acuminate; inflorescence narrow, branches erect or steeply ascending-spreading; capitula more or less secund; involucre pale brown, more or less glossy, doliform, ca. 2.6 x 2.5 mm. Does not appear similar to any North American plant.

Artemisia borealis var. *adamsii* Besser, Bull. Soc. Imp. Naturalistes Moscou 8: 81. 1835. **TYPE:** Ad Lenam [On the Lena R], *Adams s.n.* (!GDC 460355 scan, S S-G-630! [scan, fragment, viewed online]). Plant small, grey-green; caudex button-like, proximal leaves closely 1-2x pinnate, segments narrowly elliptic-oblongate, apices blunt to acute, capitula sessile, hemispheric, ca. 1.5-2.5 x 1.5-3 mm, not distinctly glossy. Appears dissimilar to any North American plant.

Artemisia borealis var. *ledebourii* Besser, Bull. Soc. Imp. Naturalistes Moscou 8: 83. 1835 [as *ledebouri*]. Type not seen. Distinguished in the Flora USSR (Komarov 1985) from the nominal variety by “pinnately cut basal leaves and simple racemose inflorescence.”

Artemisia borealis var. *pallasii* Bess., Bull. Soc. Imp. Naturalistes Moscou 8: 87. 1835. **SYNTYPE:** In rupibus ad Goloustram Ircutia, 1835, *Turczaninov s.n.* (GDC! [scan viewed online], indexed erroneously as var. *ammaniana*). Apparently short-lived, root crown simple, plants grey-green, moderately tall, proximal leaves 2x pinnate, lobes distant, linear; capitulescence narrow, moderately diffuse, capitula mostly distinctly pedunculate; involucre doliform, ca. 2.5 x 2.5 mm, not particularly hairy, slightly glossy. Does not appear similar to any North American species.

Artemisia borealis var. *mertensii* Besser, [validated by Poljakov?], Bull. Soc. Imp. Naturalistes Moscou 8: 87. 1835. **TYPE:** Karaginsk, *Mertens s.n.* (probable isotype: S S-G-635! [scan viewed online]). There are two packets of fragments, the lower one is labeled (modern label only) “*Menzies Karaginsk*”, the other has no collector or location indicated. The upper plant (darker green, lax inflorescence, leaf segments filiform) is not the same as the GDC scan cited below, but that packet has Besser’s handwriting labeling it as *mertensii*. But the lower one is apparently the same taxon as seen in the GDC scan cited here: Also reviewed: Kamtschatka. *Besser s.n.* (K 891864! [scan viewed online]). This also is the entity with the broad, dark petioles, seen by Besser in 1835, not all the labels are legible, ex Herb. C.Gay, collector not indicated. Also reviewed: Collector not indicated on sheet, may be *Langsdorff s.n.* East Kamtschatka. (GDC 460361! [scan viewed online]). Plant on lower left: Short, probably long-lived; grey, hairs densely lanuginose; basal leaves with broad, dark petioles, blade 2x pinnate into linear segments; cauline leaves 1-2x pinnate, even in the capitulescence; capitulescence interrupted-thyriform, dense; involucre densely hairy, ca. 1.8 x 1.8 mm, hemispheric, (sub)sessile. The other plant on the sheet (upper right) collected [?] by C. Gay [? scarcely legible, Chamisso’s name is also on label, perhaps as *determinor?*], Kamtschatka, appears to be the same entity, also with the broad petioles, which adaxially are also strikingly dark below the hairs.

Artemisia borealis var. *schanginii* Besser, Bull. Soc. Imp. Naturalistes Moscou 8: 90. 1835. **TYPE:** Siberia orientalis, date unknown, *Schangin s.n.* Described by Besser as having trifid distal leaves and capitula about half as small as those of his var. *wormskioldii*. But as that species cannot be clearly tied to a type specimen, that statement is meaningless except in that it suggests particularly small capitula. All North American species in the complex have capitula closer in size than to allow any species to have capitula half the size of any other of our species.

Artemisia sachalinensis Tilesius ex Besser, Bull. Moskovsk. Obshch. Isp. Prir. 8: 45. 1835. Type not seen. Described as suffruticose, with patent capitulescence branches and pendant capitula. Placed in synonymy under *A. capillaris* in the Flora USSR (Komarov 1985).

Artemisia foetida Jacq. ex Besser, Bull. Soc. Imp. Naturalistes Moscou 9: 96. 1836. **TYPE:** Indes Orientales – Himalaya, 18[illegible], *Jacquemont 1741* (isotypes: P 852306!, P 852307!, P 852308! K 942038! [scans of all viewed online]). Plants grey-green; stems with sterile branches, but apparently not particularly woody, caudex branches close together, so root crown at first appears unbranched; capitulescence sparse, linear; capitula shortly pedunculate, very distant, hemispheric, ca. 2.5 x 2.8 mm. Does not appear similar to any North American plant.

Artemisia arenaria DC., Prodr. [A.P. de Candolle] 6: 94. 1838. **Probable type:** Desert Caucasicum, 1821, *Steven s.n.* (GDC 460219! [scan viewed online]). Appears to be short-lived, leaves greyish green, some cauline leaves with 2-4 lateral lobes, capitulescences narrow, with short lateral branches, capitula sessile or short-stalked; involucre doliform, slightly glossy(?) about 1.8 x 1.5 mm. Does not appear similar to any North American plant.

Artemisia borealis var. *willdenovii* Besser, Linnaea 15: 96. 1841. Possibly a nomen confusum. Not clearly described, and no identifiable type could be located.

Artemisia sericophylla Rupr., Beitr. Pflanzenk. Russ. Reiches ii. 41. (1844-1859). Type not seen, synonymized under *A. campestris* in the Flora USSR (Komarov 1985).

Artemisia camtschatica Schlecht. ex Ledeb., Fl. Ross. (Ledebour) 2(2,6): 568. 1845. Type not seen, placed in synonymy under *A. borealis* in the flora USSR (Komarov 1985).

Artemisia stricta Edgew., Trans. Linn. Soc. London 20: 73. 1846. **TYPE:** India, Sikkim, 1859, *Hooker & Thomson s.n.* (isotype: P 2284382! [scan viewed online]). Appears to be annual, branched from the base, capitulescence interrupted, glomerate, narrow, leaves grey-green, 1x pinnate, segments narrowly elliptic, acute to acuminate, the hairs appear to be sericeous to hirsute, involucre doliform to hemispheric, ca. 1.5 x 1.5 mm. Does not appear similar to any North American plant.

Artemisia blepharolepis Bunge, Beitr. Fl. Russl. 7, 3 40. 1851. **TYPE:** China borealis, *Bunge s.n.*, 1831 (P 852264! [scan viewed online]). Appears not to be a close relative of *A. campestris* or *A. borealis*. Largest leaves with primary lobes distant and spreading 90 degrees, and these with deep perpendicular incision. Appears to be annual, stems sinuous, no basal rosette seen. Distinct from any North American plant.

Artemisia campestris var. *macilenta* Maxim., Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 9: 158. 1859. Type not seen. A specimen at P (Russian Federation: Amur region. 1990. *Boyko 6945* (P 3386481! [scan viewed online]) has secund capitula and dark purplish florets, which, if the specimen is correctly identified, would make the plant dissimilar to any in North America.

Artemisia monostachya Bunge ex Maxim., Prim. Fl. Amur. 482. 1859. Type not seen, placed in synonymy under *A. commutata* in the Flora USSR (Komarov 1985).

Artemisia tomentella Trautv., Bull. Soc. Imp. Naturalistes Moscou 39. 1. 351. 1866. Type not seen. Description in the Flora USSR (Komarov 1985) as a species of dunes in a semi-arid climate having a much-branched caudex, cauline leaves with basal linear auricles, and capitula with an ovate-elliptic outline.

Artemisia capillaris var. *simplex* Maxim., Bull. Acad. Sci. Petersb. 8: 25. Publication and type not seen. Treated as a synonym of *A. macilenta* in the Flora of the USSR (Komarov 1985).

Artemisia clausonis Pomel, Nouveaux matériaux pour la flore Atlantique. Paris. 1874. **TYPE:** A. Koléa, Algeria, *Clauson 9-1858* (MPU 4826! [scan viewed online]). Capitula elliptic-ovate in outline, ca. 1.6 x 1 mm; plants dark green, only capitulescence included on type, heads not distinctly secund. A plant having smaller capitula than any member of the complex in North America.

Artemisia campestris subsp. *bottnica* A.N. Lundström ex Kindb., Svensk Fl. 301. 1877. **TYPE:** Norrbotten: Westerbotten, vid Piteåelfvens utlopp, 15 Sep 1871, *Lundström s.n.* (S S08-5977! [scan viewed online]). Involucres ca. 3.5-4 mm long, doliform to subspheric, more or less glossy, capitulescence branches ascending ca. 45 deg., pubescence appears appressed throughout, caudex closely branched, few basal leaves present on type. Not like any North American species.

Artemisia campestris var. *maritima* Arcangeli, Comp. Fl. Ital. (Arcangeli) 366. 1882. Type not seen. Described in the Flora Europaea (Tutin et al. 1976) as a glabrescent plant with stems usually >25 cm with fleshy leaves, wide panicles, and often recurved capitula.

Artemisia oligocarpa Hayata, J. Sci. Coll. Imp. Univ. Tokyo 25: 137-138. 1908. Type not seen. A specimen at P (Japan, Mt. Nanko-Taisan, Jul 1933, *Ohwi 4123* (P 3386377! [scan viewed online]) appears similar to or conspecific with *A. borealis*.

Artemisia mairei H. Lév., Repert. Spec. Nov. Regni Veg. 11: 303. 1912. **TYPE:** China, Sud de Tong-Tchouan, 15 Sep 1911, *Maire s.n.* (holotype: E 417314! [scan viewed online]). Apparently short-lived, leaves darkish grey-green, proximally tomentose, stems grey tomentose; no basal leaves present on specimen, cauline leaves very dense, simple or with proximal linear lobes (or those lobes may be fascicles of smaller leaves at the axils); capitulescence somewhat diffuse, branches ascending 45 deg. or steeper, capitula in glomerules or solitary, more or less secund; involucre hemispheric, some nodding, ca. 1 x 1 mm. Appears different from all North American plants.

Artemisia nortonii Pamp., Nuovo Giorn. Bot. Ital. n.s., 34: 683. 1927. **TYPE:** Tibet, N. Dzaka Chu, 6 Jul 1922, *Norton 325* (K 891832! [scan viewed online]). A Tibetan species described in the Flora of China (Lin et al. 2019) as having narrow capitulescences and subspheric involucre. The plants are small and multi-stemmed, appearing unlike any North American plants.

Artemisia nakaii Pamp., Nuovo Giorn. Bot. Ital. n.s. 34: 682. 1927. **TYPE:** Korea, in limoso del arenoso margine maris prope Chinampo, 10 Sep 1901, *Faurie 361* (isotype: P 711960! [scan viewed online]). Capitula small, consistently nodding, phyllaries with a broad green portion and narrow scarious margins. Appears different from all North American plants.

Artemisia remosa Sugaw., Pl. Saghalien. 364. 1934. Type not seen, synonymized under *A. borealis* in the Flora USSR (Komarov 1985).

Artemisia congesta Kitam., Acta Phytotax. Geobot. 5: 93. 1936. Type not seen. Described in the Flora of Japan (Meyer & Walker 1965) as a seashore plant with creeping rhizomes and a spiciform capitulescence.

Artemisia pannosa Krasch., Trudy Bot. Inst. Akad. Nauk S.S.S.R. Ser. 1. Fl. Sist. Vyssh. Rast. 3: 347. 1937. Type not seen. A maritime species from the Russian Far East described in the Flora USSR (Komarov 1985) as having a densely sericeous pubescence, proximally winged petioles, narrow capitulescences, and densely sericeous involucre 2-3 mm wide. No specimens found, but an image

posted online (<http://www.plantarium.ru/page/image/id/580490.html>, copyright Irina Shcheglova, 2018, det. Vera Volkotrub) shows a plant distinct from any in North America.

Artemisia demissa Krasch., Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1. Fl. Sist. Vyssh. Rast. 3: 348. 1937. Type not seen. Described in the Flora of China (Lin et al. 2019) as an annual or biennial species with procumbent lower branches.

Artemisia limosa Koidz., Pl. Saghalien. 303. 1937. Type not seen. Described in the Flora USSR (Komarov 1985) as having glabrous red stems, a simple caudex, stems 20-25 cm, and capitula 4-5 mm. Said to be endemic to mud volcanoes on Sakhalin.

Artemisia pubescens subsp. *eriopoda* Kitam., [based on illegitimate name *A. eriopoda* Bunge] Mem. Coll. Sci. Kyoto Imp. Univ.. Ser. B. Biol. 15: 387. 1940. **TYPE?**: *Bunge s.n.* China. 1831. (possible isotype: P 852332! [scan viewed online]). Apparently short-lived, or perhaps with a growth form like *A. dracunculoides*; darkish grey-green, leaves dense, larger ones 1-2x pinnatifid, lobes oblong-lanceolate, smaller leaves simple, linear, sterile fascicles numerous; capitulescence immature, appears to be glomerate. Possibly not part of the *A. campestris* complex.

Artemisia henriettae Krasch., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 5, 3. 1943. Type not seen. An arctic species described in the Flora USSR (Komarov 1985) as having a pulvinate growth form and very short stems, to be compared against *A. aleutica*, perhaps differing in having merely once-pinnate leaves.

Artemisia depauperata Krasch., Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kuybysheva 1-2: 3. 1949. Type not seen. Treated in the Flora of the USSR (Komarov 1985) as a variety of *A. pycnorrhiza*, differing in larger involucre and a more spiciform capitulescence with exerted leaves.

Artemisia dolosa Krasch., Animadvers. Syst. Herb. Univs. Tomsk. 1-2:4 1949. Type not seen. Treated in the Flora of the USSR (Komarov 1985) as a variety of *A. commutata* similar to *A. commutata* var. *helmiana* but differing in its larger (to 3 mm wide) capitula in narrow, racemiform-paniculiform capitulescences, stems 8-30 cm high, and said to be endemic to the southeastern Altai.

Artemisia sosnovskiyi Krasch., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 11: 178. 1949. **TYPE**: Azerbaijan, 5 Aug 1897, *Alexeenko s.n.* (E 531388! [scan of photo of type, viewed online]). Caudex densely branched, long-lived plants, stems ca. 30-40 cm, capitulescence branches strongly ascending, capitula more or less secund, subspheric. Treated as a variety of *A. campestris* in the Flora USSR (Komarov 1985).

Artemisia araratica Krasch., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 11: 179. 1949. Type not seen. A Caucasus Mountain endemic treated as a variety of *A. campestris* in the Flora USSR (Komarov 1985), characterized by narrowly ovate capitula with glandular or hairy phyllaries.

Artemisia eldarica Rzazade, Izvest. Acad. Nauk Azerb. SSR 3, 22, reimpr. 1955. **TYPE**: Azerbaijan [illegible location] 200 m, *Rzazade s.n.* (isotypes: E 531386!, E 531387! [scans of photos of type sheets viewed online]). Treated as a synonym of *A. campestris* in Flora of the USSR (Komarov 1985), appears similar to *A. glutinosa*.

Artemisia dniproica Klokov, Fl. Rep. Societ. Social. Ucr. 11. 330, 556. 1962. **TYPE:** Kyivska, Litky, Ukraine, 16 Sep 1904, *Selezhinskij s.n.* (holotype: KW 4997! [scan viewed online]). Similar to *A. campestris*, capitula subsecund, elliptic, ca. 2 x 1.4 mm, branches less divergent and straighter.

Artemisia campestris subsp. *sericea* Lemke & Rothm., Excursionsflora Deutschlands Krt. Bd. 1963. Type not seen. Treated in the Flora Europaea (Tutin et al. 1976) as a synonym of *A. campestris* subsp. *campestris*.

Artemisia edgeworthii N.P. Balakr., J. Bombay Nat. Hist. Soc. 43: 329. 1969. **TYPE:** Western Himalaya, Rangdum, Zanskar, Kashmir, 12 Sep 1931, *Koelz 2921* (isotype: K 942039! [scan viewed online]). Appears to be short-lived, branching from base, basal leaves faded by flowering time; stems bearing capitula to near base, capitulescence branches linear, interrupted, somewhat glomerate; stems purplish; leaves greyish green, small, 1x pinnate (or perhaps some 2x); involucre hemispheric, glossy, 1.5-1.8 x 1.8-2.2 mm. Not similar to any North American plant.

Artemisia coracina W. Wang, Acta Phytotax. Sin. 17: 89. 1979. Type not seen. Treated as a variety of *A. pubescens* in the Flora of China (Lin et al. 2019) and said to be a sub-shrub.

Ambiguous Eurasian taxa

Artemisia odoratissima Desf. Publication and type not seen.

Artemisia campestris subsp. *inodora* Nyman Publication and type not seen.

Artemisia campestris subsp. *lempergii* Sennen Publication and type not seen.

Artemisia campestris var. *alpicola* Author and publication unknown. Probably not an orthographic variant of var. *alpina*; the various possible types (K 891648!, K 891647!, K 891646, K 891645 [scans viewed online]) appear different from var. *alpina*: darkish green, basal leaves lax, sub-bilaterately lobed, lobes linear, caudex branches somewhat diffuse; capitulescence narrowly paniculiform, with ascending, short branches that bear dense, somewhat secund capitula; involucre subspheric, ca. 1.8 x 1.8 mm.

Artemisia campestris var. *canescens* Boiss. Publication not seen. **TYPE:** Azerbaijan, *Hohenacker s.n.* (isotype: WAG 4100! [scan viewed online]). Capitulescence branches stiffly ascending, capitula appear secund, involucre narrow, ca. 2 x 1.2 mm, phyllaries imbricate.

Artemisia campestris var. *steveniana* Besser Publication not seen. **TYPE:** Ukraine, 1835, *Besser s.n.* (isotype: GDC 460310! [scan viewed online]). Like *A. campestris* except heads more crowded and less distinctly secund, branches stiffer, involucre doliform, ca. 1.6 x 1.4 mm, scarcely glossy.

Artemisia suberecta Jord. Publication not seen. **TYPE:** France? de Rossillon, 1864, *Jordan s.n.* (isotype: BM 1026929! [scan viewed online]). Cauline leaves numerous and nodes with short leaf fascicles, plant dark greyish green, capitulescence like *A. campestris*, but branches straighter, capitula more or less dull, doliform, ca. 2.5 x 2 mm.

Artemisia campestris var. *glomerata* Pamp. Publication not seen. **TYPE:** Plaine de Tong-tchouan, cultures, China, *Maire 609* (syntype: E 417307! [scan viewed online]). Plant darkish grey-green, capitulescence dense, leafy, branches steeply ascending, with dense elliptic-ovate glomerules of capitula, capitula ca. 1x1 mm, but not yet mature. Plants appear to be biennial.

Artemisia commutata var. *turtschaninoviana* Besser Publication not seen. **TYPE:** Russia, in siccis ad Mondam Ircutiae, 1835, *Turczaninov s.n.* (isotype: GDC 460018! [scan viewed online]). Leaves long-petiolate, 2x pinnate; caudex branched; plant grey-green; capitulescence diffuse, branches rather lax, ascending, capitula more or less secund; involucre more or less hemispheric, ca. 1.6 x 1.6 mm.

Artemisia pubescens var. *helmiana* Besser [or *Artemisia commutata* var. *helmiana*?] Publication not seen. **TYPE:** Ex Ircutia, date unknown, *Turczaninov s.n.* (isotype: GDC 460334! [scan viewed online]). Short-lived, basal leaves nearly gone, greyish green, shortly lobed, difficult to assess due to poor condition of specimen; capitulescence narrowly paniculiform, branches steeply ascending, capitula more or less secund, all distinctly pedunculate; involucre doliform, ca. 1.8 x 1.6 mm, slightly glossy.

Artemisia trautvetteriana Besser, Mém. Acad. Imp. Sci. Pétersbourg Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 4, 464. 1, 5. 1845. Type not seen. The cited publication does not contain mention of any *Artemisia* nor does it present any work by Besser. The Euro+Med database (Greuter 2019) places it in synonymy under *A. campestris*.

Artemisia campestris f. *adscendens* Neuman, Bot. Not. 1882: 177. Type and publication not seen. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

Artemisia campestris f. *prostrata* Neuman, Bot. Not. 1882: 177. Type and publication not seen. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

Artemisia borealis var. *yamadea* Kitam., Acta Phytotax. Geobot. 5: 93. 1936. Type not seen. I find no mention of this taxon in Asian floras. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

Artemisia borealis var. *alluvialis* Korobkov, Arktichesk. Fl SSSR 10: 175. 1987. Type and publication not seen. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

Artemisia borealis var. *ammophila* Korobkov, Arktichesk. Fl. SSSR 10: 175. 1987. Type and publication not seen. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

Artemisia desertorum var. *pseudojaponica* Darijma & Kamelin, Byull. Moskovsk. Obsch. Isp. Prir., Otd. Biol. 97: 66. 1992. Type not and publication seen. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

Artemisia borealisiamensis Y.R. Ling, Bull. Bot. Res., Harbin 12: 62. 1992. [Replacement name for *Artemisia roxburghiana* var. *acutiloba* Pamp.]. Type and publication not seen. The species epithet implies a southeast Asian distribution, hence unlikely to occur in North America.

Artemisia desertorum var. *lineata* G.Y. Zhang, Bull. Bot. Res, Harbin 13: 51. 1993. Type and publication not seen. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

Artemisia pubescens var. *taheensis* G.Y. Chang & L.S. Wang, Bull. Bot. Res, Harbin 13: 51. 1993. Type and publication not seen. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

Artemisia desertorum var. *lineatoangustissima* G.Y. Zhang, *Artemisia* (Compositae) of NE China 154. 1996. Type and publication not seen. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

Artemisia desertorum var. *longiflora* G.Y. Zhang, Monogr. *Artemisia* (Compositae) of NE China 154. 1996. Published as 'longiflora', Type and publication not seen. Not combined at the level of species, hence not for consideration as an older name for any of the North American species treated.

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