

119. ARTEMISIA Linnaeus, Sp. Pl. 2: 845. 1753; Gen. Pl. ed. 5, 367. 1754 • Felon-herb, mugwort, sagebrush, sailor's-tobacco, wormwood, armoise, herbe Saint-Jean [Greek *Artemis*, goddess of the hunt and namesake of Artemisia, Queen of Anatolia]

Leila M. Shultz

Annuals, biennials, perennials, subshrubs, or shrubs, 3–350 cm (usually, rarely not, aromatic). **Stems** 1–10+, usually erect, usually branched, glabrous or hairy (hairs basi- or medifixed). **Leaves** basal or basal and cauline; alternate; petiolate or sessile; blades filiform, linear, lanceolate, ovate, elliptic, oblong, oblanceolate, obovate, cuneate, flabellate, or spatulate, usually pinnately and/or palmately lobed, sometimes apically ± 3-lobed or -toothed, or entire, faces glabrous or hairy (hairs multicelled and filled with aromatic terpenoids and/or 1-celled and hollow, dolabriform, T-shaped). **Heads** usually discoid, sometimes disciform (subradiate in *A. bigelovii*), in relatively broad, paniculiform arrays, or in relatively narrow, racemiform or spiciform arrays. **Involucres** campanulate, globose, ovoid, or turbinate, 1.5–8 mm diam. **Phyllaries** persistent, 2–20+ in 4–7 series, distinct, (usually green to whitish green, rarely stramineous) ovate to lanceolate, unequal, margins and apices (usually green or white, rarely dark brown or black) ± scarious (abaxial faces glabrous or hairy). **Receptacles** flat, convex, or conic (glabrous or hairy), epaleate (except paleate in *A. palmeri*). **Ray florets** 0 (peripheral pistillate florets in disciform heads usually 1–20, their corollas filiform; corollas of 1–3 pistillate florets in heads of *A. bigelovii* sometimes ± 2-lobed, weakly raylike). **Disc florets** 2–20(–30+), bisexual and fertile, or functionally staminate; corollas (glabrous or ± hirtellous) usually pale yellow, rarely red, tubes ± cylindric, throats subglobose or funnellform, lobes 5, ± deltate. **Cypselae** (brown) fusiform, ribs 0 (and faces finely striate) or 2–5, faces glabrous or hairy (not villous), often gland-dotted (pericarps sometimes with myxogenic cells, without resin sacs; embryo sac development monosporic); **pappi** usually 0 (coroniform in *A. californica* and *A. papposa*, sometimes on outer in *A. rothrockii*). $x = 9$.

Species ca. 350–500 (50 in the flora), mostly Northern Hemisphere (North America, Eurasia), some in South America and Africa.

As circumscribed here, there are five subgenera in *Artemisia*; four are represented in the flora area.

Etymologies of the common names used for *Artemisia* species provide glimpses of their uses and demonstrate the rich diversity within the genus. The common name 'mugwort' is from the Old English *mucgwyrt*, *mucg* meaning 'midge,' and refers to the use of Old World herbaceous species in repelling flies and midges. *Artemisia* was called Motherwort in nineteenth century Maine (as an indication of the high esteem for this otherwise rather pedestrian plant), and in the herbal by R. Banckes (1525): "This herb helpeth a woman to conceyve a chylde, and clenseth the mother, and maketh a woman to have her flowers." Early settlers in North America brought European plants of *A. dracunculus*, *A. vulgaris*, *A. absinthium*, and *A. abrotanum* into their herb gardens for seasoning and medicinal uses; they would also have learned about aboriginal uses of *Artemisia* species native to North America, uses that included fertility rites (sagebrush in western North America) and antihelminthics (wormwoods of grasslands and mountain habitats). Immigrants used *A. annua* (sweet Annie) in *potpourris* and later recognized its utility as an anti-malarial drug, a use that was well known in oriental medicine. 'Bulwand' is the local name used for herbaceous wormwoods in Scotland, and 'green-ginger' and 'Sailor's tobacco' are local names in England (T. Coffey 1993). Use of the names 'sagewort' and 'sagebrush' in North America arise from the familiar aroma of culinary sage, *Salvia officinalis* (Lamiaceae). Because true sages (*Salvia*) and sagewort/sagebrushes (*Artemisia*)

are in separate families, the chemical similarities are an example of convergent evolution. The intense aroma and bitter taste of the plants from terpenoids and sesquiterpene lactones discourages herbivory and undoubtedly has contributed to the remarkable evolutionary success (measured by abundance as well as diversity) of species in this genus.

Members of *Artemisia* are wind-pollinated and their heads and florets are exceptionally small (even for composites) and, consequently, difficult to examine and assess. Nevertheless, the sexual constitution of floral heads is important in recognition of subgenera. Plant habits and ornamentations of receptacles have also figured in arriving at subgeneric circumscriptions; additional characteristics are enumerated in the descriptions.

Artemisia has a well-deserved reputation for being taxonomically difficult. The number of subgenera varies from four to five in modern treatments, and the number of taxa recognized at the species or subspecific levels varies between 250 and 500 (K. Bremer and C. J. Humphries 1993; H. M. Hall and F. E. Clements 1923; Y. R. Ling 1982, 1995; P. P. Poljakov 1961; M. Torrell et al. 1999). In this treatment, I recognize four native subgenera; subg. *Seriphidium* is endemic to Asia. In the flora area, the greatest diversity occurs in subg. *Artemisia*. Subgenus *Absinthium* can be segregated on the basis of hairs on the receptacle; it may be not phylogenetically distinct (L. E. Watson et al. 2002; J. Valles and E. D. McArthur 2001). Subgenus *Dracunculus* is clearly distinguished by molecular differences, and subg. *Tridentatae* is well defined with the exception of *A. pygmaea*.

This treatment is based on extensive fieldwork, review of recent research, and examination of thousands of specimens; taxonomic circumscriptions remain controversial. Molecular analyses have helped define subgenera but have not clarified relationships between closely related species. The morphologic characters useful in distinguishing species tend to be variable and are often hard to assess (i.e., the sexuality of microscopic florets). Users of the keys will meet with frustrations; descriptions of subgenera and illustrations will help in defining the major groupings of species.

The subgenera are arranged in approximate phylogenetic order; species are arranged alphabetically within the subgenera. Molecular studies define subg. *Dracunculus* as a major clade that is ancestral to the majority of *Artemisia*. The subgenera *Absinthium*, *Tridentatae*, and *Artemisia* can be classified as clades; they are weakly supported by molecular evidence.

SELECTED REFERENCES Hall, H. M. and F. E. Clements. 1923. The phylogenetic method in taxonomy: The North America species of *Artemisia*, *Chrysothamnus*, and *Atriplex*. Publ. Carnegie Inst. Wash. 326. Ling, Y. R. 1982. On the system of the genus *Artemisia* L. and the relationship with its allies. Bull. Bot. Lab. N. E. Forest. Inst., Harbin 2: 1-60. Ling, Y. R. 1995. The New World *Artemisia* L. In: D. J. N. Hind et al., eds. 1995. Advances in Compositae Systematics. Kew. Pp. 225-281. Torrell, M., N. Garcia-Jacas, A. Susanna, and J. Valles. 1999. Phylogeny in *Artemisia* (Asteraceae, Anthemideae) inferred from nuclear ribosomal DNA (ITS) sequences. Taxon 48: 721-736. Valles, J. and E. D. McArthur. 2001. *Artemisia* systematics and phylogeny: Cytogenetic and molecular insights. In: E. D. McArthur and D. J. Fairbanks, comps. 2001. Shrubland Ecosystem Genetics and Biodiversity: Proceedings. Provo, UT, June 13-15, 2000. Ogden. Pp. 67-74.

1. Shrubs; leaves in lateral fascicles (on vegetative shoots); heads discoid (except in *A. bigelovii* with, rarely, 1-2 raylike florets); florets bisexual (corollas 5-lobed); receptacles glabrous 119b. *Artemisia* subg. *Tridentatae*, p. 509
1. Annuals, biennials, perennials, or subshrubs (shrubs in *A. filifolia*, *A. californica*, and *A. nesiotica*); leaves not in fascicles; heads usually disciform, rarely discoid; receptacles glabrous or villous.
 2. Disc florets functionally staminate (not setting fruits), corollas subglobose 119a. *Artemisia* subg. *Dracunculus*, p. 505
 2. Disc florets usually bisexual and fertile (sometimes functionally staminate in *A. packardiae* in subg. *Artemisia*), corollas funnel-form.
 3. Receptacles villous 119c. *Artemisia* subg. *Absinthium*, p. 518
 3. Receptacles glabrous (paleate in *A. palmeri*) 119d. *Artemisia* subg. *Artemisia*, p. 520

119a. ARTEMISIA Linnaeus subg. DRANCUNCULUS Besser, Bull. Soc. Imp. Naturalistes Moscou 1: 223. 1829 (as Dracunculi)

Biennials, perennials, or subshrubs (shrubs in *A. filifolia*); fibrous rooted or taprooted, caudices woody, rhizomes absent. Stems wandlike (new stems may sprout from caudices). Leaves deciduous (persistent in *A. aleutica* and *A. borealis*), usually cauline, sometimes basal, not in fascicles. Heads disciform. Receptacles epaleate, glabrous. Florets: peripheral 1–25 pistillate and fertile; central 3–32 functionally staminate (not setting fruits); corollas subglobose.

Species ca. 80 (8 in the flora): North America, Eurasia.

- 1. Plants 5–30(–80+) cm (often caespitose and/or mounded).
 - 2. Perennials; leaves 2–3-palmately or -pinnately lobed.
 - 3. Leaves 2-palmately lobed; corollas purplish red; Aleutian Islands 1. *Artemisia aleutica*
 - 3. Leaves 2–3-pinnately or -ternately lobed; corollas (at least lobes) usually yellow-orange or deep red; n latitudes and w mountains 2. *Artemisia borealis*
 - 2. Perennials or subshrubs; leaves 1–2-pinnately or -ternately lobed.
 - 4. Leaves gray-green, lobes 1–2 mm wide; involucre 3–4 × 3–4 mm; corollas yellow, usually red-tinged, glabrous 6. *Artemisia pedatifida*
 - 4. Leaves silver-green, lobes mostly 2–3 mm wide; involucre 4–5(–7) × 2–3 mm wide; corollas pale yellow, glandular 7. *Artemisia porteri*
- 1. Plants (10–)50–180 cm (not caespitose).
 - 5. Plants tarragon-scented or not aromatic; leaves mostly entire, sometimes (basal) irregularly lobed, faces usually glabrous, sometimes glabrescent (deserts) 4. *Artemisia dracunculoides*
 - 5. Plants faintly to strongly aromatic (not tarragon-scented); leaves lobed, faces hairy.
 - 6. Shrubs, 60–180 cm (rounded, stems wandlike); involucre 1.5–2 mm diam 5. *Artemisia filifolia*
 - 6. Biennials or perennials, (10–)30–80(–150) cm; involucre 2–4.5(–7) mm diam.
 - 7. Stems usually 1–5; heads in (mostly leafless) paniculiform arrays 3. *Artemisia campestris*
 - 7. Stems usually 10+; heads (clustered in glomerules) in (densely leafy) paniculiform to spiciform arrays 8. *Artemisia pycnocephala*

- 1. *Artemisia aleutica* Hultén, Bot. Not. 1939: 829, fig.
- 2. 1939 • Aleutian wormwood [C] [E]



Perennials, 5–10 cm (caespitose), mildly aromatic; caudices branched. Stems usually 1, reddish brown to gray, tomentose to glabrate. Leaves persistent, mostly basal, gray-green; (petioles often expanded) blades (at least proximal) obovate, 1.5–5 × 0.5–1 cm, 2-palmately lobed,

lobes relatively narrow, apices acute, faces densely white-villous (brownish in age); cauline smaller, distally 1-ternate. Heads (sessile or peduncles 2–15 mm) in racemiform or spiciform arrays, 1.5–3 × 0.5–1 cm. Involucre hemispheric or globose, (2–)5–7 × (2–)6–8 mm. Phyllaries villous. Florets: pistillate 4–6; functionally staminate 15–30; corollas purplish red, 1.5–2 mm, hairy. Cypselae oblong, ca. 1 mm, faintly nerved, glabrous.

Flowering mid-late summer. Open areas, fellfield tundra; of conservation concern; 0–100 m; Alaska.

Artemisia aleutica is known only from the western Aleutian Islands. It is morphologically similar to *A. borealis*, and the relationships of these species complexes warrant further study.

- 2. *Artemisia borealis* Pallas, Reise Russ. Reich. 3: 755. 1776



Artemisia campestris Linnaeus subsp. *borealis* (Pallas) H. M. Hall & Clements

Perennials, (6–)8–20(–40) cm (caespitose), mildly aromatic; taprooted, caudices branched. Stems (1–)2–5, gray-green, tomentose. Leaves persistent, basal rosettes persistent, gray-green to white; blades ovate, 2–4 × 0.5–1 cm, 2–3-pinnately or -ternately lobed, lobes linear to narrowly oblong, apices acute, faces moderately to densely sericeous. Heads (proximal sessile, distal pedunculate) in (leafy) spiciform arrays 4–9(–12) × (0.5–)1–5 cm. Involucre hemispheric, 3–4 × 3.5–4 mm. Phyllaries (obscurely scarios) densely tomentose-villous. Florets:

pistillate 8–10; functionally staminate 15–30; corollas (or lobes) yellow-orange or deep red, 2.2–3.5. Cypselae oblong-lanceoloid, somewhat compressed, 0.4–1 mm, faintly nerved, glabrous.

Subspecies 2 (2 in the flora): w North America, especially at high elevations and northern latitudes; Eurasia.

1. Herbage villosa-tomentose, glabrate, or glabrous; corollas (at least lobes) usually yellow-orange, 2.2–3 mm; mountains, w North America

..... 2a. *Artemisia borealis* subsp. *borealis*

1. Herbage white-hoary; corollas (at least lobes) deep red, 3–3.5 mm; w arctic North America

..... 2b. *Artemisia borealis* subsp. *richardsoniana*

2a. *Artemisia borealis* Pallas subsp. *borealis*

• Boreal sage



Artemisia campestris Linnaeus var. *purshii* (Besser) Cronquist; *A. campestris* var. *spithamaea* (Pursh) M. Peck; *A. campestris* var. *strutziae* S. L. Welsh; *A. purshii* Besser; *A. spithamaea* Pursh; *Oligosporus borealis* (Pallas) Polyakov; *Oligosporus groenlandicus* (Hornemann) Á. Löve & D. Löve

Plants 10–20(–40) cm, herbage villosa-tomentose, glabrate, or glabrous. Corollas (at least lobes) usually yellow-orange (sometimes red-tinged), 2.2–3 mm. $2n = 18, 36$.

Flowering mid-late summer. Open meadows, usually on well-drained soils; 0–3500 m; Alta., B.C., N.W.T., Nunavut, Sask., Yukon; Alaska, Calif., Colo., Idaho, Mont., Utah, Wash., Wyo.; Eurasia.

Subspecies *borealis* is widespread in the mountains of western North America. Some high-elevation populations have corollas tinged with red.

2b. *Artemisia borealis* Pallas subsp. *richardsoniana*

(Besser) Korobkov in A. I. Tolmatchew, Fl. Arct. URSS

10: 178. 1987 • Richardson's sagewort [E]



Artemisia richardsoniana Besser, Bull. Soc. Imp. Naturalistes Moscou 9: 64. 1836, based on *A. arctica* Besser in W. J. Hooker, Fl. Bor.-Amer. 1: 323. 1833, not Lessing 1831; *A. caudata* Michaux var. *richardsoniana* (Besser) B. Boivin; *A. desertorum* Sprengel var. *richardsoniana* (Besser) Besser

Plants (6–)8–15(–20) cm, herbage white-hoary. Corollas (at least lobes) deep red, 3–3.5 mm.

Flowering mid-late summer. River terraces, tundra; 0–600 m; N.W.T., Nunavut, Yukon; Alaska.

Long overlooked, subsp. *richardsoniana* is easily distinguished by its relatively short stature, dense, white indument, and deep red corollas. It is known only from western arctic North America.

3. *Artemisia campestris* Linnaeus, Sp. Pl. 2: 846. 1753

• Field sagewort, sand wormwood [E]



Biennials or perennials, (10–)30–80(–150) cm, faintly aromatic; taprooted, caudices branched. Stems usually 1–5, turning reddish brown, (often ribbed) tomentose or glabrous. Leaves persistent or deciduous, mostly basal; basal blades 4–12 cm, cauline gradually reduced, 2–4 × 0.5–1.5 cm, 2–3-

pinnately lobed, lobes linear to narrowly oblong, apices acute, faces densely to sparsely white-pubescent. Heads (pedunculate) in (mostly leafless) paniculiform arrays. Involucres broadly turbinate, 2.5–3(–5) × 2–3.5(–7) mm. Phyllaries (margins scarious) glabrous or villous-tomentose. Florets: pistillate 5–20; functionally staminate 12–30; corollas pale yellow, sparsely hairy or glabrous. Cypselae oblong-lanceoloid, somewhat compressed, 0.8–1 mm, faintly nerved, glabrous.

Subspecies ca. 7 (3 in the flora): North America, especially mountains and high latitudes; Eurasia.

Artemisia campestris varies; each morphologic form grades into another. The present circumscription is conservative in that only three subspecies are recognized; the subspecies usually can be separated geographically as well as morphologically. Populations in western North America consist primarily of subsp. *pacifica*; east of the continental divide, plants are assigned to subsp. *canadensis* in northern latitudes and to subsp. *caudata* in southern latitudes.

1. Perennials; stems 2–5; basal rosettes persistent.

..... 3c. *Artemisia campestris* subsp. *pacifica*

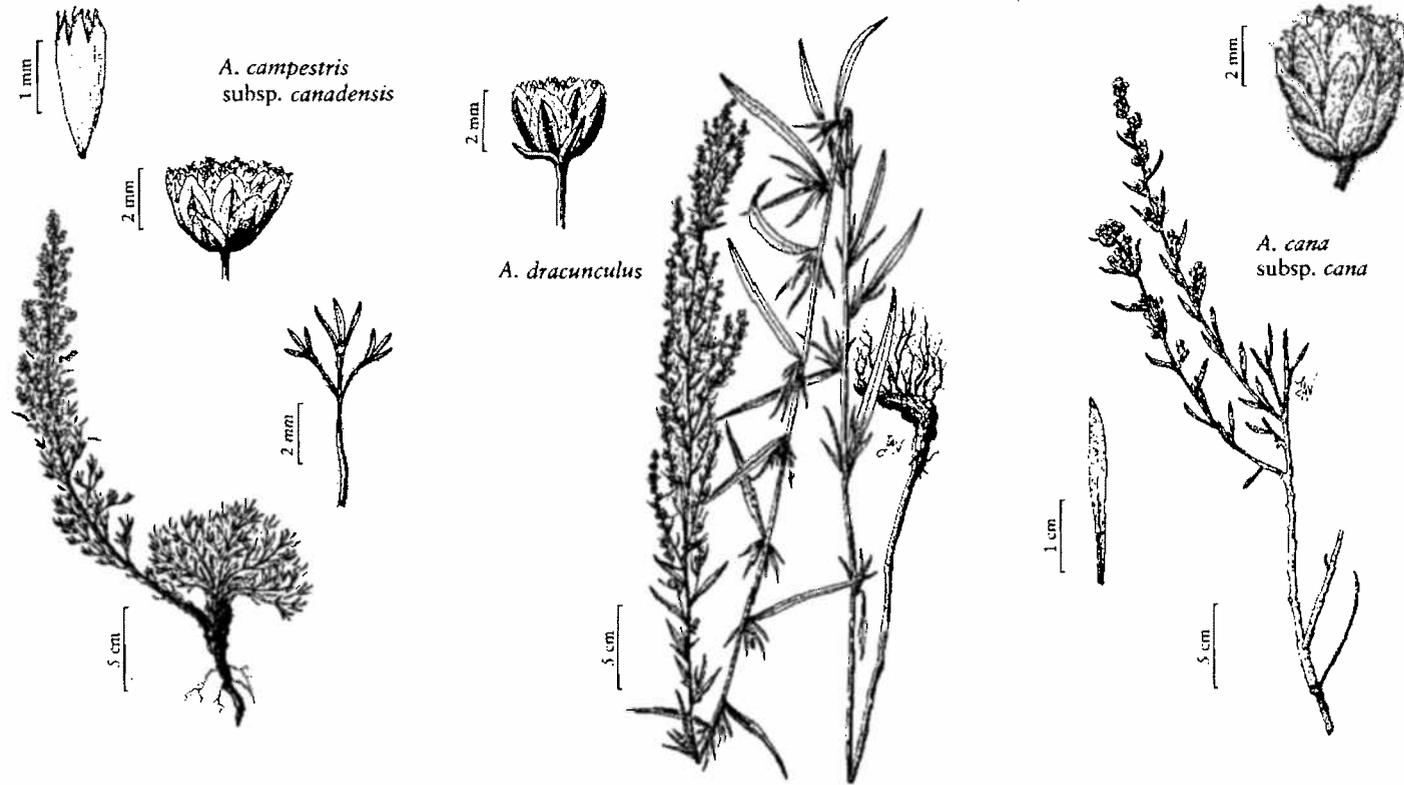
1. Biennials; stems 1(–3); basal rosettes not persistent (withering before flowering).

2. Involucres globose, 3–4 × 3.5–5 mm; n of 50°, primarily Canada

..... 3a. *Artemisia campestris* subsp. *canadensis*

2. Involucres turbinate, 2–3 × 2–3 mm; s of 50°, e from Rocky Mountains to coastal North America

..... 3b. *Artemisia campestris* subsp. *caudata*



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- 3a. *Artemisia campestris* Linnaeus subsp. *canadensis* (Michaux) Scoggan, Fl. Canada 1: 52. 1978
• Armoise du Canada [E] [F]

Artemisia canadensis Michaux, Fl. Bor.-Amer. 2: 128. 1803

Biennials, 20–40 cm. **Stems** usually 1. **Leaves**: basal rosettes not persistent. **Heads** in arrays 8–10(–12) × 1–2(–3) cm. **Involucres** globose, 3–4 × 3.5–5(–6) mm.

Flowering early–late summer. Open meadows; 0–1000 m;

Greenland; Man., N.B., Nfld. and Labr., Nunavut, Ont., Que., Sask.; Maine.

A more broadly circumscribed interpretation of the subsp. *caudata* complex would encompass subsp. *canadensis*.



- 3b. *Artemisia campestris* Linnaeus subsp. *caudata* (Michaux) H. M. Hall & Clements, Publ. Carnegie Inst. Wash. 326: 122. 1923 • Armoise caudée [E]

Artemisia caudata Michaux, Fl. Bor.-Amer. 2: 129. 1803;
A. forwoodii A. Gray

Biennials, 20–80(–150) cm. **Stems** usually 1. **Leaves**: basal rosettes not persistent (faces green and glabrous or sparsely white-pubescent). **Heads** in arrays 12–30(–35) × 1–8(–12) cm. **Involucres**

turbinate, 2–3 × 2–3 mm.

Flowering early–late summer. Open meadows, usually moist soils, sometimes sandy or rocky habitats; 10–1000; Ont., Que., Sask.; Ark., Colo., Conn., Fla., Ill., Ind., Iowa, Kans., Maine, Mass., Mich., Minn., Miss., Mo., Mont., Nebr., N.H., N.J., N.Mex., N.Y., N.C., N.Dak., Ohio, Okla., Pa., R.I., S.C., S.Dak., Tex., Vt., Wis.

A population of *Artemisia campestris* found in Massachusetts differs from populations of subsp. *caudata* by its smaller heads and multiple branched stems. That population is typical of subsp. *campestris*, formerly believed to be restricted to Europe.



- 3c. *Artemisia campestris* Linnaeus subsp. ***pacifica***
(Nuttall) H. M. Hall & Clements, Publ. Carnegie Inst.
Wash. 326: 122. 1923 • Western sagewort [E]



Artemisia pacifica Nuttall, Trans. Amer. Philos. Soc., n. s. 7: 401. 1841; *A. campestris* var. *petiolata* S. L. Welsh; *A. campestris* var. *scouleriana* (Besser) Cronquist; *A. desertorum* Sprengel var. *scouleriana* Besser; *Oligosporus campestris* (Linnaeus) Cassini subsp. *pacificus* (Nuttall) W. A.

Weber; *O. pacificus* (Nuttall) Poljakov

Perennials, 30–100 cm. Stems 2–5. Leaves: basal rosettes persistent (faces green and glabrous or gray-green and sparsely hairy). Heads in arrays 10–22 × 1–3(–7) cm. Involucres turbinate, 2–3 × 2(–3) mm.

Flowering mid–late summer. Sandy soils, arid regions; 100–2500 m; Alta., B.C., Man., Sask.; Alaska, Ariz., Calif., Colo., Idaho, Mont., Nebr., Nev., N.Mex., Oreg., Tex., Utah, Wash., Wyo.

Throughout western North America, members of the *Artemisia campestris* complex can be assigned to subsp. *pacifica*. Although morphologically distinct through much of its range, subsp. *pacifica* may intergrade with subsp. *canadensis* and *A. borealis* in areas where their ranges overlap.

4. *Artemisia dracunculus* Linnaeus, Sp. Pl. 2: 849.
1753 • Wild tarragon [F]



Artemisia aromatica A. Nelson;
A. dracunculina S. Watson;
A. dracunculoides Pursh;
A. dracunculoides subsp.
dracunculina (S. Watson) H. M.
Hall & Clements; *A. glauca* Pallas
ex Willdenow; *A. glauca* var.
megacephala B. Boivin

Perennials or subshrubs, 50–120 (–150) cm, strongly tarragon-scented or not aromatic; rhizomatous, caudices coarse. Stems relatively numerous, erect, green to brown or reddish brown, somewhat woody, glabrous. Leaves: proximal blades bright green and glabrous or gray-green and sparsely hairy, 5–8 cm; cauline blades bright green (gray-green in desert forms), linear, lanceolate, or oblong, 1–7 × 0.1–0.5(–0.9) cm, mostly entire, sometimes irregularly lobed, acute, usually glabrous, sometimes glabrescent (deserts). Heads in terminal or lateral, leafy, paniculiform arrays 15–45 × 6–30 cm; appearing ball-like on slender, sometimes nodding peduncles. Involucres globose, 2–3 × 2–3.5(–6) mm. Phyllaries (light brown, broadly lanceolate, membranous): margins broadly hyaline, glabrous. Florets: pistillate 6–25; functionally staminate

8–20; corollas pale yellow, 1.8–2 mm, eglandular or sparsely glandular. Cypselae oblong, 0.5–0.8 mm, faintly nerved, glabrous. $2n = 18$.

Flowering mid summer–late fall. Open meadows and fields, desert scrub, moist drainages, roadsides; 500–3000 m; Alta., B.C., Man., Ont., Sask., Yukon; Alaska, Ariz., Calif., Colo., Idaho, Ill., Iowa, Kans., Minn., Mo., Mont., Nebr., Nev., N.Mex., N.Dak., Okla., Oreg., S.Dak., Tex., Utah, Wash., Wis., Wyo.; Eurasia.

Artemisia dracunculus is widely cultivated as a culinary herb and may be introduced in parts of its range. It is easily cultivated from rootstocks, and while establishment from seeds is rare, seedlings can be found with amenable environmental conditions. Because of its popularity as an herb, it may suffer from overcollecting. Its scarcity in Missouri, Iowa, and Illinois (J. T. Kartesz and C. A. Meacham 1999) may have been caused by overly enthusiastic collecting as well as habitat loss.

5. *Artemisia filifolia* Torrey, Ann. Lyceum Nat. Hist.
New York 2: 211. 1827 • Sand sage [E]



Artemisia plattensis Nuttall;
Oligosporus filifolius (Torrey)
Poljakov

Shrubs, 60–180 cm (rounded), faintly aromatic. Stems green or gray-green, wandlike (usually slender, curved, sometimes stout and stunted in harsh habitats), glabrous or sparsely hairy. Leaves gray-green; blades linear if entire, obovate if lobed, (1.5–)2–5(–6) × 0.1–2.5 cm, entire to 3-lobed, lobes filiform (less than 1 mm wide), apices acute, glabrous or sparsely hairy. Heads (mostly sessile) in paniculiform arrays 8–15(–17) × 2–4(–5) cm (branches erect to somewhat recurved). Involucres globose, 1.5–2 × 1.5–2 mm. Phyllaries (ovate, inconspicuous, margins scarious) densely hairy. Florets: pistillate 1–4; functionally staminate 3–6; corollas pale yellow, 1–1.5 mm, glabrous. Cypselae oblong (distally incurved-falcate and oblique), 0.2–0.5 mm, obscurely nerved, glabrous. $2n = 18$.

Flowering late summer–early winter. Open prairies, dunes, sandy soils; 500–2000 m; Ariz., Colo., Kans., Nebr., Nev., N.Mex., Okla., S.Dak., Tex., Utah, Wyo.

One of the more easily distinguished of the shrubby *Artemisia* species, *A. filifolia* occurs in sandy soils and cohabits with species of *Yucca*, Cactaceae, and *Salvia dorrii*, the purple sage of western literary fame. Its filiform leaves and faintly aromatic foliage distinguish it from members of subg. *Tridentatae*.

6. *Artemisia pedatifida* Nuttall, Trans. Amer. Philos. Soc., n. s. 7: 399. 1841 • Matted sagewort [E]



Perennials or subshrubs, 5–15 cm (cespitose), aromatic. Stems 5–20), gray-green, glabrescent. Leaves persistent, gray-green, mostly basal; proximal blades reduced, mostly less than 1 cm, lobed or entire; distal blades 1–2 × 0.5–0.8 cm, 1–2-ternately lobed, lobes 1–2 mm wide, apices acute,

faces densely tomentose. Heads (mostly 6–15, 1 or 3–4 on lateral branches; mostly erect, sessile or pedunculate) in racemiform-paniculiform arrays, 5–8 × 0.5–0.8 cm. Involucres globose, 3–4 × 3–4 mm. Phyllaries (margins scarious, obscured) white-tomentose. Florets: pistillate 4–7; functionally staminate 5–9; corollas yellow, usually red-tinged, 2–3 mm, glabrous. Cypselae (brown) ellipsoid (angled), 0.8–1 mm, (sometimes with white ribs) glabrous.

Flowering early spring–mid summer. High plains, grasslands; 1600–1800 m; Colo., Idaho, Mont., Wyo.

7. *Artemisia porteri* Cronquist, Madroño 11: 145. 1951 • Porter mugwort [E]



Perennials or subshrubs, (7–)8–14 cm (cespitose), faintly aromatic. Stems 5–8, silver-gray, densely tomentose. Leaves persistent, silver-green, mostly basal; proximalmost blades 3–4 × 1–1.5 cm, 1-pinnately lobed, lobes mostly 2–3 mm wide; blades of flowering stems somewhat reduced, (1–)2–3(–5) × 0.15

cm, mostly entire; apices rounded, faces densely hairy. Heads borne singly or (clustered in 2s and 3s on lateral branches; peduncles 0 or to 5 mm) in paniculiform arrays, (2–)4–9 × 1–1.5(–2) cm. Involucres broadly campanulate, 4–5(–7) × 2–3 mm. Phyllaries (ovate, margins broadly

scarious) densely tomentose. Florets: pistillate 8–10 (2–2.8 mm); functionally staminate 22–32; corollas pale yellow, 2.2–4.5 mm, glandular. Cypselae (light brown) ellipsoid, flattened (faintly nerved), 1.5–2 mm, sparsely hairy, glabrous or resinous.

Flowering mid–late summer. Barren clay and gravelly soils; 1800–2000 m; Mont., Wyo.

Although Cronquist observed that *Artemisia porteri* may be an autopolyploid derivative of *A. pedatifida*, morphologic similarities to northerly cespitose taxa suggest a more complex origin.

Artemisia porteri is in the Center for Plant Conservation's National Collection of Endangered Plants.

8. *Artemisia pycnocephala* (Lessing) de Candolle in A. P. de Candolle and A. L. P. P. de Candolle, Prodr. 6: 99. 1838 • Coastal sagewort [E]



Oligosporus pycnocephalus Lessing, Linnaea 6: 524. 1831; *Artemisia campestris* Linnaeus subsp. *pycnocephala* (Lessing) H. M. Hall & Clements

Perennials, 30–70(–100) cm, faintly aromatic. Stems usually 10+ (rising beyond basal leaves, decumbent), whitish gray, (ca. 5

mm diam., densely leafy) densely hairy. Leaves persistent, gray-green; blades broadly lanceolate, faces woolly-hairy; proximalmost blades 3–8 × 2–6 cm, 2–3-pinnatifid, lobes linear (to 2 mm wide); cauline somewhat reduced, 2–3 × 0.8–1.2 cm; apices acute, faces hairy. Heads (sessile, clustered in glomerules) in (densely leafy) paniculiform to spiciform arrays 10–20(–30) × 1–4 cm. Involucres globose, 3–4.5 × 3–4.5 mm. Phyllaries (lanceolate, margins obscured by indument, hairs straight). Florets: pistillate 5–20; functionally staminate 12–25; corollas pale yellow (broadly tubular), ca. 2 mm, glabrous. Cypselae ellipsoid (faintly nerved), 1–1.5 mm, glabrous.

Flowering late spring–mid summer. Rocky or sandy soils of coastal beaches; 0–200 m; Calif.

119b. ARTEMISIA Linnaeus subg. TRIDENTATAE (Rydberg) McArthur, Amer. J. Bot. 68: 590. 1981

Artemisia [unranked] *Tridentatae* Rydberg in N. L. Britton et al., N. Amer. Fl. 34: 282. 1916

Shrubs; fibrous rooted, caudices woody, rhizomes absent. Stems not wandlike (relatively numerous; new stems may sprout from caudices). Leaves (pungently aromatic) deciduous or persistent, cauline (in lateral fascicles on vegetative shoots). Heads discoid (except *A. bigelovii* with, rarely, 1–2 raylike florets). Receptacles epaleate, glabrous. Pappi 0. Florets: 3–20, bisexual, fertile; corollas (pale yellow) funnellform.

Species 10 (10 in the flora): North America, nw Mexico.

Difficulty in classification of *Artemisia* subg. *Tridentatae* has been complicated by transfer of North American species to *Seriphidium* (Y. R. Ling 1995b; W. A. Weber 1984b), a disposition not followed here. Species circumscription varies among authors, but most modern treatments recognize the species as defined here. The most useful field characteristics in sagebrush taxonomy are size of the plant, shape and lobing of the vegetative leaves, and size and shape of the flowering heads (A. A. Beetle 1960; A. H. Winward 1970). Differences in chromosome number are more useful in defining subspecies than species (E. D. McArthur et al. 1981; G. H. Ward 1953), and introgression among subspecies is common (McArthur et al. 1988; McArthur and S. C. Sanderson 1999). The following key relies on vegetative characteristics, and unless noted, descriptions of leaf size and lobing refer to the leaves found in the vegetative shoots proximal to arrays of heads. These 'vegetative leaves' occur in bundles, or fascicles that are part of the lateral shoots. They are subtended by an elongate leaf (termed 'ephemeral'), which is attached to the primary stem and falls off early in the season. With the exception of *Artemisia spiciformis*, which retains its ephemeral leaves through most of the growing season, ephemeral leaves normally drop from the plant before the onset of flowering.

SELECTED REFERENCES Beetle, A. A. 1960. A study of sagebrush. The section *Tridentatae* of *Artemisia*. Wyoming Agric. Exp. Sta. Bull. 368. Ling, Y. R. 1995b. The New World *Seriphidium* (Besser) Fourr. In: D. J. N. Hind et al., eds. 1995. Advances in Compositae Systematics. Royal Botanic Gardens, Kew. Pp. 283-291. McArthur, E. D., C. L. Pope, and D. C. Freeman. 1981. Chromosomal studies of subgenus *Tridentatae* of *Artemisia*: Evidence for autopolyploidy. Amer. J. Bot. 68: 589-605. McArthur, E. D. et al. 1998. Randomly amplified polymorphic DNA analysis (RAPD) of *Artemisia* subgenus *Tridentatae* species and hybrids. Great Basin Naturalist 58: 12-27. McArthur, E. D. and S. C. Sanderson. 1999. Cytogeography and chromosome evolution of subgenus *Tridentatae* of *Artemisia*. Amer. J. Bot. 86: 1754-1775. Shultz, L. M. 1983. Systematics and Anatomical Studies of *Artemisia* subgenus *Tridentatae*. Ph.D. dissertation. Claremont Graduate School. Shultz, L. M. 1986. Taxonomic and geographic limits of *Artemisia* subgenus *Tridentatae* (Beetle) McArthur. In: E. D. McArthur and B. L. Welch, eds. 1986. Proceedings, Symposium on the Biology of *Artemisia* and *Chrysothamnus*, Provo, Utah, July 9-13, 1984. Ogden. Pp. 20-28. Shultz, L. M. 1986b. Comparative leaf anatomy of sagebrush. In: E. D. McArthur and B. L. Welch, eds. 1986. Proceedings, Symposium on the Biology of *Artemisia* and *Chrysothamnus*, Provo, Utah, July 9-13, 1984. Ogden. Pp. 253-264. Ward, G. H. 1953. *Artemisia* section *Seriphidium* in North America, a cytotoxicological study. Contr. Dudley Herb. 4: 155-206. Winward, A. H. 1970. Taxonomic and Ecological Relationships of the Big Sagebrush Complex in Idaho. Ph.D. dissertation. University of Idaho.

1. Leaves deciduous, blades usually entire, sometimes irregularly lobed; moist habitats 11. *Artemisia cana*
1. Leaves deciduous or persistent, blades usually lobed, sometimes entire; dry habitats.
 2. Leaves bright green, pinnately lobed, lobes 3-7 (gypsum or shale) 13. *Artemisia pygmaea*
 2. Leaves gray-green, usually palmately lobed, lobes 0 or 3 or 3-6.
 3. Leaf lobe lengths $\frac{1}{3}$ + blade lengths, widths 1-1.5 mm.
 4. Leaves rigid (lava scablands, Oregon and Washington) 14. *Artemisia rigida*
 4. Leaves not rigid. 18. *Artemisia tripartita*
 3. Leaf lobe lengths to $\frac{1}{3}$ blade lengths, widths (1-)1.5-5 mm.
 5. Shrubs, 50-200(-250) cm.
 6. Leaves mostly deciduous (variable in size and shape, entire or irregularly 3-6-lobed, lobes rounded or acute); involucre broadly campanulate 16. *Artemisia spiciformis*
 6. Leaves persistent (lobes 3, uniform, lengths to $\frac{1}{3}$ blade lengths); involucre lanceoloid or ovoid.
 7. Leaves light or dark gray-green, sticky-resinous; involucre ovoid, 3-5 x 4-6 mm; florets 12-20 (California) 15. *Artemisia rothrockii* (in part)
 7. Leaves gray-green, not sticky-resinous (widespread, including California); involucre lanceoloid, (1-)1.5-4 x 1-3 mm; florets 3-8 17. *Artemisia tridentata*
 5. Shrubs, 10-50 cm.
 8. Leaves silver-green, blades narrowly cuneate, lobes acute; heads mostly nodding; involucre globose 10. *Artemisia bigelovii*
 8. Leaves dark green to gray-green, blades broadly cuneate, lobes obtuse or rounded; heads mostly erect; involucre campanulate, globose-ovoid, or turbinate.

[9. Shifted to left margin.—Ed.]

- 9. Leaves on flowering stems entire (heads mostly pedunculate); involucre narrowly turbinate; phyllaries sparsely hairy or glabrous 12. *Artemisia nova*
- 9. Leaves on flowering stems entire or lobed (heads mostly sessile); involucre campanulate or globose-ovoid; phyllaries densely pubescent or tomentose.
- 10. Leaves on flowering stems 3-lobed, not sticky-resinous 9. *Artemisia arbuscula*
- 10. Leaves on flowering stems entire, sticky-resinous or densely hairy and not sticky 15. *Artemisia rothrockii* (in part)

9. *Artemisia arbuscula* Nuttall, Trans. Amer. Philos. Soc., n. s. 7: 398. 1841 • Low sagebrush [E]



Artemisia tridentata Nuttall subsp. *arbuscula* (Nuttall) H. M. Hall & Clements; *A. tridentata* var. *arbuscula* (Nuttall) McMinn; *Seriphidium arbusculum* (Nuttall) W. A. Weber

Shrubs, 10–30(–50) cm, aromatic; root-sprouting. **Stems** gray-green to brown, glabrate (diffusely branched from bases, brittle). **Leaves** (vegetative stems) persistent, gray-green; blades broadly to narrowly cuneate, 3–10 × 2–5 mm, lobed (lobes 3, oblong-linear, to 1/3 blade lengths, mostly 1–3 mm wide, flat, obtuse, laterals sometimes 2–3-fid; leaves on flowering stems deciduous, blades narrowly cuneate, deeply 3-lobed), faces densely hairy (not sticky resinous). **Heads** usually borne singly, rarely (1–4, erect, mostly sessile, in pedunculate clusters) in spiciform or paniculiform arrays 2–9 × 0.5–2 cm (branches slender). **Involucre** campanulate or globose-ovoid, (1.5–)2–4(–5) × 1.5–4.5 mm. **Phyllaries** (margins green) ovate (outer) to oblong, pubescent or tomentose. **Florets** 4–6(–10); corollas 1.5–2 mm, glabrous. **Cypselae** (light brown) 0.7–0.8 mm, resinous.

Subspecies 3 (3 in the flora): w North America.

Artemisia arbuscula is one of the more perplexing species in the *Tridentatae* complex. Anatomic and morphologic characteristics suggest multiple hybrid origins for the subspecies. Deciduous leaves of flowering stems in plants that otherwise have persistent leaves suggest a hybrid origin involving plants of the *A. tridentata* and *A. cana* lineages. In most instances, populations of *A. arbuscula* appear to be reproductively stable. The disposition of *Artemisia arbuscula* subsp. *longicaulis* Winward & McArthur (with $2n = 54$) has not been determined.

- 1. Involucre 2–4.5 mm diam.; usually in rocky soils; flowering mid–late summer 9a. *Artemisia arbuscula* subsp. *arbuscula*
- 1. Involucre 1.5–2.5 mm diam.; clays or stony soils; flowering early spring–late summer.

[2. Shifted to left margin.—Ed.]

- 2. Leaves broadly cuneate (4–10 × 2–5 mm, often irregularly lobed, lobes rounded, middle lobes overlapping lateral lobes); usually in clay soils; flowering early spring. 9b. *Artemisia arbuscula* subsp. *longiloba*
- 2. Leaves narrowly cuneate (5–10 × 3–6 mm, lobed, lobes 1/2+ blade lengths, laterals to 1 mm wide, often acute); usually in stony soils; flowering mid–late summer 9c. *Artemisia arbuscula* subsp. *thermopola*

9a. *Artemisia arbuscula* Nuttall subsp. *arbuscula* [E]



Leaves broadly cuneate (lobed, lobes less than 1/2 blade lengths, 1–3 mm wide, rounded). **Involucre** 3.5–4(–5) × 2–4.5 mm. $2n = 18, 36$.

Flowering mid–late summer. Rocky sedimentary soils, high valleys, mountain slopes; 1500–3800 m; Calif., Colo., Idaho, Mont., Nev., Utah, Wash., Wyo.

The relatively large heads of *Artemisia arbuscula* subsp. *arbuscula* suggest a relationship with *A. cana*; the extreme morphologic variability of this subspecies from east to west may be the result of hybridization with various subspecies within the *A. cana* complex.

9b. *Artemisia arbuscula* Nuttall subsp. *longiloba* (Osterhout) L. M. Shultz, Sida 21: 1637. 2005 [E]



Artemisia spiciformis Osterhout var. *longiloba* Osterhout, Muhlenbergia 4: 69. 1908; *A. longiloba* (Osterhout) Beetle; *Seriphidium arbusculum* (Nuttall) W. A. Weber subsp. *longilobum* (Osterhout) W. A. Weber

Leaves broadly cuneate (4–10 × 2–5 mm, often irregularly lobed, lobes rounded, middle lobes overlapping lateral lobes). **Involucre** 2–3 × 1.5–2.5 mm. $2n = 18, 36$.

Flowering early–late spring. Clay soils of alkaline basins and valleys, occasionally on outwash plains of mountains; 1500–2500 m; Calif., Colo., Idaho, Mont., Oreg., Utah, Wyo.

Subspecies *longiloba* is distinguished from other members of the *Artemisia arbuscula* complex by its early blooming time. It is the only member of subg. *Tridentatae* to begin flowering as snow melts in early spring, and it is ecologically distinguished from other subspecies by its occurrence at low elevations, in fine-grained clay soils.

9c. *Artemisia arbuscula* Nuttall subsp. *thermopola*

Beetle, *Rhodora* 61: 83. 1959 • Hot Springs sagebrush [E]



Seriphidium arbusculum (Nuttall) W. A. Weber var. *thermopolum* (Beetle) Y. R. Ling

Leaves narrowly cuneate (5–10 × 3–6 mm, lobed, lobes 1/2+ blade lengths, laterals to 1 mm wide, often acute). Involucres (1.5–) 2–2.5 × 1.5–2 mm.

Flowering mid–late summer.

Rocky soils of igneous origin; 2200–2500 m; Idaho, Utah, Wyo.

Because of its deeply lobed leaves, subsp. *thermopola* can be confused with *Artemisia tripartita*. The habit, leaf morphology, and geographic distribution of subsp. *thermopola* suggest introgression between typical *A. arbuscula* and *A. tripartita*.

10. *Artemisia bigelovii* A. Gray in War Department

[U.S.], *Pacif. Railr. Rep.* 4(5): 110. 1857 • Bigelow sagebrush [E]



Artemisia petrophila Wootton & Standley; *Seriphidium bigelovii* (A. Gray) K. Bremer & Humphries

Shrubs, 20–40(–60) cm (branched from bases, rounded), mildly aromatic; not root-sprouting. Stems silvery, canescent (bark gray-brown). Leaves persistent, light gray-green; blades narrowly

cuneate, 0.5–3 × 0.2–0.5 cm, entire or 3(–5)-lobed (lobes 1.5–2 mm, less than 1/3 blade lengths, acute), faces silvery canescent. Heads (usually nodding) in arrays 6–25 × 1–4 cm (branches erect, somewhat curved). Involucres globose, 2–3 × 1.5–2.5 mm. Phyllaries (8–15) ovate, canescent or tomentose. Florets: pistillate 0–2 (raylike, laminae to 1 mm); bisexual 1–3; corollas 1–1.5 mm (style branches of ray florets elongate, exsert, epapillate, tips acute; of disc florets, short, truncate, papillate). Cypselae (ellipsoid, 5-ribbed) 0.8–1 mm, glabrous. 2*n* = 18, 36, 72.

Flowering early summer–late fall. Deserts, sandy or alkaline soils, rock outcrops; 1000–2500 m; Ariz., Calif., Colo., Nev., N.Mex., Tex., Utah.

Artemisia bigelovii of the southwestern deserts is easily confused in the field with *A. tridentata*, even though it is well distinguished ecologically and morphologically. Systematic placement within subg. *Tridentatae* remains problematic. Presence of “ray” florets (though rare) and vestigial spines on the pollen (R. P. Wodehouse 1935) suggest a relationship with groups ancestral to *Tridentatae*. The species also has the unusual characteristic of lignified trichomes (L. M. Shultz 1986b). Further research may help to determine proper placement; its affinities may be with members of subg. *Artemisia*.

11. *Artemisia cana* Pursh, *Fl. Amer. Sept.* 2: 521. 1813

[E] [F]



Seriphidium canum (Pursh) W. A. Weber

Shrubs, 50–150 cm (trunks definite, freely branched from bases, branches erect), pleasantly aromatic; root-sprouting. Stems light brown to gray-green (woody, somewhat pliable, leafy), persistently canescent to glabrescent. Leaves deciduous, whitish gray or green to dark gray-green; blades narrowly elliptic to lanceolate, 1.5–8 × 0.2–1 cm, usually entire, sometimes irregularly lobed, sparsely to densely hairy. Heads in (congested, leafy) paniculiform arrays 10–20 × 0.2–7 cm. Involucres (subtended by green, leaflike bracts) narrowly to broadly campanulate, 3–4 × 2–5 mm. Phyllaries ovate or lanceolate (scarious margins nearly invisible), densely canescent. Florets 4–20; corollas 2–3 mm, resinous (style branches ellipsoid, to 2.3 mm, exsert, gland-dotted). Cypselae (light brown) 1–2.3 mm, resinous.

Subspecies 3 (3 in the flora): w North America.

1. Shrubs 100–150 cm; leaves 2–8 cm (entire); primarily e of continental divide 11a. *Artemisia cana* subsp. *cana*
1. Shrubs 50–90 cm; leaves 1.5–4 cm (usually some with irregular lobes); w of continental divide.
 2. Stems felty-tomentose; leaves green to gray-green; involucres 4–5 mm diam.; California, Nevada, Oregon 11b. *Artemisia cana* subsp. *bolanderi*
 2. Stems hairy (not felty-tomentose); leaves green to dark green; involucres 2–3(–4) mm diam.; Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming 11c. *Artemisia cana* subsp. *viscidula*

11a. *Artemisia cana* Pursh subsp. *cana* • Silver wormwood [E] [F]



Artemisia columbiensis Nuttall

Shrubs, 100–150 cm. Stems white to light gray or brown. Leaves whitish gray, blades narrowly elliptic to lanceolate, 2–8 × 0.3–1 cm, usually entire, sometimes irregularly lobed, densely silvery-canescenscent. Heads in (leafy) arrays 10–20 × 5–7 cm. Involucres

broadly campanulate, 3–4 × 3–5 mm. Phyllaries broadly ovate (mostly obtuse), densely hairy. Florets 10–20. Cypselae 1–1.2 mm. $2n = 54$.

Flowering mid–late summer. Sandy loam soils, often along streams; 1000–1500 m; Alta., B.C., Man., Sask.; Colo., Mont., Nebr., N.Dak., S.Dak., Wyo.

Subspecies *cana* is found primarily in the grasslands of Canada and the west-central United States. It is unusual within the species in that there is no morphologic evidence of hybridization with other species in subg. *Tridentatae*.

11b. *Artemisia cana* Pursh subsp. *bolanderi* (A. Gray) G. H. Ward, Contr. Dudley Herb. 4: 192. 1953 • Bolander sagebrush [E]



Artemisia bolanderi A. Gray, Proc. Amer. Acad. Arts 19: 50. 1883; *A. tridentata* Nuttall subsp. *bolanderi* (A. Gray) H. M. Hall & Clements; *Seriphidium bolanderi* (A. Gray) Y. R. Ling; *S. canum* (Pursh) W. A. Weber subsp. *bolanderi* (A. Gray) W. A. Weber

Shrubs, 50–60(–80) cm. Stems white (felty-tomentose when young). Leaves sometimes bright green, blades linear to narrowly lanceolate, (1.5–)3–4 × 0.2–0.6 cm, usually entire, sometimes with irregular lobes. Heads (2–3 per branch) in (sparsely leafy) arrays 12–18 × 1–2 cm. Involucres broadly campanulate, 3–4 × 4–5 mm. Phyllaries narrowly ovate-lanceolate, acute (outer) or obtuse, densely hairy. Florets 8–16. Cypselae 1–1.5 mm. $2n = 18, 36$.

Flowering mid–late summer. Gravel soils, mountain meadows, stream banks; 1600–3300 m; Calif., Nev., Oreg.

Subspecies *bolanderi* is known only from the western United States.

11c. *Artemisia cana* Pursh subsp. *viscidula* (Osterhout) Beetle, Rhodora 61: 84. 1959 • Sticky sagebrush [E]



Artemisia cana var. *viscidula*

Osterhout, Bull. Torrey Bot. Club 27: 507. 1900; *A. argillosa* Beetle; *A. viscidula* (Osterhout) Rydberg

Shrubs, 50–70(–90) cm. Stems white (sparsely tomentose) or brown (glabrous). Leaves bright to dull green, blades linear to narrowly lanceolate, (1.5–)2–3 × 0.2–0.4 cm, often with irregular lobes, sparsely hairy or glabrescent, viscid. Heads (2–3 per branch, erect, sessile) in (sparsely leafy) arrays 12–20 × 1–2 cm. Involucres narrowly campanulate, 3–4 × 2–3(–4) mm. Phyllaries narrowly lanceolate, acute (outer) or obtuse, sparsely hairy. Florets 4–8. Cypselae 1–2.3 mm. $2n = 18, 36, 72$.

Flowering mid–late summer. Wet mountain meadows, stream banks, rocky areas with late-lying snows; 2000–3300 m; Ariz., Colo., Idaho, Mont., Nev., N.Mex., Utah, Wyo.

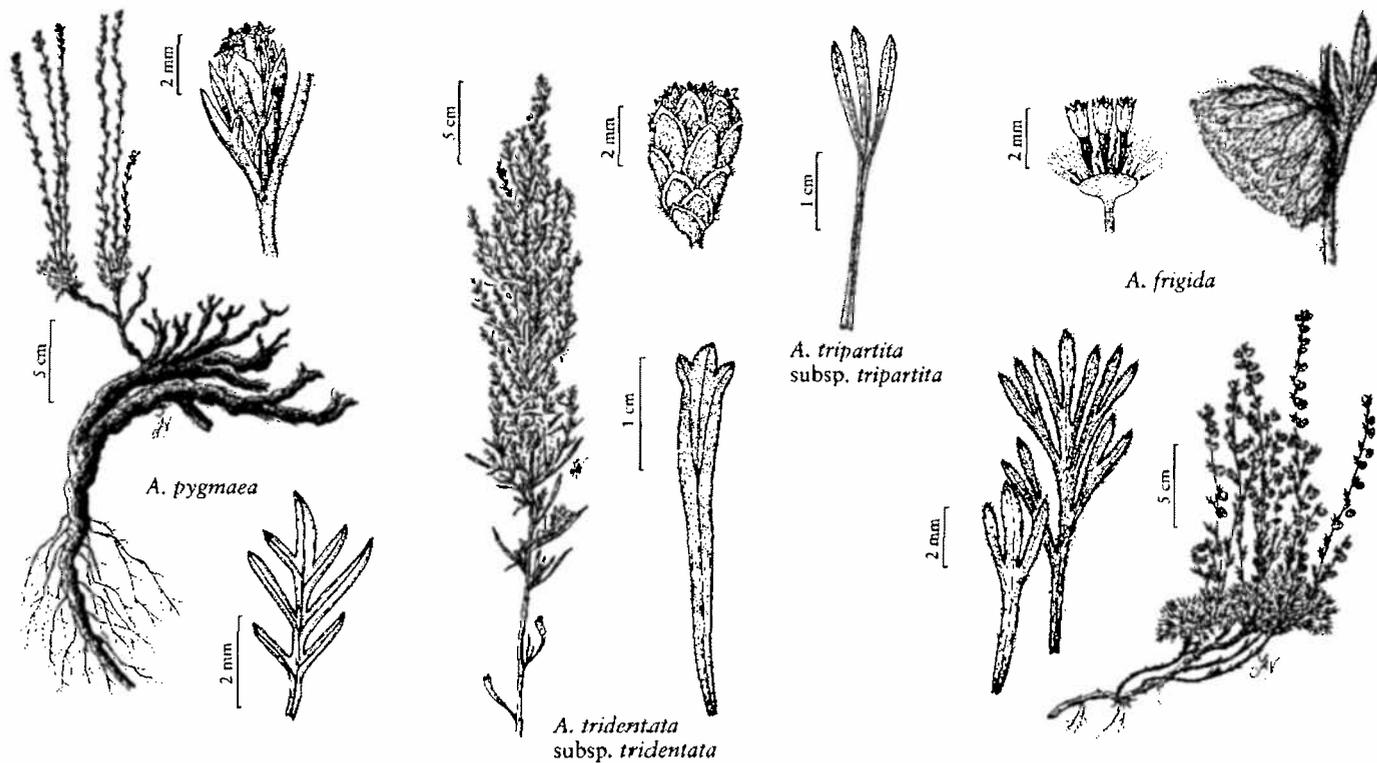
Subspecies *viscidula* is the common silver sagebrush of the intermountain region of western North America. In New Mexico, it is known only from Rio Arriba County. It is distinguished from subsp. *bolanderi* by geography as well as its darker green foliage and sparsely (rather than densely) tomentose or glabrous stems. Usually restricted to wet meadows and stream banks, it is distinctive in the late summer and fall by its yellowing ephemeral leaves.

12. *Artemisia nova* A. Nelson, Bull. Torrey Bot. Club 27: 274. 1900 • Black sagebrush, black sage [E]



Artemisia arbuscula Nuttall subsp. *nova* (A. Nelson) G. H. Ward; *A. arbuscula* var. *nova* (A. Nelson) Cronquist; *A. tridentata* Nuttall subsp. *nova* (A. Nelson) H. M. Hall & Clements; *Seriphidium novum* (A. Nelson) W. A. Weber

Shrubs, 10–30(–50) cm (trunks relatively short, widely and loosely branched), pungently aromatic; not root-sprouting. Stems brown, glabrescent (vegetative of approximately equal heights, giving plants a ‘hedged’ appearance; bark dark gray, exfoliating with age). Leaves persistent, usually bright green to dark green, sometimes gray-green; blades cuneate, 3-lobed (lobes to 1/3 blade lengths, 0.5–2 × 0.2–1 cm, rounded), faces sparsely hairy, gland-dotted. Heads in paniculiform arrays 4–10 × 0.5–3 cm (branches ± erect; peduncles slender). Involucres narrowly turbinate, 2–3 × 2 mm. Phyllaries (straw-colored



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or light green) ovate to elliptic (margins hyaline, shiny-resinous), sparsely hairy or glabrous. **Florets** 2–6; corollas 2–3 mm, glabrous (style branches scarcely exsert). **Cypselae** (ribbed) 0.8–1.5 mm, glabrous or resinous. $2n = 18, 36$.

Flowering mid summer–late fall. Shallow soils, desert valleys, exposed mountain slopes; 1500–2300 m; Ariz., Calif., Colo., Idaho, Mont., Nev., N.Mex., Utah, Wyo.

Artemisia nova is the common low-growing dark-green (“black”) sagebrush of desert valleys or south-southwest-facing slopes. It is prized by sheep ranchers as forage in areas where little else is available for grazing. It is conspicuous by its low growth habit, dark green foliage, and, in late season, by its pale orange to light brown flowering branches that rise beyond the vegetative growth. Often confused in herbarium collections with *A. arbuscula*, *A. nova* is easily distinguished by the entire leaves of the flowering stems, pedunculate heads, narrowly turbinate involucre, and often straw-colored, glabrous or sparsely hairy phyllaries.

13. *Artemisia pygmaea* A. Gray, Proc. Amer. Acad. Arts 21: 413. 1886 • Pygmy sage [E] [F]

Seriphidium pygmaeum (A. Gray)
W. A. Weber



Shrubs, 5–10 cm, slightly aromatic; not root-sprouting (caudices coarsely woody, branched). **Stems** pale to light brown (stiffly erect, densely clothed with appressed foliage), sparsely tomentose. **Leaves**

persistent (sessile, rigid), bright green; blades oblong to ovate, 0.3–0.5 × 0.2–0.3 cm, pinnately lobed (nearly to midribs, $\frac{1}{3}+$ widths of blades, lobes 3–7, divergent), faces glabrous or sparsely tomentose, resinous. **Heads** (sessile, erect) in paniculiform to racemiform arrays (1–)2–3 × 0.5–1 cm. **Involucre** narrowly turbinate, 2–3 × 3–4 mm. **Phyllaries** (green) narrowly lanceolate (midribs prominent), glabrous or sparsely tomentose. **Florets** 2–6; corollas 2.5–3 mm, glandular (style branches flat, erose, exsert). **Cypselae** (prismatic) 0.4–0.5 mm, glabrous, resinous. $2n = 18$.

Flowering mid summer–fall. Fine-textured soils of gypsum or shale; 1500–1800 m; Ariz., Colo., Nev., N.Mex., Utah.

Artemisia pygmaea is a distinctive, faintly aromatic shrublet, often mistaken for something other than a sagebrush. In early spring its stiff, bright green, deeply

pinnatifid leaves are reminiscent of some prickly member of Polemoniaceae. After flowering, its heads and narrow panicles easily identify it as a member of *Artemisia*; it is unlike other members of the subgenus (which typically have 3-lobed leaves in fascicled lateral shoots). The molecular analysis by L. E. Watson et al. (2002) supported its phylogenetic alignment within subg. *Tridentatae*.

14. *Artemisia rigida* (Nuttall) A. Gray, Proc. Amer. Acad. Arts 19: 49. 1883 • Scabland sagebrush [E]



Artemisia trifida Nuttall var. *rigida* Nuttall, Trans. Amer. Philos. Soc., n. s. 7: 398. 1841; *Seriphidium rigidum* (Nuttall) W. A. Weber

Shrubs, 20–40 cm (branches widely spreading), mildly aromatic; root-sprouting (caudices stout). **Stems** gray (coarse, brittle), hairy (bark gray, exfoliating). **Leaves**

deciduous, silver-gray (rigid); blades broadly spatulate, 1.5–4 × 0.5–0.7 cm (bases narrow), 3-lobed (lobes 1/2+ blade lengths, ca. 1 mm wide), faces densely hairy. **Heads** borne singly or (in glomerules) in (densely leafy) spiciform or paniculiform arrays 2–20 × 2 cm. **Involucre**s narrowly campanulate, 4–5 × 2.5–3.5 mm. **Phyllaries** elliptic (acute to obtuse), densely canescent. **Florets** 4–8; corollas yellowish red to red, 2–2.8 mm (style branches oblong, truncate, exsert). **Cypselae** (4–5-ribbed) 1–1.5 mm, glabrous. $2n = 18, 36$.

Flowering mid summer–early fall. Dry rocky scablands, volcanic plains; 1500–1800 m; Idaho, Mont., Oreg., Wash.

Artemisia rigida is an important successional species following fires because the plants form new shoots from the underground caudices. This characteristic aligns the species with other ‘sprouters’ in the subgenus, namely *A. cana*, *A. tripartita*, and *A. arbuscula*.

15. *Artemisia rothrockii* A. Gray in W. H. Brewer et al., Bot. California 1: 618. 1876 • Rothrock or sticky sagebrush [E]



Artemisia tridentata Nuttall subsp. *rothrockii* (A. Gray) H. M. Hall & Clements; *Seriphidium rothrockii* (A. Gray) W. A. Weber

Shrubs, 20–50 cm (sticky-resinous and dark green throughout), pungently aromatic; not root-sprouting (trunks relatively narrow). **Stems** white (becoming

dark gray with age), canescent (bark exfoliating). **Leaves** persistent, light or dark gray-green; blades long-cuneate to lanceolate, (0.4–)1–1.5(–2) × 0.2–0.4 cm, 3-lobed

(lobes to 1/3 blade lengths, rounded, margins sometimes entire, somewhat wavy), faces densely to sparsely canescent, gland-dotted, sticky-resinous. **Heads** (erect, sessile or pedunculate) in paniculiform arrays, 5–15 × 1–2(–3) cm. **Involucre**s broadly ovoid, 3–5 × 4–6 mm. **Phyllaries** (usually gray-green) ovate, densely or sparsely canescent. **Florets** 12–20; corollas 2.5–3.5 mm. **Cypselae** 0.8–2 mm, (smooth), resinous. $2n = 36, 54, 72$.

Flowering mid summer–all. Clay soils of mountain meadows; 2500–3100 m; Calif.

Artemisia rothrockii is known only from the central and southern Sierra Nevada and the White Mountains of California. In the Rocky Mountains, *A. spiciformis* has been confused with *A. rothrockii*. Distinctive chemistry and anatomical structure of the leaves support the distinctness of *A. rothrockii* (L. M. Shultz 1986b). Intermediate characteristics suggest a hybrid origin from races of *A. cana* and *A. tridentata*.

16. *Artemisia spiciformis* Osterhout, Bull. Torrey Bot. Club 27: 507. 1900 • Snowfield sagebrush [E]



Artemisia tridentata Nuttall subsp. *spiciformis* (Osterhout) Kartesz & Gandhi; *Seriphidium spiciforme* (Osterhout) Y. R. Ling

Shrubs, 30–80 cm (widely branched, gray-tomentose), aromatic; root-sprouting. **Stems** relatively numerous, brown or grayish green. **Leaves** ± deciduous

(by late summer, turning yellow); blades lanceolate, oblanceolate, or cuneate, 2.5–5.5 × 0.8–1.2+ cm, entire or irregularly 3–6-lobed (lobes to 1/3 blade lengths, 1.5+ mm wide, rounded or acute; leaves of flowering stems usually smaller, entire), faces ± sericeous or tomentose. **Heads** (erect) in (leafy) paniculiform arrays 8–15(–25) × 0.5–3(–4) cm. **Involucre**s ovoid or lanceoloid, (2.5–)4–6(–7) mm. **Phyllaries** lanceolate, sparsely to densely hairy. **Florets** 8–18(–27); corollas 2.5–3.5, glabrous. **Cypselae** 1–1.5 mm, glabrous or resinous. $2n = 18, 36, 54, 72$.

Flowering mid summer–fall. Moist open slopes, rocky meadows, streamsides, woodlands, late-lying snowfields; 2100–3700 m; Calif., Colo., Idaho, Nev., Oreg., Utah, Wash., Wyo.

Often confused with *Artemisia rothrockii*, *A. spiciformis* has been recognized only recently as a widespread, high-elevation sagebrush of late-lying snowfields. Molecular analysis has not yet determined the degree to which this species intergrades with *A. cana* subsp. *viscidula* and *A. tridentata* subsp. *vaseyana*, the presumed parents of this putative hybrid. Because snowfield sagebrush produces fertile seeds and forms a stable community type, it is treated here as a distinct species.

17. *Artemisia tridentata* Nuttall, Trans. Amer. Philos. Soc., n. s. 7: 398. 1841 [E]



Seriphidium tridentatum (Nuttall)
W. A. Weber

Shrubs, 40–200(–300) cm (herbage gray-haired), aromatic; not root-sprouting (trunks relatively thick). **Stems** gray-brown, glabrate (bark gray, exfoliating in strips). **Leaves** persistent, gray-green; blades usually cuneate, (0.4–)0.5–3.5 ×

0.1–0.7 cm, 3-lobed (lobes to 1/3 blade lengths, 1.5+ mm wide, rounded), faces densely hairy. **Heads** (usually erect, on slender peduncles) in paniculiform arrays 5–30 × 1–6 cm. **Involucres** lanceolate, (1–)1.5–4 × 1–3 mm. **Phyllaries** oblanceolate to widely obovate, densely tomentose. **Florets** 3–8; corollas 1.5–2.5 mm, glabrous. **Cypselae** 1–2 mm, hairy or glabrous, glandular.

Subspecies 4 (4 in the flora): w North America, nw Mexico.

Artemisia tridentata has undergone considerable taxonomic revision in the past century and circumscription of subspecies remains a topic of considerable controversy. Workers in the field should be aware of the morphologic variation within the subspecies across the range of the species (i.e., approximately from the Sierra Nevada in the west to the plains of the Rocky Mountains in the east). Because rangeland managers and conservationists can often identify local morphologic and chemical races based on grazing or habitat preferences of wildlife and domestic animals, some impetus exists to further subdivide the subspecies within *A. tridentata* at the varietal level. This treatment of the species complex remains conservative in light of the need for further study. As to chemical differences among the subspecies, aroma is often used to distinguish subspecies in the field. Volatile resins in the plants are strongly aromatic and, when crushed, leaves have very distinctive (although not easily described) aromas.

SELECTED REFERENCES McArthur, E. D. 1984. Natural and artificial hybridization among *Artemisia tridentata* populations. [Abstract.] *Amer. J. Bot.* 71(suppl.): 105. McArthur, E. D., B. L. Welch, and S. C. Sanderson. 1988. Natural and artificial hybridization between big sagebrush (*Artemisia tridentata*) subspecies. *J. Heredity* 79: 268–276.

1. Shrubs 100–200(–300) cm (leaf blades: lengths usually 3+ times widths); heads in relatively broad, paniculiform arrays.
2. Involucres 1.5–2.5 × 1–2 mm; deep, well drained (usually sandy) soils in valley bottoms, lower montane slopes along drainages
 17a. *Artemisia tridentata* subsp. *tridentata*
2. Involucres 2–4 × 1–2 mm; loose, sandy soils of valleys and foothills
 17b. *Artemisia tridentata* subsp. *parishii*

1. Shrubs 30–150 cm (leaf blades: lengths usually less than 3 times widths); heads in relatively narrow, paniculiform arrays.
3. Shrubs, 60–80(–150) cm (crowns flat-topped); heads in arrays 10–15 cm; involucre 2–3 × 1.5–3 mm; mountains
 17c. *Artemisia tridentata* subsp. *vaseyana*
3. Shrubs, 30–50(–150) cm (crowns rounded); heads in arrays 2–6(–8) cm; involucre (1–)1.5–2 × 1.5–2 mm; usually cold-desert basins and high plateaus, sometimes foothills
 17d. *Artemisia tridentata* subsp. *wyomingensis*

17a. *Artemisia tridentata* Nuttall subsp. *tridentata*

- Great Basin sagebrush, big sage [E] [F]



Artemisia angustifolia (A. Gray)
Rydberg; *A. tridentata* subsp.
xericensis Winward ex
R. Rosentreter & R. G. Kelsey

Shrubs, 100–200(–300) cm. **Vegetative branches** nearly equaling flowering branches. **Leaves** cuneate or lanceolate, 0.5–1.2(–2.5) × 0.2–0.3(–0.6) cm, 3-lobed (lobes to 1/3

lengths of blades, rounded). **Heads** in paniculiform arrays 5–15(–20) × (1.5–)5–6 cm. **Involucres** 1.5–2.5 × 1–2 mm. **Florets** 4–6. **Cypselae** glabrous. $2n = 18, 36$.

Flowering mid summer–late fall. Deep, well-drained (usually sandy) soils in valley bottoms, lower montane slopes, along drainages; 1300–2200 m; Alta., B.C.; Ariz., Calif., Colo., Idaho, Mont., Nev., N.Mex., Oreg., Utah, Wash., Wyo.

Subspecies *tridentata* is the common sagebrush of deep, well-drained soils in the Great Basin of western North America, where it is often the dominant shrub of valleys and open grasslands. On drier sites and on high plateaus, it is replaced by subsp. *wyomingensis*, a taxon that appears to be increasing with prolonged droughts and disturbance from grazing. In dry valley bottoms of the Great Basin, subsp. *tridentata* is conspicuous by its great height and wide arrays of heads along roadways, fencerows, and other areas where moisture is more readily available through runoff or reduced competition.

- 17b. *Artemisia tridentata* Nuttall subsp. *parishii*
(A. Gray) H. M. Hall & Clements, Publ. Carnegie
Inst. Wash. 326: 137. 1923 (as *parishi*) • Mojave
sagebrush



Artemisia parishii A. Gray, Proc.
Amer. Acad. Arts 17: 220. 1882;
A. tridentata var. *parishii* (A. Gray)
Jepson; *Seriphidium tridentatum*
(Nuttall) W. A. Weber subsp.
parishii (A. Gray) W. A. Weber

Shrubs, 100–200(–300) cm
(crowns rounded). **Vegetative**
branches interspersed among flow-

ering stems. **Leaves** cuneate or lanceolate (1–)1.5–2(–2.5)
× 0.1–0.3 cm, usually 3-lobed, sometimes entire. **Heads**
in paniculiform arrays 15–30 × 2–6 cm (branches widely
spreading or drooping). **Involucres** 2–4 × 1–2 mm. **Flo-**
rets 3–7. **Cypselae** hairy or glabrous. $2n = 36$.

Flowering mid summer–late fall. Loose sandy soils
of valleys and foothills; 300–1800 m; Ariz., Calif., Nev.,
Utah; Mexico (Baja California).

Subspecies *parishii* is found in coastal ranges in
southern California and Baja California, and inland to
areas south of the Great Basin. It has been distinguished
traditionally by the presence of drooping flowering
branches and hairy cypselae, characteristics found on
the type specimen. These characteristics occur
sporadically in populations of other subspecies
throughout the warm desert regions of southern
California, Nevada, and Utah; the characteristically
longer leaves and distinctive aroma support recognition
of this subspecies. This treatment is the first to include
Mojave Desert, Owens Valley, and Colorado Plateau
populations within subsp. *parishii*.

- 17c. *Artemisia tridentata* Nuttall subsp. *vaseyana*
(Rydberg) Beetle, Rhodora 61: 83. 1959
• Mountain sagebrush [E]



Artemisia vaseyana Rydberg in
N. L. Britton et al., N. Amer. Fl. 34:
283. 1916; *A. tridentata* var.
pauciflora Winward & Goodrich;
A. tridentata var. *vaseyana*
(Rydberg) B. Boivin; *Seriphidium*
vaseyanum (Rydberg) W. A. Weber

Shrubs, 60–80(–150) cm (plants
highly aromatic, crowns flat-

topped). **Vegetative branches** of nearly equal lengths.
Leaves (vegetative branches) broadly cuneate, 1.2–3.5 ×
0.3–0.7 cm, regularly 3-lobed to irregularly toothed. **Heads**
in paniculiform arrays 10–15 × 2–4 cm. **Involucres** 2–3 ×
1.5–3 mm. **Florets** 3–9. **Cypselae** glabrous. $2n = 18, 36$.

Flowering mid summer–late fall. Montane meadows,
usually in rocky soils, sometimes in forested areas; 2000–

2800 m; B.C.; Calif., Colo., Idaho, Mont., Nev., N.Dak.,
Oreg., S.Dak., Utah, Wash., Wyo.

Subspecies *vaseyana* is the common sagebrush of
mountain slopes and is the most abundant of all the
subspecies of *Artemisia tridentata*. A. A. Beetle (1960)
estimated that it dominates an area of approximately
260,000 square kilometers. That estimate remains
reasonably accurate today even though sagebrush is often
cleared (by burning, herbicide spray, or the practice of
'chaining') and replaced by grasses (especially crested
wheatgrass) suitable for livestock grazing. The acreage
in which sagebrush has been removed appears to be more
than compensated by acreage where it has increased in
abundance because of overgrazing. While there may be
evidence of introgression with other subspecies of *A.*
tridentata, the subsp. *vaseyana* is usually well-separated
geographically and ecologically from the other three
subspecies. Variation within subsp. *vaseyana* may
warrant the recognition of two varieties. A few-flowered
(6 or fewer florets) form occurs at lower elevations
(usually less than 2300 m) than the more robust form
(with more than 6 florets per head), occurring at higher
elevations (generally more than 2300 m). The type
specimen of *A. vaseyana* is the large-headed variant.
Pending further study, I am including var. *pauciflora*
Winward & McArthur as part of subsp. *vaseyana*. In
areas where populations of subsp. *vaseyana* co-occur
with subspecies of *A. cana*, introgression is common.

- 17d. *Artemisia tridentata* Nuttall subsp. *wyomingensis*
Beetle & A. M. Young, Rhodora 67: 405. 1965
• Wyoming sagebrush [E]



Artemisia tridentata var.
wyomingensis (Beetle & A. M.
Young) S. L. Welsh; *Seriphidium*
tridentatum (Nuttall) W. A. Weber
subsp. *wyomingense* (Beetle &
A. M. Young) W. A. Weber

Shrubs, 30–50(–150) cm (crowns
rounded). **Vegetative branches**
(stiffly spreading, often persisting,

giving mature plants a twiggy appearance) interspersed
among flowering stems. **Leaves** narrowly to broadly
cuneate, (0.4–)0.7–1.1(–2) × (0.1–)0.2–0.3 cm, lobed (lobes
rounded). **Heads** in paniculiform arrays 2–6(–8) × 1–3 cm
(often immersed in vegetative branches). **Involucres**
(1–)1.5–2 × 1.5–2 mm. **Florets** 4–8. **Cypselae** glabrous.
 $2n = 36, 54$.

Flowering mid summer–late fall. Rocky or fine-
grained soils, cold-desert basins to high plateaus,
foothills; 800–2200 m; Ariz., Calif., Colo., Idaho, Mont.,
Nebr., Nev., N.Mex., N.Dak., Oreg., S.Dak., Utah,
Wash., Wyo.

Subspecies *wyomingensis* is the common sagebrush of rocky or fine-grained soils from valleys to high plateaus in the Great Basin. It is an allopolyploid that may be derived from the populations of subsp. *tridentata* with which it occurs. Identification is based primarily on the shorter leaves of subsp. *wyomingensis*, its usually shorter stature, and its shorter flowering branches that are retained from year to year. Wyoming sagebrush may be increasing in abundance in response to increased grazing pressure and drought in the high valleys of the Great Basin.

18. *Artemisia tripartita* Rydberg, Mem. New York Bot. Gard. 1: 432. 1900 • Three-tipped sagebrush [E] [F]



Artemisia trifida Nuttall, Trans. Amer. Philos. Soc., n. s. 7: 398. 1841, not Turczaninow 1832; *A. tridentata* Nuttall subsp. *trifida* H. M. Hall & Clements; *Seriphidium tripartitum* (Rydberg) W. A. Weber

Shrubs, 5–15 or 20–150(–200) cm, aromatic; root-sprouting (caudices with adventitious buds,

fibrous rooted). Stems pale gray, glabrous. Leaves deciduous, gray-green; blades broadly cuneate, 1.5–4 × 0.5–2 cm, deeply 3-lobed (lobes 1–1.4 mm wide, acute; cauline leaves smaller, mostly 3-lobed). Heads in paniculiform or spiciform arrays (5–)8–15(–35) × (0.5–)1–5 cm. Involucres globose or turbinate, 2–4 × 1.5–3 mm. Phyllaries broadly lanceolate (margins scarious, obscured by indument), canescent. Florets 3–11; corollas 2–2.5 mm, glandular (style branches included). Cypselae (columnar, unequally ribbed) 1.8–2.3 mm, glabrous or resinous.

Subspecies 2 (2 in the flora): w North America.

1. Shrubs 20–150(–200) cm; lobes of leaves linear, to 0.5 mm wide; loamy soils, w of continental divide 18a. *Artemisia tripartita* subsp. *tripartita*
1. Shrubs 5–15 cm; lobes of leaves lanceolate, 1–1.5 mm wide; stony grasslands, e Wyoming 18b. *Artemisia tripartita* subsp. *rupicola*

18a. *Artemisia tripartita* Rydberg subsp. *tripartita*

[E] [F]



Shrubs, 20–150(–200) cm. Leaves 1.5–4 × 0.5–1.5 cm, lobes linear, to 0.5 mm wide. Heads in spiciform arrays (6–)8–15(–35) × (1–)4–5 cm. Involucres 2–3 × 2 mm. Florets 4–8. Cypselae 1.8–2.3 mm. $2n = 18, 36$.

Flowering mid summer–late fall.

Deep loam soils, usually igneous in origin; 900–1900 m; B.C.; Idaho, Nev., Oreg., Wash., Wyo.

Subspecies *tripartita* ranges throughout the Snake River and Columbia River basins, extending north through central British Columbia, where average annual precipitation is 375–800 mm. Because much of the range includes fertile agricultural land, much of the habitat has been lost to farming, and populations of subsp. *tripartita* occur as isolated islands along drainages and at the bases of mountain slopes. It may be one of the parents involved in the presumed hybrid origin of *Artemisia arbuscula* subsp. *thermopola*.

18b. *Artemisia tripartita* Rydberg subsp. *rupicola*

Beetle, Rhodora 61: 82. 1959 [E]



Shrubs, 5–15 cm. Leaves 1.5–3.5 × 1–2 cm; lobes lanceolate, 1–1.5 mm wide. Heads in paniculiform arrays (5–)8–12(–15) × (0.5–)1–3 cm. Involucres 2–4 × 1.5–3 mm. Florets 3–11. Cypselae 1.8–2 mm.

Flowering early–late summer. Shallow rocky soils, grasslands; 2500–2900 m; Wyo.

Subspecies *rupicola* is known only from the high, windy plains of south-central Wyoming. The continental divide separates subsp. *tripartita* to the west and subsp. *rupicola* to the east. Because of its limited distribution and scant representation in herbaria, this distinct morphologic form escaped notice until it was described in 1959. Its dwarf habit and ecology distinguish it from subsp. *tripartita*.

119c. ARTEMISIA Linnaeus subg. ABSINTHIUM (Miller) Lessing, Syn. Gen. Compos., 264. 1832

Absinthium Miller, Gard. Dict. Abr. ed. 4, vol. 1. 1754; *Artemisia* subsect. *Absinthium* (Miller) Darijma

Perennials; fibrous rooted, caudices woody, rhizomes absent. Stems not wandlike. Leaves deciduous or persistent, basal and/or cauline (petiolate or sessile, not in fascicles). Heads disciform. Receptacles epaleate, villous (hairs relatively long). Florets: peripheral 6–27 pistillate and fertile; central 15–100 bisexual and fertile; corollas (pale yellow) funnellform.

Species ca. 40 (5 in the flora): temperate regions, North America, South America, Eurasia.

SELECTED REFERENCE Besser, W. S. J. G. von. 1829. Lettre [on *Artemisia* including *Absinthium*]...au Directeur. Bull. Soc. Imp. Naturalistes Moscou 1: 219-265.

- 1. Plants 10-40 or 40-60(-100) cm; leaves pinnately lobed (basal 2-3-pinnatifid) or 1-2-ternately lobed.
 - 2. Leaves pinnately lobed (basal 2-3-pinnatifid, lobes obovate) 19. *Artemisia absinthium*
 - 2. Leaves 1-2-ternately lobed (lobes filiform, to 0.5 mm wide) 20. *Artemisia frigida* (in part)
- 1. Plants 5-50 cm; leaves entire or 1-3-pinnately lobed.
 - 3. Involucres 3-5 mm diam 20. *Artemisia frigida* (in part)
 - 3. Involucres 4-8 mm diam.
 - 4. Leaves bright green, faces glabrous or sparsely hairy; phyllary margins light green 22. *Artemisia rupestris*
 - 4. Leaves gray-green, faces canescent to villous; phyllary margins black to brown.
 - 5. Heads borne singly or (2-5) in paniculiform to racemiform arrays; corolla lobes glabrous 21. *Artemisia pattersonii*
 - 5. Heads (5-22) in spiciform arrays; corolla lobes hairy 23. *Artemisia scopulorum*

19. *Artemisia absinthium* Linnaeus, Sp. Pl. 2: 848. 1753 • Common wormwood, armoise absinthe [I]



Perennials, 40-60(-100) cm (mat-forming), aromatic. Stems gray-green (sometimes woody proximally), densely canescent to glabrescent (hairs appressed). Leaves deciduous, gray-green; blades broadly ovate, 3-8 x 1-4 cm, mostly pinnately lobed (basal 2-3-pinnatifid, lobes obovate), faces

densely canescent. Heads (nodding) in open (diffusely branched), paniculiform arrays 10-20(-35) x (2-)10-13 (-15) cm. Involucres broadly ovoid, 2-3 x 3-5 mm. Phyllaries gray-green, densely sericeous. Florets: pistillate 9-20; bisexual 30-50; corollas 1-2 mm, glandular. Cypselae (± cylindric, slightly curved, obscurely nerved), ± 0.5 mm, glabrous (shiny). 2n = 18.

Flowering mid summer-fall. Widely cultivated, persisting from plantings, disturbed areas; 0-1000 m; introduced; Alta., B.C., Man., N.B., Nfld. and Labr. (Nfld.), N.S., Ont., P.E.I., Que., Sask.; Calif., Colo., Conn., Idaho, Ill., Ind., Iowa, Kans., Maine, Md., Mass., Mich., Minn., Mo., Mont., Nebr., N.H., N.J., N.Y., N.C., N.Dak., Ohio, Oreg., Pa., R.I., S.C., S.Dak., Tenn., Utah, Vt., Wash., Wis., Wyo.; Europe.

Artemisia absinthium provides the flavoring as well as the psychoactive ingredient for *absinthe* liquor, a beverage that is illegal in some markets. Known as a powerful neurotoxin, absinthe in large quantities is addictive as well as deadly. The species is popular in the horticultural trade. Prized by gardeners for its gracefully scalloped leaves and gray-green foliage, it creates an attractive and winter-hardy flower border.

20. *Artemisia frigida* Willdenow, Sp. Pl. 3: 1838. 1803 • Fringed sage, prairie sagewort, armoise douce [F]



Artemisia frigida var. *gmeliniana* (Besser) Besser; *A. frigida* var. *williamsiae* S. L. Welsh

Perennials, 10-40 cm (forming silvery mats or mounds), strongly aromatic. Stems gray-green or brown, glabrescent. Leaves persistent, silver-gray; blades ovate, 0.5-1.5(-2.5) cm, 1-2-

ternately lobed (lobes 0.2-0.5 mm wide), faces densely whitish-pubescent. Heads in (leafy) paniculiform arrays 0.5-2(-4) x 4-15(-20) cm. Involucres globose, (3-)5 x (2-)5-6 mm. Phyllaries gray-green (margins sometimes brownish), densely tomentose. Florets: pistillate 10-17; bisexual 20-50; corollas 1.5-2 mm, glabrous. Cypselae 1-1.5 mm, glabrous. 2n = 18.

Flowering summer-fall. Fields, meadows, dry grasslands, steppes, usually stony, well-drained soils; 500-3300 m; Alta., B.C., Man., N.B., N.W.T., Nunavut, Ont., Que., Sask., Yukon; Alaska, Ariz., Colo., Idaho, Ill., Iowa, Kans., Minn., Mont., Nebr., N.Mex., N.Dak., S.Dak., Tex., Utah, Wash., Wis., Wyo.; Eurasia.

Reports of *Artemisia frigida* from eastern Canada (Ontario eastward), the eastern United States (e.g., Connecticut, Massachusetts, Michigan, Vermont), and Arkansas and Missouri appear to be from old garden sites where the plants may persist. The similarity of this native species to cultivars from eastern Asia (especially Siberia) has led to a number of reports that are apparently based on other cultivars. As a plant with attractive silver foliage, this species has good potential as a drought-hardy plant for flower gardens in cold climates.

21. *Artemisia pattersonii* A. Gray in A. Gray et al., Syn. Fl. N. Amer. ed. 2, 1(2): 453. 1886 (as *pattersonii*)

• Patterson sagewort [E]



Artemisia monocephala (A. Gray) A. Heller; *A. scopulorum* A. Gray var. *monocephala* A. Gray

Perennials, 8–20 cm, mildly aromatic. **Stems** gray-brown, glabrate or finely pubescent. **Leaves** deciduous, gray-green; petiolate; blades (basal) broadly spatulate, 2–4 × 0.5 cm, pinnately lobed (lobes ca. 1.5 mm wide; cauline smaller, 1-pinnately lobed or entire), faces silky-hairy. **Heads** borne singly or (2–5, spreading to nodding, pedunculate) in paniculiform or racemiform arrays 1–5 × 0.5–1 cm. **Involucres** broadly hemispheric, 5–8 × 5–8(–10) mm. **Phyllaries** gray (margins dark brown to black), villous. **Florets**: pistillate 7–27; bisexual 32–100; corollas (yellow tinged with red), 2–3 mm (including exsert anthers), mostly glabrous (embedded in tangled receptacular hairs). **Cypselae** 1.5–2 mm, glabrous. $2n = 14$.

Flowering mid–late summer. Alpine meadows; 3500–4000 m; Colo., N.Mex., Wyo.

Artemisia pattersonii can be distinguished from the closely related *A. scopulorum* by its heads being borne singly and narrower phyllary margins.

22. *Artemisia rupestris* Linnaeus, Sp. Pl. 2: 847. 1753



Absinthium viridifolium (Ledebour) Besser var. *rupestre* (Linnaeus) Besser; *Artemisia rupestris* subsp. *woodii* Neilson

Perennials, 5–15(–25) cm (cespitose), faintly aromatic. **Stems** brownish purple, glabrous. **Leaves** deciduous, bright green; blades (proximalmost petiolate)

ovate, 1.5–5 × 1–2.5 cm, 2–3-pinnately lobed (cauline sessile, ternately or pinnately lobed, terminal lobes lance-

linear, 1–6 × 0.5–1 mm), faces glabrous or sparsely hairy, glandular. **Heads** (5–9, pedunculate or sessile, spreading or drooping) in spiciform arrays 3–9 × 0.5–1 cm. **Involucres** globose, 4–5(–7) × 4–5(–7) mm. **Phyllaries** green (margins light green), ± hairy. **Florets**: pistillate 14–16 (glandular, style branches exsert, linear, spreading); bisexual 40–70; corollas 1.5–2 mm, glabrous or glandular (styles shorter than corollas). **Cypselae** ca. 1 mm (apices flat), glabrous.

Flowering late summer–fall. Steppes, alkaline meadows, stony slopes; 0–1400 m; Yukon; Asia.

The sole North American occurrence of *Artemisia rupestris* in southwestern Yukon is a remarkable disjunction from the Asiatic range of this species.

23. *Artemisia scopulorum* A. Gray, Proc. Acad. Nat.

Sci. Philadelphia 15: 66. 1863 [E]



Perennials, 10–25 cm (cespitose), mildly aromatic (caudices relatively slender). **Stems** gray-green, glabrate. **Leaves** persistent, gray-green; blades (basal) oblanceolate, 2–7 × 0.1 cm, 2-pinnately lobed (lobes linear or oblanceolate; cauline blades smaller, 1–2-pinnate or entire), faces silky-canescenscent.

Heads (5–22) in spiciform arrays 5–9 × 1–1.5 cm. **Involucres** broadly globose or subglobose, 4 × 4–7 mm. **Phyllaries** green (margins black or dark brown), densely villous. **Florets**: pistillate 6–13; bisexual 15–30; corollas 1.5–2.5 mm, hairy (at least on lobes). **Cypselae** 0.8–1 mm, glabrous. $2n = 18$.

Flowering mid–late summer. Alpine meadows, protected areas, bases of rocks; 3100–4200 m; Colo., Mont., Nev., N.Mex., Utah, Wyo.

119d. ARTEMISIA Linnaeus subg. ARTEMISIA

Artemisia sect. *Abrotanum* Besser

Annuals, biennials, or perennials (shrubs in *A. californica*, subshrubs in *A. nesiotica*); usually fibrous-rooted, sometimes taprooted, caudices sometimes woody, rhizomes sometimes present. **Stems** usually not wandlike (wandlike in *A. californica*, *A. nesiotica*, *A. palmeri*). **Leaves** usually deciduous, rarely persistent, basal (rosettes) and/or cauline (not in fascicles). **Heads** usually disciform (discoid in *A. nesiotica* and *A. palmeri*). **Receptacles** glabrous (paleate in *A. palmeri*). **Florets**: usually peripheral 3–20 pistillate and fertile (0 pistillate in *A. nesiotica*, *A. palmeri*); central (or all) 14–70 bisexual and fertile; corollas funnelform.

Species ca. 220 (27 in the flora): widespread in Northern Hemisphere, especially North America, Europe, and central and northern Asia, sporadic in South America and northern Africa.

SELECTED REFERENCES Estes, J. R. 1969. Evidence for autoploid evolution in the *Artemisia ludoviciana* complex of the Pacific Northwest. *Brittonia* 21: 29-43. Keck, D. D. 1946. A revision of the *Artemisia vulgaris* complex in North America. *Proc. Calif. Acad. Sci.*, ser. 4, 25: 421-468.

1. Subshrubs or shrubs (stems wandlike).
 2. Plants 100-350 cm; leaves relatively deeply and coarsely pinnately lobed (lobes 3-7+; coastal California and Baja California) 42. *Artemisia palmeri*
 2. Plants 10-250 cm; leaves pinnately lobed or 3-lobed.
 3. Shrubs (20-250 cm); leaves pinnately lobed (lobes 0.5-1 mm wide); California (chaparral) 28. *Artemisia californica*
 3. Subshrubs (10-60 cm, stems mostly prostrate); leaves 3-lobed (lobes 1-2 mm wide); Channel Islands, California 39. *Artemisia nesiotica*
1. Annuals, biennials, perennials, subshrubs, or shrubs (stems sometimes brittle, not wandlike).
 4. Annuals or biennials; leaves among heads (relatively deeply) lobed.
 5. Annuals, 30-200(-300) cm, sweetly aromatic; leaves 2-3-pinnatifid; arrays of heads 10-20 cm diam 26. *Artemisia annua*
 5. Annuals or biennials, (10-)30-80(-150) cm, not aromatic; leaves 1-2-pinnately lobed; arrays of heads 2-4 cm diam 27. *Artemisia biennis*
 4. Perennials, subshrubs, or shrubs; leaves among heads mostly entire.
 6. Perennials, subshrubs, or shrubs (not rhizomatous).
 7. Heads in capitate or dense, corymbiform arrays (plants caespitose).
 8. Leaves pinnately lobed; involucre 3-5 mm diam.; phyllaries lanceolate to ovate (margins white) 45. *Artemisia senjavinensis*
 8. Leaves 1-2-palmatifid; involucre 3.5-11 mm diam.; phyllaries lanceolate (margins brown or white).
 9. Involucre 3.5-6 × 6-11 mm; phyllaries lanceolate (margins brown); corollas yellow or reddish black, glabrous or glandular (not pilose) 33. *Artemisia globularia*
 9. Involucre 3-4 × 3.5-5 mm; phyllaries lanceolate (margins white); corollas yellow, glabrous or pilose 34. *Artemisia glomerata*
 7. Heads in paniculiform or racemiform arrays (plants not caespitose).
 10. Leaves entire, irregularly palmatifid, or palmately 3-lobed to 2-ternately lobed.
 11. Pappi coroniform; Idaho, Nevada, Oregon 43. *Artemisia papposa*
 11. Pappi 0; Alberta, British Columbia, Northwest Territories, Nunavut; Alaska, Washington.
 12. Plants 15-70 cm; leaves palmately 3-lobed to 2-ternately lobed 25. *Artemisia alaskana*
 12. Plants (5-)10-40 cm; leaves 1-3-palmately lobed 32. *Artemisia furcata*
 10. Leaves 2-3-pinnatifid.
 13. Perennials or subshrubs, 50-170 cm (widely branched, stems brittle); leaf lobes less than 1 mm wide; heads erect; involucre 1.5-3 mm diam. (gardens, waste places, much of North America) 24. *Artemisia abrotanum*
 13. Perennials, 10-50 cm (erect, stems not brittle); leaf lobes 1+ mm wide (margins coarsely toothed); heads nodding; involucre 4-10 mm diam.
 14. Peduncles 0 or to 10 mm 35. *Artemisia laciniata*
 14. Peduncles to 50 mm 40. *Artemisia norvegica*
6. Perennials (usually rhizomatous, stems sometimes woody at bases).
 15. Leaves entire, serrate, toothed, or lobed (sinuses to 1/2 blade widths).
 16. Plants 20-50(-80, rarely more) cm.
 17. Leaves usually entire, sometimes toothed or lobed; involucre 4-5 mm diam. 36. *Artemisia longifolia*
 17. Leaves usually lobed, sometimes entire; involucre (1-)2-5 mm diam.

18. Involucres 2–4(–5.5) mm; phyllaries (gray-green) densely tomentose
..... 37. *Artemisia ludoviciana*
18. Involucres 3.5–4 mm; phyllaries (violet-brown) sparsely tomentose
(w North America) 49. *Artemisia tilesii*
16. Plants 50–300 cm.
19. Phyllaries glabrous or sparsely hairy (coast, n California to British
Columbia) 48. *Artemisia suksdorfii*
19. Phyllaries usually densely hairy.
20. Leaves densely hairy (both faces, broadly lanceolate, mostly entire,
the proximal lobed; w North America, mostly inland grasslands)
..... 30. *Artemisia douglasiana*
20. Leaves (bicolor) hairy abaxially, glabrate or glabrous adaxially.
21. Leaves serrate (teeth ca. 2 mm; inland grasslands and barren
areas, high plains) 46. *Artemisia serrata*
21. Leaves mostly deeply lobed (lobes 4–20 mm; mostly e North
America, introduced w coast) 50. *Artemisia vulgaris*
- [15. Shifted to left margin.—Ed.]
15. Leaves (relatively deeply) lobed (sinuses 1/2+ blade widths).
22. Leaves not bicolor (both faces bright green or silvery), lobes acute or rounded.
23. Leaves silver-gray, lobes rounded (coastal dunes) 47. *Artemisia stelleriana*
23. Leaves bright green, lobes acute (not coastal dunes).
24. Involucres (4–)5–8 × 4–10 mm; 0–3800 m 40. *Artemisia norvegica*
24. Involucres 2.5–3.5 × 2–4.5 mm; 100–2400 m 41. *Artemisia packardiae*
22. Leaves bicolor (abaxial faces silvery, adaxial green), lobes acute.
25. Plants 30–100 cm, lemon-scented; heads usually erect (subalpine and alpine)
..... 38. *Artemisia michauxiana*
25. Plants 15–70 cm, not lemon-scented; heads usually nodding.
26. Perennials (widely spreading, stems brittle); garden escapes, c, e North America
..... 44. *Artemisia pontica*
26. Biennials or perennials (erect).
27. Leaves pinnatifid (lobes 3–5, 0.5–1 mm wide); grasslands or deserts, 600–
2900 m 29. *Artemisia carruthii*
27. Leaves 2–3-pinnately lobed (lobes elliptic, 2–6 mm wide); w mountains,
2200–3100 m 31. *Artemisia franserioides*

24. *Artemisia abrotanum* Linnaeus, Sp. Pl. 2: 845.
1753 • Southernwood, lad's love, old man, armoise
aurone



Perennials or subshrubs, 50–130(–170) cm (not caespitose), aromatic (roots thick, woody). **Stems** relatively numerous, erect, brown, branched, (woody, brittle), glabrous or sparsely hairy. **Leaves** cauline, dark green; blades broadly ovate, (2–)3–6 × 0.02–0.15 cm, 2–3-pinnatifid (lobes

linear or filiform), faces sparsely hairy (abaxial) or glabrous (adaxial). **Heads** (nodding at maturity) in open, widely branched arrays 10–30 × 2–10 cm. **Involucres** ovoid, (1–)2–3.5 × (1–)2–2.5 mm. **Phyllaries** oblong-

elliptic, sparsely hairy. **Florets**: pistillate 4–8(–15); bisexual 14–16(–20); corollas yellow, 0.5–1 mm, glandular. **Cypselae** (light brown) ellipsoid (2–5-angled, flattened, furrowed), 0.5–1 mm, glabrous. $2n = 18$.

Flowering late summer–fall. Waste places; 0–3000 m; introduced; Alta., Man., N.B., Ont., Que., Sask.; Colo., Conn., Del., D.C., Ill., Iowa, Kans., Maine, Md., Mass., Mich., Minn., Nebr., N.H., N.J., N.Y., N.C., Oreg., Pa., S.C., Utah, Vt., Wis., Wyo.; Eurasia; Africa.

Artemisia abrotanum has been widely cultivated in gardens for old-time uses such as a fly and parasite repellent. It has had a renewed popularity in xeriscape gardening; it is drought tolerant and can fill difficult garden spaces (e.g., dry rocky slopes). Reports of naturalization may be exaggerated; it is not known to become weedy in any of its known locations in North America.

25. *Artemisia alaskana* Rydberg in N. L. Britton et al., N. Amer. Fl. 34: 281. 1916 • Siberian wormwood [E]

Artemisia tyrrellii Rydberg

Perennials or subshrubs, 15–30 (–60) cm (not caespitose), aromatic (caudices woody). **Stems** 1–10, erect, gray-green, simple (suffrutescent from woody offsets), densely hairy to glabrescent. **Leaves** basal and cauline, mostly gray-green; blades obovate, 1.5–5 × 0.5–1.5 cm, 3-lobed to 2-ternately lobed (lobes 0.5–3 mm wide, margins flat; cauline leaves smaller, sometimes entire), faces tomentose. **Heads** (peduncles 0 or to 30 mm) in (leafy) paniculiform to racemiform arrays 12–25 × 1–4.5 cm. **Involucres** broadly campanulate, 3.5–5 × 6–9 mm. **Phyllaries** ovate (margins brownish or hyaline), tomentose. **Florets**: pistillate 8–10; bisexual 20–45; corollas yellow, 2–2.5 mm, glabrous or glandular. **Cypselae** ellipsoid (flattened), 1–1.5 mm, glabrous. $2n = 18$.

Flowering early–late summer. Well-drained soils, flood plains, gravel stream banks, roadsides, dry, rocky slopes, forest openings, alpine and arctic tundras; 100–2500 m; B.C., N.W.T., Yukon; Alaska.

As circumscribed here, *Artemisia alaskana* is known from northwestern North America. The type specimen of *A. alaskana* is atypical, with longer peduncles and narrower leaf lobes than are found in most populations.

26. *Artemisia annua* Linnaeus, Sp. Pl. 2: 847. 1753

• Sweet Annie, sweet sagewort, armoise annuelle [I]

Artemisia chamomilla C. Winkler

Annuals, 30–200 (–300) cm, sweetly aromatic. **Stems** mostly 1, erect, green, turning to reddish brown with age, simple (smooth or ribbed), glabrous or sparsely hairy. **Leaves** cauline, bright green; blades triangular to broadly ovate, 2–5 (–10) × 2–4 cm, 2–3-pinnatifid (lobes relatively narrow, ± toothed), faces glabrous, gland-dotted. **Heads** (nodding, peduncles 2–5 mm) in open, (diffusely branched, leafy) arrays 15–30 (–40) × 10–20 cm. **Involucres** globose, 1.5–2.5 × 1.5–2.5 mm. **Phyllaries** (green) lanceolate, glabrous. **Florets**: pistillate (0–)10–20; bisexual 18–24; corollas pale yellow (broadly campanulate), 0.5–1 mm, glabrous. **Cypselae** oblong (flattened), 0.3–0.8 mm, glabrous. $2n = 18$.

Flowering late summer–fall. Moist waste areas, sandy soils; 0–2000 m; introduced; N.B., Ont., Que.; Ala., Ariz., Ark., Calif., Colo., Conn., Del., D.C., Idaho, Ill., Ind.,

Iowa, Kans., Ky., La., Maine, Md., Mass., Mich., Miss., Mont., Nebr., N.H., N.J., N.Y., N.C., Ohio, Okla., Oreg., Pa., Tenn., Tex., Vt., Va., Wash., W.Va., Wis., Wyo.; Eurasia.

Widely cultivated for aromatic oils, *Artemisia annua* often persists in gardens, becoming naturalized in moist-temperate areas (especially in eastern United States). Reports of naturalization may be exaggerated (reported for Prince Edward Island, but not established).

The systematic placement of this species appears to align most closely with species of the Eurasian subg. *Seriphidium* (L. E. Watson et al. 2002). Molecular evidence suggests that the *Artemisia annua* lineage may be ancestral to woody species in the Old World.

27. *Artemisia biennis* Willdenow, Phytographia, 11.

1794 • Biennial wormwood, armoise bisannuelle [E]

Artemisia biennis var. *diffusa* Dorn

Annuals or biennials, (10–)30–80 (–150) cm, not aromatic. **Stems** 1, erect, often reddish, simple (finely striate), glabrous. **Leaves** cauline, green or yellow-green (sessile); blades broadly lanceolate to ovate, 4–10 (–13) × 1.5–4 cm, 1–2-pinnately lobed (ultimate

lobes coarsely toothed), faces glabrous. **Heads** (erect, subsessile) in (leafy) paniculiform to spiciform arrays 12–35 (–40) × 2–4 cm (lateral branches relatively short). **Involucres** globose, 2–4 × (1.5–)2–4 mm. **Phyllaries** (green) broadly elliptic to obovate, glabrous. **Florets**: pistillate 6–25; bisexual 15–40; corollas pale yellow, ca. 2 mm, glabrous. **Cypselae** ellipsoid (4–5-nerved), 0.2–0.9 mm, glabrous. $2n = 18$.

Flowering mid summer–late fall. Disturbed habitats, margins of vernal pools, desert flats, usually clay or silty soils; 600–2000 m; Alta., B.C., Man., N.B., N.W.T., N.S., Ont., P.E.I., Que., Sask., Yukon; Alaska, Ariz., Calif., Colo., Conn., Del., Idaho, Ill., Ind., Iowa, Kans., Ky., Maine, Md., Mass., Mich., Minn., Mo., Mont., Nebr., Nev., N.H., N.J., N.Mex., N.Y., N.Dak., Ohio, Oreg., Pa., R.I., S.Dak., Utah, Vt., Wash., W.Va., Wis., Wyo.; introduced in Europe, Pacific Islands (New Zealand).

Artemisia biennis is naturalized and weedy in the eastern portion of its range. It is morphologically similar to *A. annua*, differing primarily in the coarser leaf lobes and larger heads that are sessile in axils of leaflike bracts. *Artemisia biennis* is considered native to the northwest United States; it may be introduced in other parts of its range. The type specimen is a horticultural specimen from New Zealand.



28. *Artemisia californica* Lessing, *Linnaea* 6: 523.
1831 • California sagebrush



Artemisia abrotanoides Nuttall;
A. fischeriana Besser; *A. foliosa*
Nuttall; *Crossostephium*
californicum (Lessing) Rydberg

Shrubs, (20-)150-250 cm (rounded), pungently aromatic. **Stems** relatively numerous, arched, green or brown, branched (slender, wandlike, bases brittle), densely canescent to glabrate. **Leaves** cauline, light green to gray; blades filiform or spatulate to obovate, 3-5(-9) × 0.5-2 cm, sometimes pinnately lobed (lobes filiform, 0.5-1 mm wide), faces sparsely to densely hairy. **Heads** (nodding at maturity, pedunculate) in paniculiform arrays 6-20 × 1-3 cm (branches erect to broadly spreading). **Involucres** globose, 2-3(-4) × 2-4(-5) mm. **Phyllaries** broadly ovate, sparsely canescent. **Florets**: pistillate 6-10; bisexual 18-25; corollas pale yellow, 0.8-1.2 mm, glabrous. **Cypselae** ellipsoid, 0.5-1.5 mm, resinous (pappi coroniform). $2n = 18$.

Flowering early-late summer. Coastal scrub, dry foothills; 0-800 m; Calif.; Mexico (Baja California).

Artemisia californica is the common sagebrush of chaparral in southern California. Its threadlike leaves and green flowering heads distinguish it from any other shrub in California. *Artemisia nesiotica*, an endemic of the Channel Islands that was initially considered a morphologic variant of *A. californica*, is distinct in size and form. Systematic placement of the complex may be problematic. The molecular phylogeny of L. E. Watson et al. (2002) suggests an alignment of *A. californica* within subg. *Tridentatae*. Based on this finding, a subgeneric realignment of this species may be in order. The odor of *A. californica* is markedly like that of the culinary mints known as common sage (*Salvia* species).

29. *Artemisia carruthii* Alph. Wood ex Carruth, *Trans. Kansas Acad. Sci.* 5: 51. 1877 • Carruth wormwood



Artemisia bakeri Greene;
A. coloradensis Osterhout;
A. kansana Britton; *A. vulgaris*
Linnaeus subsp. *wrightii* (A. Gray)
H. M. Hall & Clements; *A. wrightii*
A. Gray

Perennials, 15-40(-70) cm, faintly aromatic (rhizomatous). **Stems** mostly 3-8, ascending, brown to gray-green, simple (bases curved, somewhat woody), sparsely to densely tomentose. **Leaves** cauline, bicolor (± gray-green); blades narrowly elliptic, 0.1-2.5(-3) × 0.5-1 cm (gradually smaller distally), relatively deeply pinnatifid (lobes 3-5), faces densely tomentose (abaxial)

to sparsely hairy (adaxial). **Heads** (usually nodding) in (leafy) paniculiform arrays 10-30 × 3-9 cm (branches erect). **Involucres** campanulate, 2-2.5(-3) × 1.5-3 mm. **Phyllaries** lanceolate, gray-tomentose. **Florets**: pistillate 1-5; bisexual 7-25; corollas pale yellow, 1-2 mm, glandular-pubescent. **Cypselae** (light brown) cylindro-elliptic, ca. 0.5 mm, (curved at summits, scarcely nerved), glabrous (shining). $2n = 18$.

Flowering mid summer-early fall. Open sites, usually sandy soils, wooded areas, grasslands, railroads; 600-2900 m; Ariz., Colo., Kans., Mich., Mo., N.Mex., Okla., Tex., Utah; Mexico (Chihuahua, Sonora).

Artemisia carruthii is closely related to members of the *A. ludoviciana* complex, with which it may intergrade.

30. *Artemisia douglasiana* Besser in W. J. Hooker, *Fl. Bor.-Amer.* 1: 323. 1833 • Northwest mugwort, Douglas sagewort [E]



Artemisia campestris Linnaeus var.
douglasiana (Besser) B. Boivin;
A. caudata Michaux var.
douglasiana (Besser) B. Boivin;
A. commutata Besser var.
douglasiana (Besser) Besser;
A. desertorum Sprengel var.
douglasiana Besser; *A. heterophylla*
Nuttall; *A. ludoviciana* Nuttall var.

douglasiana (Besser) D. C. Eaton; *A. vulgaris* Linnaeus var.
douglasiana (Besser) H. St. John

Perennials, 50-180(-250) cm, aromatic (rhizomatous). **Stems** 1-20, erect, brown to gray-green, simple, hairy or glabrescent. **Leaves** cauline, bicolor (white and green to light gray-green); blades narrowly elliptic to widely oblanceolate, (1-)3-11(-15) × 0.5-2(-6) cm (proximal with 3-5 lateral lobes, distal mostly entire), faces sparsely tomentose (abaxial) to sparsely hairy (adaxial). **Heads** (usually nodding) in (leafy) paniculiform arrays 10-30 × 3-9 cm (branches widely spreading, ascending, stout). **Involucres** narrowly turbinate to campanulate, 2-3 × 2-4 mm. **Phyllaries** (green to gray) ovate, tomentose to pubescent. **Florets**: pistillate 6-10; bisexual 6-25; corollas pale yellow, 1-1.5 mm, glabrous, sometimes glandular. **Cypselae** ellipsoid, 0.5-1 mm, glabrous. $2n = 54$.

Flowering mid spring-late fall. Meadows, shaded sites, along drainages; 100-2200 m; Calif., Nev., Oreg., Wash.

Artemisia douglasiana is sometimes weedy. Reports from areas outside the northwestern portion of the United States are based on misidentifications of plants in the *A. ludoviciana* complex.

31. *Artemisia franserioides* Greene, Bull. Torrey Bot. Club 10: 42. 1883 • Bursage mugwort



Biennials or perennials, 30–100 cm, faintly aromatic (rhizomatous). Stems 1–3, erect, reddish brown, simple (leafy), glabrous or glabrate. Leaves basal (in rosettes, petiolate) and cauline, bicolor (white and green); blades ovate, 3–7(–20) × 2–4(–6) cm, 2–3-pinnately-lobed (lobes elliptic, 2–6 mm wide; cauline sessile, smaller), faces tomentose (abaxial) or glabrous or glabrescent (adaxial), glandular. Heads (nodding, peduncles 0 or 2) in paniculiform to racemiform arrays 10–35 × 2–4 cm (often 1-sided). Involucres broadly ovate, 3–5 × 4–5(–6) mm. Phyllaries broadly ovate, sparsely hairy. Florets: pistillate 4–5 (–13), (1–1.5 mm); bisexual 25–35; corollas yellow, 1.5–2 mm, glabrous. Cypselae elliptic, 0.5–0.8 mm, glabrous.

Flowering late summer–early fall. Open coniferous forests, mid to upper montane; 2200–3100 m; Ariz., Colo., N.Mex.; Mexico (Chihuahua).

32. *Artemisia furcata* M. Bieberstein, Fl. Taur.-Caucas. 3: 567. 1819



Artemisia furcata var. *heterophylla* (Besser) Hultén; *A. hyperborea* Rydberg; *A. tacomensis* Rydberg; *A. trifurcata* Stephani ex Sprengel

Perennials, 7–35 cm (not caespitose), faintly aromatic (not rhizomatous, taproots stout, caudices simple or branched, branches clothed with persistent leaf bases). Stems (flowering) 1–5, erect, light brown, simple, strigillose or glabrate. Leaves basal (in rosettes) and cauline, gray-green; blades oval, 2–10(–12) cm (basal) or 1–1.5 × 0.4–0.6 cm (cauline), 1–3-palmately lobed, faces sparsely to densely strigillose. Heads (erect or spreading, some nodding, peduncles 0 or to 30 mm) in racemiform or spiciform arrays 1–6 × 1–2 cm. Involucres broadly campanulate, 3–6 × 4.5–8 mm. Phyllaries (greenish, color often obscured by indument) ovate or lanceolate (margins dark brown), sparsely to densely tomentose. Florets: pistillate 6–7; bisexual 15–26; corollas mostly yellow, sometimes red-tinged, 1–2 mm, glabrous or glabrate. Cypselae oblong (ribbed), 1–1.5 mm, glabrous. $2n = 18, 36, 72, 90$.

Flowering late summer. Talus slopes or tundra; 500–2700 m; Alta., B.C., N.W.T., Nunavut, Yukon; Alaska, Wash.; Asia.

Artemisia furcata extends from the islands of the Bering Sea into southern and interior Alaska, parts of Canada (disjunct in British Columbia and the northernmost Rocky Mountains of Alberta), and on Mt.

Rainier in Washington. The array of names applied to *A. furcata* shows the taxonomic confusion arising from a myriad of morphologic variants that may indicate introgression with other species.

33. *Artemisia globularia* Chamisso ex Besser, Nouv. Mém. Soc. Imp. Naturalistes Moscou 3: 64. 1833



Ajania globularia (Besser) Poljakov; *Artemisia norvegica* Fries subsp. *globularia* (Besser) H. M. Hall & Clements

Perennials, (3–)5–16(–30) cm (caespitose), faintly aromatic (not rhizomatous, taproots stout, caudices simple or branched, proximal branches clothed with persistent leaf bases). Stems 1–5, erect, whitish gray, densely tomentose. Leaves mostly basal (cauline 1–4), greenish to whitish green; blades (basal) 1–4.5 × 0.6–1.5 cm, 1–2-ternately to palmately lobed (flowering-stem blades 3-lobed), faces sparsely hairy. Heads (2–20, peduncles 0 or to 25 mm) in subcapitate to capitate arrays 2–3 × 2–3 cm. Involucres campanulate or hemispheric, 3.5–6 × 6–11 mm. Phyllaries lanceolate (margins brown), pilose. Florets: pistillate 9–10; bisexual 20–30; corollas yellow or reddish black, 2–3 mm, sometimes glandular. Cypselae oblong, 1.5–2.5 mm, (apices flattened) glabrous.

Subspecies 2 (2 in the flora): nw North America, Asia.

1. Corollas reddish black; cypselae ca. 2.5 mm, margins with relatively narrow ribs. 33a. *Artemisia globularia* subsp. *globularia*
1. Corollas yellow; cypselae 1.5–2 mm, margins with relatively broad ribs. 33b. *Artemisia globularia* subsp. *lutea*

33a. *Artemisia globularia* Chamisso ex Besser subsp. *globularia*



Flowering stems 2–12(–16) cm. Corollas reddish black, eglandular. Cypselae ca. 2.5 mm, margins with relatively narrow ribs. $2n = 18, 36$.

Flowering late summer. Arctic and alpine tundra, interior mountains; 200–1300 m; Yukon; Alaska; e Asia (Russian Far East).

The red color of the glabrous corollas and the larger heads of subsp. *globularia* distinguish it from the morphologically similar *Artemisia glomerata*.

- 33b. *Artemisia globularia* Chamisso ex Besser subsp. *lutea* (Hultén) L. M. Shultz, Sida 21: 1638. 2005

E



Artemisia globularia var. *lutea*
Hultén, Fl. Alaska Yukon 10: 1567.
1950; *A. flava* Jurtzev

Flowering stems 5–9 cm. **Corollas** yellow, orange-glandular. **Cypselae** 1.5–2 mm, margins with relatively broad ribs.

Flowering late spring–mid summer. Rocky ridges and slopes; 0–100 m; Alaska.

Subspecies *lutea* is common on St. Mathew Island and infrequent on surrounding islands and the mainland (Seward Peninsula). It might be confused with *Artemisia furcata*.

34. *Artemisia glomerata* Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 564. 1815

• Congested sagewort E



Ajania glomerata (Ledebour)
Poljakov; *Artemisia glomerata* var. *subglabra* Hultén; *A. norvegica*
Fries var. *glomerata* (Ledebour)
H. M. Hall & Clements

Perennials, 30–50(–100) cm (densely cespitose), mildly aromatic (not rhizomatous, caudices subterranean, branches clothed

with persistent leaf bases). **Stems** relatively numerous, ascending, brown, simple, hairy. **Leaves** mostly basal (cauline mostly 2–4, smaller), whitish; blades (basal) flabellate, 0.5–1(–2) × 0.5–0.8(–1.5) cm, relatively deeply lobed (lobes 5–9, linear), faces strigillose. **Heads** (3–10, erect or nodding, peduncles 0 or to 15 mm) in subcapitate to corymbiform arrays 1–5 × 2–4 cm. **Involucres** broadly campanulate, 3–4 × 3.5–5 mm. **Phyllaries** lanceolate (margins brownish), densely pilose. **Florets**: pistillate 4–5; bisexual 10–15; corollas yellow (3–5-toothed), 2–2.5 mm, glabrous or sparsely pilose. **Cypselae** ellipsoid (flattened, margins ribbed), 1–1.5 mm, glabrous. $2n = 18, 27, 36, 54$.

Flowering mid summer. Arctic and alpine tundra and sandy slopes; 0–1000 m; Yukon; Alaska.

Artemisia glomerata is similar to *A. senjavinensis*; it can be distinguished by its more deeply lobed leaves and sparser indument.

35. *Artemisia laciniata* Willdenow, Sp. Pl. 3: 1843. 1803



Perennials, 5–15 cm (not cespitose), sometimes mildly aromatic. **Stems** 1–3, erect, reddish brown, simple, strigillose to spreading-hairy, or glabrous. **Leaves** basal (in rosettes, petioles to 12 cm) and cauline, greenish; blades (basal) 2–3-pinnate, relatively deeply lobed (cauline sessile,

1–2-pinnately lobed to entire), faces sparsely hairy to pilose. **Heads** (10–70, spreading to nodding, peduncles 0 or to 10 mm) in spiciform arrays 2–5 × 0.5–1 or 8–18 × 1–4 cm. **Involucres** globose, 3–5 × 4–8 mm. **Phyllaries** (greenish or yellowish) elliptic (margins hyaline, brownish), glabrous or sparsely hairy. **Florets**: pistillate 6–8; bisexual 20–50; corollas yellowish or yellow to reddish-tinged, 1–2 mm, hairy (hairs tangled). **Cypselae** oblong, 0.5–1 mm, glabrous.

Subspecies 2 (2 in the flora): nw, w North America; Eurasia.

1. **Stems** hairy; leaves mostly cauline, blades 5–20 × 1–2 cm, sparsely hairy; arrays of heads 8–18 × 1–4 cm; corollas yellowish, 1–1.5 mm 35a. *Artemisia laciniata* subsp. *laciniata*
1. **Stems** glabrous; leaves mostly basal, blades of proximalmost 4–8 × 0.5–1 cm, of cauline 1.5–0.8 × 0.2 cm, sericeous; arrays of heads 2–5 × 0.5–1 cm; corollas yellow or reddish-tinged, 1.5–2 mm 35b. *Artemisia laciniata* subsp. *parryi*

- 35a. *Artemisia laciniata* Willdenow subsp. *laciniata*



Artemisia laciniatiformis Komarov;
A. macrobotrys Ledebour

Stems 20–50 cm, hairy. **Leaves** mostly cauline, blades 5–20 × 1–2 cm, sparsely hairy. **Heads** in arrays 8–18 × 1–4 cm. **Involucres** 3–5 × 4–8 mm. **Corollas** yellowish, 1–1.5 mm. **Cypselae** 0.5–1 mm. $2n = 18$.

Flowering mid–late summer.

Dry, gravelly stream banks, grassy flats, forested areas, dry hillsides; 100–1500 m; Yukon; Alaska; Eurasia.

Widely distributed in Eurasia and often confused with *Artemisia norvegica*, *A. laciniata* subsp. *laciniata* can be distinguished by its well-developed basal leaves and smaller heads.

35b. *Artemisia laciniata* subsp. *parryi* (A. Gray)
W. A. Weber, *Phytologia* 58: 382. 1985 • Parry
sagewort [E]



Artemisia parryi A. Gray, Proc. Amer. Acad. Arts 7: 361. 1868; *A. saxicola* Rydberg var. *parryi* A. Nelson

Stems 10–40 cm, glabrous. **Leaves** mostly basal, faces sericeous; proximalmost 4–8 × 0.5–1 cm, cauline 1.5–0.8 × 0.2 cm. **Heads** in 2–5 × 0.5–1 cm arrays.

Involucres 3–4 × 4–5 mm. **Corollas** yellow or reddish-tinged, 1.5–2 mm.

Flowering late summer–fall. Subalpine and alpine meadows, rocky soils; 2700–3900 m; Colo., Idaho, N.Mex., Utah.

36. *Artemisia longifolia* Nuttall, Gen. N. Amer. Pl. 2: 142. 1818 • Long-leaved sage [E]



Artemisia falcata Rydberg; *A. ludoviciana* Nuttall var. *integrifolia* A. Nelson; *A. natronensis* A. Nelson; *A. vulgaris* Linnaeus subsp. *longifolia* (Nuttall) H. M. Hall & Clements; *A. vulgaris* var. *longifolia* (Nuttall) M. Peck

Perennials, 20–80 cm (not caespitose), pleasantly aromatic (fibrous-rooted, rootstocks relatively short, horizontal, layered stems sometimes sprouting). **Stems** 3–20+, erect, gray-green, usually simple, sometimes branched (bases woody), densely tomentose. **Leaves** cauline, bicolor (white and green); blades linear to lanceolate, 3–12 × 1 cm, margins usually entire, sometimes toothed or lobed, faces densely tomentose (abaxial) or glabrate (adaxial). **Heads** (peduncles 0 or to 2 mm) in mostly racemiform arrays 8–13 × 1–2 cm. **Involucres** campanulate, 4–5 × 4–5 mm. **Phyllaries** ovate-lanceolate (margins hyaline), densely to sparsely tomentose. **Florets**: pistillate 3–10; bisexual 8–26; corollas pale yellow, 1–2 mm, sparsely glandular. **Cypselae** ellipsoid, 0.5–0.8 mm, glabrous. $2n = 36$.

Flowering mid summer–early fall. Alkaline flats, grasslands, barren areas, high plains; 500–1800 m; Alta., B.C., Man., Sask.; Idaho, Minn., Mont., Nebr., N.Dak., S.Dak., Wyo.

Artemisia longifolia appears to be more salt-tolerant than most species of the genus. It is closely related to *A. ludoviciana*.

37. *Artemisia ludoviciana* Nuttall, Gen. N. Amer. Pl. 2: 143. 1818 • Silver wormwood, white or silver sage [E]

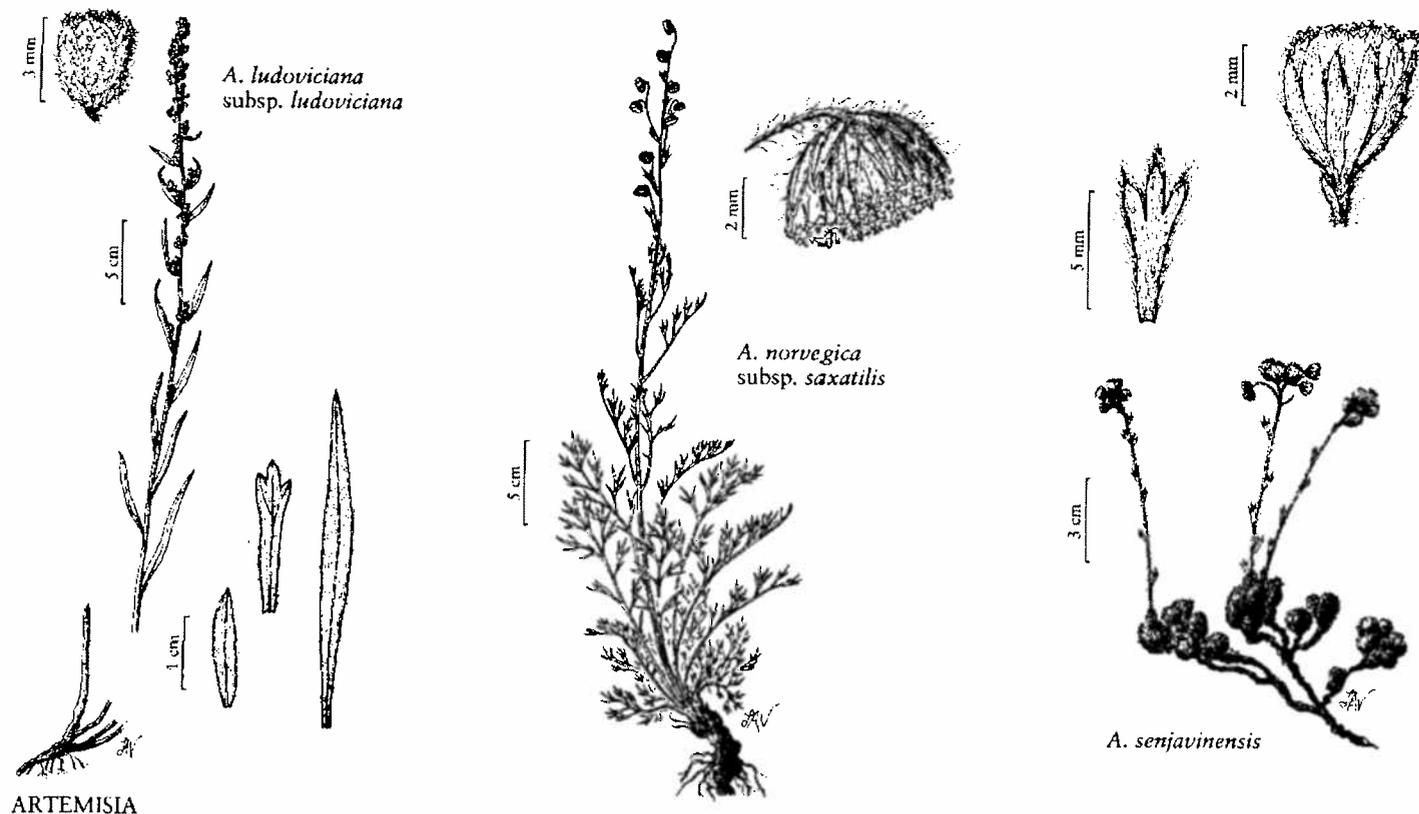


Artemisia vulgaris Linnaeus var. *ludoviciana* (Nuttall) Kuntze

Perennials, 20–80 (rarely to 120 in desert washes) cm, aromatic (rhizomatous). **Stems** relatively few to relatively numerous, erect, gray-green, simple or widely branched, hairy. **Leaves** cauline, uniformly gray-green, green, or white, or bicolor (white and green); blades linear to broadly elliptic, 1.5–11 × 0.5–4 cm, entire or lobed to relatively deeply pinnatifid, faces hairy. **Heads** (erect to nodding, peduncles 0 or 2–5 mm) in congested to open (widely branched) arrays. **Involucres** campanulate or turbinate, (1–)2–4(–5) × 2–5(–8) mm. **Phyllaries** (gray-green), lanceolate to ovate or obovate (margins narrowly hyaline), densely tomentose. **Florets**: pistillate 5–12; bisexual 6–45; corollas yellow, sometimes red-tinged, 1.5–2.8 mm, glabrous. **Cypselae** ellipsoid ca. 0.5 mm, (obscurely nerved) glabrous. $2n = 18, 36, 54$.

Subspecies ca. 7 (6 in the flora): North America, Mexico.

1. Leaves usually relatively deeply lobed ($\frac{1}{3}$ + widths, nearly to midrib, proximal leaves sometimes entire); involucre 3–8 mm diam.; mountain meadows and slopes.
 2. Involucres 4–5 × 4–8 mm 37c. *Artemisia ludoviciana* subsp. *candicans*
 2. Involucres 3–4 × 3–5 mm 37d. *Artemisia ludoviciana* subsp. *incompta*
1. Leaves entire or relatively shallowly lobed (lobes to $\frac{1}{3}$ widths); involucre 2–3(–4) mm diam.; desert valleys and mountains.
 3. Heads in paniculiform arrays (4–)8–30 cm diam.; leaves mostly 1.5–2 cm 37b. *Artemisia ludoviciana* subsp. *albula*
 3. Heads in paniculiform or racemiform arrays 1–6 cm diam.; leaves 1.5–11 cm.
 4. Leaf margins plane 37a. *Artemisia ludoviciana* subsp. *ludoviciana*
 4. Leaf margins revolute.
 5. Leaves bicolor (gray-green and bright green), margins mostly entire, abaxial faces glabrous 37f. *Artemisia ludoviciana* subsp. *redolens*
 5. Leaves gray-green, margins usually lobed, abaxial faces hairy 37e. *Artemisia ludoviciana* subsp. *mexicana*



37a. *Artemisia ludoviciana* Nuttall subsp. *ludoviciana*

• Armoise de l'ouest [E] [F]



Artemisia brittonii Rydberg;
A. cuneata Rydberg; *A. diversifolia*
 Rydberg, *A. falcata* Rydberg;
A. gnaphaloides Nuttall;
A. herriotii Rydberg;
A. lindheimeriana Scheele;
A. pabularis (A. Nelson) Rydberg;
A. paucicephala A. Nelson;
A. pudica Rydberg; *A. purshiana*
 Besser; *A. rhizomata* A. Nelson

Stems (gray to white) mostly simple, 30–80 cm, tomentose. Leaves gray; blades linear to narrowly elliptic, 3–11 cm, margins plane (proximalmost entire or apically lobed, lobes to $\frac{1}{3}$ blade lengths; cauline 1.5–11 × 1–1.5 cm, entire or lobed to pinnatifid), faces densely tomentose. Heads in congested, paniculiform or racemiform arrays 5–30 × 1–4 cm. Involucres 3–4 × 2–4 mm. Florets: pistillate 5–12; bisexual 6–30; corollas 1.9–2.8 mm. $2n = 18, 36$.

Flowering mid summer–late fall. Disturbed roadsides, open meadows, rocky slopes; 100–3000 m; Alta., B.C., Man., N.B., Ont., P.E.I., Que., Sask.; Ala., Ariz., Ark., Calif., Colo., Conn., Del., Ga., Idaho, Ill., Ind., Iowa, Kans., Ky., La., Maine, Md., Mass., Mich., Minn., Miss., Mo., Mont., Nebr., N.H., N.J., N.Mex., N.Y., N.C., N.Dak., Ohio, Okla., Penn., R.I., S.C., S.Dak., Tenn., Tex., Utah, Vt., Va., Wash., Wis., Wyo.

Subspecies *ludoviciana* is widespread in North America in diverse habitats. It is the most common subspecies and the most variable morphologically.

37b. *Artemisia ludoviciana* Nuttall subsp. *albula*

(Wooton) D. D. Keck, Proc. Calif. Acad. Sci., ser. 4, 25: 446. 1946 • White wormwood



Artemisia albula Wooton, Contr. U.S. Natl. Herb. 16: 193. 1913, based on *A. microcephala* Wooton, Bull. Torrey Bot. Club 25: 455. 1898, not Hillebrand 1888

Stems 30–80 cm, widely branched, tomentose or glabrous. Leaves uniformly whitish green; blades lance-linear (and entire), or obovate to elliptic (with antrorse teeth or lobes to $\frac{1}{3}$ blade lengths, usually 1–2 cm, margins revolute), faces ± tomentose. Heads in open, paniculiform arrays (9–)15–40 × (4–)8–30 cm. Involucres 1–2 × 2–3 mm. Florets: pistillate 8–11; bisexual 8–13; corollas 1–1.5 mm.

Flowering early summer–fall. Desert drainages, sandy soils; 1500–2000 m; Ariz., Calif., Colo., Nev., N.Mex., Tex., Utah; Mexico.

37c. *Artemisia ludoviciana* Nuttall subsp. *candicans* (Rydberg) D. D. Keck, Proc. Calif. Acad. Sci., ser. 4, 25: 447. 1946



Artemisia candicans Rydberg, Bull. Torrey Bot. Club 24: 296. 1897; *A. gracilentia* A. Nelson; *A. latiloba* (Nuttall) Rydberg; *A. ludoviciana* var. *candicans* (Rydberg) H. St. John; *A. ludoviciana* var. *latiloba* Nuttall; *A. vulgaris* Linnaeus subsp. *candicans* (Rydberg) H. M. Hall & Clements; *A. vulgaris* var. *candicans* (Rydberg) M. Peck

Stems 30–50(–80) cm, mostly simple, sparsely tomentose. **Leaves** ± white; blades broadly obovate to oblong, 4–10 × 1.5–4 cm, relatively deeply lobed (lobes, lanceolate, 1/3+ blade lengths, acute), faces tomentose (usually less densely adaxially). **Heads** in racemiform arrays 4–7 × 2–4 cm. **Involucres** (broadly campanulate), 4–5 × 4–8 mm. **Florets**: pistillate 8–10; bisexual 20–30; corollas 1.5–2 mm.

Flowering mid–late summer. Mountains, usually in loamy soils; 1800–3000 m; Alta., B.C.; Calif., Idaho, Mont., Nev., Oreg., Utah, Wash., Wyo.

Subspecies *candicans* is broadly circumscribed in this treatment. Variants within the complex, especially var. *latiloba*, may merit segregation.

37d. *Artemisia ludoviciana* Nuttall subsp. *incompta* (Nuttall) D. D. Keck, Publ. Carnegie Inst. Wash. 520: 327. 1940 • Mountain wormwood



Artemisia incompta Nuttall, Trans. Amer. Philos. Soc., n. s. 7: 400. 1841; *A. arachnoidea* E. Sheldon; *A. atomifera* Piper; *A. lindleyana* Besser; *A. ludoviciana* var. *incompta* (Nuttall) Cronquist; *A. prescottiana* Besser; *A. vulgaris* Linnaeus var. *incompta* (Nuttall) H. St. John

Stems 20–50(–80) cm, mostly simple, hairy. **Leaves** bicolor (white and green, or gray-green and green); blades narrowly to broadly lanceolate, 1.5–11 × 1–1.5 cm, irregularly lobed (lobes usually 1/3+ blade widths), faces hairy (abaxial) or glabrous or glabrescent. **Heads** in paniculiform arrays (10–)15–25 (–35) × (2–)3–8(–10) cm. **Involucres** (broadly campanulate) 3(–4) × 3–5 mm. **Florets**: pistillate 5–12; bisexual 6–45; corollas yellow, sometimes red-tinged, 1.5–2 mm. $2n = 36, 54$.

Flowering mid summer–late fall. Open meadows, mountain slopes; 1900–3500 m; Alta., B.C.; Calif., Colo., Idaho, Mont., Nev., Oreg., Utah, Wash., Wyo.; Mexico.

Subspecies *incompta* varies. It could be (and has been) subdivided. The variation found within one population,

as well as from one part of its range to another, makes the recognition of discrete taxa difficult as well as questionable. The morphologic variant treated as *Artemisia lindleyana* by some authors may warrant infraspecific status.

37e. *Artemisia ludoviciana* Nuttall subsp. *mexicana* (Willdenow ex Sprengel) D. D. Keck, Proc. Calif. Acad. Sci., ser. 4, 25: 452. 1946 • Mexican wormwood



Artemisia mexicana Willdenow ex Sprengel, Syst. Veg. 3: 490. 1826; *A. neomexicana* Greene ex Rydberg; *A. revoluta* Rydberg

Stems 30–80(–100) cm, widely branched, sparsely hairy or glabrous. **Leaves** strongly bicolor (white and green, or gray-green and green), narrowly lanceolate, 4–10 × 0.5–1 cm, lobed; faces ± tomentose (abaxial) or glabrescent. **Heads** in paniculiform or racemiform arrays 1–8 × 2–5 cm. **Involucres** (campanulate) 3–4 × 2–3 mm. **Florets**: pistillate (5–)8–10; bisexual (6–)10–20; corollas ca. 1.5 mm. $2n = 18, 36$.

Flowering late summer–late fall. Mountain slopes, rocky soils; 500–1000 m; Ariz., Colo., Nev., N.Mex., Okla., Tex.; Mexico.

37f. *Artemisia ludoviciana* Nuttall subsp. *redolens* (A. Gray) D. D. Keck, Proc. Calif. Acad. Sci., ser. 4, 25: 454. 1946



Artemisia redolens A. Gray, Proc. Amer. Acad. Arts 21: 393. 1886; *A. vulgaris* Linnaeus subsp. *redolens* (A. Gray) H. M. Hall & Clements

Stems 20–80 cm, mostly unbranched, glabrous. **Leaves** bicolor (white and green); blades lanceolate to ovate, 5–7 × 0.5–1 cm, irregularly pinnatifid; abaxial faces tomentose (abaxial) or glabrate (adaxial). **Involucres** campanulate, 2–3 × 2–3 mm. **Heads** in paniculiform or racemiform arrays 10–15 × 2–6 cm. **Florets**: pistillate ca. 10; bisexual 3–8; corollas 2 mm.

Flowering mid–late summer. Rocky loam soils; 100–300 m; Ariz., N.Mex., Tex.; Mexico.

38. *Artemisia michauxiana* Besser in W. J. Hooker, Fl. Bor.-Amer. 1: 324. 1833 • Lemon sagewort [E]



Artemisia discolor Douglas ex Besser; *A. vulgaris* Linnaeus subsp. *michauxiana* (Besser) H. St. John

Perennials, 30–100 cm, strongly aromatic (lemon-scented; rhizomatous). Stems relatively many, erect, green, simple, glabrous. Leaves cauline, green; blades broadly lanceolate to narrowly elliptic, 1.5–11 × 1–1.5 cm, 2-pinnately lobed, (ultimate lobes toothed), faces white-tomentose (abaxial) or glabrous (adaxial), yellow-gland-dotted. Heads (erect to nodding, peduncles 0 or to 10 mm) in paniculiform to spiciform arrays 8–15 × 1–1.5 cm. Involucres campanulate, 3(–4) × 2–5.5 mm. Phyllaries (yellow-green, rarely purplish) broadly ovate, glabrous or sparsely hairy, yellow-gland-dotted. Florets: pistillate 9–12; bisexual 15–35; corollas yellow, 1–1.5 mm, glandular. Cypselae (yellow to light brown) ellipsoid, ca. 0.5 mm, glabrous or glandular. $2n = 18, 36$.

Flowering mid summer–early fall. Talus slopes, alpine and subalpine drainages; 1900–3700 m; Alta., B.C., Yukon; Calif., Colo., Idaho, Mont., Nev., Oreg., Utah, Wash., Wyo.

Members of the *Artemisia ludoviciana* complex with deeply lobed leaves are sometimes confused with *A. michauxiana*, and there is evidence that plants hybridize in some locations. *Artemisia michauxiana* is distinguished by its glabrous, bright green to yellow-green foliage and lemony-sweet fragrance.

39. *Artemisia nesiotica* P. H. Raven, Aliso 5: 341. 1963 • Island sagebrush [E]



Crossostephium insulare Rydberg in N. L. Britton et al., N. Amer. Fl. 34: 244. 1916, not *Artemisia insularis* Kitamura 1936; *A. californica* Lessing var. *insularis* (Rydberg) Munz

Subshrubs, 10–60 cm (rounded), aromatic. Stems relatively numerous, ascending or prostrate, gray, simple or branched (slender, wandlike, soft, bases woody and brittle), densely canescent. Leaves cauline, gray-green; blades linear-oblong, 3–5 × 1–2 cm, mostly 3-lobed (lobes 1–2 mm wide), faces gray-hairy. Heads (usually erect, sometimes nodding) in (leafy) paniculiform arrays 10–25 × 3–5(–7) cm. Involucres broadly campanulate, 2.5 × 4–4.5 mm. Phyllaries broadly ovate, densely hairy. Florets: pistillate 0; bisexual 20–50; corollas pale yellow, 1.2–1.5 mm, glandular. Cypselae (light brown) ellipsoid (ribbed), 0.5 mm, resinous.

Flowering mid–late summer. Rocky slopes, often fog-shrouded hillsides; 0–100 m; Calif.

Artemisia nesiotica is known only from the Channel Islands of California. It differs from the closely related *A. californica* by its shorter stature, wider leaf lobes, and larger heads.

40. *Artemisia norvegica* Fries, Novit. Fl. Svec., 56. 1817 • Alpine sagewort [E]

Subspecies 2 (1 in the flora): w North America, Eurasia.

- 40a. *Artemisia norvegica* Fries subsp. *saxatilis* (Besser) H. M. Hall & Clements, Publ. Carnegie Inst. Wash. 326: 58. 1923 [E]



Artemisia chamissoniana Besser var. *saxatilis* Besser in W. J. Hooker, Fl. Bor.-Amer. 1: 324. 1833; *A. arctica* Lessing; *A. arctica* subsp. *beringensis* (Hultén) Hultén; *A. arctica* subsp. *comata* (Rydberg) Hultén; *A. arctica* subsp. *ebrendorferi* Korobkov; *A. arctica* var. *saxatilis* (Besser) Y. R. Ling;

A. comata Rydberg; *A. norvegica* var. *piceetorum* S. L. Welsh & Goodrich

Perennials, 25–40(–60) cm (not caespitose), mildly aromatic (roots often horizontal, woody). Stems 1–3, erect to ascending, green or reddish, simple, glabrous or sparsely tomentose. Leaves mostly basal (in rosettes, petiolate), bright green; blades (basal) broadly lanceolate, 5–8(–10) × 2–3(–4) cm, 1–3-pinnately lobed (apical lobes 1–7 × 1.5–3 mm; mid cauline sessile, pinnately lobed; on flowering stems, sessile, linear, entire), faces glabrous or hairy. Heads (nodding, proximalmost on peduncles to 50 mm) in racemiform arrays 10–17 × 1–2 cm. Involucres globose, (4–)5–8 × 4–10 mm. Phyllaries ovate-lanceolate to elliptic (margins dark brown to black), sparsely hairy to villous. Florets: pistillate 6–20; bisexual (30–)50–70; corollas yellow or red-tinged, 1.5–2.5(–3.5) mm, long-hairy. Cypselae ovoid-oblong (angular), ca. 2.5 mm, glabrous or villous. $2n = 18, 36$.

Flowering mid–late summer. Coastal, arctic, subalpine to alpine habitats, boreal forests, moist soils; 0–3800 m; Alta., B.C., Yukon; Alaska, Calif., Colo., Mont., Utah, Wash., Wyo.; e Asia (Russian Far East).

Variation within *Artemisia norvegica* in North America is not well understood and, for that reason, this treatment represents a conservative taxonomy with only one subspecies for the flora area. Subspecies *saxatilis* differs from typical *A. norvegica* primarily by its larger heads. European plants have involucres less than 10 mm in diameter. Chromosome number may be used to justify separation of taxa either at the level of subspecies or species. If separated as distinct species, then *A. arctica* is the name for North American plants.

The diploid *A. arctica* ($2n = 18$) and tetraploid *A. comata* ($2n = 36$) are treated as separate species by R. Elven et al. (pers. comm.).

41. *Artemisia packardiae* J. W. Grimes & Ertter, *Brittonia* 31: 454, fig. 1. 1979 • Succor Creek mugwort [E]



Perennials, 20–50(–60) cm, strongly aromatic (rhizomatous, fibrous-rooted). **Stems** 3–20, erect, light brown, simple or branched, glabrous. **Leaves** cauline, dark green; blades lanceolate, 1.5–5 × 1–2.5 cm, 2-pinnatifid (primary lobes 5–9, 0.4–1.5 cm; cauline smaller, pinnatifid to entire), faces tomentose (abaxial) or glabrous (adaxial). **Heads** (peduncles 0 or to 3 mm) in usually paniculiform, sometimes racemiform, arrays 5–20 × 1.5–4 cm. **Involucres** campanulate to hemispheric, 2.5–3.5 × 2–4.5 mm. **Phyllaries** broadly ovate, glandular (at least at bases). **Florets**: pistillate 3–8; bisexual, sometimes functionally staminate, (15–)20–35; corollas bright yellow, 1.3–2.2 mm, glandular. **Cypselae** (light brown) ellipsoid (\pm arcuate, ribs 4, prominent), ca. 1 mm, glandular. $2n = 18$.

Flowering late summer. Coarse taluses, alkaline soils, erosion gullies; 1000–2400 m; Idaho, Nev., Oreg.

Artemisia packardiae is known only from southeastern Oregon, western Idaho, and northeastern Nevada. It is closely related to *A. michauxiana* and could be considered an ecologic variant.

42. *Artemisia palmeri* A. Gray, *Proc. Amer. Acad. Arts* 11: 79. 1876 • Palmer sagewort [C]



Artemisiastrum palmeri (A. Gray) Rydberg

Subshrubs, 100–350 cm, mildly aromatic. **Stems** usually 1–15, erect, brown, simple (wandlike, brittle, bases woody), glabrous. **Leaves** cauline (petiolate), bicolor (gray-green and dark green); blades broadly lanceolate, 3.5–

12(–15) × 0.2–10 cm, relatively deeply and coarsely pinnately lobed (lobes 3–7+), faces canescent (abaxial) or glabrous or sparsely hairy (adaxial). **Heads** (erect or nodding, peduncles relatively slender) in open, paniculiform arrays, 15–40 × 3–10 cm (widely branched). **Involucres** globose, 2.5–3.5 × 2–5 mm. **Phyllaries** (pale green to stramineous) broadly ovate, glabrous or sparsely hairy (receptacles paleate). **Florets**: pistillate 0; bisexual 8–30; corollas pale yellow, 1.5–2.2 mm, resinous-glandular (style branches exsert, truncate, erose). **Cypselae** (light brown, shiny) ellipsoid, 1–1.2 mm, (4-angled), glabrous or glandular. $2n = 18$.

Flowering early–mid summer. Ravines, coastal areas, sandy soils; of conservation concern; 100–300 m; Calif.; Mexico (Baja California).

Artemisia palmeri is known only from drainages near the coast, from northeast of San Diego to just south of Ensenada. Most of its habitat has been destroyed by urban development. It is of particular interest because of its paleate receptacles, an anomalous trait that confounds our understanding of its evolutionary relationship to other species of *Artemisia*.

43. *Artemisia papposa* S. F. Blake & Cronquist, *Leafl. W. Bot.* 6: 43, plate 1. 1950 • Owyhee sage [E]



Shrubs, 5–15(–20) cm (not caespitose), aromatic. **Stems** relatively numerous, erect, gray, simple (annual flowering branches leafy), loosely sericeous. **Leaves** (semideciduous) cauline (sessile), gray-green; blades oblanceolate, 0.5–3 × 0.2–1.5 cm (bases attenuate), 3-lobed or irregularly

palmatifid (lobes narrow, apices acute), sparsely sericeous-lanate. **Heads** (mostly erect, peduncles 0 or to 25 mm) in racemiform arrays (4–)8–12(–14) × (0.5–)1–2 (–4) cm. **Involucres** globose, 3.5–5 × 4–5 mm. **Phyllaries** ovate, sparsely sericeous. **Florets**: pistillate 8; bisexual 20–35; corollas yellow (tubular with broad throats), ca. 2 mm, glandular. **Cypselae** (light brown) oblanceoloid (4–5-angled, broadest at truncate apices), 0.3–0.5 mm, glandular-pubescent (pappi coroniform, 0.3–0.6 mm, irregularly lacerate).

Flowering early spring–mid summer. Rocky swales, dry meadows, alkaline mud flats; 1400–2100 m; Idaho, Nev., Oreg.

The pappose cypselae make *Artemisia papposa* anomalous within *Artemisia*. *Artemisia papposa* has capitulescence characteristics that suggest a relationship to *Sphaeromeria*.

44. *Artemisia pontica* Linnaeus, *Sp. Pl.* 2: 847. 1753
• Roman wormwood, green-ginger, armoise de la mer Noire [I]



Perennials, 40–100 cm, somewhat aromatic; rhizomes creeping, woody. **Stems** relatively numerous, erect, brown, mostly simple (brittle, bases woody) canescent or glabrate. **Leaves** cauline, grayish green; sessile (proximalmost short-petiolate); blades triangular to ovate, 1–5 × 1–3 cm, 2–3-pinnatifid (lobes 0.5–1 mm wide, acute), faces pubescent (abaxial) or hairy to glabrate (adaxial). **Heads** (nodding) in paniculiform arrays 10–22 × 2–4 cm.

Involucres spheric, 1.5–2(–3) mm. **Phyllaries** (subequal) linear, hairy. **Florets**: pistillate 10–12; bisexual 40–45; corollas pale yellow, 0.2–0.3 mm, sometimes gland-dotted (stigma lobes relatively short, not emerging from tubes, short-ciliate). **Cypselae** ellipsoid (angled), 0.1–0.2 mm, glabrous. $2n = 18$.

Flowering late summer–fall. Disturbed areas, valleys, shaded thickets; 100–500 m; introduced; Man., N.S., Ont., Que.; Conn., Del., Ill., Ky., Maine, Md., Mass., Mich., Minn., N.H., N.J., N.Y., Ohio, Pa., R.I., Vt., Wis.; Eurasia.

Artemisia pontica has finely dissected gray foliage and is widely planted as an ornamental. It escapes locally; it has not been reported as problematic. The only species with which it has been confused in North America is *A. abrotanum*, which has dark green (not gray) foliage.

45. *Artemisia senjavinensis* Besser, Nouv. Mém. Soc. Imp. Naturalistes Moscou 3: 35. 1834 [F]



Ajania senjavinensis (Besser) Poljakov; *Artemisia androsacea* Seemann

Perennials, 30–90 cm (densely caespitose), mildly aromatic (caudices branched, woody, taprooted). **Stems** 1–9, erect, gray-green, lanate. **Leaves** mostly basal (in rosettes, cauline 2–5, scattered on

flowering stems); blades (basal) broadly oblanceolate, 0.5–0.8 × 0.5–0.7 cm, relatively deeply lobed (lobes 3–5, acute; cauline blades 0.5–1 cm, entire or pinnately lobed, lobes 3–5), faces densely tomentose to sericeous (hairs 1–2 mm). **Heads** in corymbiform arrays 0.5–2.5 × 0.5–2.5 cm (subtended by white-sericeous bracts). **Involucres** turbinate, 3–4 × 3–5 mm. **Phyllaries** lanceolate or ovate, hairy. **Florets**: pistillate 4–5; bisexual 3–4; corollas yellow or tan, 1.5–2, glandular (style branches blunt, not fringed). **Cypselae** (brown) linear-oblong, ca. 2 mm, (apices flat), glabrous. $2n = 36, 54$.

Flowering mid–late summer. Open calcareous gravelly slopes in tundra or heath, sandy slopes above high tide; 0–600 m; Alaska; e Asia (Russian Far East, Chukotka).

Artemisia senjavinensis is known only from western Alaska (Seward Peninsula) and the Chukchi Peninsula of the Russian Far East.

46. *Artemisia serrata* Nuttall, Gen. N. Amer. Pl. 2: 142. 1818 • Serrate-leaved sage [E]



Artemisia vulgaris Linnaeus subsp. *serrata* (Nuttall) H. M. Hall & Clements

Perennials, 50–100(–300) cm (not caespitose), pleasantly aromatic (fibrous-rooted, rhizomes horizontal, relatively short). **Stems** 2–5, erect, brown, mostly simple (bases woody), sparsely tomentose. **Leaves** cauline, bicolor (white and green); blades lanceolate, 7–15 × 1–2.5 cm, serrate (teeth ca. 2 mm), faces densely tomentose (abaxial) or glabrate (adaxial). **Heads** (peduncles 0 or to 2 mm) in racemiform arrays 10–15 × 5–15 cm. **Involucres** campanulate, 2.5–3 × 2–2.5 mm. **Phyllaries** lanceolate (margins hyaline), densely tomentose. **Florets**: pistillate 3–5; bisexual 9–10; corollas pale yellow, 1.5–2 mm, sparsely glandular. **Cypselae** ellipsoid, ca. 1 mm, glabrous. $2n = 36$.

Flowering mid summer–early fall. Grasslands and barren areas on high plains; 500–1800 m; Ill., Iowa, Minn., N.Y., N.Dak., Wis.

Artemisia serrata is closely related to *A. ludoviciana* and *A. longifolia*; it is distinguished by its prominent, serrated leaf margins. It is apparently native to the upper Mississippi Valley and naturalized in New York, presumably following introduction as a garden plant. Reports from Kansas and Missouri may be based on collections of *A. ludoviciana*.

47. *Artemisia stelleriana* Besser, Nouv. Mém. Soc. Imp. Naturalistes Moscou 3: 79, plate 5. 1834 • Beach wormwood, armoise de Steller



Perennials, (15–)20–60(–70) cm (mat-forming), sometimes faintly aromatic (rhizomes creeping, relatively thin). **Stems** 1–3, erect or ascending, white, simple (stout), densely tomentose to floccose. **Leaves** basal and cauline (petiolate), silver-gray; blades oblanceolate, (proximalmost) 3–10 × 1–5 cm, pinnatifid (lobes relatively broad, rounded; distal leaves, on flowering stems, smaller), faces densely tomentose. **Heads** (erect or spreading, peduncles 0 or to 3 mm) in dense, paniculiform, racemiform, or spiciform arrays 8–20 × 2–4 cm. **Involucres** broadly campanulate, 5–8 × 6–7 mm. **Phyllaries** broadly lanceolate, tomentose. **Florets**: pistillate 12–16; bisexual 25–30; corollas yellow (narrow or tubular), 3.2–4 mm (unusually large), glabrous or sparsely hairy (style branches prominent, erect, blunt). **Cypselae** (dark brown) narrowly oblong-linear (slightly flattened, smooth), 3–4 mm, glabrous. $2n = 18$.

Flowering early spring–fall. Sandy soils, coastal strand; 0–200 m; St. Pierre and Miquelon; N.B., Nfld. and Labr. (Nfld.), N.S., Ont., P.E.I., Que.; Alaska, Conn., Del., Fla., La., Maine, Md., Mass., Mich., Minn., N.H., N.J., N.Y., N.C., Ohio, Pa., R.I., Vt., Va., Wash., W.Va., Wis.; n Europe; e Asia (Japan, Kamchatka).

Artemisia stelleriana is apparently native along the western tip of the Aleutian islands (D. F. Murray, pers. comm.). It is an attractive ornamental and, in parts of its range in the flora area, it appears to have escaped from cultivation and is naturalized in beach dunes and other sandy habitats.

48. *Artemisia suksdorfii* Piper, Bull. Torrey Bot. Club 28: 42. 1901 • Suksdorf sagewort [E]



Artemisia heterophylla Nuttall, Trans. Amer. Philos. Soc., n. s. 7: 400. 1841, not Besser 1834; *A. vulgaris* Linnaeus var. *littoralis* Suksdorf

Perennials, 50–170(–200) cm, aromatic (rhizomes woody, coarse). **Stems** usually 10+, erect, light brown, simple, usually glabrous. **Leaves** cauline (sessile), bicolor (white and dark green); blades lanceolate, 5–10(–15) × 1–5 cm (bases strongly tapered, attenuate), coarsely and irregularly lobed, faces tomentose (abaxial) or glabrous (adaxial). **Heads** (erect) in crowded (proximally leafy), paniculiform or racemiform arrays 17–30 × (2–)4–5 cm (lateral branches stiff, erect). **Involucres** narrowly turbinate or globose, 1.5–2.5 × 1–1.5 mm. **Phyllaries** (straw-colored to yellow-green, shiny) lanceolate, glabrous or sparsely hairy. **Florets**: pistillate 2–5; bisexual 2–7; corollas yellow, 1.5–3 mm, glabrous. **Cypselae** ellipsoid, 0.8–1.5 mm, glabrous. **2n** = 18.

Flowering mid summer–fall. Coastal habitats, often along roads or drainages; 0–200 m; B.C.; Calif., Oreg., Wash.

Artemisia suksdorfii is similar morphologically to *A. douglasiana*; it has more and smaller heads, and glabrous phyllaries. The two species hybridize where their ranges overlap.

49. *Artemisia tilesii* Ledebour, Mém. Acad. Imp. Sci. St. Pétersbourg Hist. Acad. 5: 568. 1814



Artemisia hookeriana Besser;
A. hultenii M. M. Maximova;
A. tilesii var. *aleutica* (Hultén) S. L. Welsh; *A. tilesii* var. *elatior* Torrey & A. Gray; *A. tilesii* subsp. *gormanii* (Rydberg) Hultén;
A. tilesii subsp. *hultenii* (M. M. Maximova) V. G. Sergienko;
A. tilesii var. *unalaschcensis* Besser;

A. unalaskensis Rydberg var. *aleutica* Hultén; *A. vulgaris* Linnaeus subsp. *tilesii* (Ledebour) H. M. Hall & Clements

Perennials, 20–60(–80) cm, mildly aromatic (rhizomes coarse). **Stems** 1–3, erect, white, tomentose (on distal branches, hairs appressed) or glabrate. **Leaves** basal and cauline, bicolor (white and green); blades (basal) linear to broadly lanceolate, 3–7(–10) × 2–5(–6) cm, coarsely pinnately lobed (cauline becoming linear distally), faces tomentose (abaxial) or glabrous (adaxial). **Heads** in compact to broadly branched, paniculiform arrays 1–20 × 2–6 cm. **Involucres** broadly campanulate, 4–5 × 3.5–4 mm. **Phyllaries** (violet-brown) oval (outer) to elliptic or lanceolate, sparsely tomentose. **Florets**: pistillate 9; bisexual 25–60; corollas yellow, 1.5–3 mm, glabrous (style branches included, erect, linear, relatively short, short-ciliate). **Cypselae** oblong-linear (angular), 1.2–1.5 mm, glabrous. **2n** = 18, 36.

Flowering mid summer–early fall. Arctic and alpine tundra, sandy, rocky slopes near shorelines; 0–2000 m; Alta., B.C., Man., N.W.T., Nunavut, Ont., Que., Sask., Yukon; Alaska, Idaho, Mont., Oreg., Wash.; Asia (Russia).

Artemisia tilesii has a bewildering array of variation in leaf and inflorescence morphology that has been separated into four infraspecific taxa recognized in some floras. I am unable to separate these taxa consistently and am including them within a broad circumscription of the species.

50. *Artemisia vulgaris* Linnaeus, Sp. Pl. 2: 848. 1753

• Common mugwort, felon-herb, green-ginger, armoise vulgaire [I]



Artemisia opulenta Pampanini;
A. vulgaris var. *glabra* Ledebour;
A. vulgaris var. *kamtschatica* Besser

Perennials, (40–)60–190 cm, sometimes faintly aromatic (rhizomes coarse). **Stems** relatively numerous, erect, brownish to reddish brown, simple proximally, branched distally (angularly ribbed), sparsely hairy or glabrous. **Leaves** basal (petiolate) and cauline (sessile), uniformly green or bicolor;

blades broadly lanceolate, ovate, or linear, (2-)3-10 (-12) × 1.8-8 cm (proximal reduced and entire, distal pinnately dissected, lobes to 20 mm wide), faces pubescent or glabrescent (abaxial) or glabrous (adaxial). **Heads** in compact, paniculiform or racemiform arrays (10-)20-30(-40) × (5-)7-15(-20) cm. **Involucres** ovoid to campanulate, 2-3(-4) mm. **Phyllaries** lanceolate, hairy or glabrescent. **Florets**: pistillate 7-10; bisexual (5-)8-20; corollas yellowish to reddish brown, 1.5-3 mm, glabrous (style branches arched-curved, truncate, ciliate). **Cypselae** ellipsoid, 0.5-1(-1.2) mm, glabrous, sometimes resinous. $2n = 18, 36, 40, 54$.

Flowering mid summer-late fall. Sandy or loamy soils, forested areas, coastal strands, roadsides; 0-500 m; introduced; Greenland; Alta., B.C., Man., N.B., Nfld. and Labr. (Nfld.), N.S., Ont., P.E.I., Que., Sask.; Ala., Alaska, Conn., Del., D.C., Fla., Ga., Idaho, Ill., Ind., Iowa, Kans., Ky., La., Maine, Md., Mass., Mich., Minn., Mo., Mont., N.H., N.J., N.Y., N.C., Ohio, Oreg., Pa., R.I., S.C., Tenn., Vt., Va., Wash., W.Va., Wis.; Eurasia.

Grown as a medicinal plant, most commonly as a vermifuge, *Artemisia vulgaris* is widely established in eastern North America and is often weedy in disturbed sites. Populational differences in morphologic forms are reflected in size of flowering heads, degree of dissection of leaves, and overall color of plants (from pale to dark green), suggesting multiple introductions that may date back to the first visits by Europeans. It is tempting to recognize the different forms as subspecies and varieties; the array of variation in the field is bewildering. If genetically distinct forms exist in native populations, the differences appear to have been blurred by introgression among the various introductions in North America. A case could be made for recognizing var. *kamtschatica* in Alaska based on its larger heads and shorter growth form; apparent introgression with populations that extend across Canada confounds that taxonomic segregation.

120. **HULTENIELLA** Tzvelev in A. I. Tomatchew, Fl. Arct. URSS 10: 117. 1987

- [For Eric Hultén, 1894-1981, Swedish botanist, specialist of the circumpolar flora]

Luc Brouillet

Dendranthema Des Moulins sect. *Haplophylla* Tzvelev in V. L. Komarov et al., Fl. URSS 26: 388, 880. 1961

Perennials, (0.6-)1-12 cm (sterile basal rosettes 1-10+; rhizomes at or below ground, ± woody, giving rise to branched, woody caudices). **Stems** (flowering) 1-10+ (1 per rosette), erect, not branched (scapiform), ± villous to woolly, particularly near heads (hairs basifixed). **Leaves** (basal marcescent, erect) all or mostly basal; alternate; sessile; blades (appearing 1-nerved or nerves inconspicuous) linear, not lobed, margins entire (villous-ciliate), faces glabrous. **Heads** radiate, borne singly. **Involucres** hemispheric or broader, (4-)4.5-6(-6.5) mm diam. **Phyllaries** persistent (green), 20-26(+) in 2(-3+) series, distinct, oblong to lance-oblong (not carinate, 1-nerved), margins and apices (dark brown, fimbriate) scarious (apices obtuse to acute, abaxial faces glabrous or villous). **Receptacles** convex (± villous), epaleate. **Ray florets** 11-19, pistillate, fertile; corollas white, laminae obovate. **Disc florets** 60-80, bisexual, fertile; corollas yellow, tubes ± cylindric, throats campanulate, lobes 5, deltate (without resin sacs). **Cypselae** ± obconic, ribs 5, faces glabrous (pericarps without myxogenic cells or resin sacs); **pappi** crowns of 6-12 irregular teeth. $x = 9$.

Species 1: n Canada, Alaska, n Eurasia.

K. Bremer and C. J. Humphries (1993) included *Hulteniella* in *Arctanthemum*. *Hulteniella* has not been included in molecular phylogenetic studies.