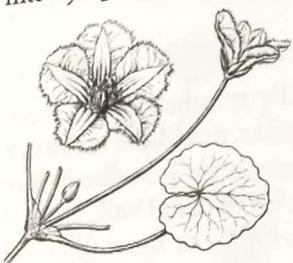


Nymphoides Ség. Floating-heart

Fls umbellate, homostylous (ours) or distylous, pedicels erect, emergent; corolla rotate, lobes glab (ours) or hairy, margins winged, entire or weakly laciniate; ovary superior; caps orbicular to ellipsoid, globose, occ strongly laterally compressed (ours), dehiscing underwater; pls aquatic, with submersed sts and floating lvs. (L, meaning like *Nymphaea*, another genus of aquatic pls with floating, heart-shaped lvs).



N. peltata (S.G. Gmel.) Kuntze. Submersed lvs absent, floating lf bls orbiculate to narrowly elliptic, 2–15 cm broad, entire to shallowly and broadly dentate; umbels 4–20-fld, sessile among subopp infl lvs, pedicels 3–10 cm; calyx lobes 10–13 mm; corolla yellow, rotate, 2–5 cm wide, margins winged and ± laciniate; anthers ca 3 mm; styles 1–5 mm; caps 12–35 mm; pond and lake margins; invasive Eurasian intro listed as noxious in WA, occ escaped from cult; s BC to sw WA, and in e WA.

ASTERACEAE (Compositae) Aster Family

Fls sessile in a close head (capitulum) on a common receptacle, each sometimes individually subtended by a small bract (palea), and nearly always collectively subtended by an involucel of few–∞ bracts (phyllaries); individual fls ♀ or unisexual or occ some neutral; corolla radially or bilaterally symmetric, gen 5-merous with a tubular base, without definite calyx; stamens = the corolla lobes and alternate with them, epipetalous, with elongate anthers united into a tube around the styles, or the anthers rarely distinct; ovary inferior, 2-carpellate, 1-locular, normally with a single erect anatropous ovule; style gen 2-cleft; fr an achene, unappendaged, or more gen crowned with a pappus consisting of 1–∞ hairs, bristles, or scales; ann, bien, or per herbs, or shrubs (trees), diverse in habit, foliage, and infl. (Compositae). One of the largest families of fl pls, with > 20,000 spp.; cosmopolitan.

The invol bracts (**phyllaries**) are gen herbaceous or subherbaceous, varying to scariosus, hyaline, or cartilaginous; they may be few and in a single row, or ∞ and imbricate, or occ spine-tipped or fused; in some genera the invol is subtended by a few, much smaller bracts (**calyculi**). The receptacle may be paleate, with a bract (palea) subtending each fl, or may be covered with long bristles, or may be naked.

There are (1–)few–∞ fls in each head (technically a capitulum). The fls are of several gen types. In one type the fl is ♀ or neutral (without a style), and the corolla is tubular only at the very base, above which it is flat, commonly bent to one side, and often 2–3-toothed at the tip. The flattened part of such a fl is a **ray** or **ligule**, and the fl bearing it is a **ray fl**. Ray fls, if present, occur only at the margin of the head. In another type the fls are ♀ (or functionally ♂) and the corolla is tubular or trumpet-shaped, with gen 5 short, terminal lobes. This type of fl is a **disk fl**; a head composed wholly of disk fls is **discoid**. A head with both ray and disk fls is **radiate**, with the center being occupied by disk fls (except in a few ♂, ♀ groups); in radiate heads, the disk diam represents the central portion of the head bearing disk fls. In some spp. the lig of the marginal, ♀ fls fails to develop, so that the corolla is tubular, but gen more slender and not so evenly toothed as a disk corolla; such a head is **disciform**. A third type of fl superficially resembles the ray fl of a radiate head, but differs in being ♀ and in having gen 5 terminal teeth. Heads in the tribe Cichorieae are composed solely of fls of this type and are called **ligulate** heads. In our area this type of fl is found only in the Cichorieae. Some few members of the tribe Cynareae have the marginal disk fls enlarged, irreg, and transitional toward the lig type.

The pappus is highly diverse in structure. Phyletically a modified calyx, it may be composed of simple, barbellate, or plumose hairs in one or more series, or scales, or stout awns, or a mere projecting ring or crown, or combinations of these; or it may be lacking entirely.

The anthers are gen coherent by their lateral margins; their bases vary from truncate to slenderly caudate. The anthers dehisce introrsely, and the pollen is pushed out through the anther tube by the growth of the style. The style bracts gen diverge above the anther tube, have various distinctive forms and textures, and tend to be stigmatic only on definite parts of their surface (the stigmatic lines), often with a short to elongate appendage above the stigmatic portion. Style bracts should be observed only in the fertile disk fls; those of the rays are gen very similar in all groups, and those of the sterile disk fls are often reduced and undivided. The sterile disk fls, when present, are said to be functionally ♂; although the ovary is absent or nonfunctional, the style is still present and retains the function of acting as a plunger to push out the pollen. Historically Asteraceae frs have been called **achenes**, which is the term used here. Technically the Asteraceae fr is a **cypsela** (plural cypselae), a dry, indehiscent, single-seeded fr formed from two fused carpels, of which only one develops into a seed.

Echinacea angustifolia DC. (*E. pallida* var. *a.*) is a Gr Pl sp. not reaching our area. *Heliopsis helianthoides* (L.) Sweet var. *scabra* (Dunal) Fernald, native e of our area, was reported, possibly in error, for se BC. Known only from old colls as ballast waifs near Portland, OR, and not otherwise treated below, are *Acanthospermum hispidum* DC., an ann with opp, rhombic-ovate lvs, heads in forks of bracts, small yellow rays, and inner phyllaries individually investing achenes and beset with hooked bristles in fr, and *Oncosiphon suffruticosum* (L. f.) Källersjö which resembles *Tanacetum* but is an ann with heads discoid (all fls ♀ and fertile).

ASTER

1a Fls all lig and ♀; juice of sts milky (Cichorieae) **Group 1, p. 519**

1b Fls not all lig, the heads with both ray and disk fls, or only disk fls, the ray fls when present marginal (except in unisexual heads), either ♀ or neutral; juice of sts gen watery

2a Heads radiate (with both ray and disk fls), the rays inconspicuous or showy
3a Rays white to pink, purple, red, or blue, not yellow or orange **Group 2, p. 521**
3b Rays yellow or orange (occ marked with purple or reddish-brown at the base)
4a Pappus partly or wholly of capillary (sometimes plumose) bristles; recep naked **Group 3, p. 524**
4b Pappus chaffy, or of firm awns, or none; recep chaffy, bristly, or naked **Group 4, p. 525**

2b Heads discoid or disciform, without rays (some pls with very small and inconspicuous rays are keyed here as well as in the radiate group)

5a Pappus partly or wholly of ∞ capillary (sometimes plumose) bristles (absent from the outer fls of *Filago* and *Logfia*; bristles rather coarse and strongly plumose in *Saussurea*) **Group 5, p. 528**

5b Pappus of scales, or awns, or very short chaffy bristles, or a mere crown, or none, never plumose (a few deciduous capillary bristles sometimes present on the central fls of the otherwise epappose genus *Stylocline*) **Group 6, p. 531**

Group 1 Fls all lig and ♀; juice of sts milky (Cichorieae)

1a Pappus absent or of minute scales or awns to 0.2 mm

2a Pappus of minute scales; fls blue (white); phyllaries 10–15 in 2 series; pls taprooted per **Cichorium**

2b Pappus none, or a few minute awns; fls yellow; phyllaries 5–10, uniseriate; pls ann (bien)

3a Phyllaries 5(–7); heads 5–8-fld; achenes 10–13-ribbed, puberulent; sts erect, 1.5–15 dm, glabrate to pubescent **Lapsana**

3b Phyllaries 8–10; heads 8–15-fld; achenes ca 20-ribbed, glab; pls prostrate to sprawling, 1–2 dm, glab; lf bls oblanceolate, lyrate; Eurasian intro; waif coll once (1940) from Sauvie's Island, Multnomah Co, OR; Japanese nipplewort **Lapsanastrum apogonoides** (Maxim.) J.H. Pak & K. Bremer

1b Pappus well developed, of plumose bristles, or bristles and scales, or scales

4a Pappus (except occ of the marginal fls) of plumose bristles, or of scales with long, plumose awns

5a Pappus of scales with long, plumose awns; achenes sometimes narrowed above, but not beaked (*M. nutans*) **Microseris**

5b Pappus (except occ of the marginal fls) of plumose bristles, occ also with some shorter outer, nonplumose bristles or scales; achenes beaked or beakless

6a Achenes beaked

7a Our spp. scapose, with naked or merely bracteate sts and rosette of oblanceolate to oblong lvs; phyllaries imbricate in 2–4 unequal series

8a Recep chaffy-bracted **Hypochaeris**
8b Recep naked **Leontodon**

7b Pls clearly lfy-std; phyllaries \pm uniseriate, subequal to =

9a Lvs linear, \pm grasslike, margins entire; pls bien, gen 5–15 dm, glab or tomentose to floccose **Tragopogon**

9b Lvs elliptic to oblanceolate, lanceolate, or ovate, margins dentate to lobed; pls ann (bien), 3–12(–20) dm, hirsute to hispid or setose; heads solitary or corymbiform; fls yellow; European intro seldom escaping cult; Wi Va to CA; ox tongue **Helminthotheca echiooides** (L.) Holub

6b Achenes sometimes narrowed above, but not beaked

10a Pls scapose, with naked or merely bracteate sts and rosette of oblanceolate lvs; fls yellow; heads solitary or few per scape **Leontodon**

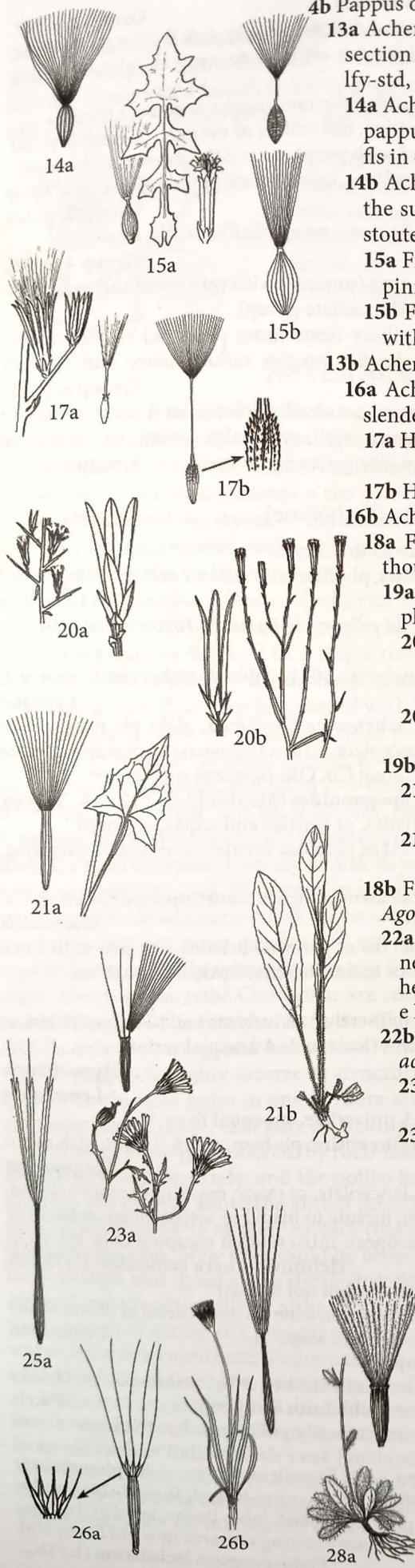
10b Pls lfy-std; fls and infl various

11a Invol and peduncles with long hairs forked at tip, forming 2 short hooks (anchorlike); fls yellow, in \pm corymbiform arrays **Picris**

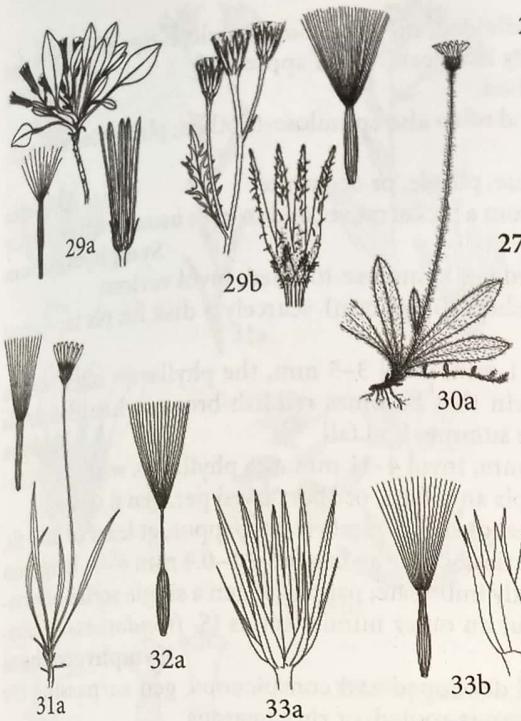
11b Invol and peduncles glab to variously pubescent, but the hairs all unforked at tip

12a Phyllaries in our spp. gen 3–12; fls pink or white **Stephanomeria**

12b Phyllaries 18–30; fls yellow, occ maroon-tinged; invol 7–20 mm; lvs reduced in size upwards, pinnately lobed, lobes linear; weed of dry, disturbed areas; European intro; occ entering our area in wc MT, s to NM and TX (*Scorzonera l.*) **Podospermum laciniatum** (L.) DC.

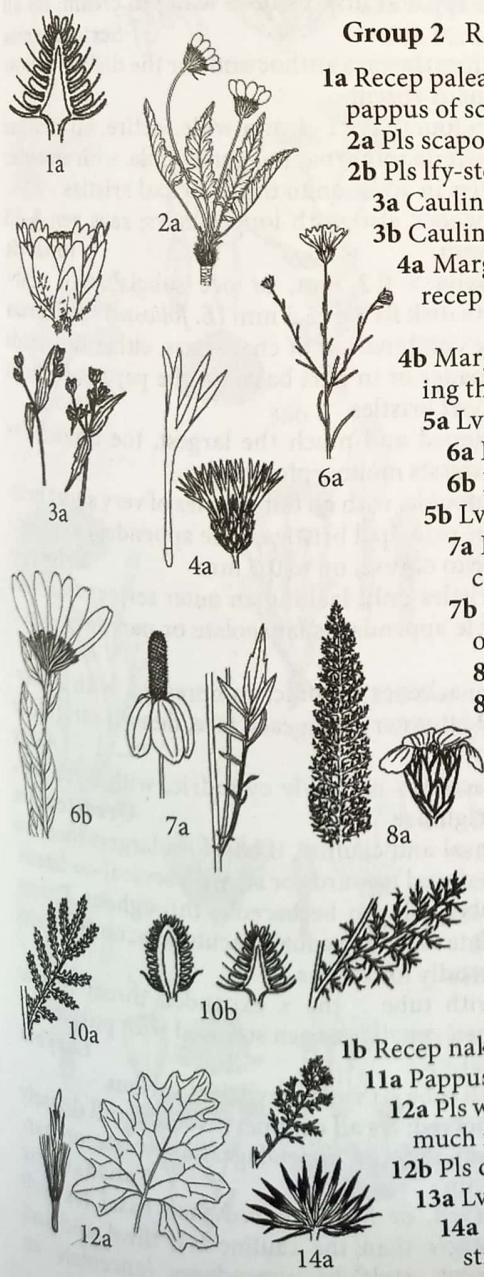


- 4b** Pappus of scales, or of simple (sometimes barbellate) capillary bristles only
- 13a** Achenes ± strongly flattened, some of the pappus bristles < 5-celled in cross-section at the base; corolla tube gen > half as long as the lig; our spp. all erect, lfy-std, and gen with several or ∞ heads
- 14a** Achenes beakless, without any enlarged pappiferous disk; some of the outer pappus bristles evidently stouter than the others; heads gen ∞-fld (ca 85–250) *Sonchus*
- 14b** Achenes beaked or less often beakless, in either case somewhat enlarged at the summit where the pappus is attached; none of the pappus bristles much stouter than the others; heads relatively few-fld (ca 11–56 fls in ours)
- 15a** Fls 5 to a head, yellow; invol 1–2 mm diam, with (4)5 phyllaries; lower lvs pinnatifid, with broad, ± ivylike terminal segm *Mycelis*
- 15b** Fls gen 8–50 to a head, yellow, bluish, or white; invol 2–5(–8) mm diam, with 5–13 phyllaries; lvs pinnately lobed, toothed, or entire *Lactuca*
- 13b** Achenes terete or prismatic, scarcely flattened; other characters various
- 16a** Achenes spinulose or muricate near the summit of the body, tipped by a slender beak, fls yellow
- 17a** Heads 7–15-fld; pls br, with narrow cauline lvs and several or ∞ heads *Chondrilla*
- 17b** Heads ∞-fld; pls strictly scapose, with solitary heads *Taraxacum*
- 16b** Achenes smooth or nearly so, not evidently spinulose or muricate
- 18a** Fls pink or purplish to white, heads several or ∞; cauline lvs present, though occ scalelike; achenes beakless, though occ narrowed upwards
- 19a** Cauline lvs narrow, ours 1–6 mm wide, often reduced to mere scales, the pls ± rushlike
- 20a** Brs spine-tipped, rigid; pls several-std from a taproot and br caudex, bearing tufts of pale or brownish wool at base; heads short-pedunculate, borne laterally on the brs *Pleiacanthus*
- 20b** Brs not spine-tipped; pls single-std from a deep-seated, creeping root, without wool; heads terminating elongate brs *Lygodesmia*
- 19b** Cauline lvs well developed, mostly 1–7 cm wide
- 21a** Lower lf bls in our spp. hastate to sagittate or truncate; sts and lvs glabrate below infl (ours); heads nodding at anthesis (ours) *Nabalus*
- 21b** Lower lf gradually tapered to petiole; sts and lvs pubescent; heads erect (*H. albiflorum*) *Hieracium*
- 18b** Fls bright yellow to orange or occ reddish (occ pink or drying purple in *Agoseris*, which is scapose and monocephalous); achenes beaked or not
- 22a** Pappus in 2 series, the outer series of 5 oblong scales 0.5–1 mm, the inner of 5 bristles 5–6 mm; pls ann, initially scapose, becoming ± lfy-std, the heads single on long peduncles; open, mossy or rocky places; uncommon e N Am intro; sw BC *Krigia virginica* (L.) Willd.
- 22b** Pappus in 1 or several series but all alike, and often more ∞, or (in *Malacothrix*) with an outer series of minute scales hardly 0.1 mm
- 23a** Pappus bristles ± connate at the base and falling connected, leaving an outer series of minute scales ca 0.1 mm *Malacothrix*
- 23b** Pappus bristles all distinct, falling separately, or if weakly connate then without an outer series of minute, persistent scales
- 24a** Pappus of flattened scales or of bristles with scalelike bases, the scales > 0.1 mm wide at base
- 25a** Pappus scales apically notched, bearing a deciduous bristle in the notch; pls ann *Uropappus*
- 25b** Pappus scales not notched, rather gradually tapered to the bristle-like tips; pls ann or per
- 26a** Pappus of 5–10 scales abruptly tapered to a bristlelike tip heads nodding in bud; pls scapose to caulescent, with 1 or several heads (*M. bigelovii*, *M. laciiniata*) *Microseris*
- 26b** Pappus of 10–30 narrow, gradually attenuate scales; heads erect in bud; pls scapose (rarely with 1 bract on the scape), monocephalous (*N. nigrescens*, *N. troximoides*) *Nothocalais*
- 24b** Pappus of capillary bristles < 0.1 mm wide at base
- 27a** Pls lfy-std, the lvs basal and cauline or all cauline; heads gen few–∞ per st
- 28a** Pls per from a very short rhizome, with ∞ fibrous roots, taproot absent; achenes cylindric or slightly broadened (rarely narrowed) upwards, not beaked *Hieracium*

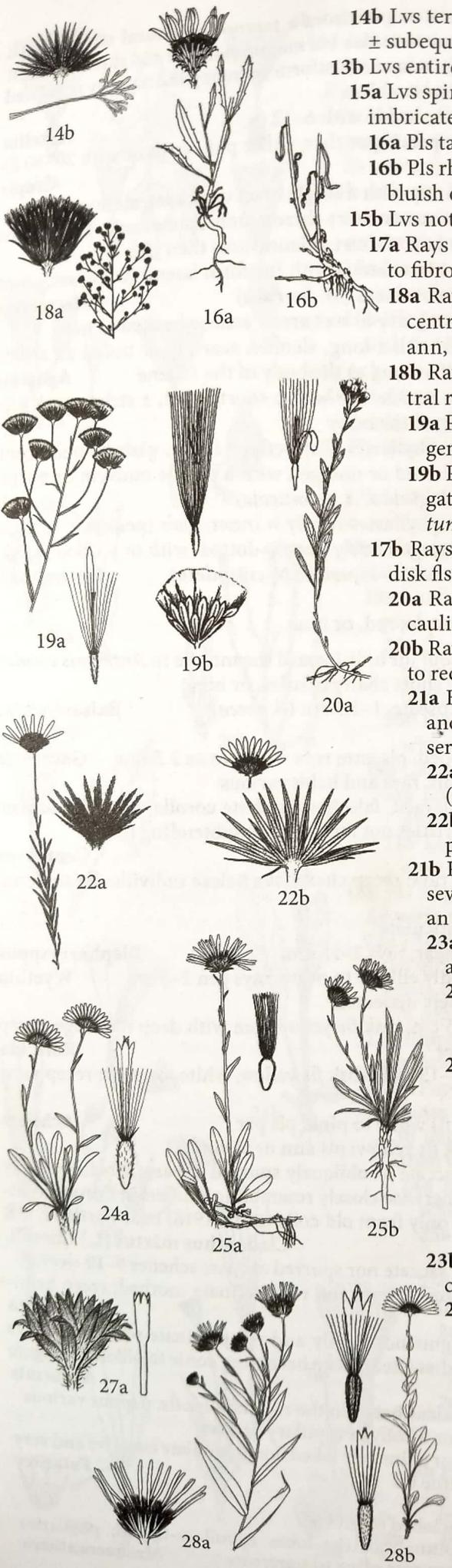


- 28b** Pls ann, bien, or per, from a taproot or several strong roots, without rhizomes (caudex brs may be elongate and rhizomelike in *Askellia nana*); achenes fusiform to subcylindric, gen narrowed above, beaked or beakless
29a Pls per, glab; heads with 6–12 fls **Askellia**
29b Pls ann or per, if per then either pubescent or with 20–50 fls per head **Crepis**
27b Pls scapose (rarely with a single bract on scape), monocephalous
30a Pls stoloniferous or short-rhizomatous, pubescent **Hieracium**
30b Pls taprooted, or if short-rhizomatous then glab
31a Pls short-rhizomatous with fusiform lateral roots; wet, mont areas; achene beakless (*M. borealis*) **Microseris**
31b Pls taprooted; dry or wet areas; achene beaked or not
32a Achenes with a long, slender, scarcely or not at all striate beak > half as long as the body of the achene **Agoseris**
32b Achenes beakless or with a short, stout, ± striate beak < ca half as long as the body
33a Outer phyllaries distinctly < inner, glab to pubescent, purple-dotted or not, gen with a purple midvein or purple center (*A. glauca*, *A. monticola*) **Agoseris**
33b Outer phyllaries nearly = inner, glab (peduncle summit occ hairy), gen finely purple-dotted, with or without a purple midvein (*N. alpestris*, *N. cuspidata*) **Nothocalais**

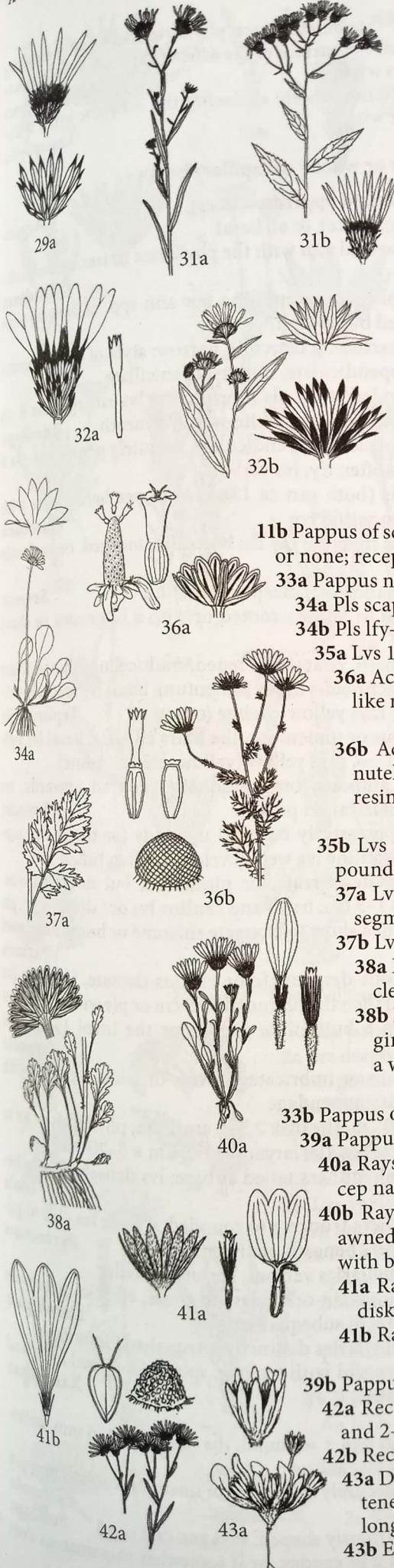
Group 2 Rays white to pink, purple, red, or blue



- 1a** Recep paleate or bristly throughout (or only toward the middle in *Anthemis cotula*); pappus of scales, or awns, or very short chaffy bristles, or none
2a Pls scapose or nearly so; rays roseate, 1–2.5 cm (*B. rosea*) **Balsamorhiza**
2b Pls lfy-std; rays various
3a Cauline lvs opp, well developed; pls ann; rays white, to ca 2.5 mm **Galinsoga**
3b Cauline lvs all or nearly all alt; rays and habit various
4a Marginal disk fls with enlarged, falsely subradiate corolla, true rays absent; recep densely bristly, the bristles not individually subtending the fls **Centaurea**
4b Marginal fls with normal rays; recep chaffy, the paleae individually subtending the fls
5a Lvs entire or merely denticulate
6a Pls slender ann; lvs linear; rays 2–11 mm **Blepharipappus**
6b Pls stout per; lvs broadly elliptic to ovate; rays gen 2–5 cm **Wyethia**
5b Lvs pinnatifid or pinnately dissected
7a Rays deep red, 0.7–3.5 cm; disk fls yellow, gen with deep red tinge; recep columnar (ours); pls per **Ratibida**
7b Rays white or pink, 1–15 mm; disk fls yellow, white, or pink; recep various; pls ann or per
8a Rays 1–5 mm; disk fls white to pink; pls per **Achillea**
8b Rays 5–15 mm; disk fls yellow; pls ann or bien (per)
9a Disk corollas ± saccate or obliquely spurred at base; achenes weakly few-nerved; pls otherwise closely resembling *Anthemis*; European intro; a waif known only from old colls (1902, 1916) near Portland, OR (*Anthemis m.*) **Cladanthus mixtus** (L.) Chevall.
9b Disk corollas not saccate nor spurred at base; achenes 9–10-nerved
10a Primary lf segms evenly and reg pectinate-toothed; recep hemispheric in fr **Cota**
10b Primary lf segms not evenly and reg pectinate-toothed, the lvs more finely dissected; recep becoming conic to oblong-elongate in fr **Anthemis**
11a Pappus of the disk fls partly or wholly of capillary bristles
11b Recep naked, or with a row of paleae between the ray and disk fls; pappus various
12a Pls with cordate, sagittate, or palmately lobed, long-petiolate basal lvs and very much reduced, scalelike cauline lvs **Petasites**
12b Pls distinctly otherwise
13a Lvs pinnately to ternately lobed or divided
13b Lvs pinnatifid to bipinnatifid, the lobes spinulose-tipped; phyllaries strongly imbricate, tips gen spreading to squarrose **Machaeranthera**



- 14b** Lvs ternately lobed or divided, the lobes not spinulose-tipped; phyllaries ± subequal or only slightly imbricate, tips ± appressed
Erigeron
- 13b** Lvs entire or merely toothed
- 15a** Lvs spinulose-tipped and often also spinulose-toothed; phyllaries strongly imbricate
Dieteria
- 16a** Pls taprooted; rays blue, purple, or occ white
Symphyotrichum
- 16b** Pls rhizomatous or from a br, cormose caudex; rays usually white, rarely bluish or pinkish
Conyza
- 15b** Lvs not spinulose-tipped nor spinulose-toothed; invol various
17a Rays ∞, filiform and short (0.3–5 mm), scarcely > disk fls; pls taprooted to fibrous-rooted
18a Ray fls with lig to 1 mm; invol 3–5 mm, the phyllaries often with a central resin-filled vein that becomes reddish-brown when dried; pls ann, weedy, gen fl late summer and fall
18b Ray fls with lig 2+ mm; invol 4–11 mm, the phyllaries without a central resin-filled vein; pls ann, bien, or short-lived per, gen fl summer
19a Phyllaries subequal or slightly imbricate; pappus, at least of disk fls, gen with an outer series of minute bristles 0.1–0.4 mm
Erigeron
- 19b** Phyllaries distinctly imbricate; pappus of gen a single series of elongate bristles, without an outer minute series (*S. frondosum*, *S. ciliatum*)
Symphyotrichum
- 17b** Rays few–∞, gen well developed and conspicuous, gen surpassing the disk fls; pls taprooted, fibrous-rooted, or rhizomatous
20a Rays few, only 1–6, the ray and disk fls both white to cream; lvs all cauline
Sericocarpus
- 20b** Rays more ∞, or if few then the rays anthocyanic or the disk fls yellow to reddish; basal lvs present or absent
21a Heads strictly solitary (ours); lvs 1–4 mm wide, entire, all cauline and gen ∞ and strongly overlapping; pappus gen double, with an outer series of very short bristles in addition to the principal bristles
22a Lvs scab-puberulent, occ also with longer hairs; rays gen 8–13 (–21); disk fls 5.5–8.5 mm
Ionactis
- 22b** Lvs hirsute, the hairs > 0.2 mm, or occ subglab, not scab-puberulent; rays 15–60; disk fls 3.5–5.5 mm (*E. foliosus*)
Erigeron
- 21b** Pls not with the above combination of characters, either the heads several–∞, or the lvs broader or in part basal, or the pappus without an outer series of very short bristles
23a Basal lvs well developed and much the largest, the cauline lvs abruptly reduced and the sts monocephalous
24a Pappus distinctly double, with an outer series of very short bristles in addition to the principal bristles; style appendages lanceolate or broader, acute to obtuse, up to 0.5 mm
Erigeron
- 24b** Pappus of long bristles only, lacking an outer series of minute bristles or scales; style appendages lanceolate or narrower, gen > 0.5 mm
25a Pls rhizomatous; achenes obconic, compressed, with 2 marginal ribs, and 0–2 faint nerves on each face, densely strigillose
Aster
- 25b** Pls taprooted; achenes narrowly cylindric, with 5–10 ribs, glab or sparsely strigillose
Oreostemma
- 23b** Lvs all cauline or basal and cauline, if basal lvs largest then the cauline lvs gradually reduced upwards or sts with several–∞ heads
26a Phyllaries = to subequal, gen herbaceous throughout, linear-lanceolate to lanceolate with a gradually acute to acuminate tip, the outer ones not broadly foliaceous
27a Disk corollas with tube > the ± expanded throat (throat length includes lobes); phyllaries gen suffused with purple, eg. glandular (*E. sibirica*)
Eurybia
- 27b** Disk corollas with tube < throat; phyllaries various
28a Achenes 4–9-nerved; lvs all cauline; invol and infl densely stipitate-glandular; style br appendages lanceolate or narrower, gen > 0.5 mm
Canadanthus
- 28b** Achenes 2-nerved, or if 4–7-nerved then basal lvs well developed and larger than the cauline lvs; invol and infl variously pubescent; style br appendages lanceolate or



broader, acute to obtuse, up to 0.5 mm

Erigeron

26b Phyllaries otherwise, either distinctly unequal and imbricate, or with a chartaceous base and greenish tip, or oblong with an abruptly acute to obtuse tip, or the outer ones wide and foliaceous

29a Rays gen 5, 8, or 13 (21); achenes with 1-2 ribs and occ 1-2 additional faint nerves; phyllaries tending to be keeled; lvs all caulinne, entire

Eucephalus

29b Rays often more ∞ ; achenes (2-)3-12(-18)-nerved; phyllaries not keeled; lvs various

30a Invol and peduncles stipitate-glandular

31a Lvs all caulinne, 4-15 mm wide, entire or few-toothed (*S. campestre*, *S. novae-angliae*)

Symphyotrichum

31b Lvs all caulinne and much > 15 mm wide, or basal lvs well developed and > reduced caulinne lvs; lvs entire or serrate (*E. conspicua*, *E. integrifolia*)

Eurybia

30b Invol and peduncles eglandular

32a Disk corollas with tube > the \pm expanded throat (throat length includes lobes); achenes 7-12-nerved (*E. merita*, *E. radulina*)

Eurybia

32b Disk corollas with tube < throat; achenes (2-)3-5(-10)-nerved

Symphyotrichum

11b Pappus of scales, or awns, or distinctly flattened, chaffy bristles, or a mere crown, or none; recep naked, or with a row of paleae between the ray and disk fls

33a Pappus none, or merely a minute crown or border

34a Pls scapose; phyllaries herbaceous, the scarious margin obscure

Bellis

34b Pls lfy-std; phyllaries with green center and wide scarious margins

35a Lvs 1-3 \times pinnately dissected with linear to filiform segms

36a Achenes with 2 nearly marginal and 3 ventral, raised but not at all wing-like ribs, otherwise smooth, without resin glands; recep conic, hollow

Matricaria

36b Achenes with 2 marginal and 1 ventral, strongly thickened ribs, minutely roughened on the back and between the ribs, often with 2 circular resin glands near tip; recep hemispheric to conic, solid

Tripleurospermum

35b Lvs toothed, or once-pinnatifid with a wide rachis, or bipinnately compound with wide, flat segms

37a Lvs \pm bipinnately compound with a slender rachis and ovate to elliptic segms; pls per; invol 5-7 mm diam (*T. parthenium*)

Tanacetum

37b Lvs toothed, or once-pinnatifid with a wide rachis and shallow lobes

38a Pls per, (1-)4-15 dm; invol 1-3.5 cm diam, the scarious bract margins clear or pale to dark brown; rays 1-3 cm

Leucanthemum

38b Pls ann, 0.5-2.5(-4) dm; invol 7-12 mm diam, the scarious bract margins dark brown to black; rays 6-12 mm; European and n African intro; a weed coll once (1992) from San Juan Co, WA

Mauranthemum paludosum (Poir.) Vogt & Oberpr.

33b Pappus of longer bristles, scales, or awns, at least on the disk fls

39a Pappus of the disk fls of 8-10+ flattened, bristlelike scales

40a Rays linear-oblanceolate to oblong; pappus of 12-35 bristlelike scales; recep naked; lvs entire

Townsendia

40b Rays broadly cuneate, trilobed; pappus of 8-10(-15) bristlelike scales or awned scales; recep with a row of paleae between the ray and disk fls or beset with bristles; lower lvs gen toothed or pinnatifid

41a Rays white, 0.3-2 cm; recep with a row of paleae between the ray and disk fls; pls ann

Layia

41b Rays deep red, 1.5-3.5 cm; recep beset with bristles; pls taprooted per

Gaillardia

39b Pappus of 2-5 scales or awns

42a Recep evidently conic or hemispheric; pappus of several minute bristles, and 2-4 longer awns; pls 3-20 dm (ours)

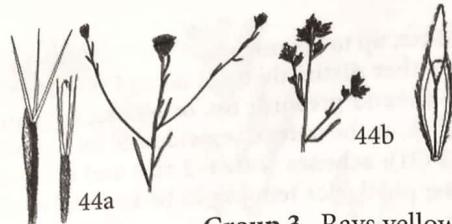
Boltonia

42b Recep flat or nearly so, occ very small; pappus of 2-5 scales, or none

43a Depressed, white-woolly ann 1-5 cm with oblanceolate lvs; achenes flattened, callous-margined, otherwise nerveless, the margins densely long-ciliate; recep naked

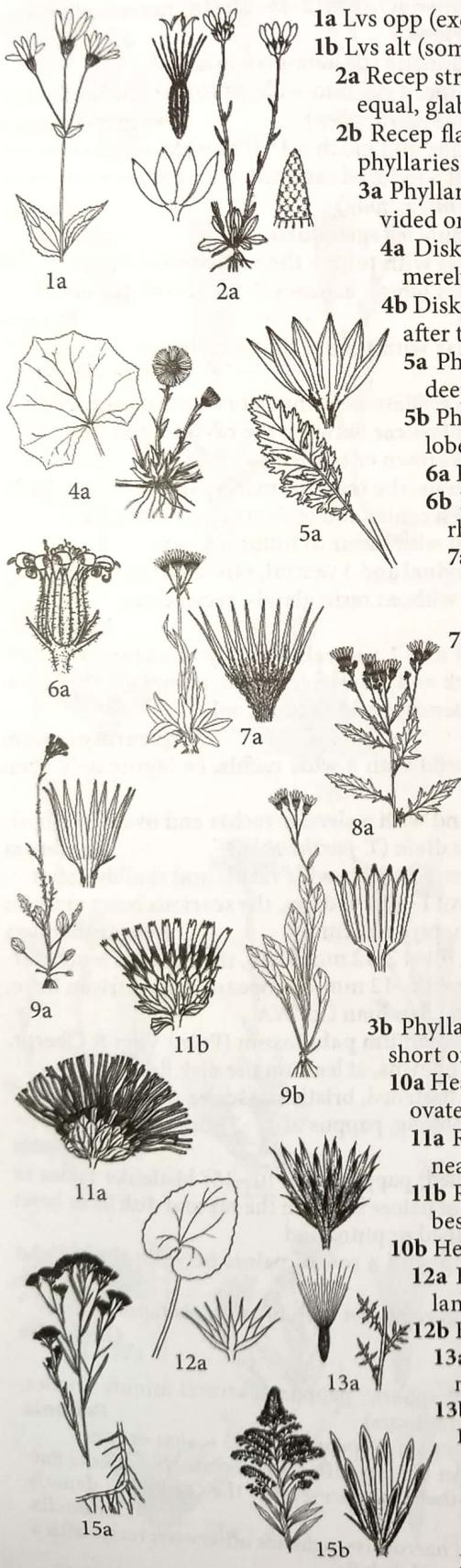
Eatonella

43b Erect ann 0.5-10+ dm with narrow lvs; achenes otherwise; recep with a row of paleae between the ray and disk fls

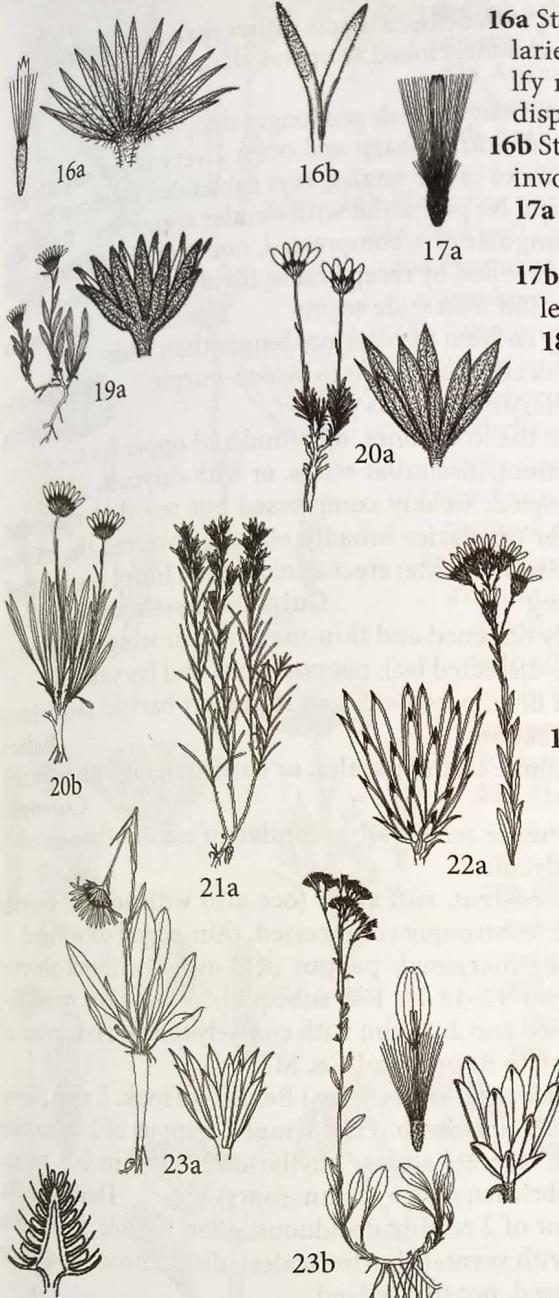


- 44a** Pappus of disk fls 3–5 subulate scales; phyllaries only partly clasping the achenes, nearly half the surface of the achene exposed; invol harshly puberulent; peduncles wiry
Rigiopappus
- 44b** Pappus none; phyllaries wholly enclosing the achenes; invol silky-villous; peduncles not wiry
Lagophylla

Group 3 Rays yellow or orange; pappus partly or wholly of capillary bristles



- 1a** Lvs opp (except sometimes the reduced uppermost ones) *Arnica*
- 1b** Lvs alt (sometimes reduced and scalelike), or all basal
- 2a** Recep strongly conic; delicate, vernal ann with the phyllaries uniseriate and sub-equal, glab, lacking calyculi *Crocidium*
- 2b** Recep flat or slightly convex; pls per (except for a few ann spp. of *Senecio* with phyllaries pubescent or subtended by calyculi)
- 3a** Phyllaries uniseriate and = (excluding calyculi), narrow; style of disk fls undivided or the brs truncate, exappendiculate, minutely penicillate
- 4a** Disk fls sterile, with undivided style; pls fl before the lvs emerge, the fl sts merely bracteate; lvs cordate-orbiculate, white-woolly beneath *Tussilago*
- 4b** Disk fls fertile; style brs truncate, exappendiculate, minutely penicillate; pls fl after the lvs emerge, the fl sts often lfy; lvs various
- 5a** Phyllaries ca = the ray fls (both gen ca 13); bien to per herbs, ours with deeply bipinnatifid to tripinnatifid lvs *Jacobaea*
- 5b** Phyllaries more numerous than the ray fls; lvs entire, toothed, or variously lobed to pinnatifid
- 6a** Pls taprooted ann; lvs shallowly to deeply pinnatifid *Senecio*
- 6b** Pls per (ours), taprooted to fibrous-rooted or with a br caudex or short rhizome; lvs various
- 7a** Lvs pubescent with small, coarse, flattened, multicellular hairs, these overlaid by a denser arachnoid-villous tomentum; basal lvs scarcely petiolate; heads 1–several; rays yellow-orange (ours) *Tephroseria*
- 7b** Lvs glab to crisp-villous or tomentose, the hairs all alike; basal lvs petiolate or sessile; heads 1–∞, rays yellow (yellow-orange, white)
- 8a** Lvs all cauline at anthesis, only gradually reduced upwards, no well-developed tuft of basal lvs present *Senecio*
- 8b** Cauline lvs gen progressively reduced upwards (or the st occ scapo), basal or lower cauline lvs well developed, often tufted
- 9a** Lvs entire to dentate, serrate, or pinnatifid, but never callos-denticulate, the bls 1–5 cm; basal and cauline lvs occ dimorphic; pls with sts arising from a short to elongate rhizome or br caudex; invol 5–12 mm diam *Packera*
- 9b** Lvs entire to callos-denticulate or callos-dentate, if entire (or irreg subpinnatifid) then the bls mostly > 5 cm or pls with the sts gen arising singly from a buttonlike caudex or the invol 15–25 mm diam *Senecio*
- 10a** Phyllaries in 2 or more series, = or imbricate, narrow or wide; style brs with short or elongate, externally hairy appendage
- 10b** Heads obviously smaller; phyllaries various; lvs often smaller
- 11a** Heads large, the invol ca 2–3 cm, the disk 2.5–5 cm diam; phyllaries ovate to ovate-oblong, imbricate; coarse pls, the larger lvs 1–5 dm × 5–20 cm *Inula*
- 11b** Rays ∞, (1–)2–3 cm (ours); anthers tailed at base; lvs densely velvety beneath; intro weed *Pyrrhocoma*
- 12a** Basal lvs 5–19 × 3–14 cm, ovate-orbiculate to ovate, elliptic, or broadly lanceolate; phyllaries in 2–3 = to subequal series *Doronicum*
- 12b** Basal lvs smaller, or the phyllaries distinctly unequal and imbricate
- 13a** Lvs pinnatifid to bipinnatifid with narrow, spinulose-tipped lobes and narrow rachis (*X. spinulosum*) *Xanthisma*
- 13b** Lvs entire or toothed
- 14a** Pls rhizomatous; heads gen ± ∞, small, the invol gen 2–6 mm, imbricate, rays 0.5–6 mm; lvs all cauline
- 14b** Pls taprooted or from a br caudex, or if somewhat rhizomatous then the heads 1–few or the invol larger, or lvs basally disposed
- 15a** Lvs punctate (occ obscurely so), linear or linear-lanceolate; rays gen 15–30 *Euthamia*
- 15b** Lvs not punctate, variously shaped; rays gen ca 8 or 13 *Solidago*



16a Style appendages very short, up to 0.5 mm; achenes 2-nerved; phyllaries subequal or \pm imbricate, gen herbaceous, but neither definitely lfly nor with chartaceous base and herbaceous green tip; lvs basally disposed; heads 1–few

Erigeron

16b Style appendages longer, gen 0.7 mm or more; achenes 4–12-nerved; invol, lvs, and heads various

17a Pappus double, the outer of short bristles much < the inner

Heterotheca

17b Pappus simple, the bristles often \pm unequal but not divided into 2 lengths

18a Pls \pm densely cespitose or loosely mat-forming or cushion-forming, with a gen much br caudex (or even creeping rhizomes), well-developed basal lvs, and monocephalous sts gen < 3 dm

19a Sts relatively lfly, the cauline lvs not greatly reduced; phyllaries relatively loose and herbaceous; rays 10–23+; subalp and alp pls

Tonestus

19b Sts only sparsely lfly or the cauline lvs much reduced or absent; phyllaries firmer, closer, and less herbaceous; rays 5–17

20a Lvs rigid, linear, 0.7–2 mm wide, glandular-scabrid to puberulent

Nestotus

20b Lvs soft and pliable, or if rigid then oblanceolate and 2–7 mm wide, pubescence various

Stenotus

18b Pls not densely cespitose and not at all mat- or cushion-forming, often taprooted, the caudex simple or moderately br, the fl sts several or solitary, with 1– ∞ heads

21a Pls low to tall shrubs (0.5–)1–20 dm, with persistent, woody, above-ground sts and lvs all cauline

Ericameria

21b Pls herbs from a taproot or br caudex, or merely woody at base with the main sts dying back each year

22a Lvs all cauline, ∞ , scarcely reduced upwards; pls from a br, woody caudex; heads few; invol 8–11 mm

Columbiadioria

22b Basal and lower cauline lvs well developed and largest, the lvs reduced in size upwards; pl base and heads various

23a Pls taprooted, the taproot gen stout; rays gen 10–50+ (occ fewer); heads solitary or few (occ to 20), ours with invol 6–30 mm; pappus bristles brownish

Pyrrocoma

23b Pls from a br caudex; rays gen ca 5–17; heads few– ∞ , ours with invol 2–6(–8) mm; pappus bristles gen white

Solidago

Group 4 Rays yellow or orange; pappus chaffy, or of firm awns, or none



1a Recep paleate or bristly throughout

2a Lvs deeply pinnatifid, the primary segms reg toothed; phyllaries distinctly scarious-margined; pappus a short crown or none

3a Heads ∞ in a compact, flat-topped to broadly rounded infl; rays gen 3–5(–12), < 3 mm (*A. filipendula*)

Achillea

3b Heads individually terminating the elongate brs in an open infl; rays 12–21+, 6–12 mm (*C. tinctoria*)

Cota

2b Lvs various, occ pinnatifid or filiform-dissected, but not deeply pinnatifid with reg toothed segms; phyllaries gen not scarious-margined; pappus various

4a Pls scapose or subscapose, the cauline lvs, if any, very much reduced and inconspicuous; heads 1–few per scape

5a Achenes densely villous throughout, strongly flattened, thin-edged; rays neutral; our pls silvery-canescens with orbiculate-ovate lvs

Enceliopsis

5b Achenes glab or strigose, quadrangular or compressed-quadrangular; rays ♀ and fertile; pubescence and lvs not combined as above

Balsamorhiza

4b Pls evidently lfly-std, although the basal lvs may be > the cauline ones

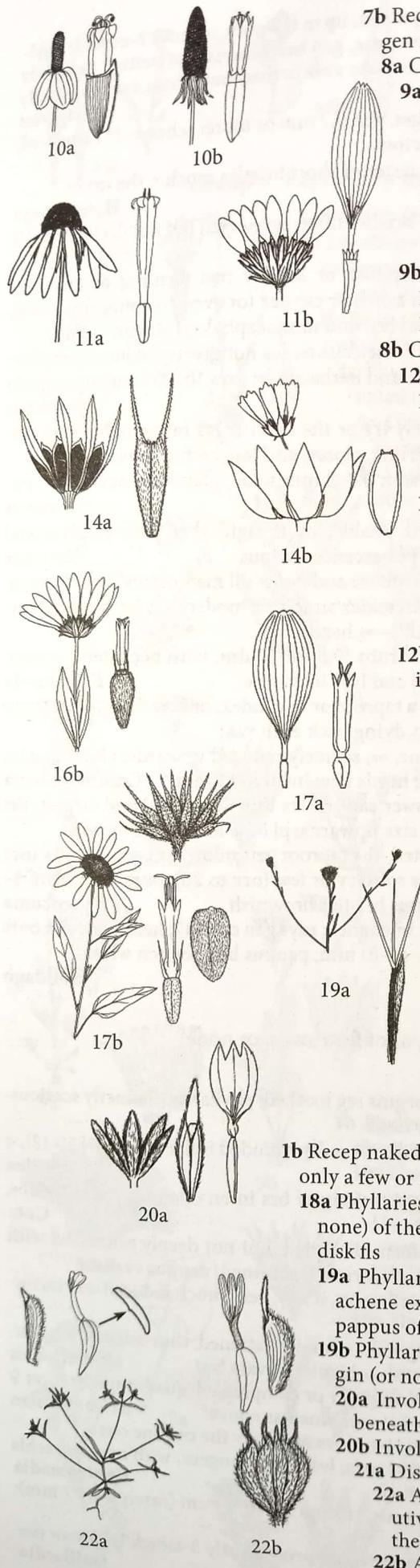
6a Rays relatively small, only ca 4–7 mm; lvs rigid, pungent, with narrow rachis and segms, the lowest opp, most alt

Centromadia

6b Rays larger and more conspicuous, seldom much < 1 cm (rarely only 7 mm); lvs various, but not as above

7a Recep merely bristly; rays cuneate and prominently 3-lobed; lvs alt, or occ all basal

Gaillardia



7b Recep paleate, provided with definite bracts rather than mere bristles; rays gen ± elliptic to oblong, minutely lobed at tip; lvs alt or opp

8a Cauline lvs all alt

9a Recep conic or columnar, the disk gen longer than wide

10a Achenes flattened, with 2 sharp and often 2 very blunt angles, gen ciliate along 1 or more of the angles; rays subtended by recep bracts; invol < 15 mm diam; lvs pinnatifid with slender segms *Ratibida*

10b Achenes quadrangular or ± compressed, not strongly flattened, not ciliate; rays not subtended by recep bracts; invol gen 15–30 mm diam; lvs entire or pinnatifid with wide segms *Rudbeckia*

9b Recep flat or merely convex, the disk not longer than wide

11a Rays neutral; disk corollas yellow to brown-purple *Rudbeckia*

11b Rays ♀ and fertile; disk corollas yellow *Wyethia*

8b Cauline lvs, or at least the lower ones, opp (mid and upper lvs occ alt)

12a Phyllaries in 2 distinct, dissimilar series, or with calyculi

13a Achenes 3–4-angled, weakly compressed but not thin-margined; pappus none; outer phyllaries broadly oblong, covering the narrow inner ones; lvs entire to serrate; erect ann; African intro, used in bird-seed, rarely escaping *Guizotia abyssinica* (L. f.) Cass.

13b Achenes strongly flattened and thin-margined or winged (except in *Bidens beckii*, with dissected lvs); pappus, invol and lvs various

14a Pappus of 2–6 firm, persistent, gen retrorsely barbed awns; invol without calyculi at base *Bidens*

14b Pappus of 2 minute teeth or scales, or absent; invol with calyculi *Coreopsis*

12b Phyllaries in 1 or more series, all ± similar in nature though often imbricate, lacking calyculi

15a Pappus of 2 persistent, stiff awns (occ also with several shorter scales); disk achenes strongly compressed, thin-edged or winged

16a Achenes wing-margined; pappus of 2 awns, without shorter scales; phyllaries 12–18 in 1–2 subequal series; rays mostly < 15 mm; taprooted ann 2–10 dm with coarsely toothed lvs; much of c and s US, intro to Beaverhead Co, MT

Verbesina encelioides (Cav.) Benth. & Hook. f. ex A. Gray

16b Achenes thin-margined but not winged; pappus of 2 awns plus several shorter, lacerate scales; phyllaries 20–30+ in 2–3 series, subequal to imbricate; rays > 15 mm (ours) *Helianthella*

15b Pappus none, or of 2 readily deciduous, often flexible, lanceolate scales (occ also with several shorter scales); disk achenes weakly or strongly compressed, not thin-edged

17a Pappus none; disk achenes weakly compressed; recep conic; rays gen 7–20 mm *Helianomeris*

17b Pappus present (ours), though sometimes readily deciduous, disk achenes weakly to strongly compressed; recep flat to slightly convex; rays gen 15–50 mm *Helianthus*

1b Recep naked, or with a single row of paleae between the ray and disk fls (sometimes only a few or even only a solitary disk fl present)

18a Phyllaries wholly or partly clasping the outer achenes, only the inner surface (or none) of the achene exposed; recep with a single row of paleae between the ray and disk fls

19a Phyllaries only partly clasping the achenes, nearly half the surface of the achene exposed; invol harshly puberulent, neither glandular nor silky-villous; pappus of disk fls of 3–5 subulate scales; heads on wiry brs *Rigiopappus*

19b Phyllaries wholly or largely enclosing the achenes, only the inner apex or margin (or none) of the achene exposed; invol glandular or silky-villous

20a Invol ± silky-villous, often also sparsely stipitate-glandular; rays maroon beneath *Lagophylla*

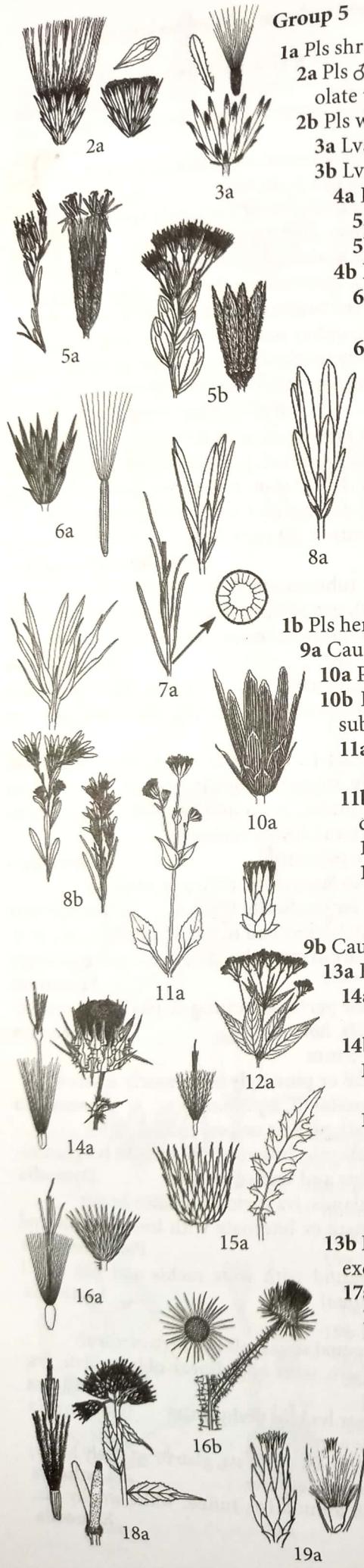
20b Invol ± strongly glandular, not silky-villous; rays yellow throughout

21a Disk achenes without pappus; pls taprooted ann

22a Achenes ± compressed at right angles to a radius of the head; pls diminutive, the better-developed pls ± divaricately br, with heads in the forks of the brs and in small, terminal, cymose clusters *Hemizonella*

22b Achenes compressed parallel to a radius of the head or ± terete; pls not divaricately br, the infl gen corymbiform to paniculiform *Madia*

- ASTERAE**
-
- 21b** Disk achenes with a pappus of 5–10 scales or bristles; pls bien or per, often shortly rhizomatous
- 23a** Anther tube yellow to brown; invol ± globose (ours); disk fls 5–30; ray acheness obscurely beaked (beak 0.2–0.3 mm) *Anisocarpus*
- 23b** Anther tube dark purplish; invol camp to hemispheric; disk fls 30–60; ray achenes beakless *Kyhosia*
- 18b** Phyllaries not clasping nor enclosing the achenes; recep naked throughout
- 24a** Rays well developed and conspicuous, gen 5–40 mm
- 25a** Pappus of 2–several firm, deciduous awns; invol ± strongly resinous; style br appendages puberulent on outer surface, glab on inner surface *Grindelia*
- 25b** Pappus of several chaffy or hyaline scales, or a mere crown, or none; invol not particularly resinous, though occ glandular-pubescent; style br appendages puberulent on both surfaces, or the brs truncate with hairs only at tip
- 26a** Phyllaries with broadly rounded, widely scarious margins; lvs, at least the lower, coarsely pinnatifid (occ merely toothed); heads 1–few in open cymes; erect ann, 1–8 dm; uncommon Eurasian intro; coastal OR to CA (*Chrysanthemum s.*)
- 26b** Phyllaries ± herbaceous, without broad, scarious margins
- 27a** Mature achenes strongly arcuate or coiled, tuberculate on outer surface; disk fls functionally ♂; rays > 30, 12–20 mm; ann to per herbs 0.5–5 dm, with elliptic to spatulate lvs and 1–few heads; Old World intro; widely cult, rarely escaping; *C. arvensis* L., with < 20 rays 5–8(–12) mm, also rarely escapes cult *Calendula officinalis* L.
- 27b** Mature achenes ± straight, not tuberculate; disk fls ♀, fertile
- 28a** Phyllaries few, gen 5–13(–15), gen subequal and subuniseriate, tending to subtend the rays individually; achenes narrow and elongate, ca 4 × as long as wide, or longer *Eriophyllum*
- 28b** Phyllaries ∞, gen 20 or more, evidently in > 1 series, though seldom much imbricate, gen not individually subtending the rays; achenes various
- 29a** Achenes linear-clavate, at least 4 × as long as wide; recep nearly flat; lvs (ours) toothed to shallowly pinnatifid; heads 1 per st *Hulsea*
- 29b** Achenes obconic to obpyramidal, 2–3 × as long as wide; recep convex to conic or subglobose; lvs and heads various
- 30a** Lvs all or partly ternate to pinnatifid *Hymenoxys*
- 30b** Lvs simple, oblanceolate to lanceolate, entire or toothed
- 31a** Pls scapose; lvs simple, entire; heads 1 per st *Tetraneuris*
- 31b** Pls either lfy-std or with lvs toothed to lobed; heads 1–∞ per st
- 32a** Lvs strongly winged-decurrent; phyllaries becoming strongly reflexed in fr *Helenium*
- 32b** Lvs not decurrent, base partly sheathing st; phyllaries spreading or weakly reflexed (*H. hoopesii*) *Hymenoxys*
- 24b** Rays short and inconspicuous, gen 1–5 mm
- 33a** Lvs, at least the lower ones, pinnatifid or pinnately or ternately dissected
- 34a** Lvs all alt, bipinnatifid; pls per; coastal (*T. bipinnatum*) *Tanacetum*
- 34b** Lvs opp (except occ the uppermost); pls ann or per, coastal or inl
- 35a** Invol and herbage dotted with elliptic, brownish oil glands; lvs pinnatifid or bipinnatifid with linear rachis and segms; pls ann *Dyssodia*
- 35b** Invol and herbage without oil glands; lvs various; pls ann or per
- 36a** Pls rhizomatous per; lvs ternate or binate with linear rachis and segms; RM and Gr Pl *Picradeniopsis*
- 36b** Pls taprooted ann; lvs pinnatifid with wide rachis and gen small segms; strictly coastal (*L. maritima*) *Lasthenia*
- 33b** Lvs entire or merely toothed
- 37a** Phyllaries imbricate in several unequal series; pls per herb or shrub
- 38a** Succulent, rhizomatous, per herb with opp, linear-ob lanceolate lvs; strictly maritime *Jaumea*
- 38b** Shrub or subshrub with alt, linear lvs, not fleshy; inl *Gutierrezia*
- 37b** Phyllaries essentially subequal; pls ann
- 39a** Lvs opp; pls erect to sprawling, with elongate sts, glab or sparsely hairy; grassl, vernally moist meadows, or coastal areas *Lasthenia*
- 39b** Lvs mostly alt (basalmost opp); diminutive, tufted, white-woolly pls; dry, sandy or gravelly des areas *Eatonella*

Group 5 Heads discoid or disciform; pappus capillary

- 1a** Pls shrubs (or subshrubs)
- 2a** Pls ♂, ♀; our pls maritime or in coast ranges; thick, coarsely few-toothed, oblanceolate to subrotund lvs *Baccharis*
- 2b** Pls with all ♀ fls; our pls not maritime nor of coast ranges; lvs various *Xanthisma*
- 3a** Lvs reg spinulose-toothed; pls subshrubs (*X. grindeliioides*)
- 3b** Lvs entire or with a few irreg, shallow teeth
- 4a** Phyllaries uniserrate, = or subequal, 4–14 in no
- 5a** Lvs linear or nearly so; invol of 4–6 phyllaries
- 5b** Lvs lanceolate to ovate or elliptic; invol of 6–14 phyllaries
- 4b** Phyllaries imbricate or in vertical ranks, often more ∞ in no
- 6a** Phyllaries imbricate, distinctly striate; twigs glab to puberulent or glandular, not tomentose; fls white or creamy to pink-purple *Brickellia*
- 6b** Phyllaries imbricate or in vertical ranks, not striate; twigs white-tomentose; fls yellow (white in *Ericameria resinosa*)
- 7a** Twigs fully covered with a dense, feltlike tomentum, this often so closely appressed as to escape observation unless the surface is scraped; phyllaries aligned in 4–5 ± definite vertical ranks *Ericameria*
- 7b** Twigs glab to variously pubescent, but not fully covered with a dense, feltlike tomentum; invol imbricate or in vertical ranks
- 8a** Phyllaries aligned in 4–5 ± definite vertical ranks; lvs ± linear *Chrysanthemum*
- 8b** Phyllaries imbricate, not aligned in vertical ranks; lvs various *Ericameria*
- 1b** Pls herbs
- 9a** Cauline lvs all or mostly opp to whorled, on elongate, erect sts
- 10a** Phyllaries strongly striate-nerved across surface, imbricate *Brickellia*
- 10b** Phyllaries not striate-nerved, gen with only a single midnerve, imbricate to subequal
- 11a** Cauline lvs opp and simple; fls yellow or orange; heads 1–few on long brs *Arnica*
- 11b** Cauline lvs whorled, or opp and compound; fls pinkish-purple; heads in dense, corymbiform arrays
- 12a** Lvs in whorls of (3)4–5(6) per node, simple *Eutrochium*
- 12b** Lvs opp, palmately compound with 3(5) distinct, ovate-lanceolate lflets; rhizomatous per 3–15 dm; ditches and disturbed areas; European intro, occ escaping cult; s BC *Eupatorium cannabinum* L.
- 9b** Cauline lvs all or mostly alt (occ some lower lvs opp), or the lvs all basal
- 13a** Pls thistlelike, with ± spiny-margined lvs and gen also with spiny invol
- 14a** Lvs ± white-mottled along the veins; pappus not plumose; recep bristly *Silybum*
- 14b** Lvs not white-mottled; pappus and recep various
- 15a** Pappus bristles plumose (or those of the outermost row of fls sometimes merely barbellate); recep densely bristly; sts winged or not *Cirsium*
- 15b** Pappus bristles merely barbellate; recep various; sts winged
- 16a** Recep densely bristly, neither honeycombed nor obviously fleshy; pappus bristles gen falling separately, occ basally connate *Carduus*
- 16b** Recep fleshy, conspicuously honeycombed, not bristly or only sparsely and very shortly so; pappus bristles basally connate *Onopordum*
- 13b** Pls scarcely or not at all thistlelike, the lvs not spiny-margined; invol not spiny except in some spp. of *Centaurea*
- 17a** Recep densely bristly or elongate-paleate
- 18a** Pappus bristles strongly plumose full length (hairs ca 0.5 mm in ours), eventually deciduous in a ring; achenes basifixed; our spp. with gen unbr/sts and lvs entire or dentate *Saussurea*
- 18b** Pappus bristles barbellate or occ plumose (in *Rhaponticum*, with hairs < 0.3 mm), not deciduous in a ring; achenes obliquely attached; lvs and sts various
- 19a** Phyllaries tapering to a firm but scarcely spiny point, margins entire; inner pappus ca 7–10 mm; recep chaffy with slender paleae *Crupina*
- 19b** Phyllaries otherwise, gen either spine-tipped or some of them with wide, scarious or hyaline, lacerate or pectinate tip or terminal appendage; pappus present or none; recep bristly

- ASTER.**
-
- 20a Pappus bristles subplumose; phyllaries not spine-tipped, margins ± entire, thin and pale or hyaline; rhizomatous per **Rhaponticum**
- 20b Pappus bristles barbellate; phyllaries gen spine-tipped or with wide, scarious or hyaline, lacerate or pectinate tip or terminal appendage; pls ann or per, taprooted or rhizomatous **Centaurea**
- 17b Recep naked (or with a few submarginal paleae)
- 21a Pappus strongly plumose
- 22a Phyllaries and fls only 2 or 3 in each head; diminutive, tufted ann 1–3 (–5) cm with spatulate lvs **Dimeresia**
- 22b Phyllaries and fls more numerous; habit and duration various
- 23a Pls scapose or subscapose; phyllaries essentially = and uniseriate **Raillardella**
- 23b Pls lfy-std; invol various
- 24a Style with a thickened, minutely hairy ring just beneath the short, papillate brs; anthers tailed; pappus bristles united at the base and eventually falling connected **Saussurea**
- 24b Style without any thickened ring; style brs subterete and gen ± clavate, minutely papillate, without evident stigmatic lines; anthers truncate to sagittate, not tailed; pappus bristles separate
- 25a Infl spiciform or racemiform; phyllaries scarcely striate **Liatris**
- 25b Infl corymbiform or paniculiform; phyllaries strongly striate-nerved (*B. eupatorioides*) **Brickellia**
- 21b Pappus merely barbellate or smooth
- 26a Fls all ♀ and fertile, the heads truly discoid
- 27a Phyllaries essentially = and uniseriate, although some very much reduced calyculi may be present
- 28a Lvs palmately cleft, the basal lvs with petioles to 3 dm and bls to 2 dm wide; fls yellow to orange **Cacaliopsis**
- 28b Lvs entire to toothed or lyrate-pinnatifid (occ with an enlarged, pinnatifid terminal segm)
- 29a Invol with calyculi at base (ours); fls gen ∞ (13–80) per head
- 30a Lvs entire to dentate, serrate, or pinnatifid, but never callos-denticulate, the bls 1–5 cm; basal and caudine lvs occ dimorphic; pls with sts arising from a short to elongate rhizome or br caudex; invol 5–12 mm diam **Packera**
- 30b Lvs entire to callos-denticulate or callos-dentate, if entire (or irreg subpinnatifid) then the bls mostly > 5 cm or pls with the sts gen arising singly from a buttonlike caudex or the invol 15–25 mm diam **Senecio**
- 29b Invol without calyculi; fls 5–26 per head
- 31a Infl thyrsoïd-racemiform, elongate; lvs basal and caudine, reduced upwards, glabrate; fls yellow (occ purplish) **Rainiera**
- 31b Infl broadly corymbiform; lvs all caudine, white-tomentose beneath; fls cream to yellow **Luina**
- 27b Phyllaries in 2–several series, imbricate or subequal
- 32a Phyllaries strongly striate-nerved across surface, imbricate; achenes gen 10(8–20)-ribbed or -striate **Brickellia**
- 32b Phyllaries not striate-nerved, gen with only a single midnerve, imbricate to subequal; achenes gen 2–5-angled or -ribbed **Erigeron**
- 33a Style appendages very short, to 0.5 mm
- 33b Style appendages longer, gen 0.7 mm or more
- 34a Style brs linear, scarcely flattened, papillate but not puberulent; fls white to pink or bluish, not yellow **Ageratina**
- 34b Style brs flattened, with a short or elongate, externally papillate-hairy appendage; fls yellow, or occ white or reddish
- 35a Basal and lower caudine lvs the largest, the others progressively reduced
- 36a Pls per from a br, often woody caudex, stipitate-glandular nearly throughout **Triniteurybia**
- 36b Pls taprooted ann, bien, or per (taproot occ surmounted by a br caudex), eglandular or occ sparsely stipitate-glandular
- 37a Disk corollas 4–6 mm; invol 6–10 mm **Dieteria**
- 37b Disk corollas 8–15 mm; invol 10–30 mm (*P. radiata*, *P. carthamoides*) **Pyrrocoma**
- 35b Basal lvs absent; lower caudine lvs evidently reduced

530

38a Pls taprooted ann (*S. ciliatum*, *S. frondosum*) *Symphyotrichum*

38b Pls per, from rhizomes or a stout taproot or caudex *Sericocarpus*

39a Disk fls white to cream *Xanthisima*

39b Disk fls yellow to reddish *Heterotheca*

40a Lvs reg spinulose-toothed; pls subshrubs (*X. grindeliioides*) *Eucephalus*

40b Lvs entire or with a few irreg, shallow teeth *Dieteria*

41a Phyllaries ± hyaline-margined, with greenish base and center; pappus with an outer series of minute bristles 0.1–0.5 mm (*H. oregonica*) *Petasites*

41b Phyllaries not hyaline-margined, either greenish throughout or with chartaceous base; pappus various

42a Phyllaries with a chartaceous base; pls from rhizomes or caudex *Anaphalis*

42b Phyllaries greenish throughout; pls taprooted *Euchiton*

26b At least the outer fls ♀ (with a gen tubular-filiform corolla lacking anthers), the heads thus disciform (some ♂, ♀ pls, with heads wholly ♀, and others functionally ♂, are keyed here)

43a Basal lvs large, long-petiolate, either sagittate and toothed, or palmately cleft; cauline lvs very much reduced, scalelike *Antennaria*

43b Basal and cauline lvs otherwise

44a Herbage ± white-woolly; lvs simple, ± entire; phyllaries gen with dry, scariosus, thin, white to yellowish, brownish, pinkish, or blackish-green tip (weakly scariosus in *Filago*); anthers tailed at base *Filago*

45a Pls per, fibrous-rooted or often with rhizomes or stolons, but without a taproot; pls ♂, ♀ or nearly so, the heads on most pls all or predominantly ♂ or predominantly ♀

46a Basal lvs gen forming a conspicuous, persistent tuft, gen gradually to abruptly reduced upwards (except often in *A. geyeri*); pls with or without stolons or rhizomes, strictly ♂, ♀ (♂ pls rare in some spp.) *Anaphalis*

46b Basal lvs withering, not much larger than the well-developed cauline lvs; pls with rhizomes, but no stolons; ♀ pls gen with a few central, functionally ♂ fls in each head *Euchiton*

45b Pls taprooted ann or per; heads all with the outer fls ♀ and the central ones ♂ (or functionally ♂)

47a Heads in terminal, capitate clusters subtended by a false invol of lfy bracts, the sts resembling a lfless peduncle below the clusters; phyllaries hyaline nearly throughout *Logfia*

47b Infl corymbiform to paniculiform or spiciform, often lfy or the st lfy ± throughout; phyllaries various *Gamochaeta*

48a Recep with 1 or more series of paleae around the outer fls (the paleae simulating an invol in *Filago*, but with a few inconspicuous ♀ fls borne between them and the smaller true phyllaries); invol and recep bracts with strongly green midrib nearly or quite to the tip; pls ann *Omalotheca*

49a Phyllaries none or 1–4, narrower than the well-developed paleae, the paleae resembling an invol *Filago*

49b Phyllaries (3–)5, wider than and enclosing the 3–7 slender, marginal paleae *Logfia*

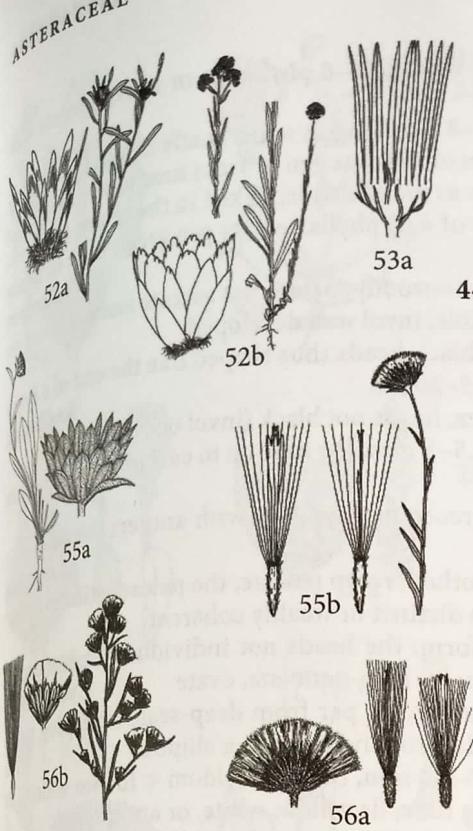
48b Recep naked; phyllaries with ± conspicuous, wide, scariosus or hyaline tip; pls ann of per *Gamochaeta*

50a Heads glomerate in an elongate, spiciform array *Gamochaeta*

51a Achenes papillate; phyllaries in 3–7 series; lvs and phyllaries oblanceolate to spatulate; infl gen comprising < 1/3 of st length, gen lfy-bracteate only among basal glomerules; pls ann to short-lived per *Omalotheca*

51b Achenes minutely strigillose; phyllaries in 2–3 series; lvs and phyllaries linear to narrowly lanceolate or oblanceolate; infl comprising 1/3–5/6 of st length, lfy-bracteate much of length with phyllaries much > glomerules; pls per *Omalotheca*

50b Heads in corymbiform to paniculiform arrays *Omalotheca*



52a Pls ann, 1–1.5(–3) dm, with the lvs all caulinne and not reduced upwards; heads in lfy-bracteate glomerules; invol 2–4 mm

Gnaphalium

52b Pls ann, bien, or per, 0.5–1.5 dm, the lvs all caulinne or occ basal lvs largest and caulinne lvs gradually reduced upwards; heads in glomerules or corymbiform to paniculiform arrays; invol 3–7 mm

Pseudognaphalium

44b Herbage often pubescent but not at all white-woolly (or if thinly so then lvs toothed or pinnatifid); phyllaries not markedly scarious at the tip (or with a narrow scarious margin and tip in *Pyrrhocoma carthamoides*); anthers truncate to sagittate at base

53a Phyllaries essentially = and uniseriate, not including the much reduced calyculi at base

Erechtites

53b Phyllaries in 2–several series, imbricate or subequal; calyculi absent

54a Pls per; lvs basal and caulinne or all caulinne

55a Invol 1.5–3 cm; disk corollas 9–14 mm (*P. carthamoides*)

Pyrrhocoma

Erigeron

55b Invol 4–9 mm; disk corollas ca 3–5 mm

54b Pls ann; lvs all caulinne

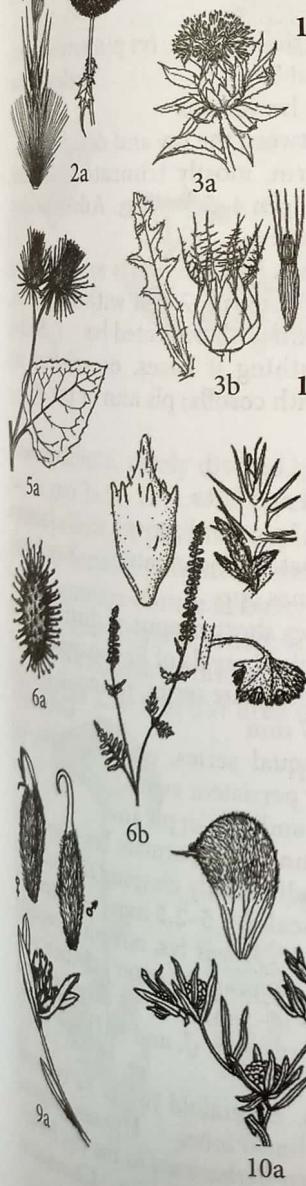
56a Invol 3–4 mm, or occ up to 6 mm but then the herbage evidently pubescent

Conyza

56b Invol 5–11 mm; herbage essentially glab except for the remotely hispidulous-ciliate margins of the lvs (*S. ciliatum*, *S. frondosum*)

Symphyotrichum

Group 6 Heads discoid or disciform, pappus chaffy, or of awns, or none



1a Pls thistlelike with spiny-margined lvs

2a Heads 1-fld, aggregated into 1 or more, globose, pedunculate secondary heads; fls white to blue

Echinops

2b Heads ∞-fld, not aggregated into secondary heads, subtended by an invol of lflike bracts or the outer phyllaries lfy; fls yellow to orange-red

3a Phyllary tips with a short, undivided spine; achenes quadrangular; fls all ♂ and fertile, the invol 2–4 cm diam; pls 3–10 dm, glab, the sts whitish; lvs dark green, ovate-lanceolate, 2–8 cm

Carthamus

3b Phyllary tips with a prominent, pectinately divided spine; achenes terete, 20-ribbed; outer fls ♀ (with a gen tubular-filiform corolla lacking anthers) (*C. benedicta*)

Centaurea

1b Pls not thistlelike, the lvs not spiny-margined (but provided with tripartite axillary spines in *Xanthium spinosum*)

4a Phyllaries either ∞ and hooked at the tip, or those of the ♀ heads fused and the invol nut- or burlike and gen provided with tubercles or spines

5a Heads all alike, with ± ∞ fls, phyllaries hooked at the tip; recep bristly; corollas ± evident, pink to purple

Arctium

5b Heads of 2 kinds; invol of the ♀ heads nut- or burlike, the phyllaries fused and gen provided with spines, tubercles, or hooked prickles; invol of ♂ heads unarmed; recep chaffy; corollas small and inconspicuous, or absent

Xanthium

6a ♀ invol with hooked prickles; ♂ heads few at br tips

Ambrosia

6b ♀ invol with tubercles or straight spines; ♂ heads ∞, nodding in elongate, racemiform to spiciform arrays at br tips

4b Phyllaries not hooked at tips (though spiny in some spp. of *Centaurea*) nor fused and nut- or burlike (achenes tipped with spines or barbs in some genera; paleae with minute hooked tips in *Ancistrocarphus*)

7a Recep paleate or bristly throughout (the paleae occ resembling an invol or saccate and enclosing the achenes), or a few of the central fls bractless

8a Pls slender or compact anns, ± white-woolly; lvs entire; paleae ± saccate, each enclosing a fl, the corollas obscure; invol of 4–6 phyllaries or none

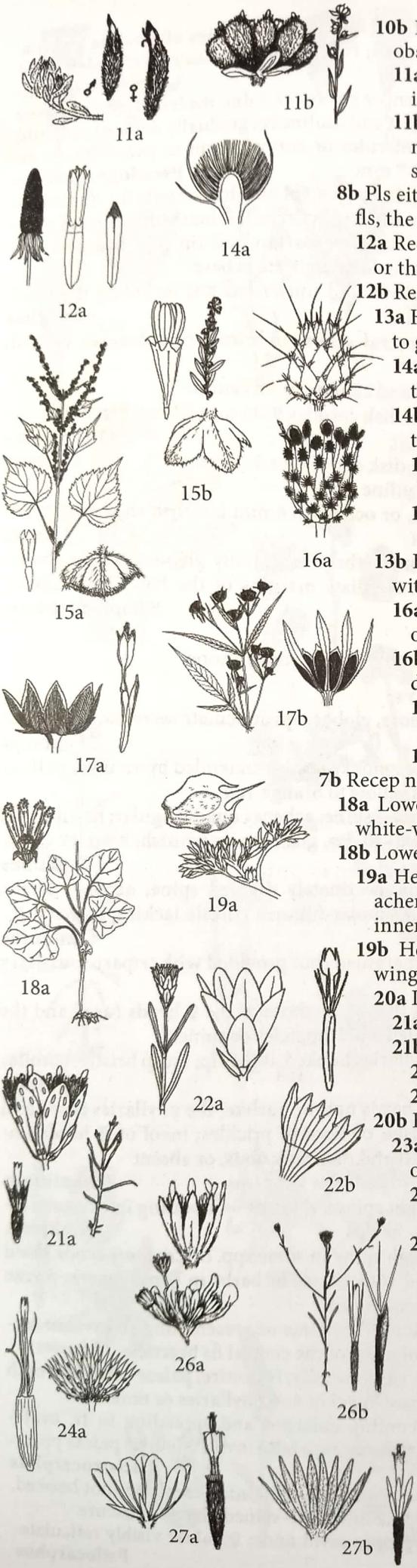
9a ♂ (inner) paleae 5(–7), becoming enlarged and spreading in fr, ovate-lanceolate with a hooked tip, resembling a false invol; ♀ (outer) paleae prominently 3-veined

Ancistrocarphus

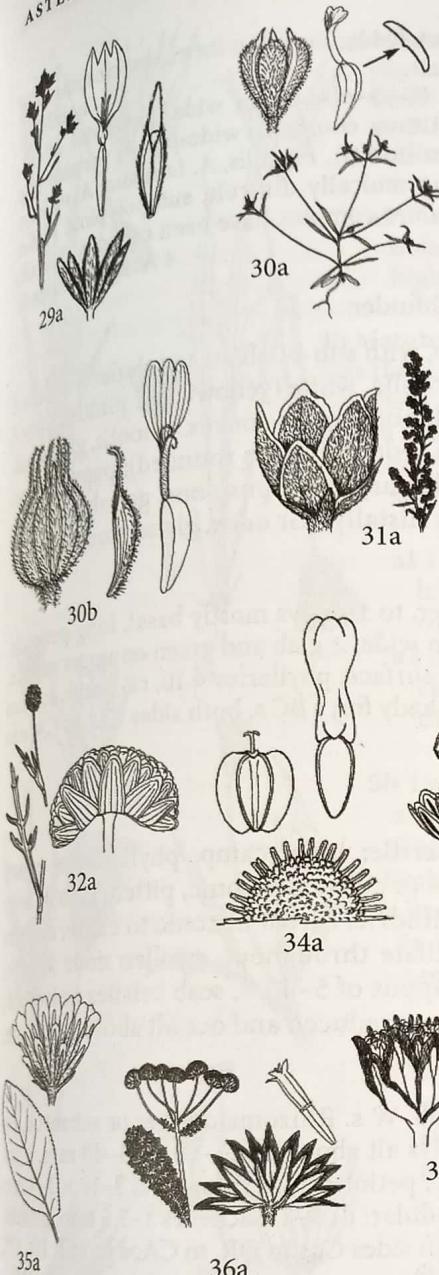
9b ♂ paleae none or 1–4, not enlarged in fr, remaining erect, tips not hooked, not resembling an invol; ♀ paleae reticulate-veined or veins obscure

10a Cauline lvs mostly opp; proper invol none; ♀ paleae visibly reticulate-veined

Psilocarphus



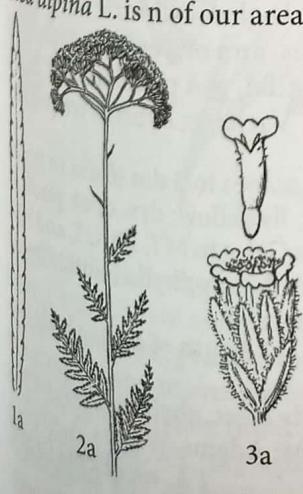
- 10b** Lvs all or nearly all alt; invol of 4–6 phyllaries or none; ♀ paleae with obscure parallel veins
11a Recep elongate, gen 3–8 × as long as wide, chaffy throughout; proper invol none or quickly deciduous; sts gen br from near base *Stylocline*
11b Recep convex, 0.5–2 × as long as wide, naked in the center, the innermost fls bractless; invol of 4–6 phyllaries; sts gen erect, unbr or nearly so *Micropus*
- 8b** Pls either per or not at all white-woolly; paleae not saccate and enclosing the fls, the corollas gen clearly visible; invol well developed
12a Recep elongate, the large black heads thus shaped like the end of a finger or thumb; coarse, erect, per 5–20 dm
12b Recep flat or merely convex; heads not black (invol occ blackish) *Rudbeckia*
- 13a** Heads small, the invol 1.5–5 mm, the disk up to ca 5 mm wide; fls white to greenish
14a Lvs 1–3 × pinnatifid; recep bristly; ♂ fls with anthers connate into a tube *Artemisia*
14b Lv entire or merely toothed; recep paleate, the paleae setiform or flattened; ♂ fls with anthers distinct or weakly coherent
- 15a** Infl large, paniculiform, the heads not individually subtended by lvs; pls ann, 1.5–20 dm; lvs long-petiolate, ovate *Cyclachaena*
15b Heads axillary, nodding; pls per from deep-seated creeping roots, 1.5–6 dm; lvs subsessile, broadly linear to ± elliptic *Iva*
- 13b** Heads larger, the invol 6–40 mm, the disk seldom < 10 mm wide; ♂ fls with anthers connate into a tube; fls yellow, white, or anthocyanic
16a Recep bristly; phyllaries imbricate, not in 2 distinct series; achenes obliquely attached to the recep *Centaurea*
16b Recep paleate, the palea chaffy; phyllaries in 2 series and obviously dimorphic; achenes basifix
- 17a** Inner phyllaries united for 1/3–2/3 their length; lvs pinnately lobed, ours with ± linear segms *Thelesperma*
17b Phyllaries all separate or nearly so; lvs various *Bidens*
- 7b** Recep naked, or with a single row of paleae between the ray and disk fls
18a Lowermost lvs deltoid-ovate to subreniform, mostly truncate to hastate, white-woolly beneath, green above; phyllaries gen 4–5 *Adenocaulon*
18b Lowermost lvs otherwise; phyllaries gen more ∞
- 19a** Heads sessile, cupped by sheathing lf bases in forks of brs and at br tips; achenes wing-margined and spine-tipped; outer fls ♀ and without corolla, inner fls functionally ♂; low, procumbent ann with dissected lvs *Soliva*
19b Heads not sessile and cupped by sheathing lf bases, or achenes not wing-margined or not spinose; fls gen all with corolla; pls ann or per
- 20a** Lvs consistently opp
21a Lvs pinnatifid or bipinnatifid; MT and e *Dyssodia*
21b Lvs entire to occ ± pinnatilobate; WA and OR s
22a Phyllaries conspicuously imbricate in several series *Jaumea*
22b Phyllaries essentially = and unisexual, occ connate *Lasthenia*
- 20b** Lvs alt, or occ some of the lowermost ones opp
23a Fls with an evident though sometimes short pappus of distinct awns or scales (pappus rarely absent on marginal ray fls of *Rigopappus*)
24a Phyllaries ± ∞ (25–100+), in 4–9 imbricate series, resinous; pappus of a few firm, deciduous awns (1–)2–7 mm *Grindelia*
24b Phyllaries 5–21 in 1–3 gen subequal series, occ glandular, but scarcely resinous; pappus of scales or persistent awns
- 25a** Heads with minute rays, these ♀ and fertile; pls ann
26a Pls depressed, white-woolly ann with spatulate lvs; phyllaries spreading to reflexed in fr, not individually clasping the achenes; pappus (ours) of 2 membranous scales, 1.5–2.5 mm *Eatonella*
26b Pls erect ann with wiry brs and ± linear lvs, not white-woolly; phyllaries erect and individually clasping the outer achenes; pappus of 3–5 stiff, subulate scales (1–)4–5 mm *Rigopappus*
- 25b** Heads strictly discoid, the fls all tubular, ♀, and fertile; pls ann, bien, or per
27a Phyllaries with wide, scarious, ± petaloid (white or colored) tips; lvs pinnatifid with elongate, linear lobes *Hymenopappus*
27b Phyllaries not at all petaloid, gen herbaceous to the tip; lvs entire to pinnatifid *Chaenactis*



- 23b** Fls without a pappus, or the pappus a mere minute crown
28a Phyllaries uniserial and = to subequal, each wholly or almost wholly enclosing an achene; pls linear-lvd ann with minute rays
29a Invol ± silky-villous, often also sparsely stipitate-glandular
Lagophylla
- 29b** Invol ± strongly glandular, not silky-villous
30a Achenes ± compressed at right angles to a radius of the head; pls diminutive, the better-developed pls ± divaricately br, with heads in the forks of the brs and in small, terminal, cymose clusters
Hemizonella
- 30b** Achenes compressed parallel to a radius of the head or ± terete; pls not divaricately br, the infl gen corymbiform to paniculiform
Madia
- 28b** Phyllaries clearly imbricate in several series, scarious-margined, not each enclosing an achene; pls ann to per herbs or shrubs
31a Infl spiciform, racemiform, or paniculiform; phyllaries gen 2–20; pls ann to per herbs, subshrubs, or shrubs
Artemisia
- 31b** Infl corymbiform to capitate, or the heads solitary; phyllary no various
Cotula
- 32a** Lvs connate-sheathing around sts; pls ± succulent per; wet areas (*C. coronopifolia*)
32b Lvs not connate-sheathing; pls ann to per herbs or shrubs
33a Pls ann, with finely pinnatifid to tripinnatifid lvs
34a Marginal fls ♀; marginal achenes stipitate, winged (ours), the stipe persistent on the recep; recep flat to hemispheric; heads few, on long peduncles (*C. australis*)
Cotula
- 34b** Fls all ♀; achenes all sessile, none winged; recep hemispheric or conic; heads gen in lfy, corymbiform arrays, occ few or solitary (*M. discoidea*)
Matricaria
- 33b** Pls per herbs or subshrubs; lvs various
35a Lvs merely crenate (occ with a few reduced basal pinnae), elliptic to oblong (*T. balsamita*)
Tanacetum
- 35b** Lvs apically 3-lobed, or ternately to pinnately dissected
36a Phyllaries 20–60; rhizomatous per with lvs all cauline at anthesis, pinnately dissected
Tanacetum
- 36b** Phyllaries 8–20; subshrub or taprooted per with lvs basal and cauline, reduced upwards, apically 3–5-lobed or ternately to pinnately dissected
Artemisia

Achillea L. Yarrow

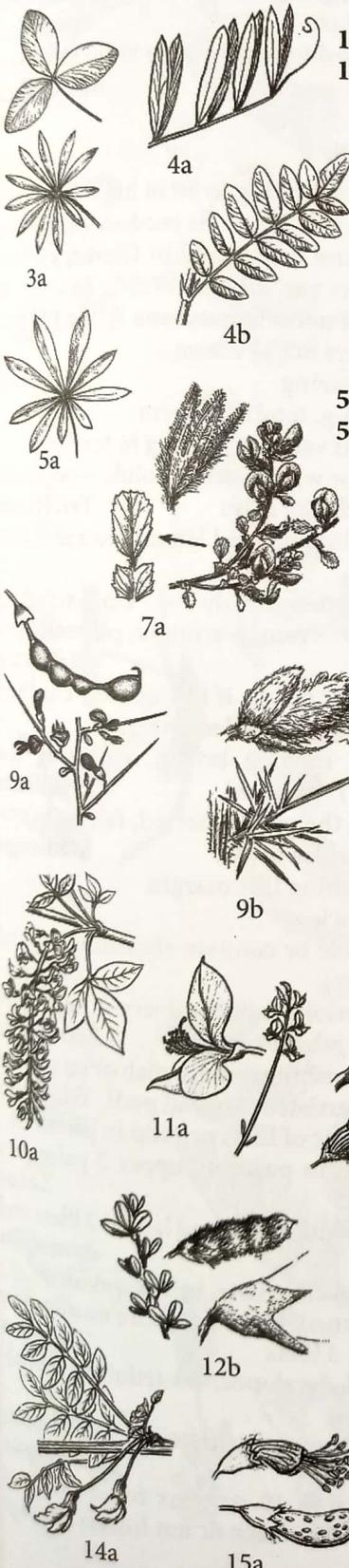
Heads radiate, rarely discoid, gen several–∞ (rarely 1) in compact to open, ± flat-topped, corymbiform arrays; ray fls gen 3–5(–12+), white, yellow, or pink to purple, ♀, fertile; disk fls gen 15–75(–∞), ♂, fertile, corolla 5-lobed, white, yellow, or pink to purple, tube short, throat camp; invol camp to hemispheric, small, phyllaries unequal, gen 2–3-seriate, persistent, margins scarious, calyculi none; recep flat to convex, occ conic, glab or minutely bristly, anthers obtuse at base, tip ovate; style brs linear, stigmatic in 2 lines; achenes obcompressed, oblong to obovate, margins thickened, winged or not, glab, pappus none; aromatic, per herbs with alt, petiolate or ± sessile lvs, the bls simple or pinnately lobed, entire or 1–2-serrate. (For Achilles of Gr mythology). Allotetraploid *Achillea alpina* L. is n of our area in AK and adj Can.



- 1a** Lvs simple, serrate; ray laminae 4–5 × 4–5 mm (occ larger in double fls); disk fls 45–75+ (occ 0 in double fls); heads in arrays of 3–15+; pls 3–6 dm, rhizomatous; disturbed areas, fields; Eurasian intro, occ escaping cult; AK to OR, scattered e across n US and Can to Atl; sneezewort (*Chamaemelum p.*)
1 A. ptarmica L.
- 1b** Lvs 1–2-pinnately lobed, entire to 1–2-serrate; ray laminae < 3 × 3 mm; disk fls 10–40; heads in arrays of 10–100(–∞)
2a Lf lobes in a single plane, margins incised serrate, glandular; rays fls yellow, occ reduced or none in cult forms with heads then discoid; pls to 10 dm; disturbed areas, roadsides; uncommon Eurasian intro, occ escaping cult; sporadic, AK s, both sides Cas, to Douglas Co, OR, e to w MT; fernlfy. (*A. eupatorium*, *A. filicifolia*, *Tanacetum angulatum*); variable
2 A. filipendulina Lam.
- 2b** Lf lobes gen multiplanar, margins finely dissected, not glandular; ray laminae white or pink to purple
3a Pls taprooted, 1.5–6 dm; invol 1.5–2.5 mm wide, phyllaries 10–15, 1–2-seriate,

FABACEAE (Leguminosae) Pea Family

Fls gen ♀, solitary to racemose, spicate, or capitate; sepals gen 5, connate, tubular to camp or occ bilabiate; corolla in one of 3 forms; our spp. (except *Gleditsia*) with papilionaceous fls, these strongly irreg with gen 5 petals, the uppermost petal (banner) gen much the largest and reflexed, 2 lateral petals (wings) ± horizontal, gen smaller than banner, gen enclosing the lowermost and innermost, partially connate pair of petals (keel) which enclose the stamens and pistil (in *Dalea* petals apparently 5 and much alike, all distinct; in *Amorpha* only banner petal present); stamens gen 10 and monadelphous (all 10 fused) or diadelphous (9 fused, 1 distinct), but occ all distinct, sometimes only 5 (in *Dalea*); style and stigma 1; pistil 1, 1-carpellate; ovary superior, gen dehiscent on 2 sutures, but sometimes breaking crosswise into gen flattened, oval segms, very rarely indehiscent, sometimes spiny or burlike; seeds 1–∞; ann to per herbs, shrubs, trees, or vines, gen with alt, stip, pinnately to palmately compound, trifoliate, or occ simple, occ tendril-bearing lvs; roots often with nitrogen-fixing nodules. The family is sometimes split into three separate families based on fl form: Caesalpinaeae, Fabaceae, and Mimosaceae. Cult *Cercis siliquastrum* L. reseeds readily in WA, but is not naturalized.



1a Pls woody trees or shrubs, all intro in our area

Group 1

1b Pls herbaceous or vinelike, rarely a woody vine, native or intro

2a Lvs simple, or absent at fl time (occ stips lflike)

Group 2, lead 17a

2b Lvs compound

3a Lvs trifoliate, or palmately compound, or lflets 2

Group 3, lead 21a

3b Lvs pinnately compound, with > 3 lflets

4a Lvs even-pinnate, lf rachis often terminated by a bristle or tendril

Group 4, lead 34a

4b Lvs odd-pinnate, the lf rachis terminated by a single lflet

Group 5, lead 36a

Group 1 Woody trees or shrubs

5a Lvs palmately compound

Lupinus

5b Lvs simple to trifoliate or pinnately compound, or absent at fl time

6a Lvs simple to trifoliate, or fully absent at fl time

7a Lvs (or lflets) serrate; fls 1(2) in lf axils, purplish or reddish; pls pilose-villous and glandular, unarmed or weakly thorny, gen decumbent; Eurasian intro, known only from old colls at Bingen, WA, and near Portland, OR; restharrow; ours subsp. **maritima** (Dumort.) P. Fourn (*O. repens*)

Ononis spinosa L.

7b Lvs (or lflets) entire; fls not red or pl not pilose-villous and glandular

8a Brs and brlets thorn-tipped; lvs simple; fls pinkish-red or yellow

9a Lvs elliptic to obovate, not spinescent; fls pinkish-red; pods exserted from calyx, glab, constricted between seeds

Alhagi

9b Lvs subulate, spinescent; fls yellow; pods gen enclosed in calyx, pubescent, not constricted between seeds

Ulex

8b Brs and brlets not thorn-tipped, the pls unarmed; lvs simple or trifoliate; fls gen yellow, occ white

10a Fls ∞ in pendent racemes; lvs trifoliate, lflets 2–6.5 cm; twigs not green, scarcely angled; large shrubs or small trees

Laburnum

10b Fls 1–few in lf axils, or few in ± erect racemes; lflets rarely > 2 cm; twigs gen green, striate to angled; shrubs

11a Calyx deeply split on upper side, thus 1-lipped, lip minutely 5-toothed; fls in erect racemes; lvs all simple; sts rushlike

Spartium

11b Calyx bilabiate or camp, teeth not confined to lower lip; fls 1–few in lf axils or small axillary racemes; lvs in part trifoliate; sts various

12a Style abruptly curved or coiled at middle, or gently curved throughout; calyx bilabiate, upper lip minutely 2-toothed

Cytisus

12b Style abruptly bent at tip; calyx weakly if at all bilabiate, upper 2 teeth well-developed

Genista

6b Lvs pinnately compound, with > 3 lflets

13a Fls minute, radially symmetrical, greenish-yellow, in spicate racemes; pods (7–)15–35 × 1.5–3.5 cm, flattened, gen curved; small trees with lvs once-pinnate (on mature sts) or twice-pinnate (on young sts), often armed with stout thorns; native to c and s US, rarely intro e Cas in our area

Gleditsia triacanthos L.

13b Fls showy, bilaterally symmetrical or petals solitary, yellow to white, pink, or purple; pods 0.5–12 × 0.3–1.5 cm; lvs all once-pinnate; pls armed or not

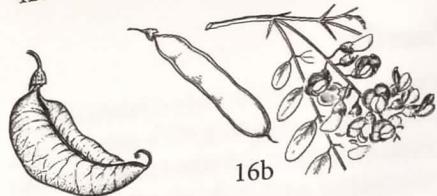
Caragana

14a Lvs even-pinnate; fls yellow, fascicled on short shoots

14a Lvs odd-pinnate; fls yellow to white, pink, or purple, in racemes

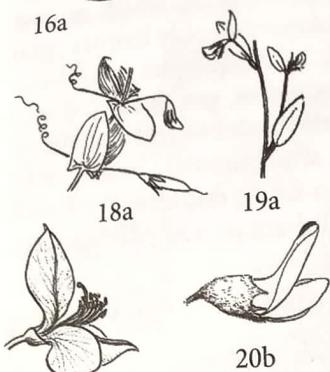
15a Corolla 5–6 mm, reduced to a single banner petal; pods 5–9 mm, 1(2)-seeded; shrubs with ∞-fld, dense racemes

Amorpha



- 15b** Corolla 15–25 mm, with all 5 petals well-developed; pods 4–12 cm, seeds several–∞; trees or shrubs with fls few–∞ in loose racemes
16a Pods inflated; fls yellow; pls unarmed shrubs
16b Pods flattened; fls white to pink or purple; pls large shrubs or trees with stips modified into thorns

Colutea
Robinia



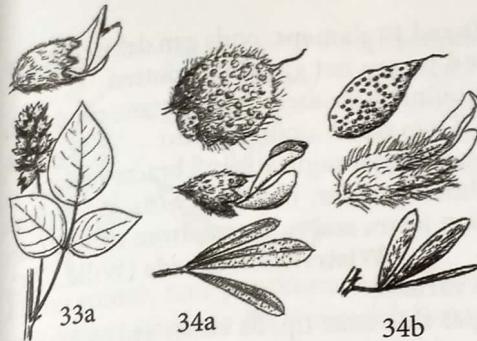
Group 2 Lvs simple, or absent at fl

- 17a** Fls 1(2) per lf axil
18a Lf bl lacking; stips lflike, ovate-triangular, hastate; tendrils present
18b Lf bl present; stips small or reduced to glands, not lflike; tendrils absent
19a Stips glandlike; lvs ovate to lanceolate, venation pinnate
19b Stips lanceolate; lvs narrowly lanceolate, venation parallel
- 17b** Fls few–∞ in axillary or terminal racemes
20a Calyx deeply split on upper side, thus 1-lipped, lip minutely 5-toothed; fls bright yellow; subshrubs with persistent, green, rushlike sts
20b Calyx ± camp, teeth well-developed, not confined to lower lip; fls various, rarely bright yellow; herbs

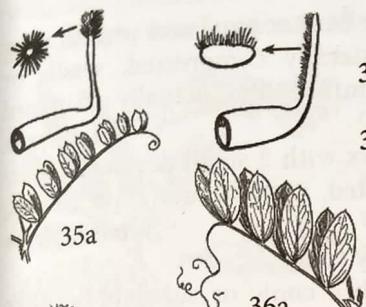
Lathyrus
Acmispon
Lathyrus
Spartium
Astragalus

Group 3 Lvs trifoliate, or palmately compound, or lflets 2

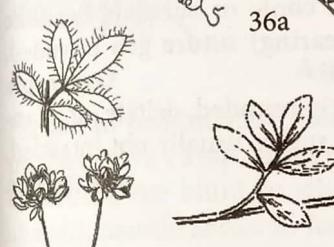
- 21a** Pls robust, twining, herbaceous vines, potentially climbing to 30 m high; lvs trifoliate, lflets 5–20 cm, orbicular-ovate, entire to irreg few-lobed; fls reddish-purple, in axillary racemes; invasive Asian intro; detected and eradicated in Clark Co, WA (2001), and Portland, OR (2000); se US; kudzu; ours var. *lobata* (Willd.) Maesen & S. M. Almeida ex Sanjappa & Predeep
- 21b** Pls not twining vines, or if so then other characters not as above
- 22a** Lflets 2; pls ann, gen twining; lvs gen tendril-bearing
- 22b** Lflets 3 or more; pls ann or per, often not twining; tendrils absent
- 23a** Lflets toothed or wavy-margined, main lateral veins extending to teeth tip
- 24a** Lvs palmately trifoliate, middle lflet sessile or with short petiolule = petiolule of lateral lflets, lf rachis not extending beyond lateral lvs
- 24b** Lvs pinnately trifoliate, the lf rachis extending beyond lateral lflets and distinct from petiolule of terminal lflet
- 25a** Fls ∞ in elongate, slender, loosely-flld racemes mostly 3–12 cm (excluding peduncle); corolla yellow or white; pods 1.5–5 mm, ± straight; pls erect, gen > 5 dm
- 25b** Fls few–∞ in short, congested racemes or heads, if infl occ > 3 cm then corolla purplish, or pods > 5 mm and curved, or pls decumbent
- 26a** Corolla withering-persistent, yellow turning brown, enclosing the ± straight, unarmed pods (*T. campestre*, *T. dubium*)
- 26b** Corolla deciduous, yellow to purplish, the pods exserted, falcate to spirally coiled at least at tip, armed with prickles or not
- 23b** Lflets entire, main lateral veins not quite reaching lflet margin
- 27a** Fls umbellate, or solitary on axillary peduncles
- 28a** Stips conspicuous, partly adnate to petiole or connate-sheathing around st, membranous to foliaceous
- 29a** Stips connate-sheathing, free from petiole; foliage silvery-villous with dolabriform hairs; corolla deciduous (*A. giliviflorus*)
- 29b** Stips adnate to petiole, not connate-sheathing; foliage glab or strigillose with basifixied hairs; corolla withering-persistent around pod
- 28b** Stips reduced to minute glands (lowest pair of lflets occ stip in position)
- 30a** Lvs actually 5-foliate, the lower 2 stip in position, upper 3 palmately trifoliate and ± sessile at rachis tip
- 30b** Lvs pinnately 3-foliate, the lf rachis extending beyond lateral 2 lflets and distinct from petiolule of terminal lflet
- 27b** Fls in congested to elongate racemes, often verticillate, infl axis evident
- 31a** Calyx strongly bilabiate; upper lip 2-toothed, lower lip entire or minutely 3-toothed; lvs palmately compound with > 3 lflets
- 31b** Calyx tubular to camp, all 5 teeth well-developed; lvs trifoliate or palmately compound
- 32a** Stips foliaceous; filaments all free to base; lvs trifoliolate; pods linear, much > calyx; herbage not gland-dotted
- 32b** Stips not foliaceous; filaments of 9 or all 10 stamens fused much of length; lvs trifoliate or palmate, pod either < calyx or not linear; herbage dotted with small sessile glands



- 33a Lflets broadly ovate-lanceolate, (1.5-)2-4 cm wide, terminal lflet with petiolule > 1 cm; fls yellowish; calyx hairs gen black *Rupertia*
- 33b Lflets oblanceolate, obovate, oblong, or linear, < 1.5 cm wide, terminal lflet sessile or with petiolule much < 1 cm; fls bluish-purple to occ white; calyx hairs white
- 34a Infl bracts quickly deciduous at anthesis; pods subglobose, exserted from calyx and falling separately; calyx lobes < tube *Ladeania*
- 34b Infl bracts persistent well into fr; pods ovoid to ellipsoid, exserted from or enclosed within calyx, the pod and calyx falling as a unit; calyx lobes ca ≥ tube *Pediomelum*



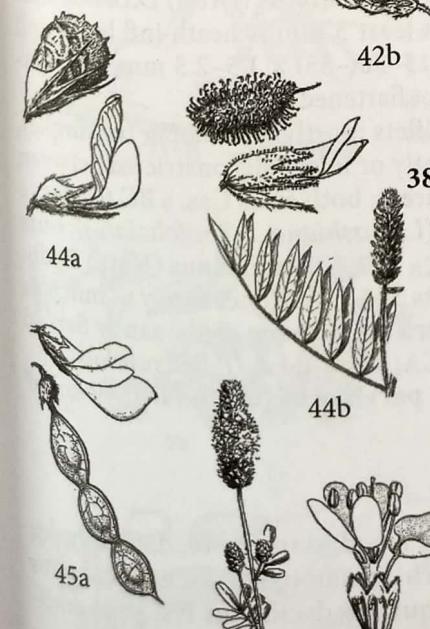
- 35a Style terete, with a distal tuft or ring of hairs ± encircling the tip or concentrated on lower side; lflets folded in bud *Vicia*
- 35b Style terete to flattened or folded, hairy for 1/3-1/2 length only on the upper side; lflets rolled or folded in bud
- 36a Style terete to curved or flattened from top and bottom, not longitudinally folded; stips either < lflets or lflets > 6; lflets rolled in bud; calyx lobes < or > tube; pls ann or per, glab or pubescent, native or intro spp. *Lathyrus*
- 36b Style longitudinally folded, appearing strongly flattened from sides; stips foliaceous, ≥ lflets; lflets 4-6, folded in bud; calyx lobes > tube; pls ann, glab; rarely escaping or persisting in waste areas; cult garden pea; our pls mostly var. *arvense* (L.) Poir., with lilac banner, reddish-purple wings, and seeds 4-8 mm; var. *sativum*, with white fls and seeds 8-12 mm, is occ *Pisum sativum* L.



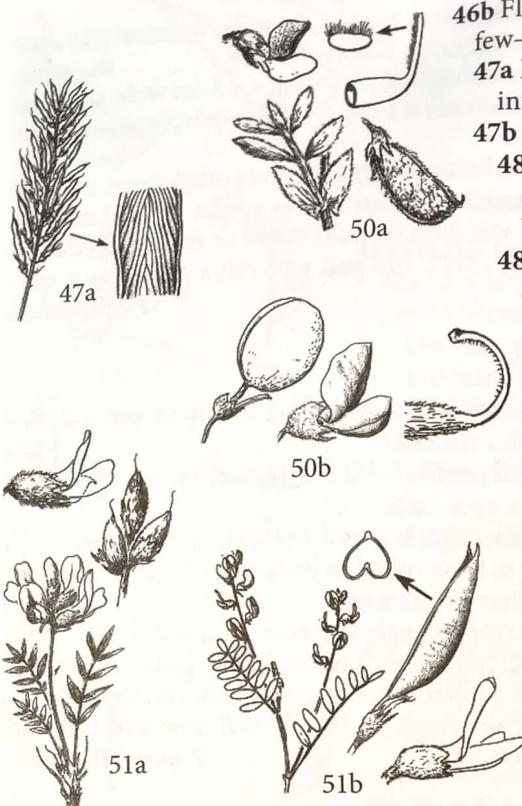
Group 5 Lvs odd-pinnate



- 37a Lflets serrate or dentate; frs inflated, glandular-hairy, 1-2-seeded; fls white to pale purple, 1-3 on axillary peduncles; wastelots, railroads, roadsides; cult crop pl, rarely persisting or escaping in our area; chickpea, garbanzo bean *Cicer arietinum* L.
- 37b Lflets entire; other characters various
- 38a Fls umbellate or solitary in lf axils, if solitary then stips glandlike
- 39a Stips reduced to glandlike bumps or obsolete (occ lowest pair of lflets in stip position); lflets 3-5
- 40a Lflets 5, the lower 2 stipular in position, upper 3 palmately trifoliate and ± sessile at rachis tip *Lotus*
- 40b Lflets 3-5, irreg arranged, lower 2 not in stip position, lf rachis often extending beyond lateral lflets and distinct from petiolule of terminal lflet *Acmispon*



- 39b Stips not glandlike, gen elongate, green to scarious; lflets 5-37
- 41a Pods dehiscent lengthwise, not breaking into segms, not or scarcely constricted between seeds, straight; lvs petiolate, lowest pair of lflets > 5 mm from lf base *Hosackia*
- 41b Pods not dehiscent but breaking crosswise into 1-seeded segms, often constricted between seeds, gen curved; lvs ± sessile; intro European weeds
- 42a Style 4-6 mm; fls 8-15 mm; infl not subtended by a lflike bract; glab per to 1.2 dm *Securigera*
- 42b Style < 1 mm; fls 3-9 mm; infl gen subtended by a lflike bract; ours pubescent anns to 5 dm *Ornithopus*
- 38b Fls few-∞ in dense (occ headlike) to elongate racemes or spikes, if rarely fls solitary then stips not glandlike
- 43a Frs spiny, or with a few short, spiny teeth near tip, 1-2-seeded
- 44a Frs with a few short, straight, spiny teeth near tip, also strongly reticulate-veined; fls pinkish-lavender; lvs without sessile glands *Onobrychis*
- 44b Frs cockleburlike, covered with ∞ hooked spines, venation not prominent; fls dirty white to yellowish or purplish; lvs with sessile glands *Glycyrrhiza*
- 43b Frs not spiny, 1-∞-seeded
- 45a Pods much constricted between seeds, not dehiscent but breaking crosswise into 1-seeded segms, strongly flattened; wing petals < the broadly truncate keel *Hedysarum*
- 45b Pods not much constricted between seeds, dehiscent lengthwise, often not flattened; wing petals gen ≥ the keel or fls not papilionaceous
- 46a Fls not papilionaceous, fertile stamens 5, alt with 4 petaloid staminodes at summit of staminal tube; pods ± indehiscent, 1-2-seeded, enclosed in capsule finely dotted with small, sessile glands *Dalea*



- 46b** Fls papilionaceous, with 5 petals and 10 stamens; pods gen dehiscent, gen few-∞-seeded, gen exserted; lvs and sts gen not glandular-dotted
47a Pods linear, prominently longitudinally striate; stips sagittate, persistent; infl bracts subulate, persisting well into fr; uncommon intro *Galega officinalis*
47b Pods not longitudinally striate; stips not sagittate; infl bracts various
48a Pls woody, twining and climbing vines; lflets 13–19; fls 15–20 mm; WA and OR
48b Pls herbaceous; lfts 4–25; fls variable
49a Style pubescent along upper side near tip; fls either red to orange-red, or bicolored pink-purple and white
49b Style glab (puberulent); fls variously colored

50a Fls bicolored with a pink-purple banner petal and whitish wing petals; calyx ebracteate; pods laterally compressed, sessile or scarcely stipitate; lflets 4–8, the terminal "lflet" actually a flattened tendril; pls 1–6 dm (*L. littoralis*)
Lathyrus littoralis

50b Fls brick-red to orange-red; calyx with 2 small deciduous bracteoles at base; pods bladdery-inflated, with slender stipe > calyx; lflets 9–25; pls mostly > 5 dm
Sphaerophysa sphaerophysoides

- 51a** Keel petal abruptly narrowed to a conic or subulate beaklike point; pods with the ventral (seed-bearing) suture gen intruded, forming a partial or complete sceptum
Oxytropis
51b Keel petal not abruptly beaked, the tip rounded, deltate, or triangular; pods variable, but with ventral suture usually not intruded, or less intruded than the dorsal suture
Astragalus

Acmispon Raf. Deervetch; Lotus

Fls papilionaceous, axillary to umbellate, cream or yellow, often tinged with reddish or pinkish; calyx tubular to camp, teeth > to < tube; stamens 10, diadelphous; pods 1–several-seeded, dehiscent or not; glab to hairy ann or per herbs with pinnately (1)3–5-foliate lvs and minute, glandlike stips. (Possibly Gr for hooked fr tip). (*Lotus* in part).



1a Fls in axillary, pedunculate umbels, mostly 3–12 per umbel, bright yellow (reddening in age); pods 6–10 mm, falcate, scarcely 2 × as long as the calyx, indehiscent, 1–3-seeded; pls per; lflets (3–)5; sandy or rocky soil of open for and slopes; s PT and Yakima Co, WA, s, along both sides Cas, to CA and NV, also in ne WA, n ID, sc BC, and Boise Co, ID; NV d.; ours var. *nevadensis* (*L. n.*; *L. n.* var. *douglasii*)

1 A. nevadensis (S. Watson) Brouillet

1b Fls 1(2) per lf axil, sessile or pedunculate, cream or pale yellow, often with pinkish tinge; pods 8–35 mm, straight, much > calyx, dehiscent, 2–8-seeded; pls ann

2a Fls subsessile in lf axils, ebracteate; pods 8–15 × 2.5–4 mm, not constricted between the 2–4 seeds; rachis of lvs flattened; calyx teeth 1.5–2 × length of tube; mostly in sandy to rocky soil in open; e side Cas to coast, s BC to c CA, disjunct in s ID and sw UT; meadow l. (*L. d.*)
2 A. denticulatus (Drew) D.D. Sokoloff

2b Fls pedunculate, the longer peduncles gen at least 3 mm beneath infl bract and ped (occ only 1–2 mm in no 3); pods mostly 15–30(–35) × 1.5–2.5 mm, occ constricted between the 4–8 seeds; rachis of lvs not flattened

3a Calyx teeth mostly > 2 mm, much > tube; lflets mostly 3 (or upper lvs simple), larger ones gen > 1 cm; fls 5–9 mm; pod slightly or not at all constricted between seeds; sandy to rocky soil, open to wooded areas; both sides Cas, s BC to Mex, e to ID, w MT, c and e N Am; Spanish-clover (*L. purshiana*, *L. unifoliolatus*); ours var. *americanus*
3 A. americanus (Nutt.) Rydb.

3b Calyx teeth 0.5–1.5 mm, < or ca = tube; lflets 3–5, larger ones rarely as much as 1 cm; fls 4–6 mm; pod mostly strongly constricted between seeds; sandy flats to open slopes; e base Cas to coast, sw BC to s CA; small-fld d. (*L. micranthus*)
4 A. parviflorus (Benth.) D.D. Sokoloff

Alhagi Gagnebin Camel-thorn

Fls papilionaceous, few–several in small, axillary racemes; calyx camp, scarcely lobed; stamens 10, diadelphous; pods indehiscent, few–several-seeded, strongly constricted between the seeds; rhizomatous shrubs or subshrubs with greenish, terete sts, needlelike axillary nodal thorns, and small, simple, quickly deciduous lvs; stips rudimentary. (Derived from Arabic name for pl, *al-hajji* or *al-haggi*, pilgrim).

POLYGALACEAE Milkwort Family

Infl racemose (ours), pan, or rarely fls solitary; fls ♀, bilaterally (ours) or radially symmetric; sepals 5, inner 2 > outer 3; petals 3 or 5, fused below; stamens (2-)5-8(-10), often connate, epipetalous (ours), anthers dehiscing apically; pistil 2-8-carpellate, ovary superior; fr caps, often 2-seeded (ours); ann or per herbs, subshrubs (ours), shrubs, trees, or woody vines with simple, entire, alt or sometimes opp or whorled, petiolate, exstip lvs.

Polygala L. Milkwort

Calyx 5-lobed, the 2 larger, inner lobes (wings) colored as the petals; corolla 3-lobed, lowest lobe (keel) often showy, fringed; lvs alt, rarely opp or whorled; seeds often with elaiosomes (ours). (Gr *poly*, much or many, and *gala*, milk, likely referring to belief that cattle grazing on these pls had increased milk production). *Polygala serpyllifolia* Hose, with lvs opp below, was coll once (1999) on Texada Island, BC.



P. vulgaris L. Erect to trailing per to 30 cm, br from base, glab or pubescent; lvs alt throughout, ± sessile, entire, 10-18 × 3-6 mm; infl gen > 10-fld; fls 4-7 mm, blue, pink, or white; caps ellipsoid to ovoid, obcompressed, narrowly winged; lawns, fields, and roadsides; European intro, rarely escaping from cult; VI and Texada Is, BC, Clark Co, WA, and w OR, also in n MI.

ROSACEAE Rose Family

Pls ♀, occ ♀, ♂; fls solitary to ∞, sometimes apet, gen radially symmetric, perig to epig; calyx (4)5(-10)-merous, ± united, often bracteolate between lobes, either adnate to pistil or free and saucerlike to camp or tubular, gen disc-lined; petals (4)5(-10) or lacking; stamens few to ∞, borne with petals on calyx; pistils 1-∞ and simple and free of hypan, or sometimes only 1 but 2-5-carpellate, ovary then partially to completely inferior; fr an achene, follicle, drupe, or pome, sometimes in an aggregation with recep and then dry to fleshy; ann to per herbs, shrubs, vines, or trees, sometimes armed, with alt, basal, or opp, simple to compound, deciduous or evergreen, mostly stip lvs. *Chaenomeles speciosa* (Sweet) Nakai (fl quince), Chinese intro, is an uncommon escape from cult in Seattle but has not naturalized.



1a Pls ann, bien, or per herbs, erect or creeping

Group 1

2a Lvs simple, margins toothed or entire

Group 2, lead 9a

2b Lvs lobed or divided

Group 3, lead 21a

3a Lvs palmate or ternate to binate or trinervate

Group 4, lead 35a

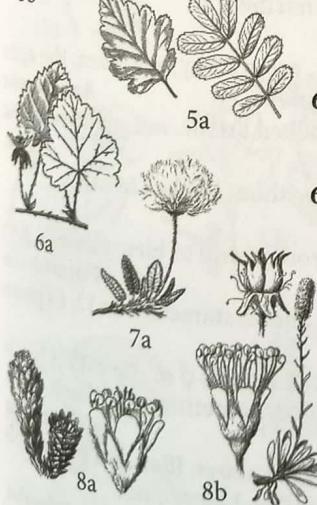
3b Lvs pinnate to interruptedly pinnate or bipinnate

Group 5, lead 44a

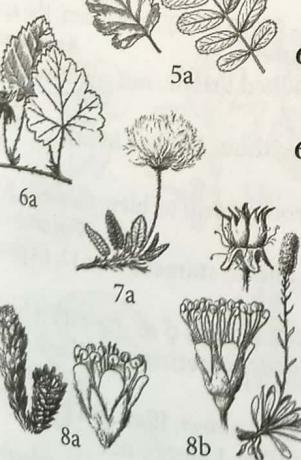
1b Pls woody vines, shrubs or small trees

Group 6, lead 55a

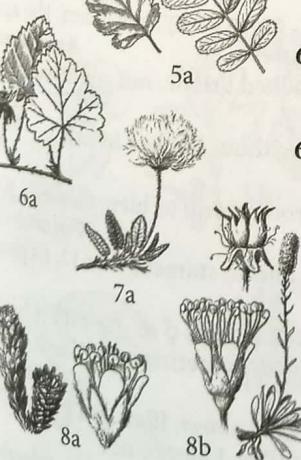
4a Pls armed with thorns or prickles; fr fleshy



4b Pls unarmed; fr dry or fleshy



5a Lvs lobed or divided



5b Lvs simple, margins toothed or entire, unlobed

Group 1 Herbs with simple lvs

6a Pls erect or loose, creeping, vinelike, not matted, sometimes armed with bristles; fls pink or white; stamens and pistils ∞; fr fleshy, an aggregation of drupelets (blackberry, raspberry), gen edible

Rubus

6b Pls dense, often forming mats or cushions, with or without erect fl sts, never armed with bristles; fls yellow or pink to white; fr a dry achene or follicle

7a Lf margins crenate to coarsely dentate, serrate, or entire; fr an aggregate of plumose achenes, much > sepals; petals white or yellow, 8-12 mm

Dryas

7b Lf margins entire; fr an aggregate of 3-6 follicles, not plumose, slightly > sepals; petals white to pink, 1-3 mm; pls suffrutescent

8a Fls pink, solitary, sessile at tip of compact sts with densely imbricated, persistent lvs 2-4 mm; pls forming dense cushions

Kelseya

8b Fls white, ∞ in elongate racemes or br racemes, on short pedicels; st lvs widely spaced, not densely imbricated, deciduous; rosette lvs 4-30 mm; pls forming

Petrosymum

loose mats

Group 2 Herbs with ternately or palmately lobed or divided lvs; no obvious woody sts

9a Pls ann gen < 10 cm, roots delicate; fls apet, axillary, ± hidden by stipules

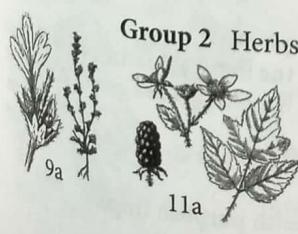
Aphanes

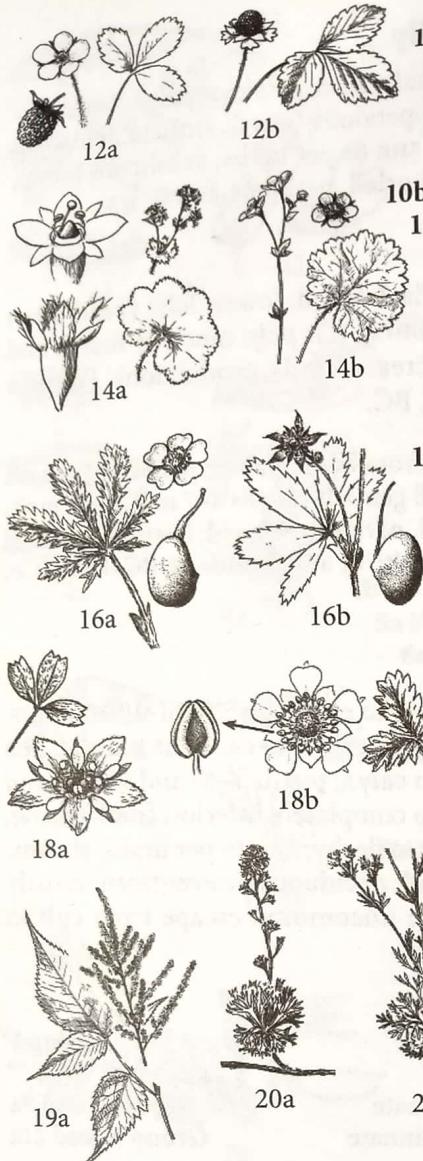
9b Pls taprooted ann or bien gen > 10 cm, or per with coarse roots or rhizomes; fls gen terminal or scapose, never ± hidden within stipules

10a Fr fleshy, like a strawberry, blackberry or raspberry

11a Fr an aggregation of drupelets, gen edible, blackberrylike, orange, red or black

Rubus





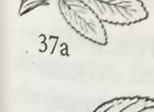
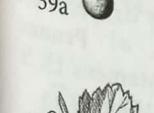
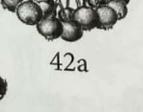
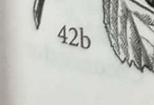
- 11b** Fr a solitary swollen receptacle with superficial achenes, strawberrylike, bright red
- 12a** Petals white or pinkish; achenes superficial or in small pits, yellow-green to red- or dark brown; fr sweet, strawberry
- 12b** Petals yellow; achenes superficial, red; fr not sweet
- 10b** Fr dry, an achene or follicle
- 13a** Lvs ± orbicular or wider than long, shallowly to deeply lobed
- 14a** Fls apetalous, yellow-green; stamens 4; lvs shallowly ∞ -lobed, often wider than long; fr a solitary achene enclosed by greenish, saclike hypanthium; Eurasian intro; sporadic on both sides Cas in s BC
- 14b** Fls with 5 petals, yellow to white; stamens 50–70; lvs unlobed or shallowly to deeply 3–5-lobed, ± as wide as long; fr 4–7 achenes partially enclosed in a conic hypanthium; ID, MT
- 13b** Lvs or lflets longer than wide
- 15a** Lvs palmately lobed or divided
- 16a** Petals and anthers yellow to white; achenes attached to a dry receptacle that is not spongy; stipules conspicuous or not; upland plants
- 16b** Petals and anthers red-purple to pink; achenes attached to an enlarged, spongy (but not fleshy) receptacle; stipules conspicuous; wetland plants
- 15b** Lvs ternate to biernate
- 17a** Lvs divided into 3 equal-sized lflets
- 18a** Stamens 5, anthers 1-chambered, splitting along a single seam over the top; lflets toothed at tip, margins entire
- 18b** Stamens (5)10–30, anthers 2-chambered, splitting along 2 seams divided by a cross wall at the top; lflet margins gen toothed or lobed
- 17b** Lvs unevenly divided or biernate
- 19a** Lvs gen > 30 cm; lflets coarse, broadly ovate, 6–15 cm; infl 500+-flowered panicle of racemes
- 19b** Lvs 1–4 cm, ternately 2–3 × dissected into linear segments; infl flat-topped panicle or a 5–30-flowered raceme
- 20a** Lvs lobed or divided near apex, where ternate or biernate; infl racemose; subalp to alp
- 20b** Lvs lobed or divided from near base, gen biernate; infl flat-topped panicle; lowl to mont

Group 3 Herbs with lvs pinnately to bipinnately lobed or divided

- 21a** Fr fleshy, an aggregation of drupelets, gen edible, blackberrylike, orange, red or black; pls armed with prickly sts or not
- 21b** Fr dry, an aggregation of achenes or follicles; pls unarmed
- 22a** Fr or fruiting hypanthium with hooked bristles
- 23a** Fr a solitary achene within a persistent, conic, grooved hypanthium, the apex with rows of hooked bristles; fls ± sessile in racemes
- 23b** Achenes clustered, ∞ , each with a terminal hooked bristle, not enclosed in the hypanthium; fls pedicellate, ± pan.
- 22b** Fr or fruiting hypanthium smooth to plumose, without hooked bristles
- 24a** Fls 4-merous, apetalous
- 25a** Lvs bipinnate or pinnate-pinnatifid; pls taprooted ann or bien; stamens 2(4); fls green
- 25b** Lvs once-pinnate; pls perfract from rhizome or caudex; stamens 4 or 12; fls green to white or purple
- 26a** Stamens 12; filaments filiform; lflets gen 1–2 cm; pls ♀ or ♂♀ with ♂ below ♀ in same spike; fr winged, also cross-ridged, sometimes papillose (20×), never hairy
- 26b** Stamens 4; filaments filiform or wide and flat above; lflets gen > 2 cm; pls ♀-flowered; fr winged, without cross-ridges or papillae, hairy or not
- 24b** Fls 5-merous, petals white, yellow, pink, or purple
- 27a** Fr awned or plumose achenes; style 2-parted, the lower sometimes hooked at tip, the upper persisting or not in fr; lflets irreg, the lateral ones gen of different sizes
- 27b** Fr unawned achenes or follicles, never plumose; style simple; lflets irreg or all similarly sized
- 28a** Lvs 2–3 × ternate-pinnate; petals white or with purplish tinge

-  29b Lvs once-pinnate (lflets occ deeply dissected); petals white, yellow, pink, or reddish
-  29a Lvs 1.5–3(–4) cm, dissected into linear segms; sepals bristly and slightly hairy; epicalyx bractlets reduced to bristles at sepal base; fr an achene; infl flat-topped cymes **Chamaerhodos**
-  28b Lvs gen > 30 cm; lflets broadly ovate, 6–15 cm; sepals glab; epicalyx bractlets absent; fr a follicle; infl 500+-fld pans of racemes **Aruncus**
-  30a Lvs once-pinnate (lflets occ deeply dissected); petals white, yellow, pink, or reddish
-  30b Terminal lflet unlobed or ternately to pinnately lobed, rarely > 8 cm; terminal and lateral lflets similar sized; pls cespitose, rhizomatous or stoloniferous; achenes 0.7–3 mm, glab; pls 0.1–1 m **Filipendula**
-  31a Stamens 5; pistils in our spp. (1)2–9; petals white or yellow **Ivesia**
-  31b Stamens 10–40; pistils in our spp. gen > 10; petals white, yellow, pink, or reddish
-  32a Stamens 10, erect or slightly incurved (at least in early fls), forming a column or cone, the filaments flattened and broadened towards the base; petals white to pinkish **Horkelia**
-  32b Stamens 10–40, ascending to spreading, never forming a column or cone, the filaments filiform; petals white, yellow, or purple
-  33a Anthers 2-chambered, splitting along 2 seams divided by a cross wall at the top; styles attached on upper half of ovary and achene; petals yellow or white **Potentilla**
-  33b Anthers 1-chambered, splitting along a single seam over the top; styles attached on lower half of ovary and achene; petals yellow or white to pink or purple
-  34a Petals and anthers red-purple to pink; achenes attached to an enlarged spongy (but not fleshy) recep; style filiform; pls with long, woody rhizomes, often stoloniferous; lvs blue-green; wetlands **Comarum**
-  34b Petals white to yellow, anthers yellow; achenes attached to a dry recep that is not spongy; style fusiform; pls cespitose; lvs green; uplands and meadows **Drymocallis**

Group 4 Woody pls with armed sts, fleshy fr

-  35a Fr an aggregate of fleshy drupelets, each with 1 seed, like a blackberry or raspberry **Rubus**
-  35b Fr various, a multi-seeded pome (like an apple), hip, or berrylike
-  36a Lvs lobed or divided
-  37a Lvs pinnately divided; fls with 35–∞ stamens; fr a hip bearing within 6–70 achenes; sts with prickles (outgrowths on st) often present, no thorns **Rosa**
-  37b Lvs lobed (often some unlobed); fls with 5–35 stamens; fr a pome with 1–5 pyrenes; sts with scattered thorns (modified br) present but no prickles
-  38a Stamens 25–35; fls 25–35 mm diam; ripe fr brown, 15–40 mm diam; infl with 1–2 fls; sepals erect and persisting on fr, > 1 cm; Eurasian intro; coll once (2004) escaped in Whitman Co, WA **Mespilus germanica** L.
-  38b Stamens 5–24; fls 8–25 mm diam; ripe fr red, black or purple, 8–22 mm diam; infl with 3–50+ fls; sepals erect or spreading, persisting on fr, < 1 cm **Crataegus**
-  36b Lvs simple, margins toothed or entire, unlobed
-  39a Fr 1-carpellate, a drupe, bearing a single seed (pit), fleshy (plum, cherry, peach) or ± dry and scarcely fleshy (almond) **Prunus**
-  39b Fr with > 1 carpel, a fleshy multi-seeded pome, like a small apple
-  40a Fr brown, 15–40 mm diam, summit with large opening and ± ascending or erect sepals 1.5–3 cm; fls solitary (see lead 38a) **Mespilus germanica**
-  40b Fr brown, yellow, orange, red, blue, or purple, summit with small or no opening and spreading to erect sepals < 1 cm; fls 6–60
-  41a Fr carpels hard, thick-walled, bony, fused to seed **Pyracantha**
-  42a Evergreen shrubs; lvs oblanceolate to narrowly elliptic or lanceolate; fr orange to red, 3–8 mm diam; stamens 15–20
-  42b Deciduous shrubs or small trees; lvs ovate to broadly elliptic, obovate, or orbicular; ripe fr red, purple, or black, 4–15 mm diam; stamens 5–24 **Crataegus**
-  41b Fr carpels softer, thin-walled, cartilaginous, separated from seed



- 43a** Styles separate to base; fr with persisting sepals; fr yellow-green to brown or brownish-purple, depressed globose to globose or pear-shaped; lf margins entire, crenate or serrate
- 43b** Styles partly fused; fr with persisting or deciduous sepals; fr bright yellow to red, depressed globose to globose; lf margins serrate

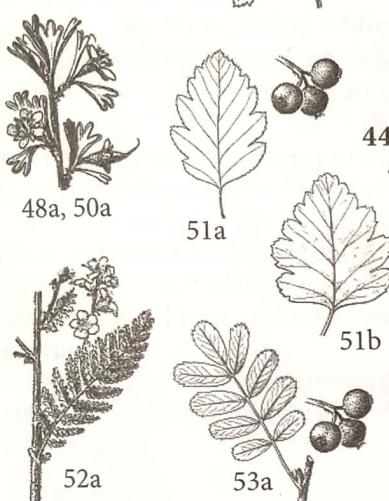
Pyrus
Malus

Group 5 Woody pls, unarmed, with lobed or divided lvs



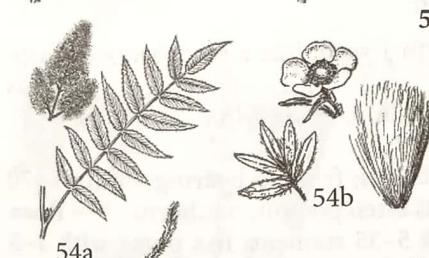
- 44a** Lvs ternately or palmately lobed or divided
- 45a** Fr an aggregate of fleshy drupelets, each with 1 seed, like a blackberry or raspberry
- 45b** Fr a dry achene or follicle, or a multi-seeded pome (like an apple), or berrylike
- 46a** Fr fleshy pomes, 6–70 mm diam; fls 15–50 mm diam; styles fused towards base
- 47a** Lvs often unlobed, except on vigorous shoots; styles 3–5; fls 2–12 in umbels or small corymbs
- 47b** Lvs all lobed; styles 2; fls 15–60+ in pans (*S. terminalis*)
- 46b** Fr dry achenes or follicles, 1–5.5 mm diam; lvs mostly lobed; fls 5–25 mm diam; styles free to base
- 48a** Fr achenes, persisting style plumose or not; lvs 0.3–2 cm, the lobes linear to oblong; fls deep or pale yellow to whitish
- 48b** Fr follicles, persisting style never plumose; lvs 2–8 cm, the lobes wide; fls white to pale pink

Rubus
Malus
Sorbus
Physocarpus

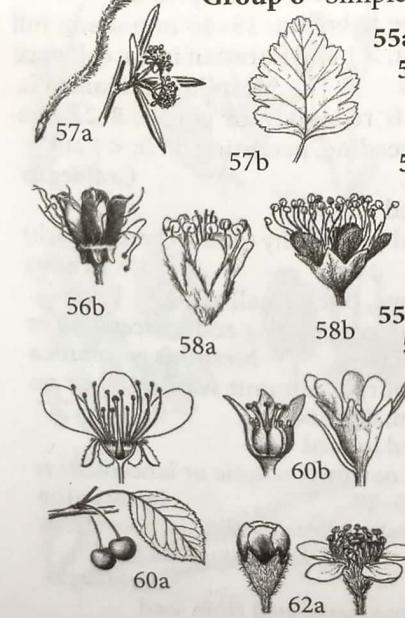


- 44b** Lvs pinnately lobed or divided
- 49a** Lvs pinnately lobed
- 50a** Lf bls gen cuneate, 1–13 mm wide, usually 3-toothed to 3(–7)-lobed at tip, ± evergreen (drought deciduous); fls solitary; petals yellow to whitish; stamens 17–125
- 50b** Lf bls ovate to obovate, 5–80 mm wide, often > 7-lobed, winter deciduous; fls 10–100 in pans; petals white to pinkish; stamens 15–20
- 51a** Fr fleshy pomes; styles 2–3 per fl
- 51b** Fr an aggregate of 5 achenes; styles 1 per ovary, 5 per fl
- 49b** Lvs pinnately divided to twice pinnate
- 52a** Lvs pinnate-pinnatifid to twice pinnate, evergreen; fr an aggregate of 4–5 follicles
- 52b** Lvs pinnate; fr dry follicles, achenes, or fleshy pomes
- 53a** Fr fleshy pomes, 6–15 mm diam
- 53b** Fr dry achenes or follicles, < 6 mm diam
- 54a** Lflets 9–25; lvs 14–35 cm; fr an aggregate of 5 follicles, glab to moderately sericeous; fls white; stamens longer than petals
- 54b** Lflets 3–9; lvs 0.5–3 cm; fr an aggregate of 30–100 achenes, densely long hairy; fls yellow; stamens shorter than petals

Purshia
Sorbus
Holodiscus
Chamaebatia
Sorbus

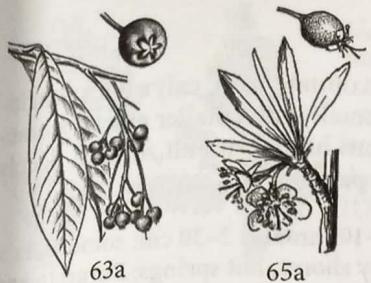


Group 6 Simple-lvd, unarmed shrubs or small trees, lf margins toothed or entire



- 55a** Fr dry achenes or follicles
- 56a** Fr 1 or 5 achenes
- 57a** Ovary and fr solitary; achene with plumose style; fls apetalous
- 57b** Ovaries and frs 5; achenes without plumose style; fls petaloid
- 56b** Fr an aggregate of 3–5 follicles
- 58a** Stamens 7–12, staminodes absent; fls solitary; lvs evergreen and often marcescent; pls forming low, dense mounds
- 58b** Stamens 10–40, staminodes 5–15; fls numerous in pans; lvs deciduous; pls erect, open shrubs
- 55b** Fr fleshy drupes or pomes
- 59a** Fr 1-seeded drupes, solitary or in an aggregate
- 60a** Lvs toothed; fls ♀; style and pistil 1; stamens 10–30; fr a solitary drupe, sweet (cherry and plum) or bitter, 5–35 mm
- 60b** Lvs entire; pls usually ♂, ♀ (rarely ♀-fld); styles and pistils 5; stamens 15; fr solitary by abortion (or an aggregate of 2–5 drupes), bitter, 5–10(–15) mm
- 59b** Fr gen several-seeded pomes, berrylike
- 61a** Carpels with a hard, woody, or bony covering protecting the seed; lvs entire
- 62a** Fr orange, red, purple or black, 4–12 mm diam; sepals in fr < 1 cm; petals white and spreading or pink and erect; fls 4–13 mm diam; stamens 8–23

Kelseya
Spiraea
Oemleria
Prunus
Cotoneaster



62b Fr brown, 15–40 mm diam; sepals in fr > 1 cm; petals white and spreading; fls 25–35 mm diam; stamens 25–40 (see lead 38a) **Mespilus germanica**

61b Carpels with thin, papery, or cartilaginous coverings or partitions in the fr flesh, the seeds thin-walled, ± unprotected; lvs entire or toothed

63a Fr with a shelllike partition forming a dome or hood below the sepals and above the seeds; fr red; infl br, sometimes highly br; lvs evergreen or deciduous

Photinia

63b Fr lacking a domed internal structure; fr red, purple, black, orange, yellow or white; infl a raceme, umbel or corymb, rarely with secondary br; lvs deciduous

64a Ovary apparently subdivided by cartilaginous partitions into 4–10 locules, each bearing a single seed

65a Infls 1–3-flld; lvs ± sessile, linear to narrowly elliptic or oblanceolate, leathery; fr yellow to orange or reddish, bitter

Peraphyllum

65b Infls 4–16-flld; lvs petiolate, ovate to obovate, thinner; fr dark purple, white or orange, sweet to insipid

Amelanchier

64b Ovary undivided or apparently subdivided by cartilaginous partitions into locules, each usually bearing 2 seeds

66a Styles fused from base to ± middle

Malus

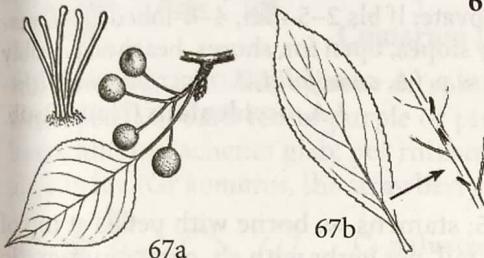
66b Styles free to base

67a Lvs glandless; fr green to brown or yellowish, 8–120 mm; fls 15–45 mm diam; gen weed in lowl

Pyrus

67b Lvs with elongate, red, appressed glands on midvein above, towards the lf base; fr black, 6–9 mm; fls 12–20 mm diam; e N Am intro; local escape near cranberry farms, Pacific Co, WA

Aronia melanocarpa (Michx.) Elliott



Agrimonia L. Agrimony

Infl bracteate, spikelike racemes; fls small; calyx with obconic free hypan, becoming 10-grooved and much hardened, hooked-bristly near top; sepals 5, persistent; petals 5, yellow; stamens 5–15; pistils 2(3), enclosed by hypan, but ovary superior; fr gen 1(2) achene; rhizomatous, per herbs with large, pinnate lvs and foliaceous stips. (Said to be a variant of *Argemone*). *Agrimonia eupatoria* L. of Europe coll as a waif in Seattle in 2000.



1a Ripe fr with basal row of bristles reflexed; fls ± alt; pls 3.5–15 dm; edges, openings, draws, thickets, open for; BC to CA, also MT s to AZ and e to Atl; common a.

1 **A. gryposepala** Wallr.

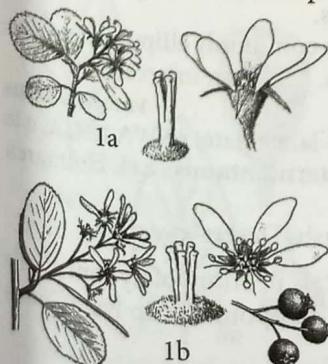
1b Ripe fr with basal row of bristles spreading, when pressed appearing ascending; fls ± opp; pls 4–13 dm; riparian zones, shores, wet meadows; e BC to MT, s and e to Atl; roadside a.

2 **A. striata** Michx.

Amelanchier Medik. Serviceberry; Shadblush

Infl racemose, fls often ± showy; calyx ± camp, adnate basally to ovary and with free, ± flared hypan, lobes 5, lanceolate, persistent; petals 5, white (pink); stamens mostly 12–20, inserted with petals at top of hypan; pistil 2–5(6)-carpellate; ovary inferior, 2–5-celled; fr ± fleshy, pomaceous; seeds 2 per carpel, separated by false partitions; unarmed trees or shrubs with alt, deciduous, simple lvs and linear, quickly deciduous stips. (Derivation obscure, perhaps from French name for *A. ovalis*, a European sp.).

Fairly choice orn shrubs. *Amelanchier laevis* Wiegand, e N Am intro, is a local escape in King Co, WA. Controversial, intergrading and unconvincing taxa within *A. alnifolia*, often based on continuum of pubescence variation or ped, infl, and petal length.

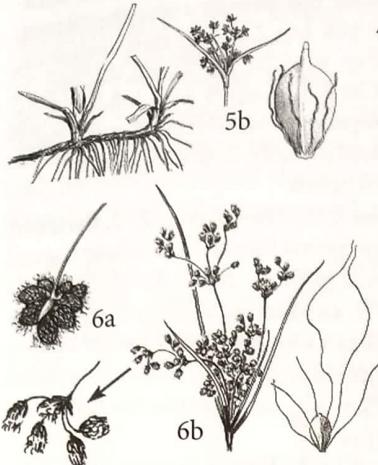


1a Fr skin and pulp white to orange, fr often pubescent; lvs ± permanently lanate, at least on lower surfaces; petals 5–14 mm; styles gen 2–4; infl 8–43 mm; valleys and hillsides, sagebr des to mont open for; se OR to se CA, e to c ID, s MT, WY, CO, and TX, reported in Yakima Co, WA; Utah s. or sh.

1 **A. utahensis** Koehne

1b Fr skin and pulp dark purple, fr glab; lvs glab to hairy on lower surface, but not lanate on either surface; petals 6–23 mm; styles mostly 4–5; infl 8–62 mm; grassl, ledges, open for, stream banks, meadows, from near sea level to subalp; s AK s, on both sides of Cas, to CA, e to Ont and TX; w s. or sh., saskatoon (*A. a. vars. cusickii, humptulipensis, pumila, semiintegrifolia, A. c., A. florida*)

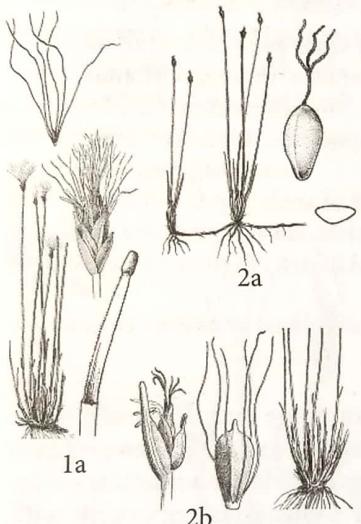
2 **A. alnifolia** (Nutt.) Nutt. ex M. Roem.



- 5b** Pls rhizomatous, gen < 5 dm; spikelets ovoid, 2.5–6 mm, ± sessile; mont, wet meadows; Cas of n OR to CA and NV; Congdon's b. **5 *S. congondii*** Britton
- 4b** Spikelets woolly, mature bristles exserted and obscuring the scales; achenes 0.6–0.9 mm
6a Spikelets mostly sessile in clusters of 2–5(–15); scales brown to reddish-brown; fls mature ± simultaneously throughout spikelet; shores, marshes, ditches, increasing; likely e N Am intro; disjunct in w from s BC to CA, both sides Cas, e to w MT; wool-grass
6b Spikelets mostly ped and solitary (rarely infl capitate); scales gen blackish-green (occ with bit of red basally); fls mature gradually from base, eventually resulting in naked rachilla below and intact scales and achenes above; marshy shores, wet meadows; c BC to OR, e to w MT, and further e to e N Am; dusky wool-grass (*S. cyperinus* var. *brachypodus*)
7 *S. cyperinus* (L.) Kunth
7 *S. atrocinctus* Fernald

Trichophorum Pers. Deergrass

Spikelets solitary, with subtending bract(s) not much different from scales except for being empty; scales spirally arranged, with or without excurrent awn-tip; fls ♀, borne singly in axils of scales; perianth of 0–6 bristles, these < to much > achene, sometimes conspicuously exserted from spikelet or occ ± reduced or obsolete; stamens 3; style trifid; achene trigonous, commonly with a short, slender, stylar apiculus, but without an apical tubercle; herbs with triangular or terete, gen solid sts; lvs with closed sheath and grasslike bl, or bl occ much reduced or obsolete. (Classical L name for some of the spp.). Split from *Scirpus*.



- 1a** Perianth bristles bright white, cottony, much elongate, conspicuously > scales; sts triangular, 3-angled, scab; peatlands, stream banks, often limy; AK to s BC, Alta, nw MT, and e to Atl; Eurasia; cotton or Hudson's Bay d. (*S. hudsonianus*)
1 *T. alpinum* (L.) Pers.
- 1b** Perianth bristles short and brown, scarcely if at all > scales, or obsolete; sts subterete, smooth
2a Bristles absent; sts < 15 cm; pls loosely cespitose with elongate slender rhizomes; infl-bracts < 2.5 mm; hummocks in limy fens, shores, mont; circumboreal, s to se BC, nw MT, Que, disjunct in CA; dwarf d. (*S. p.*)
2 *T. pumilum* (Vahl) Schinz & Thell.
- 2b** Bristles 6; sts (5–)15–45 cm; pls densely cespitose without elongate rhizomes; infl bracts > 3 mm; peatlands, wet meadows, snowmelt channels, cliffs, lowl to alp; circumboreal, s to OR, ID, UT, and GA; n d. (*S. c.*, variant spelling *caespitosus*)
3 *T. cespitosum* (L.) Hartm.

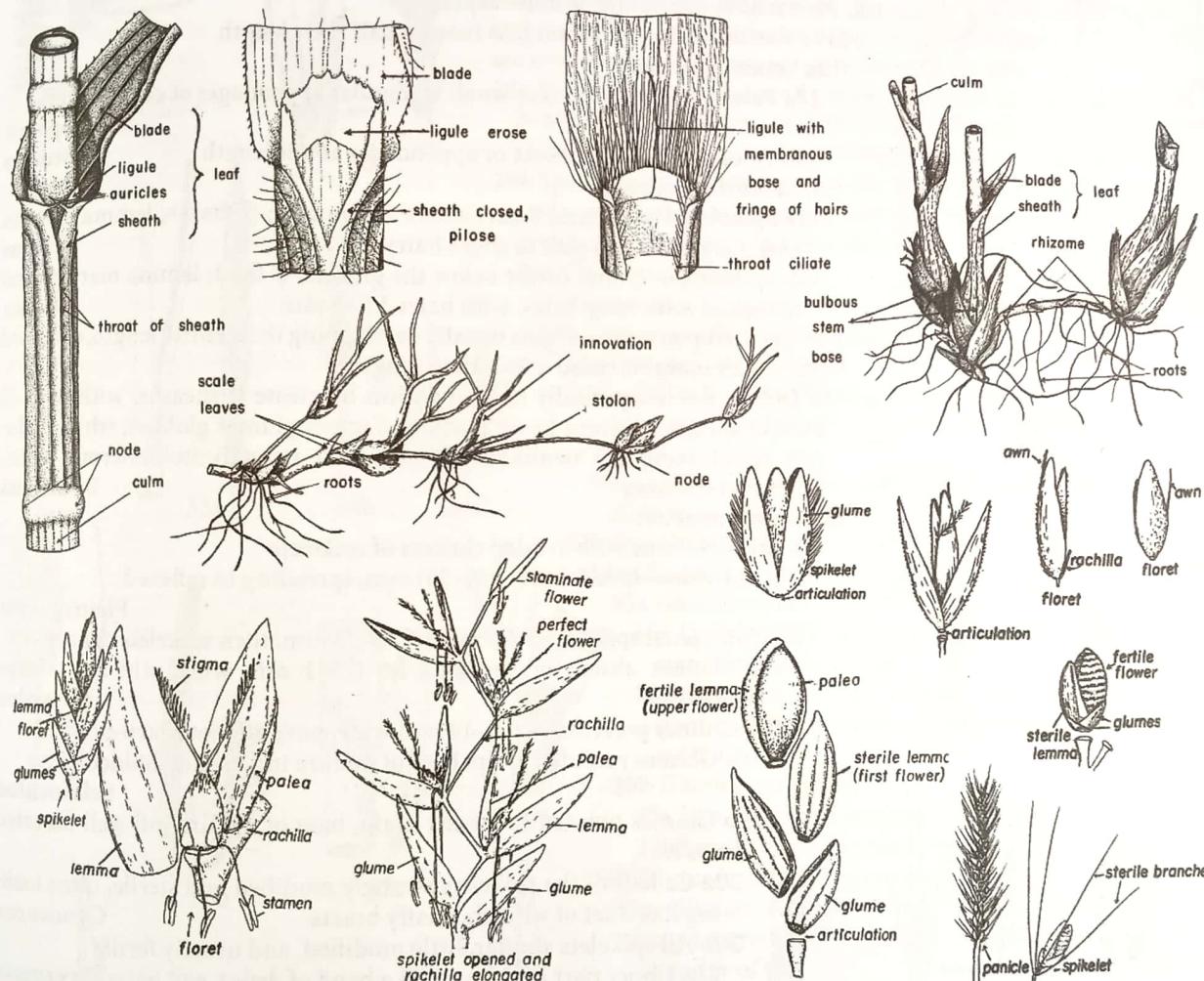
POACEAE (Graminae) Grass Family

Fls mostly ♀, occ ♂, ♀, or sterile, sessile along a shortened, jointed axis (rachilla) in 1–several-fld, reduced spikes (spikelets); spikelets occ sessile in 1–several spikes, but gen borne on individual pedicels, each typically subtended by 2 bracts (glumes) nearly opp arranged, 1 (rarely both) of which may be reduced or lacking; individual fls (florets, abbreviated here to flts) greatly variable, each gen borne within 2 bracts that may or may not be similar to the glumes in texture, size, and nervation (veins of fl bracts are referred to as nerves, often slightly raised on the exposed surface, but gen detectable at minimum of 10×); abaxial or outer fl bract (lemma) gen partially enfolding the adaxial or inner one (palea), at maturity the basal portion of the lemma often (esp in 1-fld spikelets) elongates past the point of attachment to the rachilla and ± hardens, forming the “callus”; stamens mostly 3, occ 1, 2, or 6; pistil gen with (1)2(3) distinct styles and plumose stigmas; fr 1-seeded caryopsis, indehiscent, the seed gen firmly attached to ovary wall; perianth represented by (1)2(3) greatly modified, tiny structures (lodicules, abbreviated here to lods) on the abaxial side of the fl (between ovary and lemma), which gen become distended at anthesis, forcing apart the lemma and palea; flts, if > 1 per spikelet, borne alt on opp sides of the rachilla, the basal or the upper flts often reduced, occ represented by an empty lemma only, the rachilla occ prolonged as a bristle behind the palea of the uppermost flt; ann or per herbs with gen terete, hollow or (less commonly) solid, rarely persistent or woodylike, erect sts (culms) with ± swollen nodes; lvs alt, 2-ranked, the lower portion (sheath) surrounding the st, the sheaths with margins overlapping (open) or fused (closed), the upper margins (throat) often more hairy than the rest of the sheath; lf bls gen narrow and elongate, the young lvs of new shoots (innovations) either equitant (folded in the bud) or enclosing one another with the margins overlapping (rolled in the bud); lower margins of the bls occ forming small projections on one or both sides (auricles, here abbreviated to aurs), the abaxial (dorsal) area of the juncture of bl and sheath (the collar) gen marked by less-heavy veination, or by a difference in color or pubescence, the adaxial (ventral) point of juncture gen with a structure (ligule, abbreviated here to lig) varying from membranous to membranous-based and ciliate-fringed, or entirely hairy-fringed, very rarely the lig absent.

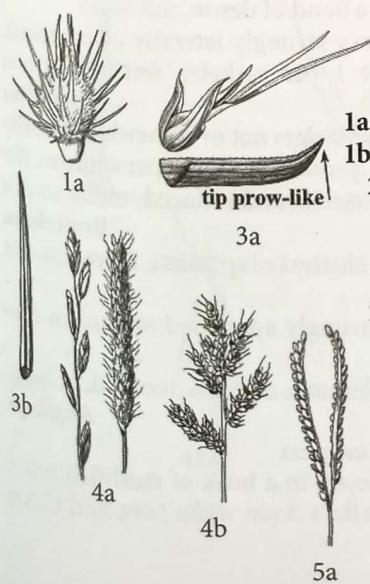
Andropogon gerardii Vitman and *A. hallii* Hack. occur e of our area. *Bothriochloa ischaemum* (L.) Keng was coll once (1997) in a pasture in Lake Co, MT. *Pennisetum glaucum* (L.) R. Br. is occ sown for soil stabilization in our area because it does not persist. The following taxa were coll or reported on ballast near Portland, OR, none more recent than 1921: *Amelichloa caudata* (Trin.) Arriaga & Barkworth, *Arthraxon hispidus* (Thunb.) Makino, *Chloris radiata* (L.) Sw., *Eriochloa villosa* (Thunb.) Kunth, *Imperata cylindrica* (L.) Raeusch., *Scleropoa rigida* (L.) Griseb. (*Desmazeria r.*, *Catapodium r.*), and *Urochloa mutica* (Forssk.) T.Q. Nguyen.

Most *Elymus* spp. readily hybridize with members of closely related genera, such as *Hordeum* (*xElyhordeum*), *Leymus* (*xElyleymus*, *xLeydeum*), *Pascopyrum* (*xPascoelymus*), and *Pseudoroegneria* (*xPseudelymus*). Such hybrids are usually sterile and are best identified by comparison with the fertile parent pls nearby. Mention of some hybrids are included within descriptions for respective parent sp. Keys to these hybrid taxa can be found in *Flora of North America* (Vol. 24) and *Flora of Oregon* (Vol. 1).

Measurements of glumes, lemmas, and spikelets exclude the awns (if any) unless otherwise noted.



Key to Groups



Cenchrus

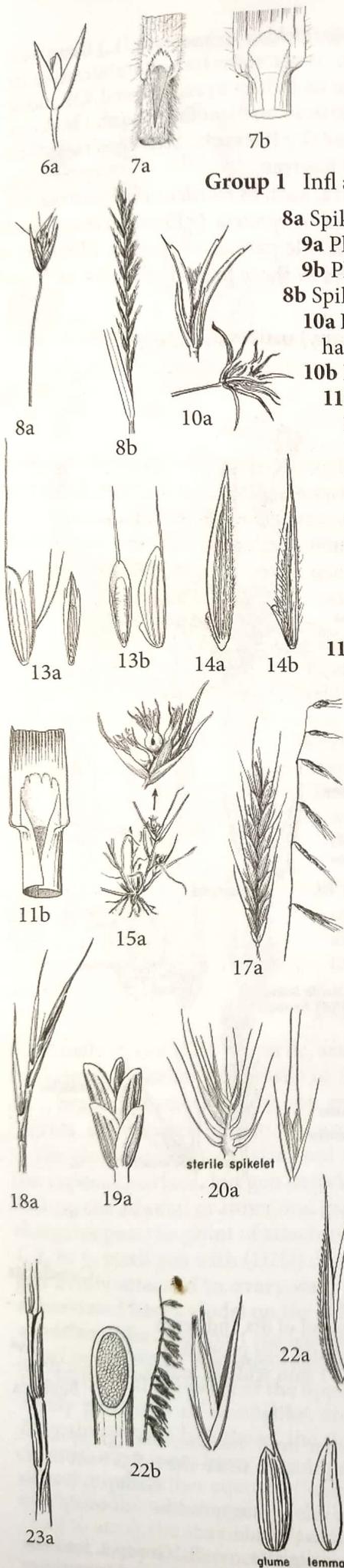
Poa

Festuca

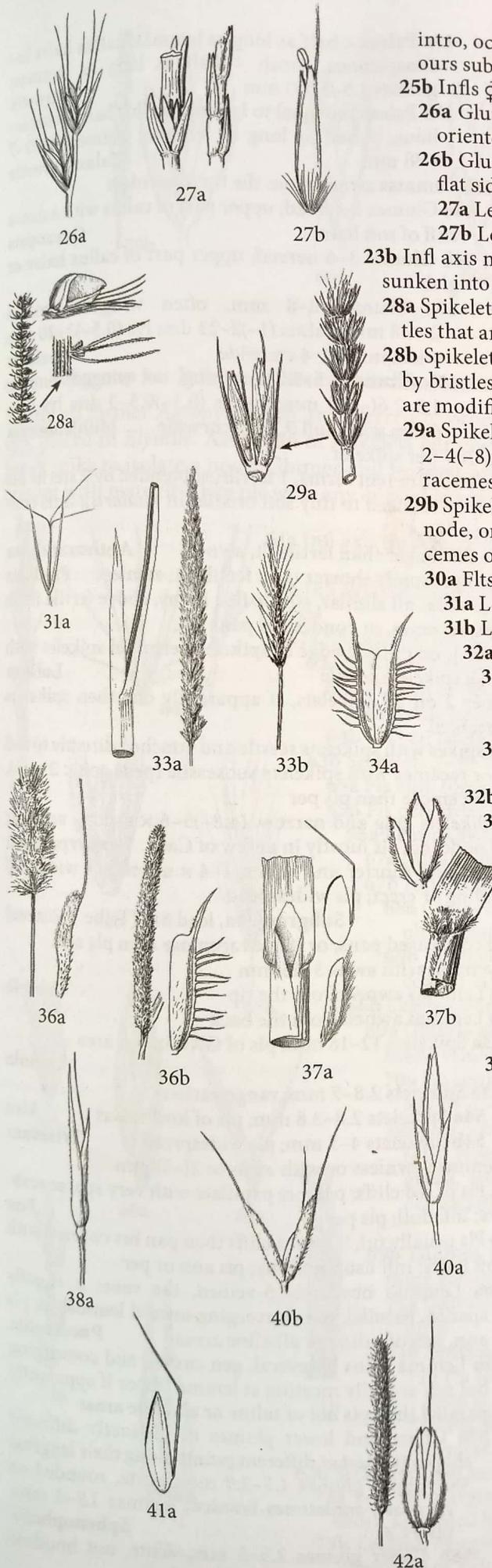
Group 1, lead 8a

Group 2, lead 86a

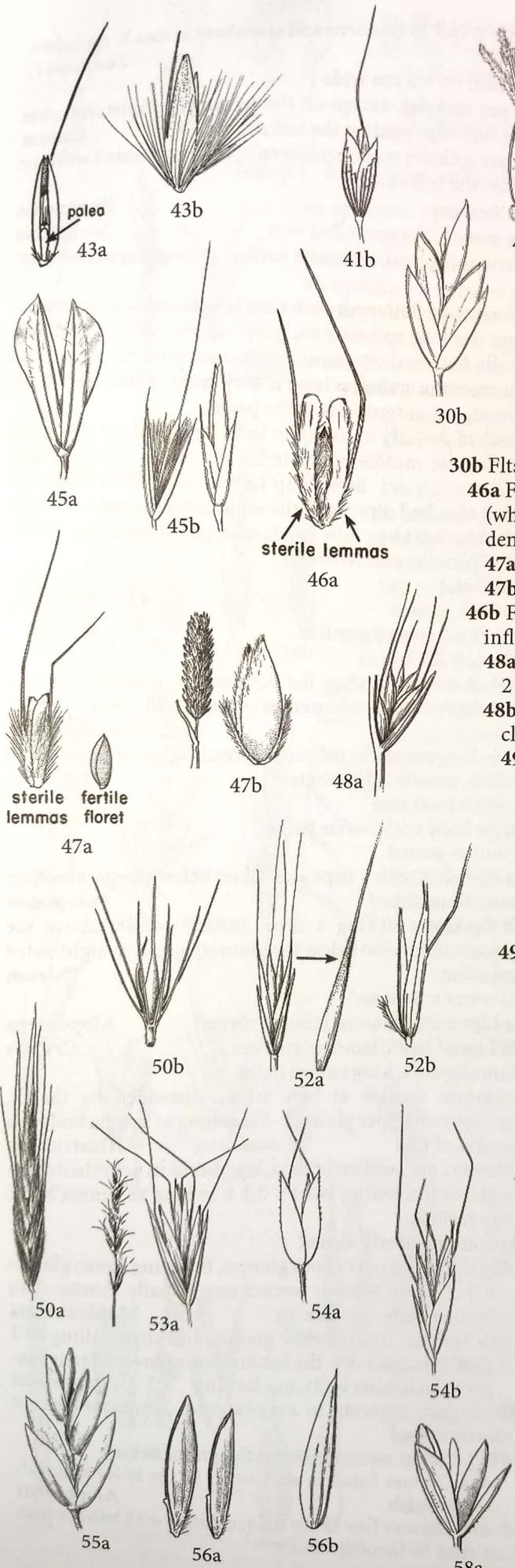
Group 3, lead 86a



- 6a** Flts 1 per spikelet **Group 3**, lead 105a
6b Flts 2 or more per spikelet (1 or more flts sometimes minute)
7a Sheaths of upper lvs closed for at least 1/4 their length
7b Sheaths of upper lvs open to the base, or nearly so **Group 4**, lead 148a
Group 5, lead 160a
- Group 1** Infl a spike, spikelike pan, or head; infl brs none or obscure
- 8a** Spikelets 1 per infl **Danthonia**
9a Pls per; glumes ≥ flts, ± enclosing them **Bromus**
9b Pls ann; glumes ± = lower flts only
- 8b** Spikelets 2 or more per infl **Munroa**
- 10a** Pls ann, mat-forming, < 2 dm; spikelets mostly hidden in short clusters of lvs that have stiff, sharp tips
- 10b** Pls not as above in one or more aspects **Pleuropogon**
- 11a** Lf sheaths closed with margins fused > half their length **Bromus**
- 12a** Lemmas awned **Pleuropogon**
- 13a** Palea keels with awns or small triangular appendages at ca midlength **Bromus**
- 13b** Palea keels lacking awns or appendages at midlength **Pleuropogon**
- 12b** Lemmas awnless **Bromus**
- 14a** Spikelets 15–40 mm, disart above the glumes; ♀ flts 3+; lemma margins and marginal veins glab to short-hairy **Bromus**
- 14b** Spikelets 6–8 mm, disart below the glumes; ♀ flts 1; lemma margins and marginal veins long-hairy, with hairs 3.5–5 mm **Melica**
- 11b** Lf sheaths open with margins usually overlapping their entire length, or closed basally with margins fused < 25% their length
- 15a** Infls < the lvs, partially hidden within bracteate lf sheaths, with 2–4(–5) burlike spikelet clusters; lower portion of upper glumes globose, white, indurate, terminating in 3 awnlike teeth; pls tufted, strongly stoloniferous, sometimes mat-forming **Bouteloua**
- 15b** Pls not as above
- 16a** Infl 1-sided or with 1-sided clusters of spikelets **Pleuropogon**
- 16b** Infl 2-sided or ± round in cross-section; clusters of spikelets, if present, not 1-sided
- 17a** Individual spikelets 20–40(–50) mm, spreading to reflexed **Nardus**
- 17b** Individual spikelets 3–25 mm, if 20–25 mm, then spikelets appressed
- 18a** Glumes absent or vestigial; lvs 0.5–1 mm wide, stiff and sharp-pointed **Sclerochloa**
- 18b** Glumes present; lvs 0.5–14 mm wide, not stiff, not sharp-pointed
- 19a** Glumes rounded at tip; base of mature infl usually hidden in lvs **Cynosurus**
- 19b** Glumes pointed to awned at tip; base of mature infl well-exserted from lvs
- 20a** Ca half of the spikelets strongly modified and sterile, often looking like a set of whitish, chaffy bracts **Oryzopsis**
- 20b** All spikelets similar, little modified, and usually fertile
- 21a** Upper part of callus with a band of dense, soft hairs **Cynodon**
- 21b** Upper part of callus without a band of dense, soft hairs
- 22a** Culms hollow; spikelets very strongly laterally compressed, disart below the glumes; flt 1 per spikelet, fertile; wetland habitats **Spartina**
- 22b** Culms solid or pith-filled; spikelets not or somewhat laterally compressed, disart above the glumes; flts 2 or 3 per spikelet, the lowest one fertile, the upper sterile and reduced; mesic to dry habitats **Bouteloua**
- 23a** Infl axis thickened; lower spikelets strongly appressed or sunken into axis **Aegilops**
- 24a** Glumes with well-developed awns; lemmas awnless, toothed, or long-awned
- 24b** Glumes awnless; lemmas awned or awnless
- 25a** ♀ infls axillary spikes (cob), enclosed in a husk of modified lvs; ♂ infls terminal panicle (tassel); lvs usually > 3 cm wide; Mex and C Am



- intro, occ escaping cult in our area and elsewhere across N Am; corn; ours subsp. *mays*
- 25b** Infls ♀, terminal; lvs < 3 cm wide
- 26a** Glumes 1 per spikelet, except on the terminal spikelet; spikelets oriented with one edge against the infl axis
- 26b** Glumes 2 per spikelet on all spikelets; spikelets oriented with the flat side against the infl axis
- 27a** Lemmas awnless
- 27b** Lemmas awned, the awns 2–4 mm
- 23b** Infl axis not clearly thickened; spikelets neither strongly appressed nor sunken into axis
- 28a** Spikelets dorsiventrally flattened, each clearly subtended by scab bristles that are longer than the spikelets and arise on the ped
- 28b** Spikelets laterally flattened or round in cross-section, not subtended by bristles longer than the spikelets (and if they seem to be, the bristles are modified glumes, not outgrowths of the ped)
- 29a** Spikelets attached directly to the main infl axis, sessile or nearly so, 2–4(–8) per node near middle of the infl; infls spikes or condensed
- 29b** Spikelets either attached directly to the main infl axis and only 1 per node, or attached to short brs; infls condensed pans (most spp.) or racemes or spikes (*Triticum* and *Aristida*)
- 30a** Flts 1 per spikelet
- 31a** Lemmas with 3 awns
- 31b** Lemmas with 1 awn or awnless
- 32a** Spikelets 10–13 mm
- 33a** Lvs 4–8 mm wide when flat but usually involute and 0.5–2.5 mm diam; infls condensed pans; per pls of coastal sands
- 33b** Lvs 6–15+ mm wide, flat; infls spreading spikes; ann pls of disturbed, usually inl habitats
- 32b** Spikelets 0.8–10 mm
- 34a** Glume keels with coarse hairs
- 35a** Glumes awned
- 36a** Spikelets with a stipe and disart below the glumes; pan sometimes lobed
- 36b** Spikelets lacking a stipe, initially disart above the glumes (later also below the glumes); pan a straight-sided cylinder
- 35b** Glumes not awned
- 37a** Liggs membranous; lemmas awned
- 37b** Liggs of hairs; lemmas awnless
- 34b** Glume keels lacking coarse hairs
- 38a** Glumes swollen at base where distended by the flt, long-tapered; upper glume 3–5 × as long as lemma body; pls in and w of Cas
- 38b** Glumes not swollen at base, tip obtuse to acuminate; upper glume (excluding awn) ≤ 2.5 × as long as lemma body; range various
- 39a** Glumes clearly awned
- 40a** Spikelet disart above glumes, flt falling alone; glumes 0.3–2 × the lemma; lemma awn usually shorter than lemma body, occ lacking
- 40b** Spikelet disart below glumes and stipe, falling as 1 unit; glumes 2–3 × the lemma; lemma awn usually longer than lemma body, occ lacking
- 39b** Glumes truncate to long-tapered or mucronate, not clearly awned
- 41a** Lemmas awned from midlength or below
- 42a** Glumes fused to each other in the lower half; calluses glab
- 42b** Glumes free to the base; calluses with hairs, which may be inconspicuous
- Zea mays L.**
- Lolium**
- Parapholis Scribneria**
- Setaria**
- Subgroup 1a** (Tribe Triticeae)
- Aristida**
- Ammophila**
- Triticum**
- Polypogon**
- Phleum**
- Alopecurus Crypsis**
- Gastridium**
- Muhlenbergia**
- Polypogon**
- Alopecurus**
- CamScanner**



43a Paleas < half as long as lemmas; callus hairs inconspicuous, much < half as long as lemmas; glumes 1.5–5(–7) mm *Agrostis*

43b Paleas subequal to lemmas; callus hairs conspicuous, > half as long as lemmas; glumes (4)–5–7 (–9) mm *Calamagrostis*

41b Lemmas awned from the tip or awnless

44a Glumes 1-nerved; upper part of callus with a dense ruff of soft hairs *Oryzopsis*

44b Glumes 3–6 nerved; upper part of callus hairy or glab

45a Glumes 2–8 mm, often winged; lemmas 2–6.8 mm; culms (1)–2–23 dm; lvs (0.5)–2–20 mm wide; infl 0.8–4 cm wide *Phalaris*

45b Glumes 1.5–3.2 mm long, not winged; lemmas 1.5–2.6(–3.2) mm; culms (0.3)–0.5–3 dm; lvs 0.5–6 mm wide; infl 0.1–1.7 cm wide *Muhlenbergia*

30b Flts (1)–2–20+ per spikelet

46a Flts 3, of two different forms, 1 fertile, subtended by 2 sterile flts (which may be reduced to tiny soft bristles in *Phalaris*); infls condensed pans

47a Sterile flts longer than fertile flt, awned *Anthoxanthum*
47b Sterile flts usually shorter than fertile flt, awnless *Phalaris*

46b Flts (1)–2–20+, all similar, sterile flts, if any, above fertile flt(s); infls spikes, racemes, or condensed pans

48a Glumes 1, on outside edge of spikelet (terminal spikelet with 2 glumes); spikelets sessile *Lolium*

48b Glumes 2 on all spikelets, if apparently one then spikelets clearly stalked

49a Infl spikes with spikelets sessile and attached directly to infl axis, or racemes with spikelets subsessile (peds gen < 2 mm), if infl racemose then pls per

50a Spikelets long and narrow, (4.8)–5–6 × as long as wide; infl nodding; pls mostly in and w of Cas *Brachypodium*

50b Spikelets shorter and wider, 1–4 × as long as wide; infl nodding or erect; pls widespread

Subgroup 1a, lead 61a (Tribe Triticeae)

49b Infl condensed pans, or if occ racemose then pls ann

51a Lemmas with awns 3–25 mm

52a Lemmas awned from the tip *Vulpia*

52b Lemmas awned from the back

53a Spikelets 12–16 mm; pls of GNP in our area *Avenula*

53b Spikelets 2.8–7 mm; range various

54a Spikelets 2.8–3.8 mm; pls of lowl w Cas *Aira*

54b Spikelets 4–7 mm; pls widespread *Trisetum*

51b Lemmas awnless or with awns to 2(–3) mm

55a Pls of sea cliffs; pan brs papillate with very sparse scabers; infl dull; pls per *Poa*

55b Pls usually inl, if on sea cliffs then pan brs covered with soft hairs; infl usually shiny; pls ann or per

56a Lemmas obscurely 5-veined, the veins ± equally spaced, parallel, not converging toward lemma tip; pls ann, gen of saline or alkaline areas *Puccinellia*

56b Lemma veins 1–several, gen curved and converging but not actually meeting at lemma tip, or if apparently parallel then pls not of saline or alkaline areas

57a Upper and lower glumes of distinctly different shapes (widest at different points along their lengths)

58a Upper glumes 1.5–2.9 mm, acute, rounded or truncate, sometimes hooded; lemmas 1.9–3 mm; pls e Cas *Sphenopholis*

58b Upper glumes 2.5–5 mm, acute, not hooded;



59a Pls ann, cespitose or with single st 0.3–5 dm; lemmas with awns 1–3 mm; European intro; waif in Portland, OR area, also CA, NY, and se US; Mediterranean hairgrass (*Koeleria phleoides*)

***Rostraria cristata* (L.) Tzvelev**

59b Pls per, cespitose, 2–8.5(–13) dm; lemmas awnless; pls widespread

Koeleria

57b Glumes ± alike in shape, though often differing in length

60a Pan brs antorsoely scab, not covered with soft hairs; pls of e Cas

Graphephorum

60b Pan brs covered with soft hairs; pls widespread

Koeleria

Subgroup 1a Infl gen spikes or spikelike racemes with sessile or subsessile spikelets (Tribe Triticeae)

Nearly all former *Agropyron* spp. transferred to other genera; most former *Agropyron* and all former *Sitanion* spp. placed in *Elymus*. Assess no of spikelets per node near middle of spike; if spikelet no is not obvious then break spike to isolate a node. Glumes and lemmas may be reduced and awnlike. Curvature of lemma awns increases with maturity; key pls with any curved lemma awns as strongly curved.



61a Infl axis thickened; lower spikelets strongly appressed or sunken into axis

Aegilops

61b Infl axis not clearly thickened; spikelets neither strongly appressed nor sunken into axis

62a Spikelets 2–4(–15) per node (occ to 35 per node on a side br in *Leymus*)

63a Spikelets consistently 3 per node

64a Pls ann or per; lateral spikelets usually on peds (if sessile, then pls cult ann with fertile lateral spikelets); pls widespread

Hordeum

64b Pls per; lateral spikelets sessile; e Cas of WA and n OR

Elymus

63b Spikelets 2–4(–15) per node at most nodes, but not consistently 3 per node

65a Pls ann; some awns longer than the infl axis

Taeniatherum

65b Pls per; awns, if present, shorter than the infl axis

66a Lemma awns > 3 mm; infl axis disart or not at maturity

Elymus

67a Infl axis disart at maturity; awns outcurving at maturity

67b Infl not disart; awns straight or outcurving at maturity

68a Glumes 1.5–4 mm wide; lemmas densely hairy with hairs 0.5–1 mm; pls of unstable, coastal sands

Leymus

68b Glumes 0.6–2 mm wide; lemmas usually glab or scab; pls not of coastal sands

Elymus

66b Lemma awns 0–3 mm; infl axis not disart (tardily so in *Psathyrostachys*)

69a Glumes awn- or awllike, tapering very gradually from base or from well below midlength

70a Pls cespitose or rhizomatous, if cespitose then ligs 0.7–8 mm or spikelets 10–25 mm; infl axis not disart

Leymus

70b Pls cespitose, not rhizomatous; ligs 0.2–0.3 mm; spikelets 7–10 (–12) mm; pls (2–)3–8(–12) dm; infl axis tardily disart; sagebr steppe; grassl, roadsides; Eurasian intro; planted for forage and reclamation, occ escaping e Cas; Russian wildrye (*Elymus j.*)

***Psathyrostachys juncea* (Fisch.) Nevski**

69b Glumes parallel-sided from base to above midlength, then tapering more abruptly

71a Glumes very thick, stiff and hard, truncate; spikelets scarcely overlapping

Thinopyrum

71b Glumes flexible to somewhat firm; spikelets overlapping

72a Pls long-rhizomatous; pls of unstable, sandy soils near coast or CR, or in se OR; infls 1–3 cm wide

Leymus

72b Pls short-rhizomatous to loosely cespitose; pls of more stable and diverse substrates, widespread; infls 0.5–1 cm wide

Elymus

62b Spikelets 1 per node at most nodes

73a Lemma marginal veins distally keeled and ciliate like the midrib, with stiff, short, separated hairs or small spines, lemmas otherwise glab

Secale

73b Lemma marginal veins not ciliate, gen not keeled (occ saw-toothed, sometimes scab or hairy if the whole lemma surface is hairy)

74a Pls ann



62b Spikelets 1 per node at most nodes

73a Lemma marginal veins distally keeled and ciliate like the midrib, with stiff, short, separated hairs or small spines, lemmas otherwise glab

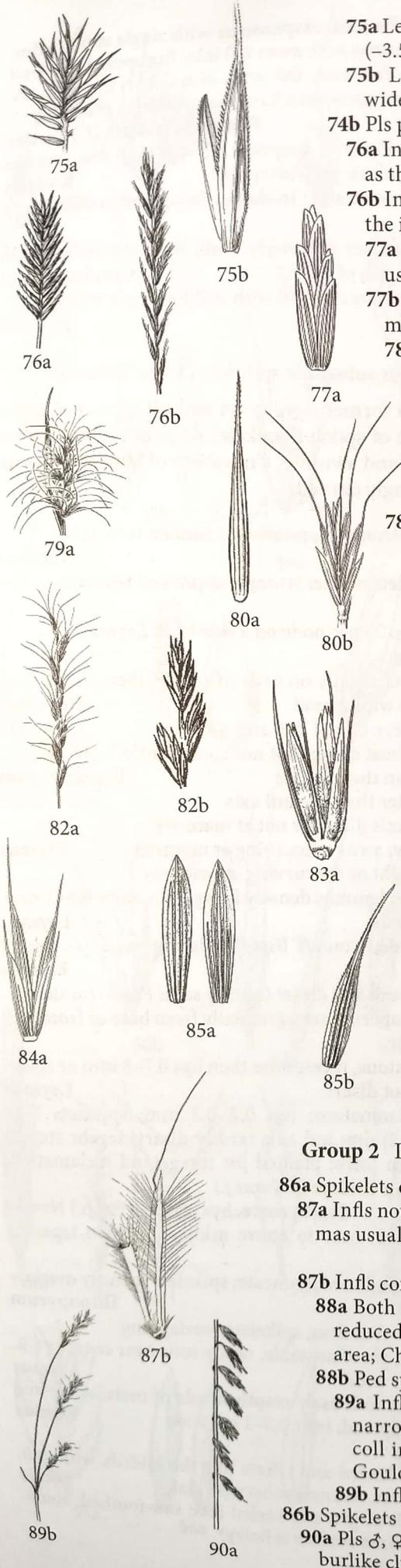
Secale

73b Lemma marginal veins not ciliate, gen not keeled (occ saw-toothed, sometimes scab or hairy if the whole lemma surface is hairy)

74a Pls ann



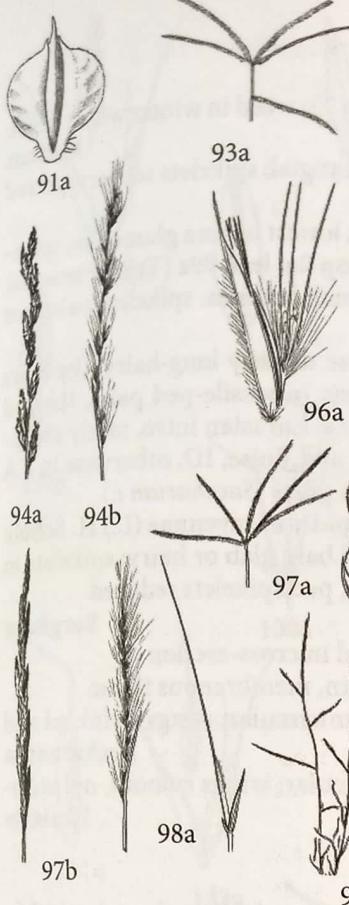
74a Pls ann



- 75a** Lemmas 5–7.5(–12) mm, if > 7.5 mm then hairy throughout; spikes 1.3–2.4 (–3.5) cm (excluding awns); pls of e Cas *Eremopyrum*
75b Lemmas 10–15 mm, glab; spikes (3.5)–6–18 cm (excluding awns); pls widespread *Triticum*
- 74b** Pls per
- 76a** Inflorescences very crowded, internodes usually < 3 mm long; spikelets > 3 × as long as the internodes; pls mainly of e Cas *Agropyron*
- 76b** Inflorescences less crowded, internodes 4–15+ mm long; spikelets 1/2–3 × as long as the internodes
- 77a** Glumes truncate to acute, very thick, stiff and hard, awnless; lemmas usually awnless *Thinopyrum*
- 77b** Glumes obtuse to acuminate, thin and flexible, awned or awnless; lemmas awned or awnless
- 78a** Lemmas with awns curving outwards at maturity
- 79a** Infl disarticulating when mature; anthers 1–2 mm *Elymus*
- 79b** Infl not disarticulating; anthers 2–8 mm
- 80a** Glumes narrowly lanceolate, the veins 1–3(4) (not counting the somewhat thickened margins) *Elymus*
- 80b** Glumes lanceolate to oblanceolate, the veins (3)4–5(–7) (check several) *Pseudoroegneria*
- 78b** Lemmas with straight awns or awnless
- 81a** Pls cespitose, sometimes loosely so; lemmas glab to sparsely hairy
- 82a** Anthers 4–8 mm; spikes loose and open, spikelets usually 1.1–1.5 × as long as internodes of infl axis; infl axis usually plainly visible; pls of e Cas *Pseudoroegneria*
- 82b** Anthers 0.7–2.5(–3.5) mm; spikes compact, spikelets usually 1.5–3 × as long as internodes of infl axis; infl axis partly concealed to plainly visible; range various *Elymus*
- 81b** Pls strongly rhizomatous; lemmas glab to densely long-hairy
- 83a** Glumes awl-shaped or awn-shaped; spikelets 2(3) per node at most or all nodes in middle of spike, 1 per node near base and apex of spike *Leymus*
- 83b** Glumes with flat bodies; spikelets 1 per node at most or all nodes in all parts of spike
- 84a** Bls 5–10 mm wide, usually flat; lower sheaths usually hirsute-pilose *Elymus*
- 84b** Bls normally strongly involute or considerably < 6 mm wide; lower sheaths usually glab
- 85a** Glumes oblong-lanceolate, widest at or above midlength, 3–9-veined, tips not twisted; glume midvein straight; lemmas glab to copiously hairy; range various *Elymus*
- 85b** Glumes lanceolate, widest near base, 3–5-veined, tips awl-like to acuminate, often twisted; glume midvein leaning slightly to one side; lemmas glab to moderately pubescent; pls usually of e Cas *Pascopyrum*

Group 2 Inflorescences with spikelike or racemiform bracts

- 86a** Spikelets dorsiventrally compressed
- 87a** Inflorescences not conspicuously hairy, hairs if present not longer than the spikelets; lemmas usually awnless (occ awned in *Echinochloa*)
- Subgroup 2a**, lead 99a (Tribe Paniceae)
- 87b** Inflorescences conspicuously hairy, hairs often longer than the spikelets; lemmas awned
- 88a** Both spikelets of each spikelet pair similar in shape and size, neither spikelet reduced; pls cespitose, culms 6–20 dm; se Asian intro rarely escaping cult in our area; Chinese silvergrass *Miscanthus sinensis* Andersson
- 88b** Pedicel of each spikelet pair reduced in shape and size
- 89a** Inflorescences terminal; pls cespitose; culms 3.5–11.5(–13) dm, panicle 4–12(–14) cm, narrowly oblong or lanceolate; disturbed roadsides; s US and Mex intro; coll in Idaho Co, ID; silver bluestem; ours subsp. *torreyana* (Steud.) Allred & Gould *Bothriochloa laguroides* (DC.) Herter
- 89b** Inflorescences terminal and axillary *Schizachyrium*
- 86b** Spikelets laterally compressed or ± round in cross-section
- 90a** Pls ♂, ♀; ♂ spikelets borne in racemose arranged 1-sided spikes, ♀ spikelets in burlike clusters surrounded by sheathing lvs *Bouteloua*



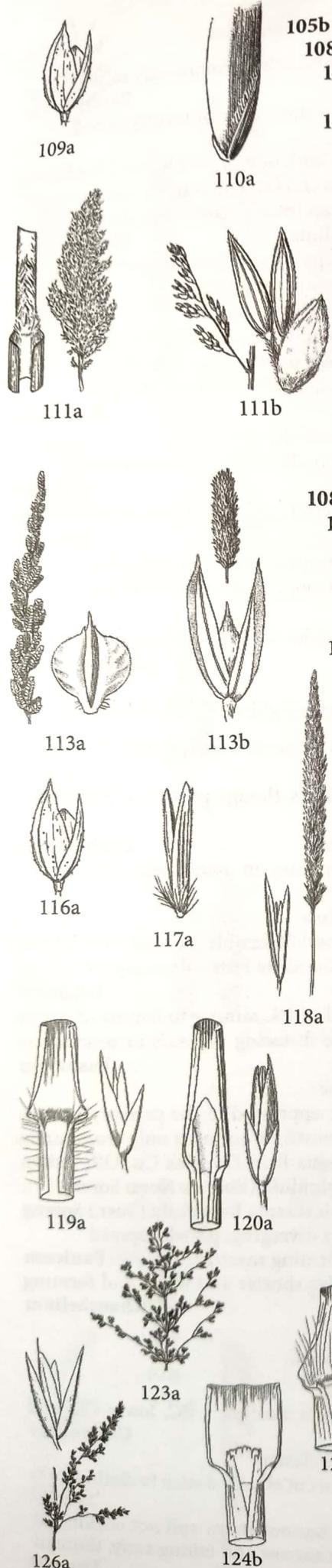
- 90b** Pls not ♂, ♀; spikelets all alike
91a Glumes semicircular, with wings inflated and veins prominently raised **Beckmannia**
91b Glumes not semicircular, gen not winged, veins not prominently raised
92a Spikelets with 2 or more ♀ flts
93a Infl brs digitate, forming a terminal whorl, occ also with 1 or 2 brs below; lemmas awnless; Eurasian intro *E. indica* (L.) Gaertn. waif in Vancouver, BC and historic waif in Portland, OR; African intro *E. tristachya* (Lam.) Lam. a historic waif near Portland, OR, and Pullman, WA **Eleusine** spp.
93b Infl brs racemose, not forming a terminal whorl; lemmas awned
94a Ligules 3–8 mm, acute to attenuate; infl brs 1-sided **Diplachne**
94b Ligules 0.2–0.6 mm, ± truncate; infl brs not 1-sided **Vulpia**
92b Spikelets with one ♀ flt, sometimes with additional ♂ or sterile flts above
95a Infl brs 1-sided, the spikelets in 1–2 rows on the same side of rachis
96a Spikelets with 1 or more reduced ♂ or sterile flts above the ♀ flt **Bouteloua**
96b Spikelets without ♂ or sterile flts above the ♀ flt
97a Infl brs digitate; spikelets 2–3.2 mm, disart above the glumes **Cynodon**
97b Infl brs racemosely arranged along infl axis; spikelets 6–25 mm, disart below the glumes **Spartina**
95b Infl brs not 1-sided, the spikelets loosely arranged or on opp sides of rachis
98a Spikelets loosely arranged, gen not strongly appressed to rachis; lemmas awned; pls gen ann **Vulpia**
98b Spikelets strongly appressed on opp sides of rachis; lemmas awnless; pls **Schedonnardus**

Subgroup 2a Spikelets dorsiventrally flattened; lower lemma resembling upper glume (Tribe Paniceae)

-
- The image shows five pairs of botanical drawings labeled 99a through 104a. Pairs 99a and 100a show detailed views of spikelets. Pairs 101a and 102a show panicle branches. Pairs 103a and 104a show long panicle branches.
- 99a** Infl a condensed, cylindrical pan; each spikelet subtended by 1–∞ scab bristles **Setaria**
99b Infl not as above; spikelets not subtended by bristles, though pustulose-based hairs may occur on the ped
100a Ligs absent; glumes and lemmas usually awned **Echinochloa**
100b Ligs present, of hairs or membranous with hairs on upper edge; glumes and lemmas awnless
101a Pan with unbr, spikelike brs; pans not diffuse
102a Pls ann, rarely per; lemma of fertile (upper) flt flexible, thinner than lemma of sterile (lower) flt and upper glume; abaxial side of fertile flt facing away from infl axis **Digitaria**
102b Pls per; lemma of fertile flt firm to hard, thick, similar to lemma of sterile flt and upper glume; abaxial side of fertile flt facing infl axis or orientation difficult to determine **Paspalum**
101b Pan brs ± br again; pans sometimes diffuse
103a Infl brs one-sided, the secondary brs ± appressed to the primary brs; pls cespitose, sts 3.5–15 dm; e N Am intro; known in our area only from sandy shore of Sproat Lake, VI, and along Umpqua R in Douglas Co, OR; redtop panicum (*Panicum r.* in part); ours subsp. *rigidula* (Bosc ex Nees) Soreng **Coleataenia longifolia** (Torr.) Soreng
103b Infl brs not one-sided, the secondary brs diverging; pls widespread
104a Pls ann; lvs all similar, basal lvs not forming rosettes **Panicum**
104b Pls per; lvs usually of 2 types, basal lvs shorter and wider and forming rosettes **Dichanthelium**

Group 3 Infl a pan, brs not spikelike; flt 1 per spikelet.

-
- The image shows three pairs of botanical drawings labeled 105a through 107b. Pairs 105a and 106a show detailed views of spikelets. Pairs 106a and 106b show panicle branches. Pairs 107a and 107b show long panicle branches.
- 105a** Glumes lacking
106a Culms to 0.5(–1) dm; pan brs in umbelliform clusters; s BC, lower CR, and CRG **Coleanthus**
106b Culms 2–50 dm; pan brs not in umbelliform clusters
107a Lf margins and surfaces sharply scab, apt to cut skin and stick to clothing; pls to 15 dm; spikelets with all flts ♀ **Leersia**
107b Lf margins and surfaces smooth or scab but not sharp and not sticking to clothing; pls 2–50 dm; lower pan spikelets ♂, narrow and falling early, those of the upper part pan ♀, wider, persisting longer. **Zizania**



105b Glumes 2, usually well-developed

108a Spikelets dorsiventrally flattened

109a Spikelet with one flt; spikelets not paired or in 3's; weed in winter wheat fields; intro to Idaho and Latah cos, ID

109b Spikelet with 2 flts, the lower flt reduced or vestigial; spikelets solitary, paired or in 3's

110a Lower glume much smaller than the upper; lowest lemma glumelike; spikelets solitary or in pairs

Subgroup 2a, lead 99a (Tribe Paniceae)

110b Both glumes well developed, hiding the small lemmas; spikelets paired or in 3's (if 3, the 2 ♂ ones may fall early)

111a Pans plumose; upper surface of lf bl base densely long-hairy, the hairs hiding the lig and surface of the bl; spikelets in sessile-ped pairs, the ped spikelet not reduced; disturbed lowl meadows; Eurasian intro, rarely escaping cult; Benton Co, WA, Umatilla Co, OR, and Boise, ID, otherwise in CA and sporadically e across US to Atl; Ravenna grass (*Saccharum r.*)

Tripidium ravennae (L.) H. Scholz

111b Pans not plumose; ventral surface of lf bl base glab or hairy; spikelets in 3's with 1 sessile spikelet and 2 ped spikelets, ped spikelets reduced

Sorghum

108b Spikelets ± laterally flattened, sometimes round in cross-section

112a Glumes winged with the keel expanded as thin, membranous tissue

113a Infl open, brs easily discernible; glumes semicircular; wings wrinkled and ± inflated

Beckmannia

113b Infl dense, brs obscure; glumes not semicircular; wings smooth, not wrinkled or inflated

Phalaris

112b Glumes wingless

114a Glumes and lemmas awnless

115a Lemmas stiffly membranous to hard, tightly enfolding the palea and fr, usually round in cross-section, not keeled

116a Pls ann; lemmas 2–2.3 mm, glab, awnless; callus glab; weed in winter wheat fields in ID

Milium

116b Pls per; lemmas 2.5–7 mm, glab or hairy, awned but awns early deciduous and often not evident; callus glab or hairy

Subgroup 3a, lead 143a (Tribe Stipeae)

115b Lemmas thin and flexible, not tightly enfolding palea and fr, usually laterally flattened, often keeled

117a Lemma base clearly hairy-tufted, if lemmas evenly hairy then the hairs at least 1 mm

118a Spikelets 10–13 mm, subsessile; infl dense; pls of coastal sand dunes

Ammophila

118b Spikelets 3–10 mm, usually clearly stalked; infl dense to open; pls not of coastal sand dunes

119a Lig of short, dense hairs; pls of sandy soils; se BC, e WA, and w MT in our area (apparently not ID)

Calamovilfa

119b Lig membranous; pls of various habitats and ranges

120a Lemmas longer than the glumes; culms usually solid; paleas well-developed, mostly subequal to the lemmas

Muhlenbergia

120b Lemmas shorter than the glumes; culms hollow; paleas often reduced or lacking, sometimes subequal to lemma

121a Pls (0.5–)1–12 dm; lvs 1–8(–10) mm wide; glumes 1.5–4 mm

Agrostis

121b Pls (4–)15–23 dm; lvs 5–20 mm wide; glumes 4–8 mm

Phalaris

117b Lemma base not hairy-tufted, if lemmas evenly hairy the hairs < 1 mm

122a Lower or both glumes shorter than lemma

Catabrosa

123a Lf sheath closed; lvs 2–13 mm wide, pans open

Catabrosa

123b Lf sheath open; lvs 0.6–6 mm wide; pans condensed or open

Sporobolus

124a Lf sheaths with a tuft of hairs at the top; lig of hairs

Muhlenbergia

124b Lf sheaths without a tuft of hairs at the top; lig membranous (sometimes also minutely ciliolate)

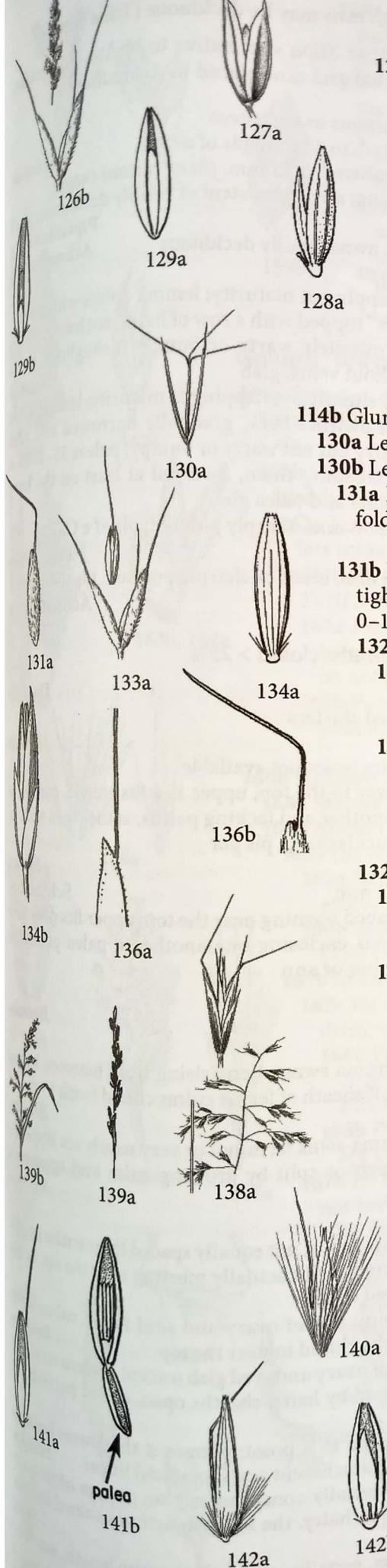
122b Both glumes equaling or longer than lemmas

Cinna

125a Spikelets disart below the glumes; if lvs > 6 mm wide then pans open

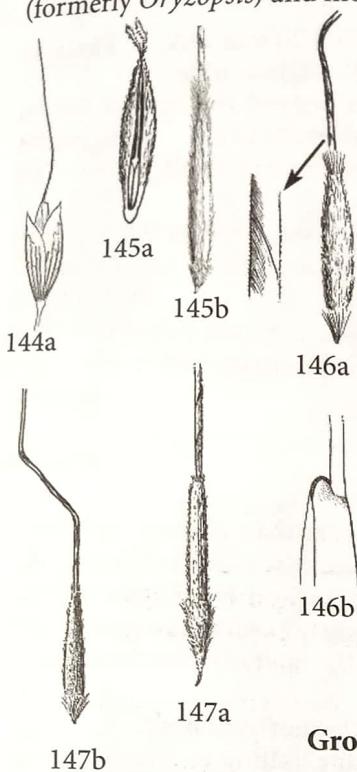
Cinna

126a Lvs 7–20 mm wide; pans open; pls widespread



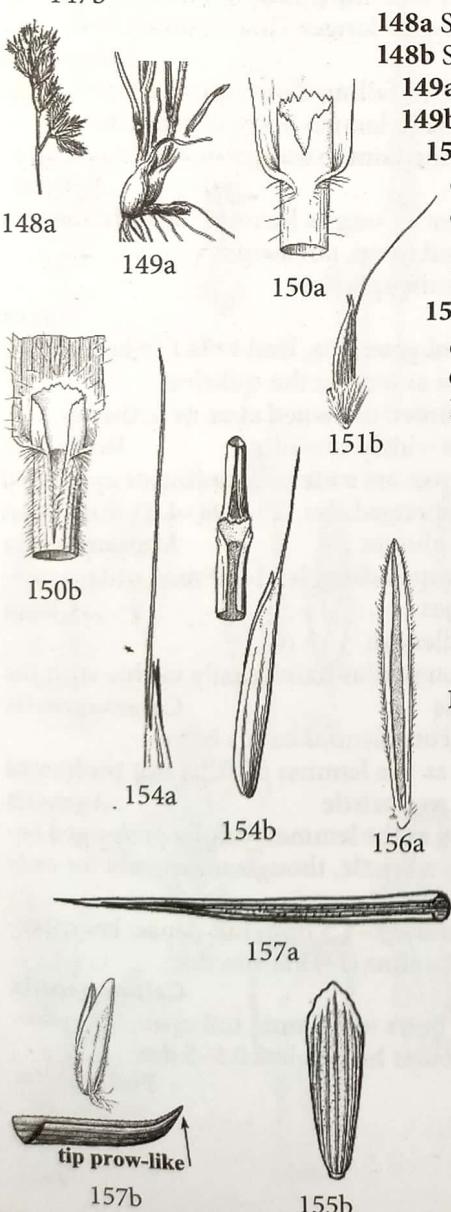
- 126b** Lvs 1–5 mm wide; pans condensed though lobed or somewhat br; pls of CRG and w Cas
125b Spikelets disart above the glumes; if lvs > 6 mm wide then pans condensed
condensed **Polypogon**
- 127a** Glumes (4–)4.5–8.1 mm; wider lf bls > 10 mm wide **Phalaris**
- 127b** Glumes 1.5–4.3(–5) mm; lf bls 2–8(–10) mm wide
- 128a** Rachilla prolonged 0.1–1.9 mm beyond the base of the flt; palea nearly as long as the lemma; pls mont to alp **Podagrastis**
- 128b** Rachilla not prolonged beyond the base of the flt; palea 0–75% as long as the lemma; pls mont to alp
- 129a** Infl rarely as much as 5 mm wide; anthers 0.6–0.7 mm; paleas 65–75% as long as the lemma; glumes 1.6–2 mm; pls mont to alp
- 129b** Infl 3–150 mm wide; anthers 0.2–2.5 mm; paleas 0–65% as long as the lemma; glumes 1.5–5(–7) mm; pls mont to alp **Podagrastis**
- 114b** Glumes or lemmas awned **Agrostis**
- 130a** Lemmas each with 3 awns
- 130b** Lemmas each with 1 awn or awnless **Aristida**
- 131a** Lemmas stiffly membranous to hard, harder than glumes, tightly enfolding the palea and fr, gen round in cross-section; awns 0–225 mm
Subgroup 3a, lead 143a (Tribe Stipeae)
- 131b** Lemmas thin and flexible, not or only slightly harder than glumes, not tightly enfolding the palea and fr, usually laterally flattened; awns 0–16 mm
- 132a** Upper or both glumes awned or abruptly short-pointed
- 133a** Spikelet disart below glumes and stipe, falling as 1 unit; glumes 2–3 × the lemma; lemma awn gen longer than lemma body, occ lacking **Polypogon**
- 133b** Spikelet disart above glumes, flt falling alone; glumes 0.3–2 × the lemma; lemma awn gen shorter than lemma body, occ lacking
- 134a** Lemmas 5-veined or veins too faint to see; palea < 67% as long as lemma **Agrostis**
- 134b** Lemmas 3-veined; palea gen as long as lemma **Muhlenbergia**
- 132b** Glumes obtuse, acute, or tapered to tip, not awned
- 135a** Lemma awns > 2 × as long as the spikelets
- 135b** Lemma awns lacking or < 2 × as long as the spikelets
- 136a** Lemma awns subterminal **Apera**
- 136b** Lemma awns terminal **Subgroup 3a**, lead 143a (Tribe Stipeae)
- 137a** Lemmas abruptly short-pointed or awned at or near the tip
- 137b** Lemmas awned below midlength
- 140a** Lemmas with conspicuous callus hairs, easily visible with the naked eye or a 10× hand lens **Calamagrostis**
- 140b** Lemmas glab or with inconspicuous callus hairs
- 141a** Paleas < 60% as long as the lemma; rachilla not prolonged beyond the base of the flt as a bristle **Agrostis**
- 141b** Paleas 65–100% as long as the lemma; rachilla prolonged beyond the base of the flt as a bristle, though sometimes for only 0.1 mm
- 142a** Callus hairy, the hairs 0.5–4.5 mm; infl dense, brs spikelet-bearing throughout; culms (1–)3.5–10+ dm **Calamagrostis**
- 142b** Callus glab or with hairs to 0.5 mm; infl open, brs spikelet-bearing only in the outer half; culms 0.5–5 dm **Podagrastis**

Subgroup 3a Flt 1, ± round in cross-section, gen awned though awn may be deciduous (Tribe Stipeae)
 Former worldwide genus *Stipa* split into several genera, with no true *Stipa* spp. native to N Am. Ricegrasses
 (formerly *Oryzopsis*) and most N Am needlegrasses are closely related and now placed in *Achnatherum*.



- 143a** Lemma awns 3–11(–15) mm, deciduous or persistent
144a Uppermost lvs of fl culms reduced, to 12 mm; pls of ne WA *Oryzopsis*
144b Uppermost lvs of fl culms not reduced, > 12 mm; pls of various ranges
145a Lemma margins not overlapping; awns persistent or readily deciduous; pls of e Cas
145b Lemma margins overlapping; awns readily deciduous
143b Lemma awns 12–225 mm, persistent
146a Lemma margins strongly overlapping at maturity; lemma apices with a membranous crown or a narrowed “neck” topped with a row of hairs, not lobed; lemma bodies glab or hairy and usually minutely warty or bumpy throughout; paleas 25–50% as long as the lemmas, without veins, glab *Nassella*
146b Lemma margins gen not or only slightly overlapping at maturity; lemma apices lacking a membranous crown or a distinct neck, gradually narrowed and often 1–2-lobed; lemma bodies glab or hairy but not warty or bumpy; paleas 33–100% as long as the lemmas, occ slightly exceeding them, 2-veined at least on the lower part, usually with hairs or both lemma and palea glab
147a Awns 6.5–22.5 cm; calluses 1.5–6 mm, sharply pointed; pls of e Cas *Hesperostipa*
147b Awns 0.1–7 cm; calluses 0.1–2 mm, blunt or sharply pointed; pls widespread *Achnatherum*

Group 4 Infl a pan; flts 2+ per spikelet; lf sheaths closed > 25%.



- 148a** Spikelets in dense 1-sided clusters *Dactylis*
148b Spikelets not borne in dense 1-sided clusters
149a Culms bulbous-based *Melica*
149b Culms not bulbous-based or culm bases not available
150a Lf sheaths gen closed all the way to the top; upper 1–4 flts sterile, composed of empty lemmas enclosing one another and lacking paleas, sometimes with reduced, non-functional anthers; aurs lacking; pls per
151a Calluses glab
151b Calluses hairy, the hairs ca 3 mm *Schizachne*
150b Lf sheaths with at least a V-shaped opening near the top; upper flts ♀, or ♀, or ♂, not composed of empty lemmas enclosing one another, a palea present in each; aurs sometimes present; pls per or ann
152a Lemmas awned
153a Pls ann *Bromus*
153b Pls per
154a Spikelets 15–80 mm; lemma awns often arising from between lemma teeth that are visible at 10×; lf sheath of fertile culms closed (with V-shaped opening at top) *Bromus*
154b Spikelets 7–17 mm; lemma awns terminal or very nearly so; lf sheaths of fertile culms usually open or split by growing culm and apparently open *Festuca*
152b Lemmas awnless
155a Lemma veins faint to conspicuous, not equally spaced their entire length, usually curved and converging but not actually meeting near the tip, or too faint to see; lf tips prow-shaped or not
156a Spikelets 16–40(–45) mm; tips of ovary and seed hairy; callus never with cobwebby hairs; sheaths closed to near the top *Bromus*
156b Spikelets 2–17 mm; tip of ovary and seed glab (except *Festuca viridula*); callus sometimes with cobwebby hairs; sheaths open, closed partially, or closed to near the top
157a Lf tips gradually tapered to a point; glumes ≤ the lowest lemmas; callus lacking hairs; hila (attachment scars on seeds) linear *Festuca*
157b Lf tips prow-shaped, usually conspicuously so; glumes often ≥ the lowest lemmas; callus often hairy, the hairs sometimes cobwebby; hila round to oval *Poa*
155b Lemma veins conspicuous, equally spaced their entire length, not converging; lf tips prow-shaped



158a



159a



159b

158a Spikelets sessile or subsessile on one side of the infl axis; pls ann; disturbed habitats, compacted upland soils, and often gravel parking areas; e Cas **Sclerochloa**

158b Spikelets ped in open or contracted pans, not restricted to one side of the infl axis; pls mostly per; pls of wetland areas

159a Spikelets with (1)2(3) flts; lower glume veinless; spikelets open with lower flt sessile and upper flt raised on relatively long rachilla internode; flts not strongly overlapping, the rachilla often visible **Catabrosa**

159b Spikelets with 2–16 flts; lower glume 1-veined; spikelets compact with rachilla internodes relatively short and often concealed by the strongly overlapping flts so that the flts strongly overlap, often concealing the rachilla, the spikelet more compact **Glyceria**



161a



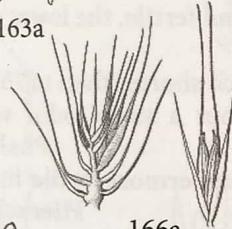
162a



163a



163b, 164a



166a



166b



167a



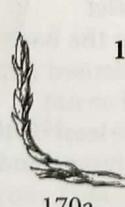
168a



168b



171a



170a



172a



173a

Group 5 Infl pan; flts 2+ per spikelet; lf sheaths open

160a Spikelets dorsiventrally flattened

161a Spikelets with 3–4 flts; spikelets only slightly dorsiventrally flattened; pls of e Cas **Scolochloa**

161b Spikelets with 2 flts, one so modified it may not be recognized as a flt; spikelets clearly dorsiventrally flattened

162a Lower glume much smaller than the upper; lowest lemma glumelike; spikelets solitary or in pairs **Subgroup 2a**, lead 99a (Tribe Paniceae)

162b Both glumes well-developed, hiding the small lemmas; spikelets paired or in 3's (if 3 the 2 ♂ ones may fall early)

163a Pans plumose; upper surface of lf bl base densely long-hairy at base, the hairs hiding the lig and bl surface; spikelets in sessile-ped pairs, the ped spikelet not reduced (see lead 111a) **Tripidium ravennae** (L.) H. Scholz

163b Pans not plumose; ventral surface of lf bl base glab or hairy; spikelets in 3's with one sessile spikelet and two ped spikelets, ped spikelets reduced **Sorghum**

160b Spikelets laterally flattened or round in cross-section

164a Mature glumes leathery, shiny, thicker than fertile lemmas **Sorghum**

164b Mature glumes and lemmas alike in texture or lemmas thicker than glumes

165a Infl one-sided, dense

166a Spikelets paired, one spikelet fertile, the other sterile and resembling an empty set of bracts; pls (5–)9–75(–100) cm tall **Cynosurus**

166b Spikelets not paired, similar in appearance, all normally fertile; pls 2–15 (–30) cm; e of Cas **Sclerochloa**

165b Infl not one sided, either open or dense

167a Pls usually > 2 m; infl large, fluffy pans 1.5–13 dm; culms (5–)10–15+ mm diam; spikelets with long, silky hairs

168a Pls strongly rhizomatous; growing in water at least part of the year; lf edges not sharply scab, not apt to cut the skin; lemmas glab, though spikelet axis long soft-hairy **Phragmites**

168b Pls densely cespitose; usually growing in uplands; lf edges sharply scab, apt to cut the skin; lemmas long-hairy, esp below midlength **Cortaderia**

167b Pls differing from the above in some way; pls usually < 2 m; infl various but not both fluffy and 1.5–13 dm; culms usually < 10 mm diam; spikelets lacking silky hairs

169a Top of lf sheath with a distinct tuft of long hairs

170a Pls strongly rhizomatous, unisexual; lvs stiffly 2-ranked; pls of alkaline areas e of Cas or saline areas near the coast **Distichlis**

170b Pls cespitose, flts ♀; lvs neither stiff nor strongly 2-ranked; pls of various habitats

171a Paleas with conspicuously dense-hairy keels, the tufts of hairs visible with naked eye; culms disintegrate at maturity; lf sheaths somewhat inflated; known from lower CR **Triplasis**

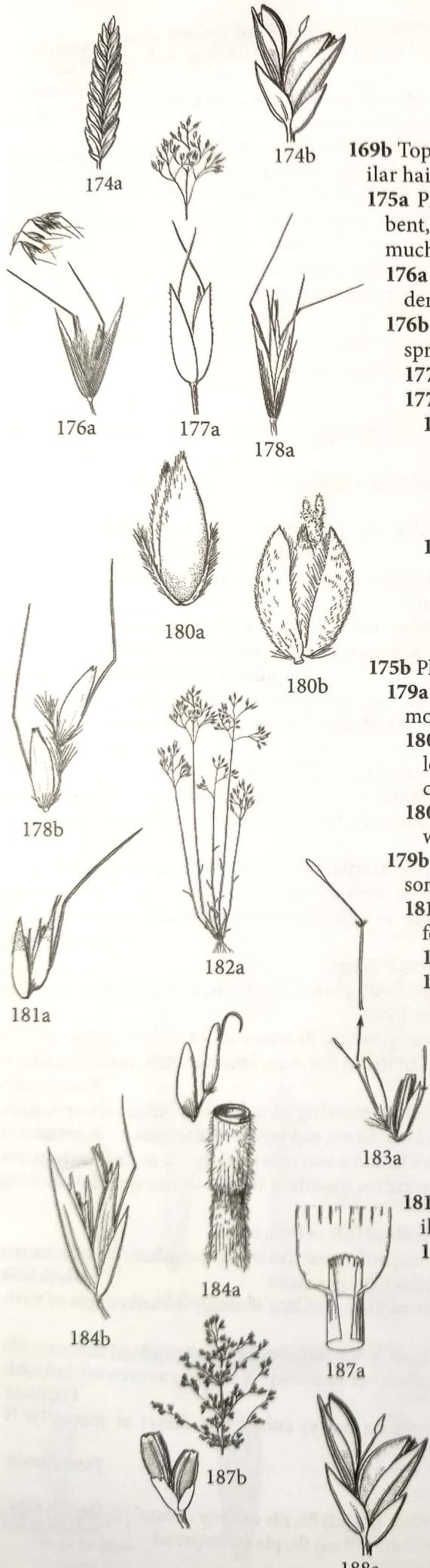
171b Paleas not conspicuously hairy; culms not disintegrate at maturity; lf sheaths not inflated **Danthonia**

172a Lemmas awned

172b Lemmas awnless

173a Glumes longer than the adj flt; pls mainly coastal **Danthonia**

173b Glumes shorter than the adj flt; pls widespread



174a Pls ann or per, often with glands; spikelets with (1)2–60 flts; lf bls not disart; pls widespread *Eragrostis*

174b Pls per, lacking glands; spikelets with (1)2–5 flts; lf bls eventually disart from the sheaths; pls along coast and n Wi Va; uncommon *Molinia*

169b Top of lf sheath lacking a distinct tuft of long hairs, or if hairy then similar hairs present elsewhere on the sheath

175a Pls ann; lemma awns easily visible without dissecting the spikelets, bent, arising below midlength of the lemma; pans open at maturity and much-br

176a Pls robust; lemma awns 15–45 mm; glumes 14–33 mm; spikelets pendent at maturity *Avena*

176b Pls delicate; lemma awns 2–9(–15) mm; glumes 1–12 mm; spikelets spreading to erect at maturity

177a Spikelets 1.5–3.5 mm *Aira*

177b Spikelets 4–15 mm

178a Glume veins (3)–5–9, conspicuous; lemmas 5–10 mm; spikelets with 2–3 flts; lowest flt with awn arising from the tip, upper flt(s) with awn arising from below midlength; infl axis ± straight; ligs 1–8 mm, acute to obtuse, usually lacerate; nodes purple-black *Ventenata*

178b Glume veins 1–3, inconspicuous; lemmas 1.5–3 mm; spikelets with 2 flts; both lemmas in each spikelet with awn arising from below midlength; infl axis slightly zigzagging; ligs (0.5)–2–3(–4.7) mm, acute to acuminate, entire; nodes greenish or brownish, not strongly contrasting with the culms *Deschampsia*

175b Pls ann or per, not as above in one or more aspects

179a Spikelets with 3 flts, the upper one thicker and fertile, the lower ones modified, sterile, often greatly reduced

180a Lower flts vestigial, 0.2–4.5 mm, from much shorter than to 75% as long as the uppermost fertile flt; pls without a sweet odor when crushed *Phalaris*

180b Lower flts ♂, 3–5 mm, longer than the uppermost fertile flt; pls with a sweet odor when crushed *Hierochloe*

179b Spikelets with (1)2–∞ fertile flts, the lower flt(s) fertile, the upper flts sometimes reduced and sterile but similar to the lower

181a Spikelets with 2(3) flts; the awn of the lower lemma distinctly different from the awn of the upper lemma, or one of the lemmas awnless

182a Pls ann, delicate; lvs and nodes glab *Aira*

182b Pls per, not delicate; lvs and nodes glab or pubescent

183a Awns bent with small, conical projections at the bend, the distal segm wider near the tip; pls cespitose; culms to 6 dm *Corynephorus*

183b Awns straight, curved, or bent, but not as above

184a Pls velvety-hairy throughout or on culm nodes; lower lemma awnless; spikelets disart below the glumes *Holcus*

184b Pls not velvety-hairy; lower lemma awned; spikelets disart above the glumes *Arrhenatherum*

181b Spikelets with 2–∞ flts; lemmas awnless or with awns that are similar (but may vary in length)

185a Lemmas with 3 conspicuous veins

186a Flts 1–2(3) per spikelet

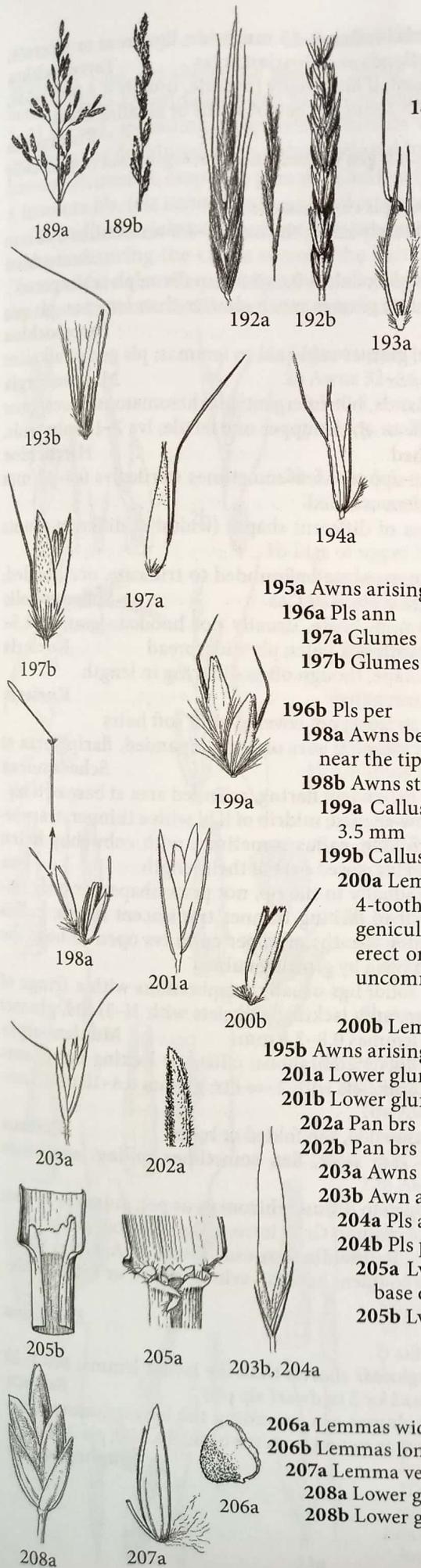
187a Lf sheath open to the base; lvs 0.6–6 mm wide, if > 2 mm wide then infl a condensed pan; glumes and lemmas gen acute to acuminate, awned or not *Muhlenbergia*

187b Lf sheath closed at least on the lower half; lvs 2–13 mm wide, infl an open pan; glumes and lemmas rounded to truncate, awnless *Catabrosa*

186b Flts (3)–5–40 per spikelet

188a Rachilla prolonged beyond the base of the distal flt, terminating in a rudimentary flt; uncommon escaped orn; sw BC, coastal OR, and near Portland *Molinia*

188b Rachilla not prolonged beyond the base of the distal flt



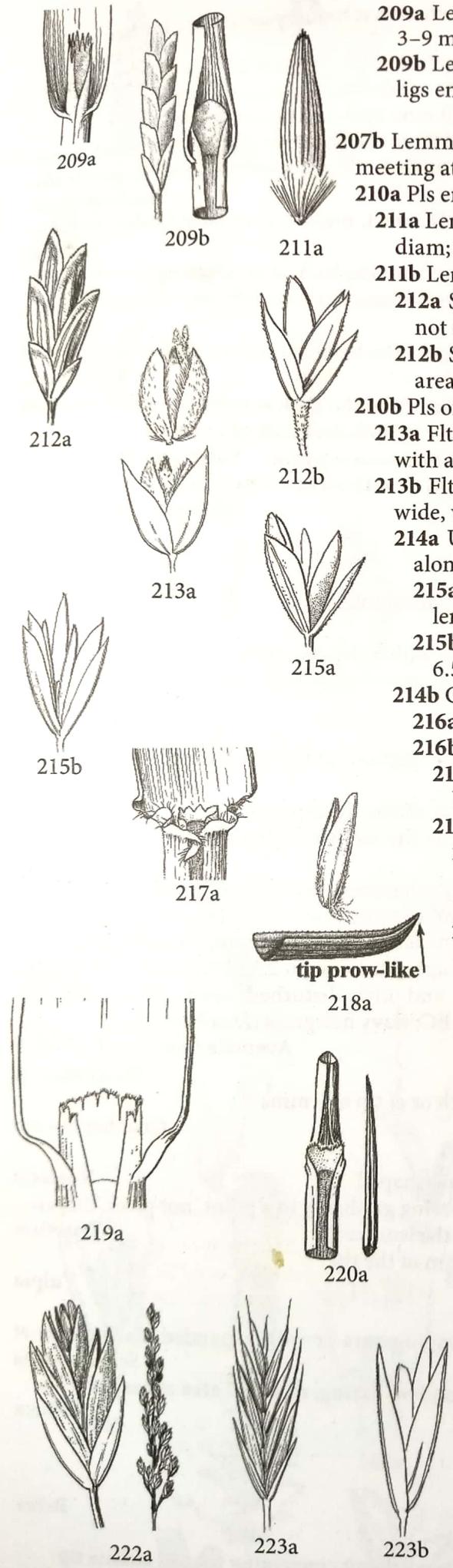
- 189a** Spikelets attached to secondary or tertiary infl brs *Eragrostis*
189b Spikelets attached to the primary infl brs *Diplachne*
- 185b** Lemmas with (1-)5-∞ faint to conspicuous veins
190a Lemmas (6-)7-20 mm; spikelets nearly sessile
191a Lemmas awned from the tip; awns straight to curved, terete
192a Infl open, flexible, nodding, main axis visible; pls mostly in and w of Cas *Brachypodium*
192b Infl dense, stiff, erect, main axis usually hidden by spikelets; pls of e Cas *Leymus*
191b Lemmas awned from the back at ca midlength or from between two acute to aristate, apical teeth; awns twisted and geniculate, flattened
193a Lemmas awned from between two acute to aristate, apical teeth *Danthonia*
193b Lemmas awned from the back at ca midlength *Avenula*
190b Lemmas 2-6(-7) mm; spikelets stalked or sessile
194a Some lemmas with awns ≥ 1 mm **Subgroup 5a**, lead 195a
194b Lemmas awnless or with awns > 1 mm long **Subgroup 5b**, lead 206a

Subgroup 5a

- 195a** Awns arising at or below midlength of lemma
196a Pls ann
197a Glumes 1.5-3.5 mm; lemma tips with 2 slender teeth *Aira*
197b Glumes 3.5-9 mm; lemma tips acute to acuminate, not toothed *Deschampsia*
- 196b** Pls per
198a Awns bent, with small, conical projections at the bend, the distal segm wider near the tip *Corynephorus*
198b Awns straight or bent, but not as above; widespread
199a Callus hairs ca half as long as the lemmas; ligules truncate to obtuse, 1.5-3.5 mm *Vahlodea*
199b Callus hairs < half as long as the lemmas; ligules acute to rounded, 1.5-13 mm
200a Lemmas scab or puberulent, not shiny; lemma with apex acute, erose to 4-toothed, awned from near the base, awns 3.7-7 mm, strongly geniculate, geniculation below the lemma apex, distal segm 2.5-4.5 mm; culms 3-8 dm, erect or geniculate; railroads, and other disturbed, open areas at low elev; uncommon e N Am intro; sw BC; wavy hairgrass (*Deschampsia f.*)
200b Lemmas glab, shiny *Avenella flexuosa* (L.) Drejer *Deschampsia*
- 195b** Awns arising from above midlength or at tip of lemma
201a Lower glume > lowest lemma
201b Lower glume ≤ lowest lemma
202a Pan brs soft-hairy; lf tips ± prow-shaped *Koeleria*
202b Pan brs glab to scab; lf tips tapering gradually to a point, not prow-shaped
203a Awns arising > 1 mm below the lemma tip
203b Awn arising at or within 1 mm of the tip *Trisetum*
204a Pls ann
204b Pls per
205a Lvs with clawlike or clasping aurs or with expanded, flaring area at base of lf bl *Schedonorus*
205b Lvs without aurs or expanded, flaring, rounded area at base of lf bls *Festuca*

Subgroup 5b

- 206a** Lemmas wider than long *Briza*
206b Lemmas longer than wide
207a Lemma veins ± equally spaced, parallel, not converging toward lemma tip
208a Lower glume half or more as long as the lowest lemma *Poa*
208b Lower glume usually < 1/3(-1/2) as long as the lowest lemma



- 209a** Lemma veins prominent; lf bls flat, 4–15 mm wide; ligs erose or lacerate, 3–9 mm; pls of freshwater wetlands and riparian areas *Torreyochoa*
- 209b** Lemma veins not prominent; lf bls usually involute, usually < 3 mm wide; ligs entire or nearly so, rarely > 3 mm; pls gen of saline or alkaline areas *Puccinellia*
- 207b** Lemma veins not equally spaced, gen curved and converging but not actually meeting at lemma tip
- 210a** Pls emergent in shallow water; pls rhizomatous
- 211a** Lemmas 4–9 mm; callus densely hairy, the hairs 1–1.5 mm; culms 6–8 mm diam; pls of e Cas *Scolochloa*
- 211b** Lemmas 2–3.6 mm; callus glab; culms 0.6–4.8 mm diam; pls widespread
- 212a** Spikelets with (3)–4–8 flts; glumes much shorter than lemmas; pls gen not of alkaline areas *Torreyochoa*
- 212b** Spikelets with 1(–3) flts; glumes subequal to lemmas; pls gen of alkaline areas *Muhlenbergia*
- 210b** Pls of moist meadows or uplands, not emergent; pls rhizomatous or cespitose
- 213a** Flts 3, the lower two sterile or ♂, the upper one fertile; lvs 2–15 mm wide, with a sweet odor when crushed *Hierochloe*
- 213b** Flts 2–12, all fertile or the upper 1–few sometimes sterile; lvs 0.4–12 mm wide, without a sweet odor when crushed
- 214a** Upper and lower glumes of different shapes (widest at different points along their lengths)
- 215a** Upper glumes 1.5–3 mm, acute or rounded to truncate, occ hooded; lemmas 1.9–3 mm; pan brs scab; pls e Cas *Sphenopholis*
- 215b** Upper glumes 2.5–5 mm, acute, usually not hooded; lemmas 2.5–6.5 mm; pan brs covered with soft hairs; pls widespread *Koeleria*
- 214b** Glumes nearly alike in shape, though often differing in length
- 216a** Pan brs covered with soft hairs *Koeleria*
- 216b** Pan brs glab, scab, or strigose, not covered with soft hairs
- 217a** Lvs with clawlike or clasping aurs or with expanded, flaring area at base of lf bl *Schedonorus*
- 217b** Lvs without aurs or expanded, flaring, rounded area at base of lf bls
- 218a** Lf tips usually prow-shaped; midrib of lf bl with a thinner, translucent band along each side; callus sometimes with cobwebby hairs; sheaths of upper culm lvs closed part of their length *Poa*
- 218b** Lf tips tapered gradually to the tip, not prow-shaped or only minutely so; midrib of lf bl lacking thinner translucent bands; callus lacking cobwebby hairs; sheaths of upper culm lvs open to near the base (sometimes torn open by growing culms)
- 219a** Culms usually solid; ligs usually membranous with a fringe of tiny hairs at the top; aurs lacking; spikelets with 1(–3) flts, glumes 0.4–2.5(–3.8) mm; lemmas 0.8–3.8 mm *Muhlenbergia*
- 219b** Culms hollow; ligs membranous, ciliate or lacking hairs; aurs present or lacking; spikelets with 2–∞ flts; glumes 0.4–10 mm; lemmas 1.5–10 mm
- 220a** Lvs 0.5–1.5 mm wide, gen folded or rolled *Festuca*
- 220b** Lvs 1.6–10+ mm wide, flat, sometimes rolling lengthwise when dry
- 221a** Pans very open to diffuse; rhizomatous per; culms 5–13 dm; sand dunes; uncommon Gr Pl intro; e WA; blowout grass *Redfieldia flexuosa* (Thurb. ex A. Gray) Vasey
- 221b** Pans dense to open; habitat various; native or intro; widespread
- 222a** Pls ♂, ♀ *Leucopoa*
- 222b** Pls with flts ♂
- 223a** Lower glumes shorter than the lowest lemma; flts 3–10 (or as few as 1 or 2 in dwarf alp pls) *Festuca*
- 223b** Lower glumes gen exceeding the lowest lemma; lemmas awnless or awned from the back; flts 2(3); pls 2–8+ dm tall *Graphephorum*