

- Fruit obcompressed; bracts 2-winged, samaralike; fruit mostly vertical *Z. brandegei* var. *brandegei*

Var. *arizonica* (Standley) Welsh [*Z. arizonica* Standley]. Fine-textured or sandy, often saline and seleniferous substrates on Entrada, Morrison, and Duchesne River formations in Emery, Uintah, and Wayne counties; Arizona; 10 (i). Despite the distinctive bracts and horizontal fruits, the plants are well within the range of vegetative variation existing in plants of *Z. brandegei* in a strict sense. Staminate plants of this variety have not previously been discerned from among the general collections of *Z. brandegei*. Previous descriptions of *Zuckia* and its only species (*arizonica*) are conspicuous in lacking discussion of staminate features. Supposed differences in vesture between the taxa apparently do not exist, and other diagnostic morphology is unknown.

Var. *brandegei* Fine-textured, often saline and seleniferous substrates on the Duchesne R., Uinta, Kaiparowits, Summerville, Morrison, Chinle, and Moenkopi formations (and probably others) at 1280 to 2440 m in Daggett, Emery, Garfield, Grand, Kane, San Juan (? type from San Juan River), Sevier, Uintah, and Wayne counties; Colorado and Arizona; 66 (xii). Both broad and narrow-leaved phases of both of the varieties are known, and there is a tendency for the wideness of leaves to be geographically correlated (i.e., the broad-leaved populations from the Uinta Basin and those on "The Blues" of the Kaiparowits Formation northeast of Henrieville and north of Fourmile Bench), but the plants differ in no other discernible way. Probably these variants do not warrant taxonomic recognition.

COMPOSITAE Giseke

Sunflower Family

Annual, biennial, or perennial herbs, or shrubs; leaves alternate, opposite, or whorled, simple, pinnatifid, or compound; inflorescence of involucrate heads, these solitary or several in corymbose, racemose, paniculate, or cymose clusters; flowers few to numerous on a common receptacle, surrounded by green bracts forming a cup-shaped, cylindrical, or urn-shaped involucre enclosing the flowers in bud; heads entirely of tubular (disk) corollas, entirely of ligulate (ray) corollas, or with tubular corollas forming a central disk and an outer radiating row of ligulate corollas; receptacle flat, convex, conic, or cylindric, naked or bearing chaffy bracts, scales, or hairs; calyx lacking, or crowning the summit of the ovary and modified as a pappus of capillary bristles, scales, or awns; stamens alternate with corolla lobes; filaments free (rarely connate); the anthers united and forming a tube (rarely separate); ovary inferior, of 2 carpels, 1-loculed and with a single ovule; styles 1, 2-cleft, exserted through the anther tube; fruit an achene; $x = 2-19+$ [Asteraceae Dumort.]. Note: All involucral measurements are from dried pressed herbarium specimens. The width measurements are sometimes broader than in fresh material.

Welsh, S. L. 1983. Utah flora: Compositae (Asteraceae). Great Basin Naturalist 43: 179-357.

1. Corollas all raylike; plants usually with milky juice . Key 1
- Corollas not all raylike, some or all of them tubular; juice seldom if ever milky 2

- 2(1). Corollas all tubular; no ray flowers present, or the rays vestigial and minute Key 2
- Corollas not all tubular; ray flowers present 3
- 3(2). Pappus of capillary bristles, at least in part Key 3
- Pappus of awns or scales, or lacking 4
- 4(3). Pappus lacking Key 4
- Pappus present, of awns or scales Key 5

Key 1.

Corollas all raylike; plants usually with milky juice.

1. Pappus lacking 2
- Pappus present 3
- 2(1). Rays 10-20 mm long; plants glabrous, with leaves in a basal rosette *Atrichoseris*
- Rays 5-7 mm long; plants pubescent, with well-developed cauline leaves *Lapsana*
- 3(1). Pappus, at least in part, of plumose bristles 4
- Pappus of simple bristles, awns, or scales 7
- 4(3). Plants acaulescent, with merely bracteate stems *Hypochaeris*
- Plants caulescent 5
- 5(4). Achenes not beaked, truncate at apex; involucres usually less than 15 mm long *Stephanomeria*
- Achenes tapering or beaked at apex; involucres usually more than 15 mm long 6
- 6(5). Leaves pinnatifid; corollas white or pinkish; involucre with an outer series of short bractlets; plants of southern Utah *Rafinesquia*
- Leaves not pinnatifid, entire; corollas yellow or purplish; involucre lacking short outer bractlets; plants widespread *Tragopogon*
- 7(3). Pappus of 1-3 series of unawned or awned scales 8
- Pappus of capillary bristles 9
- 8(7). Pappus of 2 or 3 series of unawned scales; corollas blue, closing by midmorning *Cichorium*
- Pappus scales in a single series, awned; corollas yellow, not closing by midmorning *Microseris*
- 9(7). Achenes more or less flattened; stems leafy; heads in panicles or in umbellate clusters 10
- Achenes not flattened; stems leafy or scapose; heads solitary or variously disposed 11
- 10(9). Involucres cylindric or ovoid-cylindric; achenes beaked; flowers yellow or blue *Lactuca*
- Involucres broadly campanulate to hemispheric; achenes not beaked; flowers yellow *Sonchus*
- 11(9). Corollas pink or purplish 12
- Corollas yellow or yellowish, or white or cream colored 14
- 12(11). Plants annual; heads mainly 5-7 mm long (from base of involucre to tip of pappus) *Prenanthes*
- Plants perennial; heads mainly 8-20 mm long or more 13
- 13(12). Plants with rigid spine-tipped branches *Stephanomeria*
- Plants unarmed, the branches soft *Lygodesmia*
- 14(11). Leaves all basal; heads solitary on scapose peduncles 15
- Leaves not all basal, the stems leafy; heads not on scapose peduncles 17

- 15(14). Achenes not beaked, truncate; pappus bristles barbellate *Microseris*
- Achenes beaked or tapering to apex; pappus not of barbellate bristles 16
- 16(15). Achenes 10-ribbed or 10-nerved, not spinulose; involucral bracts usually imbricated in several series *Agoseris*
- Achenes 4- to 5-ribbed, spinulose, especially near apex; principal bracts in a single series, the outer much shorter *Taraxacum*
- 17(14). Achenes ridged or tuberculate between the angles; leaves either crustaceous-margined or peduncles stipitate-glandular; plants of southwestern Utah 18
- Achenes striate between the angles; leaves and peduncles otherwise (rarely glandular setose in some *Crepis* species); plants widely distributed 19
- 18(17). Plants depressed annuals with crustaceous-margined leaves, not stipitate-glandular; achenes abruptly beaked, transversely ridged between the ribs *Glyptopleura*
- Plants erect, lacking crustaceous-margined leaves, conspicuously stipitate-glandular above; achenes tapering to a beak, not transversely ridged *Calycoseris*
- 19(17). Pappus bristles early deciduous, more or less united below and falling together, only a few of the stout outer ones may be persistent *Malacothrix*
- Pappus bristles persistent or tardily deciduous, and then falling separately 20
- 20(19). Pappus tan to brown; involucral bracts not thickened *Hieracium*
- Pappus white or whitish; involucral bracts somewhat thickened at base or on midrib *Crepis*

Key 2.

Corollas all tubular; no ray flowers present.

1. Heads unisexual, the pistillate heads with 1-4 flowers enclosed in involucre; involucre burlike or nutlike, only style tips exserted 2
 - Heads perfect or unisexual; involucre not burlike or nutlike 4
 - 2(1). Involucral bracts of the staminate heads separate; fruiting involucres burlike, covered with hooked appendages *Xanthium*
 - Involucral bracts of the staminate heads united; fruiting involucres various but, if burlike, lacking hooked appendages 3
 - 3(2). Shrubs; fruiting involucre with several transverse, scarious wings; leaves or their lobes linear-filiform *Hymenoclea*
 - Shrubs or herbs; fruiting involucre lacking transverse wings; leaves and their lobes not linear-filiform *Ambrosia*
 - 4(1). Stamens not united by their anthers; flowers always unisexual, the pistillate corollas none or much reduced 5
 - Stamens with united anthers or rarely not united in some species with perfect flowers, at least some flowers usually perfect 7
 - 5(4). Achenes long-villous; leaves or their lobes linear-filiform *Oxytenia*
 - Achenes not long-villous; leaves or their lobes not linear-filiform 6
 - 6(5). Pistillate flowers subtended by large, chaffy scales simulating inner involucral bracts; achenes with pectinate or winged margins *Dicoria*
- Pistillate flowers subtended by chaffy scales or these lacking; achenes without pectinate or toothed wings *Iva*
- 7(4). Involucral bracts with translucent, usually yellow or orange dots *Porophyllum*
- Involucral bracts without distinct dots; pappus various, but not as above 8
- 8(7). Pappus of capillary bristles, at least in part, these smooth, scabrous, barbellate, or plumose 9
- Pappus lacking or, if present, not of capillary bristles 43
- 9(8). Leaves opposite or whorled, some or all caudine 10
- Leaves alternate, at least basally, or basal and actually alternate 14
- 10(9). Plants rushlike, xeric herbs of low elevations in Washington County *Bebbia*
- Plants not rushlike or xeric, of various habitats and distribution, but not as above 11
- 11(10). Corollas yellow; involucral bracts in 1 series or in 2 series, but all equal in length *Arnica*
- Corollas white, ochroleucous, flesh colored, blue, or purple; involucral bracts in 2 to several series 12
- 12(11). Pappus double—the outer series of short scales, the inner series of capillary bristles; shrubs with white bark *Hofmeistera*
- Pappus single, or the plants herbaceous; shrubs or herbs 13
- 13(12). Achenes 5-angled or 5-ribbed; involucral bracts subequal or in 2 series *Eupatorium*
- Achenes 10-angled or 10-ribbed; involucral bracts imbricated in several series of different lengths *Brickellia*
- 14(9). Leaves spinescent, usually with spiny teeth or lobes, rarely entire but then with spine-tipped apex, mostly thistlelike 15
- Leaves entire, denticulate or lobed, lacking spines, not thistlelike 19
- 15(14). Corollas of some or all flowers bilabiate; basal leaf axils woolly; leaves spinulose-dentate; flowers pink; arid sites in Kane and Washington counties *Perezia*
- Corollas not bilabiate; leaves not or seldom spinulose-dentate; basal leaf axils woolly; flowers pinkish white or cream; various distribution 16
- 16(15). Pappus of 2 series of awns, the outer long and naked, the inner short and hispidulous; flowers yellow *Cnicus*
- Pappus of plumose or barbellate capillary bristles; flowers not yellow 17
- 17(16). Pappus bristles plumose (rarely some otherwise); receptacle densely bristly *Cirsium*
- Pappus bristles merely barbellate 18
- 18(17). Receptacle densely bristly, not fleshy or honeycombed; heads nodding *Carduus*
- Receptacle not bristly or scarcely so, fleshy and honeycombed; heads not nodding *Onopordum*
- 19(14). Receptacle with dense bristles or narrow, chaffy scales between disk flowers 20
- Receptacle naked or at most short-hairy, never with dense bristles or scales 22
- 20(19). Involucral bracts with hooked spines; lower leaves large (resembling rhubarb), cordate at base *Arctium*
- Involucral bracts without spines, or spines not hooked; lower leaves not large and cordate at base 21

- 21(20). Receptacle chaffy except in center; plants small, woolly *Filago*
- Receptacle chaffy throughout; plants not small and woolly *Centaurea*
- 22(19). Heads unisexual; plants dioecious (staminate flowers may have styles but ovary does not develop) 23
- Heads with at least central flowers perfect 25
- 23(22). Plants shrubs or else woody at base, not tomentose; leaves sometimes toothed or lobed; involucral bracts not strongly scarious margined *Baccharis*
- Plants herbaceous, more or less tomentose; leaves entire; involucral bracts strongly scarious, at least along margins 24
- 24(23). Pappus bristles of pistillate flowers united at base and falling together; pappus bristles of staminate flowers usually club-shaped at apex; plants typically less than 30 cm tall; basal leaves commonly in a rosette; caudine leaves reduced and different in shape; leaves usually tomentose on both sides *Antennaria*
- Pappus of pistillate flowers separate at base and falling separately; pappus bristles of staminate flowers not club-shaped at apex; plants mostly over 30 cm tall; leaves all alike, usually green and glabrate above *Anaphalis*
- 25(22). Stems longitudinally brown-striate; involucral bracts imbricate, chartaceous, the inner with scarious margins and broadly rounded apices; shrubs with yellow flowers, of western Millard County *Lepidospartum*
- Stems striate or not; involucral bracts scarious, hyaline, or herbaceous but not as above; herbs, or shrubs with flowers and distribution various 26
- 26(25). Involucral bracts scarious or hyaline (only partly so in *Pluchea*) 27
- Involucral bracts herbaceous, at least in the center 29
- 27(26). Involucral bracts subscarious; corollas purplish; plants not tomentose, slender woody shrubs or annual to perennial herbs *Pluchea*
- Involucral bracts scarious; corollas rarely purplish; plants tomentose, prostrate to erect herbs 28
- 28(27). Plants perennial, subdioecious pistillate heads usually with a few, central, perfect flowers *Anaphalis*
- Plants annual or perennial, not dioecious; heads all alike, the marginal flowers pistillate and central ones perfect *Gnaphalium*
- 29(26). Involucral bracts in a single series, a few very short ones may be present at the very base 30
- Involucral bracts of 2 or more series, these often of different lengths 33
- 30(29). Plants woody, shrubs; involucral bracts 4–6 per head *Tetradymia*
- Plants herbaceous; bracts more than 6 per head 31
- 31(30). Plants annual; heads with inner flowers perfect, the outer pistillate *Conyza*
- Plants perennial; heads with all flowers perfect 32
- 32(31). Style branches with a tuft of hairs near the truncate apex; involucral bracts in 1 series only (a few short bracts may be present) *Senecio*
- Style branches without a tuft of hairs near the truncate apex; involucral bracts actually in 2 or more series *Erigeron*
- 33(29). Pappus double, the outer series of short scales, the inner ones of capillary bristles; shrubs with white bark *Hofmeistera*
- Pappus simple or else the plants herbaceous 34
- 34(33). Plants annual 35
- Plants perennial or woody shrubs 37
- 35(34). Plants low, depressed, scurfy pubescent herbs; leaves broadly ovate or roundish, entire or toothed *Psathyrotes*
- Plants not as above 36
- 36(35). Leaves all entire *Aster*
- Leaves toothed or lobed, at least the lower *Conyza*
- 37(34). Involucral bracts in more or less distinct vertical rows *Chrysanthemum*
- Involucral bracts not in vertical rows 38
- 38(37). Involucral bracts usually in one subequal series *Erigeron*
- Involucral bracts imbricate, in 2 or more series 39
- 39(38). Involucral bracts not longitudinally striate; flowers commonly yellow 40
- Involucral bracts longitudinally striate; flowers commonly cream to off-white, or pink to purplish 41
- 40(39). Plants woody shrubs, evergreen; involucral bracts in 2 series, the outer subterete and subulate; plants of Washington County *Peucephyllum*
- Plants herbs or shrubs; involucral bracts in 2 or more series but, if 2, not terete and subulate *Haplopappus*
- 41(39). Flowers pink to purplish; plants of northwestern Utah *Eupatorium*
- Flowers cream to white; plants of various distribution 42
- 42(41). Pappus plumose; plants perennial herbs *Kuhnia*
- Pappus scabrous or hispidulose; plants shrubs or herbs *Brickellia*
- 43(8). Receptacle with bristles or chaffy scales among the flowers 44
- Receptacle naked or merely short-hairy 52
- 44(43). Receptacle densely bristly *Centaurea*
- Receptacle with chaffy scales 45
- 45(44). Plants low woolly annuals; outer bracts boat-shaped and enclosing the achenes 46
- Plants various, but not low and woolly; outer bracts various but not usually enclosing the achenes 47
- 46(45). Stem leaves opposite; style lateral *Psilocarpus*
- Stem leaves alternate; style terminal *Stylocline*
- 47(45). Involucral bracts in 2 distinct sets—the outer herbaceous, the inner differing in shape and texture; leaves opposite, at least below, or alternate 48
- Involucral bracts not in 2 unlike sets; leaves alternate or basal 49
- 48(47). Leaves alternate throughout; outer involucral bracts ca 5, spreading, herbaceous, the inner (1–3 subtending pistillate flowers) larger and broader, becoming strongly accrescent and hooded in fruit *Dicoria*
- Leaves opposite, at least below; outer involucral bracts various, but not as above, not accrescent and hooded in fruit *Thelesperma*
- 49(47). Involucral bracts in 1 series, boat-shaped, each bract enclosing a marginal flower; rays short, yellow *Madia*
- Involucral bracts in 1 or more series, not boat-shaped and enclosing marginal flowers; rays lacking 50
- 50(49). Plants woody shrubs; mostly along the canyons of the Colorado and Green rivers *Encelia*
- Plants herbaceous; widely distributed 51

- 51(50). Receptacles high-conical, mostly over 3 cm long; stems leafy *Rudbeckia*
 — Receptacles merely convex, much less than 3 cm long; leaves all basal *Enceliopsis* 53
- 52(43). Pappus none 56
 — Pappus present 56
- 53(52). Leaves opposite, some caulin, somewhat connate at base; plants of Grand, San Juan, and Tooele counties *Flaveria*
 — Leaves alternate or basal 54
- 54(53). Heads numerous, in spikes, racemes, or panicles; anthers with acute tips; receptacles flat; plants woody or herbaceous *Artemisia*
 — Heads solitary on ends of stems, or sometimes corymbose or capitate; anthers with rounded tips; receptacles convex or conic; plants herbaceous, or woody only at base 55
- 55(54). Plants annual; heads solitary or paniculately arranged; leaves green and glabrous *Chamomilla*
 — Plants perennial; heads corymbose or capitate; leaves usually silvery-canescens *Chrysanthemum*
- 56(52). Plants dioecious shrubs *Baccharis*
 — Plants not dioecious herbs or shrubs 57
- 57(56). Pappus of 2–8 caducous awns; plants usually strongly glutinous *Grindelia*
 — Pappus various, but not of 2–8 caducous awns 58
- 58(57). Leaves and involucre conspicuously punctate with translucent oil glands *Dyssodia*
 — Leaves and involucre sometimes impressed-punctate, but without translucent oil glands 59
- 59(58). Pappus of 12 or more scale or bristlelike segments, these nearly or quite as long as achene 60
 — Pappus of fewer than 12 scalelike segments or else much shorter than achene 61
- 60(59). Pappus of 12–16 linear, acuminate awns; involucres glutinous; leaves 3– to 5-nerved *Vanclevea*
 — Pappus of ca 35 flattened, silvery scales and bristles of different widths; involucres not glutinous; leaves 1-nerved *Acamplopappus*
- 61(59). Achenes strongly compressed; pappus of 1 or 2 slender awns *Perityle*
 — Achenes not compressed or, if so, the pappus not of 1 or 2 slender awns 62
- 62(61). Pappus a crown with margins entire or of short scales united into a crown 63
 — Pappus not as above 65
- 63(62). Plants annual; heads solitary or paniculately arranged; flowers all perfect; leaves green and glabrous *Chamomilla*
 — Plants perennial; heads corymbose or capitate, rarely solitary, with some marginal flowers pistillate only; leaves mostly silvery-canescens 64
- 64(63). Plants 0.5–1 m tall; leaves doubly pinnately dissected, mainly 10–20 cm long *Tanacetum*
 — Plants mainly less than 0.3 m tall; leaves entire, once pinnately dissected, ternate, merely toothed apically, or entire, mainly less than 10 cm long *Sphaeromeria*
- 65(62). Involucral bracts with a thin, scarious, white, yellow, or purplish margin and tip *Hymenopappus*
 — Involucral bracts without a scarious, colored margin and tip 66

- 66(65). Plants scapose; leaves roundish, entire, or crenate *Chamaechaenactis*
 — Plants leafy stemmed; leaves not roundish and entire or subentire 67
- 67(66). Pappus scales with a strong midrib; leaves lanceolate or linear, entire; southern Utah *Palafoxia*
 — Pappus scales nerveless or essentially so; leaves, at least in part, toothed to pinnatifid; widely distributed *Chaenactis*

Key 3.

Corollas not all tubular; ray flowers present
pappus of capillary bristles.

1. Rays white, pink, violet, or purple, not yellow 2
 — Rays yellow or orange yellow 9
- 2(1). Pappus of numerous unequal bristles, alternating with shorter, lacerate scales; involucral bracts subequal; low winter annuals *Monoptilon*
 — Pappus of numerous bristles; involucral bracts imbricate or subequal; plants various, but seldom low winter annuals 3
- 3(2). Pappus, at least of disk flowers, of several to many rigid bristles; achenes pubescent with 2-forked hairs or the hairs barbed at apex *Townsendia*
 — Pappus, at least of disk flowers, of many capillary bristles, at least in part; achenes glabrous or pubescent with simple hairs 4
- 4(3). Rays very inconspicuous, shorter than the tube and scarcely if at all exceeding their pappus; central perfect flowers few; plants annual *Conyzia*
 — Rays usually conspicuous, longer than the tube and pappus; central perfect flowers several to many; plants annual, biennial, or perennial 5
- 5(4). Involucres subequal, rarely somewhat graduated; rays usually narrow; style tips very short, triangular, rounded, or obtuse *Erigeron*
 — Involucres usually strongly graduated; rays comparatively broad; style tips ovate and acute to subulate, usually lanceolate 6
- 6(5). Plants perennial, rhizomatous, or annual, or, if from a caudex then ordinarily less than 10 cm tall (see also *Aster kingii*) 7
 — Plants from a caudex or taproot 8
- 7(6). Low, white-rayed perennial herbs from spreading cordlike rootstocks, in arid sites; flowering in springtime *Leucelene*
 — Low to tall, white- to pink- or purple-rayed annual or perennial herbs from rhizomes or fibrous roots (a caudex in *A. kingii*); mainly flowering in summer and autumn *Aster*
- 8(6). Plants herbaceous, from a taproot, biennial or perennial; heads usually several to numerous *Machaeranthera*
 — Plants more or less woody, from a ligneous caudex; heads usually solitary and large (primary senophytes) *Xylorhiza*
- 9(1). Leaves opposite, at least below 10
 — Leaves alternate throughout 12
- 10(9). Plants subshrubs *Perityle*
 — Plants herbaceous 11
- 11(10). Leaves with stiff marginal bristles; involucre and leaves with conspicuous oil glands; plants annual *Pectis*

- Leaves without stiff marginal bristles; involucre and leaves without oil glands; plants perennial *Arnica*
- 12(9). Plants 1–1.5 m tall, herbaceous; heads 3–5 cm wide; rays 1–2 cm long *Inula*
- Plants various, usually less than 1 m tall or, if taller, woody; heads much smaller; rays seldom to 1 cm long 13
- 13(12). Pappus of 2–8 stiff, caducous bristles; plants usually glutinous *Grindelia*
- Pappus of numerous, usually soft, persistent bristles 14
- 14(13). Pappus of ca 20 twisted, flattish bristles *Amphipappus*
- Pappus of numerous, straight, capillary bristles 15
- 15(16). Pappus double, the inner of numerous bristles, the outer sometimes scalelike 16
- Pappus not double, of subequal capillary bristles only 17
- 16(15). Leaves essentially filiform *Conyza*
- Leaves not filiform, linear-oblong or broader *Heterotheca*
- 17(15). Involucral bracts in distinct vertical ranks 18
- Involucral bracts not in distinct vertical ranks 19
- 18(19). Outer involucral bracts with loose herbaceous tips; erect stems perennial; plants shrubs; leaves deciduous *Chrysanthemus*
- Outer involucral bracts without loose herbaceous tips; erect stems annual; plants herbaceous; leaves persistent *Petradoria*
- 19(17). Involucral bracts in 1 series, frequently with some smaller bracts at base; style branches truncate apically *Senecio*
- Involucral bracts neither in 1 series nor with smaller bracts at base; style branches without truncate tips 20
- 20(19). Heads small, the involucres usually less than 6 mm high, usually very numerous and densely paniculate, rarely racemose or corymbose; plants rhizomatous, fibrous rooted *Solidago*
- Heads medium to large, the involucres usually more than 6 mm high, neither very numerous nor densely paniculate; plants with taproots, occasionally also rhizomatous *Haplopappus*

Key 4.

Corollas not all tubular; ray flowers present; pappus lacking.

- Rays white, pink, or pink purple, sometimes yellow at base 2
- Rays yellow, sometimes partly purplish or maroon 7
- Receptacle naked 3
- Receptacle with chaffy scales 6
- Leaves all basal; plants scapose *Bellis*
- Leaves not all basal, at least some cauline; plants caulescent 4
- Leaves palmately lobed, the blades about as broad as long; heads less than 6.5 mm high *Perityle*
- Leaves pinnately lobed to serrate, the blades longer than broad; involucres more than 8 mm high, or otherwise differing from above 5
- Receptacle broad and flattish; involucral bracts with a dark brown submarginal line *Chrysanthemum*

- Receptacle convex, conic, or hemispheric; involucral bracts without a dark brown submarginal line *Chamomilla*
- 6(2). Heads small, numerous, in dense, flattish or rounded cymose panicles; plants perennial *Achillea*
- Heads comparatively large, solitary or few; plants annual or perennial *Anthemis*
- 7(1). Receptacles not chaffy 8
- Receptacles chaffy, at least toward the margin 13
- 8(7). Heads 1- or 2-flowered, in dense glomerate clusters, sessile in the forks of the stem, or terminal and leafy involucrate *Flaveria*
- Heads several- to many-flowered, solitary on terminal peduncles 9
- 9(8). Plants woolly 10
- Plants not woolly 11
- 10(9). Rays persistent, becoming papery *Baileya*
- Rays not persistent *Eriophyllum*
- 11(9). Involucre and leaves with translucent oil glands *Pectis*
- Involucre and leaves without translucent oil glands 12
- 12(11). Rays conspicuous; involucral bracts acuminate, without scarious margins *Bahia*
- Rays minute; involucral bracts obtuse, with scarious margins *Tanacetum*
- 13(7). Ray achenes partly or wholly enfolded by their involucral bracts; plants annual, glandular-viscid above *Madia*
- Ray achenes not conspicuously enfolded by their involucral bracts or, if so, the plants perennial; plants perennial or, if annual, not glandular above 14
- 14(13). Involucre distinctly double, the outer bracts herbaceous, the inner ones broader and united to about the middle *Thelesperma*
- Involucre not double, the bracts distinct to the base 15
- 15(14). Plants scapose perennials; leaves broad, silvery-pubescent, entire; heads very broad *Enceliopsis*
- Plants leafy stemmed or subscapose; leaves various but not broad and silvery-pubescent or, if so, sagittate; heads broad or narrow 16
- 16(15). Plants subscapose; leaves variously dissected or sagittate; heads broad *Balsamorhiza*
- Plants with stems definitely leafy; leaves usually not dissected or sagittate 17
- 17(16). Plants shrubby; achenes conspicuously ciliate on the margins, notched at the apex, very flat *Encelia*
- Plants herbaceous; achenes not conspicuously ciliate on the margins 18
- 18(17). Leaves doubly pinnately dissected; heads numerous in corymbose cymes *Achillea*
- Leaves simple, entire or toothed to lobed; heads few to several 19
- 19(18). Achenes 2-winged; disks 15–25 mm wide; leaves white-strigose beneath, green above *Verbesina*
- Achenes not 2-winged; disks 6–15 mm wide; leaves green on both sides *Helianimeris*

Key 5.

Corollas not all tubular; ray flowers present; pappus of awns or scales.

- Receptacle chaffy 2
- Receptacle not chaffy, either naked or bristly 17

- 2(1). Pappus scales fimbriate; ray flowers 4 or 5, white, only slightly surpassing the disk; introduced weedy plants, to be expected in Utah *Galinsoga parviflora* Cav.
- Pappus scales or awns not fimbriate; ray flowers various in size and color; indigenous or introduced 3
- 3(2). Receptacle bearing a row of chaffy scales between the ray flowers and the outer disk flowers, otherwise naked; pappus of 10–20 slender setiform scales *Layia*
- Receptacle chaffy throughout; pappus not of 10–20 slender scales 4
- 4(3). Ray achenes dorsiventrally compressed, the thickened margins attached to a contiguous pair of infertile disk flowers and the subtending bract, and falling as a unit; pulvinate herbs of eastern Utah and shrubs of southwestern Utah *Parthenium*
- Ray achenes various, but not as above; herbs or shrubs 5
- 5(4). Pappus of awns only, without scales 6
- Pappus, at least in part, of scales 10
- 6(5). Achenes flat and obcompressed; awns retrorsely hispid *Bidens*
- Achenes not obcompressed; awns not retrorsely hispid 7
- 7(6). Achenes plump; pappus of 2 to several caducous awns *Helianthus*
- Achenes flat, very strongly compressed; pappus various 8
- 8(7). Plants scapose; heads large, solitary *Enceliopsis*
- Plants leafy stemmed; heads medium sized, usually several 9
- 9(8). Plants shrubby; achenes narrowly white-margined, the margin not continuous between weak awns *Encelia*
- Plants herbaceous annuals; achenes strongly white-margined the margin continuous between stout awns *Geraea*
- 10(5). Achenes very flat, strongly compressed 11
- Achenes not very flat, usually much thickened 13
- 11(10). Leaves once to twice pinnatifid *Anthemis*
- Leaves not pinnatifid, entire or nearly so 12
- 12(11). Plants scapose *Enceliopsis*
- Plants leafy stemmed *Helianthella*
- 13(10). Pappus caducous (of 2 awns and rarely some scales) *Helianthus*
- Pappus persistent 14
- 14(13). Inner involucral bracts united to middle into a cup *Thelesperma*
- Inner involucral bracts not united into a cup 15
- 15(14). Receptacle merely convex; rays pistillate *Wyethia*
- Receptacle conic or cylindric; rays neuter 16
- 16(15). Involucral bracts subequal, in 2 or 3 series *Rudbeckia*
- Involucral bracts unequal, in 2 series, the inner ones shorter *Ratibida*
- 17(1). Rays white or purple 18
- Rays yellow, sometimes marked with purple 23
- 18(17). Pappus a short crown 19
- Pappus of awns or scales 21
- 19(18). Leaves entire or pinnately divided *Chrysanthemum*
- Leaves irregularly 2–3 times pinnately dissected 20
- 20(19). Plants annual; heads 1–2.5 cm wide; receptacle conic, hollow *Chamomilla*
- Plants biennial or perennial; heads 3–5 cm wide; receptacle hemispheric *Matricaria*
- 21(18). Pappus of 1 plumose awn and a denticulate crown *Monoptilon*
- Pappus of 2 to several awns or scales 22
- 22(21). Plants dwarf woolly annuals *Eriophyllum*
- Plants annual or perennial, not woolly *Townsendia*
- 23(17). Receptacle densely bristly or hairy 24
- Receptacle naked 25
- 24(23). Heads very small; involucres less than 10 mm wide *Gutierrezia*
- Heads medium sized; involucres more than 10 mm wide *Gaillardia*
- 25(23). Pappus of 4 hyaline scales united at the base; rays reddish purple to yellow *Hulsea*
- Pappus a crown, or of caducous or persistent awns or scales; rays mostly yellow 26
- 26(25). Pappus a mere crown or of caducous awns 27
- Pappus persistent, of awns or scales 29
- 27(26). Pappus of 2–8 caducous awns; plants glutinous *Grindelia*
- Pappus a short crown; plants seldom if ever glutinous 28
- 28(27). Leaves entire, bristly margined basally *Pectis*
- Leaves 2- or 3-pinnate *Tanacetum*
- 29(26). Pappus of 1 or 2 awns or scales (rarely more) with or without a crown *Perityle*
- Pappus of 4 to many awns or scales 30
- 30(29). Pappus of about 20 slender, twisted awns; rays 1 or 2 small *Amphipappus*
- Pappus of 4–16 twisted or plane awns or scales; rays usually several 31
- 31(30). Pappus of several scales dissected nearly to base; dwarf woolly annuals *Syntrichopappus*
- Pappus awns or scales not dissected or else plants perennial or woody 32
- 32(31). Pappus of several more or less united scales; rays broad, papery, and persistent *Psilostrophe*
- Pappus not of united scales; rays not papery and persistent (occasionally so in *Hymenoxys*) 33
- 33(32). Leaves and involucre with conspicuous oil glands *Dyssodia*
- Leaves and involucre without conspicuous oil glands 34
- 34(33). Achenes slender, elongate-clavate 35
- Achenes stouter, oblong or obovoid 36
- 35(34). Plants woolly *Eriophyllum*
- Plants merely strigose *Platyschkuhria*
- 36(34). Involucral bracts spreading or reflexed; receptacle convex to subglobose; leaves decurrent *Helenium*
- Involucral bracts appressed; receptacle almost flat; leaves not decurrent 37
- 37(36). Pappus of numerous scales; stems leafy; leaves linear or linear-spatulate, entire, 2.5 mm wide or less *Gutierrezia*
- Pappus of about 5 scales; leaves lobed or, if entire, broader and mostly or entirely basal *Hymenoxys*

Acamplopappus Gray

Shrubs with white bark; leaves alternate, entire, 1-nerved; heads yellow, discoid, subglobose, cymose at

- 3(1). Leaves 15–40 mm wide, toothed, clothed with spreading, pilose hairs; plants widespread *S. palustris*
 — Leaves 7–12 mm wide, entire or very finely toothed, clothed with silvery strigose-canescens hairs; plants of Kane County *S. rothrockii*

***Stachys albens* Gray** Stems stout, 3–10 dm tall, simple or branched, densely cobwebby; leaves 3–12 cm long, narrowly to broadly ovate-oblong, cordate basally, villous-tomentose (especially beneath), crenate-serrate, the petioles 0.6–5 cm long; spikes 1–2 dm long, more or less interrupted at maturity; calyx 5–7 mm long, woolly, the deltoid-ovate teeth cuspidate; corolla white or pinkish, with purple veins, the tube 6–8 mm long, the upper lip 3.5–5.5 mm long, the lower 5–8 mm long. Riparian, creosote bush, pinyon-juniper, mountain brush, and aspen communities at 800 to 2100 m in Washington county; Nevada and California; 10 (v).

***Stachys byzantina* C. Koch.** Woolly Betony; Lambsears. [*S. olympica* authors, not Koch; *S. lanata* Jacq, not Crantz]. Stems 2.5–8 dm tall, simple or branched at the base; leaves 4–9 (10) cm long, 1.5–3.5 cm wide, the petioles 0.5–3 cm long, the blades lanceolate to ovate or elliptic; entire to finely toothed; white woolly on both sides; spikes 3–15 cm long, compact or the lower verticel separated; calyx 8–12 mm long, the tube ca 3–4 mm long; corolla pink to purple, densely woolly. Cultivated ornamental, escaping and persisting, in sagebrush community at 2257 m in Summit County; introduced from Asia; 2(0).

***Stachys palustris* L.** Marsh Betony. [*S. asperrima* Rydb. Type from Jordan, Salt Lake County]. Stems 1.5–8 dm tall, spreading hirsute or villous, especially above; leaves 4–8 cm long, ovate-oblong, villous or pilose with spreading hairs, crenate-serrate; calyx 5–9 mm long, hispidulose, the deltoid teeth cuspidate; corolla pale rose, veined with deeper red, the tube subequal to the calyx, (8) 10–15 mm long, the lower lip 6–8 mm long, villous on the back; n = 32. Riparian or palustrine communities at 1500 to 2800 m in Cache, Daggett, Duchesne, Garfield, Iron, Kane, Piute, Rich, Salt Lake, Uintah, Utah, Wasatch, and Weber counties; widely distributed in North America; circumboreal; 21 (iii). Our plants have been assigned to var. *pilosa* (Nutt.) Fern. [*S. pilosa* Nutt.].

***Stachys rothrockii* Gray** Stems 1–3.5 dm tall, simple or branched from the summit of a caudex, strigose-canescens or tomentose; leaves 2–6 cm long, 7–12 mm wide, sessile or subsessile, oblong or narrowly elliptic-lanceolate, entire or finely toothed; spikes 8–15 cm long; calyx 6–8 mm long, the deltoid lobes shortly cuspidate; corolla whitish, with purple lines, 10–13 mm long, the lower lip 3–4 mm long, the upper lip 4–5 mm long, woolly villous externally. Tropic Shale outcrops in pinyon-juniper and salt desert shrub communities at 1615 to 2200 m in Kane County; New Mexico and Arizona; 4 (ii).

***Teucrium* L.**

Perennial herbs; leaves simple, serrate; flowers terminal, in slender spikes; calyx saccate, toothed or deeply 5-lobed; corolla pinkish, bluish, or nearly white, the upper lip very short, deeply notched, the lower lip conspicuous and spreading, with small lateral lobes; stamens 4, paired; nutlets roughened.

***Teucrium canadense* L.** American Germander. Stems 3–8 dm tall, erect, branching mostly above, if at all,

spreading hairy throughout, more or less glandular upward; leaves 4–9 cm long, ovate, oblong, oval, or lanceolate, serrate, villous, at least beneath; calyx 5–7 mm long, villous to tomentose, the teeth unequal, shorter than the tube; corolla 7–15 mm long, rose to purplish, or sometimes cream colored; n = 16. Riparian and palustrine habitats at 1400 to 2100 m in Cache and Utah counties; widespread in North America and Mexico; 2 (0). Our plants have been assigned to var. *occidentale* (Gray) McClintock & Epling [*T. occidentale* Gray]. They are characterized by having glandular hairs, especially in the inflorescence.

***Thymus* L.**

Shrubs or subshrubs; stems decumbent to erect; leaves small, entire; flowers verticillate in axils of upper leaves; calyx 2-lipped, 10- to 13-veined, villous at the throat within, the upper lip 3-toothed, the lower one more deeply cleft into 2 narrow lobes; corolla 2-lipped, the upper lip nearly flat, the lower 3-lobed and spreading; stamens 4, mostly exserted, subequal or the lower pair the longer.

***Thymus serpyllum* L.** Thyme. Stems 10–25 cm tall, the slender branches somewhat woody, with dense whitish pubescence; leaves 3–10 mm long, petiolate, elliptic to lanceolate, ovate, or obovate; inflorescence dense and often headlike or racemose and interrupted, the whorls rather loosely several- to many-flowered; calyx ca 3 mm long, hairy in the throat, the teeth of upper lip lanceolate, of the lower lip subulate and ciliate; corolla lilac or purplish, ca 4 mm long. Cultivated ornamental, persisting, but not established, at lower elevation regions of Salt Lake and Utah counties; introduced from Europe; 4 (0). Another species, ***Thymus vulgaris* L.**, with the leaves sessile rather than petiolate is to be expected in cultivation in Utah.

LEGUMINOSAE A. L. Juss.

Legume Family

Herbs, shrubs, or trees; leaves alternate, pinnately or palmately compound, or simple, stipulate; flowers perfect, irregular or regular, usually borne in racemes; calyx 5-lobed; petals 5 (a banner, 2 wings, and 2 keels) or fewer, less commonly reduced to 1 (banner), or lacking; stamens 10 or 5, or numerous, diadelphous, monadelphous, or distinct; pistil 1, the ovary superior, 1- or 2-loculed, 1-carpelled, the style and stigma 1; fruit (pod) a legume or loment, sessile, subsessile, stipitate, or with a gynophore, dehiscent or indehiscent; x = 5–14. [Fabaceae Lindl.].

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 —. 1964. Legumes of Utah II. Conspectus of the genera. Proc. Utah Acad. 41: 84–86.
 —. 1978. Utah flora: Fabaceae (Leguminosae). Great Basin Naturalist 38: 225–367.

1. Flowers regular, in dense heads or compact spicate racemes; stamens 5 or numerous (Mimosoideae) Key 1

- Flowers irregular (only slightly so in some); stamens 10 or fewer 2
- 2(1). Corolla not papilionaceous, sometimes nearly regular, the upper petal enclosed by the others; stamens 10 or fewer, commonly distinct (Caesalpinoideae) Key 2
- Corolla papilionaceous, the upper petal (banner) enclosing the wing and keel petals in bud, much reduced in *Amorpha*, or lacking in *Dalea*, *Psorothamnus*, and *Parryella*; stamens 10 or 5 (Papilioideae) 3
- 3(2). Plants woody; trees, shrubs, or woody vines Key 3
- Plants herbaceous perennials or annuals 4
- 4(3). Leaves even-pinnate Key 4
- Leaves odd-pinnate or simple 5
- 5(4). Leaflets 3 only Key 5
- Leaflets 5 or more, or the leaves simple Key 6

Key 1.

Flowers regular; stamens 5 or numerous (Mimosoidea).

- 1. Plants herbaceous; flowers whitish, in compact heads; stamens shortly exserted *Desmanthus*
- Plants woody, either trees or shrubs; flowers variously colored, in racemes or spikes or, if in heads, the stamens long-exserted 2
- 2(1). Trees, unarmed, cultivated; flowers in umbellate heads; stamens long-exserted, the filaments commonly 20–30 mm long *Albizia*
- Trees or shrubs, armed, indigenous; flowers in spicate racemes; stamens included or shortly exserted, the filaments less than 5 mm long 3
- 3(2). Spines recurved; pods flat, 10–20 mm broad, brown at maturity *Acacia*
- Spines straight; pods spirally coiled or if flattened, less than 10 mm broad and yellowish to tan at maturity *Prosopis*

Key 2.

Corolla not papilionaceous (Caesalpinoideae).

- 1. Leaves simple, the blades rotund-ovate; flowers pink, appearing before the leaves *Cercis*
- Leaves once or twice compound; flowers yellow, white, or greenish, appearing after the leaves 2
- 2(1). Shrubs or herbs; flowers with yellow petals, the stamens exserted or not; plants indigenous in eastern Utah or cultivated and naturalized in Washington County *Caesalpinia*
- Trees; flowers with yellow, white, or greenish yellow petals, the stamens included or not much exserted; distribution broad 3
- 3(2). Leaves subsessile, the pinnae in 1 or 2 pairs and with numerous leaflets 2–4 mm long and 0.5–1 mm wide; flowers bright yellow *Parkinsonia*
- Leaves typically petiolate, the pinnae various, but leaflets not both numerous and 2–4 mm long; flowers white or greenish yellow 4
- 4(3). Leaves once to twice pinnate; branches often armed; flowers greenish yellow, borne in spicate racemes; pods long and straplike *Gleditsia*
- Leaves bipinnate; branches unarmed; flower white, long-stalked, in open panicles; pods thick *Gymnocladus*

Key 3.

Trees, shrubs, or woody vines (Papilioideae).

- 1. Leaves even-pinnate, the rachis produced apically as a bristle; flowers yellow *Caragana*
- Leaves simple or odd-pinnate; flowers variously colored 2
- 2(1). Leaves simple or the lower ones 3-foliolate; plants shrubs; flowers yellow, solitary or borne in erect racemes 3
- Leaves compound; plants varying in one or more ways from above 4
- 3(2). Calyx split above, hence 1-lipped, with 5 minute teeth; flowers borne in erect racemes; plants known from Washington County *Spartium*
- Calyx bilabiate, the upper lip 2-lobed, the lower 3-lobed; flowers mostly solitary, axillary; plants known from Weber County *Cytisus*
- 4(2). Plants twining woody vines; flowers large and showy, borne in terminal, pendulous racemes *Wisteria*
- Plants trees or shrubs; flowers various, usually borne in axillary, erect or pendulous racemes 5
- 5(4). Leaflets 3; flowers yellow, borne in pendulous racemes *Laburnum*
- Leaflets 5 or more; flower white, pink, indigo, or yellow, borne in erect or spreading racemes 6
- 6(5). Herbage glandular-punctate; indigenous shrubs with petals indigo or lacking 7
- Herbage not glandular-punctate; cultivated or indigenous shrubs or trees; petals white, pink, or yellow or, if indigo (as in *Amorpha*), the corolla reduced to a single petal (the banner) 8
- 7(6). Petals lacking; leaflets linear; plants of Grand and San Juan counties *Parryella*
- Petals present; leaflets broad; plants of southern and southeastern Utah *Psorothamnus*
- 8(6). Petal 1, the banner only present, indigo; sparingly cultivated shrubs *Amorpha*
- Petals 5, white, pink, or yellow; shrubs or trees, sparingly to commonly cultivated 9
- 9(8). Plants shrubs; pods bladdery-inflated; flowers yellow; ornamental and roadside plants *Colutea*
- Plants trees or shrubs; pods flat or terete; flowers white or pink 10
- 10(9). Branches armed with stipular spines or internodal hispid processes; staminal filaments diadelphous; petals pink or white *Robinia*
- Branches unarmed; staminal filaments distinct; petals white 11
- 11(10). Leaf bases hollow, covering superposed buds; pods flat, not constricted between the seeds *Cladrastis*
- Leaf bases solid, not covering buds; pods terete, constricted between the seeds *Sophora*

Key 4.

Leaves even-pinnate (Papilioideae).

- 1. Flowers yellow; fruit ripening below ground, tardily dehiscent, constricted between the seeds *Arachis*
- Flowers white, pink, red, lavender, or cream; fruit borne above ground, not constricted between the seeds 2

- 2(1). Style strongly dilated; sepals foliaceous; plants cultivated *Pisum*
 — Style not strongly dilated; sepals not foliaceous; plants indigenous or cultivated 3
 3(2). Style bearded down one side; wings of corolla essentially free from the keel *Lathyrus*
 — Style bearded in a tuft or ring at apex; wings of corolla adherent to the keel *Vicia*

Key 5.

Leaflets three (Papilionoideae).

1. Leaves palmate, the terminal leaflet neither stalked nor jointed 2
 — Leaves pinnate, the terminal leaflet stalked or jointed 4
 2(1). Flowers golden yellow, the banner orbicular, large; legumes narrowly oblong, erect or ascending; staminal filaments distinct *Thermopsis*
 — Flowers ochroleucous to white or pink to pink purple, the banner not orbicular, moderate to small in size; staminal filaments diadelphous 3
 3(2). Leaflets usually toothed; flowers mostly in heads, commonly pink or white *Trifolium*
 — Leaflets entire; flowers not in heads, commonly ochroleucous or pink *Astragalus*
 4(1). Herbage glandular-punctate; indigenous plants with usually linear to oblanceolate leaflets 5
 — Herbage not glandular-punctate; indigenous or cultivated plants with spatulate to obovate or oblanceolate to ovate leaflets 6
 5(4). Plants caulescent, with 5 or more developed internodes; pods not included in the calyx at maturity *Psoralidium*
 — Plants acaulescent or short-caulescent, usually with fewer than 5 developed internodes; pods included in the calyx at maturity *Pediomelum*
 6(4). Leaflets entire 7
 — Leaflets toothed (except in some *Trifolium* species) 9
 7(6). Flowers in umbels, loosely capitate, or solitary in leaf axils, (white) yellow or suffused with orange *Lotus*
 — Flowers in interrupted racemes or panicles, purplish 8
 8(7). Leaflets stipellate; pods several-seeded, several to many times longer than broad *Phaseolus*
 — Leaflets lacking stipels; pods 1-seeded, only somewhat longer than broad *Lespedeza*
 9(6). Flowers usually in heads; corolla persistent, investing the fruit; fruit straight *Trifolium*
 — Flowers usually in racemes; corolla not persistent; fruit straight or curved to coiled 10
 10(9). Leaflets toothed along the distal 1/2 or more; racemes elongate, several times longer than broad *Melilotus*
 — Leaflets toothed along the distal 1/3 only (except in some *Trigonella*); racemes compact or loose, seldom more than twice longer than broad 11
 11(10). Fruit straight or falcately curved, prominently veined on the valves; flowers yellow; terminal leaflet with an apical spinose cusp, rarely as much as twice longer than broad; plants rare *Trigonella*
 — Fruit coiled or curved, veined or not; flowers pink, lavender, whitish, or yellow; terminal leaflet seldom strongly cuspidate apically, usually more than twice longer than broad; plants common *Medicago*

Key 6.

- Leaflets (4) 5 or more, or leaves simple (Papilionoideae).
 1. Leaves palmately compound, with usually 5–11 leaflets, long-petiolate 2
 — Leaves pinnately compound or, if rarely palmately compound (as in some *Lotus* species), sessile or with only 4 leaflets 4
 2(1). Herbage not glandular-dotted; leaflets usually 7–11, variously shaped; stamens monadelphous; pods several-seeded *Lupinus*
 — Herbage glandular-dotted; leaflets usually 5, broadly obovate-spatulate; stamens usually diadelphous; pods 1-seeded 3
 3(2). Plants caulescent, usually with 5 or more developed internodes; pods not included within the calyx at maturity *Psoralidium*
 — Plants subacaulescent to short-caulescent, usually with fewer than 5 developed internodes; pods included within the calyx at maturity *Pediomelum*
 4(1). Herbage glandular-dotted 5
 — Herbage not glandular-dotted 6
 5(4). Racemes spicate; legumes 1-seeded, not bearing appendages; stamens 5; petals (except banner) inserted on staminal tube *Dalea*
 — Racemes not spicate; legumes several-seeded, bearing hooked appendages; stamens 10; petals not inserted on staminal tube *Glycyrrhiza*
 6(4). Terminal leaflet of lower leaves several times larger than the lateral; inflorescence a many-flowered head closely subtended by foliose involucral bracts; flowers yellow; introduced, rare *Anthyllis*
 — Terminal leaflet not much larger than the lateral; inflorescence a raceme or an umbel, lacking foliose bracts (except in *Lotus*); flower color various 7
 7(6). Margin of leaflets toothed; corolla persistent, investing the fruit *Trifolium*
 — Margin of leaflets entire; corolla usually deciduous 8
 8(7). Flowers in umbels, loosely capitate, or solitary in leaf axils; petals yellow, often suffused with orange, or pink 9
 — Flowers in racemes or cymes; petals usually not yellow 10
 9(8). Leaflets 3–5; flowers yellow *Lotus*
 — Leaflets 9–23; flowers pink to pink purple *Coronilla*
 10(8). Keel petals much longer than the wings; fruit a flattened loment 11
 — Keel petals subequal to the wings or shorter; fruit a legume (a terete loment in *Sophora*) 12
 11(10). Fruit 4– to several-seeded, not spiny (except in *H. boreale* var. *gremiale*); plants indigenous *Hedysarum*
 — Fruit 1– to 2-seeded, more or less spiny-toothed; plants adventive, cultivated and escaping *Onobrychis*
 12(10). Stipules spiny; flowers dirty whitish *Peteria*
 — Stipules various, but not spiny; flowers seldom if ever dirty whitish 13
 13(12). Staminal filaments distinct; fruit a terete to somewhat flattened loment; plants with blue or white flowers, usually of sandy sites *Sophora*
 — Staminal filaments diadelphous or monadelphous; fruit a legume; plants from a caudex and/or taproot, rarely rhizomatous; habitats various 14

- 14(13). Keel with a porrect beak; ventral suture of legume forming a partial or complete partition; plants usually acaulescent *Oxytropis*
- Keel beakless, or the beak diverging from the floral axis; ventral suture usually not produced internally, the dorsal usually produced in bilocular fruits; plants usually caulescent 15
- 15(14). Stamens monadelphous; flowers blue *Galega*
- Stamens diadelphous; flowers pink purple, pink, lavender, ochroleucous, red, white, or variously suffused, but not blue 16
- 16(15). Flowers red orange when fresh; plants adventive *Sphaerophysa*
- Flowers pink, pink purple, lavender, or white to ochroleucous; plants indigenous, or rarely adventive *Astragalus*

Acacia Miller

Armed trees; leaves alternate, often clustered on short axillary shoots, bipinnate, petiolate, the pinnae bearing several leaflets; internodal spines curved; stipules small and deciduous; flowers numerous, borne in elongate spikes; calyx 5-lobed; corolla regular, 5-lobed, inconspicuous; stamens numerous, included, distinct; ovary substipitate; pods flattened, indehiscent.

Acacia greggii Gray Catclaw Acacia. Small trees to 4 m tall, the branches armed with curved internodal spines; leaves to ca 4 cm long, with 2 pairs of pinnae, each with 4-6 pairs of obovate to oblong leaflets 3-6 mm long, puberulent on both surfaces; petioles 2-5 mm long, bearing a solitary gland between the lower pair of pinnae; spikes mostly 3-6 cm long (including peduncles); flowers fragrant, 2-2.5 mm long; petals greenish, like the sepals; legumes flattened, oblong, usually curved, 5-10 cm long, 10-20 mm wide, constricted between the seeds; seeds 5-7 mm broad, nearly circular. Warm desert shrub, drainage-terrace vegetation, at ca 870 m in Washington County; Nevada, California, Arizona, New Mexico, Texas, and Mexico; 10 (iii). Our material belongs to var. *arizonica* Isely.

Albizia Durazz.

Unarmed trees; leaves alternate, not clustered, bipinnate, petiolate, the several pairs of pinnae each with numerous oblique leaflets; stipules small and caducous; flowers several to many, in umbellate heads; calyx tubular, 5-lobed; corolla united, funnelform, the 5 lobes shorter than the tube; stamens numerous, united into a tube basally, long-exserted; pods flattened, dehiscent.

Albizia julibrissin Durazz. Silk-tree; Mimosa. Small tree to 3 m tall or more and as broad or broader; leaves to 25 cm long or more (including petiole), with 5-10 (15) pairs of pinnae, each with 12-25 (30) pairs of leaflets 7-15 mm long, puberulent, if at all, on rachis and leaflet margins; petioles 3-6 cm long, each with a single large flattened gland; calyx 3-3.5 mm long; corolla 7.5-9.5 mm long, cream to greenish; staminal filaments exserted 20-30 mm, brightly rose pink to reddish in color; pods 12-20 cm long, 15-25 mm wide, oblong, flattened, membranous; $2n = 26$. Cultivated ornamental at lower elevations in much of Utah, but frost sensitive; introduced from Asia; 7 (i).

Amorpha L.

Cultivated shrubs; leaves alternate, odd-pinnate, the leaflets marked with dots, usually with stipels; flowers purple, borne in terminal spicate racemes; calyx 5-toothed, persistent; banner present (wings and keel lacking), wrapped around the stamens and style; stamens 10, monadelphous at the base only, otherwise distinct; pods 1- to 2-seeded, tardily dehiscent.

- Plants usually less than 1 m tall; petioles short, usually shorter than width of lowest leaflets *A. canescens*
- Plants usually more than 1 m tall; petioles elongate, longer than the width of the lowest leaflets *A. fruticosa*

Amorpha canescens Pursh Lead Plant. Subshrub, the erect branches, mostly 4-10 dm tall, the herbage densely white-villous; leaves subsessile, 2.5-12 cm long, with 15-51 leaflets, these elliptic to lance-elliptic or oblong, green above, white-hairy beneath; racemes clustered, paniculate; calyx tube white-villous; pods white-villous, the style almost as long as the body. Cultivated ornamental in some communities in northern Utah (Reimschussel s.n., BRY); introduced from the Great Plains; indigenous from Canada south to Texas and New Mexico; 2 (0).

Amorpha fruticosa L. False Indigo; Bastard Indigo. Shrub to 3 m tall or more, the herbage sparingly pubescent to glabrate; leaves long-petioled, with 13-35 leaflets, these elliptic to oblong, green on both sides, the lower only somewhat paler and strigulose; racemes clustered, paniculate; calyx tube glabrous; pods glabrous, the style much shorter than the body; $2n = 40$. Cultivated ornamental and botanical curiosity in northern Utah; introduced from eastern U. S.; indigenous in much of eastern North America and southwestward to Arizona; 5 (0).

Anthyllis L.

Cultivated herbaceous perennial; leaves odd-pinnate; stipules small, adnate to the petiole, the lowermost somewhat sheathing; flowers many, borne in pedunculate heads or headlike clusters; calyx tubular, 5-lobed; corolla papilionaceous; stamens 10, monadelphous; pods invested by the accrescent calyx, 1- or few-seeded.

Anthyllis vulneraria L. Kidney Vetch, Woundwort. Stems arising from a caudex, 8-30 cm tall, decumbent to erect; leaves 2-7 cm long, odd-pinnate, with usually 5-9 leaflets, the terminal leaflet of lowermost leaves much larger than the lateral ones; peduncles 5-16 cm long, usually with a foliose bract below the inflorescence; heads 1 to few, each closely subtended by foliose bracts; flowers 10-15 mm long, sessile, yellow (or suffused with red); calyx pilose, much inflated at maturity; $2n = 12$. Introduced forage and reseeding plant, known from Sanpete County, but to be expected elsewhere; indigenous to Eurasia; 1 (0).

Arachis L.

Cultivated annual herbs; leaves even-pinnate, lacking tendrils; stipules prominent, long-attenuate, adnate to the petiole and almost sheathing the stem; flowers yellow, papilionaceous, few or solitary in the axils, sessile, hypanthium elongating and pushing the developing ovary underground; stamens diadelphous, usually 9 and 1; pods maturing underground, indehiscent, constricted between the seeds.

Garfield, Juab, Kane, Millard, Piute, Salt Lake, Sanpete (type from Manti Canyon), Sevier, Tooele, Utah and Washington counties; Nevada, Arizona, Colorado, and Wyoming; 50 (viii).

***Ceanothus velutinus* Dougl.** Deer-brush. Rounded to spreading unarmed shrubs, mainly 0.5–1.5 m tall; leaves alternate, persistent with petioles 0.6–2.4 cm long, the blades 18–85 mm long, 12–55 mm wide, broadly elliptic to oval or oblong, strongly 3-veined from the base, serrulate throughout, green and shiny above, pale and velvety beneath; inflorescence more or less corymbose; sepals 0.9–1.4 mm long, white; petals hooded, 2–2.5 mm long, white; fruit 3–4 mm thick, 3-lobed; seeds tan, shiny, 2–2.5 mm long; $2n = 24$. Ponderosa pine, sagebrush, mountain brush, aspen, and lodgepole pine communities at 1890 to 2900 m in Box Elder, Cache, Daggett, Davis, Duchesne, Millard, Morgan, Salt Lake, Sanpete, Summit, Tooele, Utah, and Weber counties; British Columbia to South Dakota, south to California, Nevada, and Colorado; 45 (iii). The plants have a pervasive odor of cinnamon that is especially noticeable when one tramples the plant.

Rhamnus L.

Shrubs or small trees; leaves alternate, pinnately veined, deciduous; flowers small, perfect or imperfect, in axillary clusters; calyx with 4 or 5 lobes, circumcisally deciduous following anthesis; petals 4 or 5 or lacking; stamens 4 or 5, with short filaments; pistils 1, the ovary free of the disk, 2- to 4-loculed; fruit a berrylike drupe.

Wolf, C. B. 1938. The North American species of *Rhamnus*. Rancho Santa Ana Bot. Gard. Monogr. Bot. Ser. 1.

- 1. Leaves mainly with 10–12 lateral veins along each side; plants of the Colorado River Canyon and tributaries *R. betulifolia*
- Leaves with fewer lateral veins on each side (2–7); plants of different distribution 2
- 2(1). Main lateral veins of leaves 2–4 on each side; flowers 4-merous, the petals usually present; style 4-lobed *R. cathartica*
- Main lateral veins of leaves 5–9; flowers 5-merous, the petals lacking; styles 3-lobed 3
- 3(2). Main lateral veins of leaves 5–7; uncommonly cultivated shrubs, but known to escape and persist *R. alnifolia*
- Main lateral veins of leaves 8–9; uncommonly cultivated ornamental, not known to escape or persist *R. frangula* L.

***Rhamnus alnifolia* L'Her.** Alder Buckthorn. Shrubs, mainly 1–1.5 m tall; leaves 1–8 cm long, elliptic to ovate, serrulate, glabrous or puberulent on one or both sides; umbels with 1–3 flowers, appearing before the leaves; flowers imperfect, mostly 5-merous; pedicels 2–6 mm long; calyx ca 3 mm long; petals lacking; fruit black, 6–8 mm long, subglobose, 3-seeded. Aspen-fir community at ca 2196 m in Davis and Salt Lake counties; British Columbia to Newfoundland, south to California and Wyoming; 1 (0).

***Rhamnus betulifolia* Greene** Birchleaf Buckthorn. Shrubs, mainly 1–2.5 m tall; leaves alternate, with petioles 0.3–1.8 cm long, the blades 2.5–15 cm long, 1.6–8.5 cm wide, elliptic to obovate, or oblong, obtuse to abruptly short attenuate, serrulate on one or both sides, at

least when young, the main lateral veins 7–12 on each side; inflorescence axillary, corymbose; flowers perfect, 5-merous; hypanthium, pedicels, and branches of the inflorescence puberulent; sepals 1.5–2.5 mm long, triangular; petals brownish, ca 1 mm long; style ca 1 mm long; ovary 3-loculed; fruits 7–10 mm long, with 3 seeds. Rock crevices, defiles, monolith bases, and hanging gardens at 1125 to 1895 m in Emery, Garfield, Grand, Kane, San Juan, Washington, and Wayne counties; Arizona, New Mexico, Texas, and Nevada; 52 (xvii).

***Rhamnus cathartica* L.** Common Buckthorn. Shrubs or small trees, mainly 2–5 m tall, often armed with blunt thorns; leaves opposite or subopposite, the petioles mainly 5–25 mm long, the blades mostly 1.5–6 cm long, 1.2–3.5 cm wide, elliptic to obovate, oval or obovate, crenulate, rounded to abruptly short-attenuate, with 2–4 main lateral veins on each side; flowers 1–3, axillary, 4-merous; sepals 1.5–3 mm long; petals brownish, 1–1.3 mm long or shorter; style 4-lobed; fruit black, 5–7 mm thick, often with 4 seeds; $2n = 24$. Cultivated, escaping, and persisting in Salt Lake and Utah counties; introduced from Eurasia; 1 (0).

Ziziphus Miller

Shrubs or small trees; leaves alternate, petiolate, markedly 3-veined from the base; flowers in axillary cymes, the hypanthium filled with a massive disk surrounding the pistil but not adherent; petals present, caducous; ovary 2-loculed; fruit drupaceous, with a solitary 2-loculed stone.

***Ziziphus jujuba* Miller** Jujube. Glabrous shrubs or small trees, mainly 3–8 m tall, spiny or unarmed; branchlets often clustered, simulating pinnate leaves often with 2 spines at each node; leaves glossy, commonly 2–6 cm long, ovate to lanceolate, serrate, obtuse to marginate; drupes dark red or brown. Uncommonly cultivated fruit plant, escaping and persisting mainly in Washington County; introduced from Eurasia; 5 (0). The fruit is edible, either dried or preserved, and resembles a small date.

ROSACEAE A. L. Juss.

Rose Family

Annual, biennial, or perennial herbs, shrubs, or trees; leaves alternate or basal (and still alternate) or less commonly opposite, simple or pinnately to palmately compound, mostly deciduous, stipulate or rarely exstipulate; flowers perfect or imperfect, regular, complete or incomplete, perigynous to epigynous, borne singly or in racemose, corymbose, umbellate or cymose clusters; sepals usually 5 (more in some), often bearing bracteoles alternate with the lobes, borne with petals and stamens on margin of a hypanthium; petals usually 5 (lacking or more in some), commonly showy; stamens 5 to numerous; pistils 1 to many, of 1 carpel, or of 5 connate or distinct carpels enclosed in the hypanthium; fruit an achene, follicle, drupe, pome, aggregate, hip, or accessory; $x = 7–9, 17+$. Note: The rose family is both large and complex. The diversity of fruit type reflects the many morphological differences in structure of the gynoecium. Suggestions by some workers that the group should be segregated into more than one family is not without merit. It is held together by the presence of the hypan-

thium on which the perianth and stamens are displayed. This is a complex structure, with several possible origins, and might fail ultimately as a diagnostic character.

1. Plants annual, biennial, or perennial herbs Key 1
- Plants trees, shrubs, or subshrubs Key 2

Key 1.

Plants herbaceous.

1. Petals lacking; flowers numerous, borne in dense spikes; leaves pinnately compound *Sanguisorba*
- Petals present; flowers not both numerous and borne in spikes 2
- 2(1). Leaves bi- or triternately dissected into linear segments; petals white; plants of Piute, Beaver, and Sevier counties *Chamaerhodos*
- Leaves various, but not bi- or triternately dissected into linear segments; petals white, yellow, or pink 3
- 3(2). Flowers solitary on scapose peduncles; leaves simple, crenate; fruit of plumose achenes; sepals and petals 8–10 each *Dryas*
- Flowers usually more than 1; leaves compound or lobed, rarely simple; fruit not of plumose achenes; sepals and petals usually 5 each 4
- 4(3). Bractlets lacking between the sepals; flowers with a stalked receptacle; hypanthium funnelform; plants of Washington County *Purpusia*
- Bractlets present, alternating with the sepals; flowers with sessile receptacle; hypanthium not funnelform 5
- 5(4). Leaflets tridentate apically, entire along the sides; stamens 5; plants prostrate or mat-forming, of high elevations *Sibbaldia*
- Leaflets variously toothed or lobed, but not regularly tridentate apically; stamens 5, 10, or more; plants of various habit and habitat 6
- 6(5). Leaves trifoliolate; plants with well-developed stolons; flowers white; receptacle ripening into an accessory fruit *Fragaria*
- Leaves mostly with more than 3 leaflets but, if trifoliolate, the lacking stolons; flowers typically yellow (less commonly purple or white); receptacle not ripening 7
- 7(6). Leaflets very numerous, mostly less than 6 mm long; petals usually clawed *Ivesia*
- Leaflets 3–15 (rarely more), commonly much more than 6 mm long; petals sessile 8
- 8(7). Leaves palmately or pinnately lobed or compound, not lyrate pinnatifid; styles at maturity not elongate and conspicuous *Potentilla*
- Leaves pinnately lobed or compound or more usually lyrate-pinnatifid; styles at maturity elongate and conspicuous *Geum*

Key 2.

Plants woody.

1. Leaves compound 2
- Leaves simple 7
- 2(1). Stems and/or leaves armed with prickles or spines 3
- Stems and leaves lacking prickles or spines 4
- 3(2). Pistils several, enclosed within a fleshy hypanthium; fruit a hip; petals very showy *Rosa*
- Pistils several to many, on an elongate receptacle; fruit an aggregate; petals not especially showy *Rubus*

- 4(2). Leaves bipinnately compound, the ultimate segments 0.5–1.5 mm long; herbage glandular-stellate, aromatic *Chamaebataria*
- Leaves once pinnately compound, the leaflets much longer than 1.5 mm; herbage not glandular-stellate 5
- 5(4). Leaflets 3–7; leaves 1.5–3.5 cm long; flowers yellow; low shrub *Potentilla*
- Leaflets 7–15 or more; leaves 5–20 cm long or more; flowers white to cream; moderate shrubs to small trees 6
- 6(5). Ovary superior; stamens 20 or more; leaflets 13–23; cultivated shrubs *Sorbaria*
- Ovary inferior; stamens 15–20; leaflets 9–15; indigenous shrubs or cultivated trees *Sorbus*
- 7(1). Leaves opposite; petals lacking; intricately branched, low desert shrubs of southern and southeastern Utah *Coleogyne*
- Leaves alternate; petals present (lacking in *Cercocarpus*); plants of various habits and habitats 8
- 8(7). Shrubs low, mat-forming; flowers solitary or in dense spikes on leafless or merely bracteate scapes 9
- Shrubs or small trees, never mat-forming; flowers various, but neither scapose nor subscapose 10
- 9(8). Flowers solitary, the sepals and petals mostly 8–10 each; leaves crenate; plants of alpine tundra *Dryas*
- Flowers in dense spikes, the sepals and petals commonly 5 each; leaves entire; plants of rock surfaces at low to moderate elevations *Petrophytum*
- 10(8). Pistils superior, the 1 to several ovaries separate or partially connate, not adnate to the hypanthium; fruit a drupe, aggregate, achene, follicle, or capsule 11
- Pistils inferior, the 3– to 5-carpellate ovaries adnate to the hypanthium; fruit a pome 20
- 11(10). Flowers inconspicuous; petals lacking; leaves entire and evergreen (except in *C. montanus*) .. *Cercocarpus*
- Flowers showy, though small in some; petals present; leaves mainly toothed or lobed, often deciduous 12
- 12(11). Pistil 1; fruit a drupe; leaves commonly with glands at base of blade or on petiole *Prunus*
- Pistils 1 to many; fruit not a drupe; leaves not gland-bearing 13
- 13(12). Leaves pinnately veined, the lobes, if any, pinnate .. 14
- Leaves palmately veined, the lobes palmately arranged or flabellate 16
- 14(13). Flowers yellow, solitary, terminating branches of the current year *Kerria*
- Flowers white to pink or lavender, borne in corymbs, panicles or racemes 15
- 15(14). Flowers borne in racemes, 1.5 cm wide or more; petals 6–12 mm long *Exochorda*
- Flowers borne in corymbs or panicles, less than 1 cm wide; petals 6–15 mm long *Spiraea*
- 16(13). Flowers large, 2 cm broad or more, in few-flowered cymes; fruit an aggregate *Rubus*
- Flowers commonly less than 2 cm broad, solitary or in corymbs or panicles 17
- 17(16). Flowers numerous, borne in panicles *Holodiscus*
- Flowers borne singly or in few- to many-flowered corymbs 18
- 18(17). Flowers borne in umbellate corymbs; leaves broad and thin, commonly 1–6 cm wide or more *Physocarpus*

- Flowers borne singly or in corymbose racemes; leaves thickish, seldom to 1 cm wide 19
- 19(18). Pistils numerous; petals white; leaf lobes tightly revolute; plants of low elevations in southern Utah. *Fallugia*
- Pistils 1–5 (rarely more); petals white to cream or pale yellowish; leaf lobes not tightly revolute; plants of broad distribution *Purshia*
- 20(10). Stems armed with thorns or spines 21
- Stems unarmed 23
- 21(20). Leaves evergreen, crenate-serrate; pomes commonly orange; petals white, less than 4 mm long. *Pyracantha*
- Leaves deciduous, serrate or doubly serrate; pomes variously colored, rarely orange; petals more than 5 mm long 22
- 22(21). Shrubs to 2 m tall (generally less); flowers 20–45 mm broad; fruit over 2 cm thick *Chaenomeles*
- Shrubs or small trees to 5 m tall or more; flowers 9–18 mm broad; fruit less than 1.5 cm thick *Crataegus*
- 23(20). Leaves entire or essentially so 24
- Leaves serrate to doubly serrate (see also *Peraphyllum*) 26
- 24(23). Leaves ovate to cordate ovate, 1.5–5 cm wide or more; pomes clothed with a villous tomentum *Cydonia*
- Leaves variously shaped, less than 1.5 cm wide; pomes glabrous 25
- 25(24). Shrubs to 1.5 m tall or more, indigenous; leaves narrowly elliptic; fruit an acrid pome *Peraphyllum*
- Shrubs of various height, cultivated; leaves ovate to obovate or oblanceolate; pomes mealy, non-acrid *Cotoneaster*
- 26(23). Flowers white, in racemes; plants indigenous, rarely cultivated; leaves prominently toothed towards the apex *Amelanchier*
- Flowers white or otherwise, in corymbs; plants cultivated, sometimes escaping; leaves toothed or lobed throughout 27
- 27(26). Leaves deeply or at least prominently lobed *Sorbus*
- Leaves moderately if at all lobed 28
- 28(27). Shrubs to 2 m tall (generally less); flower solitary or sessile in corymbose clusters *Chaenomeles*
- Shrubs or trees to 7 m tall or more; flowers pedicellate in corymbose or umbellate clusters 29
- 29(28). Flowers in umbels; styles connate at the base; fruit with few if any stone cells, apple-shaped *Malus*
- Flowers in corymbs; styles free; fruit with stone-cells, mostly pear-shaped *Pyrus*

Amelanchier Medicus

Shrubs or small trees with unarmed branches; leaves alternate, simple, not lobed; stipules linear, caducous; flowers perfect, regular, borne in racemes; hypanthium short, with a glandular disk on the inner surface; sepals 5, persistent; petals 5, white; stamens usually 10 or more; pistil 1, the ovary inferior, usually 5-loculed (appearing as 10); styles 2–5, the stigmas capitate; fruit a reddish to purplish, often glaucous, pome.

Jones, G. N. 1946. American species of *Amelanchier*. Ill. Biol. Monogr. 20: 1–126.

1. Leaves mainly over 2.5 cm long; petals mostly 9–15 mm long; styles commonly 5 *A. alnifolia*

- Leaves mainly less than 2.5 cm long; petals 5–10 mm long; styles 2–4 (rarely 5) *A. utahensis*

***Amelanchier alnifolia* (Nutt.) Nutt.** Serviceberry, Shadblush, Saskatoon. [*Aronia alnifolia* Nutt.; *Amelanchier canadensis* var. *pumila* Nutt. in T. & G.; *A. pumila* (Nutt.) Roemer; *A. alnifolia* var. *cusickii* (Fern.) C. L. Hitchc.]. Low shrubs to small trees, mostly 2–5 m tall; leaves petiolate, mainly 20–50 mm long, 15–40 mm broad, oval to oblong, acute to rounded or subcordate basally, rounded to truncate apically, serrate near the apex, glabrous or hairy on one or both sides; flowers in short racemes; sepals 2.8–4.6 mm long; petals 9–15 mm long, 3.3–5.8 mm wide, spatulate-oblanceolate, white to pinkish; styles 5 (or 4); fruit purplish to black purple, glaucous, subglobose, 6–14 mm long, palatable; 2n = 34. Streamsides, meadows, and mountain slopes at 1500 to 2900 m in sagebrush, mountain brush, aspen, and mixed conifer communities at 1220 to 2900 m in all Utah counties; Alaska and Yukon east to Hudson Bay and south to California, Arizona, New Mexico, and Nebraska; 112 (iii). Attempts to segregate the various proposed infraspecific taxa among our Utah materials are fraught with difficulties not easily overcome, even by application of mechanical and arbitrary keys. Pubescence or its absence and the position of that pubescence form the basis of the main proposed segregates. The feature of pubescence seems to be so variable, not only within *A. alnifolia*, but within *A. utahensis* (q.v.), that it might indicate a response to ecological conditions rather than genetic affinities. More work is indicated.

***Amelanchier utahensis* Koehne** Utah Serviceberry. [*A. bakeri* Greene; *A. oreophila* A. Nels.; *A. utahensis* ssp. *oreophila* (A. Nels.) Clokey; *A. florida* var. *oreophila* (A. Nels.) R. J. Davis; *A. utahensis* var. *cinerea* Goodding, type from Washington County]. Low to large shrubs, mostly 0.5–4 m tall, intricately branched, often in dense clumps; leaves petiolate, mainly 10–27 mm long, 6–27 mm wide, oval to ovate, oblong, or elliptic, acute to rounded or subcordate basally, rounded to truncate or less commonly acute apically, serrate near the apex, hairy on one or both sides, rarely glabrous; sepals 1–3 mm long; petals 5.2–10 mm long, 1.8–4.2 mm wide, spatulate-oblanceolate to elliptic, white, cream or pinkish; styles 2–4 (5); fruit purplish or pinkish, 5–12 mm long, palatable or dry and hardly edible. Streamsides, dry slopes, or thickets in sagebrush, grassland, mountain mahogany, mountain brush, pinyon-juniper, aspen, and ponderosa pine communities at 900 to 2800 m in all counties in Utah (type from Leeds, Washington County); Washington to Montana and south to Baja California, Arizona, New Mexico, and Texas; 268 (xxxi). Segregation of all specimens in the *alnifolia*-*utahensis* complex is difficult if not impossible. Diagnostic features show overlap, and while trends are apparent in the vast amount of material available, the best of characteristics fail singly and often in combination as well. Because of the trends indicated by leaf and petal size, and other features, it seems best to treat *A. utahensis* apart from the tangled morphology of *A. alnifolia*. Additionally, variation within the *utahensis* assemblage is as great as (or greater) than that known to occur in the *alnifolia* materials. Both taxa are hosts to a cedar-apple rust.

compact cluster, 1–2 cm long; scales shining brown, with white, hyaline, sometimes ciliolate margins, the apex entire, the midrib firmer than the body and greenish, not exserted as a mucro; perianth bristles 1–3 (4), retrorsely barbellate, mostly less than 1/2 as long as the achene; styles 2-branched for ca 1/2 their length or less; achenes plano-convex, ca 2 mm long, cellular-reticulate, not at all apiculate. Moist alkaline meadows at ca 1315 m in Juab County; Washington to Saskatchewan, south to California and Wyoming; Argentina; 1 (i).

Scirpus pallidus (Britt.) Fern. [*S. atrovirens* var. *pallidus* Britt.]. Plants perennial, 4–15 dm tall, from robust rhizomes; culms triangular, 6–15 (20) mm thick toward the base; leaves caudine, the sheaths not marked with reddish purple, the blades well developed, flat, commonly 20–60 cm long, 6–20 mm wide; leaflike involucral bracts commonly 3–5, mostly 3–15 cm long or longer; inflorescence a compound, umbellate, terminal cyme; spikelets very numerous, 3–4 mm long, borne in sessile or pedunculate clusters averaging larger than in *S. microcarpus*, ca (20) 40 or more per cluster; scales with a green midrib and scarious margins flecked with dark purple and appearing greenish black, the midrib exserted as a short mucro; perianth bristles mostly 6, minutely retrorse-barbellate above the middle, subequal to or shorter than the achene; achene trigonous, with the ventral side the widest, ca 1 mm long. Along ditches, canals, and streams at 1370 to 1710 m in Uintah and Utah counties; Washington to Minnesota, south to Texas and Missouri; 11 (vii).

Scirpus pungens Vahl Common Threesquare. [*S. americanus* Pers. misapplied]. Plants perennial, 1.3–11.6 dm tall, from robust rhizomes; culms subterete to sharply triangular, the sides not concave, 2–5 (7) mm thick; leaves commonly 2–4, borne on the lower 1/3 of the culms, the lower ones often reduced to bladeless sheaths, the upper ones with blades commonly (5) 8–25 (38) cm long, the blades flat to involute, 0.5–4 mm wide, linear, well developed; leaflike involucral bract solitary, rarely 2, 2–11 cm long, commonly 3–7 times longer than the inflorescence, more or less appearing as a continuation of the culm, accompanied by 1 or 2 smaller, empty, scalelike bract(s), these often blackish purple and usually with an awn from ca 1/3 to as long as the body; spikelets 1–6, sessile or essentially so in a compact cluster, commonly 7–20 mm long; scales yellowish brown to reddish brown, some (especially the lower ones) often blackish purple, rather scarious, the midrib prominent and exserted as a mucro, the mucro equal to or a little longer than the apical notch of the scale; perianth bristles 4–6, retrorsely barbellate; styles 2 or 3; achenes lenticular or trigonous, 2.2–3.3 mm long including the conspicuous apiculus, 1.6–2.3 mm wide; n = 39?; 2n = 74. Tolerant of alkali, along flood plains, ditches, and streams, seeps, springs, margins of ponds and lakes, and in marsh, swamp, and lowland meadow communities at 850 to 2290 m in all Utah counties, except Morgan and Summit; Canada to South America, Europe, Australia, and New Zealand; 95 (xiii). Unfortunately, the name *S. americanus* has generally been misapplied to this species. While plants of the two taxa are apparently closely related, they are strikingly different in the field. Our plants are referable to var. *longispicatus* (Britt.) Cronq. [*S. americanus* var. *longispicatus* Britt.].

Scirpus supinus L. Sharpscale Bulrush. Plants annual, tufted, 2–25 cm tall, from fibrous roots; culms decumbent

to erect; leaves few, mostly on the lower 1/2 of the culms, reduced to bladeless or bristle-tipped sheaths, or the upper ones with short blades or the blades rarely elongate and to 5 cm long; principal involucral bract solitary, erect to somewhat incurved, ca 2–10 cm long, more or less simulating a continuation of the culm, smaller bracts borne at the base of the spikelets, these inconspicuous or to 3 cm long; spikelets commonly 2–7, sessile or nearly so or some conspicuously short-pedunculate; scales hyaline except for the greenish, short-excurrent midrib; perianth bristles present or lacking; style branches 3; achenes unequally trigonous, the ventral side the widest, ca 1.4 mm long, dark gray brown to blackish, conspicuously rugulose; n = 14. Shores of drying lakes and ponds, mud flats, and flood plains at 1380 to 1417 m in Millard, Salt Lake, and Uintah Counties; almost cosmopolitan, but rare and irregularly distributed; 4 (0).

Scirpus validus Vahl Softstem Bulrush; Tule. Plants perennial, commonly 8–12 dm tall, from robust rhizomes; culms terete, ca 5–10 (15) mm thick; leaves borne on the lower 1/4 of the culms, reduced to bladeless sheaths or the upper one with a mostly erect blade to 9 cm long and 4 mm wide; inflorescence commonly umbellate, subtended by a greenish involucral bract that simulates a continuation of the culm, this shorter or longer than the inflorescence, also with additional inconspicuous bracts; spikelets usually numerous, more or less orange brown or reddish brown, commonly 6–10 (15) mm long, borne singly or 2 or 3 together; scales (2) 2.5–3 (3.5) mm long, with red brown striolae that hardly, if at all, contrast with the red brown background color of the scales except on the sometimes pale hyaline margins, the margins entire or shortly fringed-ciliolate to somewhat lacerate; perianth bristles retrorse barbellate, subequal to the achenes, styles 2-branched for ca 3/4 their length; achenes ca 1.8–2.3 mm long, plano-convex, the margins usually not covered by the scales; 2n = 42. Streams, ditches, canals, margins of ponds and lakes, flood plains of rivers, and marshlands, sometimes emergent in shallow water at 1220 to 1880 m in Box Elder, Carbon, Daggett, Duchesne, Emery, Grand, Kane, Uintah, Utah, and Wayne counties; temperate North America and into tropical America; 23 (iv). A number of our specimens apparently show intergradation with *S. acutus*, but the plants are quite distinct in the field.

GRAMINEAE A. L. Juss.

Grass Family

Contributed and edited by Lois A. Arnow

Perennial or annual herbaceous plants (more or less woody only in giant reeds and bamboos); stems (culms) terete or flattened, simple or branched, with swollen or depressed nodes that often differ from the internodes in color, the internodes hollow or less commonly pithy to solid; leaves alternate, 2-ranked, the lower portion (sheath) closed and tubular or more commonly open with membranous, usually overlapping margins, the lateral margins at the summit occasionally prolonged as small, acute to rounded appendages (auricles), the upper portion (blade) narrowly elongate, parallel-veined, flat or folded to involute, often scabrous due to the presence of sharp-pointed siliceous spicules, the junction of the

sheath and blade on the abaxial surface (collar) usually marked by thickened tissues and a different coloration, on its adaxial surface nearly always giving rise to an appendage (ligule) consisting of a band of membranous tissue or a ring of hairs. Flowers (florets) small and inconspicuous, commonly wind-pollinated, bisexual or, in a few species, unisexual (sometimes proliferating as bulblets or some florets sterile or rudimentary), borne in few to numerous spikelets, these sessile or pedicelled at each node of a primary axis (rachis) or secondary axis (branch), the ultimate inflorescence a spike, raceme, or panicle based on the arrangement of the spikelets (not flowers) with the most mature spikelets toward the apex; each spikelet normally consisting of a pair of subopposite bracts (glumes) subtending 1–50 individual florets, these alternating on opposite sides of an axis (rachilla), the first glume (lower) sometimes reduced or lacking, rarely both glumes absent; each floret typically consisting of a pair of subopposite, usually dissimilar bracts, the margins of the outer bract (lemma) partially or completely enfolding the inner one (palea), these subtending 2 (3) minute scales (lodicules), the stamens, and the pistil; lemma either flattened to convex on the back (dorsiventrally compressed) or more or less folded (keeled) along the mid-nerve (laterally compressed), in some species the base of the lemma (or floret) prolonged and hardened to form a blunt to sharply acute, often bearded structure (callus); palea nerveless or (1) 2 (3) –nerved and thought by some to represent fused members of an ancestral trio of petals, the third member entirely suppressed; stamens usually (1 or 2) 3; pistil 1, the ovary 2 (3) –carpellate, superior, 1-loculed, 1-ovuled, glabrous or occasionally hairy, the styles 2 (3), each with a more or less featherlike stigma. Fruit a caryopsis having the pericarp fused with the seed coat, or sometimes an achene having the pericarp free of the seed coat, the seeds with a hard or soft, fairly large starchy endosperm and a small to large embryo lying toward one side. [Poaceae Barnh.]. Note: See additional grass references pp. 10–12.

Allred, K. 1982. Describing the grass inflorescence. *J. Range Management*

35: 672–675.

Sutherland, D. 1986. Poaceae, in Great Plains Flora Association, *Flora of the Great Plains*. Univ. Press of Kansas. Lawrence, Kansas.

Note: The following key to the genera occasionally employs apparent rather than actual characters. Data pertaining to lemmas are taken from those of the lowermost floret in the spikelet, and that pertaining to ligules from those of the uppermost culm leaf. Nerves of the glumes and lemmas may be more accurately assessed from the ventral than the dorsal surface.

1. Inflorescence a small headlike cluster largely obscured by subtending leaf fascicles; plant a low, stoloniferous annual; leaves typically narrowly white-margined, flat, and 1–3 mm wide *Munroa*
- Inflorescence not headlike or, if so, not largely obscured by the leaves; plants not otherwise as above 2
- 2(1). Spikelets enclosed within a spiny bur or cuplike structure, not usually visible 3
- Spikelets not so enclosed, usually exserted at flowering 4
- 3(2). Spikelets enclosed within a spiny bur; plant a widely distributed weedy annual *Cenchrus*
- Spikelets enclosed within a lobed, cuplike structure; plant a rare, strongly stoloniferous perennial *Buchloe*

- 4(2). Spikelets dorsiventrally compressed (glumes or lemmas flattened to convex on the back), 1-flowered or in some species 2-flowered (the lower floret then reduced and the lemmas dissimilar), disarticulating below (and sometimes also above) the glumes, in a few species the rachis disarticulating below the sessile spikelet of a pair or trio Key 1, p. 685
- Spikelets terete to laterally compressed (the lemma rounded on the back to strongly keeled along the mid-nerve) or, if dorsiventrally compressed, the spikelets either more than 2-flowered or disarticulating above the glumes 5
- 5(4). Spikelets sessile, the inflorescence either a solitary terminal spike or made up of 1 to many, usually simple, 1-sided, spikelike branches, these variously arranged along the main axis [in *Hordeum* the lateral spikelets of a trio short-pedicelled; in *Bouteloua curtipendula* the branches very short (spikelike) and pendulous] Key 2, p. 686
- Spikelets pedicelled, the inflorescence a spikelike to open panicle (reduced to a single spikelet in *Danthonia unispicata*), the pedicels 0.2–50 mm long (plants with spikelike panicles in which some of the spikelets are sessile will key here) 6
- 6(5). Spikelets with a single well-developed floret, in several species with 1 or 2 (3) staminate or neuter to rudimentary florets above or below the perfect one, the lemmas then dissimilar Key 3, p. 687
- Spikelets with 2 to many florets, rarely the florets replaced by bulblets; lemmas often progressively smaller upward, otherwise similar 7
- 7(6). Glumes (at least the longer one) consistently equal to or longer than the body of the lowermost lemma, in some species surpassing all of the florets Key 4, p. 689
- Glumes (both) averaging shorter than the body of the lowermost lemma, sometimes only slightly so Key 5, p. 690

Key 1.

Spikelets dorsiventrally compressed (glumes or lemmas flattened to convex on the back), 1-flowered or occasionally 2-flowered (the lower floret then neuter or staminate and the lemmas dissimilar), disarticulating below (and occasionally also above) the glumes, in a few species the rachis disarticulating below the sessile spikelet of a pair or trio.

1. Spikelets in 3s at each node of a spicate inflorescence, the lateral spikelets often reduced; rachis disarticulating at each node (except in a cultivated annual); glumes awnlike throughout or nearly so *Hordeum*
- Spikelets diversely arranged on the rachis (occasionally in 3s at tips of branches); either the rachis continuous or the glumes not awnlike 2
- 2(1). Glumes thinner than the lemma of the fertile floret, the first glume sometimes reduced or lacking, the second then resembling the lemma of the lower sterile floret 3
- Glumes firmer than the lemma, in some species only in the sessile spikelet of a pair or trio 9
- 3(2). Spikelets subtended by 1 to many seaberulous bristles *Setaria*
- Spikelets not subtended by bristles 4
- 4(3). Ligule lacking; spikelets in irregular clusters along one side of the panicle branches; glumes and sterile lemma with short stiff hairs on the nerves *Echinochloa*
- Ligule present; plants not otherwise as above 5

5(4). Inflorescence an open to compact panicle, the primary branches regularly rebranched	<i>Panicum</i>	—	Inflorescence a 1-sided terminal spike or of (1) 2 to many, usually simple, spikelike branches, the latter in a few species spikeletlike and pendulous; spikelets arising from one side of a more or less flattened rachis	11
— Inflorescence of chiefly simple, 1-sided, spikelike branches	6	—	Glumes longer and broader than the solitary floret, strongly compressed and stiffly ciliate on the keel; spike dense, ovoid to cylindrical	<i>Phleum</i>
6(5). Panicle of erect-appressed, spikelike branches mostly less than 5 cm long and racemously arranged along the main axis	7	—	Glumes not both larger than a solitary floret and ciliate on the keel; spike diverse	3
— Panicle of mostly widely spreading, often elongate, spikelike branches mostly digitately arranged	8	3(2).	First glume lacking (except in the terminal spikelet); spikelets strongly compressed, placed edgewise to and alternating on either side of the rachis	<i>Lolium</i>
7(6). Plants annual; second glume minutely awn-tipped; ligule a ring of hairs	<i>Eriochloa</i>	—	First glume nearly always present, sometimes much reduced; spikelets not otherwise as above	4
— Plants perennial; second glume and lower lemma abruptly acute to rounded at the apex; ligule membranous	<i>Panicum obtusum</i>	4(3).	Spikelets in clusters of 3 at each node of the rachis, the clusters hairy at the base (the hairs mostly 2–5 mm long) and falling from the rachis as a unit	<i>Hilaria</i>
8(6). Plants annual; spikelets to ca 1 mm wide; panicle branches 2–16	<i>Digitaria</i>	—	Spikelets 1–7 at each node of the rachis, neither hairy at the base nor falling from the rachis as a unit	5
— Plants perennial, stoloniferous; spikelets 1.2–2 mm wide; panicle branches 2 (4)	<i>Paspalum</i>	5(4).	Spikelets 3 at each node of a readily disarticulating rachis, (continuous in the annual cultivar, <i>H. vulgare</i>), each 1-flowered, the central spikelet of the trio sessile, the lateral ones pedicelled (all sessile in <i>H. vulgare</i>)	<i>Hordeum</i>
9(2). Inflorescence typically 2.5–6 dm long; spikelets enveloped in long hairs arising chiefly from the base of the spikelet; culms mostly 2–4 m tall	<i>Saccharum</i>	—	Spikelets 1–7 per node of the continuous or disarticulating rachis, all sessile or nearly so and more than 1-flowered	6
— Inflorescence less than 2 dm long (occasionally longer in two rare species); spikelets glabrous or hairy, in a few species partially obscured by long hairs arising from the rachis and pedicels; culms diverse in height	10	6(5).	Spikelets crowded on a continuous rachis, the internodes averaging less than 3 (0.2–3) mm long near midlength of the spike	7
10(9). Inflorescence a compact to open panicle with primary branches rebranched	11	—	Spikelets diversely arranged on a continuous or disarticulating rachis, the internodes averaging at least 3 mm long near midlength of the spike	8
— Inflorescence of 1 to numerous, slender, subdigitately arranged racemes or racemelike branches terminating culms and (when present) culm branches	12	7(6).	Plants annual; uppermost sheath typically inflated; internodes of the rachis 0.2–1 mm long	<i>Eremopyrum</i>
11(10). Spikelets all alike, each subtended by 1 or 2 short-hairy, nonspikelet-bearing pedicels	<i>Sorghastrum</i>	—	Plants perennial; uppermost sheath not inflated; internodes of the rachis mostly 1–3 mm long	<i>Agropyron</i>
— Spikelets dimorphic, the sessile broader than the pedicelled ones	<i>Sorghum</i>	8(6).	Plants perennial, tufted or rhizomatous, occupying native or disturbed habitats	<i>Elymus</i>
12(10). Culm and its branches terminating in a solitary raceme; pedicelled spikelets typically no wider than the pedicels, the latter ciliate with white hairs to ca 3 (4) mm long	<i>Schizachyrium</i>	—	Plants annual or biennial, solitary or in small tufts, occupying disturbed habitats	9
— Culm and (when present) its branches terminating in (1) 2 to numerous, loosely digitate racemelike branches; pedicelled spikelets diverse, in one species represented only by the pedicels; pedicels copiously pubescent with white or yellow hairs mostly 2–9 mm long	13	9(8).	Spike cylindrical, to ca 5 mm wide; spikelets about as wide as the rachis and appressed to its concave aspect (sometimes slightly spreading at flowering)	<i>Aegilops</i>
13(12). Pedicels and rachis segments (at least those toward the apex of the branches) vertically grooved, the central portion membranous; first glume of the sessile spikelet usually pubescent below midlength	<i>Bothriochloa</i>	—	Spike flattened or more or less 4-angled in cross section, nearly always more than 5 mm wide; spikelets broader than the rachis, erect to spreading	10
— Pedicels and rachis segments flat to rounded, not grooved down the center; first glume of the sessile spikelet glabrous or scaberulous below midlength	<i>Andropogon</i>	10(9).	Glumes subulate to narrowly lanceolate, 1 (3) -nerved; lemmas coarsely ciliate on keel and exposed margins	<i>Secale</i>

Key 2.

Spikelets sessile, 1- to many-flowered; lemmas usually laterally compressed; inflorescence either a solitary terminal spike or made up of 1 to many, usually simple, 1-sided, spikelike branches.

1. Inflorescence a solitary terminal spike; spikelets arising on alternate sides of or appearing to encircle the rachis

— Inflorescence with spikelike branches in 1 or more whorls, in some species 1 to several branches loosely spaced below the terminal whorl	12
— Inflorescence either a solitary, 1-sided spike or a panicle with 1 to many, erect to pendulous spikelike branches racemously arranged along the rachis	15
12(11). Glumes or lemmas with awns at least 1 mm long	13
— Glumes and lemmas awnless	14

- 13(12). Panicle branches 3–20 in 1–5 whorls, each branch typically terminating in a floret; spikelets 2-flowered, the reduced lemma of the upper floret truncate and awned *Chloris*
- Panicle branches 2–6 in a single whorl, each branch terminating in a naked, sharp point 1–7 mm long; spikelets 3 (5) –flowered, the florets all well developed, the lemmas awn-tipped to short-awned; known in Utah from a single 1953 collection (Flowers 2317 UT), not persistent, not included in the text *Dactyloctenium aegyptium* (L.) Beauv.
- 14(12). Spikelets 1 (2) –flowered; both glumes 1-nerved; plants perennial, rhizomatous or stoloniferous *Cynodon*
- Spikelets 3– to 9–flowered; second glume 3– to 7-nerved; plants annual, usually branched from the base *Eleusine*
- 15(11). Spikelets obovate; glumes typically inflated to some degree, enclosing the floret except for the sharply pointed tip of the lemma *Beckmannia*
- Spikelets linear or lanceolate to elliptical; glumes not inflated, the florets often visible 16
- 16(15). Glumes (at least the conspicuous one) more than 1-nerved 17
- Glumes (both) 1-nerved 19
- 17(16). Plants perennial, strongly rhizomatous; spikelike branches 2–50 *Spartina*
- Plants annual; spike or spikelike branch solitary 18
- 18(17). Lemmas obtuse to truncate apically; spikelets disarticulating below the glumes *Sclerochloa*
- Lemmas acute to mucronate apically; spikelets disarticulating above the glumes *Eleusine*
- 19(16). Spikelike branches 0.5–2 cm long, readily disarticulating near the base and falling as a unit 20
- Spikelike branch or branches 0.5–15 cm long, persistent 21
- 20(19). Spikelike branches 1–5 per culm, erect to slightly spreading; florets staminate; plants stoloniferous, rare in Utah *Buchloe*
- Spikelike branches 2–80 per culm, mostly ascending to widely spreading or pendulous; lowermost florets perfect; plants rarely stoloniferous, general in distribution *Bouteloua*
- 21(19). Spikelets disarticulating below the glumes; glumes nearly always short-ciliate on the prominent keel; plants coarse, strongly rhizomatous, occupying wet places *Spartina*
- Spikelets disarticulating above the glumes; glumes diverse, not short-ciliate on the keel; plants mostly slender-stemmed, often annual, occupying diverse habitats 22
- 22(21). Spikelets 1-flowered, about as broad as and mostly appressed to the concave surface of the branches; branches linear, 2–20 cm long and stiffly spreading from the main axis *Schedonnardus*
- Spikelets more than 1-flowered (upper florets often reduced or rudimentary), either broader than or not strictly appressed to the branches; branches nonlinear, 0.5–16 cm long 23
- 23(22). Spikelets with 2–12 well-developed florets *Leptochloa*
- Spikelets with 1 perfect floret below 1 or 2 (4) rudimentary ones 24
- 24(23). Upper florets consisting entirely or in part of 1–3 awns; lemma of the perfect floret awned or unawned; spikelike branches 0.5–5 cm long, usually about equally spaced along the main axis, occasionally solitary *Bouteloua*

- Upper floret more or less club-shaped with a short solitary awn; lemma of the perfect floret with an awn 4–12 mm long; spikelike branches 2–16 cm long, usually at least some of them in closely spaced groups *Chloris*
- Key 3.
- Spikelets pedicelled, each with a single perfect or pistillate floret, several species having 1 or 2 (3) staminate or neuter to rudimentary florets above or below the fertile one, the lemmas then dissimilar.
1. Glumes lacking; spikelets strongly flattened, mostly short-pedicelled and appressed to one side of the panicle branches; lemmas minutely ciliate on the keel; plants tall, occupying wet areas *Leersia*
 - Glumes (at least one) present or, if obsolete, the plants not otherwise as above 2
 - 2(1). Reduced florets regularly present in each spikelet (in one species absent in the lowermost spikelet of each panicle branch) 3
 - Reduced florets not regularly present in each spikelet (or not recognizable as such) 13
 - 3(2). Spikelets with 1–3 rudimentary florets above the perfect one 4
 - Spikelets with all reduced florets below (or appearing lateral to) the perfect one, in some species the spikelets appearing to have 3 glumes 9
 - 4(3). Inflorescence of 1 to many, simple, spikelike, 1-sided branches 5
 - Inflorescence a spikelike to loose panicle, the latter with branches mostly rebranched and not 1-sided 6
 - 5(4). Branches of the inflorescence 2–16 cm long, arranged in whorls, occasionally some of the branches solitary or racemosely arranged below the terminal whorl *Chloris*
 - Branches of the inflorescence 0.5–5 cm long, racemosely arranged, occasionally solitary *Bouteloua*
 - 6(4). Lowermost lemma termintaing in 9 plumose awns *Enneapogon*
 - Lowermost lemma awnless or no more than 3-awned 7
 - 7(6). Lemmas leathery and glossy, the lowermost typically awnless, the upper with a straight to hooked awn to 2 mm long *Holcus*
 - Lemmas thin or dull, the lowermost awned, the upper diverse 8
 - 8(7). Lowermost lemma with a stout, geniculate awn 10–15 mm long arising from the back *Helictotrichon*
 - Lowermost lemma with the midnerve free as a plumose awn 3–5 mm long *Blepharidachne*
 - 9(3). Lower lemma with an awn 1–2 cm long *Arrhenatherum*
 - Lemmas awnless 10
 - 10(9). Sterile lemma resembling the second glume in size and texture *Panicum*
 - Sterile lemma not resembling the second glume 11
 - 11(10). Panicle open, the branches naked at the base; spikelets bronze in color; lower (lateral) florets broader than the fertile one *Hierochloe*
 - Panicle compact or, if open, the branches spikelet-bearing to the base or nearly so; spikelets whitish, green, or tawny; rudimentary florets much narrower than the fertile one 12
 - 12(11). Glumes with hairs mostly 8–15 mm long *Imperata*
 - Glumes glabrous to short-hairy *Phalaris*

- 13(2). Glumes (at least one) averaging shorter than the lemma; glumes and lemmas all 1-nerved, neither awned nor awn-tipped 14
 — Plants not as above in every detail 17
- 14(13). Ligule membranous *Muhlenbergia*
 — Ligule a ring of hairs 15
- 15(14). Lemmas bearded on the callus with hairs at least half as long as the lemma *Calamovilfa*
 — Lemmas glabrous or at most scaberulous 16
- 16(15). Panicle spikelike, 0.3–8 cm long; plants annual and often mat-forming *Crypsis*
 — Panicle open or, if spikelike, more than 8 cm long; plants perennial or rarely annual but not mat-forming *Sporobolus*
- 17(13). Spikelets disarticulating below (and sometimes also above) the glumes, in a few species disarticulation occurring in the rachis, the pedicels, or at the base of short panicle branches 18
 — Spikelets disarticulating above the glumes, not regularly breaking off below the glumes or in the rachis, pedicels, or panicle branches 32
- 18(17). Rachis of the inflorescence readily disarticulating; spikelets short-pedicelled in groups of 3 at each node; glumes awnlke throughout their length or nearly so *Hordeum*
 — Rachis of the inflorescence remaining intact; plants not otherwise as above 19
- 19(18). Spikelets enveloped by hairs 4–12 mm long arising chiefly from the base of the spikelet; panicles 10–60 cm long 20
 — Spikelets not enveloped by long hairs, or the hairs not arising chiefly from the base of the spikelet; panicles diverse 21
- 20(19). Lemmas awned *Saccharum*
 — Lemmas awnless *Imperata*
- 21(19). Ligule a ring of hairs 22
 — Ligule membranous 23
- 22(21). Plants annual, often mat-forming with decumbent to prostrate culms; sheaths glabrous or minutely ciliate below the summit; panicles spikelike, 0.3–6.5 (8) cm long *Crypsis*
 — Plants perennial or, if annual, not otherwise as above *Sporobolus*
- 23(21). First glume typically 2-nerved, bifid or awned at the apex; branches of the panicle disarticulating at the base 24
 — First glume not both 2-nerved and either bifid or awned at the apex; branches of the panicle not regularly disarticulating 25
- 24(23). Plants annual; first glume unawned, typically bifid apically; spikelets 1–3 per branch, the pedicels distinctly unequal in length .. *Muhlenbergia depauperata*
 — Plants perennial; first glume with 2 awns typically 1–5 mm long; spikelets borne on paired, subequal pedicels *Lycurus*
- 25(23). Glumes averaging shorter than the body of the lemma, conspicuously soft-hairy on the keel *Alopecurus*
 — Glumes (at least the second) equal to or longer than the body of the lemma, glabrous or hairy on the keel 26
- 26(25). First glume lacking, the second one firm and completely enclosing the thin lemma; plant a low, strongly rhizomatous and often stoloniferous lawn-grass or weed, rare in Utah *Zoysia*
 — First glume present; plant either tall or without rhizomes 27
- 27(26). Glumes with awns averaging more than 1 (1–10) mm long; inflorescence a dense to somewhat interrupted, mostly spikelike panicle 28
 — Glumes awnless or with an awn tip to ca 1 mm long; inflorescence diverse 29
- 28(27). Awn of the glumes noncapillary, to 4 mm long; glumes strongly compressed, the prominent keel ciliate with spreading hairs mostly at least 0.5 mm long *Phleum*
 — Awn of the glumes hairlike or nearly so, 1–10 mm long; glumes not strongly compressed or, if so, the keel only minutely hairy *Polypogon*
- 29(27). Panicle nodding, 1–3 dm long; glumes narrowly lanceolate, scabrous to short-ciliate on the sharp keel *Cinna*
 — Panicle erect or plants not otherwise as above 30
- 30(29). Inflorescence of multiple, 1-sided, spikelike branches; glumes glabrous *Beckmannia*
 — Inflorescence a terminal, spikelike to more or less interrupted panicle; glumes scabrid-roughened to variously hairy 31
- 31(30). Spikelets strongly compressed, the glumes hairy on the keel or throughout *Alopecurus*
 — Spikelets subterete, the glumes roughened to scabrid-puberulent over the back (at 10x magnification) *Polypogon semiverticillatus*
- 32(17). Lemma with a terminal or dorsal awn averaging at least 1 mm long (in some species the awn jointed to the lemma and readily deciduous, the lemmas then terete or nearly so and firmer than the glumes) 33
 — Lemmas awnless or with an awn tip averaging less than 1 mm long 45
- 33(32). Awn of the lemma 3-branched *Aristida*
 — Awn of the lemma simple 34
- 34(33). Awn arising from the back of the lemma 35
 — Awn terminal on the lemma 40
- 35(34). Callus bearded, the longer hairs at least 1/3 as long as the lemma *Calamagrostis*
 — Callus glabrous or bearded with hairs less than 1/3 as long as the lemma 36
- 36(35). Lemmas 3 mm long or longer 37
 — Lemmas less than 3 mm long 38
- 37(36). Awn of the lemma arising below midlength *Calamagrostis*
 — Awn of the lemma arising above midlength (spikelets normally 2-flowered, plant will rarely key here) *Trisetum*
- 38(36). Rachilla of the spikelet prolonged behind the palea and conspicuously hairy *Calamagrostis rubescens*
 — Rachilla sometimes minutely prolonged but not long-hairy 39
- 39(38). Lemma thinner than the glumes, glabrous, the awn rarely as much as 5 mm long *Agrostis*
 — Lemmas slightly firmer than the glumes, regularly scaberulous above midlength, the awn (4) 6–16 mm long *Apera*
- 40(34). Awns deciduous 41

- Awns persistent 42
- 41(40) Body of the lemma with hairs 1–4 mm long, the callus 0.5–1 mm long and obtuse to sharply acute *Stipa*
- Body of the lemma glabrous or with hairs less than 1 mm long, the callus less than 0.5 mm long and blunt *Oryzopsis*
- 42(40) Awn jointed to the lemma, the junction between awn and lemma clearly visible unless obscured by hairs arising near the apex of the lemma *Stipa*
- Awn confluent with the lemma, no joint visible; lemma glabrous to scabrous or, if hairy, the hairs not prolonged beyond the apex 43
- 43(42) Pedicels distinctly short-hairy (at 5x magnification), mostly about equal to or slightly longer than the body of the lemma; second glume 4.5–7 mm long *Festuca dasyclada*
- Pedicels glabrous to scabrid-puberulent (at 10x magnification), averaging shorter or much longer than the body of the lemma; glumes rarely to 4.5 mm long 44
- 44(43) Second glume slightly exceeding the floret; lemma with a hairlike, flexuous awn 4–16 mm long *Apera*
- Second glume shorter than the floret or, if longer, the lemma long-hairy, awn-tipped, or with a stout rigid awn *Muhlenbergia*
- 45(32) Lemmas laterally compressed, firm and glossy, subtended laterally by minute, closely appressed, bristlelike structures that often appear to be pubescence on the lemma *Phalaris*
- Lemmas not as above in every particular 46
- 46(45) Lemmas yellow brown, more or less fleshy, conspicuously 3-nerved, apically truncate and erose *Catabrosa*
- Lemmas not as above 47
- 47(46) Ligule of hairs 48
- Ligule a membrane 50
- 48(47) Lemmas bearing a basal tuft of hairs to 2 mm long *Redfieldia*
- Lemmas glabrous to minutely hairy 49
- 49(48) Lemmas awn-tipped to short-awned *Muhlenbergia*
- Lemmas obtuse to acute, neither awn-tipped nor awned *Sporobolus*
- 50(47) Lemmas 3-nerved, each nerve hairy over at least the lower 1/3, otherwise glabrous; glumes smooth throughout *Blepharoneuron*
- Lemma diversely nerved, glabrous or the hairs not restricted to the nerves; glumes often scabrous, at least on the midnerve 51
- 51(50) Callus bearded with hairs 1/4 the length of the lemma or longer *Calamagrostis*
- Callus glabrous or minutely hairy 52
- 52(51) Lemmas less than 3 mm long (including awn tip when present) 53
- Lemmas 3 mm long or more (including awn tip when present) 55
- 53(52) Glumes (at least one) averaging shorter than the lemma, rarely both longer and then the lemma conspicuously hairy; spikelets greenish white to dark gray *Muhlenbergia*
- Glumes both longer than the lemma (sometimes barely so); lemma glabrous or minutely hairy on the callus; spikelets green or purple-tinged to dark purple 54
- 54(53) Glumes stiffly ciliate on the prominent keel, abruptly tapered at the apex into a stout awn 0.6–4 mm long *Phleum*

- Glumes glabrous or scabrous, awnless or at most minutely awn-tipped *Agrostis*
- 55(52) Lemmas green and often purple-tinged; rachilla prolonged behind the palea and pubescent with hairs at least 0.5 mm long *Trisetum wolffii*
- Lemmas whitish or more often gray green to black (in one species red purple to brownish); rachilla either not prolonged or not long-hairy *Muhlenbergia*

Key 4.

Spikelets pedicelled, 2– to many-flowered, disarticulating above or below the glumes; florets perfect or occasionally unisexual; lemmas variously compressed, all similar as to shape and texture (except in *Hierochloe*); at least the longer glume equal to or exceeding the body of the lowermost lemma.

- 1. Lemmas awnless or with an awn tip not more than 1 mm long 2
- Lemmas (at least 1 per spikelet) awned, the awns terminal or dorsal, averaging more than 1 mm long 15
- 2(1). Ligule a ring of hairs, sometimes with a short membranous base; lemmas pubescent 3
- Ligule membranous; lemmas glabrous or pubescent 5
- 3(2). Lemmas more than 3-nerved; plants annual *Schismus*
- Lemmas 3-nerved; plants perennial 4
- 4(3). Panicle to 4.5 cm long, about as broad as long; leaf blades rarely as much as 6 cm long; lemmas awn-tipped *Erioneuron*
- Panicle 4.5–20 cm long, longer than broad; leaf blades mostly 3–25 cm long; lemmas usually shallowly notched, not awn-tipped *Tridens*
- 5(2) Glumes 1.6–3 cm long; plants annual, cultivated or escaped *Avena fatua* var. *sativa*
- Glumes no more than 1.4 cm long; plants either perennial or native 6
- 6(5) Lemmas typically more than 5-nerved, the nerves prominent; culms either bulbous-based or the spikelets 6–24 mm long and falling entire *Melica*
- Lemmas no more than 5-nerved or the nerves faint (lemmas obscured by the long hairs in *Arundo*); culms not bulbous-based; spikelets either disarticulating above the glumes or less than 6 mm long 7
- 7(5). Spikelets ovate; glumes soon turning bronze-membranous throughout; florets sub sessile, the narrow central floret often obscured by the broad lateral ones *Hierochloe*
- Spikelets lanceolate to elliptical or the glumes not both bronze in color and membranous, the florets not dimorphic as above 8
- 8(7). Glumes markedly dissimilar, the first linear, the second oblanceolate to obovate, 3–4 times as wide as the first; spikelets disarticulating below the glumes *Sphenopholis*
- Glumes similar in shape or not dissimilar as above; spikelets disarticulating above the glumes 9
- 9(8). Lemmas pubescent with hairs 6–9 mm long *Arundo*
- Lemmas glabrous or pubescent with hairs less than 6 mm long 10
- 10(9). Rachilla pubescent with hairs to ca 1 mm long; glumes equal or nearly so, averaging more than 5 (4.5–8.5) mm long *Trisetum wolffii*
- Rachilla glabrous to minutely hairy; glumes often unequal, at least one less than 5 mm long 11

- 11(10). Spikelets to 2.8 mm long, whitish to pale or dark gray (spikelets typically 1-flowered, plant will rarely key here) *Muhlenbergia asperifolia*
- Spikelets either at least 3 mm long or not whitish to dark gray 12
- 12(11). Panicle spikelike or nearly so, the rachis and pedicels of the panicle minutely soft-hairy throughout (at 10x magnification); paleas shiny-hyaline throughout, prominent at flowering *Koeleria*
- Panicle open or rarely spikelike, the rachis and pedicels glabrous to scabrid-puberulent; paleas not hyaline throughout, at least the nerves green 13
- 13(12). Lemmas minutely awn-tipped *Festuca*
- Lemmas abruptly to sharply acute but not awn-tipped 14
- 14(13). Panicle of simple, spikelike, 1-sided branches; second glume 1-nerved; plants reported only from Washington County *Leptochloa filiformis*
- Panicle of regularly rebranched branches; second glume 3- to 5-nerved; plants general in distribution *Poa*
- 15(1). Awn arising from the tip of the lemma or produced in the sinus of a mostly bilobed apex 16
- Awn arising from the back of the lemma, below the entire to toothed or lobed apex 22
- 16(15). Lemmas terminating in 9 plumose awns *Enneapogon*
- Lemmas with fewer awns 17
- 17(16). Lemmas pubescent with hairs 6-9 mm long; panicle 20-70 cm long *Arundo*
- Lemmas glabrous or pubescent with hairs less than 6 mm long; panicles often less than 20 cm long 18
- 18(17). Lemmas prominently 3-nerved; ligule a ring of hairs 19
- Lemmas either more than 3-nerved or the nerves obscure; ligule diverse 20
- 19(18). Spikelets 4-flowered; uppermost lemma reduced to a 3-awned rudiment, the lower lemmas lobed to midlength or below, the midnerve free as a plumose awn *Blepharidachne*
- Spikelets mostly (4) 5- to 18-flowered; uppermost lemma smaller than those below but not rudimentary, the lower lemmas entire or lobed for less than half their length, the awn not plumose *Erioneuron*
- 20(18). Awn (at least the central one) flattened near the base; spikelets 9-24 mm long; ligule a ring of hairs *Danthonia*
- Awn terete or nearly so; spikelets often less than 9 mm long; ligule membranous 21
- 21(20). Awns averaging more than 5 (4-10) mm long; panicle branches glabrous or scabrous to puberulent *Bromus*
- Awn 1-5 mm long; panicle branches typically short-hairy *Festuca dasyclada*
- 22(15). Glumes 1.6-3 cm long; plants coarse annuals of the valleys *Avena*
- Glumes less than 1.6 cm long; plants diverse 23
- 23(22). Florets dissimilar, at least as to the awns 24
- Florets similar 26
- 24(23). Lower floret typically awnless; upper floret with a hooked or occasionally straight awn to ca 2 mm long *Holcus*
- Lower floret with a geniculate awn; upper floret awnless or with a straight, twisted, or geniculate awn usually more than 2 mm long 25
- 25(24). Plants to 2 dm tall, rare, restricted to high elevations *Helictotrichon*
- Plants (6) 7-18 dm tall, occupying disturbed sites from low to moderately high elevations *Arrhenatherum*
- 26(23). Lemmas at maturity smooth and shiny, blunt and minutely toothed to erose apically, the awn arising near midlength or below *Deschampsia*
- Lemmas dull, often scaberulous, acute and often minutely bristle-toothed apically, the awn diverse 27
- 27(26). Callus bearded with hairs more than 1 mm long or the awn arising below midlength of the lemma (florets typically 1-flowered, plant will rarely key here) *Calamagrostis*
- Callus glabrous or bearded with hairs no more than 1 mm long, the awn arising above midlength of the lemma *Trisetum*

Key 5.

Spikelets pedicelled, 2- to many-flowered, disarticulating above or rarely below the glumes; florets perfect or occasionally unisexual, rarely replaced by bulbils; both glumes averaging shorter than the body of the lowermost lemma.

1. Plants mostly 2-4 m tall, occurring in low wet places; panicles 1.5-5 dm long; spikelet rachilla with spreading hairs exceeding the narrowly lanceolate lemmas *Phragmites*
- Plants either less than 2 m tall or not otherwise as above 2
- 2(1). Spikelets in dense, 1-sided clusters at the tips of otherwise naked branches; glumes awn-tipped, the keel coarsely ciliate to occasionally merely scabrous; sheaths closed at least half their length, often compressed and keeled *Dactylis*
- Plants not as above in every particular 3
- 3(2). Lemmas (1 or more per spikelet) with an awn more than 0.5 mm long 4
- Lemmas awnless or with an awn tip no more than 0.5 mm long 11
- 4(3). Spikelets 2-flowered; lemma of the lower floret with a dorsifixed, geniculate awn mostly 1-2 cm long; lemma of upper floret awnless or with a terminal awn shorter and more slender than that of the lower floret *Arrhenatherum*
- Spikelets more than 2-flowered or the awns of the lemmas not as above 5
- 5(4). Lemmas prominently 3-nerved, the lateral nerves and usually the midnerve hairy (often near the base), otherwise glabrous, the awn 0.5-3.5 mm long 6
- Lemmas either more than 3-nerved or not with pubescence restricted to the nerves, the awn variable in length 7
- 6(5). Panicle 7-40 cm long; plants of mostly wet places *Leptochloa*
- Panicle to 4.5 cm long; plants of dry places *Erioneuron*
- 7(5). Sheaths of culm leaves closed at least half their length, sometimes mechanically split and then the margins not overlapping; lemmas 6-17 mm long 8
- Sheaths of the culm leaves open throughout or nearly so, the margins typically overlapping; lemmas in some species less than 6 mm long 9
- 8(7). Callus of the lowermost lemma bearded with hairs 1-3 mm long *Schizachne*
- Callus glabrous or minutely hairy *Bromus*

- 9(7). Awn of the lemma arising 0.5–2.5 mm below the entire to bristle-toothed apex; rachilla of the spikelet pubescent with hairs mostly 0.5–1 mm long .. *Trisetum*
- Awn of the lemma terminal or arising less than 0.5 mm below the acute apex; rachilla of the spikelet glabrous or the hairs minute 10
- 10(9). Inflorescence a usually glistening, spikelike panicle; spikelets 2 (3–5) –flowered; glumes and lemmas strongly keeled, broadly membranous-margined, the awns to ca 1 mm long *Koeleria*
- Inflorescence not spikelike; spikelets 2– to 20-flowered; glumes and lemmas mostly rounded on the back, not broadly membranous-margined, the awns often more than 1 mm long *Festuca*
- 11(3). Pedicels hairlike, mostly 1–5 cm long, much longer than the 4–8 mm long spikelets; rhizomatous perennial of sand dunes *Redfieldia*
- Pedicels not both long and hairlike or the spikelets less than 4 mm long; plants of diverse habitats 12
- 12(11). Lemmas prominently 3-nerved, the lateral nerves sometimes very near the margins 13
- Lemmas either more than 3-nerved or the nerves not regularly conspicuous 18
- 13(12). Lemmas averaging more than 6 (6–14) mm long, glabrous or, if puberulent, the hairs not confined to the nerves 14
- Lemmas averaging less than 6 (2–6) mm long or rarely to 6 mm, the 3 nerves then conspicuously hairy 15
- 14(13). Spikelets to 11 mm long; panicles usually nodding *Festuca sororia*
- Spikelets 12–40 mm long; panicles usually erect *Bromus*
- 15(13). Lemmas firm to somewhat fleshy, typically yellow brown, erose to irregularly toothed at the truncate apex; plants rhizomatous perennials of wet places .. *Catabrosa*
- Lemmas not as above; plants either annual or without rhizomes, occupying diverse habitats 16
- 16(15). Ligules membranous; sheaths glabrous or rarely long-hairy throughout *Leptochloa*
- Ligules of short hairs, sheaths often ciliate with longer hairs lateral to the ligule 17
- 17(16). Glumes 1–3 mm long; lemmas with nerves glabrous or scaberulous *Eragrostis*
- Glumes (the longer one) 4–6 mm long; lemmas with nerves hairy *Tridens*
- 18(12). Glumes dissimilar, the first linear, the second ob lanceolate to obovate and 3–4 times as broad as the first; lemmas obscurely nerved, glabrous or scaberulous *Sphenopholis*
- Glumes similar in shape or not dissimilar as above; lemmas diverse 19
- 19(18). Lemmas no more than 3 (1–3) mm long 20
- Lemmas averaging more than 3 (3–17) mm long 24
- 20(19). Lemmas 1.2–2 mm long, 3-nerved, whitish to dark gray green, occasionally purple-tinged; plant a rhizomatous perennial occurring below 2135 m (spikelets normally 1-flowered, plant will rarely key here) *Muhlenbergia asperifolia*
- Lemmas to 3 mm long, often more than 3-nerved; plants otherwise diverse 21
- 21(20). First glume more than 2 mm long or, if shorter, the lemmas compressed and keeled, glabrous to conspicuously hairy, 3- to 5-nerved, sometimes obscurely so *Poa*
- First glume averaging less than 2 (0.4–2.2) mm long; lemmas rounded on the back, glabrous or inconspicuously hairy near the base, 5- to 7-nerved, obscurely or prominently so 22
- 22(21). Lemmas obscurely nerved *Puccinellia*
- Lemmas prominently (5) 7- to 9-nerved 23
- 23(22). Sheaths closed to the top or nearly so; second glume 1-nerved; lemmas mostly obtuse to rounded apically *Glyceria*
- Sheaths open throughout, the membranous borders overlapping; second glume 3-nerved; lemmas mostly truncate apically *Puccinellia pauciflora*
- 24(19). Inflorescence a spikelike panicle (the short branches often spreading at flowering), the rachis and pedicels minutely soft-hairy (at 10x magnification); palea shiny-hyaline throughout, usually prominent at flowering *Koeleria*
- Inflorescence diverse but, if spikelike, the rachis glabrous or scabrous, not minutely soft-hairy; plants not otherwise as above in every particular 25
- 25(24). Rachilla pubescent with hairs to ca 1 mm long; lower lemma 4–6 mm long, keeled; anthers 0.6–1.8 mm long *Trisetum wolffii*
- Rachilla glabrous to minutely hairy; plants otherwise diverse 26
- 26(25). Sheaths of the culm leaves closed about half their length or more, occasionally mechanically split, the margins then not overlapping 27
- Sheaths of culm leaves regularly open more than half the length to throughout, the margins typically overlapping 31
- 27(26). Lemmas mostly 7- to 15-nerved 28
- Lemmas with fewer than 7 nerves or the nerves obscure 30
- 28(27). Lemmas to ca 4 mm long; plants of wet places *Glyceria borealis*
- Lemmas 6–18 mm long; plants of mostly mesic to dry sites 29
- 29(28). Culms bulbous at the base or the spikelets borne on pubescent pedicels and disarticulating below the glumes *Melica*
- Culms fibrous-rooted; spikelets not borne on hairy pedicels or, if so, disarticulating above the glumes *Bromus*
- 30(27). Spikelets at maturity averaging more than 12 (10–50) mm long; lemmas at least 6 mm long; ovary or fruit bearing an apical tuft of short hairs *Bromus*
- Spikelets at maturity averaging no more than 12 (2–12) mm long; lemmas often less than 6 mm long; ovary or fruit lacking an apical tuft of hairs *Poa*
- 31(26). Panicle 1-sided, spikelike (occasionally branched near the base), to 4 (5) cm long and 12 mm wide; spikelets disarticulating below the glumes and falling entire; plant a low, glabrous, weedy annual *Sclerochloa*
- Panicle either not spikelike or not secund, often more than 5 cm long and 12 mm wide; spikelets disarticulating above the glumes; plants otherwise diverse 32

- 32(31). Lemmas 7- to 13-nerved, the nerves visible at 10x magnification on all but the most mature florets; florets unisexual; leaf blades at culm base typically scale-like; plants strongly rhizomatous, growing in alkaline-saline soils (occasionally weedy in neutral soils of the valleys) *Distichlis*
- Lemmas not more than 5-nerved, or the plants not otherwise as above in every particular 33
- 33(32). Lemmas distinctly roughened to scabrous throughout (at 10x magnification), firmer than the largely or entirely membranous glumes, (4.5) 5-10 mm long; florets typically unisexual, often subterete; panicle branches and pedicels smooth or nearly so *Leucopoa*
- Lemmas not both scabrous throughout and conspicuously firmer than the glumes, variable in length; florets diverse; panicle branches smooth or scabrous to hairy 34
- 34(33). Lemmas acute to awn-tipped, sometimes minutely so, rounded on the back or, if somewhat keeled, the lemmas often averaging more than 6 (6-10) mm long; sheaths in some species with well-developed auricles *Festuca*
- Lemmas rounded to acute but not awn-tipped at the apex, compressed and keeled, or if rounded on the back, rarely averaging more than 6 (2-7) mm long; sheaths lacking auricles (in *P. bulbosa* the florets replaced by bulblets) *Poa*

Aegilops L.

Annuals; sheaths open, with or without auricles; blades usually flat; ligule membranous, short; inflorescence a spike, the rachis disarticulating either at the nodes or near the base and then the spike falling entire; spikelets 2- to 8-flowered, solitary and sessile at each node, terete, and fitting closely into a shallow concavity in the rachis, the lowermost 1 or 2 spikelets vestigial; glumes oblong to obovate, leathery to hardened, subequal, more than half as long as the opposing lemma, flat to rounded on the back, many nerved, awned or awnless; lemma oblong to lance-oblong, usually rounded on the back, 5- to 13-nerved, awned or awnless; callus very short, obtuse; palea subequal to the lemma; stamens 3; caryopsis free of or adherent to the lemma and palea; embryo to about half as long as the grain; $x = 7$.

***Aegilops cylindrica* Host** Jointed Goatgrass. [*Triticum cylindricum* (Host) Cesati]. Annual; culms mostly 2-6 dm tall, erect or geniculate at the lower nodes; lower sheaths sparsely hairy, the upper glabrous with auricles small or lacking; blades flat to somewhat involute, 2-5 mm wide, often sparsely hairy; ligule to ca 0.5 mm long; spike cylindrical, 4-12 cm long, 3-5 mm wide, disarticulating at the base and ultimately between the florets; spikelets 2- to 5-flowered, sessile and solitary at each node of the rachis, subequal to the internodes, terete and strongly appressed to the more or less concave joint of the rachis or occasionally slightly spreading at flowering; glumes hardened, 6-10 (14) mm long, mostly 6- to 9-nerved, the apex laterally toothed or awned; awns of the terminal spikelet mostly 3-8 cm long, those of the lower spikelets 0.1-2 cm long; lemma membranous below, hardened above, rounded on the back, 5- to 7-nerved, those of upper spikelets with awns mostly 3-7 cm long, those of lower spikelets with awns to ca 2 cm long; $2n = 28$. Disturbed sites, especially along roadsides and in fallow

fields at 1070 to 2130 m in Box Elder, Cache, Davis, Duchesne, Garfield, Iron, Juab, Kane, Millard, Salt Lake, San Juan, Sanpete, Tooele, Uintah, Utah, Wasatch, Washington, and Weber counties; native to Eurasia, introduced to the U. S. about 1930 and now widely established; 51 (vi). According to Tsvelev (1984), jointed goatgrass is a good source of forage.

Agropyron Gaertner

Perennials; culms solitary or tufted; sheaths with or without auricles, those of the culm leaves open for more than 2/3 their length, those of the basal leaves closed throughout or nearly so; blades flat to involute; ligule membranous; inflorescence a spike, the rachis continuous, the internodes much shorter than the spikelets; spikelets 3- to 10-flowered, sessile and solitary at each node of the rachis, strongly overlapping to widely spreading, compressed, disarticulating above the glumes and between the florets; glumes lanceolate to lance-ovate, somewhat asymmetrical, unequal, 1- to 4-nerved, often obscurely so, typically keeled, acute or short-awned; lemma lanceolate to lance-oblong, 5-nerved, laterally compressed and usually keeled, with or without a short awn; callus to 0.2 mm long, rounded, glabrous or minutely bearded; palea equal or subequal to the lemma, keeled on each of the 2 nerves, 2-toothed at the apex; stamens 3; caryopsis ellipsoidal, typically somewhat adherent to the palea and often to the lemma, the embryo 1/6-1/2 as long as the grain; $x = 7$. The tribe Triticeae, of which *Agropyron* is a member, consists of a series of closely allied, interbreeding taxa about whose generic alignments considerable disagreement exists. Barkworth et al. (1983) and Dewey (1984), on the basis of genome homology as revealed by the level of chromosome pairing in artificially produced hybrids, would redistribute among seven genera (*Elytrigia*, *Leymus*, *Pascopyrum*, *Pseudoroegneria*, *Psathyrostachys*, *Thinopyrum*, and a redefined *Elymus*) those species traditionally included in *Agropyron*, *Elymus*, and *Sitanion*. In applying the genomic method of classification to the Triticeae of North America, however, Barkworth and Dewey (1985) find it necessary to describe plants belonging to the genus *Leymus* as having one set of characters when growing inland and a diametrically opposite set when growing along the coast. Thus, a classification based on genomic data violates the concept that a genus is composed of taxa universally recognizable by a unique cluster of characters. I have followed the treatment of Gould (1947) and the persuasive logic of Estes and Tyrl (1982) in adding *Sitanion* and all of *Agropyron* except the crested wheatgrasses to the genus *Elymus*. A guide to some of the more common hybrids produced by the often freely interbreeding members of the tribe Triticeae is provided following the key to the genus *Elymus*.

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