

1975, 1981, 1982, 1986a, 1990; Elias 1974; Robertson & Lee 1976; Isely & Polhill 1980; Summerfield & Bunting 1980; Allen & Allen 1981; Duke 1981; Polhill & Raven 1981; Gunn 1983, 1984, 1991; Stirton 1987; Stubbendieck & Conard 1989; Ballenger et al. 1993.

KEY TO SUBFAMILIES OF FABACEAE

1. Flowers usually small and individually inconspicuous, arranged in dense heads or clusters, regular (= radially symmetrical); corollas usually sympetalous and so small as to be ± inevident; stamens 5–numerous, their filaments exserted beyond the petals and often showy; leaves twice pinnately compound _____ **Mimosoideae**
1. Flowers whether small or large usually individually conspicuous, arranged in various types of inflorescences, usually zygomorphic (= bilaterally symmetrical); corollas usually easily seen, of separate petals except 2 petals (= keel) fused along the margin in many; stamens 1–10, usually not exserted beyond the petals (except in *Caesalpinia*); leaves simple or palmately or once or twice pinnately compound (3–numerous leaflets).
 2. Corollas of 5 distinct petals, these not differentiated into a larger standard (= banner), wings, and keel; sepals separate or nearly so; stamens externally visible and free from one another, not enclosed by a keel; leaves simple or once or twice pinnately compound (usually with > 3 leaflets except in *Cercis* and 2 species of *Senna*); equivalent of standard (= adaxial petal) inside of lateral petals in bud _____ **Caesalpinoideae**
 2. Corollas of 3 separate petals (larger standard, 2 wings) and 2 petals fused to form a keel (corollas rarely of only 1 petal); sepals at least partially fused; stamens usually enclosed by keel and usually not externally visible, their filaments usually fused or free in a few species; leaves simple, once pinnately compound (often with 3 leaflets OR with many leaflets), or palmately compound; standard outside of lateral petals in bud _____ **Papilioideae**

SUBFAMILY 1. MIMOSOIDEAE

Leaves twice even-pinnately compound; stipules thread-like or minute, often falling early; flowers in heads or spikes; sepals united; petals 4 or 5, equal, separate or united, rather inconspicuous; stamens 5 to many, separate or the filaments all united toward base, exceeding the corolla.

KEY TO GENERA OF MIMOSOIDEAE

1. Trees or woody shrubs or if herbaceous perennials, then stamens numerous.
 2. Stamens numerous.
 3. Stamens 23–36 mm long, pinkish to reddish; introduced species _____ **Albizia**
 3. Stamens less than 20 mm long, white to yellow; native species _____ **Acacia**
 2. Stamens 10 or less.
 4. Leaflets 15 mm or more long; fruits (5–)7–20 cm long, about as thick as broad, without prickles; flowers yellowish white _____ **Prosopis**
 4. Leaflets less than 15 mm long; fruits 1.5–5 cm long, flattened (sometimes contorted), with or without prickles; flowers pink to purple _____ **Mimosa**
1. Herbaceous perennials; stamens 10 or less.
 5. Plants armed with sharp recurved prickles capable of causing pain _____ **Mimosa**
 5. Plants unarmed or with numerous, weak, hair-like or bristle-like structures not painful to the touch.
 6. Flowers pink or purplish; fruits 15–20 mm long, with conspicuous appressed hairs _____ **Mimosa**
 6. Flowers whitish or yellow; fruits of variable lengths, sometimes much longer than 20 mm, usually glabrous or essentially so.

7. Flowers whitish; fruits sessile; leaves with a petiolar gland between the lowest pair of pinnae (the gland sometimes minute) _____ **Desmanthus**
 7. Flowers yellow; fruits stipitate (= stalked); leaves without a petiolar gland _____ **Neptunia**

SUBFAMILY 2. CAESALPINIOIDEAE

Leaves once or twice compound, even- or odd-pinnate (reduced to 1 leaflet and apparently simple in *Cercis*); stipules very small, often falling early; sepals united or separate; petals 5, slightly or markedly unequal; stamens 5 or 10, separate.

KEY TO GENERA OF CAESALPINIOIDEAE

1. Trees or shrubs.
 2. Leaves simple; flowers purple-red (rarely white); flowering Mar–Apr _____ **Cercis**
 2. Leaves once or twice pinnately compound; flowers yellow, orange, greenish yellow, or greenish white; flowering at various times of the growing season.
 3. Leaflets < 10 mm long.
 4. Plants armed with sharp spines; leaves with 2(–4) pinnae (each with leaflets), but each pinna appearing as a once pinnate leaf due to the absence of a common petiole; stamens small, inconspicuous _____ **Parkinsonia**
 4. Plants unarmed; leaves with 11–29 pinnae (each with leaflets); stamens very long, 70–90 mm, bright red _____ **Caesalpinia**
 3. Leaflets 15–50 mm long.
 4. Plants conspicuously armed with straight or branched thorns OR unarmed; leaves once or twice pinnately compound with 18–numerous leaflets; corollas inconspicuous, 4–10 mm long, greenish yellow or greenish white; trees to ca. 15(–35) m tall.
 5. Plants usually armed (cultivated forms sometimes unarmed); leaflets usually 4–15 mm wide, lanceolate to narrowly elliptic, rounded or ± blunt at apex, often crenulate, sometimes entire; native species widespread in nc TX _____ **Gleditsia**
 5. Plants unarmed; leaflets usually 15–30 mm wide, ovate, rather abruptly acuminate at apex, entire; cultivated species rarely escaping in nc TX _____ **Gymnocladus**
 4. Plants unarmed; leaves once pinnately compound with 4–24 leaflets; corollas conspicuous, 10–20 mm long, yellow to orangish; shrubs to 3.5 m tall _____ **Senna**
 1. Herbaceous annuals or perennials.
 6. Leaflets glandular-dotted beneath; leaves twice compound with 5–7 pinnae (each with leaflets) _____ **Pomaria**
 6. Leaflets not glandular-dotted beneath; leaves once OR twice compound, if twice compound, then with 5–11(–13) pinnae (each with leaflets).
 7. Leaves twice compound; leaflets 3–8 mm long _____ **Hoffmannseggia**
 7. Leaves once compound; leaflets usually much longer (7–170 mm long).
 8. Leaflets 2 _____ **Senna**
 8. Leaflets 12 to numerous.
 9. Leaflets 2.5 cm or more long; petiolar glands slender or stipitate or absent _____ **Senna**
 9. Leaflets 2 cm or less long; petiolar glands disc-shaped _____ **Chamaecrista**

SUBFAMILY 3. PAPILIONOIDEAE

Leaves once compound with 3-many leaflets (simple or apparently so in species of *Baptisia* and *Crotalaria*), odd- or even-pinnate, or palmate; stipules various; sepals united (barely so in *Indigofera*); petals 5 (except in *Amorpha* and sometimes *Eysenhardtia*) and very unequal: uppermost petal (= standard) usually largest, two lateral (= wings) smaller and separate, two lowest (= keel) smaller and united except at base; stamens 5–10; filaments separate or united.

KEY TO TRIBES AND GENERA OF PAPILIONOIDEAE

1. Stamens distinct.
2. Leaves pinnately compound; trees or shrubs _____ Sophoreae (only **Sophora**)
2. Leaves simple or palmately compound; herbs _____ Thermopsideae (only **Baptisia**)
1. Stamens united, at least basally.
3. Leaves simple; petals yellow _____ Crotalarieae (only **Crotalaria**)
3. Leaves compound; petals variously colored including yellow.
4. Leaves palmately compound with 4–7 leaflets; stamens monadelphous; petals deep blue (rarely white) _____ Genistae (only **Lupinus**)
4. Leaves pinnately compound with 3–many leaflets OR if palmately compound, then stamens diadelphous; stamens monadelphous or diadelphous; petals variously colored including blue.
5. Leaflets dentate, the teeth usually easily visible but very small and often visible only near the leaflet tips in *Trifolium arvense* and *T. pratense*; stipules adnate to petioles (Trifolieae).
6. Fruits coiled or curved, sometimes prickly; stems usually 4-angled _____ **Medicago**
6. Fruits straight, never prickly; stems terete (= round).
7. Inflorescence an elongated slender raceme, loose enough that the axis is easily visible to the naked eye; petals deciduous, the mature fruit visible _____ **Melilotus**
7. Inflorescence a globose to cylindrical, often head-like spike or raceme, so dense that the axis is not easily visible; petals withering and persistent, concealing the mature fruit from view _____ **Trifolium**
5. Leaflets entire to dentate; stipules distinct OR if united to petioles then leaflets entire.
8. Tendrils present in place of terminal leaflets; leaflets entire to dentate (Vicieae).
9. Corollas yellow; leaflets absent, the leaf consisting only of a tendril (however, leaf-like stipules present) _____ **Lathyrus**
9. Corollas white to blue, lavender, pink-purple, purple, or bicolored but not yellow; leaflets 2–numerous.
10. Leaflets 2; stems winged _____ **Lathyrus**
10. Leaflets 4–18; stems not winged (but can be angled or edged).
11. Leaflets usually 30–60 mm long, 10–30 mm wide; style flattened; rare species possibly on e margin of nc TX _____ **Lathyrus**
11. Leaflets usually smaller, 5–35 mm long, 1.5–15 mm wide; style ± round in cross-section; widespread species common throughout nc TX _____ **Vicia**
8. Tendrils absent; leaflets entire.
12. Leaves pinnately compound (3–numerous leaflets) OR palmately compound with (3–)5–7 leaflets; leaflets usually glandular-punctate; fruits 1-seeded (Amorpheae and Psoraleeae).
13. Shrubs.
14. Petals white to pale yellow, 4–5; leaflets (3–)5–12 mm long; in nc TX only in extreme s part in Bell and Williamson cos. _____ **Eysenhardtia**
14. Petals bluish to purplish, 1 or 5; leaflets 1.5–80 mm long; widespread in nc TX.
15. Petal 1 (standard only); leaflets (3–)10–80 mm long; small to large shrubs 0.3–3.5 m tall _____ **Amorpha**
15. Petals 5; leaflets 1.5–3.5(–5) mm long; small shrubs 0.3–1.2 m tall (only *D. frutescens*) _____ **Dalea**
13. Herbaceous plants.
16. Wing and keel petals attached laterally or apically on staminal tube; leaves pinnately compound with 3–numerous leaflets _____ **Dalea**
16. All petals basally attached; leaves palmately compound (3–7 leaflets) or pinnately compound with 3 leaflets.

17. Fruits conspicuously cross-wrinkled; leaves pinnately compound with 3 leaflets; extreme e or ne part of nc TX _____ **Orbexilum**
17. Fruits smooth, not cross-wrinkled; leaves pinnately compound with 3 leaflets (1 species) or palmately compound with 3–7 leaflets (sometimes reduced to 1 or 2 near top of stem); widespread in nc TX.
18. Fruits enclosed in enlarging calyces with beak exserted (in 1 species calyces only ca. 1/2 as long as fruits); pericarp (= fruit wall) thin, usually papery _____ **Pediomelum**
18. Fruits exserted above calyces, the calyces only at very base of the fruits; pericarp thick, coriaceous _____ **Psoralidium**
12. Leaves pinnately compound (3–numerous leaflets, often 3) OR palmately compound with 4 leaflets; leaflets not glandular-punctate; fruits 1- to several-seeded.
19. Fruits segmented, the segments separating at maturity OR fruits 1-seeded (or in 1 species unsegmented and borne underground) (Aeschynomeneae, Coronilleae, and Desmodieae).
20. Leaves palmately or pinnately compound with 4 leaflets; flowers yellow.
21. Leaves palmately compound (all leaflets arising from a single point); leaflets 1–3 cm long; fruits borne above ground, breaking part into 4–6 segments; each flower enclosed by 2 conspicuous bracts _____ **Zornia**
21. Leaves pinnately compound (2 leaflets separated from the other 2 by a rachis); leaflets 2–6 cm long; fruits developing underground, not breaking apart into segments; flowers not enclosed in bracts _____ **Arachis**
20. Leaves odd-pinnately compound with 3–many leaflets; flowers variously colored including yellow.
22. Leaves pinnately compound with 9–25 leaflets; fruit (loment) segments 4-angled to terete _____ **Coronilla**
22. Leaves pinnately compound with 3 leaflets; fruit segments usually flattened.
23. Fruits of 2–6 segments, usually with hooked hairs causing them to stick to hair or clothing; leaflets usually stipellate _____ **Desmodium**
23. Fruits of 1(–2) segment, without hooked hairs; leaflets estipellate.
24. Petals orange or orange-yellow (very rarely white); stipules adnate to petioles; stamens monadelphous; anthers of 2 kinds _____ **Stylosanthes**
24. Petals purplish or pinkish to white; stipules free from petioles; stamens diadelphous; anthers of 1 kind.
25. Stipules nearly thread-like; leaflets not striate; plants perennial _____ **Lespedeza**
25. Stipules ovate or nearly so, striate; leaflets striate with conspicuous parallel lateral veins; plants annual _____ **Kummerowia**
19. Fruits non-segmented, several-seeded.
26. Inflorescences umbellate; leaves pinnately compound with 5 leaflets (the lower 2 stipular in position); petals yellow, marked with red _____ Loteae—in part (only **Lotus**)
26. Inflorescences racemose OR of solitary flowers; leaves pinnately compound with 3–numerous leaflets; petals variously colored.
27. Plants herbaceous twining vines (except in introduced *Glycine* and *Erythrina* and a small annual *Lotus*); leaves with 3 leaflets (except *Apios* and *Galactia* which have 5–7 leaflets) (Phaseoleae).
28. Leaves with 5–7 leaflets.

29. Lower 2–3 pairs of leaflets attached at different places; leaflets 2–10 cm long; corollas at least somewhat brownish red _____ ***Apios***
29. Lower 2 pairs of leaflets attached at the same place (leaves almost palmate but with the terminal leaflet short-stalked); leaflets 1–3 cm long; corollas mostly lavender (standard often with some white) _____ ***Galactia***
28. Leaves with 3 leaflets.
30. Plants not twining vines.
31. Corollas red, very long (30–53 mm long); flowers in a terminal raceme _____ ***Erythrina***
31. Corollas white to pink, violet, or purple (rarely yellowish with pink tinge), 8 mm or less long; flowers axillary, either solitary or in racemes.
32. Leaflets 1–2 cm long; fruits not densely bristly _____ ***Lotus***
32. Leaflets 3–15 cm long; fruits densely bristly _____ ***Glycine***
30. Plants twining vines.
33. Standard (= banner) greatly exceeding keel and wings (ca. 2 times as long), 20–60 mm long.
34. Calyx tube short, ca. 4 mm long; calyx lobes linear, longer than the tube; fruits ca. 7–12(–14) cm long, sessile or nearly so _____ ***Centrosema***
34. Calyx tube cylindrical, 10–20 mm long; calyx lobes ovate, much shorter than the tube; fruits 3–6(–8) cm long, stipitate, the stipe 10–20 mm long _____ ***Clitoria***
33. Standard ± equaling or shorter than keel and wings, 4–25 mm long.
35. Keel of corollas strongly incurved _____ ***Strophostyles***
35. Keel of corollas essentially straight.
36. Corollas yellow; fruits 11–20 mm long _____ ***Rhynchosia***
36. Corollas white, pink, or purplish; fruits 15–55 mm long (except subterranean fruits).
37. Plants high climbing vines with stems often many meters long; corollas 15–25 mm long; fruits densely and conspicuously long hairy at a glance _____ ***Pueraria***
37. Plants relatively low climbing vines, the stems to ca. 2 m long; corollas 8–15 mm long; fruits ± glabrous to pubescent, but not densely and conspicuously long hairy.
38. Bracts subtending pedicels ± as wide as long (2–5 mm long), easily visible to the naked eye; calyx teeth nearly equal, ca. 1/2 as long as tube or less; leaflets gradually narrowed to ± acute apex, the larger leaflets 2–10 cm long, 18–70 mm wide; stipules 3–8 mm long, persistent; fruits 6–12 mm wide; corollas lilac or whitish _____ ***Amphicarpaea***
38. Pedicels without conspicuous bracts ± as wide as long; calyx teeth unequal, ca.

- as long as tube; leaflets usually abruptly narrowed to a rounded or obtuse apex, the larger leaflets 2–4(–6) cm long, 10–25(–35) mm wide; stipules 1–3 mm long, soon deciduous; fruits 3–6 mm wide; corollas pink or rose _____ **Galactia**
27. Plants erect, non-twining (except in woody *Wisteria*); leaves pinnately compound with (5–)7–40(–52) leaflets (Galegeae, Indigofereae, Loteae in part, Robinieae, and Tephrosiaeae).
39. Trees, shrubs, or woody vines; flowers white or rose, reddish purple, or violet-blue; plants sometimes with stipular spines or conspicuously hispid young stems.
40. Plants trees or shrubs (not vine-like); racemes axillary; young stems either hispid or with stipular spines _____ **Robinia**
40. Plants woody vines or vine-like shrubs; racemes terminal; young stems neither hispid nor with stipular spines _____ **Wisteria**
39. Herbaceous plants; flowers variously colored; plants without either stipular spines or hispid young stems.
41. Leaves even-pinnately compound.
42. Flowers 6–9 mm long; peduncle 5–12 cm long; fruits 2.5–8 cm long, oblong to ellipsoid, not winged, with 2 seeds _____ **Glottidium**
42. Flowers 10–20 mm long; peduncle 1–5 cm long; fruits usually 5–20 cm long, either winged or narrowly linear, usually with 3–40 seeds _____ **Sesbania**
41. Leaves odd-pinnately compound.
43. Leaflets mostly alternate along leaf rachis; petals reddish orange with tints of pink or salmon; pubescence of hairs attached at middle _____ **Indigofera**
43. Leaflets opposite along leaf rachis; petals variously colored, but not reddish orange; pubescence of hairs attached basally or submedianly.
44. Main racemes terminal or if apparently lateral, then opposite a leaf; standard orbicular; fruits flattened, with neither suture intruding; style with fine stiff hairs _____ **Tephrosia**
44. Main racemes axillary; standard obovate; fruits subcylindric or somewhat triangular in cross-section to inflated, with 1 suture intruding; style glabrous.
45. Leaves all basal or crowded near base, the leafless peduncles more than twice as long as the leaf-bearing lower portion of the stem; flowers 15–26 mm long; keel tipped with a pointed slender beak _____ **Oxytropis**
45. Leaves all basal (1 species with flowers 8.5–14 mm long) OR leaves usually extending well up the stem; keel acute or rounded, not beaked _____ **Astragalus**

ACACIA

Herbaceous perennials, spiny shrubs, or small trees; leaves twice even-pinnately compound; inflorescences of many-flowered heads or spikes; flowers very small, white to yellow; petals inconspicuous, separate nearly to base; stamens numerous, 20–40 per flower, serving as the main attractant structure for the flower.

Acacia is a huge genus of 1,200 species of tropical and warm areas, especially Australia; most are trees and shrubs of dry regions where they can be important components of the vegetation. In Mexico, Central America, and in Africa, ants have a mutualistic relationship with species of *Acacia*, protecting the plant in exchange for shelter and/or food. Many species are of economic importance as sources of timber, fuel, forage, tanbark, gums, scents, and as cultivated ornamentals. *Acacia senegal*(L.) Willd., of arid tropical Africa, is the source of gum arabic used in lozenges, adhesives (e.g., postage stamps), watercolors, bakery products, and medicines (Morton 1977). (Greek: *akis*, a sharp point, alluding to the thorns of many species) (subfamily Mimosoideae, tribe Acacieae)

REFERENCES: Isely 1969, 1973; Beauchamp 1980; Clarke et al. 1989.

1. Flowers in globose heads; plants unarmed or armed.

2. Plants unarmed: herbs or subshrubs to ca. 1 m tall, usually less; pinnae 6–16 pairs (these with numerous leaflets) per leaf; fruits flat, 6–10 mm wide; filaments creamy white; petiolar gland absent _____ **A. angustissima**

2. Plants armed: shrubs or small trees 1–4 m tall; pinnae 1–6 pairs per leaf; fruits either round in cross-section OR flat and 15–30 mm wide; filaments creamy white or bright yellow; petiolar gland usually present.

3. Plants with straight, paired, stipular spines; pinnae 2–6 pairs per leaf; filaments bright yellow; fruits ± round in cross-section _____ **A. farnesiana**

3. Plants without paired, stipular spines, instead armed along the internodes with recurved prickles; pinnae usually 1–3 pairs per leaf; filaments creamy white; fruits flat in cross-section _____ **A. roemeriana**

1. Flowers in elongate spikes or racemes; plants armed _____ **A. greggii**

Acacia angustissima (Mill.) Kuntze var. **hirta** (Nutt.) B.L. Rob., (sp: most narrow; var: hairy), FERN ACACIA, PRAIRIE ACACIA, WHITE-BALL ACACIA. Perennial with creeping, woody root; leaflets sensitive, folding together on being touched, in rain, or at night; heads solitary or few in axils of upper leaves, also terminal, forming erect, ± leafy racemes of heads; fruits 5–7 cm long. Common in prairies in calcareous clay, occasional to frequent in sandy soils; widespread in TX. Late May–early Jul. [A. *hirta* Nutt.] This is the most common *Acacia* in nc TX.

Acacia farnesiana (L.) Willd., (for Cardinal Odoardo Farnese, 1573–1626, of Rome, who grew the plant in his gardens), HUISACHE, SWEET ACACIA. Shrub or small tree 2–4 m tall; petioles usually with a small circular gland; flowers sweet-scented; fruits (2–)3–8 cm long. Chiefly in sandy or silty ground; Bell Co. (Fort Hood–Sanchez 1997), reportedly wild n to McLennan Co. (Mahler 1988), also Hopkins [?] (Turner 1959) and Tarrant (R. O'Kennon, pers. obs.) cos; common in s Texas. Mar–Apr. [*Acacia minuta* (M.E. Jones) Beauch. subsp. *densiflora* (Alexander ex Small) Beauch., A. *smallii* Isely] Previously used as a source of fragrant oils for perfumes (Correll & Johnston 1970), valued as a honey plant in s TX (Wills & Irwin 1961), and used medicinally (Crosswhite 1980). The common name HUISACHE is derived from the Nahuatl (language of the Aztecs), *huitz-axin* (Crosswhite 1980). Texas populations of this species have sometimes been treated as A. *minuta* subsp. *densiflora* (Beauchamp 1980; Kartesz 1994), A. *minuata* (orthographic error) (Jones et al. 1997), or A. *smallii* (Powell 1988; Isely 1973, 1990); however, we are following Clarke et al. (1989) and Powell (1998) in treating it as *A. farnesiana*.

Acacia greggii A. Gray, (for Josiah Gregg, 1806–1850, who collected in Mexico and died in the wilderness in n CA). Shrub or small tree (1–)2–3 m tall; stems with recurved prickles usually along the internodes or occasionally at a node; pinnae 1–3 pairs per leaf; flowers sweet-scented; filaments creamy white; fruits 5–8 cm long, 15–20 mm wide. Possibly poisonous to animals due to the high cyanide content of the foliage (Kingsbury 1964). ☣

1. Leaflets 3–6 mm long; inflorescences 2–5 cm long; fruits usually strongly constricted, often twisted _____ var. **greggii**
1. Leaflets 5–9(–12) mm long; inflorescences often exceeding 5 cm; fruits straight-margined or somewhat constricted, not twisted _____ var. **wrightii**
- var. **greggii**, CATCLAW, CATCLAW ACACIA, DEVIL'S-CLAW. Rocky, gravelly, or sandy soils; Brown, Coleman, Shackelford, and Stephens cos., also Young Co. (Mahler 1988); West Cross Timbers s and w to w TX. Apr-May.
- var. **wrightii** (Benth.) Isely, (for Charles Wright, 1811–1885, TX collector), CATCLAW, WRIGHT'S ACACIA, JOINT-VETCH, UÑA DE GATO, HUISACHILLO. Very similar to var. *greggii*. Similar habitats as var. *greggii*; Callahan and Shackelford cos.; West Cross Timbers s and w to w TX. Apr-early Jun. [*Acacia wrightii* Benth.]

Acacia roemeriana Scheele, (for Ferdinand Roemer, 1818–1891, geologist, paleontologist, and explorer of TX), ROEMER'S ACACIA, CATCLAW. Shrub 1–2(–3) m tall with weak stems; flowers fragrant; fruits 5–10 cm long, 15–30 mm wide. Rocky or sandy areas; Brown Co.; w margin of nc TX s and w to w TX. Spring or later according to rains. [*A. malacophylla* Benth.] Jack Stanford (pers. comm.) indicated that flowers of this species dissected by him and U.T. Waterfall had five separate carpels.

Calliandra conferta A. Gray, (genus: Greek: *kalos*, beautiful, and *andros*, male; sp: compact, closely crowded together), a very small shrub native to s TX, occurs n to Travis Co. just s of nc TX. It is similar to *Acacia* species but can be distinguished by the combination of its small size (10–30 cm tall), unarmed stems, and leaves with only 2(–4) leaflets. The pollen of this species is quite distinctive—in large, golden, tear-shaped groups of usually 8 cells (= octads) (Stanford 1966).

ALBIZIA

— A genus of 118 species of trees, shrubs, or lianas of warm areas of Asia, Africa, and South America. Species are variously used for timber, gums, shade for coffee or tea, or as ornamentals. (Named for Filippo delgi Albizzi, 18th century Italian naturalist, who introduced the genus into European culture) (subfamily Mimosoideae, tribe Igneae)

REFERENCES: Isely 1970b, 1973.

Albizia julibrissin Durazzo, (modification of Persian name), MIMOSA, SILKTREE. Broad-headed, fast growing, short-lived, small, unarmed tree with flat top; leaves twice even-pinnately compound, the ultimate leaflets folding together at night or in rain, or on being touched; flowers in small, short-peduncled, hemispherical heads; heads clustered, conspicuous and showy due to mass of stamens; corollas narrowly funnelform, greenish to yellowish, inconspicuous, with united petals; stamens usually 20–40; filaments ca. 23–36 (rarely more) mm long, united and white in basal 1/4, separate and pink to rose-lavender or reddish above, serving as the main attractant structure for the flower; fruits flat, ca. 8–18 cm long. Commonly cultivated, occasionally escaped; can aggressively invade native habitats; Grayson Co., also Dallas, Parker, and Tarrant cos. (O'Kennon & Diggs, pers. obs.); widespread in TX. Late May–early Jun. Native of s Asia. ☕

AMORPHA

Unarmed erect shrubs; leaves once odd-pinnately compound; leaflets many, oblong or elliptic, often gland-dotted; stipules slender, falling when the leaves expand; flowers many, in terminal, solitary or panicled, slender, dense, erect, spike-like racemes (young tips often nodding); calyces 5-toothed, often gland-dotted; corollas usually of one petal (standard), sometimes with very reduced additional ones; stamens 10; fruits gland-dotted.

— A North American genus of 15 species. (Greek: *amorphos*, shapeless deformed, from the absence of four of the petals) (subfamily Papilionoideae, tribe Amorpheae)

REFERENCE: Wilbur 1975.

1. Inflorescences (15–)20–40 cm long; leaflets 30–80 mm long, (15–)20–30 mm wide; se and e TX to very e margin of nc TX _____ **A. paniculata**
1. Inflorescences (2–)7–15(–25) cm long; leaflets (3–)10–50 mm long, (2–)4–15(–20) mm wide; widespread in nc TX.
 2. Leaves sessile or short-petioled, the petioles up to 5(–8) mm long; shrubs less than 1 m tall; leaflets (3–)10–18(–25) mm long; fruits often canescent, 3–4(–5) mm long (not counting conspicuous beak ca. 2 mm long), 1-sided, but ± straight except for beak; all calyx lobes acute _____ **A. canescens**
 2. Leaves with petioles (10–)20–30(–50) mm long; shrubs 1–3.5 m tall; leaflets (15–)20–50 mm long; fruits usually glabrous, 5–7 mm long (not counting inconspicuous beak < 1 mm long), definitely curved; adaxial calyx lobes often rounded _____ **A. fruticosa**

Amorpha canescens Pursh, (gray-pubescent), LEADPLANT. Rhizomatous, usually conspicuously canescent, gray-green, low shrub; leaflets 11–41(–49); racemes usually numerous near stem apices, often forming a dense compound cluster; standard 4.5–6 mm long, bright violet. Sandy prairies; Montague Co. in West Cross Timbers; also Panhandle, se, and sc TX. May–Jul.

Amorpha fruticosa L., (shrubby, bushy), FALSE INDIGO, BASTARD INDIGO, INDIGO-BUSH AMORPHA. Much-branched shrub to 3 m tall, dark-green; leaflets 9–21(–31), pubescent at least on veins on lower surface; racemes solitary or in clusters of 2–4; calyces ca. 3–5 mm long; standard 5–6 mm long, dark blue to reddish purple. Stream banks, chiefly limestone areas; widespread in TX. Apr–May. [A. *fruticosa* var. *angustifolia* Pursh] Reported as poisonous to livestock and to contain alkaloids (Burlage 1968). ☣

Amorpha paniculata Torr. & A. Gray, (with flowers in panicles), PANICLED AMORPHA. Shrub 1–3 m tall; leaflets 15–19, tomentose, often densely so and with conspicuous raised veins on the lower surface; racemes clustered 5–10 together in a compound inflorescence exserted above the leaves; standard purple; calyx lobes all acute or acuminate; fruits 6–8 mm long. Wooded and wet areas; Henderson Co. on the far e margin of nc TX; mainly se and e TX. May–Jun.

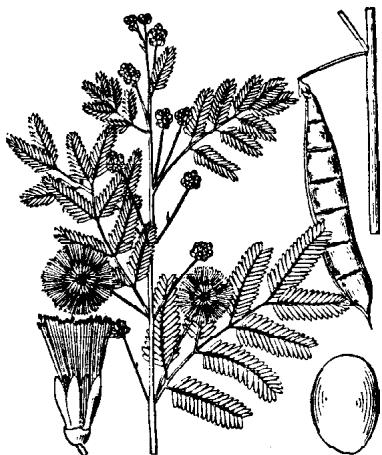
Amorpha wemeriana Scheele, (for Ferdinand Roemer, 1818–1891, geologist, paleontologist, and explorer of TX), occurs n to Travis Co. just s of nc TX. It is similar to *A. paniculata* but differs in having leaflets with inconspicuous veins beneath, 15–40 mm long, and an inflorescence 10–20 cm long. [A. *texana* Buckley]

AMPHICARPAEA HOG-PEANUT

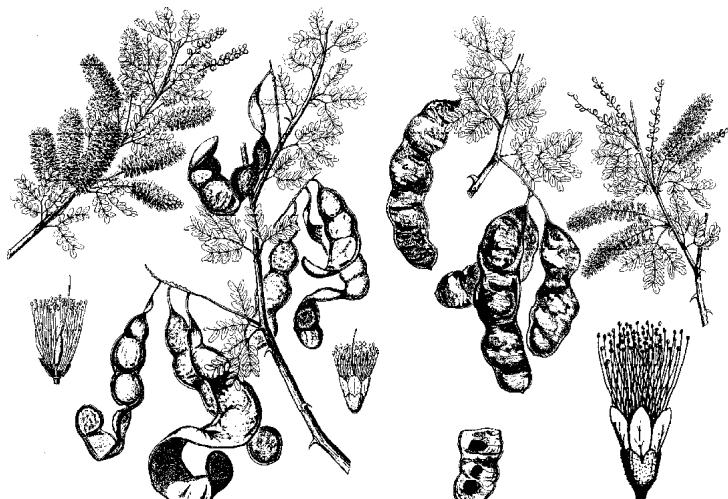
— A genus of 3 species of e Asia, North America, and Africa; some have cleistogamous flowers giving rise to subterranean fruits. Sometimes spelled *Amphicarpa*. (Greek: *amphi*, of both kinds, and *carpos*, fruit, in allusion to the two different fruit types) (subfamily Papilionoideae, tribe Phaseoleae)

REFERENCE: Turner & Fearing 1964.

Amphicarpaea bracteata (L.) Fernald, (bracteate, with bracts), SOUTHERN HOG-PEANUT. Annual with twining or sprawling stems 0.3–2 m long; leaves alternate, pinnately compound with 3 leaflets; leaflets 2–10 cm long, 18–70 mm wide, entire; petioles 2–10 cm long; stipules 3–8 mm long; chasmogamous flowers in axillary racemes of 1–17 flowers on peduncles 1–6 cm long; calyces 4–5 mm long, with 4 lobes; corollas lilac or whitish; stamens 10, diadelphous; fruits 1.5–4 cm long, flattened; racemes of cleistogamous, inconspicuous, often apetalous flowers near or underground producing fleshy, often subterranean fruits 6–12 mm in diam. Wooded areas; Bell, Dallas, and Grayson cos; se and e TX w to nc TX. May–Sep. [A. *bracteata* var. *comosa*(L.)

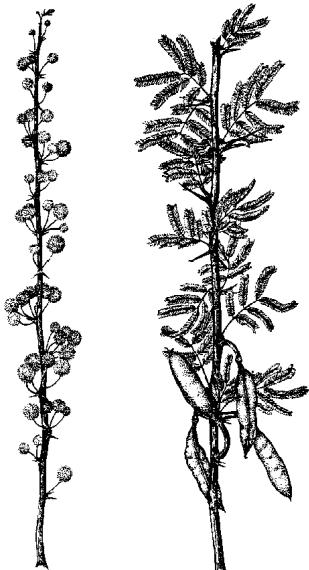


Acacia angustissima [BB2]

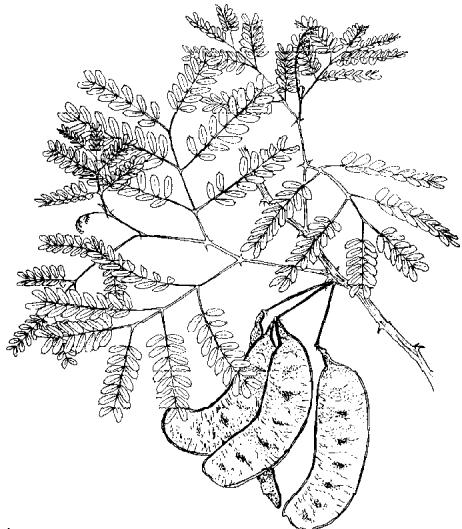


Acacia greggii var. greggii [SA3]

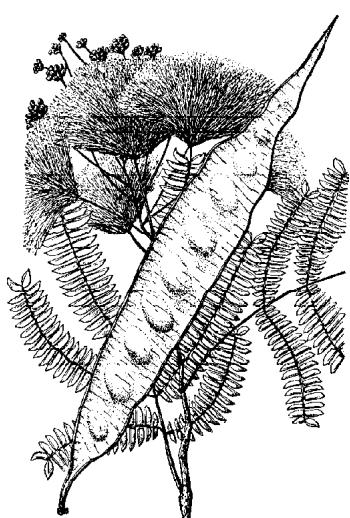
Acacia greggii var. wrightii [SA3]



Acacia farnesiana [VIN]



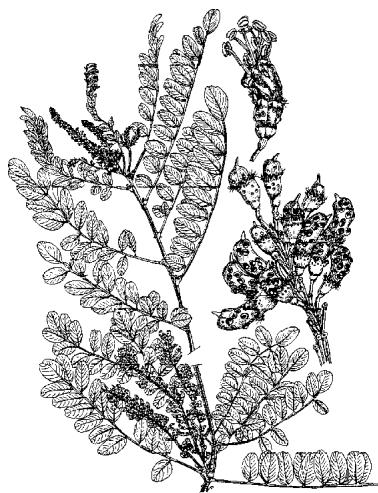
Acacia roemeriana [LYN]



Albizia julibrissin [BR1]



Amorpha canescens [GLE]



Amorpha fruticosa [CO1]

Fernald] The underground fleshy fruits, when cooked, are edible and were used by Native Americans (Mabberley 1987).

APIOS GROUNDNUT, POTATO-BEAN

— A genus of 10 species of e Asia and North America. The habit (vine), characteristic leaves, and striking flower color make the single nc TX member of this genus easily recognizable in the field. (Greek: *apios*, pear, from the somewhat pyriform tuberous enlargement of the rhizomes) (subfamily Papilionoideae, tribe Phaseoleae)

REFERENCE: Seabrook & Dionne 1976.

Apios americana Medik., (of America), GROUNDNUT, AMERICAN POTATO-BEAN. Perennial from tuberous-enlarged rhizomes to 6 cm in diam.; stems annual, twining and climbing, to 4 m long, sparsely to densely pubescent; leaves once pinnately compound; leaflets 5–7, ovate- or elliptic-lanceolate, 2–10 cm long, pubescent, especially beneath, rounded at base; petioles 15–70 mm long; stipules nearly thread-like, 4–7 mm long, soon deciduous; flowers slightly sweet-scented, in axillary, short-peduncled, spike-like racemes; pedicels 2–6 mm long; standard cupped or hooded, brown-red with pale back; wings down-curved, brown-red or purple-red; keel sickle-shaped, brownish or dull red; stamens 10, diadelphous; fruits linear, 5–12 cm long, 4–7 mm wide, slightly flattened. Damp woods and thickets; Cooke, Denton, Fannin, Grayson, and Henderson cos.; e TX w to East Cross Timbers, rare in Edwards Plateau. Jun-Aug. The cooked tubers were eaten by Native Americans and early explorers (McGregor 1986; Heiser 1993). ☒/78

ARACHIS PEANUT

— A South American genus of 69 species (Krapovickas & Gregory 1994). The rich yellow to nearly orange flowers, conspicuous stipules, and readily identified subterranean fruits make the single species occasionally escaped in nc TX easily recognizable in the field. (Greek: *a*, without, and *rachos*, branch) (subfamily Papilionoideae, tribe Aeschynomeneae)

REFERENCES: Hermann 1954b; Gregory et al. 1980; Krapovickas & Gregory 1994.

Arachis hypogaea L., (underground), COMMON PEANUT, PEANUT, GOOBER, GROUNDNUT, MONKEYNUT, EARTHNUT. Annual with erect or decumbent, villous stems; leaves pinnately compound, usually with 4 leaflets; leaflets 2–6 cm long; stipules prominent, linear-subulate, 10–50 mm long; flowers axillary; pedicel (really sterile lower portion of fruit) eventually elongating and pushing the fruit underground where it matures; corollas yellow (standard can be nearly orange), 1–1.5 cm long; stamens 10, monadelphous; fruits indehiscent, with 1–3 seeds, 1–5 cm long, 1–2 cm wide. Sandy areas along rivers, weedy areas; Comanche, Dallas, Grayson, and Somervell cos., also Hood Co. (R. O'Kennon, pers. obs.); also Post Oak Savannah. Jun-Oct. Native of South America. PEANUT is thought to be of allopolyploid origin (Mabberley 1987). Leaf lesions caused by the rust fungus *Puccinia arachidis* Speg. can sometimes be found (J. Hennen, pers. comm.). This is an important crop locally in areas of sandy soils (e.g., annual Peanut Festival in Whitesboro, in w Grayson Co.); it is cultivated for its edible seeds and for oil. Peanut meal can be toxic as a result of contamination with aflatoxin, produced by the fungus *Aspergillus flavus* Link: Fr. (Lewis & Elvin-Lewis 1977). ☠ ☐ ☈

ASTRAGALUS LOCOWEED, MILK-VETCH

Ours herbaceous, unarmed, annuals or perennials, prostrate or decumbent to wide-spreading or erect or nearly so; leaves once odd-pinnately compound, stipulate, estipellate; flowers in peduncled, terminal or axillary heads or head-like or spike-like racemes; petals various shades of pink, lavender, or purple to white or yellowish; stamens 10, diadelphous; fruits inflated, bladdery, or linear to narrowly oblong, not inflated.

— A huge genus of 1,750 species; *Astragalus* is considered one of the largest genera of vascular plants. It occurs mainly in the n temperate zone, especially w North America and c and w Asia and extends to Chile, n India, and the mountains of tropical Africa; it is notoriously difficult taxonomically. ☣ Some species concentrate selenium in their tissues (POISON-VETCHES); such plants can cause a toxic, sometimes fatal response in livestock—when symptoms include emaciation, hoof deformity, and lameness, the condition has been referred to as alkali disease; when blindness, excitement, and other nervous symptoms occur, the condition has been referred to as blind staggers; other *Astragalus* species (LOCOWEEDS) are apparently toxic due to indolizidine alkaloids (e.g., swainsonine) and cause locoism; symptoms in livestock include intoxication, paralysis, respiratory problems, and sudden death; affected horses become excessively excited and wild and are dangerous to ride (Kingsbury 1964, 1965; Blackwell 1990; James & Welsh 1992; Ralphs 1992). Other species, however, are cultivated for hay or forage. *Oxytropis*, sometimes included in *Astragalus*, is here treated as a separate genus. (Ancient Greek name of a leguminous plant; perhaps from *astragalos*, ankle bone or dice, possibly alluding to rattling of seeds within fruit) (subfamily Papilionoideae, tribe Galegeae)

REFERENCES: Barneby 1964; Isely 1983–1986.

1. Leaves all basal or crowded near base of stem, the leafless peduncles more than twice as long as the leaf-bearing lower portion of the stem; leaflets, above and beneath, densely gray-pubescent; pubescence consisting of hairs attached above their bases so that they have a long and a short arm (= malpighian or dolabiform hairs); plants perennial.
 2. Leaflets linear or narrowly lanceolate, 4–15 times as long as wide; keel tipped with a pointed, slender beak; corollas 15–26 mm long; fruits 7–12 mm long (without beak) _____ see ***Oxytropis lambertii***
 2. Leaflets lanceolate to elliptic-orbicular, 1.5–4 times as long as wide; keel acute or rounded, not beaked; corollas 8.5–14 mm long; fruits 12–37 mm long (without beak) _____ ***A. lotiflorus***
1. Leaves extending well up the stem, the peduncles about equaling or shorter than the leaf-bearing portion of stem; leaflets glabrous to sparsely pubescent above OR else plant an annual; pubescence consisting of hairs attached at their bases (not malpighian or dolabiform—except in *A. canadensis*).
 3. Plants perennial, with rhizomes or woody taproot.
 4. Plants erect and tall (0.4–1.6 m); stipules dry, papery, deciduous; inflorescences densely spike-like, the flowers usually 20 or more; stems and leaves with hairs attached above their bases so that they have a long and a short arm _____ ***A. canadensis***
 4. Plants prostrate to ascending-erect, usually < 0.4 m tall; stipules herbaceous, persistent; inflorescences with 1–20 flowers; stems and leaves with hairs attached at their bases.
 5. Leaflets acute or obtuse, pubescent beneath, at least when young; mature fruits 1.8–27 mm wide.
 6. Calyces 7–10 mm long, the tube longer than lobes; corollas 12–20 mm long; mature fruits 10–27 mm wide.
 7. Ovaries and fruits glabrous; plants without slender rhizomes; mature fruits 11–27 mm wide _____ ***A. crassicarpus***
 7. Ovaries and fruits densely gray-pubescent; old plants with slender rhizomes; mature fruits 10–13 mm wide _____ ***A. plattensis***
 6. Calyces 2.5–5 mm long, the tube about equaling lobes; corollas 5–12 mm long; mature fruits 1.8–3.5 mm wide _____ ***A. nuttallianus***
 5. Leaflets notched or truncate, glabrous beneath; mature fruits 1.8–7 mm wide.
 8. Inflorescences with 6–20 flowers, spicate or racemose; calyces with short white or white and black hairs; mature fruits 3.5–7 mm wide _____ ***A. distortus***
 8. Inflorescences often with 1–6 flowers (sometimes more), head-like or subumbellate; calyces varying from glabrous to villous, without black hairs; mature fruits 1.8–3.5 mm wide _____ ***A. nuttallianus***

3. Plants annual, with slender taproot.
9. Leaflets of all leaves notched to truncate apically.
10. Peduncles with wide-spreading hairs; keel longer than the wings; wings whitish; standard and keel violet or white-tipped or margined; corollas 4–5.2 mm long; fruits 5.5–9 mm long _____ **A. reflexus**
10. Peduncles with appressed or ascending hairs or glabrous; keel shorter than the wings; petals variously colored; corollas (4–)4.8–18 mm long; fruits 12–37 mm long.
11. Corollas (12–)13–18 mm long; wings wholly white in apical 2/3; ovules 8–12; style pubescent; mature fruits 3.5–6.5 mm wide, stipitate, the stipes 1–3 mm long _____ **A. lindheimeri**
11. Corollas 5–12 mm long; wings colored to apex along lower edge; ovules 10–26; style glabrous; mature fruits 1.8–3.5 mm wide, sessile or nearly so, the stipes < 1 mm long.
12. Ovules 20–26; mature fruits 20–37 mm long, straight or gently and evenly curved for their whole length; standard 8.3–12 mm long; occasional in Blackland Prairie and West Cross Timbers _____ **A. leptocarpus**
12. Ovules 10–18; mature fruits 12–26 mm long, usually curved near base, otherwise straight or nearly so; standard (4–)4.8–10 mm long; widespread throughout nc TX _____ **A. nuttallianus**
9. Leaflets of middle and upper leaves acute to obtuse at apex.
13. Calyx teeth about equal in length to calyx tube; mature fruits glabrous or sparsely hairy, 12–26 mm long, curved near base or straight, spreading, ascending, or deflexed, not erect; calyces half as long as corollas or less; ovules 10–18; widespread throughout nc TX _____ **A. nuttallianus**
13. Calyx teeth 1.5–2.5 times as long as calyx tube; mature fruits densely pilose-hairy, 7–13 mm long, straight or nearly so, erect; calyces over half as long as corollas to nearly as long as corollas; ovules 5–9; limited to the s and sw margins of nc TX _____ **A. wrightii**

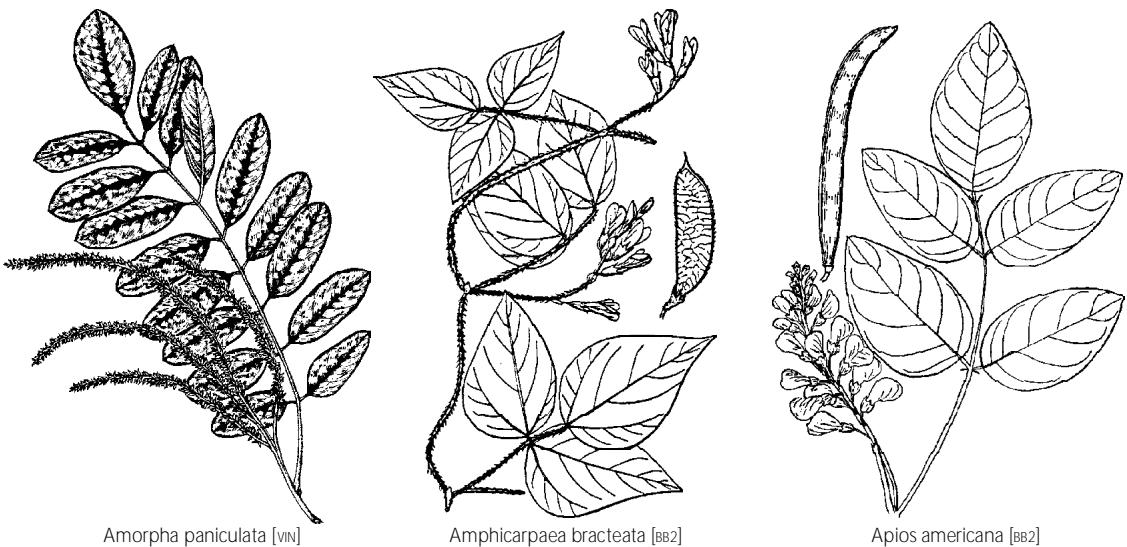
Astragalus canadensis L., (of Canada), CANADA MILK-VETCH. Perennial, inconspicuously pubescent or glabrous, usually tall and robust; stems 0.4–1.6 m tall, erect, leafy, branched above; petals greenish white, light yellowish green, yellowish white, or dull straw-colored; fruits 10–15 mm long, 4–5.2 mm wide. Rocky or sandy thickets; Cooke, Dallas, and Grayson cos., also Lamar Co. (Mahler 1988); se and e TX w to the n part of nc TX. Jun–early Jul.

Astragalus crassicarpus Nutt., (thick-fruited), GROUND-PLUM, BUFFALO-PLUM, POMME DE PRAIRIE, GROUND-PLUM MILK-VETCH. Perennial; stems 10–60 cm long, decumbent, ascending, or suberect; flowers often showy; petals lilac, pink-purple, or purple. Native Americans ate the immature, succulent, plum-like fruits; care must be taken because there are several closely related poison MILK-VETCHES or LOCOWEEDS. The two varieties below can be separated by the following key modified from Barneby (1964).

1. Stems arising singly or few together from slender, widely creeping, subterranean caudex-branches, forming loosely matted or colonial growths; ovules 34–50; c TX n to extreme s part of nc TX _____ var. **berlandieri**
1. Stems arising together from the crown of the taproot or shortly forking, determinate caudex at or just below soil-level; ovules 52–68; widespread in nc TX _____ var. **crassicarpus**

var. **berlandieri** Barneby, (for Jean Louis Berlandier, 1805–1851, French botanist who explored TX, NM, and Mexico, and one of the first botanists to make extensive collections in TX). Similar to var. *crassicarpus*; petals lilac or pink-purple. Soils derived from limestone or clay, gravelly areas, prairies; Williamson Co. (Correll & Johnston 1970); mainly Edwards Plateau e to coastal plain; endemic to TX. Late Apr–summer. 

var. **crassicarpus**. GROUND-PLUM, MILK-VETCH, INDIAN-PEA. Petals purple or lilac; fruits globose to ovoid or obovoid, sometimes superficially plum-like in appearance, up to 1.5 times as long as



Amorpha paniculata [vin]

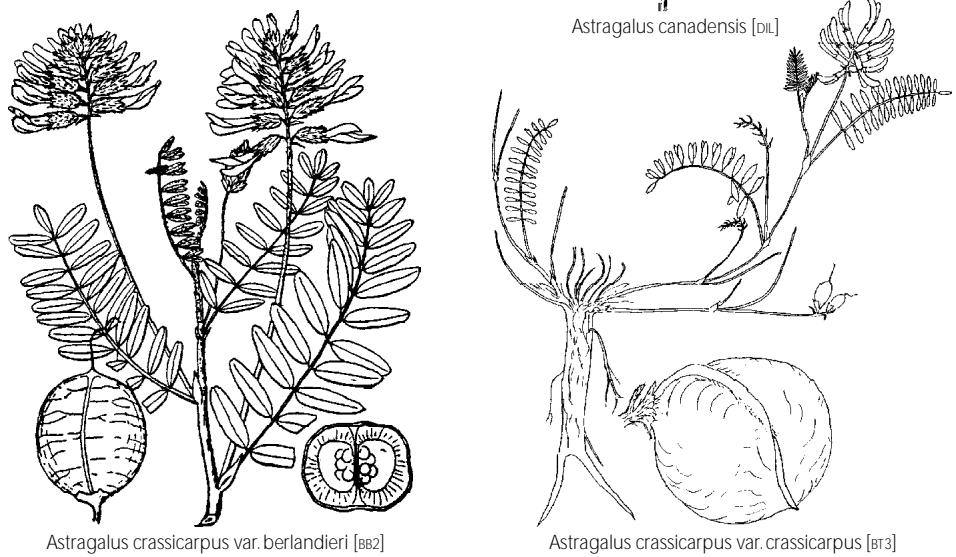
Amphicarpaea bracteata [BB2]

Apios americana [BB2]



Arachis hypogaea [EN2]

Astragalus canadensis [DIL]



Astragalus crassicus var. *berlandieri* [BB2]

Astragalus crassicus var. *crassicus* [BT3]

wide, 15–27 mm long, 12–25 mm wide. Clayey or rocky prairies; mainly Blackland and Grand prairies; also Panhandle to Trans-Pecos. Mar–Jul.

var. *trichocalyx* (Nutt.) Barneby, (with a hairy calyx), with greenish white or creamy petals, occurs in open woods just to the e of nc TX.

Astragalus distortus Torr. & A. Gray, (twisted, from the fruit shape). Low perennial; stems decumbent to prostrate, 10–35 cm long; calyces with white or mixed black and white hairs, 3.1–6.3 mm long; corollas 8.2–15.3 mm long, variable in color, pink-purple, lilac to whitish, sometimes with markings; fruits 13–25 mm long. The 2 varieties below can be distinguished by the following key modified from Barneby (1964).

1. Flowers relatively large, the standard 11–15.5 mm long, the keel (7–)7.4–9.3 mm long; fruits deeply sulcate both dorsally and ventrally; ovules 26–37; only known n of Red River to the n of nc TX ____ var. **distortus**
1. Flowers smaller, the standard 8.2–12 mm long, the keel 5.5–7.2 mm long; fruits shallowly sulcate dorsally but not or only obscurely so ventrally; ovules 16–28; only known s of Red River ____ var. **engelmannii**

var. **distortus**. OZARK MILK-VETCH, BENT-POD MILK-VETCH. Prairies and post oak woodland; Cross Timbers just n of Red River in OK; not reported in TX; included because of proximity and possibility of occurrence. Late Mar–Jul.

var. **engelmannii** (E. Sheld.) M.E. Jones, (for George Engelmann, 1809–1884, German-born botanist and physician of St. Louis), ENGELMANN'S MILK-VETCH. Sandy soils; Hunt, Henderson, and Kaufman cos., also Tarrant Co. (Barneby 1964); in much of e 1/2 of TX; not reported n of Red River in OK. Mar–May.

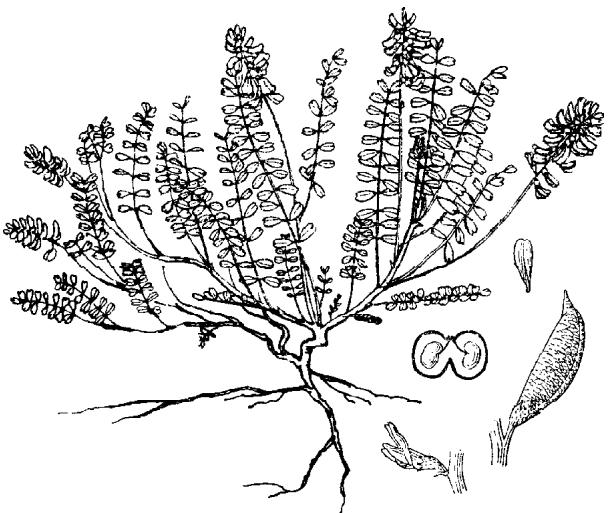
Astragalus leptocarpus Torr. & A. Gray, (thin- or slender-fruited), SLIM-POD MILK-VETCH, BODKIN MILK-VETCH. Inconspicuously appressed-pubescent or glabrous annual; stems erect, ascending, or decumbent, 3–20(–35) cm long; racemes with 2–7(–12) flowers; petals purple-blue drying violet, the center of standard and upper sides of wings and keel often white; fruits straight or slightly curved, linear, 2.2–3.1(–3.5) mm wide. Sandy open woods or calcareous clays; Bell, Dallas, Denton, Henderson, Limestone, and Parker cos.; se and e TX w to nc TX. Apr. *Astragalus leptocarpus* "is closely related to *A. nuttallianus* and might logically be treated as forming part of that polymorphic complex; for apart from the ordinarily longer pod enclosing from one to four extra pairs of ovules and seeds, it possesses no single attribute which cannot be matched somewhere in *A. nuttallianus*. In practice it is easily distinguished from sympatric varieties of *A. nuttallianus*: from var. *trichocarpus* by its glabrous ovary; from var. *pleianthus* by its retuse leaflets; from var. *macilentus* by the acute keel-tip; and from var. *nuttallianus*, which it most nearly resembles in its green, glabrescent foliage and in shape of the leaflets, by the nearly always longer and more amply proportioned flower" (Barneby 1964).

Astragalus lindheimeri Engelm. ex A. Gray, (for Ferdinand Jacob Lindheimer, 1809–1879, German-born TX collector), LINDHEIMER'S MILK-VETCH, BUFFALO-CLOVER, MILK-VETCH. Inconspicuously appressed-pubescent annual; stems decumbent to ascending, to ca. 35 cm long; inflorescences racemose, with 2–8 crowded flowers; flowers sweet-scented, large and very showy; petals bicolored, purple-blue, with center of standard, upper side and tips of wings, and tip of keel white, turning violet upon drying; fruits 17–27 mm long, flattened, curved-oblong. Sandy, silty, or rocky ground; West Cross Timbers, also Dallas and Navarro cos. (Barneby 1964); also Rolling Plains and Edwards Plateau and in sw part of Oklahoma along Red River (Barneby 1964). Late Mar–early May.

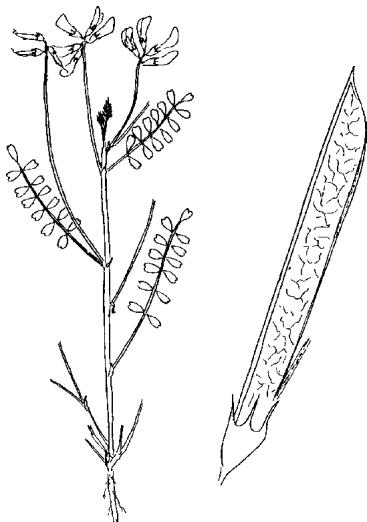
Astragalus lotiflorus Hook., (with flowers like *Lotus*—deer-vetch, trefoil), LOTUS MILK-VETCH. Plant low, tufted, ± scapose, spreading to erect, to 18 cm tall, usually densely pubescent with hairs attached above base so that they have a long and a short arm (= malpighian or



Astragalus distortus var. distortus [BB2]



Astragalus distortus var. engelmannii [HEA, JME]



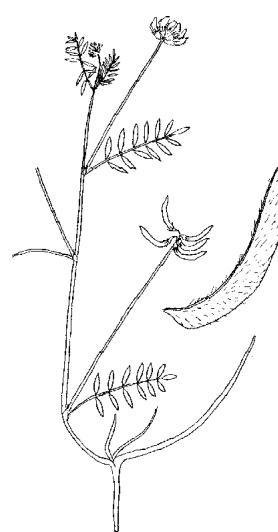
Astragalus leptocarpus [BT3]



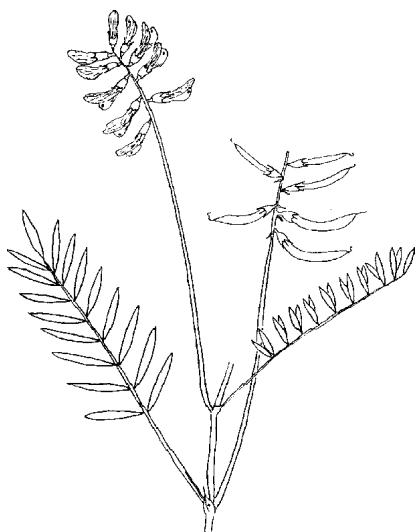
Astragalus lindheimeri [BT3]



Astragalus lotiflorus [BT3]



Astragalus nuttallianus var. austrinus [BT3]



Astragalus nuttallianus var. macilentus [BT3]



Astragalus nuttallianus var. trichocarpus [coc]

dolabriflorous hairs); chasmogamous and cleistogamous inflorescences both produced, commonly on different plants; inflorescences with (3-)5-17 flowers; petals greenish white to yellowish or tinged with red or purple or purple-tipped or -margined. Limestone and sandstone outcrops; n Blackland Prairie and Grand Prairie w to Plains Country and Trans-Pecos. Late Mar-Apr. Barneby (1964) considered the species to be a polymorphic indivisible entity. [A. *lotiflorus* var. *reverchonii* (A. Gray) M.E. Jones]

Astragalus nuttallianus DC., (for Sir Thomas Nuttall, 1786-1859, English-American botanist), TURKEY-PEA, SMALL-FLOWER MILK-VETCH. Glabrous to pubescent annual (but can also be keyed as a perennial in the key); stems erect to decumbent, to 35(-45) cm long; petals varying in color from various shades of pinkish to purplish, often with variable white markings, to whitish; fruits 12-26 mm long, 1.8-3.5 mm wide. This is an extremely variable species with a number of often difficult to distinguish varieties occurring in or near nc TX. They are distinguished in the key modified from Barneby (1964); distributions also follow Barneby (1964).

1. Leaflets of all leaves notched or truncate-emarginate.
 2. Flowers small, the standard 4.3-7.3(-7.6) mm long, the keel-tip triangular-acute or sharply deltoid; raceme axis not elongating or scarcely so, not over 0.8(-1) cm long in fruit; widespread in nc TX _____ var. **nuttallianus**
 2. Flowers larger, the standard 8.5-13 mm long, the keel-tip obtusely rounded; raceme axis mostly elongating and usually 1-3 cm long in fruit; just to the s of nc TX _____ var. **macilentus**
1. Leaflets not all notched or truncate-emarginate, elliptic or ovate and obtuse to subacute in at least some upper or often all leaves.
 3. Keel obtusely rounded at tip; racemes elongating, the axis 1-3 cm long in fruit; fruits commonly glabrous; just to the s of nc TX _____ var. **macilentus**
 3. Keel triangular or narrowly deltoid at tip, acute or subacute; racemes not or scarcely elongating, the axis 0.8(-1.2) cm or less long in fruit; fruits glabrous or with pubescence; widespread in nc TX.
 4. Flowers relatively large, the standard mostly 7-9 mm long; racemes mostly with 4-10 flowers; fruits consistently glabrous _____ var. **pleianthus**
 4. Flowers small, the standard mostly 5-7 mm long; racemes mostly with 1-5(-6) flowers; fruits glabrous or with pubescence.
 5. Fruits hirsutulous, the hairs 0.5-1 mm long; leaflets commonly 11-13 _____ var. **trichocarpus**
 5. Fruits glabrous or if pubescent the hairs shorter, appressed, 0.5 mm long or less; leaflets commonly 7-11 _____ var. **austrinus**

var. **austrinus** (Small) Barneby, (southern). Dry plains and hillsides; from West Cross Timbers s and w to w TX. Mar-May.

var. **macilentus** (Small) Barneby, (thin, lean). Rocky and disturbed areas, often on calcareous soils; just to the s of nc TX in s Burnet and Travis cos.; c to w TX. Mar-May. Isely (1983-1986) treated this variety as a separate species indicating that although partially sympatric with *A. nuttallianus*, it does not intergrade with that species. [*A. macilentus* (Small) Cory]

var. **nuttallianus**. NUTTALL'S MILK-VETCH, TURKEY-PEA, PEAVINE. Disturbed ground, mostly limestone; Blackland and Grand Prairies and Cross Timbers; also South TX Plains, Edwards Plateau, and Rolling Plains. Mar-Jun.

var. **pleianthus** (Shinners) Barneby, (many-flowered). Calcareous soils; prairies, open woodlands; Blackland Prairie sw to Edwards Plateau; endemic to TX. Mar-May. [*A. pleianthus* (Shinners) Isely] Kartesz (1994) and Jones et al. (1997), following Isely (1983-1986), treated this taxon as a separate species; Isely (1983-1986) indicated that "Though sympatric with several of

its congeners, it seemingly does not blend with any of them." However, we are following Barneby (1964) in maintaining it at the rank of variety. ↗

var. **trichocarpus** Torr. & A. Gray, (hairy-fruited), SOUTHWESTERN MILK-VETCH. Calcareous or sandy soils; Archer, Young, Palo Pinto, Erath, Somervell, and McLennan cos. (Barneby 1964); scattered mainly in e 1/2 of TX. Mar-May.

Astragalus plattensis Nutt., (of the Platte River), PLATTE RIVER MILK-VETCH, GROUND-PLUM. Resembling *A. crassicarpus*, usually largely decumbent, more pubescent throughout; flowers sweet-scented; standard yellowish white to light or deep lavender or rosy lavender; wings similar or deeper-colored; keel lavender to purple or red-purple with dark tip; ovary pubescent. Sandy or rocky prairies or open woods; from e edge of East Cross Timbers s to South TX Plains and nw to Panhandle. Late Mar-mid-Jul.

Astragalus reflexus Torr. & A. Gray, (reflexed, bent sharply backward), TEXAS MILK-VETCH, DROOPING MILK-VETCH. Rather sparsely pilose, prostrate to erect annual; stems to 35 cm long; racemes with 3-10 flowers; corollas 4-5.2 mm long; petals bicolored, bluish violet or reddish violet with white; fruits 5.5-9 mm long, 2.5-5.5 mm wide. Prairies, roadsides, calcareous or clay soils; Bell, Dallas, Hill, McLennan, Somervell, and Tarrant cos; nc and c TX mainly between the Trinity and Colorado rivers from Dallas-Ft. Worth to Austin, also disjunct to Cameron Co. in far s TX; endemic to TX. Feb-May. ↗

Astragalus wrightii A. Gray, (for Charles Wright, 1811-1885, TX collector), WRIGHT'S MILK-VETCH. Gray-pilose, erect annual to 35 cm tall; inflorescences head-like, 3-7-flowered; corollas 5.2-6.2 mm long; petals reddish violet, lilac, or whitish with lilac tinge; fruits 7-13 mm long, 2.5-35 mm wide. Sandy or gravelly ground; Bell, Burnet, Lampasas, and Williamson cos, also Brown Co. (Barneby 1964); Edwards Plateau and s and w parts of nc TX; endemic to TX. Apr. ↗

BAPTISIA WILD INDIGO, FALSE INDIGO

Herbaceous perennials with woody crown and tough roots; foliage sometimes darkening upon drying; leaves very short-petioled, palmately compound with 3 leaflets (or uppermost with only 1 or 2); stipules large to small, persistent or falling early; flowers terminal, large, solitary or in erect to horizontal or drooping racemes or solitary in the leaf axils; corollas variously colored; stamens 10, separate; fruits rounded or subcylindric, becoming woody, often with a beak.

— A genus of 17 species endemic to the e U.S.; nc TX species can usually be easily recognized to genus by the combination of the palmately 3-foliate leaves, free stamens, and inflated fruits (Isely 1990). *Baptisia tinctoria* (L.) R. Br. ex W.T. Aiton was formerly used as a dye plant; others are used as ornamentals or medicinally; a number contain alkaloids. ☣ The plants are avoided by grazing animals and some species are reportedly toxic to livestock. Hybridization is well known in *Baptisia* (e.g., Turner & Alston 1959; Alston & Turner 1962, 1963). Kosnik et al. (1996) described a *Baptisia* hybrid complex in nc TX including a new hybrid. In nearly every case where 2 or more parental species have been found growing together in nc TX, hybrid individuals have also been found. The key to species below includes the hybrids known to occur within nc TX. (Greek: *baptis*, dye or dip, from the economic use of some species which yield a poor indigo dye) (subfamily Papilionoideae, tribe Thermopsisideae)

REFERENCES: Larisey 1940; Turner & Alston 1959; Alston & Turner 1962, 1963; Kosnik et al. 1996.

1. Petals cream-colored; inflorescences held distinctly below the level of the leaves; vegetative structures densely pubescent _____

B. bracteata

1. Petals blue-violet to yellow, orange, or brick-red, but not cream; inflorescences at least partially erect and held above the level of the leaves OR flowers solitary in the upper leaf axils; vegetative structures glabrous to moderately pubescent.

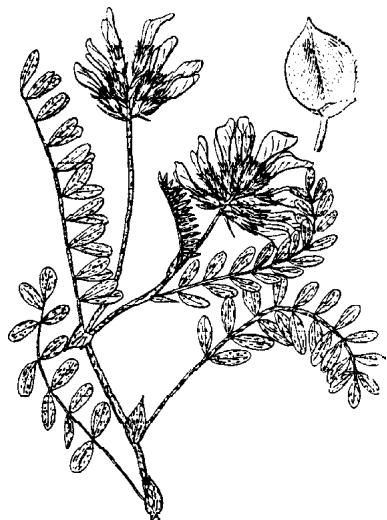
2. Flowers solitary in the upper leaf axils (at least some) or in short terminal racemes with 1–4 flowers; petals yellow _____ **B. nuttalliana**
2. Flowers in racemes of 5–20 or more flowers; petals yellow, orange, brick-red, or blue-violet.
 3. Petals blue-violet (keel sometimes whitish); stems at base thick (> 5 mm diam.); plants usually growing individually; inflorescences one to a few per plant.
 4. Petals intensely to moderately blue-violet; inflorescences vertical (strictly erect); foliage glabrous and glaucous _____ **B. australis**
 4. Petals moderately to pale blue-violet; inflorescences angled about 45°; foliage slightly pubescent, not glaucous _____ **B. × bicolor**
 3. Petals yellow or multicolored; stems at base thin (< 5 mm diam.); plants usually growing in dense clusters; inflorescences usually numerous per plant.
 5. Petals yellow, all ± the same color; foliage glabrous to moderately pubescent.
 6. Petals vividly yellow; racemes nearly vertical (strictly erect); foliage glabrous _____ **B. sphaerocarpa**
 6. Petals pale to medium yellow; racemes angled about 45°; foliage moderately pubescent _____ **B. × bushii**
 5. Petals brick-red and yellow to orangish to blue-violet and yellow, different petals of the same flower often of different colors; foliage glabrous _____ **B. × variicolor**

Baptisia australis (L.) R. Br. ex W.T. Aiton var. **minor** (Lehm.) Fernald, (sp: southern; var: smaller), BLUE WILD INDIGO, WILD BLUE-INDIGO, BLUE-INDIGO. Plant usually growing individually, tall (usually 46–74 cm), of strictly erect posture, with a single thick (> 5 mm diam.), glaucous stem rising from the ground several cm before branching; branches generally few and rigid; leaves small (center leaflet 18–34 mm long) and glabrous; stipules small (4–11 mm long); flowers borne on a usually single, rigidly erect raceme; floral bracts quickly deciduous; pedicels 5–15 mm long; corollas large (27–36 mm long), blue-violet of variable intensity; fruits usually much longer than wide, 30–60 mm long, 20–30 mm wide, with a distinct persistent beak that is noticeably widened at base, black at maturity, glabrous. Clay soils, prairies, pastures; Fannin, Grayson, and Montague cos. in Red River drainage, also Collin and Hunt cos., also Dallas Co. (Mahler 1988); otherwise only known in TX from the Panhandle and Titus Co. to the e. Apr. [B. minor Lehm., B. minor var. aberrans Larisey, B. texana Buckley, B. vespertina Small ex Rydb.] According to Ajilvsgi (1984), the sap turns purple when exposed to air; it is still used in making a blue dye for dying wool for use in weaving. ☒/80

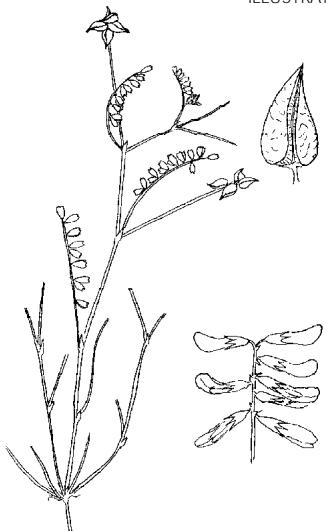
Baptisia australis var. *australis* is cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2) and Jones et al. (1997) cited it for TX. However, J. Kartesz (pers. comm. 1997) indicated there is not a TX record. Isely (1990) separated the 2 varieties as follows;

1. Legume more nearly symmetric, tending to be oblong, moderately inflated, 1.2–1.5(–2) cm in diam.; stems commonly 1–1.5 m tall, with ascending branches _____ var. *australis*
1. Legume usually strongly asymmetric, ovoid to oblong-lanceoloid, much inflated, 2–3 cm in diam.; stems usually 0.5–1 m long or tall, with spreading, divaricate branches _____ var. *minor*

Baptisia × bicolor Greenm. & Larisey [B. australis × B. bracteata], (two-colored), TWO-COLOR WILD INDIGO. Plant usually growing individually, intermediate to both parents in numerous characters, of medium height (30–60 cm tall), generally branching at or near the ground; stems and foliage moderately pubescent; leaves and stipules of moderate length (center leaflet 27–51 mm long; stipules 4–10 mm long); flowers borne on 1–several racemes angled about 45° above the ground; floral bracts quickly deciduous; pedicels of 10–18 mm long; corollas large (27–33 mm long), moderately to pale blue-violet. Prairies, pastures, soils often intermediate between clay and sand or in areas where soil types are in close proximity; Fannin and Grayson cos. in Red River drainage; we are unaware of other TX locations. Apr. ☒/80



Astragalus plattensis [BB1]



Astragalus reflexus [BT3]



Astragalus wrightii [BT3]



Baptisia australis var. *minor* [STE]



Baptisia bracteata var. *leucophaea* [STE]



Baptisia nuttalliana [coc]



Baptisia sphaerocarpa [BT3]

Baptisia bracteata Muhl. ex Elliott var. **leucophaea** (Nutt.) Kartesz & Gandhi, (sp: with bracts; var: dusky-white), PLAINS WILD INDIGO. Plant usually growing individually, low (21–36 cm tall), often wider than tall, branching at or near the ground, with all vegetative parts densely pubescent; leaves and stipules large (center leaflet 30–60 mm long; stipules 10–40 cm long); flowers on reclining or hanging racemes; floral bracts persistent and large (10–30 mm long); pedicels long (15–35 mm long); corollas large (25–38 mm long); fruits (2–)3–4(–5) cm long, 1.5–2.5 cm wide, tapering to a slender beak (beak rather wide at base), black, pubescent or rarely later glabrate. Sandy open woods, prairies, pastures, and roadsides; e TX w to East Cross Timbers. Late Mar–Apr. [*B. bracteata* var. *glabrescens* (Larisey) Isely, *B. leucophaea* Nutt., *B. leucophaea* var. *glabrescens* Larisey] The plants turn blackish or silver-gray late in the summer, break off, and tumble in the wind (Ajilvsgi 1984). /80

Baptisia ×bushii Small [*B. bracteata* × *B. sphaerocarpa*], (for Benjamin Franklin Bush, 1858–1937, amateur botanist of Missouri), BUSH'S WILD INDIGO. Plant usually growing individually, intermediate to both parents in numerous characters, low (26–36 cm tall), branching at or near the ground; stems and foliage moderately pubescent; leaves and stipules moderate to large (center leaflet 42–60 mm long; stipules 7–34 mm long); flowers on several racemes angled about 45° above the ground; floral bracts quickly deciduous; pedicels 7–15 mm long; corollas medium-sized (22–29 mm long), pale to medium yellow. Usually on sandy soils; Fannin and Grayson cos. in Red River drainage; also e TX. Apr. [*B. ×intermedia* Larisey, *B. ×stricta* Larisey] /80

Baptisia nuttalliana Small, (for Sir Thomas Nuttall, 1786–1859, English-American botanist), NUTTALL'S WILD INDIGO. Plant erect, to 120 cm tall, with well-developed individuals spherical and bush-like in form, puberulent, then glabrate; leaflets 25–60(–80) mm long; stipules very small, deciduous; pedicels 2–5 mm long; corollas 17–20 mm long, yellow; fruits ovoid to subspheroid, usually 8–13 mm long, (5–)8–13 mm wide, abruptly beaked, black, glabrate. Sandy open woods, pastures, and roadsides; Tarrant Co., also Lamar (Carr 1994) and McLennan (Turner 1959) cos; mainly e TX. Apr–May. According to Isely (1990), often forming extensive poorly fruiting stands. This is the only nc TX *Baptisia* species with mostly axillary flowers.

Baptisia sphaerocarpa Nutt., (globe- or spherical-fruited), GREEN WILD INDIGO, YELLOW BUSH-PEA. Plant often growing in a dense cluster with a number of apparently identical individuals in close proximity, suggesting vegetative spread, tall (40–70 cm) and of generally erect posture, with 1–many small, flexible, glabrous stems, branching close to the base and often; leaves large (center leaflet 36–67 mm long); upper leaves often reduced to 1–2 leaflets; stipules small (2–5(–6) mm long) to absent; flowers borne on 1–many flexible vertical racemes; floral bracts quickly deciduous; pedicels short (1–7 mm long); corollas small (17–25 mm long), intensely yellow; fruits subspheroid, 1.4–1.8 cm in diam., usually light brown (Isely (1990) also reported black), glabrous; in nc TX the small, nearly round, light brown fruits immediately distinguish *B. sphaerocarpa* from the other 2 common parental species with larger, elongate, black fruits. Sandy or silty clay; e TX w to w Blackland Prairie (Grayson Co.). Apr–May. [*B. viridis* Larisey] /80

Baptisia ×variicolor Kosnik, Diggs, Redshaw, & Lipscomb, [*B. australis* × *B. sphaerocarpa*], (variably colored), VARICOLORED WILD INDIGO. Plant often growing in a dense cluster with a number of apparently identical individuals in close proximity, suggesting vegetative spread, intermediate to both parents in numerous characters, but vegetatively often more similar to *B. sphaerocarpa* than *B. australis*, tall (40–76 cm) and of generally erect posture, with one to many small, flexible, glabrous stems, branching at or near the base and often; leaves medium-sized (center leaflet 30–50 mm long); stipules small (3–15 mm long) to absent; flowers borne on 1–many flexible vertical racemes; floral bracts quickly deciduous; corollas of intermediate size (22–27 mm long), brick-red and yellow to orangish to blue-violet and yellow. Prairies, pastures, soils often intermediate between clay and sand or in areas where soil types are in close proxim-

ity; known in TX only in Fannin and Grayson cos. in the Red River drainage; also probably in s OK. Apr-May. Described in 1996 (Kosnik et al.). ☐/80

Baptisia alba (L.) Vent. var. *macrophylla* (Larisey) Isely, (sp: white; var: large-leaved), with white flowers in erect racemes, is cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2). It probably occurs only to the s and e of nc TX.

CAESALPINIA RUSH-PEA

— A genus of ca. 138 species (excluding *Pomaria*—Simpson 1998) of trees, shrubs, or hook-climbers with extra-floral nectaries; they are found in the tropics, warm areas of the Americas, and Namibia. A number of species are cultivated as ornamentals or used as a source of tannin; the leaves of *C. pulcherrima* (L.) Sw. (PRIDE-OF-BARBADOS) have been used as a fish poison in Guatemala and Panama and the seeds have been used to poison criminals (Lewis & Elvin-Lewis 1977). Several Texas species (*C. drummondii*, *C. jamesii*) previously treated in *Caesalpinia* are now placed in *Hoffmannseggia* and *Pomaria* respectively (Simpson 1998; B. Simpson, pers. comm.) (Named for Andrea Caesalpini, 1519–1603, Italian botanist physician to Pope Clement VIII and director of the botanical garden at Bologna; his work, *De Plantis*, influenced Linnaeus; his herbarium, dating from the 1500s, is preserved in Florence—Porter 1967) (subfamily Caesalpinoideae, tribe Caesalpineae)

REFERENCES: Isely 1975; Simpson & Miao 1997; Simpson 1998.

Caesalpinia gilliesii (Hook.) Wall. ex D. Dietr, (for John Gillies, 1792–1834, Scottish physician and botanist who collected in Argentina, Brazil, and Chile), BIRD-OF-PARADISE, POINCIANA, POP-BEAN BUSH. Unarmed shrub or tree to ca. 5 m tall; leaves twice pinnately compound with 11–29 pinnae (each with many leaflets), the pinnae paired or not so; inflorescences densely glandular-pubescent with yellow glands; sepals separate to base, the lower broader than others; petals 5, yellow, 25–30 mm long; stamens 10, 70–90 mm long, much longer than petals; filaments free, bright red; fruits flat, 6–12 cm long, 1.5–2 cm wide, glandular-pubescent. Cultivated for its showy flowers and escapes, dry habitats, pastures; Callahan, Parker, and Young cos., also Brown (HPC) and Tarrant (R. O'Kennon, pers. obs.) cos.; w part of nc TX s and w to w TX. Feb-Jul. Native to Argentina and Uruguay. [*Poinciana gilliesii* Wall. ex Hook.] The seeds are reported to be useful medicinally due to antitumor activity (Mabberley 1987) and the green pods to be severely irritating to the digestive tract (Kingsbury 1964). ☺☛

CENTROSEMA BUTTERFLY-PEA

— A genus of 35 species of warm areas of the Americas; some are used as green manures under crops such as rubber and coconut. *Centrosema* and *Clitoria* are the only U.S. members of the family with large resupinate flowers (= turned upsided down or inverted, with standard on lower side of the flower) (Isely 1990). (Greek: *centron*, a spur, and *sema*, a standard) (subfamily Papilioideae, tribe Phaseoleae)

Centrosema virginianum (L.) Benth., (of Virginia), BUTTERFLY-PEA. Perennial vine; stems glabrous or inconspicuously pubescent, trailing or twining, to 1.6 m long; leaves pinnately compound; leaflets 3, oblong-ovate to lanceolate, scabrous-pubescent above, minutely pubescent or nearly glabrous and with prominent raised veins beneath; flowers axillary, solitary (rarely in 2s); calyxes campanulate, the tube ca. 4 mm long; corollas 20–40 mm long; petals lavender to violet-blue, the standard with reddish central markings and whitish base, rarely all petals white; stamens 10, diadelphous; fruits linear, beaked, 7–12(–14) cm long, ca. 4 mm wide. Sandy woods, roadsides; se and e TX w to Lampasas Cut Plain and Edwards Plateau, also to West Cross Timbers (Erath Co.—Correll & Johnston 1970). Jun-Sep. ☐/83

CERCIS

—A n temperate genus of 6 species extending s to ne Mexico; they are deciduous trees with flowers appearing along the branches and trunk (= cauliflory) before the leaves have expanded; some are cultivated as ornamentals. The tribe Cercideae is considered among the most basal elements in the family (Ballenger et al. 1993). (Ancient Greek name applied perhaps to a popular, but also to *C. siliquastrum* L., JUDASTREE; possibly from *kerkis*, a weaver's shuttle, alluding to the large woody fruits; the common name reflects the tradition that this was the tree from which Judas hanged himself) (subfamily Caesalpinoideae, tribe Cercideae)

REFERENCE: Hopkins 1942.

Cercis canadensis L., (of Canada), REDBUD, JUDASTREE. **State tree of Oklahoma.** Small thornless tree; leaves apparently simple (with 1 leaflet), opening after the flowers, cordate basally; flowers pedicillate in clusters of 2–6; calyces asymmetrically cup-shaped, 5-toothed; petals purple-red (very rarely white), ca. 9–12 mm long, very unequal, the flower simulating a papilionaceous form; stamens 10, all fertile, separate; fruits slightly stipitate, flattish, 4–10 cm long, 8–18 mm wide. Mar–Apr. Hybridization apparently occurs where both varieties are found. Our cultivated redbuds are mostly mongrel types derived from the two native varieties, especially the second (Mahler 1988). Cox and Leslie (1991) reported that the buds, flowers, and young pods are edible—particularly sauteed; however, Burlage (1968) indicated that REDBUD is poisonous due to a saponin (no further details as to which organ, etc., were given). ☠

1. Plants usually single-trunked: blades of mature leaves thin (but firm), cordate, about as long as wide or slightly longer, pointed, dull green on both surfaces _____ var. **canadensis**
1. Plants often multi-trunked: blades of mature leaves thick and leathery, cordate to cordate-reniform, wider than long, rounded or barely pointed, rich deep green, shiny, distinctly glaucous above _____ var. **texensis**

var. **canadensis**, EASTERN REDBUD. Stream bottoms and lower slopes, sandy or silty ground; mainly e and nc TX. ☒/83

var. **texensis** (S. Watson) M. Hopkins, (of Texas), TEXAS REDBUD. Rocky limestone slopes; Blackland Prairie w to West Cross Timbers and s to Edwards Plateau. [*C. occidentalis* Torr. & A. Gray] The National Champion TEXAS REDBUD (largest recorded in the U.S.) is located in Dallas Co. (American Forestry Association 1996).

CHAMAECRISTA SENNA

Erect annuals; leaves 2-ranked, once even-pinnately compound; petioles with a sessile to stalked, ± disc-shaped gland; petals yellow, some of them sometimes with a reddish spot at base; stamens 5 or 10, all fertile, separate; anthers basifixied, apically dehiscent by pores; fruits elastically dehiscent.

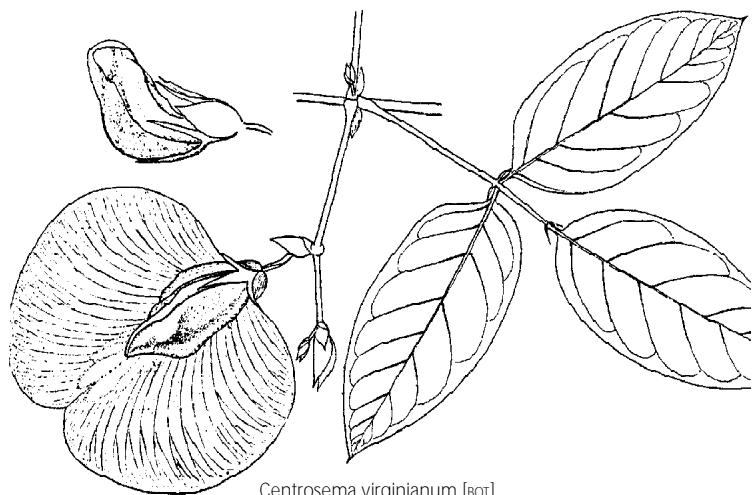
—A genus of 265 species; pantropical but mainly South America to s U.S.; sometimes lumped into the genus *Cassia* (e.g., Isely 1975), but differing in characters such as anthers apically dehiscent by pores, filaments not sigmoid, and fruits elastically dehiscent. Irwin and Barneby (1982) gave a detailed key separating *Cassia*, *Chamaecrista*, and *Senna*. (Greek: *chamai*, on the ground or low, and *crista*, crest) (subfamily Caesalpinoideae, tribe Cassiaeae)

REFERENCES: Turner 1955; Isely 1975; Irwin & Barneby 1982.

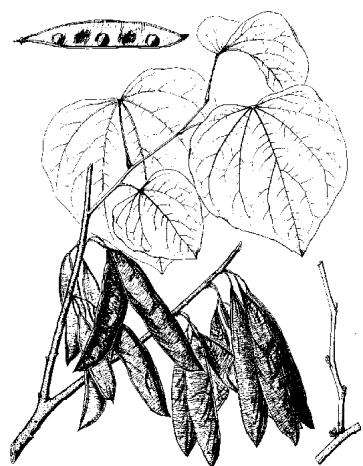
1. Flowers and fruits distinctly pedicellate (pedicels 5–10 mm long); flowers 10–17 mm long; stamens 10 _____ **C. fasciculata**
1. Flowers and fruits essentially sessile (pedicels rarely to 3 mm long); flowers about 5(–8) mm long; stamens usually 5 _____ **C. nictitans**



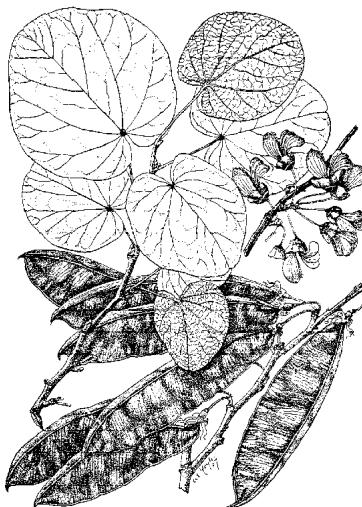
Caesalpinia gilliesii [BR3]



Centroserma virginianum [BOT]



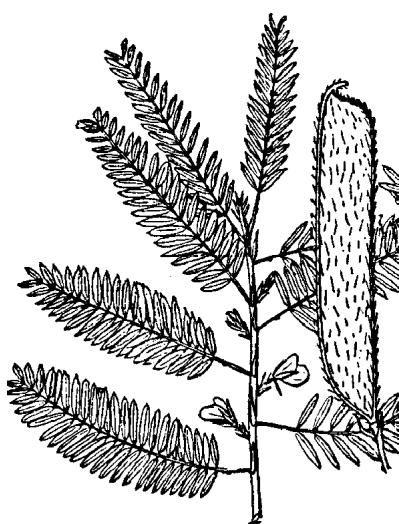
Cercis canadensis var. canadensis [SA3]



Cercis canadensis var. texensis [SUD]



Chamaecrista fasciculata [JON]



Chamaecrista nictitans [BB2]



Clitoria mariana [BOT, WIL]

Chamaecrista fasciculata (Michx.) Greene, (fascicled, clustered), PARTRIDGE-PEA, SHOWY PARTRIDGE-PEA, BEEFLOWER, PRAIRIE SENNA. Annual to ca. 1 m tall; leaves 2-ranked, usually with 8–20 pairs of leaflets, very slightly touch sensitive; petioles with a conspicuous (using hand lens) sessile or short-stalked disk-like gland ca. 1.5 mm across, the gland located from near the middle of the petiole to somewhat closer to the lower pair of leaflets; petals yellow, the upper 4 with a reddish spot at base, the lower larger; anthers yellow and/or purple; fruits usually 5–7 mm long. Open woods or prairies, disturbed areas, often on sandy soils; widespread in TX, but mainly e 1/2. Jun–Oct. [*Cassia chamaecrista* L., *Cassia fasciculata* Michx., *Cassia fasciculata* var. *ferrisiae* (Britton ex Britton & Rose) Turner, *Cassia fasciculata* var. *puberula* (Greene) J.F. Macbr., *Cassia fasciculata* var. *wbusta* (Pollard) J.F. Macbr., *Cassia fasciculata* var. *nstrata* (Wooton & Standl.) B.L. Turner] The petiolar glands are small, orangish, and nectar-producing; ants utilize the nectar (Ajilvsgi 1984). The green plant, hay, and seeds have been considered toxic to animals (Kingsbury 1964). ☣ ☣/83

Chamaecrista nictitans (L.) Moench, (blinking, moving), SENSITIVE-PEA, SENSITIVE PARTRIDGE-PEA. Annual usually less than 0.5 m tall; leaves 2-ranked, somewhat touch sensitive; petiolar gland usually stalked or sometimes subsessile; petals yellow; anthers pinkish to rose; fruits 2.5–5 cm long. Sandy open woods, disturbed areas; Denton, Fannin, Grayson, Limestone, and Tarrant cos; se and e TX w to East Cross Timbers. Sep–Oct. [*Cassia nictitans* L.] The leaves are reported to act as a cathartic (Burlage 1968). ☣

CLITORIA PIGEON-WINGS, BUTTERFLY-PEA

—A genus of 60 species primarily of the tropics, especially of the Americas. The flowers are inverted so that the anthers and pistil touch visiting insects on the back. Some are cultivated as climbing ornamentals and others used as aphrodisiacs, possibly based on the ancient idea known as the Doctrine of Signatures. *Centrosema* and *Clitoria* are the only U.S. members of the family with large resupinate flowers (= turned upsided down or inverted, with standard on lower side of the flower) (Isely 1990). (Derivation from the small keel relative to the large standard, suggesting mammalian clitoris) (subfamily Papilionoideae, tribe Phaseoleae)

REFERENCES: Fantz 1977, 1991.

Clitoria mariana L., (of Maryland), SPOONFLOWER, ATLANTIC PIGEON-WINGS. Perennial herb; stems glabrous or minutely pubescent above, erect to low-spreading or trailing, to 1 m long; leaves pinnately compound; leaflets 3, ovate-elliptic to oblong-lanceolate, glabrous, much paler below; stipules linear-lanceolate; flowers solitary or few on short, axillary peduncles; flowers inverted, with standard at base; corollas very large, the standard 3.5–6 cm long, 3–4 cm wide; petals violet-blue or lavender-blue, the standard with darker or reddish markings toward center and pale or whitish base; stamens 10, diadelphous. Sandy open woods; se and e TX w to West Cross Timbers and Edwards Plateau. Late May–Sep.

CORONILLA CROWN-VETCH

—A genus of 9 species of the Atlantic Islands, the Mediterranean, and Europe. Some are cultivated as ornamentals with strongly scented flowers, others for erosion control. The single naturalized nc TX species can be easily recognized in the field by the combination of its pinkish flowers in umbels and its segmented fruits. (Diminutive of Latin: *cōrona*, a crown, alluding to the inflorescence) (subfamily Papilionoideae, tribe Cornilleae)

REFERENCE: Lassen 1989.

Coronilla varia L., (variable), CROWN-VETCH. Perennial herb with erect to ascending or trailing stems 30–50(–100) cm long; leaves once odd-pinnately compound with 9–25 leaflets, essentially sessile; umbels axillary, on peduncles 5–15 cm long; flowers 5–15(–20) per umbel; calyces

2–3 mm long; petals pinkish (can dry lavender), 7–13 mm long; stamens 10, diadelphous; ovary glabrous; fruits glabrous, linear, ± cylindrical with 4 angles, 1.5–5.5 cm long, stipitate, with 3–7(–12) disarticulating segments. Roadsides, planted for erosion control, apparently spreads; originally reported for TX from Montague Co. (Lipscomb 1984), now also Grayson and Tarrant cos.; Hatch et al. (1990) cited only vegetational area 4 (Fig. 2) for TX. May–Jul. Native of Europe and the Mediterranean area. According to McGregor (1986), the seeds are reported to be poisonous.



CROTALARIA RATTLEPOD

Ours annual or perennial herbs with stems sometimes winged above; leaves sessile or subsessile, apparently simple in our species; flowers usually in axillary or terminal, 2-many-flowered racemes, long-pedicelled; sepals united up to half way; petals yellow; stamens 10, monadelphous; fruits much inflated, with the seeds rattling inside when dry.

— A genus of ca. 600 species of the tropics and subtropics, mostly (511 species) in Africa and Madagascar. Some are used as sources of fodder or fiber; others can cause poisoning in livestock or humans, apparently due to pyrrolizidine alkaloids (e.g., monocrotaline) (Kingsbury 1964; Fuller & McClintock 1986; Turner & Szczawinski 1991; Hardin & Brownie 1993). (Greek: *crotalon*, a rattle, from the loose seeds rattling in the coriaceous inflated pods) (subfamily Papilioideae, tribe Crotalarieae)

REFERENCES: Senn 1939; Windler 1974.

1. Larger leaves 20 mm or more wide; standard 15 mm long or longer, much longer than the calyx; escaped cultivated species.
—
2. Bracts in inflorescence conspicuous, ovate, 5–12 mm long; stipules ovate, 5 mm or more long; calyces glabrous or essentially so; leaves 5–15 cm long ***C. spectabilis***
2. Bracts in inflorescence small (3 mm or less long) or absent, linear to awl-shaped if present; stipules bristle-like, very small, < 2 mm long or absent; calyces with short appressed hairs; leaves 4–8 cm long ***C. retusa***
1. Larger leaves 15 mm or less wide; standard < 15 mm long, shorter than or equal to the calyx; native species.
—
3. Stems appressed-pubescent or nearly glabrous, the hairs 0.3–1 mm long; leaves usually 4–10 mm wide; rare or possibly absent from nc TX ***C. purshii***
3. Stems ± spreading-pilose, the hairs usually 1–2 mm long; leaves 8–15 mm wide; widespread in nc TX ***C. sagittalis***

Crotalaria purshii DC., (for Frederick Traugott Pursh, 1774–1820, German explorer, collector, horticulturist, and author), PURSH'S CROTALARIA. Erect perennial to 40(–50) cm tall; leaves linear- or oblong-lanceolate; racemes with (2–)4–6 flowers; fruits 2.5–4 cm long. Senn (1939) cited a Tarrant Co. collection; Hatch et al. (1990) cited vegetational areas 4 and 5 (Fig. 2); Turner (1959) and Correll and Johnston (1970) questioned the occurrence of *C. purshii* in Texas. Windler (1974), who treated the unifoliolate crotalarias of North America, indicated that the w most location was in e LA. We have seen no TX specimens. Late May–Aug.

Crotalaria retusa L., (retuse, notched slightly at a rounded apex). Erect annual; stems 30–90 cm tall; racemes 10–30 cm long; petals yellow or yellow streaked with red, 20–25 mm long; fruits 2.5–5 cm long. Cultivated and escapes, apparently not persistent; Senn (1939) cited a Tarrant Co. specimen; no recent TX collections are known. Summer–fall. Native to the Asian tropics. Significant losses have occurred in fowl due to the alkaloid monocrotaline in the seeds (Kingsbury 1964); poisoning is similar to that caused by *C. spectabilis* (Burlage 1968). 

Crotalaria sagittalis L., (sagittate, arrow-like), ARROW CROTALARIA. Annual or perennial; stems

10–50 cm tall; stipules conspicuous; racemes with 2–4 flowers; fruits 2–4 cm long. Sandy areas; se and e TX w to West Cross Timbers. Apr–Sep. According to McGregor (1986), there are reports of fatal poisoning in horses from eating fresh or dried plants; Burlage (1968) reported this species as the cause of “bottom disease” or “Missouri Bottom Disease.” “The condition is characterized by slow emaciation, weakness, stupor, fatal hemorrhages and degenerative changes in the liver and spleen.” ☠

Crotalaria spectabilis Roth, (spectacular, remarkable, showy), SHOWY CROTALARIA. Erect annual 50–100(–200) cm tall; racemes 15–50 cm long, with up to 20–50 flowers; standard yellow, can have veins darker with purple streaks, 15–25 mm long; fruits 3–5 cm long. Cultivated and escapes, sandy or weedy areas and roadsides; Dallas and Hood cos; se and e TX w to nc TX and Edwards Plateau. Spring–Oct. Native of Asia. This species was introduced into the U.S. in 1921 for use as a cover crop and soil enricher; however, its use was abandoned with the advent of mechanized harvesting of crops and the associated danger of grain contamination by SHOWY CROTALARIA seeds (Morton 1982). The plants, hay, and seeds are toxic to animals and humans due to the presence of pyrrolizidine alkaloids including monocrotaline; liver damage and heart failure can result and animal fatalities are known; human poisoning has resulted from eating the seeds or drinking a “medicinal” tea; severe liver damage can occur (Muenscher 1951; Morton 1982). ☠

DALEA PRAIRIE-CLOVER

Ours unarmed herbaceous perennials or low shrubs; leaves once odd-pinnately compound; leaflets few to many, resin-dotted; stipules slender, falling early; flowers in terminal spikes, these often dense and cone-like; bracts of ten resin-dotted; petals usually 5, separate; stamens 5–10, monadelphous, attached to staminal tube, either laterally or apically; fruits indehiscent. We are including *Petalostemon* which is separated by some authors; according to Correll and Johnston (1970) who recognized it, *Petalostemon* is “... not at all well-delimited from *Dalea* but technically keyed out on the basis of the insertion of 4 of the petals at the rim of the ‘stamen tube’ instead of along the length of it.”

—A New World genus of ca. 160 species native from Canada to Argentina, but especially in Mexico and the Andes. They mainly occur in dry or desert areas. (Named for Samuel Dale, 1659–1739, English botanist and physician who practiced at Essex) (subfamily Papilionoideae, tribe Amorpheae)

REFERENCES: Shinners 1949b, 1949c, 1953f; Wemple & Lersten 1966; Wemple 1970; Barneby 1977; Meeson 1977.

1. Small shrubs with clearly woody branches; petals purple **D. frutescens**
1. Herbaceous perennials; petals purple to pink, white, or yellow.
 2. Calyx teeth triangular or lanceolate, broadly or narrowly acute, much shorter than or equaling the tube; stamens usually 5: 1 petal inserted near rim of floral cup, the other 4 at end of the “stamen tube.”
 3. Calyces glabrous outside or nearly so; petals white.
 4. Floral bracts below buds or very young flowers nearly equaling or exceeding the calyces (but bracts deciduous); spikes 14–70(–100) mm long in flower, elongate and cylindric; leaflets 10–30 mm long **D. candida**
 4. Floral bracts below buds or very young flowers 1/3–2/3 as long as the calyces; spikes 7–16 mm long in flower, globose or subglobose; leaflets 6–12 mm long **D. multiflora**
 3. Calyces densely pubescent or pilose outside, at least on the teeth; petals white, pink, or purple.
 5. Leaves long pilose; stems ± pilose; rare on extreme e margin of nc TX **D. villosa**



Coronilla varia [WIL]



Crotalaria purshii [RHO]



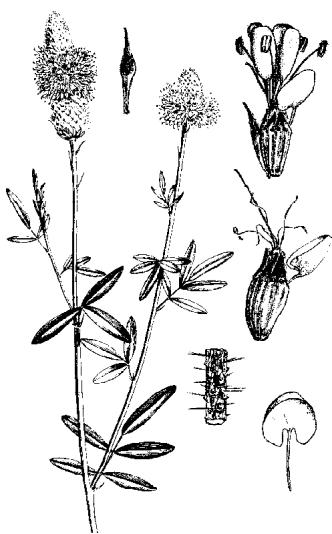
Crotalaria retusa [WIL]



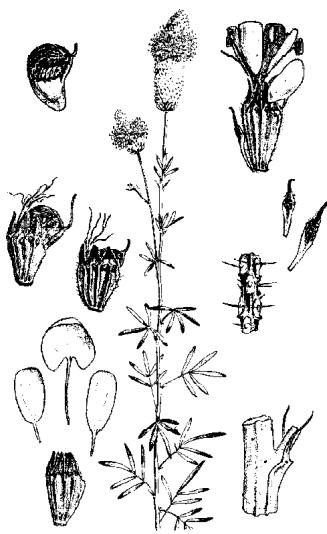
Crotalaria sagittalis [RHO]



Crotalaria spectabilis [GRE]



Dalea candida var. candida [MIC, MNY]



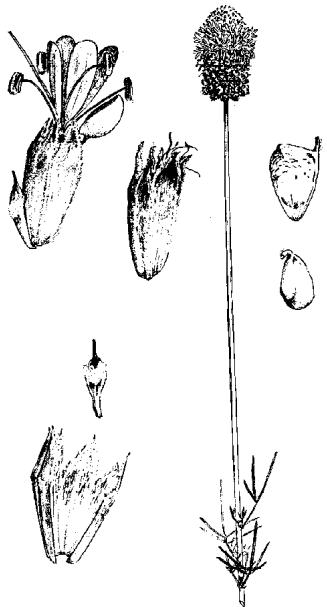
Dalea candida var. oligophylla [MIC, MNY]



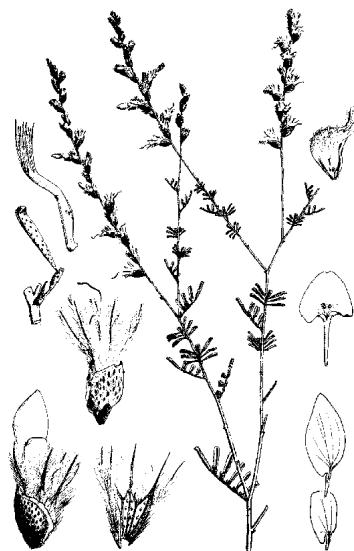
Dalea aurea [MNY]

5. Leaves glabrous; stems glabrous or short pubescent; widespread in nc TX.
6. Leaflets 13–41(–49) per leaf, the larger lanceolate to oblong or elliptic, 2–5 times as long as wide; petals white _____ **D. phleoides**
6. Leaflets 3–9(–11) per leaf, the larger linear or linear-oblong to linear-lanceolate, 5–20 times as long as wide; petals pink to purple.
7. Spikes crowded but not densely cone-like, the inflorescence axis visible in part after flowering, at least in pressed specimens; calyx teeth as long as the tube or nearly so and distinguishable with the naked eye; leaflets usually 7–9(–11) per leaf; stems decumbent; rare endemic known only from Hood, Parker, and Wise cos. _____ **D. reverchonii**
7. Spikes permanently dense and cone-like, the flowers even when pressed completely concealing the inflorescence axis; calyx teeth shorter than the tube and usually not easily distinguishable with the naked eye; leaflets 3–7 per leaf; stems ascending to erect; including species widespread in nc TX.
8. Cone-like spikes 7–10 mm thick in fruit (or in flower excluding corollas); pubescence of calyces of two types, that of tube retrorsely descending, that of teeth antrorsely ascending: s Wise Co. s and w _____ **D. tenuis**
8. Cone-like spikes usually 10–14 mm thick in fruit (or in flower excluding corollas); pubescence of calyces antrorsely ascending; including species widespread in nc TX.
9. Calyx tube largely or wholly glabrous in sharp contrast to the pubescent teeth; peduncles 4–12 cm long; widespread in nc TX _____ **D. compacta**
9. Calyx tube densely pubescent, the pubescence essentially the same as on the teeth; peduncles variable in length but often < 4 cm long; only in n part of nc TX _____ **D. purpurea**
2. Calyx teeth with bristle-like tips slightly shorter to much longer than the tube; stamens usually 7–10; 1 petal attached near rim of floral cup, the other 4 at various places on the "stamen tube," but not at its end.
10. Petals white; flowers widely spaced in slender, drooping spikes; plants usually with a single main stem from the base (this can be quite branched); leaflets completely glabrous _____ **D. enneandra**
10. Petals yellow or purple; flowers crowded in rather slender to thick, spreading to erect spikes; plants usually with several main stems from the base; leaflets glabrous or pubescent.
11. Petals purple; leaflets glabrous or pubescent.
12. Leaflets with dense pubescence; spikes narrow, 3–8 mm wide in fruit (or in flower excluding corollas); stems prostrate; on sandy soils on n margin of nc TX _____ **D. lanata**
12. Leaflets completely glabrous; spikes 10–13 mm wide in fruit (or in flower excluding corollas); stems decumbent to ascending; on limestone on w margin of nc TX _____ **D. lasiathera**
11. Petals yellow; leaflets all pubescent.
13. Main leaves of the stem with 5–7(–9) leaflets (mostly 5).
14. Spikes (12–)14–21 mm wide in fruit (or in flower excluding corollas), 20–50 mm long; stems usually erect, 30–75 cm long; standard (blade and claw) 6.3–8.6 mm long; yellow petals staying yellow even when old or dry; w Blackland Prairie w through most of nc TX _____ **D. aurea**
14. Spikes 7–13(–15) mm wide in fruit (or in flower excluding corollas), 10–30 mm long; stems often spreading, 5–35 cm long; standard 4.4–5.5 mm long; yellow petals often fading to pink or brown; on the sw margin of nc TX _____ **D. nana**
13. Main leaves of the stem with 3 leaflets (some upper leaves with 1 or 2) _____ **D. hallii**

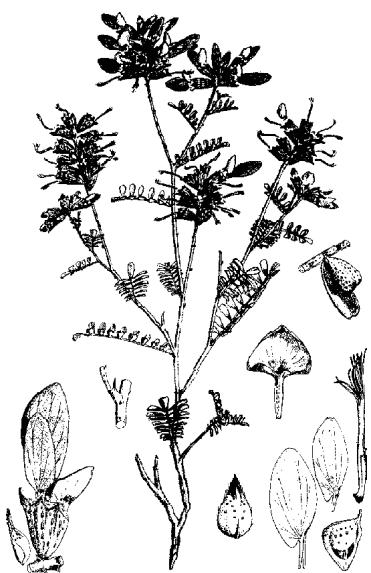
Dalea aurea Nutt. ex Pursh, (golden, in reference to the flowers), GOLDEN DALEA, SILK-TOP DALEA. Stems spreading to usually erect, 30–75 cm long; leaflets 5(–7), 10–20 mm long, pubescent; petals yellow. Silty or gravelly limestone soils; Blackland Prairie (Grayson Co.) s and w to w TX. Late May–Jul, sporadically to Sep. ☼/86



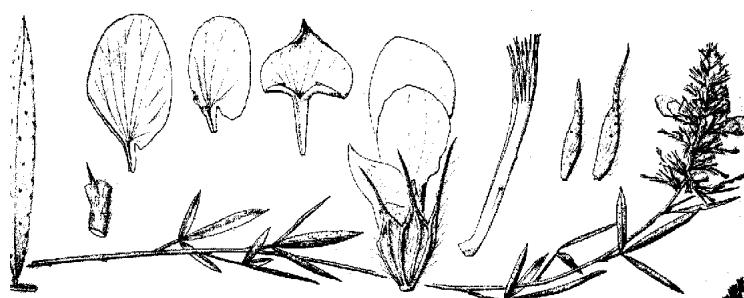
Dalea compacta var. pubescens [MNY]



Dalea enneandra [MNY]



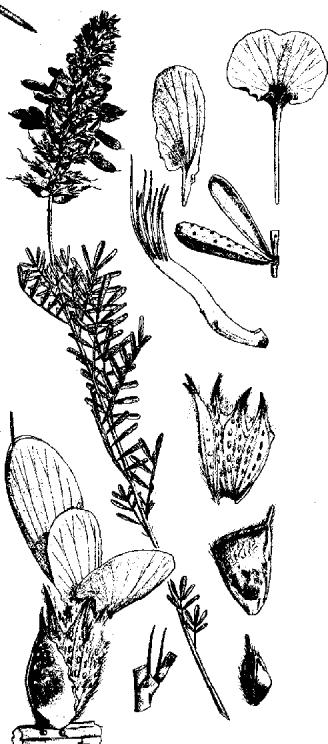
Dalea frutescens [MNY]



Dalea hallii [MNY]



Dalea lanata [MNY]



Dalea lasiathera [MNY]

Dalea candida Willd., (shining or pure white, in reference to the flowers). Stems spreading or ascending, 30–100 cm long; leaflets 5–9, 10–30 mm long, linear-lanceolate or oblanceolate, acute to obtuse, glabrous; petals white; calyces usually with a ring of small glands near top. Prairies and open woods; sandy, rocky, or clayey soils. Late May–early Jul. The 2 varieties intergrade (Turner 1959) and are questionably distinct.

1. Most lateral leaflets > 2 mm wide; apical leaflet of larger leaves 15–32 mm long, 3–8 mm wide (much smaller on second-growth stems of injured plants); spikes remaining dense during and after flowering, the axis concealed _____ var. **candida**
1. Most lateral leaflets < 2 mm wide; apical leaflet of larger leaves 7–20 mm long, 1–6 mm wide; spikes becoming loose, exposing the axis _____ var. **oligophylla**

var. **candida**. Dallas, Fannin, Grayson, Hopkins, and Lamar cos., also Denton Co. (J. Quayle, pers. comm.); e TX w to Rolling Plains (Turner 1959). [*Petalostemon candidus* Michx.]

var. **oligophylla** (Torr.) Shinners, (few-leaved). Panhandle to Trans-Pecos, e to Rolling Plains (Wichita Co.) just w of nc TX; there is a single report (Montague Co. in the West Cross Timbers) from nc TX (Turner 1959). [*Petalostemon candidus* Michx. var. *oligophyllus*(Torr.) F.J. Herm.]

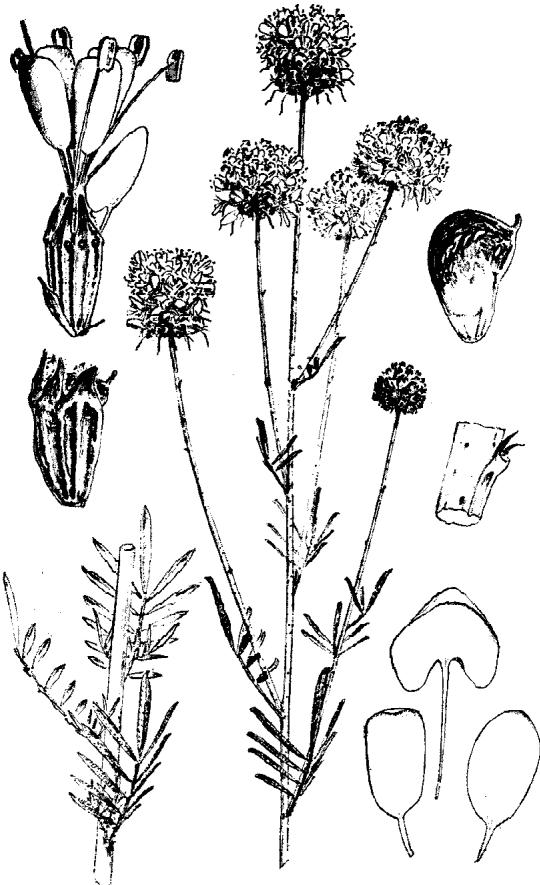
Dalea compacta Spreng. var. **pubescens** (A. Gray) Barneby, (sp.: compact, dense; var.: pubescent, downy), SHOWY PRAIRIE-CLOVER, PRAIRIE-CLOVER. Stems erect, 30–70 cm tall; leaflets 3–7, 10–25 mm long, glabrous or with sparse pubescence; spikes usually 10–14 mm thick (more slender on small, new shoots of mowed plants); petals purplish. Prairies, on clay and limestone; Blackland Prairie w to e Rolling Plains. Jun–early Jul. [*D. helleri* Shinners, *Petalostemon pulcherrimus* (A. Heller) A. Heller]

Dalea enneandra Nutt., (with nine stamens), BIG-TOP DALEA. Stems 20–150 cm tall, bushy-branched above, from a tough, woody, orange root; leaflets usually 5–9, narrowly linear to oblong, 5–12 mm long, glabrous; calyx teeth conspicuously white-pilose; keel pale yellow; standard and wings white. Rocky, sandy, or silty soils; Blackland Prairie w to the Panhandle. Jun–Jul. [*D. laxiflora* Pursh, *D. enneandra* var. *pumila* (Shinners) B.L. Turner] While recently lumped by most authorities, *D. enneandra* var. *pumila*, originally named by Shinners who observed the plants for many years in the field, likely deserves varietal recognition. The plants are consistently short (20–30 cm tall) and compact, with shorter, denser inflorescences, and overall in the field have a different aspect from typical *D. enneandra*. These plants are known from Ellis and Hill cos. in nc TX and from Gillespie and Kerr cos. on the Edwards Plateau.

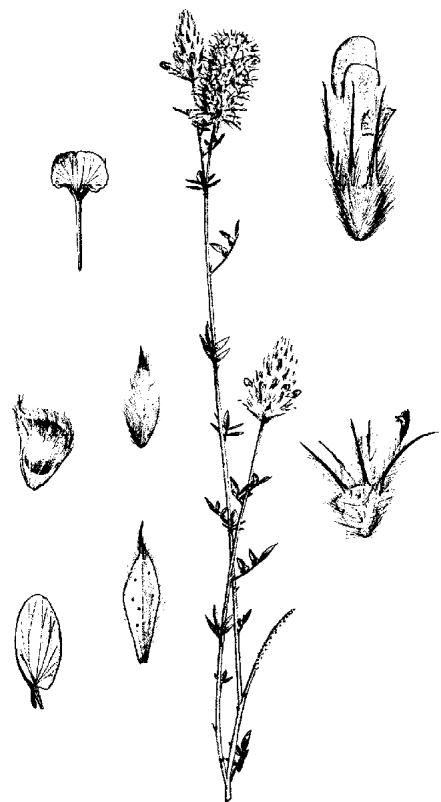
Dalea frutescens A. Gray, (shrubby, bushy), BLACK DALEA. Small shrubs, 30–80(–120) cm tall; leaflets 13–17, 1.5–3.5(–5) mm long, glabrous; flowers in short, few-flowered spikes; bracts conspicuously gland-dotted; calyx lobes shorter than tube, the tube glabrous; petals purplish. Rocky, disturbed habitats; Montague, Dallas, and Bell cos. s and w to c TX and the Trans-Pecos. Apr–Sep. [*D. frutescens* var. *laxa* B.L. Turner] *Pilotyles thurberi* A. Gray (THURBER'S PILOSTYLES), a member of the Rafflesiaceae, parasitizes *D. frutescens* in nc TX; its vegetative structures are ± entirely within the tissues of the host plant with the visible portions bud-like; only the small flowers and sometimes a few subtending scale-like leaves are externally visible.

Dalea hallii A. Gray, (for its collector, Elihu Hall, 1822–1882, collected in TX and also botanized with Parry in the Rocky Mts.), HALL'S DALEA. Stems trailing to erect, to 35 cm long, appressed-pubescent; leaflets 3, 10–25 mm long, pubescent below; calyces red-brown, the tube and teeth pilose; petals yellow. Eroding limestone slopes; Blackland Prairie and Grand Prairie s to c TX; endemic to TX. Late May–Jun, repeating in Sep. Type from Dallas (Barneby 1977). 

Dalea lanata Spreng., (woolly), WOOLLY DALEA. Perennial from a tough orange root, with ascending to trailing stems 30–70 cm long; stems and leaves gray-pubescent; leaflets 9–13, 4–12 mm



Dalea multiflora [MNY]



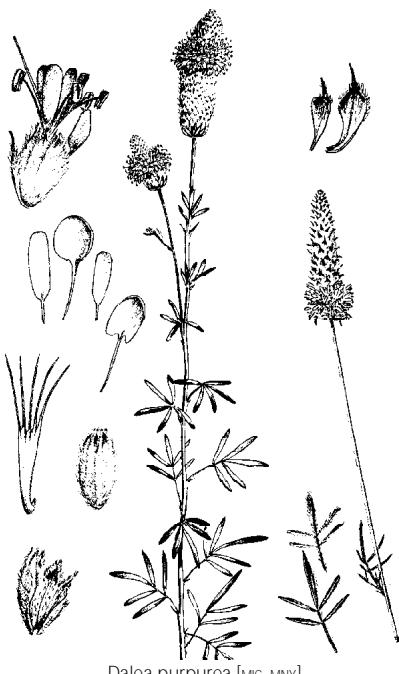
Dalea nana var. carnescens [MNY]



Dalea nana var. nana [MNY]



Dalea phleoides var. microphylla [MNY]



Dalea purpurea [MIC, MNY]

long; petals purple or red-purple. Gravelly or sandy soils; Grayson Co. in Red River drainage; extreme s TX, Panhandle to Trans-Pecos, e in Red River drainage to nc TX. Jul-Sep.

Dalea lasiathera A. Gray, (with woolly awns, of the calyx teeth), PURPLE DALEA. Stems decumbent to ascending, 10–35 cm tall; leaflets 7–13, 5–15 mm long, glabrous; bracts conspicuously gland-dotted to the naked eye; calyx teeth always shorter than tube, pilose but not plumose; petals purple. Limestone hillsides; Brown Co. on w margin of nc TX; c and w TX n to w edge of nc TX. Mar-Jun. /86

Dalea multiflora (Nutt.) Shinners, (many-flowered), ROUND-HEAD DALEA, WHITE PRAIRIE-CLOVER. Bushy-branched; stems erect or ascending, 30–60 cm long; leaflets 3–9, 6–12 mm long, glabrous, linear or narrowly oblanceolate; petals white. Prairies, on limestone or calcareous clay; Blackland Prairie w to Rolling Plains and s to se TX. Mid-Jun–mid-Jul (mowed plants as late as Sep). [*Petalostemon multiflorus* Nutt.]

Dalea nana Torr. ex A. Gray, (dwarf), DWARF DALEA. Stems decumbent to ascending, 10–30 cm tall; leaflets 5–9, 5–15 mm long, pubescent; petals yellow. Sandy, rocky, or gravelly areas, prairies, roadsides; s and w TX n to sw part of nc TX. Late Mar–Sep.

1. Bracts narrower, narrowly ovate, lanceolate, or elliptic-acuminate, 1.2–2 mm wide; spikes permanently dense and cone-like, the flowers in each vertical rank contiguous or nearly so, the axis concealed; calyx tube vase-shaped, 1.6–2.4 mm in diam.; usually on rocky or gravelly areas, particularly limestone _____ var. **carnescens**
1. Bracts broadly ovate, obovate, or elliptic-acuminate, 2–4 mm wide; spikes relatively loose, at least with age, the flowers in each vertical rank at least 1 mm apart, the axis partly visible in pressed specimens; calyx-tube campanulate, 2.2–3 mm in diam.; usually on sandy soils, not on limestone _____ var. **nana**

var. **carnescens** Kearney & Peebles, (derivation not given in type description, possibly from Latin: *carneus*, flesh-colored, and *escens* becoming, from the corolla described as fading to reddish). Brown and Lampasas cos.; mainly Edwards Plateau to Trans-Pecos. [*D. nana* var. *elatior* A. Gray ex B.L. Turner]

var. **nana**. Callahan Co; mainly s and w TX.

Dalea phleoides (Torr. & A. Gray) Shinners var. **microphylla** (Torr. & A. Gray) Barneby, (sp: resembling *Phleum* of the Poaceae, in reference to the narrow spike; var: small-leaved), LONG-BRACT PRAIRIE-CLOVER. Stems erect or ascending, 20–60 cm tall; leaflets usually 25–41(–49) per leaf, 4–6 mm long, pilose or glabrate with age; peduncles conspicuously glandular; spikes becoming elongate; axis of spike and calyx tube, at least at base and often throughout, pilosulous with spreading-incurved hairs; petals white. Sandy open woods and open ground; Limestone, Parker, and Tarrant cos., also Brown (HPC) and Montague (Barneby 1977) cos; se and e TX w to Rolling Plains (Young Co.–Mahler 1988) and Edwards Plateau. Jun–early Jul, repeating in September. [*D. drummondiana* Shinners, *Petalostemon phleoides* Torr. & A. Gray var. *microphyllus* (Torr. & A. Gray) Barneby]

var. *phleoides*, GLANDULAR PRAIRIE-CLOVER, SLIM-SPIKE PRAIRIE-CLOVER, is known just to the e of nc TX. It can be distinguished by the leaflets 13–21(–25) per leaf and the axis of the spike and the exterior of calyces glabrous or almost so (but glands often conspicuous on the peduncle).

Dalea purpurea Vent., (purple), PURPLE PRAIRIE-CLOVER, PRAIRIE-CLOVER. Stems erect to ascending, 20–90 cm tall, simple or sparingly branched above; leaflets usually 5, 8–20 mm long, linear, glabrous or villous; spikes, at least well-developed ones, usually 10–13 thick in fruit; petals purple. Sandy prairies; Montague Co., also Red River and Wichita cos. (Mahler 1988), rarely s to

Tarrant Co. (Mahler 1988); also in the Trans-Pecos (Correll & Johnston 1970). Jun-early Jul. [*Petalostemon purpureus* (Vent.) Rydb.]

 **Dalea reverchonii** (S. Watson) Shinners, (for Julien Reverchon, 1837–1905, a French-American immigrant to Dallas and important botanical collector of early TX), COMANCHE PEAK PRAIRIE-CLOVER. Similar to *D. tenuis*; stems 10–30 cm long, decumbent; leaflets usually 7–9(–11), 5–10 mm long, glabrous; spikes 10–70 mm long in fruit, essentially sessile (peduncles to ca. 1.5 cm long); calyx teeth rather short pubescent; petals rose to magenta-purple. Limestone with sandy surface; type locality—Comanche Peak (Hood Co.); only known current populations are in Parker and Wise cos; narrowly endemic to nc TX. May-Jun, sporadically afterward depending upon rainfall. [*Petalostemon reverchonii* S. Watson] (TOES 1993: V)  

Dalea tenuis (J.M. Coulter) Shinners, (slender, thin). Stems erect or ascending, 15–50 cm tall, glabrous or inconspicuously pubescent, widely branched; leaflets 3–5, 5–12 mm long, glabrous or nearly so; spikes 10–30 mm long in fruit, on slender peduncles 1.5–15 cm long; petals pink-purple. Eroding limestone slopes; sw Fort Worth Prairie (from s Wise Co.) s through Lampasas Cut Plain to Edwards Plateau and w to e Rolling Plains; endemic to TX. Jun. [*D. stanfieldii* (Small) Shinners, *Petalostemon tenuis* (J.M. Coulter) A. Heller] 

Dalea villosa (Nutt.) Spreng. var. **grisea** (Torr. & A. Gray) Barneby, (sp.: villous, soft hairy; var.: gray). Stems usually erect, 20–70 cm tall; leaflets 9–17, 6–12 mm long; spikes short-peduncled; petals pink or pink-purple. Milam Co. (Turner 1959) on e margin of nc TX; mainly se and e TX. Spring–summer. [*Petalostemon griseus* Torr. & A. Gray]

Dalea emarginata (Torr & A. Gray) Shinners, (with a shallow notch at the end), an annual with a slender taproot cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2), probably only occurs s of nc TX n to Llano Co.

Dalea pogonathera A. Gray, (with bearded awns, in reference to the plumose calyx teeth), BEARDED DALEA, HIERBA DEL CORAZÓN, similar to *D. lasianthera*, but with calyx lobes usually longer than the tube and plumose, is cited by Hatch et al. (1990) for vegetational area 5 (Fig. 2) but apparently comes e only as far as Wichita Co., in the Rolling Plains to the w of nc TX.

DESMANTHUS BUNDLE-FLOWER

Unarmed herbaceous or semi-shrubby perennials; root often woody; leaves twice even-pinnately compound, with a petiolate gland between the lowest pair of pinnae (gland sometimes minute); flowers in peduncled, axillary heads; petals separate, linear; stamens 5 or 10; filaments white or yellowish white, separate, serving as the main attractant structure for the flower; fruits flattened, 1-several-seeded, dehiscent. Many species have nyctinastic (= nighttime or “sleep”) leaf movements (Luckow 1993).

 A genus of 24 species of warm areas of the Americas. We are following Luckow (1993) for nomenclature of *Desmanthus*. (Greek: *desme*, a bundle, and *anthos*, a flower, presumably from the flowers clustered in heads) (subfamily Mimosoideae, tribe Mimosae)

REFERENCES: Turner 1950a, 1950b; Isely 1970a, 1973; Luckow 1993.

1. Young stems minutely pubescent all around; peduncles ± equaling or exceeding the subtending leaves _____ **D. velutinus**
1. Young stems glabrous except on the angles; peduncles shorter than the subtending leaves.
 2. Leaves with 2–4(–5) pairs of pinnae (each with numerous leaflets); stamens 10.
 3. Stipules conspicuously pubescent; nectaries on petiole large, wider than petiole, somewhat flattened; fruits falcate; taproot red, cylindrical or napiform _____ **D. acuminatus**
 3. Stipules usually glabrous; nectaries on petiole small, orbicular; fruits straight; taproot brown, cylindrical _____ **D. virgatus**

2. Leaves (except smallest) with 5–18 pairs of pinnae; stamens 5.
4. Heads 4–12-flowered; fruits nearly straight, at maturity 2–3 mm wide, 35–70 mm long, usually ca. 7 times or more longer than wide, readily dehiscent along both sutures _____ **D. leptolobus**
4. Heads 20–70-flowered; fruits strongly sickle-shaped, at maturity 4.5–7 mm wide, 15–32 mm long, 3–4 times longer than wide, dehiscent along both sutures but tardily so on one side _____ **D. illinoensis**

Desmanthus acuminatus Benth., (tapering to a long narrow point), SHARP-POD BUNDLE-FLOWER. Stems sprawling to decumbent or ascending, usually 20–60 cm long; petioles 3–6 mm long; heads with 6–13 flowers; fruits ca. 30–50 mm long. Gravelly or sandy ground; n to Bell, Burnet, and McLennan cos. in s part of nc TX, also Hamilton (HPC) and Williamson (Luckow 1993) cos; s part of nc TX s to sc TX; endemic to TX. Apr–May(–fall). [Desmanthus virgatus (L.) Willd. var. *acuminatus* (Benth.) Isely] While this taxon is often treated as a variety of *D. virgatus* (e.g., Kartesz 1994; Jones et al. 1997), we are following Luckow (1993) in treating it as a distinct species; she cited numerous differences. 

Desmanthus illinoensis (Michx.) MacMill. ex B.L. Rob. & Fernald, (of Illinois), ILLINOIS BUNDLE-FLOWER, ILLINOIS DESMANTHUS, PRAIRIE-MIMOSA, PRICKLEWEED. Stems erect or spreading, 20–150 cm tall; petioles 2–10 mm long; fruits 3–4 times as long as broad (vs. at least 7 times in our other species), tightly clustered. Ditches, stream bottoms, fields, roadsides, and low areas, often clay soils; nearly throughout TX. Late May–Jun, sporadically to Sep.

Desmanthus leptolobus Torr. & A. Gray, (thin-lobed), PRAIRIE BUNDLE-FLOWER, PRAIRIE-MIMOSA. Stems prostrate to suberect, 60–100 cm long; leaflets essentially linear or narrowly elliptic; petioles 2–5 mm long. Prairies and open ground, clayey, rocky, or less often sandy soils, often a weed in lawns; Post Oak Savannah w through nc TX to Rolling Plains and e Edwards Plateau. Late May–Jun.

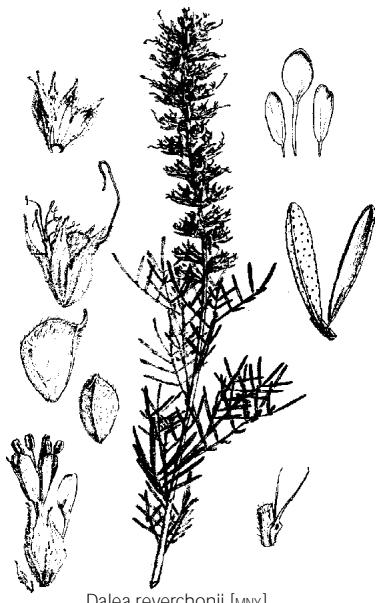
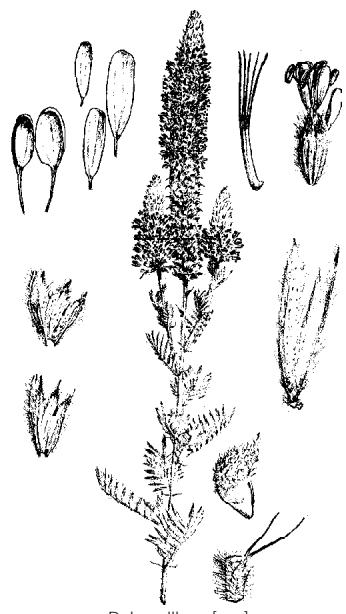
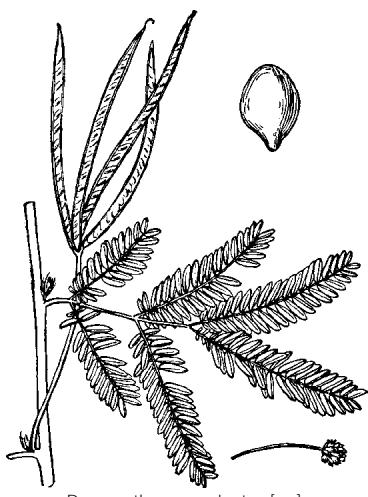
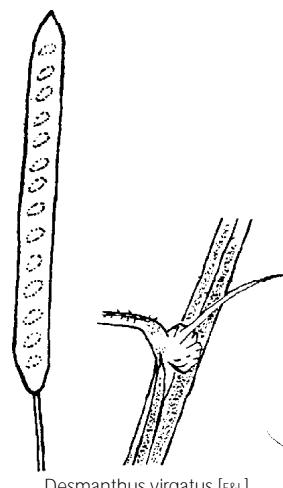
Desmanthus velutinus Scheele, (velvety). Stems spreading to erect, 20–50 cm long; leaves with 3–7 pairs of pinnae; petioles 4–12 mm long; flowers 15–33 per head; stamens 10; fruits straight, ca. 30–80 mm long. Rocky limestone outcrops; Bell, Bosque, Dallas, Hill, and Williamson cos., also Collin Co. and many cos. in the West Cross Timbers (Luckow 1993); nc TX s and w to w TX. May–Jun and Sep–Oct, sporadically Jul–Aug.

Desmanthus virgatus (L.) Willd., (twiggy). Stems prostrate to erect, to 1.5 m tall; foliage on living plants blue-green, glaucous; petioles usually 1–3(–5) mm long; heads with 3–22 flowers; fruits straight or slightly falcate, 22–88 mm long. Disturbed areas; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); Rio Grand Plains and sc TX n to at least Travis Co. (Correll & Johnston 1970; Luckow 1993). Apr–Nov. [D. *depressus* Humb. & Bonpl. ex Willd., *D. virgatus* var. *depressus* (Humb. & Bonpl. ex Willd.) B.L. Turner] While TX material is sometimes treated as *D. virgatus* var. *depressus* (Kartesz 1994; Jones et al. 1997), we are following Luckow (1993) in lumping this variety. She indicated that the holotype of *D. virgatus* (at LINN) corresponds to what has traditionally been called *D. virgatus* var. *depressus*.

Desmanthus reticulatus Benth., (netted), NET-LEAF BUNDLE-FLOWER, cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2), is endemic to s and c TX and apparently extends n only as far as Travis Co. (Correll & Johnston 1970; Luckow 1993) just s of nc TX. It is distinguished by having the lower surface of the leaflets with raised, somewhat reticulate veins (not so in nc TX species), leaves with 1–4 pairs of pinnae, stems pubescent all around, and the fruits on peduncles 80–150 mm long (4–60 mm long in nc TX species). 

DESMODIUM TICK-CLOVER, BEGGAR'S-LICE, BEGGAR'S-TICKS

Ours perennial herbs; leaves pinnately compound; leaflets 3 (except *D. psilophyllum* with 1

*Dalea reverchonii* [MNY]*Dalea tenuis* [MNY]*Dalea villosa* [MNY]*Desmanthus acuminatus* [BR2]*Desmanthus illinoensis* [BB2]*Desmanthus leptolobus* [BB2]*Desmanthus virgatus* [F&L]*Desmanthus velutinus* [HEA]

leaflet); stipules broad or narrow, persistent or falling early; flowers small, usually many, in erect, narrow racemes or panicles; petals pink, lavender, red-purple, purple, or whitish, often drying bluish or a striking blue-green; fruits (loments) flat, constricted into ca. 2–6 one-seeded segments, usually with small hooked hairs. In nc TX the genus is easily identified in the field because it is the only native group with flat fruits breaking into segments.

— A genus of 450 species of warm areas of the world, especially e Asia, Brazil, and Mexico. The fruits fall into 1-seeded segments which stick to hair or clothing, hence the common names. Species are variously used as fodder, green manure, or medicinally. (Greek: *desmos* a chain, alluding to the connected segments of the fruit giving it a chain-like appearance) (subfamily Papilioideae, tribe Desmodieae)

REFERENCES: Schubert 1950; Isely 1983.

1. Leaves apparently simple (with 1 leaflet) _____ **D. psilophyllum**
1. Leaves compound, with 3 leaflets.
 2. Calyces hardly lobed, merely with 5 nearly equal teeth, these not more than 1/2 as long as the tube; incisions between fruit segments cutting almost completely through fruit; stipe of fruit exserted from calyx, 3 times or more as long as calyx; leaflets estipellate; stamens monadelphous.
 3. Stems usually branched; leaves dispersed over the stem; petals white; leaflets acute or slightly acuminate; inflorescences usually 20 cm or less long _____ **D. pauciflorum**
 3. Stems unbranched below inflorescence; leaves clustered, almost in a whorl; petals usually pink to purple; leaflets conspicuously and often rather abruptly acuminate; inflorescences 30–80 cm long _____ **D. glutinosum**
 2. Calyces 2-lobed (the upper lobe 2-toothed, the lower lobe with the central tooth longer than the 2 laterals), the teeth very unequal, slightly shorter to much longer than the tube (lower lobe with central tooth longer); incisions between fruit segments various, usually cutting 1/2–7/8 of way through fruit, not completely to band of tissue at upper margin; stipe of fruit usually not exserted from calyx or only slightly so (up to 2.5 times as long as calyx); leaflets stipellate; stamens diadelphous.
 4. Either inflorescence axis pilose (long straight hairs) as well as having short hooked hairs OR leaves with large conspicuous pale or whitish area along midvein; stipules ovate (but with elongate tip), 3–8 mm wide at base and semi-clasping; pedicels long, in flower 5–15 mm long; lower surface of leaf blades with pubescence of hooked hairs (lens or scope necessary).
 5. Leaflets with large conspicuous pale to whitish areas along midvein; inflorescence axis mainly with short hooked hairs; petals white with greenish or yellowish tinge, sometimes with lavender base _____ **D. tweedyi**
 5. Leaflets without pale to whitish areas along midvein; inflorescence axis pilose in addition to having short hooked hairs; petals pinkish purple or white _____ **D. canescens**
 4. Inflorescence axis not pilose (only with short hooked hairs); leaves without pale to whitish areas along midvein; stipules awl-shaped or lanceolate, 0.5–3 mm wide, not clasping; pedicels long or short, in flower 1–15 mm or more long; lower surface of leaf blades without hooked hairs (or with only a few along the veins).
 6. Fruits mostly with 2(–3) segments, these rounded below; flowers small, 3–6 mm long; plants glabrate or pubescent, not conspicuously villous.
 7. Leaves subsessile (petioles 3 mm or less long); leaflets narrow, narrowly oblong to linear, 4–10 times as long as wide; pedicels 5 mm or less long _____ **D. sessilifolium**
 7. Leaves usually petiolate (petioles 1–25 mm long); leaflets usually broadly ovate to elliptic, < 3.5 times as long as wide (very rarely to 5 times as long as wide); pedicels 3–20 mm long.
 8. Lateral leaflets of middle and lower leaves nearly as long as petioles; stems and leaves essentially glabrous or sparsely puberulent with short hooked hairs _____ **D. marilandicum**

8. Lateral leaflets of middle and lower leaves distinctly longer than petioles; stems and leaves pilose and/or densely puberulent with short hooked hairs.
9. Stems and leaves sparsely to densely pilose (hairs ± straight); terminal leaflets 9–30 mm long, usually 2.5 times as long as wide or less, similar to lateral leaflets _____ **D. ciliare**
9. Stems and leaves pubescent with short hooked hairs, but without pilose hairs or these rare; terminal leaflets (25–)30–75 mm long, 2–3.5 times as long as wide, usually longer and narrower than lateral leaflets _____ **D. obtusum**
6. Fruits mostly with 3–6 segments, these usually obtusely angled or if rounded then the plant at least somewhat villous; flowers usually 6–9 mm long.
10. Terminal leaflets rather broad, narrowly ovate to broadly ovate or rhombic to deltoid, 1–2.2 times as long as wide; plants in general and especially lower surface of leaflets villous (usually ± velvety to the touch); stipules often brick-red in color; bracts villous.
11. Fruits nearly straight below, with (3–)4–5(–6) segments, these usually 5–8 mm long and obtusely angled; terminal leaflet usually at least 2/3 as wide as long, rhombic to deltoid _____ **D. viridiflorum**
11. Fruits usually curved, with 2–4 segments, these 4–5 mm long and often rounded below; terminal leaflet ca. 1/2 as wide as long, elliptic-ovate _____ **D. nuttallii**
10. Terminal leaflets narrow, usually lanceolate to narrowly oblong, usually 2.5–10 times as long as wide; plants in general, including lower surface of leaflets with sparse pubescence, not velvety to the touch; stipules not reddish; bracts glabrate or sparsely hairy _____ **D. paniculatum**

Desmodium canescens (L.) DC., (gray pubescent), HOARY TICK-CLOVER. Stems erect or ascending, 0.5–1.2(–2) m tall; leaflets 5–10 cm long, 1.5–2 times as long as wide, petioles 19–100 mm long; pedicels 8–13 mm long; corollas 9–13 mm long, purplish or pinkish becoming greenish. Sandy woods; Dallas and Henderson cos.; mainly e TX. Sep.

Desmodium ciliare (Muhl. ex Willd.) DC., (ciliate, fringed), LITTLE-LEAF TICK-CLOVER. Stems ascending to erect, 0.4–1.5 m tall; leaflets 1.5–3 cm long, 1.5–2.3(–5) times as long as wide; petioles 1–3(–5) mm long; pedicels 3–8 mm long; corollas 3.5–5 mm long, lavender-purple or pink; fruits with 1–2(–3) segments, each segment 4–5 mm long. Sandy woods and openings; se and e TX w to East Cross Timbers. Aug–Oct.

Desmodium glutinosum (Muhl. ex Willd.) A.W. Wood, (glutinous, sticky). Stems erect, 0.3–0.8(–1.3) m tall; leaflets 5–10 cm long, usually 1–1.5 times as long as wide; petioles 30–80 mm long; leaves crowded just below inflorescence; pedicels 3.5–5.5 mm long; corollas 5–7 mm long, pink to pink-purple, drying bluish (rarely white); fruit segments 2–3, each segment 7.5–9 mm long. Woods; Dallas, Grayson, and Lamar cos.; mainly e TX. Jun–Jul.

Desmodium marilandicum (L.) DC., (of Maryland), MARYLAND TICK-CLOVER. Stems ascending or erect, 0.3–1 m tall; leaflets 1.5–2.5(–4) cm long, 1.2–1.5(–2) times as long as wide; petioles 10–25 mm long; pedicels 8–15 mm long; corollas ca. 5 mm long, lavender to red-violet, often drying bluish green; fruit segments 2(–3), each segment 3.5–4.5 mm long. Open woods; included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990); mainly e TX. Aug–Oct.

Desmodium nuttallii (Schindl.) B.G. Schub., (for Sir Thomas Nuttall, 1786–1859, English-American botanist), NUTTALL'S TICK-CLOVER. Stems ascending to erect, 0.3–1 m tall; terminal leaflet often largest; leaflets 2–8 cm long, 1.5–2(–2.2) times as long as wide; petioles 10–30 mm long; pedicels 4–10 mm long; corollas 6–7 mm long, purple or pink; fruit segments 2–4, each segment 4–5 mm long. Sandy open woods; included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990); mainly e TX. Jun–Sep.

Desmodium obtusum (Muhl. ex Willd.) DC., (blunt), RIGID TICK-CLOVER, STIFF TICK-CLOVER.

Stems ascending-erect, 0.5–1.5 m tall; leaflets (2.5–)4–6(–7.5) cm long, 2–3.5 times as long as wide, petioles 3–12 mm long; pedicels 4–10 mm long; corollas 4.5–6 mm long, pink-purple (rarely white); fruit segments 2–3, each segment 3–5 mm long. Sandy woods; included based on citation of collection near Tarrant-Denton County line (Turner 1959); mainly e TX. Oct. [*D. rigidum* (Elliott) DC.]

Desmodium paniculatum (L.) DC., (with flowers in panicles), PANICLED TICK-CLOVER. Stems 0.3–1(–1.5) m tall, ascending-spreading to erect, usually with few, long, wide-spreading branches; leaflets 2–5(–6) cm long, usually 3–8 times as long as wide, glossy and dark green above; petioles (10–)20–50 mm long; pedicels usually 6–12 mm long; corollas 6–7(–8) mm long, lilac to purple; fruit segments 3–5, each segment 3.5–7 mm long. Low woods, fencerows, and open ground; se and e TX w to Rolling Plains and Edwards Plateau. Jun–Sep. [*D. dichnotum* Shinners] is lumped with *D. paniculatum*; it is known only from a single collection n of Mineral Wells, Palo Pinto Co.

Desmodium pauciflorum (Nutt.) DC., (few-flowered), FEW-FLOWER TICK-CLOVER. Stems ascending or spreading, 0.2–0.6 m long; leaflets 3–7 cm long, 1.2–1.5 times as long as wide; petioles 30–70 mm long; pedicels 2–7 mm long; corollas 4.5–6 mm long, white; fruiting segments 1–2(–3), each segment 9–10 mm long. Woods; included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990); mainly e TX. Jul.

Desmodium psilophyllum Schltdl., (slender- or naked-leaved), WRIGHT'S TICK-CLOVER, SIMPLE-LEAF TICK-CLOVER. Stems ascending to erect, to 0.5(–0.9) m tall, minutely and inconspicuously pubescent; leaves apparently simple, the single leaflet 3.3–5.5 cm long, 1–2 cm wide; petioles 6–9 mm long; flowers in a loose raceme; pedicels 4–10 mm long; corollas pink or lavender-pink; fruit segments 4–4.5 mm long. Stream banks and rocky slopes; Bell Co. (Mahler 1988) in s part of nc TX; Trans-Pecos to Edwards Plateau and n to edge of nc TX. May. [*D. wrightii* A. Gray]

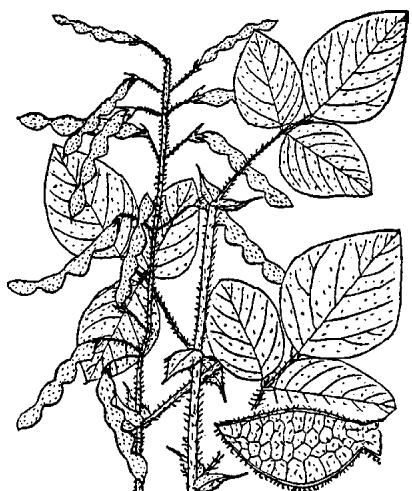
Desmodium sessilifolium (Torr.) Torr. & A. Gray, (sessile-leaved), SESSILE-LEAF TICK-CLOVER. Stems ascending-erect to erect, 0.5–1(–2) m tall, branched above, densely spreading-pubescent; leaves sessile or subsessile; leaflets (3–)4–8 cm long, 5–10 mm wide, 4–10 times as long as wide, densely soft-pubescent beneath, with prominent, raised veinlets; pedicels 2–5 mm long; corollas ca. 5 mm long, pale lavender to reddish purple to nearly white, withering greenish; fruit segments 2(–3), each segment 4.5–6 mm long. Sandy or rocky open woods, roadsides, and fields; e 1/2 of TX. Late May–Jul, less freely to Sep.

Desmodium tweedyi Britton, (for Frank Tweedy, 1854–1937, topographic engineer and botanical collector in the nw U.S.), TWEEDY'S TICK-CLOVER. Stems erect, to 1.25 m tall, short-pilose; leaflets 3–12 cm long, ovate to rhombic-elliptic, with raised veinlets beneath, forming a prominent network, densely spreading-pubescent beneath; petioles 40–90 mm long; pedicels 10–22 mm long; corollas white; fruit segments 6–8 mm long. Thickets in limestone areas; Blackland Prairie w to Rolling Plains and Edwards Plateau. Jun–Jul.

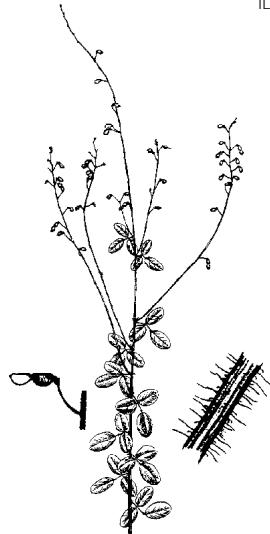
Desmodium viridiflorum (L.) DC., (green-flowered), VEILLET-LEAF TICK-CLOVER. Stems erect or ascending, 0.3–1 m tall; leaflets 5–12(–15) cm long, 1–1.5(–1.9) times as long as wide; petioles 20–50 mm long; pedicels 3–9 mm long; corollas 7–8 mm long, purple to pink or light lavender; fruit segments (3–)4–5(–6), each segment usually 5–8 mm long. Woods; Dallas, Grayson, and Henderson cos.; se and e TX w to nc TX. Sep–Oct.

ERYTHRINA CORAL-BEAN, COLORÍN

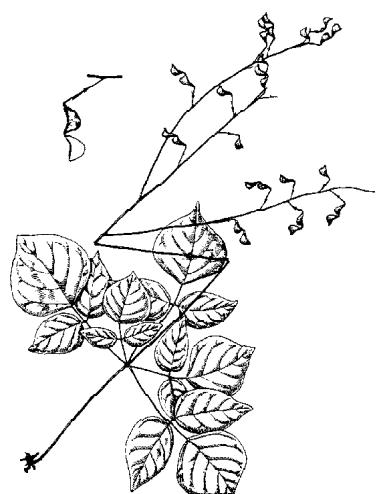
• A genus of 112 species of warm areas of the world. The species have red to orange flowers and are apparently all bird-pollinated. Species are variously used as shade trees, ornamentals with showy flowers (CORAL TREES), for their colorful seeds used as beads, or to shade coffee on



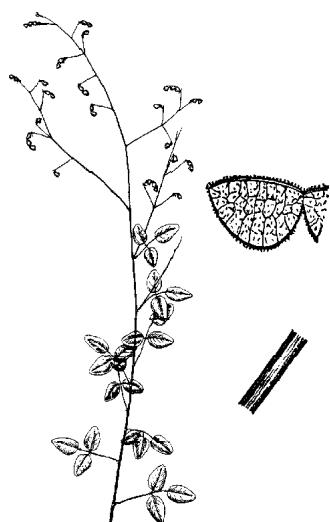
Desmodium canescens [BB2]



Desmodium ciliare [WL]



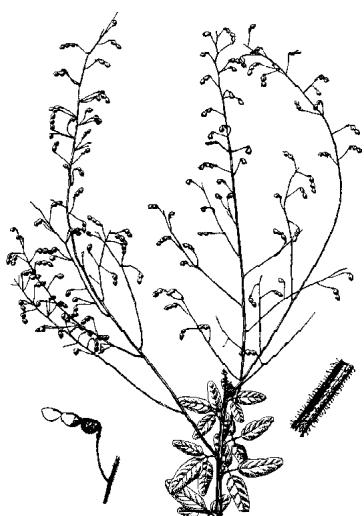
Desmodium glutinosum [WL]



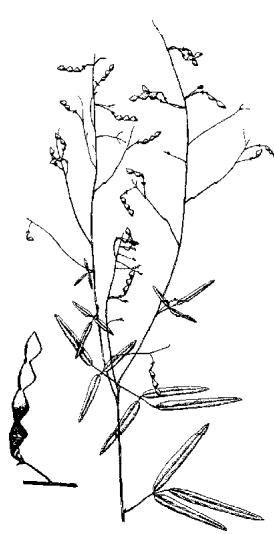
Desmodium marilandicum [WL]



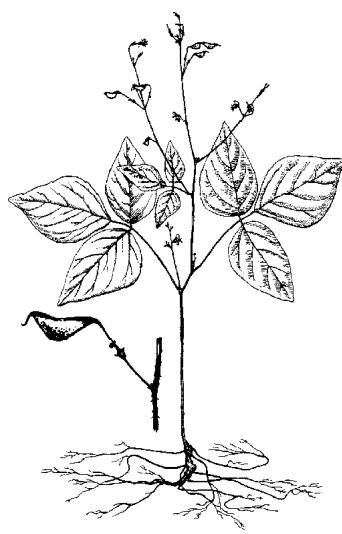
Desmodium nuttallii [WL]



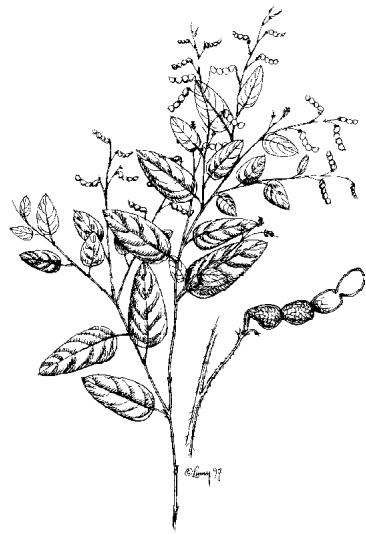
Desmodium obtusum [WL]



Desmodium paniculatum [WL]



Desmodium pauciflorum [WL]



Desmodium psilophyllum [HEA]

plantations. Some have extrafloral nectaries to attract ants which guard the plant against herbivores. ☣ The seeds of all species are reported to be poisonous; some are used as fish poisons (Burlage 1968). (Greek: *erythros*, red, referring to the color of the flowers) (subfamily Papilionoideae, tribe Phaseoleae)

REFERENCES: McClintock 1953; Krukoff & Barneby 1974.

Erythrina herbacea L., (herbaceous, not woody), CORAL-BEAN, EASTERN CORAL-BEAN, CHEROKEE-BEAN. Subshrub or shrub in nc TX dying back to the ground in winter; stems prickly, 0.5–2+ m tall; leaves alternate, pinnately compound with 3 leaflets; leaflets hastately 3-lobed to widely deltoid, (2–)4–13 cm long, glabrous or nearly so; inflorescence a terminal, long pedunculate raceme; pedicels 3–9 mm long; calyces ± tubular, 5–11.5 mm long; corollas scarlet, very showy, narrow and elongate; standard 30–53 mm long; wings and keel 5.5–13 mm long; stamens 10, usually diadelphous; fruits 7–15(–21) cm long, 1.2–1.6 cm wide, constricted between the seeds, the stipe 1.5–4.5 cm long; seeds scarlet, 5–13 mm long. Cultivated as an ornamental, apparently escaped in Fort Worth (Tarrant Co.); native to sandy woods of se and e TX to the se of nc TX. Apr-Jun. Austin (1975) considered this species adapted for pollination by ruby-throated hummingbirds (*Archilochus colubris*). The seeds have been used as beads; they contain numerous toxic alkaloids (e.g., erysodine, erysopine) and are used as a rat or dog poison in Mexico (Schmutz & Hamilton 1979; Morton 1982); according to Burlage (1968), the poison is similar in action to curare. ☣ 89

EYSENHARDTIA KIDNEYWOOD, BEEBRUSH

—A genus of 10 species native from the sw U.S. to Guatemala. (Named for C.W. Eysenhardt, M.D., professor at Univ. of Konigsberg, Prussia) (subfamily Papilionoideae, tribe Amorpheae)

Eysenhardtia texana Scheele, (of Texas), TEXAS KIDNEYWOOD, VARA DULCE. Largely glabrous unarmed shrub to 3 m tall; leaves crowded, once pinnately compound; leaflets many (15–47), (3–) 5–12 mm long, oblong, gland-dotted, aromatic, with the aroma of tangerine rinds; stipules thread-like, persistent; flowers in terminal, erect, solitary or panicled, slender, spike-like racemes, sweet-scented; petals 4–5, white to pale yellow, separate; stamens 10, diadelphous. Limestone hillsides; Bell and Williamson cos. in s part of nc TX, also Fort Hood (Bell or Coryell cos.—Sanchez 1997); s part of nc TX s to s TX and w to Trans-Pecos. Apr-Sep. [*E. angustifolia* Pennell] Dyes have been obtained from the wood and the wood is fluorescent in water (Powell 1988); the wood, according to Crosswhite (1980), “when leached in water turned the water orange, fluorescing blue against a black background. This was used as a diuretic [during frontier days].”

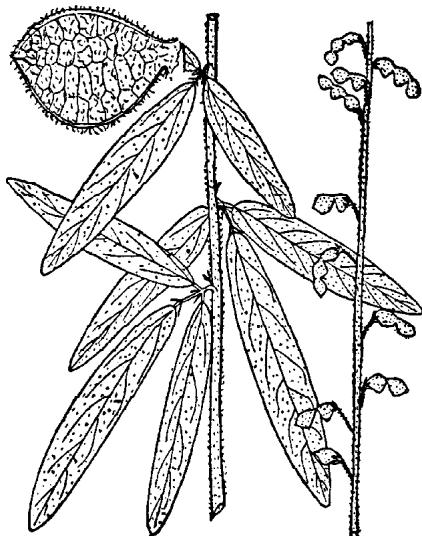
GALACTIA MILK-PEA

Prostrate perennials with trailing or twining stems, pubescent to nearly glabrous; leaves pinnately compound; leaflets 3 (5 in one species rare in nc TX); stipules thread-like, falling early; flowers in axillary, uncrowded, spike-like racemes; petals pink, roseate, pink-purple, or lavender.

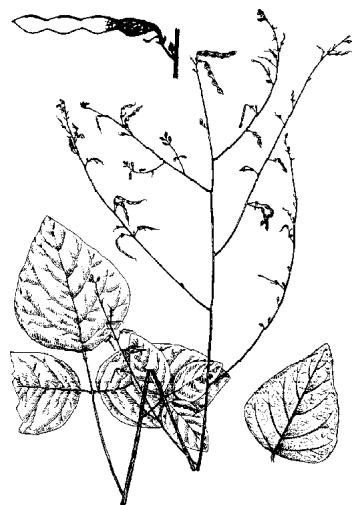
—A genus of 140 species of warm areas of the world, especially the Americas. Many have latex (rare in Fabaceae), hence the common name. (Greek: *gala*, milk; Patrick Browne originally stating that it has “milky branches”) (subfamily Papilionoideae, tribe Phaseoleae)

REFERENCES: Vail 1895; Rogers 1949; Duncan 1979.

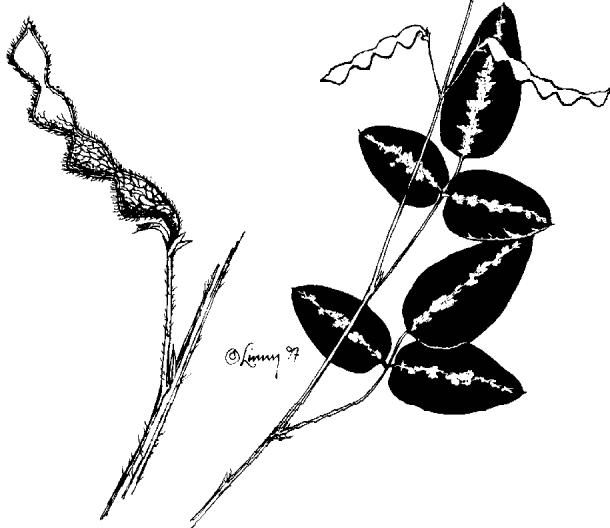
1. Leaves (at least most) with 5 leaflets; corollas lavender (standard often with some white); in nc TX known only from Brown Co. on w margin of area _____ **G. heterophylla**
1. Leaves with 3 leaflets; flowers pink to roseate or pink-purple; widespread in nc TX.
 2. Leaflets thick, leathery, with densely appressed pubescence on both surfaces but particularly



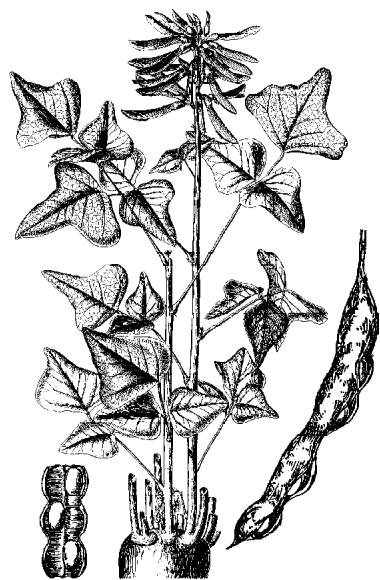
Desmodium sessifolium [BB2]



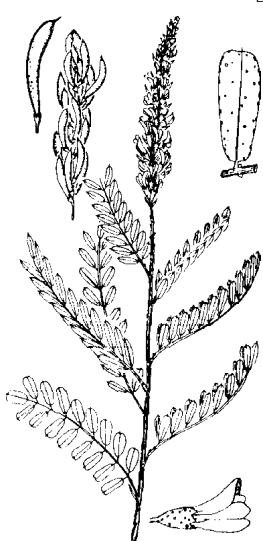
Desmodium viridiflorum [WL]



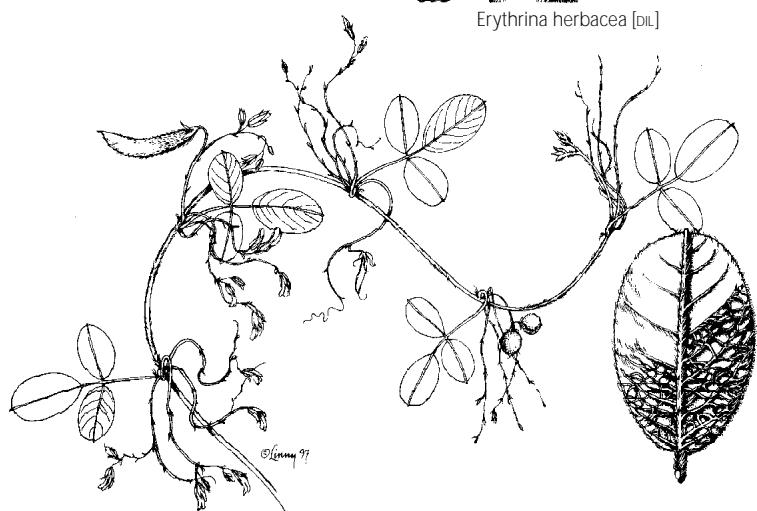
Desmodium tweedyi [HEA]



Erythrina herbacea [DIL]



Eysenhardtia texana [POW]



Galactia canescens [HEA]

- beneath, prominently reticulate-veined beneath to the naked eye; racemes 2–7 per node;
stems trailing but not twining; rare in nc TX _____ **G. canescens**
2. Leaflets thin, with pubescence ± spreading to nearly glabrate, not prominently reticulate beneath; racemes 1–2 per node; stems usually twining; widespread in nc TX _____ **G. volubilis**

Galactia canescens (Scheele) Benth., (gray-pubescent), HOARY MILK-PEA. Stems appressed-pubescent, to 2 m long; leaflets elliptic to orbicular-ovate; corollas 9–12 mm long, pinkish, developing into fruits above ground; cleistogamous flowers and small, peanut-like, 1-seeded fruits also produced underground. Sandy soils; South TX Plains disjunct n to Brazos River terrace (Hood Co.—R. O'Kennon, pers. obs., and Somervell Co.—Correll & Johnston 1970), also in deep sand near Azle in Parker and Tarrant cos; endemic to TX. May–Jun. ↗

Galactia heterophylla A. Gray, (various-leaved). Stems to 0.6 m long; leaflets 5, usually oblanceolate, the lower 2 pairs attached at the same spot, the terminal leaflet with a short (1–4 mm long) stalk; cleistogamous flowers and underground fruits not present. Shallow or gravelly soils; Brown Co. (HPC); w edge of nc TX s to Edwards Plateau, s, and se TX; endemic to TX. Apr–Sep. [G. grayi Vail] ↗

Galactia volubilis (L.) Britton, (twining around a support), DOWNTY MILK-PEA. Stems short villous to subappressed-pubescent, to 1–2 m long; leaflets ovate to oblong-lanceolate, 1.5–4.5(–5) cm long; corollas 8–12(–14) mm long, pink to roseate or pink-purple, fading pale; fruits 2–6 cm long. Dry open woods, thickets, semi-open areas; se and e TX w to nc TX and Edwards Plateau. Late May–Sep. [G. mississippiensis(Vail) Rydb.] Duncan (1979) had a different view of the correct nomenclature of this taxon and treated it as *G. regularis* (L.) Britton, Sterns, & Poggenb.

GLEDITSIA HONEY-LOCUST

Polygamous or dioecious trees or shrubs, usually armed with straight or branched thorns; leaves alternate, deciduous, once or twice pinnately compound, sometimes a leaf partly once pinnate, partly two times pinnate; leaflets entire or crenulate; flowers small, in lateral, catkin-like racemes appearing with the leaves; petals 3–5, resembling the calyx lobes, inconspicuous, yellowish or greenish yellow; stamens usually 6–10, separate; fruits stalked, flattened.

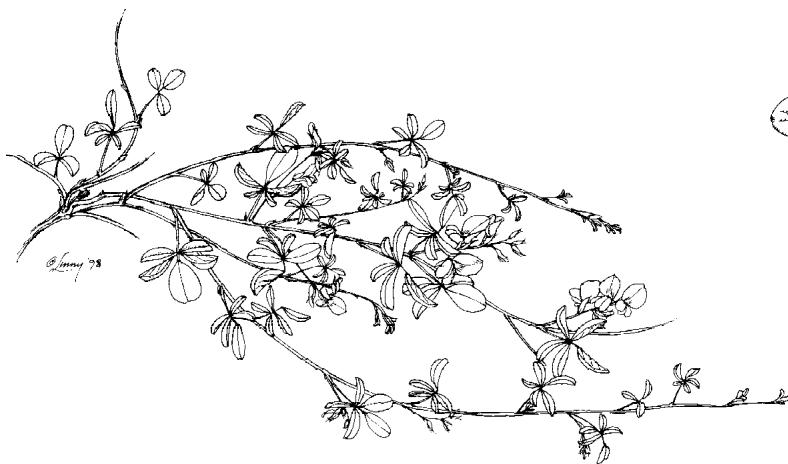
—A genus of 14 species, with 2–3 e North America, 1 South America, 1 Caspian area, and the rest India and Japan to New Guinea. They are trees usually with stout, axillary, branched thorns. Species are variously used as cultivated ornamentals, for shade, timber, or as hedges. (Simplified and Latinized from name of Johann Gottlieb Gleditsche, 1714–1786, a botanist contemporary with Linnaeus) (subfamily Caesalpinoideae, tribe Caesalpinieae)

REFERENCE: Michener 1986.

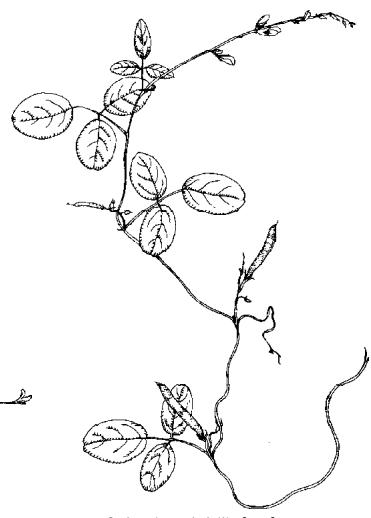
1. Fruits with only 1(–3) seeds, 3–5(–8) cm long, ± ovate, neither twisted nor contorted; mature leaf axes, stalks of leaflets, and leaflets glabrous or with a few hairs; seeds not surrounded by a sugary pulp _____ **G. aquatica**
1. Fruits many-seeded, 10–40 cm long, elongate, oblong, often twisted or contorted; mature leaf axes, stalks of leaflets, and often midribs on lower surfaces of leaflets pubescent; seeds surrounded by a sugary pulp _____ **G. triacanthos**

Gleditsia aquatica Marshall, (growing in or near water), WATER HONEY-LOCUST, WATER-LOCUST. To ca. 25 m tall, armed or unarmed; thorns if present simple or few-branched; leaves resembling *G. triacanthos* except for pubescence; fruits 2–3.5 cm wide; seeds 10–15 mm in diam. Swampy areas, along streams, bottomland woods; Lamar Co. in Red River drainage (Carr 1994); mainly se and e TX and Edwards Plateau. May–Jun.

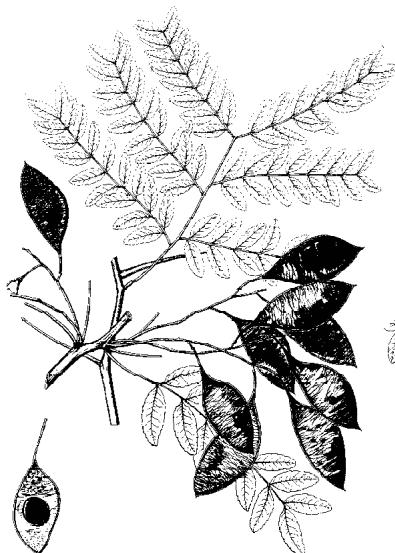
Gleditsia triacanthos L., (three-thorned), COMMON HONEY-LOCUST, HONEYSHUCK. To 30(–45) m



Galactia heterophylla [HEA]



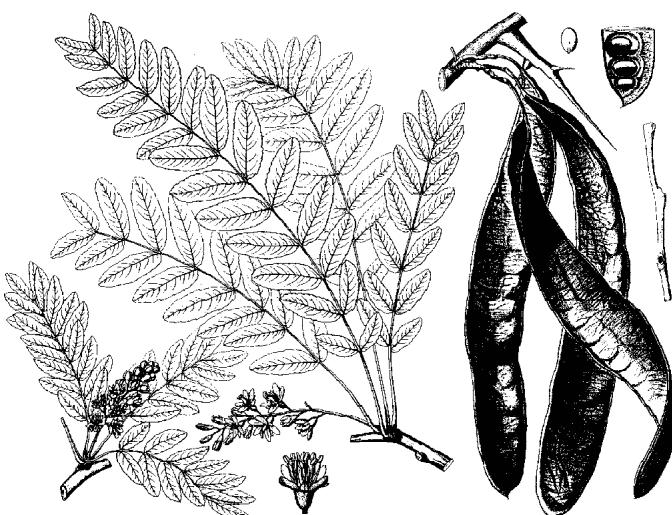
Galactia volubilis [HEA]



Gleditsia aquatica [SA3]



Glottidium vesicarium [Gwo]



Gleditsia tricanthos [SA3]



Glycine max [HE2]

tall, with long, stout, branched thorns on trunk and mostly simple ones on branches, rarely thornless; thorns sometimes very conspicuous, 6–15(–40) cm long; once pinnate leaves with 10–14 pairs of leaflets; twice pinnate leaves with 2–8 pairs of pinnae; leaflets 1.5–3(–3.5) mm long; petals 4–6 mm long; fruits 2–4 cm wide; seeds < 10 mm in diam. Stream bottoms, also weedy invader of disturbed sandy slopes or open ground, becoming problematic in some areas; se and e TX w to West Cross Timbers; also scattered in Rolling Plains and Edwards Plateau. Apr. [*G. triacanthos* var. *inermis* (L.) C.K. Schneid.] The very long thorns observed on some individuals are among the most striking examples of physical plant defense seen on any species in nc TX; Native Americans used them for fishing-spear tips (Cox & Leslie 1991). The thornless condition observed in some plants is unstable and appears to vary with age (Michener 1986). The sweet fruits (containing up to 30 percent sugar) are eaten by cattle, and Native Americans ate the honey-like substance in the young pods (Cox & Leslie 1991); according to Crosswhite (1980), “Early settlers using them for food called them ‘Honey-Shucks,’ eating the young pods and considering the older ones too bitter.”

GLOTTIDIUM BLADDERPOD, BAGPOD

—A monotypic genus of the se U.S.; previously treated in *Sesbania*. It can be recognized in the field by its large size, slender racemes of small flowers, and somewhat inflated fruits. (Presumably from Greek: *glotti*; tongue) (subfamily Papilionoideae, tribe Robinieae)

Glottidium vesicarium (Jacq.) R.M. Harper, (bladder-like), BLADDERPOD, BAGPOD. Unarmed annual herb to 4 m tall; leaves once pinnately compound; leaflets numerous; flowers in axillary racemes, reddish brown to orange or yellowish or tinged with pink or red; body of fruits oblong, 2.5–8 cm long, 1.5–2 cm wide, acuminate at both ends, the valves of fruits separating at maturity into a thicker outside layer and a papery-membranous, thinner, inside layer; stipe of fruits 1–1.5 cm long, 1–1.5 mm thick. In damp soils; se and e TX w to West Cross Timbers and Edwards Plateau. Aug–Sep. [*Sesbania vesicaria* (Jacq.) Elliott] The seeds and green leaves are reportedly poisonous to livestock due to the presence of saponins (Kingsbury 1964; Mabberley 1987; Hardin & Brownie 1993). ☣

GLYCINE

—A genus of 18 species native from Asia to Australia including the important crop plant SOYBEAN. (Greek, *glyca* sweet, alluding to the sweet taste of the tubers of a species of *Apios* at one time included in *Glycine*) (subfamily Papilionoideae, tribe Phaseoleae)

REFERENCES: Hermann 1962; Hymowitz & Newell 1981.

Glycine max (L.) Merr., (old name), SOY-BEAN, SOYA-BEAN. More or less erect, bushy, annual herb 0.3–2 m tall, densely long-hairy; leaves pinnately compound with 3 entire leaflets; flowers in rather inconspicuous axillary inflorescences of (1–)5–8(–12) flowers; calyces 4–7 mm long, densely pubescent; petals 4.5–7 mm long, white to pink, violet, or purple; stamens diadelphous; fruits (2–)4–8 cm long, with conspicuous, dense, bristly pubescence, pendant, with 2–4 seeds. Waif along railroads, waste places; extremely widely cultivated; Grayson Co.; probably widespread as a waif in TX. Summer. Native of e Asia. An old and very important crop cultivated primarily for its seeds which are extremely rich in protein and also as a source of oil; SOYBEAN is also the source of soy sauce and bean curd or tofu. It was apparently derived in ne China ca. 11th century BC from *Glycine soya* Siebold & Zucc.; first cultivated in the U.S. in 1924; perhaps the world’s most important pulse and currently one of the major agricultural crops of the U.S.; in this country grown mainly as an oil seed crop (Mabberley 1987; Isely 1990). ☣

GYMNOCLADUS

— A genus of 5 species, 1 in e North America and 4 in e and se Asia; this disjunct distribution pattern is discussed under the genera *Campsis* (Bignoniaceae) and *Carya* (Juglandaceae). The species are trees with the fruits opening along a partial suture like a follicle (an ancestral characteristic). While quite distinct (e.g., spines absent), *Gymnocladus* shows some similarities to *Gleditsia* (e.g., plants polygamous or dioecious, seeds with copious endosperm, roots lacking nodule formation, and calyx similarities—Lee 1976). (Greek: *gymno-*naked, and *clados*-branch, referring to the branches being naked when the deciduous leaves are shed) (subfamily Cesalpinoideae, tribe Caesalpinieae)

REFERENCE: Lee 1976.

Gymnocladus dioicus (L.) Koch, (dioecious, having the sexes on separate plants), KENTUCKY COFFEE TREE. Unarmed, dioecious or polygamous tree to 23(-35) m tall; leaves alternate, irregularly twice pinnately compound, with 3-7 pairs of pinnae, the pinnae with (3-)4-7 pairs of leaflets in addition to a terminal leaflet; leaflets 2-7 cm long, usually 15-30 mm wide, ovate, rather abruptly acuminate at apex, entire; petioles often 20-40 cm long; inflorescences racemose to paniculate; flowers usually functionally imperfect; hypanthium 6-12(-18) mm long; perianth radially symmetrical, of 2 similar 5-merous whorls, greenish white; stamens 10; fruits asymmetrically oblong, (5-)10-18(-25) cm long, 3-5 cm wide, woody at maturity; seeds few, embedded in a pulp. Cultivated and long persisting; apparently rarely escaping into native woodland; Tarrant Co. (S. Ursel, pers. comm.). May-Jun. Native to the e and c U.S. s to OK just n of nc TX. There are problems with the generic name *Gymnocladus* Lamarck and N. Harriman (pers. comm.) has submitted a manuscript (Harriman, forthcoming) to *Taxon* to conserve the name with a conserved gender; according to Harriman (forthcoming), there is an earlier available name making *Gymnocladus* illegitimate. Secondly, there is a problem with the gender of *Gymnocladus* Lamarck treated the name as feminine, but according to the *International Code of Botanical Nomenclature* (Greuter et al. 1994), the name should be masculine. Until this matter is resolved, we are following Harriman's recommendation and treating this species as *Gymnocladus dioicus*. Poisoning in animals (potentially fatal) has been reported from eating the foliage or sprouts and in humans from eating the fruit pulp or seeds; the toxic substance is reported to be a quinolizidine alkaloid or cytisine (Kingsbury 1964; Turner & Szczawinski 1991; Hardin & Brownie 1993). ☀

HOFFMANNSEGGIA RUSH-PEA

— A genus of 28 species mostly native to the New World from sw U.S. to Chile, with 3 species in s Africa; Simpson (1998) indicated that future study will probably result in the transfer of several South American species to *Pomaria*. Some sw U.S. species have tubers that are edible when roasted. (Named for J. Centurius, 1766-1849, Count of Hoffmannsegg, Germany) (subfamily Cesalpinoideae, tribe Caesalpinieae)

REFERENCES: Isely 1975; Simpson & Miao 1997; Simpson 1998.

Hoffmannseggia glauca (Ortega) Eifert, (whitened with a coating or bloom), SICKLE-POD RUSH-PEA, MESQUITEWEED, INDIAN RUSH-PEA, HOG-PEANUT, HOG-POTATO, CAMOTE DE RATÓN. Perennial herb to 30 cm tall; stems glabrous or pubescent; leaves twice pinnately compound; pinnae 5-11(-13); leaflets 4-11 pairs per pinna, not glandular-dotted beneath; petiole and rachis glandular; racemes glandular, 10-20 cm long; petals 5, yellow, clawed; stamens 10, separate, glandular; fruits falcate, 2-4 cm long, 5-8 mm broad. Roadsides and disturbed areas; Montague and Palo Pinto cos.; West Cross Timbers s and w to w TX. Late Apr-Sep. [*H. densiflora* Benth.] According to Ajilvsgi (1984), this species forms underground tubers that were roasted by Native Americans and have sometimes been fed to hogs. ☒/93

Hoffmannseggia drummondii Torr. & A. Gray, (for Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), DRUMMOND'S RUSH-PEA, was cited for vegetational area 4 (Fig. 2) by Hatch et al. (1990); however, it occurs only well to the s of nc TX (B. Simpson, pers. comm.). The leaves with 3 pinnae (each pinna with 4–5 pairs of leaflets) distinguish this species from *H. glauca* Apr-Sep. [*Caesalpinia drummondii* (Torr. & A. Gray) Fisher] While this species has often been treated in *Caesalpinia* (e.g., Isely 1975; Kartesz 1994; Jones et al. 1997), molecular evidence shows it should be included in *Hoffmannseggia* (B. Simpson, pers. comm.).

INDIGOFERA INDIGO

—A genus of ca. 700 species of tropical and warm areas of the world. Several tropical species (e.g., *I. tinctoria* L.) are a source of the blue dye indigo, now largely replaced by synthetics. Some species are cultivated as ornamentals. (Latin: *indicus*, indigo, and *fieri*, to bear, in reference to the dye) (subfamily Papilionoideae, tribe Indigofereae)

Indigofera miniata Ortega, (cinnabar-red), SCARLET-PEA. Appressed-pubescent perennial from tough taproot; stems ascending to prostrate, to 50 cm long, usually freely branched; leaves once pinnately compound; leaflets 5–9; stipules nearly thread-like; flowers in axillary and terminal, peduncled, spike-like racemes; sepals divided nearly to base, acuminate; petals light brick-red to salmon-rose, the standard abruptly bent back from near base; fruits 10–40 mm long, 2–3 mm in diam. Sandy or rocky prairies and open woods. Mid-May–Jun, less freely to Sep.

1. Petals 8–11(–20) mm long _____ var. **leptosepala**
1. Petals 6–8 mm long _____ var. **miniata**

var. **leptosepala** (Nutt. ex Torr. & A. Gray) B.L. Turner, (thin-sepaled), WESTERN SCARLET PEA, WESTERN INDIGO, SCARLET-PEA. Common, increases under disturbance; e 1/2 of TX. Intergrades with the following variety. /94

var. **miniata**, COAST INDIGO, SCARLET-PEA. Brown and Comanche cos. (Stanford 1971) in w part of nc TX, also cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2).

Indigofera suffruticosa Mill., (somewhat shrubby), INDIGO, a native of tropical America and one of the sources for the precursor of the blue dye indigo, is cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2). It apparently occurs to the s and se of nc TX. This species can be distinguished from *I. miniata* by its size (0.5–2 m tall), erect habit, and greater number of leaflets (9–15). 

KUMMEROWIA LESPEDEZA, BUSH-CLOVER

Low or prostrate annuals; leaves palmately compound with 3 leaflets; leaflets striate with parallel veins; stipules ovate, striate, 3–8 mm long; flowers axillary, solitary or few, shorter than the leaves.

—An Asian genus of 2 species; in the past lumped into *Lespedeza*, but differing in its annual habit, striate leaflets, conspicuous stipules, and solitary flowers (Isely 1990). (Named in 1912 for Professor Kummerov Posnaniensi) (subfamily Papilionoideae, tribe Desmodieae)

REFERENCE: Isely 1948.

1. Stem hairs antrorse (= pointing up toward apex of stem, the free end of the hair distal to the attached end); leaflet margins not conspicuously ciliate _____ **K. stipulacea**
1. Stem hairs retrorse (= pointing down toward base of stem); leaflet margins usually conspicuously spreading-ciliate _____ **K. striata**

Kummerowia stipulacea (Maxim.) Makino, (having stipules), KOREAN BUSH-CLOVER, KOREAN LESPEDEZA. Stems erect or ascending, 10–30(–60) cm long, freely branched; main stem leaves

with petioles 2–10 mm long; calyces glabrous or nearly so; corollas 6–7 mm long; standard violet with dark base; wings white; keel white with red-black tip; fruits 3 mm long, covered by calyx for 1/2 the fruit length. Cultivated and naturalized, sandy soils; Fannin and Grayson cos; mainly e TX; introduced into the U.S. in 1919 and used for pasture, hay, and as a cover crop (McGregor 1986); there are reports of death in cattle due to uncontrollable hemorrhaging (Lewis & Elvin-Lewis 1977). Jul-Sep. Native of Korea. [*Lespedeza stipulacea* Maxim.] ☣ ↗

Kummerowia striata (Thunb.) Schindl., (striated, striped), JAPANESE BUSH-CLOVER, COMMON LESPEDEZA, JAPANESE LESPEDEZA. Stems freely branched, prostrate to erect, pubescent or in age nearly glabrous, 10–40(–50) cm long; main stem leaves with petioles 1–3 mm long; calyx lobes usually ciliate; corollas 4.5–6 mm long; standard rose-violet; wings white; keel white, often with purple tip; fruits 3–4 mm long, covered by calyx for 1/2–3/4 the fruit length. Cultivated and naturalized, sandy roadsides, pastures, and open woods; se and e TX w to East Cross Timbers; introduced into the U.S. in 1846 and used for hay, pasture, and as a cover crop (McGregor 1986). Jun-Sep. Native of China and Japan. [*Lespedeza striata* (Thunb.) Hook. & Arn.] ↗

LATHYRUS PEAVINE, VETCHLING

Annual or perennial, trailing, sprawling, or ascending to climbing herbs with winged stems (except in *L. venosus*); leaves pinnately compound, the rachis terminating in a tendril that is often branched; leaflets in nc TX species 2 (except in *L. aphaca* and *L. venosus*), estipellate; stipules semi-sagittate, usually persistent and conspicuous; racemes few- to many-flowered, axillary, pedunculate; calyces essentially symmetrical basally; corollas white, pink-purple, lavender-blue, blue-purple, or bicolored; stamens 10, diadelphous; style dilated and flattened, pubescent on upper surface (= adaxial side); fruits elastically dehiscent, several-seeded, essentially linear, usually somewhat flattened.

☞ A genus of 160 species of the n temperate zone, mountains of e Africa, and temperate South America; they are usually climbers with branched tendrils. Many are used as ornamentals and a number as fodders. ☣ Eating the seeds of some species can lead to lathyrism (including spinal cord degeneration and paralysis of the legs); heavy losses of human life have occurred under conditions where other food was not available (e.g., Africa); poisonous due to the presence of toxic nonprotein amino acids (Tampion 1977; Schmutz & Hamilton 1979; Fuller & McClintock 1986). According to Kupicha (1981), the genus is closely related to *Vicia*; with 2 rare exceptions (*L. aphaca* and *L. venosus*), nc TX *Lathyrus* species can be readily distinguished by the combination of winged stems and leaves with only 2 leaflets (*Vicia* has stems unwinged and leaves with 4–18 leaflets). (Greek: *la*, very, and *thoures*, stimulant or passionate, the name due either to the seeds which were said to have irritant properties or from the reputation of the first described species as an aphrodisiac) (subfamily Papilionoideae, tribe Vicieae)

REFERENCES: Shinners 1948a; Hitchcock 1952; Kupicha 1981, 1983; Jones & Reznicek 1997.

1. Corollas yellow; leaflets absent, the leaf consisting only of a tendril; stipules leaf-like, 5–40 mm wide; stems not winged _____ ***L. aphaca***
1. Corollas various shades of blue to purple, pink, or white; leaflets 2–14; stipules various, usually < 10 mm wide; stems winged OR not winged (in 1 species).
 2. Leaflets 2; stems winged.
 3. Corollas 18–25 mm long, usually pink-purple to white; racemes with 5 or more flowers; fruits 6–9(–12) cm long; petioles with conspicuous wings ca. 3–4 mm wide on each side; plants perennial _____ ***L. latifolius***
 3. Corollas 6–13 mm long, lavender-blue, pink-purple, blue-purple, or bicolored; racemes with 1–4 flowers; fruits 2.5–4.5 cm long; petioles wingless or with wings to ca. 1 mm wide on each side; plants annual.

4. Corollas 6–9 mm long, pale or light lavender-blue; fruits and enlarging ovaries glabrous; mature fruits 3–5 mm wide _____ **L. pusillus**
4. Corollas 10–13 mm long, with standard pink-purple or blue-purple with white eye, the wings paler, and the keel nearly white; fruits and enlarging ovaries hirsute; mature fruits 6–8 mm wide _____ **L. hirsutus**
2. Leaflets 8–14; stems not winged _____ **L. venosus**

Lathyrus aphaca L., (name used by Pliny for a leguminous plant), Sprawling, suberect, or slightly scandent annual; stems glabrous, 0.3–0.6(–1) m long; leaflets absent (leaves of seedlings with 1 pair of leaflets); tendrils unbranched; stipules 1–5 cm long, ovate to broadly lanceolate, hastate; racemes with 1(–2) flowers; calyces 6–10 mm long; corollas yellow, 10–12(–18) mm long; fruits 2–4 cm long, glabrous. Roadsides or other open areas; a recent collection from Kaufman Co. is the first record of this species from TX (Jones & Reznicek 1997). Late spring–summer. Native of Europe. A report for Tennessee by Beardsley & Brown (1972) was the first report for the se U.S. 

Lathyrus hirsutus L., (hairy), ROUGH-PEA, SINGLE-TARY-PEA, SINGLE-TARY VETCHLING, CALEY-PEA. Ascending or sprawling, glabrous or sparsely pubescent annual; stems 0.2–1 m long; leaflets 2–7 cm long; stipules 10–18 mm long, 1–2 mm wide, linear; racemes with 1–4 flowers; calyces 5–7 mm long; fruits hirsute with pustulate hairs 1 mm or more long. Occasionally cultivated for pasture or soil improvement, roadside escape; Limestone Co. on e margin of nc TX, also Denton Co. (Shinners 1948a), also Tarrant Co. (R. O'Kennon, pers. obs.); mainly e TX. May. Native of the Mediterranean region. Reported as poisonous by Burlage (1968).  

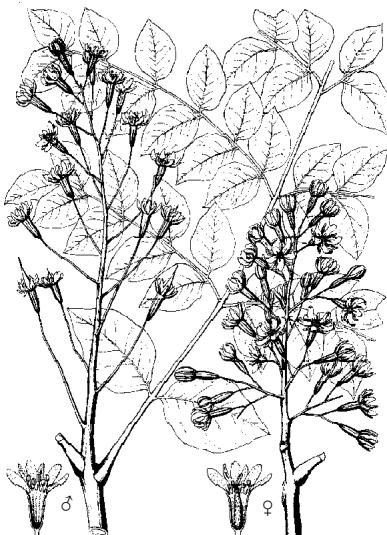
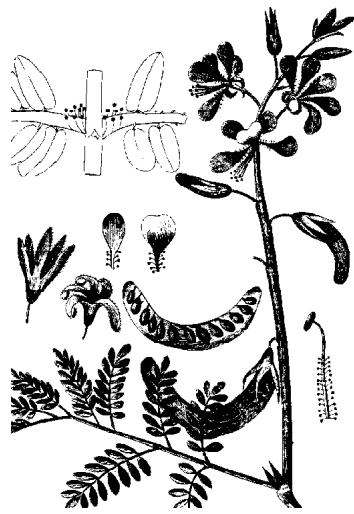
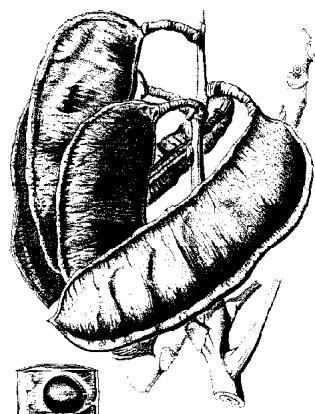
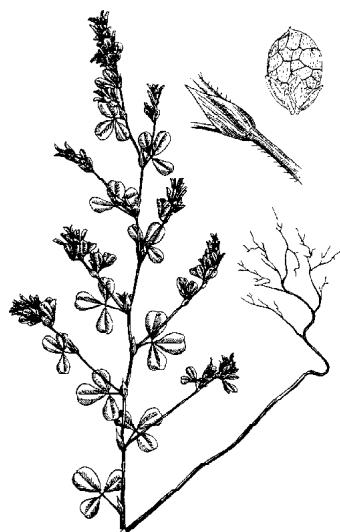
Lathyrus latifolius L., (broad-leaved), PERENNIAL SWEET-PEA, EVERLASTING-PEA. Glabrous perennial; stems climbing, 0.8–2 m long, broadly winged; leaflets to 4–8(–15) cm long; tendrils branched; stipules large, 3–5 cm long, 4–10 mm wide, lanceolate to ovate; racemes with 5–12(–15) flowers; calyces 10–11 mm long; corollas 18–22(–25) mm long, usually pinkish purple but varying to white or even red or striped; fruits 7–10 mm wide, glabrous. Cultivated in TX as an ornamental, persists and escapes? Grayson Co., also observed on a fencerow in Tarrant Co. (R. O'Kennon, pers. obs.) Spring. Native of Europe. Seeds poisonous.  

Lathyrus pusillus Elliott, (very small), LOW PEAVINE. Sprawling or low-climbing, glabrous or slightly pubescent annual; leaflets 2.5–6 cm long; stipules 1–3 cm long, usually 1–5 mm wide, lanceolate to lance-ovate, the upper lobe 2–3 times as long as the lower; racemes with 1–3 flowers; calyces 5–8 mm long. Sandy or rarely clayey soils, open woods, roadsides; se and e TX w to West Cross Timbers. Apr. Reported to cause livestock poisoning (Kingsbury 1964). 

Lathyrus venosus Muhl. ex Willd. (veiny). Perennial; stems 0.4–1 m long, erect or scandent; leaflets 3–8 cm long, 1–3 cm wide; stipules linear-lanceolate to lanceolate, (0.5)–1–2.5(–3.5) cm long, usually < 10 mm wide, 1/6–1/2 as long as leaflets; racemes with 5–15(–25) flowers; calyces 6–14 mm long, with unequal lobes; corollas 12–22 mm long, bluish or purplish; fruits 3–6 cm long, 5–8 mm wide. Open woods; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); also Post Oak Savannah. Apr–May. [L. venosus var. *intonus* Butters & H. St. John]

LESPEDEZA BUSH-CLOVER

Perennial herbs; leaves rather small, numerous, and crowded, short-petioled, pinnately compound with 3 leaflets; leaflets entire; stipules inconspicuous, slender, linear to nearly thread-like; flowers usually small, axillary or terminal, in pairs or in head-like or loose racemes or panicles; petals white to cream to purplish or pinkish (on open flowers; cleistogamous flowers also produced by some species); stamens 10, diadelphous; fruits flattened, 1-seeded, indehiscent,

*Gymnocladus dioicus* [SA3]*Hoffmannseggia glauca* [LAM]*Indigofera miniata* var. *leptosepala* [BB2]*Kummerowia stipulacea* [STE, WIL]*Kummerowia striata* [RCA, STE, WIL]*Lathyrus aphaca* [BEN]*Lathyrus hirsutus* [BEN]*Lathyrus latifolius* [STE, WIL]

usually ovate or rounded; style elongate on chasmogamous fruits (though easily broken off), recurved tightly on cleistogamous fruits.

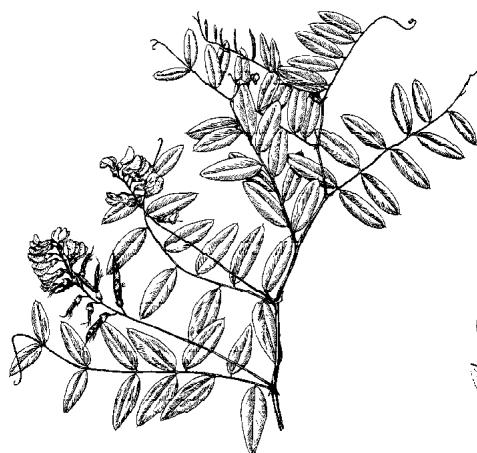
—A genus of 40 species of temperate North and South America, tropical and e Asia, and Australia; some are cultivated for forage, fodder, or green manure. *Lespedeza* species are well known to hybridize (Turner 1959; Clewell 1966, 1968; McGregor 1986) and because of this some individuals are very difficult to definitively identify. A population including *L. virginica*, *L. procumbens* and numerous hybrid individuals is known from Grayson Co. (Named for Vincente Manual de Céspedes, Spanish Govenor of East Florida, on account of the hospitality provided in the late 1700s to Michaux during his explorations there; later misspelled, probably by Michaux's editor as de Lespedez) (subfamily Papilioideae, tribe Desmodieae)

REFERENCES: Clewell 1966, 1968.

1. Plants basically prostrate (procumbent to trailing) for most of their length, sometimes weakly ascending; petaliferous flowers long-pedunculate, exceeding subtending leaves.
 2. Stem hairs spreading _____ ***L. procumbens***
 2. Stem hairs appressed.
 3. Main stems usually completely trailing; fruits 3–5 mm long; stipules 1.5–3(–4) mm long; found on sandy soil _____ ***L. repens***
 3. Main stems weakly ascending or erect for up to 15 cm and then trailing; fruits 4.5–7 mm long; stipules 2.5–8 mm long; found on rocky limestone soil.
 4. Stems weakly ascending; petioles of main leaves 20–40 mm long; main stem much-branched; leaflets usually green or light green beneath; rare in n part of nc TX _____ ***L. violacea***
 4. Stems erect for up to 15 cm and then trailing; petioles of main leaves 5–20 mm long; main stem unbranched or nearly so; leaflets gray-green to whitish beneath; c TX n through nc TX _____ ***L. texana***
1. Plants erect or strongly ascending; petaliferous flowers short-pedunculate, not greatly exceeding leaves (except longer in *L. violacea*).
 5. Flowers white or cream-colored, sometimes with a purplish spot; calyces equal to or longer than the mature fruits; flowers either 1–4 in axillary clusters or in spike-like globose or short-cylindric inflorescences of 10–45 flowers.
 6. Leaflets spatulate to cuneate (= wedge-shaped); flowers 1–4 in axillary clusters; wing petals and keel ± equal in length _____ ***L. cuneata***
 6. Leaflets not spatulate to cuneate; flowers in spike-like, globose or short-cylindric inflorescences; wing petals longer than keel.
 7. Leaflets narrowly elliptic to oblong; well-developed terminal leaflets > 2 times as long as wide; rachis (stalk of terminal leaflet) longer than petiole on well-developed leaves; calyx teeth 7–13 mm long; standard 7–12 mm long _____ ***L. capitata***
 7. Leaflets mostly ovate to elliptic; well-developed terminal leaflets usually 1–2 times as long as wide; rachis equal to or shorter than petiole; calyx teeth 5–8 mm long; standard 6–8 mm long _____ ***L. hirta***
 5. Flowers pink to purple or violet; calyces 1/2 or less as long as mature fruits; flowers in axillary, racemose inflorescences with 4–14 flowers (not appearing spike-like).
 8. Leaflets narrow, linear to linear-oblong, 3–8 times as long as wide _____ ***L. virginica***
 8. Leaflets broader, elliptic or ovate, 1–3 times as long as wide.
 9. Upper surface of leaflets and stems glabrous or with sparse pubescence; lower surface of leaflets with sparse pubescence; keel longer than wing petals, extending 1–2 mm past wings; racemes usually longer than subtending leaves _____ ***L. violacea***
 9. Upper surface of leaflets and stems conspicuously appressed-pubescent or pilose; lower surface of leaflets with dense pubescence; keel ± equal in length to wing petals, included within the wings; racemes usually shorter than subtending leaves _____ ***L. stuevei***



Lathyrus pusillus [WL]



Lathyrus venosus [WL]



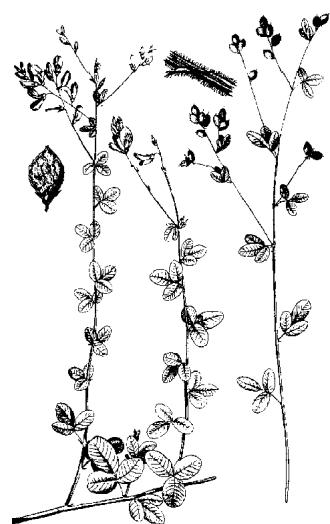
Lespedeza capitata [BB1]



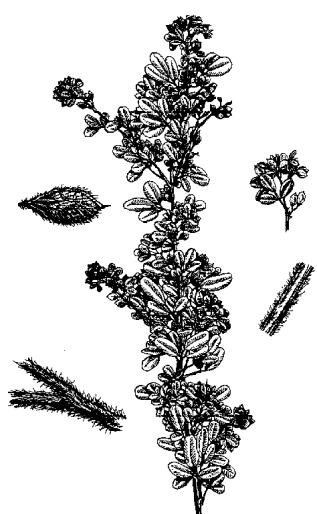
Lespedeza cuneata [WL]



Lespedeza repens [WL]



Lespedeza procumbens [MIC]



Lespedeza stuevei [WL]

Lespedeza capitata Michx., (capitate, headed), ROUND-HEAD BUSH-CLOVER, ROUND-HEAD LESPEDEZA. Stems erect or arched, 0.5–1.2(–2) m long, densely spreading-pubescent; leaflets 2–5 cm long; corollas 7–12 mm long; fruits 4–5 mm long. Sandy open woods or open ground; Grayson Co., also Lamar Co. (Turner 1959); e and nc TX and Rolling Plains. Sep.

Lespedeza cuneata (Dum.Cours.) G. Don., (wedge-shaped), SERICEA, SERICEA LESPEDEZA, CHINESE BUSH-CLOVER. Plant bushy-branched; stems 0.5–2 m tall; leaflets 1–2 cm long, the larger leaflets truncate or slightly notched; corollas 6–9 mm long; fruits 2.5–3 mm long. Cultivated for erosion control, escaped and now a problematic invader, especially on sandy soils; e TX w to East Cross Timbers. Jul-Oct. Native of e and c Asia. 

Lespedeza hirta (L.) Hornem., (hairy), HAIRY BUSH-CLOVER, HAIRY LESPEDEZA. Stems low-spreading to erect or over-arched, 0.5–1.8 m long, densely spreading-pubescent; leaflets 1.5–4 cm long; corollas 6–8 mm long; fruits 4–7 mm long. Sandy woods; Denton and Grayson cos.; mainly se and e TX. Jul-Sep.

Lespedeza procumbens Michx., (procumbent, prostrate), TRAILING BUSH-CLOVER, TRAILING LESPEDEZA. Stems prostrate or nearly so, to 1 m long, usually freely branched; leaflets oblong-elliptic to suborbicular, spreading-pubescent beneath; stems and peduncles pilose; flowers 8–12 per raceme; petals rosy lavender to purple. Sandy open woods or open ground; e TX w to West Cross Timbers. Late May–Sep. Similar to *L. repens* which, however, has stems and peduncles sparsely short-appressed pubescent and typically 4–8 flowers per raceme.

Lespedeza repens (L.) Barton, (creeping), CREEPING BUSH-CLOVER, CREEPING LESPEDEZA. Stems partly decumbent to spreading or ascending, usually freely branched, to 1 m long; leaves ± of one size, though reduced upwards; leaflets oblong-lanceolate or oblanceolate to obovate or short-elliptic, appressed-pubescent beneath; stipules 1.5–3(–4) mm long; calyces 1/4 or more the length of fruits developed from cleistogamous flowers; corollas purple. Sandy soils, woods and fencerows; se and e TX w to East Cross Timbers. Late May–Sep. This species is sometimes difficult to distinguish from *L. violacea* which, however, has the calyces < 1/4 the length of the fruits from cleistogamous flowers, stipules up to 2.5–6 mm long, and leaves of at least 2 distinct sizes due to smaller leaves in the axils of larger leaves.

Lespedeza stuevei Nutt., (for its discoverer, W. Stüwe, 1875–?, Prussian pharmacist and botanist), TALL BUSH-CLOVER, STUEVE'S BUSH-CLOVER. Stems spreading to erect or arched, 0.5–1.5 m tall; stems and lower surface of leaflets densely spreading- or occasionally appressed-pubescent; leaflets 0.5–3 cm long; corollas 5–8 mm long, lavender-pink to rose-purple; fruits 4–7 mm long, hairy. Sandy open woods, fencerows, roadsides; Dallas, Grayson, and Tarrant cos., also Turner (1959) gave many other citations from nc TX; e 1/2 of TX. Late May–Sep.

Lespedeza texana Britton, (of Texas), TEXAS BUSH-CLOVER, TEXAS LESPEDEZA. Similar to *L. repens*; stems to 1.5 m long; leaflets to 3.5 cm long, grayish green beneath, coriaceous; stipules (3–)4–8 mm long; corollas purple; fruits 4–7 mm long. Clay soils, on or near limestone outcrops; Bell, Dallas, Fannin, Grayson, Hood, and Somervell cos.; Blackland Prairie and Grand Prairie; also Rolling Plains and Edwards Plateau. Late May–Sep.

Lespedeza violacea (L.) Pers., (violet), VIOLET LESPEDEZA, PRAIRIE-CLOVER. Stems weakly erect to trailing, usually branched, 0.2–0.7 m long, pubescence appressed; leaves petioled, of two sizes, small leaves in axils of larger leaves; leaflets 2–5 cm long; calyces 3–6 mm long; corollas purple; fruits 3.5–7 mm long. Open woodland along edges of openings; Grayson and Dallas cos. (Turner 1959); rare in TX, Hatch et al. (1990) cited only vegetational area 5 (Fig. 2). A Hunt Co. population with single sessile flowers in the leaf axils appears most similar to *L. violacea* (Sanders 3449, BRIT). Jul-Aug.

Lespedeza virginica (L.) Britton, (of Virginia), SLENDER BUSH-CLOVER, SLENDER LESPEDEZA. Stems erect, 0.3–1 m tall; stems and leaflets appressed-pubescent to short pilose; corollas 6–8 mm long, purple; fruits 4–5 mm long. Sandy open woods, fencerows, roadsides; e 1/2 of TX. Jul-Sep.

Lespedeza intermedia (S. Watson) Britton, (intermediate), according to Correll and Johnston (1970), was once collected in Tarrant Co. (in 1910). This e U.S. species, otherwise unknown in TX, is similar to *L. stuevei* but differs in having appressed-pubescent stems, leaflets glabrous above, and fruits glabrate.

LOTUS DEER-VETCH, TREFOIL

Annuals or perennials; leaves very short-petioled or sessile, pinnately compound, with 5 leaflets (lower 2 stipule-like in position) or with 3 leaflets or upper leaves often reduced to 1 leaflet (leaves thus appearing palmately compound or simple); stipules apparently absent (or reduced to glands); flowers solitary in the leaf axils or in peduncled umbels; fruits dehiscent.

— A genus of 100 species of the n temperate zone; some are cultivated as ornamentals or for forage. (From the classical Greek name *lotus*, used for a number of different plants; restricted by Linnaeus to this genus) (subfamily Papilionoideae, tribe Loteae)

REFERENCES: Ottley 1944; Isely 1981.

1. Petals yellow, marked with red; plants trailing perennials; leaves with 5 leaflets (the lower pair stipule-like in position); flowers in long-peduncled, head-like umbels _____ ***L. corniculatus***
1. Petals white to rosy or lavender-pink; plants erect annuals; leaves with 3 leaflets or the upper leaves reduced to 1 leaflet; flowers solitary in the leaf axils _____ ***L. unifoliolatus***

Lotus corniculatus L., (horned), BIRD-FOOT TREFOIL, BIRD-FOOT DEER-VETCH, EGGS-AND-BACON. Sparsely pubescent or glabrous perennial; umbels with (2–)4–8 flowers; corollas 10–14 mm long; fruits 1.5–3.5 cm long. Cultivated and escaped into disturbed and weedy areas; Grayson Co.; also Post Oak Savannah. May–Aug. Native of Eurasia. Used for fodder, but can be cyanogenic and poisonous (Mabberley 1987). ☣ ☦

Lotus unifoliolatus (Hook.) Benth., (with only one leaflet), PURSH'S DEER-VETCH. Moderately short-pilose annual to 80 cm tall; calyces nearly equaling the corollas; corollas 5–7(–8) mm long. Sandy open ground; widespread in much of e 1/2 of TX. Mid-May–early Jul. We are following Kartesz (1994) and Jones et al. (1997) in treating this species (which has long been known as *L. purshianus*) as *L. unifoliolatus* [*L. purshianus* (Benth.) Clem. & E.G. Clem.]

LUPINUS BLUEBONNET, LUPINE, LUPIN

— A genus of 200 species widespread geographically including the Andes, Rockies, Mediterranean, tropical African highlands, and e South America; often in areas of temperate climate. A number are cultivated as ornamentals, as fodder, or as green manure. ☣ Many have alkaloids (e.g., lupinine) and can cause poisoning in humans or livestock (Kingsbury 1964; Schmutz & Hamilton 1979). A South American species is cultivated as a food crop by descendants of the Incas.

In 1901, the Texas legislature was in the process of adopting a state flower. "... in the House, debates were flying fast and furious as one legislator launched his appeal for his favorite, to be followed by more eloquent protestations of the virtues of yet another. Phil Clement of Mills pleaded the case of the open cotton boll, which he likened to 'the white rose of commerce.' John Nance Garner, later the vice-president of the United States, jested in behalf of the prickly-pear cactus flower. ...Then up to the podium strode John M. Green of Cuero. As Green made his appeal for the beautiful bluebonnet, calls came from the floor asking, 'What the devil is a bluebonnet?' ...'You must mean 'el conejo'.' 'The rabbit' was a name used by the Mexicans because the waving white tip reminded them of the bobbing tail of a cottontail

rabbit. 'No, no, no,' roared another. 'He's referring to what some have called 'buffalo clover'....At this point a group of stalwart Texas women rose to the cause. ...The National Society of the Colonial Dames of America in the State of Texas ... had originated the idea of using the bluebonnet as the state flower and they were not going to let their favored blossom be left by the roadside for a cactus bloom or cotton boll just because a bunch of representatives didn't know what it was A bluebonnet painting was sent for, and one painted by Miss Mode Walker of Austin was carried into the chamber. We are told by Mary Daggett Lake that 'deep silence reigned for an instant. Then deafening applause fairly shook the old walls.' The bluebonnet had won hands down." (Andrews 1986). Unfortunately, due to confusion about common names and the fact that the legislators probably didn't know there were six bluebonnet species in the state, *Lupinus subcarnosus* which some felt was the least attractive of the bluebonnet species, was officially designated as the state flower, rather than the more beautiful and widespread *L. texensis*. As a result, "For seventy years the argument kicked up dust in the halls of the state Capital until the politically astute representatives ... decided to correct their oversight. In 1971, in order to make certain that they would not be caught in another botanical trap, they covered all their bases ... by offering an additional resolution that would include 'any other variety of Bluebonnet not heretofore recorded'." (Andrews 1986). As a result, because there are six *Lupinus* species in TX, there are six state flowers.

(From the ancient Latin: *lupinus*, wolf, from the mistaken idea that the plants rob soil of nutrients) (subfamily Papilionoideae, tribe Genisteae)

REFERENCES: Shinners 1953c; Erbe 1957; Turner 1957; Andrews 1986; Turner & Andrews 1986.

Lupinus texensis Hook., (of Texas), TEXAS BLUEBONNET, BUFFALO-CLOVER, TEXAS LUPINE. **One of the six *Lupinus* species which are the state flowers of Texas.** Winter annual to 60 cm tall; stems pilose with appressed or ascending hairs; leaves long-petioled, palmately compound; leaflets 4-7, lanceolate or oblanceolate, glabrous above or nearly so, obtuse to acute or abruptly short-pointed apically; flowers in erect, terminal racemes, the white, pointed or acute raceme tips conspicuous from a distance (due to incompletely expanded and silvery-white hairy buds); calyces 6-8 mm long; petals deep blue (rarely white); standard with white center (changing to magenta red) bearing yellow-green dots; wing petals not inflated, nearly straight when viewed from front; fruits conspicuously hairy, ca. 2.5-4.2 cm long. Rocky limestone soils, clay; sc to nc TX mainly on the Blackland and Grand prairies and Edwards Plateau; now widely cultivated and planted along highways in much of TX and adjacent OK; endemic to TX (can now be found in s OK). Apr-May. Apparently unpalatable to cattle. ♀♂/97

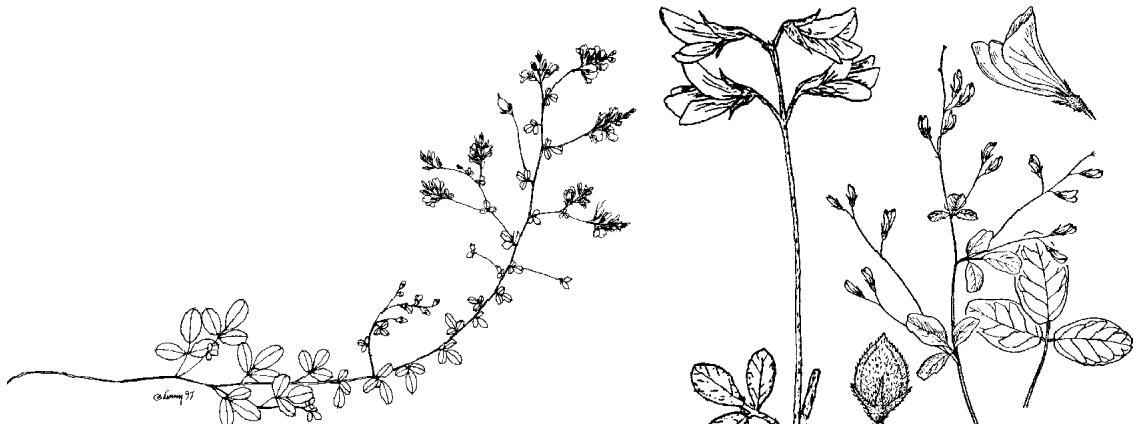
Lupinus subcarnosus Hook., (somewhat fleshy), TEXAS BLUEBONNET, FLESHY-LEAF LUPINE, occurs in deep sandy soils just to the se of nc TX. It can be distinguished by its racemes without distinct white tips (the buds at the rounded raceme tips have yellowish gray or brownish hairs), leaflets rounded, very obtuse or even indented apically, and wing petals inflated (cheek-like), light blue. Several Brown Co. and Comanche Co. specimens (HPC) of *L. texensis* have inflated wing petals and are thus similar to *L. subcarnosus*

MEDICAGO MEDICK, BUR-CLOVER, ALFALFA, BURWEED

Annual or perennial herbs; stems prostrate to erect; leaves pinnately compound; leaflets 3, with small, sharp teeth, at least in apical portion; flowers in axillary or terminal, peduncled, head-like or short cylindrical, spike-like racemes; petals yellow (in all nc TX species except 1), blue, purple, or rarely white; stamens 10, diadelphous; fruits spirally coiled to curved.

—An Old World genus of 85 species native to Europe, the Mediterranean, Ethiopia, and s Africa. A number are cultivated as ornamentals, for fodder or green manure. All nc TX species are introduced from the Old World. (Greek: *medice*, the name of alfalfa, because it came to the Greeks from Media) (subfamily Papilionoideae, tribe Trifolieae)

REFERENCES: Wagner 1948; Lesins & Lesins 1979; Small & Jomphe 1989.



Lespedeza texana [HEA]

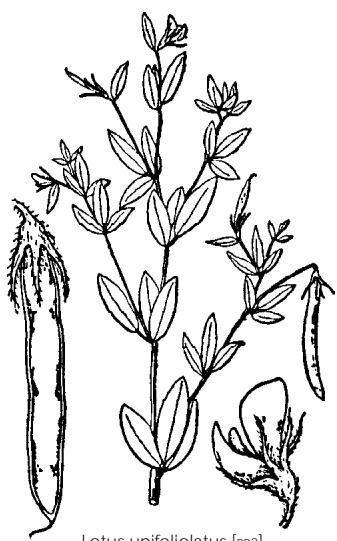
Lespedeza violacea [GLE, STE]



Lespedeza virginica [WIL]



Lotus corniculatus [BEN]



Lotus unifoliolatus [BB2]



Lupinus texensis [JON]

1. Petals purple to pale blue, rarely white, 6–12 mm long; ovaries and fruits without prickles; plants perennial _____ **M. sativa**
1. Petals yellow, 2–5 mm long; ovaries and fruits with or without prickles; plants annual.
 2. Stipules (2 at base of each leaf) shallowly toothed; stems and leaflets pubescent.
 3. Ovaries and fruits without prickles; flowers 8–20(–50) per raceme; petals 1.5–2 mm long _____ **M. lupulina**
 3. Ovaries and fruits prickly; flowers 5–10 per raceme; petals 2.5–4 mm long _____ **M. minima**
 2. Stipules deeply toothed to deeply lobed; stems sparsely pubescent or glabrous; leaflets glabrous.
 4. Stipules of upper leaves not divided more than half way to base; leaflets with prominent, central, purple-red spot _____ **M. arabica**
 4. Stipules of upper leaves divided more than half way to base; leaflets without central spot.
 5. Pedicels shorter than the calyx lobes, some flowers subsessile; mature fruits prickly or roughened with short points, loosely curled, barrel-shaped, 4–6 mm in diam. _____ **M. polymorpha**
 5. Pedicels equaling or exceeding the calyx lobes; mature fruits smooth, tightly coiled and flattened, disk-shaped, 10–15(–20) mm in diam. _____ **M. orbicularis**

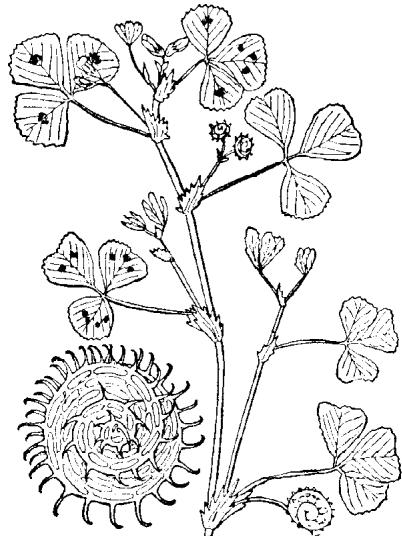
Medicago arabica (L.) Huds., (of Arabia), SPOTTED BUR-CLOVER, SPOTTED MEDIC. Stems erect to decumbent, 10–60 cm long; leaflets 10–25 mm long; terminal leaflet very short-stalked; flowers 1–5 per head-like raceme; petals ca. 4–5 mm long; fruits prickly, with 4–7 coils, 5–6 mm in diam. (excluding prickles); prickles of fruits 2–3 mm long, recurved. Sandy pastures, lawns, and roadsides, chiefly in low ground; se and e TX w to East Cross Timbers; first TX record 1913 (Wagner 1948). Late Mar–Apr. Native of s Europe and sw Asia. ☎

Medicago lupulina L., (resembling *Humulus lupulus*—hops, apparently based on a resemblance of the clusters of tiny fruits to those of hops), BLACK MEDICK, NONE-SUCH, HOP-CLOVER, YELLOW TREFOIL. Stems ascending or trailing, to 100 cm long; leaflets 10–20 mm long; racemes 7–10 mm long, with 8–20(–50) flowers; fruits with 1 partial coil, curved, kidney-shaped, 2–3 mm in diam. Planted for pasture and soil improvement; established as a weed on roadsides, in lawns, and waste places; se and e TX w to Grand Prairie and Edwards Plateau, also West Cross Timbers (Erath Co.—Turner 1959); first TX record 1937 (Wagner 1948). Apr–May, less commonly to Jul. Native of Eurasia. Said by some to be the Irish SHAMROCK; however, it is more likely that either *Trifolium dubium* or *T. repens* is actually the SHAMROCK (Nelson 1991). ☎

Medicago minima (L.) L., (least, smallest), BUR-CLOVER, SMALL MEDIC, SMALL BUR-CLOVER. Similar to *M. lupulina* except for the fruits and usually short stems 10–30(–50) cm long; fruits with 3–5 coils, ca. 3–5 mm in diam. (excluding prickles); prickles of fruits 1.5–3 mm long, hooked at tip. Lawns, pastures, and roadsides; e 1/2 of TX; first TX record 1914 (Wagner 1948). Apr–May, rarely again in Sep. Native of Europe. ☎

Medicago orbicularis (L.) Bartal., (orbicular, round), BUTTON-CLOVER, BUTTON MEDIC. Similar to *M. polymorpha* stems 10–50 cm long; leaflets 8–18 mm long; flowers 1–5 per head-like raceme; petals ca. 3 mm long; fruits with 4–6 coils, 10–15(–20) mm in diam. Lawns and roadsides, various soils; Callahan, Dallas, Ellis, Grayson, Hamilton, Lampasas, and Tarrant cos, mainly nc TX w to Rolling Plains and s to c TX; first TX record 1915 (Wagner 1948). Apr–early Jun. Native of the Mediterranean region. ☎

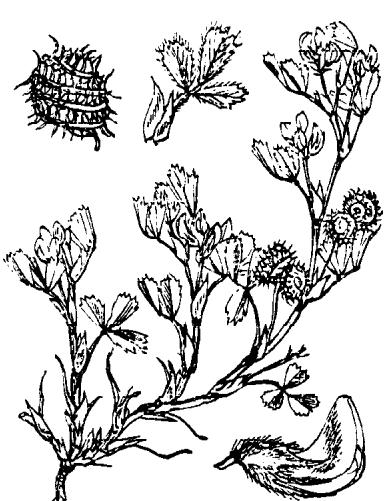
Medicago polymorpha L., (of many forms), CALIFORNIA BUR-CLOVER, BUR-CLOVER. Stems decumbent to ascending, 5–50 cm long; leaflets 6–15 mm long; terminal leaflet rather long-stalked; flowers (1–)3–5(–8) per head-like raceme; petals 2.5–4 mm long; fruits coiled 2–5 times, 4–6 mm in diam. (excluding prickles); prickles of fruits usually well-developed, 2–3 mm long, hooked at tips, rarely absent. Sandy or less commonly clayey pastures, lawns, and roadsides; widespread



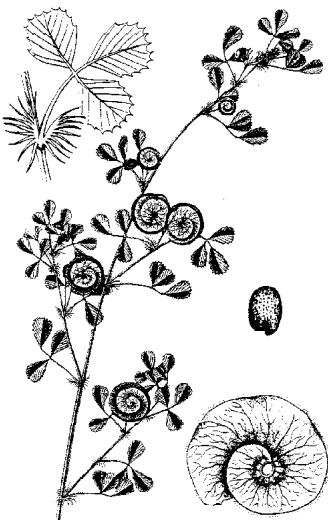
Medicago arabica [BB2]



Medicago lupulina [REE]



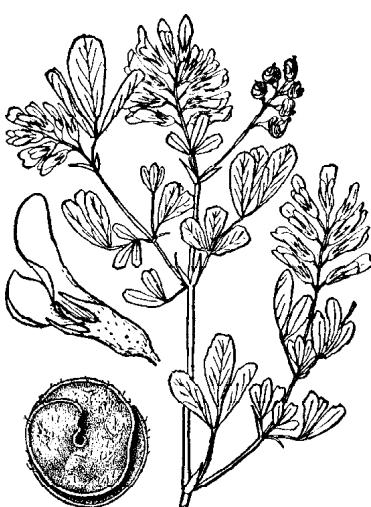
Medicago minima [BEN]



Medicago orbicularis [MOR]



Medicago polymorpha [GLE]



Medicago sativa [BB2, GLE]



Melilotus albus [BEN]



Melilotus indicus [MOR]

in TX; first TX record 1900 (Wagner 1948). Apr-early May. Native of Eurasia. [*M. polymorpha* var. *vulgaris* (Benth.) Shinners, *M. hispida* Gaertn.] ☠

Medicago sativa L., (cultivated), ALFALFA, LUCERNE. Glabrous perennial, 30–100 cm tall; leaflets 10–30 mm long; racemes 10–40 mm long, crowded, with 10–20(–30) flowers; fruits loosely coiled in 1 or 2 turns, 4–5 mm in diam. Cultivated and persisting, locally established as an escape on roadsides; nearly throughout TX; first TX record 1915 (Wagner 1948). Late Apr–Sep. Native of sw Asia. Long cultivated for fodder and silage (Mabberley 1987); it is considered by some to be the most important forage plant in the world (Isely 1990). ALFALFA hay can sometimes contain blister beetles (*Epicauta* species) which, if ingested, are extremely dangerous and even potentially fatal to horses as well as other livestock (Hardin & Brownie 1993). Such beetles have been found in ALFALFA hay being fed to horses in nc TX. ☠ ☠

MELILOTUS SWEET-CLOVER, MELILOT

Annuals or biennials with erect or spreading, branched stems; leaves pinnately compound; leaflets 3, with small, sharp teeth, at least in apical portion; flowers in erect, elongated, spike-like racemes; petals yellow or white; stamens 10, diadelphous.

— A genus of 20 species of fragrant herbs native to temperate and subtropical Eurasia and n Africa; cultivated for forage, hay, and green manure; also valued as a bee plant for honey production; similar to *Medicago*. All of the nc TX species are introduced. SWEET-CLOVERS can be recognized in the field by the combination of their slender racemes of small yellow or white flowers, indehiscent 1–2-seeded fruits, and often fragrant herbage. ☠ Sweet-clover poisoning, a hemorrhagic disease of cattle in which the animal bleeds to death, is caused by ingestion of improperly cured or molded sweet-clover hay (coumarin glycosides release coumarin which becomes converted to dicoumarin, a toxic substance—dicoumarin prevents blood clotting; it is now used medicinally as an anticoagulant) (Kingsbury 1964; Lewis & Elvin-Lewis 1977). (Greek: *meli*, honey, and *lotus*, some leguminous plant) (subfamily Papilionoideae, tribe Trifolieae)

REFERENCES: Hennen 1951; Isely 1954, 1990; Stevenson 1969.

- | | |
|---|------------------------------|
| 1. Corollas 1.7–2.4(–3) mm long, yellow; stipules with wide, clasping, short-auricled base; mature fruits 1.5–2.5 mm long | <i>M. indicus</i> |
| 1. Corollas 3.6–5.2 mm long, yellow or white; stipules narrow-based, or with wing-like extension part way around stem, but not free auricles; mature fruits 2.5–4 mm long | |
| 2. Corollas yellow; standard about as long as wings | <i>M. officinalis</i> |
| 2. Corollas white; standard markedly longer than wings | <i>M. albus</i> |

Melilotus albus Medik., (white), WHITE SWEET-CLOVER, WHITE MELILOT, HUBAM-CLOVER (an annual strain). Annual or biennial; stems 0.5–2 m tall; crushed leaves fragrant; very similar to *M. officinalis* and lumped by some into that species (e.g., Kartesz 1994); we are following Isely (1990) in recognizing it as a separate species. Roadsides, railroads, and disturbed sites; widely scattered in TX. May–Jun. Native of Europe and Asia. This species is known to cause sweet-clover poisoning in cattle. ☠ ☠

Melilotus indicus (L.) All., (of India), SOUR-CLOVER, YELLOW SOUR-CLOVER, ALFALFILLA. Annual 0.1–0.6 m tall; racemes with 10–60 flowers; fruits flattened, nearly orbicular to ovoid. Roadsides, pastures, and disturbed sites; widely scattered across TX. Apr–May. Native of the Mediterranean region and s Asia. ☠

Melilotus officinalis (L.) Lam., (medicinal), YELLOW SWEET-CLOVER, YELLOW MELILOT. Annual or biennial 0.4–1(–2) m tall; crushed leaves fragrant; stipules lanceolate, usually 5–8 mm long; racemes with 30–70 flowers; fruits ovoid, 2.5–4 mm long, 2–2.5 mm wide. Roadsides and rail-

roads, disturbed areas; n half of Blackland Prairie w to Grand Prairie, scattered elsewhere in TX. Late Apr-May, sporadically later. Native of Europe and Asia. The leaves have a characteristic, vanilla-like odor when crushed or dried and have been used in making sachets (Ajilvsgi 1984). This species is known to cause sweet-clover poisoning in cattle. ☠ ☷

MIMOSA CATCLAW, SENSITIVE-BRIAR

Ours prostrate, low spreading, or trailing, herbaceous perennials to 4 m long or erect shrubs, usually armed; leaves twice even-pinnately compound, the ultimate leaflets folding together at night, in rain, or on being touched, sensitive to touch or not so; flowers sweet-scented, in our species in pink to purple (rarely white), globose heads; petals separate or united; stamens usually 8-12, the filaments separate, showy, serving as the main attractant structure for the flower.

☞ A genus of 480 species of tropical and warm areas, especially the Americas. The group includes herbs, shrubs, lianas, and trees, often with stipular spines. ☠ Some *Mimosa* species contain the toxic amino acid, mimosine, and if eaten can cause hair loss, gastritis, and cataracts in animals (Spoerke & Smolinske 1990). As treated here, *Mimosa* includes *Schranksia*, the SENSITIVE-BRIARS; however, Stanford (1966) and J. Stanford (pers. comm.) indicated that pollen morphology warrants further study and possibly justifies generic recognition for *Schranksia*. We are following Turner (1994d) for nomenclature of the *M. quadrivalvis* complex; he treated the 4 nc TX taxa as species arguing that they are isolated geographically, do not appreciably intergrade, and when occasionally growing together apparently do not hybridize; Barneby (1991) treated them as varieties of *M. quadrivalvis*. The leaves of a number of *Mimosa* species (previously treated in *Schranksia*) are touch sensitive and display rapid movements upon being touched; these movements result from pressure changes in the pulvinules (= tiny swollen joints) at the base of each leaflet and the larger pulvini (singular: pulvinus) at the base of each leaf (Wills & Irwin 1961); this is possibly an adaptation to reduce water loss or a defense against herbivores. (Greek: *mimos* mimic, referring to the sensitive leaves) (subfamily Mimosoideae, tribe Mimosae)

REFERENCES: Isely 1971a, 1971b, 1973; Barneby & Isely 1986; Barneby 1991; Turner 1994d.

1. Plants prostrate, sprawling, or trailing; stems herbaceous; fruits with conspicuous hairs or distinctly prickly over the surface.
2. Plants with numerous weak, hair-like or bristle-like structures not painful to the touch; recurved prickles absent; mature fruits 10–20 mm long, noticeably flattened, with numerous appressed hairs on the surface _____ ***M. strigillosa***
2. Plants conspicuously armed with numerous recurved prickles capable of causing pain; mature fruits 20–120 mm long, not noticeably flattened OR flattened in *M. roemeriana*, usually covered with erect, recurved to straight prickles (*M. quadrivalvis* complex).

 3. Leaflets with raised midrib and side-veins beneath.
 4. Fruits 4–12 cm long with acute or beaked apex; peduncles in late flower or fruit 2–7(–10) cm long; heads in bud stage with bracts not at all protruding or only slightly so; widespread in nc TX _____ ***M. nuttallii***
 4. Fruits 1–4 cm long with round apex; peduncles in late flower or fruit (4–)8–12(–20) cm long; heads in bud stage with bracts protruding (can be seen with naked eye); if present in nc TX only on extreme se margin, mainly se and e TX _____ ***M. hystricina***
 3. Leaflets smooth or only midrib raised beneath.
 5. Mature fruits flattened at maturity, 3–6 times as wide as thick, 4–6 mm wide; lower part of stems rounded or 5-sided; young stems puberulent or less often glabrous; usually on calcareous soils; widespread in nc TX _____ ***M. roemeriana***
 5. Mature fruits usually 4-sided to nearly terete, essentially unflattened, at most 2 times as wide as thick, 2–4 mm wide; lower part of stems mostly distinctly 4-sided; young stems

glabrous; usually on sandy soils; in nc TX known only from Milam Co. on extreme se margin of area _____

M. latidens

1. Plants erect shrubs, never prostrate, sprawling, or trailing; stems woody; fruits glabrous or with recurved prickles limited to the margins.

6. Leaves with 1–4(–5) pairs of pinnae per leaf; mature fruits 6–8 mm broad, often without spine-like structures on the margins, sometimes with an occasional recurved prickle; filaments definitely pink, fading pale _____

M. borealis

6. Leaves with 4–8 pairs of pinnae per leaf; mature fruits usually 3–4 mm broad, often with numerous, conspicuous, recurved prickles on the margins; filaments white, tinged with pink _____

M. aculeaticarpa

Mimosa aculeaticarpa Ortega var. **biuncifera** (Benth.) Barneby, (sp: prickly-fruited; var: bearing two hooks), CATCLAW, WAIT-A-BIT, WAIT-A-MINUTE. Rounded or spindly shrub ca. 1 m tall; stems straight to often zig-zag in appearance; petals united half way or more; fruits 35 mm or less long. Calcareous or sandy rocky open areas, also alluvial soils; Bell, Palo Pinto, Stephens, and Williamson cos., also Brown Co. (HPC); nc TX s and w to w TX. May-Aug. [M. biuncifera Benth.]

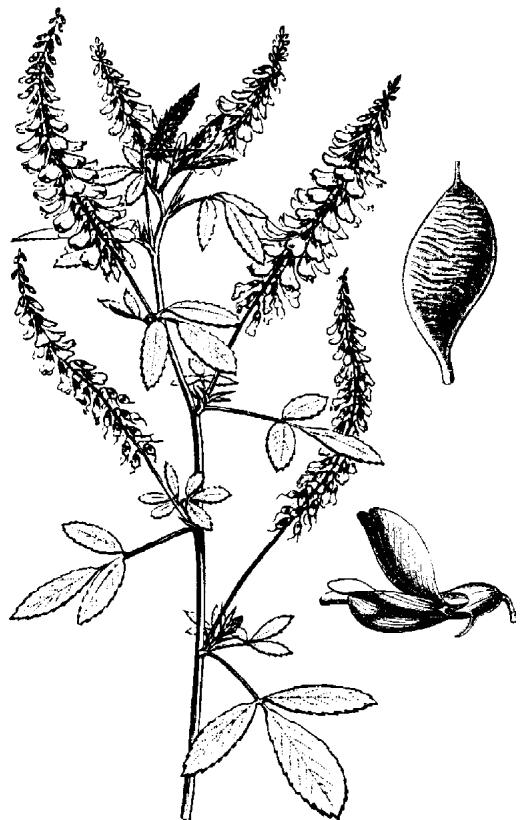
Mimosa borealis A. Gray, (northern), CATCLAW, FRAGRANT MIMOSA, PINK MIMOSA. Rounded shrub usually ca. 1(–2.5) m tall; stems ± straight; flowers very fragrant; petals distinct; fruits 25–50 mm long. Sandy or rocky open woods or open ground; Grand Prairie s and w to w TX. Apr-May.

Mimosa hystricina (Small) B.L. Turner, (porcupine-like, bristly), BRISTLY SENSITIVE-BRIAR. Stems sprawling or trailing, 2–4 m long; pinnae usually 4–5 pairs per leaf; ultimate leaflets folding together at night or on being touched; petals united nearly half way; filaments conspicuous, pink; fruits subterete, densely prickly. Sandy wooded areas; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly se and e TX, probably only to the se of nc TX (Turner 1994d). Feb-May. [M. quadrivalvis var. *hystricina* (Small) Barneby, Schrankia *hystricina* (Small) Standl.]

Mimosa latidens (Small) B.L. Turner, (broad-toothed), KARNES SCHRANKIA. Stems sprawling or trailing; pinnae usually (1–)2–3 pairs per leaf; ultimate leaflets folding together at night or on being touched; stipules 1–3(–4) mm long; petals united nearly half way; filaments conspicuous, pink. Sandy soils or sandy loams; Milam Co. (Turner 1994d) on se margin of nc TX; mainly se and s TX. Apr-Sep. [M. quadrivalvis var. *latidens* (Small) Barneby, Schrankia *latidens* (Small) K. Schum., Schrankia *microphylla* of TX auth., not (Dryand) J.F. Macbr.]

Mimosa nuttallii (DC.) B.L. Turner, (for Sir Thomas Nuttall, 1786–1859, English-American botanist), CATCLAW SENSITIVE-BRIAR, CATCLAW SCHRANKIA, SHAME-BOY, NUTTALL'S SENSITIVE-BRIAR. Stems sprawling or trailing, usually 0.6–1.2 m long; pinnae usually 4–8 pairs per leaf; ultimate leaflets folding together at night or on being touched; petals united nearly half way; filaments conspicuous, pink; fruits 4-sided or nearly terete, densely or sparsely prickly. Open woods, prairies, and roadsides, various but usually sandy or silty alluvial soils; widespread in TX. Apr-Jun. [M. quadrivalvis L. var. *nuttallii* (DC.) Barneby, Schrankia *nuttallii* (DC.) Standl., Schrankia *uncinata* of TX auth., not Willd.]

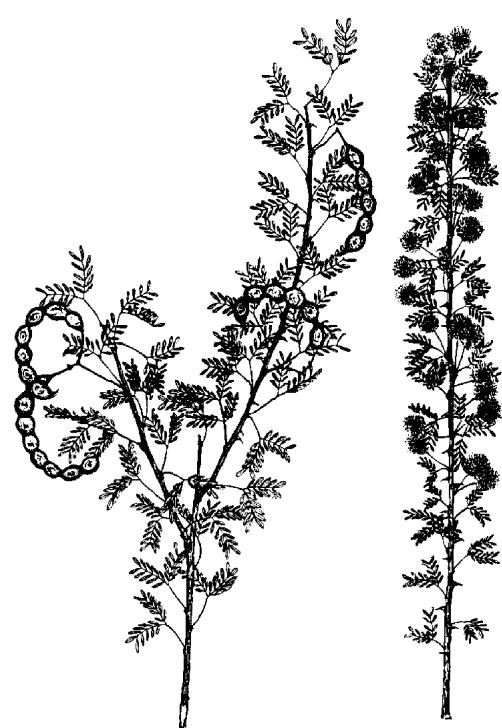
Mimosa roemeriana Scheele, (for Ferdinand Roemer, 1818–1891, geologist, paleontologist, and explorer of TX), ROEMER'S SENSITIVE-BRIAR, ROEMER'S SCHRANKIA. Stems sprawling or trailing, usually 0.3–1 m long; pinnae usually 4–5 pairs per leaf; ultimate leaflets folding together at night or on being touched; stipules 3–6 mm long; petals united nearly half way; filaments conspicuous, pink. Rocky slopes on limestone, occasional on sandy soils; mainly nc TX and Edwards Plateau. Apr-Jul. [M. quadrivalvis var. *platycarpa* (A. Gray) Barneby, Schrankia *roemeriana* (Scheele) Blank.] ☒/99



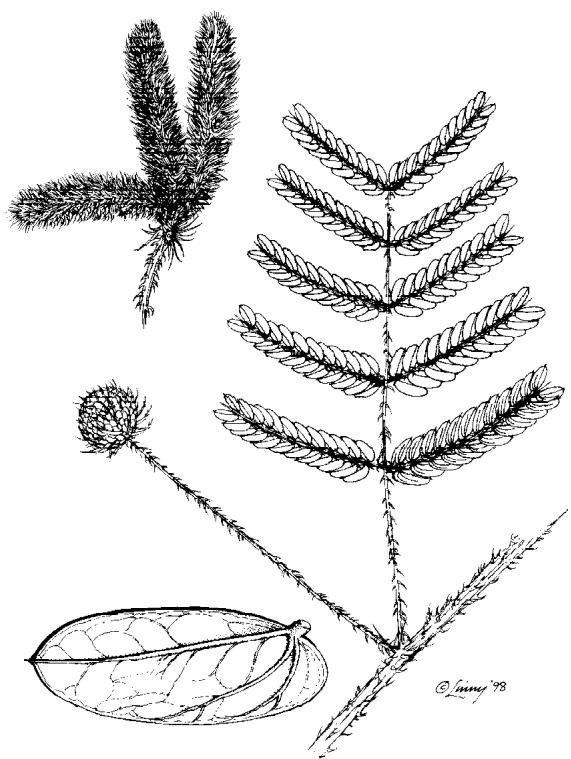
Melilotus officinalis [BL3, EN2]



Mimosa aculeaticarpa var. *biuncifera* [VIN]



Mimosa borealis [VIN]



Mimosa hystrixina [HEA]

Mimosa strigillosa Torr. & A. Gray, (somewhat strigose, with stiff bristles), POWDERPUFF, VERGONZOSA, HERBACEOUS MIMOSA. Stems sprawling, 1–2(–4) m long, with numerous stiff bristle-like structures, not painful to the touch; pinnae usually 4–6 pairs per leaf; filaments pink to purple. Open, often somewhat sandy areas; Dallas and Tarrant cos; mainly e TX. May–Oct.

NEPTUNIA

—A genus of 11 species native to tropical and warm areas of the world, especially Australia and America; some have sensitive leaves (leaflets folding together on being touched) as in *Mimosa* (Named for Neptune, in Roman religion a god who had to do with perpetuity of springs and streams; sometimes referred to as god of the seas; so named because some species are aquatic) (subfamily Mimosoideae, tribe Mimoseae)

REFERENCES: Turner 1951; Isely 1970a, 1973.

Neptunia lutea (Leavenw.) Benth., (yellow), YELLOW-PUFF, YELLOW NEPTUNIA. Perennial, unarmed (in contrast to the armed sensitive species of *Mimosa* previously treated in *Schranksia*); stems prostrate, vine-like, usually densely and minutely pubescent, to 2 m long; foliage blue-green; leaves twice even-pinnately compound, sensitive—the leaflets folding together on being touched; leaflets 8–18 pairs per pinna; flowers in short heads ca. 2 cm long on erect, axillary peduncles; heads (in bud) with 30–60 flowers, all flowers in the heads with stamens all alike and bearing anthers; calyces 1–2 mm long; petals separate almost or quite to base; stamens 10; filaments separate, deep yellow, serving as the main attractant structure for the flower; fruits 2.5–5 cm long, 10–15 mm wide, the stipe 4–15 mm long. Disturbed ground, various soils (some preference for sandy clay); in much of the e 1/2 of TX. Mid-May–Jun, sporadically later.

Neptunia pubescens Benth. (TROPICAL NEPTUNIA) var. *micropurpa* (Rose) Windler and var. *pubescens* are both reported from vegetational area 4 (Fig. 2) by Hatch et al. (1990). This primarily se coastal plain species apparently only reaches ne to Travis Co. just s of nc TX. The species is distinguished from *N. lutea* as follows: flowers in upper part of head with stamens bearing anthers, the lower flowers smaller and with staminodes; heads (in bud) with 20–30 flowers; stipe of fruits 0–4(–5) mm long; leaflets 14–43 pairs per pinna; calyces 2–2.7 mm long. Variety *pubescens* has stipe of fruits longer than calyx, fruits tapering to stipe, and leaves with 3–6 pairs of pinnae; var. *micropurpa* has stipe usually shorter than calyx, fruits rounded to stipe, and leaves usually with 2–3 pairs of pinnae.

ORBEXILUM SNAKEROOT

Perennial herbs; leaves pinnately compound with 3 leaflets; leaflets gland-dotted; racemes dense, spike-like; fruits cross-wrinkled, nearly beakless.

—A genus of 8 species native to the U.S. and Mexico (Grimes 1990); it was previously placed in *Psoralea*. (Derivation of generic name unknown, not indicated by original author) (subfamily Papilioideae, tribe Psoraleeae)

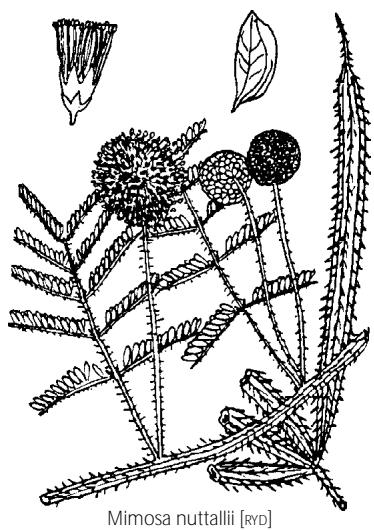
REFERENCES: Isely 1986a; Grimes 1990.

1. Corollas grayish lavender or lilac (rarely white), 4–7 mm long; calyces 2–3 mm long _____ **O. pedunculatum**
1. Corollas deep purple, 7–10 mm long; calyces 3.2–4 mm long _____ **O. simplex**

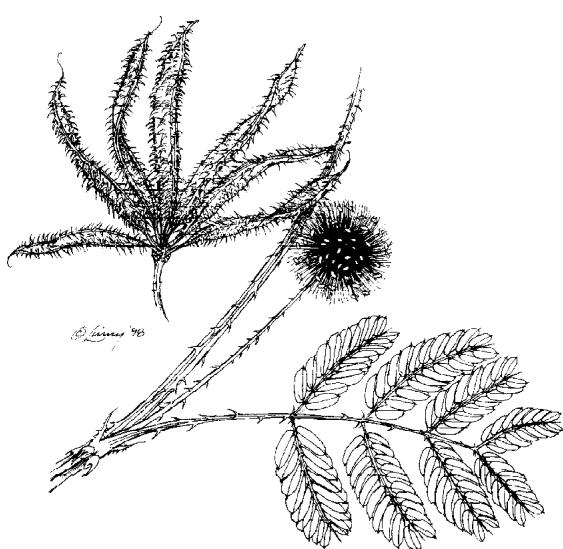
Orbexilum pedunculatum (Mill.) Rydb., (with a flower stalk), SAMPSON'S SNAKEROOT, BOBSROOT SNAKEROOT. Plant erect, to 0.6(–0.8) m tall; leaflets 40–70 mm long, 10–20 mm wide, elliptic to lanceolate; racemes 4–10 cm long; floral bracts and calyces eglandular. Damp or dry sandy open ground and open woods; Hopkins and Lamar cos. in ne part of nc TX; mainly se and e TX. Apr–May. [*Psoralea pedunculata* (Mill.) Vail, *Psoralea psoraloides* (Walter) Cory var. *eglandulosa* (Elliott) Freeman, *O. pedunculatum* var. *eglandulosum* (Elliott) Isely]



Mimosa latidens [HEA]



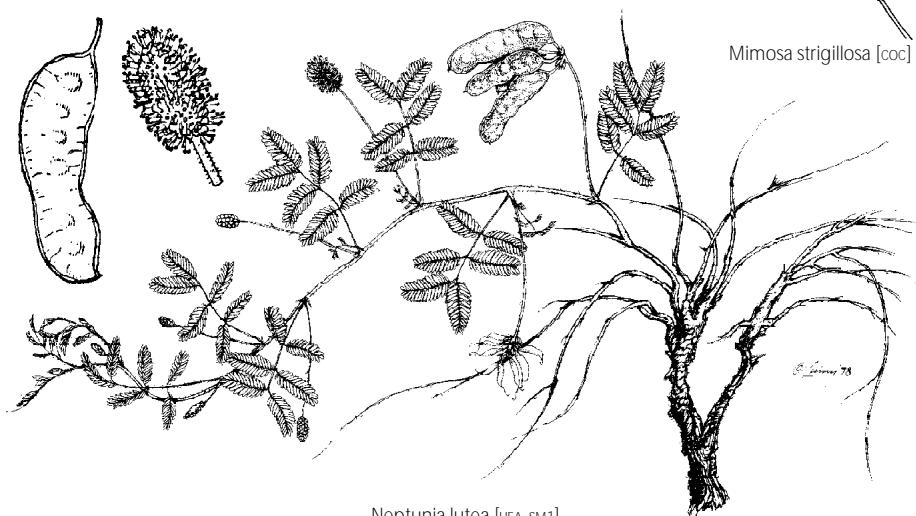
Mimosa nuttallii [RYD]



Mimosa roemeriana [HEA]



Mimosa strigillosa [coc]



Neptunia lutea [HEA, SM1]

Orbexilum simplex (Nutt. ex Torr. & A. Gray) Rydb., (simple, unbranched), SINGLE-STEM SNAKE-ROOT. Plant erect, to 1 m tall, minutely and inconspicuously pubescent; leaflets 20–70 mm long, 5–15 mm wide, linear-lanceolate or lanceolate; racemes 2–5 cm long; calyces purple, gland-dotted. Damp sandy woods or open ground; Limestone Co. on e margin of nc TX; mainly se and e TX. May-Jun. [*Psoralea simplex* Nutt. ex Torr. & A. Gray]

OXYTROPIS LOCOWEED, PURPLE LOCO, CRAZYWEED

—A genus of 300 species of the n temperate zone, particularly c Asia; some are harmful to livestock and a number are cultivated as ornamentals; sometimes lumped into *Astragalus*. (Greek, *oxy*, sharp, and *tropis*, keel, alluding to the keel of the flowers) (subfamily Papilionoideae, tribe Galageae)

REFERENCE: Barneby 1952.

Oxytropis lambertii Pursh, (for Alymer Bourke Lambert, 1761–1842, from whose cultivated plants Pursh described it), LOCOWEED, PURPLE LOCO, LAMBERT'S CRAZYWEED, WHITE LOCO, LAMBERT'S LOCO, CRAZYWEED, POINT LOCO. Perennial pubescent herb, often forming colonies; plant tufted, ± scapose, erect, to 35 cm tall; pubescence of hairs attached above base so that they have a long and a short arm (= malpighian or dolabriform hairs); leaves once odd-pinnately compound, often dimorphic; leaflets 7–19, sometimes falcate; stipules 7–24 mm long; flowers 10–25 per raceme, with sweet carnation scent; corollas 15–26 mm long, light to deep purple-red to almost white, withering to blue-violet; fruits 8–15(–25) mm long, the beak 3–7 mm long, stri-gose. Limestone outcrops; Blackland Prairie and Grand Prairie; also Rolling Plains and Edwards Plateau. Apr-May. [*Astragalus lambertii* (Pursh) Spreng. var. *abbreviatus* (Greene) Shinners, *Oxytropis lambertii* var. *articulata* (Greene) Barneby] Some authorities (e.g., Jones et al. 1997) treat TX material as var. *articulata* (Greene) Barneby. As in some *Astragalus* species, toxins (apparently indolizidine alkaloids—e.g., swainsonine) can cause fatal loco poisoning or locoism in livestock; horses are particularly susceptible; symptoms include trembling, abortion, tendency to become excessively excited and wild, and eventually, inability to eat, paralysis, and death; all parts of the plant are toxic and the poison is cumulative; (Kingsbury 1964; Burlage 1968; James & Welsh 1992; Ralphs 1992). ☠ FIG/101

PARKINSONIA

—A genus of 29 species with 25 in drier parts of the Americas, 1 in s Africa, and 3 in ne Africa. (Named for John Parkinson, London apothecary and botanical author, 1567–1650) (subfamily Caesalpinoideae, tribe Caesalpinieae)

Parkinsonia aculeata L., (prickly), RETAMA, PALOVERDE, HORSE-BEAN, JERUSALEM-THORN, MEXICAN PALOVERDE. Shrub or small tree to ca. 12 m tall; branches green, well-armed with sharp spines; leaves twice pinnately compound with 2(–4) pinnae (each with leaflets), but each pinna appearing as a once pinnate leaf due to the absence of a common petiole; pinnae with flattened green rachis; leaflets very small, 2–5(–9) mm long; flowers in racemes; petals 8–13 mm long, yellow; stamens 10, separate, inconspicuous; fruits usually 5–10 cm long, constricted between the seeds. Low sandy or gravelly limestone areas; s part of TX n to Williamson Co. (Correll & Johnston 1970) on s margin of nc TX, also Fort Hood (Bell or Coryell cos.—Sanchez 1997); also spreading from cultivation in Tarrant Co., also Brown Co. (HPC). Spring–Fall. Native of tropical America n to TX; Correll and Johnston (1970) indicated this species is perhaps adventive in TX and possibly native to South America; Elias (1989) said it is native from s TX s through Mexico to South America. This species was used in a famous forensic botany case in 1993. A PALOVERDE tree was instrumental in linking a murder suspect to an Arizona crime site where the suspect allegedly dumped the body of a victim. Plant geneticist Tim Helentjaris of the University of Arizona demonstrated that two seed pods found in the back of suspect's truck

came from a specific PALOVERDE tree scraped by the truck at the crime scene. This example is important because it was the first in which plant DNA was used in a criminal case (Mestel 1993; Yoon 1993).

PEDIOMELUM SCURF-PEA

Perennials with tough or swollen (tuberous) root, caulescent or acaulescent; leaves once pinnately or palmately compound with 3–7 leaflets, often gland-dotted; corollas blue to lavender-purple, brick-red, or salmon-pink (rarely pink); stamens 10, monadelphous; fruits gland-dotted or eglandular, not cross-wrinkled, enclosed by enlarged, often gland-dotted calyces, dehiscent by transverse rupture and with the base of the fruit persistent on the receptacle; beak of fruit prominent, not cross-wrinkled.

— A genus of 21 species native from c Mexico n through the U.S. to sc Canada (Grimes 1990); it was previously placed in *Psoralea*. With the exception of *P. hypogaeum* and *P. rhombifolium*, nc TX species usually have conspicuously gland-dotted leaves, fruits, and often calyces and bracts. (Greek: *pedion*, plain, and *melo*, apple) (subfamily Papilioideae, tribe Psoraleeae)

REFERENCES: Shinners 1951a; Ockendon 1965; Isely 1986a; Grimes 1990.

1. Leaves pinnately compound with 3 leaflets, not gland-dotted; stems normally prostrate; petals brick-red to salmon-pink (rarely pink) ***P. rhombifolium***
1. Leaves palmately compound with 3–7 leaflets, gland-dotted (except in *P. hypogaeum*); stems erect or ascending or plants acaulescent; petals blue to lavender or purple.
 2. Inflorescence a slender loose raceme or slender, interrupted, spike-like raceme, < 2 cm thick; calyces 2–9 mm long; bracts up to 5 mm long; root thick, elongate.
 3. Plants eglandular except for upper surfaces of leaflets; pedicels 1–3 mm long; petioles of middle and upper stem leaves 6 mm or more long (often much more); bracts 2–10 mm long ***P. digitatum***
 3. Plants gland-dotted on both leaf surfaces, stipules, bracts, and calyces; pedicels 3.5–10 mm long; petioles of middle and upper stem leaves 5 mm or less long; bracts 1.5–3.5 mm long ***P. linearifolium***
 2. Inflorescence a dense, spike-like raceme 2–4 cm thick; calyces 8–17 mm or more long; bracts 4–15 mm or more long; root thick, elongate or often tuberous-enlarged, sometimes conspicuously so.
 4. Leaves all basal or nearly so at flowering time; fruits long-beaked (beak 7–19 mm long); foliage eglandular or inconspicuously gland-dotted ***P. hypogaeum***
 4. Leaves distributed well up the stem; fruits short-beaked (beak 2–6 mm long); foliage usually conspicuously gland-dotted.
 5. Stems densely pilose with widely spreading hairs; leaf blades long-pubescent on margins and midrib beneath ***P. latestipulatum***
 5. Stems and leaf blades glabrous or appressed-pubescent.
 6. Floral bracts ovate-orbicular, abruptly contracted to a narrow sharp point, the body about as wide as long (6–13 mm wide); inflorescences with 3–7 flowers, with only 2 nodes ***P. reverchonii***
 6. Floral bracts ovate- or oblong-lanceolate, gradually acute or acuminate, longer than wide (1–6 mm wide); inflorescences many-flowered, usually with 3 or more nodes.
 7. Peduncles shorter than or equal to subtending petioles; stipules 2.5–7 mm wide, elliptic-lanceolate to falcately oblanceolate or orbicular, the largest often in the middle of the plant ***P. latestipulatum***
 7. Peduncles longer than subtending petioles; stipules (except quickly deciduous ones of very basal leaves) usually 2.5 mm or less wide, linear-lanceolate to lanceolate.
 8. Leaflets (except those of quickly deciduous basal leaves) linear-lanceolate or nar-

- rowly oblong-lanceolate, 7–14 times as long as wide, 35–95 mm long, 3–9(–13) mm wide _____ **P. cyphocalyx**
8. Leaflets broadly lanceolate to rhombic, elliptic, or obovate, 2–3(–5) times as long as wide, 20–50 mm long, (6–)10–24 mm wide _____ **P. cuspidatum**

Pediomelum cuspidatum (Pursh) Rydb., (with a sharp stiff point), TALL-BREAD SCURF-PEA. Stems decumbent or ascending, occasionally erect, to 80 cm long, freely branched; leaves and fruits gland-dotted; flowers often with sweet-clover scent, 12–20 mm long; petals blue or purplish; fruit body 6–8 mm long, completely enclosed in calyx, the beak to 2 mm long. Clayey, rocky, or sandy prairies; Blackland Prairie s and w to w TX. Late Apr-May. [*Psoralea cuspidata* Pursh]

Pediomelum cyphocalyx (A. Gray) Rydb., (bent or curved calyx), TURNIP-ROOT SCURF-PEA. Stems usually solitary, ascending or erect, to 1 m tall, simple or sparingly branched above; leaves and fruits gland-dotted; flowers similar to *P. cuspidatum*, fruit body 5–6 mm long, completely enclosed in calyx, glabrous, the beak pubescent, to ca. 4 mm long. Limestone outcrops; Bell and Hamilton cos.; also Burnet, Lampasas, Parker, and Wise cos. (Ockendon 1965); Grand Prairie s to Edwards Plateau; endemic to c and nc Texas. Late May-Jun. [*Psoralea cyphocalyx*A. Gray] 

Pediomelum digitatum (Nutt. ex Torr. & A. Gray) Isely, (finger- or hand-like), PALM-LEAF SCURF-PEA. Plant stiffly and openly branched from lower down, 30–80 cm tall; root not tuberous-enlarged; leaves and fruits gland-dotted; leaflets linear-oblanceolate, (2–)3–8 mm wide, gray and densely appressed-pubescent beneath, nearly glabrous above; spikes or spike-like racemes erect or ascending, interrupted; fruit body 5–6 mm long, the beak to 4 mm long. Sandy or clayey soils; e TX w to Rolling Plains and Edwards Plateau. Mid-May-early Jul. [*Psoralea digitata* Nutt. ex Torr. & A. Gray, *Psoralea digitata* var. *parvifolia* Shinners]. Variety *parvifolia*, supposedly with narrower linear leaflets, those of the middle leaves only 2–4 mm wide, is recognized by some authorities; we are following Grimes (1990), who indicated there is no discrete break in leaflet width and did not recognize var. *parvifolia*. It occurs in e TX w to Henderson and Limestone cos. at the extreme e margin of nc TX.

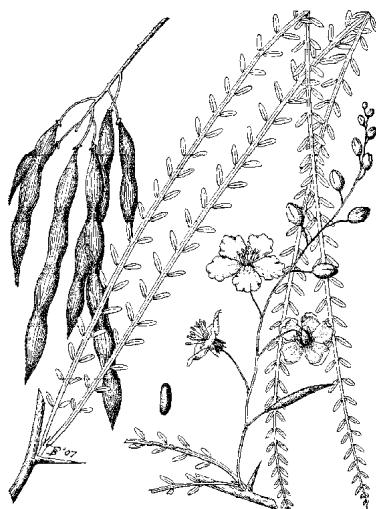
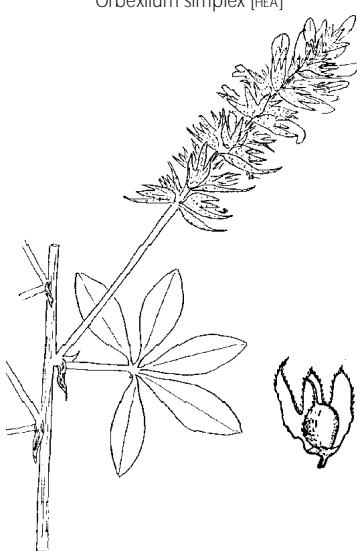
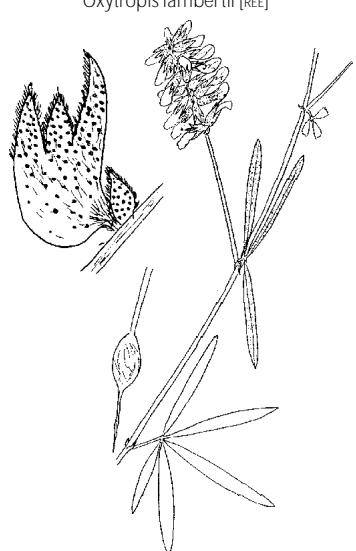
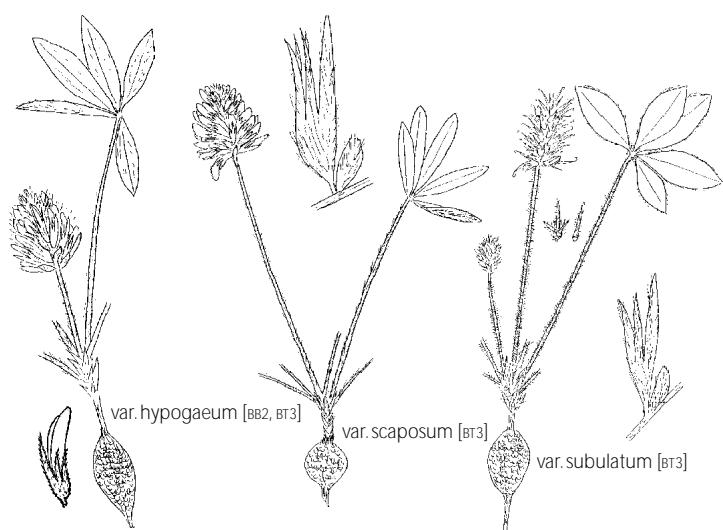
Pediomelum hypogaeum (Nutt. ex Torr. & A. Gray) Rydb., (underground). Plant to 25 cm tall, eglandular or with obscure glands; leaflets elliptic to rhombic or oblanceolate; flowers in short, dense spikes; petals lavender to purple; fruit body 5–6.5 mm long, the beak 7–19 mm long, projecting well past calyx. Sandy or rocky areas, roadsides, prairies, woods. Mar-May.

1. Peduncles (= stalk of inflorescence) 1.2–3.5 cm long, < 1/2 as long as the petiole of the subtending leaf _____ var. **hypogaeum**
1. Peduncles (1.7–)4–14 cm long, > 1/2 as long as the petiole of the subtending leaf.
2. Peduncles and petioles with appressed or closely ascending hairs; leaflets narrow, 4–11(–13) mm wide, 3–4 times as long as wide _____ var. **scaposum**
2. Peduncles and petioles with wide-spreading hairs; leaflets broad, (8–)13–37 mm wide, 2 times as long as wide or less _____ var. **subulatum**

var. **hypogaeum**, EDIBLE SCURF-PEA, PRAIRIE-POTATO, POMME BLANCHE, POMME-DE-PRAIRIE. Parker Co. (Grimes 1990); scattered in w 1/2 of TX. [*Psoralea hypogaea* Nutt. ex Torr. & A. Gray, *Psoralea scaposa*(A. Gray) J.F. Macbr. var. *breviscapa* Shinners] The tuber-like root was an important food source for Native Americans (Ajilvsgi 1984).

var. **scaposum** (A. Gray) Mahler, (with scapes). C TX n to Fort Worth Prairie and West Cross Timbers; type locality near Fredricksburg; endemic to TX. [*Psoralea hypogaea* var. *scaposa*A. Gray, *Psoralea scaposa*(A. Gray) J.F. Macbr.] 

var. **subulatum** (Bush) J.W. Grimes, (awl-shaped). Cooke and Denton cos., also Grayson, Navarro (Ockendon 1965), McLennan (Grimes 1990), and Tarrant (R. O'Kennon, pers. obs.) cos; type locality

*Orbexilum pedunculatum* [BB2]*Orbexilum simplex* [HEA]*Oxytropis lambertii* [REE]*Parkinsonia aculeata* [sud]*Pediomelum cuspidatum* [BB2, BT3]*Pediomelum cyphocalyx* [BT3]*Pediomelum digitatum* [BB2]*Pediomelum hypogaeum*

in Dallas Co.; se and e TX w to East Cross Timbers. [*Psoralea subulata* Pursh, *Psoralea subulata* var. *minor* Shinners]

Pediomelum latestipulatum (Shinners) Mahler, (with broad stipules). Stems erect, 7–18(–45) cm tall; rootstock usually turnip-shaped; leaves and fruits gland-dotted; leaflets usually elliptic to oblanceolate, 5–15 mm wide; flowers 18–26 mm long; petals blue to lavender or purple; fruit body 5–6.5 mm long, the beak narrow, 5–6 mm long. Rocky or sandy prairies; Grand Prairie southwestward. Apr–mid-May.

1. Stems with appressed pubescence _____ var. **appressum**
1. Stems with erect pubescence _____ var. **latestipulatum**

var. **appressum** (Ockendon) Ghandi & L.E. Br., (pressed close to, lying flat against). According to Grimes (1990), while var. *appressum* is larger overall than var. *latestipulatum*, there is overlap in the size characters. The difference in pubescence is the only consistent character separating the varieties. Williamson Co. (Grimes 1990); mainly Edwards Plateau; type is from Travis Co.; endemic to TX. [*Psoralea latestipulata* Shinners var. *appressa* Ockendon] 

var. **latestipulatum**. Brown, Coleman, Comanche, Mills, Parker, Stephens, and Tarrant cos., also Callahan, Eastland, and Wise cos. (Ockendon 1965); mainly Grand Prairie w to Rolling Plains; endemic to TX. [*Psoralea latestipulata* Shinners] 

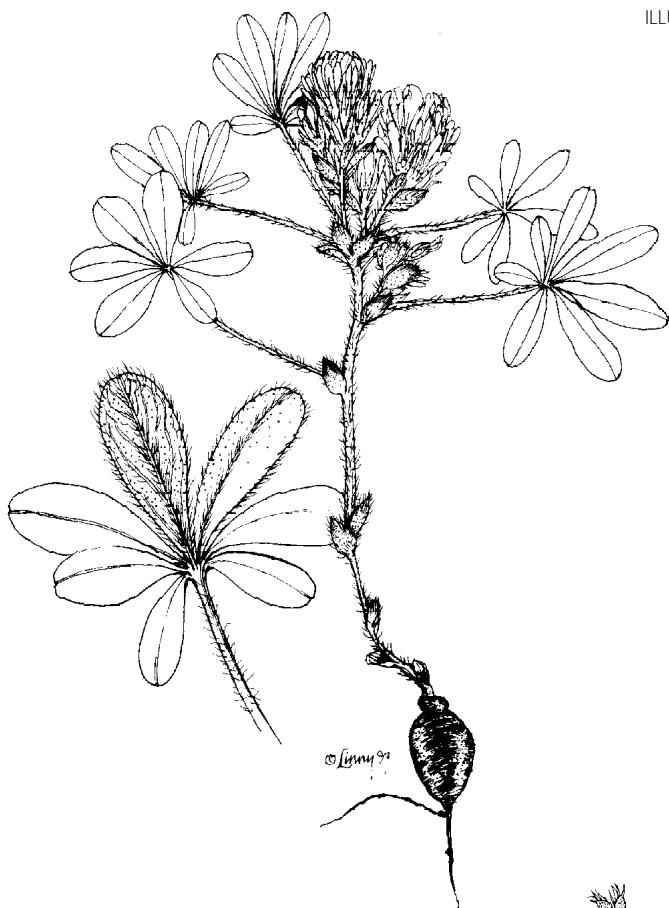
Pediomelum linearifolium (Torr. & A. Gray) J.W. Grimes, (linear-leaved). Plant to 170 cm tall, branched above, glabrate to inconspicuously appressed-pubescent; leaves and fruits gland-dotted; leaflets linear, 1–4(–6) mm wide; racemes slender, loose, drooping; flowers 8–10 mm long; petals blue to purplish; fruits 8–10.5 mm long including a broad beak to 3.5 mm long. Rocky prairies or open ground, chiefly on limestone; w Blackland Prairie w and n to Panhandle. Late May–Jun, sporadically later. [*Psoralea linearifolia* Torr. & A. Gray, *Psoralidium linearifolium* (Torr. & A. Gray) Rydb.]

Pediomelum reverchonii (S. Watson) Rydb., (for Julien Reverchon, 1837–1905, a French-American immigrant to Dallas and important botanical collector of early TX), ROCK SCURF-PEA. Plant rather bushy-branched, erect, to 120 cm tall; branches with appressed pubescence; leaflets lanceolate to elliptic, 5–9(–14) mm wide; bracts large, 18–20 mm long, 8–12 mm wide, conspicuously gland-dotted; flowers 10–15 mm long; petals blue-lavender; fruit body 7–8 mm long, the beak 3–4 mm long. Limestone outcrops; Cooke, Hood, and Tarrant cos. (type locality—Hood Co., Reverchon); also Johnson, Montague, Parker, and Wise cos. (Grimes 1990); w part of nc TX; narrowly endemic to nc TX and sc OK. Jun–Sep. [*Psoralea reverchonii* S. Watson]

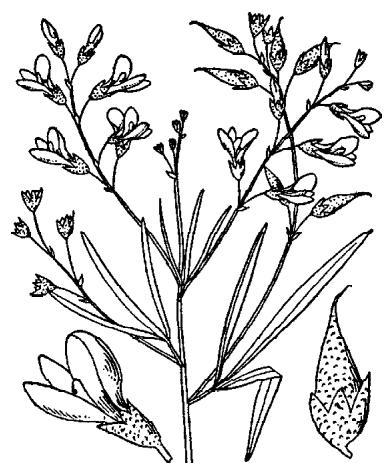
Pediomelum rhombifolium (Torr. & A. Gray) Rydb., (with rhomboid leaves), ROUND-LEAF SCURF-PEA. Plant sparsely to densely gray-pubescent; stems normally prostrate, to 100 cm long; root not tuberous-enlarged; leaflets and fruits eglandular; leaflets variable in shape, ca. 10–30 mm wide; peduncles axillary, erect, 2–12 cm long; bracts inconspicuous; flowers 5–8(–10) mm long; fruit body 8–11 mm long, the beak 6–8 mm long. Sandy stream banks, roadsides, disturbed areas; e 1/2 of TX w through Rolling Plains; endemic to TX, s most OK and w most LA. May–Jul, sporadically to Sep. [*Psoralea rhombifolia* Torr. & A. Gray]

POMARIA

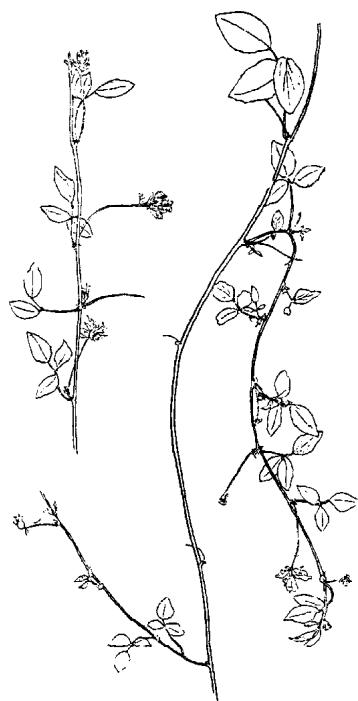
—A genus of 12 species with 9 occurring in the U.S. from Kansas southward and in Mexico to the state of Hidalgo; also 3 species occur in South Africa (Simpson 1998). We are following Simpson and Miao (1997) and Simpson (1998) in recognizing this segregate of *Caesalpinia*; future study will probably result in the transfer of several South American species of



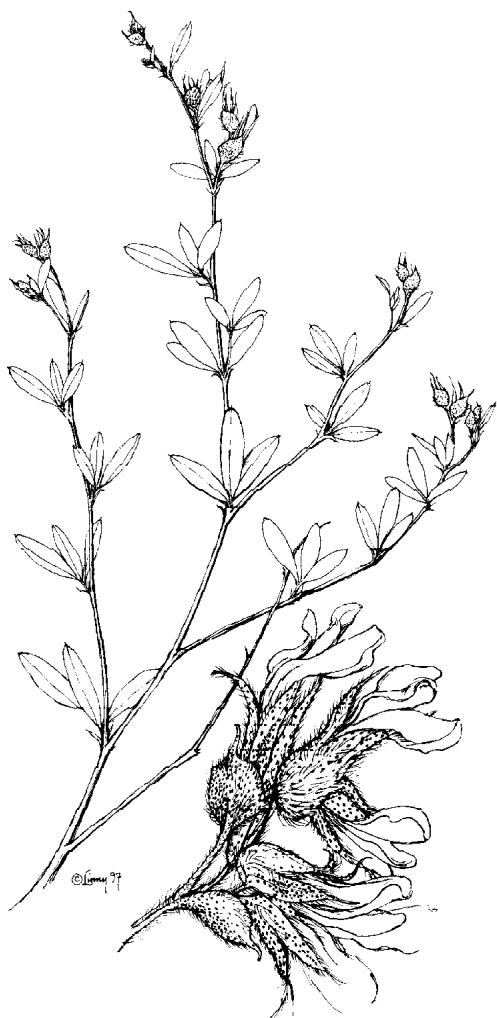
Pediomelum latestipulatum var. latestipulatum [HEA]



Pediomelum linearifolium [BB2]



Pediomelum rhombifolium [coc]



Pediomelum reverchonii [HEA]

Hoffmannseggia Pomaria (Simpson 1998). (Named in 1799 by Cavanilles for Domini Pomár, physician of Phillip III) (subfamily Caesalpinoideae, tribe Caesalpinieae)

REFERENCES: Isely 1975; Simpson & Miao 1997; Simpson 1998.

Pomaria jamesii (Torr. & A. Gray) Walp., (for Edwin James, 1797–1861, American botanical explorer of the Rocky Mt. area). Unarmed perennial herb to 40 cm tall, from a thick woody root; stems appressed-pubescent, glandular; leaves twice pinnately compound with 5–7 pinnae; each pinna with 5–10 pairs of leaflets; leaflets 2.5–7 mm long, with orange sessile glands on under surface (glands black upon drying); stipules linear to lanceolate, ± entire; flowers zygomorphic; calyxes and corollas glandular; petals 5, yellow, with red markings or sometimes red at base; stamens 10, to 6 mm long, shorter than the petals; filaments free; fruits 20–25 mm long, 8–10 mm wide; seeds 2. Loose sandy soils, disturbed areas; Hamilton Co., also Brown (HPC) and Comanche (Turner 1959; Simpson 1998) cos.; Trans-Pecos to Panhandle, e to Rolling Plains and sw part of nc TX. May–Sep. [*Caesalpinia jamesii* (Torr. & A. Gray) Fisher, *Hoffmannseggia jamesii* Torr. & A. Gray] While this species has usually been treated in *Caesalpinia* (e.g., Correll & Johnston 1970; Isely 1975; Kartesz 1994; Jones et al. 1997), we are following Simpson (1998) in treating it in *Pomaria*.

PROSOPIS MESQUITE

—A mainly American genus of 44 species with some in sw Asia and Africa; mostly trees or shrubs, usually spiny. (From the Greek name for a kind of prickly fruit, such as the head of *Arctium lappa* L.—burdock, for obscure reasons) (subfamily Mimosoideae, tribe Mimosae)

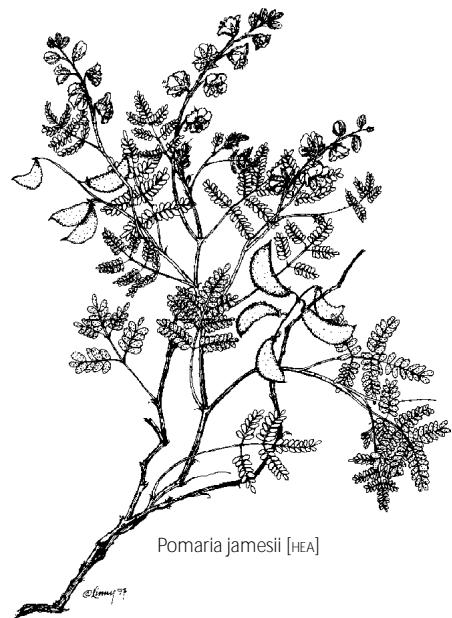
REFERENCES: Isely 1972, 1973; Solbrig & Bawa 1975; Solbrig & Cantino 1975; Burkart 1976.

Prosopis glandulosa Torr., (glandular), HONEY MESQUITE, MESQUITE, ALGARROBA. Shrub or small tree, spreading by deep roots; branches with small, stout, straight spines at enlarged nodes; leaves twice even-pinnately compound; leaflets glabrous; flowers in drooping, short-peduncled, catkin- or spike-like racemes, yellowish white; petals separate nearly or quite to base; stamens 10, separate, serving as the main attractant structure for the flower; fruits (5–)7–20 cm long, nearly as thick as broad, constricted between seeds. Various soils; throughout most of TX, common and locally abundant from Post Oak Savannah w, rare and local further e; frequently preserved as a semi-cultivated tree about houses. Late Apr–May, less freely to Jul or later. [*P. juliflora* (Sw.) DC. var. *glandulosa*(Torr.) Cockerell] This species was originally uncommon and restricted to stream banks and rocky slopes; it has greatly increased in abundance since settlement and is now a problematic invader of abused grasslands, particularly under abusive grazing regimes. It is well known for its deep roots which can go to depths of 100 feet or more in search of water (Cox & Leslie 1991). Large, fist-sized, swollen galls are sometimes formed on the stems by the rust fungus *Ravenelia holwayi* Dietel; leaf lesions can also be present; the rust has a complex life cycle involving 5 different spore types (J. Hennen, pers. comm.). Smoke from the burning wood is widely used to flavor foods and the seeds of MESQUITE have long been eaten by livestock and humans; Native Americans made bread from the pods and an intoxicating beer by fermenting the meal (Standley 1922b; Powell 1988); however, large amounts can cause poisoning in livestock (Kingsbury 1964). Furniture and flooring are made from the hard reddish brown wood. ☣

PSORALIDIUM SCURF-PEA

—A genus of 3 species widespread in North America from s Canada to n Mexico (Grimes 1990); it was previously placed in *Psoralea*. *Psoralidium linearifolium* is here treated in *Pediomelum*. (Diminutive of *Psoralea*, from Greek: *psoraleos*, warty or scurfy, alluding to the glandular, dotted leaves of some species of that genus) (subfamily Papilioideae, tribe Psoraleeae)

REFERENCES: Shinners 1951a; Isely 1986a; Grimes 1990.



Pomaria jamesii [HEA]



Pomaria jamesii [HEA]

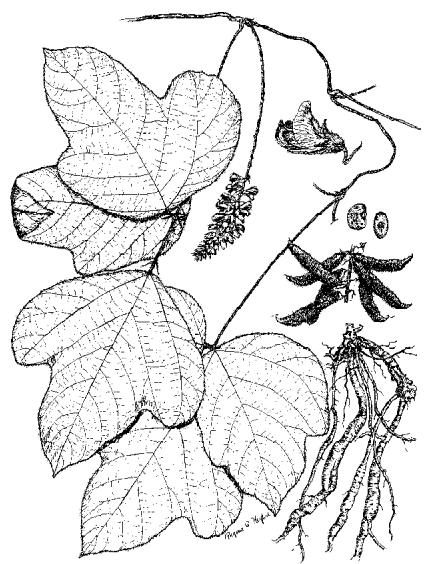
Pomaria jamesii [HEA]



Prosopis glandulosa [SA2, SUD]



Psoralidium tenuiflorum [GLE]



Pueraria montana var. *lobata* [REE]

Psoralidium tenuiflorum (Pursh) Rydb., (slender-leaved), SLIM-LEAF SCURF-PEA, WILD ALFALFA, SCURVY-PEA, SLENDER SCURFY-PEA. Much-branched perennial herb with erect or ascending stems 40–60(–120) cm tall; stems, lower surfaces of leaf blades and inflorescences strigose with conspicuous whitish hairs; leaves with 3 leaflets, rarely 5 below; leaflets 10–50 mm long, up to 6(–12) mm wide, narrowly elliptic to oblong, conspicuously gland-dotted on both surfaces; stipules gland-dotted; racemes erect to drooping, with flowers numerous and crowded; calyces conspicuously gland-dotted; corollas usually 5–7 mm long; fruits 7–9 mm long, densely gland-dotted, not cross-wrinkled, exerted from the calyces, the calyx remnants basal only. Sandy or rocky prairies, open woods, and roadsides; widely scattered across TX. Apr-Jul, sporadically later. [*Psoralea tenuiflora* Pursh] Reported to be poisonous to livestock (Muenscher 1951). ☣

PUERARIA KUDZU, KUDZUVINE

— A genus of 17 species of twiners with extra-floral nectaries native to tropical and e Asia. (Named for Marc Nicolas Puerari, 1766–1845, Swiss botanist) (subfamily Papilionoideae, tribe Phaseoleae)

REFERENCES: Frankel 1989; Ward 1998.

Pueraria montana (Lour.) Merr. var. **lobata** (Willd.) Maesen & Almeida, (sp.: pertaining to mountains; var: lobed), KUDZU, KUDSU, KUDZUVINE, JAPANESE ARROWROOT. Perennial vine with trailing or high-climbing, villous stems to 20 or even 30 m long; foliage killed back to the ground during the winter in nc TX; leaves pinnately compound with 3 leaflets; leaflets ovate-rhombic to ovate or nearly rotund, entire to often 2–3 lobed, pubescent below, 5–20 cm long; petioles very long, often as long as rest of the leaf; inflorescence an axillary raceme; pedicels 2–8 mm long; flowers fragrant; corollas 15–25 mm long, violet-purple or reddish purple; stamens monodelphous; fruits linear-oblong, 4–5 cm long, conspicuously tawny to reddish brown villous. Roadsides, waste places; Grayson and Tarrant cos., also Lamar Co. (G. Diggs, pers. obs.); se and e TX w to nc TX. Late summer-fall. Native of China and Japan. [*Pueraria lobata* (Willd.) Ohwi] This species has been used for its edible root, as a green manure, for fodder, and in misguided attempts to control erosion or serve as a ground cover. It was introduced to the U.S. in 1876 by the Japanese as a gift at the Philadelphia Centennial Exposition and was endorsed and encouraged by the U.S. Department of Agriculture as a soil binder and fertilizer (Frankel 1989). It grows extremely rapidly (a foot or more a day) and invades and literally covers up native vegetation including large trees. In some areas of the se U.S. it is probably the most problematic noxious alien invader; KUDZU now covers more than one million acres in the southeastern U.S., is sometimes referred to as the “Scourge of the South,” and is outlawed in several states (Frankel 1989). Recent studies with animals suggested that isoflavones and isoflavone glycosides from KUDZU may be useful in the treatment of alcohol abuse (Keung & Vallee 1993; Leung & Foster 1996). For an explanation of the nomenclature of this species, see Ward (1998). ☣

RHYNCHOSIA SNOUT-BEAN

Ours trailing or twining perennials with deep, often partly tuberous-thickened or branched roots; leaves pinnately compound in our species (1-foliate in a species to the se of nc TX); leaflets 3, with resin droplets beneath; stipules small; flowers axillary, solitary or spike-like racemes; petals yellow or orangish, sometimes tinged with brown or red.

— A mainly tropical genus of ca. 300 species; they can usually be recognized by the combination of ± yellow corollas, small typically 2-seeded fruits, and conspicuously glandular foliage (Isely 1990). (Greek: *rhyngchos* snout or beak, presumably in allusion to the somewhat beak-like form of the keel) (subfamily Papilionoideae, tribe Phaseoleae)

REFERENCE: Grear 1978.

1. Calyces 1.5–6 mm long, divided ca. 1/2 way to base, shorter than the corollas; corollas 3.5–7 mm long.
 2. Flowers 1–3 in the axils of the leaves _____ **R. senna**
 2. Flowers in conspicuous elongate racemes of 5–15 flowers _____ **R. minima**
1. Calyces 8–14 mm long, divided nearly to base, ca. equal to or longer than the corollas; corollas 8.5–13 mm long _____ **R. latifolia**

Rhynchosia latifolia Nutt. ex Torr. & A. Gray, (broad-leaved), BROAD-LEAF SNOUT-BEAN, BROAD-LEAF RHYNCHOSIA. Plant short-pilose; stems to 100 cm long; leaflets 12–80 mm wide, suborbicular to rhombic-ovate or elliptic-lanceolate; flowers in elongate racemes 3–30 cm long; corollas yellow; fruits ca. 13–20 mm long, 7–9 mm wide, shortly ovate-oblong. Sandy woods and roadsides; se and e TX w to West Cross Timbers (Parker Co. at Azle). Late May–Jun, Sep, sporadically Jul–Aug.

Rhynchosia minima (L.) DC., (least, smallest), LEAST SNOUT-BEAN. Plant minutely pubescent; racemes usually 4.5–16.5 cm long; corollas 4–7 mm long, yellow, sometimes with brownish tinge; fruits 12–20 mm long, 3–4.5 mm wide, scimitar-shaped (= like a curved sword). Clay soils; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); the n most specimen we have seen is from Travis Co.; mainly coastal plain to c TX. Apr-Dec. [R. minima var. *diminifolia* Walraven]

Rhynchosia senna Gillies ex Hook. var. *texana* (Torr. & A. Gray) M.C. Johnst., (sp.: from the Arabic name; var.: of Texas). Plant minutely pubescent throughout; stems to 70 cm long; leaflets 4–18 mm wide, ovate-lanceolate or elliptic to narrowly oblong; calyces half as long as the corollas; corollas yellow, often tinged with red or brown; fruits to 11–19 mm long, scimitar-shaped. Gravely or rocky limestone soils; Bell, Burnet, and Somervell cos., also Dallas and Palo Pinto cos. (Correll & Johnston 1970); c part of nc TX s to Edwards Plateau and w to Trans-Pecos. Jun–Sep. [R. senna var. *angustifolia*(A. Gray) Grear, R. *texana* Torr. & A. Gray]

Rhynchosia americana (Houst. ex Mill.) Metz is cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2), probably based on a Fayette Co. record (Correll & Johnston 1970) to the se of nc TX. This species differs from all nc TX species of *Rhynchosia* in having a single reniform leaflet.

ROBINIA LOCUST

Trees or shrubs; leaves once odd-pinnately compound; leaflets 7–19, entire; flowers in drooping axillary racemes; calyces campanulate; fruits linear-oblong, compressed to flat.

— A North American genus of 4 species of deciduous trees and shrubs usually with stipular spines and extrafloral nectaries; some are cultivated as ornamentals. (Named for Jean Robin, 1550–1629, herbalist to Henry IV of France, and his son Vespasian Robin, 1579–1662, who first cultivated the locust in Europe) (subfamily Papilionoideae, tribe Robinieae)
REFERENCES: Isely & Peabody 1984; Peabody 1984.

1. Young stems and leaves densely and conspicuously hispid (= bristly); petals rose to reddish purple; fruits densely hispid (but rarely developed); usually unarmed shrub _____ **R. hispida**
1. Young stems and leaves glabrous; petals whitish; fruits glabrous; tree usually armed with stipular spines _____ **R. pseudoacacia**

Robinia hispida L., (hispida, bristly), BRISTLY LOCUST, ROSE-ACACIA, MOSSY LOCUST. Shrub to 3 m tall (rarely small tree); stipules not spiny; racemes with 3-ca. 10 flowers; flowers inodorous, very showy; petals 2–3 cm long; fruits 5–8 cm long, often not formed. Cultivated, persisting and spreading around old homesites; Grayson Co; Hatch et al. (1990) cited only vegetational areas 3 and 4 (Fig. 2). Spring. Introduced from the e U.S. This variable species has been used in some areas in soil conservation plantings and in reclamation of strip mine spoils (Isely 1990).

Robinia pseudoacacia L., (false *Acacia*), BLACK LOCUST, FALSE ACACIA, BASTARD ACACIA. Tree becoming 20–30 m tall, forming colonies by root sprouts; bark furrowed; racemes with ca. 10–35 flowers; flowers fragrant, 1.5–2.5 cm long; fruits 5–10 cm long. Sandy roadsides and fencerows; Denton, Grayson, Johnson, and Tarrant cos; se and e TX w to East Cross Timbers, also Edwards Plateau. Mar–May. Native of e U.S. This species is very difficult to eradicate once established because of the root sprouts. The wood is one of the strongest and most durable in North America (Peattie 1948; Cox & Leslie 1991). The leaves exhibit nyctinastic (nighttime or “sleep”) movements, the leaflets drooping on their petiolules (Peattie 1948). The inner bark, young leaves, and seeds are toxic to all classes of livestock and humans; children have been poisoned by sucking on fresh twigs or eating inner bark or seeds; toxins include a lectin (= type of phyto-toxin or toxic protein), known as robin, that agglutinates red blood cells, and robitin, a glycoside (Hardin & Arena 1974; Lewis & Elvin-Lewis 1977; Fuller & McClintock 1986). ☠

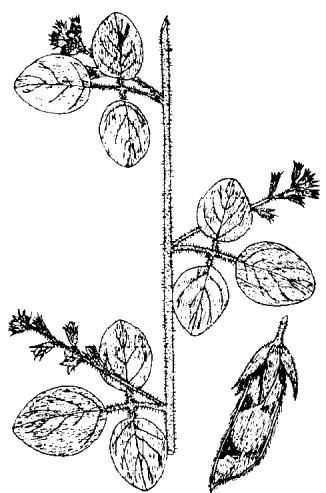
SENNA

Ours annual or perennial, unarmed herbs or shrubs; leaves once even-pinnately compound; petiolar glands present or absent; corollas yellow or orange; stamens 10, unequal, usually not all fertile, separate; anthers basifixd, dehiscing by apical pores; fruits not elastically dehiscent.

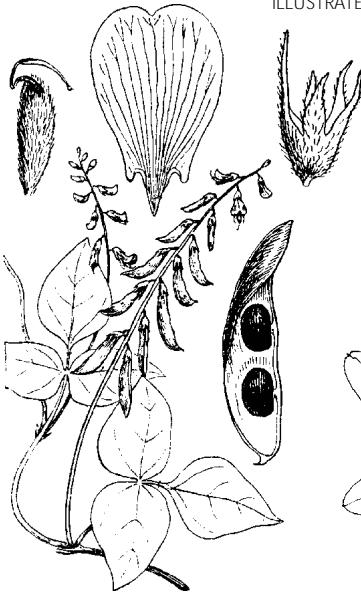
—A genus of ca. 250 species (Isely 1990) or ca. 350 species (Mabberley 1997); pantropical in distribution but mostly in the New World; extending northward in xeric regions (Isely 1990). Sometimes lumped into the genus *Cassia*, but *Senna* differs in characters such as anthers dehiscent by apical pores, filaments not sigmoid, and bracteoles absent (Irwin & Barneby 1982). Irwin and Barneby (1982) gave a detailed key separating *Cassia*, *Chamaecrista*, and *Senna*. Reported to have the “vibrator” or “buzz” pollination syndrome; pollinators (such as bumblebees) shake the anthers by vibrating their thoracic flight muscles at a certain frequency; this sets up a resonance in the anthers or the space they enclose and the otherwise inaccessible pollen is released from the terminal pores of the anthers and collected by the insect (Barth 1985; Proctor et al. 1996). ☠ Some are poisonous or important medicinally (source of pharmaceutical senna) due to their anthraquinone glycosides; others are cultivated as ornamentals. (Ancient Arabic name of these plants, *sana*) (subfamily Caesalpinoideae, tribe Cassieae)

REFERENCE: Irwin & Barneby 1982.

1. Leaflets 2 (1 pair) per leaf.
 2. Leaflets linear, 1–3 mm wide; flowers solitary _____ ***S. pumilio***
 2. Leaflets lanceolate, 7–12 mm wide; flowers 2–5 per peduncle _____ ***S. roemeriana***
1. Leaflets 4–numerous (2 or more pairs) per leaf.
 3. Leaflets usually 4–6 per leaf; mature fruits either terete OR 16–20 cm long.
 4. Plants not malodorous; leaflets oblanceolate to lanceolate or lanceolate-elliptic, acute to acuminate at apex; petiolar gland (between lowest leaflets) erect; mature fruits 6–8 cm long, 6–9 mm wide _____ ***S. corymbosa***
 4. Plants malodorous; leaflets obovate, apex rounded and apiculate; petiolar gland appressed; mature fruits 16–20 cm long, 4–5.5 mm wide _____ ***S. obtusifolia***
 3. Leaflets 8–numerous per leaf; mature fruits neither terete nor as long as 16 cm.
 5. Petioles without glands; mature fruits 10–20 cm long, winged _____ ***S. alata***
 5. Petioles with gland(s) between each pair of leaflets or below lowest pair of leaflets (near base of petiole); mature fruits 4–12 cm long, not winged.
 6. Petiolar glands occurring between each pair of leaflets; mature fruits 4–6 cm long _____ ***S. lindheimeriana***
 6. Petiolar glands solitary, below lowest pair of leaflets (usually near base of petiole); mature fruits 7–12 cm long.
 7. Plants annual, malodorous; flowers usually 2–3(–5) per raceme; mature fruits brown



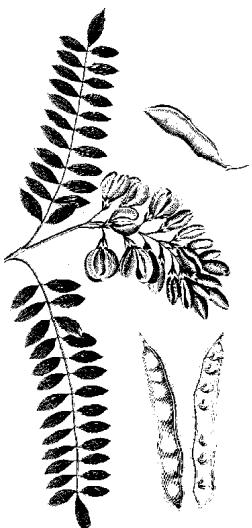
Rhynchosia latifolia [STE]



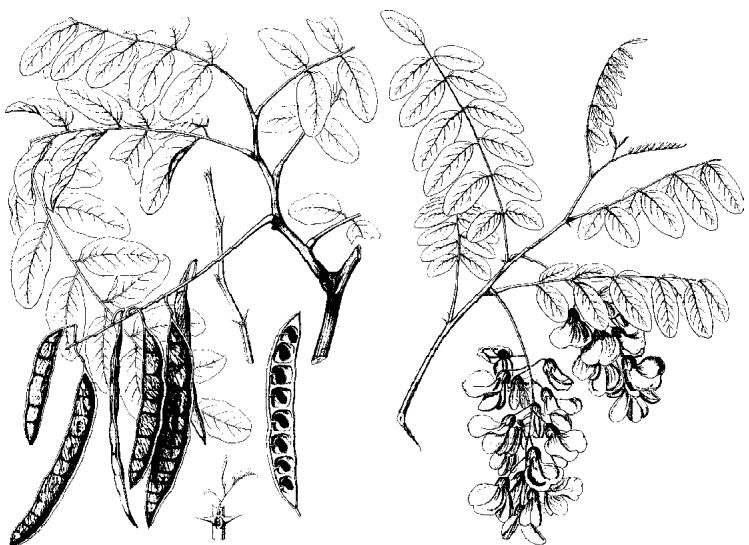
Rhynchosia minima [FAW]



Rhynchosia senna var. *texana* [HEA]



Robinia hispida [LAM]



Robinia pseudoacacia [SA3]



Senna alata [WG]



Senna corymbosa [APG, SM1]

- with lighter margins, somewhat raised over the seeds but without distinct septations between the seeds _____ **S. occidentalis**
7. Plants perennial, not malodorous; flowers (4–)5–numerous per raceme; mature fruits black, flat, with cross septations (visible externally as very distinct lines across the fruit) _____ **S. marilandica**

Senna alata (L.) Roxb., (winged), EMPEROR'S-CANDLESTICKS. Perennial shrub to 2–3 m tall, usually dying back to the ground in winter in TX; leaflets 6–12 pairs per leaf; upper 3 stamens much reduced; lowest 3 stamens with larger anthers; our only *Senna* with winged fruit. Cultivated and apparently escapes; included based on citation for vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); sc to c TX. Aug–Oct. Native of tropical America. [*Cassia alata* L.] ☀

Senna corymbosa (Lam.) H.S. Irwin & Barneby, (with corymbs), ARGENTINE SENNA. Glabrous perennial shrub or small tree to 3.5 m tall; evergreen where not killed back by cold; leaflets 2–3 pairs per leaf, oblanceolate to lanceolate or lanceolate-elliptic, acute to acuminate apically; upper 3 stamens much reduced; lowest 3 stamens with long arching filaments. Cultivated and apparently escapes; included based on citation for vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); sc to c TX. Aug–Sep. Native of Argentina and Uruguay. [*Cassia corymbosa* Lam.] ☀

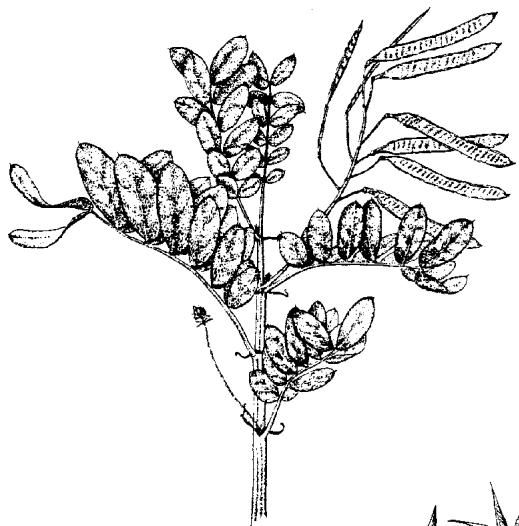
Senna lindheimeriana (Scheele) H.S. Irwin & Barneby, (for Ferdinand Jacob Lindheimer, 1801–1879, German born TX botanist), LINDHEIMER'S SENNA. Erect perennial herb 1–2 m tall; leaflets 5–8 pairs per leaf; upper 3 stamens much reduced; fruits compressed, 4–6 cm long, 6–8 mm wide. Limestone soils; Burnet Co.; mainly Edwards Plateau to Trans-Pecos. [*Cassia lindheimeriana* Scheele] The leaves are reported to be toxic but not fatal to grazing animals; they also act as a strong laxative (Kingsbury 1964; Ajilvsgi 1984). ☠

Senna marilandica (L.) Link, (OF MARYLAND), WILD SENNA, MARYLAND SENNA. Erect perennial herb from woody root, to 1(–2) m tall, essentially glabrous; leaflets (5–)6–10 pairs per leaf; petiolar glands usually conical; upper 3 stamens much reduced; lowest 3 stamens with somewhat larger anthers; fruits 7–11 cm long, 8–11 mm wide, flattened, the segments rectangular. Disturbed areas, sandy fields, and open woods; Bell, Dallas, Grayson, and Johnson cos.; se and e TX w to nc TX. Aug–Sep. [*Cassia marilandica* L.] The leaves were used as a cathartic by Native Americans; glycosides are present and probably also saponins (Burlage 1968). ☠

Senna obtusifolia (L.) H.S. Irwin & Barneby, (blunt-leaved), SICKLE-POD, COFFEEWEED. Erect annual to 1(–1.5) m tall, usually smaller, essentially glabrous; leaflets usually 3 pairs per leaf; petiolar glands slender; upper 3 stamens much reduced; lowest 3 stamens with very large anthers; fruits terete or 4-angled, usually sickle-shaped. Sandy soils, disturbed sites; Dallas, Grayson, and Milam cos.; se and e TX w to Blackland Prairie. Jul–Sep. [*Cassia obtusifolia* L.] Glycosides, alkaloids, and other toxins are present which can poison cattle and possibly other livestock if the leaves, stems, or seeds are eaten; fatalities can result (Hardin & Brownie 1993). ☠

Senna occidentalis (L.) Link, (western), COFFEE SENNA, STYPIEWED, BRICHO. Erect annual to 1–2 m tall; leaflets 4–6 pairs per leaf, lanceolate to ovate, acute or acuminate at apex; upper 3 stamens much reduced; lowest 3 stamens with elongate filaments; fruits 8–12 cm long, 7–10 mm wide. Roadsides and disturbed sites; Travis Co. (Turner 1959) at the s margin of nc TX; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); se and e TX, also Edwards Plateau. Aug–Nov. Geographic origin unclear (Irwin & Barneby 1982), possibly pantropical, n to s U.S. [*Cassia occidentalis* L.] Use as a coffee substitute in some areas has been reported; slightly toxic to livestock (Correll & Johnston 1970). ☠

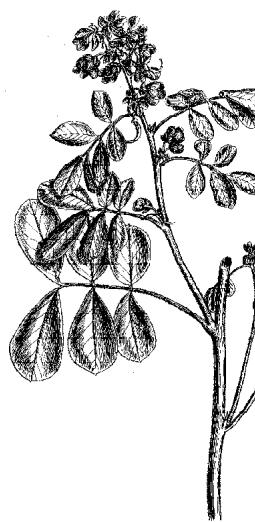
Senna pumilio (A. Gray) H.S. Irwin & Barneby, (dwarf), DWARF SENNA, PYGMY SENNA. Small perennial to 0.2 m tall, usually shorter, nearly glabrous; root tuberous; leaflets 1 pair per leaf; upper 3 stamens much reduced; fruits inflated, subglobose, indehiscent, 10–15 mm long, 7–10 mm



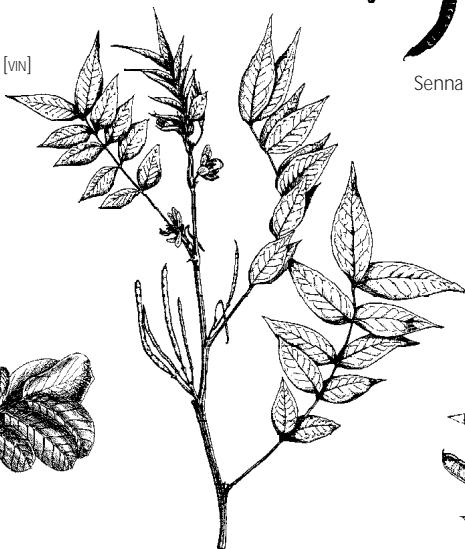
Senna lindheimeriana [VIN]



Senna marilandica [WL]



Senna obtusifolia [DIL]



Senna occidentalis [WL]



Senna pumilio [HEA]



Senna roemeriana [HEA]

wide. Rocky limestone soils; Shackelford Co., also Brown (HPC), Mills, and Throckmorton (Turner 1959) cos; w edge of nc TX s and w to w TX; sometimes abundant and showy. Apr-early May. [Cassia pumilio A. Gray]

Senna roemeriana (Scheele) H.S. Irwin & Barneby, (for Ferdinand Roemer, 1818–1891, geologist, paleontologist, and explorer of TX), TWO-LEAF SENNA. Perennial 0.3–0.6 m tall, from thick, woody root; stems and leaves pubescent, gray-green; leaflets 1 pair per leaf; upper 3 stamens much reduced; fruits turgid, 20–30 cm long. Limestone outcrops; Blackland Prairie s and w to w TX. Apr-May, sparingly Jun-Aug, and again in Sep. [Cassia roemeriana Scheele] Agricultural agents indicate that this species can cause fatal poisoning in grazing livestock. ☣/105

Senna pendula (Humb. & Bonpl. ex Willd.) H.S. Irwin & Barneby var. *glabrata* (Vogel) H.S. Irwin & Barneby, a less hardy species closely related to *S. corymbosa* can be distinguished from that species by its obovate leaflets rounded apically. This tropical American taxon is reported by Hatch et al. (1990) from vegetational area 5 (Fig. 2); we have seen no nc TX material and persistence seems unlikely. [Cassia bicapsularis sensu Correll & Johnston, not L.] ☣

SESBANIA

Annual or perennial herbs or subshrubs, unarmed; stems long, green, glabrous, unbranched below; leaves once even-pinnately compound, up to 30 cm long; leaflets numerous, 2–3 cm long, glabrous; flowers in axillary racemes; calyces campanulate, the tube broader than long, the lobes shorter than tube; corollas yellow or orange-yellow, often tinged with red; keel petals auriculate.

—A genus of 50 species of warm and usually wet areas of the world; it includes herbs, shrubs, and trees, some cultivated as ornamentals; including *Daubentonia*. *Glottidium*, recognized here as a distinct genus, is sometimes treated as part of *Sesbania*. (Either from the Arabic: *sesban*, name for *Sesbania sesban* (L.) Merrill, or possibly from Persian, *sisaban*, rope, fiber, or a kind of tree) (subfamily Papilionoideae, tribe Robinieae)

REFERENCES: Isely 1986a; McVaugh 1987.

- | | |
|---|----------------------|
| 1. Flowers 10–30 per raceme; fruits 5–6 cm long, ca. 10 mm wide, 4-winged | S. drummondii |
| 1. Flowers 2–6 per raceme; fruits 10–20 cm long, 3–4 mm wide, not winged | S. herbacea |

Sesbania drummondii (Rydb.) Cory, (for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), RATTLEBUSH, POISON-BEAN, COFFEE-BEAN, DRUMMOND'S SESBANIA. Subshrub, lower part becoming woody; plant to 3 m tall; flowers yellow or orange-yellow, often with red lines; fruits 4-sided and conspicuously 4-winged, apically short-beaked, the stipe 1–1.5 cm long; seeds usually 3–7 per fruit. Moist low areas; Denton Co., also Comanche (Stanford 1976) and Williamson (Correll & Johnston 1970) cos; mainly se and e TX, chiefly in Coastal Plain, also Edwards Plateau. [*Daubentonia drummondii* Rydb.] The seeds become loose and rattle when moved and are poisonous to sheep, goats, and cattle when eaten, apparently due to the presence of saponins; affected animals develop diarrhea, weakness, lethargy, and sometimes die; the seeds are also poisonous to humans (Sperry et al. 1955; Kingsbury 1964; Ellis 1975; Lewis & Elvin-Lewis 1977; Crosswhite 1980). ☣

Sesbania herbacea (Mill.) McVaugh, (herb-like, with succulent stems), COFFEE-BEAN, BEQUILLA, COLORADO RIVER-HEMP, SESBANE. Large annual to 4 m tall, openly branched; flowers yellow; fruits narrowly linear, glabrous, the sutures thickened, with beak 5–10 mm long, the stipe 0–4 mm long; seeds 30–40 per fruit. Disturbed areas; Dallas, Denton, Ellis, Grayson, Kaufman, and Tarrant cos; se and e TX w to nc TX, also Edwards Plateau. Jul-Oct. [?*Darwinia exaltata* Raf., ?*S. exaltata* (Raf.) Rydb. ex A.W. Hill, ?*S. macrocarpa* Muhl. ex Raf.] This species has long gone under the name *S. exaltata* (e.g., Kartesz 1994; Jones et al. 1997). However, we are following McVaugh

(1987) who made the combination, *S. herbacea*, based on an older name, [*Emerus herbacea* Mill.], published in 1768. The species was important as a source of fiber for Native Americans (Mabberley 1987). The seeds have been reported to be poisonous (Hardin & Brownie 1993). ☣

SOPHORA

Ours unarmed shrubs or small trees; leaves once odd-pinnately compound; stipules very small, falling early; flowers in terminal or lateral racemes of 4–15 flowers, large and showy; stamens 10, separate; fruits torulose or moniliform.

— A genus of 45 species, mostly in n temperate areas and the tropics. A number are cultivated as ornamentals including the Chinese and Korean *S. japonica* L. (PAGODA TREE). (Arabic: *sophera*, used for a tree with pea-like flowers) (subfamily Papilioideae, tribe Sophoreae)
REFERENCES: Rudd 1972; Merrill 1977.

1. Leaves deciduous, thin; leaflets 13–19 (on well-developed leaves); standard white changing to pink, keel rose- to lavender-pink; fruits 7–8 mm thick, black at maturity: widespread in nc TX _____ ***S. affinis***
1. Leaves evergreen, coriaceous; leaflets 5–11; petals all deep violet-blue; fruits 10–20 mm thick, brown at maturity: n to s part of nc TX _____ ***S. secundiflora***

Sophora affinis Torr. & A. Gray, (related), EVE'S-NECKLACE, TEXAS SOPHORA. Usually a small tree; racemes drooping; flowers showy, but obscured by new leaves; corollas 11–14 mm long; fruits usually with 2–6 fertile segments, irregularly moniliform (= constricted at intervals and resembling a string of beads), hence the common name; seeds brown, ca. 5 mm long. Rocky limestone slopes and ravines; Blackland Prairie and Grand Prairie s to Edwards Plateau. Apr-early May. The seeds are reported to be poisonous (Correll & Johnston 1970). ☣ ☒/106

Sophora secundiflora (Ortega) Lag. ex DC., (with flowers on only one side of a stalk), MOUNTAIN-LAUREL, TEXAS MOUNTAIN-LAUREL, MESCAL-BEAN, FRIJOLITO. Usually a shrub; corollas 15–16 mm long; fruits torulose, knobby with 1–4 fertile segments; seeds 10–15 mm in diam. Rocky limestone slopes; Fort Hood (Bell or Coryell cos.—Sanchez 1997), also McLennan (Mahler 1988) and Williamson (Little 1976) cos; s part of nc TX s and w to w TX; also cultivated. Mar. One of the most beautiful native plants of Texas; unfortunately poisonous to livestock, and the flowers and bright red seeds poisonous to humans; one seed is reported to be enough to cause fatal poisoning. Before the use of peyote, MESCAL-BEAN was used as a hallucinogen in sw North America by Native Americans, but is very toxic (due to cytisine and related quinolizidine alkaloids) and fatal in excess (Standley 1922b; Kingsbury 1964; Lampe & McCann 1985; Mabberley 1987). The name MESCAL-BEAN is supposedly derived from “use (misuse) in adulterating weak whisky or mescal liquor, a small amount making the liquor so potent that over-indulgence brought on dizziness, disorientation and sometimes death” (Crosswhite 1980). Merrill (1977) gave extensive ethnographic and archeological information on this plant. ☣

STROPHOSTYLES WILD BEAN, FUZZY-BEAN

Annual twining or trailing vines, glabrous to pubescent; leaves pinnately compound with 3 leaflets, petiolate, stipulate; leaflets ovate to linear, entire or 3-lobed, stipellate; racemes axillary, long pedunculate, few-flowered; petals short-clawed, usually pinkish to purplish; keel strongly and conspicuously incurved or sickle-shaped; stamens 10, diadelphous; fruits linear, sessile, dehiscent. Nc TX species are easily recognized in the field by the combination of long peduncles and curved keels.

— A North American genus of 3 species. (Greek: *strophe*, a turning, and *stylos* a pillar or style, apparently in reference to the style which is curved to conform with the incurved or sickle-shaped keel surrounding it) (subfamily Papilioideae, tribe Phaseoleae)

REFERENCE: Stace & Edye 1984.

1. Flowers 9–14 mm long; leaflets usually < 2 times as long as wide, often somewhat 3-lobed; fruits ca. 50–100 mm long; seeds 5–10 mm long, hairy _____ **S. helvula**
 1. Flowers 5–8 mm long; leaflets usually 2 times or more as long as wide, usually not lobed; fruits ca. (15–)30–45 mm long; seeds 3–4 mm long, glabrous _____ **S. leiosperma**

Strophostyles helvula (L.) Elliott, (pale yellow), AMBERIQUE-BEAN, TRAILING WILD BEAN. Stems glabrous to pilose; leaflets ovate, sparsely strigose, 3–6.5 cm long, often 3-lobed or with an indentation on one or both sides; peduncles (5–)10–30 cm long; calyces ca. 4–5 mm long including longest lobe; keel incurved, darkened apically; seeds covered with a thick, felty layer. Sandy open ground; se and e TX w to West Cross Timbers and Edwards Plateau. Jul-Oct. [Phaseolus helvula L. (original spelling by Linnaeus of the specific epithet)]; sometimes spelled *S. helvola*; see Isely 1986b for explanation.

Strophostyles leiosperma (Torr. & A. Gray) Piper, (smooth-seeded). Stems pilose; leaflets linear to narrowly ovate, pilose, 2.5–5 cm long, usually not lobed, rarely with an indentation on one side or with very shallow lobing; peduncles 3–10(–11) cm long; calyces 2–4 mm long; keel incurved; seeds shiny. Sandy open ground; widespread in TX. Jun-Sep. [Phaseolus leiospermus Torr. & A. Gray]

STYLOSANTHES PENCIL-FLOWER

• A genus of 25 species of tropical and warm areas of the world. The single nc TX species is easily recognized in the field by the combination of conspicuous stipules and orange to orange-yellow flower color. (subfamily Papilionoideae, tribe Aeschynomeneae)

REFERENCES: Mohlenbrock 1957 [1958], 1958.

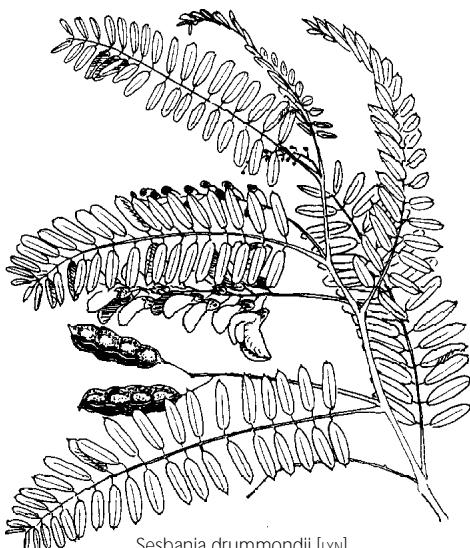
Stylosanthes biflora (L.) Britton, Sterns, & Poggenb., (two-flowered), SIDE-BEAK PENCIL-FLOWER. Perennial herb from a tough, deep, vertically or obliquely branched root; stems decumbent to erect, 10–50(–60) cm long; leaves short-petioled, pinnately compound; leaflets 3, narrowly lanceolate or oblanceolate to elliptic, acute, with short, bristle-point; stipules narrow, united ca. 2/3–3/4 the length of the petiole, the apical 3–8 mm free; flowers solitary or few together, terminal, closely subtended by reduced leaves; petals orange to orange-yellow (rarely white); standard 5–9 mm long; wings and keel 3.5–4.5 mm long; stamens 10, monadelphous; fruits 3–5 mm long, with 2 segments, the lowest usually sterile and pedicel-like. Sandy open woods; se and e TX w to West Cross Timbers (Montague and Parker cos.); also Edwards Plateau. May-Oct. [S. biflora var. *hispidissima* (Michx.) Pollard & C.R. Bell]

TEPHROSIA CATGUT, HOARY-PEA

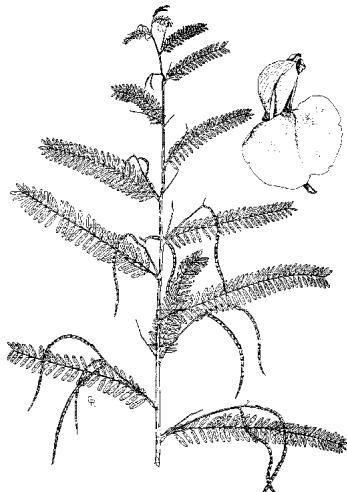
Clump-forming perennials with tough roots; stems densely short-pilose; leaves once odd-pinnately compound; leaflets many, conspicuously pilose, often with prominent bristle-tip; stipules very slender; flowers in terminal or lateral, spike-like, short or elongate racemes; petals large and showy; fruits dehiscent.

• A genus of 400 species mainly in seasonal areas of the tropics, especially Africa. • Some *Tephrosia* species are the source of the alkaloid rotenone, used as a fish poison and insecticide; use of *Tephrosia* species as a fish poison developed independently in the Americas, Africa, Asia, and Australia; typically the pounded leaves, branches, or roots are thrown into a body of water and the fish rise stunned to the surface (Wood 1949). (Greek: *tēphros*, ash-colored or hoary, presumably from the dense pubescence of this color in some species) (subfamily Papilionoideae, tribe Tephrosieae)

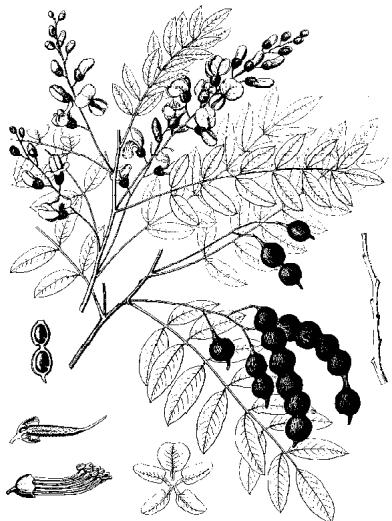
REFERENCE: Wood 1949.



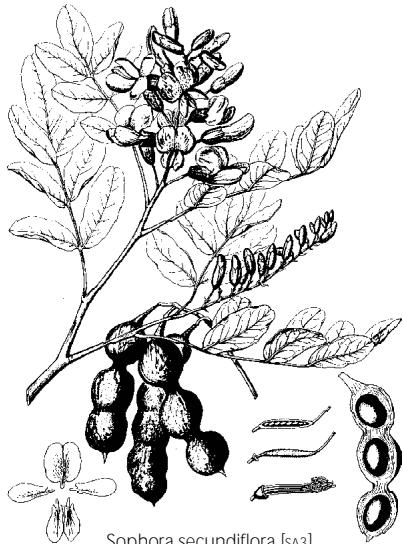
Sesbania drummondii [LYN]



Sesbania herbacea [GWO]



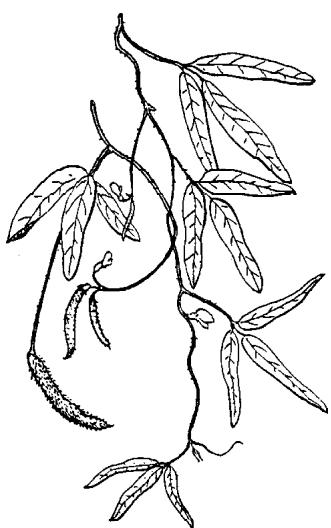
Sophora affinis [SA3]



Sophora secundiflora [SA3]



Strophostyles helvula [DIL, GLE]



Strophostyles leiosperma [GAT]

1. Leaflets narrow, linear (narrowly to broadly), 3–6 times as long as wide; mature fruits 5.5 mm or less wide; widespread in nc TX.
2. Corollas bicolored, the standard light yellow, the wings and keel partly or wholly pink or red; flowers crowded in thick, short racemes 3–10 cm long; stems ascending or erect, 25–70 cm tall; leaflets usually acute at apex (also bristle-tipped) _____ **T. virginiana**
2. Corollas of 1 color, all petals white to yellowish white or whitish pink, changing to rosy or purple-red; flowers loosely spaced in long-peduncled, slender, elongate racemes 10–40 cm long; stems spreading to largely decumbent, 30–100 cm long; leaflets usually obtuse to truncate (also bristle-tipped) _____ **T. onobrychoides**
1. Leaflets broad, obovate or elliptic to suborbicular, only 1–2 times as long as wide; mature fruits 7 mm or more wide; limited to the extreme s margin of nc TX _____ **T. lindheimeri**

Tephrosia lindheimeri A. Gray, (for Ferdinand Jacob Lindheimer, 1809–1879, German-born TX collector), LINDHEIMER'S TEPHROSIA, ROUND-LEAF TEPHROSIA. Leaflets (5–)7–15(–19), 11–37 mm long; flowers 7–21 mm long; corollas rose-purple, the standard with a white spot near base; fruits 25–50 mm long, 7–8.5 mm wide. Sandy areas; Burnet Co.; s margin of nc TX s to s TX; endemic to TX. Apr–Sep. ↗

Tephrosia onobrychoides Nutt., (resembling *Onobrychis*—another genus of Fabaceae), MULTI-BLOOM TEPHROSIA. Leaflets (11–)13–25(–29), 17–60 mm long; flowers 15–20 mm long; fruits 35–85 mm long, 3.5–5 mm wide. Sandy open woods or open ground; Dallas, Grayson, Henderson, and Milam cos., also Lamar (Carr 1994) and Tarrant (Wood 1949) cos; se and e TX w to nc TX. Mostly Jun–Jul, less freely to Sep. The light colored flowers open in the evening and close the next morning; before closing, they change color (Ajilvsgi 1984) becoming rosy or purple-red.

Tephrosia virginiana (L.) Pers., (of Virginia), GOAT'S-RUE, VIRGINIA TEPHROSIA, DEVIL'S-SHOESTRING, CATGUT. Leaflets (9–)15–25(–31), 11–33 mm long; flowers 14–21 mm long; fruits 25–55 mm long, 3.5–5.5 mm wide. Sandy open woods or open ground; mostly n and e TX. Mostly middle and late May(–Jun). Rotenone is present in the roots; the plant was used medicinally by Native Americans and early settlers (Ajilvsgi 1984). ☠

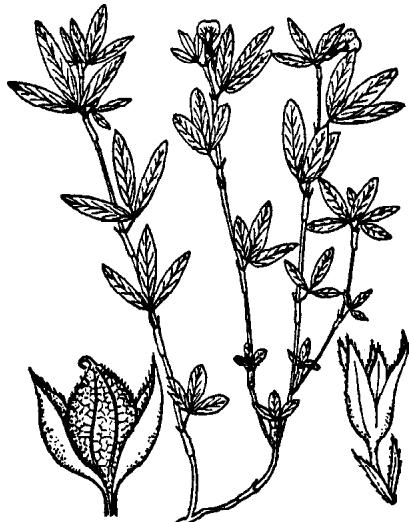
TRIFOLIUM CLOVER

Annual or perennial herbs; leaves alternate, palmately or pinnately compound; leaflets 3, rounded or notched at apex, entire or with small, sharp teeth, usually with well-developed petioles; flowers sessile or pedicellate, in terminal or axillary, sessile to long-peduncled, very dense, head-like or spike-like inflorescences; petals usually withering and persistent long after flowering; stamens 10, diadelphous; fruits 1–4-seeded.

—A genus of 238 species of bee-pollinated herbs of temperate and subtropical areas except Australia. A number of species are agriculturally important as forage, fodder, hay, in crop rotation, and as bee plants; some species are cyanogenic; a number are used as ornamentals, especially *T. incarnatum* in nc TX. (Latin: *tres*, three, and *folius*, leaf, from the three leaflets) (subfamily Papilionoideae, tribe Trifolieae)

REFERENCES: McDermott 1910; Hennen 1950; Isely 1951; Hermann 1953; Brown & Peterson 1984; Zohary & Heller 1984.

1. Petals pale to bright yellow or greenish yellow; terminal leaflet on a stalk longer than those of the lateral leaflets (leaves pinnately compound).
 2. Petals not striate-sulcate; inflorescences 5–20-flowered; flower clusters 5–8 mm in diam.; flowers 2.5–3 mm long, with standard 1–2 mm wide; petioles of middle stem leaves usually shorter than leaflets _____ **T. dubium**
 2. Petals striate-sulcate (with lines in shallow grooves—use lens); inflorescences 20–40-flowered;



Stylosanthes biflora [BB2]



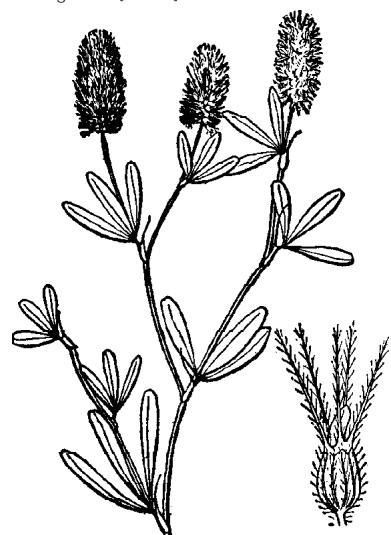
Tephrosia lindheimeri [HEA]



Tephrosia onobrychoides [HEA]



Tephrosia virginiana [GLE, WIL]



Trifolium arvense [BB2]

- flower clusters 8–15 mm in diam.; flowers 2.5–5 mm long, with standard 2–4 mm wide; petioles of middle stem leaves usually longer than leaflets _____ **T. campestre**
1. Petals pink to purplish, red, or white; terminal leaflet sessile or nearly so (leaves palmately compound).
3. Flower clusters sessile or nearly so at the ends of the main branches (clusters immediately subtended by a leaf; peduncles can be up to 5 mm long); corollas usually pinkish or reddish purple _____ **T. pratense**
 3. Flower clusters on peduncles (5–)10 mm or more long; corollas variously colored, white to pink, purplish, or scarlet-red.
4. Calyces greatly inflated, contracted at mouth, with extremely long (ca. 4–5 mm) awn-like teeth; corollas white, becoming pinkish _____ **T. vesiculosum**
 4. Calyces not inflated OR if inflated then with much shorter teeth; corollas variously colored.
5. Leaflets narrow, > 3 times as long as wide; stems, leaves, and calyces conspicuously silky pubescent; calyces usually longer than corollas _____ **T. arvense**
 5. Leaflets broader, < 3 times as long as wide (usually < 2 times as long as wide); stems, leaves, and calyces not all conspicuously silky pubescent; corollas usually as long as or longer than calyces (often much longer).
6. Corollas a striking scarlet-red; stems ascending, not rooting at the nodes; flower clusters spike-like, at least 2 times as long as wide _____ **T. incarnatum**
 6. Corollas not red OR if red then with stems creeping and rooting at the nodes; flower clusters globose or nearly so, ca. as wide as long.
7. Individual flowers when fully opened sessile or nearly so and corollas white, turning pink; in nc TX known only from extreme ne part (Lamar Co.) _____ **T. lappaceum**
 7. Individual flowers when fully opened sessile and lavender-pink OR on pedicels 1–4(–8) mm long and variously colored; widespread in nc TX.
8. Individual flowers when fully opened sessile or nearly so (pedicels 1 mm or less long); corollas lavender-pink; calyces conspicuously inflated on one side at maturity _____ **T. resupinatum**
 8. Individual flowers when fully opened on pedicels 1–4(–8) mm long; corollas variously colored, white to pink or red; calyces not inflated.
9. Corollas red; plants producing solitary cleistogamous flowers near base which push into the soil and produce underground fruits; stems creeping _____ **T. polymorphum**
 9. Corollas white to yellowish white or some petals pinkish; plants not producing underground fruits; stems creeping or decumbent to erect.
10. Stems creeping and rooting at the nodes; flower clusters short-racemose, the pedicels arising over a 2–5 mm distance at the end of the peduncle; lobes of calyx equal to or shorter than tube _____ **T. repens**
 10. Stems decumbent, ascending, or erect, not rooting at the nodes; flower clusters umbellate, the pedicels all arising at the very end of the peduncle; lobes of calyx mostly longer than the tube.
11. Calyx lobes broadly oblong, 1–1.5(–2.5) mm wide, some of them nearly as wide as long, usually acute to slightly acuminate _____ **T. bejariense**
 11. Calyx lobes very narrow, linear or nearly so, 0.5 mm or less wide, all of them 2–3 times as long as wide, very acuminate _____ **T. carolinianum**

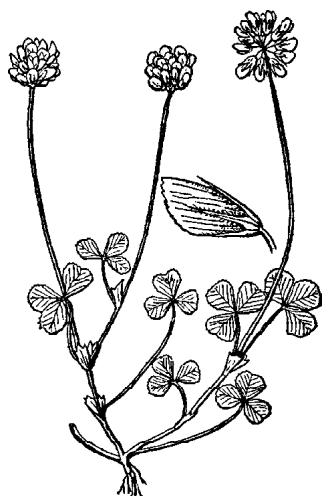
Trifolium arvense L., (pertaining to cultivated fields), RABBIT-FOOT CLOVER, OLD-FIELD CLOVER. Soft-pilose erect annual 10–40(–45) cm tall; leaflets 8–25 mm long, the margins with teeth small and visible only near the leaflet tips; flowers sessile in short, dense spikes; spikes 5–25 mm long, 10–15 mm in diam.; calyces prominently pilose, giving the whole inflorescence a silky-hairy appearance; corollas rose, pinkish, or white, ca. 4 mm long, usually exceeded by the calyx lobes. Sandy roadsides, pastures, disturbed areas; Grayson and McLennan cos., also



Trifolium bejariense [z01]



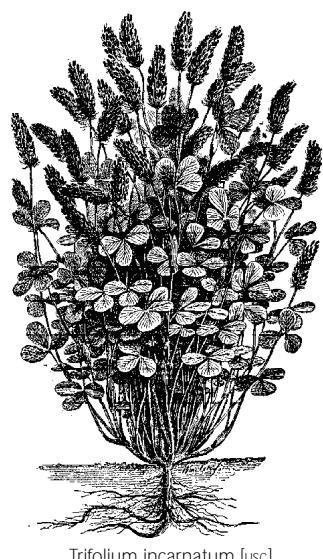
Trifolium campestre [GLE]



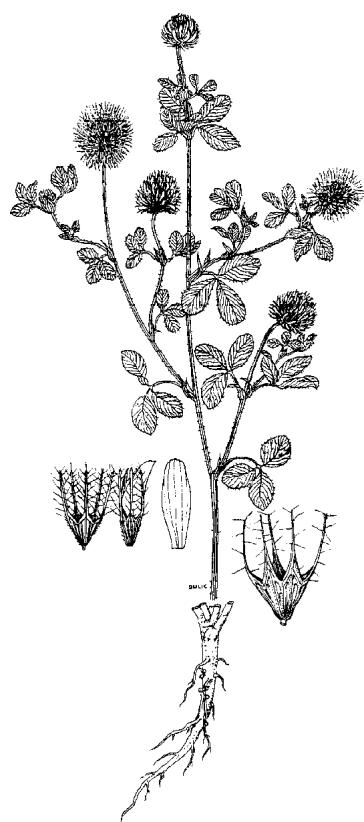
Trifolium carolinianum [BB2]



Trifolium dubium [GLE]



Trifolium incarnatum [usc]



Trifolium lappaceum [z01]



Trifolium polymorphum [z01]

Lamar Co. (Carr 1994); also e TX. May–early Jun. Native of Europe. Reported to produce dermatitis and photosensitization in domestic animals (Burlage 1968). ☣☒

Trifolium bejariense Moric., (for San Antonio de Béxar— now San Antonio in Bexar County on se edge of the Edwards Plateau), BEJAR CLOVER. Annual; stems glabrous or nearly so; leaflets usually 5–10 mm long; at least some calyx lobes as broad as long, very unequal; corollas slightly longer than calyces, white to yellowish white. Open wooded areas, prairies, in sandy or sandy clay soils; Hunt, Kaufman, and Navarro cos. (Turner 1959), also Lamar Co. (Hennen 1950); e TX w to nc TX; endemic to TX. Spring. ☞

Trifolium campestre Schreb., (of the fields or plains), LARGE HOP CLOVER, LOW HOP CLOVER, HOP TREFOIL. Erect to decumbent annual 10–40 cm tall; leaflets 6–15 mm long. Waste areas and roadsides; Grayson and Lamar cos. in Red River drainage; mainly se and e TX. Apr–May. Native of Europe. ☦

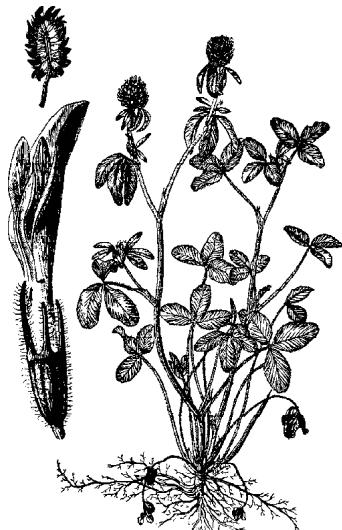
Trifolium carolinianum Michx., (of Carolina), CAROLINA CLOVER. Annual (perennial ?); stems glabrous or sparsely pubescent; leaflets 4–10(–15) mm long; flower clusters 10–15 mm in diam. at flowering; calyx lobes 2–3 times as long as wide; corollas 1–2 times as long as calyces, 5–7 mm long, yellowish white, changing to brown or according to some, purplish. Fields, roadsides; Henderson Co., also Dallas Co. (Hennen 1950), also Fannin, Hunt, Navarro, and Williamson cos. (Turner 1959); se and e TX w to nc TX. Mar–May.

Trifolium dubium Sibth., (doubtful), LEAST HOP CLOVER, SMALL HOP CLOVER, SHAMROCK. Erect to decumbent annual 5–25(–35) cm tall; leaflets 5–12 mm long. Waste areas and roadsides; Grayson, Hopkins, Lamar, and Tarrant cos.; se and e TX w to East Cross Timbers. Apr–May. Native of Europe. This species and *T. repens* are the two species usually considered to be the Irish SHAMROCK (Nelson 1991). ☦

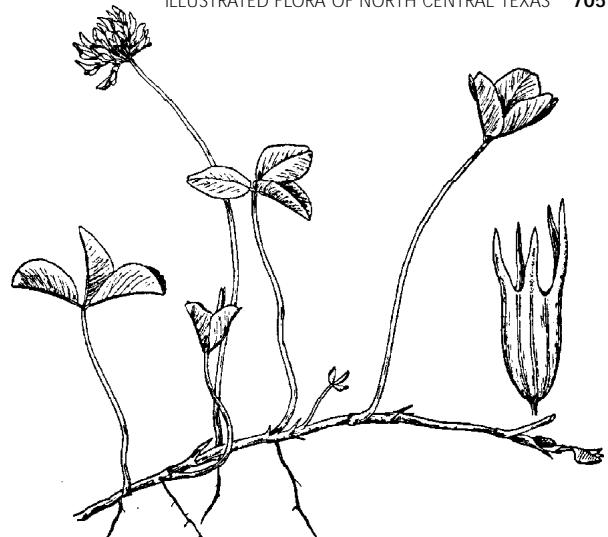
Trifolium incarnatum L., (flesh-colored), CRIMSON CLOVER, ITALIAN CLOVER. Soft-pilose annual 20–45(–80) cm tall; leaflets 10–40 mm long; spikes elongated, cylindrical, 10–25 mm in diam., tapering apically, showy; flowers sessile; calyx tubes densely long hairy; corollas 8–12 mm long. Sandy roadsides and fields; Grayson Co.; se and e TX w to nc TX. Apr–May. Native of Europe. This species is often planted along roadsides because of its scarlet-red corollas. Overripe crimson clover hay, with numeous stiff hairs on the pedicels and calyces, can be dangerous to horses; indigestible phytobezoars (= hairballs) can form in the stomach and death can result from impaction (Kingsbury 1964; Burlage 1968). ☣☒

Trifolium lappaceum L., (perhaps from resemblance to bur or burdock from Latin, *lappa*, bur or burdock), LAPPA CLOVER. Annual; stems decumbent to erect, 10–40 cm long, glabrous to thinly pubescent; leaflets 5–25 mm long; inflorescences globose, ca. 1–1.3 cm in diam. at flowering, in fruit bur-like, 1.5–2 cm in diam.; corollas ± equal to calyces in length, 7–8 mm long. According to Isely (1990), this species can be distinguished by its calyx tube which is 20-ribbed and glabrous, with pilose lobes. Weedy areas and roadsides; Lamar Co. in Red River drainage (Carr 1994); mainly se and e TX; first reported for TX by Brown and Peterson (1984). Spring–summer. Native of Mediterranean region. ☦

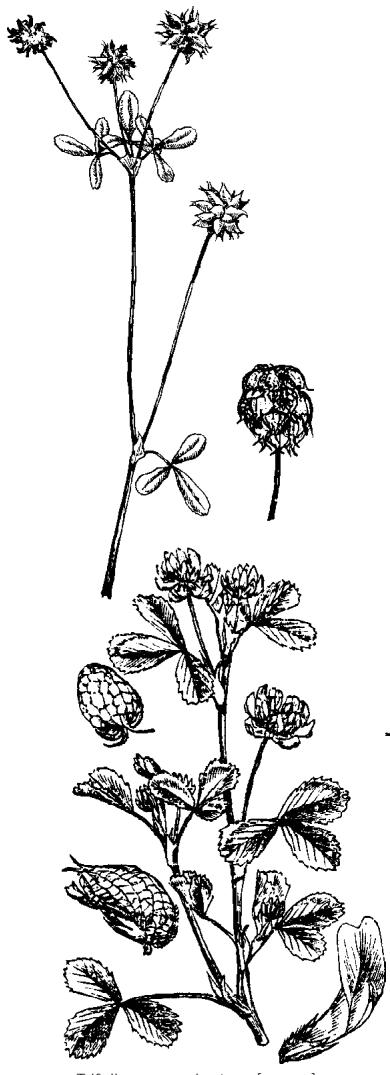
Trifolium polymorphum Poir., (of many forms), PEANUT CLOVER. Glabrous or sparsely pubescent creeping perennial with cleistogamous flowers and long-peduncled clusters of open flowers about twice as high as the leaves; corollas 2–4 times as long as calyces; called PEANUT CLOVER because of fruits developing underground from cleistogamous flowers. Sandy prairies, open woods, and roadsides; Denton, Dallas, Kaufman, Johnson, McLennan, Milam, and Tarrant cos. (Hennen 1950); no recent collections seen; se and e TX w to nc TX. Apr–early May. [*Trifolium amphianthum* Torr. & A. Gray]



Trifolium pratense [BL3]



Trifolium repens [GLE]



Trifolium resupinatum [BEN, WIL]



Trifolium vesiculosum [HEA]

Trifolium pratense L., (of meadows), RED CLOVER. Perennial or biennial; stems usually with spreading pubescence; leaflets 10–30(–60) mm long, marginally with very small teeth to nearly entire, often with a reddish or darkened spot; flowers sessile or nearly so, in subglobose to ovoid clusters 1–3 cm long; corollas 12–20 mm long. Roadsides; Grayson and Red River cos. in Red River drainage, scattered escape in e TX w to nc TX, also Edwards Plateau. May–Jul. Native of Europe. Said by some to be the Irish SHAMROCK; however, it is more likely that either *Trifolium dubium* or *T. repens* is actually the SHAMROCK (Nelson 1991). Reported to cause slobbering, bloating, stiffness of gait, diarrhea, emaciation, and abortion in cattle; a saponin is present (Burlage 1968). ☣️ ↗

Trifolium repens L., (creeping), WHITE CLOVER, DUTCH CLOVER. Glabrous perennial, often mat-forming; leaflets usually 10–20(–30) mm long; petioles long (5–20 cm); flower clusters 10–30 mm in diam.; corollas 6–12 mm long, white or pinkish. Lawns, roadsides, and disturbed areas; Dallas, Grayson, Lamar, and Tarrant cos.; se and e TX w to nc TX and Edwards Plateau. Apr–May, sporadically later. Native of Europe. This species and *T. dubium* are the two species usually considered to be the Irish SHAMROCK (Nelson 1991). It can be toxic to livestock due to the presence of a cyanogenic glycoside (Lewis & Elvin-Lewis 1977). ☣️ ↗

Trifolium resupinatum L., (upside-down), PERSIAN CLOVER, REVERSED CLOVER. Largely glabrous annual with erect or partly decumbent stems 10–45 cm long; leaflets usually 10–20 mm long; heads hemispherical, 5–10 mm in diam. at flowering, enlarging to 15–20 mm in fruit; flowers resupinate; calyces pilose, papery, prominently reticulate veined, with awn-like teeth < 2 mm long, inflated at one side in age, the heads bur-like; corollas 4–6 mm long, lavender-pink. Roadsides and lawns; Denton, Grayson, and Lamar cos.; se and e TX w to nc TX. Apr–May. Native of the Mediterranean region. ☣️ ↗

Trifolium vesiculosum Savi, (bladder-like), ARROW-LEAF CLOVER. Annual; stems usually 15–50(–70) cm long; leaflets 15–30(–60) mm long; flower clusters globose, ovoid, or oblong, 20–60 mm long, 20–35 mm wide; corollas white, becoming pink, 1.5–2 times as long as calyces. Sandy open areas; Grayson and Tarrant cos., also Wise Co. (B. Lipscomb, pers. obs.); also e TX; first reported for the U.S. from LA and MS by Thieret (1969b). May–Aug. Native of s Europe. ☣️ ↗

VICIA VETCH

Ours usually annual, decumbent, trailing to climbing herbs; leaves once pinnately compound, the rachis tip usually terminating in a simple or branched tendril, stipulate; leaflets estipellate, 2–9 pairs, entire, opposite to alternate on the rachis; flowers 1–2 in leaf axils or in few to many-flowered, axillary, spike-like racemes; calyces persistent, symmetrical or gibbous basally; corollas white to blue, lavender, pink-purple, purple, or bicolored; stamens 10, diadelphous; style nearly terete, bearded apically on side adjacent to standard or in a tuft about the apex; fruits elastically dehiscent, linear to oblong, flattened, 2- to several-seeded.

☞ A mostly n temperate genus of 140 species with some in South America, Hawaii, and tropical e Africa; possibly paraphyletic; they are mainly scrambling herbs often with alkaloids. Some are used as forage, fodder, or as green manure; others for their edible seeds including the Old World *V. faba* L. (BROAD-BEAN, FIELD-BEAN, HORSE-BEAN), important before introduction of New World *Phaseolus* species; ☣️ some species, however, are toxic; the uncooked seeds of *V. faba* can cause hepatitis in some people of Italian or Jewish ancestry due to a genetic predisposition to a biochemical deficiency of red blood cells. In nc TX, VETCHES are recognized in the field by the combination of their leaves with the rachis ending in a tendril, numerous small leaflets, and unwinged stems. (The classical Latin name, from *vincire*, to bind, alluding to the clasping tendrils) (subfamily Papilioideae, tribe Vicieae)

REFERENCES: Shinners 1948a; Hermann 1960; Kupicha 1976; Lassetter 1978, 1984; Olwell 1982.

1. Flowers sessile or nearly so in the axils of the leaves, solitary or paired _____ **V. sativa**
1. Flowers 1–many in peduncled racemes, the peduncles nearly equal to much longer than the leaves.
 2. Calyces strongly swollen on one side basally; fruits 8–10 mm wide; racemes with 8–40 flowers; corollas 10–18 mm long _____ **V. villosa**
 2. Calyces symmetrically tapered basally; fruits 4–7 mm wide; racemes with 1–19 flowers; corollas 4–8 mm long.
 3. Racemes 3–19-flowered _____ **V. ludoviciana**
 3. Racemes 1- or 2-flowered.
 4. Larger leaves with 2–8 leaflets; ovules or seeds 7–12; fruits 4–4.5 mm wide; calyces 2.2–2.8 mm long _____ **V. minutiflora**
 4. Larger leaves with 8–18 leaflets; ovules or seeds 3–8; fruits 4–8 mm wide; calyces 2.8–3.7 mm long _____ **V. ludoviciana**

Vicia ludoviciana Nutt., (of Louisiana), DEER PEA VETCH. Glabrate or sparsely pubescent annual; stems 10–100 cm long; corollas 4.5–8 mm long. The species is quite variable and has been divided into 2 intergrading subspecies (Lassetter 1984).

1. Flowers opening before elongation of peduncle; peduncle 1/8–1/2 as long as its subtending leaf when all flowers have opened, elongating rapidly as pods develop, ultimately equaling or slightly exceeding the leaf, 0.5–3.5 cm long in flower, 2–8.5 cm in age; racemes with 1–5(–6) flowers; corollas pinkish white to light lavender; leaflets (7–)11–15(–17) _____ subsp. **leavenworthii**
1. Flowers opening after elongation of peduncle; peduncle more than 1/2 as long as to exceeding its subtending leaf when all flowers have opened, elongating slightly in age (but tip of raceme often shriveled then), mostly 3–8.5 cm long in flower, about the same in age; racemes with 1–19 flowers; corollas pinkish white to deep bluish purple; leaflets 7–10(–13) _____ subsp. **ludoviciana**

subsp. **leavenworthii** (Torr. & A. Gray) Lassetter & C.R. Gunn., (for its discoverer, Melvyn Conklin Leavenworth, 1796–1862, s U.S. botanist), LEAVENWORTH'S VETCH. Rocky, clayey, or occasionally sandy prairies, roadsides; se and e TX w to e Rolling Plains and Edwards Plateau. Apr–May. [V. leavenworthii Torr. & A. Gray]

subsp. **ludoviciana**. Rocky or sandy soils, open woods and roadsides; se and e TX w to e Rolling Plains and Edwards Plateau. Late Mar–early May. [V. exigua Nutt., V. leavenworthii var. *occidentalis* Shinners, V. ludoviciana var. *laxiflora* Shinners, V. ludoviciana var. *texana* (Torr. & A. Gray) Shinners]

Vicia minutiflora A. Dietr., (small-flowered), SMALL-FLOWER VETCH, PYGMY-FLOWER VETCH. Glabrous annual; stems 20–80 cm long; leaflets of middle and upper leaves linear or narrowly oblong; corollas 5–6(–7) mm long, pale blue to lavender; fruits glabrous or sparsely to densely pubescent. Sandy open woods, fencerows, and roadsides; se and e TX w to East Cross Timbers. Mar–Apr. Including [V. reverchonii], with fruits densely pubescent (Olwell 1982). [V. micrantha Nutt. ex Torr. & A. Gray, V. reverchonii S. Watson]

Vicia sativa L., (cultivated), COMMON VETCH. Annual, glabrous or (especially younger parts) ± pubescent; stems 30–100 cm long; leaflets (6–)8–14; flowers solitary or paired; fruits 3.5–8 mm wide. Apr–May. Native of Europe and the Mediterranean region. This is a complex group, often treated as several species and many varieties; according to Isely (1990), determination of variety can be ambiguous. ↗

1. Corollas 10–18 mm long, pink-purple to white; calyces 7–11(–12) mm long; leaflets on upper leaves essentially linear, 1.5–4 mm wide, subacute to truncate or slightly notched at apex; seeds 2.5–4 mm in diam., mottled or black; widespread in nc TX _____ subsp. **nigra**

1. Corollas 18–25(–30) mm long, usually pink-purple; calyces 10–12(–15) mm long; leaflets on upper leaves narrowly oblong, 3–9 mm wide, slightly or strongly notched at apex; seeds 6–8 mm in diam., black; rare in nc TX _____ **subsp. *sativa***

subsp. *nigra* (L.) Ehrhend. (black), NARROW-LEAF VETCH. Leaflets 4–10 times as long as wide. Frequently cultivated and escapes to roadsides and weedy areas; se and e TX w to East Cross Timbers. [V. *angustifolia* L., V. *sativa* var. *nigra* L., V. *sativa* var. *segetalis* (Thunb.) Ser.] Extrafloral nectaries are often present on the stipules; the nectaries are small, ± round, depressed, deep purple areas; under appropriate conditions glistening droplets of nectar can be seen in the nectaries; ants have been observed feeding at the nectaries in nc TX (G. Diggs, pers. obs.). ☣

subsp. *sativa*. Leaflets 2–5(–7) times as long as wide. Rarely cultivated; found once as a weed in field near Dallas in May 1946. Extrafloral nectaries are often present on the stipules (Hermann 1960). Reported in some instances to be poisonous to livestock and humans due to lethal concentrations of a cyanogenic glycoside in the seeds (Kingsbury 1964). ☣ ☣

Vicia villosa Roth, (villoso, soft-hairy), Annual; stems 50–100 cm long; leaflets (10–)14–18; racemes usually 1-sided; calyces 5–6 mm long; corollas violet or bicolored (rarely white). Both of the following subspecies are cultivated for hay, forage, soil improvement, and erosion prevention; however, poisoning and death in cattle have been reported. Native of Eurasia. ☣ ☣

1. Stems glabrous or sparsely and inconspicuously appressed-pubescent; flowers usually 10–20 per raceme _____ **subsp. *varia***

1. Stems densely and conspicuously villous, the hairs spreading or ascending; flowers usually more than 20 per raceme _____ **subsp. *villosa***

subsp. *varia* (Host) Corb. (varied), WINTER VETCH, WOOLLY-POD VETCH. Flowers in dense or loose racemes, showy. Commonly cultivated and escapes; sandy soils, roadsides; se and e TX w to West Cross Timbers. Late Apr–May. [V. *dasycarpa* Ten., V. *villosa* var. *glabrescens* WDJ. Koch] ☣

subsp. *villosa*. HAIRY VETCH, RUSSIAN VETCH, WINTER VETCH. Flowers closely crowded in dense racemes. Cultivated and escapes; mostly sandy soils; e TX w to West Cross Timbers. Late Apr–May. ☣

Vicia caroliniana Walter, (of Carolina), CAROLINA VETCH, PALE VETCH, WOOD VETCH, with racemes of 8–20 or more flowers, corollas 8–12 mm long, white to lavender tinged, and fruits 4–5 mm wide, is cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2). It apparently occurs only to the s of nc TX.

WISTERIA

High climbing woody vines or vine-like shrubs with twining branches; plants unarmed; leaves once odd-pinnately compound; leaflets entire; racemes terminal, drooping, with numerous, large, showy, usually violet-blue (rarely white) flowers; calyces campanulate; fruits compressed, stipitate.

☛ A genus of ca. 6 species native to e Asia and e North America; this disjunct distribution pattern is discussed under the genera *Campsis* (Bignoniaceae) and *Carya* (Juglandaceae). The Asiatic species are sometimes split as the segregate *Rehnsenia* (Stritch 1984). ☣ All parts of *Wisteria* species should be considered poisonous, especially the fruits and seeds (Blackwell 1990) due to the presence of the glycoside wisterin (Schmutz & Hamilton 1979; Lampe & McCann 1985); as little as 2 seeds are enough to cause serious illness in children (Hardin & Arena 1974). (Named for Professor Caspar Wistar, 1760–1818, anatomist of Philadelphia) (subfamily Papilionoideae, tribe Tephrosiae)

REFERENCES: Stritch 1984; Valder 1995.



Vicia ludoviciana var. leavenworthii [HE1]



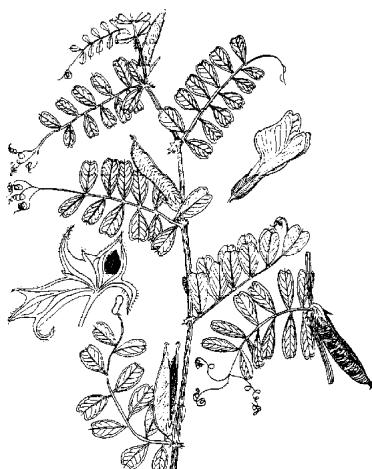
Vicia ludoviciana var. ludoviciana [HE1]



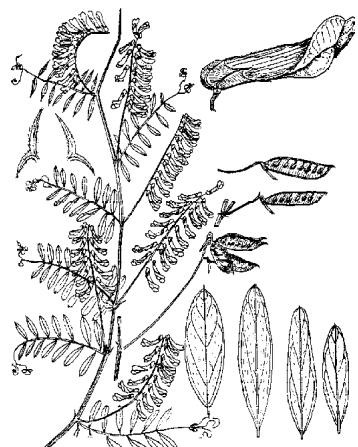
Vicia minutiflora [HE1]



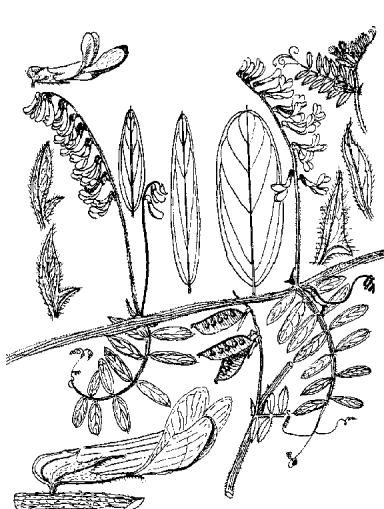
Vicia sativa subsp. nigra [HE1]



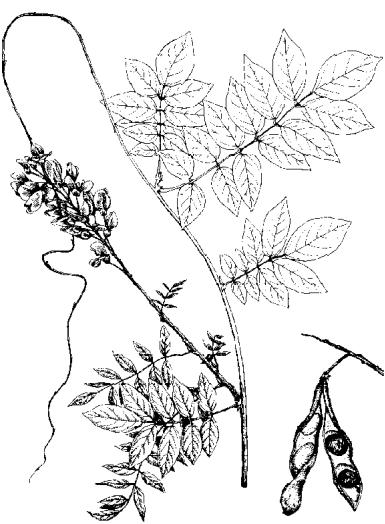
Vicia sativa subsp. sativa [HE1]



Vicia villosa subsp. varia [HE1]



Vicia villosa subsp. villosa [HE1]



Wisteria sinensis [WIL]



Zornia bracteata [WIL]

Wisteria sinensis (Sims) DC., (Chinese), CHINESE WISTERIA. High climbing vine or vine-like shrub with twining branches, to ca. 20 m long; young stems densely short pubescent; leaves with 7–13 leaflets; racemes 15–30 cm long, the flowers opening nearly simultaneously; pedicels (10–)15–25 mm long; corollas ca. 2–2.7 cm long; ovary and fruit velvety pubescent. Widely cultivated and long persists around old home sites; escapes?; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990). Mostly Apr–May. Native of China. Poisonous. Two other species are also cultivated in nc Texas (Shinners 1958a): ☠️ ↗

Wisteria floribunda (Willd.) DC., JAPANESE WISTERIA, native of Japan, has the ovary and fruit velvety pubescent, (13–)15–19 leaflets per leaf, flowers gradually opening from base to tip of raceme, and corollas 1.5–2 cm long. Poisonous (Lampe & McCann 1985). ☠️ ↗

Wisteria frutescens (L.) Poir. (fruitful, fruit-bearing), [= *W. macrostachya* (Torr. & A. Gray) Nutt. ex B.L. Rob. & Fernald], native to se and e TX, has the ovary and fruit glabrous and pedicels usually ca. 4–10 mm long. Presumably poisonous. ☠️

ZORNIA

—A genus of 86 species of warm areas of the world. (Named for Johannes Zorn, 1739–1799, a German apothecary) (subfamily Papilioideae, tribe Aeschynomeneae)

REFERENCE: Mohlenbrock 1961.

Zornia bracteata J.F. Gmel. (bracteate, with bracts), BRACTED ZORNIA, VIPERINA. Glabrous perennial herb from a deep, tough, vertically or obliquely branched root; stems prostrate to decumbent or ascending, 20–80 cm long; leaves palmately compound; leaflets 4, usually 1–3 cm long, inconspicuously punctate; petioles as long as the leaflets; flowers widely spaced in long-peduncled, axillary spikes of 3–10 flowers, each flower with a pair of large, conspicuous, elliptic-ovate bracts 7–15 mm long; petals 9–14 mm long, yellow to orangish; stamens 10; fruits 10–20 mm long, bristly, breaking apart into 2–6 segments. Sandy, low, open woods or open ground; Tarrant Co., also Erath and Parker cos. (Turner 1959); se and e TX w to nc TX and Edwards Plateau. Apr–Jun. The combination of 4 leaflets, large paired bracts, and bristly fruits make this species distinctive (Isely 1990).

FAGACEAE OAK OR BEECH FAMILY

—An economically very important family of 600–800 species in 9 genera (Nixon 1997a); cosmopolitan in distribution except in the tropics and s Africa; often vegetational dominants in n hemisphere temperate forests; usually wind-pollinated trees and shrubs, most with large amounts of tannins. Many species are utilized as a source of hardwood lumber, as ornamental trees, or for their edible nuts. North American genera include *Castanea* (CHESTNUT), *Castanopsis* (CHINQUAPIN), *Fagus* (BEECH), *Lithocarpus* (TAN OAK, TAN-BARK OAK), and *Quercus* (OAK). *Castanea dentata* (Marshall) Borkh. (AMERICAN CHESTNUT), of the e U.S., was virtually wiped out in the first half of the 20th century by chestnut blight, caused by an introduced Old World fungus (*Cryphonectria parasitica* (Murrill) Barr [*Endothia parasitica* (Murrill) H.W. & P.J. Anderson]). The botanical journal, *Castanea*, published by the Appalachian Botanical Club, is named after *C. dentata* (Brooks 1937). The distribution of the s hemisphere genus *Nothofagus* (SOUTHERN-BEECH), in New Guinea, New Caledonia, temperate Australia, New Zealand, and temperate South America, in part reflects the different distribution of the continents during Tertiary times caused by plate tectonics; while this genus has traditionally been placed in Fagaceae, molecular evidence indicates that it should be recognized in its own family, Nothofagaceae (Manos et al. 1993). Family name from *Fagus*, BEECH, a mainly n temperate genus of 10 species of deciduous monoecious trees. (Classical Latin name, derived from Greek: *figo* an oak with edible acorns, probably from Greek *fagein*, to eat—Nixon 1997a) (subclass Hamamelidae)

FAMILY RECOGNITION IN THE FIELD: trees or shrubs with male flowers in *catkins*; fruit an *acorn* (= a nut subtended or enveloped by a cupule—involute or cup of wholly or partly fused bracts); leaves alternate, simple, often lobed or toothed, with straight pinnate veins; buds clustered at tips of twigs. The cupule is characteristic of the family; in the genus *Castanea* (CHESTNUTS and CHINQAPINS—1 species in e TX) it is spiny and completely surrounds the nuts.

REFERENCES: Forman 1966; Elias 1971b; Nixon 1984, 1997a; Jones 1986; Kaul 1986a; Kubitzki 1993c; Manos et al. 1993.

QUERCUS OAK

Trees or shrubs with alternate (often closely bunched), simple, deciduous or evergreen (in nc TX only *Quercus fusiformis* and *Q. virginiana*) leaves; stipules very slender or minute, falling early; flowers in nc TX species appearing in early spring; unisexual, both sexes borne on the same plant (monoecious), with 5- to 6-parted calyces, apetalous; staminate flowers in clustered spreading to drooping catkins; stamens usually 4–10; pistillate flowers solitary or several together in short spikes; pistil 1; ovary inferior; each pistillate flower subtended by a cupule (= an involucre of numerous bracts/scales that harden at maturity into a cup subtending or partly enveloping the 1-seeded fruit); seed enclosed in a shell forming a nut; shell of nut glabrous or tomentose on inner surface (the nut and its cupule are together known as an acorn); flowering in spring, the flowers (in deciduous species) appearing just before or with the leaves.

• A genus of ca. 400 species (Nixon 1997b) of the n temperate zone s to Malesia and Colombia at higher elevations. OAKS are important as a source of timber, as ornamentals, for tannins, and for cork. Cork is derived from the thick bark of *Q. suber*L. (CORK OAK) of s Europe and n Africa. Acorns, after they were treated to remove bitter tannins, were an important food source for a number of Native American groups; species in the white oak group were preferred because of their lower tannin content (Martin et al. 1951). The windborne pollen contributes to allergies. Numerous insect galls (= abnormal swellings or growths produced by plants in response to attack by a parasite) are found on nc TX OAKS and are frequently observed; in fact, no other plant group is known to have more insect galls than OAKS; hundreds of different kinds are known (Felt in Strausbaugh & Core 1978). OAK species are not easily identifiable before the leaves are fully expanded, by which time the flowers are largely past (last year's leaves still present on live oaks; some old dead leaves often still present on others). The following key is for use with full-grown leaves of flowering or fruiting branches, not sucker-shoots, stump-sprouts, or shade forms. Hybridization is well known in *Quercus* (Palmer 1948), and hybrids occur between a number of nc TX species (e.g., *Q. marilandica* × *Q. velutina*; *Q. marilandica* × *Q. shumardii*); therefore, individuals difficult to identify should not be a surprise. The 17 nc TX species make this the largest genus of woody plants found in the area; it is also the largest woody genus in adjacent Oklahoma (Tyrl et al. 1994). ☣ Toxicity to cattle due to the presence of tannins can cause significant loss in some areas, particularly during drought years; mostly new foliage is involved, but mature leaves and acorns can also cause poisoning if eaten in large quantities; the compounds actually causing the toxic effects are apparently low molecular weight phenolic compounds produced as the result of biodegradation of high molecular weight tannins (Kingsbury 1964; Zhicheng 1992). (Classical Latin name for the ENGLISH OAK, *Quercus robur* L., from some central European language)

Oaks in c TX and in parts of nc TX are being killed by oak wilt, caused by the fungus *Ceratocystis fagacearum* (Bretz) J. Hunt. Live oaks and members of the red oak group are most susceptible. Live oaks show variability in response to infection with most individuals dying within 3–6 months while some survive indefinitely with crown loss. In the most susceptible red oaks, death can occur in a matter of weeks after initial symptoms are seen. Transmission seems to occur by root grafts and in some cases by insects (beetles) (Appel 1995; MacDonald

1995; Reisfield 1995). Appel and Billings (1995) gave detailed information on this disease.

REFERENCES: Trelease 1924; Palmer 1948; Müller 1951; Little 1971; Hardin 1975; Jensen 1977; Elias 1980; Axelrod 1983; Appel & Billings 1995; Dorr & Nixon 1985; Simpson 1988; Nixon 1997b.

1. Leaf blades with midrib and side veins not exserted bristles (blade or its lobes may have a minute point not formed by an exserted rib or nerve); bark pale, often scaly; inner surface of acorn shell glabrous; cup scales usually thickened at base and loosely appressed at apex; fruits maturing first autumn after spring flowering (**"White" oak group**).
 2. Lower surface of blades mostly glabrous except along main veins or in their axils (or hairs so inconspicuous that surface appears glabrous).
 3. Leaf blades shallowly or deeply lobed _____ ***Q. alba***
 3. Leaf blades entire (without teeth) or irregularly toothed.
 4. Leaves evergreen, with a coarse, hard to leathery texture.
 5. Leaf blades in general relatively broad to near base and often rounded to broadly so basally; mature acorns fusiform, much longer than broad, usually extended from cup for more than 1/2 their length, (17–)20–30(–33) mm long, the apex acute; widespread in nc TX (mainly East Cross Timbers westward) _____ ***Q. fusiformis***
 5. Leaf blades in general tapering to base and cuneate (= wedge-shaped) basally; mature acorns usually ovoid, not much longer than broad, usually not extended from cup for more than 1/2 their length, 15–20(–25) mm long, the apex rounded or blunt; probably only to the e of nc TX _____ ***Q. virginiana***
 4. Leaves deciduous, not coarse (this is included because some Red/Black group oaks with unlobed leaves have only 1 nerve exserted as a bristle at the leaf tip—this is sometimes lost and they are thus apparently without bristles) _____ see Red/Black oak group—dichotomy 13
 2. Lower surface of blades pale with soft and felty or close and firm pubescence.
 6. Petioles 0.7–4 cm long, thinly and loosely pubescent or glabrous.
 7. Leaf blades deeply and unevenly lobed.
 8. Terminal leaf lobe only slightly larger than others; lobes usually pointed; mature acorn nearly completely (>3/4) enclosed in the thin, shell-like cups, the cup opening usually < 1/2 the diam. of the acorn; cups 3 cm or less in diam. _____ ***Q. lyrata***
 8. Terminal leaf lobe much larger than others; lobes usually rounded; mature acorn rarely more than half-enclosed in cup, the cup opening ca. same diam. as acorn; cups large, 3–6 cm in diam. _____ ***Q. macrocarpa***
 7. Leaf blades rather evenly toothed (shallowly or deeply), not lobed _____ ***Q. muehlenbergii***
 6. Petioles 0.1–0.7 cm long, sparsely to densely short-pubescent.
 9. Leaf blades 3–10 cm wide, usually lobed more than half way to midrib; pubescence on lower surface rather open, in widely separated stellate tufts; veinlets of lower surface raised, the network of veinlets prominent.
 10. Twigs glabrous or nearly so; plant a shrub (small tree) to ca. 7 m tall _____ ***Q. margarettiae***
 10. Twigs persistently densely tomentulose or velvety; plant a small to large tree _____ ***Q. stellata***
 9. Leaf blades 1–4 cm wide, entire to toothed or shallowly and evenly lobed; pubescence on lower surface close and dense, concealing the surface; veinlets faint or invisible.
 11. Leaves deciduous, entire to shallowly lobed; acorn nearly cylindrical, with wide, blunt apex _____ ***Q. sinuata***
 11. Leaves evergreen, entire or with 1–3 teeth near base or apex; acorn usually tapering gradually to apex, ovoid or fusiform.
 12. Leaf blades in general relatively broad to near base and often rounded to broadly so basally; mature acorns fusiform, much longer than broad, usually extended from cup for more than 1/2 their length, (17–)20–30(–33) mm long, the apex acute; widespread in nc TX (mainly East Cross Timbers westward) _____ ***Q. fusiformis***

12. Leaf blades in general tapering to base and cuneate (= wedge-shaped) basally; mature acorns usually ovoid, not much longer than broad, usually not extended from cup for more than 1/2 their length, 15–20(–25) mm long, the apex rounded or blunt; probably only to the e of nc TX _____ ***Q. virginiana***
1. Leaf blades with main veins (at least the midrib) exserted as bristles (these sometimes broken off in age—species with unlobed leaves will have only one bristle at the leaf tip); bark often dark, furrowed but rarely scaly; inner surface of acorn shell with hairs; cup scales usually scarcely thickened at base and tightly appressed at apex; fruits maturing second autumn after spring flowering (**"Red/Black" oak group**).
13. Leaves entire.
14. Leaves linear-lanceolate to narrowly elliptic, at least 5 times as long as wide _____ ***Q. phellos***
14. Leaves elliptic to oblanceolate, obtriangular to club-shaped, rarely more than 3 times as long as wide.
15. Leaves usually broadest close to middle; twigs and lower (abaxial) leaf surfaces uniformly and persistently gray-tomentose _____ ***Q. incana***
15. Leaves usually broadest close to apex; twigs and lower leaf surfaces glabrate or nearly so or with brownish or yellowish pubescence, not gray-tomentose.
16. Base of leaf blade narrowly cuneate (tapering to a narrow point); petioles nearly absent or sometimes present; twigs and petioles glabrous or nearly so; leaves glabrous beneath except for tufts of stellate hairs in the axils of the veins _____ ***Q. nigra***
16. Base of leaf blade rounded to subcordate; petioles usually 5 mm or more long; twigs and petioles usually with brownish pubescence; leaves sometimes with some brownish pubescence beneath (especially near base of the midrib) _____ ***Q. marilandica***
13. Leaves variously toothed or lobed.
17. Leaves at most irregularly toothed or shallowly lobed.
18. Leaves neither 3-lobed apically nor so much broader apically than basally as to be distinctly club-shaped; leaves usually broadest near middle _____ ***Q. incana***
18. Leaves apically 3-lobed (often obscurely so), much broader apically than basally and distinctly club-shaped.
19. Twigs and petioles glabrous or nearly so; leaves glabrous except for axillary tufts of stellate hairs _____ ***Q. nigra***
19. Twigs and petioles brownish- or yellowish-pubescent; leaves variously pubescent beneath.
20. Base of leaf blade broadly cuneate (wedge-shaped, narrowed to a point) to rounded; leaves densely and uniformly brownish- or yellowish-tomentulose beneath _____ ***Q. falcata***
20. Base of leaf blade rounded to subcordate; leaves variously pubescent beneath (especially near the attachment of the petiole) but never uniformly tomentulose _____ ***Q. marilandica***
17. Leaves regularly toothed or lobed, the lobes often large.
21. Main lateral lobes simple (not divided into smaller lobes), usually with only 1(–2) bristle-tipped tooth, broadly to narrowly triangular in shape.
22. Terminal lobe elongate, often prominent, oblong, acuminate apically, usually with 2–several lateral teeth _____ ***Q. falcata***
22. Terminal lobe scarcely more prominent than the lateral lobes or nearly absent, not oblong, apically acute to rounded, usually with 0–1 lateral teeth _____ ***Q. marilandica***
21. Main lateral lobes divided into several tiny lobes, usually with 2–several bristle-tipped teeth, variously shaped, usually not triangular.
23. Leaves densely brownish- or yellowish-tomentulose beneath.

24. Terminal lobe often greatly elongated and much more prominent than lateral lobes and/or leaf bases sometimes broadly U-shaped _____ ***Q. falcata***
24. Terminal lobe usually not much more prominent than lateral lobes; leaf bases variously obtuse to rounded or cordate but not broadly U-shaped _____ ***Q. velutina***
23. Leaves variously pubescent or glabrate but not densely tomentulose.
25. Terminal lobe often greatly elongated and much more prominent than lateral lobes and/or leaf bases sometimes broadly U-shaped _____ ***Q. falcata***
25. Terminal lobe usually not much more prominent than lateral lobes; leaf bases variously obtuse to rounded or cordate but not broadly U-shaped.
26. Terminal buds large (6–10 mm long), often quadrangular, densely brownish- or yellowish- or gray-tomentose or strigose; in nc TX found only in counties adjacent to the Red River (w to Grayson Co.) _____ ***Q. velutina***
26. Terminal buds not over 5(–6) mm long, spindle-shaped to lanceolate or narrowly ovoid, sparsely pubescent or glabrous; nearly throughout nc TX.
27. Acorn cups 16–25 mm broad, abruptly narrowed at base, enclosing acorn by 1/3 or less (nearly flat with abruptly raised sides to shallowly cup-shaped); acorns 20–25 mm long, usually flat at base; leaf blades mostly 8–18 cm long, the lower surfaces at maturity with conspicuous (to the naked eye) tufts of tomentum in the vein axils; mostly Blackland Prairie and to the e _____ ***Q. shumardii***
27. Acorn cups 12–18 mm broad, rounded or tapered at base, enclosing 1/3–1/2 the acorn (deeply cup-shaped); acorns 14–20 mm long, usually round at base; leaf blades mostly 4–11(–15) cm long, the lower surfaces at maturity glabrous or with minute (often only detectable with magnification) tufts of tomentum in the vein axils; mostly East Cross Timbers and to the w _____ ***Q. buckleyi***

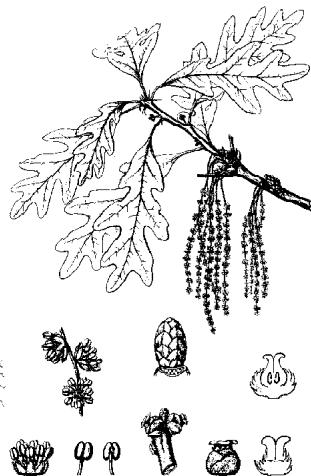
Quercus alba L., (white), WHITE OAK, STAVE OAK, RIDGE WHITE OAK, FORKED-LEAF WHITE OAK. Large tree. Stream bottom woods; once collected in Dallas Co. (Mahler 1988); mainly far e TX w to Red River Co. (Little 1971). The wood has long been valued for staves used in making barrels that would hold liquids—such as wine and liquor (Peattie 1948).

Quercus buckleyi Nixon & Dorr, (for Samuel Botsford Buckley, 1809–1884, state geologist of TX and plant collector), TEXAS RED OAK, SPANISH OAK, SPOTTED OAK, ROCK OAK. Small tree usually to only 10 m (rarely more) tall; leaf blades appearing more finely and deeply cut than in *Q. shumardii*. Limestone outcrops and slopes or in stream bottoms, much less often on sandy soils. This species has long incorrectly gone under the name *Q. texana*. Dorr and Nixon (1985) pointed this out and named this species, which occurs in nc and c TX mainly from the East Cross Timbers westward, *Q. buckleyi*. The name *Q. texana* is now restricted to a species extending w only as far as extreme e TX (much to the east of nc TX). *Quercus buckleyi* and the similar *Q. shumardii* (occurring mainly from the w edge of the Blackland Prairie e to e TX) hybridize along a narrow zone of overlap from the Cooke and Grayson co. area near the Red River s to the vicinity of San Antonio (Bexar Co.) (Simpson 1988). To the w of this hybrid zone “pure” individuals of *Q. buckleyi* can be found, while to the e “pure” *Q. shumardii* occurs. In the hybrid zone, specific determination is often not possible. This taxon is possibly better treated as a variety of *Q. shumardii* as intended by Shinners (1956b) who made the combination, *Q. shumardii* Buckley var. *microcarpa* (Torr.) Shinners. However, the type of this variety is equal to *Q. gravesii* Sudworth (Dorr & Nixon 1985). [*Q. shumardii* var. *microcarpa* in part, excluding type, *Q. shumardii* var. *texana* in part, excluding type, *Q. texana* of authors, not Buckley]

Quercus falcata Michx., (sickle-shaped), SOUTHERN RED OAK, SPANISH OAK, SWAMP RED OAK, SWAMP SPANISH OAK, CHERRY-BARK OAK, BOTTOM-LAND RED OAK, THREE-LOBE RED OAK. Large tree;



Quercus alba [SA3]



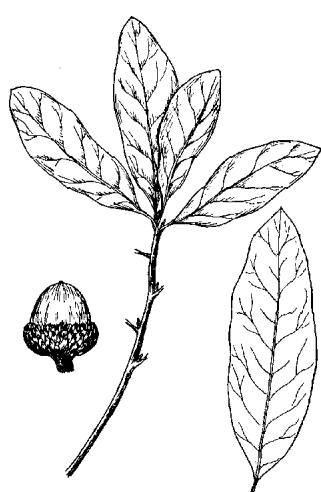
Quercus buckleyi [SA3]



Quercus falcata [SA3]



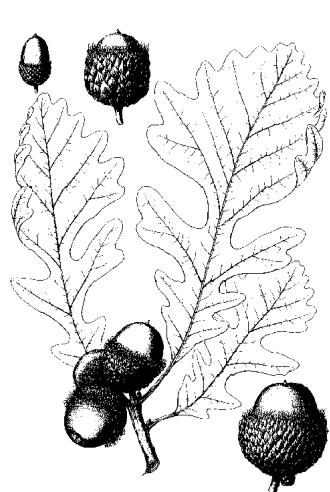
Quercus fusiformis [LYN]



Quercus incana [GLE]



Quercus lyrata [SA3]



Quercus macrocarpa [SA3]

leaves quite variable, sometimes entire with 3 apical lobes, usually with long, falcate (sickle-shaped) lobes with deep, rounded sinuses, terminal lobe usually elongated. Moist to wet forests; Fannin and Lamar cos. in Red River drainage in ne part of nc TX, also Delta Co. (Little 1971); mainly e TX. ■/104

Quercus fusiformis Small, (spindle-shaped), PLATEAU LIVE OAK, ESCARPMENT LIVE OAK, SCRUB LIVE OAK, WEST TEXAS LIVE OAK, LIVE OAK. Evergreen; small shrub to rather large tree, spreading by root sprouts. Possibly only a more xeric and cold tolerant subspecies of the more widespread *Q. virginiana*. Limestone outcrops, well-drained soils, mainly xeric habitats; primarily East Cross Timbers w to West Cross Timbers and sw to Edwards Plateau, also n into the Arbuckle and Wichita Mountains of s OK; also cultivated. [*Quercus virginiana* Mill. var. *fusiformis* (Small) Sarg.] Jones et al. (1997b) treat this species as a variety of *Q. virginiana*. While we are following Nixon (1997b) in treating it as a separate species, there appears to be extensive hybridization and introgression with *Q. virginiana*; see discussion under that species.

Quercus incana W. Bartram, (hoary, quite gray), BLUEJACK OAK, SANDJACK OAK, UPLAND WILLOW OAK, CINNAMON OAK, SHIN OAK, TURKEY OAK, HIGHGROUND OAK. Shrub or small tree to ca. 8 m tall; leaves distinctly gray-tomentose on lower (abaxial) surfaces. Sandy uplands; Kaufman Co.; scattered in se, e and c TX.

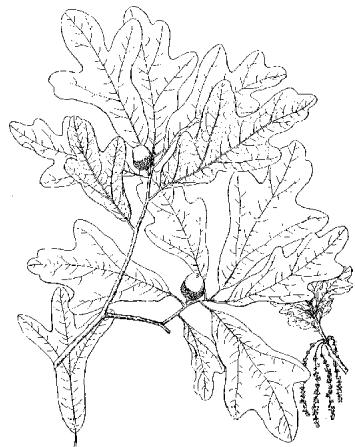
Quercus lyrata Walter, (lyre-shaped), OVERCUP OAK, SWAMP POST OAK, SWAMP WHITE OAK, WATER WHITE OAK. Medium size tree. Swamps, stream banks or other areas with frequent standing water, often acidic soils; Henderson Co, also Fannin (Little 1971) and Lamar (Simpson 1988) cos. in Red River drainage; mainly se and e TX. OVERCUP OAK is sometimes confused with *Q. macrocarpa* (BUR OAK) which is found on at least moderately drained calcareous soils; the 2 species are thus extremely different in terms of habitat.

Quercus macrocarpa Michx., (large-fruited), BUR OAK, MOSSY-CUP OAK, PRAIRIE OAK, MOSSY-OVERCUP OAK. Large tree; nuts and cups (3–6 cm wide) largest of all nc TX species. Stream bottoms, lower slopes, upland woods; usually in at least moderately drained places; in or near limestone areas; se and e TX w to West Cross Timbers and Edwards Plateau. This species is well known for its large acorns and thick, fire-resistant bark.

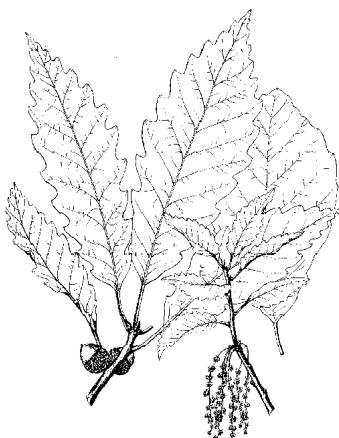
Quercus margarettiae Ashe ex Small, (for Margaret Henry Wilcox, later married to William Willard Ashe, 1872–1932, who named the species), SAND POST OAK, DWARF POST OAK, SCRUBBY POST OAK, RUNNER OAK. Shrub (rarely a small tree) to ca. 7 m tall. Restricted to deep sandy soils; Eastland and Palo Pinto cos., also Comanche, Grayson, and Tarrant cos. (Simpson 1988); e TX w to nc TX and Edwards Plateau. [*Q. stellata* Wangenh. var. *margarettiae* (Ashe ex Small) Sarg.] Jones et al. (1997) treated this species as a variety of *Q. stellata* While we are following Nixon (1997b) in treating it as a separate species, he noted that, “Populations of post oak in east Texas (the Cross Timbers region) on sands and gravels exhibit characteristics intermediate between *Q. stellata* and *Q. margarettiae*.” He further indicated that these populations have been referred to as *Q. drummondii* Liebm., DRUMMOND’S POST OAK, and “perhaps the Texas material is best treated as a nothospecies, *Q. ×drummondii*”

Quercus marilandica Münchh., (of Maryland), BLACKJACK OAK, BLACKJACK, BARREN OAK, JACK OAK, BLACK OAK. Small to large tree, smaller westward, often coarse and densely branched to near base; leaves nearly entire varying to having 3 shallow lobes near apex (rarely with a basal lobe on each side), narrowest basally, wedge-shaped or club-shaped in general outline. Sandy or occasionally gravelly and silty soils; chiefly upland; se and e TX w to West Cross Timbers and Edwards Plateau.

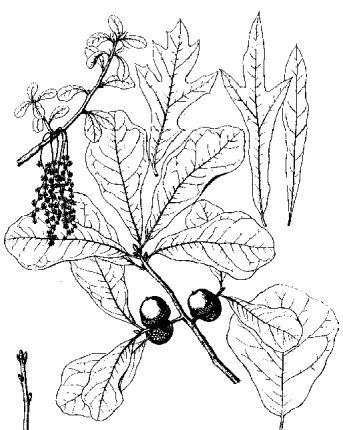
Quercus muehlenbergii Engelm., (for Gotthilf Henry Muhlenberg, 1753–1815, German-educated minister and pioneer botanist of Pennsylvania), CHINQAPIN OAK, CHESTNUT OAK, SWAMP CHEST-



Quercus margarettiae [sa3]



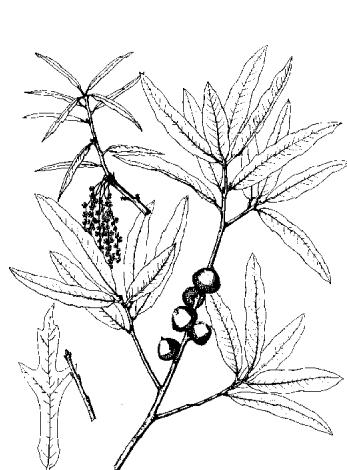
Quercus muehlenbergii [sa3]



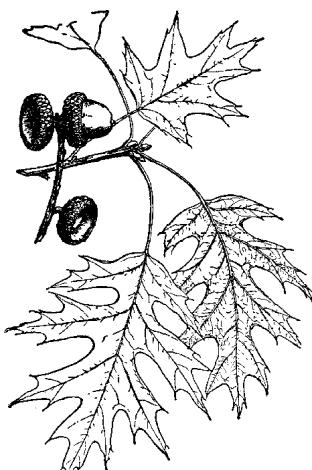
Quercus nigra [sa3]



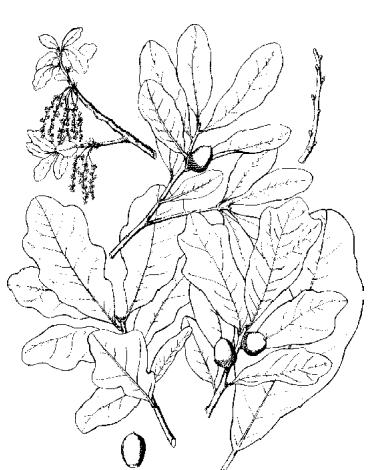
Quercus marilandica [LYN, sa3]



Quercus phellos [sa3]



Quercus shumardii [sa2]



Quercus sinuata var. brevirostra [sa3]

NUT OAK, YELLOW OAK, ROCK OAK. Medium to large tree; leaves shallowly to deeply rather evenly toothed, not lobed. Uplands, creek bottoms, ravines, on limestone or calcareous soils; e TX w to nc TX and s and w to Edwards Plateau and Trans-Pecos. The common name derives from the similarity of the leaves to those of CHINQAPIN, *Castanea pumila* Mill, another member of the Fagaceae native to the e U.S. as far w as e TX.

Quercus nigra L., (black), WATER OAK, POSSUM OAK, SPOTTED OAK, DUCK OAK, PUNK OAK. Large tree with dark gray or blackish bark, smooth in upper part. Stream bottom woods; Fannin, Kaufman, Henderson, Lamar, and Limestone cos, also Ellis Co. (Mahler 1988), also Grayson Co. (possibly introduced); se and e TX w to e part of nc TX.

Quercus phellos L. (Greek for cork oak—*Q. suber*), WILLOW OAK, PIN OAK, PEACH OAK, SWAMP WILLOW OAK, WILLOW-LEAF OAK. Medium to large tree; leaves usually linear-lanceolate to lanceolate (ob lanceolate to narrowly ovate or narrowly obovate), 5–12(–16) cm long, 1–2.5(–4) cm wide. Moist forests; Fannin and Lamar cos.; e TX w in Red River drainage to ne part of nc TX.

Quercus shumardii Buckley, (for Benjamin Franklin Shumard, 1820–1869, state geologist of TX in 1860), SHUMARD'S OAK, SHUMARD'S RED OAK, RED OAK, SWAMP RED OAK, SPOTTED OAK. Small to large tree to 30 m or more tall. Leaf blades divided about 0.5–0.6 of distance to midrib. Moist forests, chiefly in stream bottoms or drainage ways; mainly w edge of Blackland Prairie e to e TX. Similar to *Q. buckleyi*; see note under that species. Very susceptible to oak wilt. [*Q. schneckii* Britt., *Q. shumardii* var. *schneckii* (Britt.) Sarg.] While var. *schneckii* is sometimes recognized (e.g., Kartesz 1994; Jones et al. 1997), we are following Nixon (1997b) in lumping this variety that differs in having more deeply rounded cups covering ca. 1/3 of the nut (vs. shallow cups covering ca. 1/4 of the cup).

Quercus sinuata Walter, (with wavy margins). Includes the following 2 varieties differing greatly in growth form and habitat.

1. Shrubs to small often multi-trunked trees usually to only 6(–12) m tall, sometimes forming thickets in limestone upland areas; widespread in nc TX _____ var. **breviloba**
1. Large trees to 20 m or more tall; in bottomland forests; e margin of nc TX _____ var. **sinuata**

var. **breviloba** (Torr.) C.H. Müll., (short-lobed), BIGELOW'S OAK, SCRUB OAK, SHIN OAK, WHITE OAK, SCALY-BARK OAK. Often on limestone outcrops or rocky areas; Blackland Prairie (on the Austin Chalk) w through West Cross Timbers and Edwards Plateau. [*Q. san-sabeana* Buckley, *Q. breviloba* (Torr.) Sarg.]

var. **sinuata**. BASTARD OAK, DURAND'S WHITE OAK, WHITE OAK, BLUFF OAK. Moist woods; mainly e TX, in nc TX only reported from Navarro Co. (Simpson 1988). [*Q. durandii* Buckley]

Quercus stellata Wangenh., (stellate, star-shaped, from the stellate hairs), POST OAK, IRON OAK, CROSS OAK. Usually rather small (medium) tree; leaves with 2–4 lobes on each side, the main lobe on each side usually rather large and perpendicular to midvein giving the leaf a cross-like appearance. Sandy or rarely gravelly-silty ground, chiefly in uplands; eastern 2/3 of TX; this is the commonest oak species in nc TX and the vegetational dominant in many areas. Post oak tree-ring chronologies extending from about 200 to 300 years have been obtained from North Central Texas sites, with individual trees dating back to 1681 (e.g., Stahle et al. 1985). According to J. Stanford (pers. comm.), hybrids of this species and *Q. marilandica* can be found in the Lampasas Cut Plain.

Quercus velutina Lam., (velvety, from the young foliage), BLACK OAK, YELLOW OAK, QUERCITRON OAK, QUERCITRON, SMOOTH-BARK OAK, YELLOW-BARK OAK. Medium to large trees. Sandy ground, upland or lowland; Fannin, Grayson, and Lamar cos.; e TX w to nc TX in Red River drainage.

Quercus virginiana Mill., (of Virginia), LIVE OAK, ENCINO, COAST LIVE OAK, VIRGINIA LIVE OAK. Small to very large evergreen tree. In the se part of nc TX, *Q. virginiana* and *Q. fusiformis* form a complicated hybrid complex (Simpson 1988). True examples of *Q. virginiana* probably only occur naturally well to the se of nc TX. Even though helpful in separating these two species, leaf shape appears quite variable. While used extensively in landscaping, *Q. virginiana* is much more sensitive to low temperature than the closely related *Q. fusiformis*. Most individuals of *Q. virginiana* were severely damaged or killed in the Dallas-Fort Worth Metroplex during the severe winter of 1983. *Quercus fusiformis*, however, survived without problems much further n. Both of these species are being significantly affected by oak wilt.

FUMARIACEAE FUMITORY FAMILY

Ours low annuals with clear sap, glabrous and often glaucous; leaves alternate and/or basal, pinnately compound, with deeply divided leaflets; flowers in spike-like racemes, bilaterally symmetrical; sepals 2, minute, scale-like; petals 4, pale to bright yellow or orange-yellow or lavender to purple, unequal, slightly united at base but mostly falling separately; outer 2 petals dissimilar, the uppermost longest, its base prolonged into a spur, its wide apex bent up or back, ± keeled or hooded; stamens 6, in 2 bundles of 3 each, the filaments of each bundle partly to completely connate; carpels 2; fruit an elongate dehiscent capsule or a subglobose to obovoid indehiscent capsule.

— A medium-sized (ca. 450 species in 19 genera), mainly n temperate family of herbs of Eurasia and North America (Stern 1997a); they contain alkaloids, though in smaller amounts than the related Papaveraceae. Some are used as ornamentals including *Corydalis* species and *Dicentra* species (BLEEDINGHEART, DUTCHMAN'S-BREECHES). The family is related to the Papaveraceae and Lidén (1986) and Judd et al. (1994) lumped within the Papaveraceae those genera (*Corydalis* and *Fumaria* in nc TX) often separated into the Fumariaceae (e.g., Kartesz 1994; Jones et al. 1997; Kiger 1997a; Mabberley 1997; Stern 1997a). This lumping of the families was based on morphological and molecular analyses (e.g., Chase et al. 1993; Judd et al. 1994) which indicated the Fumariaceae was derived from within the Papaveraceae sensu stricto. However, a more recent study (Hoot et al. 1997 [1998]) supported the monophyly of both families; we are therefore recognizing both the Fumariaceae and the Papaveraceae. According to Stern (1997a), "... although a few taxa are morphologically intermediate, the members of the Fumariaceae generally are quite distinct from those of Papaveraceae in several respects, including floral symmetry, sap character, and stamen number and fusion." (subclass Magnoliidae)

FAMILY RECOGNITION IN THE FIELD: herbs with *pinnately compound* leaves with deeply divided leaflets, watery sap, and *bilaterally symmetrical* flowers with 1 spurred petal; stipules absent; sepals 2; petals 4; fruit a capsule.

REFERENCES: Ernst 1962; Gunn 1980; Lidén 1986, 1993; Chase et al. 1993; Judd et al. 1994; Stern 1997a; Hoot et al. 1997 [1998].

1. Petals pale to bright yellow or orange-yellow; fruits elongated cylindrical, 10–45 mm long, with many seeds, dehiscent; seeds with elaisomes _____ **Corydalis**
1. Petals light to deep purple; fruits subglobose–obvoid, ca. 2.5 mm long, 1-seeded, indehiscent; seeds without elaisomes _____ **Fumaria**

CORYDALIS SCRAMBLED-EGGS, FITWEED, FUMITORY, FUMEWORT

Leaves with 2–3 orders of leaflets and lobes; racemes initially congested, soon elongating; petals pale to bright yellow or orange-yellow, one conspicuously spurred; fruit an elongate dehiscent capsule; seeds many, with elaisomes.

— A genus of ca. 100 species (Stern 1997b) of the n temperate zone and tropical African mountains. Many are cultivated as ornamentals; some have edible tubers; ☣ many contain isoquinoline alkaloids (e.g., aporphine, protoberberine) and are toxic to livestock (Kingsbury 1964). A number are difficult to distinguish without mature fruits and seeds. (Greek: *korydallis*, name of the crested lark, possibly from the resemblance of the spur to the hind claw of the bird, or from a resemblance of the shape of the flower to the bird's head)

REFERENCES: Ownbey 1947, 1951; Stern 1997b.

1. Ovaries and capsules coated with thick, short, white hairs; spurred petal of fully developed flower 16–22 mm long, with crest conspicuous and marginal wing very broad _____ ***C. crystallina***
1. Ovaries and capsules glabrous; spurred petal 9–18 mm long, with crest inconspicuous OR conspicuous, the marginal wing narrow to medium or narrow.
 2. Spurred petal 9–15 mm long, the spur 3–7 mm long; greatest diam. of seeds 1.2–1.6 mm; plants often with inconspicuous racemes of 1–5 cleistogamous flowers _____ ***C. micrantha***
 2. Spurred petal 14–18 mm long, the spur 4–9 mm long; greatest diam. of seeds 1.8–2.2 mm; plants usually without cleistogamous flowers.
 3. Seeds finely roughened (under magnification); mature capsules 20–35 mm long; bracts subtending flowers to 17 mm long; spurred petal crested with a fold or not crested _____ ***C. curvisiliqua***
 3. Seeds faintly dotted or smooth except on margins; mature capsules 12–20 mm long; bracts subtending flowers usually 4–10 mm long; spurred petal not crested _____ ***C. aurea***

Corydalis aurea Willd. subsp. ***occidentalis*** (Engelm. ex A. Gray) G.B. Ownbey, (sp.: golden; subsp.: western), GOLDEN CORYDALIS. Stems usually prostrate with age, usually 10–25 cm long; racemes usually longer than leaves, bracts much reduced upward; petals bright yellow, the spurred petal 14–18 mm long, with hood not crested, the spur 5–9 mm long; seeds ca. 2 mm in diam. Sandy soils; Brown, Callahan, and Shackelford cos.; also Comanche Co. (Ownbey 1947); w part of nc TX s and w to w TX. Late Mar-Jun. [*C. aurea* var. *occidentalis* Engelm. ex A. Gray, *C. montana* Engelm.] ☣ Reported as occasionally toxic to livestock due to alkaloids (Burlage 1968).

Corydalis crystallina Engelm., (crystalline, transparent), MEALY CORYDALIS. Stems erect or ascending, 20–40 cm tall; racemes longer than the leaves; bracts 5–12 mm long; petals bright yellow, sometimes with inconspicuous brown-red marking, the hood always crested; fruits 14–18 mm long; seeds ca. 2 mm in diam., minutely roughened. Sandy open ground; Post Oak Savannah w to East Cross Timbers, also Edwards Plateau. Late Mar–early May.

Corydalis curvisiliqua Engelm., (with curved pods). Stems ascending, 10–40 cm long; foliage glaucous; bracts to 15 mm long and 6 mm wide; flowers bright yellow, usually ca. 12 per inflorescence; spurred petal 15–18 mm long, the spur 7–9 mm long and often somewhat globose at the tip. Mar–May.

1. Mature fruits 26–34 mm long, usually abruptly acute; bracts (lowermost) 10 mm or less long, much reduced upward; hood (= end of spurred petal) crestless or with a crest (= fold); on w and s margins of nc TX _____ subsp. ***curvisiliqua***
1. Mature fruits 20–25 mm long, gradually tapered; bracts (lowermost) 10–15 mm long, conspicuous, somewhat reduced upward; hood with a well-developed crest; widespread in nc TX _____ subsp. ***grandibracteata***

subsp. ***curvisiliqua***, CURVE-POD CORYDALIS. Disturbed areas, sandy soils; Young Co. on w margin of nc TX and Travis Co. just s of nc TX s to s Edwards Plateau; endemic to TX. ↗

subsp. ***grandibracteata*** (Fedde) G.B. Ownbey, (large-bracted). Sandy or silty ground; Clay, Collin, Denton, Montague, and Shackelford cos.; also Brown (HPC), Archer, Dallas, and Navarro (Ownbey 1947) cos.; Blackland Prairie w to e Rolling Plains, also Edwards Plateau. [*C. curvisiliqua* var. *grandibracteata* Fedde]

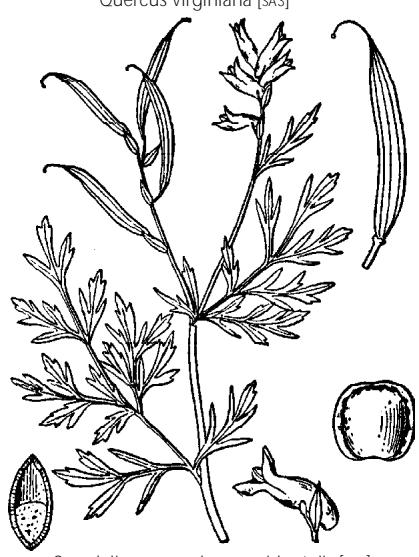


Quercus stellata [LYN, SA3]

Quercus velutina [SA3]



Quercus virginiana [SA3]



Corydalis aurea subsp. *occidentalis* [BB2]



Corydalis curvisiliqua subsp. *curvisiliqua* [HEA]

Corydalis micrantha (Engelm. ex A. Gray) A. Gray, (small-flowered). Stems erect to ascending, to 30(–60) cm tall; bracts 5–8 mm long; flowers pale yellow; spurred petal with low crest usually present on hood, the spur 4–7 mm long; cleistogamy (= having closed self-pollinated flowers) is more common in this species than in any other *Corydalis*. Sandy or silty clay ground. Mar–Apr.

1. Racemes of normal flowers elongated, much longer than the leaves, with 3–20 flowers, these becoming widely spaced; spur not globose at tip; fruits 15–25 mm long (including beak) _____ subsp. **australis**
1. Racemes of normal flowers often short, not much longer than the leaves, with 3–12 flowers, these crowded; spur usually somewhat globose at tip; fruits usually 10–15 mm long (including beak) _____ subsp. **micrantha**

subsp. **australis** (Chapm.) G.B.Ownbey, (southern), SOUTHERN CORYDALIS. Stems semi-erect or ascending, 20–40(–60) cm tall, weak, not strongly striate when dry; foliage green to glaucous. Se and e TX w to East Cross Timbers, and in Brazos River valley w to Somervell Co. (Mahler 1988). [*C. micrantha* var. *australis* (Chapm.) Shinners]

subsp. **micrantha**, SMALL-FLOWER CORYDALIS, SLENDER FUMEWORT. Stems erect or ascending, 15–25 cm tall. Bell, Hood, and Tarrant cos; also Dallas Co. (Ownbey 1947); e TX w to nc TX.

subsp. *texensis* G.B. Ownbey, (of Texas), TEXAS CORYDALIS. This endemic subspecies was cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2). It is similar to subsp. *australis* but differs in having fruits 25–30 mm long, glaucous foliage, and stems usually stout and strongly striate (= lined) when dry. Based on distributional information from Ownbey (1947) and from specimens available, this subspecies apparently occurs n only to Travis Co. just s of nc TX. 

FUMARIA FUMITORY, EARTH-SMOKE

☛ A genus of ca. 50 species native to Eurasia, Africa, and Atlantic islands, with greatest diversity in the w Mediterranean area (Boufford 1997a); a number contain alkaloids. (Latin: *fumus* smoke; according to Pliny, the juice of an Old World species causes the eyes to water as if exposed to smoke (Tveten & Tveten 1993), or perhaps from the nitrous odors of the fresh roots)
REFERENCE: Boufford 1997a.

Fumaria officinalis L., (medicinal), DRUG FUMITORY, COMMON FUMITORY. Glabrous, glaucous annual; stems spreading or ascending; leaves with 3–4 orders of leaflets and lobes; plant similar in foliage and flower structure to *Corydalis*, but with lavender or purple corollas 6–9.5 mm long and short, subglobose to obovoid fruits. Roadsides, railroads, and disturbed sites; Dallas Co., also Tarrant Co. (Mahler 1988); rare in nc TX, more frequent in c and s TX. Spring–summer. Native of Europe. 

GARRYACEAE SILKTASSEL FAMILY

☛ A very small family of 1 genus and 13 species of w North America, Central America, and the West Indies. They are dioecious evergreen trees and shrubs with ☣ highly toxic alkaloids. The Garryaceae were previously thought to be closely related to Cornaceae and were sometimes treated in that family (e.g., Correll & Johnston 1970; Hatch et al. 1990); however, recent molecular studies (Xiang et al. 1993) did not support a close relationship to Cornaceae. (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is an evergreen shrub or small tree with opposite, simple, entire leaves and small, inconspicuous, apetalous, unisexual flowers in catkin-like pendulous inflorescences; fruit a blue drupe.

REFERENCE: Xiang et al. 1993.

GARRYA SILKTASSEL

A genus ranging from Washington to Panama and the West Indies; some are cultivated as ornamentals and used medicinally; ~~as~~ some species have bark containing at least 5 alkaloids including delphinine otherwise known only from *Aconitum* and *Delphinium* in the Ranunculaceae. (Named for N. Garry, 1782[?]-1856, first secretary of Hudson Bay Co. and friend of David Douglas—Daniel 1993)

REFERENCES: Coulter & Evans 1890; Dahling 1978.

Garrya ovata Benth. subsp. **lindheimeri** (Torr.) Dahling, (sp.: ovate, egg-shaped; subsp.: for Ferdinand Jacob Lindheimer, 1801-1879, German-born TX collector), LINDHEIMER'S SILKTASSEL, MEXICAN SILKTASSEL. Dioecious, low shrub or rarely a small tree, 1-4 m tall; leaves evergreen, opposite, petiolate; leaf blades oblong-elliptic to broadly elliptic, ovate, or obovate, ca. 4.5-8 cm long and 2.5-5 cm wide, entire, the lower surfaces densely pubescent with curled or crinkly hairs, whitish gray or gray-green; inflorescences racemose, pendulous, branched, fasciculate; flowers without petals; staminate flowers pedicelled, with 4 stamens; pistillate flowers ± sessile; ovaries inferior; fruits blue, glaucous, globose drupes 6-10 mm in diam. Rocky slopes and bottoms in juniper-oak woodland; Burnet and Williamson cos. (Balcones Canyonlands Nat. Wildlife Refuge, C. Sexton, pers. comm.); endemic to Edwards Plateau and adjacent Lampasas Cut Plain. Mar-early April. [G. *lindheimeri* Torr.] 

GENTIANACEAE GENTIAN FAMILY

Ours low, glabrous annual or short-lived perennial herbs; leaves opposite, sessile or subsessile, simple, entire, without stipules; flowers terminal, solitary or in cymose inflorescences; calyces often with prominently ribbed tube, usually with 4-5 teeth or lobes; corollas salverform, rotate or campanulate, usually 4-5-lobed; stamens as many as corolla lobes; ovary superior, 2-carpelate; fruit a many-seeded, 2-valved capsule.

◀ A medium-large (1,225 species in 78 genera), cosmopolitan family of mainly herbs or shrubs or rarely small trees; they usually accumulate bitter iridoid substances; many are showy and frequently used as ornamentals including species of *Centaurium*, *Eustoma*, *Exacum*, *Gentiana*, and *Sabatia*. *Nymphoides* previously placed in this family, is here treated in the Menyanthaceae. Family name from *Gentiana*, GENTIAN, a temperate, arctic, and montane genus of 361 species of usually perennial herbs. (Named for Gentius, 2nd century king of Illyria, who is said to have discovered the medicinal properties of *G. lutea* L. roots) (subclass Asteridae) FAMILY RECOGNITION IN THE FIELD: herbs with opposite, simple, glabrous leaves without stipules; calyces bell-shaped or tubular; corollas showy, salverform to rotate or bell-shaped, radially symmetrical with the same number of epipetalous stamens alternating with the corolla lobes.

REFERENCES: Wood & Weaver 1982; Mésezáros et al. 1996.

1. Corollas pink to rose, rarely white, salverform or rotate, the lobes < 24 mm long; style filiform, usually deciduous from capsule; anthers coiled after dehiscence.
2. Corollas rotate, the tube much shorter than the lobes; leaves 5-26 mm wide; corolla lobes 11-23 mm long; anthers recurved or revolute (circinately coiled) after dehiscence _____ **Sabatia**
2. Corollas salverform, the tube equal to or longer than the lobes; leaves 1-13 mm wide (4 mm or less wide except in *C. calycosum* which is rare in nc TX); corolla lobes 3.5-13 mm long; anthers spirally curved after dehiscence _____ **Centaurium**
1. Corollas blue-purple with darker center, rarely largely white or rose, campanulate, the lobes 30-50 mm long; style usually stout and persistent; anthers not coiled _____ **Eustoma**

CENTAURIUM CENTAURY

Erect, usually much-branched annuals; flowers numerous, showy; calyces and corollas 4- or 5-parted; corollas usually pink to rose (rarely white), often with a light area at very base, the tube elongate, slender; anthers spirally coiled or twisted after dehiscence.

☛ A mainly n hemisphere genus of ca. 50 species (J. Pringle, pers. comm.) with several in South America and Australia; some are cultivated as ornamentals. ☠ Some are toxic to livestock though eaten only when other forage is scarce (Kingsbury 1964). Material for the key and descriptions was obtained in part from an unpublished manuscript being prepared for the Flora of North America by J. Pringle. (An old name, variously applied by the herbalists, from Latin: *Centaurus*, Centaur, mythical discoverer of its medicinal qualities)

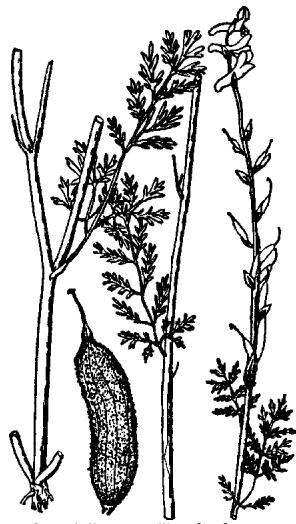
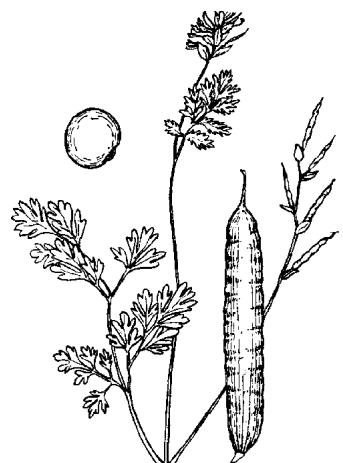
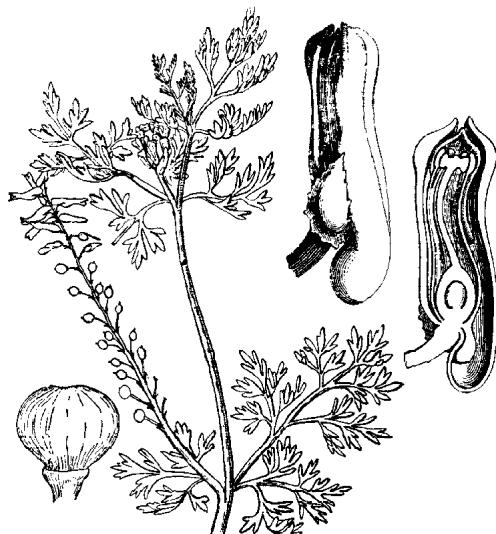
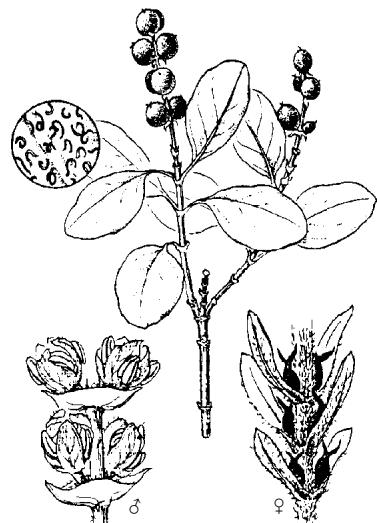
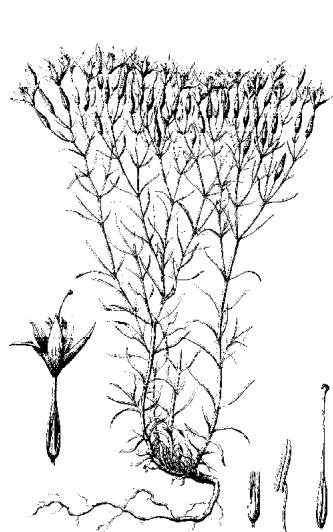
REFERENCES: Hess 1968; Melderis 1972; Turner 1993a; Holmes & Wivagg 1996.

1. Corolla lobes 1–6(–7) mm long, 1.5(–1.7) mm or less wide, much shorter than the corolla tube; anther sacs (when coiled at maturity) 0.6–1.1 mm long.
 2. Flowers on pedicels (1–)2–12 mm long; inflorescence rather open (but there can be numerous flowers), not flat-topped.
 3. Pedicels usually ca. as long as calyces; corolla lobes 3–6(–7) mm long; stem leaves linear to linear-lanceolate, 1–3(–4) mm wide; native species widespread in nc TX _____ **C. texense**
 3. Pedicels shorter than calyces; corolla lobes 1–4 mm long; stem leaves lance-ovate to lanceolate, 2–7 mm wide; introduced species known in nc TX only from extreme e margin of area _____ **C. pulchellum**
 2. Flowers sessile or subsessile; inflorescence dense, flat-topped _____ **C. floribundum**
1. Corolla lobes 6–13 mm long, usually > 1.5 mm wide, nearly equal in length to the corolla tube; anther sacs (when coiled at maturity) 1.5–2.5 mm long.
 4. Stem leaves typically linear to very narrowly linear-ob lanceolate, 1–3 mm wide; corolla tube at first about equaling, finally twice the calyx length (calyx measured to end of calyx lobes); plants much branched from the very base; widespread in nc TX _____ **C. beyrichii**
 4. Stem leaves oblong to oblong-elliptic or narrowly lanceolate, 3–13 mm wide; corolla tube shorter than to slightly longer than calyx (calyx measured to end of calyx lobes); plants usually with one stem from base, branched well above base but not much-branched from the very base (but sometimes somewhat branched from very base); rare in nc TX _____ **C. calycosum**

Centaurium beyrichii (Torr. & A. Gray) B.L. Rob., (for Heinrich Kral Beyrich, 1796–1834, Prussian botanist who collected in GA, SC, and TX), ROCK CENTAURY, MOUNTAIN-PINK. Plant to ca. 30 cm tall; without numerous glands; stem leaves to 3 cm long and 3 mm wide; flowers numerous, densely packed in the much-branched inflorescence; corollas pink, rarely white; seeds dark brown. Limestone gravel; Grand Prairie s and w to w TX. May-Aug. [Erythraea beyrichii Torr. & A. Gray] Turner (1993a) indicated that *C. beyrichii* "... sometimes occurs near or with *Centaurium calycosum* and the occasional hybrid between these probably occurs." This species is poisonous to livestock; severe gastroenteritis, organ damage, and death can result; however, it is eaten only when other forage is scarce (Kingsbury 1964; Burlage 1968). ☠ 图/83

Centaurium calycosum (Buckley) Fernald, (with large calyx), BUCKLEY'S CENTAURY, ROSITA. Plant to ca. 60 cm tall, usually much smaller; stem leaves to 6 cm long and 13 mm wide; inflorescence open; corollas pink to rose-colored, rarely white; seeds light brown. Moist soils, along streams, prairies, and hillsides; Coleman Co., also Parker Co. (Turner 1993a); w part of nc TX s and w to w TX. Apr-Jun(-Aug). [Erythraea calycosa Buckley] This species is much less common in nc TX than the other native species. It is toxic to livestock but somewhat less so than *C. beyrichii* (Kingsbury 1964). ☠

Centaurium floribundum (Benth.) B.L. Rob., (flowering abundantly), JUNE CENTAURY. Plant 5–

*Corydalis crystallina* [BB2]*Corydalis micrantha* subsp. *australis* [BB2]*Corydalis micrantha* subsp. *micrantha* [BB1]*Fumaria officinalis* [BB1, BL1]*Garrya ovata* subsp. *lindheimeri* [POW]*Centaurium beyrichii* [RBM]*Centaurium calycosum* [BB2]*Centaurium floribundum* [ABR]

50(-90) cm tall; stem leaves 1-2.5 cm long, 2-7(-9) mm wide; corollas pink, the lobes 2-5 mm long; seeds brown. Moist open areas, stream banks, open woods; Ellis, Falls, Hill, Johnson, Limestone, McLennan, Milam, and Navarro cos. (Holmes & Wivagg 1996, cited as *C. muehlenbergii*); nc and e TX. Summer-fall. Native of the w U.S.A., naturalized and spreading in TX. [*Erythraea floribunda* Benth.] While some authorities have lumped *C. floribundum* with *C. muehlenbergii* (e.g., Holmes & Wivagg 1996), J. Pringle (pers. comm.) indicated that it appears to be a distinct species and that specimens from TX cited by Holmes and Wivagg (1996) as *C. muehlenbergii* are actually *C. floribundum*. According to J. Pringle (pers. comm.), "True *C. muehlenbergii*, as indicated by studies of the type, is characterized by proportionately elongate, relatively few-flowered inflorescences with predominantly monochasial branching, with some or all flowers being distinctly pedicellate. *Centaurium floribundum*, in contrast is characterized by flat-topped, densely many-flowered inflorescences with predominantly dichasial branching, with all of the flowers sessile or subsessile."

Centaurium pulchellum (Sw.) Druce, (pretty, beautiful but small). Plant 10-26 cm tall; stem leaves 1-2 cm long, 2-7 mm wide; inflorescence an open compound dichasium, not flat topped; pedicels 2-5 mm long; calyces 5-9 mm long; corolla tube exceeding calyx; corollas pink, the lobes 1-4 mm long; seeds light brown. Roadsides, fields; Limestone Co. at the extreme e margin of nc TX (Holmes & Wivagg 1996); mainly e TX; this species was first reported for TX by Correll and Johnston (1972). Apr-Jun. Native of Europe. [*Erythraea pulchella* (Sw.) Fr.] 

We are following Holmes and Wivagg (1996) in treating this taxon as *C. pulchellum*; however, there may be problems with the identification of TX material. James Pringle (pers. comm.) indicated, "... Anton A. Reznicek (in annotations, TRT) has suggested that some of the plants naturalized in North America identified as *C. pulchellum* may actually be *C. tenuiflorum* (Hoffsgg. & Link) Fritsch ex E. Janchen, a European species abundantly naturalized in parts of Australia but thus far not reported in print for North America." Pringle indicated that further study is thus needed. Melderis (1972), in *Flora Europaea*, separated the two as follows:

1. Stem usually dichotomously branched in the lower part, with patent branches; caudine internodes usually 2-4; flowers long-pedicellate, usually in a lax dichasial cyme _____ *C. pulchellum*
1. Stem branched in the upper part, with strict branches; caudine internodes usually 5-9; flowers shortly pedicellate, usually in a dense dichasial cyme _____ *C. tenuiflorum*

Centaurium texense (Griseb.) Fernald, (of Texas), TEXAS CENTAURY, LADY BIRD'S CENTAURY. Stem leaves linear to linear-lanceolate, to 2.5 cm long, 1-3(-4) mm wide; inflorescence ± open; pedicels ca. as long as calyces; corollas light pink; corolla tube at first shorter, finally longer than calyx; corolla lobes 3-6(-7) mm long; seeds light brown. Dry limestone areas; Bell, Bosque, Burnet, Dallas, Denton, Hood, Montague, and Tarrant cos., also Brown (HPC) and Somervell (R. O'Kennon, pers. obs.) cos.; Post Oak Savannah w to nc TX and Edwards Plateau. Jun-Aug. [*Erythraea texensis* Griseb.] According to Correll and Johnston (1970), the common name is for Mrs. Lyndon B. Johnson, who made a special effort to collect seeds of this species from limestone hills south of Johnson City and planted them along her ranch's airfield runway.

Centaurium glanduliferum (Correll) B.L. Turner, (bearing glands), [*C. beyrichii* var. *glanduliferum* Correll], is cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2); we have seen no nc TX material of this mainly w TX taxon. It can be distinguished from the related *C. beyrichii* by the numerous minute glands, the leaves especially being densely gland-covered, seeds blackish or very dark brown, and plant size (to ca. 15 cm tall). We are following Turner (1993a), Jones et al. (1997), and J. Kartesz (pers. comm. 1997) in recognizing this taxon at the specific level.

EUSTOMA

BLUEBELLS, PRAIRIE GENTIAN, CATCHFLY GENTIAN

☛ A genus of a single species (J. Pringle, pers. comm.) of s North America to n South America. (Greek: *eu*, good, and *stoma*, mouth, from corolla tube)
REFERENCE: Shinners 1957.

Eustoma russelianum (Hook.) G. Don, (derivation either for the Dukes of Bedford, whose family name is Russell, or for Mr. Russell of Falkirk), BLUEBELL GENTIAN, BLUEBELLS, TEXAS BLUEBELLS, SHOWY PRAIRIE GENTIAN, LIRA DE SAN PEDRO, PURPLE PRAIRIE GENTIAN. Erect glaucous annual or short-lived perennial to 70 cm tall; leaves ovate to elliptic-oblong or elliptic-lanceolate, 1.5–8 cm long, noticeably 3-veined; flowers solitary or in few-flowered inflorescences, 5(-6)-merous; corollas blue-purple with darker center, rarely largely white, white with yellow center, white with deep red center, or pink, very large, deeply divided, the lobes 30–40 mm long, 15–24 mm wide, at least 3 times as long as tube; anthers ca. 10 mm long, not coiled; stigma 2-lobed, yellow, ca. 8 mm wide. Low spots in prairies, low open ground, or disturbed sites; throughout most of TX. Late Jun-Aug. [*E. grandiflorum* (Raf.) Shinners] This is one of the most striking wildflowers in nc TX. It is closely related to *E. exaltatum* (L.) Salisb. ex G. Don; according to J. Pringle (pers. comm.), there are not two distinct categories of flower size—a character often used in the past to separate *E. exaltatum* and *E. russelianum*. Instead, considerable intergradation in flower size exists; however, plants with flowers in the size range traditionally associated with *E. russelianum* do tend to prevail in some areas. Kancheepuram Gandhi (pers. comm.) is currently studying these taxa to determine if *E. russelianum* is most appropriately recognized at the species level or as a subspecies/variety of *E. exaltatum*. Until that study is completed, we are following the traditional approach and treating this taxon at the specific level. According to Stanford (1976), “Numerous color forms occur in Texas. Dried material is often misleading in that the water-soluble pigments at the corolla base are sometimes dispersed throughout the petals, resulting in a wide array of petal color.” Shinners (1957) and Stanford (1976) listed the following color forms: forma *grandiflorum* [forma *russelianum*]—typical, blue-purple with darker center, forma *fisheri* (Standl.) Shinners—pure white; forma *bicolor* (Standl.) Shinners—white with deep red center (dried material usually with purple-tinged lobes); forma *roseum* (Standl.) Shinners—pink; and forma *flaviflorum* (Cockerell) Shinners—white with bright yellow center (dried material with entire corolla yellow). ☒/90

SABATIA ROSE GENTIAN

Erect glabrous annuals; leaves mostly cauline; flowers in terminal cymose inflorescences, showy, in ours usually 5-merous; corollas usually pink to rose (rarely white) with a yellow or greenish yellow triangular spot at the base of each corolla lobe, these spots together forming a yellow or greenish yellow star in the center of the corolla; anthers bright yellow, recurved or revolute (circinately coiled) after dehiscence.

☛ A genus of 19 species (J. Pringle, pers. comm.) of North America and the West Indies; some are cultivated as ornamentals. Material for the key and descriptions was obtained in part from an unpublished manuscript being prepared for the *Flora of North America* by J. Pringle. (Named for Liberato Sabbati, born 1714?, Italian botanist and surgeon in Rome)
REFERENCES: Wilbur 1955; Perry 1971; Bell & Lester 1980.

1. Calyx tube essentially smooth, wingless, 1–3.5 mm long, covering < 1/3 of the corolla tube; stems slightly winged; upper nodes usually with 2 side branches per node _____ ***S. angularis***
1. Calyx tube prominently 5-ribbed or winged, 4–8 mm long, covering 2/3 or more of the corolla tube; stems not winged; upper nodes usually with 1 side branch per node.

2. Calyces shorter than corollas in mature bud; yellow eye of corollas with sharply defined red border; known from s and w parts of nc TX _____ **S. formosa**
2. Calyces usually ca. as long as or longer than corollas; yellow eye of corollas with adjacent reddish zone grading into pink but usually without sharply defined red border; known from n and e parts of nc TX _____ **S. campestris**

Sabatia angularis (L.) Pursh, (angular, angled), ROSE-PINK, SQUARE-STEM ROSE GENTIAN, BITTER-BLOOM. Plant (10-)30-80 cm tall; leaves sub-orbicular to cordate-ovate; corolla lobes to ca. 20 mm long, ca. 4-6(-8) mm wide, pink to rose or rarely white, with yellow or greenish yellow spot at base usually bordered by a dark red line. Prairies, woods; e TX w in Red River drainage to Cooke, Grayson, and Lamar cos. Jun-Aug.

Sabatia campestris Nutt., (of the fields or plains), PRAIRIE ROSE GENTIAN, MEADOW-PINK, TEXAS-STAR, ROSE-PINK. Plant 10-37(-50) cm tall; leaves oblong-elliptic to broadly ovate-elliptic; largest leaves usually near mid-stem; basal rosette usually absent at flowering time; pedicels 18-91 mm long; corolla lobes ± obovate, usually widest distally (but narrowed at very apex), 13-25 mm long (mean ca. 19), ca. 7-11(-15) mm wide, rose to pale pink (rarely white), basally with a 3-4 mm long by 1-1.5 mm wide yellow or greenish yellow triangular spot, this often bordered by a white band and sometimes by a reddish area (this not sharply defined); width of white band at base of corolla lobes > 1 mm when present. Chiefly in clay soils but also in sand, open ground, edge of woods, roadsides; e 1/2 of TX. May-early Jul. ■/104

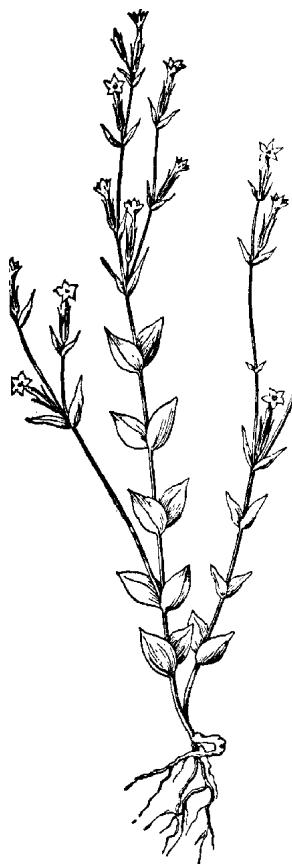
Sabatia formosa Buckley, (handsome, beautiful), BUCKLEY'S SABATIA. Similar to *S. campestris* plant 7-28 cm tall; leaves 7-25 mm long; largest leaves generally at or near the stem base, with basal rosette typically persisting at flowering time; pedicels 20-62 mm long; corolla lobes ± broadly lanceolate to elliptic-rhombic, widest near the middle (narrower in shape overall than in *S. campestris*), 9-20 mm long (mean ca. 15), magenta-rose (typically more deeply pigmented than in *S. campestris*), with patterning similar to *S. campestris* but yellow or greenish yellow area with sharply defined red border and width of white band at base of corolla lobes < 1 mm. Loose sandy soils, but sometimes in clay, typically in more xeric situations than *S. campestris* Comanche and Eastland cos. (Bell & Lester 1980); widespread in e 1/2 of TX, but not known from extreme ne part of the state. Late Mar-Apr. While *S. formosa* has often been considered an early flowering morph of *S. campestris*, we are following J. Pringle (pers. comm. of treatment forthcoming in Flora of North America) and Bell and Lester (1980) in distinguishing *S. formosa* from *S. campestris*. Electrophoretic as well as morphological evidence supports the separation; hybrids between the two have been observed but are limited by differences in flowering time (Bell & Lester 1980).

GERANIACEAE GERANIUM FAMILY

Ours annual or biennial, pubescent herbs; leaves alternate or subopposite, simple or compound, toothed or lobed; stipules ovate to lanceolate, somewhat papery; flowers axillary or terminal, solitary or in peduncled pairs, congested cymose inflorescences, or umbels; sepals 5; petals 5; stamens 5 or 10, the filaments united basally; pistil 5-carpellate, the united styles and central column forming a prolonged beak; ovary superior; carpels 1-seeded, variously separating at maturity.

—A medium-sized (700 species in 11 genera) mainly temperate (few tropical) genus of mostly herbs or small shrubs including the ornamental GERANIUMS (most in the South African genus *Pelargonium*); many have glandular hairs containing aromatic essential oils and some have been used medicinally. (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: herbs with lobed or compound leaves and a distinctive



Centaurium pulchellum [GLE]



Centaurium texense [ROE]

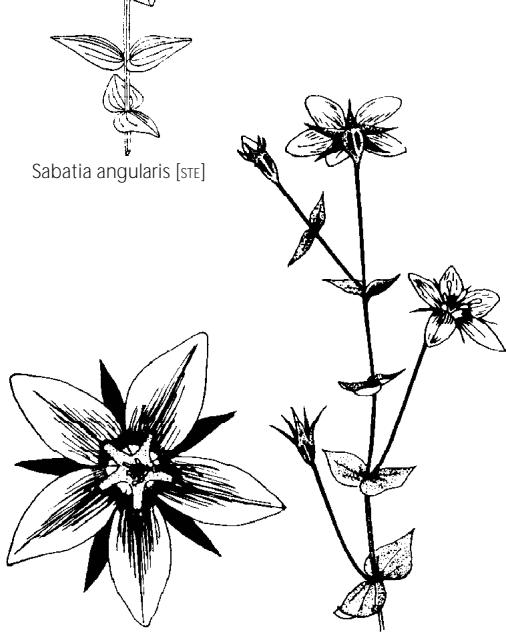
Eustoma russellianum [BT3]



Sabatia angularis [STE]



Sabatia campestris [AJB]



Sabatia formosa [AJB]

birdbill-like, long-beaked pistil that separates into segments in fruit; flowers radially symmetrical, with 5 separate petals.

REFERENCES: Hanks & Small 1907; Robertson 1972; Price & Palmer 1993.

1. Fertile stamens (= those with anthers) 10; beak short (< 15 mm long); basal rosette usually absent; leaf blades usually ± as wide as long, deeply palmately or ternately divided (the ultimate segments usually ± narrow in appearance); seeds noticeably reticulate; stylar portion of the carpels remaining attached at the beak apex, the beak separating from the base first, nearly glabrous inside, the beak segments merely outwardly coiled _____

Geranium

1. Fertile stamens 5; beak long, usually 20–50(–75) mm; basal rosette present; leaf blades usually slightly to much longer than wide, palmately lobed (lobes rounded and crenate, not narrow in appearance) or pinnately compound; seeds smooth; beak separating at the apex first, with long hairs inside, the beak segments tightly twisted when dry _____

Erodium

ERODIUM STORK'S-BILL

Ours annuals or biennials; stems partly decumbent to ascending, to 40 cm long; leaves petiolate, the blades usually longer than broad; inflorescences axillary, long-peduncled, umbellate; petals deeply colored, opening in the morning, usually falling by late afternoon.

— A genus of ca. 60 species of Europe, the Mediterranean to c Asia, temperate Australia, and tropical s America. The beak segments ("awns") coil and uncoil in response to moisture and drive the seeds into the ground; this can be easily observed in the laboratory using water to cause uncoiling and 95% ethanol to cause drying and recoiling. (Greek: *erōdios*, a heron, from the long bill-like beak of the fruit)

1. Leaves pinnately compound with leaflets finely pinnately dissected; petals to 6–8 mm long, pink to pinkish purple _____

E. cicutarium

1. Leaves simple, usually palmately lobed; petals 10 mm or more long, purple to red _____

E. texanum

Erodium cicutarium (L.) L'Hér. ex Aiton, (resembling *Cicuta*—water hemlock), FILAREE, PIN-CLOVER, CALIFORNIA FILAREE, ALFILARIA, ALFILERILLO. Stems ± pubescent with flattened, whitish hairs; umbels with 2–8 flowers. Roadsides and disturbed areas; throughout most of TX. Late Feb–May. Native of Europe. 

Erodium texanum A. Gray, (of Texas), STORK'S-BILL, TEXAS FILAREE, HERONBILL. Stems minutely pubescent; sinuses between leaf lobes usually to less than 2/3 the distance to the petiole. Rocky or sandy prairies, disturbed sites; widespread in TX. Mar–Apr. /88

GERANIUM CRANE'S-BILL

Ours annuals or biennials, pubescent; leaves essentially orbicular in outline, deeply palmately or ternately lobed (usually divided 3/4 or more of distance to petiole), long-petioled; flowers usually in pedicellate pairs on short peduncles borne from the leaf axils; inflorescences sometimes congested, cymose; sepals aristate; petals white to pink or reddish pink.

— A genus of 300 species of the temperate zone and tropical mountains; many are cultivated ornamentals, particularly as ground-covers. (Old Greek name, from *geranos*, crane, the long beak thought to resemble the bill of that bird)

REFERENCES: Fernald 1935; Jones & Jones 1943.

1. Sepals ca. 6–8 mm long, ovate-lanceolate to elliptic-lanceolate, pubescent with long spreading hairs on nerves and margins; stem pubescence of short and long hairs, at least some spreading.

2. Petals pale pink or white with pink veins; carpel body with non-glandular hairs 0.8–1.5 mm



Erodium cicutarium [BT3]

- long; beak pubescent, with only a few hairs glandular; style branches yellow, 1 mm or more
 long; widespread in nc TX _____ **G. carolinianum**
2. Petals dark pink or dark reddish pink; carpel body with gland-tipped hairs 0.2–0.5 mm long;
 beak densely pubescent with gland-tipped hairs; style branches purplish, ca. 0.5 mm long;
 rare in nc TX, known only from Dallas Co. _____ **G. dissectum**
1. Sepals 4–5 mm long, orbicular-ovate, glabrous except for short appressed hairs on the nerves;
 stem pubescence short, appressed, retrorse (= pointing down) _____ **G. texanum**

Geranium carolinianum L., (of Carolina), CRANE'S-BILL, CAROLINA CRANE'S-BILL, CAROLINA GERANIUM. Winter annual or biennial, beginning to flower with stems only 3 cm tall; stems ascending, ultimately to 80 cm long; leaf blades sub-orbicular, deeply lobed and toothed; flowers usually in pairs; petals ca. as long as sepals. Woods, fields, waste places, various soils; throughout most of TX. Mar-early May.

Geranium dissectum L., (dissected, deeply cut). Winter annual or biennial; similar to *G. carolinianum*; stems ascending, to 60 cm long; ultimate leaf segments linear; petals ca. 4–6 mm long. Fields, waste areas; Dallas Co., mainly ne TX to the e of nc TX. Apr-May. Native of Europe. ☎

Geranium texanum (Trel.) A. Heller, (of Texas), TEXAS GERANIUM. Winter annual similar to *G. carolinianum*; petals white or white with pinkish veins. Disturbed soils; widespread in TX, but mainly Blackland Prairie w to Rolling Plains and Edwards Plateau. Mar-Apr, usually flowering before *G. carolinianum*. [*G. carolinianum* L. var. *texanum* Trel.]

GROSSULARIACEAE CURRANT FAMILY

—The Grossulariaceae is a small (330 species in 24 genera), cosmopolitan family of trees and shrubs; some are armed, while others accumulate aluminium or are cynogenic. The family is sometimes included in the Saxifragaceae. Family name conserved from *Grossularia*, a genus now treated as *Ribes*, GOOSEBERRY (the name *Ribes* was published earlier and thus has priority in terms of nomenclature). (Latin: *grossula* gooseberry, apparently from *grossus* an unripe fig, from a resemblance of the fruits to small unripe figs) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is a shrub with alternate, simple, lobed leaves; flowers with 5 yellow to red petals; fruit a berry.

REFERENCES: Coville & Britton 1908; Spongberg 1972.

RIBES CURRANT, GOOSEBERRY

—A genus of 150 species of often spiny shrubs of temperate regions of the n hemisphere and the Andes; many species have edible fruits (gooseberries and currants) and some are cultivated as ornamentals. In some areas of the U.S. *Ribes* species have been eliminated and their cultivation prohibited because they serve as the alternate host of white pine blister rust, an introduced fungus that attacks white pines. (According to Fernald (1950a), said by A. DeCandolle to come from the old Danish colloquial, *ribs*, for the red currant; according to other sources from the Arabic: *ribas*, acid tasting, alluding to the fruit)

REFERENCES: Berger 1924; Sinnott 1985.

Ribes aureum Pursh var. **villosum** DC., (sp: golden; var: villous, with soft hairs), CLOVE CURRANT, BUFFALO CURRANT. Erect, unarmed shrub to ca. 2 m tall; leaves simple, alternate; leaf blades 3–8 cm wide, nearly as wide as long, 3–5-lobed, the lobes usually dentate; inflorescence a raceme of 3–10 flowers, usually nodding; flowers fragrant, 5-merous; calyces yellow, with tube 10–15 mm long; petals yellow to red; ovary inferior; fruit an ovoid to globose berry 7–10 mm long, yellowish turning black. Rocky slopes, sandy bluffs; included based on citation of vegetational area 5

(Fig. 2) by Hatch et al. (1990); mainly w 1/2 of TX. Feb-May. [*R. odoratum* H. Wendl.] The fruits of this species were formerly used with buffalo meat to make pemmican (Mabberley 1987).

HALORAGACEAE WATER-MILFOIL FAMILY

Glabrous perennial herbs growing in water or on wet ground; leaves alternate or whorled, sessile, simple (but in most so deeply divided as to appear compound), sharply toothed or pinnately lobed with almost thread-like segments; flowers minute, sessile, axillary or in terminal spikes, unisexual or perfect; calyces 3-4-lobed; petals 0 or 4; stamens 3-8; ovary inferior; fruits nut-like, 3-4-celled.

— A small (145 species in 9 genera), cosmopolitan, but especially s hemisphere family of usually aquatic or wet area herbs or sometimes shrubs or small trees. The family is sometimes interpreted to include the well-known tropical genus *Gunnera*. It is sometimes referred to as the Haloragidaceae; however, the name Haloragaceae is conserved. Family name from *Haloragis*, a genus of 26 species of Australia, New Caledonia, New Zealand, Rapa, and Juan Fernandez. (Greek: *hals*, the sea, a lump of salt, or salt, and *rhas*, *rhasos*, berry or grape) (subclass Rosidae)
FAMILY RECOGNITION IN THE FIELD: aquatic or wet area herbs; leaves alternate or whorled, at least the submerged ones pinnately divided into numerous segments and *feather-like* in appearance; flowers minute.

1. Leaves mostly or all whorled, the ones out of the water usually reduced and bract-like; stamens 4 or 8; carpels 4; sepals 4 _____ **Myriophyllum**
1. Leaves alternate, the ones out of water well-developed; stamens 3; carpels 3; sepals 3 _____ **Proserpinaca**

MYRIOPHYLLUM WATER-MILFOIL, PARROT'S-FEATHER

Stems and leaves mostly submersed except in *M. aquaticum*; leaves whorled, the submersed leaves pinnately divided into thread-like segments; flowers in terminal spikes held above the surface of the water or in the axils of leaves, small, unisexual or perfect; petals 0 or 4; stigmas 4; fruits small (1-3 mm long), subglobose to ovoid, 3-angled.

— A cosmopolitan genus of 60 species, especially in Australia; they resemble *Ceratophyllum* but the leaves are pinnately divided, not forked. Some are cultivated as aquarium plants. (Greek: *myrios*, numberless, and *phyllon*, leaf, alluding to the innumerable leaf divisions)
 REFERENCES: Löve 1961; Jarman 1968; Correll & Correll 1972; Reed 1977; Aiken 1981; Godfrey & Wooten 1981.

1. Whorls of leaves on lower and middle parts of stem usually 1 cm or more apart.
2. Many of the leafy vegetative branches emerged (= out of the water), sometimes trailing on mud or wet ground and erect-ascending; leaf segments usually 6 mm or less long; flowers in clusters in axils of leaves essentially like the sterile leaves _____ **M. aquaticum**
2. Most of the leafy vegetative branches submersed (or sometimes stranded out of the water when water low); leaf segments usually 6-20 mm long; flowers in whorls in a slender terminal spike, the individual whorls not subtended by leaf-like bracts, the bracts very small and shorter than to slightly exceeding the flowers.
3. Lowermost bracts usually slightly exceeding the flowers and fruit, pectinate to serrate or nearly entire; middle stem leaves usually < 2.5 cm long, with 12 or more segments on each side, the segments usually 15 mm or less long; stem thickened below the inflorescence to almost double the width of the lower stem; abundant in several nc TX lakes and probably being more widely spread at present _____ **M. spicatum**
3. Lowermost bracts shorter than flowers and fruit, entire to serrate; middle stem leaves

usually 3 cm or more long, with 11 or fewer segments on each side, the segments often > 15 mm long; stem not thickened below the inflorescence; rare if present in nc TX; probably not occurring in TX _____ **M. sibiricum**

1. Whorls of leaves on lower and middle parts of stem usually much < 1 cm apart.
 4. Emerged bracts or bracteal leaves very deeply pinnately dissected or lobed (and thus comb-like in appearance), as long as flowers or fruits or to only 2–3 times as long—the spikes thus appearing ± naked; anthers (4)–8; fruits 2–3 mm long; submersed foliage leaves with a total of 18–26 thread-like segments _____ **M. verticillatum**
 4. Emerded bracts or bracteal leaves merely serrate OR with long serrations (and thus nearly comb-like in appearance), many times as long as the flowers and fruits—the bracts thus obvious at a glance; anthers 4; fruits 1–1.8 mm long; submersed foliage leaves with a total of 8–20 thread-like segments.
 5. Submersed foliage leaves with a total of 12–20 thread-like segments; emerged bracts or bracteal leaves with only small serrations _____ **M. heterophyllum**
 5. Submersed foliage leaves with a total of 8–10 thread-like segments; emerged bracts or bracteal leaves with long (relative to leaf size) serrations, usually nearly comb-like _____ **M. pinnatum**

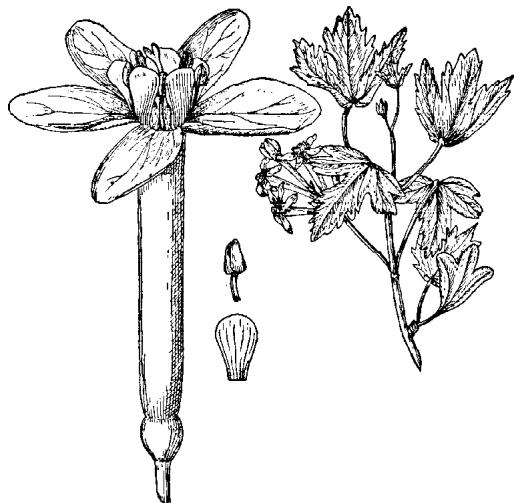
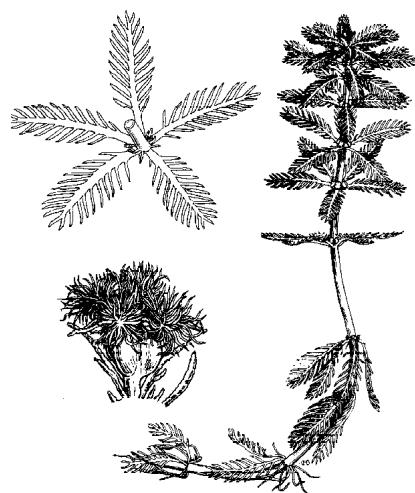
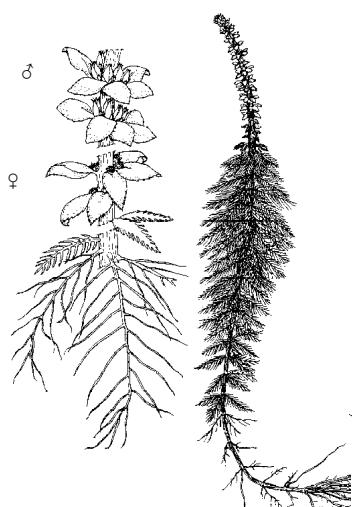
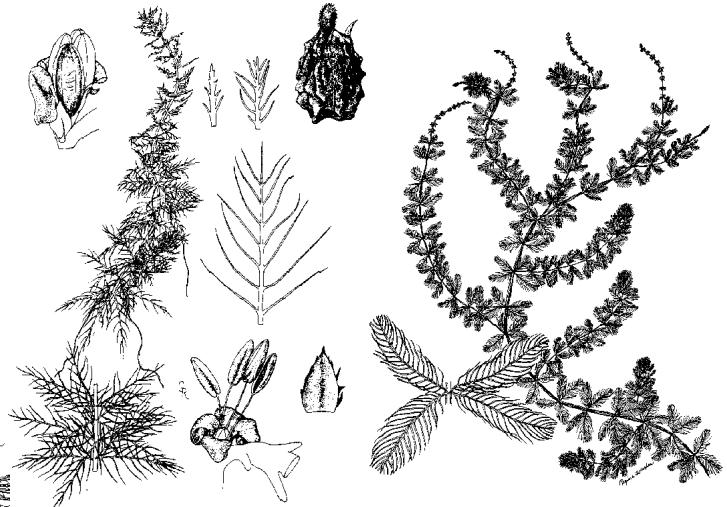
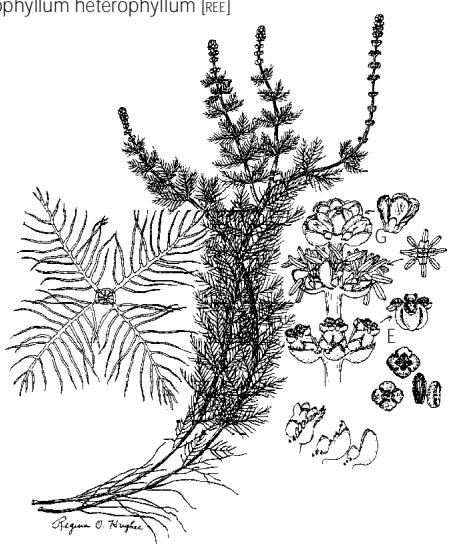
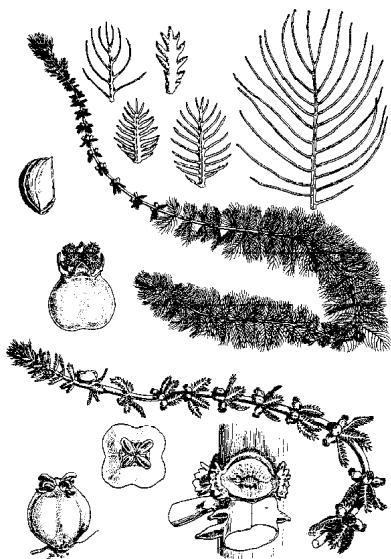
Myriophyllum aquaticum (Vell.) Verdc., (growing in or near water), PARROT'S-FEATHER, WATER-FEATHER. Creeping and freely branching, forming masses around ponds or along stream banks; leaves all whorled, with 20 or more linear-filiform divisions; upper leaves often yellow, suggesting flowers from a distance; flowers axillary, unisexual, apparently seldom produced; the species is dioecious (= sexes on different plants); only pistillate flowers are known from North America and no seed set is known to occur (Aiken 1981). Common aquarium plant, cultivated and escaped, ponds, lakes, streams; Grayson Co., also Denton (G. Dick, pers. comm.) and Tarrant (C. Owens, pers. comm.) cos; se and e TX w to Rolling Plains and Edwards Plateau. Mar-May. Native of Brazil. [M. brasiliense Camb., M. proserpinacoides Gillies ex Hook. & Arn. ↗

Myriophyllum heterophyllum Michx., (variously leaved). Submersed leaves 2–5(–6) cm long, usually in whorls of 5–6; surface of fruits papillose. Fort Hood (Bell or Coryell cos.—Sanchez 1997), also Palo Pinto and Wise cos. (Mahler 1988); mainly Rolling Plains, Edwards Plateau and se TX. Apr-Aug.

Myriophyllum pinnatum (Walter) Britton, Sterns, & Poggenb., (feather-like, having leaflets arranged on each side of a common stalk), GREEN PARROT'S-FEATHER. Plant variable, either submersed or predominantly terrestrial; submersed leaves to ca. 3 cm long, usually in pseudowhorls of 3–4(–5) and often some alternate or subopposite; surface of fruits tuberculate. Ponds, lakes, streams; found at Dallas by Reverchon, not seen there recently (Mahler 1988); mainly se and e TX, also Edwards Plateau. Mar-Aug. Note that the illustration we use for *M. pinnatum* is the same as figure 570 from Correll and Correll (1972); however, the figure captions for *M. pinnatum* and *M. heterophyllum* were inadvertently switched in Correll and Correll (1972).

Myriophyllum sibiricum Kom., (of Siberia). Plant rarely branching near the water surface; developing oblanceolate turions (= swollen scaly structures that store carbohydrates and act as a means of propagation); scales (= modified leaves) of turions shorter, thicker, and darker green than regular leaves; stamens 8. Included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); supposedly widespread in TX; we have seen no material for nc TX and Aiken (1981) indicated that TX records of this species (as *M. exalbescens*) were probably based on misidentifications; J. Kartesz (pers. comm. 1997) also indicated that it is not in TX. [M. exalbescens Fernald, M. spicatum L. var. exalbescens (Fernald) Jeps.] Despite the epithet, this species is native to North America as well as the Old World (McClintock 1993).

Myriophyllum spicatum L., (spicate, with spikes), EURASIAN WATER-MILFOIL. Often branching prolifically near the water surface; not developing turions; stamens 8. Lakes, ponds; Grayson

*Ribes aureum* var. *villosum* [GLE]*Myriophyllum aquaticum* [MAS]*Myriophyllum heterophyllum* [REE]*Myriophyllum pinnatum* [Gwo]*Myriophyllum spicatum* [REE]*Myriophyllum sibiricum* [REE]*Myriophyllum verticillatum* [MAS]

(Lake Ray Roberts) and Lamar (Pat Mayse Lake) cos; distribution in other parts of TX not known; probably fragments spread by powerboats. Native of Eurasia. Flowering material from nc TX not seen. This species can be a problematic invader of aquatic habitats in some areas (Jarman 1968); Reed (1977) discussed its spread in North America. In Texas, EURASIAN WATER-MILFOIL is considered a "harmful or potentially harmful exotic plant" and it is illegal to release, import, sell, purchase, propagate, or possess this species in the state (Harvey 1998). Jones et al. (1997) treated TX material of this species as *M. spicatum* var. *exalbescens* which is apparently a synonym of *M. sibiricum* (Kartesz 1994). ↗

Myriophyllum verticillatum L., (whorled). Developing turions; submersed leaves to 30(-45) mm long, the divisions to 28 mm long. Lakes; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); we have seen no material for nc TX; ne TX. Apr-Jun.

PROSERPINACA MERMAID-WEED

☛ A genus of 2-3 species of e North America to the West Indies; unusual for a dicot in having 3-merous flowers. (Possibly from Latin: *prowspew*, to creep, referring to the creeping stems of most species)

Proserpinaca palustris L. var. **amblyogona** Fernald, (sp.: of marshes; var: with rounded angles), MARSH MERMAID-WEED. Stems to 1 m or more long, the lower stems usually creeping and rooting at the nodes, the upper stems ascending or suberect; leaves alternate; submerged leaves finely pinnatifid with a total of 8-14 divisions, grading into merely sharply toothed upper ones; upper leaves to 7 cm long and 10 mm wide; flowers usually solitary or in clusters of 2-5 in axils of upper serrate leaves, perfect, the parts in threes; petals absent; fruits small (ca. 2-4 mm long), 3-angled. Shallow water, shorelines, other wet areas; Henderson Co.; se and e TX w to extreme e margin of nc TX. Late May-Jul.

Proserpinaca pectinata Lam., (comb-like), which occurs in e TX to the e of nc TX, has the upper leaves deeply pinnately divided into narrow segments like the lower leaves.

HAMAMELIDACEAE WITCH-HAZEL FAMILY

☛ A small family of ca. 100 species in ca. 31 genera (Meyer 1997); mainly temperate and subtropical, especially e Asian trees and shrubs including *Hamamelis*, the source of medicinal witch-hazel. Many of the genera (12-14) are monotypic and the family may thus represent relicts of an ancient group. The subfamily Altingioideae, which includes *Liquidambar*, is sometimes recognized as a discrete family, the Altingiaceae. Species are variously used for timber, as a source of medicinal extracts or scents, or cultivated as ornamentals. Family name from *Hamamelis*, WITCH-HAZEL, a genus of 5-6 species of e North America and e Asia. (Greek name for an unidentified pear-shaped fruit) (subclass Hamamelidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is a tree with alternate, simple, deeply palmately 5-7 lobed (*star-like* in shape), toothed, fragrant leaves with stipules or at least stipule scars; fruits woody 2-valved capsules (in ours grouped together in stalked *ball-like* clusters).

REFERENCES: Ernst 1963b; Goldblatt & Endress 1977; Endress 1989, 1993; Meyer 1997.

LIQUIDAMBAR SWEETGUM

☛ A genus of 3-4 species (Meyer 1997) of monoecious, deciduous trees native to se North America, Central America, the e Mediterranean, and e Asia; the species are valuable for timber, for the aromatic balsam (storax) used medicinally and in scents, and as cultivated ornamentals with spectacular fall colors. The Asian *L. orientalis* Mill. is the source of Levant storax, the balm (of Gilead) of the Bible. (According to Fernald (1950a), a mongrel name, from Latin:

liquidus, fluid, and Arabic: *ambar*; amber, in allusion to the fragrant terebinthine juice or gum which exudes from the tree)

REFERENCES: Duncan 1959; Bogle 1986; Hoey & Parks 1994.

Liquidambar styraciflua L., (flowing with storax or gum), SWEETGUM, REDGUM. Monoecious tree to 40 m or more tall, often exuding a gum (chewed by some); small branches often with corky ridges; leaves alternate, simple, deciduous; leaf blades to ca. 18 cm long and 12 cm wide, deeply palmately 5–7 lobed, star-like in shape, fragrant if crushed, quite showy in fall, yellow to orange, crimson, or purplish, the lobes acuminate, usually serrate; petioles to 12 cm long; flowers unisexual, without petals; staminate flowers in bracteate globose masses on racemose inflorescences to 6 cm long; pistillate flowers in peduncled globose heads that develop into woody globose clusters (to 3 cm in diam.) of 2-beaked capsules. Wet areas, low or rich woods; native w in Red River drainage to Lamar Co., widely cultivated further w, escaped in vacant lot in Fort Worth (Tarrant Co.); mainly e TX. Mar–May. SWEETGUM is particularly noted for its colorful fall foliage; it is also the source of a fragrant gum (copalm balm, American copalm, storax) obtained from the inner bark after wounding or gashing; it has a long history of usage including being smoked with tobacco and burned as an incense by the Aztecs; it has also been used for a chewing gum, as an antiseptic, and medicinally in the treatment of skin diseases and dysentery; it was much used by Confederate doctors (Standley 1922a; Peattie 1948; Mabberley 1987). SWEETGUM is a leading commercial hardwood species in e TX (Cox & Leslie 1991). Populations of this species (sometimes treated as a different variety or species) occur in the mountains of Mexico and Central America; their occurrence is presumably a relict of a once more widespread distribution. It is odd to observe such a familiar tree in the floristically very different montane forests of Central America.

HIPPOCASTANACEAE BUCKEYE FAMILY

— A very small (15 species in 2 genera) family of mainly n temperate trees and shrubs with some to n South America and se Asia; the family is best known for the ornamental, *Aesculus hippocastanum* L. (HORSE-CHESTNUT). The evergreen genus *Billia* has 2 species native from s Mexico to tropical South America. The Hippocastanaceae is closely related to the Sapindaceae and appears to represent a clade within that family. From a cladistic standpoint they should be lumped to form a more inclusive monophyletic Sapindaceae (Judd et al. 1994). Family name conserved from *Hippocastanum*, a genus now treated as *Aesculus* (the name *Aesculus* was published earlier and thus has priority in terms of nomenclature). (Greek: *hippos*, horse, and *kastana*, chestnut; also the Latin name for horse-chestnut) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: shrubs or small trees with opposite, *palmately compound* leaves; flowers bilaterally symmetrical, in *showy panicles*; seeds large, in a leathery capsule.

REFERENCES: Hardin 1957a, 1957b; Brizicky 1963b; Judd et al. 1994.

AESCALUS BUCKEYE, HORSE-CHESTNUT

Ours shrubs or small trees; leaves palmately compound, deciduous; leaflets toothed; inflorescence a large, showy, terminal panicle with perfect and unisexual, bilaterally symmetrical flowers; sepals 5; petals 4–5, with a claw and blade; stamens usually 7; ovary superior; fruit a 3-celled, (1–)2–3-seeded leathery capsule; seeds large.

— A genus of 13 species of North America, India, e Asia, and se Europe; some are cultivated as ornamentals, while others are used as fish poisons. — The raw seeds of *Aesculus* species are poisonous to humans, domestic animals, and livestock; the early leaves are also apparently poisonous; a strychnine-like effect is produced with the toxic principle apparently a glycoside, aesculin; in severe cases coma and death from respiratory paralysis can result; BUCKEYE honey

may also cause poisoning (Kingsbury 1964; Burlage 1968; Schmutz & Hamilton 1979; Cheatham & Johnston 1995; Turner & Szczawinski 1991). The toxic seeds and roots were used by Native Americans to stupefy fish (Tyrl et al. 1994). *Aesculus hippocastanum*L. (HORSE-CHESTNUT), native from the Balkans to the Himalayas, is a widely used ornamental tree. Hybridization and introgression are known to occur in *Aesculus* in the e U.S. (e.g., DePamphilis & Wyatt 1989). (Ancient Latin name of some OAK or mast-bearing tree)

REFERENCES: Hardin 1957c, 1957d; Wyatt & Lodwick 1981; McGregor 1984a; DePamphilis & Wyatt 1989.

1. Leaflets 7–11; flowers creamy yellow to greenish yellow; calyces about 6 mm long; petals subequal:

stamens exerted to almost twice the corolla length; fruits spiny or rarely smooth _____ ***A. arguta***

1. Leaflets 5(–7); flowers red; calyces usually 8–16 mm long; petals unequal, the upper pair longer and narrower with minute spatulate blade and the claw often equaling the lateral petals in length, the lateral petals with a wide and nearly rounded blade; stamens included or only slightly exerted beyond the uppermost petals; fruits smooth _____ ***A. pavia***

Aesculus arguta Buckley, (sharp-toothed), WHITE BUCKEYE, TEXAS BUCKEYE, WESTERN BUCKEYE. Shrub or shrubby small tree to ca. 7(–12) m tall; leaflets to 12 cm long and 4 cm wide; corollas to 15 mm long. Limestone slopes and sandy open woods; Bell, Comanche, Cooke, Grayson, McLennan, and Tarrant cos., also Hamilton Co. (HPC); e TX w to Rolling Plains and Edwards Plateau. Apr. [*A. glabra* Willd. var. *arguta* (Buckley) B.L. Rob.] Poisonous. ☣

Aesculus pavia L. var. ***pavia***, (for Peter Paaw, 1564–1617, Dutch botanist), RED BUCKEYE, SCARLET BUCKEYE, FIRECRACKER-PLANT. Large shrub or small tree to 10 m tall; leaflets to 17 cm long and 7 cm wide; calyces rarely < 8 mm long; corollas to 30 mm long. Forests, thickets, along streams; Callahan, Dallas (apparently cultivated), Hopkins, and Williamson cos. (Wyatt & Lodwick 1981); mainly se and e TX, rarely further w. Mar–May. Pollinated by ruby-throated hummingbirds (*Archilochus colubris*) (James 1948; Wyatt & Lodwick 1981). Poisonous. ☣ ☒/77

*Aesculus pavia*L. var. *flavescens*(Sarg.) Correll, (yellowish), PALE BUCKEYE, TEXAS YELLOW BUCKEYE, PLATEAU YELLOW BUCKEYE), a yellow-flowered variety, is endemic to the Edwards Plateau. According to Wyatt and Lodwick (1981), there is limited introgression between the varieties along the Balcones Escarpment; however, a number of morphological characters separate the two and Wyatt and Lodwick (1981) concluded that they are distinctive taxa appropriately recognized as varieties. Poisonous. ☣ ☒

HYDRANGEACEAE HYDRANGEA FAMILY

The Hydrangeaceae is a small (190 species in 17 genera), mainly n temperate family extending to Malesia. Species range from trees to shrubs, lianas, or herbs including the ornamentally important *Hydrangea* and *Philadelphus*. The family has often been included in the Saxifragaceae. *Philadelphus* and related genera are sometimes segregated as Philadelphaceae (Quibell 1993). Recent molecular analyses (Xiang et al. 1993, 1998) suggest that *Cornus*, Nyssaceae, Hydrangaceae, and Loasaceae, as well as several other groups, form a “cornaceous clade.” ☣ Some members of the family (e.g., *Hydrangea* species) contain the cyanogenic glycoside, hydrangin (Spoerke & Smolinske 1990). Family name from *Hydrangea*, a genus of 23 species of shrubs native from the Himalaya to Japan, the Philippines, and America. (Greek: *hydor*, water, and *aggos*, jar, or *aggeion*, vessel, in reference to the cup-shaped fruits) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is a shrub with opposite, simple, unlobed, exstipulate leaves, flowers with 4 showy white petals and numerous stamens fruit a capsule.

REFERENCES: Small & Rydberg 1905b; Spongberg 1972.

PHILADELPHUS MOCK ORANGE

• A n temperate genus of 65 species of shrubs with white, usually strongly scented flowers. A number of *Philadelphus* species and their hybrids are cultivated as ornamentals. (Named either for Ptolomy Philadelphus, 283–247 B.C., King of Egypt, or from Greek name meaning brotherly love from *phileo*, love, and *adelphus*, brother)

REFERENCE: Hu 1954–1956.

Philadelphus pubescens Loisel, (pubescent, downy). Shrub to ca. 3 m tall; leaves simple, opposite, deciduous, the blades ovate to ovate-elliptic, 5–8 cm long, 2.5–5 cm wide, apically acuminate, dentate to nearly entire; inflorescences racemose, of 5–7 flowers; flowers ca. 2.5 cm wide, showy; petals 4, white; stamens numerous; ovary partly inferior; fruit a capsule. Wooded river bluffs; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); also Red River Co. (Correll & Johnston 1970); in TX apparently limited to ne part of the state. Apr-Jun.

HYDROPHYLACEAE WATERLEAF FAMILY

Low annuals, biennials, or perennials; leaves alternate, simple or pinnately compound, entire, toothed, or lobed; flowers radially symmetrical, perfect, axillary or terminal, solitary or in spike-like, uncurling, one-sided cymes; sepals 5, linear or oblong-lanceolate, barely united at base; corollas rotate, funnelform, or almost salverform, 5-lobed or -angled, with or without out-growths variously called appendages, scales, or glands near the attachment of the filaments; stamens 5, attached to base of corolla tube, the filament bases rarely expanded on both sides into wings or appendages; pistil 2-carpellate; ovary superior; styles or stigmas 2; capsules usually many-seeded.

• A small (270 species in 18 genera), subcosmopolitan (especially dry w North America) family of herbs and small shrubs including a number of ornamentals. Many either have glandular hairs and are odorous or are rough hairy. Family name from *Hydrophyllum*, WATERLEAF, a North American genus of 8 species. (Greek: *hydor*, water, and *phyllon*, leaf, in reference to the high water content of the young leaves) (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: usually bristly herbs typically with *scorpioid cymes* (= uncurling, 1-sided inflorescences); corollas sympetalous; leaves alternate, frequently toothed, lobed, or compound; fruit a many-seeded capsule (the similar Boraginaceae has a fruit of 4 or fewer nutlets).

REFERENCES: Constance 1939; Wilson 1960b.

1. Plant growing at edge of ponds or streams or in other aquatic habitats; stems with conspicuous spines painful to the touch _____ **Hydrolea**
1. Plant of terrestrial habitats; stems not spiny.
 2. Leaves toothed, lobed, or compound; placentation parietal.
 3. Flowers mostly solitary and axillary or sometimes a few in a terminal cyme; pedicels often much longer than the calyces; upper leaves distinctly petioled.
 4. Corollas 8–12 mm long, ca. 1.5–2 times as long as the calyces; calyx lobes alternating with auriculate appendages 1–2 mm long; seeds with an eliosome (= appendage) _____ **Nemophila**
 4. Corollas 4 mm or less long, shorter than or equal to the calyces; calyx lobes not alternating with auriculate appendages; seeds without an eliosome _____ **Ellisia**
 3. Flowers many, in terminal, 1-sided, uncoiling (= scorpioid) cymes; pedicels shorter to longer than the calyces; upper leaves sessile (petioled in 1 species) _____ **Phacelia**
 2. Leaves entire, simple; placentation appearing axile _____ **Nama**

ELLISIA AUNT LUCY

— A monotypic North American genus. (Named for John Ellis, 1711–1776, Irish-born merchant, naturalist, and correspondent of Linnaeus)

REFERENCE: Constance 1940.

Ellisia nyctelea (L.) L., (nocturnal), AUNT LUCY, WATERPOD. Annual 5–40 cm tall, ± hispid-pilose; leaf blades 3–8 cm long, 1–2(–3) cm wide, deeply pinnatifid, the divisions mostly coarsely toothed; flowers solitary, axillary; pedicels 4–15(–28) mm long; calyces 3–4 mm long at anthesis, becoming accrescent; corollas white to bluish- or lavender-tinged, rather small and inconspicuous, with minute corolla appendages alternating with filament bases; stamens included; capsules globose, 5–6 mm in diam. Stream bottom thickets; in TX known only from Denton Co. Apr. Reportedly introduced to Texas (Correll & Johnston 1970) from n U.S.

HYDROLEA

— A mainly tropical genus of 11 species of semi-aquatics (Davenport 1988). (Derivation of generic name uncertain, presumably from Greek: *hydor*, water, in reference to aquatic habitat)

REFERENCE: Davenport 1988.

Hydrolea ovata Nutt. ex Choisy, (ovate, egg-shaped), HAIRY HYDROLEA. Erect, spiny, rhizomatous, pubescent perennial to 1 m tall; spines 1–2 per node, 5–12 mm long; leaves entire, oblong to ovate, 1.5–7 cm long, 10–25 mm wide; calyces shorter than corollas; corollas rotate-campanulate, blue (rarely white), showy, 11–17 mm long, the lobes 5–9 mm wide; corolla appendages absent; capsules globose, 4.5–5.5 mm long. In water or wet areas; Cooke, Fannin, Grayson, and Lamar cos. in Red River drainage, also Henderson, Hunt, Limestone, and Milam cos. on e edge of nc TX, also Dallas (Davenport 1988) and Kaufman (R. O'Kennon, pers. obs.) cos.; se and e TX w to nc TX. Sep-Oct. [Nama ovata (Nutt. ex Choisy) Britton] ■/93

NAMA

Ours small, pubescent or hispid annuals; leaves simple, entire; flowers solitary, axillary or few together in small terminal cymes; corolla appendages absent; stamens included, filament bases without or rarely with minute appendages; placentation appearing axile but actually extruded parietal (J. Bacon, pers. comm.).

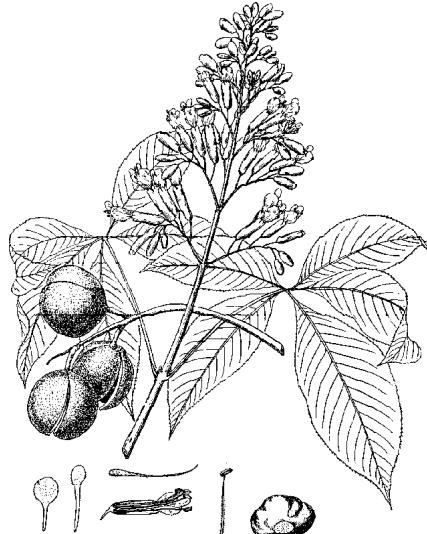
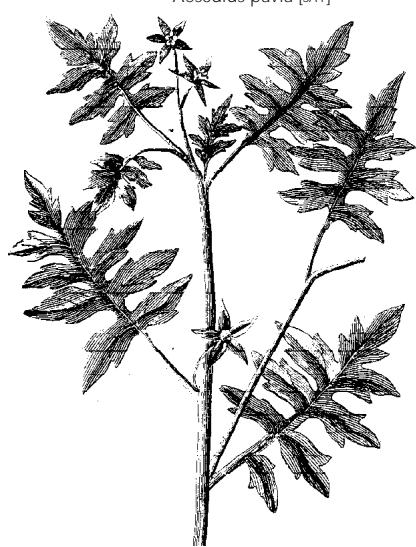
— A genus of 45 species of sw U.S. and tropical America with 1 species in Hawaii. (Greek: *nama*, a stream or spring, referring to habitat of the first described species)

REFERENCES: Hitchcock 1933a, 1933b; Bacon 1974, 1984.

1. Leaves linear or linear-oblong to oblanceolate, 1–8 mm wide, not decurrent; plant erect or spreading; corollas pink to purple, 8–15 mm long. **N. hispidum**
1. Leaves oblanceolate or obovate, 5–35 mm wide, conspicuously decurrent at base forming wings on stem; plant largely prostrate; corollas white, 6–7 mm long. **N. jamaicense**

Nama hispidum A. Gray, (hispida, bristly), SANDBELL, ROUGH NAMA. Plant hispid pubescent; stems 10–50 cm tall; corollas funnelform-campanulate. Sandy open woods or open ground; in nc TX from Bell and Dallas cos. to the w; widespread in TX. Late Apr-Jun.

Nama jamaicense L., (of Jamaica), FIDDLELEAF, FIDDLELEAF NAMA. Plant with pubescence softer than in *H. hispidum*; stems 10–50 cm long; corollas nearly tubular. Sandy or silty ground, roadsides or disturbed places; Bell and Williamson cos., also Johnson Co. (Mahler 1988); se and e TX w to s part of nc TX and Edwards Plateau. Apr-May, earlier farther s.

*Proserpinaca palustris* var. *amblyogona* [GLE]*Liquidambar styraciflua* [GLE]*Aesculus arguta* [SA1]*Aesculus pavia* [SA1]*Philadelphus pubescens* [Lou]*Ellisia nyctelea* [LAM]*Hydrolea ovata* [co1, BT3]

NEMOPHILA BABY BLUE-EYES

☛ A genus of 11 species of w and se North America including cultivated ornamental annuals. (Greek: *nemos* glade, and *phileo*, to love)

REFERENCE: Constance 1941.

Nemophila phacelioides Nutt., (resembling *Phacelia*, another genus of Hydrophyllaceae), BABY BLUE-EYES, LARGE-FLOWER NEMOPHILA, FLANNEL-BREECHES. Annual 20–60 cm tall, hispid-pilose, at least on younger parts; leaf blades 6–8 cm long, 2–5 cm wide, deeply pinnatifid or compound, usually with 9–11 mostly entire divisions; flowers solitary, axillary or few in small terminal cymes; pedicels very long, usually 15–60 mm or more; corollas rotate, blue-lavender with pale center, rather large and showy, 8–12 mm long, with broad fimbriate corolla appendages alternating with filament bases; stamens included; capsules globose, 5–9 mm in diam., equaled or exceeded by the accrescent calyx. Stream bottom woods, sandy or silty ground; Bell, Dallas, Grayson, McLennan, and Williamson cos., also Ellis, Lampasas (Constance 1941), Hamilton (HPC), and Johnson (R. O'Kennon, pers. obs.) cos.; se and e TX w to nc TX, also Edwards Plateau. Apr-May. ☒/100

PHACELIA

Glabrous to hispid-pilose annuals or biennials, ours without stinging hairs; leaves toothed to once or twice pinnately compound; corollas rotate to campanulate, pale to deep lavender or violet-blue, often white centered, rarely white, with scale-like corolla appendages or glands alternating with filament bases; stamens included to exerted.

☛ A genus of 150 species mostly of w North America, but also e U.S. and South America. Typically bee-pollinated with anthers that turn inside out at maturity; many are cultivated as ornamentals. ☚ The bristly stinging hairs of some species to the w of TX (e.g., nine Arizona species) can cause dermatitis in sensitive individuals; the substances causing the reaction are low molecular weight compounds (haptens) that upon penetrating the skin, combine with skin proteins and form antigens (Fuller & McClintock 1986; Lampe 1986; Wilken et al. 1993). According to Lampe (1986), only four families (Euphorbiaceae, Hydrophyllaceae, Loasaceae, and Urticaceae) have stinging hairs—nc TX has stinging representatives of all of these except the Hydrophyllaceae. The scale-like corolla appendages alternating with the filament bases apparently act as little flaps which shield some nectar from easy access; in the process of obtaining this hard-to-reach nectar, bees jar the anthers which shower them with pollen by explosively turning inside-out (Wills & Irwin 1961). (Greek: *phacelos* a fascicle, alluding to the flowers clustered in raceme-like scorpioid cymes)

REFERENCES: Voss 1937; Constance 1949, 1950; Atwood 1975; Wilken 1986b; Wilken et al. 1993; Moyer & Turner 1994.

1. Upper leaves petioled; leaves compound with toothed leaflets _____ **P. congesta**
1. Upper leaves sessile; leaves simple or the lower compound.
 2. Plants viscid-glandular (= sticky due to gland-tipped hairs); main stem stout, at base usually > 3 mm thick; stamens exserted; filaments each with a pair of scaly basal appendages, but glands absent between filament bases; seeds 4 per capsule _____ **P. integrifolia**
 2. Plants not viscid-glandular; main stem delicate, at base usually 3 mm or less thick; stamens included; filament bases alternating with glands bordered by minute flaps; seeds 4–20 per capsule.
 3. Pedicels and stems pubescent.
 4. Lowest stem leaves sessile or short-petioled, the petioles broadly winged; basal leaves usually shallowly toothed or shallowly lobed; fruiting pedicels erect, often shorter than calyces _____ **P. strictiflora**

4. Lowest stem leaves often long-petioled, the petioles narrowly margined; basal leaves deeply pinnately lobed or pinnate, usually appearing compound or nearly so; fruiting pedicels spreading-ascending to reflexed, often longer than calyces.
5. Stem leaves toothed or shallowly lobed (usually not more than 1/2 way to midvein); ovules 6–12 per placenta; seeds usually 10–15 per capsule _____ **P. patuliflora**
5. Stem leaves deeply lobed to pinnatifid (often more than 1/2 to midvein); ovules typically 4 per placenta; seeds 6–8 per capsule _____ **P. hirsuta**
3. Pedicels and stems glabrous _____ **P. glabra**

Phacelia congesta Hook., (arranged very closely together), BLUE-CURLS, SPIKE PHACELIA. Variously pubescent annual or biennial, usually somewhat viscid-glandular; corollas 4–7 mm long; stamens exserted, the filaments with a pair of scaly basal appendages; capsules with 4 seeds. Gravelly or sandy soils; Cooke, Montague, Somervell, and Tarrant cos., also Dallas Co. (Mahler 1988); nc TX s and w to w TX. Apr-Jun, sporadically later.

Phacelia glabra Nutt., (smooth, hairless), SMOOTH PHACELIA. Annual 5–40 cm tall; leaves deeply lobed or pinnatifid; stamens included, the filament bases alternating with glands bordered by minute flaps; seeds 4–8 per capsule. Prairies, forest margins, sandy loam; Kaufman and Hopkins cos.; e TX w to ne part of nc TX. Apr.

Phacelia hirsuta Nutt., (hairy), HAIRY PHACELIA. Densely pubescent annual 10–50 cm tall; corollas 5–8 mm long; stamens included, the filament bases alternating with glands bordered by minute flaps; capsules with 6–8 seeds. Sandy areas, forest margins and openings; Collin (railroad fill), Hunt, Lamar, and Limestone cos.; se and e TX w to nc TX and Edwards Plateau. Apr.

Phacelia integrifolia Torr., (entire-leaved), GYP PHACELIA, CRENATE-LEAF PHACELIA. Viscid annual or biennial; leaves 2–7 cm long, crenate to shallowly pinnatifid, the caudine ones usually sessile; corollas 4–7 mm long; stamens exserted, the filaments with a pair of scaly basal appendages; capsules with 4 seeds. Sandy or rocky areas especially on gypsum or limestone; included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990); mainly w and nw TX. Mar-May. Reported to cause skin inflammation (Burlage 1968), but apparently not due to stinging hairs. ☠

Phacelia patuliflora (Engelm. & A. Gray) A. Gray, (spreading flower). Densely to finely pubescent annual 8–60 cm tall; stamens included, the filament bases alternating with glands bordered by minute flaps; capsules usually with 10–15 seeds. Sandy areas, woods, and terraces. Moyer and Turner (1994) recognized the following 2 varieties as well as a variety (var. *austrotexana*) from s TX.

1. Peduncles with small, well-defined glandular hairs ca. 0.1 mm long in addition to non-glandular hairs; branches decumbent; fruiting pedicels spreading to reflexed; calyx lobes obtuse _____ var. **patuliflora**
1. Peduncles without glandular hairs; branches ascending; fruiting pedicels spreading-ascending in age; calyx lobes acute _____ var. **teucriifolia**

var. **patuliflora**, SAND PHACELIA. Burnet Co., also Falls Co. (Constance 1949); s part of nc TX s to s TX. Apr-May.

var. **teucriifolia** (I.M. Johnst.) Constance, (with leaves like *Teucrium* —germander). Rich open woods; found by A. Ruth in Tarrant Co., also Coleman Co. (Constance 1949); otherwise s TX, particularly w and n Edwards Plateau. Apr-May.

Phacelia strictiflora (Engelm. & A. Gray) A. Gray, (erect- or upright-flowered). Densely pubescent annual 5–30 cm tall, with a basal rosette; leaves linear-oblong to orbicular, with 1–6 pair of teeth or lobes; stem leaves sessile; corollas 7–10 mm long; stamens included, the filament bases alternating with glands bordered by minute flaps; capsules with 10–20 seeds. Sandy or gravelly areas. Mar-May. The four varieties discussed below are sympatric and intergrade (Constance

1949; Wilken 1986b). Constance (1949) suggested the variability within this species may be due to introgressive hybridization with *P. hirsuta*.

1. Stems with widely spreading or spreading-ascending hairs _____ var. **strictiflora**
1. Stems with appressed or closely ascending or incurved hairs.
 2. Stem leaves deeply pinnatifid; lower leaves pubescent on both sides; basal rosette usually withering early.
 3. Stems relatively thicker, 1–3 mm thick on well-developed plants; leaves linear-oblong, crowded during flowering (overlapping 1/4–1/2); leaf lobes acute: widespread in nc TX _____ var. **connexa**
 3. Stems slender, mostly 0.2–1 mm thick; leaves oblong-ovate, not very crowded; leaf lobes usually obtuse; in nc TX known only from Grayson Co. _____ var. **robbinsii**
2. Stem leaves toothed or shallowly pinnatifid; lower leaves glabrous or nearly so on lower surfaces; basal rosette usually present _____ var. **lundelliana**

var. **connexa** Constance, (connected, closely related). Dallas, Grayson, Limestone, Tarrant, and Wise cos.; se and e TX w to West Cross Timbers.

var. **lundelliana** Constance, (for Cyrus Longworth Lundell, 1907–1994, botanist and founder of the Texas Research Foundation, Renner, the institution that published the *Flora of Texas* and the *Manual of the Vascular Plants of Texas*). Clay, Hood, Montague, Parker, and Somervell cos., also Navarro Co. (Constance 1949); Blackland Prairie w to Rolling Plains, also Edwards Plateau.

var. **robbinsii** Constance, (named for the G.T. Robbins, collector of the type specimen). Grayson Co. (Constance 1949) and OK.

var. **strictiflora**. Collin and Dallas cos., also Milam Co. (Constance 1949); se and e TX w to nc TX; endemic to TX. 

JUGLANDACEAE WALNUT FAMILY

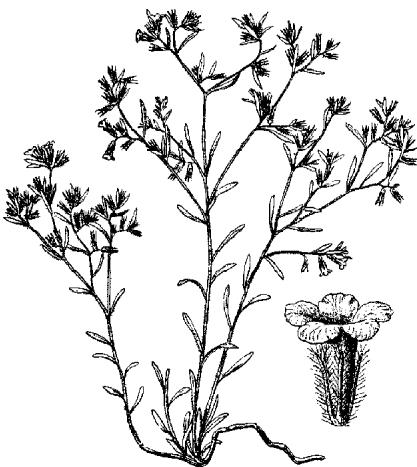
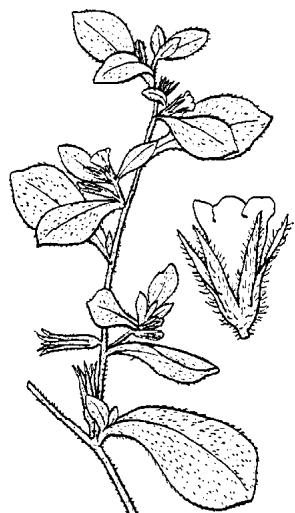
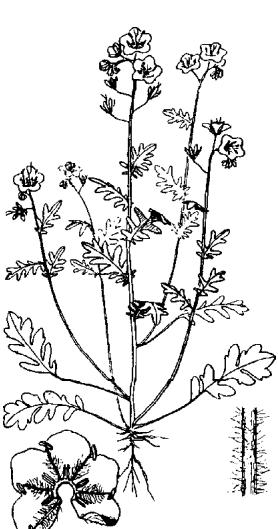
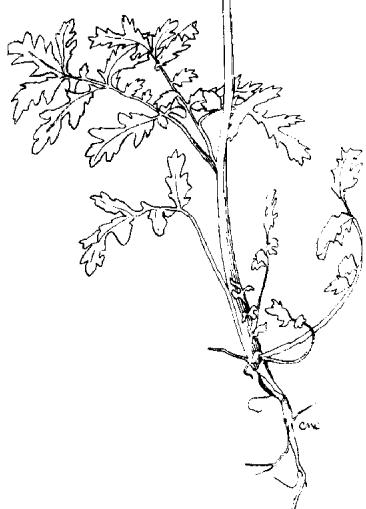
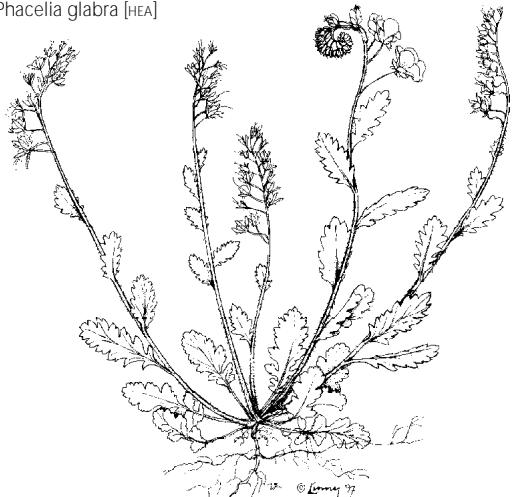
Trees with alternate, pinnately compound leaves; leaflets often asymmetrical, often gland-dotted beneath and aromatic; stipules absent; flowers appearing with the leaves, unisexual, the sexes on the same plant (monoecious); staminate flowers in drooping catkins, with 3–many stamens; pistillate flowers solitary or in short spikes, with separate pistils; ovaries inferior; fruits usually hard, nut-like, covered by a fibrous-fleshy to firm, dry husk (bract and bractlets of involucre); seed 1 per fruit, 2–4 lobed. The species exhibit mast fruiting, a type of cyclical fruiting with years of heavy fruit production occurring irregularly. This is possibly an adaptation to reduce seed predation by making the seeds an unpredictable resource. The seeds are nevertheless an important wildlife food.

 A small (59 species in 8 genera) mainly temperate and warm n hemisphere family extending to South America and Malesia. Juglandaceae are wind-pollinated, resinous and aromatic, deciduous trees valued for their fine timber, as ornamentals, and for their nuts. Species producing edible nuts include PECANS, BLACK WALNUTS, and ENGLISH OR PERSIAN WALNUTS (*Juglans regia* L.). (subclass Hamamelidae)

FAMILY RECOGNITION IN THE FIELD: trees with *alternate, pinnately compound* leaves, often aromatic; branches stout, round, with conspicuous leaf-scars and several buds per node; male flowers in *catkins*; fruits nut-like.

REFERENCES: Elias 1972; Stone 1993, 1997a.

1. Leaflets 2–8 pairs per leaf, with a single terminal leaflet; terminal 3 leaflets equal to or larger than the lateral leaflets; pith of branchlets continuous, not chambered; husk around nut at least partly splitting into sections; surface of nut smooth or reticulate, not furrowed; staminate catkins clus-

*Nama hispidum* [PHY]*Nama jamaicense* [BR2]*Nemophila phacelioides* [CUR]*Phacelia glabra* [HEA]*Phacelia hirsuta* [AAA]*Phacelia congesta* [GBN]*Phacelia patuliflora* var. *patuliflora* [HEA]

tered, mostly attached to short, new-growth peduncles; staminate flowers lacking true perianth but with 1–3 perianth like bractlets at one side; stamens 3–8 _____ **Carya**

1. Leaflets 5–11 pairs per leaf, with or without a single terminal leaflet; terminal 2–3 leaflets usually smaller than the middle lateral leaflets; pith of branchlets chambered (= separating into thin plates); husk around nut not splitting into sections; surface of nut with irregular furrows; staminate catkins solitary, attached directly to twigs of the previous year; staminate perianth 4- or 5-parted; stamens 8–40 _____ **Juglans**

CARYA HICKORY, PECAN

Husk of nut splitting vertically into sections, firm, dry, usually 4-valved.

— A genus of 14 species of e North America (s into Mexico), with a few in e Asia.

This disjunct e Asia-e North America distribution pattern is an interesting one to plant geographers. In the geologic past, dispersal between the Eurasian and North American continents was possible, and the combined area is considered a single “Holarctic” biogeographic region. The fossil record shows that many plants had distributions across the Northern Hemisphere—temperate forests, for example, occurred very broadly and reached their maximum extension in the mid-Tertiary (the Tertiary extended from 65 million years ago to 5 mya). This widespread flora has been referred to as the Arcto-Tertiary flora or the Tertiaro-mesophytic flora. Geohistorical events from the mid-Tertiary to the present have included alterations in the shapes of the northern land masses, fluctuations in sea levels, mountain building, and profound changes in the climate. As a result, there have been great changes in both the composition and the disposition of the flora and the ranges of many plant have been greatly restricted (e.g., eliminated from Europe and w North America). A significant number now survive in only two areas, e North America and e Asia. The genus *Carya* is such an example with other nc TX examples including *Campsis*, *Menispermum*, *Penthorum*, *Phryma*, *Sassafras*, *Saururus*, *Triadenium*, *Triosteum*, and *Veronicastrum* (Li 1952b; Little 1970; Graham 1972; Boufford & Spongberg 1983; Hamilton 1983; Hsü 1983; Wu 1983; Ying 1983; Cox & Moore 1993; Graham 1993a).

Carya species are important for timber and nuts (pecans, hickory nuts); the nuts were widely used as food by Native Americans (Heiser 1993). The wood of HICKORIES is hard, heavy, and very tough; it is excellent for tool handles because of the combined strength and shock resistance (Stone 1997b). (Greek: *carya* or *k_{ary}on*, nut, kernel; ancient name of the WALNUT)

REFERENCES: Grauke et al. 1986; Brummitt 1988; Manaster 1994; Stone 1997b.

1. Bud scales valvate (edges touching but not overlapping) in pairs, usually 4–6; seams of the fruit husk with prominent narrow wings or keels; fruit husk thin, ca. 1 mm or less thick; leaflets usually without tufts of hairs beneath (except these often present in *C. cordiformis*). _____

2. Leaflets (7–)9–17; lateral leaflets falcate (= sickle-shaped), the base usually asymmetrical, sometimes conspicuously so; terminal leaflet lanceolate to oblong-lanceolate to ovate-lanceolate, usually broadest at middle or below, with stalk 8–25 mm long to nearly sessile; buds usually brown or reddish brown (rarely yellowish brown). _____

3. Teeth of leaflets usually prominent; bark ridged or with appressed scales or exfoliating with small plate-like scales; fruits (nut with husk) oblong-cylindric, usually not flattened laterally, ca. 25–80 mm long; lateral petiolules 0–7 mm long; midribs adaxially mostly glabrous, rarely hirsute near base; nut longer than wide, smooth; fascicles of staminate catkins sessile or nearly so; widespread in nc TX _____ **C. illinoiensis**

3. Teeth of leaflets usually inconspicuous; bark exfoliating in long strips or plate-like scales; fruits subglobose to obovoid, somewhat compressed or flattened laterally, to 40 mm long; lateral petiolules 0–2 mm long; midribs adaxially villous near base; nut as wide as long, furrowed or wrinkled; fascicles of staminate catkins with definite stalks; only on extreme e edge of nc TX _____ **C. aquatica**

2. Leaflets (5–)7–9; lateral leaflets straight to slightly falcate, the base essentially symmetrical or

- slightly asymmetrical; terminal leaflet ovate-lanceolate to obovate, usually broadest beyond the middle, sessile or with stalk to ca. 5 mm long; buds yellow or yellow-orange to brownish.
4. Leaflets with flattened scales beneath (use lens) but usually without pubescence; nut rounded at end (but apiculate); fruits ellipsoid, to ca. 2 cm wide, the fruit husk winged to base, splitting nearly to base _____ **C. myristiciformis**
 4. Leaflets usually with pubescence at least on the main veins beneath in addition to scales; nut often flattened or depressed at end; fruits subglobose, 2–3.2 cm wide, the fruit husk wingless at base, splitting about halfway _____ **C. cordiformis**
 1. Bud scales imbricate (their edges overlapping), not in distinct pairs, usually 6–12; seams of the fruit husk without wings or keels; fruit husk 2–15 mm thick; leaflets often with tufts of hairs beneath (use lens).
 5. Leaflets 5(–7); teeth of older leaflets with persistent tufts of hairs just below tip of each tooth (use lens; leaflets also densely ciliate marginally when young); bark shaggy, exfoliating in large vertical strips _____ **C. ovata**
 5. Leaflets (5–)7–13; teeth of older leaflets without tufts of hairs (but leaflets can be ciliate marginally); bark usually not shaggy, not exfoliating.
 6. Leaflets velvety to the touch beneath; twigs stout, 3 mm or more wide just below terminal bud; terminal bud usually 4 mm or more wide; leaflets (5–)7–9 _____ **C. alba**
 6. Leaflets not velvety to the touch beneath; twigs slender, 2 mm or less wide just below terminal bud; terminal bud usually 4 mm or less wide; leaflets 7–13 _____ **C. texana**

Carya alba (L.) Nutt. ex Elliott, (white), MOCKERNUT HICKORY, WHITE-HEART HICKORY, WHITE HICKORY, HARD-BARK HICKORY. Fruits 30–50 mm long, with husk ca. 3–15 mm thick; shell of nut usually very thick; kernel sweet. Dry to moist woods; Lamar Co., also Delta and Hopkins cos. (Little 1971); e TX w to e edge of nc TX. Apr. [*C. tomentosa* (Lam. ex Poir.) Nutt.] We are following Kartesz (1994), Jones et al. (1997), and J. Kartesz (pers. comm. 1997) in recognizing this taxon nomenclaturally as *C. alba*; Stone (1997b) treated it as *C. tomentosa*

Carya aquatica (F. Michx.) Nutt., (growing in or near water), WATER HICKORY, SWAMP HICKORY, BITTER PECAN, WATER PIGNUT. Leaflets glabrous beneath; buds usually dark red-brown; fruits winged to base, often in clusters of 3–4; nut somewhat flattened laterally; kernel bitter. Stream banks and wet woods; Kaufman and Lamar cos., also Delta, Hopkins, Hunt cos. (Little 1971); se and e TX w to e part of nc TX. Apr.

Carya cordiformis (Wangenh.) K. Koch, (in the form of a heart), BITTER-NUT, BITTER-NUT HICKORY, PIGNUT. Leaflets pubescent beneath; buds yellow or orange-yellow; nut depressed or obcordate at apex, smooth to uneven; kernel bitter. Stream banks and wet woods; Delta, Falls, Hopkins, Hunt, and Lamar cos. (Little 1971) on e margin of nc TX, also disjunct w to Dallas Co. (Reverchon); mainly se and e TX. Apr.

Carya illinoensis (Wangenh.) K. Koch, (of Illinois), PECAN, NOGAL MORADO, NUEZ ENCARCELADA. **State tree of Texas.** Buds usually brown (rarely yellowish brown); fruits 25–80 mm long, 12–25 mm in diam.; nut usually not flattened laterally, ± pointed at both ends; kernel sweet. Stream bottoms or slopes; also cultivated, both as a shade tree and for the nuts; mainly e 1/2 of TX, scattered further w. Apr. [*Carya pecan* (Marshall) Engl. & Graebn., *Hicoria pecan* (Marshall) Britton] PECAN was adopted as the state tree by the Texas State Legislature in 1919 (Jones et al. 1997). The wind borne pollen can be a significant hay fever causing allergen. The first pecan cultivars were selected in 1846; currently there are over 500 named cultivars including thin-shelled pecans; in addition to being edible, the nuts provide an oil used in cosmetics (Mabberley 1987). All PECAN cultivars with Indian names were developed at the USDA Field Station in Brownwood, TX (J. Stanford, pers. comm.). The National Champion PECAN (largest recorded in the U.S.) is located in Weatherford, Parker Co. (American Forestry Association 1996);

it is located 3 miles n of downtown Weatherford on State Highway 51 (H. Garrett, pers. comm.). Manaster (1994) gave extensive information on the PECAN.

Carya myristiciformis (F. Michx.) Nutt., (in the form of *Myristica*—nutmeg), NUTMEG HICKORY, NOGAL, BITTER WATERNUT. Fruits usually solitary, ca. 35 mm long; nut rounded and apiculate at both ends; kernel sweet. Stream banks and swampy areas; scattered localities in e TX, w to nc TX in river drainages in Delta, Fannin, and Hunt cos. (Little 1971), also Lamar Co. Apr.

Carya ovata (Mill.) K. Koch, (ovate, egg-shaped), SHAG-BARK HICKORY, SCALY-BARK HICKORY, UPLAND HICKORY, RED-HEART HICKORY, SHELLBARK. Bark separating into large, conspicuous, light gray plates remaining attached at the middle; fruits 25–50(–60) mm long, with husk 4–15 mm thick; nut often 3-ridged or -angled, usually with thin shell; kernel sweet. Rich woods, often moist areas; se and e TX w to Red River Co. (Little 1971), also a disjunct collection from Parker Co. (West Cross Timbers). The wood is very strong and tough (Steyermark 1963) and was valued for smoking meat such as hams (Peattie 1948).

Carya texana Buckley, (of Texas), BLACK HICKORY, TEXAS HICKORY, BUCKLEY'S HICKORY, OZARK HICKORY. Variable in size and shape of leaflets and nuts; buds rusty; fruits 30–50 mm long, with husk 2–4 mm thick; nut acute at both ends, rough and pitted; kernel bitter. Lowland or upland woods, sandy soils or occasional on limestone; se and e TX w to East Cross Timbers. Apr.

JUGLANS WALNUT, NOGAL

Husk of nut fibrous-fleshy, indehiscent.

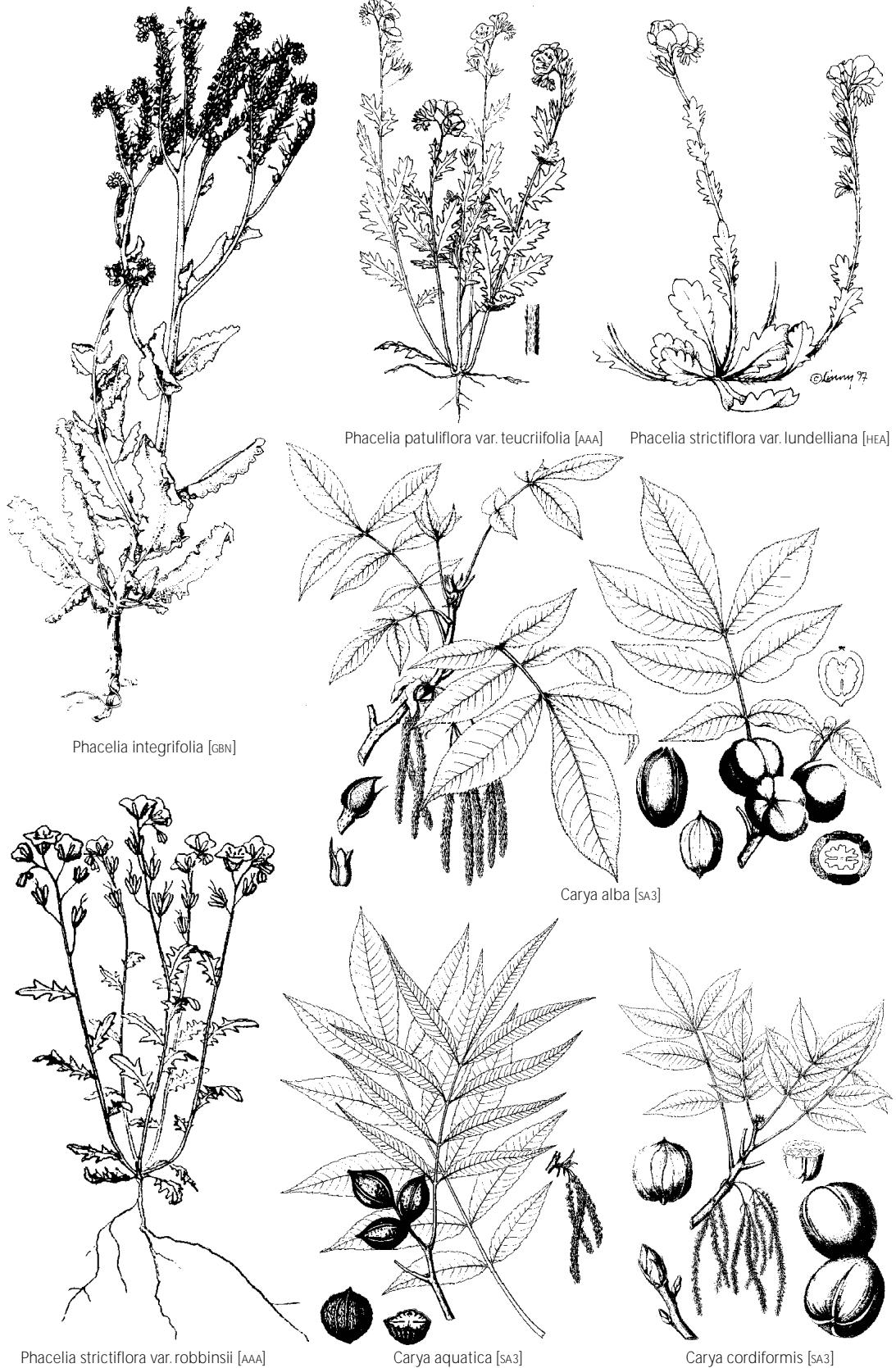
—A genus of 21 species native from the Mediterranean to e Asia and North America s to the Andes; this is one of the few n temperate tree genera extending s to South America (*J. neotropica* Diels is the source of an important carving wood in Ecuador). Species are variously used as cultivated ornamentals, for the edible nuts (these were widely used by Native Americans—Heiser 1993), and for timber. The wood of most species is durable, dark-colored, and highly prized for woodworking. *Juglans* species produce juglone, an allelopathic compound that inhibits the growth of other plants; it is found in the leaves, bark, and fruits; — this compound can also cause a toxic reaction in horses when walnut shavings or leaves are used in stalls (Hardin & Brownie 1993). (Classical Latin name for *J. regia* L., from *jovis*, of Jupiter, and *glands*, acorn, nut, or gland; thought by some to refer to the male organs of Jupiter)

REFERENCES: Sudworth 1934; Wittemore & Stone 1997.

1. Mature fruits 35 mm or larger in diam.; nuts with conspicuously irregular grooves and ridges; margins of leaflets conspicuously serrate to serrate-crenate; se and e TX w to Grand Prairie and further w in Red River drainage _____ ***J. nigra***
1. Mature fruits 35 mm or less in diam.; nuts with regular lengthwise grooves and ridges; margins of leaflets subentire to serrate-crenate; from w Cross Timbers and Lampasas Cut Plain s and w to w TX.
 2. Fruits 25–35 mm in diam.; leaflets usually 9–15; mature leaflets usually 15–35 mm wide _____ ***J. major***
 2. Fruits usually 20 mm or less in diam.; leaflets (15–)17–23; mature leaflets usually 15(–17) mm or less wide _____ ***J. microcarpa***

Juglans major (Torr.) A. Heller, (greater, larger), ARIZONA WALNUT, ARIZONA BLACK WALNUT, NOGAL SILVESTRE. Tree to ca. 15 m tall; leaflets usually 9–15 (rarely more), kernel edible. Along streams and in floodplains; Hood Co., also Lampasas Co. (Little 1976) and Fort Hood (Bell or Coryell cos.—Sanchez 1997); mainly Edwards Plateau and Trans-Pecos. Apr.

Juglans microcarpa Berland., (small-fruited), TEXAS WALNUT, LITTLE WALNUT, TEXAS BLACK WALNUT, DWARF WALNUT, NOGAL, NOGALILLO, NOGALITO. Shrubby small tree to ca. 6 m tall; kernel ed



ible. Limestone outcrops and gravelly stream bottoms; McLennan Co. (Mahler 1988), also West Cross Timbers (Jack Co.—Simpson 1988 and Palo Pinto Co.—Little 1976); mainly Edwards Plateau and Trans-Pecos. Apr. The National Champion LITTLE WALNUT (largest recorded in the U.S.) is located in Denton Co. (American Forestry Association 1996).

Juglans nigra L., (black), BLACK WALNUT. A broad-headed tree; leaflets usually 11–23; kernel edible. Stream bottom woods on calcium rich soils; se and e TX w to Grand Prairie, also w in the Red River drainage to Wilbarger Co. in the Rolling Plains (Little 1971), also Edwards Plateau; sometimes cultivated. Late Apr. The chocolate to purplish brown heartwood is one of the most valuable North American woods; it is used in cabinets, furniture, and gunstocks; because a single tree can be worth thousands of dollars, they are sometimes “rustled.” This species exhibits allelopathy, the inhibition of one plant by another via the release of chemicals into the environment. Rain dripping from the leaves has a strong influence on the types of plants capable of growing beneath the trees (Brooks in Daubenmire 1974); according to H. Garrett (pers. comm.), members of the Solanaceae (e.g., tomatoes) in particular are adversely affected by proximity to BLACK WALNUT trees. Because of the possible allelopathic effects, some organic gardeners are careful concerning the use of BLACK WALNUT leaves as mulch. According to J. Stanford (pers. comm.), BLACK WALNUT sawdust is sometimes effective in killing fire ants. A brown dye can be obtained from the husk of the fruits and was used by Native Americans (Burlage 1968). BLACK WALNUT is reported to be capable of causing contact dermatitis (Lampe & McCann 1985). ☠

KRAMERIACEAE RATANY OR KRAMERIA FAMILY

—A very small (15 species), New World family containing only a single genus; it has at times been placed in the Fabaceae or Polygalaceae, and is apparently related to the Polygalaceae. Chromosome evidence presented by Turner (1958) argued against a relationship with the Fabaceae. (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the single nc TX species is a prostrate or trailing herb with simple, alternate, entire leaves; flowers bilaterally symmetrical, purplish or reddish, superficially orchid-like; fruits pea-sized, spiny.

REFERENCES: Britton 1930; Robertson 1973; Simpson 1989.

KRAMERIA RATANY

—A genus of 15 species of hemiparasitic shrubs, trees, or herbs native from the sw U.S. to Argentina and Chile, especially in dry areas. (Possibly named for J. Kramer, 1700s, Austrian army physician)

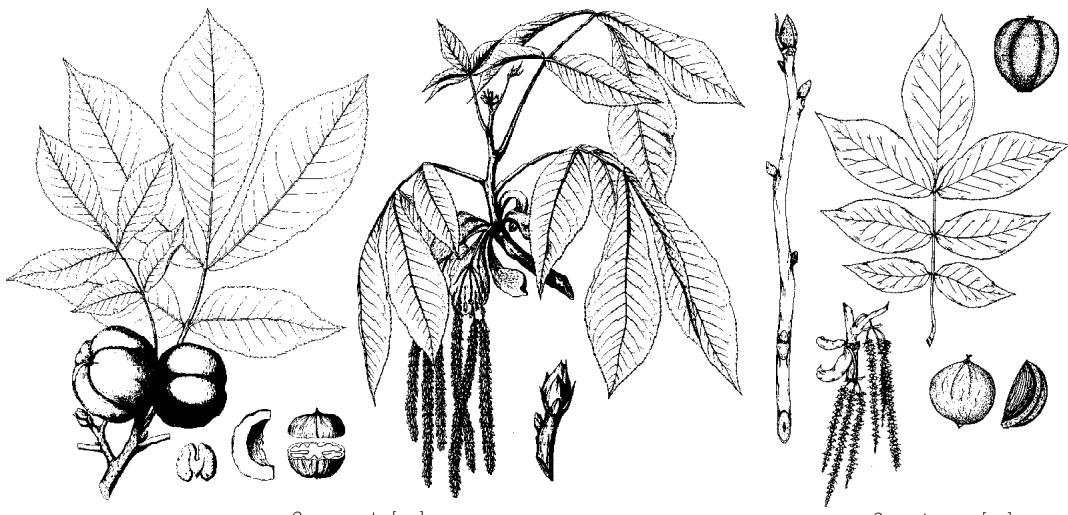
REFERENCES: Musselman 1975 [1976], 1977; Simpson & Skvarla 1981.

Krameria lanceolata Torr., (lanceolate, lance-shaped), TRAILING RATANY, CRAMERIA, PRAIRIE BUR, SANDBUR. Perennial herb; roots woody; stems prostrate or trailing, to 0.2–1(–1.8) m long; leaves alternate, entire, linear to elliptical, to 2 cm long, minutely spiny-tipped; peduncles 2–3 cm long, 2-bracted; flowers solitary, axillary, bilaterally symmetrical, superficially orchid-like; sepals 4–5, unequal, colored, 8–10 mm long; petals 5, the upper 3 long-clawed and often united, purplish or reddish, the lower 2 thick, sessile; stamens 4; filaments united below; anthers opening by terminal pores; ovary 1- or 2-celled, superior; fruits indehiscent, subglobose, 6–9 mm in diam, 1-seeded, woolly, spiny, the spines retrorsely scabrous. Rocky prairies, nearly throughout TX. Apr–Nov. [*K. secundiflora* of authors, not DC.] Reported to be hemiparasitic; forming haustoria on the roots of a broad range of host plants (Musselman 1975 [1976], 1977). ☒/95



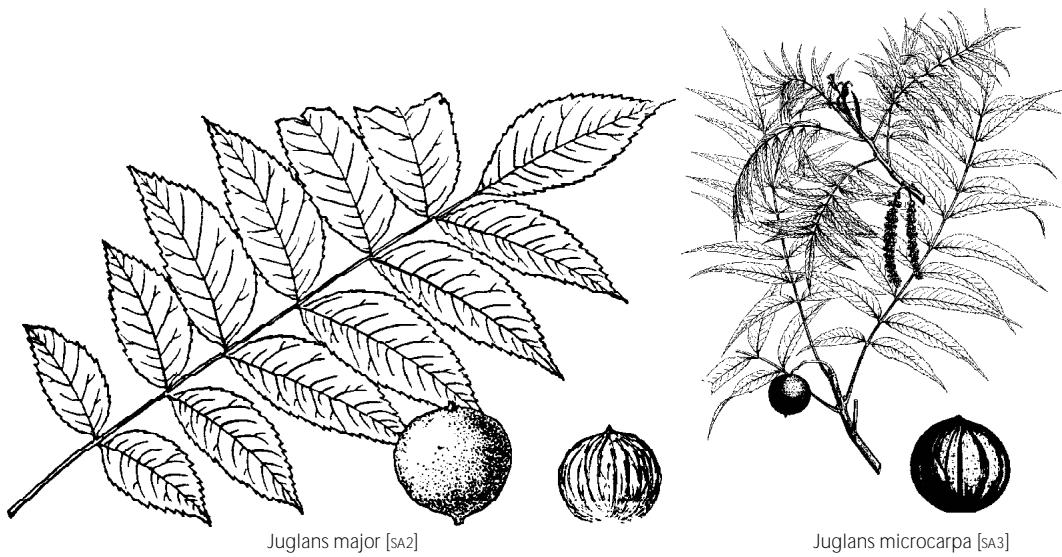
Carya illinoensis [SA3]

Carya myristiciformis [SA3]



Carya ovata [SA3]

Carya texana [STP]



Juglans major [SA2]

Juglans microcarpa [SA3]

LAMIACEAE (LABIATAE) MINT FAMILY

Annual or perennial, often aromatic herbs or shrubs; stems square; leaves opposite, simple, entire, toothed, or lobed; flowers axillary or terminal, solitary or in whorls, spikes, racemes, panicles, or small heads; calyces 2- to 5-toothed or -lobed; corollas usually bilaterally symmetrical, commonly 2-lipped; stamens 2 or 4, attached to the corolla tube; pistil 1, 2-carpellate, deeply 4-lobed; ovary superior; style 1, simple or 2-branched apically; fruit usually of 4 one-seeded nutlets.

— A large (6,700 species in 252 genera), cosmopolitan, but especially Mediterranean to c Asian family of mostly herbs or small shrubs including many ornamentals (e.g., *Salvia*—SAGE, *Solenostemon*—COLEUS) and numerous aromatic herbs including *Lavandula* (LAVENDER), *Mentha* (MINT), *Nepeta* (CATNIP), *Ocimum* (BASIL), *Origanum* (MARJORAM and OREGANO), *Rosmarinus* (ROSEMARY), *Salvia* (SAGE), and *Thymus* (THYME); many species have also been used medicinally. Often there are short-stalked epidermal glands containing volatile essential oils giving rise to characteristic aromas. The family is related to the Verbenaceae. Judd et al. (1994) argued that as traditionally circumscribed, the Verbenaceae are paraphyletic and the Lamiaceae polyphyletic; taxa traditionally recognized as MINTS seem to be derived independently from a number of different Verbenaceae clades. They indicated that in order for the families to be monophyletic, the Verbenaceae should be restricted to the Verbenoideae (those taxa with racemose or spicate inflorescences), while the Lamiaceae should be expanded to include most of the Verbenaceae. However, recent molecular studies (Wagstaff & Olmstead 1997) do not support the monophyly of a clade composed of Lamiaceae sensu lato and Verbenaceae sensu stricto. Until the phylogeny of this group is more clearly resolved, we are treating these families in the traditional manner. (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: usually aromatic herbs or shrubs with *square stems* and *opposite leaves*; corollas sympetalous, *2-lipped*; stamens 4 (in 2 sets) or 2; ovary usually 4-lobed, with a basal style; fruits usually of 4 one-seeded nutlets. Similar families can be distinguished as follows: Boraginaceae have alternate leaves and radially symmetrical corollas; Verbenaceae have the style usually terminal on the ovary; Scrophulariaceae have an unlobed ovary and many-seeded fruits.

REFERENCES: Cantino & Sanders 1986; Cantino 1992; Harley & Reynolds 1992; Abu-Asab & Cantino 1993; Judd et al. 1994; Wagstaff & Olmstead 1997.

1. Calyces with a conspicuous cap-like or shield-like projection on 1 side, bilabiate, with both lips entire. **Scutellaria**
 1. Calyces without projections, radially symmetrical or bilabiate with 1 or both lips toothed.
 2. Corollas bilaterally symmetrical and appearing 1-lipped, the upper lip inconspicuous and hardly discernible or lobes of upper lip on the margins of the lower lip.
 3. Corollas white to cream or lavender with darker markings; middle lobe of lower lip of corollas 2–3 times as long as lateral lobes; leaves of flowering stems sharply or coarsely toothed or deeply lobed; flowering stems 7–150 cm tall **Teucrium**
 3. Corollas blue, rarely white; middle lobe of lower lip of corollas only slightly longer than lateral lobes; leaves of flowering stems entire or indistinctly and bluntly toothed; flowering stems 30 cm or less tall **Ajuga**
 2. Corollas definitely 2-lipped, the upper lip clearly discernible OR corollas nearly radially symmetrical with 4 or 5 ± equal lobes.
 4. Fertile (anther-bearing) stamens 2.
 5. Flower clusters in the axils of well-developed typical leaves usually longer than the flower clusters; corollas < 10(–13) mm long (often much less).

6. Corollas very bilaterally symmetrical, ± conspicuously 2-lipped; calyces bilabiate; plants aromatic _____ **Hedeoma**
6. Corollas nearly radially symmetrical, funnelform or nearly salverform, with small nearly equal lobes or teeth, not distinctly 2-lipped; calyces radially symmetrical or nearly so; plants aromatic OR not so.
7. Flowers essentially sessile in dense axillary whorls; leaves 1.5–15 cm long; plants not aromatic _____ **Lycopus**
7. Flowers in short-stalked axillary cymes; leaves 1–4(–5) cm long; plants with a mint like aroma _____ **Cunila**
5. Flower clusters in spikes or racemes, the clusters not subtended by well-developed leaves, OR in terminal heads or head-like whorls and subtended by large, often colored bracts unlike the leaves; corollas typically > 10 mm long (often much more).
8. Flowers in dense heads or head-like whorls with involucres of large, often colored bracts immediately below the heads; calyces radially symmetrical _____ **Monarda**
8. Flowers in elongate spikes or racemes; calyces bilabiate _____ **Salvia**
4. Fertile (anther-bearing) stamens 4 (2 are sometimes shorter).
9. Flowers opposite, 1 per axil of each floral bract.
10. Calyces deeply 2-lipped, the upper lip either with 3 lobes much larger than the 2 lobes of the bottom lip (in *Warnockia*) OR upper lip with lobes fused for almost their entire length and ± indistinct (in *Brazoria*).
11. Stems pubescent below inflorescences; corollas mostly 15–22(–25) mm long; uppermost lobe of corollas split for a portion of its length and erect; nutlets pubescent; calyces often with a tuft of long hairs at base; plants growing on sand, rare if present in nc TX _____ **Brazoria**
11. Stems glabrous below inflorescences; corollas 8.5–12 mm long; uppermost lobe of corollas entire and sub-galeate; nutlets glabrous; calyces minutely pubescent; plants widespread in nc TX on gravelly or thin clayey soils on limestone _____ **Warnockia**
10. Calyces with 5 slightly unequal, distinct lobes, not deeply 2-lipped _____ **Physostegia**
9. Flowers whorled or compactly panicled, > 1 per axil of each floral bract.
12. Main stem leaves and leaves (leaf-like bracts) subtending flowers (at least some) deeply lobed.
13. Plants tall, to 200 cm high; leaves (leaf-like bracts) subtending flowers long-petioled; stem leaves all deeply lobed; calyx lobes ± spine-tipped _____ **Leonurus**
13. Plants to only 45 cm high; leaves (leaf-like bracts) subtending flowers sessile; stem leaves (at least some) merely crenate; calyx lobes not spine-tipped _____ **Lamium**
12. Main stem leaves and leaves (leaf-like bracts) subtending flowers not lobed.
14. Stems gray with soft, matted or incurled hairs.
15. Flowers in dense axillary whorls; calyces (8–)10-toothed, the teeth often tipped by hooked spines; leaf blades wedge-shaped to subcordate at base; corollas 5–6 mm long, white _____ **Marrubium**
15. Flowers in terminal compact panicles; calyces 5-toothed, the teeth straight or slightly incurved; leaf blades cordate at base; corollas 7–12 mm long, white to pale purple, with dark purple dots _____ **Nepeta**
14. Stems glabrous or with spreading pubescence.
16. Inflorescences generally appearing axillary, the flower clusters in axils of leafy bracts very similar to regular leaves.
17. Flowers and fruits sessile; leaf blades crenate to deeply lobed, never entire _____ **Lamium**
17. Flowers and fruits on pedicels (these can be short); leaf blades entire or crenate or rarely serrulate, never lobed.

18. Calyces 2-lipped, upper and lower teeth unequal.
19. Leaf blades 5 mm or less wide; calyces ca. 3 mm long; plant with pennyroyal odor; s part of nc TX _____ **Calamintha**
19. Leaf blades 4–25 mm wide; calyces 2.7–6 mm long in flower, enlarging to 4.6–8.9 mm long in fruit; plant without pennyroyal odor; ne part of nc TX _____ **Trichostema**
18. Calyces nearly radially symmetrical, the teeth all equal or nearly so.
20. Leaves reniform (= kidney-shaped) to suborbicular; corollas (7–)10–20(–22) mm long; stems (except short erect flowering stems) trailing, creeping, and rooting at the nodes _____ **Glechoma**
20. Leaves linear-elliptic to lanceolate or ovate; corollas 1.5–4.5 mm long; stems erect _____ **Trichostema**
16. Inflorescences generally terminal in appearance, the flower clusters in dense glomerules, loose corymbs, or spike-like inflorescences, not in axils of leaf-like bracts.
21. Flowers numerous, in 1–3 large globose clusters 40–60 mm thick, these encircling the stem; corollas orange-yellow or orange-red, 20–25 mm long, very pubescent _____ **Leonotis**
21. Flowers not in inflorescences as above; corollas not as above.
22. Flower clusters in dense head-like glomerules or in ± flat-topped inflorescences; corollas nearly radially symmetrical, with small nearly equal lobes or teeth, not distinctly 2-lipped _____ **Pycnanthemum**
22. Flower clusters in elongate spike-like inflorescences; corollas distinctly 2-lipped.
23. Inflorescences so dense that main flowering stalk is not visible among the flowers; calyces 6–11(–15) mm long at flowering time; corollas 10–15(–20) mm long _____ **Prunella**
23. Inflorescences less dense, loose or interrupted in places so main flowering stalk is usually visible; calyces 1.2–6 mm long at flowering time (can elongate in fruit); corollas 1.7–14 mm long (6 mm or less long in all except 1 species of *Stachys*).
24. Calyces distinctly 2-lipped, the lower lobes different from the upper, ca. 3 mm long in flower, elongating in fruit to 8–12 mm long; petioles 10–80 mm long; corollas ca. as long as or only slightly longer than calyces; leaves sometimes distinctly crinkly in appearance, sometimes with striking purplish coloration _____ **Perilla**
24. Calyces nearly radially symmetrical, the lobes all ± the same, only 1.2–6 mm long in flower or fruit, not elongating; petioles (except lowermost) 0–20 mm long; corollas longer than calyces, often much longer; leaves not distinctly crinkly, usually without striking purplish coloration.
25. Lower leaves with petioles nearly as long as or longer than blades; plants without aromas as described below _____ **Stachys**
25. Lower leaves sessile or with blades many times longer than petioles; plants strikingly aromatic with peppermint, spearmint, or apple odors OR not so.
26. Corollas 10–14 mm long, with upper lip hooded over stamens; petioles 10–20 mm long; calyces 5–6 mm long; plants without aromas as described below _____ **Stachys**

26. Corollas 1.7–5 mm long, the upper lip not hooded over the exserted stamens; leaves sessile or with petioles to 15 mm long; calyces 1.2–3.4 mm long; plants strikingly aromatic with peppermint, spearmint, or apple odors _____ **Mentha**

AJUGA BLUE-BUGLE

☞ An Old World genus of 50 species, mainly temperate but extending to lowland Malesia; some are medicinal, others cultivated as ornamentals. The upper lip of the corolla is very short or absent. (Greek: *a*, without, and *zugos* (Latin *jugum*), yoke, from the seeming absence of the upper corolla lip)

Ajuga reptans L., (creeping), CARPET AJUGA, BUGLE, BUGLEWEED. Low mat-forming perennial with basal rosette and leafy stolons; flowering stems erect, to 30 cm tall; flowers in whorls of 2–6 in leafy-bracted, spike-like racemes; calyces 4–6 mm long; corollas blue to purplish, bilabiate but appearing ± 1-lipped, the upper lip much shorter (0.5–1.5 mm long) than the lower lip (5–10 mm long); lower lip with middle lobe bilobed, much broader than and only slightly longer than lateral lobes; stamens 4. Cultivated as a ground cover, becoming weedy; Dallas and Grayson cos, also Tarrant Co. (R. O'Kennon, pers. obs.); Hatch et al. (1990) cited only vegetational area 4 (Fig. 2) for TX. Mar–Apr. Native of Europe. Duke (1985) referenced sources indicating that this species is a narcotic hallucinogen and that it is known to have caused fatalities. ☣ ☦

BRAZORIA BRAZOS MINT

☞ A genus of 2 species endemic to Texas (Turner 1996). The related monotypic *Warnockia scutellarioides* was previously treated in this genus. (Named for its habitat on the Brazos River, the longest river in Texas; derived from the Spanish name—*Brazos de Dios* or Arms of God)
REFERENCES: Lundell 1945, 1968, 1969a; Shinners 1953d; Turner 1996.

Brazoria truncata (Benth.) Engelm. & A. Gray var. **truncata**, (cut off square), BLUNT-SEPAL BRAZORIA, RATTLESNAKE WEED. Plant usually 20–35 cm tall; stems simple or branched from base; leaves oblanceolate to spatulate; mature spikes densely flowered, with lower internodes mostly 5–6 mm long; lower lip of calyces inflexing after anthesis, with a tuft of long hairs reaching 2 mm in length; corollas 15–22(–25) mm long, the 2 upper lobes lavender, the 3 lower lobes very pale lavender; $2n = 28$. On loose sandy soils; included based on citation for vegetational area 4 (Fig. 2) by Hatch et al. (1990); this Texas endemic, probably occurs only s of nc TX n to the sw part of Burnet Co. (Turner 1996). Apr–May. ☦

var. *pulcherrima* (Lundell) M.W. Turner, (very handsome), endemic to e TX just e of nc TX can be distinguished as follows: mature spikes loosely interrupted, with lower internodes mostly 8–13 mm long; lower lip of calyces lightly pubescent to canescent at base, with most hairs reaching only 0.2 mm in length, occasional hairs reaching 1.0 mm long (Turner 1996). This variety is possibly worthy of specific recognition as originally treated by Lundell (1968). ☦

CALAMINTHA SAVORY, CALAMINT

☞ A genus of ca. 12 species native from Europe to c Asia and the New World (estimate of number of species from Shinners 1962e and Mabberley 1987). Previously recognized in the genus *Satureja* and sometimes lumped into *Clinopodium* (e.g., Mabberley 1997) (Greek: *kallos*, beautiful, and *minthe*, mint)

REFERENCES: Dewolf 1955; Shinners 1962e; Epling & Játiva 1964, 1966.

Calamintha arkansana (Nutt.) Shinners, (of Arkansas), OZARK SAVORY, ARKANSAS CALAMINT. Stoloniferous perennial, also with erect stems 10–40 cm tall; aromatic with pennyroyal odor; sto-

lon leaves ovate to elliptic; caudine leaves ± linear, essentially entire, to 25 mm long and 5 mm wide, gland-dotted; flowers in cymes; calyces strongly ribbed, ca. 3 mm long; corollas bluish, 10 mm long, 2-lipped; stamens 4; style branches curled. Calcareous outcrops; Bell and Burnet cos. in s part of nc TX; se and e TX w to nc TX and Edwards Plateau. Apr-Aug. [*Satureja arkansana* (Nutt.) Briq.]

CUNILA DITTANY, STONE-MIST

☛ A New World genus of 15 species native from e North America to Uruguay. (An ancient Latin name for some fragrant plant, transferred to this American genus)

Cunila origanoides (L.) Britton, (resembling *Origanum*—another mint genus including oregano), MARYLAND STONE-MIST, AMERICAN DITTANY. Glabrous perennial herb to ca. 40 cm tall, with woody base; leaves essentially sessile, ovate, 1–4(–5) cm long, rounded to cordate basally, gland-dotted, aromatic; flowers in terminal or axillary cymes usually shorter than subtending leaf; calyces radially symmetrical, ca. 3 mm long, strongly 10-nerved, the throat villous; corollas purplish to white, nearly radially symmetrical, 6–8 mm long, pubescent; stamens 2; filaments straight, exceeding corolla. Dry open woods; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); Post Oak Savannah w to nc TX. Sep-Oct. [*C. mariana* L.] Used as a culinary herb and source of medicinal cunila oil (Mabberley 1987).

GLECHOMA GROUND-IVY

☛ A temperate Eurasian genus of ca. 10 species. (Old Greek name *glechon* for a kind of mint)

Glechoma hederacea L., (resembling *Hedera*—English ivy), GROUND-IVY, GILL-OVER-THE-GROUND, RUNAWAY-ROBIN. Perennial herb with creeping stems rooting at the nodes; flowering stems erect, 5–20(–40) cm tall; leaf blades reniform to suborbicular, 1–2.5(–4.5) cm long, coarsely crenate, cordate at base, green or with purplish coloration, gland-dotted on lower surface, petiolate; petioles on creeping stems long, to 10 cm; flowers 2–7 in axillary and terminal cymules; calyces 4–7 mm long; corollas bilabiate, (7–)10–20(–22) mm long, blue to violet or with white streaks (rarely white), the lower lip speckled with red-purple; stamens 4. Weedy areas and waste places; Dallas Co., also Tarrant Co. (R. O'Kennon, pers. obs.); not cited for TX by Hatch et al. (1990). Apr-Jun. Native of Europe. Formerly used as a medicinal tea and added to beer on long voyages (Mabberley 1987); toxic and even potentially fatal to horses if ingested in large amounts (Kingsbury 1964). ☠ ☣

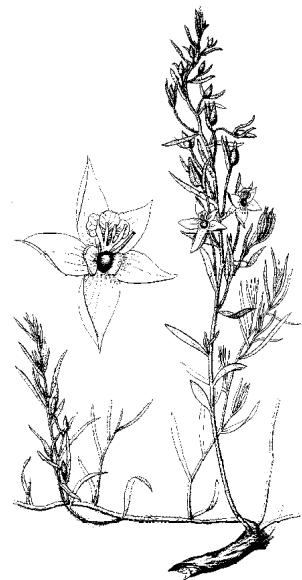
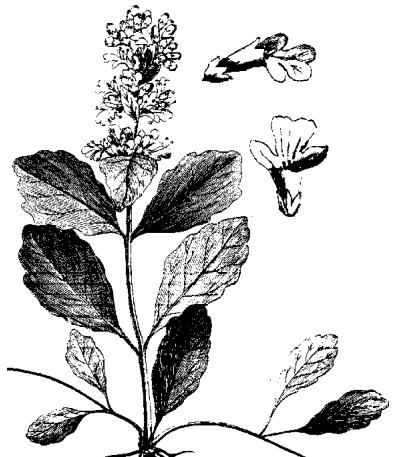
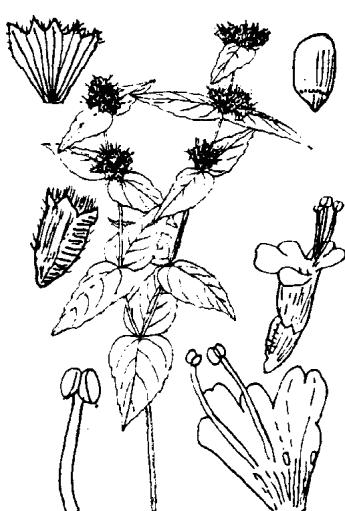
HEDEOMA MOCK PENNYROYAL, FALSE PENNYROYAL

Small, pubescent, aromatic annuals or perennials; leaves short-petioled; leaf blades linear to elliptic, entire or indistinctly toothed, gland-dotted on 1 or both surfaces; flowers axillary or both axillary and terminal, solitary or in condensed axillary cymes of 2–12, the overall appearance sometimes spike-like; calyces narrow, curved, with bristle-like teeth; corollas bilabiate, small, white to pink, lavender, or blue; fertile stamens 2.

☛ A genus of 38 species of sw North America and South America. (Name altered from *hedysoman*, an ancient name of mint, from Greek: *hedys*, sweet, and *osme*, scent)

REFERENCES: Epling & Stewart 1939; Irving 1976, 1979, 1980.

1. Plants annual; calyx teeth not convergent (instead straight to spreading or reflexed); corolla tube not inflated.
2. Leaves ovate to elliptical, 3.5–8 mm wide, petiolate, inconspicuously toothed or entire; upper lip of corollas bent at right angle to tube; calyx tube saccate for up to 1/3 its length _____ ***H. acinoides***
2. Leaves linear, 1–3 mm wide, sessile, entire; upper lip of corollas ± straight, not bent at right angle to tube; calyx tube markedly saccate for 3/4 its length _____ ***H. hispida***

*Juglans nigra* [MIC, SA3]*Krameria lanceolata* [GR1]*Ajuga reptans* [LAM]*Calamintha arkansana* [BB2]*Cunila origanoides* [STE]*Glechoma hederacea* [LAM]

1. Plants annual or perennial (sometimes woody based with shoots from previous season often persistent); EITHER calyx teeth strongly convergent and completely or incompletely closing the calyx opening at maturity OR corolla tube markedly inflated.
3. Plants with aroma of peppermint; leaves usually more than 3 times as long as wide, bright green; upper and lower calyx teeth usually strongly convergent (\pm completely closing the calyx opening at maturity); corollas 7–11 mm long, blue; annuals or herbaceous to woody-based perennials averaging < 25 cm tall _____ **H. drummondii**
3. Plants with aroma of camphor or lemon; leaves usually less than 3 times as long as wide, gray green or dark green; upper and lower calyx teeth incompletely closing opening; corollas 8–15 mm long, white or lavender; woody-based perennials usually averaging > 25 cm tall _____ **H. reverchonii**

Hedeoma acinoides Scheele, (resembling *Acinos*—another genus of Lamiaceae), SLENDER HEDEOMA. Delicate annual, ephemeral, 5–30 cm tall; taproot slender; basal leaves often purplish; petioles 1–4 mm long; calyces 5–6 mm long, the lower 1/3 of the tube saccate; corollas pink, 9–13 mm long, not inflated. Rocky limestone soils; Palo Pinto Co., also Brown, Hamilton (HPC), Parker, Somervell (R. O'Kennon, pers. obs.), and Tarrant cos. (Irving 1980); s and w parts of nc TX, also c and coastal TX. Apr–May. Dried plants are used by some as an aromatic tea (R. O'Kennon, pers. obs.).

Hedeoma drummondii Benth., (for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), DRUMMOND'S HEDEOMA, DRUMMOND'S FALSE PENNYROYAL. Annual or robust perennial 15–45 cm tall; leaves usually essentially linear, 5–11 mm long, 1–4 mm wide, entire; calyces finely hirsute, 5–6 mm long, the tube saccate for ca. 2/3 of its length; corollas blue, 7–11 mm long. Disturbed habitats; McLennan and Palo Pinto cos., also Parker, Somervell, and Tarrant cos. (R. O'Kennon, pers. obs.); nc TX s and w to w TX. Jun–Sep. According to Irving (1980), *H. drummondii* can hybridize with *H. reverchonii*.

Hedeoma hispida Pursh, (hispid, bristly), ROUGH HEDEOMA, ROUGH FALSE PENNYROYAL. Coarse annual 9–40 cm tall; taproot slender; leaves essentially sessile or subsessile; calyces 5–6 mm long; corollas dimorphic: cleistogamous corollas small, blue or white, ca. 5.3 mm long, scarcely exserted from the calyces; chasmogamous corollas larger, blue, 6–7 mm long, well-exserted from calyces. Prairies, sandy soils; se and e TX w to Rolling Plains. Apr–May.

Hedeoma reverchonii (A. Gray) A. Gray, (for Julien Reverchon, 1837–1905, a French-American immigrant to Dallas and important botanical collector of early TX), REVERCHON'S FALSE PENNYROYAL, ROCK HEDEOMA. Robust, woody-based perennial 15–60 cm tall, with shoots persisting from previous year; leaves elliptic-oblong, 6–14 mm long, 2.2–5 mm wide.

1. Plants lemon-scented; leaves gray green; calyces 6–7 mm long; corollas 10–15 mm long, the tube conspicuously dilated upward _____ var. **reverchonii**
1. Plants camphor-scented; leaves dark green; calyces 5–6 mm long; corollas 8–10 mm long, the tube only slightly dilated _____ var. **serpyllifolium**

var. **reverchonii**, ROCK HEDEOMA. Corollas white or lavender. Open, exposed, calcareous outcrops; e TX w to Blackland and Grand prairies s to c TX. Jun–Sep. [*H. drummondii* Benth. var. *reverchonii* A. Gray]

var. **serpyllifolium** (Small) R.S. Irving, (with leaves like *Thymus serpyllum*—thyme). Corollas mainly white, occasionally lavender. Open, exposed, calcareous outcrops; sw part of nc TX s and w to w TX. Jun–Sep. [*H. drummondii* Benth. var. *serpyllifolium* (Small) R.S. Irving, *H. serpyllifolium* Small]

LAMIUM DEAD-NETTLE

Ours low, ± pubescent annuals often rooting at lower nodes; stems decumbent at base, erect to flexuous above, 10–45 cm tall; lower leaves rather long-petioled; leaf blades triangular-ovate, bluntly and coarsely toothed; flowers in dense whorls subtended by leaf-like bracts; corollas 10–20 mm long, 2-lipped, pinkish purple to reddish purple, rarely white, with darker markings on lower lip, the upper lip hooded, with reddish pubescence; stamens 4; mericarps yellowish to olive-brown mottled with white scaly areas.

— A genus of ca. 40 species of n Africa and Eurasia; called DEAD-NETTLES because non-flowering stems resemble *Urtica* species. (Old Latin name of a nettle-like plant mentioned by Pliny, presumably from resemblance of leaves to those of nettles)

REFERENCE: Mennema 1989.

1. Leaf-like bracts (those just below flowers) sessile and clasping: calyces densely villous: leaves, including those below flowers, coarsely crenate to lobed _____ **L. amplexicaule**
1. Leaf-like bracts (those just below flowers) petioled; calyces glabrous or sparsely hairy; leaves, including those subtending flowers, crenate, not lobed _____ **L. purpureum**

Lamium amplexicaule L., (stem-clasping), HENBIT, DEAD-NETTLE. Bracts (leaf-like) usually wider than long, ± horizontal; plant producing cleistogamous flowers (appearing to be in bud, the corollas unexpanded) from Nov-Feb. Extremely abundant in gardens, lawns, roadsides, disturbed areas; throughout TX. Feb-May, sporadically throughout the year. Native of Europe and the Mediterranean to Iran. ☎

Lamium purpureum L., (purple), RED DEAD-NETTLE, PURPLE DEAD-NETTLE. Bracts (leaf-like) usually longer than wide, often reflexed; leaves and bracts deep green or often tinged with purple. Less common than HENBIT; disturbed areas; Dallas and Grayson cos., also Tarrant Co. (R. O'Kennon, pers. obs.); e TX w to nc TX. Late Mar-Apr(-Sep). Native of Europe and the Mediterranean. ☎

A number of varieties are sometimes recognized in this species (e.g., Mennema 1989); Jones et al. (1997) listed two varieties for TX, var. *incisum* (Willd.) Pers. and var. *purpureum*; nc TX material appears to be var. *purpureum*. Mennema (1989) separated the two as follows:

1. Leaves irregularly and usually deeply incised, especially the upper ones _____ var. *incisum*
1. Leaves regularly and mostly faintly crenate _____ var. *purpureum*

LEONOTIS

— A genus of 15 species of tropical Africa with 1 extending to Asia and the New World. (Greek: *leon*, lion, and *otis*, ear; the corolla has been likened to a lion's ear)

Leonotis nepetifolia (L.) W.T. Aiton, (with leaves like *Nepeta*—another mint genus including catnip), NEP-LEAF LION'S-EAR, LION'S-HEAD. Robust annual herb 0.5–2 m tall; stems erect, canescent; leaves ovate, 5–12 cm long, 4–10 cm wide, petiolate; inflorescence of 1–3 dense, globose flower clusters 4–6 cm thick, these encircling the stem; calyces curved, to 15–20 mm long; corollas bilabiate, 20–25 mm long, conspicuous, orange-yellow to scarlet; stamens 4. Roadsides and in waste places; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); naturalized in parts of e 1/2 of TX. Jun-Nov. Native of s Africa. ☎

LEONURUS MOTHERWORT

Erect, aromatic, biennial or perennial herbs; leaves usually palmately 3–5(–7)-parted or -lobed; flowers in numerous close whorls in axils on terminal, leafy-bracted, spike-like inflorescences; calyces 5- or 10-ribbed, with 5 ± equal spiny teeth; corollas bilabiate; fertile stamens 4.

— A temperate Eurasian genus of 3 species containing alkaloids. In the past, used as a tea for mothers at child birth, hence the common name (Strausbaugh & Core 1978). (Greek: *leon*, lion, and *oura*, tail, alluding to the hairy flowers)

1. Calyces with 5 ribs and 5 angles; upper lip of corollas densely long-hairy; stem leaves shaped somewhat like a maple leaf, with 3–5(–7) conspicuous large lobes _____ **L. cardiaca**
1. Calyces usually with 10 ribs and scarcely any angles; upper lip of corollas short-hairy; stem leaves deeply 3-parted, the divisions cleft so that the ultimate divisions are narrow _____ **L. sibiricus**

Leonurus cardiaca L., (for the heart), MOTHERWORT, COMMON MOTHERWORT, LION'S-TAIL. Perennial; stems 0.6–2 m tall, freely branched, glabrous or retrorsely pubescent on angles; leaves all cauline, gradually reduced upwards; leaf blades 5–12 cm long, palmately 3–5(–7)-lobed or the smallest unlobed (the lobes toothed or lobed), basally cuneate, rounded, truncate or cordate, apically obtuse to acute or acuminate; petioles 1–5 cm long; bracts similar to the leaves but slightly smaller; calyces 3–8 mm long, 5-ribbed; corollas 6–12 mm long, exceeding calyces, white to pink with purple spots. Disturbed areas; Montague Co. (photographed in 1983 by R. O'Kennon, photo at BRIT); possibly otherwise unknown in TX since not in Hatch et al. (1990) or Jones et al. (1997); however, Steyermark (1963) cited TX without locality; known from e OK (Taylor & Taylor 1994). May–Aug. Native of Eurasia. The leaves can cause contact dermatitis in susceptible individuals and the fragrant lemon-scented oil can cause photosensitization; grazing animals can have their mouths injured by the sharp teeth of the calyces (Steyermark 1963; Duke 1985). 

Leonurus sibiricus L., (of Siberia), SIBERIAN MOTHERWORT. Biennial; stems to nearly 2 m tall, retrorsely pubescent; leaf blades deeply palmately 3-parted, the divisions 2–7 cleft and incised, with minute golden glands, reduced upwards, long-petioled; calyces ca. 7 mm long, (5–)10-ribbed; corollas ca. 10–16 mm long, ca. 2 times as long as calyces, rose-pink to purplish. Open and waste areas; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990), also Tarrant Co. (R. O'Kennon, pers. obs.); naturalized in parts of e 1/2 of TX. Apr–Aug. Native of Asia. 

LYCOPUS WATER-HOREHOUND, BUGLEWEED

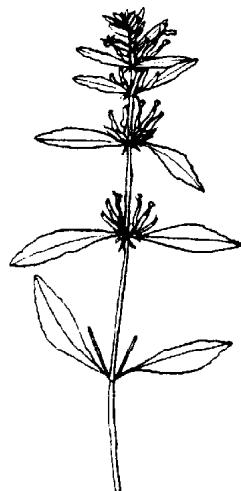
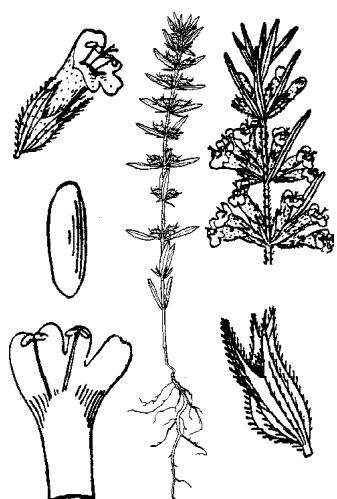
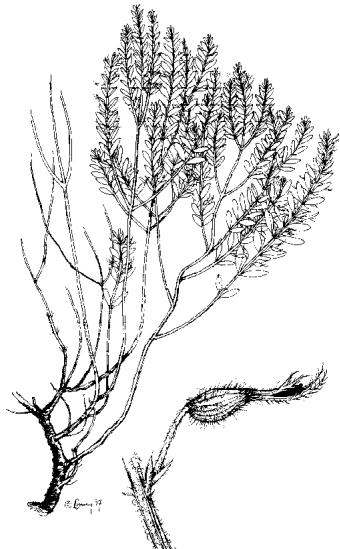
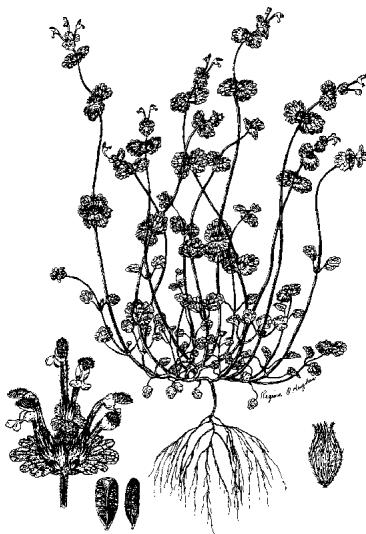
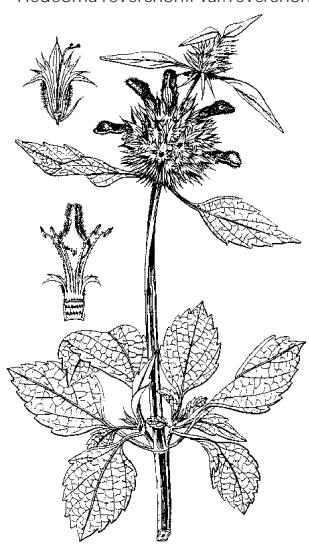
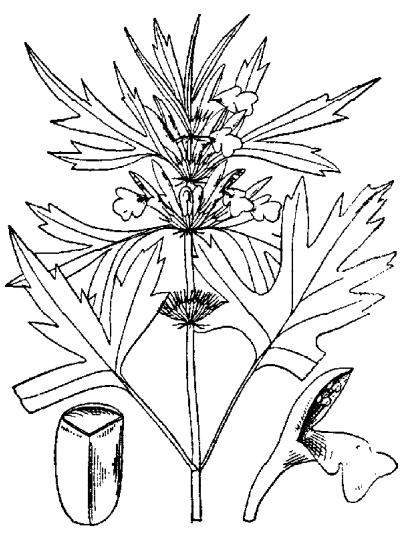
Erect perennial herbs with stolons; not fragrant; leaves linear-elliptic to nearly ovate, subentire to toothed or pinnatifid, gland-dotted, usually petiolate to subsessile; bracts similar to leaves, many times longer than dense whorls of small flowers in their axils; corollas white, 4–5-lobed, 1.8–5 mm long, sometimes with spots; fertile stamens 2.

— A n temperate and Australian genus of 4 species. (Greek: *lycos* wolf, and *pous* foot, for some fancied likeness in the leaves)

REFERENCES: Hermann 1936; Henderson 1962.

1. Calyces equal to or shorter than the nutlets, the calyx lobes acute to obtuse at tips _____ **L. virginicus**
1. Calyces much longer than the nutlets, the calyx lobes acuminate to subulate (awl-shaped) at tips.
 2. Lower and sometimes upper leaves usually distinctly incised to pinnatifid at least at base; corollas with 4 lobes, 2.5–3.5 mm long; w to at least w part of Blackland Prairie _____ **L. americanus**
 2. Leaves merely toothed; corollas with 5 lobes, 2.5–5 mm long; only in extreme e part of nc TX _____ **L. rubellus**

Lycopus americanus Muhl. ex Barton, (of America), AMERICAN BUGLEWEED, WATER-HOREHOUND. Plant stoloniferous without tubers; stems 0.3–0.9 m tall, glabrous or sparingly appressed-pubescent with dark hairs; leaves lanceolate to nearly ovate, to ca. 12 cm long and 3(–6) cm wide; lower leaves incised or pinnatifid, sometimes only serrate; calyx teeth with long subulate tips; corollas white, barely longer than calyces. Low moist or wet areas; Collin, Dallas, Grayson, Parker, and Tarrant cos., also Fort Hood (Bell or Coryell cos.—Sanchez 1997); also Panhandle. Aug–Nov.

*Hedeoma acinoides* [SHI]*Hedeoma drummondii* [BB2]*Hedeoma hispida* [BT3, BB2]*Hedeoma reverchonii* var. *reverchonii* [HEA]*Lamium amplexicaule* [REE]*Lamium purpureum* [GLE]*Leonotis nepetifolia* [WIG]*Leonurus cardiaca* [BEN]*Leonurus sibiricus* [BB2]

Lycopus rubellus Moench, (reddish), WATER-HOREHOUND, ARKANSAS BUGLEWEED, TAPER-LEAF BUGLEWEED, STALKED BUGLEWEED. Stems 0.4–1.2 m tall, from stolons and slender tubers; leaves to 5–15 cm long and 1.5–5 cm wide; calyx teeth acuminate and sharp-pointed, scarcely subulate-tipped; corollas white, often with purple spots. Wet areas; se and e TX w to Hopkins and Milam cos. on e edge of nc TX. Aug–Dec. [*L. rubellus* var. *arkansanus* (Fresen.) Benner, *L. rubellus* var. *lanceolatus* Benner]

Lycopus virginicus L., (of Virginia), VIRGINIA BUGLEWEED. Stems to 0.3–0.9 m tall, from stolons, mostly without tubers; leaves sometimes purple-tinged, to 15 cm long and 5 cm wide, coarsely toothed; calyx teeth lanceolate to triangular; corollas whitish, 1.8–2.2 mm long, 4-lobed; mature nutlets usually longer than and concealing the calyces. Wet areas; se and e TX w to Henderson Co. near the extreme e margin of nc TX. Aug–Dec.

MARRUBIUM HOREHOUND

— A genus of 30 species of Europe, the Mediterranean, and Asia. (Name used by Pliny, from Hebrew: *marob*, bitter juice)

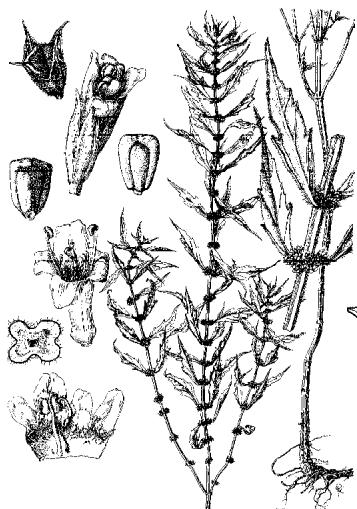
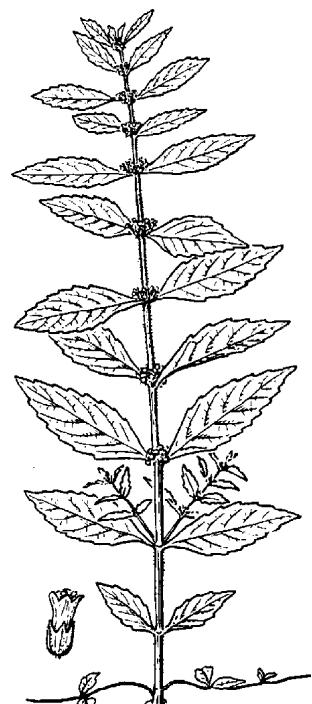
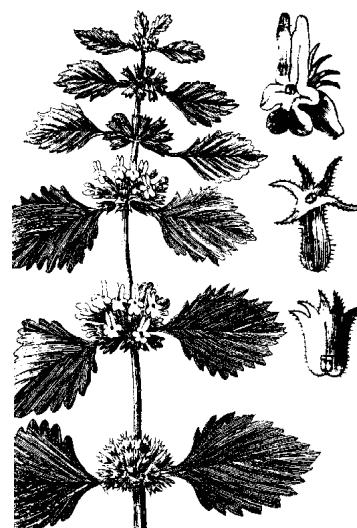
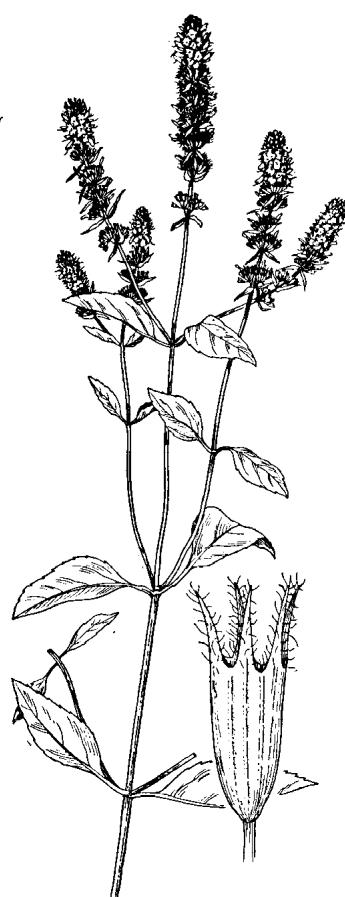
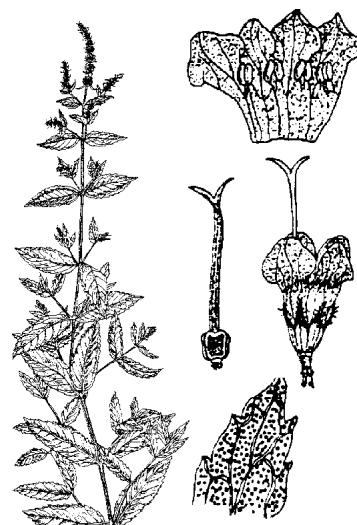
Marrubium vulgare L., (common), COMMON HOREHOUND, WHITE HOREHOUND, MARRUBIO. Perennial aromatic herb 0.3–0.7(–1) m tall, with very conspicuous white tomentum and often stellate hairs; old plants with woody root; leaves broadly ovate to suborbicular, 1.5–5 cm long, toothed, wrinkled-veiny, petioled; flowers in widely spaced dense axillary clusters; calyces 4–5 mm long, usually with 10 teeth, some of these hooked at the tip; corollas bilabiate, 5–6 mm long, white, often with rose-purple dots; stamens 4. Eroding or disturbed limestone soils, waste places; Bell Co. in s part of nc TX, also Somervell Co. (common at Fossil Rim Wildlife Center—R. O'Kennon, pers. obs.); naturalized in scattered localities throughout TX. Reverchon (1880) indicated that it appeared in Dallas Co. in the vicinity of cattle and sheep lots after a few years of settlement. Apparently, it requires large amounts of nitrogen—it is often abundant near livestock pens and beneath large trees where livestock stand in the shade and their droppings add to soil fertility (J. Stanford, pers. comm.). Apr–Jul, less freely later. Native of Eurasia, Mediterranean, and Macaronesia. Brooks (1986a) indicated that there may be some taxonomic confusion with this species. It is used as a flavoring and medicinally in remedies such as cough drops; it was formerly much used medicinally as a tea and in sweets and liqueurs (Mabberley 1987). Ranchers detest this species because the dried calyces get in wool and mohair and greatly reduce their value. ☺

MENTHA MINT

Conspicuously aromatic perennial herbs from rhizomes or stolons; leaves simple, sessile or petiolate, toothed, usually gland-dotted; flowers small, in whorls in axils of leaves or in terminal spike-like inflorescences; corollas bilabiate, purplish to whitish or pink; stamens 4, equal.

— A temperate Old World genus of 25 species of aromatic herbs long cultivated for use as flavorings. (Latin name; possibly from Minthe of Theophrastus, a nymph fabled to have been changed by Proserpine into mint)

1. Upper stem leaves sessile; leaf blades 1–2 times as long as wide, crenate-serrate, rounded in outline at tip (except for a pointed tooth); leaf blades and calyx tubes densely pubescent ____ **M. ×rotundifolia**
1. Upper stem leaves sessile to petiolate; leaf blades 2–3.5 times as long as wide, sharply serrate, acute to acuminate at tip; leaf blades and calyx tubes glabrous or nearly so.
 2. Calyces 1.5–2 mm long; leaves sessile to short-petiolated (petioles 0–3 mm long); spikes slender, including corollas < 10 mm wide, ± interrupted ____ **M. spicata**
 2. Calyces 2.5–3.4 mm long; petioles 4–15 mm long; spikes thicker, including corollas 10–15 mm wide, mostly dense, with few interruptions ____ **M. ×piperita**

*Lycopus americanus* [MAS]*Lycopus rubellus* [GLE]*Lycopus virginicus* [ST1]*Marrubium vulgare* [LAM]*Mentha spicata* [co1]*Mentha x piperita* [GLE]*Mentha x rotundifolia* [SMI]

Mentha ×piperita L. [*M. aquatica* × *M. spicata*], (like the pepper vine, pepper-like), PEPPERMINT. Plant with leafy stolons; stems erect to decumbent, 0.3–0.9 m tall, often purplish; leaves lanceolate to ovate-lanceolate, 3–8 cm long, acute, sharply serrate; calyces to 3.4 mm long; corollas 3–5 mm long, rose-purplish to lavender or white. Wet areas; Grayson and Parker cos.; also Tarrant Co. (R. O'Kennon, pers. obs.); mainly c to w TX. Jun-Oct. Native of Europe. Some authorities (e.g., Brooks 1986a) suggest it is possibly a hybrid of *M. arvensis* and *M. aquatica*. PEPPERMINT is the source of menthol, a widely used flavoring in things such as chocolate, crème de menthe, tea, ice cream, and toothpaste (Mabberley 1987); the fresh leaves are also frequently used to flavor beverages and foods. 

Mentha ×rotundifolia (L.) Huds. [*M. longifolia* × *M. suaveolens*], (round-leaved), APPLEMINT, ROUND-LEAF MINT. Plant with leafy stolons; stems usually erect, 0.45–1(–1.5) m tall; leaves broadly elliptic, 2.5–5 cm long, crenate-serrate; calyces ca. 2 mm long; corollas ca. 4 mm long, white or pink. Roadsides, waste places; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); mainly c and w TX. May-Sep. Native of Europe. 

Mentha spicata L., (with spikes), SPEARMINT. Plant stoloniferous; stems to 0.3–0.7(–1.2) m tall, often purplish; leaves oblong-lanceolate to ovate-lanceolate, acute to acuminate, 3–7(–9) cm long, sharply serrate; calyces 1.5–2 mm long; corollas 1.7–3 mm long, whitish to lavender or pinkish. Ditches, around lakes, other moist areas; Bell Co., also Brown (HPC), Dallas, and Tarrant (R. O'Kennon, pers. obs.) cos; mainly c and w TX. Native of Europe. Jun-Oct. The fresh leaves are frequently used to flavor beverages and foods; an oil is also obtained from SPEARMINT and used in flavoring a variety of items including chewing gum. 

MONARDA HORSE MINT, BEEBALM

Ours erect, aromatic, annual or perennial herbs; leaf blades usually toothed, gland-dotted; flowers large, sessile or nearly so, in leafy-bracted, head-like floral clusters, the floral clusters solitary or arranged in interrupted spikes; floral clusters subtended by large conspicuous bracts and the individual flowers also usually subtended by small, inconspicuous, linear or subulate bracteoles; calyces tubular, prominently ribbed, with 5, short, erect, stiff, acute or spine-tipped teeth, hairy or not in the throat; corollas bilabiate, elongate, with a long tube and an erect to sickle-shaped upper lip, the lower lip wider, 3-lobed; stamens 2.

 A North American of genus of ca. 19 species (Turner 1994e); a number are used as teas, herbs to flavor foods, or medicinally; others are cultivated as ornamentals; some are frequently components of commercial wildflower mixes. We are following a recent treatment by Turner (1994f) for nomenclature of *Monarda*. (Named for Nicolas Monardes, 1493–1588, Spanish physician and botanist who wrote on medicinal and other useful plants of the New World; he authored a book translated into English in 1577 under the title *Joyful Newes out of the Newe Founde Worlde*.)

REFERENCES: McClintock & Epling 1942; Fernald 1944; Shinners 1953b; Scora 1967; Turner 1994f.

1. Flower heads solitary (rarely 2) at ends of branches; middle and lower leaf blades abruptly narrowed to truncate or subcordate base; corolla tube gradually expanded; upper lip of corollas erect or slightly arching; stamens exserted beyond upper lip.

2. Corollas nearly white or pale lavender or pale pink, with purple or red-purple dots; broad leaf-like bracts subtending floral clusters long-pilose on the margins, 2–8 mm wide; calyx teeth with conspicuously stalked glands (use lens); uppermost stem leaves 3–14 mm wide; mid-stem leaves with petioles mostly 1–3 mm long _____

M. russeliana

2. Corollas white or lavender, not purple- or red-purple-dotted; broad leaf-like bracts minutely pubescent on the margins, 5–17 mm wide; calyx teeth without stalked glands; uppermost stem leaves 7–20 mm wide; mid-stem leaves with petioles 3 mm or more long.

3. Nodes and often lower stems with long, spreading hairs; pedicels 2–5 mm long; corollas cream-white; mid-stem leaves with petioles mostly 3–7 mm long, or if somewhat longer then \pm pilose with spreading hairs _____ **M. lindheimeri**
3. Nodes and stems nearly glabrous or with minute appressed or incised hairs; pedicels 1–2 mm long; corollas lavender (rarely white); mid-stem leaves with petioles mostly 8 mm or more long, never pilose with spreading hairs _____ **M. fistulosa**
1. Flower heads (1–)2–7 in an interrupted spike; middle and lower leaf blades usually gradually narrowed at base; corolla tube narrow for most of its length and then abruptly expanded; upper lip of corollas sickle-shaped; stamens not exserted.
4. Bracts subtending floral clusters and calyx teeth both ending in long, bristle-like tips usually 2 mm or more long; calyx teeth (3–)5–10 times as long as wide (including bristle-like tips); corollas white to pink or lavender, with or without purple spots.
5. Bracts all \pm the same in shape, oblong, usually bent outward near the middle revealing the pubescent inner surface, variable in color but often purplish, abruptly narrowed into a bristle tip; corollas white to pink or lavender with purple spots _____ **M. citriodora**
5. Bracts dissimilar, the outer ones broad, progressing to narrow inner ones, usually not bent outward, or if so, the inner surface glabrous or nearly so, variable in color but often whitish or yellowish to green, sometimes tinged with purple, gradually tapering into a terminal bristle; corollas white to pink or lavender, usually without spots.
6. Calyx teeth stout, stiff, 3–6 mm long, often reddish or purplish; bracts elliptic, with veins strongly raised; widespread in nc TX _____ **M. clinopodioides**
6. Calyx teeth slender, not stiff, 1–3 mm long, mostly greenish; bracts ovate, the veins slightly raised; mainly w TX, questionably e as far Somervell Co. in West Cross Timbers _____ **M. pectinata**
4. Bracts subtending floral clusters acute to acuminate but not bristle-tipped; calyx teeth triangular to triangular-lanceolate, not bristle-tipped, 1–3 times as long as wide; corollas yellow to cream, white, or rarely pink, usually with red-brown spots _____ **M. punctata**

Monarda citriodora Cerv. ex Lag., (lemon-scented), LEMON BEEBALM, LEMON MINT, HORSE MINT. Pubescent annual 15–80 cm tall; floral bracts and calyces hispid-margined; bracts with a spine bristle 2–5 mm long, the inner surface often purple; calyx teeth with bristle-like tips 2–7 mm long; corollas white to pink or lavender with purple dots, with tubes 7–19 mm long. Prairies, savannahs, roadsides; throughout TX. Mainly May–Jul. According to Kirkpatrick (1992), citronellol, used as a perfume and insect repellent, is obtained from this species. ☒/99

Monarda clinopodioides A. Gray, (from resemblance of the bracteal leaves to those of *Clinopodium*, now treated as *Pycnanthemum incanum* (L.) Michx.), BASIL BEEBALM. Pubescent annual 15–55 cm tall; bracts and calyx teeth hispid-margined, the inner bracts 3–7 mm wide; corollas white to pink or lavender, sometimes with purple markings, with tubes 11–15 mm long. Sandy open ground; mainly e 1/2 of TX. May–Jun.

Monarda fistulosa L. var. **mollis** (L.) Benth., (sp.: hollow; var.: soft, with soft hairs), WILD BERGAMOT, LONG-FLOWER HORSE MINT. Finely pubescent perennial 70–150 cm tall; calyx teeth acuminate, 1–2 mm long; corollas lavender (rarely white), with tubes 15–24 mm long. Stream banks, hillsides, open ground, prairies, or woods; se and e TX w to West Cross Timbers. May–Jul. Sometimes treated as [*M. fistulosasubsp. fistulosavar. mollis*] [*M. mollis* L.] ☒/99

Monarda lindheimeri Engelm. & A. Gray ex A. Gray, (for Ferdinand Jacob Lindheimer, 1801–1879, German-born TX collector), LINDHEIMER'S BEEBALM. Finely pubescent perennial 30–65 cm tall; calyx teeth acuminate, 1–2 mm long; corollas creamy white, with tubes 11–19 mm long. Open woods, sandy or gravelly limestone soils; Grayson Co. in Red River drainage, also Fannin Co. (Turner 1994f); mainly se and e TX. May. [*M. hirsutissima* Small]

Monarda pectinata Nutt., (comb-like), PLAINS BEEBALM. Pubescent annual 15–50 cm tall; floral

bracts and calyces hispid-margined; corollas white to pink or lavender, with or without purple markings, with tubes 8–14 mm long. Panhandle to Trans-Pecos, e to Somervell Co. (according to McClintock and Epling 1942, who cited this record with question mark); Turner (1994f) mapped this species only in the w 1/2 of TX far to the w of nc TX and questioned the McClintock and Epling citation. May-Jun, sporadically later.

Monarda punctata L., (spotted), SPOTTED BEEBALM, PERENNIAL SANDY-LAND-SAGE, DOTTED MONARDA, HORSE MINT, YELLOW HORSE MINT. Annual or short lived perennial, usually freely branched, to 100 cm tall; corollas yellow to cream, white or rarely pink, usually with reddish brown dots. Sandy open woods or open ground; in much of nc TX this species is an excellent indicator of sandy soil. Late May-Jul, sporadically to Sep. This noticeably aromatic species contains thymol, an antiseptic substance; it is not grazed by cattle and sometimes forms extensive stands (Ajilvsgi 1984). The following are recognized by some authorities (e.g., Kartesz 1994) as varieties within subsp. *punctata*

1. Leaf blade pubescence consisting mainly of long (0.3–1 mm), erect or ascending hairs along the midvein on the lower surface; corollas white to cream, with reddish brown dots; in nc TX only known from Lamar Co. in Red River drainage _____ var. **lasiodonta**
1. Leaf blade pubescence on both surfaces of very short (0.1–0.2 mm), appressed or incurved hairs; corollas yellow, white, cream, or pink, with reddish brown dots; widespread in nc TX.

 2. Calyx teeth usually longer than broad, often 2 times as long as broad, usually acuminate; corollas yellow; bracts green to yellowish green; leaves 5–7 cm long; widespread in nc TX _____ var. **intermedia**
 2. Calyx teeth ca. as broad as long, usually acute; corollas white to cream or pink; bracts pale or whitish green; leaves 3–4 cm long; w part of nc TX _____ var. **occidentalis**

var. **intermedia** (E.M. McClint. & Epling) Waterf., (intermediate). Leaf blades 10–23 mm wide; calyx teeth narrow, elongate, acuminate. Nc TX w to Rolling Plains and e Edwards Plateau; endemic to TX. This is by far the most common variety in nc TX. [M. *punctata* subsp. *intermedia* E.M. McClint. & Epling] 

var. **lasiodonta** A. Gray, (woolly-toothed), PLUMETOOTH BEEBALM. Leaf blades commonly 4–7 cm wide. Lamar Co. in Red River drainage (Turner 1994f); mainly se and e TX. [M. *lasiodonta* (A. Gray) Small]

var. **occidentalis** (Epling) E.J. Palmer & Steyermark, (western), WESTERN BEEBALM. Leaf blades 8–13 (-27) mm wide; calyx teeth broadly triangular-lanceolate. According to Turner (1994f), this variety only occurs to the w of nc TX; Scora (1967), however, cited a number of nc TX counties: Bell, Dallas, Hamilton, Johnson, Milam, and Tarrant; specimens from Brown, Comanche, and Montague cos. appear to match this variety; nc TX w to w TX. [M. *punctata* subsp. *occidentalis* Epling]

Monarda russeliana Nutt. ex Sims, (for Thomas Russell, 1793–1819, surgeon and collector with Thomas Nuttall), RUSSELL'S BEEBALM. Perennial 30–60(-80) cm tall; stems slender, rather weak; calyx teeth ca. 2 mm long; corollas white or pale lavender, with purple dots. Sand or sandy loam, woods, roadsides, fields; Hopkins, Lamar, and Red River cos., also Fannin Co. (Turner 1994f); ne corner of nc TX and adjacent n part of e TX.

Monarda stanfieldii Small, (named for Stanfield who collected it at San Marcos, TX in 1897), [Monarda *punctata* var. *stanfieldii* (Small) Cory, M. *punctata* subsp. *stanfieldii* (Small) Epling]. According to Turner (1994f) who recognized it at the specific level, this is a well-marked taxon largely confined to the granitic sands along the middle course of the Colorado River; it occurs immediately to the s of nc TX. Its calyx (mouth closed by a dense mass of white hairs) and glabrous corolla tube distinguish it from M. *punctata* (calyx opening merely ciliate; corolla tube pubescent).



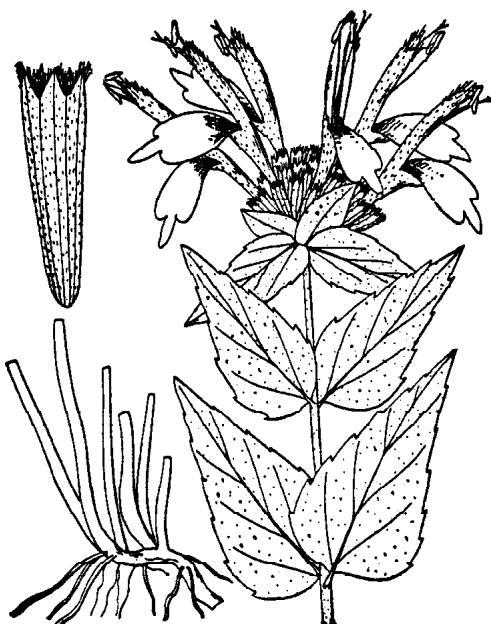
Monarda citriodora [STE]



Monarda clinopodioides [HEA]



Monarda lindheimeri [HEA]



Monarda fistulosa var. mollis [BB2]

Mondara viridissima Correll, (very green), [*M. punctata* subsp. *punctata* var. *viridissima* (Correll) Scora]. This is a mostly fall flowering entity that occurs just to the se of nc TX. According to Turner (1994f), who recognized it at the specific level, this taxon is largely confined to areas of Carrizo sands in sc TX. It has 2 or more flowers heads in an interrupted spike and can be distinguished from nc TX taxa by the combination of its narrow (mostly 4–6 mm wide), linear-lanceolate leaves and stem hairs short and usually spreading at right angles to the stem.

NEPETA CATNIP, CAT MINT

☛ A genus of ca. 250 species of temperate Eurasia, n Africa, and tropical African mountains, usually in dry habitats; some are strongly attractive to cats. (Latin name, possibly from Nepete, an Etruscan city, or Nepi in Italy)

Nepeta cataria L., (old generic name, pertaining to cats), CATNIP, CATNEP. Pubescent, perennial, erect or ascending herb 0.3–1 m tall; leaves pale green, petioled; leaf blades triangular-ovate, coarsely toothed, with minute golden glands on lower surface; flowers in dense or interrupted, spike-like inflorescences; calyces 5–7 mm long; corollas bilabiate, 7–12 mm long, white with red-violet dots; stamens 4. Disturbed areas and waste places; reported by Reverchon as “adventive in Dallas Co.” (Mahler 1988), also Henderson and McLennan cos. (Mahler 1988); e TX w to nc TX and Edwards Plateau. May–Sep. Native of Eurasia. While CATNIP is sometimes used as a herbal remedy, toxicity was reported in a 19-month-old child who displayed a “drugged” appearance after ingesting CATNIP (Osterhoudt et al. 1997). ☣ ☣

PERILLA

☛ A genus of ca. 6 species native from India to Japan. (Possibly from the Hindu name)

Perilla frutescens (L.) Britton, (shrubby, bushy), COMMON PERILLA, BEEFSTEAK-PLANT. Aromatic, annual, coarse herb, often with purplish coloration; stems 0.2–1 m tall; leaf blades ovate to suborbicular, 4–15 cm long, 3–10 cm wide, coarsely serrate to crenate, sometimes ± crinkly in appearance, acute to acuminate at apex, with minute glands on lower surface; petioles 1–8 cm long; flowers solitary in axils of very small bracts, together forming spike-like, elongate, somewhat 1-sided racemes 5–15 cm long; calyces 2–3 mm long at flowering, elongating to 8–12 mm long in fruit, the base slightly inflated and villous outside; corollas bilabiate, 5-lobed, white to lavender, 2.5–3 mm long, ca. as long as or only slightly longer than calyces; stamens 4, ca. equal. Wet areas, low woods, along streams, low pastures; Grayson Co., also Lamar Co. as an abundant pasture weed (G. Diggs, pers. obs.); mainly se and e TX. Jul–Nov. Native from Himalaya to e Asia. Much cultivated in the Old World as an ornamental, for the leaves and seed which are eaten in Asia, and for an oil (yegoma) like linseed oil used to waterproof papers, in paints, and in printing inks (Duke 1985; Mabberley 1987). Duke (1985) cited references of toxicity including dermatitis; pulmonary edema, respiratory distress, and even death can result from ingestion by cattle and horses (Hardin & Brownie 1993). ☣ ☣

PHYSOSTEGIA

OBEDIENT-PLANT, LION'S-HEART, FALSE DRAGON'S-HEAD

Largely glabrous, erect, perennial herbs; leaves, except lowest, sessile, slightly clasping, oblong to lanceolate or elliptic, toothed; flowers in terminal, spike-like racemes with small floral bracts; corollas bilabiate, usually large and showy, pale to deep lavender to reddish violet or white, the throat mottled white with dark dots; stamens 4.

☛ A North American genus of 12 species including cultivated ornamentals; almost all the species are showy and are potential ornamentals. Flowers if pushed to one side remain in place, hence the common name OBEDIENT-PLANT (not one generally used in TX). (Greek: *physa* bladder,

and *stege*, covering, in allusion to the calyx which can become somewhat inflated)
REFRERENCES: Lundell 1959, 1960, 1969a; Cantino 1982.

1. Several pair of small sterile bracts usually present and conspicuous below lowest flower of inflorescence; plants flowering Aug-Dec _____ **P.virginiana**
1. Sterile bracts absent below lowest flower of inflorescence; plants flowering mid-Mar-Jul, rarely to Aug.
 2. Corollas less than 2 cm long (usually 1.5 cm or less); flowering calyces usually 3–5(–6) mm long. _____ **P.micrantha**
 3. Corollas 5–7 mm long; calyces 3–4 mm long _____ **P.intermedia**
 2. Corollas, at least most, over 2 cm long; flowering calyces 5–10 mm long.
 4. Leaves conspicuously broad, to 75 mm wide; flowering late Jun-Jul, rarely to Aug _____ **P.digitalis**
 4. Leaves narrow, 25 mm or less wide; flowering Apr-Jun, rarely to Jul.
 5. Corollas usually pale lavender to whitish; lower petiolate leaves usually absent at flowering time; leaves usually 12 mm or less wide; flowering mid-May-Jun, rarely to Jul; limited to extreme s part of nc TX _____ **P.angularifolia**
 5. Corollas deep lavender to reddish violet; lower petiolate leaves usually present at flowering time; leaves to 25 mm wide; flowering Apr–mid-May; widespread in Blackland Prairie _____ **P.pulchella**

Physostegia angustifolia Fernald, (narrow-leaved). Stems to 2 m tall, usually much less; rhizomes short and vertical; lowest 1–4 stem nodes bearing petiolate leaves deciduous by anthesis; leaves in nc TX usually < 12 mm wide, linear to narrowly lanceolate or oblanceolate, sharply serrate, usually clasping stem; corollas usually 22–33 mm long, usually pale lavender to whitish (rarely brighter lavender), spotted and sometimes streaked inside with purple; nutlets usually 2–3 mm long. Low moist areas, roadside ditches; s part of Lampasas Cut Plain (Lampasas Co.), also s part of Blackland Prairie (Burnet Co.) (Cantino 1982); also Edwards Plateau. Mid-May-Jun (Jul). [*P.edwardsiana* Shinners]

Physostegia digitalis Small, (of the finger, possibly from the flowers being somewhat like the finger of a glove, or from resemblance to flowers of the genus *Digitalis*—foxglove), FINGER LION'S-HEART, FALSE DRAGON'S-HEAD. Stems stout, to 2 m tall; leaves large, to 22 cm long, oblong to elliptic-oblong; calyces 8–10 mm long; corollas 20–25 mm long, pale lavender to whitish, often with reddish purple dots. Sandy open areas; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); possibly on extreme e edge of nc TX; mainly se and e TX. Jun-Jul(–Aug).

Physostegia intermedia (Nutt.) Engelm. & A. Gray, (intermediate), INTERMEDIATE LION'S-HEART. Stems 0.3–1.5 m tall; rhizomes producing horizontal secondary and tertiary rhizomes to 40 cm long; lower 3–8 pairs of stem leaves petiolate, usually deciduous by anthesis; leaves widely spaced, at least some clasping the stem, linear-lanceolate to linear, the larger usually 3–15 mm wide, entire or teeth few; corollas lavender, spotted and streaked inside with purple; nutlets usually 2–2.5 mm long. Low moist areas, roadside ditches; Dallas, Denton, and Rockwall cos., also Bell (Fort Hood—Sanchez 1997), Cooke (Mahler 1988), and Fannin (Lundell 1969a) cos.; se and e TX w to nc TX. Late Mar–Late Jul.

Physostegia micrantha Lundell, (small-flowered). Similar to *P.intermedia*; stems to ca. 0.9 m tall, usually much smaller; leaves to ca. 12 cm long and 11 mm wide; corollas pinkish to light lavender or white. Wet bottomlands; originally known only from a single population from Titus Co. in e TX; also from Collin Co. in the Blackland Prairie; also a population has been observed in Red River Co. (A. Crosthwaite, pers. comm.). May–Jun. The species has also been reported from McCurtain Co., OK (Correll & Correll 1972), but no specimens were located when a status report was prepared by Tyrl et al. (1978). Cantino (1982) indicated that since this taxon was based

on a single population, since it resembled *P. intermedia* except in having smaller flowers with aborted anthers, and since typical *P. intermedia* individuals were also present in the population, it should be lumped with *P. intermedia*. However, more recently (in 1995), a large population (100s to a thousand individuals) of consistently small-flowered individuals closely resembling the type collection of *P. micrantha* was located in a roadside wetland in Collin Co. by R. O'Kennon; in early 1998 this population was destroyed by the TX Dept. of Transportation. While final disposition of this entity is unclear, we are here recognizing it at the specific level. Kartesz (1994) and Jones et al. (1997) lumped it with *P. intermedia*.

Physostegia pulchella Lundell, (pretty, beautiful), BEAUTIFUL FALSE DRAGON'S-HEAD. Stems to 1.4 m tall; rhizomes unbranched, vertical, to 6 cm long; lowest 1–4 pairs of stem leaves petiolate, some usually present at anthesis; stem leaves usually sharply serrate to base; base of sessile leaves auriculate clasping; corollas spotted or streaked inside with purple; nutlets 2.2–3 mm long. Low moist areas, roadsides ditches; se and e TX w to Grayson and Collin cos., also Cooke and Denton cos; this is the most common *Physostegia* of the Blackland Prairie; endemic to TX. Apr–mid-May. ↗/103

Physostegia virginiana (L.) Benth. subsp. **praemorsa** (Shinners) P.D. Cantino, (sp.: of Virginia; subsp: as though the end was bitten off). Stems to ca. 1.3 m tall; rhizomes short, usually unbranched, vertical; lower petiolate leaves usually early deciduous, to 13 mm wide; stem leaves narrower (to ca. 6 mm wide), the margins sharply serrate; frequently sterile floral bracts (without flowers) present (up to 40 pairs) below lowest flower; corollas reddish violet, lavender, or white, usually spotted and streaked with purple inside; nutlets usually 2.9–3.8 mm long. Prairies, limestone glades, roadside ditches; the holotype was collected in Fannin Co., also two nc TX localities (without county) were mapped by Cantino (1982); se and e TX w to nc TX, also Trans-Pecos. Aug–Dec. [*P. praemorsa* Shinners, *P. servitina* Shinners]

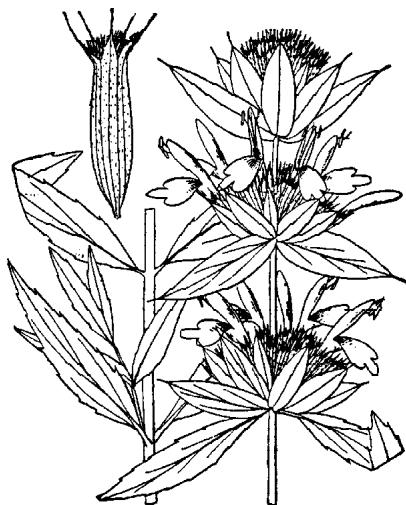
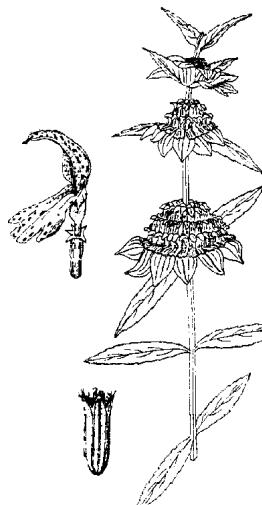
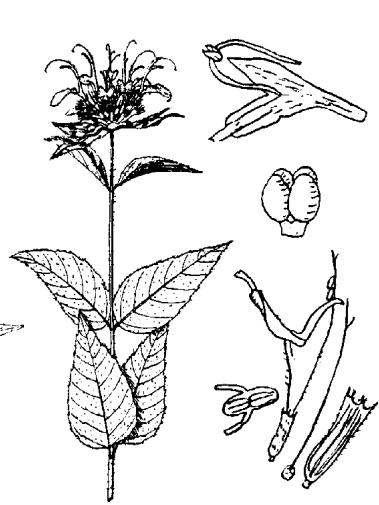
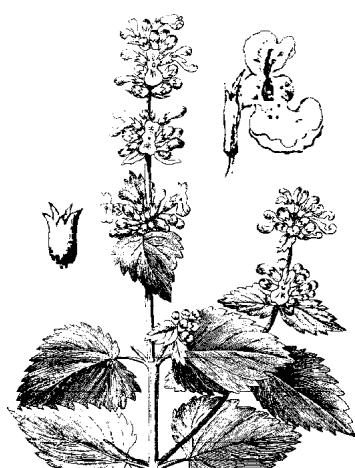
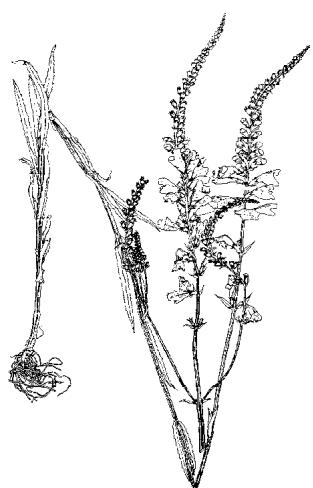
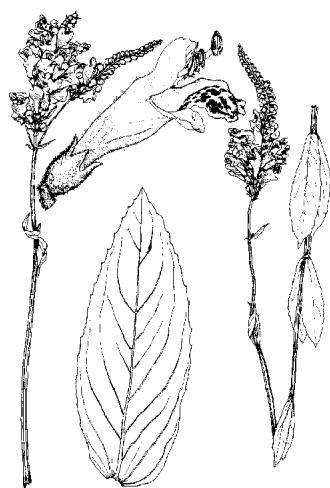
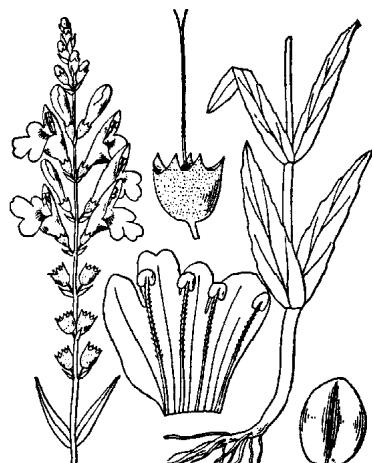
subsp. *virginiana*, native to the e U.S., is cultivated in nc TX and possibly escapes (1 individual has been found in Collin Co.); apparently also escaping in e TX. It can be distinguished by its much broader leaves (those of the stem 3–55 mm wide). ↗

PRUNELLA HEALALL, SELFHEAL

↖ A genus of 4 species of the n temperate zone and nw Africa. (From the pre-Linnean name *brunella*, which may have been derived from the German: *breaume*, quinsy, a throat infection these plants were supposed to cure)

Prunella vulgaris L. subsp. **lanceolata** (Barton) Hultén, (sp: common; subsp: lanceolate, lance-shaped), COMMON SELFHEAL, CARPENTER-WEED. Low perennial; stems erect to half decumbent or prostrate, spreading-pilose; leaves petiolated; leaf blades oblong-lanceolate, 3–7 cm wide, indistinctly toothed or entire, usually cuneate to attenuate at base; flowers in dense, cylindrical, terminal spikes 2–5(–7) cm long; bracts green or often with purple; calyces green or purple, 6–11(–15) mm long; corollas bilabiate, 10–15(–20) mm long, lavender to blue-purple (rarely white), with pale or white center on lower lip, the upper lip hooded. Sandy ground, damp woods; se and e TX w to West Cross Timbers, more common eastward. Apr–May. [*Prunella vulgaris* var. *lanceolata* (Barton) Fernald]

subsp. *vulgaris* including [*P. vulgaris* var. *hispida* Benth.], with wider, ovate leaves rounded basally, also occurs in vegetational area 4 (Fig. 2) according to Hatch et al. (1990). We have seen no nc TX material of this subspecies. Brooks (1986a) indicated that within this cosmopolitan species, subsp. *vulgaris* represents European plants and that the presence of intermediate individuals makes taxonomic recognition of infraspecific taxa questionable. ↗

*Monarda pectinata* [BB2]*Monarda punctata* var. *occidentalis* [STE]*Monarda russeliana* [STE]*Nepeta cataria* [LAM]*Perilla frutescens* [GLE]*Physostegia angustifolia* [LUN]*Physostegia digitalis* [co1]*Physostegia intermedia* [BB2]*Physostegia micrantha* [LUN]

PYCNANTHEMUM MOUNTAIN MINT

Erect perennial herbs with a strong mint aroma; foliage gland-dotted; bracts often whitish; flowers crowded in terminal head-like clusters or looser corymbs with branches visible; corollas much larger than calyces, stamens 4, didynamous.

☛ A North American genus of 17 species including some used medicinally and as flavorings. (Greek: *pycno-* dense, and *anthemon*, flower, from the densely-flowered inflorescences)

REFERENCE: Grant & Epling 1943.

- 1. Leaf blades linear, usually 4.5 mm or less wide, entire _____ **P. tenuifolium**
- 1. Leaf blades narrowly lanceolate to ovate, > 5 mm wide, subentire to toothed, the teeth often scattered.
 - 2. Leaf blades rounded to subcordate at base, sessile or nearly so; flowers in very tight globose heads, so tightly clustered that the branches holding the flowers or small groups of flowers cannot be seen; calyces ± radially symmetrical, all of the teeth ca. the same length, not 2-lipped _____ **P. muticum**
 - 2. Leaf blades wedge-shaped at base, on petioles 2–6(–12) mm long; flowers in crowded inflorescences but loose enough that the stalks supporting individual flowers or small groups of flowers are clearly visible; calyces 2-lipped with some teeth longer than others _____ **P. albescens**

Pycnanthemum albescens Torr. & A. Gray, (whitish), WHITE-LEAF MOUNTAIN MINT, WHITE MOUNTAIN MINT. Stems 0.4–0.8(–1.5) m tall, white canescent above; leaves ovate, ovate-lanceolate, or elliptic, 2.5–7 cm long, 10–25 mm wide, all but the lower strongly whitened; bracts strongly whitened; calyces 3.5–5 mm long; corollas 5–7.5 mm long, whitish or pale lavender with purple spots on lower lip. Low woods, along streams; Fannin Co. (Talbot property) in Red River drainage, also Lamar Co. (Carr 1994); mainly se and e TX. Jul–Nov.

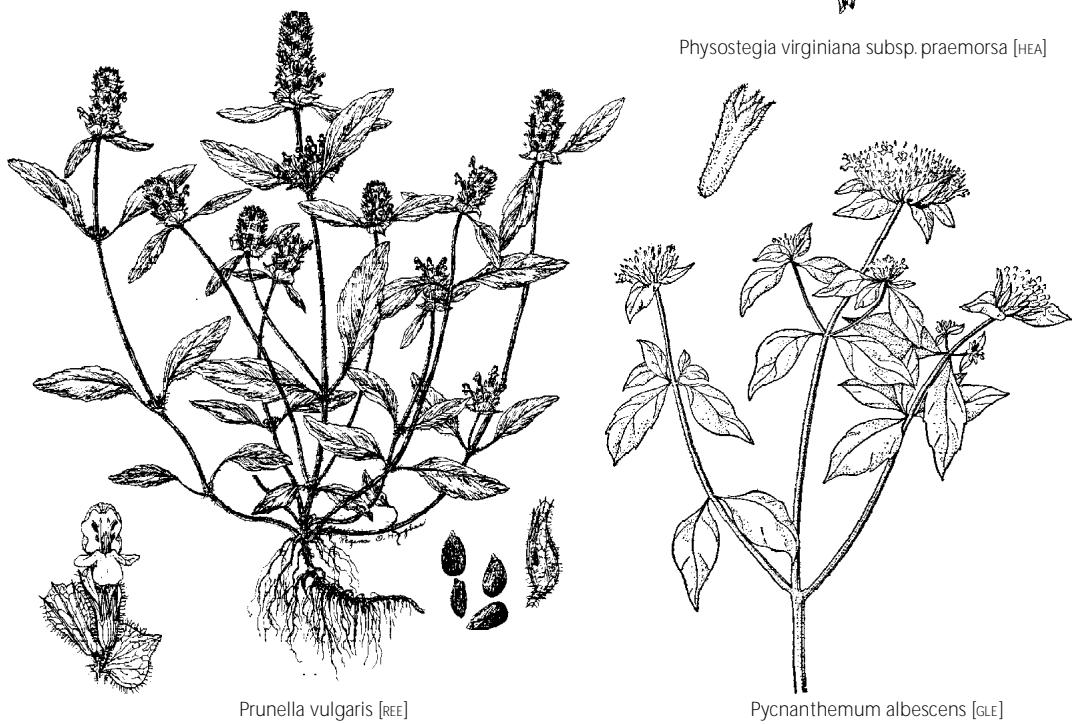
Pycnanthemum muticum (Michx.) Pers., (blunt, pointless), CLUSTER MOUNTAIN MINT. Stems to 1.1 m tall; leaves ovate-lanceolate to ovate, 2.5–8 cm long, 15–40 mm wide; bracts often whitened; calyces 3–5 mm long; corollas 4–6 mm long, white to purplish with purple spots. Dry open woods; Dallas Co.; rare in TX where it is limited to the nc part of the state; widespread in the e U.S. Jul–Nov.

Pycnanthemum tenuifolium Schrad., (slender-leaved), SLENDER MOUNTAIN MINT, NARROW-LEAF MOUNTAIN MINT, SLENDER-LEAF MOUNTAIN MINT. Plants often forming dense colonies from horizontal roots; stems 0.4–1.1 m tall, glabrous or puberulent on the angles; leaves 1.5–6 cm long, 1–4.5 mm wide, sessile, not whitened; flowers in dense or open corymbs; calyces radially symmetrical, 3.7–5 mm long; corollas 5–7 mm long, whitish or pale lavender, with purple spots on lower lip. Moist open areas, limestone; Cooke, Grayson, Henderson, and Lamar cos.; se and e TX rarely w to nc TX. May–Oct.

SALVIA SAGE

Annual or perennial herbs or shrubs, often aromatic; leaves often gland-dotted; flowers in terminal, spike-like racemes, opposite or whorled, with minute to large leafy bracts; calyces bilabiate; corollas strongly bilabiate, purple, blue, red, or white, often showy; stamens 2.

☛ A genus of 900 species of the tropics to temperate regions, especially of the Americas, the Sino-Himalaya area, and sw Asia. Some are used medicinally or as culinary herbs; *Salvia officinalis* L. (COMMON SAGE, GARDEN SAGE), native to s Europe and the Mediterranean, is widely grown and used as an herb; it is the primary flavoring used in sausage and in many stuffings and dressings. Many other *Salvia* species, particularly ones with red flowers, are used as ornamentals. The seeds of some species of *Salvia* (known to Native Americans as Chia) were used



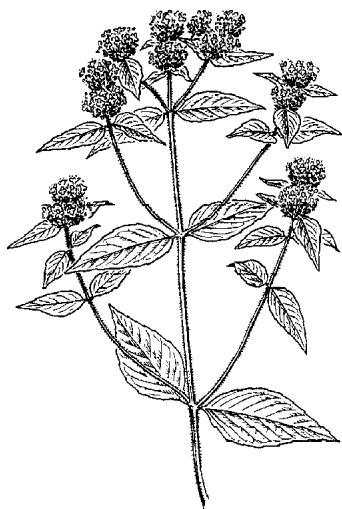
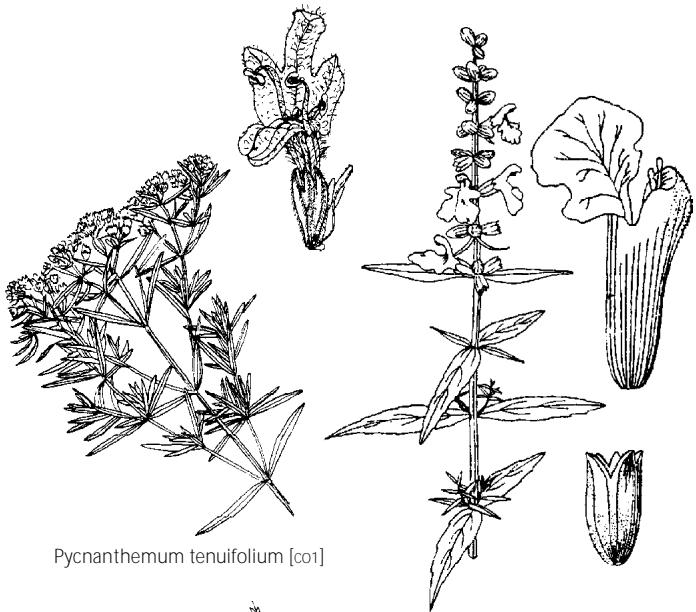
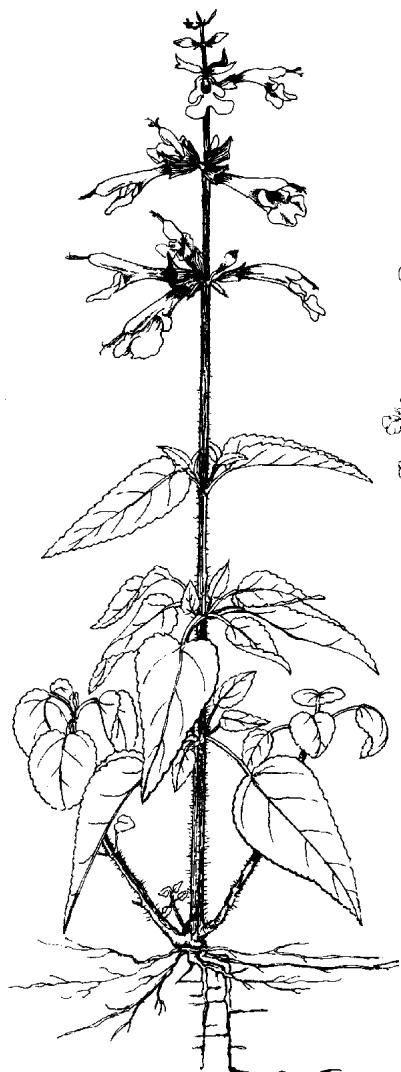
for food; the seeds, which are rich in protein and easily digested fats, were toasted and ground to make a flour (Powell 1988). The 2 anthers have a rocker action, with pollinating bees, etc. having pollen pressed onto their backs or heads from the fertile part of the anther as a result of pushing against a sterile projection from the other end. (Old Latin name, from *salvare*, to save or heal, alluding to the medicinal properties of many of the species).

REFERENCES: Epling 1938–1939; Whitehouse 1949.

1. Floral bracts large and leafy, exceeding the calyces; calyx throat with dense ring of bristly white hairs inside.
 2. Upper lip of corolla ca. 5–6.5 mm long, shorter than the undivided portions of the corolla (tube and throat) which together are ca. 10–13 mm long; stems usually with 4–6 pairs of leaves below inflorescences; inflorescences with few flowers open at one time _____ ***S. texana***
 2. Upper lip of corolla 10–12 mm long, longer than undivided portions of the corolla (tube and throat) which together are ca. 8–10 mm long; stems with 8–11 pairs of leaves below inflorescences; inflorescences with 10–30 flowers open at one time _____ ***S. engelmannii***
1. Floral bracts small, not exceeding the calyces; calyx without dense ring of bristly hairs inside.
 3. Leaves (at least some, often the lowest) deeply divided, lobed, or compound.
 4. Corollas blue or violet; leaves mostly in a basal rosette (1 or 2 pairs of small leaves can be on the flower stalk), at least some usually deeply divided or lobed, but not with distinct leaflets; on sandy soils in ne part of nc TX _____ ***S. lyrata***
 4. Corollas scarlet red; leaves abundant on the stem as well as basal, the lower ones often with 3–4 distinct leaflets, the terminal leaflet much larger; on limestone in s part of nc TX _____ ***S. roemeriana***
 3. Leaves entire or at most toothed, neither divided, lobed, nor compound.
 5. Basal leaves present at flowering time; leaves mostly in a basal rosette (1 or 2 pairs of small leaves can be on the flower stalk) _____ ***S. lyrata***
 5. Basal leaves usually withered by flowering time; stem leaves numerous, crowded.
 6. Plants shrubs with definitely woody stems; corollas red _____ ***S. greggii***
 6. Plants herbaceous, the stems not woody; corollas purple, violet-blue, blue, or red.
 7. Flowers mostly opposite (one per axil and thus 2 per node); corollas 6–10.5 mm long; plants annual _____ ***S. reflexa***
 7. Flowers whorled (usually > 1 per axil and thus usually > 2 per node); corollas 14–22 mm long; plants perennial (but may flower the first year).
 8. Calyces with matted, felty, white or purplish hairs; calyx teeth very short, virtually unnoticeable due to the matted hairs; corollas purple or violet-blue _____ ***S. farinacea***
 8. Calyces with appressed or spreading hairs, the hairs not matted; calyx teeth clearly visible to the naked eye, ca. 1/4–1/3 the length of the calyx; corollas red or blue.
 9. Corollas deep red; leaf blades deltoid-ovate, truncate to cordate basally, abruptly contracted to the long petioles; petioles 10–35 mm long _____ ***S. coccinea***
 9. Corollas blue; leaf blades linear to lanceolate or oblong, long tapering to the short petioles; petioles 0–15 mm long _____ ***S. azurea***

Salvia azurea Michx. ex Lam. var. ***grandiflora*** Benth., (sp: azure, sky-blue; var: large-flowered), BLUE SAGE, AZURE SAGE, PITCHER SAGE. Perennial herb, occasionally flowering when as little as 15 cm tall; stems to 1.5 m tall, pubescent with reflexed hairs; leaves 3–10 cm long, 1–4 cm wide; calyces 4.5–10 mm long; corollas 15–25 mm long, deep blue to light blue with whitish center (rarely white). Rocky, clayey, or sandy prairies; throughout most of TX. Jun–Oct. ☼/105

Salvia coccinea Buc'hoz ex EtL., (scarlet), TROPICAL SAGE, TEXAS SAGE, MIRTO, SCARLET SAGE, INDIAN-FIRE, MEJORANA. Perennial; stems to 1 m tall; leaves to 7 cm long and 5 cm wide; calyces 6–9 mm long, usually tinged with red, the lobes of the calyx nearly half the tube length; corollas 16.5–22 mm long, bright or deep red. Sandy woodlands; Tarrant Co; scattered in e 1/2 of TX. Feb–Nov.

*Pycnanthemum muticum* [GLE]*Pycnanthemum tenuifolium* [co1]*Salvia azurea* var. *grandiflora* [STE]*Salvia coccinea* [jon]*Salvia greggii* [HEA]

Salvia engelmannii A. Gray, (for George Engelmann, 1809–1884, German-born botanist and physician of St. Louis), ENGELMANN'S SAGE. Perennial herb from a woody root; stems to ca. 0.4 m tall; leaves linear-lanceolate, to 8 cm long and 1 cm wide, entire; corollas to ca. 22 mm long, gaping, pale lavender-blue, the throat with darker veins, the lower lip with 2 white areas towards base. Lime-stone prairies, often very shallow soils; Bell, Dallas (Whitehouse 1949), and Denton cos. w to West Cross Timbers and Lampasas Cut Plain and s to Edwards Plateau; endemic to TX. Apr-May. 

Salvia farinacea Benth., (mealy, powdery), MEALY SAGE, MEALY-CUP SAGE. Minutely pubescent perennial herb 0.25–1 m tall, flowering the first year, developing a woody root; leaves lanceolate or oblong-lanceolate, to 10 cm long and 3 cm wide, shallowly toothed or entire; calyces with matted, felty, white or purplish hairs; corollas to 25 mm long, purple or violet-blue. Limestone prairies and rock outcrops; in nc TX mainly Dallas and Wise cos. s and w; widespread in TX. Apr-Jul. Widely planted as a native wildflower. /105

Salvia greggii A. Gray, (for Josiah Gregg, 1806–1850, who collected in Mexico and died in the wilderness in n CA), AUTUMN SAGE, GREGG'S SAGE. Much-branched, shrubby perennial to 0.9 m tall; leaves coriaceous, obovate to elliptic, small, 10–25 mm long; calyces 10–15 mm long; corollas 25–30 mm long, red. Native in rocky soils of c, w, and s TX probably s of nc TX; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); a showy ornamental cultivated in nc TX that long persists and possibly escapes. Mar-May.

Salvia lyrata L., (lyre-shaped), CANCERWEED, LYRE-LEAF SAGE. More or less pilose, usually scapose, perennial herb 0.25–0.65(–0.8) m tall, with prominent basal leaves; stems with 1–2 pairs of reduced leaves below the simple or few-branched inflorescences; corollas 20–30 mm long, light blue-lavender with darker blue markings. Sandy woods, low ground; Hunt Co. and w in Red River drainage to Grayson Co., also Dallas Co. (S. Wasowski, pers. comm.); mainly se and e TX. Apr.

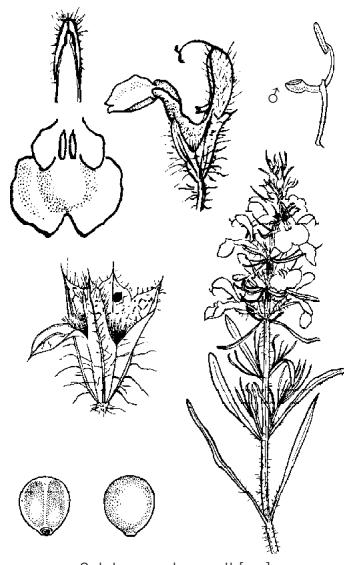
Salvia reflexa Hornem., (bent sharply backward), ROCKY MOUNTAIN SAGE, LANCE-LEAF SAGE. Minutely pubescent annual 0.2–0.6(–0.7) m tall; leaves lanceolate to linear-lanceolate, to 5 cm long and 12 mm wide, toothed or entire, rather short-petioled; calyces 4–8 mm long; corollas pale blue to whitish, 6–10.5 mm long. Ditches, disturbed soils; Dallas and Tarrant cos. s and w to w TX. May–Oct. Extremely aromatic with an aroma reminiscent of the genus *Mentha*. Reported to be toxic to cattle, possibly through nitrate poisoning (Kingsbury 1964). 

Salvia roemeriana Scheele, (for Ferdinand Roemer, 1818–1891, geologist, paleontologist, and explorer of TX), CEDAR SAGE. Herbaceous perennial to ca. 0.7 m tall; foliage often conspicuously white hairy; leaves (upper) or terminal leaflet (on lower leaves) suborbicular to reniform-cordate, coarsely crenate or with an undulate margin, 2.5–5 cm wide; racemes elongate; calyces to 15 mm long, glabrous inside; corollas 25–35 mm long. Limestone rocks, cedar brakes, wooded areas; Bell Co. in s part of nc TX; mainly Edwards Plateau, also Trans-Pecos. Mar–Aug. Widely planted as a landscape plant, escapes in the landscape, and persists.

Salvia texana (Scheele) Torr. (of Texas), TEXAS SAGE. Perennial 0.1–0.4 m tall, from a woody root; stems spreading-pilose; leaves subsessile, lanceolate, to 6 cm long and 2 cm wide, entire or slightly toothed; calyces hispid-pilose outside; corollas ca. 16.5–21.5 mm long, purplish blue, the lower lip 6.5–8.5 mm long, with 2 prominent white areas toward base. Limestone prairies or rock outcrops; Dallas and Denton cos. s and w to w TX. Apr-May.

SCUTELLARIA SKULLCAP, HELMET-FLOWER

Annual or perennial herbs, sometimes with woody root or base, not aromatic; leaves often gland-dotted; flowers in the axils of ± reduced upper leaves or floral bracts; calyces with a shield-like (or skullcap-like) protrusion (= scutellum), hence the common name; corollas blue



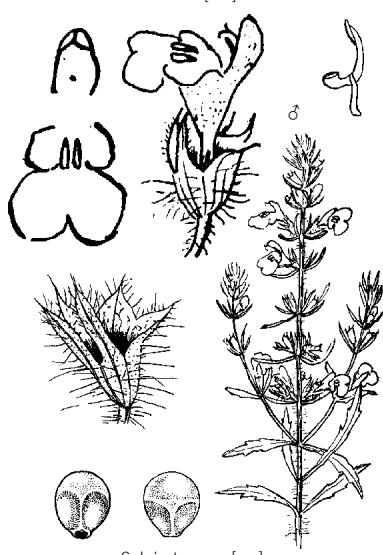
Salvia engelmannii [F&L]



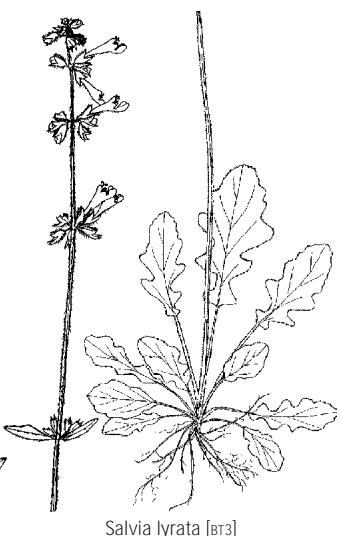
Salvia farinacea [SHI]



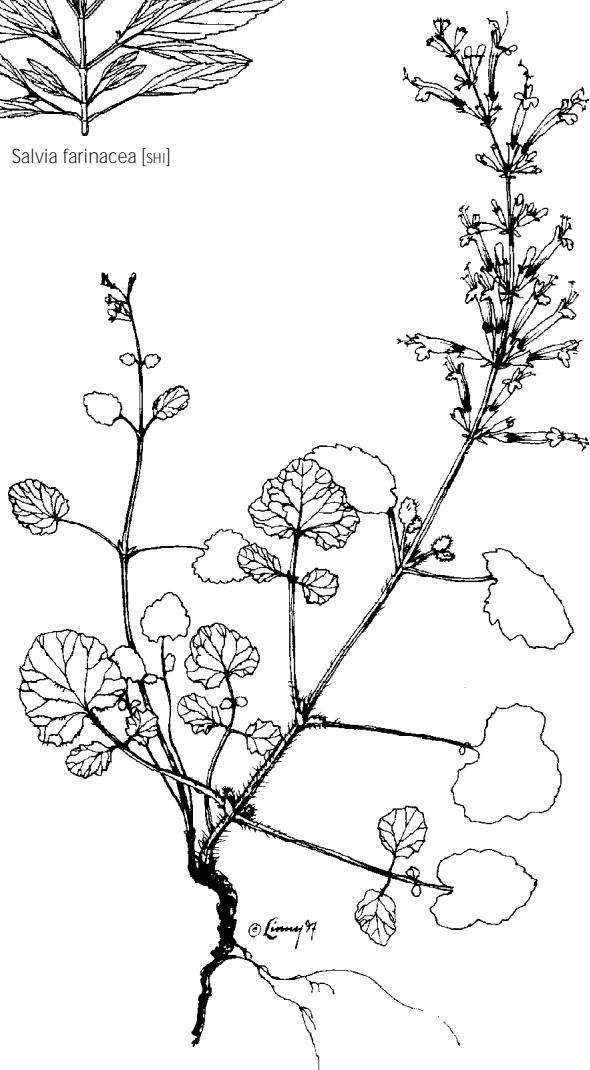
Salvia reflexa [BB2]



Salvia texana [F&L]



Salvia lyrata [BT3]



Salvia roemeriana [HEA]

to purple or violet (rarely white), with ± prominent white markings toward base of lower lip, the upper lip hooded; stamens 4, didynamous.

— A genus of 350 species, cosmopolitan except s Africa; some are used medicinally or cultivated as ornamentals. (Latin: *scutella*, a small dish or shield, in allusion to the protrusion from the calyx)

REFERENCES: Leonard 1927; Epling 1939, 1942; Lane 1983, 1986; Paton 1990; Goodman & Lawson 1992; Turner 1994b.

1. Stem leaves distinctly petioled, the longest leaves including petiole 3 cm or more long; leaf blades toothed, with cordate to truncate bases; plants usually much > 30 cm tall.
 2. Stems minutely pubescent, the hairs inconspicuous; upper leaves becoming gradually reduced in size as they grade rather smoothly into the leafy floral bracts; leaf blades glabrous on upper surfaces.
 3. Corollas large, 13–22 mm long; leaf margins minutely ciliate; calyces 4–4.5 mm long in flower, 5–6 mm long in fruit ***S. cardiophylla***
 3. Corollas small, 5–9 mm long; leaf margins not ciliate; calyces 2–2.7 mm long in flower, 3–4 mm long in fruit ***S. lateriflora***
 2. Stems prominently spreading or recurved pubescent, the hairs obvious to the naked eye; upper leaves only slightly reduced, not grading smoothly into the floral bracts—instead with an abrupt transition to the much smaller floral bracts; leaf blades pubescent on upper surfaces ***S. ovata***
1. Stem leaves petioled OR sessile, the largest leaves including petiole 1–3(–4) cm long; leaf blades entire or few-toothed, the bases tapering to truncate or subcordate; plants usually < 30 cm tall.
 4. Middle stem leaves with subcordate or truncate bases; plants with rhizomes; nutlets with peg-like, cylindrical, blunt projections ***S. parvula***
 4. Middle stem leaves with rounded to tapering bases; plants with a taproot; nutlets not as above, with short tubercles or lamellae.
 5. Calyces spreading-pubescent or pilose, with long hairs conspicuous with a lens; stems (especially upper stems) with relatively long, spreading, often gland-tipped hairs; lower leaves with petioles 4–18 mm long, the petioles mostly narrowly margined; corollas 5–11 (–13) mm long; plants annual, the stems hardened but neither enlarged nor distinctively woody ***S. drummondii***
 5. Calyces short-pubescent with inconspicuous hairs; stems with minute spreading or appressed hairs without gland-tips; lower leaves sessile or with petioles to 4 mm long, the blades decurrent as wings on the petioles; corollas (11–)12–23 mm long; plants perennial, the stems (at least on older plants) enlarged and distinctively woody.
 6. Stems with minute pubescence of downwardly curved and appressed hairs (use lens); leaf pubescence usually downcurved; calyces without gland-tipped hairs or sometimes with a few (as well as sessile glands); widespread in nc TX ***S. wrightii***
 6. Stems with minute pubescence of spreading hairs, sometimes somewhat retrorse but not downcurved; leaf pubescence spreading or ascendent; calyces usually with minute gland-tipped hairs (as well as sessile glands); on extreme w edge of nc TX ***S. resinosa***

Scutellaria cardiophylla Engelm. & A. Gray, (with heart-shaped leaves), HEART-LEAF SKULLCAP. Perennial, flowering the first year, 25–80 cm tall; leaf blades ± triangular, 2–5 cm long; corollas 13–22 mm long. Sandy woods; Denton, Henderson, Kaufman, and Limestone cos; se and e TX w to East Cross Timbers, more common to the e. Jun–Jul, sporadically later.

Scutellaria drummondii Benth., (for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), DRUMMOND'S SKULLCAP. Annual or short-lived perennial 20–30 cm tall, old plants forming small, bushy, many-stemmed clumps; upper stems glandular pubescent; leaves 1–3(–4) cm long; corollas violet; nutlets fuscous or black, covered with ±

imbricated lamellae. Apr–May. The foliage is reported to be toxic (Kirkpatrick 1992). While this species has traditionally been recognized as a single variable species (e.g., Epling 1942; Kartesz 1994); Turner (1994b) separated 2 weakly differentiated varieties as occurring in nc TX: ☀

1. Pubescence of middle and lower stems to some considerable extent glandular, the longer-spreading hairs bearing minute capitate glands at their apices; extreme e margin of nc TX, mainly se and e TX _____ var. **drummondii**
1. Pubescence of middle and lower stems mostly of eglandular hairs; widespread in nc TX (plants with ± eglandular stems also occur in the n part of nc TX as a result of apparent hybridization between var. *edwardsiana* and *S. wrightii*) _____ var. **edwardsiana**

var. **drummondii**. On sandy or sandy-loam soils; Milam Co. (Turner 1994b) on extreme e edge of nc TX; mainly se and e TX w to e edge of Edwards Plateau.

var. **edwardsiana** B.L. Turner, (of the Edwards Plateau). On limestone; nc TX s and w to w TX; this is the variety occurring over the vast majority of nc TX. Turner (1994b) noted that intergrades between the two varieties occur along the e edge of the Edwards Plateau; he also noted that occasional plants intermediate between *S. drummondii* var. *edwardsiana* and *S. wrightii* have been observed in the n part of nc TX (e.g., Collin, Dallas, and Grayson cos.) and adjacent OK. They have calyces and nutlets of *S. drummondii*, but intermediate vestiture and habit; the stems have very short downcurved hairs and only a few if any glandular hairs (Turner 1994b).

Scutellaria lateriflora L., (lateral-flowered), MAD-DOG SKULLCAP, VIRGINIAN SKULLCAP, SIDE-FLOWERING SCULLCAP. Delicate perennial with rhizomes and stolons; stems to 60(–100) cm tall; leaves thin, ovate, 3–11 cm long, crenate to serrate; flowers mainly in 1-sided racemes from the axils of leafy bracts that are reduced upwards; corollas blue-violet. Low woods; Lamar Co. in Red River drainage; e TX, also Panhandle. Jul–Sep.

Scutellaria ovata Hill, (ovate, egg-shaped), EGG-LEAF SKULLCAP. Perennial to ca. 85(–100) cm tall; leaves to 13 cm long, cordate-ovate, crenate-serrate, long-petiolate; flowers in ± distinct racemes from upper nodes; bracts 4–9 mm long, 3–6 mm wide; corollas 17–23 mm long, blue to violet, with a whitish lower lip. Sandy or rocky slopes, in woods or thickets. Apr–Jul. While recognizing it is a variable species, Lane (1986) questioned the need for infraspecific taxa.

1. Stems glandular throughout with both spreading glandular and non-glandular hairs _____ subsp. **bracteata**
1. Middle and lower parts of the stems below the inflorescences with only decurved or retrorse or even subappressed non-glandular hairs _____ subsp. **mexicana**

subsp. **bracteata** (Benth.) Epling, (having bracts), TUBER SKULLCAP. Burnet and Dallas cos; se and e TX w to nc TX and Edwards Plateau.

subsp. **mexicana**, (of Mexico). Bell Co., also Dallas Co. (Epling 1942); se and e TX w to nc TX and Edwards Plateau.

subsp. *ovata* was reported by Hatch et al. (1990) for vegetational area 4 (Fig. 2); we have found no specimens or other citations for this subspecies in nc TX.

Scutellaria parvula Michx., (very small). Small herbaceous perennial 8–30 cm tall, developing horizontal rhizomes with bead-like bulbous thickenings; leaves deltoid-ovate to ovate-oblong; corollas 7–8 mm long, blue. Prairies and open woods. Late Mar–May.

1. Stems glabrous or with a few non-glandular curled or appressed hairs _____ var. **missouriensis**
1. Stems definitely hairy with glandular or spreading non-glandular hairs.
 2. Hairs along stem ca. 1/3 as long as stem is wide; lower leaf surfaces rather evenly covered with sessile golden glands and also with long hairs mainly along the veins; lateral veins of the leaf usually not noticeably connected _____ var. **parvula**

2. Hairs along stem ca. 1/2 as long as stem is wide; lower leaf surfaces without sessile glands, only with long hairs mainly along the veins: lateral veins of the leaf often connected and forming a ± continuous vein just below the leaf margin _____ var. **australis**

var. **australis** Fassett, (southern). Se and e TX w to w Blackland Prairie, also Erath Co. (Epling 1942). [S. *australis* (Fassett) Epling] This is by far the most common variety in nc TX.

var. **missouriensis** (Torr.) Goodman & C.A. Lawson, (of Missouri). Included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); se and e TX w to nc TX. [S. *leonardii* Epling, S. *parvula* var. *leonardii* (Epling) Fernald] Goodman and Lawson (1992) explained the need to replace the varietal epithet *leonardii* with *missouriensis*, an earlier overlooked name.

var. **parvula**, SMALL SKULLCAP. Dallas Co., also Tarrant Co. (Epling 1942); se and e TX w to nc TX.

Scutellaria resinosa Torr., (full of resin), RESIN-DOT SKULLCAP, SHORT-LEAF SKULLCAP, RESINOUS SKULLCAP. Stiff low perennial usually ca. 15–20 cm tall with woody taproot and base, usually with many stems; leaves (7–)9–20 mm long; foliage with small sessile glands that glisten under a lens; calyces with minute spreading hairs; corollas 17–22 mm long, deep violet-blue; nutlets black and minutely, evenly, and closely tuberculate. Prairies, slopes, rocky or sandy areas; Callahan Co. (Turner 1994b) on w margin of nc TX w to Panhandle. Apr-Oct. Closely related to S. *wrightii*; see discussion under that species.

Scutellaria wrightii A. Gray, (for Charles Wright, 1811–1885, TX collector), WRIGHT'S SKULLCAP. Perennial ca. 15–20 cm tall usually with several stems from a woody base; similar to S. *resinosa*; flower size variable, the corollas 12–23 mm long (rarely more), deep violet-blue; nutlets black and minutely, evenly, and closely tuberculate. We are following Turner (1994b) in recognizing this species that has sometimes been lumped with S. *resinosa* (e.g., Lane 1983; Hatch et al. 1990; Kartesz 1994). Turner (1994b), agreeing with Epling (1942), indicated the 2 are largely allopatric and they are readily distinguished by pubescence; intermediates have not been found. The stem pubescence is very minute and requires a strong lens or scope to properly observe; however, it appears to be definitive in separating the 2 species. Calcareous areas or sandy loam, prairies, slopes, and open woods; Blackland Prairie w to Rolling Plains and Edwards Plateau. Mar-Jul. [S. *brevifolia* (A. Gray) A. Gray, S. *integrifolia* L. var. *brevifolia* A. Gray, S. *resinosa* var. *brevifolia* (A. Gray) Penland] A showy plant in full bloom. ■/105

STACHYS BETONY, HEDGE-NETTLE

Ours annual to perennial herbs; leaves simple; flowers in interrupted inflorescences; corollas strongly 2-lipped; stamens 4, didynamous.

—A genus of 300 species of herbs and shrubs with alkaloids; native to temperate and warm areas except Australasia and tropical mountains. Some are cultivated as ornamentals; others provide edible tubers or are used medicinally. (Greek: *stachys* spike or ear of corn, alluding to the inflorescence)

REFERENCES: Epling 1934; Nelson 1981; Mulligan & Munro 1989 [1990]; Turner 1994c.

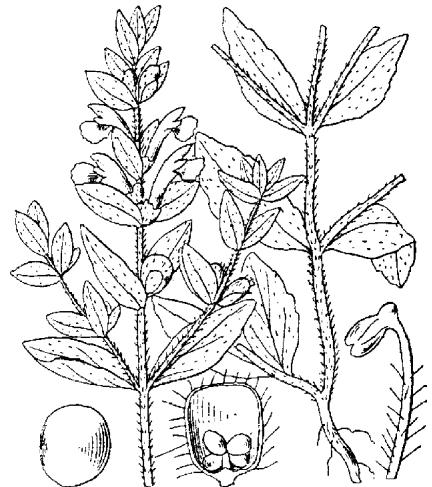
1. Leaf blades 4 cm or less long; lower leaves with petioles nearly as long as or longer than blades; uppermost leaves sessile; leaf margins crenate; leaf apices obtuse; corollas 5–6 mm long; plants annual or biennial _____ **S. crenata**

1. Leaf blades to 13+ cm long; lower leaves with petioles many times shorter than blades; uppermost leaves with at least a short petiole; leaf margins dentate or serrate; corollas 10–14 mm long; plants perennial _____ **S. tenuifolia**

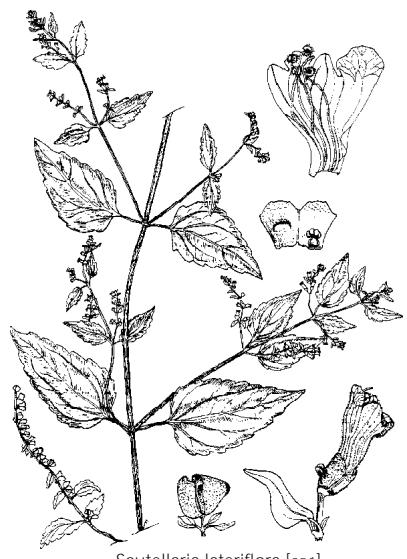
Stachys crenata Raf., (crenate, scalloped), SHADE BETONY. Plant slender, pubescent, usually several-stemmed, these erect or decumbent, to 30 cm long; leaves petioled, the petioles reduced



Scutellaria cardiophylla [HEA]



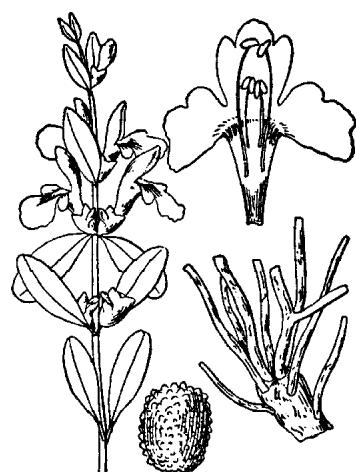
Scutellaria drummondii var. drummondii [BB1]



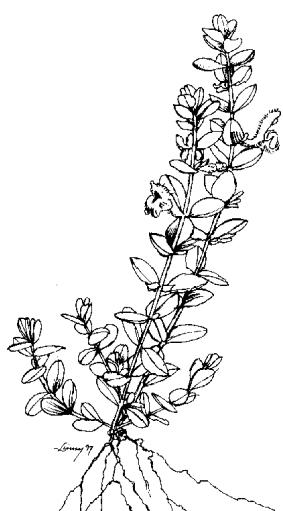
Scutellaria lateriflora [co1]



Scutellaria parvula var. parvula [BB2]



Scutellaria resinosa [BB2]



Scutellaria wrightii [MEE]

above; leaf blades ovate or oblong-ovate, to 4 cm long, the upper gradually much smaller, passing into floral bracts; flowers few, in whorls, the lower in leaf axils, the upper short-bracted; calyces 3–5 mm long; corollas light lavender-pink to pink or bluish (rarely white). Ditches, damp woods, weedy areas; n to Dallas Co., also Brown (Stanford 1976) and Denton (Mahler 1988) cos; se and e TX w to nc TX and Edwards Plateau. Apr-May. [S. *agraria* of authors, not Cham. & Schldl.]

Stachys tenuifolia Willd., (slender-leaved), SLENDER-LEAF BETONY, SMOOTH HEDGE-NETTLE. Stems erect, to 1.3 m tall, glabrous or with a few hairs on the angles; leaf blades linear to linear-lanceolate or narrowly ovate, the main ones 6 cm or more wide; middle and lower leaves with blades 4–11 times longer than petioles; inflorescence a few-flowered, interrupted spike; corollas variously colored including white with hints of pink/purple. Low woods, stream banks; Lamar Co. in Red River drainage; otherwise in TX known only from deep e TX. Aug-Nov.

Stachys coccinea Ortega, (scarlet), TEXAS BETONY, is becoming popular in nc TX as a xeric landscape plant where it persists and spreads. This native of the Trans-Pecos can be distinguished from the species above by the large (18–24 mm long), showy, scarlet corollas. The authority for this species is often given as Jacq.; however, Turner (1994c) pointed out that it should be Ortega.

TEUCRIUM GERMANDER, WOOD-SAGE

Perennial herbs; leaves simple, serrate to pinnatifid, often gland-dotted; flowers rather showy, in terminal, spike-like racemes, with small or large leafy bracts; corollas bilabiate but appearing ± 1-lipped; upper lip of corollas much shorter than the lower lip, divided into 2 lobes each equal to or smaller than the lateral lobes of the lower lip; lower lip of corollas with middle lobe much larger than lateral lobes; stamens 4.

— A cosmopolitan, especially Mediterranean genus of 100 species; the corollas appear to have a single 5-lobed lip. Various species are used medicinally or as cultivated ornamentals. (Greek: *teucrion*, name used by Dioscorides for some related plant, possibly from Teucer, the Trojan king who used the plant medicinally)

REFERENCE: McClintock & Epling 1946.

1. Leaf blades toothed, conspicuously pubescent beneath; corollas lavender with dark dots, the tube 4–7 mm long.

T. canadense

1. Leaf blades, at least the lower, deeply lobed to pinnatifid, glabrous; corollas white to cream, usually with pink or purple markings toward base, the tube 1–2 mm long.

2. Largest lobes of corollas 5–8 mm long; leaf blades with few wide lobes, the lobes mostly 2 mm or more wide; plants 15–70 cm tall; e part of nc TX

T. cubense

2. Largest lobes of corollas 9–13 mm long; leaf blades deeply cut, the ultimate segments narrow (1–1.5 mm wide); plants 5–20(–30) cm tall; West Cross Timbers and Lampasas Cut Plain westward

T. laciniatum

Teucrium canadense L., (of Canada), AMERICAN GERMANDER, WOOD-SAGE. Rhizomatous perennial 30–150 cm tall; leaves ovate to lanceolate, 6–10 cm long, 2–4 cm wide, the lower surfaces silvery pubescent; inflorescences silvery from numerous appressed hairs; bracts about as long as calyces or slightly longer; flowers subsessile or on pedicels to ca. 2 mm long; calyces 5–9 mm long at flowering, usually silvery pubescent; corollas 10–18 mm long, lavender (rarely white). Stream bottom woods and low open ground; Blackland Prairie westward. Jun-Aug. This is by far the most abundant *Teucrium* species in nc TX.

Teucrium cubense Jacq. var. **laevigatum** (Vahl) Shinners, (sp. of Cuba; var.: smooth), ANNUAL GERMANDER. Perennial (also possibly annual), ± bushy herb; stems usually several from a taproot, to 70 cm tall; median leaves mostly 3–5-lobed nearly to the midrib; floral bracts 3-parted nearly to the base, often much longer than calyces; flowers on pedicels 4–12 mm long; calyces 5–10 mm

long at flowering; corollas 6–15 mm long. Low open ground; Kaufman Co. (possibly introduced); mainly s and sw TX; endemic to TX. Jun–Oct. [*T. cubense* subsp. *laevigatum* (Vahl) E.M. McClint. & Epling] ↗

Teucrium cubense var. *cubense* is cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2); this taxon apparently only occurs to the s and e of nc TX. It differs in having the median leaves crenate to lobed only ca. 1/2 way to midrib and in having the floral bracts 3-lobed only to the middle to entire.

Teucrium laciniatum Torr., (lacinate, torn), CUT-LEAF GERMANDER. Perennial; plant forming beds from oblique, creeping roots; stems many, tufted, 5–20(–30) cm tall; leaves cut nearly to midrib into narrow lobes; bracts longer than calyces, quite similar to the leaves; pedicels 3–8 mm long; flowers with strong, spicy, sweet scent; calyces 8–13 mm long at flowering; corollas 14–22 mm long. Sandy or gravelly prairies and roadsides; Grand Prairie (Tarrant Co.) and Lampasas Cut Plain (Bell and Hamilton cos.), also Brown Co. (HPC); w part of nc TX and Edwards Plateau w to w TX. Apr–May. Jones et al. (1997) lumped this species with *T. cubense* var. *laevigatum*; we are following Kartesz (1994) and J. Kartesz (pers. comm. 1997) in recognizing it at the specific level. ☒/107

TRICHOSTEMA BLUE-CURLS

Ours annual herbs; leaves simple, usually entire or sometimes irregularly serrate; flowers in axillary cymes of 1–7 flowers, together appearing racemose or paniculate; corollas not exserted from calyces, 5-lobed, bilabiate, the lower single-lobed lip usually longer than the upper lip made up of 4 equal lobes; stamens 4.

— A North American genus of 16 species including cultivated ornamental herbs and shrubs. (Greek: *thrix*, hair, and *stema*, stamen, from the capillary filaments)

REFERENCES: Lewis 1945; Abu-Asab & Cantino 1989.

1. Calyces radially symmetrical, the 5 teeth ± equal; stamens straight or only slightly arched, 2.3–4.2 mm long, not greatly exserted; stems to 0.5 m tall; w as far as Tarrant Co. _____ ***T. brachiatum***
1. Calyces strongly 2-lipped, the lower 2 teeth ca. 1/3 as long as the partially fused upper 3 teeth (calyces inverting at maturity so the 3 longer teeth become lowermost); stamens arched, 6–16 mm long, exserted; stems to 1 m tall; in nc TX known only from Lamar Co. in extreme ne part of area _____ ***T. dichotomum***

Trichostema brachiatum L., (branched at right angles), FLUX-WEED, FALSE PENNYROYAL. Stems 0.15–0.5 m tall, usually freely branched, pubescent; leaves linear to elliptic, 10–50 mm long, 4–16(–20) mm wide, entire or sometimes irregularly serrate, sessile to with a petiole 1–5 mm long; inflorescence a 1–3-flowered axillary cyme, usually glandular; pedicels 1–15(–20) mm long; flowering calyces 2.5–4 mm long, enlarging in fruit to 3.5–8 mm, with minute stalked glands; corollas 1.5–4.5 mm long, not much longer than calyces, bluish to rose-pink; stamens 4; nutlets pubescent and glandular. Sandy or limestone sites, disturbed areas; Bell, Grayson, and Johnson cos., also Tarrant Co. (Mahler 1988); also Edwards Plateau. Jul–Oct. [*isanthus brachiatus* (L.) Britton, Sterns, & Poggenb.]

Trichostema dichotomum L., (forked in pairs), FORKED BLUE-CURLS, BASTARD PENNYROYAL. Stems to 1 m tall, typically branched, pubescent; leaves oblong to ovate, 15–60 mm long, 5–25 mm wide, entire, narrowed to petioles 2–15 mm long; cymes 3–7-flowered; flowering calyces 2.7–6 mm long, enlarging in fruit to 4.6–8.9 mm long; corollas bluish; nutlets glabrous. Open woods, stream banks, sandy soils; Lamar Co. in Red River drainage (Carr 1994); mainly se and e TX. Jul–Oct.

WARNOCKIA

— A monotypic genus endemic to Texas and one site in the Arbuckle mountains of s Okla-

homa (also possibly a site in Mexico) (Turner 1996). Previously treated in the genus *Brazoria* (Kartesz 1994). (Named for Dr. Barton Holland Warnock, 1911–1998, professor of Biology, Sul Ross State Univ., Alpine, TX, and avid student and collector of the flora of the Trans-Pecos)
 REFERENCES: Shinners 1953d; Lundell 1969a; Turner 1996.

Warnockia scutellaroides (Engelm. & A. Gray) M.W. Turner, (resembling *Scutellaria*—skullcap), PRAIRIE BRAZORIA, RATTLESNAKE-FLOWER. Erect annual herb 7–45(–75) cm tall, simple or widely branched; leaves, except lowest, sessile, oblong or oblanceolate, to 70 mm long and 23 mm wide, slightly clasping, toothed toward apex; flowers in terminal spike-like racemes, with small floral bracts 3–6 mm long; calyces 3–5 mm long, to 7.9 mm long at maturity, minutely pubescent, closed at maturity; corollas rosy, pinkish, or lavender, the throat paler or white with purple dots, 8.5–12 mm long; stamens 4; mature nutlets conspicuously 3-angled, sulfur yellow maturing to brown overlain with gold; $2n = 10$. Gravelly or thin clayey soils on limestone; Coryell Co., also Dallas, Erath, Hamilton, Tarrant (Lundell 1969a), Bell, Johnson (Shinners 1953b), Bosque, Hill, McLennan, Parker, Williamson (Turner 1996), and Somervell (R. O'Kennon, pers. obs.) cos.; scattered in e 2/3 of TX. Mid-Apr–early Jun. While we are following Turner (1996) in recognizing this taxon at the generic level, it is possibly only worthy of subgeneric recognition in *Brazoria*.
 [Brazoria scutellaroides Engelm. & A. Gray]

LAURACEAE LAUREL FAMILY

Ours shrubs and small trees, conspicuously aromatic; leaves alternate, simple, deciduous, entire or lobed; flowers small, in clusters, imperfect or perfect, greenish yellow or yellowish; sepals 6; petals 0; staminate flowers with 9 stamens in 3 rows; pistillate flowers with rudimentary stamens and 1 pistil; ovary superior; fruit a 1-seeded, red or blue drupe.

☛ A large (2,000–3,000 species in ca. 50 genera—van der Werff 1997a) family of mostly tropical and subtropical areas, especially se Asia and Brazil; they are mostly aromatic evergreen trees and shrubs (however, nc TX species are deciduous). Economically important members include *Cinnamomum* species (source of cinnamon and camphor), *Laurus nobilis* L. (TRUE or BAY LAUREL—source of bay leaf; also used for the Greek and Roman crown or wreath of laurel—hence resting on your laurels, baccalaureate, poet laureate), and the Central American *Persea americana* Mill. (AVOCADO). AVOCADO, with many cultivars, has been cultivated since 8,000 BC. for the highly nutritious fruit which is rich in oils and vitamins A, B, and E; the oil is also used in cosmetics (Rohwer 1993a). Fruits of Lauraceae are important foods for tropical frugivorous birds such as bell-birds, toucans, and quetzals; the whole fruit is often swallowed and in a short time the seed regurgitated unharmed (Snow 1981; Rohwer 1993a). Family name from *Laurus*, a genus of two species of evergreen shrubs and trees, one of the Mediterranean region, the other of Macaronesia. (Classical Latin name for *L. nobilis*) (subclass Magnoliidae)

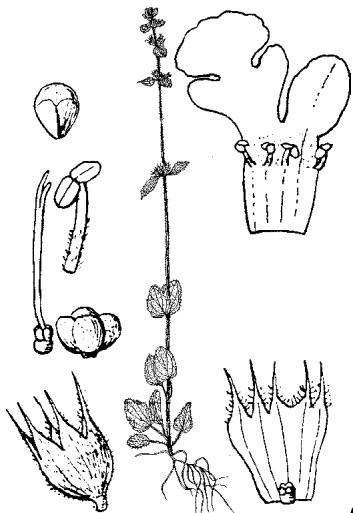
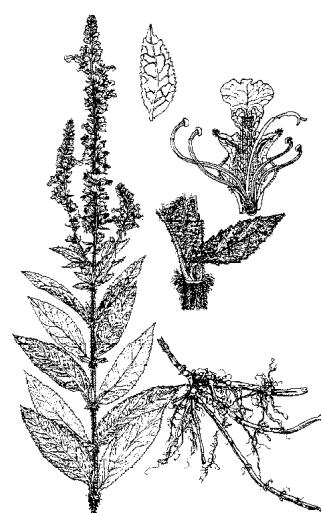
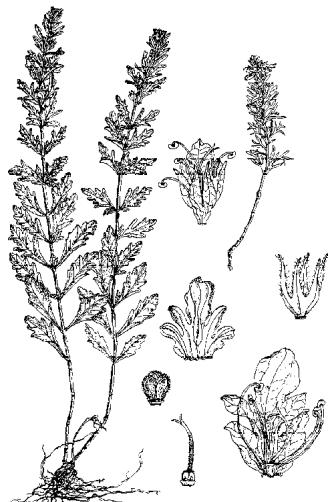
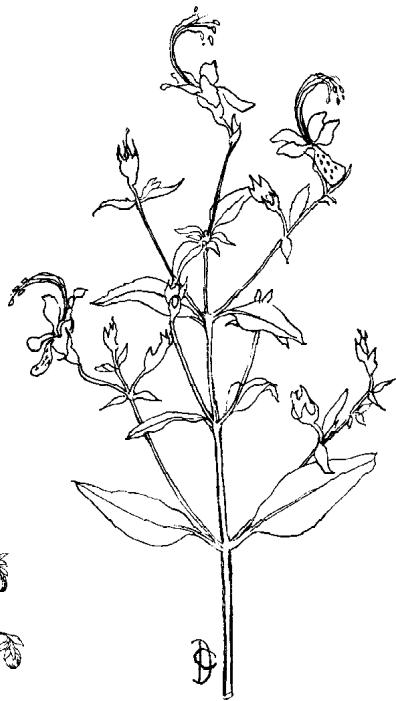
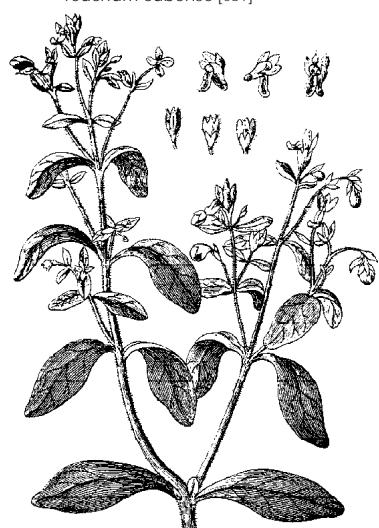
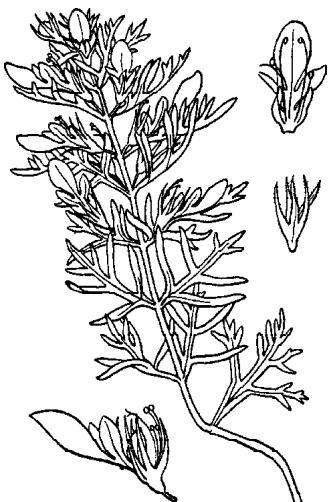
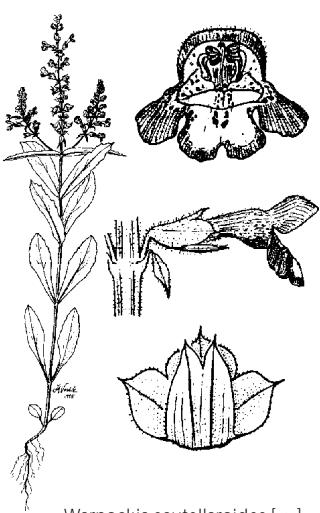
FAMILY RECOGNITION IN THE FIELD: aromatic shrubs or small trees with alternate simple leaves; flowers small; petals absent; anthers opening by valves or flaps; fruit a small drupe.

REFERENCES: Wood 1958; Rohwer 1993a; van der Werff & Richter 1996; van der Werff 1997a.

1. Leaves completely unlobed, pinnately veined with 5–7 pairs of nerves originating from along the midvein; young twigs brownish; flowers appearing before the leaves _____ **Lindera**
1. Leaves often with 1 or 2 conspicuous side lobes (rarely up to 4), with 3 main veins from near the base of the blade; young twigs yellowish green; flowers appearing with the young leaves _____ **Sassafras**

LINDERA SPICEBUSH, WILD ALLSPICE, FEVERBUSH

☛ A genus of ca. 100 species (Wofford 1997) of aromatic trees primarily of tropical and temperate Asia, with 2 in e North America. (Named for Johann Linder, 1676–1723, Swedish botanist)
 REFERENCE: Wofford 1997.

*Stachys crenata* [BT3, SM2]*Stachys tenuifolia* [BB2, GLE]*Teucrium canadense* [co1]*Teucrium cubense* [co1]*Trichostema dichotomum* [DOR]*Trichostema brachiatum* [LAM]*Teucrium laciniatum* [BB2]*Warnockia scutellaroides* [PSE]

Lindera benzoin (L.) Blume var. **pubescens** (E.J. Palmer & Steyermark) Rehder, (sp. from an Arabic word meaning aromatic gum; var: pubescent, downy), SPICEBUSH. Dioecious or polygamo-dioecious shrub or small tree to ca. 5 m tall, much branched; young branches pubescent; leaf blades (4-)6-15 cm long, 2-6 cm wide, mostly obovate to elliptic to ovate, entire, cuneate or tapering at base, glaucous and pubescent below, very aromatic with a spicy odor; petioles ca. 10 mm long; flowers and fruits along the branches and at their tips, in numerous nearly sessile clusters at the nodes; flowers fragrant; sepals 6, yellow; pistillate flowers with ca. 12-18 rudimentary stamens; drupes red, 6-10 mm long, 3-7 mm wide, on pedicels 3-5 mm long. Rich woods, along streams; Bell Co. on s margin of nc TX and Lamar Co. in Red River drainage; mainly Edwards Plateau and e TX. Mar-Apr. SPICEBUSH is so aromatic that even brushing against the plant makes you aware of its presence. The leaves were formerly used to make a tea and the fruits as an allspice substitute (Mabberley 1987). The fruits are bird-dispersed (Moore & Willson 1982) and have a high lipid content (ca. 37%) which makes them particularly attractive to migratory birds which have high energy demands (Stiles 1984).

SASSAFRAS

— A genus of 3 species with 2 in e Asia and 1 in e North America; this disjunct distribution pattern is discussed under the genera *Campsis* (Bignoniaceae) and *Carya* (Juglandaceae). (Probably derived by French or Spanish settlers from a Native American name for the plant)

REFERENCES: Rehder 1920; van der Werff 1997b.

Sassafras albidum (Nutt.) Nees, (white), SASSAFRAS. Dioecious, usually small tree with spicy aromatic bark; leaves ovate to elliptic in outline, entire, unlobed or 2-3 (rarely more) -lobed, 6-12(-18) cm long, 2-8(-10) cm wide, aromatic when crushed, densely pubescent beneath, at least when young; flowers and fruits at the branch tips; flowers in stalked, branched clusters; sepals 3-4 mm long, greenish yellow or yellow; pistillate flowers with 6 rudimentary stamens; fruit a subglobose to ovoid, blue-black drupe ca. 6-10(-15) mm long, on an elongate (3-4 cm) reddish pedicel, the upper part of which grades into a reddish, cup-like structure enclosing the base of the fruit. Forest margins, old fields, fencerows; Fannin and Lamar cos. in Red River drainage, also Delta and Hopkins cos. (Little 1971); mainly se and e TX. Mar-Apr. [*S. albidum* var. *molle* (Raf.) Fernald] The blue-black fruit contrasting with the reddish pedicel is an example of a bi-color fruit display, thought to be more effective than a single color at attracting birds which act as dispersal agents (Willson & Thompson 1982). Dried SASSAFRAS leaves are the file of Creole file gumbo; the species is also used for light timber and the oil medicinally, including killing lice and for insect bites; the bark of the roots has been used to flavor root beers and to make sassafras tea. However, the plant contains safrole (an allylbenzene) which is considered by the FDA to cause cancer; it also has weak hepatotoxic and mutagenic potential; its use as a flavoring is now prohibited and interstate marketing of SASSAFRAS for sassafras tea has been banned by the FDA (Fuller & McClintock 1986; Mabberley 1987; Duke 1985; McGuffin et al. 1997). ☣

LENTIBULARIACEAE BLADDERWORT FAMILY

— A small (245 species in 3 genera), cosmopolitan family of aquatic or moist area herbs. The Lentibulariaceae as a whole, and *Utricularia* in particular, are well known as insectivorous/carnivorous; this family and the unrelated Droseraceae (SUNDEWS) and Sarraceniaceae (PITCHER-PLANTS) are the only such groups within nc TX. As with other carnivorous plants, nutrients (especially nitrogen), rather than calories, are obtained through carnivory. Some authorities believe the Lentibulariaceae is derived from the Scrophulariaceae. Family name conserved from *Lentibularia*, a genus now treated as *Utricularia* (the name *Utricularia* was published earlier and thus has priority in terms of nomenclature). (Latin: *lens*, *lensis*, shaped

like the seed of the lentil, lens-shaped; presumably in reference to the lens-like shape of some part of the plant, possibly the bladders) (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: aquatic or wet area insectivorous herbs with small, *bladder like traps*; leaves or their segments *thread-like* [these “leaves” may actually be stem tissue]; corollas 2-lipped, yellow.

REFERENCE: Barnhart 1916.

UTRICULARIA BLADDERWORT

Ours small, glabrous, perennial herbs, floating in clear water or stranded or buried in mud or wet sand, bearing small bladder-like traps for capturing small aquatic organisms; leaves alternate or whorled, linear-filiform or mostly cut into thread-like segments (while leaves are often recognized in this group, all vegetative structures may actually be stem tissue, some of which can be leaf-like—Godfrey & Wooten 1981); flowers solitary or racemose, on naked, erect peduncles; calyces 2-lipped; corollas yellow, 2-lipped, spurred at base; stamens 2; pistil 1; ovary superior; style and stigma 1; fruit a capsule.

► A cosmopolitan (especially tropical) genus of 180 species of aquatics, epiphytes, and twiners. They possess bladders with trap doors; when triggered by a microscopic animal, the prey is sucked into the bladder, the door closes, and nutrients are absorbed from the victim. The trap is set by removal of most of the water in the bladder resulting in lower pressure inside the bladders than outside. When a prey touches one or more of the trigger hairs on the door, the door opens and water rushes in carrying the prey. Trapping is extremely rapid, usually within 1/50 of a second (Pietropaolo & Pietropaolo 1986). *Utricularia* species can become noxious aquatic weeds in rice fields in some parts of the world (Woodland 1997). (Latin: *utriculus*, a little bladder, from the bladder-like traps)

REFERENCES: Rossbach 1939; Reinert & Godfrey 1962; Pietropaolo & Pietropaolo 1986; Taylor 1989.

1. Leaves minute and linear (not branched) or none; plant usually terrestrial (can be aquatic); inflorescences to 35 cm tall; corollas 15–25 mm high (from tip of spur to tip of upper lip) and nearly as wide _____ ***U. cornuta***
1. Leaves 1–3 times finely dichotomously branched; plant forming mats in water or on mud; inflorescences to 15 cm tall (usually shorter); corollas 6–12 mm high, 6–8 mm wide _____ ***U. gibba***

Utricularia cornuta Michx., (horned), HORNED BLADDERWORT. Leaves inconspicuous, usually underground, usually seen only by carefully washing away soil; flowers 1–several (rarely up to 9), the spur 7–12 mm long, conspicuous; seeds reticulate, not winged. Wet soils or bogs or at edge of water; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly e TX w to at least Henderson Co. near e margin of nc TX, also Edwards Plateau. May–Sep.

Utricularia gibba L., (swollen on one side), CONE-SPUR BLADDERWORT. Leaves usually conspicuous on the stems, forked 1–3 times; flowers 1–4, the spur inconspicuous; seeds smooth, broadly winged. Shallow water and mud; Bell, Dallas, Fannin, Grayson, Henderson, and Tarrant cos.; se and e TX w to Rolling Plains and Edwards Plateau. May–Aug. Including [*U. biflora* Lam.] previously separated on the basis of the leaves forking 2–3 times. ☒/108

LINACEAE FLAX FAMILY

► A small (250 species in 14 genera), cosmopolitan family of herbs, shrubs, lianas, and trees, sometimes cyanogenic. Some yield timber, edible fruit, or are cultivated as ornamentals; *Linum usitatissimum* L. is the source of flax (fibers used in linen, fine writing paper, and cigarette paper) and linseed oil. (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: herbs with alternate, simple, entire leaves; flowers with 5 easily lost petals; stamens connate basally around the superior ovary; fruit a capsule.

REFERENCES: Small 1907b; Robertson 1971; Rogers 1984.

LINUM FLAX

Ours annual or perennial herbs; leaves alternate, opposite or whorled, sessile, simple, entire; stipular glands present or not so; flowers in terminal cymes or sometimes in racemose or paniculate inflorescences; sepals 5; petals 5, falling early, often showy, blue, white, yellow, or yellow with red at base (or red in 1 introduced species rare in nc TX); stamens 5; staminodes 5; ovary 5-carpellate, superior; capsules globose, dehiscing in 5 or 10 segments.

—A genus of ca. 180 species of temperate and subtropical areas, especially the Mediterranean. Many species are cultivated as ornamentals; some as a source of fibers. Use of a hand lens to examine cilia and glands on the margins of sepals is often necessary for definitive identification. The petals of some species fall off at the slightest disturbance or in very hot weather (Kirkpatrick 1992). (Latin: *linum*, classical name of flax; this word is also the source of the words linen, linseed, and lingerie—Ajilvsgi 1984)

REFERENCES: Rogers 1963, 1964, 1968; Mosquin 1971.

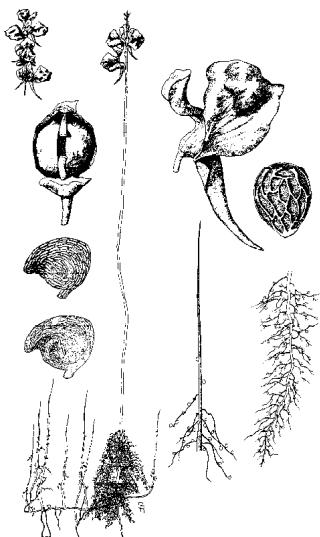
1. Petals blue or rarely white.
 2. Sepals (at least alternate ones) ciliate-margined, 6–8 mm long; pedicels erect after flowering; stigmas slender, not capitate; introduced species _____ **L. usitatissimum**
 2. Sepals entire-margined or nearly so, 3.5–5 mm long; pedicels becoming reflexed after flowering; stigmas capitate; native species _____ **L. pratense**
1. Petals yellow or orange, often partly red-brown, OR red (in one introduced species rare in nc TX).
 3. Flowers red; introduced species known in nc TX only from s and w part of area _____ **L. grandiflorum**
 3. Petals yellow or orange, often partly red-brown; widespread native species.
 4. Styles separate or united only at base; fruits ultimately dehiscing into 10 one-seeded segments.
 5. Outer sepals entire; stipular glands not present at bases of leaves.
 6. Petals 5–8 mm long; margins of inner sepals with conspicuous stalked glands; mature fruits in dried specimens usually adhering to the plant; leaf blades narrowly lanceolate or narrowly oblanceolate, 3.5 mm or less wide _____ **L. medium**
 6. Petals 2.5–4.5 mm long; margins of inner sepals glandless or with very inconspicuous glands; mature fruits in dried specimens usually soon shattering; leaf blades elliptic to oblanceolate or obovate, to 10 mm wide _____ **L. striatum**
 5. All sepals with glandular teeth; stipular glands present at bases of most or all leaves.
 7. Plants annual, typically with 1 main stem and a rather small taproot; styles united at the base _____ **L. sulcatum**
 7. Plants perennial, typically with several stems from a hardened or enlarged base; styles completely separate.
 8. Leaves lanceolate to oblanceolate or broader, some of the lower ones in whorls of 4; petals 3–6 mm long; probably only to the w of nc TX _____ **L. schiedeanum**
 8. Leaves linear, the lower ones alternate or opposite; petals 6–10 mm long; widespread in nc TX _____ **L. rupestre**
 4. Styles united at least beyond the middle and often to near the summit; fruits dehiscing along the false septa into 5 two-seeded segments.
 9. Leaves 5–10 mm long; petals usually 6.5–12 mm long; sepals entire or fringed, not glandular-toothed; flowers few, mostly terminating leafy branches.
 10. Upper leaves and bracts sparsely but conspicuously ciliate-margined (use hand lens); upper stems and pedicels short hirsute; petals 6.5–8 mm long _____ **L. imbricatum**



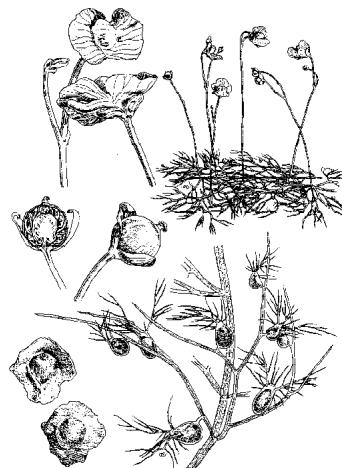
Lindera benzoin var. pubescens [VIN]



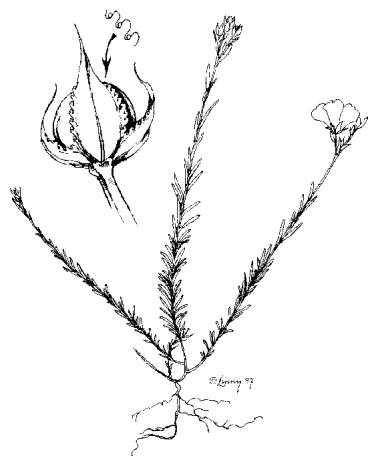
Sassafras albidum [SA3]



Utricularia cornuta [GWO]



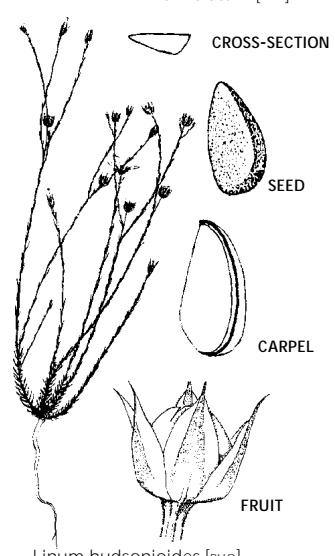
Utricularia gibba [MAS]



Linum alatum [HEA]



Linum grandiflorum [NIC]



Linum hudsonioides [RHO]

10. Upper leaves and bracts not ciliate-margined; upper stems and pedicels with hairs
only on the angles; petals 8–12 mm long _____ **L. hudsonioides**
9. Leaves 10–30 mm long; petals usually 10–18 mm long; sepals glandular-toothed; flowers
in racemose or paniculate inflorescences.
11. Outer sepals ovate, the broad scarious margins irregularly crenate, each of the coarse
teeth bearing a delicate gland; in nc TX only on the e margin (Milam Co.) _____ **L. alatum**
11. Outer sepals lanceolate or narrower, the margins not scarious or narrowly so, regu-
larly (though sometimes sparsely) minutely serrate with gland-tipped teeth; wide-
spread in nc TX _____ **L. rigidum**

Linum alatum (Small) H.K.A. Winkl., (winged). Glabrous annual 10–40 cm tall; leaves linear to linear-lanceolate, alternate or lowest opposite; petals 10–18 mm long, yellow with reddish base. Open sandy areas; Milam Co. (Rogers 1968); mainly se TX. Mar-Jul.

Linum grandiflorum Desf., (large-flowered), FLOWERING FLAX. Erect annual 30–60 cm tall; leaves oblong to lanceolate, 10–20 mm long; sepals ciliate; petals 15–30 mm long, various shades of red; anthers blue. Roadsides; Fort Hood (Coryell Co.—Sanchez 1997), also Brown and Lampasas (J. Stanford, pers. comm.), and Tarrant (R. O'Kennon, pers. obs.) cos; according to J. Stanford (pers. comm.), this species has been introduced along roadsides in c TX. Native of n Africa. ☿

Linum hudsonioides Planch., (resembling *Hudsonia*—beach-heath in the Cistaceae). Annual 5–30 cm tall, glabrous except on angles of upper stem; leaves linear to linear-lanceolate, 10 mm or less long; petals yellow, with or without a brick-red base. Sandy or gravelly areas; Bosque, Jack, and Wise cos., also Clay, Dallas (Rogers 1968), Brown, Callahan, Eastland, Erath, Hood, and Mills (Rogers 1963) cos; Post Oak Savannah s and w to w TX. Mar-Sep.

Linum imbricatum (Raf.) Shinners, (overlapping in regular order like tiles), TUFTED FLAX. Glabrous, erect to spreading annual 3–30 cm tall, usually with several stems, sparingly branched above; leaves conspicuously overlapping; petals yellow, with or without red-brown base. Sandy or rocky open ground; Bell, Burnet, Cooke, Hamilton, Hunt, and Montague cos., also Grayson (Rogers 1968), Dallas, McLennan, and Navarro (Rogers 1963) cos; nc to s TX. Apr-early May.

Linum medium (Planch.) Britton var. **texanum** (Planch.) Fernald, (sp.: intermediate; var.: of Texas), TEXAS FLAX, SUCKER FLAX. Erect glabrous perennial 20–80 cm tall; leaves narrowly lanceolate, 10–25 mm long; petals yellow. Open areas, often in sandy soils; Fannin, Hunt, Kaufman, Milam, Parker, and Tarrant cos., also Lamar Co. (Carr 1994); se and e TX w to nc TX. Mar-Aug.

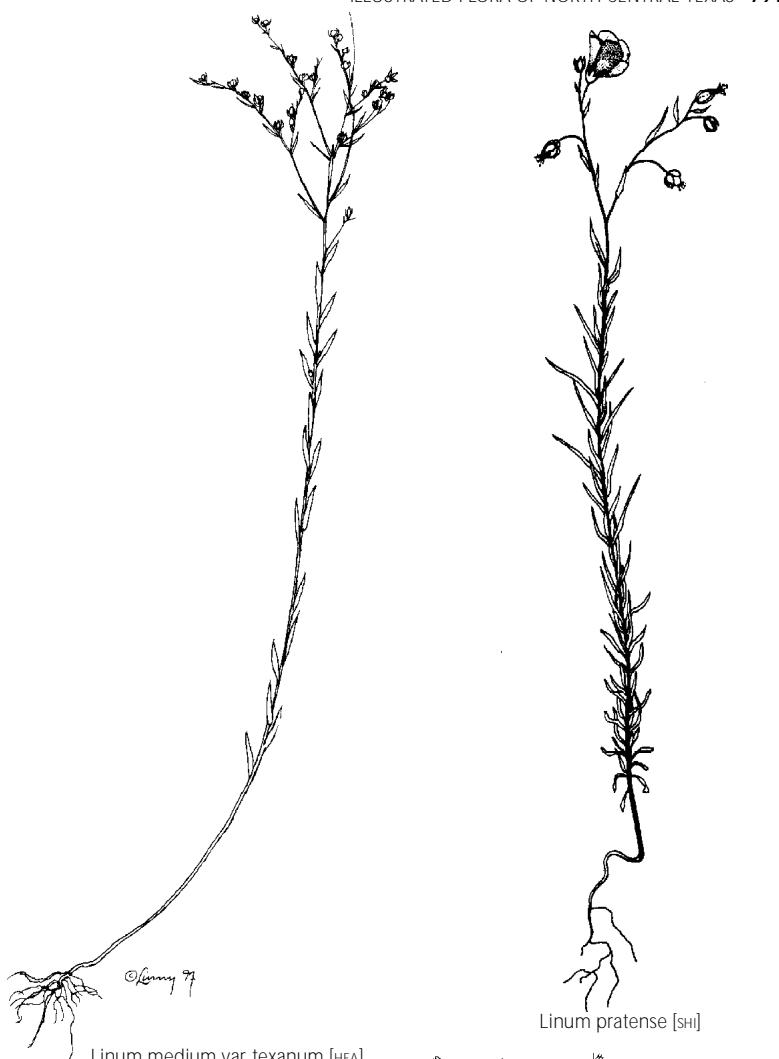
Linum pratense (J.B. Norton) Small, (of meadows), MEADOW FLAX, NORTON'S FLAX. Glabrous annual; stems erect to partly prostrate, to 60 cm long, sometimes flowering when quite small; leaves linear to linear-lanceolate, 10–20 mm long; pedicels becoming reflexed after flowering; petals blue or rarely white, 5–14 mm long; styles mostly 3 mm long or less; capsules 4–6 mm long. Rocky limestone to sandy soils, prairies or disturbed ground; widespread in TX, mainly Blackland Prairie w to Panhandle and Edwards Plateau. Late Mar-May.

Linum rigidum Pursh, (stiff). Glabrous, erect or ascending annual to 40 cm tall, usually widely branched above; flowers showy; sepals 6–12 mm long; petals (9–)12–16(–19) mm long; fruits 3.5–4.7 mm long. Rocky or sandy areas, disturbed prairies or open ground. Mid-Apr-early Jun. This species, reported to contain a saponin, has been implicated in livestock poisoning (Lewis & Elvin-Lewis 1977). ☠

1. Fruits thick-walled, opaque, broadly ovoid, tapering abruptly to the flattened base; usually with
stipular glands _____ var. **berlandieri**
1. Fruits thin-walled, translucent (dark seeds commonly evident through the wall), elliptic, the base
rounded; without stipular glands _____ var. **rigidum**



Linum imbricatum [HEA, RHO]



Linum medium var. texanum [HEA]

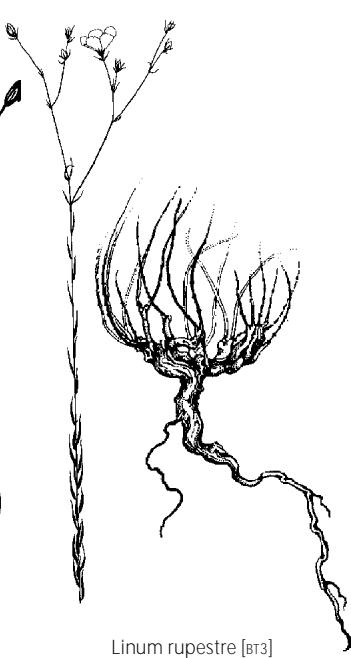
Linum pratense [SHI]



Linum rigidum var. berlandieri [BT3]



Linum rigidum var. rigidum [BB2]



Linum rupestre [BT3]

var. **berlandieri** (Hook.) Torr. & A. Gray, (for Jean Louis Berlandier, 1805–1851, French botanist who explored TX, NM, and Mexico, and one of the first botanists to make extensive collections in TX), BERLANDIER'S FLAX. Leaves linear-lanceolate or lanceolate, acute, 1–4.1 mm wide, usually with stipular glands; petals usually 13–16 mm long, deep yellow with broad, deep brown-red basal zone; sepals 7–9 mm long in flower. Widespread in TX, but mainly Blackland Prairie s and w throughout most of TX. [L. *berlandieri* Hook.] While often treated as a separate species (e.g., Kartesz 1994; Jones et al. 1997), because of hybridization and introgression, we follow Rogers (1968) and McGregor (1986) in keeping this taxon as a variety of *L. rigidum*. ☒/95

var. **rigidum**, STIFF-STEM FLAX. Leaves linear, acute or acuminate, 1–2 mm wide, without stipular glands; petals mostly 12–14 mm long, coppery yellow or orange, red-lined or with short, pale to deep brown-red zone at base; sepals 6–7.5 mm long in flower. Montague, Tarrant, and Wise cos.; mainly nc TX nw to Panhandle.

Linum rupestre (A. Gray) Engelm. ex A. Gray, (rock-loving), ROCK FLAX. Glabrous perennial 20–70 cm tall; leaves linear or nearly so; petals clear yellow. Limestone outcrops; Bell, Hood, Johnson, Parker, Somervell, and Tarrant cos.; widespread in TX, but mainly Trans-Pecos to Edwards Plateau, ne to nc TX. May–Jun.

Linum schiedeanum Schltdl. & Cham., (for Christian J.W. Schiede, d. 1836, German-born physician who collected plants in Mexico). Perennial to 39(–68) cm tall; petals lemon-yellow. Open or semi-shaded areas, calcareous soils; reported as occurring in vegetational area 5 (Fig. 2) by Hatch et al. (1990), but according to Rogers (1968) limited to the Trans-Pecos. Jun–Aug.

Linum striatum Walter, (striated, striped), RIGID FLAX. Glabrous perennial 30–100 cm tall, usually with several stems from base; petals yellow. Open or semi-shaded wet areas; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly se and e TX. May–Aug.

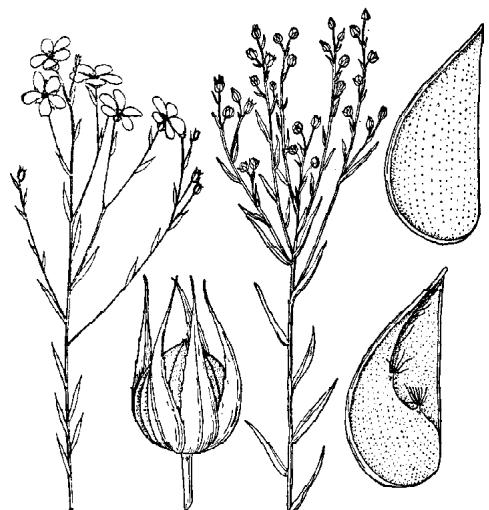
Linum sulcatum Riddell, (furrowed), GROOVED FLAX. Glabrous erect annual 20–80 cm tall, loosely branched above; leaves linear to linear-lanceolate; petals 5–10 mm long, pale yellow. Sandy open woods and prairies; Hopkins and Kaufman cos., also Montague and Tarrant cos. (Mahler 1988); se TX and Post Oak Savannah w to West Cross Timbers and Edwards Plateau. Jun–Oct.

Linum usitatissimum L., (most useful), COMMON FLAX, CULTIVATED FLAX, LINAZA. Erect, glabrous annual 35–90 mm tall; leaves linear to linear-lanceolate, 12–30 mm long; pedicels erect after flowering; petals 11–15 mm long, blue or rarely white; sepals (at least alternate ones) ciliate-margined; stigmas slender, not capitate; capsules 6–8 mm long. Cultivated and escapes; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); widely scattered in TX. Apr–May. Native of Mediterranean region. The flax of commerce is a fiber derived from this species; the fibers have great tensile strength and are used for such things as linen, thread, carpets, and paper; the seeds yield linseed oil, used in food-processing, paints, varnish, printing inks, and water-proofing (Mabberley 1987). FLAX is thought by some to be one of the oldest known textile plants; it was used in Egypt as long ago as the fourth millennium BC (Hepper 1992) and linen objects were found in the tomb of Tutankhamun (Hepper 1990). The leaves and seed chaff contain a poisonous cyanogenic glycoside, linamarin; livestock fatalities from eating the plant are known to have occurred (Kingsbury 1964). ☒ ☐

Linum lewisii Pursh, (for Meriwether Lewis, 1774–1809, explorer, naturalist, and leader of expedition with William Clark), LEWIS' FLAX, BLUE FLAX, PRAIRIE FLAX, native to the Trans-Pecos, is used in some wildflower mixes and has been planted in Parker Co.; it is apparently persisting. It can be distinguished by the combination of its blue or rarely white petals 10–15 mm long, inner sepals entire, styles usually 4 mm or more long, stigmas capitate, fruiting pedicels spreading or recurved, and its cespitose perennial habitat.



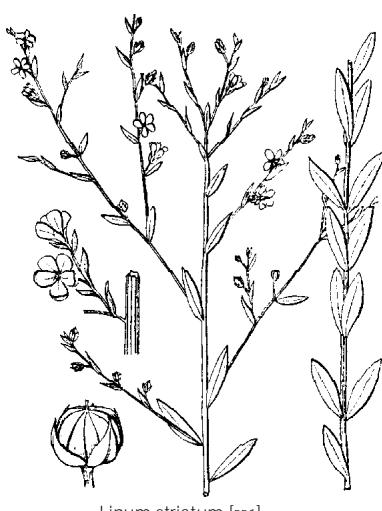
Linum schiedeanum [HEA]



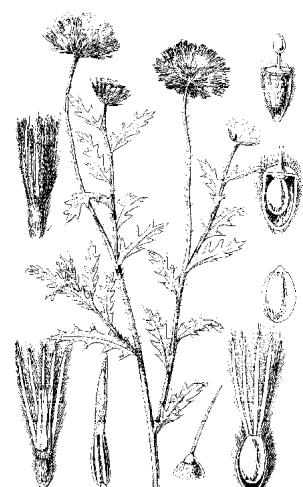
Linum sulcatum [GLE, STE]



Linum usitatissimum [JAM]



Linum striatum [BB1]



Cevallia sinuata [IPL]



Mentzelia decapetala [GLE]

LOASACEAE

STICKLEAF OR BLAZINGSTAR FAMILY

Brittle-stemmed annuals or perennials often with barbed or stinging hairs, with papery or flaky bark on older parts; leaves usually alternate (sometimes subopposite), sessile or short-petioled, simple, toothed or lobed, in our species scabrous-pubescent or hispid; flowers terminal, solitary, corymbose, or in head-like clusters; calyces with cylindrical tube and 5 slender lobes; petals 5 or ca. 10, attached to summit of calyx tube; stamens 5 to many, with or without prominent appendages, attached next to the petals, or inside narrow to petal-like staminodia (= modified sterile stamens); ovary inferior, unilocular, with 1–5 placentae, with 1–many ovules; fruit a capsule or in *Cevallia* achene-like.

— A small (260 species in 14 genera), largely herbaceous (some shrubs or small trees) family mainly of tropical and subtropical America with some in Africa and Arabia. They often have coarse, multicellular, silicified or calcified hairs, these sometimes stinging or often glandular; the hairs can have harpoon-like barbs. It is a family whose phylogenetic affinities have been unclear; recent molecular analyses (Xiang et al. 1993, 1998) suggest that *Cornus*, Nyssaceae, Hydrangaceae, and Loasaceae, as well as several other groups, form a “cornaceous clade.” Family name from *Loasa*, a genus of 105 species of herbs and subshrubs usually with stinging hairs; native from Mexico to South America, especially in the mountains. (Name derived from a South American native name) (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: usually herbs with alternate leaves; rough, *barbed or stinging hairs* present; stamens variable in number but often numerous; petals 5 or often more than 5.

REFERENCES: Ernst & Thompson 1963; Thompson & Powell 1981; Kaul 1986d.

1. Flowers in tight, head-like clusters on long peduncles; stamens 5, with prominent, spatulate, inflated appendages extending beyond the anthers; plants with stinging hairs; fruits indehiscent, 1-seeded _____ **Cevallia**

1. Flowers solitary or cymose; stamens 10 to numerous, without appendages; stinging hairs absent; fruits dehiscent, 2–many-seeded _____ **Mentzelia**

CEVALLIA STINGING CEVALLIA, SHIRLEY'S-NETTLE

— A monotypic genus of sw North America. (Derivation of generic name unknown)

Cevallia sinuata Lag. (with wavy margins), STINGING CEVALLIA, SHIRLEY'S-NETTLE. Low, clump-forming, suffrutescent perennial to 60 cm tall; stems and leaves tomentose and armed with long stinging hairs; leaves oblong, pinnately lobed or coarsely toothed, to 5 cm long and 2.5 cm wide, sessile; flowers opening in the morning; calyx lobes and petals narrowly linear, pilose, ± yellow to orange or reddish, very similar to each other. Open areas, rocky or gravelly ground; Clay Co. (Mahler 1988); West Cross Timbers s and w to w TX. Jun-Jul. The stinging hairs look like tiny glass trees when examined with a hand lens; they contain formic acid and can produce a severe skin rash (Ajlvsgj 1984). According to Lampe (1986), only four families (Euphorbiaceae, Hydrophyllaceae, Loasaceae, and Urticaceae) have stinging hairs—nc TX has stinging representatives of all of these except the Hydrophyllaceae. ☣ ☒/83

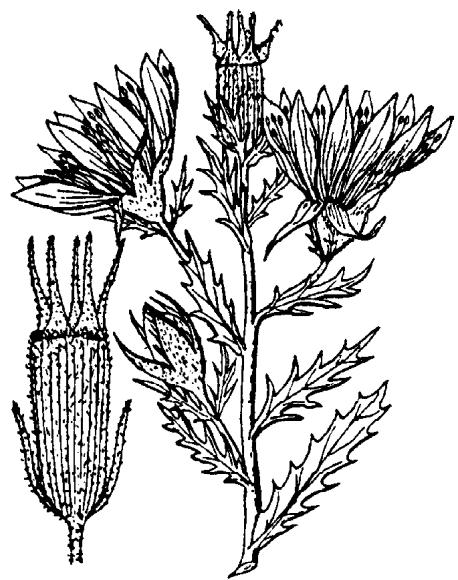
MENTZELIA STICKLEAF

Herbaceous perennials or biennials; hairs barbed but not stinging; stems whitish; leaves lobed or entire, petiolate or sessile; flowers 5-merous; stamens 10 to numerous; petal-like modified stamens sometimes present.

— A genus of 60 species of warm areas of the Americas including some cultivated ornamen-



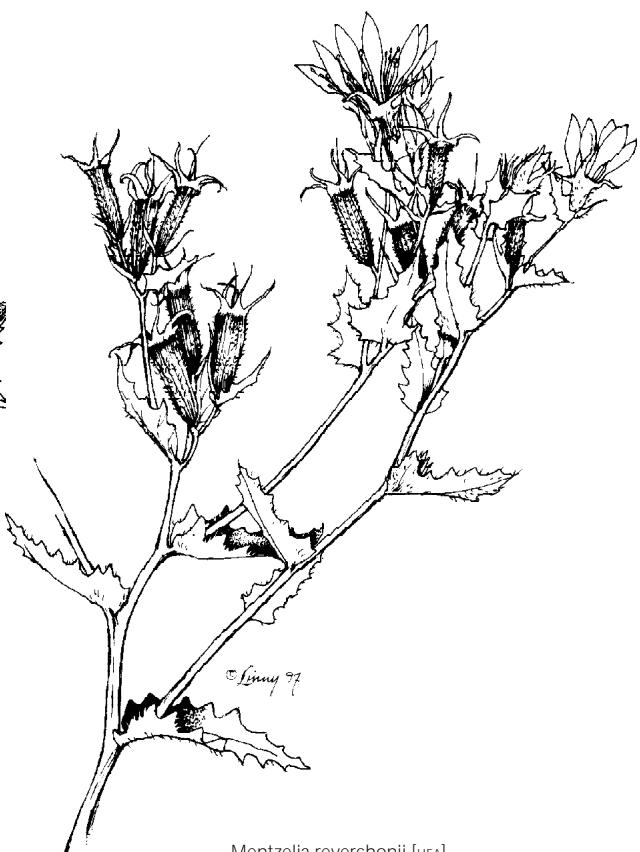
Mentzelia albescens [HEA]



Mentzelia nuda [BB2]



Mentzelia oligosperma [GLE]



Mentzelia reverchonii [HEA]

tals. The leaves of some species have a pubescence that gives them a sandpaper-like feel and causes them to attach to clothes and animal fur—hence the common name; this is problematic for sheep ranchers and can lower the market value of the fleece (Wills & Irwin 1961). (Named for Christian Mentzel, 1622–1701, German botanist)

REFERENCES: Osterhout 1902; Darlington 1934.

1. Petals 5, usually orange (rarely yellow), 8–15 mm long; seeds not winged; filaments narrow; staminodia (= modified sterile stamens) absent; flowers opening in early morning _____ **M. oligosperma**
1. Petals (including petal-like modified stamens) more than 5, yellow to white, 6 mm or more long (except in the small-flowered *M. albescens*, the petals are 15 mm or more long); seeds winged; filaments of outer fertile stamens sometimes broadened; staminodia sometimes present; flowers opening in late afternoon or early evening.
 2. Petals light yellow to yellow, 6–30 mm long; calyx lobes 3–12 mm long; styles 4–17 mm long.
 3. Petals 6–11 mm long, light yellow, lanceolate to ± ovate; calyx lobes 3–6 mm long, styles 4–6 mm long _____ **M. albescens**
 3. Petals 15–30 mm long, yellow, spatulate; calyx lobes 10–12 mm long; styles 11–17 mm long _____ **M. reverchonii**
 2. Petals white to cream, 25–80 mm long; calyx lobes 10–40 mm long; styles 18–60 mm long.
 4. Petals 25–40 mm long; calyx lobes 10–19 mm long; styles 18–30 mm long _____ **M. nuda**
 4. Petals 40–80 mm long; calyx lobes 25–40 mm long; styles 50–60 mm long _____ **M. decapetala**

Mentzelia albescens (Gillies & Arn.) Griseb., (whitish), WAVY-LEAF MENTZELIA. Stems to 0.6 m tall; flowers opening in late afternoon; stamens 40 or less, with 5 of the outer stamens petaloid (these together with 5 true petals make the flowers appear to have 10 petals); capsules cylindric, 20–30 mm long; seeds flattened, winged. Disturbed sites; Archer and Parker cos. in w part of nc TX, Hatch et al. (1990) also cited vegetational areas 4 and 5 (Fig. 2); mainly Rolling Plains and Edwards Plateau w to w TX. May–Aug.

Mentzelia decapetala (Pursh ex Sims) Urb. & Gilg ex Gilg, (ten-petaled), TEN-PETAL MENTZELIA. Stems to 1 m tall; flowers large, opening about 1 hour after sunset; petals ca. 10 (the inner 5 smaller and representing petaloid stamens), 10–20 mm wide; stamens numerous; capsules 3–4.5 cm long; seeds flattened, winged. Disturbed habitats; Dallas Co. (on Austin Chalk on Cedar Hill); nc TX w to Panhandle. Usually Jun–Aug.

Mentzelia nuda (Pursh) Torr. & A. Gray, (naked), BRACTLESS MENTZELIA, SAND-LILY, POOR-MAN'S PATCHES, STARFLOWER. Stems to 1 m tall, usually unbranched below, branched above; flowers opening in late afternoon; bracts subtending flowers serrate to laciniate; petals ca. 10, 3–10 mm wide; stamens numerous; narrow staminodia (= modified sterile stamens) present, some nearly as long as the petals; capsules cylindrical, 18–30 mm long; seeds flattened, winged. Usually sandy soils, prairies; Palo Pinto and Young cos., also Dallas Co. (Mahler 1988); nc TX s and w to w TX. Jun–Oct. The leaves adhere tenaciously to clothing or hair and can be problematic to sheep ranchers because of their tendency to stick in sheep's wool (Kirkpatrick 1992). While [var. *stricta* (Osterh.) H.D. Harr] is sometimes recognized (e.g., Kartesz 1994; Jones et al. 1997), we are following Correll and Johnston (1970), Kaul (1986d), and Hatch et al. (1990) in lumping this variety. Jones et al. (1997) listed only var. *stricta* for TX. If varieties are recognized, nc TX plants best fit var. *stricta*. [*M. stricta* (Osterh.) G.W. Stevens, *Nuttallia nuda* (Pursh) Greene, *Nuttallia stricta* (Osterh.) Greene] Rydberg (1932) separated the 2 (as species of *Nuttallia*) as follows:

1. Plant branched below; flowers subtended by solitary entire bracts _____ var. *nuda*
1. Plant simple below; flowers subtended by several toothed bracts _____ var. *stricta*

Mentzelia oligosperma Nutt. ex Sims., (few-seeded), STICKLEAF, CHICKENTHIEF, REGAHOSA.

Rounded semi-woody perennial; stems 0.2–0.6(-1) m tall; roots enlarged; flowers opening in early morning; petals 5, 3–4 mm wide, usually orange (reported as varying to yellow by Kaul 1986d); stamens 15–40, all fertile; styles 7–10 mm long; capsules cylindrical, 7–13 mm long; seeds oblong, 3-angled. Limestone soils; Blackland Prairie s and w to w TX, also se TX. Late May-Jun. This is the most common *Mentzelia* in nc TX.

Mentzelia reverchonii (Urb. & Gilg) H.J. Thomps. & Zavort., (for Julien Reverchon, 1837–1905, a French-American immigrant to Dallas and important botanical collector of early TX), PRAIRIE STICKLEAF, BUENA MUJER. Stems to 1 m tall; flowers opening in late afternoon; petals apparently more than 10, yellow; stamens numerous; narrow staminodia present; capsules cylindrical, 15–30 mm long; seeds flattened, winged. Limestone or gravel soils; Archer, Shackelford, and Young cos; apparently widespread in TX, but mainly extreme w part of nc TX s and w to w TX. May–Sep. The leaves cling tightly to clothing or animal hair due to the presence of barbed hairs; this has given rise to the Spanish common name BUENA MUJER meaning good woman in English (Ajilvsgi 1984).

LOGANIACEAE STRYCHNINE OR LOGANIA FAMILY

Ours annual or perennial herbs or high-climbing, twining, woody vines; leaves opposite, sessile or short-petioled, simple, entire or nearly so; leaf bases connected around the stem by united short stipules or a stipular ridge; flowers sessile or short-pedicelled, terminal or axillary, solitary or in cymes or cymose spike-like inflorescences; corollas funnellform to salverform or nearly tubular, 5-lobed; sepals 5, united at least basally; stamens 5; pistil 2-carpellate; ovary superior; fruit a capsule or separating into 2 carpels at maturity.

— A medium-sized (ca. 570 species in 29 genera) tropical to temperate family of herbs, shrubs, trees, and vines. ☠ The family contains numerous extremely poisonous and medicinal plants (due to alkaloids, iridoids, and saponins) such as *Strychnos nux-vomica*L. (source of strychnine); some were used as arrow poisons in South America and as ordeal poisons in Africa; the family also includes ornamentals such as *Gelsemium* (CAROLINA or YELLOW JESSAMINE). *Polyppodium*, here treated in the Buddlejaceae, is sometimes placed in the Loganiaceae. Family name from *Logania*, a genus of 15 species native from Australia to New Caledonia and New Zealand. (Named for James Logan, 1674–1751, Irish botanist and writer, William Penn's agent in the U.S., and governor of Pennsylvania) (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: herbs or vines with opposite simple leaves; stipules present; corollas sympetalous, radially symmetrical; fruit a capsule developing from a superior ovary.

REFERENCES: Moore 1947; Rogers 1986; Jensen 1992.

1. Plant an erect or spreading herb < 1 m tall; corollas white, white suffused or lined with pink outside, or red outside and yellowish inside.
2. Corollas 10–50 mm long, white, white suffused or lined with pink outside, or red outside and yellowish inside; fruits separating into 2 carpels at maturity, falling from persistent base; calyces ca. 5–10 mm long or longer; stems pubescent or glabrous _____ **Spigelia**
2. Corollas 1.5–2.5 mm long, white; fruits 2-horned but not separating into 2 carpels at maturity, persistent; calyces ca. 1 mm long; stems glabrous _____ **Mitreola**
1. Plant a twining, high-climbing woody vine; corollas yellow _____ **Gelsemium**

GELSEMIUM YELLOW JESSAMINE

— A genus of 3 species, 2 s U.S. to Guatemala and 1 se Asia to w Malesia. They contain alkaloids and have been used medicinally and ☠ in murder and suicide. (Italian: gelsem ino, jessamine)

REFERENCES: Duncan & Dejong 1964; Ornduff 1970.

Gelsemium sempervirens A. St.-Hil., (evergreen), CAROLINA JESSAMINE, POOR-MAN'S-ROPE, EVENING TRUMPET-FLOWER, YELLOW JESSAMINE. Perennial twining vine; leaves evergreen, opposite; leaf blades ovate to lanceolate or elliptic, to 75 mm long and 30 mm wide, petioles ca. 5 mm long; flowers axillary, solitary or 2–6 in cymes, very fragrant; corollas showy, yellow, funnel-form, 5-lobed, 25–35 mm long; capsules 1.4–2 cm long; seeds winged. Wooded areas and forest margins; Dallas Co., apparently spreading or escaped from cultivation, also Lamar Co. (Carr 1994); mainly se and e TX. Feb–Apr. Numerous alkaloids including sempervirine, gelsemine, and gelsemoidine are found throughout the plant; a tea made from as few as three leaves has been reported to cause death; children have been poisoned by chewing on leaves or sucking nectar; honeybees can also be poisoned and honey derived from the flowers can be lethal; animals may also be poisoned (Muenscher 1951; Hardin & Arena 1974; Westbrooks & Preacher 1986; Leung & Foster 1996). ☣

MITREOLA MITERWORT, HORNPOD

☛ A mainly tropical genus of 6 species. (Greek: *mitra*, mitre or cap, in reference to similarity of the 2-horned fruit to a certain kind of cap)

REFERENCE: Nelson 1980.

Mitreola petiolata (J.F. Gmel.) Torr. & A. Gray, (with a petiole or leaf-stalk), LAX HORNPOD. Glabrous annual herb to ca. 75 cm tall; leaves ovate-elliptic to elliptic-lanceolate, 2–8 cm long, tapering to a petiolate base; flowers in long peduncled cymes; corollas white; capsules 3–4 mm long, the surface smooth or with a few scattered papillae. Wet, sandy areas, ponds, streams; Bell, Burnet, Dallas, and Tarrant cos.; e 1/2 of TX. Jun–Nov. Previously treated in the genus *Cynoctonum*[as *C. mitreola* (L.) Britton].

Mitreola sessilifolia (J.F. Gmel.) G. Don, with leaves broadly oval, sessile, and rarely more than 2 cm long, occurs in se and e TX just to the e of nc TX.

SPIGELIA PINKROOT, WORM-GRASS

Perennial herbs; flowers solitary or in short 1-sided inflorescences; corollas tubular-funnelform or funnelform, with small lobes; calyces with slender lobes; anthers linear; fruits separating into 2 carpels at maturity.

☛ A genus of 50 species of tropical and warm areas of the Americas; species have variously been used as a vermicifer, medicinally, ☣ or as a criminal poison. (Named for Adrian van der Spiegel, Latinized Spigelius, 1578–1625, Dutch professor of anatomy at Padua, who was perhaps the first to give directions for preparing an herbarium)

REFERENCE: Henrickson 1996.

1. Corollas white or white suffused or lined with pink externally, 10–13.5 mm long: plant 5–15(–19) cm tall, much branched from base; leaf blades 1.2–3.5 cm long, 3–13 mm wide, tapering at base _____ **S. hedyotidea**
1. Corollas red outside, yellowish inside, 35–50 mm long: plant 15–80 cm tall, usually with only 1 stem from base; leaf blades 5–12 cm long, 10–60 mm wide, broadly rounded at base _____ **S. marilandica**

Spigelia hedyotidea A. DC., (sweet-ear), PRAIRIE PINKROOT. Plant bushy-branched, low, 5–15(–19) cm tall; stems purplish tinged near base; flowers terminal and in leaf axils, 2 per node; corollas funnelform; anthers and style included; fruit of 2 nearly spheroid cocci, the pair 2.5–3.7 mm long, 5–6 mm wide, glabrous. Limestone outcrops and gravelly soils; Brown (HPC), Bell, McLennan, and Palo Pinto (Henrickson 1996) cos.; s and w parts of nc TX s and w to s TX and Edwards Plateau. May. [*Coelostylis lindheimeri* (A. Gray) Small, *S. lindheimeri* A. Gray] We are following Henrickson (1996) for nomenclature on *Spigelia hedyotidea*.

Spigelia marilandica L., (of Maryland), INDIAN-PINK. Stems erect, unbranched or sparsely so; leaves sessile, entire; flowers showy, in short, 1-sided, terminal inflorescences; corollas tubular-funnelform; anthers and style exserted; fruits 4–6 mm long, 6–10 mm wide. Rich woods; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); mainly e TX. May–Oct. Austin (1975) considered this species adapted for pollination by ruby-throated hummingbirds (*Archilochus colubris*). An alkaloid, spigiline, is present and has been used medicinally as an antihelmintic or vermifuge; convulsions and poisoning have been reported from overdoses (Muenscher 1951; Blackwell 1990). ☣

LYTHRACEAE

CRAPE-MYRTLE OR LOOSESTRIFE FAMILY

Annual or perennial herbs, shrubs, or small trees; leaves opposite or alternate, sessile or subsessile, simple, entire; flowers terminal or axillary, solitary or in cymes, spike-like racemes, or panicles; flowers perigynous; hypanthium cup-shaped or tubular, calyx lobes 4–6; petals 4–6, attached near summit of hypanthium, lavender or pink to red or white, clawed; stamens 6 to many; pistil 2- to 6-celled; ovary superior, free in the hypanthium; fruit a capsule.

☛ A medium-sized (600 species in 27 genera) family of mostly herbs with some shrubs and trees found mainly in the tropics, but with some temperate species; alkaloids are often present. A number of taxa provide dyes (e.g., *Lawsonia*—HENNA), while others are ornamentals including *Cuphea* (CIGAR-FLOWER), *Lythrum* (LOOSESTRIFE), and *Lagerstroemia* (CRAPE-MYRTLE). (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: herbs (or 1 introduced species a shrub or small tree) with simple entire leaves and often 4-angled stems; flowers with a *hypanthium*; petals usually 4 or 6, often *crumpled* like crepe paper, particularly in bud; stamens free, inserted inside the hypanthium below the petals, often unequal in length; fruit a capsule.

REFERENCES: Shinners 1953a; Graham 1975, 1986.

1. Plant a shrub or small tree to ca. 7 m tall; leaves alternate; petals ca. 10–20 mm long (including narrow claw); introduced showy ornamental _____ **Lagerstroemia**
1. Plant herbaceous (stem can be woody at base) < 1.5 m tall (usually much less); leaves opposite, alternate, or whorled; petals 7 mm or less long; native species (also 1 introduced).
 2. Flowers borne in nearly all axils of well-developed stem leaves; petals 0–4, 2.5 mm or less long; fruits subglobose, ca. as wide as long.
 3. Flowers 1 per leaf axil (therefore 2 per node); leaves above mid-stem short-petioled and/or with narrowed base; fruits opening along distinct sutures _____ **Rotala**
 3. Flowers (1–)3–many per leaf axil; leaves above mid-stem sessile, auriculate to cordate at base; fruits opening irregularly _____ **Ammannia**
 2. Flowers borne in axils of reduced leaves along the terminal part of the stem in spike-like inflorescences with reduced leaves or bracts; petals usually 6, 3–7 mm long; fruits cylindric, ca. 2 times as long as wide _____ **Lythrum**

AMMANNIA TOOTHCUP

Glabrous, usually widely branched annual herbs to 60(–100) cm tall; leaves opposite; inflorescences of sessile or stalked axillary cymes of (1–)3–15 flowers; flowers 4-merous; petals small (to 2.5 mm long), quickly deciduous; stamens 4–8; capsules irregularly dehiscent.

☛ A cosmopolitan genus of 25 species, mainly of wet habitats. (Named for Paul Ammann, 1634–1691, German botanist)

REFERENCES: Graham 1979, 1985.

1. Plant delicate in appearance; peduncles filiform, 3–9 mm long; flowers (1–)3–12(–15) per axil, commonly 7; petals deep rose-purple; leaves membranous; capsules (1–)1.5–3(–3.5) mm in diam.; lowest branches much shorter than main stem _____ **A. auriculata**
1. Plant robust in appearance; peduncles stout, 0–4(–9) mm long; flowers usually 1–5 (rarely more) per leaf axil; petals deep rose-purple or pale lavender; leaves fleshy or membranous; capsules 3.5–6 mm in diam.; lowest branches sometimes nearly equal in length to the main stem.

 2. Flowers mostly 1–3 per leaf axil; peduncles essentially absent (inflorescences thus sessile); petals pale lavender; anthers pale yellow; fruits 4–6 mm in diam. _____ **A. robusta**
 2. Flowers mostly 3–5 per leaf axil; peduncles stout, 0–4(–9) mm long; petals deep rose-purple; anthers deep yellow; fruits 3.5–5 mm in diam. _____ **A. coccinea**

Ammannia auriculata Willd., (eared), EAR-LEAF AMMANNIA. Plant to ca. 0.8 m tall; pedicels elongated; anthers deep yellow. In muddy ground about lakes, ponds, and ditches; Denton and Tarrant cos., also Comanche Co. (HPC); nc TX w to Rolling Plains and Edwards Plateau. Jul-Oct.

Ammannia coccinea Rottb., (scarlet), PURPLE AMMANNIA, TOOTHCUP. Plant to 1 m tall, usually widely branched; leaves membranous to fleshy, oblong- or linear-lanceolate, with widened base; petals deep rose-purple, sometimes with a deeper purple spot at base. In muddy ground about lakes, ponds, and ditches; e 1/2 of TX. Jul-Oct, occasionally as early as May. Graham (1979) has shown that *A. coccinea* is a morphologically intermediate polyploid hybrid ($n = 33$) derived from *A. auriculata* ($n = 16$) and *A. robusta* ($n = 17$). She further indicated that all occur in apparently identical, intermittently open, wet habitats (e.g., margins of drying ponds), and occur in mixed populations. Based on her range maps, all 3 taxa are widespread in nc TX. As might be expected with hybridization, there is overlap in a number of characters making correct identification of some specimens problematic.

Ammannia robusta Heer & Regel, (stout, strong). Plant to ca. 1 m tall; lowest branches often nearly equal in length to main stem; leaves fleshy; pedicels none; easily distinguished when fresh by the pale lavender petals (these sometimes with a deep rose spot at base of midvein or with rose-purple midvein). In muddy ground about lakes, ponds, and ditches; Falls and Williamson cos. (Graham 1979); nc to se TX. Jul-Oct. [*A. coccinea* Rottb. subsp. *robusta* (Heer & Regel) Koehne]

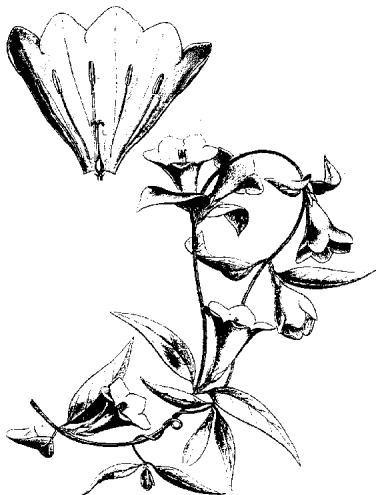
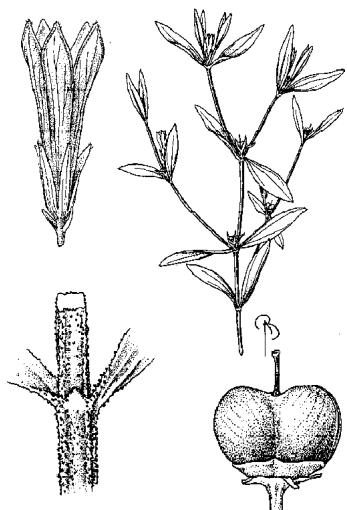
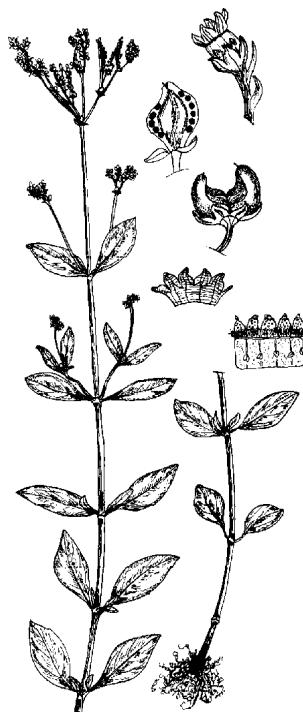
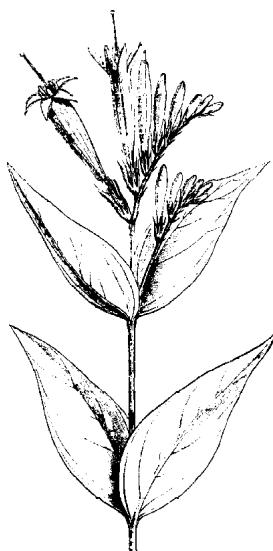
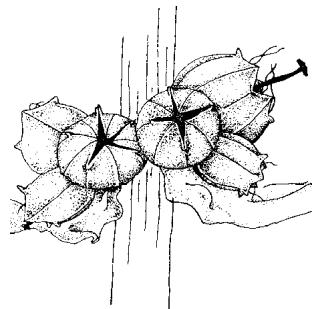
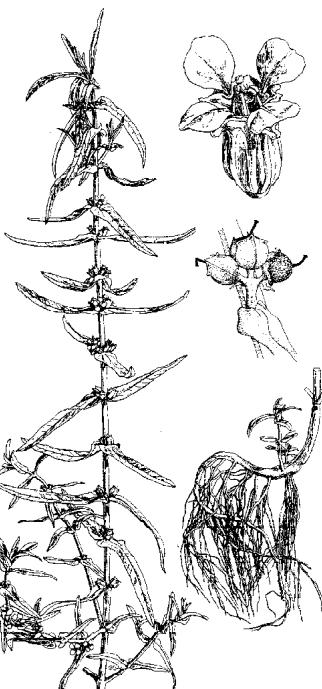
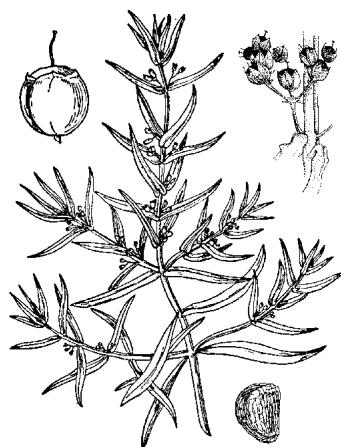
LAGERSTROEMIA CRAPE-MYRTLE

—A genus of 53 species of the tropics from Asia to Australia. Some species are cultivated as ornamentals, others used for timber. (Named for Magnus von Lagerstrom, 1691–1759, Swedish merchant and friend of Linnaeus)

Lagerstroemia indica L., (of India), COMMON CRAPE-MYRTLE, CRESPO. Shrub or small tree to ca. 7 m tall, with smooth grayish bark; leaves alternate, deciduous, suborbicular to obovate, to ca. 7 cm long, entire, sessile or nearly so; inflorescence a terminal panicle to 20 cm long; flowers very showy, perfect, radially symmetrical, pedicillate; calyces campanulate, 6–9-lobed, 7–10 mm long; petals usually 6, to 2 cm long, purple or pink to white, conspicuously slender-clawed with orbicular-cordate blades, the margins crisped; stamens numerous (36–42); fruit a capsule ca. 1 cm long. Widely cultivated, persisting around old homesites, rarely escaping; Lamar and Tarrant cos. Summer-fall(-late fall). Native of Asia. ☎

LYTHRUM PURPLE LOOSESTRIFE

Rhizomatous perennial herbs with woody bases; stems 4-angled; leaves opposite, alternate, or whorled; inflorescence a terminal spike or spike-like; flowers 1–2 per axil or clustered in cymules; calyces glabrous, the lobes alternating with appendages; petals (5–)6, light lavender or bluish purple to reddish purple.

*Gelsemium sempervirens* [EN2]*Spigelia hedyotidea* [SD]*Spigelia marilandica* [EN2]*Mitreola petiolata* [co1]*Ammannia robusta* [TAX]*Ammannia coccinea* [MAS, TAX]*Ammannia auriculata* [GLE, MAS, TAX]*Lagerstroemia indica* [BT3]

— A cosmopolitan genus of 36 species. (Name used by Dioscorides for *L. salicaria* L., from Greek: *lythron*, blood, alluding to the color of the flowers of some)

REFERENCES: Shinners 1953a; Stuckey 1980.

1. Stamens 6(–8); upper stem leaves usually alternate (rarely subopposite); flowers solitary or paired in the axils (many together forming a spike-like inflorescence).
2. Middle stem leaves lanceolate to oblanceolate to narrowly elliptical (the upper leaves/bracts smaller, but usually ± similar in shape), cuneate (= wedge-shaped) basally, green, membranous

L. alatum

2. Middle stem leaves narrowly linear to linear-oblong, oblong, or lanceolate-oblong (the upper leaves/bracts smaller, usually linear or nearly so), rounded to nearly auriculate basally, gray-green, glaucous, sometimes somewhat fleshy ***L. californicum***
1. Stamens usually 12; upper stem leaves opposite or whorled; flowers clustered in cymules in the axils (many together forming a showy spike-like inflorescence) ***L. salicaria***

Lythrum alatum Pursh var. ***lanceolatum*** (Elliott) Rottb. & A. Gray ex Rothr., (sp: winged; var: lanceolate, lance-shaped), LANCE-LEAF LOOSESTRIFE, WINGED LOOSESTRIFE. Plant to 1.2 m tall; lower stem leaves opposite to subopposite; upper stem leaves supopposite to mostly alternate; petals 3–6 mm long, purple. Low moist areas; se and e TX w to East Cross Timbers, also Edwards Plateau. Late May–Jul. [*Lythrum lanceolatum* Elliott]

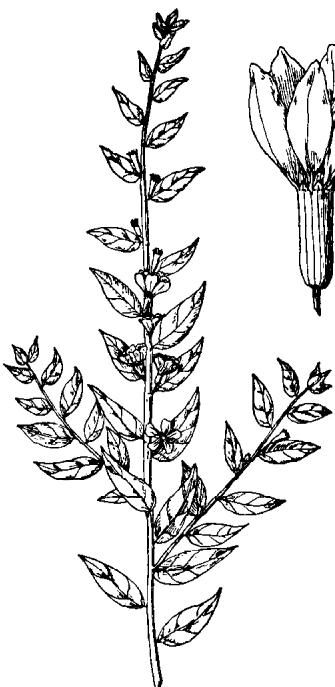
Lythrum californicum Torr. & A. Gray, (of California), CALIFORNIA LOOSESTRIFE, HIERBA DEL CÁNCER, WINGED LOOSESTRIFE. Plant 0.2–1 m tall; lower stem leaves opposite to subopposite; upper stem leaves subopposite to mostly alternate; petals 4–6 mm long, purple. Low moist areas; Parker and Tarrant cos; also Montague Co. (Mahler 1988); nc TX s and w to w TX. Late May–Jul. The differences between *L. californicum*, apparently rare in nc TX, and the common *L. alatum* var. *lanceolatum*, seem rather tenuous. Graham (1986) suggested they may ultimately be viewed as parts of a single, widespread, variable species consisting of several geographic races. Shinners (1953a) suggested that there is apparently hybridization and introgression between *L. californicum* and *L. alatum* var. *lanceolatum* [as *L. lanceolatum*] in a wide belt through c and n TX and OK.

Lythrum salicaria L., (resembling *Salix*—willow), PURPLE LOOSESTRIFE. Plant to 1.2 m tall; leaves opposite or whorled, cordate to rounded basally; inflorescences showy. Cultivated and observed in a drainage area adjacent to a flower bed in Dallas Co. (R. O'Kennon, pers. obs.); it is included because of the possibility of escape and spread in nc TX; in some parts of the ne U.S. *L. salicaria* can aggressively invade native marshlands eliminating native species; dense stands covering thousands of acres are sometimes formed with even tenacious natives such as *Typha* species being excluded. PURPLE LOOSESTRIFE is often cited as one of the most detrimental cases of habitat alteration by an exotic species in the U.S.; it was introduced in New England in the early 1800s and by 1995 was known in every state but Florida; because of its potential as a pest, it has been declared a noxious weed in several states with laws banning its distribution and cultivation; this species should not be planted (Stuckey 1980; Graham 1986; Yatskiewych & Spellenberg 1993; Flack & Furlow 1996). ?–Jun–Jul. Native of Eurasia. ☰

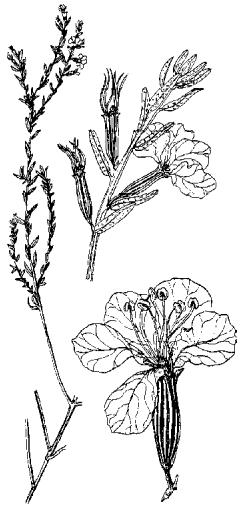
ROTALA

— A genus of 44 species of temperate to tropical areas of the world, typically in wet habitats. (Name an incorrect diminutive of Latin: *rotula*, a wheel, from the whorled leaves of the first described species)

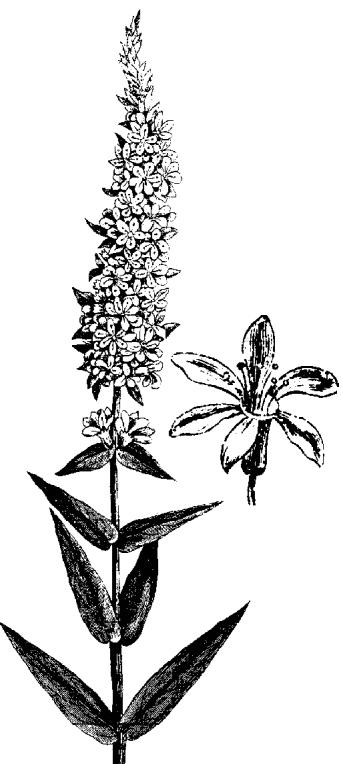
Rotala ramosior (L.) Koehne, (very branched), TOOTHCUP. Small glabrous annual to ca. 40 cm tall; leaves opposite, linear to narrowly oblanceolate; petals usually 4, pink to purple-red,



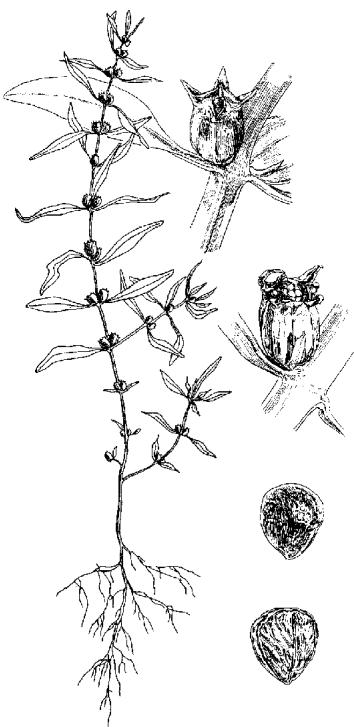
Lythrum alatum var. *lanceolatum* [GLE]



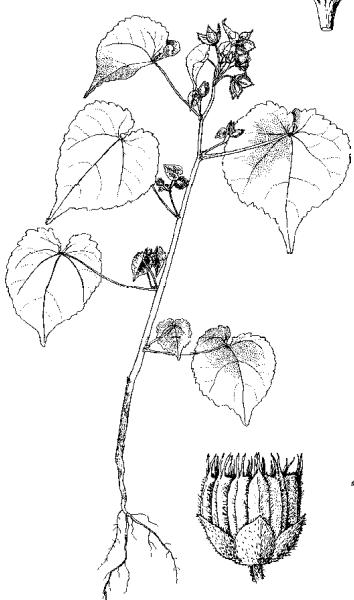
Lythrum californicum [co1]



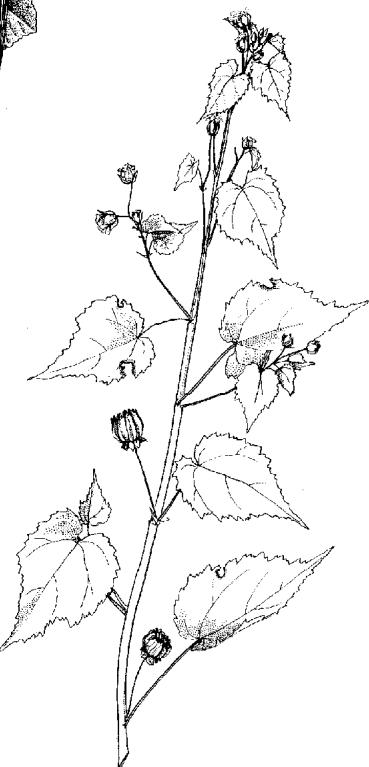
Lythrum salicaria [LAM]



Abelmoschus esculentus [BAY]



Rotala ramosior [MAS]



Abutilon theophrasti [BT3, GLE]

Abutilon fruticosum [BT3]

scarcely exceeding calyx lobes; sepals 4; fruit a many-seeded capsule. Damp, sandy or silty ground, sometimes shallow water; se and e TX w to West Cross Timbers, also Edwards Plateau. Late Jun-Oct.

MALVACEAE MALLOW FAMILY

Ours annual or perennial herbs or shrubs often with mucilaginous sap, usually with simple, forked, stellate or lepidote pubescence; leaves alternate, usually palmately nerved, simple or rarely palmately compound, entire, toothed or lobed; stipules present, sometimes falling early; flowers solitary or clustered in the leaf axils or terminal in spike-like racemes or corymbs, radially symmetrical; sepals 5, united at least near base, often subtended by an involucel of separate or united bracts (called epicalyx); petals 5, free from each other but often fused to base of the stamen tube; stamens numerous; anthers free; filaments united into a tube at least near base and thus surrounding the ovary and styles, separate apically; pistil with 3-more carpels; ovary superior; fruit a capsule or schizocarp, rarely a berry.

— A medium-large (1,800 species in 111 genera), cosmopolitan, but especially tropical family of herbs, shrubs, and some trees; there are usually stellate hairs and mucilage. It includes several economically important plants, *Gossypium* species (COTTON) and *Abelmoschus esculentus* (L.) Moench (OKRA), as well as a number of showy ornamentals (e.g., *Alcea*—HOLLYHOCK, *Hibiscus* and *Malva*—MALLOW). The family is related to Sterculiaceae, Tiliaceae, and the tropical woody Bombacaceae which includes BAOBAB (*Adansonia*) and KAPOK (*Bombax* and *Ceiba*) (Judd et al. 1994). The European *Althaea officinalis* L. (MARSH-MALLOW) yielded a mucilaginous sap that was converted into a foamy sweet confection—the original marshmallows. (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: usually herbs (2 species of shrubs) with alternate, usually *palmately veined* leaves and often with stellate pubescence; flowers with a conspicuous and unique *stamen tubew*with numerous free anthers; petals separate, usually attached basally to the stamen tube; involucel of bracts often subtending the calyx.

REFERENCES: Hanson 1920; Kearney 1951; Fryxell 1988, 1997; La Duke & Doebley 1995.

1. Plants a woody shrubs to 3 m tall; petals bright red, 20–35 mm long; fruits berry-like until fully mature, with a fleshy outer layer, red in color _____ **Malvaviscus**
1. Plants herbaceous (except shrubby in 1 species of *Hibiscus* and 1 species of *Pavonia*); petals variously colored and sized; fruits not berry-like (either a capsule or schizocarp).
 2. Plants small shrubs to ca. 1(–1.5) m tall; petals deep rose-pink; number of style branches and stigmas (10) twice the number of carpels (5) _____ **Pavonia**
 2. Plants usually herbaceous (1 species of *Hibiscus* shrubby); petals variously colored and sized; number of style branches and stigmas equal the number of carpels.
 3. Fruit a capsule, the 3–5 carpels united into a compound ovary, opening apically at maturity to dehise the seeds, the carpels remaining attached to one another and the axis after the seeds have been shed (seeds within the compound ovary as a whole).
 4. Sepals subtended by an involucel of 3 bracts; bracts ovate in outline, 15–25 mm or more wide, divided beyond the middle into numerous (7–13) slender teeth; seeds densely hairy; foliage usually gland-dotted and punctate (use lens). _____ **Gossypium**
 4. Sepals subtended by an involucel of usually 8 or more bracts; bracts linear, < 3 mm wide, not divided beyond the middle into numerous teeth; seeds not hairy; foliage neither gland-dotted nor punctate.
 5. Mature capsules < 4 cm long; leaves usually < 9 cm wide; calyces symmetrical, 5-merous, persistent in fruit (involucel of bracts also present just below calyx) _____ **Hibiscus**
 5. Mature capsules 7.5–20 cm long; leaves usually > 9 cm wide; calyces asymmetrical,

spathe-like, splitting laterally at flowering time, deciduous in fruit (involucel of bracts also present just below calyx) _____

Abelmoschus

3. Fruit a schizocarp, the 5–many individual carpels (called mericarps) loosely united into a ring around a central axis and at maturity separating and dispersing individually (seeds inside the individual carpels can be either dehiscent or indehiscent).

6. Style branches not abruptly larger at very tip, thread-like or club-like, with the stigmas decurrent along their inner side.

7. Involucel of (1–)3 separate bracts or bracts absent.

8. Pedicels of lower flowers shorter than the petioles of their subtending leaves or bracts; carpels beakless; petals often deeply notched at apex; taproot not thickened

Malva

8. Pedicels of lower flowers equaling or exceeding the petioles of their subtending leaves or bracts; carpels usually with a beak; petals not deeply notched at apex; taproot often much thickened _____

Callirhoe

7. Involucel of 6–9 bracts fused at base _____

Alcea

6. Stigmas usually distinctly and abruptly larger than style branches, limited to very tip of style branch or nearly so.

9. Carpels greatly inflated, the walls thin and papery; petals whitish to pale yellow to yellow-orange, ca. 8–12 mm long _____

Herissantia

9. Carpels not inflated, the walls not thin and papery; petals variously colored and of various sizes.

10. Petals yellow or orange.

11. Carpels sharply differentiated into 2 parts, the upper part without seeds, smooth, the lower part seed-containing, reticulate; w part of nc TX (Tarrant Co. and w)

Sphaeralcea

11. Carpels not differentiated into upper and lower parts; widespread in nc TX.

12. Involucel bracts absent; silvery lepidote tomentum absent; leaves symmetrical; widespread in nc TX.

13. Ovules usually 3 in each carpel; leaves either large (to 15 cm or more in diam.) and suborbicular OR broadly ovate, cordate basally, acute to acuminate apically, and up to 10 cm long (often much smaller) _____

Abutilon

13. Ovules 1 in each carpel; leaves various but not as above.

14. Calyces accrescent (=enlarging with age), becoming 10–12 mm long, forming a wing-angled, loose, globose, membranous covering over the fruit; mature carpels indehiscent _____

Rhynchosida

14. Calyces not as above; mature carpels apically dehiscent _____

Sida

12. Involucel of 1–3 bracts OR foliage with silvery lepidote tomentum OR leaves asymmetrical (sometimes all 3); uncommon in nc TX.

15. Leaves symmetrical (= the 2 sides shaped the same); calyces inflated at maturity; silvery lepidote tomentum absent; involucel bracts 3, ovate, ca. 3–4 mm wide or lanceolate, 0.6–1 mm wide; carpels (9–)10–14(–16)

Malvastrum

15. Leaves asymmetrical (= the 2 sides shaped differently); calyces not inflated at maturity; silvery lepidote tomentum usually present; involucel bracts 0–3, if present linear, < 1 mm wide; carpels usually 6–10 _____

Malvella

10. Petals various shades of pink, lavender, purple, or red.

16. Leaves asymmetrical; silvery lepidote tomentum usually present (stellate pubescence can also be present) _____

Malvella

16. Leaves symmetrical; silvery lepidote tomentum absent (pubescence of simple, paried, or stellate hairs).

17. Petals 4–6 mm long; calyces and leaves glabrous or with pubescence of simple or paired hairs _____ **Modiola**
17. Petals 7–22 mm long; calyces and leaves velvety- or felty-pubescent with dense stellate hairs (use hand lens) _____ **Sphaeralcea**

ABELMOSCHUS

—A genus of 15 species of the Old World tropics; previously treated as part of *Hibiscus* (Arabic: *abu-l-mosk*, father of musk, referring to the musk-scented seeds or Arabic: *kabb-el-misk*, musk seed)
REFERENCES: Bates 1968; Charrier 1984.

Abelmoschus esculentus (L.) Moench, (edible), OKRA, GUMBO, GOBO, GOMBO, LADY'S-FINGER, BANDAKAI, GOBBO. Stout annual to ca. 2 m or more tall, glabrate to bristly; leaves very large, often > 30 cm across, palmately compound to divided to scarcely lobed; flowers solitary in the upper axils; involucel bracts 8–12, linear; petals white to yellow, purple to red at base; capsules tender when young, becoming tough with age, ± long cylindrical. Widely cultivated and rarely escapes; Milam Co. Summer-fall. Native of tropical Asia. [*Hibiscus esculentus* L.] The immature capsule is the vegetable okra; the soup, gumbo, derives its character from the mucilaginous quality of the capsule. ☕

ABUTILON INDIAN-MALLOW

Ours annual or perennial herbs with stellate pubescence; leaf blades toothed, cordate basally; flowers solitary, axillary, pedunculate, or inflorescence slightly paniculate; petals yellow; carpels separating at maturity.

—A genus of ca. 160 species (Fryxell 1997) of tropical and warm areas of the world; many are cultivated as ornamentals; some are used medicinally or as sources of fiber. (Arabic name for a species of *Malva*; or probably compounded from the Arabic: *abu*, father of, and Persian: *tula* or *tulha*, mallow—Fryxell 1997)

REFERENCES: Kearney 1955b; Fryxell 1983.

1. Carpels 5–9 per fruit, 6–9 mm long, essentially awnless; leaves to 5(–9.5) cm wide; calyces 3–5 mm long, parted ca. 1/2 way, spreading to reflexed in fruit _____ **A. fruticosum**
1. Carpels 10–15 per fruit, 10–18 mm long, with awns (beaks) 2–6 mm long; leaves to 16(–21) cm wide; calyces 8–14 mm long, 5-parted nearly to base, accrescent, not reflexed _____ **A. theophrasti**

Abutilon fruticosum Guill. & Perr, (shrubby, bushy), INDIAN-MALLOW, PELOTAZO. Perennial to 85 cm tall from a woody root, finely and densely gray-pubescent with stellate hairs; leaf blades ovate to triangular, (2–)4–10(–16) cm long; peduncles 1–3 cm long; petals yellow, 4–6(–10) mm long. Slopes, prairies, limestone outcrops; in nc TX more common to the w; Blackland Prairie s and w to w TX. Jun–Oct. This species (with 6–9 carpels) has in the past been incorrectly treated by TX authors as *A. incanum* (Link) Sweet, a species with 5 carpels which occurs further west (P. Fryxell, pers. comm.). [*A. texense* Torr. & A. Gray]

Abutilon theophrasti Medik., (for the Greek naturalist, Theophrastus, 372–287 B.C., considered to be Aristotle's finest student and the founder of botany based on his detailed descriptions of plants growing in the botanical gardens of Athens; his *History of Plants* is the oldest botanical work in existence—Porter 1967; Simpson & Ogorzaly 1986), INDIAN-MALLOW, VELVET-LEAF BUTTERPRINT, CHINGMA. Annual to 2 m tall, velvety with soft stellate pubescence throughout; leaf blades ovate to nearly orbicular, usually larger than in *A. fruticosum*, (3–)5–15(–17.5) cm long; peduncles 1.5–5 cm long; petals yellow, 6–15 mm long. Disturbed or weedy areas; Collin, Dallas, Grayson, Johnson, and Tarrant cos; scattered in TX. Jun–Oct. Native of Eurasia. ☕

ALCEA HOLLYHOCK

— An Old World genus of 60 species (Fryxell 1997) native from the Mediterranean to c Asia; a number are cultivated as ornamentals. (Greek: *alkaia*, used for a kind of mallow; from *akce*, remedy, in reference to its medical uses or *alke*, strength, in reference to its vigorous growth—Fryxell 1997)

Alcea rosea L., (rose-colored), HOLLYHOCK, AMAPOLA GRANDE. Biennial or perennial with stellate pubescence; stems mostly unbranched, to 3 m tall; leaf blades suborbicular, 8–30 cm wide, coriaceous basally, long-petioled; inflorescence a terminal spike-like raceme; bracts 6–9 below the calyx; flowers showy; corollas white to pink, red, or purple, to ca. 10 cm wide; fruit a schizocarp, the carpels beakless, 25 or more. Cultivated and occasionally escapes; Grayson Co. May–Sep (–frost). Native of Asia. [*Althaea rosea* (L.) Cav.] —

CALLIRHOE WINECUP, POPPY-MALLOW

Annuals or perennials from a slender or in perennial species an enlarged root; petals large (to 23 mm long) and extremely showy, purple-red to pink or white; carpels separating at maturity.

— A North American genus of 9 species; some are cultivated as ornamentals or valued as wild-flowers. Gynodioecy is known in a number of species (Dorr 1990). (Named after Callirhoe, in Greek mythology, daughter of the river god Achelous)

REFERENCES: Waterfall 1951; Bates et al. 1989; Dorr 1990.

1. The 5-lobed calyces with involucel of 3 bracts at or close to base _____ **C. involucrata**
1. The 5-lobed calyces without bracts.
 2. Calyces hispid-pubescent outside; pedicels 0.5–4 cm long; carpels pubescent at least on the beaks; petals white to rarely pink _____ **C. alcaeoides**
 2. Calyces glabrous or sparsely pubescent on the ribs outside; pedicels 3–14 cm long; carpels glabrous; petals deep red-purple to light pink or white.
 3. Plants perennial with a swollen root; mature fruits 6–10 mm wide; carpel beak small, making up < 1/3 of the total length of the carpel; back of mature carpel body not or only slightly prolonged over the base of the beak; widespread in nc TX _____ **C. pedata**
 3. Plants annual with a slender taproot; mature fruits 4–6 mm wide; carpel beak large and hollow, making up 1/3 or more of the total length of the carpel; back of carpel body prolonged ca. 1 mm into a conspicuous whitish “collar” covering the base of the beak; s and w parts of nc TX _____ **C. leiocarpa**

Callirhoe alcaeoides (Michx.) A. Gray, (resembling *Alcea*—hollyhocks), PLAINS WINECUP, PLAINS POPPY-MALLOW, LIGHT POPPY-MALLOW, CLUSTERED POPPY-MALLOW. Erect to spreading perennial to 55 cm tall, pubescent with 4-rayed hairs or glabrous; flowers crowded in terminal corymbs; petals white, rarely pink. Prairies; calcareous clay; nc TX and Edwards Plateau. Apr–May.

Callirhoe involucrata (Nutt.) A. Gray, (with an involucre), PURPLE POPPY-MALLOW. Stems curved-ascending or trailing, to 70(–80) cm long; flowers axillary, solitary; petals reddish purple; pedicels 3–10(–21) cm long. Sandy, eroding, disturbed ground, roadsides. Late Apr–Jun. Some authorities lump the following 2 varieties (e.g., Thompson & Barker 1986).

1. Sinuses between lobes of the leaf extending to within 5–10 mm of the petiole; stipules usually large, 5–15 mm long, 5–14 mm wide; carpels strigose _____ var. **involucrata**
1. Sinuses between lobes of the leaf extending to within 2–4 mm of the petiole; stipules 2–7(–10) mm long, 1–5 mm wide; carpels glabrous or with varying amounts of strigose pubescence _____ var. **lineariloba**

var. **involucrata**, LOW WINECUP, LOW POPPY-MALLOW, PURPLE POPPY-MALLOW, BUFFALO-ROSE,

WINECUP, PURPLE-MALLOW. Dallas, Denton, and Grayson cos; throughout TX except Trans-Pecos. /81

var. **lineariloba** (Torr. & A. Gray) Torr., (with linear lobes), SLIM-LOBE POPPY-MALLOW, GERANIUM POPPY-MALLOW, WINECUP, COWBOY-ROSE. Se and e TX w to West Cross Timbers, also Edwards Plateau. Dorr (1990) indicated this is an exceedingly variable taxon with a number of morphological types described as species; however, he further indicated there is a gradual intergradation of populations and thus did not recognize formal taxa.

Callirhoe leiocarpa R.F. Martin, (smooth-fruited), TALL WINECUP, TALL POPPY-MALLOW. Erect annual (rarely biennial) to ca. 85 cm tall; glabrous or slightly pubescent with 4-rayed hairs; flowers solitary, petals to ca. 23 mm long, red-purple to light pink. Prairies, roadsides, wooded areas; Bell and Shackelford cos. on s and w margins of nc TX, also Brown Co. (HPC); mainly c and s TX. Apr-Aug.

Callirhoe pedata (Nutt. ex Hook.) A. Gray, (footed, with leaf lobes at the foot of the leaf), FINGER POPPY-MALLOW. Perennial; stems erect to reclining, to ca. 100 cm tall, glabrous to strigose pubescent; flowers solitary or in loose corymbose inflorescences; petals usually reddish purple, sometimes white or pink; a population at Tandy Hills Park in Fort Worth had white flowered individuals out numbering those with reddish purple flowers 100 to 1—B. Benz, pers. comm. Limestone outcrops or rocky prairies; mainly Blackland Prairie w to West Cross Timbers and s to Edwards Plateau. Apr-May. [*C. digitata* Nutt. var. *stipulata* Waterf.]

GOSSYPIUM COTTON

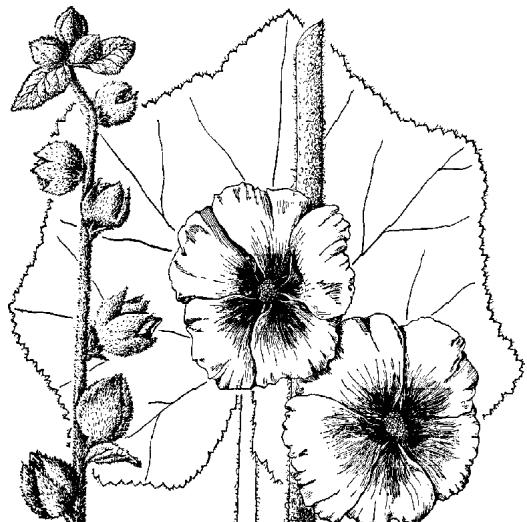
—A genus of ca. 50 species (Wendel & Albert 1992) of warm temperate and tropical areas of the world. Four COTTON species, cultivated for at least 5,000 years, seem to have been domesticated independently; this is an example of multiple domestication otherwise unknown among crop plants (Wendel & Albert 1992). The hairs covering the seeds and the oil extracted from the seeds are important products. (Latin, *gossypion*, cotton plant)

REFERENCES: Watt 1907; Saunders 1961; Fryxell 1968, 1979a, 1992; Kohel & Lewis 1984; Wendel & Albert 1992; Selanan et al. 1997.

Gossypium hirsutum L., (hairy), UPLAND COTTON, COTTON BELT COTTON, WEST INDIAN COTTON, ALGODÓN. Annual or perennial to ca. 1.5 m tall; foliage commonly glandular-dotted and punctate; leaf blades usually broadly palmately 3–5 lobed; involucel bracts 3, ovate, ca. 3–5.5 cm long, lacerate with 7–13 slender teeth to 2.5 cm or more long; corollas whitish to yellow, fading to pinkish purple, to 7.5 cm long; capsules (boll) dehiscent, 3–5 celled, to nearly 3.5 cm long, beaked, each cell with 5–11 seeds covered with a close tomentum (fuzz) and a loose, woolly tomentum (lint) yielding the cotton of commercial importance. Widely cultivated in TX and occasional as a waif; Milam Co. Summer. This tetraploid cultivar was presumably brought into cultivation in Mexico or Central America; it has been found in Mexican archaeological sites dating to 3,400 B.C. (Simpson & Ogorzaly 1986). COTTON cultivation was historically very important on the Blackland Prairie and was an important component of the economic development of nc TX; one result was the nearly complete conversion of the native prairie ecosystem into cultivated fields. COTTON is still widely cultivated in TX, particularly in the w part of the state. A toxic dihydroxyphenol, gossypol, found in the seedlings and seeds, must be removed before the seeds can be used for animal food (Duke 1985); Duke (1985) referenced a source indicating hogs have died from eating the raw seeds; in women it is an abortifacient, and chronic herbal use may cause sterility in men (McGuffin et al. 1997)  

HERISSANTIA

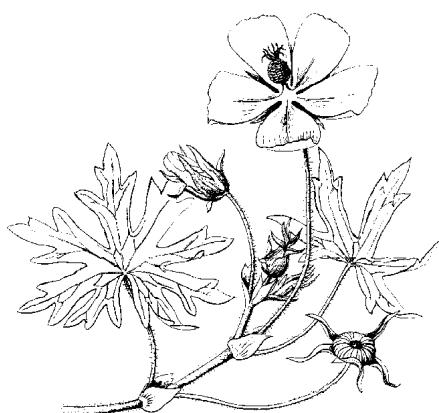
—A genus of 4 species occurring from the s U.S. to tropical America and also (probably introduced) in tropical Asia and Australia (Fryxell 1973); sometimes lumped with *Abutilon* (e.g.,



Alcea rosea [GLE]



Callirhoe alcaeoides [BB2]



Callirhoe involucrata var. involucrata [GR1]



Callirhoe pedata [BT3]



Callirhoe leiocarpa [HEA]

Mabberley 1997). (Named for Louis Antoine Prospère Herissant, 18th century French physician, naturalist, and poet)

REFERENCES: Brizicky 1968; Fryxell 1973.

Herissantia crispa (L.) Brizicky, (finely waved, closely curled), NET-VEIN HERISSANTIA. Trailing perennial with stems to 1 m or more long, velvety-tomentulose; leaves broadly ovate, 2–7 cm long, deeply cordate basally, usually abruptly acuminate apically, often prominently net-veined, crenulate; involucel bracts absent; calyx lobes 4–6 mm long; petals ca. 2 times as long as calyces, whitish to pale yellow or yellowish orange; carpels ca. 12, thin and papery, greatly inflated at maturity, usually long hirsute; fruits globose, 1–2 cm in diam. Brushy or rocky areas; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); c, s, and w TX. Flowering throughout the growing season. [*Abutilon crispum* (L.) Medik.]

HIBISCUS ROSE-MALLOW, MARSH-MALLOW

Annuals or perennials; leaves alternate, stipulate; flowers often large and showy, solitary, axillary, peduncled; involucel bracts usually 8 or more; ovary of 5 permanently united carpels; styles 5, stigmas capitate or peltate; fruit a loculicidal capsule.

— A genus of ca. 300 species of warm temperate to tropical areas of the world. Species are variously used for fiber and medicine and a number are cultivated as ornamentals including some with very large showy flowers. *Abelmoschus esculentus* (OKRA) is sometimes treated in the genus *Hibiscus* (Greek: *ibicos*, old name used for some large mallow)

REFERENCE: Fryxell 1980.

1. Plants woody shrubs or small trees; seeds long-ciliate _____ **H. syriacus**
1. Plants herbaceous: seeds not ciliate.
 2. Plants low annuals to 0.6(–1) m tall with some branches becoming prostrate; plants hispid; leaves deeply incised or divided; calyces bladdery-inflated, loose around the capsule _____ **H. trionum**
 2. Plants erect perennials to 2.5 m tall; plants glabrous or pubescent; leaves toothed or lobed but not deeply incised or divided; calyces not bladdery-inflated, filled by the capsules.
 3. Stems, lower leaf surfaces, and calyces glabrous or nearly so; middle and upper leaf blades often hastate (= arrowhead-shaped) basally _____ **H. laevis**
 3. Stems, lower leaf surfaces, and calyces covered with fine stellate pubescence; leaf blades rounded or cordate to broadly cuneate basally _____ **H. moscheutos**

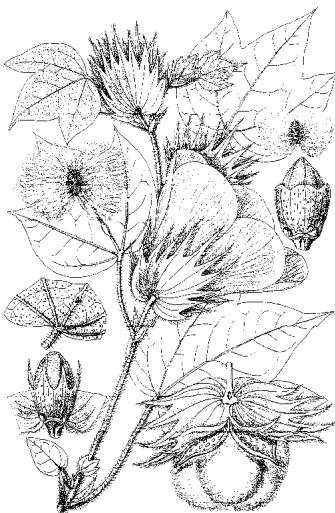
Hibiscus laevis All., (smooth), HALBERD-LEAF ROSE-MALLOW, SCARLET ROSE-MALLOW, HALBERD-LEAF HIBISCUS. Calyces closely enclosing the capsules; petals pink or whitish with crimson to purple blotch at base, 5–8 cm long; capsules glabrous. In low wet areas and shallow water; Dallas, Grayson, and Tarrant cos; se and e TX w to Rolling Plains and Edwards Plateau. May–Nov. [*H. militaris* Cav.] ■/92

Hibiscus moscheutos L., (musky), Stems to 2.5 m tall; leaves lanceolate to ovate, some angled or obscurely lobed, to ca. 22 cm long; petals 5–10 cm long. Wet areas; mainly e and se TX. Jun–Oct.

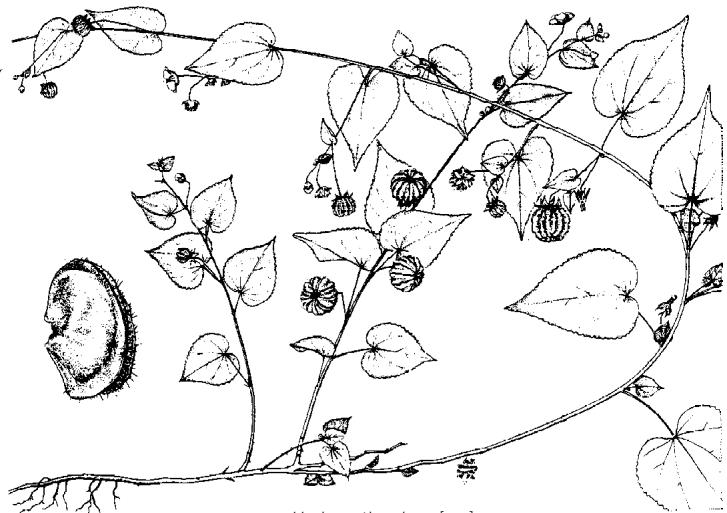
1. Upper surface of leaf blades permanently pubescent; capsules densely pubescent _____ subsp. **lasiocarpus**
1. Upper surface of leaf blades glabrous or becoming so; capsules glabrous _____ subsp. **moscheutos**

subsp. **lasiocarpus** (Cav.) Blanch., (woolly-fruited), WOOLLY ROSE-MALLOW, SWAMP ROSE-MALLOW, MALLOW-ROSE, ROSE-MALLOW. Leaves long petiolate (petioles to 10 cm long); petals white to rose with crimson or deep purplish red blotch at base. Grayson Co., also Dallas Co. (hybrids with *H. laevis*); e TX w to Rolling Plains and Edwards Plateau. [*H. lasiocarpus* Cav.]

subsp. **moscheutos**. COMMON ROSE-MALLOW, SWAMP ROSE-MALLOW, MALLOW-ROSE, WILD COTTON. Petioles to ca. 5 cm long; petals white or creamy-yellow with a crimson-purple base. Included



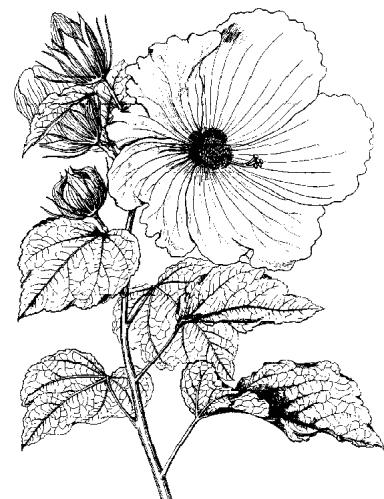
Gossypium hirsutum [WAT]



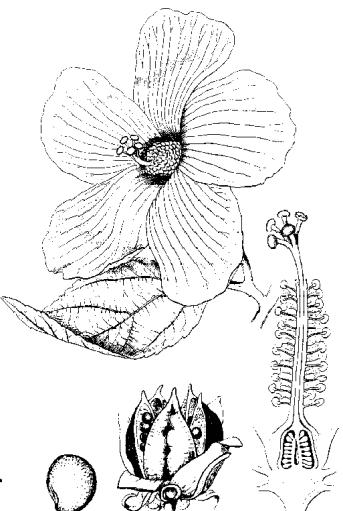
Herissantia crispa [SBM]



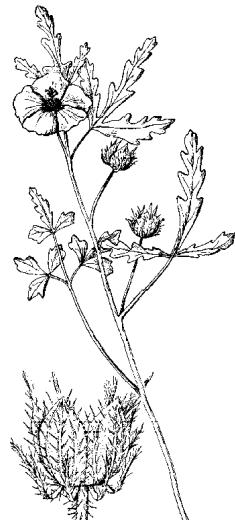
Hibiscus laevis [co1]



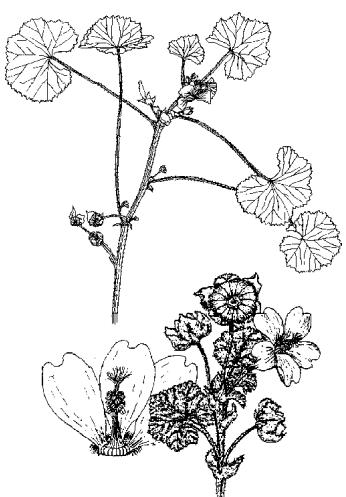
Hibiscus moscheutos subsp. lasiocarpus [G&F]

Hibiscus moscheutos subsp. moscheutos
[GR1]

Hibiscus syriacus [GLE]



Hibiscus trionum [GLE]



Malva neglecta [BT3, REE]

based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly se and e TX. Jones et al. (1997) did not list this subspecies for TX; J. Kartesz (pers. comm. 1997) does; we have seen no specimens from TX and its status in the state is unclear.

Hibiscus syriacus L., (of Syria), ROSE-OF-SHARON, ALTHAEA. To ca. 7 m tall; foliage glabrous; leaves ovate to rhombic-ovate in outline, 2–8(–12) cm long, usually 3-lobed, toothed; flowers axillary, subtended by 6–10 linear to lanceolate involucel bracts; petals 5–7 cm long, white to pink, reddish or lavender with a dark red base (flowers sometimes doubled—with more than the normal 5 petals). Commonly cultivated, long persists, and spreads by seeds; Tarrant Co. (R. O'Kennon, pers. obs.); widely cultivated in TX. Jun–Sep. Native of e Asia. 

Hibiscus trionum L., (old generic name), FLOWER-OF-AN-HOUR, VENICE-MALLOW. Calyces bladdery, loosely enclosing the capsules; petals pale yellow or whitish, with a purple or brown eye, 2.5–4 cm long; capsule pubescent. In disturbed habitats; Tarrant Co, also Grayson Co. (K. Haller, pers. comm.); nc TX w to Rolling Plains and s to Edwards Plateau. Aug–Sep. Native of c Africa.  /92

MALVA MALLOW, CHEESE WEED

Annuals, biennials or perennials; leaves mostly long-petioled; blades orbicular to suborbicular or reniform, shallowly palmately lobed and toothed, cordate basally; petals purple-red to pale blue or white; carpels indehiscent.

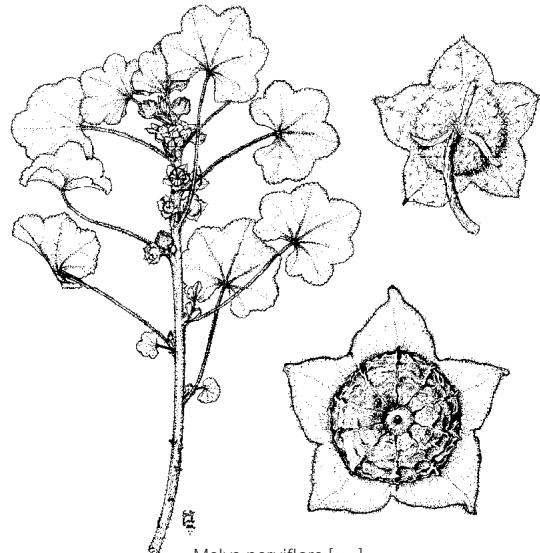
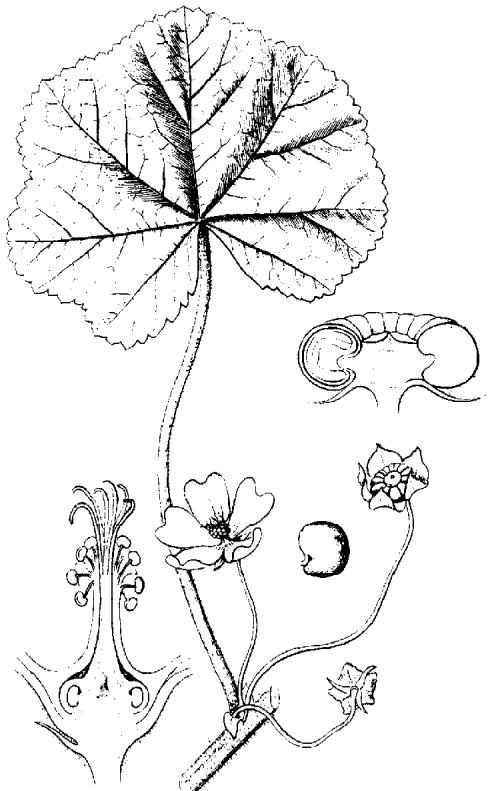
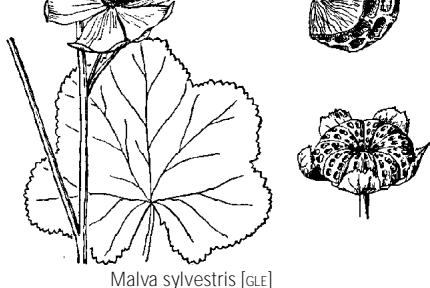
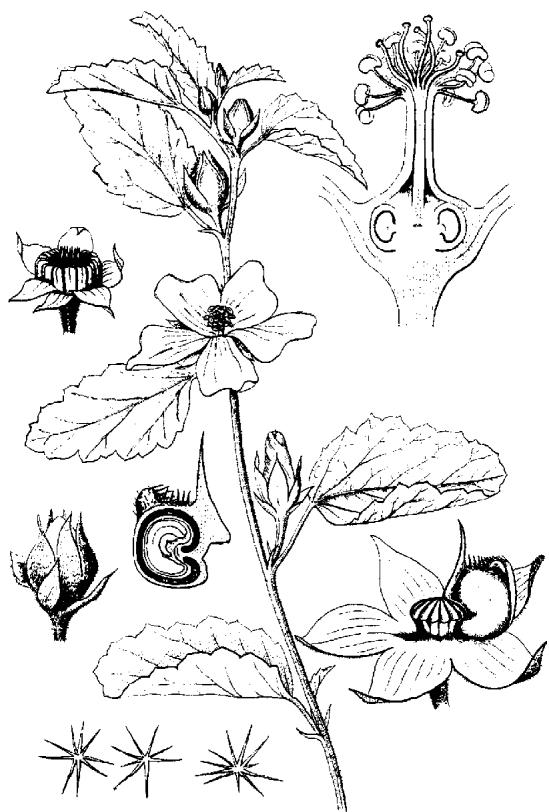
—A genus of ca. 40 species of Europe, the Mediterranean, temperate Asia, and tropical African mountains; some are cultivated as ornamentals, while others are used as a leaf vegetable. (Classical Latin name for mallow, from Greek: *malachos*, soothing or soft, alluding to its medicinal properties or its soft mucilaginous quality, or *malos*, tender, soft, woolly)

REFERENCES: Morton 1937; Ray 1995.

1. Petals purple-red, 15–30 mm long, 3–5 times as long as the sepals; involucel bracts oblong to ovate or obovate ***M. sylvestris***
1. Petals pale blue to white, 4–12 mm long, < 2.4 times as long as sepals; involucel bracts linear to linear-lanceolate or oblong.
 2. Petals ca. 2 times as long as sepals; mature carpels smooth or faintly reticulate ***M. neglecta***
 2. Petals 2 times as long as sepals; mature carpels rugose-reticulate (with a hand lens)
 3. Calyces not enlarged or only barely so with age, mostly closed over the fruits; pedicels 10–25 mm long; claw of petals pilose ***M. rotundifolia***
 3. Calyces much-enlarged with age and widely spreading under the fruits; pedicels 3–10(–15) mm long; claw of petals glabrous ***M. parviflora***

Malva neglecta Wallr., (neglected, overlooked), COMMON MALLOW, CHEESES. Plant at first erect, becoming partly decumbent; stems to ca. 1 m long; leaves 3–6 cm wide, shallowly 5–9-lobed; flowers fascicled in leaf axils; petals 6–12 mm long; carpels 12–15. Waste ground and roadsides; Dallas, Grayson, and Jack cos., also Brown, Coleman, and Hamilton cos. (HPC); established in various localities mainly in w 2/3 of TX. Late Apr–Jun, sometimes repeating Sep–Oct. Native of Eurasia and n Africa. 

Malva parviflora L., (small-flowered), LITTLE MALLOW. Glabrous or sparsely pubescent annual similar to *M. neglecta* and *M. rotundifolia*; stems erect or ascending; leaf blades suborbicular-cordate to reniform or angulate-lobed, to 7 cm long and 12 cm wide, usually wider than long; flowers fascicled in leaf axils; petals 4–5 mm long; carpels ca. 10. Weedy areas; Brown Co. on w margin of nc TX (B. Ellebracht s.n., 19 Mar 1998, HPC); according to label data, possibly introduced with wheat seeds from Kansas; also s, se, and e TX, Edwards Plateau, and Trans-Pecos. Mar–Jul. Native from Spain and North Africa to India. 

*Malva parviflora* [SBM]*Malva rotundifolia* [GR1]*Malva sylvestris* [GLE]*Malvastrum coromandelianum* [RHO]*Malvastrum aurantiacum* [GR1]

Malva rotundifolia L., (round-leaved), RUNNING MALLOW, ROUND-LEAF MALLOW, COMMON MALLOW, DWARF MALLOW, NORTHERN MALLOW. Similar to *M. neglecta* stems decumbent to ascending; carpels 8–15. Found as a farm-yard weed n of Denton in May 1950, also Tarrant Co. (Dec 1998); nc TX and w TX. May–Dec. Native of Europe. ☎

Malva sylvestris L., (of woodland), HIGH MALLOW. Erect biennial or perennial 0.2–1 m tall; leaves orbicular to reniform, shallowly 3–7-lobed; flowers fascicled in upper leaf axils or in a spike-like inflorescence; carpels ca. 10. Cultivated and escapes, waste places; Brown, Dallas, and Tarrant cos.; e TX w to nc TX, also s TX. May–Oct. Native of Eurasia. ☎

MALVASTRUM FALSE MALLOW

Stellate-pubescent annuals or perennials; leaves petioled; leaf blades symmetrical; flowers solitary, axillary or rarely on reduced 2–3-flowered, apical, axillary branches; involucels of 3 bracts present; petals of varying shades of golden-yellow or orange-yellow; carpels (9–)10–14(–16), in-dehiscent.

☛ A genus of 14 species of tropical and warm areas of the world. (Possibly from genus name *Malva* and Greek: *aster*, star, presumably in reference to the fruit or possibly from *Malva* and the diminutive suffix *astrum*, indicating a resemblance, hence the common name FALSE MALLOW—Fryxell 1997)

REFERENCES: Kearney 1955a; Brizicky 1966b; Fryxell & Hill 1977; Hill 1980b, 1982.

1. Stems and leaves with sub-lepidote 6–10-rayed stellate hairs usually with basally united rays; petals (12–)15–16 mm long, 10–13(–15) mm wide; mericarps (4–)5(–6) mm long, with a prominent medial-apical cusp 1.5–2.3 mm long and 2 contiguous flattened obtuse cusps at the distal margin _____ ***M. aurantiacum***
1. Stems and leaves with simple or 2–4-rayed stellate hairs, the rays usually not united basally; petals (6–)8–10(–13) mm long, (4.5–)6–7(–9) mm wide; mericarps (3–)3.5–4 mm long, with a prominent or small medial-apical cusp 0.2–1.2 mm long and 2 divergent pointed cusps at the distal margin _____ ***M. coromandelianum***

Malvastrum aurantiacum (Scheele) Walp., (orange-red), WRIGHT'S FALSE MALLOW. Perennial; stems rigid, 0.4–1 m tall, from a woody base; leaf blades subcordate to broadly ovate to oblong, (18–)30–40(–55) mm long, usually unlobed or very infrequently with 2 obscure lateral lobes, crenate-dentate, obtuse in general outline apically (but often with a small, pointed, apical tooth); bracts of involucel ovate to subcordate, adnate to base of calyx; petals golden-yellow to pale orange-yellow, drying to pinkish purple; carpels (12–)14(–16). Stream banks and pastures; Bell, Dallas, and Tarrant cos.; mainly c and s TX; endemic to TX. Apr–Jul (Oct). [M. *wrightii* A. Gray] ☘

Malvastrum coromandelianum (L.) Garcke, (of the Coromandel Coast of se India), THREE-LOBE FALSE MALLOW. Herbaceous annual or perennial, 0.2–0.6(–1) m tall; leaf blades ovate to lanceolate, (17–)30–40(–65) mm long, unlobed or infrequently with 3 lobes, dentate to serrate, usually acute apically; bracts of involucel linear to narrowly spatulate; petals pale golden-yellow to orange-yellow; carpels (9–)10–14(–15). Alkaline soils; disturbed areas; Fort Hood (Bell or Coryell cos.—Sanchez 1997); also P. Fryxell (pers. comm.) indicated that this species is a common weed in Austin, just to the s of nc TX and therefore likely in the s part of nc TX; mainly s TX and Edwards Plateau n to edge of nc TX, also Callahan Co. (Hill 1982) just w of nc TX. Apr–Nov. A pantropical weed extending into temperate regions (Correll & Johnston 1970; Fryxell 1988).

MALVAVISCUS TURK'S-CAP

☛ A mainly tropical American genus of 3 species. (From genus name *Malva*, and Latin: *viscus* glue, but the meaning is unclear since *Malvaviscus* is not viscid—Fryxell 1997; an alternative

possibility is that the name is a combination of *Malva* and *Hibiscus*

REFERENCES: Schery 1942; Turner & Mendenhall 1993.

Malvaviscus arboreus Dill. ex Cav. var. **drummondii** (Torr. & A. Gray) Schery, (sp.: tending to be woody, tree-like; var.: for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), DRUMMOND'S WAX-MALLOW, TEXAS-MALLOW. Shrub to 3 m tall; leaf blades 4–9 cm long, cordate-orbicular, as wide as long, shallowly and evenly 3-lobed or 3-angled, rather closely toothed; flowers in upper leaf axils; bracts of involucel linear-spatulate; petals bright red, 2–3.5 cm long, the corolla somewhat contorted and tube-like, the petals spreading only above; number of style branches and stigmas (10) twice the number of carpels (5); fruits 5-celled, the carpels berry-like, indehiscent, red, reported to be edible (Standley 1923b; Crosswhite 1980). Bell and Limestone cos., also Brown and McLennan cos. (Turner & Mendenhall 1993), also escaped in Dallas Co. (E. McWilliams, pers. comm.); native n to s part of nc TX, mainly s and e TX n to nc TX; also cultivated as a perennial further n and freezing back in most winters. While this taxon is often recognized as a distinct species (e.g., Kartesz 1994), we are following Turner and Mendenhall (1993) and J. Kartesz (pers. comm. 1997) in treating it as a variety of *M. arboreus*. Jun-Jul. [*M. drummondii* Torr. & A. Gray] This is the only temperate zone member of the genus. Austin (1975) considered this species adapted for pollination by ruby-throated hummingbirds (*Archilochus colubris*).

MALVELLA

Low perennial herbs with decumbent, prostrate to ascending stems to 40 cm long; foliage with silvery scales (lepidote) to free-rayed stellate hairs; leaves variable in shape, often asymmetrical, mostly palmately 5-nerved from base; flowers axillary; sepals subtended by an involucel of 0–3 bracts; petals 10–17 mm long, white to sulfur-yellow to rose; carpels usually 6–10.

— A genus of 4 species, 3 of the Americas and 1 from the Mediterranean; previously included in *Sida*. The key to *Malvella* species is adapted from Fryxell (1974). (Diminutive of genus name *Malva*)

REFERENCES: Clement 1957; Fryxell 1974.

1. Leaf blades rounded to subacute at apex, reniform, wider than long, with stellate pubescence predominating; involucel of 1–3 bracts present; calyx lobes ovate _____ ***M. leprosa***
1. Leaf blades acute at apex, ovate, triangular to narrowly triangular, longer than wide, predominantly or exclusively silvery-lepidote (= covered with scales); involucel usually absent but sometimes present; calyx lobes ovate-cordate to cordate.
 2. Leaf blades ovate-triangular, 1–2(–3) times as long as wide, often with at least some stellate pubescence mixed with silvery scales, the margins toothed to apex; involucel sometimes present; calyx lobes ovate-cordate _____ ***M. lepidota***
 2. Leaf blades narrowly elongate-triangular, (2–)2.5–5(–6) times as long as broad, indument solely silvery-lepidote, the margins entire except for few hastate teeth at base; involucel absent; calyx lobes cordate _____ ***M. sagittifolia***

Malvella lepidota (A. Gray) Fryxell, (with small scruffy scales), SCURFY SIDA. Leaf blades 10–30(–45) mm long, to 50 mm wide; petals white to cream to pale brownish yellow, rose upon drying. Rocky or silty soils along irrigation canals and in depressions; Hamilton Co. (HPC—in that county known from a single collection); also Hatch et al. (1990) cited vegetational areas 4 and 5 (Fig. 2); mainly c to w TX. Mar-Oct. [*Sida lepidota* A. Gray, *Sida leprosa* (Ortega) K. Schum. var. *depauperata* (A. Gray) Clement]

Malvella leprosa (Ortega) Krapov., (scruffy), ALKALI SIDA, DOLLAR WEED, ALKALI-MALLOW. Leaf blades to 40 mm long and 50 mm wide; petals white to cream or rose, brownish on drying.

Flats and rocky areas; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); mainly c to w TX. Mar-Oct. [*Sida hederacea* (Douglas ex Hook.) Torr. ex A. Gray, *Sida lepnsa* var. *hederacea* (Douglas ex Hook.) K. Schum.]

Malvella sagittifolia (A. Gray) Fryxell, (arrow-leaved). Leaves to 54 mm long, 2–5(–10) mm wide; petals yellow or white, often suffused with red. Flats and rocky areas; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); mainly c to w TX. Throughout growing season. [*Sida lepnsa* var. *sagittifolia* (A. Gray) Clement, *Sida sagittifolia* (A. Gray) Rydb.]

MODIOLA

—A monotypic New World genus native from Virginia to Argentina. (Latin: *modiolus* hub or body of a wheel, in allusion to the fruit)

Modiola caroliniana (L.) G. Don, (of Carolina), CAROLINA MODIOLA. Creeping perennial herb, sparsely hispid-pilose; leaf blades orbicular-ovate, shallowly to deeply palmately 3–5-lobed and toothed, to 6 cm long and 4 cm wide; flowers axillary, solitary, rather small; petals 4–6 mm long, salmon to purplish red; fruits of 15–30 carpels. Disturbed and waste areas; found as a garden weed at Dallas in 1949, also Denton and Limestone cos., also Brown (Stanford 1976), Parker, and Tarrant (R. O'Kennon, pers. obs.) cos.; common in s and se Texas, scattered elsewhere in the state. Apr-Jun. Reported as poisonous to livestock (Burlage 1968).

PAVONIA

—A genus of ca. 150 species of herbs, subshrubs, or shrubs (rarely arborescent) (Fryxell 1997) of tropical and warm areas; some are cultivated as ornamentals and others for their fibers. (Named for José Antonio Pavón, 1754–1844, Spanish botanist and physician, traveler in Peru, and one of the authors of *Flora Peruviana* —Fryxell 1997)

REFERENCE: Fryxell 1979b.

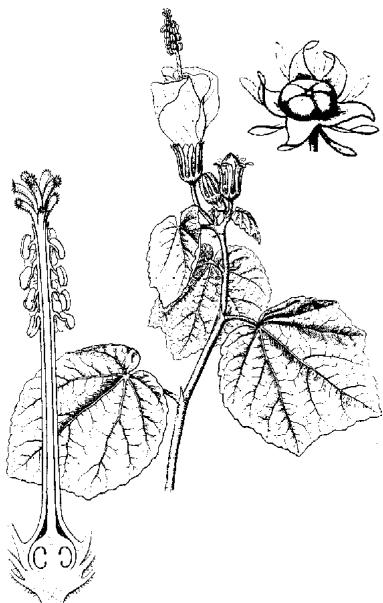
Pavonia lasiopetala Scheele, (woolly-petaled), WRIGHT'S PAVONIA. Small shrub to ca. 1(–1.5) m tall; stems densely to sparsely stellate-pubescent; leaves alternate, petioled; leaf blades ovate-cordate, usually acute apically, 2–5(–7.5) cm long, stellate-pubescent on both surfaces; flowers solitary, axillary, on pedicels 2–5 cm long, opening in early morning and lasting only 1 day; involucel of 5(–8) linear bracts; calyx lobes ovate, acuminate, conspicuously nerved, the nerves green and the intervening tissue whitish; petals deep rose-pink, 12–25 mm long; styles 10; carpels 5; fruits 8–9 mm in diam. Cultivated and spreading in landscapes; Tarrant Co.; native in rocky woods of Edwards Plateau and s TX. Flowering throughout the growing season. ☒/102

RHYNCHOSIDA BEAKED SIDA

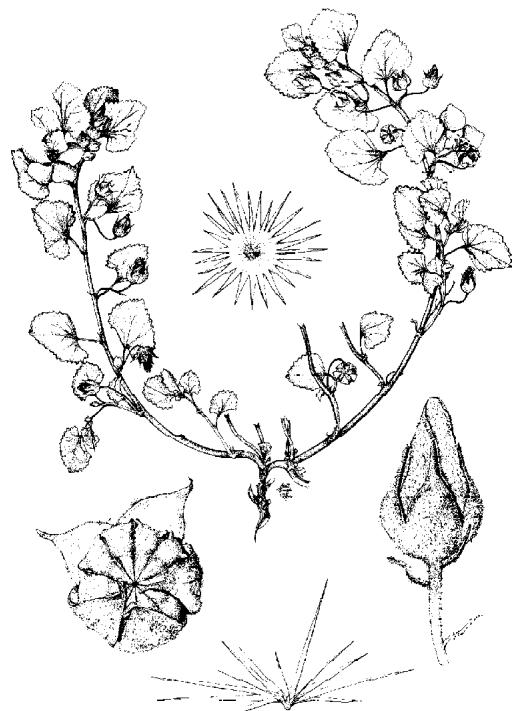
—A genus of 2 species of the Americas; previously treated in the genus *Sida*; Fryxell (1978) discussed generic relationships of *Rhynchosida*, *Sida*, and related genera. (Presumably from Greek: *rhyncho*, snout, and the genus name *Sida*)

REFERENCE: Fryxell 1978.

Rhynchosida physocalyx (A. Gray) Fryxell, (bladder calyx, alluding to the somewhat inflated calyx), SPEAR-LEAF SIDA. Perennial from a fleshy-woody rootstock; stems spreading or decumbent, to ca. 40 cm long; foliage with stellate pubescence; leaf blades suborbicular to oblong, to 6 cm long and 5 cm wide, obtuse to broadly rounded apically, cordate basally; flowers solitary in the leaf axils; calyx lobes cordate, with an apical mucro, ca. 8 mm long in flower, later enlarging and covering the fruit, petals ca. as long as calyx, yellow or buff in color; fruits of 10–14 carpels, disk-like, blackish at maturity. Rocky or sandy soils, prairies, waste places; Brown, Coleman,



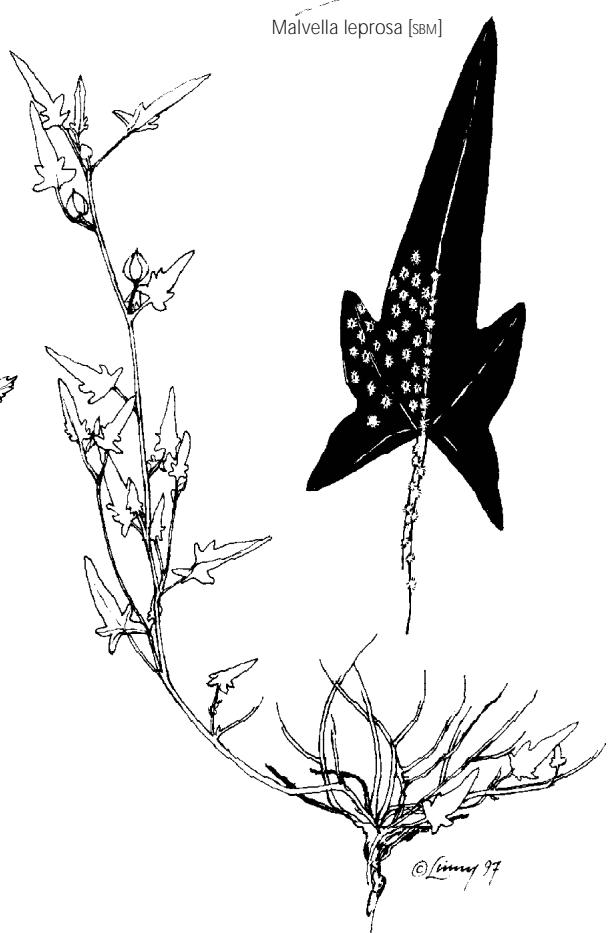
Malvaviscus arboreus var. drummondii [GR1]



Malvella leprosa [SBM]



Malvella lepidota [HEA]



Malvella sagittifolia [HEA]

Stephens, McLennan, Mills, Palo Pinto, Tarrant, and Young cos., also Hamilton Co. (HPC); mainly w part of nc TX s and w to w TX. Apr-Oct. [*Sida hastata* A. St.-Hil., *Sida physocalyx*A. Gray] ■/104

SIDA

Ours prostrate to erect annuals or perennials with stellate pubescence; flowers axillary, petals light yellow to orange-yellow; carpels 5, dehiscent at apex, usually apiculate with 2 beaks 0-1 mm long.

—A genus of ca. 100 species (Fryxell 1997) native to tropical and warm areas, especially the Americas; some are sources of fiber. The botanical journal *Sida, Contributions to Botany* published by the Botanical Research Institute of Texas, is named after this genus; Lloyd Shinners chose the abbreviated one word title for simplicity in reference citations and because it would be familiar to botanists all over the world (Mahler 1973b). (Greek name used by Theophrastus for some similar plant)

REFERENCES: Kearney 1954; Clement 1957; Fryxell 1978, 1985.

1. Stems prostrate; small spine-like structure absent; pedicels much longer than the petioles; petals yellow to orange-yellow _____ ***S. abutifolia***
1. Stems erect; small (ca. 1 mm long) spine-like structure present at the base of the petiole of well-developed leaves; pedicels shorter than the petioles; petals pale yellow _____ ***S. spinosa***

Sida abutifolia Mill., (with leaves like *Abutilon*—Indian mallow), SPREADING SIDA. Perennial from a woody rootstock; stems to 50 cm long; foliage stellate-pubescent; leaf blades linear to ovate or oblong, to 35 mm long, usually much smaller, crenate-dentate; calyces ca. 5 mm long; petals much longer than calyces; carpels apiculate varying to having 2 prominent points. Limestone outcrops, rocky prairies, and roadsides; in nc TX mainly Blackland Prairie and Grand Prairie; widespread in TX. Apr-Oct. [*Sida filicaulis* Torr. & A. Gray]

Sida spinosa L., (spiny), PRICKLY SIDA, PRICKLY-MALLOW. Minutely stellate-pubescent, branched annual to ca. 100 cm tall; leaves ovate to narrowly lanceolate, to 55 mm long and 30 mm wide, crenate-dentate; calyces 5-7 mm long; petals slightly longer than calyces; carpels opening into 2 prominent beaks. Disturbed and waste areas; se and e TX w to East Cross Timbers. May-Nov.

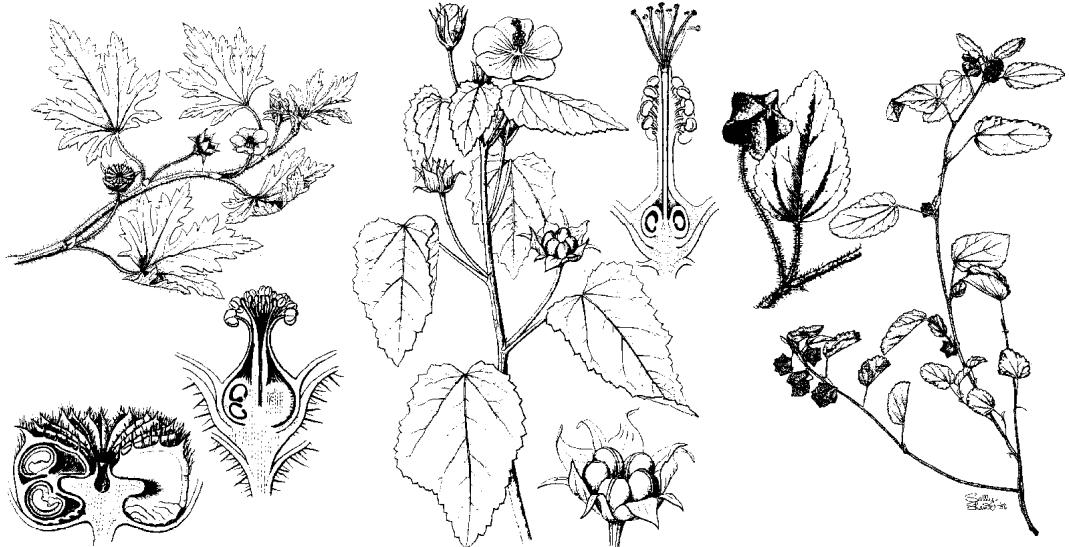
SPHAERALCEA GLOBE-MALLOW, FALSE MALLOW

Perennials with stellate pubescence; flowers axillary and in terminal, spike-like racemes; carpels sharply differentiated into 2 parts, the lower part seed-containing, indehiscent, reticulate, the upper part seedless, smooth.

—A genus of ca. 40 species (Fryxell 1997) of arid areas of the Americas; some are cultivated as ornamentals. (Greek: *sphaera*, sphere or globe, and the genus name *Alcea*—hollyhock, from the commonly spherical fruit)

REFERENCES: Kearney 1935; La Duke & Northington 1978.

1. Larger leaf blades toothed or with only 2 prominent basal lobes; calyces subtended by linear-lanceolate to thread-like involucel bracts, these soon falling.
2. Leaf blades oblong-lanceolate to linear-lanceolate, toothed, but unlobed; most pedicels shorter than calyces _____ ***S. angustifolia***
2. Leaf blades triangular-lanceolate, with 2 basal lobes; longer pedicels as long as or longer than calyces _____ ***S. hastulata***
1. Larger leaf blades compound or very deeply several-lobed (typically 5 narrow lobes); calyces usually not subtended by involucel bracts _____ ***S. coccinea***



Modiola caroliniana [GR1]

Pavonia lasiopetala [GR1]

Rhynchosida physocalyx [MAR, SBM]



Sida spinosa [REE]

Sida acutifolia [BT3]

Sphaeralcea angustifolia (Cav.) G. Don subsp. **cuspidata** (A. Gray) Kearney, (sp: narrow-leaved; subsp: with a cusp or sharp stiff point), NARROW-LEAF GLOBE-MALLOW, POINT-SEED GLOBE-MALLOW, COPPER-MALLOW. Stems spreading to erect, to 100 cm long; petals 7–20 mm long, variable in color, salmon (Tarrant Co. specimen), reddish to orangish to lavender; carpels 10–15. Sandy or rocky soils; Tarrant Co. (near Fort Worth stockyards), also Brown Co. (Kearney 1935 and HPC); mainly w 1/2 of TX. Late May–Oct. [*S. angustifolia* var. *cuspidata* A. Gray] ☒/106

Sphaeralcea coccinea (Nutt.) Rydb., SCARLET GLOBE-MALLOW, RED FALSE MALLOW. Stems decumbent to ascending, to 35(–50) cm long; plant spreading by branching roots; petals scarlet, 10–20 mm long; carpels 10–14. Sandy or gravelly open ground, roadsides; Jack and Montague cos., also Brown Co. (HPC) and Fort Hood (Bell or Coryell cos.—Sanchez 1997); mainly West Cross Timbers s and w to w TX. Apr–Jun, sporadically to Oct. The stellate trichomes of this species were used as evidence in a forensic botany case involving a 1989 plane crash near Ruidoso, New Mexico (Fish vs. Beech Aircraft Corp.); trichomes obtained from the stored wreckage of the airplane engine were argued to be evidence for faulty engine design; i.e., that the design had allowed plant material to be sucked into the engine, thus causing the crash. However, botanists were able to show that the trichomes were introduced into the engine post-crash and could not have caused the accident; their evidence included information showing the trichomes could not have survived the heat of the crash (melted aluminium was present), that the trichomes were from *S. coccinea* which was common at the storage site, and that associated with the trichomes there were dead bees, pollen, and chewed *Sphaeralcea* leaves suggesting that the presence of the plant material was the result of nest building activities by bees in the wreckage during post-crash storage (Blaney 1995; Bates et al. 1997; Brunk 1997; Linddell 1997; Rozen & Eickwort 1997).

Sphaeralcea hastulata A. Gray, (somewhat spear-shaped). Stems usually decumbent, 15–40 cm long, forming bushy clumps; petals orange to rose-orange or scarlet, 11–22 mm long. Sandy, silty, gravelly, and rocky ground; Trans-Pecos to s Rolling Plains, spreading e along roadsides in Erath Co. in w nc TX, and along railroad in Tarrant Co. (Mahler 1988), also Brown Co. (HPC). Apr–May, sporadically to Oct.

MELASTOMACEAE

MELASTOME OR MEADOW-BEAUTY FAMILY

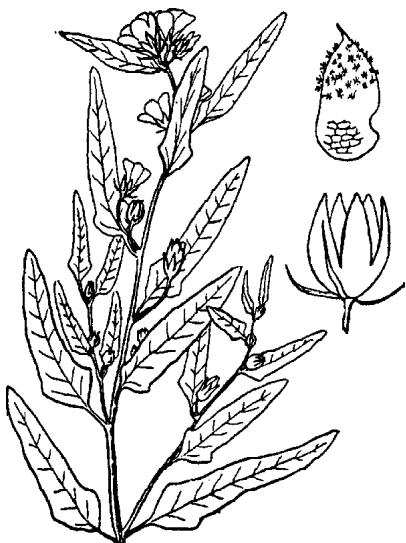
☛ A large (4,950 species in 188 genera), mainly tropical and warm area family with many species in South America; most are shrubs or herbs, less often trees or lianas. Some yield timber or dyes or are used as cultivated ornamentals. Family name from *Melastoma*, a genus of ca. 70 species native from Indomalesia to the Pacific. (Greek: *melas*, black, and *stoma*, mouth, in reference to the mouth being stained black by the fruits of some species) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: herbs with opposite, simple, palmately veined leaves with the *main veins parallel*; stems often 4-angled; petals 4, whitish rose to rose to purple; filaments geniculate (= elbow-shaped); anthers opening by apical pores, with sterile appendages.

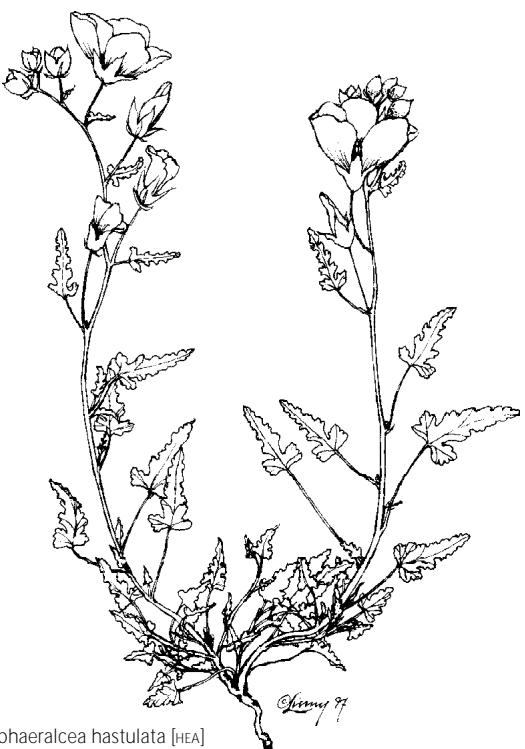
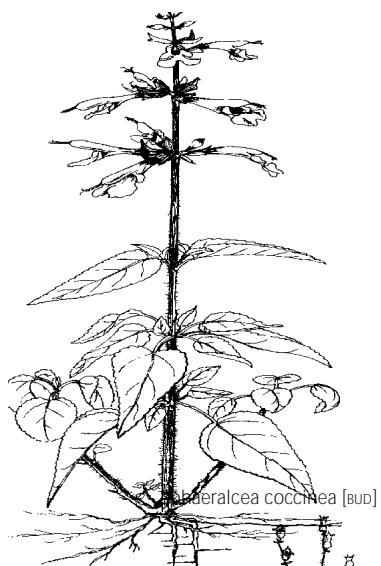
REFERENCE: Wurdack & Kral 1982.

RHEXIA MEADOW-BEAUTY, DEER-GRASS

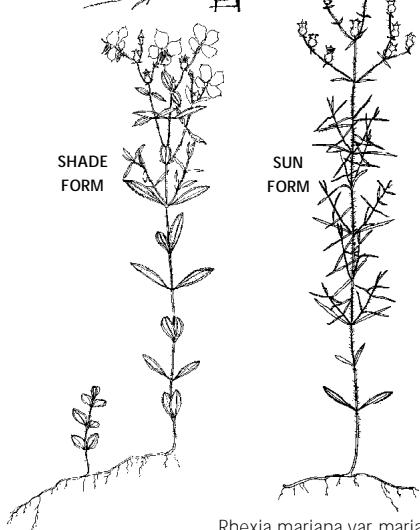
Perennial herbs often with long glandular hairs; stems above the middle with 4 well-defined sides (faces); leaves opposite, distinctly palmately 3-veined, serrate-ciliate; stipules absent; flowers showy, solitary or in cymose inflorescences; calyx lobes 4; petals 4, lavender-rose to lavender or white, obovate; stamens 8; anthers yellow, conspicuous, basifixated, typically with a basal appendage, often curved or straight, dehiscing by a pore; hypanthium cylindrical at flowering, ±



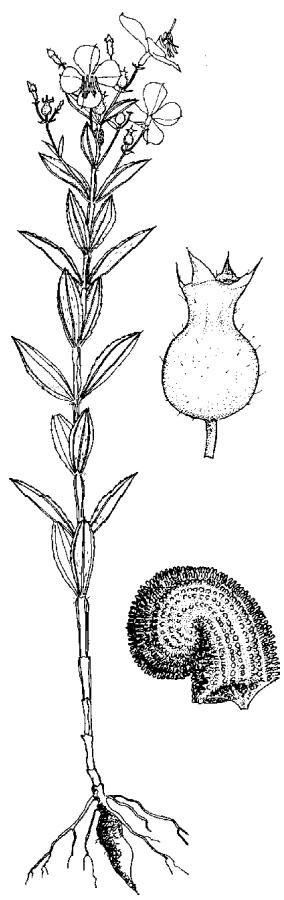
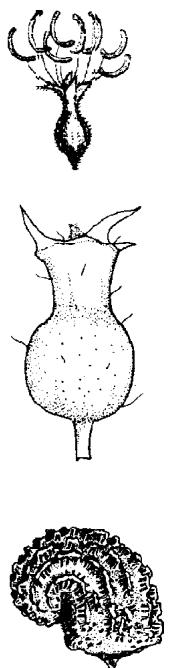
Sphaeralcea angustifolia subsp. cuspidata [BB2]

Sphaeralcea hastulata [HEA] *Lenny 97*

Sphaeralcea coccinea [BUD]



Rhexia mariana var. mariana [SID]



Rhexia virginica [SID]

urceolate at maturity and enclosing all or most of the capsule, narrowed distally to form a neck-like portion, usually with glandular-stipitate hairs; fruit a globose or subglobose capsule.

— A North American genus of 13 species including cultivated ornamental herbs. (Name used by Pliny for a member of the Boraginaceae, which was reputed to be useful in curing ruptures; from Greek; *rhexis*, a breaking or rupture, for breaking or bursting forth of the entrails of victims; why adopted for its modern use unknown)

REFERENCES: James 1956; Eyde & Terri 1967; Kral & Bostick 1969.

1. Leaves short-petiolate; stems not conspicuously winged, with one pair of the 4 stem faces flat to concave and much narrower than the convex or rounded other pair; petals lavender to white or rarely lavender-rose; plants from elongate stoloniferous rhizomes _____ **R. mariana**
1. Leaves sessile or nearly so; stems usually with conspicuous wings to ca. 2 mm wide, with the 4 stem faces flat to convex and essentially equal; petals lavender-rose; plants from spongy-thickened or tuberiferous rootstocks _____ **R. virginica**

Rhexia mariana L. var. **marianna**, (of Maryland), MARYLAND MEADOW-BEAUTY. Stems to ca. 0.8 m tall, branched or unbranched; leaf blades linear to elliptic to lanceolate or ovate (variable depending on whether in sun or shade—see illustration), to 6.5 cm long and 2 cm wide; calyx lobes to 1–3 mm long; petals 10–25 mm long, lavender to white, rarely lavender-rose; anthers 6–10 mm long; hypanthium 6–10 mm long. Moist or wet, usually open areas; Lamar Co. in Red River drainage, also Limestone and Milam cos. near e margin of nc TX, also Grayson Co. (S. Crosthwaite, pers. obs.); se and e TX w to e part of nc TX. May–Sep.

Rhexia mariana var. *interior* (Pennell) Kral & Bostick, (inland), [*R. interior* Pennell], has the 4 stem faces subequal (and thus using that character in the key above it would key to *R. virginica*), stem angles sharp or narrowly winged, rhizomes stout, leaves short-petiolate, flowers bright lavender-rose, and hypanthium 10–13 mm long. This variety is known from se and e TX and from s OK just n of nc TX (Kral & Bostick 1969); its occurrence would not be surprising in nc TX in the Red River drainage or on the e margin of nc TX.

Rhexia virginica L., (of Virginia), COMMON MEADOW-BEAUTY. Stems to 1 m tall, usually branched; leaves ovate to ovate-lanceolate or elliptic, to 10 cm long and 3.5 cm wide (usually smaller); calyx lobes to 1.5–3 mm long; petals 10–25 mm long, lavender-rose; anthers 4–7 mm long; hypanthium usually 8–10 mm long. Seeps or wet areas; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly se and e TX; much less common in TX than *R. mariana*. Jun–Oct.

MELIACEAE MAHOGANY FAMILY

— A medium-sized (565 species in 51 genera), mainly tropical family with a few in the subtropics; most are trees or rarely shrubs; the bark is typically bitter and astringent. The family includes the genus *Swietenia* (MAHOGANY), the source of a valuable tropical wood used for furniture including cabinets and formerly in shipbuilding. (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the single species introduced in nc TX is a tree with large, alternate, bipinnately compound leaves; flowers radially symmetrical, usually *lavender*, in a panicle; fruit a small drupe.

REFERENCES: Wilson 1924; Miller 1990.

MELIA CHINA-BERRY, UMBRELLA-TREE

— An Old World, mainly tropical genus of 3 species. (Classical Greek name for the ash, which has similar leaves)

Melia azedarach L., (derivation unknown), CHINA-BERRY, PRIDE-OF-INDIA, CAVELÓN, PARÁISO, CHINA-TREE, WHITE-CEDAR, CEYLON MAHOGANY. Bushy-topped small tree to ca. 15 m tall; leaves alternate, bipinnately compound, 30 cm or more long; ultimate leaflets rhombic- or ovate- or elliptic-lanceolate, toothed, to 6(-8) cm long and 3 cm wide; flowers many, in terminal panicles over-topped by leaves; sepals 5, pubescent with simple or stellate hairs; petals 5, narrowly oblanceolate, 7-13 mm long, lavender (rarely whitish); filaments united into a narrow, purplish, cylindrical tube 6-10 mm long with a many-toothed summit; ovary superior; fruit a yellowish drupe ca. 15 mm in diam. Commonly cultivated, established as an escape in floodplain forests, thickets, and forest margins and almost appearing native; se and e TX w to nc TX and Edwards Plateau. Mid-Apr–mid-May. Native of Himalaya Mountains and e Asia. Cultivated as an ornamental and used as a timber tree in its native habitat; the bark and leaves have been used medicinally and as an insecticide (Mabberley 1987); poisoning is known from ingesting the fruits, and fatalities in livestock and humans have been reported; 6-8 fruits are reported to have caused death in a young child; leaves, bark, and flowers are also toxic; toxins include tetranotriterpene neurotoxins and unidentified resins which cause digestive tract irritation and degeneration of the liver and kidneys (Kingsbury 1964; Hardin & Arena 1974; Lampe & McCann 1985; Turner & Szczawinski 1991). ☠ ☷

MENISPERMACEAE MOONSEED FAMILY

Ours perennial vines; leaves alternate, simple; leaf blades entire or usually few-toothed or -lobed, palmately veined at base; stipules absent; flowers very small, in axillary and terminal, racemose panicles, unisexual, the sexes on different plants (dioecious); sepals 4-9; petals 4-8 or absent; stamens 6-many, the filaments enlarged at base; pistils 2-4; ovaries superior; fruit a drupe with the bony endocarp typically curved, laterally compressed, and often sculptured.

— A medium-sized (ca. 525 species in ca. 78 genera—Rhodes 1997), mainly tropical and warm area family of primarily lianas, vines, and scandent shrubs, or rarely trees or herbs; most have bitter, poisonous sesquiterpenoids and alkaloids; Kessler (1993b) considers the accumulation of some alkaloids unparalleled by any other angiosperm family. A number of species are used medicinally or as fish-poisons, sweeteners, or contraceptives; the alkaloid tubocurarine, traditionally used as a component of curare arrow or dart poisons by Amazonian natives, and now to relax muscles during surgery, is obtained from the South American *Chondrodendron tomentosum* Ruiz & Pav. (subclass Magnoliidae)

FAMILY RECOGNITION IN THE FIELD: vines with alternate, simple, palmately-veined leaves; flowers small, inconspicuous, unisexual, the female with 2-4 pistils; fruit a drupe, the endocarp (= hard seed-like inner part of fruit) often *curved and sculptured*

REFERENCES: Ernst 1964a; Barneby & Krukoff 1971; Loconte & Estes 1989; Kessler 1993b; Rhodes 1997.

1. Leaves usually densely soft-pubescent beneath, at least some usually longer than wide, often without lobes or with wavy margins or 3-5-lobed; fruits red at maturity; stamens (in staminate flowers) 6 _____ **Cocculus**
1. Leaves nearly glabrous to sparsely pubescent beneath, usually ca. as wide as long, usually 3-7-lobed or angled; fruits blue to bluish black or black; stamens (in staminate flowers) 12-24.
 2. Leaves peltate (the petiole attached to lower leaf surface slightly back from the margin); fruits globose, 6-15 mm in diam.; flowers with 4-8 petals _____ **Menispernum**
 2. Leaves not peltate (petiole attached to margin of leaf); fruits ellipsoid, ca. (15-)20-25 mm long; flowers with petals absent _____ **Calycocarpum**

CALYCOCARPUM CUPSEED, WILD SARSAPARILLA

☛ A monotypic genus of e North America. (Greek: *calyx*, cup, and *carpos*, fruit, presumably from the shape of the stone)

Calycocarpum lyonii (Pursh) A. Gray, (for John Lyon, a Scottish gardener and botanist who died on an expedition in Tennessee between 1814 and 1818), CUPSEED, WILD SARSAPARILLA. High climbing vine; leaves to 20 cm long, ca. the same width to wider, with 3–5 acuminate lobes, cordate basally, thin; inflorescences to ca. 20 cm long; flowers ca. 5 mm across; sepals 6–9, petaloid, greenish white; petals 0; stamens (in staminate flowers) 12; fruits blackish at maturity, the stone deeply scooped out on one side, cup-like in shape, and with irregularly toothed margins. Low woods near stream; Lamar Co. in the Red River drainage; this record is the westernmost locality known in TX; previously known only from deep e TX. May-Jun.

COCCULUS SNAILSEED, CORALVINE, CORALBEAD

☛ A genus of 8 species of tropical and warm areas excluding South America and Australia; some contain alkaloids and are used medicinally; others have edible fruits or are cultivated as ornamentals. (An old name, diminutive of Greek: *coccus* berry)

Cocculus carolinus (L.) DC., (of Carolina), CAROLINA SNAILSEED, CORALBERRY, CORALBEAD, CAROLINA MOONSEED, RED-BERRY MOONSEED. Becoming a high-climbing vine, but often beginning to flower when only 15–30 cm long, sometimes prostrate or scandent; leaf blades extremely variable in shape, toothing, lobing, and size, to ca. 12 cm long (usually much smaller), widely cordate, truncate or cuneate basally, leathery; inflorescences to ca. 15 cm long; sepals 6–9; petals (5–)6, yellow; fruits 5–8.5 mm in diam., globose, red, the stone ridged with a central depression and roughly snail-shaped. Thickets, roadsides, disturbed sites; nearly throughout TX. Jun-Jul, sporadically to Oct. Often abundant and by far the most common member of the family in nc TX. Some individuals with completely unlobed leaves superficially resemble *Smilax* (Smilacaceae); *Cocculus* can easily be distinguished by the lack of both armature and tendrils, its leaf pubescence, and its snail-shaped stones. Reported to contain alkaloids (Burlage 1968).

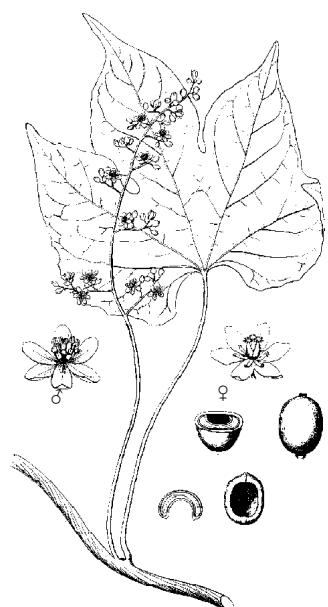
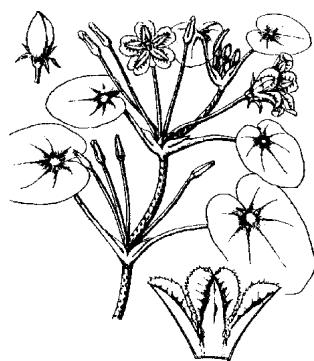
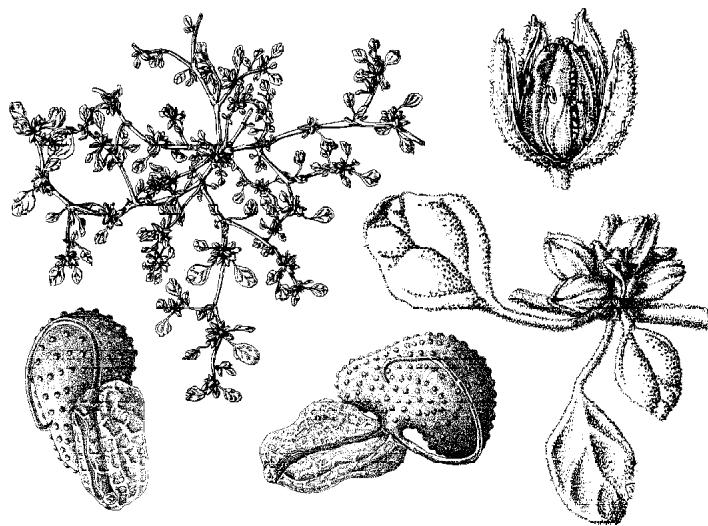
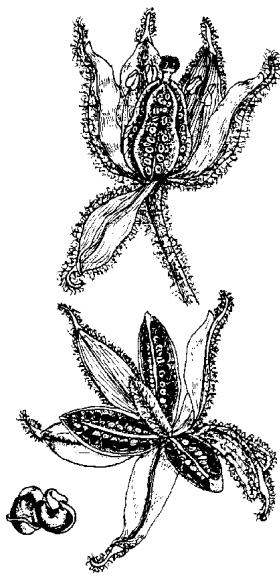
MENISPERMUM MOONSEED

☛ A genus of 3 species of e North America (including Mexico) and e Asia (Rhodes 1997); this disjunct distribution pattern is discussed under the genera *Campsis* (Bignoniaceae) and *Carya* (Juglandaceae). (Greek: *men*, moon, and *sperma*, seed, from the shape of the seed)

Menispermum canadense L., (of Canada), MOONSEED, YELLOW PARILLA. Vine to ca. 3–4 m; leaf blades 3–15 cm long, 5–7 palmately lobed or angled, orbicular-ovate or orbicular-reniform, ± cordate at base, thin or firm; inflorescences to ca. 15 cm long; sepals 4–8; petals 4–8; stamens (in staminate flowers) 12–24; fruits globose, blue to blue-black, the stone flattened and somewhat crescent (moon)-shaped. Damp woods; collected by Reverchon in Oak Cliff (Dallas), not found there since; otherwise only reported in TX from the Edwards Plateau. May-Jun. This species is cultivated as an ornamental and the rhizomes are used medicinally (Mabberley 1987); the fruits are dangerous due to the presence of isoquinoline alkaloids, including dauricine, a compound with curare-like action; they can be mistaken for grapes and deaths have been reported (Hardin & Arena 1974; Tampion 1977; Lampe & McCann 1985; Turner & Szczawinski 1991). ☣

MENYANTHACEAE BUCKBEAN OR BOGBEAN FAMILY

☛ A small (40 species in 5 genera), nearly cosmopolitan family of aquatic or wet area herbs. *Nymphoides* sometimes lumped into the Gentianaceae; however, the Menyanthaceae is now

*Melia azedarach* [LAM]*Calycocarpum lyonii* [GR1]*Cocculus carolinus* [GR1]*Menispernum canadense* [GR1]*Glinus lotoides* [MAS, SID]*Glinus radiatus* [co1]

generally considered to be allied with other Asteridae and not closely related to the Gentianaceae. Family name from *Menyanthes*, BUCKBEAN or BOGBEAN, a circumboreal genus represented by a single, rhizomatous, herbaceous, perennial species. (Either from Greek: *men*, moon or month, and *anthos*, flower, in reference to the length of the flowering period, or from *menanthes*, moonflower, the name used by Theophrastus for a plant growing on Lake Orchomenos) (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: the single nc TX species is an *aquatic* with suborbicular floating leaves and *yellow flowers in umbels*; corollas short tubular below the 5 lobes, with stamens attached at base. Other superficially somewhat similar plants (Cabombaceae, Nymphaeaceae, Nelumbonaceae) have separate petals.

REFERENCE: Wood 1983b.

NYMPHOIDES FLOATING-HEART

—A cosmopolitan genus of 20 species; some have edible tubers, medicinal seeds, or are cultivated as ornamentals. (From the genus name *Nymphaea*, from Greek: *nymphē*, water nymph, and *eidos*, form, like, or appearance, alluding to the resemblance)

REFERENCE: Ornduff 1966.

Nymphaoides peltata (J.G. Gmel.) Kuntze, (shield-shaped), YELLOW FLOATING-HEART, WATER-FRINGE. Perennial, submersed, aquatic herb with floating leaves; leaves opposite, petiolate, 2 or more per long, petiole-like stem; leaf blades suborbicular, coarsely undulate-dentate, to 15 cm long and wide, cordate basally; flowers in umbels; pedicels often 6 cm or more long; calyces 5-parted; corollas bright yellow, 2–3 cm broad, the 5 lobes somewhat fringed, also with basal crests of hairs; anthers 4–5 mm long; ovary superior; capsules beaked, to 2.5 cm long. Cultivated and escaped, quiet water of streams and ponds; Dallas Co. (J. Stanford, pers. comm.), also Hatch et al. (1990) cited vegetational areas 4 and 5 (Fig. 2); ne and nc TX. Jul–Sep. Native of Eurasia. ☎

MOLLUGINACEAE CARPETWEED FAMILY

Ours annual, nonsucculent or scarcely succulent herbs; leaves simple, alternate to apparently whorled, sometimes unequal at the nodes, entire; flowers solitary or clustered in the leaf axils, small, radially symmetrical, perfect, hypogynous, inconspicuous; sepals 5; petals absent; fruit a many-seeded capsule dehiscent by valves.

—A small (130 species in 13 genera) usually herbaceous family mainly of tropical and warm areas, especially s Africa; it was formerly included in the Aizoaceae and some of the genera have been placed in the Ficoidaceae. The family is unusual in its subclass in having anthocyanin rather than betalain pigments (Cronquist & Thorne 1994); however, molecular evidence places it within the Caryophyllales (Downie & Palmer 1994). (subclass Caryophyllidae)

FAMILY RECOGNITION IN THE FIELD: prostrate to ascending herbs with simple, alternate to whorled, entire leaves; flowers small, inconspicuous, radially symmetrical, lacking petals; fruit a many-seeded capsule.

REFERENCES: Thieret 1966; Bogle 1970; Endress & Bittrich 1993; Behkne & Mabry 1994; Downie & Palmer 1994.

1. Plants with branched or stellate pubescence; leaf blades 8–15 mm wide, narrowly to broadly obovate; flowers essentially sessile; seeds with conspicuous bladder-like appendage _____ **Glinus**
1. Plants glabrous; leaf blades narrow, usually 3–5(–10) mm wide, spatulate to oblanceolate to narrowly obovate; flowers on filiform pedicels 5–15 mm long; seeds without an appendage _____ **Mollugo**

GLINUS

Pubescent annuals with habit resembling *Molluga*; flowers in small, dense, few (ca. 5–10)-flowered clusters in the leaf axils; seeds with a distinct bladder-like appendage (= strophiole) and a persistent, long slender funiculus.

☛ A genus of ca. 12 species of tropical and warm areas of the world. The following 2 species are very similar; according to Godfrey and Wooten (1981), “There appears to be no concensus as to whether plants naturalized in the U.S. are representatives of 2 species.” (Greek: *glinoς*, sweet juice; the usage not evident)

- | | |
|--|---------------------------|
| 1. Seeds minutely tuberculate (use scope if possible), 0.4–0.6 mm long, 0.3–0.4 mm wide; stamens
(3–)5–10 | <i>G. lotoides</i> |
| 1. Seeds usually smooth, 0.4–0.5 mm long, 0.25–0.3 mm wide; stamens 3–5 | <i>G. radiatus</i> |

Glinus lotoides L., (resembling *Lotus*—deer-vetch, trefoil). Plant ± gray-green from branched or stellate pubescence; stems prostrate or ascending, branched at base, ca. 10–30 cm long; leaves alternate to apparently whorled, 0.5–3 cm long, ovate to orbicular, narrowed to a slender petiole; sepals 4–7 mm long; capsules ellipsoid to ovoid, loculicidal, ca. 4 mm long. Waste places, exposed mud of dried-up lake bottoms; Denton and Grayson cos.; also Post Oak Savannah. Jul–Sep. Introduced from the Old World. An excellent illustration of the distinctive seed, including its strophiole and funiculus, was provided by Thieret (1966). ☀

Glinus radiatus (Ruiz & Pav.) Rohrb., (with rays). Very similar to *G. lotoides*; leaves tending to be narrower. Muddy or sandy soils; included on the basis of citation for vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly se and e TX. Apr–Oct. Apparently native to tropical America, possibly n to s U.S. Bogle (1970) suggested that these 2 similar species need further study. ☀

MOLLUGO CARPETWEED

☛ A genus of ca. 35 species of tropical and warm areas of the world. (Old name for *Galium mollugo* L. of Rubiaceae, transferred to this genus, probably due to the similarly whorled leaves)

Mollugo verticillata L., (whorled), GREEN CARPETWEED, INDIAN-CHICKWEED. Glabrous nonsucculent annual with prostrate to ascending stems to 20(–50) cm long; leaves apparently whorled, 3–6(–8) together, to ca. 3 cm long, unequal, the broadest leaves usually basal; flowers small, pedicellate, 2–5 from each node; sepals to 2.5 mm long, green to white with green back; stamens usually 3(–5); seeds without a distinct appendage (= strophiole). Waste ground, disturbed low areas, cultivated sites; throughout TX. Late May–Oct. Apparently native of tropical America. In the past, placed by some workers in the Ficoidaceae. ☀

MORACEAE MULBERRY OR FIG FAMILY

Shrubs, trees, or herbaceous plants usually with ± milky juice; leaves usually rather short-petioled, usually alternate, simple, entire or toothed or lobed; stipules slender, falling when the leaves open or soon after; flowers unisexual, the sexes on the same or separate trees (plants thus monoecious or dioecious), in catkin-like clusters, heads, or hollow receptacles; perianth 2–6-parted or perianth absent from pistillate flowers; stamens 1–6; pistil 1; fruits achenes surrounded by the fleshy perianths, all the fruits of a pistillate inflorescence united into a multiple fruit (= syncarp), or fruits inside a fleshy receptacle (= synconium).

☛ A medium-large family of nearly 1,100 species in 38 genera (Wunderlin 1997); they are primarily tropical and warm area (a few temperate) trees, shrubs, lianas, stranglers, and herbs, usually having laticifers with milky sap. It includes *Artocarpus* (JACKFRUIT and BREADFRUIT) and *Ficus* (FIGS, including tropical STRANGLER FIGS). *Artocarpus altilis* (Parkinson) Fosberg,

BREADFRUIT, is famous because plants of it were being transported on the sailing ship Bounty, when a mutiny occurred against Captain Bligh. The Moraceae are closely related to the Urticaceae and Cannabaceae and probably paraphyletic when treated separately. From a cladistic standpoint these families should be lumped to form a more inclusive monophyletic Urticaceae (Judd et al. 1994). (subclass Hamamelidae)

FAMILY RECOGNITION IN THE FIELD: woody plants (1 herb) with alternate simple leaves; sap usually milky; flowers reduced, unisexual, with a 4-parted perianth; fruits usually *multiple* or inside a *receptacle*.

REFERENCES: Rohwer & Berg 1993; Judd et al. 1994; Wunderlin 1997.

1. Plant an erect annual herb < 1 m tall _____ **Fatoua**
1. Plant a perennial tree, shrub, or creeping vine.
 2. Flowers and fruits hidden from view inside a hollow receptacle; plant a shrub (rarely a small tree) or creeping vine; terminal vegetative bud surrounded by a pair of stipules; rare introduced species persisting or spreading around homesites _____ **Ficus**
 2. Flowers not inside a hollow receptacle; plant a tree (rarely a shrub); terminal vegetative bud scaly, not surrounded by a pair of stipules; widespread native and introduced species.
 3. Leaf blades entire; branches usually with short thorns (the thorns sometimes absent); multiple fruits large, to 15 cm in diam., green to greenish yellow _____ **Macfura**
 3. Leaf blades toothed and/or lobed; branches thornless; multiple fruits small, to 2–3 cm in diam. or less, variously colored.
 4. Twigs glabrous or nearly so; bark scaly or furrowed; multiple fruits cylindric; leaves alternate; buds with 3–6 scales _____ **Morus**
 4. Twigs pubescent; bark smooth; multiple fruits globe-shaped; leaves alternate, sometimes opposite; buds with 2–3 scales _____ **Broussonetia**

BROUSSONETIA PAPER-MULBERRY

— A genus of 8 species native to tropical and warm Asia and Madagascar; anthers are explosive (as in *Urtica*, but rare in Moraceae in the strict sense). (Named for Auguste Broussonet, 1761–1807, of Montpellier, French physician and naturalist)

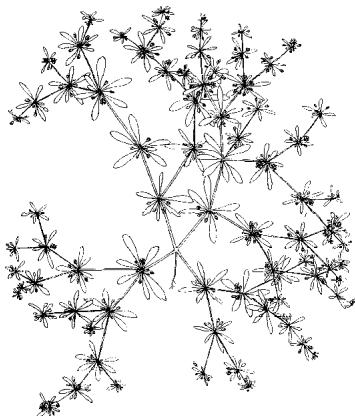
Broussonetia papyrifera (L.) L'Hér. ex Vent., (paper-bearing), PAPER-MULBERRY. Dioecious small tree to 16 m tall; sap milky; leaves broadly ovate, unlobed or sometimes lobed, coarsely dentate marginally, rounded to cordate at base; petioles to 10 cm long; staminate catkins 4–8 cm long, slender, pendulous; multiple fruits orange-red, 2–3 cm in diam., the red achenes protruding. Dallas, Grayson, and Tarrant cos.; ornamental naturalizing in se and e TX w to nc TX and Edwards Plateau. Mar-Apr. Native of China and Japan. Tapa or kapa cloth and fine paper are obtained from the inner bark (Mabberley 1987; Rohwer & Berg 1993). This species can spread by rhizomes and be a problematic invader. ↗

FATOUA CRABWEED

— An herbaceous genus of 2 species (Wunderlin 1997) native from Madagascar to e Asia, n Australia, and New Caledonia. (Derivation of generic name unknown)

REFERENCES: Thieret 1964; Massey 1975.

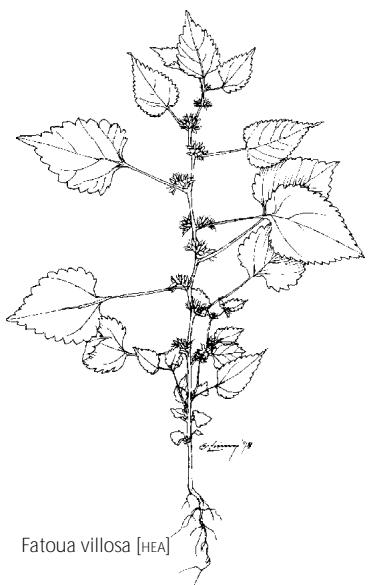
Fatoua villosa (Thunb.) Nakai, (soft hairy), MULBERRY-WEED, HAIRY CRABWEED. Monoecious annual to 80 cm tall; sap not milky; stems finely pubescent, erect, seldom branched, resembling a member of the Urticaceae; leaves alternate, petioled, broadly ovate, 3-nerved at base, cordate to truncate basally, crenate to dentate; staminate and pistillate flowers mixed in axillary, pedunculate glomerules; staminate perianths 4-merous; stamens 4, exserted; pistillate perianths 6-lobed; achenes compressed-trigonous. Weed in lawns, flower beds, and nurseries; first observed



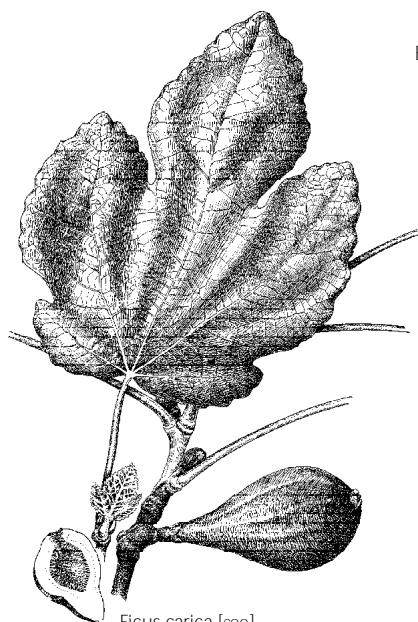
Mollugo verticillata [STE]



Broussonetia papyrifera [EN2, STE]



Fatoua villosa [HEA]



Ficus carica [coo]



Ficus pumila [BA1]



Maclura pomifera [LYN, SA3]



in TX in Dallas in 1978 (R. O'Kennon, pers. obs.), first vouchered TX collection 1980 (Lipscomb 1984); now common in portions of nc TX; first reported for North America by Thieret (1964) in se U.S.; apparently spreading westward. Jul-Sep. Native of e Asia. [*Urtica villosa* Thunb.] ☿

FICUS FIG

Ours shrubs (rarely small trees) or root-clinging vines; sap milky; flowers unisexual inside a receptacle (the receptacle fleshy at maturity with the whole structure called a fig) with a small apical opening.

— A large genus of ca. 750 species (Wunderlin 1997) of tropical and warm areas, especially Indomalesia to Australia; the genus is diverse vegetatively, ranging from trees, shrubs, lianas, and epiphytes to stranglers; some spread by aerial roots descending and becoming additional trunks—they can thus occupy several hectares. FIGS often have intricate, species-specific pollination mutualisms with wasps. Many species are cultivated as ornamentals, as sources of rubber, or for fiber, paper, timber, fruits, or medicines. *Ficus religiosa* L. (PEEPUL, BO-TREE), native from India to se Asia, is sacred to Hindus and Buddhists because Buddha is said to have had the true insight beneath one. The Indomalesian *F. elastica* Roxb. ex Hornem. (RUBBER-PLANT, INDIAN RUBBER-TREE) yields a latex-containing sap that was formerly used as a source of rubber. Currently, most natural rubber is obtained from *Hevea brasiliensis* (Juss.) Müll.Arg. (RUBBER, PARÁ RUBBER), a South American member of the Euphorbiaceae. ☿ The latex of *Ficus* species contains protein-digesting enzymes as well as other toxins; some species including COMMON FIG can cause severe dermatitis; some also contain photosensitizers which can result in phytophotodermatitis (Lampe & McCann 1985; Fuller & McClintock 1986; Turner & Szczawinski 1991). (Classical Latin name for *Ficus carica*, the edible FIG)

1. Plants shrubs (rarely small trees); leaves 3–5 lobed, very large (10–20 cm long and nearly as wide) _____ ***F. carica***

1. Plants creeping vines; leaves not lobed, often small (< 2.5 cm long), with larger leaves (to 5–10 cm long) on fruiting branches _____ ***F. pumila***

Ficus carica L., (Latin for Caria, a district in Asia Minor where neither fig nor papaya originated), COMMON FIG, HIGUERA, FIG TREE. Deciduous shrub, sometimes killed back during severe winters; leaves large, usually 3–5 lobed (rarely unlobed), thick, scabrous, usually cordate basally; figs axillary, solitary, spherical or pear-shaped, fleshy, 5–8 cm long, greenish or brownish violet. Cultivated and long persists around old homesites in nc TX but probably does not naturalize; Grayson Co., also Fort Hood (Bell or Coryell cos.—Sanchez 1997); also se TX. May–Aug. Native of w Asia. This is the cultivated, edible FIG; Egyptians were growing it by 4,000 BC (Mabberley 1987) and dried figs were uncovered at a Neolithic Age (5,000 BC) site on the western slopes of the Judean mountains (Zohary 1982). The latex can cause dermatitis or phytophotodermatitis in some people (Burlage 1968; Lampe & McCann 1985). ☿ ☿

Ficus pumila L., (dwarf), CREEPING FIG, CLIMBING FIG, CREEPING RUBBER-PLANT. Climbing on walls, etc. by roots; leaves dimorphic, those on creeping vegetative stems sessile or short petioled, cordate-ovate, small (< 2.5 cm long), oblique at bases; leaves on erect fruiting branches elliptic to oblong, larger, (to ca. 5–10 cm long); figs yellowish, pear-shaped, to ca. 5 cm long. Cultivated in Fort Worth (Tarrant Co.) and spreading from cultivation. Native of e Asia. [*F. repens* Hort.] The latex can cause phytophotodermatitis (Lampe & McCann 1985). ☿ ☿

MACLURA BOIS D'ARC, HORSE-APPLE, OSAGE-ORANGE

— A monotypic genus endemic to TX, OK, and AR. This is one of only 11 genera of trees restricted to the e U.S. (only three of these, *Asimina*, *Maclura*, and *Taxodium*, occur in nc TX)

(Little 1983). It is sometimes (e.g., Mabberley 1997) treated as including *Cudrania* and *Plecospermum*; if so the genus has 12 species ranging from Indomalesia to Australia, Africa, and America. (Named for William Maclure, 1763–1840, early American geologist)
REFERENCES: Lipscomb 1992; Laushman et al. 1996; Weniger 1996.

Maclura pomifera (Raf.) C.K. Schneid., (pome-bearing), BOIS D'ARC, HORSE-APPLE, OSAGE-ORANGE, NARANJO CHINO, BOW-WOOD, HEDGE-APPLE. Broad-headed small tree often with arching branches; wood yellow to orange; roots with conspicuous orange coloration; sap milky; leaf blades elliptic to ovate-lanceolate, acuminate, entire, glabrous above, rather sparsely pubescent beneath; staminate flowers in short-peduncled, dense, short, oblong-ovoid clusters; pistillate flowers on separate trees (plants thus dioecious), in globose heads with long, conspicuous styles; fruits multiple, superficially resembling a greenish or greenish yellow large orange with a wrinkled surface, to 12 cm or more in diam, the individual achenes completely enclosed by fleshy calyces. Stream bottoms, lower slopes, waste places; a weedy invader of disturbed uplands, chiefly in limestone areas; mainly ne to nc TX and s to c TX; native to a relatively small area in TX and adjacent OK and AR (Little 1971). According to Weniger (1996), based on field notes of pre-1860 surveys, the native range of BOIS D'ARC in TX was apparently limited to 12 counties in nc and extreme ne TX from Dallas and Grayson cos. on the w, e to Bowie Co. and s to Kaufman Co. Apr–early May. This species was used by Native Americans (e.g., Osage Indians) to make bows (French: *bois d'arc*, wood of the bow) and war-clubs; before the invention of barbed wire, it was widely cultivated for hedges and fencerows—such a hedge was said to be “horse high, bull-strong and pig tight.” According to some sources, the inventor of barbed wire, who had a BOIS D'ARC fence, saw the thorns on the plant and had the idea of “putting steel thorns” on twisted wire (Conrad 1992). The wood is one of the most decay resistant in North America and was widely used in nc TX as piers in pier and beam houses; the roots are a source of yellow dye and the leaves have been used to feed silkworms (Mabberley 1987; Conrad 1992). The fruits were used historically in TX to repel insects such as cockroaches (Conrad 1992) and such usage continues to the present. While horses relish them, the large fruits can cause death in horses and ruminants by lodging in the esophagus (Burlage 1968). Some humans develop dermatitis from contact with the milky sap of stems, leaves, and fruits (Muenscher 1951). ☠

MORUS MULBERRY

Deciduous monoecious or dioecious trees (rarely shrubs); leaf blades ovate, lobed or unlobed, serrate or dentate, 3–5 nerved from base, truncate to cordate basally, subobtuse to acute or acuminate apically; flowers unisexual; both sexes in separate catkin-like inflorescences; calyces 4-parted; stamens 4; edible multiple fruits resembling a blackberry or raspberry, composed of numerous achenes covered by sweet, juicy, white to dark purple calyces.

— A genus of 10 species (Wunderlin 1997) of deciduous trees of the subtropics; it includes cultivated ornamental and fruit trees. (Latin: *morum*, classical name for MULBERRY)

1. Mature leaf blades at most slightly scabrous on one side, usually > 8 cm long; petioles 1 cm or more long.
 2. Leaf blades glabrous except for small tufts of hairs in axils of main veins on lower surface; fruits usually white to pinkish; leaves usually variously lobed _____ ***M. alba***
 2. Leaf blades soft-pubescent beneath, sparsely pubescent or glabrous above; fruits red to dark purple; leaves lobed or often unlobed _____ ***M. rubra***
1. Mature leaf blades scabrous with very short, stiff hairs on both surfaces, 7 cm or less long; petioles usually < 1 cm long. _____ ***M. microphylla***

Morus alba L., (white), WHITE MULBERRY, RUSSIAN MULBERRY, SILKWORM MULBERRY, MORAL BLANCO. Small tree to ca. 15 m tall; leaves to 20 cm long. Established in thickets in limestone ar-

eas, local; Dallas, Denton, Grayson, and Tarrant cos., also McLennan Co. (Mahler 1988); also cultivated; self-sowing and apt to become a yard weed; naturalized at scattered localities across TX. Early and mid-Apr. Native of e Asia. The leaves are the main food of silkworms (larvae of the silkworm—*Bombyx mori*) (Correll & Johnston 1970; Rohwer & Berg 1993). Fruits edible when ripe (Correll & Johnston 1970). The cultivated FRUITLESS MULBERRY is a cultivar of *M. alba*. ☺

Morus microphylla Buckley, (small-leaved), MEXICAN MULBERRY, TEXAS MULBERRY, MOUNTAIN MULBERRY. Shrub or small tree to ca. 7 m tall. Rocky slopes; Brown, Dallas, and Palo Pinto cos., also Coleman, Comanche, Erath (Little 1976) and Somervell (Fossil Rim Wildlife Center—R. O'Kennon, pers. obs.) cos.; nc TX s and w to w TX. Apr. Fruits edible when ripe (Correll & Johnston 1970) and used by Native Americans (Powell 1988).

Morus rubra L., (red), RED MULBERRY, MORAL. Becoming a medium to large tree; leaves unlobed or lobed, to 20 cm long. Stream bottoms, less often on slopes; se and e TX w to e Rolling Plains and Edwards Plateau. Late Mar–Apr. While it is sometimes recognized as a variety (e.g., Kartesz 1994; Jones et al. 1997), we are following Wunderlin (1997) in lumping [*M. rubra* var. *tomentosa* (Raf.) Bureau]. Fruits edible when ripe (Correll & Johnston 1970). The milky sap from leaves and unripe fruits can cause dermatitis, hallucinations, and central nervous system disturbances (Schmutz & Hamilton 1979). ☣

MYRICACEAE WAX-MYRTLE OR BAYBERRY FAMILY

☛ The Myricaceae is a small (55 species in 3 genera) nearly cosmopolitan family of aromatic shrubs and trees; 2 of the genera are monotypic. The family appears to have a relationship with the Juglandaceae (Kubitzki 1993d). (subclass Hamamelidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is a shrub with alternate, simple, *gland-dotted, fragrant* leaves; flowers small, inconspicuous, in spike-like catkins; fruits small, drupaceous, usually with a *white waxy coating*

REFERENCES: Baird 1968; Elias 1971b; Kubitzki 1993d; Wilbur 1994; Bornstein 1997.

MYRICA WAX-MYRTLE

☛ A subcosmopolitan genus of ca. 50 species (Bornstein 1997) of shrubs, usually with nitrogen-fixing bacteria; it includes species used as sources of wax, for their edible fruit, or as cultivated ornamentals. (Greek, *myrike*, name of the tamarisk or some other fragrant shrub, perhaps from *myrizein*, to perfume; the name later transferred to this aromatic genus)

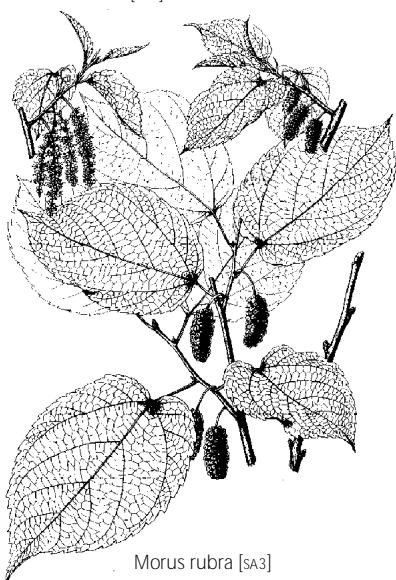
Myrica cerifera L., (wax-bearing), SOUTHERN WAX-MYRTLE, CANDLE-BERRY, TALLOW-SHRUB, WAXBERRY, SPICEBUSH, BAYBERRY, SWEET-OAK. Evergreen shrub 0.3–7 m tall; leaves alternate, short-petioled or sessile with narrowed base; leaf blades oblanceolate, entire or irregularly few-toothed in apical part, glabrous, sprinkled with fine yellow glandular dots, especially beneath, fragrant when crushed; flowers unisexual, in short, chiefly lateral, spike-like catkins, without perianth but with small bracts; staminate and pistillate flowers on separate plants (= dioecious); ovary superior; mature fruits drupaceous, 2–3 mm in diam., usually with a white waxy coating. Boggy ground, or a weedy invader in drier areas; se and e TX w locally to Henderson Co. on e margin of nc TX and along Brazos River to McLennan Co. (Little 1976 [1977]), also Dallas Co. (Mahler 1988) [introduced?]. Late Mar–Early Apr. Wilbur (1994) argued that the genus *Myrica* should be split into *Morella* and *Myrica* sensu stricto; Jones et al. (1997) accepted this viewpoint and recognized the SOUTHERN WAX-MYRTLE as [*Morella cerifera* (L.) Small]. We are following the traditional approach advocated by Bornstein (1997) and retaining this species in a broadly defined *Myrica*. The wax-like coating on the fruits is rich in palmitic acid and can be used to make candles and scented bayberry soap (Mabberley 1987). This is an attractive shrub widely used in landscapes.



Morus alba [EN2]



Morus microphylla [SA2]



Morus rubra [SA3]



Myrica cerifera [SA3]



Nelumbo lutea [BA1, GR1]

NELUMBONACEAE LOTUS OR LOTUS-LILY FAMILY

—The Nelumbonaceae is a family of a single genus with only 2 species; it has sometimes been placed in the Nymphaeaceae, but is profoundly different in terms of its chemistry (Williamson & Schneider 1993b) and 3-aperturate pollen (1-aperturate in Nymphaeaceae) (Cronquist 1993). According to Meacham (1994), this is a classic case of an ancient taxon with an unusual combination of characters; he indicated it is more closely related to Nymphaeales than the Ranunculidae (with which it has sometimes been linked). However, in the analyses of Hembry and Zimmer (1992) and Chase et al. (1993), *Nelumbo* did not appear related to Nymphaeales. The modern consensus is that it is a distinct taxon deserving familial rank (Williamson & Schneider 1993b). (subclass Magnoliidae)

FAMILY RECOGNITION IN THE FIELD: aquatic, water-lily-like herbs with large *peltate* leaves (not peltate in the somewhat similar Nymphaeaceae), large conspicuous flowers, and acorn-like fruits in pits in a distinctive, enlarged, *inverted-cone-like receptacle*.

REFERENCES: Wood 1959; Williamson & Schneider 1993b; Meacham 1994; Wiersema 1997a.

NELUMBO LOTUS, SACRED-BEAN

—A genus of 2 species, 1 in s and e North America and the West Indies to Colombia, 1 in lower Volga and s and se Asia to tropical Australia. The Old World *Nelumbo nucifera* Gaertn., SACRED LOTUS, EGYPTIAN-BEAN, with fragrant, pink/red flowers, is sacred in India, Tibet, and China; its seeds are viable for several hundred years in the mud of rivers; this species, easily distinguished by flower color, is cultivated in nc TX as an ornamental; it is also widely cultivated in Asia as a food crop for its edible tubers and embryos (Williamson & Schneider 1993b). (Name used in Sri Lanka for *N. nucifera*)

REFERENCES: Hall & Pendfound 1944; Ward 1977.

Nelumbo lutea (Willd.) Pers., (yellow), YELLOW LOTUS, LOTUS, YELLOW NELUMBO, WATER-CHIN-QUAPIN, POND-NUT, YOQUEPEN. Robust, aquatic, perennial herb rooted in mud; rhizomes of two types: slender, elongated, 6–8 mm in diam. or thick, banana-like in appearance, 8–20 mm in diam.; leaf blades nearly orbicular, to ca. 70 cm in diam., floating or usually held above the water, glabrous; petioles to 1 m or more long, attached to center of lower surface of blade (= peltate), the blade not notched; flowers solitary, held well above water on long peduncles, large, to 25 cm wide, not noticeably fragrant or only mildly so, opening in morning and closing at night; petals many, large, yellowish white or yellowish cream; stamens numerous (ca. 200), spirally arranged; pistils numerous, sunken in pits in the nearly flat upper surface of the greatly enlarged (to ca. 10 cm in diam.), inverted-conical, erect receptacle that becomes dry, hard, and brown by the time the fruits ripen; fruits acorn-like, hard, indehiscent, 1-seeded, ca. 1 cm in diam. Lakes, ponds; se and e TX w to West Cross Timbers and Edwards Plateau; said to have been spread by Indians in prehistoric times. Jun-Sep. The storage tubers along the rhizomes, as well as the seeds, are edible and were used by Native Americans (Wiersema 1997a); the dried receptacles are often used in floral arrangements. Once established, this species can be aggressive and hard to eradicate. ☐/100

NYCTAGINACEAE FOUR-O'CLOCK FAMILY

Ours annual or perennial herbs or shrubby low perennials (*Selinocarpus*); stems often with at least the lower nodes swollen; leaves opposite, simple, entire or indistinctly toothed, somewhat thick or fleshy, sessile or petioled, usually the 2 at each node unequal; stipules absent; inflorescences axillary or terminal; involucres enclosing 1–several flowers, in some cases an involucre resembling a calyx present below the corolla-like calyx (the whole structure thus superficially resembling a typical flower with both calyx and corolla); flowers perfect; calyces 3- to 5-lobed,

corolla-like, sometimes very showy; corollas absent; stamens 1–9; pistil 1; ovary superior but apparently inferior (tightly enclosed by base of perianth); fruit an anthocarp, an accessory fruit composed of the persistent base of the perianth tube enclosing the indehiscent achene—the whole structure is referred to in the following treatment as the fruit.

☞ A small (390 species in 30 genera), mainly tropical and warm area family, especially in the Americas with a few in the temperate zone; they are betalain-containing herbs, shrubs, and trees. Some are edible, used medicinally, or cultivated as ornamentals including *Mirabilis* and the widely grown tropical ornamental genus *Bougainvillea* with brightly colored bracts subtending the 3-flowered inflorescences. Molecular evidence indicates the family is related to Phytolaccaceae (Downie & Palmer 1994). (subclass Caryophyllidae)

FAMILY RECOGNITION IN THE FIELD: usually herbs (1 shrubby perennial) with opposite leaves and often swollen nodes; single perianth whorl often subtended by an involucre; ovary superior, developing into a nut-like, 1-seeded achene enclosed by the perianth tube.

REFERENCES: Standley 1918; Reed 1969c; Bogle 1974; Bittrich & Kühn 1993; Behkne & Mabry 1994; Downie & Palmer 1994.

1. Flowers with an involucre of bracts (apparently with calyx, the corolla is absent in this family and the colorful perianth parts are actually the corolla-like calyx) or in bracted heads; fruits winged or not winged.
 2. Flowers with calyx-like involucre of united bracts _____ **Mirabilis**
 2. Flowers or heads with separate bracts.
 3. Flowers in pedunculate heads of 8–many flowers; leaf blades usually 3–9 cm long; fruits with or without wings; petioles 10–85 mm long.
 4. Stigmas linear; fruits with at least narrow wings; flowers usually > 15 per head; stamens (3–)5 _____ **Abronia**
 4. Stigmas capitate; fruits not winged, merely 1-ribbed; flowers 8–15 per head; stamens 5–8 _____ **Nyctaginia**
 3. Flowers solitary or in pairs in the leaf axils; leaf blades 1.2–2.5 cm long; fruits with conspicuous thin wings; petioles 3–25 mm long _____ **Selinocarpus**
 1. Flowers neither involucrate nor in bracted heads; fruits not winged.
 5. Flowers solitary, axillary; perianth very long, 80–170 mm (with very slender elongate tube), white tinged with purple or pink; plants prostrate or sprawling _____ **Acleisanthes**
 5. Flowers in numerous umbel-like or head-like clusters of ca. 2–6 at the ends of slender peduncles OR in racemes arranged in panicles, terminal; perianth tiny, 1–1.5 mm long, white to pink, purple, or reddish; plants procumbent to ascending or erect _____ **Boerhavia**

ABRONIA SAND-VERBENA

Perennial herbs; stems viscid-pubescent; leaves opposite, the pair usually unequal; flowers perfect, in conspicuous heads, the heads long pedunculate, each subtended by 5(–7) distinct bracts; perianth viscid, with long slender tube and short funnelform limb; stamens 5; stigma linear; fruits turbinate (= top-shaped) or biturbinate, deeply lobed or winged.

☞ A North American genus of 33 species ranging from sw U.S. to n Mexico; the roots, when ground, of some species were formerly eaten by Native Americans; some are cultivated as ornamentals. (Greek: *abros*, delicate or graceful, referring to the bracts)

REFERENCE: Galloway 1975.

1. Leaf blades elliptic to orbicular; fruits glabrous or with a few hairs apically, 6–9 mm long, 3–4.5 mm wide, never rugose; involucral bracts rounded to acutish at apex _____ **A. ameliae**
1. Leaf blades ovate-oblong to narrowly triangular-ovate; fruits pubescent, 5–12 mm long, 2.5–7 mm wide, somewhat rugose; involucral bracts acute or acuminate at apex _____ **A. fragrans**

Abromia ameliae Lundell, (for Amelia Anderson Lundell, 1908–1998, wife of Cyrus Longworth Lundell who described the species), AMELIA'S SAND-VERBENA. Stems spreading, to 60 cm long; leaf blades 3–8 cm long, 2–6 cm wide; perianth 18–25 mm long, orchid-color (from label data) to bright red-magenta, the limb ca. 10 mm wide; fruits top-shaped. Sandy woodlands or deep sand; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly s 1/2 of TX; endemic to TX. Mar-Jun.  /77

Abromia fragrans Nutt. ex Hook., (fragrant), SAND-VERBENA, SWEET SAND-VERBENA, SNOWBALL, LASATER'S-PRIDE. Stems erect or procumbent, freely and widely branched, 25–100 cm long; leaf blades usually 2–9 cm long; flowers sweet-scented; perianth 18–32 mm long, the limb deep lavender (varying to pink or white westward), 5–10 mm wide; fruits usually biturbinate (= narrowing both ways from the middle). Loose sand; Panhandle, South TX Plains, Rolling Plains, and West Cross Timbers (Mahler 1988); Hatch et al. (1990) also cited vegetational area 5 (Fig. 2). Late Apr–Jun, sporadically to Oct. [A. speciosa Buckley—type from Ft. Belknap, Young Co.] The flowers are open from late afternoon through the night (Kirkpatrick 1992).

ACLEISANTHES TRUMPETS

☛ A genus of 7 species of sw North America. (Greek: *a*, without, *cleis*, close, and *anthus*, flower, alluding to absence of involucre)

REFERENCE: Smith 1976.

Acleisanthes longiflora A. Gray, (long-flowered), ANGEL-TRUMPETS, YERBA-DE-LA-RABIA. Glabrous perennial; stems brittle, prostrate, freely branched, mat-forming or sprawling; leaves opposite; leaf blades 15–50 mm long, 3–35 mm wide, deltoid to linear-lanceolate; flowers axillary, sessile or subsessile, opening in afternoon and throughout the night, erect, fragrant, white tinged with purple or pink, the funnelform limb 15–20 mm across, the tube long (80–170 mm), slender, 1.5–2 mm in diam.; fruits 5–10 mm long, 5-angled. Sandy or rocky ground, often a roadside weed; Coleman Co. (Reverchon) on the extreme w margin of nc TX, also Burnet Co. (Smith 1976) on s margin of nc TX; mainly s and w TX. Apr–Oct, after rains. The flowers are some of the longest found among TX plants; the species is nocturnal—the flowers open at dusk and are apparently pollinated by moths (Wills & Irwin 1961; Ajilvsgi 1984).

BOERHAVIA SPIDERLING

Annual or perennial herbs, our species with minutely glandular-pubescent stems and opposite, unequal, glabrous, entire or sinuate leaves often lighter in color beneath; perianth funnelform, corolla-like, small (1–1.5 mm long); stamens 1–5; fruits 5-angled.

☛ A genus of ca. 50 species of warm areas of the world. (Named for H. Boerhave, 1668–1738, Dutch botanist)

REFERENCES: Woodson et al. 1961; Procher 1978.

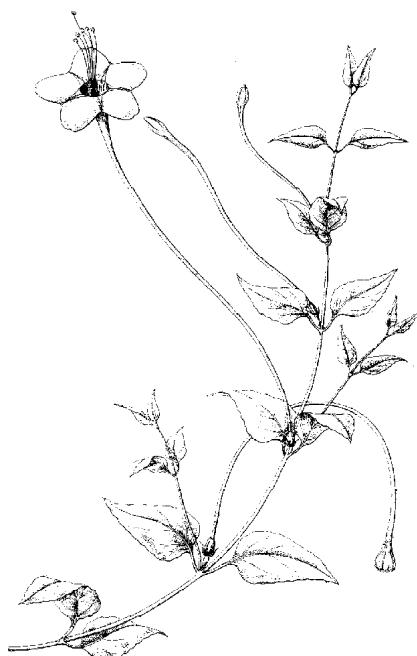
1. Fruits minutely spreading-pubescent; perianth deep red or purple-red; plants perennial with prostrate to ascending stems _____ **B. diffusa**
1. Fruits glabrous (can be sticky); perianth white to pink or pink-lavender; plants annual usually with ascending to erect stems (can be decumbent).
 2. Flowers in numerous small umbel-like or head-like clusters of 2–6 at the ends of long slender peduncles, not in racemose inflorescences; stamens equal to or slightly longer than perianth; mature fruits truncate or nearly so at tip, 3–4 mm long; widespread in nc TX _____ **B. erecta**
 2. Flowers in elongate racemose inflorescences, never in small umbel-like or head-like clusters; stamens included within perianth; mature fruits rounded at tip, ca. 2.5 mm long; possibly in the extreme w part of nc TX _____ **B. spicata**



Abronia ameliae [HEA]



Abronia fragrans [ush]



Acleisanthes longiflora [EMO]



Boerhavia diffusa [ive]

Boerhavia diffusa L., (diffuse, spreading), SCARLET SPIDERLING. Stems to 3 m long; leaf blades 1.5–5.5 cm long, 0.8–5 cm wide; flowers in numerous small umbel-like or head-like clusters at the ends of slender peduncles; perianth deep red or purple-red; fruits 2.5–4 mm long, rounded at tip. Rocky, gravelly, or sandy ground; widespread in TX. May–Oct. While *B. coccinea* is often recognized as a separate species (e.g., Kartesz 1994; Jones et al. 1997), we are following Woodson et al. (1961) and Procher (1978) in putting [*B. coccinea* Mill.] into synonymy with *B. diffusa*. Woodson et al. (1961), for example, said that, “A rather extensive examination of herbarium specimens has revealed no tangible differences . . .” Further, R. Spellenberg (pers. comm.) recently indicated that he could not see the differences between the two once an array of variation was considered. He suggested that the two seem to differ primarily in flower color, “. . . in the New World [*B. coccinea*] the deep wine color predominates, in the Old World [*B. diffusa*] pink to white predominates.”

Boerhavia erecta L., (erect, upright), ERECT SPIDERLING. Stems erect to decumbent, 20–120 cm long; leaf blades 2–8 cm long, 1–5 cm wide; perianth white or tinged with pink or purple. Along roadsides or disturbed sites; mainly e 1/2 of TX. Jun–Sep.

Boerhavia spicata Choisy, (with spikes), SPICATE SPIDERLING. Stems erect to decumbent, 20–60 cm long; leaf blades 1–4.5 cm long, 4–25 mm wide; flowers in short, dense to remotely-flowered racemes; perianth pink to pink-lavender or whitish. Sandy or rocky soils; included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990); mainly c and w TX. Jul–Aug.

Boerhavia intermedia M.E. Jones, (intermediate), similar to *B. erecta*, was reported from Dallas Co. by Reed (1969c). According to his key, this species has small fruits (2.2–2.7 mm long). A sheet at BRIT/SMU from Dallas, annotated by Reed as *B. intermedia*, has fruits 3 mm long and is possibly *B. erecta*. *Boerhavia intermedia* is otherwise known in TX only from the w part of the state. The following key to separate the two is modified from R. Spellenberg (pers. comm.):

1. Pedicels (of a given few-flowered group) not all attached at the same point; half mature fruits turbinate at apex _____ *B. erecta*
1. Pedicels all attached at the same point (the few-flowered groups thus ± umbels); half mature fruits ± flat at apex _____ *B. intermedia*

MIRABILIS FOUR-O'CLOCK

Perennial herbs with stout, pithy or woody taproot; foliage sometimes glaucous or whitened; leaves opposite; flowers solitary or few in 5-lobed, calyx-like, saucer- or cup-shaped to cylindrical, sometimes colored involucres, these axillary and solitary, or terminal and panicled (both types produced by the same plant, often on different stems at different times, the two phases utterly dissimilar); perianth of 5 fused sepals, extremely corolla-like, salverform to funnelform-campanulate, lasting part of one day; true corollas absent; fruits 5-ribbed or -angled, ± smooth to tuberculate.

—A genus of 54 species, mainly of warm areas of the Americas, especially sw North America, and 1 species in the Himalayas; some are cultivated as ornamentals. ~~•~~ *Mirabilis* species contain the alkaloid trigonelline; poisoning has occurred in children (Schmutz & Hamilton 1979). We are following the recent treatment by Turner (1993b) for nomenclature of *Mirabilis*. The common name results from some species opening their flowers in late afternoon (Woodland 1997). (Latin: *mirabilis*, wonderful)

REFERENCES: Shinners 1951g; Turner 1993b; Le Duc 1995.

1. Perianth 3–6 cm long, salverform; involucre tubular-campanulate, divided 1/3–2/3, the lobes erect; fruits smooth or slightly 5-angled, but not ribbed _____ *M. jalapa*

1. Perianth 1.5 cm or less long, variously shaped; involucre rotate to funnelform-campanulate, divided 1/3 or less, the lobes spreading or ascending; fruits with 5 prominent ribs.
 2. Fruits glabrous or with a few short appressed hairs, the ribs on the fruit surface roughened but not conspicuously tuberculate; plants essentially glabrous throughout (involucres can have a few short appressed hairs); growing in deep loose sands in far w part of nc TX _____ **M. glabra**
 2. Fruits conspicuously pubescent, the ribs on the fruit surface conspicuously tuberculate OR not so; plants pubescent, at least involucres or inflorescences, the pubescence sometimes viscid; growing in various, often calcareous soils; widespread in nc TX.
 3. Blades of stem leaves narrowly linear to linear-lanceolate, 1–5(–10) mm wide, ca. 15–30 times as long as wide; ribs on the fruit surface roughened but without tubercles (at least in nc TX) _____ **M. linearis**
 3. Blades of stem leaves narrowly lanceolate to oblong-elliptic, 3–100 mm wide, 1–12 times as long as wide; ribs on the fruit surface usually with conspicuous elongate or cylindrical tubercles (visible to the naked eye).
 4. Upper and lower internodes densely appressed-puberulent; robust herbs 0.6–2 m tall; growing deep sandy soils _____ **M. gigantea**
 4. Upper internodes glabrous or slightly pubescent, the lower glabrous (rarely short pubescent) OR internodes spreading-pilose; herbs 0.3–0.8 m tall; growing in various, often calcareous soils.
 5. Well-developed leaf blades 3–30 mm wide, gradually tapering to the petioles OR truncate to cordate; flowers variously arranged but often in rather open inflorescences.
 6. Blades of stem leaves linear or lanceolate to oblong-elliptic, tapered at base, 3–30 mm wide, ca. 3–12 times as long as wide _____ **M. albida**
 6. Blades of stem leaves elliptic to ovate or triangular, widely V-shaped to truncate or cordate at base, 10–30 mm wide, the larger ones 1–4 times as long as wide (mostly less than 3 times) _____ **M. latifolia**
 5. Well-developed leaf blades mostly 40–100 mm wide, broadly obtuse, truncate or cordate at base; flowers mostly in rather congested terminal clusters _____ **M. nyctaginea**

Mirabilis albida (Walter) Heimerl, (white), WHITE FOUR-O'CLOCK. Plant usually ± glabrous except for viscid-pubescent inflorescence and upper stem; stems erect, 0.20–1.5 m tall, whitish; leaf blades bright green above, glaucous or whitened below; perianth 8–10 mm long, pink to rose or whitish; fruits ca. 5 mm long. Dry soils, rocky or sandy prairies, open woods, open areas; se and e TX w to Rolling Plains and across Edwards Plateau to Trans-Pecos; this is the commonest *Mirabilis* in nc TX. May-Jul and Sep-Oct. Turner (1993b) indicated this species is exceedingly variable vegetatively, but uniform in terms of fruit characters; the anthocarps are markedly tuberculate, including on the 4–5 ribs, irregularly pubescent with tufted hairs ca. 0.5 mm long, and in addition with a minute layer of much shorter glandular hairs. Turner (1993b) considered *M. eutricha* to be a form with longer stem-hairs; he considered *M. dumetorum*, here treated as *M. latifolia*, to represent broad-leaved, pubescent-stemmed individuals. [*M. albida* var. *lata* Shinners, *M. eutricha* Shinners]

Mirabilis gigantea (Standl.) Shinners, (gigantic), GIANT FOUR-O'CLOCK. Stems erect, 0.6–2 m tall; leaves almost sessile or petioles to 10 mm long; larger leaf blades to 80 mm wide; perianth ca. 10 mm long, rose-pink to light purple; fruits ca. 5 mm long, conspicuously pubescent with tufted hairs, with ribs tuberculate. Sandy open ground or open woods; East and West cross timbers and on sandy river terraces within the Blackland Prairie (McLennan Co., also Dallas Co. (Shinners 1951g; Turner 1993b)); Hatch et al. (1990) also reported it from vegetational areas 3 and 7 (Fig. 2); endemic to TX. Apr-Oct. ↗

Mirabilis glabra (S. Watson) Standl., (smooth, hairless), TALL FOUR-O'CLOCK. Stems erect, 0.6–1.5

m tall, essentially glabrous throughout, glaucous below; leaves often whitish below; fruits 5-angled. Deep loose sands; Callahan Co., also Comanche Co. (Shinners 1951g; Turner 1993b); w part of nc TX w to w TX. May-Nov. [*M. exaltata* (Standl.) Standl.]

Mirabilis jalapa L., (Latin for Xalapa, a town in Veracruz, Mexico; the drug jalap was at one time mistakenly thought to be derived from this plant), FOUR-O'CLOCK, MARVEL-OF-PERU, COMMON FOUR-O'CLOCK, FALSE JALAP. Erect, essentially glabrous perennial with large tuberous root; stems 0.5-1 m tall; upper leaves nearly sessile; leaf blades ovate to ovate-deltoid, 4-14 cm long, 2-8.5 cm wide; petioles 5-50 mm long; involucres herbaceous, 7-15 mm long, the lobes ovate to lanceolate; flowers open ca. 4 pm and close the following morning; perianth very large and extremely showy, purplish red, white, yellow, orange, or variegated, 3-6 cm long, the tube 2-5 mm in diam., the limb 20-35 mm wide; fruits 7-10 mm long. Commonly cultivated; questionably native populations on limestone outcrops; Bell and Dallas cos., also Brown and Hamilton (HPC) cos.; also Edwards Plateau and Trans-Pecos; probably naturalized from tropical America. May-Nov. We are following Le Duc (1995) in lumping [*M. jalapa* L. subsp. *lindheimeri* Standl., *M. lindheimeri* (Standl.) Shinners] with *M. jalapa*. Cultivated by the Aztecs prior to the Spanish conquest as a medicine and for its flowers (Emmant in Le Duc 1995). Seeds and roots are reported to cause digestive disturbances (Hardin & Arena 1974). ☀️✿

Mirabilis latifolia (A. Gray) Diggs, Lipscomb, and O'Kennon, comb. nov. BASIONYM: *Oxybaphus nyctagineus* (Michx.) Sweet var. *latifolius* A. Gray, Bot. Mex. Bound. Surv. 174. 1859; *Allionia latifolia* (A. Gray) Standl., Contr. U.S. Natl. Herb. 12:350. 1909. TYPE: TEXAS. Travis Co.: near Austin, 1849, C. Wright 603 (LECTOTYPE: GH—designated by Turner 1993b), (broad-leaved). Resembles a small-leaved *M. nyctaginea*, erect or decumbent and growing over other plants; stems 0.18-1.15 m long; upper stems with short incurved hairs; leaf blades ± ovate, the larger 2-5 cm long; petioles 5-12 mm long; inflorescences widely branched; fruits 4-angled, some fruits 5-angled on type specimen. Various soils, disturbed sites; Dallas, Denton, and Grayson cos., also Burnet and Williamson cos. (Turner 1993b); nc TX and Edwards Plateau, also e TX. Jun-Oct. Turner (1993b) lumped this taxon, which has long gone under the name of *M. dumetorum*, with *M. albida* but indicated that he is "... not especially sure of my relegation of *M. dumetorum* to synonymy." Because of this uncertainty and the rather distinctive leaf shape, we are following Shinners (1951g) in recognizing this taxon at the specific level. Turner (1993b) pointed out that the combination *M. latifolia* must be used if the entity is given specific recognition. [*M. dumetorum* Shinners]

Mirabilis linearis (Pursh) Heimerl, (narrow, with sides nearly parallel), LINEAR-LEAF FOUR-O'CLOCK. Stems erect to procumbent, 0.2-2 m long, usually glaucous, often very whitish; leaves usually glaucous, at least below; inflorescence and involucres densely viscid-pubescent; perianth ca. 10 mm long, purple-red to lavender-pink; fruits 4.5-5 mm long, pubescent, the ribs on the fruit surface roughened but without tubercles. Sandy or rocky soils; widespread in TX but mainly w 2/3. May-Jun and Aug-Oct. Richard Spellenberg (pers. comm.) indicated that *M. linearis* often has tuberculate fruits and that the lack of tubercles (a character used above in the key to species) will not serve as a distinction for material outside nc Texas; however, material from nc TX consistently has non-tuberculate ribs.

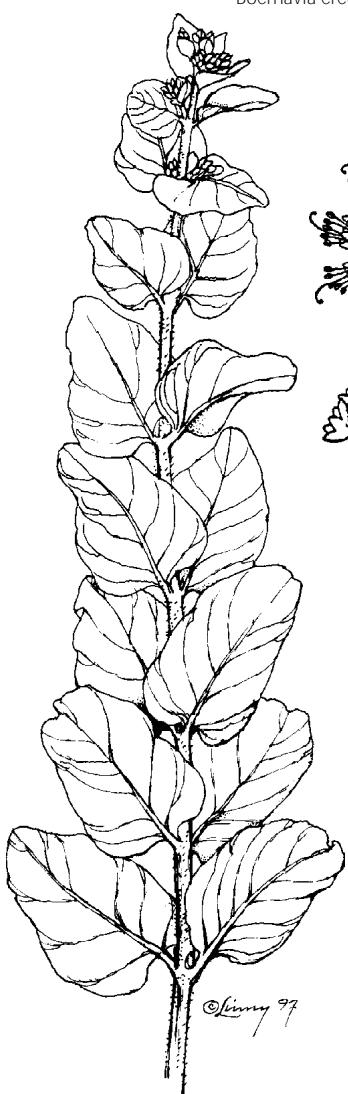
Mirabilis nyctaginea (Michx.) MacMill., (night-blooming), WILD FOUR-O'CLOCK. Stems several, erect to ascending, 0.3-1.2 m tall, glabrous or nearly so; leaf blades ovate-lanceolate to cordate; involucres becoming enlarged and colored in fruit; flowers 3-5 per involucle; perianth campanulate, pink to purple or reddish (rarely white), the limb 8-18 mm wide; fruits 4-6 mm long, with small tubercles, pubescent. Prairies and thickets, calcareous clay; from Blackland Prairie w to Plains Country. Late Apr-May. ☀️/99



Boerhavia erecta [BR2]



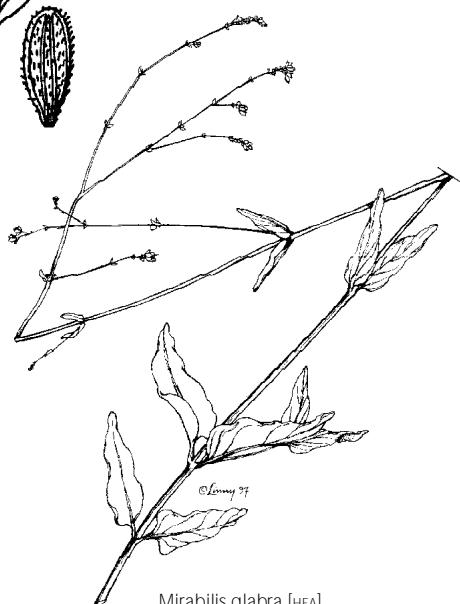
Boerhavia spicata [HEA]



Mirabilis gigantea [HEA]



Mirabilis albida [BB2]



Mirabilis glabra [HEA]

NYCTAGINIA SCARLET MUSKFLOWER, DEVIL'S-BOUQUET

☛ A monotypic genus of sw North America. (Greek: *nyktoς* night, and *gig nomaī* becoming)

Nyctaginia capitata Choisy, (capitate, headed), SCARLET MUSKFLOWER, DEVIL'S-BOUQUET. Perennial herb from woody taproot to 4.5 cm in diam., flowering the first year; stems viscid-puberulent or glabrate with age; leaves opposite; leaf blades 4–9 cm long, 6–55 mm wide, entire or sinuate; flowers in clusters 5 cm or more in diam.; perianth funnelliform, the limb pink to salmon-rose to deep red, 10–14 mm wide; stamens longer than the perianth; fruits 5–6 mm long, 4 mm in diam., glabrous, many-ribbed. Sandy soils; included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990); mainly s 1/2 of TX. May-Oct, especially after wet periods. Cultivated as an ornamental. Wills and Irwin (1961) indicated that as with many members of this family, the flowers of SCARLET MUSKFLOWER open in late afternoon and close early the next day or sometimes later in cloudy weather. The flowers have a strong, ± offensive odor (Ajilvsgi 1984). ☒/100

SELINOCARPUS MOONPOD

☛ A tropical American genus of 10 species. (Greek: *selinon*, parsley, and *carpus*, fruit)

REFERENCE: Fowler & Turner 1977.

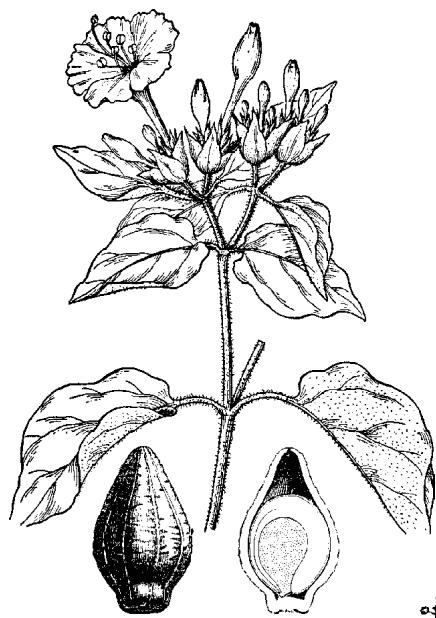
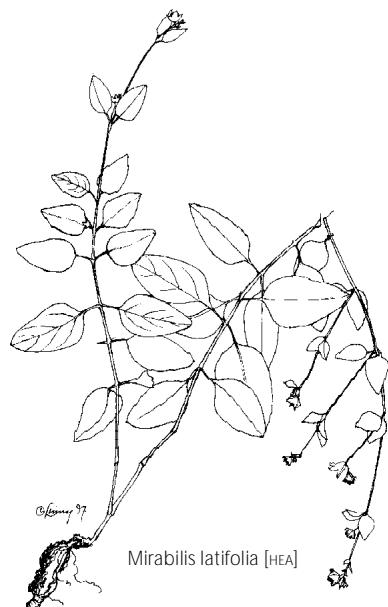
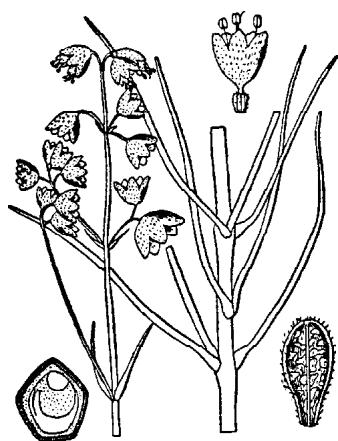
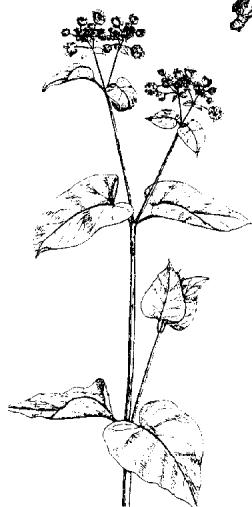
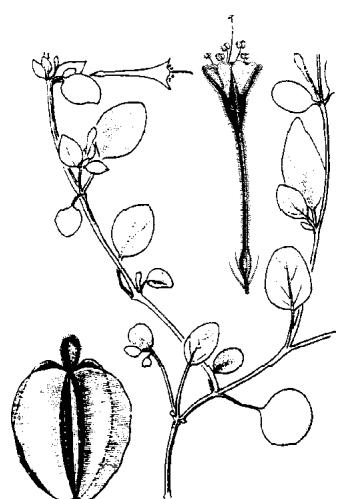
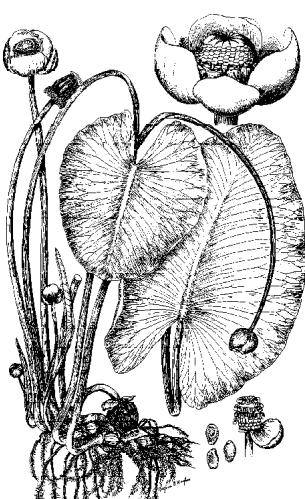
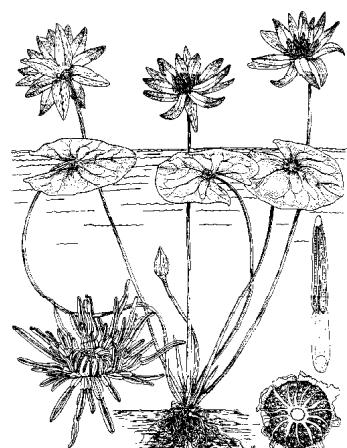
Selinocarpus diffusus A. Gray, (diffuse, spreading), SPREADING MOONPOD. Shrubby low perennial; stems erect to decumbent, 10–30 cm tall; leaves opposite; leaf blades 12–25 mm long, 6–15 mm wide, fleshy; upper leaves not reduced; perianth tubular-funnelform, 35–45 mm long, densely glandular-hirtellous externally, pale greenish yellow; perianth tube very slender; perianth limb ca. 15 mm wide; stamens 5; fruits 6–7 mm long with 5 wings 2–3 mm long. Sandy or gypseous soils; included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990); nc TX s and w to w TX. Spring and summer.

NYMPHAEACEAE WATER-LILY FAMILY

Rhizomatous and stoloniferous aquatic perennial herbs; leaves long-petioled, simple, entire, not peltate; flowers solitary; receptacle ± obconical or club-shaped, the flower parts (except pistils) closely spiral; in ours sepals 4–6(–14), sometimes grading into the numerous petals, which in turn may grade into staminodes; stamens many; pistils many; ovaries superior; fruits in ours berry-like, many-seeded.

☛ A small family of ca. 50 species in 6 genera (Wiersema & Hellquist 1997); it is a cosmopolitan group of aquatic herbs often with alkaloids; a number of species are cultivated including the huge (can support a human's weight) *Victoria amazonica* (Poepp.) J.C. Sowerby (QUEEN VICTORIA's WATER-LILY), native to the Amazon basin. The family has a number of characters linking it to monocots (e.g., lack of a cambium, scattered vascular bundles) and Cronquist (1993) suggested that the early dicots from which monocots arose were probably something like modern Nymphaeales; he considered the Nymphaeales as the probable sister group of the monocots. Some taxonomists refer to the Nymphaeaceae as "paleoherbs" (a group including Aristolochiales, Piperales, and Nymphaeales) and believe them to be an early branch off the evolutionary line leading to monocots (Zomlefer 1994). This view is supported by molecular data which place the "paleoherbs" as the immediate sister group of the monocots (Chase et al. 1993) (see Fig. 41 in Appendix 6). According to Mabberley (1987), "... there is good evidence that the group is a successful, specialized relic of the stock which existed before the monocotyledons were recognizably distinct from dicotyledons." *Nelumbo* (LOTUS), as well as *Brasenia* (PURPLE WEN-DOCK) and *Cabomba* (FANWORT), previously placed in this family, are here treated in the Nelumbonaceae and Cabombaceae respectively. (subclass Magnoliidae)

FAMILY RECOGNITION IN THE FIELD: water-lilies with long-petioled, floating, simple leaves that

*Mirabilis jalapa* [GLE]*Mirabilis latifolia* [HEA]*Mirabilis linearis* [BB2]*Mirabilis nyctaginea* [STE]*Nyctaginia capitata* [IVE]*Selinocarpus diffusus* [ABR, EN2]*Nuphar advena* [REE]*Nymphaea elegans* [co1]

are *not* peltate (peltate in Nelumbonaceae); carpels united (free in Cabombaceae); flower parts numerous, spirally arranged.

REFERENCES: Wood 1959; Schneider & Williamson 1993; Wiersema & Hellquist 1997.

1. Sepals usually 6, suborbicular, about as long as wide; petals inconspicuous, 0.6–0.9 cm long, slender, resembling broad staminal filaments; perianth subglobose, the flower appearing somewhat closed and ball-like; leaf venation essentially pinnate _____ **Nuphar**
1. Sepals 4, oblong-lanceolate, 2.5–4 times as long as wide; petals showy, 2–10 cm long, not filament-like; perianth widespread, the flower appearing conspicuously open; leaf venation essentially palmate _____ **Nymphaea**

NUPHAR SPATTER-DOCK, COW-LILY, YELLOW POND-LILY

☛ A genus of 10–12 species (Wiersema & Hellquist 1997) of n temperate and cold areas; the plants are water-lilies typically with alkaloids and flowers usually held above the water; the seeds often have a slimy pericarp with air-bubbles which are thought to aid in dispersal. (Derivation either from Arabic (Persian): *ninufar*, pond-lily, or Arabic (Egyptian): *nilufar*, water-lily—Paclt 1998)

REFERENCES: Beal 1956; Wiersema & Hellquist 1994; Paclt 1998.

Nuphar advena (Aiton) W.T. Aiton in Aiton & W.T. Aiton, (newly arrived, adventive, not native), YELLOW COW-LILY, SPATTER-DOCK. Leaf blades floating or emergent, elliptic- or orbicular-ovate, to 30 cm long, glabrous above, glabrous or pubescent below; petiole attached at base of deep notch or sinus in blade; petioles and peduncles with numerous minute air cavities; flowers to 45 mm across; sepals (4–)6(–14), in 2 rows, petaloid, green on backs, usually yellow (rarely green or red-tinted) inside, 12–24 mm long; “petals” (apparently outer stamens) numerous, small and inconspicuous, stamen-like or scale-like, yellow or reddish, inserted with the stamens; stamens numerous; anthers 3–7 mm long; pistils numerous, united; fruits broadly ovoid, slightly constricted below the stigmatic disk, ca. 3–5 cm broad, maturing underwater; seeds not arillate. Lakes, ponds; Bell, Dallas, and McLennan cos, also Parker and Tarrant cos. (R. O’Kennon, pers. obs.); mainly e TX and Edwards Plateau. Jun-Oct. [*Nuphar lutea* (L.) Sm. subsp. *advena* (Aiton) Kartesz & Gandhi, *N. lutea* subsp. *macrophylla* (Small) E.O. Beal, *Nymphaea advena* Aiton] Cultivated as an ornamental. While sometimes treated as *N. lutea* subsp. *advena* (e.g., Kartesz 1994), we are following Wiersema and Hellquist (1994, 1997) in recognizing this taxon as *N. advena*.

NYMPHAEA WATER-LILY, WATER-NYMPH

Leaf blades floating or slightly elevated, elliptic- or orbicular-ovate to suborbicular, usually glabrous, often reddish or purplish beneath; petiole attached at base of deep notch in blade; flowers closed at night; sepals 4; petals many, showy, the inner petals grading into stamens; anthers ca. 4–6 mm long; fruits ovoid to depressed globose, in ours ca. 1.5–3 cm long, maturing underwater; seeds arillate. A number of cultivated types have become established in artificial ponds and lakes, where deliberately introduced; most are of hybrid origin; their identity can only be approximated with the key.

☛ A cosmopolitan genus of 35–40 species of water-lilies (Wiersema 1997b). Many species and hybrids are cultivated as ornamentals; the rhizomes and seeds of some species are edible. The seeds have a spongy aril which traps air-bubbles, causing the seed to float and aiding in dispersal. (Greek: *nymphē* water nymph, from the habitat)

REFERENCES: Conrad 1905; Wiersema 1987, 1988, 1997b.

1. Petals pale to deep yellow; stolons present _____ **N. mexicana**
1. Petals white to blue, lavender, or rosy; stolons absent.

2. Leaf blades about as long as wide (length usually not over 1 cm greater than width); petals white to rosy, usually > 25 per flower; flowers floating; sepals abaxially uniform in color, not flecked with short dark lines _____ ***N. odorata***
2. Leaf blades distinctly longer than wide (length usually 2–3 cm greater than width); petals blue to lavender-blue or pale violet (rarely white), usually 6–10 per flower; flowers usually raised on peduncle above surface of water; sepals abaxially flecked with short dark lines _____ ***N. elegans***

Nymphaea elegans Hook., (elegant), BLUE WATER-LILY, SENORITA WATER-LILY, LAMPAZOS. Stolons elongate, spongy, at the terminal nodes developing clusters of curved, fleshy, overwintering roots that resemble tiny bananas; leaves usually 6–10(–20) cm wide; flowers small, the petals ca. 2–4 cm long. In ponds or other bodies of water; McLennan Co; mainly s TX. May–Oct.

Nymphaea mexicana Zucc., (of Mexico), YELLOW WATER-LILY, BANANA WATER-LILY, LAMPAZO AMARILLO. Leaves to ca. 20 cm wide; flowers small in the original (non-hybrid) form, with petals 2–4 cm long; hybrids with petals up to 10 cm long, but size may vary in the same colony according to depth of water and time of year; petals usually ca. 25 per flower; sepals abaxially uniform in color, not flecked with short dark lines. Ponds, lakes or other bodies of water; Hood Co. in Lake Granbury (probably a hybrid with *N. odorata*). Jul–Oct, occasionally earlier. Native of s TX, Mexico, and Florida.

Nymphaea odorata Aiton, (fragrant), WHITE WATER-LILY, AMERICAN WATER-LILY, FRAGRANT WATER-LILY, ALLIGATOR-BONNET, POND-LILY, NINFA ACUÁTICA. Leaves usually 9–25 cm wide; flowers sweet-scented, large, with white petals, the outer ones 4.5–9 cm long; hybrids with smaller or larger flowers, with white to rose-pink petals. Dallas, Grayson, and Hood cos, also Comanche (HPC), Erath, and Hamilton (Stanford 1976) cos; native and frequent in se and e Texas, probably only introduced farther w. May–Sep. [*Nymphaea odorata* var. *villosa* Casp.] ☒/101

NYSSACEAE SOUR-GUM FAMILY

► The Nyssaceae is a very small (10 species in 3 genera—treated as a separate family by Mabberley (1987) with numbers updated following Mabberley 1997) family of trees and shrubs of e North America (s to Central America) and e Asia; it is related to Cornaceae, and Burckhalter (1992) and Mabberley (1997) placed Nyssain that family. Recent molecular analyses (Xiang et al. 1993, 1998) suggest that *Cornus*, Nyssaceae, Hydrangaceae, and Loasaceae, as well as several other groups, form a “cornaceous clade”; however, they do not support the lumping of Nyssaceae into Cornaceae. Some species accumulate cobalt and can be used as cobalt indicators. (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is a tree with alternate, simple, exstipulate leaves; flowers small, greenish, in axillary clusters; fruit a blue-black drupe.

REFERENCES: Rickett 1945b; Eyde 1959, 1963, 1966; Eyde & Barghoorn 1963; Little 1971; Burckhalter 1992; Wen & Stuessy 1993; Xiang et al. 1993.

NYSSA TUPELO, SOUR-GUM

► A genus of 8 species with 3 in s North America, 1 Central America, 1 in China, and 1 in Indo-malesia; some are used for timber or cultivated as ornamentals for their showy fall colors. (From Nyssa, a water nymph in Greek mythology, because the first described species grows in water)

Nyssa sylvatica Marshall, (of woodland, forest-loving), BLACK-GUM, BLACK TUPELO, SOUR-GUM, PEPPERIDGE, COTTON-GUM. Tree to 30 m tall; leaves alternate, deciduous, the blades obovate to oblanceolate or elliptic (rarely suborbicular), to ca. 10(–15) cm long and 6(–10) cm broad, entire or toothed above middle, bright crimson or burgundy in fall, with petioles to 2(–2.5) cm long; inflorescences usually axillary, pedunculate; staminate inflorescences umbellate or umbellate-

racemose; pistillate flowers small, greenish, solitary or in clusters of 2–8; fruit a 1-seeded, blue-black, ellipsoid to subglobose drupe 10–15 mm long, on peduncles to 7 cm long. Swamps, low woods and open woods; Fannin and Lamar cos. in Red River drainage, also Delta, Hopkins, Henderson, Navarro, and Limestone cos. (Little 1971) on e margin of nc TX; mainly e TX w to e part of nc TX. Apr–May. The common name TUPELO is apparently derived from the Native American Creek language: *eto*, tree, and *opelwy* swamp (Peattie 1948).

OLEACEAE OLIVE FAMILY

Perennial shrubs or trees (nearly herbaceous in *Menodora*); leaves opposite, simple or compound, entire, toothed or lobed; stipules none; flowers axillary, lateral, or terminal, perfect or unisexual, with or without perianth; calyces and corollas, when present, synsepalous and sympetalous, each 4-lobed (except 10–14 calyx lobes and 5–6 corolla lobes in *Menodora*); stamens usually 2 or 4; pistil 1, 2-locular; ovary superior; fruit a drupe, capsule, or samara.

— A medium-sized (615 species in 24 genera), nearly cosmopolitan, but especially Asian family of mostly trees and shrubs including timber trees and the economically important *Olea europaea* L. (OLIVE); OLIVE has been in cultivation north of the Dead Sea for its oil and drupes since at least 3700–3600 BC; the foliage was an ancient sign of good will—the olive branch. The family also includes a number of ornamentals including some commonly cultivated in nc TX such as *Forsythia* (GOLDENBELLS) species (shrubs with yellow flowers in early spring) and *Syringa* (LILAC) species. Family name from the genus *Olea*, a genus of 20 species of evergreen trees and shrubs of the Old Word tropics and warm temperate regions. (Greek: *elaia*, olive) (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: shrubs or trees (1 species nearly herbaceous) with opposite, simple or compound leaves; calyces and corollas (if present) usually 4-merous; stamens usually 2 or 4, epipetalous; ovary superior.

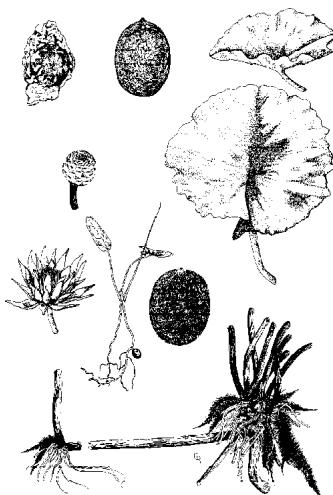
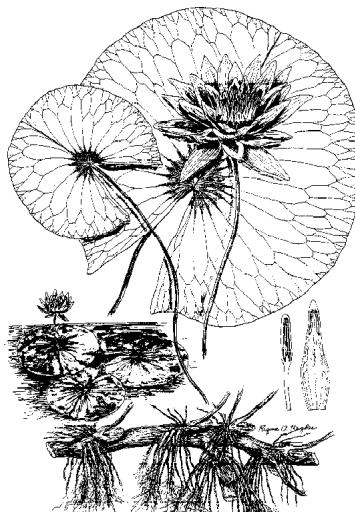
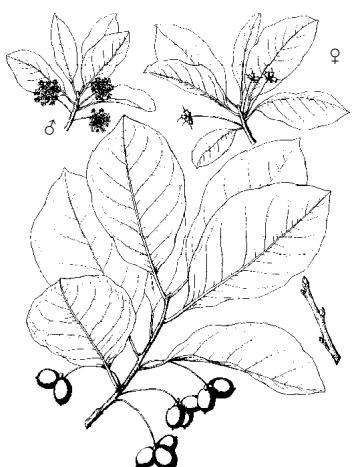
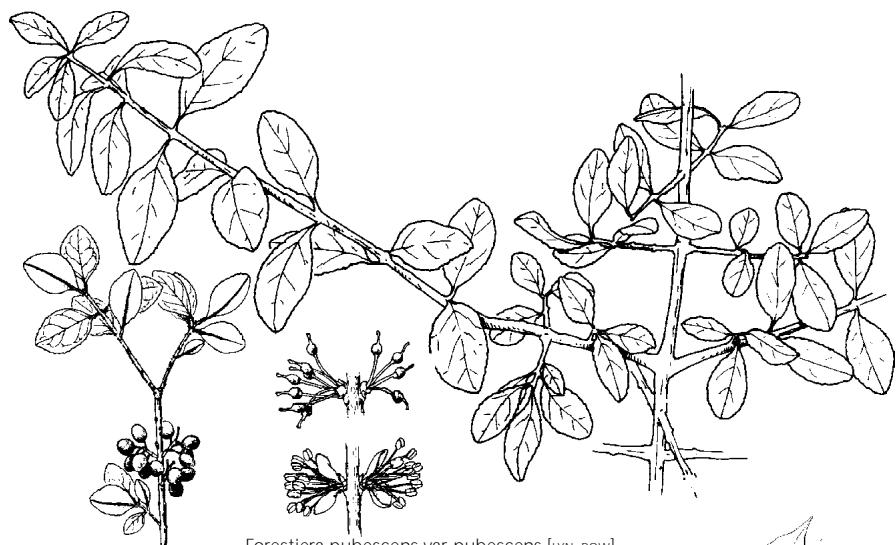
REFERENCES: Wilson & Wood 1959, Hardin 1974.

1. Leaves compound; fruit a samara with a prominent terminal wing OR a small berry (in the introduced *Jasminum*): plants trees (*Fraxinus*) or shrubs (*Jasminum*).
2. Leaves pinnately compound with 5–9 leaflets; plants native trees: flowers in drooping panicles: corollas absent _____ **Fraxinus**
2. Leaves with 3 leaflets; plants introduced shrubs: flowers borne singly: corollas yellow, showy _____ **Jasminum**
1. Leaves simple (unlobed or pinnately lobed); fruit a drupe or unwinged capsule: plants small to large shrubs (rarely small trees) or nearly herbaceous.
3. Fruit a thin-walled capsule: plants nearly herbaceous, small, to 25 cm or less tall; leaves entire to pinnately lobed: corollas with 5–6 lobes _____ **Menodora**
3. Fruit a small drupe; plants woody, usually much more than 25 cm tall; leaves entire or minutely or indistinctly toothed, not lobed; corollas with 4 lobes or absent.
4. Corollas absent; flowers in clusters or small panicles in the axils of leaves; leaf margins usually minutely or indistinctly toothed _____ **Forestiera**
4. Corollas present, bright or creamy white; flowers in panicles terminating the branches; leaf margins entire _____ **Ligustrum**

FORESTIERA

Ours deciduous shrubs, sometimes half vine-like, or small trees; leaves short-petioled; leaf blades minutely or indistinctly toothed; flowers appearing before the leaves, lateral, in sessile clusters with sepal-like bud-scales, or in small panicles, unisexual, the sexes usually on separate plants (= dioecious); sepals minute; fruit a dark blue to purple to blackish, glaucous drupe.

— A genus of 15 species of the Americas, especially sw North America; some are cultivated as

*Nymphaea mexicana* [gwo]*Nymphaea odorata* [REE]*Nyssa sylvatica* [SA3]*Forestiera pubescens* var. *pubescens* [LYN, POW]*Forestiera acuminata* [GLE]*Fraxinus americana* [SA3]

ornamentals. (Named for Charles Le Forestier, deceased ca. 1820, French physician and naturalist and Poiret's first teacher in botany)

REFERENCE: Johnston 1957.

1. Leaf blades usually acuminate, 3–9 cm long, on petioles 4–20 mm long; pistillate inflorescence a short panicle 10–20 mm long with 18–32 flowers; mature drupes 9–18 mm long; leaves and twigs usually glabrous; filaments 4–7 mm long _____ **F. acuminata**
1. Leaf blades acute or obtuse, 2.5–4 cm long, on petioles 1–7 mm long; pistillate inflorescence umbel-like or a corymbose cluster, of 3–12 flowers; mature drupes 5–7 mm long; leaves and twigs glabrous or pubescent; filaments 1–4 mm long _____ **F. pubescens**

Forestiera acuminata (Michx.) Poir., (tapering to a long narrow point), SWAMP-PRIVET, TEXAS ADELIA. Shrub or small tree; lenticels conspicuous on twigs. Low woods; Lamar and Navarro cos., also Bell, Collin, and Dallas cos. (Little 1976 [1977]); mainly se and e TX. Mar.

Forestiera pubescens Nutt., (pubescent, downy), SPRING-HERALD, HERALD-OF-SPRING DEVIL'S-ELBOW, ELBOW-BUSH, STRETCH-BERRY, CHAPARRAL. Shrub, often with looping, half vine-like stems. Limestone outcrops, pastures, brushy prairies. Jan-Mar.

1. Leaves glabrous _____ var. **glabrifolia**
1. Leaves pubescent _____ var. **pubescens**

var. **glabrifolia** Shinners, (smooth- or hairless-leaved), SMOOTH-LEAF FORESTIERA, EVERGREEN FORESTIERA. Blackland Prairie w to West Cross Timbers and Lampasas Cut Plain, also Rolling Plains.

var. **pubescens**. Blackland Prairie (Dallas, Ellis, and Grayson cos.) s and w to w TX.

FRAXINUS ASH

Deciduous, often dioecious trees; branchlets, petioles, and leaflets usually glabrous or nearly so in ours; leaves odd-pinnately compound, the leaflets entire or with rather widely spaced teeth; flowers in drooping panicles (at first compact) in late March and April, appearing before or with the leaves; corollas absent; species hardly identifiable until fully expanded leaves are present.

☛ A primarily n temperate genus of 65 species with a few extending to the tropics. Some cultivated as ornamentals for bright fall foliage or valuable for timber; the elastic wood of some was formerly used for making wheels; it is also used for making tool handles and sports equipment, such as baseball bats or hockey sticks. The ash flower gall mite, *Aceria fraxiniflora* Felt, can infect the male inflorescences of ashes in nc TX turning them into masses of lumpy distorted galls (Solomon et al. 1993). (The classical Latin name for ASH)

REFERENCE: Miller 1955.

1. Wing of fruit not decurrent on fruit body (wing ± ending where body of fruit begins): petiolules of lateral leaflets 3–14 mm long; blades of leaflets usually pale glaucous below, abruptly narrowed, usually asymmetrical basally, short-decurrent on petiolules.
2. Leaflets 5–9, typically 7; blades usually 2.5–3.5 times as long as wide, 6–15 cm long, normally widely spreading; fruits 2.7–5 cm long _____ **F. americana**
2. Leaflets 5–7, typically 5; blades usually 1.75–2.5 times as long as wide, usually < 6(–8) cm long, often drooping; fruits 1.5–2.7(–3) cm long _____ **F. texensis**
1. Wing of fruit decurrent over half way on fruit body (wing extending along body of fruit): petiolules of lateral leaflets 0–7 mm long; blades of leaflets lighter green below but not noticeably pale, usually gradually narrowed basally and long-decurrent (sometimes with blade tissue to petiolule base and leaflet thus appearing sessile) _____ **F. pennsylvanica**

Fraxinus americana L., (of America), WHITE ASH, FRESNO. Large tree to 40 m tall; usually glabrous throughout. Stream bottom woods or on slopes; e TX w to Collin, Grayson, Johnson, and McLennan cos., also Hamilton (HPC) and Tarrant (Little 1971) cos. Feb-Mar. The wood of this species is famous as the source of baseball bats, tennis racquets, and hockey sticks (Peattie 1948).

Fraxinus pennsylvanica Marshall, (of Pennsylvania), GREEN ASH, RED ASH. Tree to 20 m tall; in nc TX usually glabrous throughout; leaflets 5–7; fruits 3–7.5 cm long, lanceolate to oblong-ovate. Stream bottom woods or on slopes; e TX w to Rolling Plains. Feb-Mar. [*F. pennsylvanica* var. *integerrima* (Vahl) Fernald]

Fraxinus texensis (A. Gray) Sarg., (of Texas), TEXAS WHITE ASH, TEXAS ASH. Small tree to ca. 16 m; glabrous throughout; leaflets suborbicular-ovate to obovate or sometimes narrowly elliptic (usually rather wide). Limestone slopes, bluffs; Grayson Co. s and w through the Edwards Plateau; endemic to TX and s OK. Closely related to *F. americana*, sometimes difficult to distinguish, and possibly only a subspecies or variety of that species. Feb-Mar. [*F. americana* L. subsp. *texensis* (A. Gray) G.N. Mill., *F. americana* L. var. *texensis* A. Gray]

JASMINUM JASMINE, JESSAMINE

☛ A mainly Old World genus of ca. 200 species (1 American) of tropical areas with a few in temperate regions; the species are deciduous and evergreen shrubs and lianas. The flowers of some are used in scent-making and perfuming tea. (Latinized form of the Persian name: *yasmin*)

Jasminum nudiflorum Lindley, (naked flower), WINTER JASMINE. Deciduous shrub to 3(–5) m tall, rambling; branches long, slender, glabrous, 4-angled; leaves opposite, with 3 leaflets; leaflets ovate to oblong-ovate, 1–3 cm long, glabrous, ciliate; flowers borne singly in axils of previous year's leaves (2 per node), appearing before the leaves; pedicels ca. 6 mm long, covered with bracts; corollas yellow, (5)–6-lobed, 2–3 cm across; corolla lobes ca. 1/2 as long as the tube; stamens 2; fruit a blackish berry. Cultivated and escapes; chalky roadside; Collin Co.; we are not aware of other TX localities. Feb. Native of China. ☛

LIGUSTRUM PRIVET, HEDGEPLANT

Evergreen or deciduous shrubs or small trees; leaves entire; flowers in dense, narrow, terminal panicles, perfect; corollas bright or creamy white; stamens usually exserted from corolla tube; fruit a small black or blackish blue drupe.

☛ A genus of ca. 40 species native to Europe, n Africa, and e and se Asia to Australia. PRIVETS are widely used as ornamentals, often as hedges; all are tolerant of city pollution. However, they are problematic weeds in that they escape from cultivation, naturalize, and displace native plants. The flowers typically have a heavy scent, offensive to some because of ammonia undertone due to presence of timethylamine—the result is a somewhat fishy smell. ☣ The fruits and leaves of all species growing in nc TX should be considered poisonous due to syringin (an irritant glycoside) and alkaloids; children have been fatally poisoned by eating the fruits and the leaves are poisonous to livestock; some species can cause dermatitis in individuals trimming hedges or bushes (Schmutz & Hamilton 1979; Lampe & McCann 1985; Turner & Szczawinski 1991). (The classical Latin name of *L. vulgare* L.)

1. Twigs glabrous; larger leaf blades 6–15 cm long, evergreen.
 2. Larger leaf blades usually 8–15 cm long, with 6–8 ± distinct veins on each side of midrib, acuminate; petioles of larger leaves 10–20 mm long; tube of corolla equaling lobes in length ____ ***L. lucidum***
 2. Larger leaf blades usually 6–10 cm long, with 4–5 indistinct veins on each side of midrib, short

- acuminate to nearly obtuse; petioles of larger leaves 6–12 mm long; tube of corolla slightly longer than the lobes _____ **L. japonicum**
1. Twigs pubescent; larger leaf blades 2–6(–7) cm long, evergreen in mild winters or somewhat deciduous.
3. Flowers sessile or subsessile; corolla tube as long as lobes; leaves often tapering at base _____ **L. quihoui**
3. Flowers distinctly pedicelled; corolla tube shorter than lobes; leaves cuneate at base, usually not tapering _____ **L. sinense**

Ligustrum japonicum Thunb., (of Japan), WAX-LEAF LIGUSTRUM, JAPANESE PRIVET, WAX-LEAF PRIVET. Similar to *L. lucidum* but usually smaller, to ca. 3 m or more tall; leaves glabrous, leathery. Cultivated and escapes; Dallas and Tarrant cos. (R. O'Kennon, pers. obs.). Jun-Jul. Native of Korea and Japan. Poisonous. ☣ ☦

Ligustrum lucidum W.T. Aiton, (bright, shining, clear), GLOSSY PRIVET, CHINESE PRIVET, NEPAL PRIVET, WAX-LEAF PRIVET, WHITE WAX TREE, TREE PRIVET. Shrub or small tree to ca. 10 m; leaves glossy, glabrous, (6–)10–15 cm long. Cultivated and escapes; Dallas and Grayson cos., also Fort Hood (Bell or Coryell cos.—Sanchez 1997) and Johnson, Parker, and Tarrant cos. (R. O'Kennon, pers. obs.). Late summer. Native of China and Korea. Poisonous. ☣ ☦

Ligustrum quihoui Carrière, (for Antoine Quihou, 1820–1889, French horticulturalist), QUIHOU'S PRIVET. Shrub to ca. 2 m tall; branches nearly horizontal; leaves very short-petioled, with dark green, usually lanceolate or oblanceolate, glabrous blades; flowers in whorl-like, separated clusters, at tips of branches and on paired side branchlets, forming an open panicle; corolla tube about equaling the lobes; stamens exserted from corolla tube. Cultivated and naturalized; Dallas and Grayson cos., also Tarrant Co. (R. O'Kennon, pers. obs.); also e TX. Late May–Jul. Native of China. Poisonous. ☣ ☦

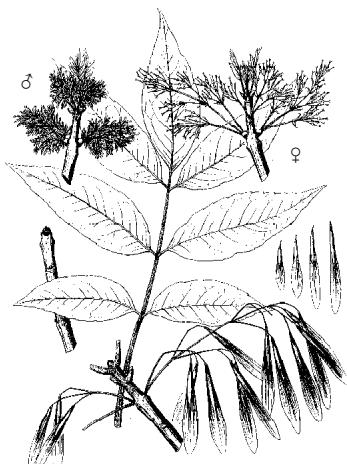
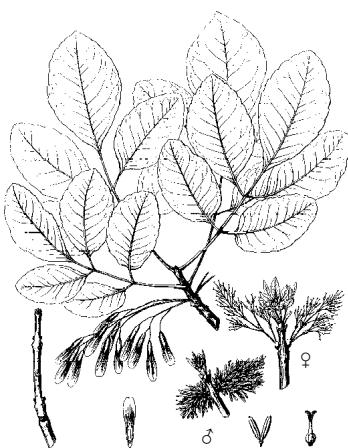
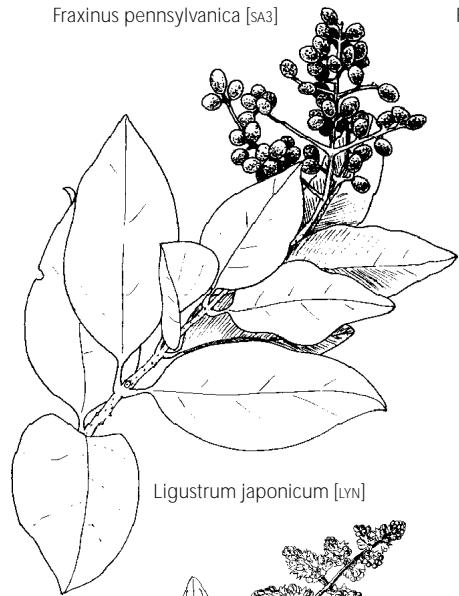
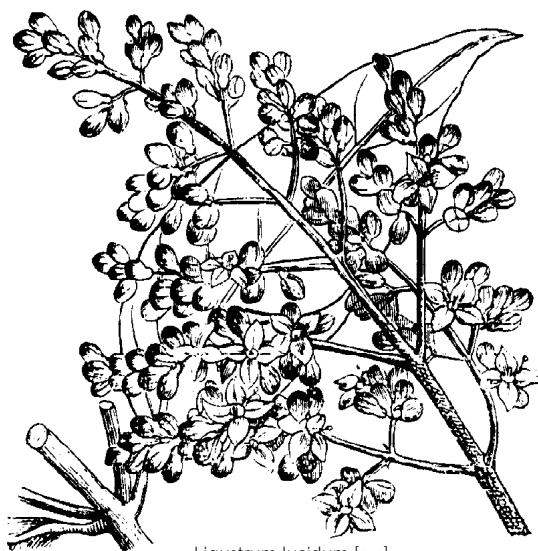
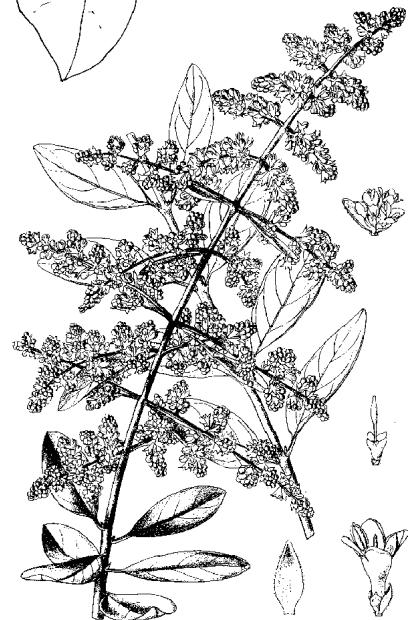
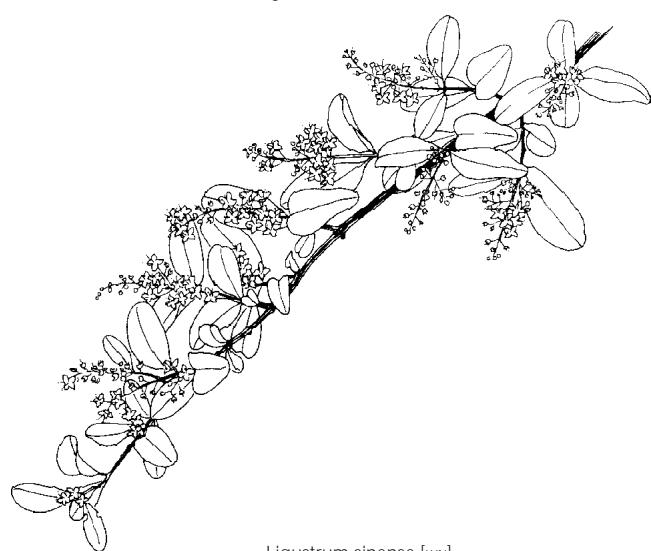
Ligustrum sinense Lour., (Chinese), CHINESE PRIVET, TRUENO DE SETO. Shrub to ca. 4 m; leaves short-petioled; leaf blades rhombic-elliptic to ovate, usually pubescent on midrib beneath; flowers in compact panicles; corolla tube shorter than lobes; stamens exserted from corolla tube. Cultivated, persisting, and naturalized; Collin, Dallas, Grayson, and Red River cos., also Comanche, Erath (Stanford 1976), and Tarrant (R. O'Kennon, pers. obs.) cos.; in TX mainly from nc TX e and s. Late April–May. Native of China. A problematic invader of native habitats; in some areas it has become the dominant understory shrub. Poisonous. ☣ ☦

Ligustrum vulgare L., (common), COMMON PRIVET, a native of the Mediterranean area similar to *L. sinense*, is cultivated in nc TX and possibly escapes. It differs in having the stamens included within the corolla tube and the leaves glabrous on the midrib beneath. Poisonous. ☣ ☦

MENODORA

—A genus of ca. 25 species mainly of warm areas of the Americas with 3 species in s Africa. (Perhaps from Greek: *mene*, moon, and *dory*, spear or shaft, from appearance of fruit on stiff pedicel)
REFERENCES: Steyermark 1932; Turner 1991b.

Menodora heterophylla Moric. ex DC., (various-leaved), REDBUD, TWINPOD, LOW MENODORA. Small, largely glabrous perennial to 25 cm tall forming patches from branching and creeping roots; leaves sessile or subsessile, varying from entire to deeply pinnatifid with sharp lobes or teeth, linear-lanceolate to elliptic-obovate in outline; pedicels 5–8 mm long, recurved in fruit; flowers solitary, terminal or axillary, perfect; unopened flower buds bright red; calyces divided to base into narrowly linear lobes; corollas to 15 mm long, with short, narrowly cylindrical tube and broadly funnelform limb, yellow within, ± red without, showy; fruit a circumscissile, distinctly 2-celled capsule 6–10 mm long. Rocky, silty, or sandy ground; Brown and Stephens cos.,

*Fraxinus pennsylvanica* [SA3]*Fraxinus texensis* [SA3]*Jasminum nudiflorum* [nic]*Ligustrum japonicum* [LYN]*Ligustrum lucidum* [GAR]*Ligustrum quihoui* [CUR]*Ligustrum sinense* [LYN]

also Burnet and Mills cos. (Turner 1991b); w margin of nc TX s through Edwards Plateau to s TX. Apr-Jun, sporadically to Sep (as early as Jan in s Texas).

Menodora longiflora A. Gray, (long-flowered), SHOWY MENODORA, native to c and w TX, extends as far north as McCullough, Llano, and Travis cos. just s and w of nc TX (Turner 1991b). This species can be distinguished by the leaves mostly entire (occasionally the lowest are 2-3-lobed), flowers numerous in terminal inflorescences, pedicels erect in fruit, and bright yellow corollas 30-60 mm long.

ONAGRACEAE EVENING-PRIMROSE FAMILY

Annual or perennial herbs or half-shrubs; leaves basal, alternate, or opposite, simple, entire, toothed or pinnately lobed; flowers basal, axillary, terminal, solitary, in spikes, or panicles; hypanthium of a short or elongate, cylindrical tube; calyx lobes or sepals (3-)4(-5); petals (0-)4 (-5), attached at summit of hypanthium (= floral tube); stamens (4-)8(-10); pistil usually 4-carpellate; ovary inferior; fruit a dehiscent capsule or an indehiscent, 1-seeded, nut-like capsule.

—A medium-sized (650 species in 18 genera) family, cosmopolitan in distribution but especially of temperate and warm areas of the Americas. The family consists of herbs and shrubs or more rarely trees and includes a number of ornamentals such as *Clarkia*, *Epilobium* (FIREWEED), *Fuchsia*, and *Oenothera*. Family name conserved from *Onagra*, a genus now treated as *Oenothera* (the name *Oenothera* was published earlier and thus has priority in terms of nomenclature) (Greek: *onagra*, evening-primrose) (subclass Rosidae)

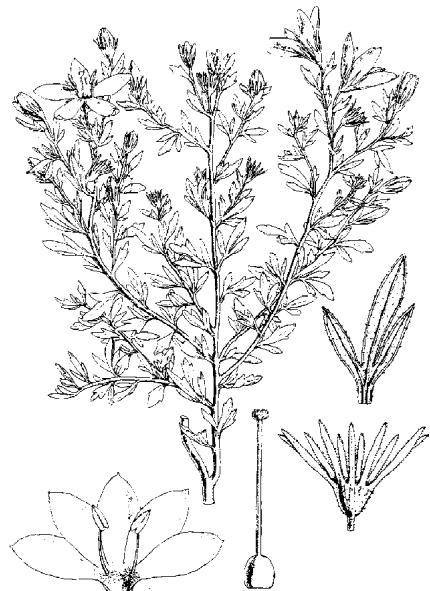
FAMILY RECOGNITION IN THE FIELD: herbs (sometimes woody-based) often with showy flowers with parts usually in 4s and a conspicuously inferior ovary; tube-shaped hypanthium often present; stamens typically 8.

REFERENCES: Munz 1961, 1965; Raven 1964; Conti et al. 1993; Hoch et al. 1993.

1. Petals equal, not clawed, yellow to white or pink, or petals absent; flowers radially symmetrical, basal, axillary, or in terminal inflorescences.
 2. Hypanthium (= floral tube) not prolonged beyond the ovary, the flower parts (petals, stamens) at the summit of the ovary; sepals persistent in fruit _____ **Ludwigia**
 2. Hypanthium much prolonged beyond the ovary, pedicel-like, the flower parts well-separated from the ovary; sepals deciduous in fruit.
 3. Stigmas deeply lobed or branched, not peltate _____ **Oenothera**
 3. Stigmas entire to only slightly lobed, peltate _____ **Calylophus**
1. Petals slightly unequal, clawed, white to pink or reddish; flowers usually bilaterally symmetrical (*Gaura*) OR radially symmetrical (*Stenosiphon*), in slender, solitary or paniced racemes.
 4. Petals white to pink or reddish, usually all projecting upward, 1.5-15 mm long; anthers red, purple, or brown, ca. 1-6 mm long; hypanthium nearly cylindrical; leaves abruptly reduced in the inflorescence; filaments often with a scale at base (except in *G. parviflora*) _____ **Gaura**
 4. Petals pure white, evenly spaced, 4-6 mm long; anthers creamy white (withering brownish), less than 2 mm long; hypanthium thread-like; leaves gradually reduced in the inflorescence; filaments without a scale at base _____ **Stenosiphon**

CALYLOPHUS EVENING-PRIMROSE, SUNDROPS

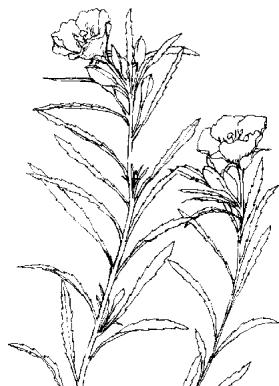
Herbaceous or woody based perennials or rarely annuals; flowers radially symmetrical, 4-merous, axillary, opening near sunrise or near sunset; petals yellow, but often with UV markings visible only to certain insects; stamens 8; stigma peltate, the lobes 4, shallow; fruit a cylindric capsule.



Menodora heterophylla [HO5]



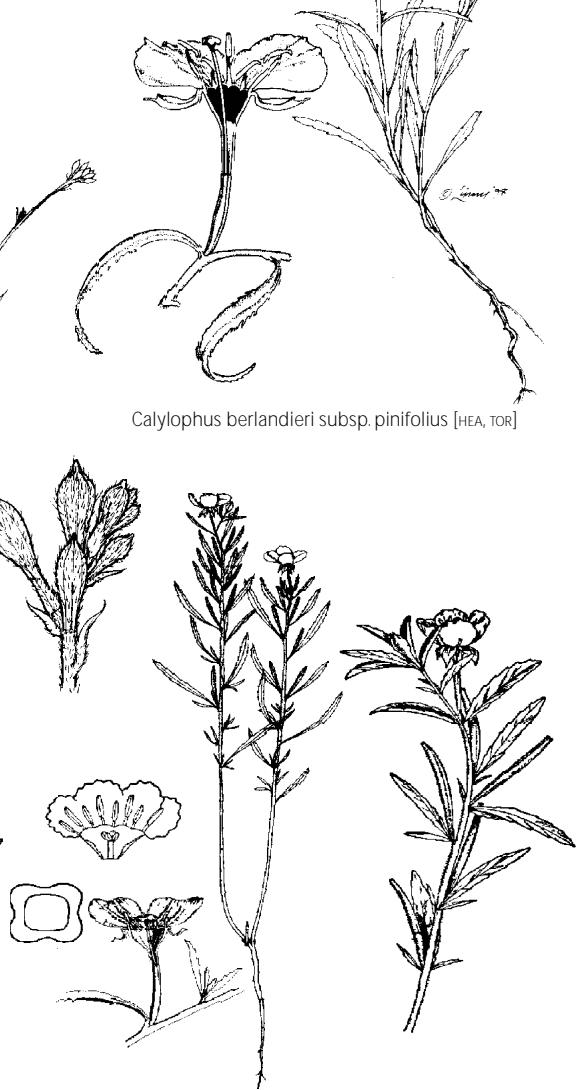
Calylophus hartwegii subsp. pubescens [BB2]



Calylophus berlandieri subsp. pinifolius [HEA, TOR]



Gaura brachycarpa [HEA, TOR]



Calylophus serrulatus [AMB, GLE, STE]

• A North American genus of 6 species previously included in *Oenothera*; segregated by Raven (1964). (Greek: *calyx*, cup, and *lophus* crest or tuft)

REFERENCES: Raven 1964; Shinners 1964a; Towner 1977.

1. Hypanthium 5–16(–20) mm long; flower buds somewhat 4-angled (due to keeled sepals); filaments of 2 lengths, some ca. 2 times as long as others; widespread in nc TX.
2. Stigma exserted to tip of outer anthers or beyond; flowers relatively larger, the petals usually 9–21 mm long; pollen 85–100% fertile _____ **C. berlandieri**
2. Stigma extends only to tip of inner anthers near apex of hypanthium; flowers relatively smaller, the petals usually 6–12 mm long; pollen 30–80% aborted _____ **C. serrulatus**
1. Hypanthium 20–50 mm long; flower buds not 4-angled (sepals not keeled); filaments nearly equal in length; limited to sw part of nc TX _____ **C. hartwegii**

Calylophus berlandieri Spach, (for Jean Louis Berlandier, 1805–1851, French botanist who explored TX, NM, and Mexico, and one of the first botanists to make extensive collections in TX), BERLANDIER'S EVENING-PRIMROSE, SQUARE-BUD DAY-PRIMROSE. Annual or perennial to 50 cm tall, similar to *C. serrulatus* except for floral characters; leaves linear to oblanceolate, subentire to denticulate; flowers self-incompatible, opening near sunrise. May–Jun. Hybridization sometimes occurs between the 2 subspecies (Towner 1977).

1. Plants ± bushy, the stems several-many, nearly decumbent to ascending, 10–40 cm tall; largest leaf blades on stem 1–4 cm long; hypanthium and stigma yellowish, never black; rare in nc TX _____ subsp. **berlandieri**
1. Plants usually not bushy, the stems 1–several, suberect to erect, 30–80 cm tall; largest leaf blades on stem 2.5–9 cm long; hypanthium (inside) and stigma sometimes black; widespread in nc TX _____ subsp. **pinifolius**

subsp. **berlandieri**, HALF-SHRUB SUNDROPS, DRUMMOND'S SUNDROPS, BEACH EVENING-PRIMROSE. Prairies, sandy, gravelly, and limestone soils in relatively dry areas; in nc TX known only from Palo Pinto and Wise cos. (Towner 1977) in West Cross Timbers; widespread in TX, but mainly s TX and Panhandle. Mar–Nov. [*C. drummondianus* Spach subsp. *berlandieri* (Spach) Towner & P.H. Raven, *Oenothera serrulata* Nutt. subsp. *drummondii* (Torr. & A. Gray) Munz]

subsp. **pinifolius** (Engelm. ex A. Gray) Towner, (with leaves like *Pinus*—pine). Prairies, sandy and rocky areas; Post Oak Savannah and se TX w to Edwards Plateau and Red Plains. Mar–Jul. [*C. drummondianus* Spach, *C. serrulatus* (Nutt.) P.H. Raven var. *spinulosus* (Nutt. ex Torr. & A. Gray) Shinners, *Oenothera serrulata* subsp. *pinifolia* (Engelm. ex A. Gray) Munz]

Calylophus hartwegii (Benth.) P.H. Raven subsp. **pubescens** (A. Gray) Towner & P.H. Raven, (sp. for Theodore Hartweg, 1812–1871, Royal Horticultural Society collector in CA and Mexico; subsp: pubescent, downy), GRAND PRAIRIE EVENING-PRIMROSE. Bushy perennial to ca. 40 cm tall; leaves linear to oblong-lanceolate, entire to denticulate, abruptly narrowed to truncate or slightly clasping basally; flowers self-incompatible, opening in afternoon or near sunset; petals 10–35 mm long; ovary with long spreading hairs. Open sandy areas or on limestone; Brown, Callahan, Comanche, Erath, Hamilton, Lampasas, Mills, and Tarrant cos; w part of nc TX s and w to w TX. Apr–Jun, sporadically later. This species is made up of 5 subspecies, only 1 of which occurs in nc TX. [*C. hartwegii* var. *pubescens* (A. Gray) Shinners, *Oenothera greggii* A. Gray, *Oenothera greggii* var. *lampasana* (Buckley) Munz]

Calylophus serrulatus (Nutt.) P.H. Raven, (with minute teeth), YELLOW EVENING-PRIMROSE, DAY-PRIMROSE. Similar to *C. berlandieri* but self-compatible; difficult to distinguish without floral characters; flowers opening in the morning; anthers shedding pollen directly on stigma. Open, sandy or rocky soils; w Blackland Prairie w to Panhandle and s to near Gulf coast. May–Jun. [*Oenothera serrulata* Nutt.]

GAURA BUTTERFLY-WEEED, WILD HONEYSUCKLE

Annual or perennial herbs (can be woody at base); leaves reduced upward; basal leaves often lyrate; inflorescence a spicate raceme or group of these; flowers opening near sunrise or sunset, (3-)4-merous, usually strongly bilaterally symmetrical; hypanthium well-developed; petals clawed, usually white, becoming pink or red with age; stamens 8; stigma (3-)4-lobed; fruit an indehiscent, woody, nut-like capsule, sometimes stipitate.

• A North American genus of 21 species; some are cultivated for cut flowers. The key is adapted from Raven and Gregory (1972a) with modifications from G. Hoggard (1998). (Greek: *gauros*, proud, showy, or majestic, from the sometimes showy flowers)

REFERENCES: Munz 1938; Raven & Gregory 1972a, 1972b; Carr et al. 1986, 1988, 1990; G. Hoggard 1999.

1. Flowers 3-merous; fruits 3-angled.
 2. Sepals 4.5–6 mm long; petals 3.5–5 mm long _____ ***G. triangulata***
 2. Sepals 9–15 mm long; petals 8–12.5 mm long _____ ***G. brachycarpa***
1. Flowers 4-merous; fruits 4-angled.
 3. Flowers small: anthers ca. 1 mm long, oval; sepals 2–5.8 mm long; petals 1.5–4 mm long; fruits weakly angled _____ ***G. parviflora***
 3. Flowers relatively larger: anthers 1.5–6 mm long, linear; sepals 4.5–17 mm long; petals 3.5–15 mm long; fruits usually distinctly angled or winged.
 4. Fruits narrowed to a slender stipe 2–8 mm long (stipe ± pedicel-like in appearance); stems densely villous OR glabrous to with sparse pubescence; plants perennial from a woody base or rhizome.
 5. Body of fruits tapering to a slender stipe, the stipe noticeably broader near attachment to body; stems usually glabrous to with sparse pubescence; widespread in nc TX _____ ***G. sinuata***
 5. Body of fruits abruptly narrowing to a slender stipe, the stipe filiform and ± equal in diam. its entire length; stems usually conspicuously and densely villous, the hairs 2–3 mm long; in nw part of nc TX _____ ***G. villosa***
 4. Fruits subsessile OR with a thick cylindrical stipe; stems pubescent or pilose, sometimes densely so; plants perennial from a woody base or rhizome OR annual from a taproot.
 6. Plants perennial from a branching woody base or aggressively rhizomatous; fruits rather abruptly constricted to a thick cylindrical stipe ca. 1/2 the length of the fruit body and 1/4–1/2 the width of the fruit body (the stipe can appear like an abruptly narrowed bottom part of a sessile fruit).
 7. Fruits relatively small, only 4–9 mm long, 1–3 mm wide, covered with dense, short, appressed pubescence (use hand lens); bracts 2–5 mm long; plants from a branching woody base _____ ***G. coccinea***
 7. Fruits relatively larger, 7–13 mm long, 3–5 mm wide, usually glabrous or with a few scattered hairs; bracts 2–8 mm long; plants aggressively rhizomatous _____ ***G. drummondii***
 6. Plants annual or biennial from a taproot (and 1 perennial species); fruits subsessile, not abruptly constricted to a thick stipe.
 8. Sepals with long, erect hairs; plants perennial; flowers opening near sunrise and withering in the afternoon; mainly to the s of nc TX _____ ***G. lindheimeri***
 8. Sepals glabrous or with appressed hairs; plants annual; flowers opening near sunset and withering the next morning; widespread in nc TX.
 9. Fruits with wings on the angles and conspicuous furrows between the angles; plants usually < 1.2 m tall, typically branched from base; flowering in spring (Feb–Jun).
 10. Buds and backs of sepals glabrous; bracts 4.5–7 mm long; fruits ellipsoidal, broader near middle _____ ***G. suffulta***

10. Buds and backs of sepals pubescent; bracts 2–4 mm long; fruits pyramidal,
broader near base _____ **G. brachycarpa**
9. Fruits angled but without wings; plants typically 1–4 m tall, usually not branched at
base; flowering in summer and fall (Jun–Dec) _____ **G. longiflora**

Gaura brachycarpa Small, (short-fruited), PLAINS GAURA. Low annual to 0.65(–0.85) m tall; hypanthium 6.5–12 mm long; petals 8–12.5 mm long, pink to rose-red or white; fruits (3)–4–angled, 5.5–10 mm long, sessile or with stipe 1 mm long. Sandy open areas; Post Oak Savannah w to West Cross Timbers and s to s TX. Mar–May(–Jun).

Gaura coccinea Nutt. ex Pursh, (scarlet), SCARLET GAURA, WILLOW-HERB GAURA, SMOOTH GAURA, WILD HONEYSUCKLE, BEE-BLOSSOM. Low perennial 0.2–0.5(–1) m tall; petals 3–8 mm long, white, withering to rosy or maroon; fruits abruptly constricted to a thick cylindrical stipe. Sandy or rocky prairies; Burnet, Callahan, Erath, Hamilton, Palo Pinto, and Parker cos., also Brown (HPC), Bell, and Williamson (Munz 1961) cos; s and w parts of nc TX s and w to w TX. Apr–Jun. [*G. coccinea* var. *glabra* (Lehm.) Munz, *G. coccinea* var. *parviflora* (Torr.) Rickett, *G. odorata* Sessé ex Lag.]

Gaura drummondii (Spach) Torr. & A. Gray, (for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), SWEET GAURA, SCENTED GAURA. Perennial spreading by rhizomes to form large patches; stems usually several, 0.2–0.6(–1.2) m tall; petals 6–10 mm long, pink to red, rarely white; fruits 7–13 mm long, abruptly constricted to cylindrical stipe. Rocky or sandy open ground; Dallas, Erath, and Tarrant cos.; e 1/2 of TX. Apr–Oct. This species has long incorrectly gone under the name of *G. odorata* (Raven & Gregory 1972a). [*Gaura odorata* sensu Mahler and various authors, not Sessé ex Lag.]

Gaura lindheimeri Engelm. & A. Gray, (for Ferdinand Jacob Lindheimer, 1801–1879, German born TX botanist), WHITE GAURA, MUNZ GAURA. Villous, clumped perennial, 0.5–1.5 m tall; flowers opening near sunrise; petals 10.5–15 mm long, white fading to light or deep pink; fruits 6–9 mm long, subsessile. Prairies, sometimes cultivated; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly se and sc TX. Apr–Jul.

Gaura longiflora Spach, (long-flowered), TALL GAURA, KEARNEY'S GAURA. Large annual or biennial typically 1–4 m tall; inflorescence pubescent or glandular-pubescent; hypanthium 4–13 mm long; petals 6.5–15 mm long; fruits 4.5–7 mm long, subsessile. Open disturbed areas; Dallas, Grayson, Hunt, and Lamar cos., also Wise Co. (Munz 1961); se and e TX w to n part of nc TX. Jun–Dec. [*G. biennis* var. *pitcheri* Torr. & A. Gray, *G. filiformis* Small]

Gaura parviflora Douglas ex Lehm., (small-flowered), LIZARD-TAIL GAURA, VEIL-V-LEAF GAURA, SMALL-FLOWER GAURA, DOWNTY GAURA. Tall annual from a large taproot, 0.15–2(–3) m tall, densely glandular-pubescent and villous with long, wide-spreading hairs; leaves entire or toothed; petals brick red to white; fruits 5–11 mm long, subsessile. Disturbed soils, stream bottoms; widespread in TX. Apr–Oct.

Gaura sinuata Nutt. ex Ser., (with wavy margins), WAVY-LEAF GAURA. Brittle-stemmed perennial 0.2–1.5 m tall, spreading by rhizomes and often forming mats; inflorescence simple or open-panicked, on a long, naked peduncle (to 20 cm tall) with a basal whorl of leafy branches; buds appressed-pubescent; petals 7–14.5 mm long, pink to red or white; fruit body 8–15 mm long; stipe 2–8 mm long. Sandy or rocky prairies or disturbed soils; widespread in TX. Apr–Oct.

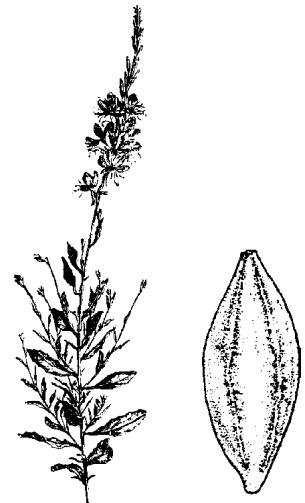
Gaura suffulta Engelm. ex A. Gray, (supported or propped), ROADSIDE GAURA, WILD HONEYSUCKLE, BEE-BLOSSOM, KISSES. Winter annual; stems erect or with decumbent bases, 0.25–1.2 m tall, spreading-pilose; leaves entire, toothed, or lobed; inflorescence glabrous or with a few long hairs near base; petals 10–15 mm long, white, withering to rosy; fruits 4.5–8 mm long, sessile or



Gaura coccinea [BB2, TOR]



Gaura drummondii [HEA, TOR]



Gaura lindheimeri [NIC, TOR]



Gaura longiflora [HEA, TOR]



Gaura parviflora [BB1, TOR]



Gaura sinuata [BB1, TOR]

on short stipe to 2.2 mm long. Prairies, roadsides, disturbed sites; e TX w to Rolling Plains, also Edwards Plateau. Feb–May(–Jun).

Gaura triangulata Buckley. (triangular, 3-angled). Slender low annual to 0.6 m tall; hypanthium 4–5.5 mm long; fruits 7–9 mm long, sessile. Sandy, open areas; West Cross Timbers and Rolling Plains; type locality in Young Co. (Buckley 1861 [1862]). Mar–Jun. [*G. tripetala* Cav. var. *triangulata* (Buckley) Munz]

Gaura villosa Torr., (soft hairy), WOOLLY GAURA. Perennial 0.6–1.8 m tall, with many erect branches from woody base, below inflorescence usually densely villous; leaves narrowly lanceolate to very narrowly elliptic or linear, sinuate-dentate to subentire; inflorescence strigulose, glandular-pubescent, or hirtellous; flowers opening near sunset and withering the next morning; petals 8.5–13 mm long, white; anthers 2.5–4.5 mm long; fruit body 9–18 mm long; stipe 2–8 mm long. Dunes and sandy flats; Cooke, Montague, and Somervell cos., also Hood Co. (R. O'Kennon, pers. obs.); nw part of nc TX w through Plains Country. Mar–Jun.

LUDWIGIA SEEDBOX, WATER-PRIMROSE, FALSE LOOSESTRIFE

Usually perennial herbs of damp ground or shallow water; stems creeping or floating to erect; leaves entire or minutely toothed; flowers 4- or 5-merous, axillary; sepals persistent in fruit; petals yellow, sometimes conspicuous, or absent; stamens as many as or twice the number of sepals; stigma capitate or globose; fruit a capsule.

— A cosmopolitan, especially American genus of 82 species of wet habitats. Some are cultivated as ornamentals, including in aquaria. Some species were formerly segregated into the genus *Jussiaea*; that genus was named by Linnaeus for the brothers Antoine Laurent (1686–1758) and Bernard (1699–1777) de Jussieu, French botanists and important early proponents of the “natural system” of classification that grouped related plants; this was a significant step forward from Linnaeus’ “artificial system” of classification. (*Ludwigia* is named for Christian Gottlieb Ludwig, 1709–1772, German botanist and physician)

REFERENCES: Munz 1944; Raven 1963; Ramamoorthy & Zardini 1987; Peng 1988, 1989; Zardini & Raven 1992.

1. Leaves opposite.

2. Petals absent; capsules with broad green bands at the corners, sessile _____ **L. palustris**

2. Petals present; capsules without green bands, on pedicels 0.3–1.5 mm long _____ **L. repens**

1. Leaves alternate.

3. Stems conspicuously 4-winged (with 4 narrow bands or wings of leaf-like tissue along the stems) _____ **L. decurrens**

3. Stems not winged.

4. Sepals 5; petals 5; plant prostrate, floating, or erect.

5. Pedicels 10–60(–80) mm long; branches prostrate or floating; seeds not falling from capsule, fused in large mass of endocarp _____ **L. peploides**

5. Pedicel 2–20 mm long; branches erect; seeds readily falling from capsule, not fused in a large mass of endocarp (each seed with a small horseshoe-shaped piece of endocarp)

_____ **L. leptocarpa**

4. Sepals 4; petals 4 or absent; plants erect or nearly so.

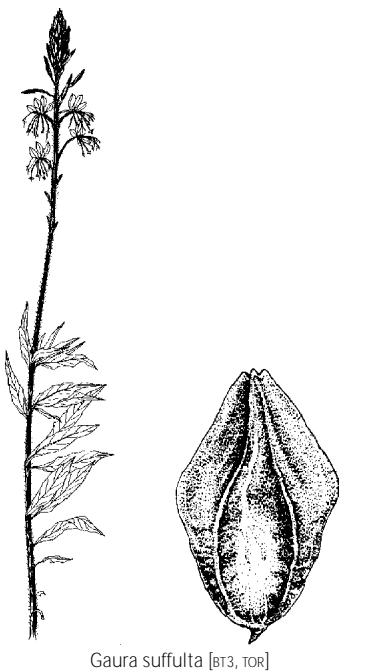
6. Stamens 8; capsules 17–45 mm long; known locally only from Bell Co. in s part of nc TX

_____ **L. octovalvis**

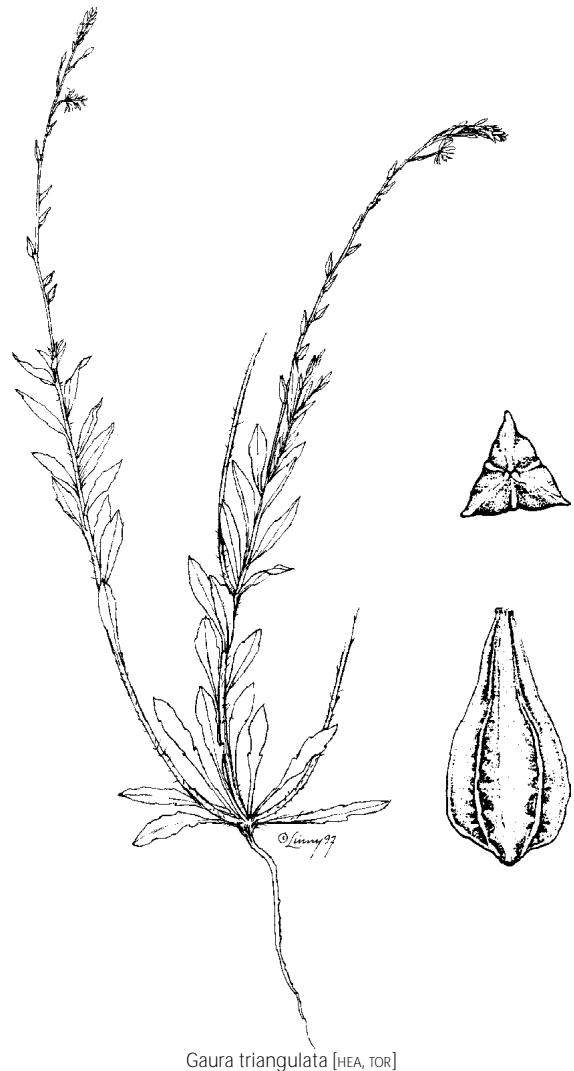
6. Stamens 4; capsules 2–10(–12) mm long; widespread in nc TX.

7. Capsules nearly globose, on short pedicels 3–5 mm long; petals present _____ **L. alternifolia**

7. Capsules subcylindric or elongate obpyramidal (not globose), sessile or subsessile; petals present OR absent.



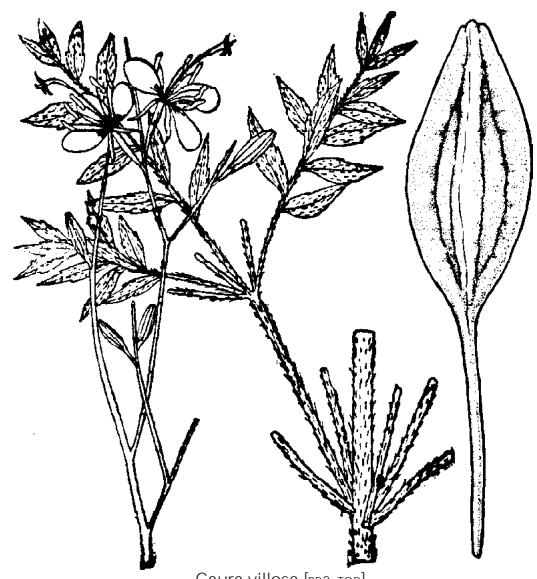
Gaura suffulta [BT3, TOR]



Gaura triangulata [HEA, TOR]



Ludwigia alterniflora [GLE]



Gaura villosa [BB2, TOR]

8. Petals present; leaf blades linear, 1.5–5(–8.5) mm wide, subsessile or with petioles to 5 mm long _____ **L. linearis**
8. Petals absent; leaf blades narrowly elliptic, 4–20 mm wide, with petioles 2–10 mm long _____ **L. glandulosa**

Ludwigia alternifolia L., (with alternate leaves), SEEDBOX, RATTLE-BOX, BUSHY SEEDBOX. Plant erect, to 1 m tall, subglabrous or rather minutely pubescent, at least in upper part; leaf blades lanceolate; petioles usually 3–7 mm long; flowers (at least upper ones) in the axils of reduced leaves or bracts; calyx lobes 4; petals 8–10 mm long, showy, but falling easily, lasting less than one day; capsules 5–6 mm long, on pedicels 3–5 mm long. Wet places; Denton, Fannin, Grayson, and Tarrant cos., also Lamar Co. (Carr 1994); se and e TX w to East Cross Timbers. Jun–Sep, rarely as early as Apr.

Ludwigia decurrens Walter, (running down the stem, from the leaf-like tissue along the stems), PRIMROSE-WILLOW, UPRIGHT PRIMROSE-WILLOW. Plant subglabrous, erect, to 2 m tall; leaves subsessile; leaf blades lanceolate to elliptic; sepals and petals 4; petals 8–12 mm long; stamens 8; capsules 10–20 mm long, on a pedicels 0–10 mm long. Wet places; Denton, Fannin, and Hopkins cos., also Dallas (Munz 1961) and Lamar (Carr 1994) cos; se and e TX w to nc TX. Jun–Oct.

Ludwigia glandulosa Walter, (glandular), TORREY'S SEEDBOX, CREEPING SEEDBOX, CYLINDRIC-FRUIT LUDWIGIA. Plant glabrous to slightly hairy, to 1 m tall; leaf blades lanceolate to elliptic; petioles 2–10 mm long; petals absent; capsules 2–8 mm long, sessile. Wet places; Denton, Grayson, and Montague cos.; se and e TX w to nc TX. Jun–Oct.

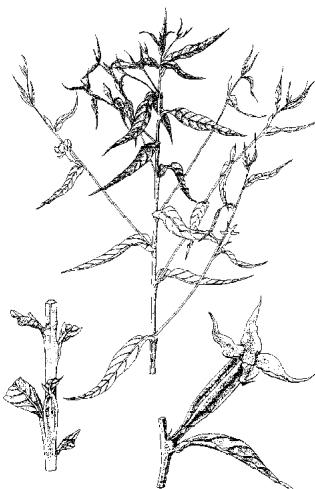
Ludwigia leptocarpa (Nutt.) H. Hara, (thin-fruited), ANGLE-STEM WATER-PRIMROSE. Similar to *L. octovalvis* plant hairy, to 1.5 m tall; leaf blades lanceolate to broadly so; petioles 2–35 mm long; flowers 5-merous, rarely with only 4 sepals and petals; petals 5–11 mm long; stamens usually 10; capsules 15–50 mm long, on pedicels 2–20 mm long; seeds 1–1.2 mm long, in a horseshoe-shaped piece of endocarp. Wet places; Dallas, Johnson, and Tarrant cos; se and e TX w to East Cross Timbers. Aug–Oct.

Ludwigia linearis Walter, (narrow, with sides nearly parallel), NARROW-LEAF SEEDBOX, LINEAR-LEAF LUDWIGIA. Plant glabrous to densely minutely strigillose or puberulent; stems erect, often well-branched, to 1 m or more tall; petals 3–6 mm long; capsules 5–10(–12) mm long, sessile; seeds 0.45–0.65 mm long. Wet places; Johnson and Lamar cos. (Peng 1989); se and e TX w to nc TX.

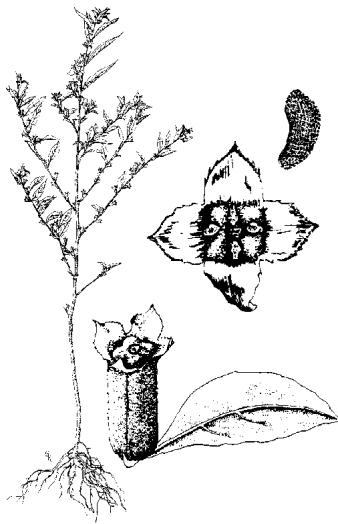
Ludwigia octovalvis (Jacq.) P.H. Raven, (eight-valved), SHRUBBY WATER-PRIMROSE, NARROW-LEAF WATER-PRIMROSE. Plant nearly glabrous to hairy, to 1 m or more tall; leaf blades narrowly lanceolate to narrowly ovate; petioles 0–10 mm long; petals 5–16 mm long; capsules 17–45 mm long, on pedicels 0–10 mm long; seeds 0.6–0.75 mm long, not in a horseshoe-shaped piece of tissue. Wet places; Bell Co. in s part of nc TX; mainly s 1/2 of TX. Jul–Oct.

Ludwigia palustris (L.) Elliott, (of marshes), MARSH-PURSLANE, AMERICAN SEEDBOX, MARSH SEEDBOX. Plant ascending or creeping and rooting at nodes; leaf blades elliptic-lanceolate, acute, entire or subentire; petioles 2–10 mm long; flowers sessile; petals absent; calyx lobes 4; capsules 2–8 mm long. Wet places; Fannin and Hopkins cos., also Lamar (Carr 1994) and Somervell (R. O'Kennon, pers. comm.) cos. and Fort Hood (Bell or Coryell cos.—Sanchez 1997); se and e TX w to nc TX, also Edwards Plateau and Trans-Pecos. Jun–Oct. Jones et al. (1997) did not list this species for TX.

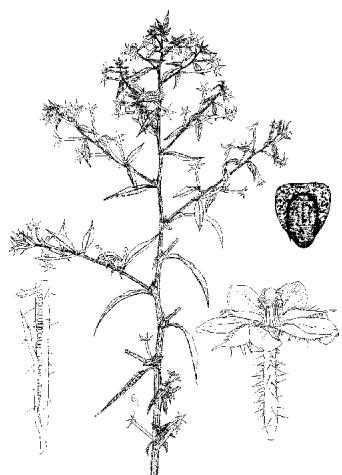
Ludwigia peploides (Kunth) P.H. Raven, (resembling *Peplis* which is now treated in *Lythrum* in the Lythraceae), WATER-PRIMROSE, SMOOTH WATER-PRIMROSE, FLOATING EVENING-PRIMROSE, VERDOLAGA DE AGUA, PRIMROSE-WILLOW. Plant trailing in shallow water or creeping in mud, with flowering branches somewhat ascending, glabrous; leaf blades oblong-elliptic or -lan-



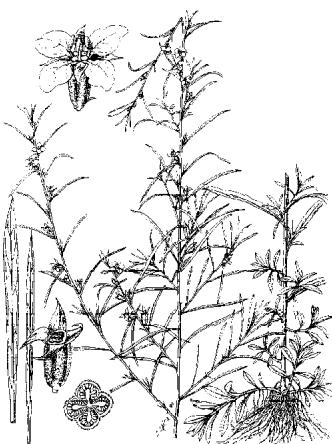
Ludwigia decurrens [gwo]



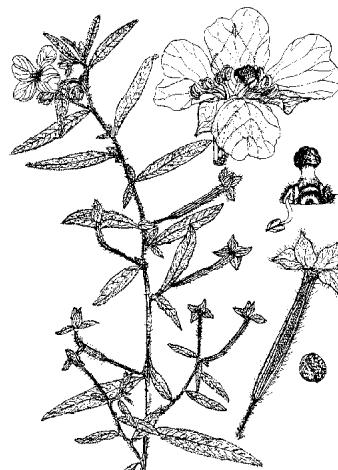
Ludwigia glandulosa [gwo]



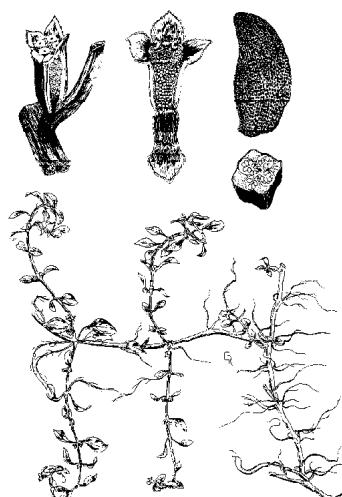
Ludwigia leptocarpa [gwo]



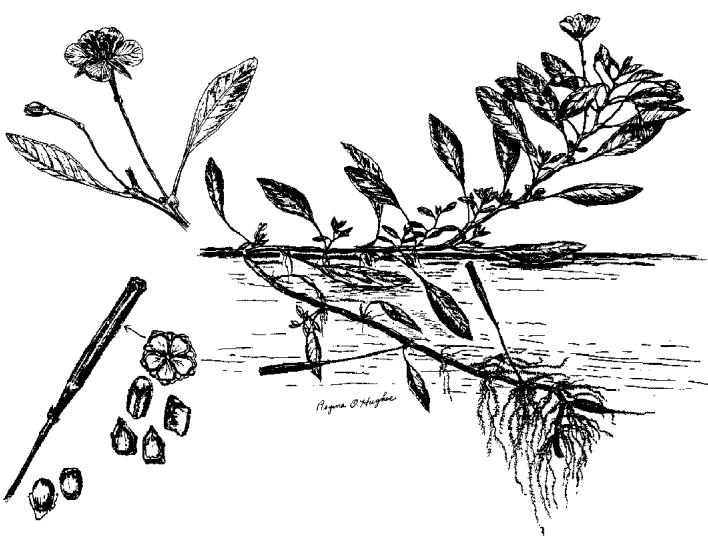
Ludwigia linearis [AMB]



Ludwigia octovalvis [co1]



Ludwigia palustris [gwo]



Ludwigia peploides [REE]



Ludwigia repens [gwo]

ceolate, entire; petioles 2–40 mm long; flowers axillary, solitary; calyx lobes 5; petals 7–14(–24) mm long, showy; capsules 10–40 mm long. Mid-May–Oct. Ponds, tanks, streams, other wet areas; se and e TX w to West Cross Timbers and Edwards Plateau. We are following McGregor (1986) in lumping [*L. peploides* subsp. *glabrescens* (Kuntze) P.H. Raven and *Jussiaea repens* L. var. *glabrescens* Kuntze]; also [*L. peploides* var. *glabrescens* (Kuntze) Shinners]. Jones et al. (1997) listed only subsp. *glabrescens* occurring in TX. ■/97

Ludwigia repens J.R. Forst., (creeping), ROUND-LEAF SEEDBOX, FLOATING PRIMROSE-WILLOW, CREEPING PRIMROSE-WILLOW, FLOATING WATER-PRIMROSE, CREEPING WATER-PRIMROSE. Plant trailing in shallow water or creeping in mud, rooting at the nodes, glabrous or puberulent; leaf blades narrowly elliptic to subrotund; petioles 3–25 mm long; flowers 4-merous; petals 4–5 mm long; capsules 3.3–7.5 mm long, on pedicels 0.3–1.5 mm long. Damp ground or shallow water; Bell and Williamson cos., also Dallas and Tarrant cos. (Munz 1961); widespread in TX. Jul-Sep. [*L. natans* Elliott, *L. natans* var. *wtundata* (Griseb.) Fernald & Griscom]

OENOTHERA EVENING-PRIMROSE, SUNDROPS

Annual or perennial herbs; flowers in leaf axils or in ± distinct inflorescences, radially symmetrical, 4-merous, opening near sunset or near sunrise; hypanthium well-developed, extending beyond the ovary; calyx lobes reflexed, not persistent in fruit; petals yellow (these sometimes drying or fading to pinkish or reddish), white to pink or rose-purple; stamens 8; stigma deeply 4-lobed; fruit a dehiscent or nut-like and indehiscent capsule.

• A genus of 124 species of the Americas, especially in temperate areas. The genus is well known for its complicated genetics including reciprocal translocation and structural heterozygotes; many species have unusual meiotic chromosome configurations (Dietrich & Wagner 1988). Oil of *Oenothera* is an important ingredient used in many cosmetics including lipstick. Many are cultivated as ornamentals; the flowers often open and are scented in the evening for moth pollination. (Greek: *oinotheeras*, name used by Theophrastus for some species of *Epilobium*, possibly from wine-scenting (*oeno*, wine), in allusion to an ancient use of the roots) REFERENCES: Gates 1958; Straley 1977; Ellstrand & Levin 1980; Raven et al. 1979; Wagner 1983, 1986; Dietrich & Wagner 1987, 1988; Harte 1994; Dietrich et al. 1997.

1. Hypanthium 0.2–5 cm long; ovaries and fruits neither deeply sharp-angled nor winged.
 2. Petals light to deep yellow (withering white or reddish).
 3. Flowers many, in dense, terminal, head-like or finally elongate spikes.
 4. Leaf blades 10–60 mm wide; petals obovate to obtiangular, usually broadest near apex; capsules 3–6 mm thick at base; ovules and seeds horizontal in locule, sharply angled _____ **O. biennis**
 4. Leaf blades 3–15 mm wide; petals broadly elliptic to nearly rhombic, usually broadest near middle; capsules 2–4 mm thick at base; ovules and seeds ascending in locule, not sharply angled.
 5. Free sepal tips 2–6 mm long; flower buds with wide-spreading hairs to nearly glabrous, the hairs pustulate-based (= swollen at base)—use dissecting scope; mature lower buds usually extending past youngest buds at end of spike _____ **O. heterophylla**
 5. Free sepal tips usually 0.5–1.5 mm long; flower buds with appressed hairs, the hairs not pustulate; mature lower buds usually not extending past youngest buds at end of spike _____ **O. rhombipetala**
 3. Flowers solitary, or few in loose terminal spikes.
 6. Hypanthium as long as the ovary or longer; fruits cylindrical, usually > 10 mm long.
 7. Stem leaves nearly entire, with only a few small teeth; plants biennial, 0.5–2 m tall; ovules and seeds horizontal in locule, sharply angled; mature capsules 3–6 mm in diam. at base _____ **O. biennis**

7. Stem leaves sinuate-dentate to sinuate-pinnatifid, rarely nearly entire; plants annual, 0.1–0.6(–1) m tall; ovules and seeds ascending in locule, not sharply angled; mature capsules 2–4 mm in diam. at base.
8. Petals 5–22 mm long; sepals 5–12(–15) mm long; stigma surrounded by anthers at flowering time; anthers 2–6 mm long _____ ***O. lacinia***
8. Petals 25–40 mm long; sepals 15–30 mm long; stigma elevated above anthers at flowering time; anthers 4–11 mm long _____ ***O. grandis***
6. Hypanthium shorter than the ovary; fruits club-shaped, the lower part narrower, the upper part swollen, 10 mm or less long.
9. Flowers terminal, borne above the leaves; leaf blades (except lowest) linear, 0.2–1.2(–3) mm wide; hypanthium 1–2 mm long; sepals 1.5–2 mm long, without free tips; petals 3–5(–7) mm long; capsules usually 4–6 mm long _____ ***O. linifolia***
9. Flowers lateral and finally terminal, in the axils of leaves or leafy bracts; leaf blades oblong-lanceolate to oblong-linear, mostly 2–10 mm wide; hypanthium 4–10 mm long; sepals 4–10 mm long, with free tips 1–1.5 mm long; petals 5–15 mm long; capsules 5–15 mm long _____ ***O. spachiana***
2. Petals white to rosy lavender with yellowish base _____ ***O. speciosa***
1. Hypanthium 2–12.5 cm long (5 cm or more long except in *O. triloba*); ovaries and fruits deeply sharp-angled and winged (except neither deeply sharp-angled nor winged in *O. jamesii*).
10. Plants essentially stemless or with suberect or trailing stems to 0.5 m or less long; ovaries and capsules deeply sharp-angled and winged, often conspicuously so.
11. Plants winter annuals; petals 1–2 cm long; capsules winged mostly above middle, borne at base of plant _____ ***O. triloba***
11. Plants perennials; petals 2–5 cm long; capsules winged their entire length, borne at base of plant or along the stems.
12. Wings of capsules 4–6 mm wide; capsules 2–3 cm long; plant essentially stemless or caespitose (clumped) with a short stem; leaf blades nearly entire to pinnatifid; limited to extreme w part of nc TX (Callahan Co.) _____ ***O. coryi***
12. Wings of capsules 7–20 mm wide; capsules 2–6.5 cm long; plant usually with distinct stems to 50 cm long; leaf blades nearly entire to with scattered small teeth; widespread in nc TX _____ ***O. macrocarpa***
10. Plants with erect stems usually 1–3 m tall; ovaries and capsules neither deeply sharp-angled nor winged _____ ***O. jamesii***

Oenothera biennis L., (biennial, living two years and flowering in the second), COMMON EVENING-PRIMROSE. Erect biennial to 2 m tall; inflorescence a terminal spike, often with short branches; flowers opening near sunset; hypanthium 2–5 cm long; buds with free sepal tips 1–4 mm long; petals yellow; capsules cylindric, tapering towards apex, 1.4–2.5 cm long. Disturbed wooded and weedy areas; Cooke, Grayson and Hopkins cos, also Tarrant Co. (Mahler 1988); e TX w to nc TX. Aug–Oct.

Oenothera coryi W.L. Wagner, (for Victor Louis Cory, 1880–1964, TX botanist at TX A&M and Southern Methodist universities). Perennial from a woody taproot; plant essentially stemless or caespitose with a short stem; pubescence hirsute and strigulose; leaf blades nearly entire to remotely pinnately lobed; flowers opening near sunset; hypanthium (5.5)–7.5–10(–12.5) cm long; buds with free sepal tips 0.7–1.2 mm long; petals broadly obovate, 3.5–4.3 cm long, yellow, fading orange. Open grasslands or disturbed areas; Callahan Co. in extreme w part of nc TX (Wanger 1986); nc TX w to Panhandle; endemic to TX. Apr–May. [*O. brachycarpa* A. Gray var. *typica* sensu Munz, not Munz (as to the type)] ↗

Oenothera grandis (Britton) Smyth, (large, big). Annual to 0.6(–1) m tall; flowers opening near

sunset; hypanthium 2.5–5 cm long; petals deep yellow; capsules (1-)2.5–3.5(-5) cm long, cylindric. Open sandy areas; Dallas and Limestone cos. w to Panhandle and s to s TX. Apr-Jun.

Oenothera heterophylla Spach, (various-leaved), VARIABLE EVENING-PRIMROSE. Annual or short-lived perennial to ca. 0.7 m tall; flowers opening near sunset; hypanthium 2.5–3 cm long; petals yellow; sepals 1.5–3 cm long; petals 2.5–3.5 cm long; capsules 1.3–2.5 cm long, cylindric. Sandy open woods; Williamson Co., also Dallas, Henderson, Hopkins, and Limestone cos. (Dietrich & Wagner 1988); se and e TX w to Blackland Prairie, also Edwards Plateau. May-Sep.

Oenothera jamesii Torr. & A. Gray, (presumably for Edwin James, 1797–1861, surgeon-naturalist, first botanical collector in CO and first known botanical collector in TX, with Major Long's expedition to the Rocky Mts. in 1819–1820), TRUMPET EVENING-PRIMROSE. Robust biennial, appressed pubescent; stems erect, to 3 m tall; inflorescence unbranched or few-branched; flowers opening near sunset, very large; hypanthium 6–11 cm long; sepals 4–6 cm long, in bud with free tips 3–6 mm long; petals yellow, fading reddish, 3.5–5 cm long; capsules 2–5 cm long, cylindric. Stream banks or other moist situations; Bell, Coryell (Fort Hood—Sanchez 1997), Somervell, Tarrant (R. O'Kennon, pers. obs.), and Williamson (Balcones Canyonlands Nat. Wildlife Refuge, C. Sexton, pers. comm.) cos; mainly Edwards Plateau w to Trans-Pecos. Jul-Oct.

Oenothera laciniata Hill, (laciniate, torn), CUT-LEAF EVENING-PRIMROSE, DOWNY EVENING-PRIMROSE, SINUATE-LEAF EVENING-PRIMROSE. Annual or short-lived perennial to ca. 0.5 m tall; flowers opening late afternoon to late morning; hypanthium 1.5–3.5 cm long; petals light yellow; capsules 2–5 cm long. Disturbed soils; nearly throughout TX. Apr-Jun.

Oenothera linifolia Nutt., (with leaves like *Linum*—flax), THREAD-LEAF SUNDROPS. Slender, low (to 0.3 m tall), glabrous, small-flowered annual; leaf blades entire, filiform, to 3 mm wide (usually less); flowers opening near sunrise; hypanthium 1.5–2 mm long; sepals 1.5–2 mm long; petals 3–5 mm long, yellow. Sandy open woods; Kaufman and Lamar cos., also Dallas Co. (Mahler 1988); se and e TX w to nc TX. Apr-May.

Oenothera macrocarpa Nutt., (large-fruited), MISSOURI-PRIMROSE. Perennial with minutely gray-pubescent to glabrous, suberect to trailing stems to 0.5 m long or nearly acaulescent; leaves green to silvery or gray with dense, appressed pubescence; flowers opening near sunset; hypanthium 5–12 cm long; sepals 2–4 cm long, in bud with free tips 1.5–8 mm long; petals 2–5 cm long, yellow, sometimes fading reddish; capsules 2–6.5 cm long, conspicuously 4-winged. Limestone outcrops or prairies. Apr-Jun.

1. Plants completely glabrous _____ subsp. **oklahomensis**
1. Plants with appressed pubescence on either stems and buds or on whole plant.
 2. Leaf blades linear-lanceolate to broadly lanceolate, greenish, only the youngest tissue gray hairy; widespread in nc TX _____ subsp. **macrocarpa**
 2. Leaf blades ovate to broadly lanceolate, conspicuously gray-hairy, the entire plant with thick pubescence; possibly e to w margin of nc TX _____ subsp. **incana**

subsp. **incana** (A. Gray) W.L. Wagner, (hoary, quite gray), MISSOURI-PRIMROSE. While subsp. *incana* is generally found to the w of nc TX, a BRIT/SMU sheet from Callahan Co. on our w margin was annotated by W.L. Wagner as subsp. *macrocarpa* intermediate to subsp. *incana*. Edwards Plateau to nw TX.

subsp. **macrocarpa**, FLUTTER-MILL. Nc TX to Edwards Plateau. [*O. missouriensis* Sims] ☒/101

subsp. **oklahomensis** (Norton) W.L. Wagner, (of Oklahoma), OZARK SUNDROPS, GLADE-LILY. Cooke Co.; mainly Rolling Plains to Panhandle. [*Megapterium oklahomense* Norton, *O. macrocarpavar. oklahomensis*(Norton) Reveal, *O. missouriensis* Sims var. *oklahomensis*(Norton) Munz]



Oenothera biennis [BL3]



Oenothera coryi [HEA]



Oenothera grandis [HEA]



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Oenothera heterophylla [HEA]



Oenothera jamesii [HEA]

Oenothera rhombipetala Nutt. ex Torr. & A. Gray, (with rhomboid or diamond-shaped petals), FOUR-POINT EVENING-PRIMROSE. Biennial 0.3-1(-1.5) m tall; flowers opening near sunset; hypanthium 2.5-3 cm long; sepals 1.5-3 cm long; petals yellow, 1.5-3.5 cm long; capsules cylindric, 1.3-2.5 cm long. Sandy disturbed areas; n 1/2 of Texas. May-Sep.

Oenothera spachiana Torr. & A. Gray, (for Édouard Spach, 1801-1879, French (Alsatian) botanist), SPACH'S EVENING-PRIMROSE. Low (to 0.5 m tall), appressed-pubescent annual; leaf blades entire or nearly so; flowers opening near sunrise; hypanthium 4-10 mm long; petals yellow. Sandy areas, often open woods; Denton, Grayson, Hunt, Navarro, and Tarrant cos., also Kaufman and Lamar cos. (Munz 1961); se and e TX w to East Cross Timbers. Apr-May.

Oenothera speciosa Nutt., (showy, good-looking), SHOWY-PRIMROSE, BUTTERCUP, TEXAS-BUTTERCUP, SHOWY EVENING-PRIMROSE, MEXICAN EVENING-PRIMROSE, MEXICAN-PRIMROSE, WHITE EVENING-PRIMROSE, AMAPOLA DEL CAMPO. Low perennial usually with several pubescent stems; leaf blades toothed to deeply pinnatifid; flowers opening in evening and morning, white to pink or rose-purple, also turning reddish or rose-purple with age; hypanthium 1-2 cm long; sepals 1.5-3 cm long; petals 2.5-4 cm long; capsules clavate, 1-1.5 cm long, the terminal portion ribbed. Low disturbed areas, especially roadsides; nearly throughout TX. Groups of thousands of individuals make extremely vivid late spring displays; this species is one of our showiest and most abundant wildflowers. According to McGregor (1986), in the Great Plains the white, evening-opening individuals are diploid, while the rose-purple, morning-opening individuals are tetraploid. Apr-Jul. ☼/101

Oenothera triloba Nutt., (three-lobed), STEMLESS EVENING-PRIMROSE, THREE-LOBED-PRIMROSE. Nearly stemless winter annual with numerous basal rosette leaves varying from entire to deeply lobed; flowers opening near sunset; hypanthium 2-10 cm long; sepals 1-1.8 cm long; petals pale yellow; capsules obpyramidal, 1-2 cm long, 4-winged apically, borne at base of plant. Grassy areas, disturbed soils, lawn weed; Blackland Prairie w to Rolling Plains and s to Edwards Plateau. Mar-Apr.

Oenothera brachycarpa A. Gray, (short-fruited), which occurs just to the w of nc TX, is similar to *O. coryi*. It differs as follows: leaves with a terminal lobe; hypanthium (9-)12-21(-22) mm long; buds with free sepal tips 1-7 mm long; petals broadly rhombic-obovate.

Oenothera mexicana Spach, (of Mexico), and *O. fulfuriae* W. Dietr. & W.L. Wagner, (for Falfurrias, where the type was collected, in Brooks Co. in se TX), cited by Hatch et al. (1990) for vegetational areas 4 and 5, and 4, respectively, apparently occur only to the se of nc TX (Dietrich & Wagner 1987, 1988). *Oenothera brachycarpa* A. Gray (WRIGHT'S EVENING-PRIMROSE, SHORTPOD EVENING-PRIMROSE) and *O. pubescens* Willd. ex Spreng., cited by Hatch et al. (1990) for vegetational area 5, and 4 and 5, respectively, apparently occur only to the w and s of nc TX (Wagner 1986; Dietrich & Wagner 1988).

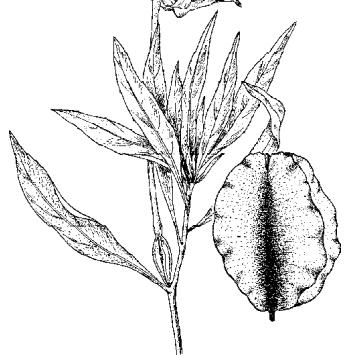
STENOSIPHON FALSE GAURA

☛ A monotypic genus of the c and s U.S. (Greek: *stenos*, slender, and *siphon*, a tube)

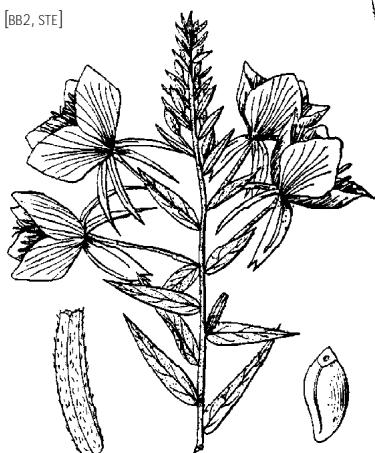
Stenosiphon linifolius (Nutt. ex E. James) Heynh., (with leaves like *Linum*—flax), FALSE GAURA, FLAX-LEAF STENOSIPHON, TALL GAURA. Glabrous, brittle-stemmed, slender biennial or perennial 0.6-3 m tall, only rarely branched below inflorescence; leaves narrowly lanceolate, 3-8(-10) cm long, 4-28 mm wide, sessile, acute, entire; flowers in panicled terminal spikes; petals 4, white, 4-6 mm long; stamens 8; fruit a 1-seeded capsule 2-4 mm long, ca. 2 mm thick. Limestone outcrops, clay soils; in nc TX Dallas to Grayson cos. w through West Cross Timbers; nc TX s to Edwards Plateau and nw to Panhandle. May-Jul, less freely to Oct.



Oenothera lacinata [BB2, STE]



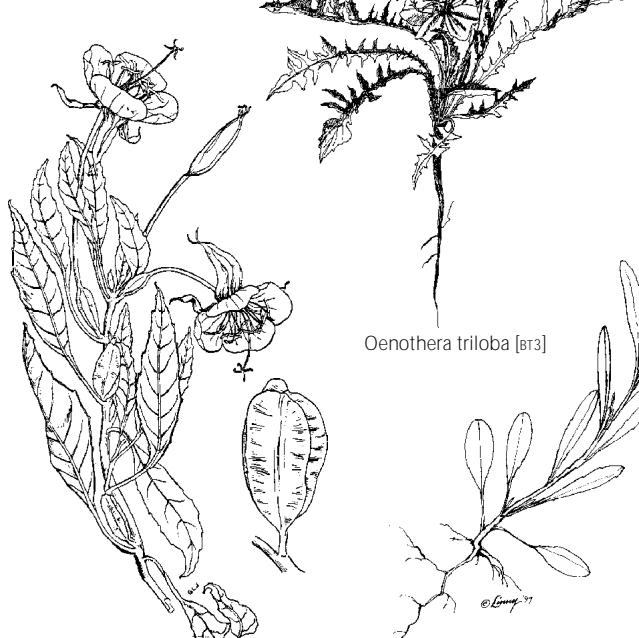
Oenothera macrocarpa subsp. macrocarpa [GLE]



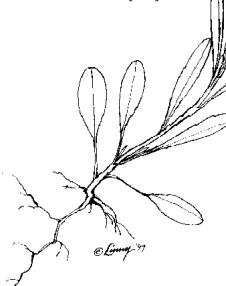
Oenothera rhombipetala [BB1]



Oenothera linifolia [GLE]



Oenothera triloba [BT3]



Oenothera spachiana [HEA]

Oenothera macrocarpa subsp. oklahomensis [ARM]



Oenothera speciosa [BB2, STE]

OROBANCHACEAE BROOMRAPE FAMILY

— A small (210 species in 15 genera) family of root parasites lacking chlorophyll. The species occur in the n hemisphere, especially in temperate regions and the Old World subtropics; some can be parasitic pests on cultivated crops. This family is similar in many respects to, and is sometimes included in, the Scrophulariaceae (which also includes some parasitic or hemiparasitic taxa). Two other genera, *Epifagus* (BEECHDROPS) and *Conopholis* (SQUAWROOT), occur in other parts of TX. (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: glandular-pubescent *root parasites* with short, fleshy, erect stems and scale-like leaves; plants *lacking chlorophyll* (and therefore not green), variously colored; corollas bilabiate, with a slightly curved tube.

REFERENCES: Thieret 1969a, 1971.

OROBANCHE BROOMRAPE

Perennial, fleshy, herbaceous plants without chlorophyll, parasitic on vascular plant roots, yellowish to brownish or purplish, glandular-pubescent; stems fleshy; leaves alternate, sessile, scale-like; flowers solitary on axillary pedicels or in spikes; corollas with a slightly curved tube, bilabiate; stamens 4, didynamous; fruit a 2-valved capsule; seeds numerous, minute.

— A genus of 150 species of n temperate and warm areas of the world; a number are restricted to certain families as hosts, rarely to just 1 species; HEMP, TOBACCO, TOMATO, EGGPLANT, COTTON, and many legumes are parasitized by *Orobanche* species (Thieret 1969a). The inflorescences of some were eaten by Native Americans. (Greek: *onobas*, vetch, and *anchein*, to strangle, from the parasitic habit)

REFERENCES: Munz 1931; Achey 1933; Collins 1973.

1. Flowers solitary on 2–12 naked, erect, long (3–12 cm) pedicels from leaf axils; bracts absent at base of calyces; stems to 10 cm tall _____ ***O. fasciculata***
1. Flowers sessile in dense spikes or on pedicels shorter than the corollas; bracts 1(–2) at the base of calyces; stems 5–30(–50) cm tall _____ ***O. ludoviciana***

Orobanche fasciculata Nutt., (fascicled, clustered), CHESTER BROOMRAPE. Parasitic on various species including Asteraceae; lower portion of plant becoming subligneous to woody; calyces 5–8.5 mm long, the lobes triangular; corollas purple (rarely yellowish), to ca. 20(–30) mm long, with small semiorbicircular lobes. Bare limestone prairies; Montague Co. (Correll & Johnston, 1970); mainly w TX. Mar–May. [*O. fasciculata* Nutt. var. *subulata* Goodman]

Orobanche ludoviciana Nutt. subsp. ***multiflora*** (Nutt.) Collins, (sp. of Louisiana; subsp.: many-flowered), LARGE-FLOWER BROOMRAPE. Parasitic on members of Asteraceae; calyces 8–17(–19) mm long, exceeding the fruits, the lobes lance-linear to attenuate; corollas 15–35 mm long, pale purple to rose or yellow, the lobes obtusely rounded. Sandy areas, sandy prairies, and gypsum soils; Bell and Tarrant (Ft. Worth Nature Center) cos; also Dallas (S. Lusk, pers. comm.) and Hamilton (HPC) cos; widespread in TX. (Mar–)Apr–Jul(–Sep). Two varieties of *O. multiflora* separated as follows are here put in synonymy: calyces 12–17 mm long; corollas 25–35 mm long, the upper lip purple, 9–12 mm long (var. *multiflora*) vs. calyces 8–10 mm long; corollas 20–25 mm long, the lips rose purple or lighter, 5–7 mm long (var. *pringlei*). [*O. ludoviciana* Nutt. var. *multiflora* (Nutt.) Beck, *O. multiflora* Nutt. var. *multiflora*, *O. multiflora* Nutt. var. *pringlei* Munz] Thieret (1969a) indicated that Texas material of this species is perplexingly variable.

Orobanche ludoviciana subsp. *ludoviciana*, currently regarded as a Great Plains taxon, is known from w TX. It differs from subsp. *multiflora* in having the calyces shorter than to equaling the fruits and the corolla lobes triangularly acute.

OXALIDACEAE WOODSORREL FAMILY

— A medium-sized (775 species in 6 genera) family of some small trees and shrubs, but mostly herbs with tubers or bulbs; they occur from the tropics to a few in temperate areas; oxalates are usually accumulated and the leaves are often folded together at night. The family contains *Averrhoa carambola* L. (CARAMBOLA, STARFRUIT), a tropical Asian tree cultivated for its fruits; the fruits, which resemble giant fleshy *Oxalis* fruits, are now commonly available in supermarkets. (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: herbs with palmately compound, *clover-like* leaves and sour sap; flowers radially symmetrical, 5-merous, usually either yellow or ± pink; stamens united basally; fruit a capsule.

REFERENCES: Small 1907a; Robertson 1975.

OXALIS WOODSORREL

Ours annual or perennial herbs with sour sap due to the presence of oxalic acid; leaves basal or alternate, palmately compound, superficially resembling those of clover, leaflets 3, crescent-shaped, obovate, or obcordate, downwardly folded together at night or in bad weather; stipules small or absent; flowers in peduncled, axillary or basal, umbel-like cymes, closing at night and in bad weather, nodding before and after blooming; sepals 5; petals 5; stamens 10; pistil 5-carpellate; pedicels often reflexed in fruit; capsules narrowly cylindrical.

— A genus of 700 species, cosmopolitan in distribution, but especially South America and s Africa. Many species have tubers and are thus difficult to eradicate, weedy pests. A number of *Oxalis* species are cultivated as ornamentals and the tubers of one, the Peruvian *O. tuberosa* Molina, OCA, are eaten as a vegetable. The Irish SHAMROCK is said by some to be *O. acetosella* L.; however, it is more likely that either *Trifolium dubium* or *T. repens* is actually the SHAMROCK (Nelson 1991). The leaves of some species have an acidic sour taste and are eaten by some people; however, they possess soluble oxalates which are toxic to humans and can cause colic, coma, and even death in animals if consumed in large quantities (Lewis & Elvin-Lewis 1977). The leaves of *Oxalis* species exhibit sleep movements with the leaflets folding downward at dusk or in cloudy weather (Wills & Irwin 1961). (Greek name for sorrel, from *oxys*, acid, alluding to the taste of the leaves)

REFERENCES: Wiegand 1925; Eiten 1955, 1963; Shinners 1956d; Lourteig 1979; Turner 1994e.

There is considerable confusion regarding the North American yellow-flowered species of *Oxalis* section *Corniculatae* DC. both in terms of the number of taxa to recognize and the appropriate names to use. A variety of authors cited above have worked on the problem, but more work on this complex is clearly needed. Within nc TX there are at least two entities, 1) *O. corniculata* var. *corniculata*, a creeping plant with dark green-purplish leaves and visible stipules (fused with base of petioles), which is apparently found mainly in disturbed or cultivated areas around houses and landscapes, and 2) another entity with erect or sometimes creeping stems, lighter green leaves, and stipules inconspicuous to absent, which is widespread throughout nc TX. Turner (1994e) decided that this second entity (which has long gone under the name of *O. dillenii*) should be called *O. corniculata* var. *wrightii*. John Kartesz (pers. comm. 1997) has concluded that *O. dillenii* should be lumped with *O. stricta* and that *O. stricta* has nomenclatural priority. While we are unsure regarding the rank at which these two entities are best recognized, we do not want to cause further confusion by making additional combinations. As a result we are following J. Kartesz.

1. Plants stemless; leaves all basal; flowers pink to rose, violet, or pinkish purple (rarely white).
2. Under surface of leaflets and pedicels pubescent; stems arising from a woody crown, with rhizomes and root-tubers; introduced ornamental _____

O. articulata

2. Under surface of leaflets and pedicels glabrous; stems arising from a scaly bulb; native species.
 3. Leaflets shallowly notched (apical lobes not longer than main part of blade); tubercles mostly at tip of each sepal, usually distinct or sometimes confluent; throughout nc TX. *O. violacea*
 3. Leaflets deeply lobed, crescent-shaped (apical lobes longer than main part of blade); tubercles up to 6 in a mass at tip of each sepal; mainly in s 1/2 of nc TX *O. drummondii*
1. Plants leafy-stemmed; flowers yellow.
 4. Stems creeping and rooting at the nodes (but peduncles erect); leaves usually deep green with purplish pigmentation; stipules (which are fused to the petiole base) noticeable, together with base of petiole forming a short broad flange, often brownish or purplish *O. corniculata*
 4. Stems usually ascending or ± erect OR creeping; leaves light green; stipules obscure or absent *O. stricta*

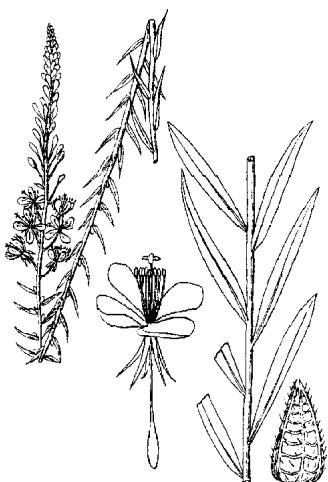
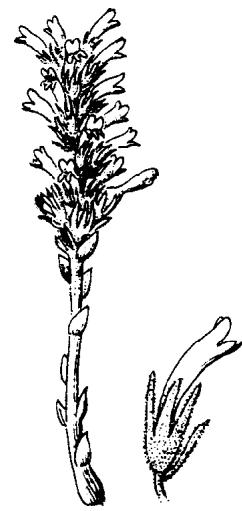
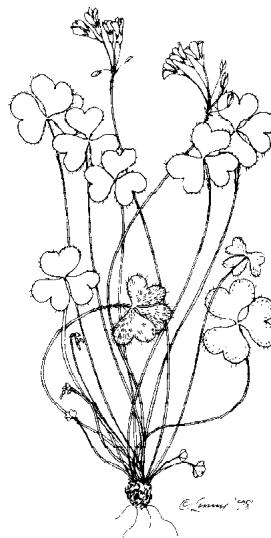
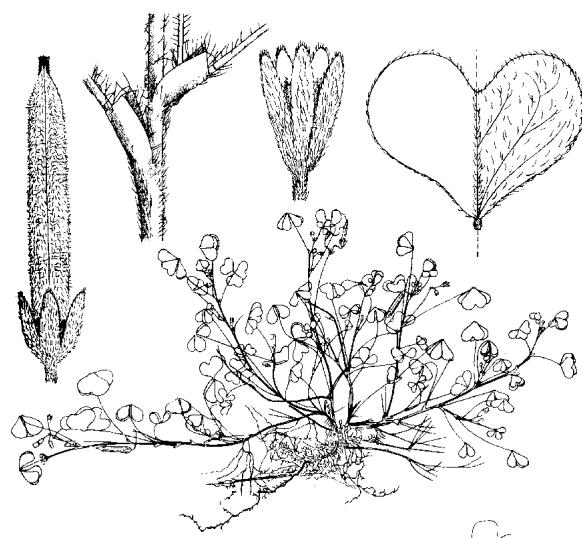
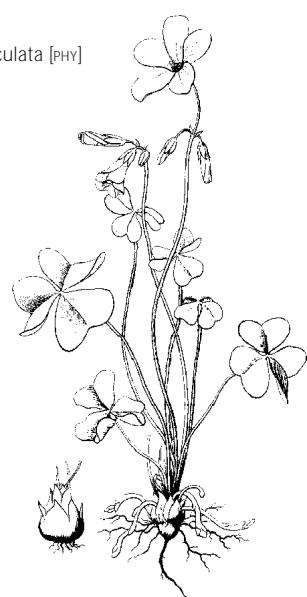
Oxalis articulata Savigny subsp. **rubra** (A. St.-Hil.) Lourteig, (sp.: articulated, jointed; subsp.: red), WINDOWBOX WOODSORREL. Perennial; leaflets broadly obocordate (rarely shallowly notched), red-spotted beneath toward the margins or sometimes over the entire surface; sepals with tubercles at tips; petals 10–15 mm long, pink to rose (rarely white), with veins sometimes darker; capsules 6–8 mm long. Cultivated and persists or spreads; Tarrant Co. (R. O'Kennon, pers. obs.); also se and e TX. Apr–May. Native of Brazil. [*O. rubra* A. St.-Hil.] 

Oxalis corniculata L., (horned), CREEPING LADIES'-SORREL, AGRITO, JOCOYOTE. Stems creeping and rooting at the nodes; peduncles usually from axils of leaves at rooted nodes; sepals without tubercles at tip; petals 4–8 mm long; capsules 8–20(–25) mm long. Disturbed or cultivated areas around houses and landscapes; Tarrant Co., also Fort Hood (Bell or Coryell cos.—Sanchez 1997); also se and s TX and Edwards Plateau. Radford et al. (1968) suggested many plants are found that are intermediate in growth habit between *O. corniculata* and *O. dillenii* (which we are treating as *O. stricta*); however, locally we have been able to distinguish the two. While *O. corniculata* is often considered native (e.g., Hatch et al. 1990), its place of origin is uncertain; it is possibly native to the Australasian region (Eiten 1963).

Oxalis drummondii A. Gray, (for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), DRUMMOND'S OXALIS. Glabrous perennial; bulb scales 3-ribbed; scapes to 30 cm tall, glabrous, with 4–8 flowers; sepals 5–7 mm long, the apical tubercles ± confluent; petals 15–23 mm long, pinkish purple; capsules 7–9 mm long. Sand or limestone soils, woodlands or prairies; Coryell, Dallas (*Reverchon*), and Somervell cos., also Brown Co. (HPC) and Fort Hood (Bell or Coryell cos.—Sanchez 1997); South TX Plains and Edwards Plateau, e to Gonzales Co., n to nc TX; endemic to TX. Flowering only in fall, with or rarely without leaves. 

Oxalis stricta L., (upright, erect), SHEEP-SHOWERS, GRAY-GREEN WOODSORREL, DILLEN'S OXALIS. Perennial without rhizomes to ca. 25 cm tall, flowering the first year; taproot slender or stout; stems erect to creeping and mat-forming; leaflets glabrous to pilose above; sepals 3–7 mm long, without tubercles at tip; petals 5–12 mm long; capsules 8–25 mm long, glabrous to canescent. Sandy open woods, clayey prairies, disturbed areas; widespread in TX. Apr–Jun, less freely to Oct. [*O. corniculata* L. var. *wrightii* (A. Gray) B.L. Turner, *O. dillenii* Jacq., *O. dillenii* var. *filipes* (Small) Eiten, *O. dillenii* var. *radicans* Shinners] While we are lumping the two species, *O. stricta* and *O. dillenii* have often been separated (e.g., Radford et al. 1968; Correll & Johnston 1970; McGregor 1986) using characters such as the following:

1. Inflorescence umbellate, rarely with an occasional cymose branch; septate hairs not present on any part of plant; capsules appressed-pubescent *O. dillenii*
1. Inflorescence cymose, the branches often only bracteate by abortion of the lateral flowers; septate hairs present on stems, petioles, or pedicels; capsules glabrous or with a few nonappressed septate hairs *O. stricta*

*Stenosiphon linifolius* [BB1]*Orobanche fasciculata* [HO1]*Orobanche ludoviciana* subsp. *multiflora* [ABR]*Oxalis articulata* subsp. *rubra* [HEA]*Oxalis corniculata* [PHY]*Oxalis drummondii* [HEA]*Oxalis stricta* [DIL]*Oxalis violacea* [GR1]

Oxalis violacea L., (violet), VIOLET WOODSORREL. Glabrous perennial; bulb scales 3-ribbed; scapes to 30(-40) cm tall, with 4-19 flowers; sepals 4-6 mm long; petals 14-20 mm long, violet to pinkish purple (rarely white); capsules 4-6 mm long. Sandy open woods, rarely in prairie clay; se and e TX w to West Cross Timbers. Late Mar-early May, repeating sparingly Sep-Oct. and then without leaves.

PAPAVERACEAE POPPY FAMILY

Ours herbaceous annuals or biennials (*Eschscholzia* can be perennial from a taproot), usually with milky or colored sap or latex (sap watery in *Eschscholzia*); leaves alternate and/or basal, from wavy margined to toothed, lobed, deeply pinnatifid, or dissected, prickly or not so; stipules absent; flowers terminal or axillary, usually solitary (can be cymosely arranged in *Eschscholzia*), conspicuous, radially symmetrical, perfect; sepals 2-3, enclosing the bud until anthesis and then falling; petals usually 4-6, often showy; stamens numerous, distinct; pistil 1, of 2-many carpels; ovary superior; fruit a capsule dehiscent by valves or pores.

— A small (230 species in 23 genera) mainly n temperate family; most are herbs or more rarely shrubs; usually with latex, often containing isoquinoline alkaloids. *Papaver somniferum* (OPIUM POPPY) produces a milky latex, that when dried is known as opium (see details under that species). A number of species are used as ornamentals including the widely cultivated, orange- or yellow-flowered *Eschscholtzia californica* Cham. (CALIFORNIA POPPY), various *Papaver* species (POPPY), and *Sanguinaria canadensis* L. (BLOODROOT). The family is related to the Fumariaceae and Lidén (1986) and Judd et al. (1994) included within the Papaveraceae those genera (*Corydalis* and *Fumaria* in nc TX) often separated into the Fumariaceae (e.g., Kartesz 1994; Jones et al. 1997; Kiger 1997a; Mabberley 1997; Stern 1997a). This lumping of the families was based on morphological and molecular analyses (e.g., Chase et al. 1993; Judd et al. 1994) which indicated the Fumariaceae was derived from within the Papaveraceae sensu stricto. However, a more recent study (Hoot et al. 1997 [1998]) supported the monophyly of both families; we are therefore recognizing both the Fumariaceae and the Papaveraceae. (subclass Magnoliidae)

FAMILY RECOGNITION IN THE FIELD: herbs with alternate and/or basal leaves and usually *milky or colored* juice; stipules absent; flowers with 2-3 sepals, radially symmetrical showy corollas with 4-6 petals, and *numerous* stamens; fruit a capsule either armed with prickles, dehiscing by pores located below a stigmatic disk, or linear and opening by valves.

REFERENCES: Ernst 1962; Gunn & Seldin 1976; Gunn 1980; Chase et al. 1993; Grey-Wilson 1993; Kadereit 1993; Judd et al. 1994; Kiger 1997a; Hoot et al. 1997 [1998].

1. Plants prickly; petals white, lavender, or yellow; capsules usually armed with prickles _____ **Argemone**
1. Plants not prickly; petals red, orange (sometimes with dark spot at base) or yellow (orange at base) to white or purple; capsules unarmed.
 2. Capsules obovate to subglobose, narrowed at base, < 3 times as long as wide, dehiscing through pores just below the flattened apical stigmatic disk; latex whitish _____ **Papaver**
 2. Capsules very long and narrow, linear, the sides ± parallel, > 10 times as long as wide, opening from above by 2 valves, eventually opening nearly to base OR opening from base; stigmatic disk absent; latex yellow or clear.
 3. Petals red (drying blackish) with a blackish spot at base OR infrequently pale orange with dark spot; leaves deeply pinnatifid with 4-8 pairs of lobes; foliage with sparse to dense covering of coarse whitish hairs; sepals distinct; receptacle neither hollow nor with a rim; latex yellow _____ **Glaucium**
 3. Petals yellow to orangish, usually with orange area at base; leaves pinnately dissected into numerous narrowly oblong or ± linear segments; foliage glabrous; sepals fused; receptacle hollow, cup-like, and closely surrounding the ovary base, with a prominent spreading rim; latex clear _____ **Eschscholzia**

ARGEMONE PRICKLY-POPPY

Usually glaucous prickly annuals or biennials, our species with pale yellow to reddish orange latex becoming brownish black upon drying; leaves sessile (except lowest), often clasping, toothed or pinnatifid, sometimes with a bluish cast, often mottled or lighter along the veins; flowers large and showy, in ours 4–12 cm in diam., cymose and crowded, or solitary; sepals 2–3, often prickly and with a conspicuous horn; petals (4–)6, in ours white, yellow, or lavender, falling early; fruit a valvate capsule, usually armed.

• A genus of 32 species (Ownbey 1997) of North and South America, the West Indies, and Hawaii. ☣ The leaves and seeds of *Argemone* species contain isoquinoline alkaloids (e.g., berberine, protopine, sanguinarine); poisoning has occurred when food grains became contaminated with PRICKLY-POPPY seeds (Kingsbury 1964; Hardin & Arena 1974); some have been used medicinally; others are cultivated as ornamentals. (Latin: *argema*, cataract of the eye, alluding to former medicinal use of these or other plants with this name)

REFERENCES: Ownbey 1958, 1997; Stermitz et al. 1969.

1. Petals yellow; fruits usually not densely prickly, the prickles usually all large and rather even-sized
(be careful not to confuse the prickly sepals, which form the covering of the flower buds, with
fruits) _____ ***A. mexicana***
1. Petals white or lavender; fruits usually densely prickly, usually with various sized prickles.
2. Petals lavender _____ ***A. polyanthemos***
2. Petals white (or flower color unknown).
3. Lower leaf surfaces minutely hispid or prickly between as well as on the primary and sec-
ondary veins; stems with closely spaced prickles; latex reddish orange when fresh _____ ***A. aurantiaca***
3. Lower leaf surfaces usually prickly only on the primary and secondary veins, sometimes
nearly smooth; stems usually with more widely spaced prickles or nearly smooth; latex yel-
low or reddish orange when fresh.
4. Largest prickles on capsules compound (with few to many smaller prickles arising from
basal portion of prickles), 15–35 mm long; latex reddish orange when fresh _____ ***A. aurantiaca***
4. Largest prickles on capsules simple, 4–10(–12) mm long; latex yellow when fresh.
5. Lower stem leaves divided to ca. 2/3 the distance to the midrib, the middle and upper
less so, the latter not greatly reduced nor widely separated, the upper strongly auricled-
clasping; all leaves very glaucous, thick and leathery; inflorescences leafy; sepal horns
6–10(–15) mm long _____ ***A. polyanthemos***
5. Lower, middle, and sometimes upper stem leaves divided ca. 4/5 the distance to the
midrib, the upper much reduced, widely spaced, slightly clasping; all leaves green or
rather glaucous, thin; inflorescences with reduced leafy bracts; sepal horns 4–6(–10)
mm long _____ ***A. albiflora***

Argemone albiflora Hornem. subsp. ***texana*** G.B. Ownbey, (sp: white-flowered; subsp: of Texas),
WHITE PRICKLY-POPPY. Annual or biennial to ca. 1.5 m tall; leaves usually entirely smooth (or with
a very few prickles) on the upper surface; capsules to ca. 4 cm long, the surface visible or some-
times partly obscured by prickles. Rocky or sandy soils, weedy areas; Dallas, Limestone, and
Somervell cos., also Brown (HPC), Grayson, Lamar, and Tarrant (Ownbey 1958) cos.; e TX w to
Grand Prairie, probably introduced w to Rolling Plains (Baylor Co.). Mar–Jul, sporadically later.
[*A. albiflora* Hornem. var. *texana* (G.B. Ownbey) Shinners]

Argemone aurantiaca G.B. Ownbey, (orange-red). Annual or biennial to ca. 0.8 m tall; capsules
4–5 cm long. Fields, pastures or hilly areas, often rocky or sandy substrates; McLennan Co., also
Bell Co. (Ownbey 1958) and Fort Hood (Bell or Coryell cos.—Sanchez 1997); endemic to sc TX n
to s part of nc TX; also to Taylor Co. to the w of nc TX. Mar–Aug. ☣

Argemone mexicana L., (of Mexico), DEVIL'S-FIG, YELLOW PRICKLY-POPPY, CARDO SANTO, CHICALOTE, MEXICAN-POPPY, THORN-APPLE. Annual to ca. 0.8 m tall; latex bright yellow; capsules 2.5–4.5 cm long. Fields, roadsides, and waste areas; sc TX n to at least Travis Co. (Ownbey 1958) just to the s of nc TX; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990). Mar–Apr. Native to West Indies and probably Central America and Florida. The yellow latex has been used to treat skin diseases (Schmutz & Hamilton 1979); the leaves and seeds are poisonous if eaten; poultry can also be poisoned by the vegetative parts and seeds (Hardin & Arena 1974; Hardin & Brownie 1993). ☣

Argemone polyanthemos (Fedde) G.B. Ownbey, (many-flowered). Annual or biennial to ca. 1.2 m tall; leaves without prickles on upper surface; petals white or lavender; capsules to ca. 3 cm long, usually less prickly than in *A. albiflora*, the surface clearly visible. *Argemone polyanthemos* appears to hybridize with *A. albiflora* subsp. *texana* where their ranges overlap in nc TX and many specimens can only be identified with reservations (Ownbey 1958). Ownbey (1958), however, concluded based on morphological and distributional grounds that the two warrant recognition as separate species. Rocky or sandy soils, prairies, fields, weedy areas; Brown, Clay, Hill, Palo Pinto, Parker, and Tarrant cos.; mainly w part of nc TX w and n through n TX; rare and apparently introduced eastward; according to Ownbey (1958), e to Bell, Dallas, and Fannin cos. Apr–Jul, sporadically later. [*A. intermedia* of authors, not Sweet, *A. intermedia* Sweet var. *polyanthemos* Fedde]

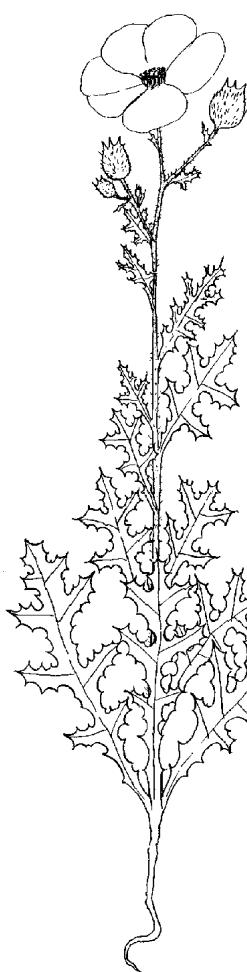
ESCHSCHOLZIA CALIFORNIA-POPPY, GOLD-POPPY

—A genus of 12 species of the w United States and nw Mexico (Clark 1997); some are cultivated as ornamentals. (Named for Johann F.G. von Eschscholtz, 1793–1831, Estonian physician and biologist who traveled with Chamisso [who named the genus] on the Romanzoff (or Kotzebue) Expedition to the Pacific Coast—Clark 1997)

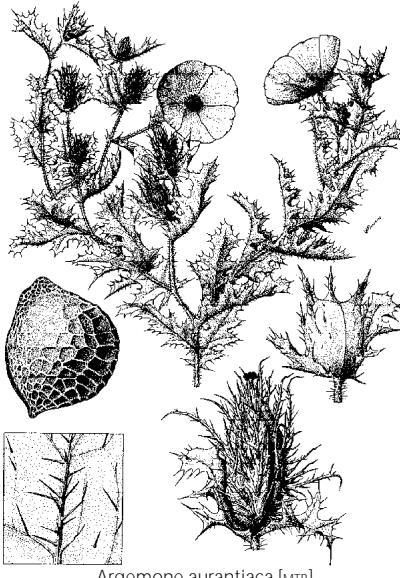
REFERENCES: Greene 1905; Lewis & Snow 1951; Ernst 1964b; Clark & Jernstedt 1978; Clark 1978, 1993, 1997.

Eschscholzia californica Cham. subsp. **californica**, (of California), CALIFORNIA-POPPY. Erect to spreading annual or perennial (from taproot) 5–60 cm tall, glabrous and sometimes glaucous; sap watery; leaves alternate, basal and cauline, 1–4 times deeply pinnately dissected into numerous narrowly oblong or ± linear segments; cotyledons usually 2-lobed; inflorescences usually 1-flowered (can be cymose); peduncles 5–15(–20) cm long; receptacles obconic, expanded, hollow, cup-like, and closely surrounding the ovary base, the spreading rim of the receptacular cup prominent; sepals 2, fused into a hood-like structure that is pushed off as a unit by the opening petals; petals 4, yellow to orangish, usually with orange area at base, 2–6 cm long; stamens numerous; capsules 3–9 cm long, dehiscent from the base. Widely cultivated as an ornamental; recently (May 1998) found escaped in an open, grassy, weedy area along railroad tracks; Tarrant Co. (Fort Worth); this is the first Texas collection of which we are aware (*Lipscomb* 3495, *Diggs & McCullough* May–Jun. Native from n Mexico through CA to s WA. This striking and morphologically variable species is the state flower of California (Clark 1993) and has become naturalized and weedy in various countries (Jepson 1925; Fuller & McClintock 1986) including New Zealand where it can form ± pure stands (Mabberley 1997). The latex is reported to be mildly narcotic and to have been used by Native Americans for toothache (Mabberley 1997); the entire plant is toxic to humans due to isoquinoline alkaloids which can depress respiration; thirteen different alkaloids have been found in this species (Fuller & McClintock 1986; Clark 1993, 1997). ☣

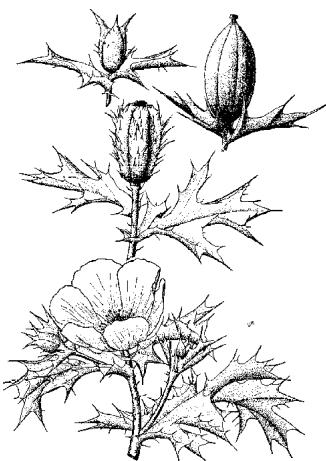
Eschscholzia californica subsp. *mexicana* (Greene) C. Clark, (of Mexico), MEXICAN GOLD-POPPY, AMAPOLA DE CAMPO, is native to the Trans-Pecos of Texas. It has the spreading rim of the receptacular cup often inconspicuous and the cotyledons unlobed.



Argemone albiflora subsp. texana [BT3]



Argemone aurantiaca [MTB]



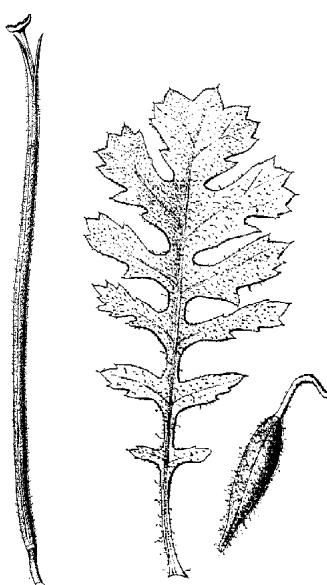
Argemone mexicana [MTB]



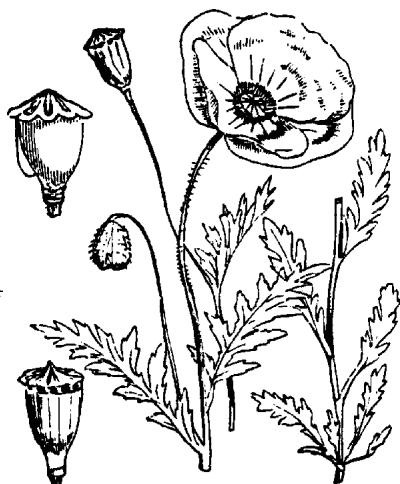
Argemone polyanthemos [MTB]



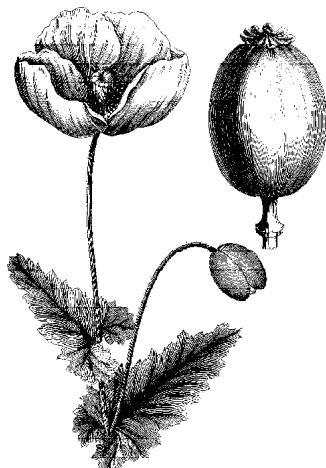
Eschscholzia californica [PAR]



Glaucium corniculatum [EN1]



Papaver rhoes [BEN]



Papaver somniferum [LAM]

GLAUCIUM HORNED-POPPY

— A genus of ca. 23 species of Europe and sw and c Asia; a number contain alkaloids. (Greek, *glaukos* gray-green or bluish gray, alluding to the color of the foliage)

REFERENCES: Kiger 1997b; Kirkpatrick & Williams 1998.

Glaucium corniculatum (L.) Rudolph, (horned), RED HORNED-POPPY. Annual or biennial herbs with yellow latex; foliage with sparse to dense covering of coarse whitish hairs; stems 30–90 cm tall; leaves 4–20 cm long, 1.5–8 cm wide, deeply pinnatifid with 4–8 pairs of lobes; rosette leaves petiolate, often withered by flowering time; cauline leaves sessile; flowers 1 per peduncle, terminal or in leaf axils; peduncles 1–3(–7) cm long; sepals 2; petals 4, red (drying blackish) with a blackish spot at base or infrequently pale orange with dark spot, broadly obovate, 2–3.5(–4) cm long; capsules linear, straight to slightly curved, 15–20 cm long, to 4–6 mm in diam., pubescent with appressed hairs. Weedy areas; Tarrant Co.; otherwise only known in TX from Garza, Gillespie, Kerr, San Saba, and Travis cos. Apr–May. Native of Europe. The first documented TX collection was by Toney Keeney in 1986 in San Saba Co.; it was listed for TX by Jones et al. (1997) with details reported by Kirkpatrick and Williams (1998). ☣

PAPAVER POPPY

Ours herbaceous annuals to ca. 1 m tall with milky latex; leaves with wavy margins to deeply pinnatifid; flowers solitary, axillary or terminal, often showy, perfect; peduncles usually > 10 cm long; sepals 2; petals 4(–6), showy; ours with subglobose to broadly ovoid or obovoid capsules dehiscing through pores just below the flattened apical stigmatic disk.

— A genus of 70–100 species (Kiger & Murray 1997) of Europe, Asia, s Africa, Cape Verde Islands, and w North America. Many species are cultivated as ornamentals or for their alkaloids (e.g., see OPIUM POPPY below); ☣ all should be considered potentially poisonous to livestock (Kingsbury 1964). (The ancient name, from Latin: *pappa*, milk, alluding to the milky latex)

REFERENCES: Duke 1973; Kiger 1973, 1975, 1985; Novák & Preininger 1987; Kiger & Murray 1997.

1. Stem leaves not cordate clasping; plants densely hirsute, not glaucous _____ ***P.rhoeas***

1. Stem leaves cordate clasping; plants glabrous, glaucous (= with a white or gray-silvery coating) _____ ***P.somniferum***

Papaver rhoeas L., (an old Greek name), CORN POPPY, FIELD POPPY, SHIRLEY POPPY, AMAPOLA. Leaves deeply pinnatifid with the divisions lobed or incised; corollas usually red with black towards center to purple or white, ca. 8 cm in diam.; capsules ovoid to subglobose to 2 cm long. Cultivated and escaped; Collin, Dallas, Denton, and Grayson cos., also Burnet, Comanche, Erath, and Mills cos. (HPC); Post Oak Savannah w to nc TX and s to Edwards Plateau. Apr–Jun. Native of Eurasia and n Africa. Poisonous alkaloids are present and have been responsible for poisoning in livestock (Burlage 1968; Kingsbury 1964). ☣ ☣

Papaver somniferum L., (sleep-bearing or producing), OPIUM POPPY, COMMON POPPY. Leaves with wavy margin or coarsely toothed or shallowly lobed; corollas white to red or purple, to 8 cm or more in diam.; capsules subglobose, 1.5–5(–9) cm long. Cultivated and escaped; Clay, Dallas, and Grayson cos., also Mills and Lampasas cos. (HPC); nc TX and Edwards Plateau. May–Jun. Native of Eurasia. The latex obtained by slitting the unripe capsules of this species is known as opium; it is the source of ca. 25 different alkaloids, including morphine and codeine, widely used as medicines and narcotics; overdoses can result in death due to respiratory failure. Morphine, unmatched by synthetics, is one of the best pain relievers known; unfortunately it is addictive. Heroin is synthetically derived from morphine by acetylation; it is even more addictive than morphine (Duke 1973; Schmutz & Hamilton 1979; Fuller & McClintock 1986; Mabberley 1987). This species has been used for thousands of years; Sumerian tablets ca. 6,000 years old that were

found in Mesopotamia mention the opium poppy (Talalaj & Talalaj 1991). Poppy seeds, used in baking and as birdseed, are also obtained from this species; while not narcotic, poppy seeds are reported to have caused positive drug tests. ☣ ☤

PASSIFLORACEAE PASSION-FLOWER FAMILY

☛ A medium-sized (575 species in 17 genera) family mainly of tropical to warm temperate areas, especially in the Americas; the family consists of vines, trees, shrubs, and herbs, often with alkaloids. It is thought to be related to the mainly tropical family Flacourtiaceae. The family also shares similarities with the Cucurbitaceae and Loasaceae. (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: herbaceous tendriled vines; flowers with an elaborate *fringed corona* overlaying a rather flat ring of petals and sepals; ovary superior, raised on a stalk surrounded by the united filaments.

REFERENCES: Killip 1938; Brizicky 1961a.

PASSIFLORA PASSION-FLOWER

Ours perennial climbing or trailing vines with axillary, simple tendrils; leaves alternate, simple, palmately 3-lobed, sometimes with petiolar glands; stipules slender; flowers axillary, solitary, on long, 1-flowered peduncles (these jointed and often bracted), open during the morning, (3-)5-merous, radially symmetrical, perigynous with floral cup, with a crown (= corona) of many, filament-like segments with united bases attached to floral cup inside the petals, the outer row equaling the petals in length, the inner rows shorter; stamens 5; filaments united into a sheath around a stalk (= gynophore) supporting the single pistil; fruits berry-like; seeds arillate.

☛ A genus of 430 species of tropical and warm areas of the Americas, Indomalesia, and the Pacific region. A number of species have edible fruits and several are cultivated commercially—the edible part is the pulpy aril; others are cultivated for their unusual, sometimes very showy flowers. Jørgensen et al. (1984) provided excellent illustrations of the complex variation in flowers of *Passiflora*. PASSION-FLOWER leaves are fed on by larvae of the butterfly family Heliconiidae; the heliconiids are distasteful to birds and other predators apparently due to substances obtained from the leaves (Howe 1975); *Passiflora* species have evolved a number of interesting anti-herbivore mechanisms including leaf shape variation (to escape detection by egg-laying female butterflies), extrafloral nectaries (to attract ants and thus discourage herbivores), egg mimics that apparently discourage egg-laying, hooked hairs, and toxins (Gilbert 1980). All four nc TX *Passiflora* species are fed on by *Dione [Agraulis] vanillae*, the Gulf Fritillary, a member of the Heliconiidae (Scott 1986). The common name, related to the scientific, was derived from Catholic missionaries in South America who used the flowers as a lesson on the Crucifixion of Jesus (e.g., 3 stigmas = 3 nails, 5 anthers = 5 wounds; corona = crown of thorns). (An adaptation of *flos passionis* a translation of *fior delle passioni*; the Italian name early applied to the flower from a fancied resemblance of its parts to the implements of the Crucifixion)

REFERENCE: Jørgensen et al. 1984.

1. Flowers large and showy; petals bluish lavender, 25–35 mm long; fruits to 50 mm long; leaf lobes finely toothed _____

P. incarnata

1. Flowers relatively small and inconspicuous; petals greenish yellow, 3–8 mm long, OR absent and sepals greenish; fruits 8–15 mm long; leaf lobes entire or with a few large, lobe-like teeth.

2. Petiolar glands absent; leaf blades shallowly to deeply lobed, the leaf lobes broadly triangular to ovate, oblong, obovate, or oblanceolate, usually blunt or rounded at apex (also often mucronate), the lower and upper surfaces both glabrous; petals present; peduncles 10–40 mm long; seeds with wrinkled transverse ridges; including species widespread in nc TX

3. Leaf blades lobed from ca. 1/4–1/2 their length; peduncles without bracts; sepals 5–10 mm long; outer corona filaments not knobbed at tips; widespread in nc TX **P. lutea**
3. Leaf blades lobed from (1/3)–1/2–2/3 their length; peduncles with small narrow bracts 1–3 mm long, these sometimes early deciduous; sepals 10–12 mm long; outer corona filaments knobbed at tips; known in nc TX only from the Lampasas Cut Plain **P. affinis**
2. Petiolar glands present and obvious at juncture of petiole and blade; leaf blades deeply lobed, the leaf lobes narrow, usually linear to narrowly oblong or narrowly lanceolate, acute to acuminate at apex, the lower surfaces glabrous but the upper surfaces with pubescence; petals absent; peduncles 3–8 mm long; seeds reticulate; rare in nc TX **P. tenuiloba**

Passiflora affinis Engelm., (similar, related), BRACTED PASSION-FLOWER. Vine; leaf blades 2–10 cm long, 3–14 cm wide, sometimes similar to those of *P. lutea*, but usually more deeply lobed, with a few ocelli (small yellowish dots that apparently act as egg mimics and thus discourage egg-laying—Gilbert 1980); petioles 1–3.5 cm long, glandless; peduncles 1–3 cm long, with remote bracts; petals linear, narrower than sepals; corona filaments purplish near base; fruits subglobose, 8–10 mm long, black-purple when ripe; seeds ca. 3 mm long. Stream bottoms in limestone areas; Bell Co. (Fort Hood—Sanchez 1997); Edwards Plateau n to s Lampasas Cut Plain. Jun–Aug. /102

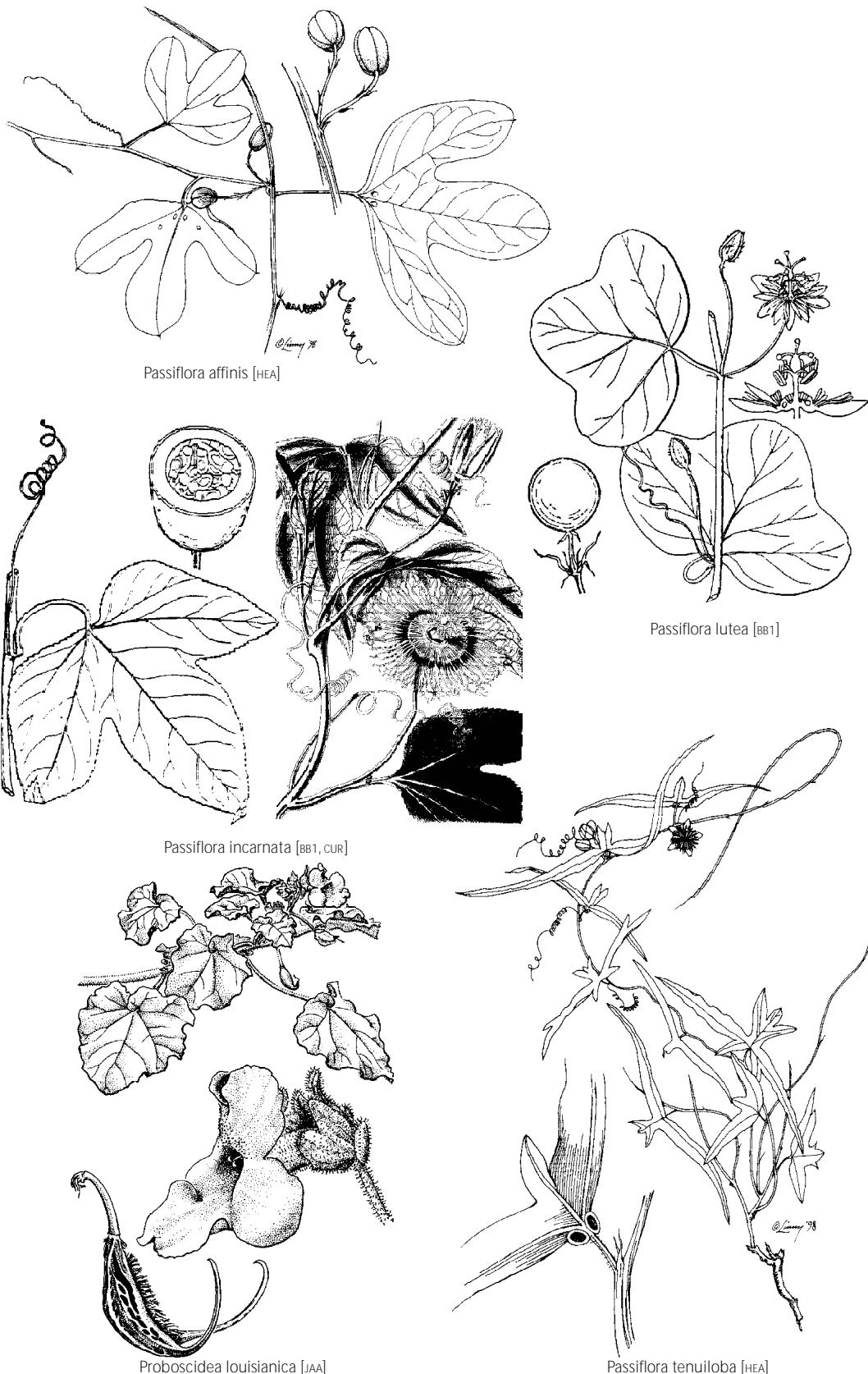
Passiflora incarnata L., (flesh-colored), MAYPOP PASSION-FLOWER, PASIONARIA, APRICOT VINE. Vine to several m long; leaf blades 6–15 cm long, 7–15 cm wide, pubescent beneath, the lobes finely toothed, pointed; petioles to 8 cm long, with 2 glands near juncture with leaf blades; petals bluish lavender, rarely white; fruits ovoid to subglobose, orange-yellow when ripe; arils edible; seeds 4–5 mm long. Stream bottoms, fencerows, and disturbed ground; Cooke, Dallas, Grayson, Henderson, Kaufman, and Rockwall cos.; se and e TX w to East Cross Timbers. Jun–Aug. This species was long cultivated by Native Americans for the edible fruits (arils) (Mabberley 1987). /102

Passiflora lutea L., (yellow), YELLOW PASSION-FLOWER. Vine to ca. 5 m long; leaf blades 3–7 cm long, 2–10 cm wide, usually wider than long; petioles to 5 cm long, glandless; peduncles 1.5–4 cm long, without bracts; peduncles to 100 mm long; petals ± linear, narrower than sepals; fruits globose-ovoid, 8–15 mm long, black-purple when ripe; seeds 4.5–5 mm long. Stream bottom or hillside woods, climbing into trees; Bell, Dallas, Grayson, McLennan, and Montague cos., also Lamar (Carr 1994), Hood, Somervell, and Tarrant (R. O'Kennon, pers. obs.) cos.; se and e TX w to West Cross Timbers, also Edwards Plateau. Jun–Jul. [*P. lutea* var. *glabriflora* Fernald]

Passiflora tenuiloba Engelm., (with narrow, slender lobes), SPREAD-LOBE PASSION-FLOWER, BIRD-WING PASSION-FLOWER. Vine; glands at juncture of petiole and leaf blades saucer-shaped, sessile, 1–1.2 mm in diam.; leaf blades of 2 different forms: 1) with 2 long narrow lateral lobes and a much shorter midlobe; 2) a western form to the w of nc TX with the lobes themselves lobed, the leaf blades thus appearing to have up to 7 lobes; sepals 6–10 mm long, ca. 2 mm wide, greenish; fruits globose, 8–15 mm in diam., black when ripe; seeds 3–4 mm long. Typically in open limestone areas, generally prostrate, sometimes climbing into low shrubs; Killip (1938) cited a Reverchon collection from Dallas Co., also known from Travis Co. just s of nc TX; mainly Edwards Plateau to s TX and Trans-Pecos. Apr–Oct. Killip (1938) indicated that the leaf blades have a few ocelli (small yellowish dots that apparently act as egg mimics and thus discourage egg-laying—Gilbert 1980) /102

PEDALIACEAE SESAME FAMILY

—A small (85 species in 17 genera) family of herbs and shrubs of tropical and warm areas, especially coastal and arid regions. The family includes the Old World tropical *Sesamum*



indicum L., SESAME, SESAMUM, GINGELLY, the source of sesame seeds and oil. *Proboscidea* and close relatives are sometimes segregated as the Martyniaceae, a family of 3 genera and 13 species of New World herbs (e.g., Hutchinson 1979; Bretting & Nilsson 1988). Family name from *Pedalium*, a monotypic genus of the Old World tropics based on *P. murex* L. whose leaves are used as a vegetable and seeds medicinally. (Name possibly from Greek: *pedalion*, *pedalium*, a rudder or kind of plant) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is a *glandular-pubescent* herb with large, tubular-cylindric-campanulate corollas and unique capsules which split and have 2 *conspicuous curved horns*

REFERENCES: Thieret 1977a; Bretting & Nilsson 1988; Manning 1991.

PROBOSCIDEA DEVIL'S-CLAW, UNICORN-PLANT, CINCO LLAGAS

— A genus of 9 species of warm areas of the Americas; some are cultivated as ornamentals or for their edible fruits. (Greek: *proboscis* snout, alluding to the long curved beak of the fruit)

REFERENCES: Thieret 1976; Bretting 1983.

Proboscidea louisianica (Mill.) Thell., (of Louisiana), COMMON DEVIL'S-CLAW, UNICORN-PLANT, COW-CATCHER, RAM'S-HORN, MULE-GRAB. Low, viscid-pubescent, ill-scented annual densely covered with glandular hairs; leaves alternate or opposite; leaf blades ovate to suborbicular on densely short pubescent petioles to 20 cm long, cordate basally; flowers long-pedicelled, in terminal racemes with small, inconspicuous bracts; sepals 5, united, unequal; corollas to 55 mm long, 5-lobed and somewhat bilabiate, tubular-cylindric for 2–5 mm, then becoming broadly campanulate, dull white to lavender, mottled purple and yellow inside; fertile stamens 4, didynamous; pistil 2-carpellate; fruit a capsule to 10 cm long, 2–3 cm thick, at maturity splitting to form 2 curved horns sharply curved at ends to form hooks, often dispersed by hooking around the ankles of small livestock. Loose sandy soils; widespread in TX. May–Sep. [*Martynia louisianica* Mill.] The fruits get tangled in the wool of sheep and can interfere with shearing; they have even been known to clamp shut the jaws of sheep resulting in starvation; however, the young pickled fruits are edible and the plants are commercially cultivated for this purpose (Thieret 1977a; Mabberley 1987). /104

PHRYMACEAE LOPSEED FAMILY

— A monotypic family native to Asia and North America. *Phryma* has been placed in the Verbenaceae by a number of authorities (e.g., Cronquist 1981; Kartesz 1994). However, Chadwell et al. (1992) concluded that when a variety of characters including pollen morphology are considered, a position near, but not within subfamily Verbenoideae is best supported. Chadwell et al. (1992) further indicated that definitive familial placement of *Phryma* cannot be determined until the broader problem of family delimitation in the Lamiales as a whole is addressed. In a recent molecular study of Labiateae and Verbenaceae (Wagstaff & Olmstead 1997), *Phryma* "... emerges as a distinct lineage, not clearly associated with any other group within the Lamiales s.l." In order to emphasize its distinct phylogenetic position, we are recognizing it at the family level. (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: the only species is a Verbenaceae-like herb with opposite leaves and small flowers in spike-like inflorescences; in fruit the calyces (enclosing the fruits) are *reflexed and parallel* to the inflorescence axis.

REFERENCES: Thieret 1972; Chadwell et al. 1992; Wagstaff & Olmstead 1997.

PHRYMA LOPSEED

— A genus of a single species native to Asia (India to Japan) and e North America; this disjunct

distribution pattern is discussed under the genera *Campsis* (Bignoniaceae) and *Carya* (Juglandaceae). *Phryma* is sometimes divided into an Asian species and a North American species but the two are distinguished by only minor differences such as length of the upper calyx lobes, shape of the upper lip of the corollas, and pubescence (Hara 1969); Hara indicated that this species "... must be of very ancient origin." (Derivation of generic name unexplained by Linnaeus)

REFERENCE: Hara 1969.

Phryma leptostachya L., (slender-spiked), LOPSEED. Pubescent or glabrous, perennial herb 30–100 cm tall; leaves opposite, the median ones rather long-petioled, the upper ones shorter-petioled; leaf blades thin, ovate to lanceolate, (3–)5–16 cm long, 3–10 cm wide, irregularly coarsely toothed; flowers minutely bracted, opposite, in slender, long-peduncled, spike-like inflorescences terminating stem and upper, axillary, leafless branches; pedicels < 1 mm long; calyces with 3 linear, acuminate upper teeth as long as the tube (2–3 mm), and 2 shorter (0.3–0.5 mm), wide, lower teeth; in fruit the calyces are closed, become reflexed, and lie parallel to the inflorescence axis; corollas 2-lipped, ca. 8 mm long, purplish to light lavender, whitish inside, the lower lip much larger and lighter in color; stamens 4; pistil 1; style 1; stigma 2-lobed; fruits achenes or achene-like, enclosed in calyces. Stream bottom woods; Bell, Dallas, Grayson, Lamar, and Tarrant cos., also Fort Hood (Bell or Coryell cos.—Sanchez 1997); e TX w to nc TX. Jun.

PHYTOLACCACEAE POKEWEED FAMILY

Ours annual or perennial herbs, sometimes with woody base; leaves alternate, simple, entire; flowers in axillary or terminal, peduncled, leafless racemes; calyces rotate, small, white to greenish, pink, rose, or reddish purple; petals absent; fruit in ours a berry.

— A small (65 species in 18 genera) mainly tropical and warm area family, especially of the Americas; usually herbs but also shrubs, trees, or woody climbers. Like most Caryophyllidae, they produce betalain pigments rather than anthocyanins (Cronquist & Thorne 1994). Some are used medicinally, as sources of dye, or as potherbs. Molecular evidence (Downie & Palmer 1994) indicated the family is polyphyletic and that *Phytolacca* and *Rivina* are related to Nyctaginaceae. (subclass Caryophyllidae)

FAMILY RECOGNITION IN THE FIELD: herbs with alternate, simple, entire leaves and usually drooping, terminal or axillary racemes of small flowers that are white to greenish or variously colored with some reddish pigmentation; fruit a *brightly colored* berry; foliage usually rather succulent, often strongly reddish- or purplish-tinted and/or with a bloom.

REFERENCES: Thieret 1966; Nowicke 1969; Brown & Varadarajan 1985; Rogers 1985; Rohwer 1993b; Behkne & Mabry 1994; Downie & Palmer 1994.

1. Fruits dark purple, 6–10 mm in diam.; sepals 5; stamens 10; plants usually much more than 1 m tall, coarse annuals _____

Phytolacca

1. Fruits red or orange, 2–3.5 mm in diam.; sepals 4; stamens 4; plants usually < 1 m tall, perennials from a woody root, sometimes with woody stem-base _____

Rivina

PHYTOLACCA POKEWEED

— A genus of 25 species native to tropical and warm regions of the world; species vary from trees to shrubs or herbs, and typically possess alkaloids; ~~some~~ some are poisonous, while a number are used as vegetables or as cultivated ornamentals. (Greek: *phyton*, plant, and either Latin: *laccā*, derived from the Hindi *lakh*, for the dye obtained from the lac insect (Tveten & Tveten 1993), or French: *lac*, lake, from the crimson (lake) color of the fruits)

Phytolacca americana L., (of America), POKEWEED, POKEBERRY, POKE, INKBERRY. Plant to 3 m tall;

stems reddish or purplish; leaf blades lanceolate or elliptic-lanceolate, to 25 cm long and 10 cm wide; flowers perfect; sepals petaloid, white or pink, 2–3 mm long, persistent in fruit; fruits usually of 10 carpels; seeds 1 per carpel, shiny, glabrous, somewhat flattened. Stream bottom woods and thickets or occasionally in disturbed ground; throughout much of TX. Late Jun–Sep. The word “poke” is possibly derived either from an American Indian word *pak*, meaning blood, in reference to the fruits, from which they obtained a brilliant purplish red dye (Core 1967) or from *pocanor puccoon* probably Algonquin for a plant that contains dye (Rogers 1985). The fruits are dispersed by birds which are presumably attracted by the bicolor displays—the reddish stems and preripe fruits contrasting with the black ripe fruits (Willson & Thompson 1982; McDonnell et al. 1984). All parts of the plant should be considered poisonous and potentially lethal, especially the roots, purple rind of the stem, and seeds; however, the very young leaves and shoots are used by some as a cooked vegetable (“poke salat” or “sallet”—Peacock 1982; Rogers 1985) after proper preparation including several boilings; the boiled water is toxic. Toxins include phytolaccatoxin and related triterpenoid saponins; an additional mitogenic (= causing cell division) compound, apparently a type of protein lectin, is present resulting in some sources recommending that the plant should not be eaten. Further, if the plant is handled, the mitogens can be absorbed through skin abrasions, potentially causing serious blood aberrations; the plant **should not be handled** except with gloves. A dye, used to color ink, wine, and sweets, has been obtained from the fruits (Hardin & Arena 1974; Lewis & Elvin-Lewis 1977; Lampe & McCann 1985; Rogers 1985; Mabberley 1987; Turner & Szczawinski 1991). ☣

RIVINA PIGEON-BERRY

♣ A monotypic genus native from the s U.S. to the American tropics. Brown and Varadarajan (1985) argued that *Rivina* and related taxa should be segregated as the family Petiveriaceae. (Named for A.Q. Rivinus, 1652–1723, German botanist)

Rivina humilis L., (low-growing, dwarf), PIGEON-BERRY, ROUGEPLANT, BLOODBERRY, CORALITO. Plant to ca. 85 cm tall; leaf blades ovate to elliptic-ovate or rhombic, to 15 cm long and 9 cm wide; sepals whitish, greenish, or rose to reddish purple, 2–2.5 mm long; ovary unilocular with a solitary basal ovule; seed 1 per fruit, hairy (Thieret 1966). Stream bottom woods and thickets, chiefly in limestone areas; throughout much of TX, rare e. Jun–Oct. Cultivated as an ornamental; the fruits have been used as a source of a red dye (Mabberley 1987); the leaves and roots are poisonous and the fruits have been implicated in non-fatal poisonings (Morton 1982; Lampe & McCann 1985). ☣

PLANTAGINACEAE PLANTAIN FAMILY

♣ A small (275 species in 3 genera), cosmopolitan (more temperate and tropical montane) family of wind-pollinated, usually scapose herbs or a few shrubs; the family is of little economic importance except several are problematic weeds. Based on molecular data, Reeves and Olmstead (1993) indicated that the Plantaginaceae should be considered part of the Scrophulariaceae. (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: herbs with rosettes of basal, ± parallel-veined leaves and leafless peduncles terminated by slender spikes of small, densely packed, membranous, 4-merous flowers.

REFERENCES: Rosatti 1984; Reeves & Olmstead 1993.

PLANTAGO PLANTAIN, RIBWORT

Ours small annual or perennial scapose herbs; leaves basal, subsessile or petioled; blades entire, toothed or pinnately lobed; flowers bracted, in heads or spikes terminating leafless, simple pe-

duncles; sepals 4 or 3 (2 abaxial sepals fused to form 1); corollas thin, dry, and membranous, white or yellowish, 4-lobed, the lobes varying from erect to reflexed; stamens 4 or 2, often exserted; pistil 1; fruit a circumscissile capsule.

• A cosmopolitan genus of ca. 270 species of herbs and a few shrubs including many weeds. The seeds of some are mucilaginous when wet and are efficient laxatives—i.e. *P. afra* L. (PSYLLIUM), native from the Mediterranean to India. Because of the small size of the flowers and the importance of pubescence characters, a hand lens is often necessary for positive identification of *Plantago* species. (The Latin name, from *planta*, footprint or sole of the foot, alluding to the leaves of *P. major* that are broad and flat and pressed to the ground)

REFERENCES: Shinners 1950d, 1967; Bassett 1966, 1973; Bassett & Crompton 1968; Rahn 1974; R. Hoggard 1999.

1. Leaves deeply pinnately lobed _____ ***P. coronopus***
1. Leaves entire or with few teeth or shallow lobes.
 2. Floral bracts scarious-margined or wholly herbaceous, with herbaceous, acute or acuminate tips formed by the midvein, without long-acuminate, scarious tips; abaxial 2 sepals not fused, each with 1 midvein (thus 4 sepals present); plants usually annual (except *P. rugelii* and *P. major*).
 3. Sepals and bracts glabrous.
 4. Leaf blades less than 4 mm wide, linear to filiform, inconspicuous; stamens 2: plants annual.
 5. Corolla lobes erect in age (look at tip of capsule): seeds 10–30 per capsule, somewhat asymmetrical, 0.6–0.8 mm long _____ ***P. heterophylla***
 5. Corolla lobes often becoming conspicuously reflexed in age: seeds (2–)4–(8) per capsule, symmetrical, (0.5–)0.8–1.7 mm long _____ ***P. elongata***
 4. Leaf blades 3–13 cm wide, broadly elliptic to ovate or ovate-cordate, large and conspicuous; stamens 4: plants perennial.
 6. Capsules circumscissile below middle, the upper part ca. 2 times as long as lower, (2.1–)2.5–5 mm long; petioles purple at least at base; floral bracts usually narrowly lance-triangular; sepals acute, (1.5–)2–3.5 mm long; seeds 4–10 per capsule _____ ***P. rugelii***
 6. Capsules circumscissile near middle, 2.2–2.6 mm long; petioles green, rarely with slight purplish tinge; floral bracts usually broadly ovate; sepals rounded, 1.6–1.8 mm long; seeds 10–25 per capsule _____ ***P. major***
 3. Sepals and bracts pubescent or pilose.
 7. Hairs on middle part of flowering stem (= peduncle) spreading at right angles.
 8. Bracts at base of spike keeled and clasping: corolla lobes usually erect and folded together before and after flowering, 0.8–3 mm long; plants usually not turning dark on drying.
 9. Bracts 1–2.8 mm long; abaxial sepals (2 on side away from axis) rounded at apex, without green midvein extending beyond scarious margins; corolla lobes 0.8–2.3 mm long; mature seeds yellow-brown to black, (0.8–)1–1.7 mm long, without a transparent margin _____ ***P. virginica***
 9. Bracts (2.2–)2.8–5.2(–5.4) mm long; abaxial sepals acuminate at apex, with green midvein extending beyond scarious margins; corolla lobes 2–3 mm long; mature seeds red to reddish black; (1.7–)2–2.8 mm long, with pronounced transparent margin _____ ***P. rhodosperma***
 8. Bracts at base of spike neither keeled nor clasping: corolla lobes at first erect, spreading to reflexed during and after flowering, (2.7–)3–4 mm long; plants usually turning noticeably dark on drying _____ ***P. helleri***
 7. Hairs on middle part of flowering stem closely ascending or appressed.
 10. Floral bracts triangular-ovate, broadly scarious-margined except at apex (each scarious margin 1/4–1/3 entire width of bract), never conspicuous at a glance.

11. Leaf blades glabrous on upper surface, with thin pubescence on lower surface; corolla lobes cordate-ovate, ca. 0.5 mm longer than wide, 2.5–3 mm long _____ **P. wrightiana**
11. Leaf blades woolly-pubescent on upper and lower surfaces; corolla lobes suborbicular, ca. as wide as long, to ca. 2–2.5 mm long _____ **P. hookeriana**
10. Floral bracts narrowly triangular-lanceolate to linear-lanceolate, narrowly scarious-margined at base, otherwise herbaceous, inconspicuous OR sometimes conspicuously elongate at a glance.
12. Leaf blades glabrous on upper surface; bracts in middle of spike 3–6 times as long as the calyces; plants usually turning noticeably dark on drying _____ **P. aristata**
12. Leaf blades densely pubescent on upper surface; bracts in middle of spikes shorter than or up to 4 times as long as the calyces; plants usually not turning dark on drying _____ **P. patagonica**
2. Floral bracts scarious except at base and in center, ovate and abruptly narrowed to long-acuminate, scarious tip extending beyond the midvein; abaxial 2 sepals fused to form 1 with 2 veins (thus apparently only 3 sepals present); plants perennial _____ **P. lanceolata**

Plantago aristata Michx., (bearded, with an awn), BUCKTHORN, BOTTLEBRUSH PLANTAIN, BRACTED PLANTAIN. Annual to ca. 25 cm tall; spikes very dense, to 15 cm long but usually much shorter, 6–10 mm thick (excluding bracts); floral bracts narrow, elongate, conspicuous. Sandy open woods; se and e TX w to West Cross Timbers. May–Jun.

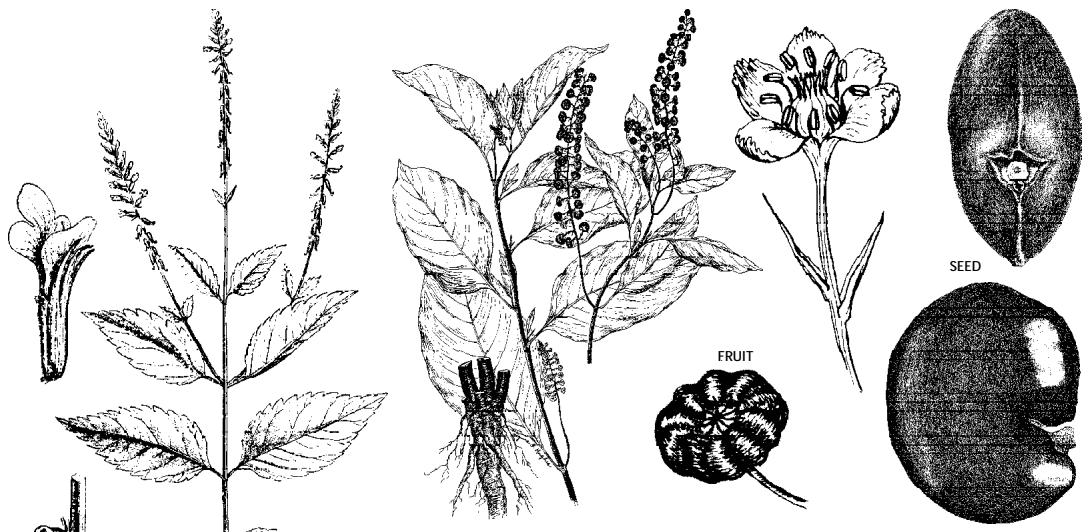
Plantago coronopus L., (presumably named for the resemblance of the leaves to those of *Cornopous* swine cress, in the Brassicaceae), BUCK-HORN PLANTAIN. Pubescent annual or biennial; leaves closely spreading on the ground or ascending, linear to lanceolate in outline, 4–25 cm long, with spreading-ascending, acute, ± linear lobes; inflorescences sometimes numerous (up to 65 observed), 5–50 cm long including the peduncle terminated by a narrowly cylindric, dense spike to ca. 12.5 cm long; bracts usually not surpassing the flowers, broadly scarious-margined at base, the keel prolonged into an acuminate tip; petals acute. Landscape weed or in weedy areas; Tarrant Co., this collection (O'Kennon 14221, 1998) is the first report for Texas (O'Kennon et al. 1998). Late Apr–Jul? In addition to the conspicuously different leaves, this species differs from all other PLANTAINS occurring in Texas in having short hairs on the corolla tubes and 3- or 4-locular capsules; other members of the genus occurring in the state have the corolla tubes glabrous and 2-locular capsules.

Plantago elongata Pursh, (elongate), SLENDER PLANTAIN. Glabrous annual, 2–18 cm tall; leaves narrowly linear, entire; spikes loosely flowered with part of axis often exposed, 2–10 cm long. Damp or disturbed bare ground; Denton, Grayson, and Tarrant cos., also Comanche Co. (HPC); mainly se and e TX w to Rolling Plains and Edwards Plateau. Apr–May. [*Plantago pusilla* Nutt.]

Plantago helleri Small, (for Amos Arthur Heller, 1867–1944, Pennsylvania botanist and plant collector of w America), CEDAR PLANTAIN. Annual; flowering stalks with conspicuous, long, spreading hairs; spikes short (to ca. 4 cm long), very thick (8–12 mm); corolla lobes conspicuous. Limestone outcrops; Johnson and Tarrant cos. w and sw to w TX. Apr–Jun.

Plantago heterophylla Nutt., (various-leaved), SLIM-SPIKE PLANTAGO. Annual similar to *P. elongata*. Open ground, roadsides, often sandy soils; Burnet, Dallas, Denton, Hopkins, and Hunt cos., se and e TX w to nc TX, also Edwards Plateau. Mar–May.

Plantago hookeriana Fisch. & C.A. Mey., (for William Jackson Hooker, 1785–1865, director of Kew Gardens), TALLOW-WEED, HOOKER'S PLANTAIN. Annual similar to *P. wrightiana*; leaves linear to narrowly oblanceolate; spikes dense, to 12 cm long and to ca. 8 mm thick. Sandy, gravelly or rocky open areas; Bell and Henderson cos.; se and e TX w to the Trans-Pecos, mainly in the s part of TX. Apr–Jul.

*Phytolacca americana* [REE, SID]*Phryma leptostachya* [EN2]*Rivina humilis* [BT3, FAW, SID]*Plantago aristata* [BAS]*Plantago coronopus* [GLE]*Plantago elongata* [BAS]

Plantago lanceolata L., (lanceolate, lance-shaped), BUCKHORN, BUCKHORN PLANTAIN, RIBBON-GRASS, ENGLISH PLANTAIN, RIBWORT, RIB-GRASS, RIPPLE-GRASS. Perennial or biennial; leaves narrowly to broadly lanceolate, prominently ribbed lengthwise; spikes very dense, short and ovoid when young, elongating and cylindric, 1.5–5(–8) cm long, to ca. 10 mm thick. Lawn weed; Dallas and Grayson cos, also Brown Co. (HPC); introduced in scattered localities in TX. Apr–May. Native of Europe. ☎

Plantago major L., (greater, bigger), DOORYARD PLANTAIN, COMMON PLANTAIN, WHITEMAN'S-FOOT, BROAD-LEAF PLANTAIN, LANTEN, GREAT PLANTAIN. Perennial; leaves petioled, large, to 30 cm long including petiole, ovate to elliptic, usually strongly ribbed; spikes loosely flowered to dense, typically dense above, the axis often exposed below, to 22 cm long and to ca. 8 mm thick. Low areas; Dallas Co.; introduced in scattered localities in TX. May–Oct. Native of Europe. ☎

Plantago patagonica Jacq., (of Patagonia), BRISTLE-BRACT PLANTAIN. Annual, gray- or yellowish pubescent with woolly or cottony hairs; corolla lobes 1–2 mm long; spike (excluding bracts) 4–8 mm thick. Sandy or gravelly stream bottoms, roadsides, and fields; nearly throughout TX. Apr–Jun. [*Plantago patagonica* Jacq. var. *breviscapa* (Shinners) Shinners, *Plantago patagonica* Jacq. var. *gnaphaloides* (Nutt.) A. Gray, *Plantago patagonica* Jacq. var. *spinulosa* (Decne.) A. Gray, *P. purshii* Roem. & Schult., *P. purshii* Roem. & Schult. var. *breviscapa* Shinners, *P. purshii* Roem. & Schult. var. *spinulosa* (Decne.) Shinners] A variable species previously divided into a number of varieties.

Plantago rhodosperma Decne., (red-seeded), TALLOW-WEED, RED-SEED PLANTAIN. Annual; leaves frequently toothed or lobed; spikes dense, to 20 cm long and to ca. 10 mm thick. Prairies, pastures, roadsides, and disturbed areas; throughout TX but mainly Blackland Prairie westward. Apr–May.

Plantago rugelii Decne., (for its discoverer, Ferdinand Rugel, 1806–1879, German-born planter and explorer in se U.S.), COMMON PLANTAIN, RUGEL'S PLANTAIN. Perennial similar to *P. major*; leaves petioled, large, broadly ovate to elliptic, to 13 cm wide, prominently and usually 5-ribbed; spikes slender, loosely flowered to dense, the axis sometimes visible below, to 22(–50) cm long and to ca. 8(–12) mm thick. Low, moist disturbed areas; Grayson and Lamar cos, also Dallas Co. (Lipscomb 1978b); also far e TX. Jun–Sep.

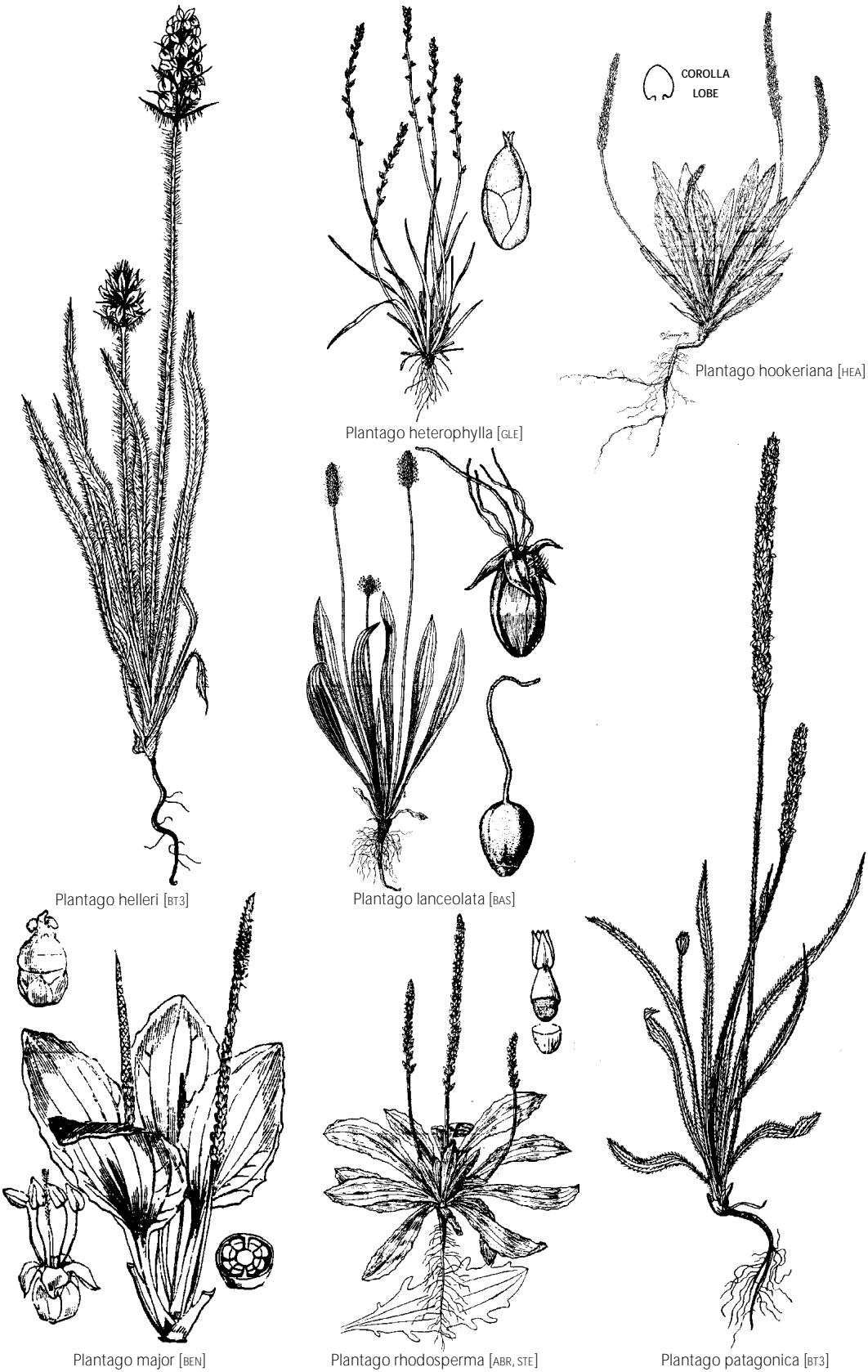
Plantago virginica L., (of Virginia), PALE-SEED PLANTAIN, DWARF PLANTAIN, HOARY PLANTAIN. Pubescent annual similar to *P. rhodosperma*, 5–30 cm tall; leaves lanceolate to elliptic, entire or rarely toothed; spikes dense to interrupted, to 20(–25) cm long and to ca. 8 mm thick. Sandy open woods, roadsides, and fields; se and e TX w to East Cross Timbers, also Edwards Plateau. Mar–May.

Plantago wrightiana Decne., (for Charles Wright, 1811–1885, TX collector), WRIGHT'S PLANTAIN. Annual, 12–40 cm tall, pubescent; leaves linear-lanceolate; spikes dense, to 10 cm long and to ca. 9 mm thick; corollas conspicuous. Rocky or sandy open ground; Blackland Prairie s and w to w TX. Late Apr–Jun. [*P. hookeriana* Fisch. & C.A. Mey. var. *nuda* (A. Gray) Poe]

PLATANACEAE SYCAMORE OR PLANETREE FAMILY

☛ A very small monogeneric family of ca. 8 species (Kaul 1997) of wind-pollinated trees often with visually striking bark; several are widely cultivated; with the exception of 3 Old World species, all are North American (Kaul 1997). (subclass Hamamelidae)

FAMILY RECOGNITION IN THE FIELD: the only TX species is a tree with large, shallowly palmately lobed or coarsely toothed, alternate leaves and usually *conspicuously exfoliating* bark; buds completely sheathed by the petiole base; flowers in spherical heads; fruits in *dangling ball-like heads*.



REFERENCES: Boothroyd 1930; Ernst 1963b; Schwarzwalder & Dilcher 1991; Kubitzki 1993e; Manos et al. 1993; Kaul 1997.

PLATANUS SYCAMORE, PLANETREE, BUTTONWOOD

► A n hemisphere genus; some are important as ornamentals or as a source of timber for furniture, pulp, or paneling. The wood is resistant to splitting, making it useful for butcher blocks and buttons, thus the old vernacular name BUTTONWOOD (Kaul 1997). (The ancient name from Greek: *platys*, broad, apparently referring to the large leaves)

Platanus occidentalis L., (western), AMERICAN SYCAMORE. Broad-headed tree with smooth or flaky bark mottled white, tan, and green, the trunk thus often quite striking in appearance; leaves deciduous, alternate, long-petioled, the petiole hollow at base and completely surrounding the axillary bud; leaf blades simple, large, to ca. 35 cm long and wide, truncate to cordate at base, shallowly palmately lobed or coarsely toothed, the lobes or teeth acute or acuminate, the blade surfaces at first coated with soft, whitish, stellate hairs, becoming sparsely pubescent in age; stipules large, conspicuous, united around the twigs, falling when leaves expand; flowers unisexual, in separate, long-peduncled, drooping, globular heads on the same tree; sepals and petals minute; stamens and styles several per flower, long and conspicuous; pistillate heads 3–4 cm in diam. in fruit; fruits indehiscent, single-seeded, surrounded at base by a tuft of tawny hairs. Stream bottoms; more common in some areas as a planted tree than a wild one; se and e TX w to Grand Prairie and Edwards Plateau. Late Mar–early Apr.

POLEMONIACEAE PHLOX OR POLEMONIUM FAMILY

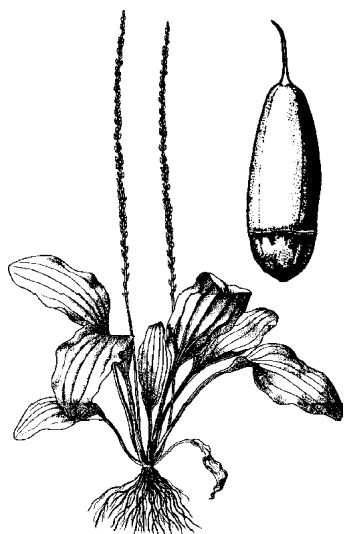
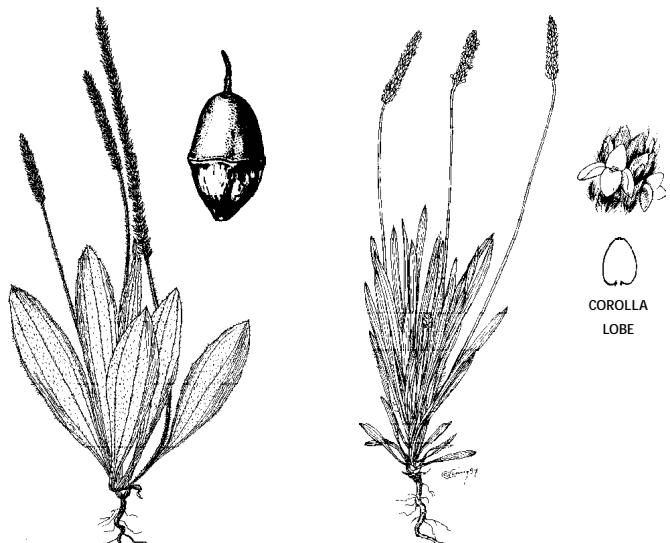
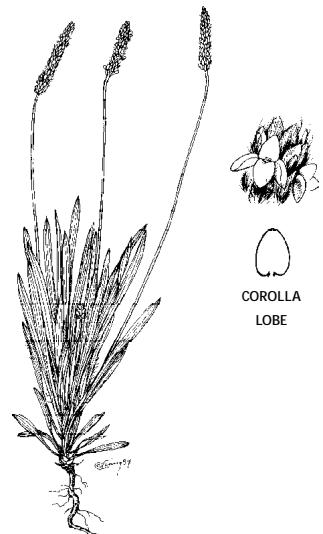
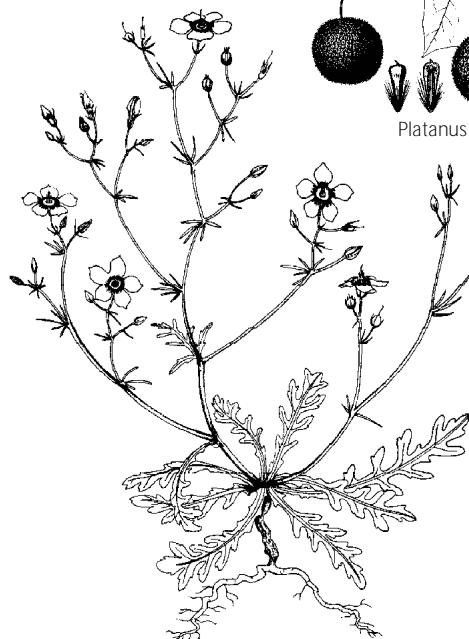
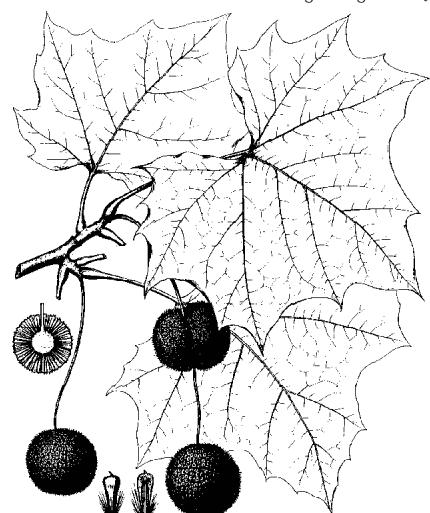
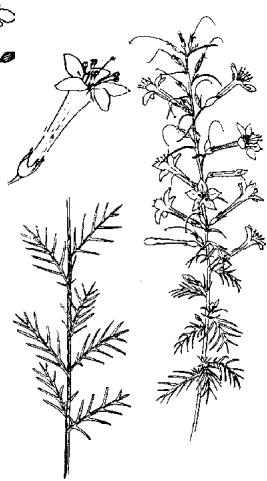
Low annual, biennial, or perennial herbs or suffrutescent; leaves alternate or opposite, sessile or short-petioled, simple, entire to very deeply pinnately lobed; stipules absent; flowers radially symmetrical or slightly bilaterally symmetrical; calyces 5-toothed or -lobed, the tube scarious between the green ribs; corollas 5-lobed, rotate to tubular-funnelform to salverform; stamens 5, epipetalous; pistil 3-carpellate; ovary superior; style 3-lobed; fruit a capsule.

► A small (290 species in 20 genera), American (especially w North America) and Eurasian family; it is a vegetatively variable group of usually herbs or shrubs, lianas, or small trees; it contains a number of showy ornamentals including *Gilia*, *Phlox*, and *Polemonium* (JACOB'S-LADDER). The family is apparently closely related to the Hydrophyllaceae. Family name from *Polemonium*, a genus of 25 species of annual and perennial herbs with alternate pinnate leaves native from the n temperate zone s to Mexico and Chile. (Greek: *polemonium*, name used by Dioscorides, perhaps for Polemon, an Athenian philosopher, or possibly from *polemos* war) (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: usually herbs; flowers usually radially symmetrical with 5 lobed calyx, 5-lobed corolla often with a *conspicuous tube*, 5 stamens attached high inside the corolla tube and alternating with the corolla lobes, and usually a 3-celled superior ovary with a 3-lobed style.

REFERENCES: Grant 1959; Wilson 1960b; Grant & Grant 1965; Wherry 1966.

1. Leaves incised to pinnately divided, sometimes appearing compound, all alternate; stamens exserted from corolla tube.
 2. Plants 20–200 cm tall; corollas deep red, rarely yellow or white, with speckled throat; corolla tube 20–25 mm long, ca. 2 times or more as long as corolla lobes; widespread in nc TX _____ **Ipomopsis**
 2. Plants 50 cm or less tall; corollas whitish to lavender, or blue-violet with a yellow eye; corolla tube < 6 mm long, shorter than to ca. as long as corolla lobes; rare in nc TX _____ **Gilia**
1. Leaves entire or nearly so, all opposite OR opposite below, becoming alternate above; stamens not or barely exserted from the corolla tube _____ **Phlox**

*Plantago rugelii* [BAS]*Plantago virginica* [BAS]*Plantago wrightiana* [HEA]*Gilia incisa* [HEA]*Gilia rigidula* subsp. *rigidula* [JON]*Platanus occidentalis* [SA3]*Ipomopsis rubra* [RAD, SHI]

GILIA

Glandular-pubescent annuals to perennials; leaves alternate; flowers solitary, in pairs, or loosely glomerate; corollas in ours subrotate to rotate.

— A New World genus of ca. 25 species, especially in w North America; some are cultivated as ornamentals. (for Felipe Gil, 18th century Spanish botanist)

REFERENCES: Shinners 1963; Turner 1994a.

1. Lower stem leaves with long slender petioles and with wide, flat, incised-toothed blades or blade segments; basal leaves often simple, serrate to deeply so; corollas lavender to whitish; sepals 4–5 mm long; corollas 4–7(–8) mm long _____ **G. incisa**
1. Lower stem leaves sessile or subsessile or with petioles short and winged, the blades pinnatifid to pinnate, the segments needle-like to narrowly oblong; basal leaves pinnatifid to pinnate; corollas violet-blue to purple, with a yellow eye; sepals usually 5–7(–9) mm long (some poorly developed flowers can have shorter sepals); corollas typically (7–)8–15 mm long _____ **G. rigidula**

Gilia incisa Benthams, (incised, cut deeply into irregular lobes), SPLIT-LEAF GILIA. Annual, biennial, or perennial to 50 cm tall; leaves conspicuously reduced up the stem; leaf blades to 15 mm wide; flowers solitary or paired, on peduncles to 35 mm long; corollas lavender to whitish; corolla tube 3–4 mm long. Rocky, gravelly, silty, or sandy soils; Bell Co. in s part of nc TX, also Burnet Co. (Turner 1994a); mainly s and w TX. Late Mar–early Jun.

Gilia rigidula Benthams, (somewhat stiff or rigid). Suffrutescent perennial, to 25 cm tall, diffusely branched at base; leaves with 2–7 segments, the segments 2–12 mm long; flowers solitary to loosely glomerate; corollas distinctive—violet-blue to purple, with a yellow eye; capsules 3–5 mm long. Dry, sandy to rocky prairies.

1. Leaf segments mostly stiffly linear, needle-like (= acerose), sharp-tipped; w and n parts of nc TX _____ subsp. **acerosa**
1. Leaf segments typically broader, usually not needle-like; s part of nc TX _____ subsp. **rigidula**

subsp. **acerosa** (A. Gray) Wherry, (needle-like). Plant usually < 10 cm tall; leaves to 20 mm long. Callahan Co., also Collin and Shackelford cos. (Turner 1994a); the Collin Co. locality is well to the east of all other known sites for this species; mainly w 1/2 of TX. (Late Mar–)Apr–Sep. [G. *acerosa* (A. Gray) Britton] Wilken (1986a) lumped this subspecies.

subsp. **rigidula**, PRICK-LEAF GILIA. Plant to 25 cm tall; leaves to 35 mm long; peduncles to 25 mm long. Burnet Co., also Milam Co. (Turner 1994a); s part of nc TX s to s TX and w to Edwards Plateau. Late Mar–May(–Oct).

IPOMOPSIS

— A genus of 26 species of w North America and Florida, with 1 species in South America. Some are showy and cultivated as ornamentals. (Greek: *ipo*, to impress, and *opsi* appearance, alluding to the showy flowers)

REFERENCES: Grant 1956; Shinners 1963.

Ipomopsis rubra (L.) Wherry, (red), STANDING-CYPRESS, TEXAS PLUME, RED GILIA, INDIAN-PLUME. Glabrous winter annual or biennial with a prominent basal rosette; stems normally unbranched, erect; leaves alternate, numerous, crowded, deeply pinnately divided into linear to filiform segments, appearing compound, 4–8 cm long, with ca. 10–15 segments 5–30 mm long and ca. 1 mm wide; flowers in showy terminal spikes; corollas tubular-funnelform, deep red, rarely yellow or white, with speckled throat, the tube 20–25 mm long, the lobes 9–11 mm long; stamens bluish; capsules 8–10 mm long. Sandy, gravelly, or rocky ground; e 1/2 of TX. May–Jul. [Gilia rubra (L.) A. Heller] This is one of the most striking wildflowers in nc TX; it is the only

member of the genus adapted to relatively moist climates (Wherry 1966). Ruby-throated hummingbirds (*Archilochus colubris*) pollinate the flowers (Grant & Grant 1965). ☒/94

PHLOX

Annuals or perennials; leaves opposite or opposite below and alternate above; flowers radially symmetrical, solitary or in cymes; corollas salverform with conspicuously distinct tube and lobes.

— A genus of 67 species of North America and ne Asia; many are cultivated as ornamentals. *Phlox cuspidata* and *P. drummondii* are known to hybridize and form hybrid swarms (Correll & Johnston 1970). Lepidopterans (butterflies & moths) pollinate the slender-tubed flowers (Grant & Grant 1965). (Greek: *phlox*, flame, an ancient name of *Lychnis* of Caryophyllaceae, transferred to this genus)

REFERENCES: Nelson 1899; Kelly 1915; Bogusch 1929; Whitehouse 1939, 1945; Wherry 1955, 1966; Erbe & Turner 1962.

1. Plants annual from a slender taproot, easily pulled from ground with roots attached.
2. Corolla lobes shorter than the tube; corolla tube not constricted at junction with corolla lobes; corollas without conspicuous yellow eye.
 3. Middle and upper stem leaves 3–6 times as long as wide, oblong-ovate or oblong-lanceolate; corolla lobes usually > 7 mm wide; corolla color variable; foliage pubescence typically conspicuous to the naked eye _____ ***P. drummondii***
 3. Middle and upper stem leaves 7–10 times as long as wide, oblong-lanceolate to linear; corolla lobes usually < 7(–8) mm wide; corollas purple to pink, with faintly striate pale eye; foliage pubescence typically inconspicuous _____ ***P. cuspidata***
2. Corolla lobes longer than the tube; corolla tube constricted at junction with corolla lobes; corollas with conspicuous yellow eye _____ ***P. roemeriana***
1. Plants perennial from a crown or branching root; stems typically breaking off near ground level when pulled.
 4. Corolla lobes obtuse to apiculate, not notched; plants (20–)30–60(–75) cm tall; widespread in nc TX _____ ***P. pilosa***
 4. Corolla lobes notched; plants 20 cm or less tall; known in nc TX only from Dallas Co. _____ ***P. oklahomensis***

Phlox cuspidata Scheele, (with a cusp or sharp stiff point), POINTED PHLOX, LARGE-FLOWER PHLOX. Stems 5–55 cm tall; usually smaller and more finely pubescent than *P. drummondii*; leaves to 35 mm long and 5 mm wide; corolla tube 8–15 mm long, pilose, some hairs glandular. Sandy or silty clay prairies and open woods; se and e TX w to East Cross Timbers, also Somervell Co. (sandy terrace of Brazos River), also Hood Co. (R. O'Kennon, pers. obs.). Apr-Jun. [*P. cuspidata* var. *grandiflora* Whitehouse, *P. cuspidata* var. *humilis* Whitehouse]

Phlox drummondii Hook., (for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), PRIDE-OF-TEXAS. Erect or half-decumbent annual, 10–50 cm tall, densely pubescent with flattened, jointed, coarse hairs; corolla color variable, the tube 12–16 mm long. Sandy open ground. Apr-May.

1. Corolla color varying conspicuously within colonies, ranging from red to pink, purple, violet, lavender, white, or even pale yellow _____ subsp. ***drummondii***
1. Corolla color not noticeably variable within colonies, either red, lavender, or purplish.
 2. Corollas bright red, with a dark red eye-ring or star _____ subsp. ***wilcoxiana***
 2. Corollas lavender or purplish, eye various.
 3. Eye pale or white with at most a narrow-rayed purple star; many leaves only 4–5 times as long as wide; native to nc TX _____ subsp. ***mcallisterii***

3. Eye well-filled by a dark red star or ring; main (lower) leaves 5–10 times as long as wide (averaging 7); native to the s of nc TX, but widely cultivated _____ subsp. **drummondii**

subsp. **drummondii**, DRUMMOND'S PHLOX. Including [var. *peregrina* Shinners] which is very variable in color and which is cultivated and escaped or planted by the highway department. Grayson Co. (Hagerman National Wildlife Refuge) [probably planted]; native to sc TX s of nc TX. /103

subsp. **mcallisterii** (Whitehouse) Wherry, (for Dr. Frederick McAllister, born 1876, professor of botany at Univ. of TX). Stems erect; leaves thin; corollas lavender with white eye or whitish lines around center. Open oak woods and roadsides; e TX w to Rolling Plains and Edwards Plateau. [*P. drummondii* var. *mcallisterii* (Whitehouse) Shinners]

subsp. **wilcoxiana** (Bogusch) Wherry, (" . . . from the geologic formation upon which the [sub]species is found most abundantly"—Bogusch 1929). Main leaves 5–10 times as long as wide (averaging 7). Milam Co. (Wherry 1966; Correll & Johnston 1970); se, e, and s TX and Edwards Plateau, mainly s of nc TX; endemic to TX. [*P. drummondii* var. *wilcoxiana* (Bogusch) Whitehouse]  /103

Phlox oklahomensis Wherry, (of Oklahoma). Rhizomatous to stoloniferous, subshrubby perennial, 8–20 cm tall and broad, pubescent; leaves linear to lanceolate, to 6 cm long and 5 mm wide; flowers fine glandular to glandless; sepals 7–10 mm long; corolla tube 8–12 mm long; corolla lobes white or tinged with red, with apical notch 1–4 mm deep; styles united to middle, 2–3 mm long. The only known collection for Texas was from sandy woods in ne Dallas Co. (Wherry 1966; Correll & Johnston 1970); also KS and OK.

Phlox pilosa L., (with long soft hairs), PRAIRIE PHLOX. Pubescent perennial from branching roots; stems (20–)30–60(–75) cm tall; leaves 3–9 mm wide; corollas purple, pink, lavender, or rarely white, the tube 10–20 mm long. Apr–May. Wherry (1966) noted that the subspecies of this markedly variable species intergrade and that further study is needed to determine their real relationships; intermediates between the subspecies should be expected.

1. Sepals subulate with awn 1.5–3 mm long; main leaves 40–90 mm long; widespread in nc TX _____ subsp. **pilosa**

1. Sepals linear-subulate with awn 1–2 mm long; main leaves 30–60 mm long; s and w parts of nc TX.

2. Stems typically simple, moderately glandular; main leaves 45–60 mm long; s and w parts of nc TX _____ subsp. **latisepala**

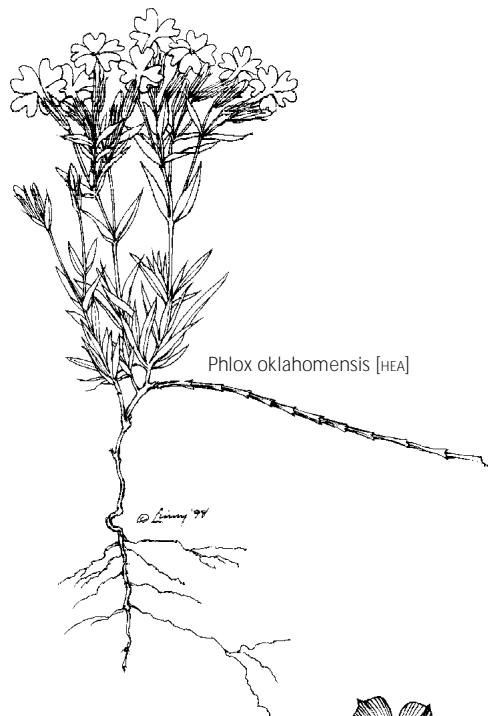
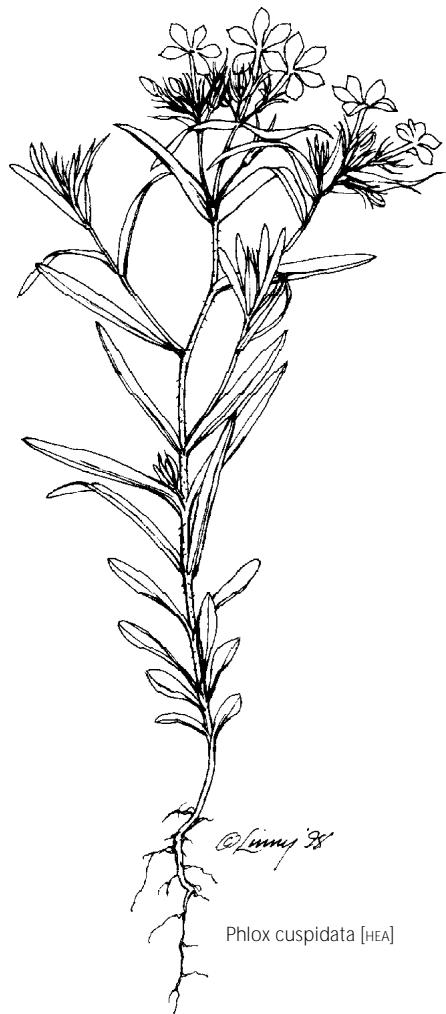
2. Stems typically branched, copiously glandular; main leaves 30–45 mm long; in nc TX known only from Bell and Williamson cos. _____ subsp. **riparia**

subsp. **latisepala** Wherry, (broad-sepaled), ROUGH PHLOX. Open woods on dry slopes, sometimes in grasslands, often over limestone; Bell, Bosque, Burnet, Comanche, Hood, Lampasas, McLennan, Tarrant, and Williamson cos. (Wherry 1966); endemic to Edwards Plateau and adjacent areas. [*P. asper* E. Nelson, *P. pilosa* var. *asper* (E. Nelson) Wherry ex Gould] According to Wherry (1966), this subspecies intergrades with both subspecies *pilosa* and subspecies *riparia*. 

subsp. **pilosa**, DOWNTY PHLOX. Herbage glandular, at least above. Prairies and open woods; se and e TX w to West Cross Timbers and Edwards Plateau. This is the commonly seen subspecies in nc TX.

subsp. **riparia** Wherry, (of river banks), TEXAS PHLOX. Gravelly areas and talus slopes; Bell and Williamson cos. (Wherry 1966); endemic on and near Edwards Plateau. 

Phlox roemeriana Scheele, (for Ferdinand Roemer, 1818–1891, geologist, paleontologist, and explorer of TX), GOLD-EYE PHLOX, ROEMER'S PHLOX. Plants to 35 cm tall, densely pubescent with



Phlox oklahomensis [HEA]



Phlox drummondii subsp. *drummondii* [JON]



Phlox pilosa subsp. *pilosa* [BT3]



Phlox roemeriana [HEA]

flattened, jointed, coarse hairs; corollas purple, pink, or rarely white, with conspicuous yellow eye bordered by white, the tube 9–13 mm long, the lobes averaging 14 mm long; seeds 3–5 in each cell. Rocky slopes, limestone areas; Bell, Bosque, Brown, Burnet, and McLennan cos., also Comanche, Hood, Johnson (Whitehouse 1945), Mills, Williamson (Wherry 1966), and Hamilton (HPC) cos.; s and sw parts of nc TX s to Edwards Plateau and w to Plains Country; endemic to TX. Late Mar–early May. ↗ [103]

POLYGALACEAE MILKWORT FAMILY

— A medium-sized (950 species in 17 genera), vegetatively variable, nearly cosmopolitan family whose flowers superficially resemble those of the unrelated Fabaceae. Species range from trees to shrubs, lianas, or herbs; some are parasites and extra-floral nectaries are often present. A relationship with the Malpighiaceae-Vochysiaceae complex has been suggested. (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: herbs (1 species woody-based) with a distinctive, bilaterally symmetrical perianth—appearing pea-like—with 5 sepals (2 larger and petal-like) and 3 petals (1 often crested); anthers dehiscing through terminal pores or slits.

REFERENCES: Blake 1924; Graham & Wood 1965; Miller 1971b.

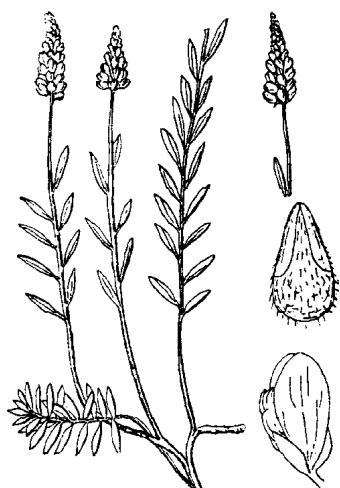
POLYGALA MILKWORT

Ours small annual or perennial herbs or 1 species a woody-based perennial (*P. lindheimeri*); sap not milky; leaves alternate, opposite, or whorled, sessile or subsessile, simple, entire; flowers in terminal or axillary, spike-like or head-like racemes; sepals 5, unequal, 2 longer and petal-like; petals 3, united at base, unequal, the lower one keeled, with variously shaped or crested apex; filaments united into a tubular sheath split down upper side; anthers 8; pistil 2-carpellate; ovary superior; capsules dehiscent; seeds usually arillate.

— A subcosmopolitan genus of ca. 500 species of trees, shrubs, and herbs. Once thought to increase the yield of cow's milk—hence the common name. A number of species are used ornamenteally or medicinally (e.g., the North American *P. senega* L. (SENEGA-ROOT or SENECA-SNAKE-ROOT) was used for treating snakebite.) (Greek: *polys*, much, and *gala*, milk; some European species were thought to enhance milk production in cows)

REFERENCES: Blake 1916; Pennell 1931, 1933; Smith & Ward 1976; Wendt 1979; McGregor 1986.

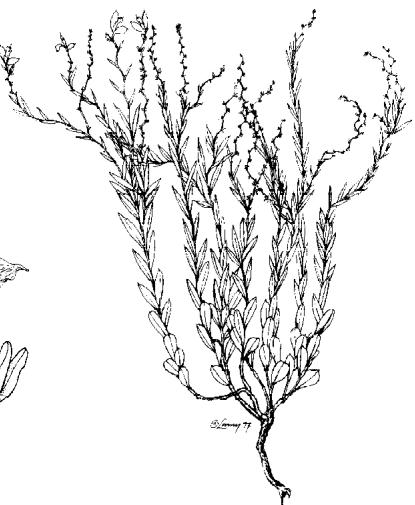
1. Stems densely pubescent; plants with woody base; keel (= lower of the 3 petals) with a conic or cylindric beak, not crested _____ ***P. lindheimeri***
1. Stems glabrous; plants without woody base (or in *P. alba* a woody taproot); keel with a fimbriate crest.
 2. Leaves whorled or apparently so.
 3. Inflorescences slender, 2.2–4.5 mm wide, tapered to a point; flowers usually whitish and greenish (rarely purple-tinged) _____ ***P. verticillata***
 3. Inflorescences thick, 10–17 mm wide, blunt or rounded at end; flowers rosy purple to greenish (rarely white) _____ ***P. cruciata***
 2. Leaves alternate.
 4. Plants perennial; stems usually several from base.
 5. Flowers white with greenish center (but can have purple crest); inflorescences in flower 4–8 mm thick; plants without cleistogamous flowers underground _____ ***P. alba***
 5. Flowers pink to pink-purple (rarely white); inflorescences in flower 9–14 mm thick; plants with whitish cleistogamous flowers underground _____ ***P. polygama***
 4. Plants annual; stems usually single from base.



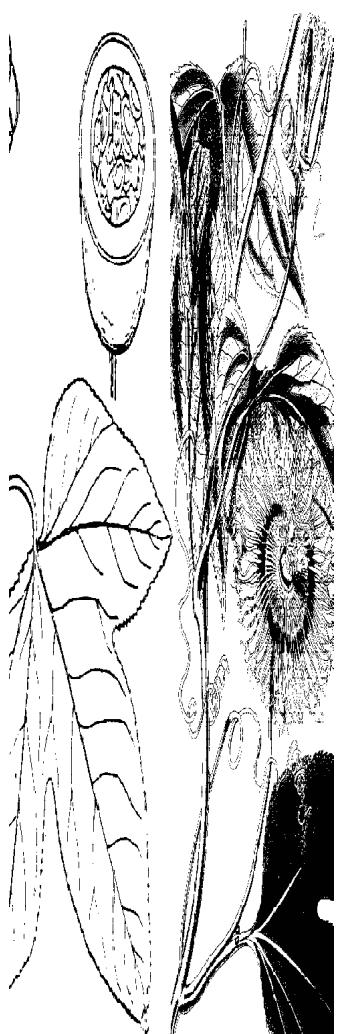
Polygala alba [BB1]



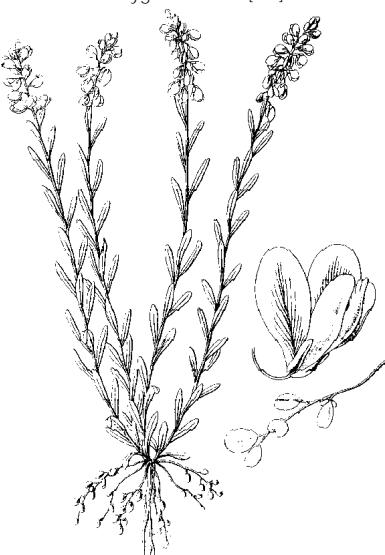
Polygala cruciata [co1]



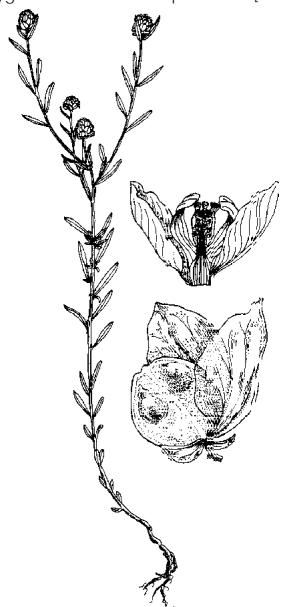
Polygala lindheimeri var. parviflora [HEA]



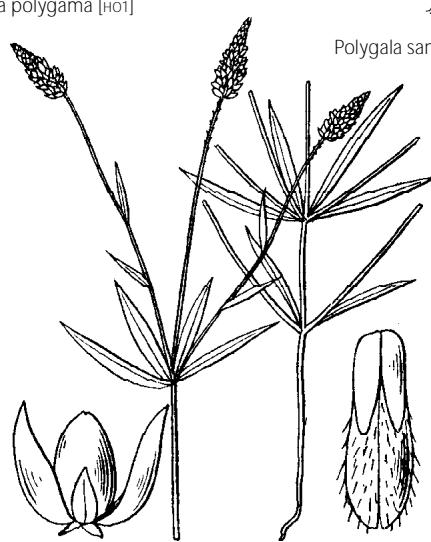
Polygala incarnata [gwo]



Polygala polygama [H01]



Polygala sanguinea [co1]



Polygala verticillata [BB2]

6. Leaves 0.3–1 mm wide, 4–12 mm long; petals and staminal tube united into a conspicuous narrow tube-like trough 5 mm long; stem and leaves glaucous _____ **P. incarnata**
 6. Leaves 1–4.5 mm wide, 7–39 mm long; petals and staminal tube not united into a conspicuous narrow tube-like trough; stem and leaves not glaucous _____ **P. sanguinea**

Polygala alba Nutt., (white), WHITE MILKWORT. Ascending or erect perennial from a stout vertical rootstock, to 45 cm tall; leaves narrow, crowded toward base of stems; flowers white with greenish center (but crest can be purple). Rocky and sandy areas; nearly throughout TX. Mid-Apr-Jun.

Polygala cruciata L., (cross-like), MARSH MILKWORT. Annual to 40 cm tall; leaves in whorls of 3 or 4 or scattered; flowers rosy purple to greenish (rarely white). Bogs, seepage slopes, and savannahs; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly e TX. May–Sep.

Polygala incarnata L., (flesh-colored), PINK MILKWORT, SLENDER MILKWORT. Glaucous, erect, simple or sparingly branched annual to 50 cm tall, with few leaves; petals rose-purplish. Low sandy or silty open ground or open woods; Cooke, Grayson, Kaufman, Milam, Montague, and Wise cos., also Lamar Co. (Carr 1994); se and e TX w to West Cross Timbers. May–Jul.

Polygala lindheimeri A. Gray, (for Ferdinand Jacob Lindheimer, 1809–1879, German-born TX collector). Stems several-many from a woody base, decumbent to erect, to 28 cm long; stems and leaves with spreading or incurved hairs; flowers pink to purple or lavender (rarely whitish).

1. Leaves essentially similar throughout, narrowly elliptic to oval or rarely suborbicular, the pubescence densely spreading or sometimes spreading-incurved (like on the stem) _____ var. **lindheimeri**
 1. Leaves mostly linear to lanceolate but sometimes with the lower ones broader, the puberulence merely incurved (like on the stem) _____ var. **parviflora**

var. **lindheimeri**, SHRUBBY MILKWORT. Brushy limestone hills and bluffs; sw TX ne to Burnet Co. near s edge of nc TX. Mar–Oct.

var. **parviflora** Wheelock, (small-flowered), ROCK MILKWORT. Limestone outcrops or gravelly areas; Burnet, Coleman, and Lampasas cos., also Brown (HPC) and Hood (Mahler 1988) cos.; mainly Trans-Pecos to Edwards Plateau ne to sw part of nc TX. Jun–Jul. [*P. tweedyi* Britton ex Wheelock]

Polygala polygama Walter var. **obtusata** Chodat, (sp.: with sexes mixed, having flowers with both male and female parts, presumably for the cleistogamous flowers; var: obtuse, blunt), BITTER MILKWORT, RACEMED MILKWORT. Stems ascending to erect, 15–30 cm tall; flowers pink to rose-purplish (rarely lighter to white), also with racemes of whitish cleistogamous (= non-opening, self-pollinating) flowers from base of plant growing underground or at soil surface. Bogs, low sandy soils, and along streams; se and e TX disjunct w to Parker and Tarrant cos. Apr–Jun. Jones et al. (1997) and J. Kartesz (pers. comm. 1997) treated all TX representatives of this species as var. *obtusata* (but spelled *obtusa* in Jones et al.).

Polygala sanguinea L., (blood-red), BLOOD MILKWORT. Erect annual 10–40 cm tall; flowers rose to purple or green (rarely white). Moist woods, prairies; Lamar Co. in Red River drainage; mainly e TX. May–Jul.

Polygala verticillata L., (whorled), WHORLED MILKWORT. Erect annual to 30 cm tall, widely branched; leaves in whorls of 4–5, rarely the upper alternate; flowers white or partly green, rarely purplish-tinged. Sandy open woods; se and e TX w to e edge of West Cross Timbers and Edwards Plateau. Mid-Apr–Jul. [*P. verticillata* L. var. *ambigua* (Nutt.) A.W. Wood, *P. verticillata* L. var. *isocycla* Fernald, *P. verticillata* L. var. *sphenostachya* Pennell] We are following Hatch et al.

(1990) in not recognizing infraspecific taxa in *P. verticillata*. Kartesz (1994) and Jones et al. (1997) recognized three varieties in TX. The three, which can intergrade, are sometimes separated using characters such as the following (Pennell 1931; McGregor 1986):

1. Leaves all or mostly whorled; plants with spreading branches; flowers and fruits crowded, the racemes ± conical, 0.5–2 cm long.
2. Plants 5–20 cm tall; leaves 1–2.5 cm long; capsules to 1.8 mm long _____ var. *isocycla*
2. Plants 20–30 cm tall; leaves 2–3 cm long; capsules 1.8–2.4 mm long _____ var. *sphenostachya*
1. Upper leaves alternate; plants less branched above; flowers and fruits less crowded (the lower ones remote), the racemes long-cylindric, slender, 1–5 cm long _____ var. *ambigua*

POLYGONACEAE KNOTWEED FAMILY

Ours annuals or perennials, mostly herbs or a few vines, these rarely woody; leaves alternate, simple, entire or with very small, blunt teeth (sometimes with basal lobes), with scarious stipules united to form a tubular sheath known as an ocrea (plural: ocreae) (ocreae absent from *Eriogonum*, apt to shrivel or break apart in others); perianth usually of (4–)5–6 tepals, in 1 or 2 rows, equal or the outer shorter, colored alike; stamens 1–9; pistil 1; ovary superior, unilocular, with a single basal ovule; fruit a trigonous or lenticular achene.

— A medium-large (1,100 species in 46 genera), nearly cosmopolitan, but chiefly n temperate family of shrubs, trees, lianas, and many herbs. The nodes are often swollen and the family is unusual in its subclass in having anthocyanin rather than betalain pigments. The ocrea is usually an excellent field character. Species are variously used as edible plants, for timber, as a source of tanning material, or as cultivated ornamentals; some are problematic weeds. The achenes of *Fagopyrum esculentum* Moench (BUCKWHEAT) are used for food as are the young petioles of *Rheum rhabarbarum* L. (RHUBARB, PIEPLANT); however, RHUBARB leaf blades contain oxalates and anthraquinone glycosides and are toxic (Spoerke & Smolinske 1990). A number of characters including the often 3-merous flowers of Polygonaceae suggests to some that, "The ancestry of Caryophyllidae [including Polygonaceae] may lie in or near Ranunculaceae." (Cronquist 1993) (3-merous flowers are known in a number of Ranunculaceae). (subclass Caryophyllidae)

FAMILY RECOGNITION IN THE FIELD: herbs (and a few vines) often with *enlarged* nodes; leaves alternate, simple, with a *tubular, membranous or papery sheath* (= ocrea) enclosing the base of the petiole; flowers small; fruit an often 3-angled or lens-shaped achene.

REFERENCES: Graham & Wood 1965; Horton 1972; McNeill 1981; Brandbyge 1993.

1. Plant not a vine, OR if an herbaceous vine, then without tendrils.
2. Ocreae (stipules) absent; flowers short-pedicelled in small, funnelform involucres of whorled, partially united bracts; leaves with white to gray pubescence beneath, sometimes strikingly so _____ **Eriogonum**
2. Ocreae present (often falling from older parts); flowers not involucrate, the inflorescences various; leaves without white to gray pubescence beneath (however, some hairs can be present).
3. Branches appearing to emerge from internodes (due to short coalescence of base of branch and stem); plants heath-like with many, small, usually linear leaves 5–20 mm long; inflorescences branched, panicle-like _____ **Polygonella**
3. Branches emerging directly from nodes; plants not heath-like; leaves not linear OR if linear then the inflorescences not panicle-like.
4. Outer tepals markedly shorter than the inner tepals in flower, the outer greatly enlarged in fruit; leaf blades lobed basally in several species, unlobed in other species _____ **Rumex**

4. Outer tepals equaling the inner tepals in flower, not greatly enlarged in fruit; leaf blades never lobed basally _____ **Polygonum**
1. Plant an herbaceous or woody vine with conspicuous tendrils.
5. Flowers pink or white; leaf blades usually deeply cordate at base; fruiting perianth usually 5–10 mm long, without a flattened wing-like base; introduced cultivar _____ **Antigonon**
5. Flowers greenish or yellow-green; leaf blades truncate or subcordate at base; fruiting perianth enlarging to 20–30 mm long, with a flattened wing-like base; native in low woods _____ **Brunnichia**

ANTIGONON CORALVINE, MOUNTAIN-ROSE

☛ A genus of 2–3 species native to Mexico and Central America. (Greek: probably from *anti*, against, opposite, and *gonia*, an angle, or *gony*, knee, in reference to the geniculate nodes)

Antigonon leptopus Hook. & Arn., (slim- or slender-stalked), QUEEN'S-WREATH, CORALVINE, CORALLITA, CONFEDERATE-VINE, COAMECATL. Perennial climbing vine to 10 m high; roots enlarged; leaf blades 2–13 cm long, entire, cordate-ovate, acuminate at apex; flowers pendulous in branched showy inflorescences. Cultivated and volunteers mainly in s and e TX; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990). Summer-fall. Native of Mexico. The tuberous roots are reported to be edible with a nut-like flavor (Mabberley 1987). 

BRUNNICHIA EARDROP-VINE

☛ A genus of 3 species, 1 in America and 2 in Africa (Graham & Wood 1965). The wing-like perianth base apparently aids in dispersal. (Named for M.T. Brünnich, a Norwegian naturalist of the 18th century)

Brunnichia ovata (Walter) Shinners, (ovate, egg-shaped), EARDROP-VINE, AMERICAN BUCKWHEAT-VINE, LADIES'-EARDROPS. Glabrous or minutely pubescent, high-climbing to trailing perennial vine; leaf blades ovate, 5–15 cm long, truncate to slightly cordate basally, acute to acuminate apically; ocreae absent; flowers greenish or yellow-green in terminal, panicled, spike-like racemes, these spreading to drooping; fruiting perianths pinkish and showy, with a conspicuous, flattened, wing-like base; achenes 6–7 mm long. Stream bottom woods; Ellis, Henderson, Hunt, Lamar, and Kaufman cos.; se and e TX w to e part of nc TX. Late Jun-Aug. [*B. cincinnata* Gaertn.]

ERIOGONUM WILD BUCKWHEAT

Annuals or perennials; stems and at least undersurfaces of leaf blades conspicuously gray or white (sometimes with brownish tinge) with cottony, matted pubescence; inflorescence a cymose panicle; flowers short-pedicelled in small, funnelform involucres of whorled, partially united bracts; stamens 9.

☛ A genus of 240 species of mostly w and s North America; taxa range from Alaska to central Mexico and e to the Appalachian Mountains and Florida (Reveal 1989). The species vary from shrubs to herbs and cushion plants and differ from most of the family in lacking ocreae. Several species are cultivated as ornamentals or for their edible leaves and roots; one species, *E. ovalifolium* Nutt., is used as a silver indicator in Montana. (Greek: *erion*, wool, and *gonu*, knee, from the woolly stems and leaves and the swollen nodes)

REFERENCES: Stokes 1936; Reveal 1968, 1989.

- Perianth (tepals) pubescent externally; involucres 4–6 mm long; basal and lower stem leaves 10–20+ cm long; plants perennial _____ **E. longifolium**
- Perianth glabrous externally; involucres 2–4 mm long; basal and lower stem leaves 7 cm or less long; plants annual or biennial.

2. Involucres densely white to gray pubescent, 2.5–4 mm long; outer perianth segments obovate _____ **E. annuum**
 2. Involucres with only scattered hairs, 2–2.5 mm long; outer perianth segments oblong-cordate _____ **E. multiflorum**
-

Eriogonum annuum Nutt., (annual), ANNUAL WILD BUCKWHEAT. Annual or biennial 0.5–2 m tall; leaves to 7 cm long; inflorescences elongated with few long branches, usually open; perianth glabrous, dull white or rarely pinkish, maturing to a dark red-brown, the outer tepals obovate; achenes glabrous. Grasslands, disturbed areas; throughout most of TX. May–Nov.

Eriogonum longifolium Nutt., (long-leaved), LONG-LEAF WILD BUCKWHEAT. Perennial herb 1–2 m tall, with thick taproot; basal and lower stem leaves 10–20 (rarely more) cm long; involucres, perianth, and achenes densely white- to silvery-pubescent externally, the perianth glabrous and yellow internally. Sandy soils and calcareous clay; throughout most of TX. Jun–Aug. [*E. longifolium*Nutt. var. *lindheimeri* Gand., *E. longifolium*var. *plantagineum* Engelm. & A. Gray]

Eriogonum multiflorum Benth., (many-flowered), HEART-SEPAL WILD BUCKWHEAT. Annual (biennial?) herb 0.5–2 m tall; leaves to 4 cm long; inflorescences compacted with several short branches; perianth glabrous, white, maturing with red-brown midribs, the outer tepals cordate; achenes glabrous. Sandy soils; e 1/2 of TX. Aug–Nov.

POLYGONELLA JOINTWEED

— A genus of 9 species of e North America. (Diminutive of *Polygonum*, a related genus)
 REFERENCE: Horton 1963.

Polygonella americana (Fisch. & C.A. Mey.) Small, (of America), SOUTHERN JOINTWEED, SMALL JOINTWEED. Perennial with numerous short leafy branches, prostrate to erect, to nearly 1 m tall, from long, woody taproots; leaves linear to linear-spatulate, 5–20 mm long, to ca. 1 mm wide, about as thick as wide; ocreae not ciliate; inflorescences panicle-like; flowers 1 per ocrea; tepals 5, white, to 3 mm long, the outer 2 becoming reflexed, the inner enlarging to 4 mm long in fruit and becoming pinkish brown. In sand; mainly se and e TX, disjunct w to Parker and Tarrant cos. in nc TX; also reported from Edwards Plateau and Plains Country. Jun–Sep(–Oct). The common name is apparently derived from the conspicuous swollen nodes or “joints” (Ajilvsgi 1984).

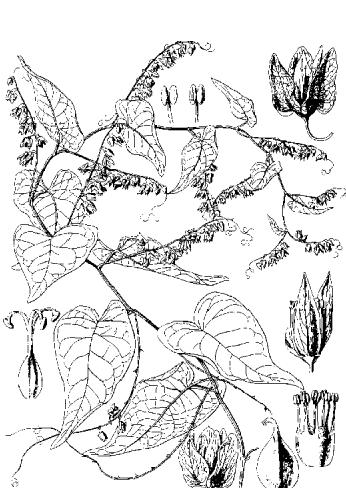
POLYGONUM KNOTWEED, SMARTWEED (INCLUDING PERSICARIA AND TOVARA)

Plants erect or twining vines, often of moist or wet areas; leaves alternate; joint present between petiole and base of leaf blade or not so; flowers in inconspicuous axillary fascicles or in axillary and/or terminal, spike-like or raceme-like inflorescences; tepals usually white or pink; stamens 4–8; achenes lenticular or trigonous.

— A nearly cosmopolitan, especially n temperate genus of ca. 172 species; it is often split into 3 genera: *Persicaria* (ca. 150 species), *Polygonum*sensu stricto (20 species), and *Tovara* (2 species) (Mabberley 1997); representatives of all three are found in nc TX and they are separated in the key to species. Some are cultivated as ornamentals, used medicinally, eaten as vegetables, or are problematic weeds. Several have been reported to cause dermatitis in susceptible individuals (Muenscher 1951; Stephens 1980); the common name SMARTWEED is possibly derived from the tendency of the sap to causing “smarting” when gotten on the skin (Kirkpatrick 1992). (Greek: *poly*, many, and *gonu*, knee or joint, from the swollen nodes of the stem)

REFERENCES: Small 1894, 1895; Stanford 1925; Fassett 1949; Li 1952a; Mertens & Raven 1965; Mitchell 1968; McDonald 1980; Wolf & McNeill 1986.

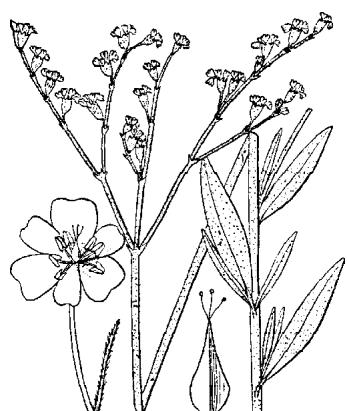
1. Flowers in dense terminal spike-like or raceme-like inflorescences OR axillary and inconspicuous, in either case, neither widely separated nor reflexed in age; plants erect to ascending or twining or prostrate and rooting at nodes; styles 2–3, falling early or not hooked at tip; tepals (4–)5–6.
2. Plants twining or trailing vines; leaf blades sagittate to cordate to truncate basally (section *Polygonum*).
 3. Outer 3 tepals minutely keeled but not winged, becoming up to 3.5 mm long; achene dull black, closely enclosed by but scarcely exceeded by perianth _____ ***P. convolvulus***
3. Outer 3 tepals conspicuously winged (the wings 0.25–2 mm wide), becoming up to 8 mm long; achene glossy black, closely enclosed by and much exceeded by the perianth _____ ***P. scandens***
2. Plants not twining or trailing vines, rather the stems erect to ascending or prostrate; leaf blades never sagittate, cordate, or truncate basally.
 4. Flowers single or in 2s or 3s at the nodes; joint present between petiole and base of leaf blade; leaf blades 30 mm or less long (part of section *Polygonum*).
 5. Achenes striated (surface roughened with fine lines), unequally trigonous, dull to mildly shiny; tepals 5; stems usually prostrate, sometimes ascending _____ ***P. aviculare***
5. Achenes smooth or striated only on the margins, equally trigonous, shiny; tepals 5 or 6; stems erect or ascending.
 6. Achenes black, marginally striated; stem 4-angled or winged below ocreae; tepals 5; leaves usually with 2 pleats parallel to the midrib _____ ***P. tenue***
6. Achenes reddish brown, generally entirely smooth; stem angles inconspicuous; tepals 6; leaves without pleats _____ ***P. ramosissimum***
4. Flowers in dense terminal spike-like or raceme-like inflorescences; joint not present between base of leaf blade and petiole; leaf blade usually much more than 30 mm long (section *Persicaria*).
 7. Ocreae (= stipules) without cilia at their summits or cilia less than 1 mm long (but surface of ocreae can be strigose).
 8. Tepals reddish pink; raceme 1 per stem or a shorter 2nd one sometimes present, terminal on the stems; ocreae and leaf blades strigose OR glabrous (note: ocreae are without cilia at summit) _____ ***P. amphibium***
8. Tepals green to white or pink; racemes several–numerous, both terminal and lateral; ocreae and leaf blades glabrous or nearly so.
 9. Peduncles with numerous stalked glands (visible under a hand lens); racemes erect or nearly so; tepals without forked veins (anchor-shaped) near apex (visible under hand lens). _____ ***P. pensylvanicum***
9. Peduncles eglandular or glandular but the glands not stalked; racemes nodding OR erect; tepals with OR without forked veins (anchor-shaped) near apex (if present, visible under hand lens).
 10. Racemes usually nodding; tepals not glandular, with forked veins (anchor-shaped) near apex (visible under hand lens); achenes flat or concave on one or both faces; plants annual; widespread in nc TX _____ ***P. lapathifolium***
10. Racemes erect; tepals glandular (visible under hand lens), without forked veins; achenes convex on both faces; plants perennial; in nc TX known only from w and s parts of nc TX _____ ***P. densiflorum***
7. Ocreae with cilia 1.5 mm long or more at their summits.
 11. Tepals greenish white, glandular, the glands yellow (visible under hand lens) _____ ***P. punctatum***
11. Tepals variously colored, eglandular.
 12. Ocrea cilia 3 mm or less long; achenes lenticular or trigonous, longer than wide; racemes usually less than 3(–4) cm long _____ ***P. persicaria***



Antigonon leptopus [HO3]



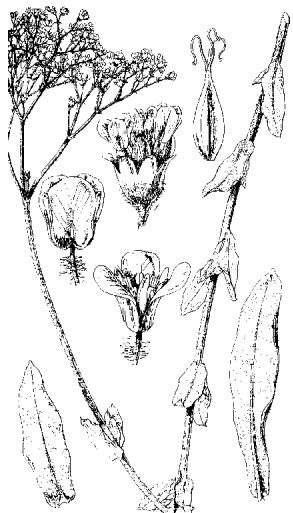
Brunnichia ovata [REE]



Eriogonum annuum [BB1]



Eriogonum longifolium [BB2]



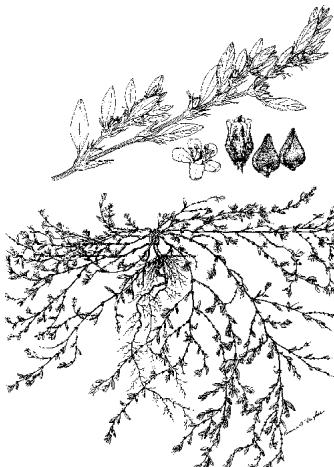
Eriogonum multiflorum [PL]



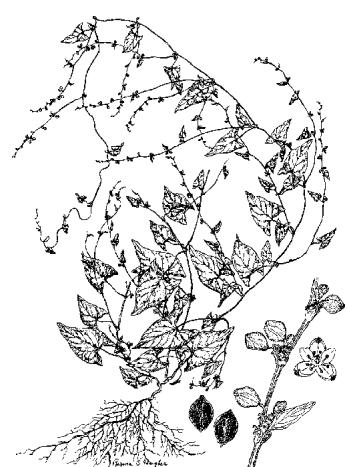
Polygonella americana [BB1]



Polygonum amphibium var. *emersum* [MAS]



Polygonum aviculare [REE]



Polygonum convolvulus [REE]

12. Ocrea cilia over 3 mm long; achenes trigonous, as wide as long; racemes over 3 cm long.
 13. Ocrea cilia 6–22 mm long; leaf blades 10–60 mm wide _____ **P.setaceum**
 13. Ocrea cilia usually 5 mm or less long; leaf blades 8–15 mm wide _____ **P.hydopiperoides**
1. Flowers in slender terminal spikes, becoming widely separated and reflexed in age; plants erect perennials forming clumps from short rhizomes; styles 2, quickly elongating, persisting as 2 slender beaks with hooked tips; tepals 4 _____ **P.virginianum** (*Tovara*)

Polygonum amphibium L. var. **emersum** Michx., (sp.: amphibious, growing on land or in water; var: raised above water level), WATER SMARTWEED. Perennial, rhizomatous, to ca. 1 m tall; ocreae usually eciliate; leaf blades 1–6 cm wide; tepals without forked veins near apex; achenes lenticular, biconvex, turgid, 2.8–4 mm long. Low moist areas; Grayson and Parker cos., also Comanche Co. (HPC); in much of TX, particularly e TX. Jun–Oct. Two intergrading varieties of *P. amphibium* are sometimes recognized in North America: var. *stipulaceum* Coleman, with stems and leaves glabrous, plants floating or sprawling on shore, and flowering while floating or recently stranded; and var. *emersum* Michx., with stems and leaves glabrous to hirsute, plants erect, and flowering from aerial shoots or shoots strongly emergent from water. The species, including the type variety, also occurs in Eurasia (Mitchell 1968; Kartesz 1994; J. Kartesz pers. comm. 1997). All nc TX plants seem to be var. *emersum*. [*Persicaria coccinea* (Muhl. ex Willd.) Greene, *Polygonum coccinum* Muhl. ex Willd.]

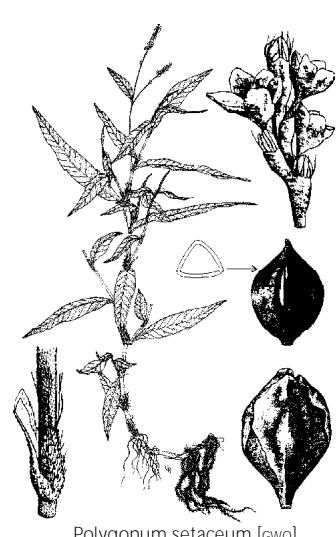
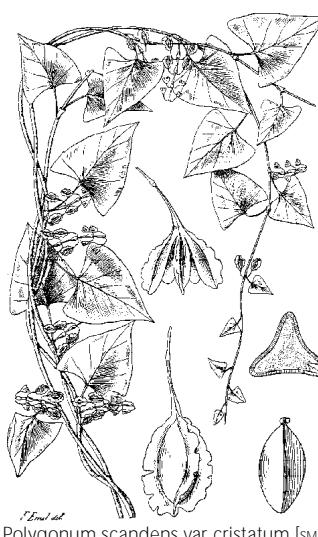
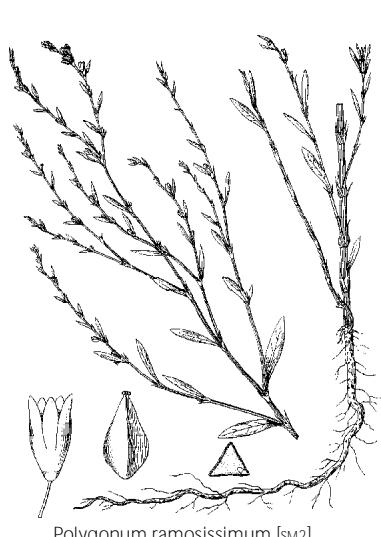
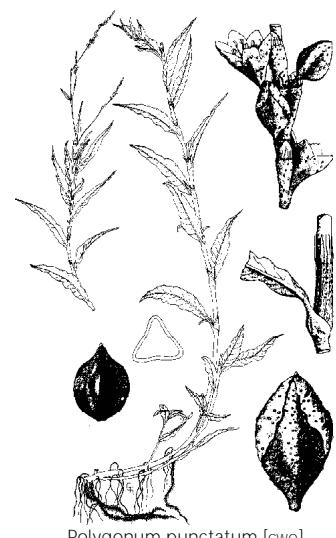
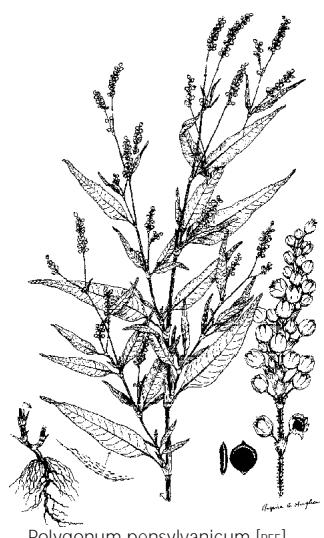
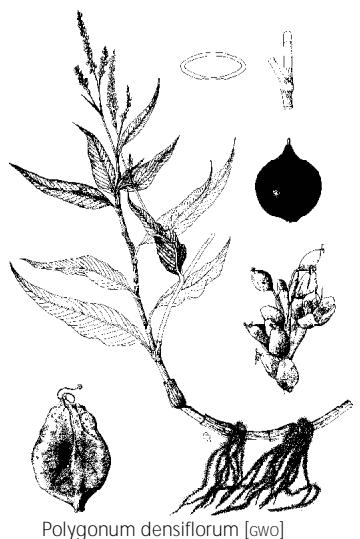
Polygonum aviculare L., (pertaining to small birds, which eat the young leaves and achenes), PROSTRATE KNOTWEED, KNOTWEED. Annual or weak perennial, prostrate or ascending (rarely erect); leaf blades narrowly oblong to narrowly elliptic to linear; flowers solitary or in 2s or 3s at some nodes; pedicels shorter than ocreae; tepals 5, greenish with white or pink margins. Disturbed areas; throughout most of TX. May–Nov. Probably native to Europe. Formerly used as a tea in treatment of asthma; now a bad weed, in places resistant to herbicides (Mabberley 1987). ☎

Polygonum convolvulus L., (old generic name for twiners, to twine around), DULL-SEED CORNBIND, CORN BINDWEED, BLACK BINDWEED, CLIMBING-BUCKWHEAT, WILD BUCKWHEAT. Annual, herbaceous, twining vine to ca. 1.2 m long; tepals greenish, sometimes purple-spotted; achenes trigonous. Disturbed sites; Collin, Dallas, Grayson, Rockwall, and Tarrant cos.; widespread in TX. Apr–Sep. A European weed. ☎

Polygonum densiflorum Meisn., (densely flowered), SNOUT SMARTWEED. Perennial 0.6–2 m tall; stems relatively coarse, usually 7–15 mm in diam. at base; ocreae eciliate; racemes 4–8 cm long; tepals greenish white to white or pink, gland-dotted; achenes lenticular, biconvex. Low moist areas; Brown Co. (HPC) on w margin of nc TX, also Fort Hood (Bell or Coryell cos.—Sanchez 1997); also cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2); widespread in s 1/2 of TX. Jun–Nov. [*Persicaria densiflora* (Meisn.) Moldenke, *Persicaria portoricensis* (Bertero ex Small) Small]

Polygonum hydropiperoides Michx., (resembling *P. hydropiper*, that name meaning water-pepper), SWAMP SMARTWEED, WATER-PEPPER. Annual or perennial to ca. 1 m tall; inflorescences usually 4–8 cm long; tepals white to pink; stamens included; achenes trigonous. Low moist areas; widespread in TX. Jun–Nov. [*Persicaria hydropiperoides* (Michx.) Small]

Polygonum lapathifolium L., (with leaves like *Rumex lapathum*—dock), WILLOW SMARTWEED, CURLTOP SMARTWEED, PALE SMARTWEED. Annual to 1 m or more tall; ocreae eciliate, strongly ribbed; tepals white to pinkish white, with distinctive and obvious (using lens or scope) forked, anchor-like veins near apex; stamens included; achenes lenticular, concave on one side. Low moist areas; throughout TX. Apr–Dec. Probably introduced from Europe. [*Persicaria lapathifolia* (L.) Gray] The leaves of this species have a pronounced tendency to stick to the newspapers in which they were pressed. ☎



Polygonum pensylvanicum L., (of Pennsylvania), SMARTWEED, PINK SMARTWEED, PENNSYLVANICA SMARTWEED. Annual to 1.5 m tall; stem nodes often cherry-red; ocreae usually eciliate; inflorescences erect; tepals white-pink to pinkish; stamens included; achenes lenticular, flat or concave on both faces or ridge on one surface. Low moist areas; nearly throughout TX. May-Jan. [Persicaria bicornis (Raf.) Nieuwl, Persicaria pensylvanica(L) M. Gomez, Polygonum bicorne Raf.]

Polygonum persicaria L., (old generic name, said to come from the leaves resembling those of peach or *persica* in Latin), LADY'S-THUMB, MOCO DE QUAJOLOTE, HEARTS-EASE. Erect annual to 1 m tall; ocrea cilia usually less than 3 mm long; peduncles usually glabrous; racemes numerous; tepals white to pink or dusky pink; stamens included; achenes lenticular or trigonous. Low moist areas, included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); supposedly throughout TX; we have seen no nc TX material. Jun-Dec. Introduced from Europe. [Persicaria vulgaris Webb & Moq.] 

Polygonum punctatum Elliott, (dotted), WATER SMARTWEED, DOTTED SMARTWEED. Erect or ascending annual or perennial 0.1-1 m tall; ocrea bristles usually less than 6 mm long; inflorescences erect to arching, slender, to 10 cm long, the flowers not crowded, irregularly spaced, especially below, the peduncles glandular; tepals with yellowish glands, greenish white; stamens included; achenes usually trigonous. Wet areas; widespread but more common in e 1/2 of TX. Feb-Dec. [Persicaria punctata (Elliott) Small] Infraspecific taxa are sometimes recognized in this species (Fassett 1949; Kartesz 1994; Jones et al. 1997); Jones et al. (1997) apparently treated all TX material as var. *confertiflorum* (Meisn.) Fassett. We are following Correll and Correll (1972), Godfrey and Wooten (1981), Kaul (1986b), and Hatch et al. (1990) in not recognizing infraspecific taxa.

Polygonum ramosissimum Michx., (much-branched), BUSHY KNOTWEED. Erect or ascending branched annual to 0.8(-1.2) m tall; leaf blades lanceolate to linear; flowers solitary or in 2s or 3s at some nodes; tepals yellowish green, 6. Low, moist, disturbed sites; Clay, Grayson, and Montague cos.; widespread in TX. Jun-Nov. Infraspecific taxa are sometimes recognized in this variable species (e.g., Small 1894; Kartesz 1994; Jones et al. 1997); however, we are following Correll and Correll (1972) and Kaul (1986b) in not recognizing taxa below the rank of species. Kaul (1986b) noted that the species is highly variable and that, "The complex needs critical study to determine the role of environment, season, and genetics in such phenotypic plasticity."

Polygonum scandens L. var. **cristatum** (Engelm. & A. Gray) Gleason, (sp: climbing; var: crested), THICKET KNOTWEED, FALSE BUCKWHEAT. Perennial twining or trailing vine to 5 m long, herbaceous; tepals greenish to whitish; achenes trigonous. Disturbed open areas of woodlands, woods margins; Cooke, Dallas, Grayson, Hunt, and Tarrant cos.; e TX w to nc TX, also Edwards Plateau. Aug-Oct. [Polygonum cristatum Engelm. & A. Gray]

Polygonum setaceum Baldwin, (bristle-like), Perennial to 2 m tall; ocrea cilia 6-22 mm long; peduncles strigose to glabrous; tepals white to pink; stamens included; achenes trigonous, the faces flat. Low moist areas; Dallas, Henderson, Hopkins, and Grayson cos.; se and e TX w to nc TX, also Edwards Plateau. Jun-Oct. Sometimes treated as a variety of *P. hydropiperoides* (e.g., Correll & Correll 1972); in some cases the two are distinguished with difficulty; McDonald (1980) gave evidence supporting the recognition of the 2 as distinct species. Jones et al. (1997) recognized TX members of this species as *P. setaceum* var. *interjectum* Fernald. [Persicaria setacea (Baldwin) Small, Polygonum hydropiperoides Michx. var. setaceum (Baldwin) Gleason]

Polygonum tenué Michx., (slender), PLEAT-LEAF KNOTWEED. Erect annual 20-30(-40) cm tall; leaves linear; tepals green with white (rarely pinkish) margins. Sandy woodlands; Denton, Grayson, and Hunt cos.; rare in e 1/2 of TX. Sep-Nov.

Polygonum virginianum L., (of Virginia), JUMPSEED. Sparsely appressed-pubescent to almost glabrous perennial 0.3–1.5 m tall; leaf blades elliptic-lanceolate to ovate-lanceolate; perianth greenish white to white; achenes lenticular, strongly biconvex. In woods, stream bottoms or lower slopes; se and e TX w to Grayson and Tarrant cos., also Edwards Plateau. Jul–Oct. Sometimes recognized in the segregate genus *Tovara* [as *T. virginiana* (L.) Raf.]. The hooked beaks of the achenes are unique in the genus and possibly aid in dispersal by animals (Li 1952a).

RUMEX DOCK, SORREL

Annuals, biennials, or perennials; inflorescence a terminal usually elongate panicle; flowers perfect, or unisexual and the plants dioecious or monoecious; perianth of 6 tepals, the inner 3 usually becoming greatly enlarged in age (and called valves), often with a grain-like tubercle on back, the outer 3 remaining small; stamens 6; fruit a 3-angled (= trigonous) achene enclosed by the valves.

— A temperate, especially n temperate genus of 200 species. Some are variously weeds, used for their edible leaves, or a source of tannin; others contain soluble oxalates and are potentially fatally toxic if eaten in large quantities by livestock, especially sheep (Lewis & Elvin-Lewis 1977). (Classical Latin name for *R. acetosella*, sorrel)

REFERENCES: Rechinger 1937; Sarkar 1958.

1. Leaf blades (except sometimes the upper ones) with lobes basally; tepals (valves) without tubercles; flowers usually unisexual, the sexes usually on separate plants (dioecious).
 2. Plants annual, with taproot; pistillate tepals greatly enlarged in age (2–3 mm long) and enclosing the achene; membranous clasping bracts in upper part of inflorescence ovate, equaling or mostly shorter than the pedicels when flowers are fully open: widespread in nc TX _____ **R. hastatus**
 2. Plants perennial, with rhizomes or stolons; pistillate tepals not enlarging (1–1.5 mm long), much shorter than the achene; membranous clasping bracts in upper part of inflorescence ovate-lanceolate, equaling or exceeding the pedicels when flowers are fully open; rare if present in nc TX _____ **R. acetosella**
1. Leaf blades tapered, rounded or cordate basally, without lobes; tepals with or without tubercles; flowers perfect or if unisexual the sexes not on separate plants (monoecious).
 3. Flowers in widely spaced whorls, the whorls mostly separated by internodes 3–10 times as long as the pedicels; inflorescences not dense in fruit, usually broad and open, with simple primary branches long, spreading-ascending; tepal margins often with teeth longer than wide; lower leaf blades usually cordate at base _____ **R. pulcher**
 3. Flowers in crowded whorls, the middle whorls of main branches separated by internodes 1–3 times as long as the pedicels; inflorescences becoming dense in fruit, much longer than broad, branches erect or closely ascending; tepal margins entire or denticulate, the teeth if present wider than long; lower leaf blades cuneate to rounded or rarely subcordate at base.
 4. At least 1 tepal usually with tubercle at base; inner fruiting tepals not becoming very large, 6 mm or less long or wide; outer fruiting tepals not reflexed in fruit; achenes to ca. 3 mm long; widespread in nc TX, typically in moist soils.
 5. Leaf blades (at least lower ones) with rather minutely toothed and/or obviously crisped margins, usually wavy as well, dark green, not glaucous; axillary shoots usually absent below inflorescence; tepal tubercles usually broadly elliptic to ovate _____ **R. crispus**
 5. Leaf blades with entire, flat or often wavy margins, pale green or glaucous; axillary shoots often present below inflorescence; tepal tubercles usually narrowly elliptic _____ **R. altissimus**
 4. Tepals without tubercles; inner fruiting tepals becoming very large, including basal lobes (8–)13–17 mm long, 7–12 mm wide; outer fruiting tepals reflexed in fruit; achenes 4–5 mm long; rare in nc TX growing in dry sandy areas _____ **R. hymenosepalus**

Rumex acetosella L., (old generic name meaning little sorrel), SHEEP SORREL, SORREL, SOUR-GRASS. Glabrous perennial 10–50 cm tall; pedicel jointed just below flower; calyces scarcely enlarged in fruit. Disturbed sites; included based on citation for vegetational area 4 (Fig. 2) by Hatch et al. (1990), probably based on a Travis Co. record; very rare if present in nc TX; also Edwards Plateau. Apr-May. Native of Europe. ↗

Rumex altissimus Wood, (very tall, tallest), PALE DOCK, SMOOTH DOCK, PEACH-LEAF DOCK. Glabrous perennial or biennial to 160 cm tall; pedicels not much longer than tepals (up to 2 times as long); tepal margins entire. Disturbed moist areas; widespread in much of TX. Apr-Jun.

Rumex crispus L., (crisped, curled), CURLY DOCK, CURLY-LEAF DOCK. Perennial 20–100(–160) cm tall; tepal margins entire or denticulate. Disturbed moist areas; widespread in TX. Apr-May. Native of Europe. ↗

Rumex hastatus Baldwin, (somewhat spear-shaped), HEART-WING SORREL, ENGELMANN'S DOCK. Glabrous perennial 15–100 cm tall; pedicels jointed below middle. Sandy open woods, disturbed sites; e 1/2 of TX. Apr-Jun.

Rumex hymenosepalus Torr., (with membranous sepals), CANAIGRE, WILD RHUBARB, TANNER'S DOCK. Glabrous perennial from cluster of tuber-like roots; stems 30–120 cm tall; leaf blades tapered at base; inflorescences dense; tepals becoming pinkish, entire. Dry sandy areas; Brown Co. (J. Stanford, pers. comm.), also Hatch et al. (1990) cited vegetational area 5 (Fig. 2); mainly Edwards Plateau and Plains Country w to w TX. Spring. The tubers are rich in tannin and were formerly used to treat leather (Mabberley 1987).

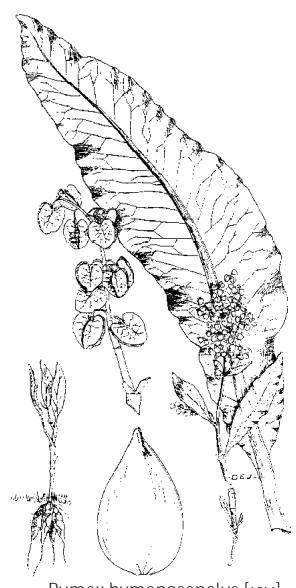
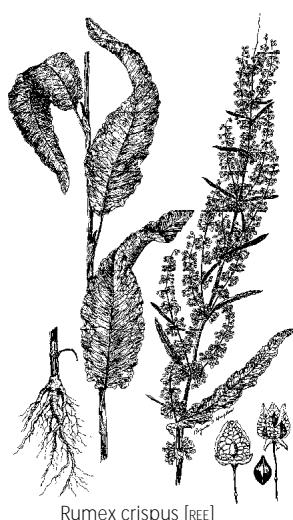
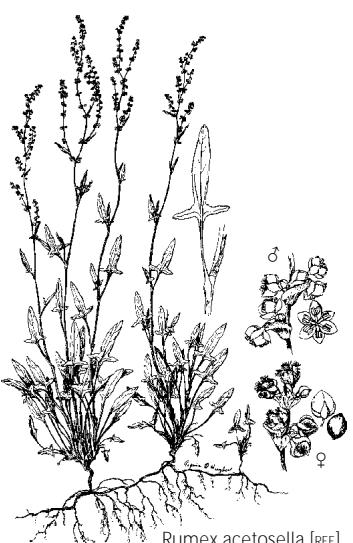
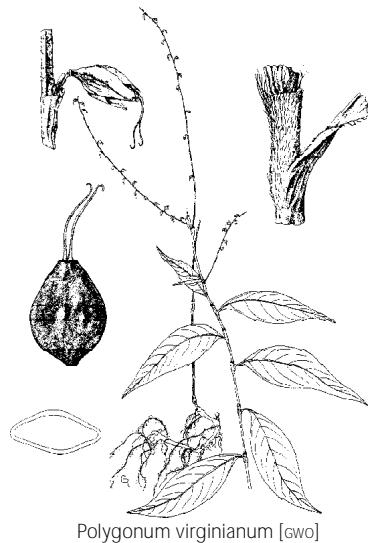
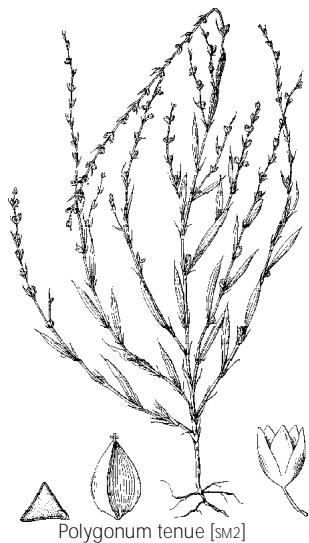
Rumex pulcher L., (handsome, beautiful), FIDDLE DOCK. Perennial 30–120 cm tall; fruiting tepals varying from spiny-toothed to subentire. Damp or disturbed ground; se and e TX w to Grand Prairie and Edwards Plateau. May. Native of Europe. ↗

Rumex verticillatus L., (whorled), SWAMP DOCK, cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2), apparently occurs only to the s of nc TX. Its pedicels, much longer than the tepals ((2–) 2.5–5 times as long), distinguish it from the similar *R. altissimus*

PORTULACACEAE PURSLANE FAMILY

Ours annual or perennial herbs; leaves ± fleshy, flattened to terete, alternate or opposite, simple, entire; flowers solitary or in corymbose panicles or racemes; sepals 2, separate, sometimes falling early; petals usually 4–5(–6), separate; stamens 5–many; pistil 1; ovary superior or half inferior; fruit a capsule, 3-valved or circumscissile.

—A small (380 species in 32 genera), cosmopolitan, especially w North American family of usually succulent herbs and shrubs with mucilaginous tissues and betalain pigments; it includes various ornamentals. A number of species have specialized Kranz ("wreath") anatomy and the associated C₄ photosynthetic pathway, adaptations for hot dry conditions (the C₄ pathway allows for a more efficient capture of CO₂ thereby reducing the degree to which the stomata have to be open and thus the amount of water lost through transpiration). The family is possibly polyphyletic or paraphyletic and may be ancestral to Cactaceae (Rodman 1990; Downie & Palmer 1994); a recent study by Hershkovitz and Zimmer (1997) indicated on the basis of molecular data that the Cactaceae is derived from within the Portulacaceae and that the molecular divergence "... between pereskiod cacti and the genus *Talinum* (Portulacaceae) is less than that between many Portulacaceae genera." The Portulacaceae also seems related to the Basellaceae (Rodman et al. 1984; Carolin 1993). Plant anatomists/morphologists consider the perianth to be of a single series, with the petal-like structures actually sepals and the sepal-like



structures actually bracts (Tyrl et al. 1994); for convenience we are following most taxonomists and using the terms sepals and petals. (subclass Caryophyllidae)

FAMILY RECOGNITION IN THE FIELD: herbs with stems or leaves *fleshy* and often mucilaginous; leaves simple, entire; flowers with 2 *sepals* and 4–5(–6) petals; fruit a capsule.

REFERENCES: Rydberg 1932; Bogle 1969; Barker 1986a; Carolin 1993; Behkne & Mabry 1994; Downie & Palmer 1994; Hershkovitz & Zimmer 1997.

1. Flowers on leafless pedicels or peduncles; ovary superior; fruit a 3-valved capsule splitting from the top (= apex) down.

2. Stem leaves several–many, alternate (but stem often short and leaves thus crowded), 7 cm or less long, 3.5 mm or less wide; flowers axillary or in a terminal branched inflorescence; sepals deciduous; petals pink to purple, orange, or reddish _____ **Talinum**

2. Stem leaves 2, opposite or nearly so, ca. 9–15 cm long, 5–15 mm wide; flowers in a terminal unbranched raceme; sepals persistent in fruit; petals white to pink with pink to purplish veins _____ **Claytonia**

1. Flowers sessile or subsessile, subtended by leaves or leafy bracts; ovary half-inferior; fruit a circumscissile capsule (= top coming off like a lid) _____ **Portulaca**

CLAYTONIA SPRING-BEAUTY

☛ A mainly North American genus of 24 species with some in e Asia; a number are cultivated as ornamentals or used for their edible corms; some have ant-dispersed seeds. (Named for John Clayton, 1686–1773, one of the earliest American botanists; he sent Johan F. Gronovius the specimens for his *Flora Virginica* (published in 1739), one of the first books on American botany—Strausbaugh & Core 1978)

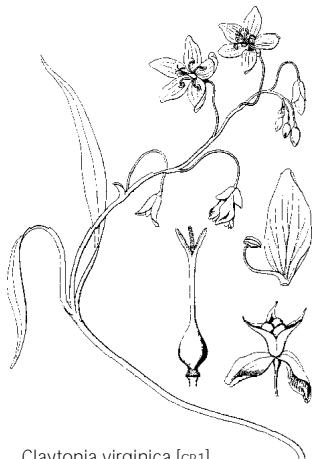
REFERENCES: Rothwell 1959; Rothwell & Kump 1965; Lewis et al. 1967; Lewis 1976; Lewis & Semple 1977; Doyle 1983, 1984.

Claytonia virginica L., (of Virginia), VIRGINIA SPRING-BEAUTY. Perennial from a soft-woody, globose, small corm; stems 1 to many, thread-like and oblique underground, half-decumbent to ascending above ground; exposed part of plant 5–30 cm long; basal leaves present (somewhat fleshy) as well as 2 stem leaves; inflorescence a terminal raceme with 6–15 flowers; flowers closed at night and in cloudy weather; petals 5, ca. 9–14 mm long; stamens 5. Sandy open woods, prairies, disturbed sites; se and e TX w to East Cross Timbers, locally in Red River drainage w to Archer Co., in Brazos River drainage w to Bosque Co. (Mahler 1988); also Edwards Plateau. Late Feb–early Apr. Cultivated as an ornamental; chromosome number varies from $2n = 12$ to almost 200, with different numbers even within the same plant (Rothwell 1959; Rothwell & Kump 1965; Lewis et al. 1967; Lewis & Semple 1977; Mabberley 1987); the bulb-like corms were apparently eaten by Native Americans (Ajilvsgi 1984). The seeds have elaiosomes and are dispersed by ants (Handel 1978). ☐/84

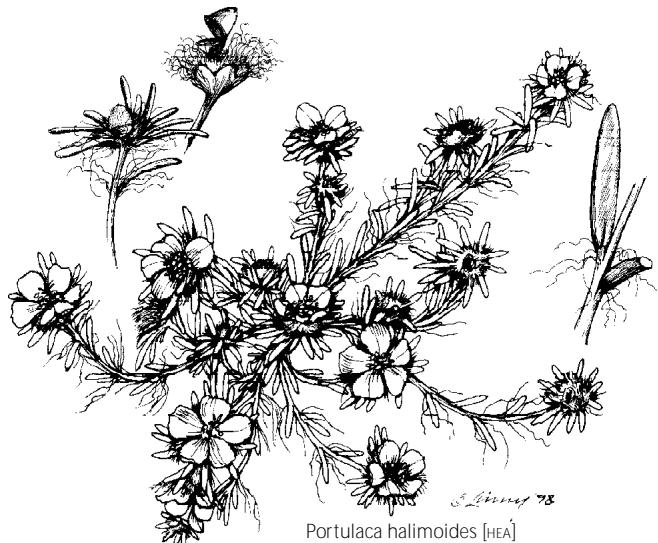
PORFULACA PURSLANE

Ours low, often prostrate, succulent annuals; leaves alternate or subopposite or the uppermost apparently whorled, sessile or subsessile, flat or terete; flowers opening in late morning or afternoon, closing at night; petals usually 5; stamens 8–many; fruits circumscissile with a bottom valve (like a pot) and an upper valve (like a lid), with or without a wing at the line where the valves separate.

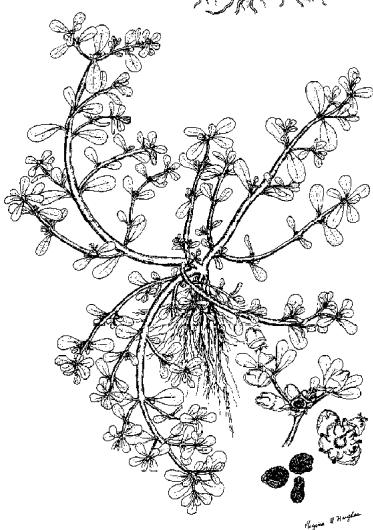
☛ A tropical and warm area genus of 40 species of succulent, trailing, usually annual herbs. Some are used as potherbs, medicinally, or as cultivated ornamentals (e.g., *P. grandiflora* Hook., ROSE-MOSS, MOSS-ROSE, of n South America with variously colored, often double flowers). (Presumably diminutive of Latin: *porta*, a gate or door, from the fruit lid)



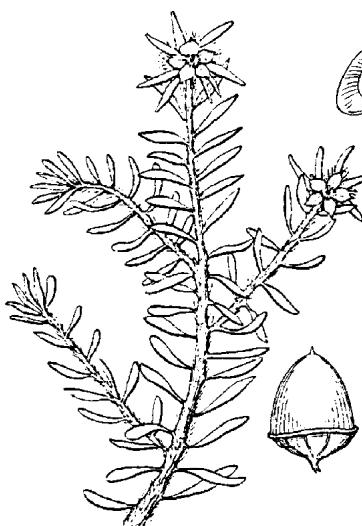
Claytonia virginica [GR1]



Portulaca halimoides [HEA]



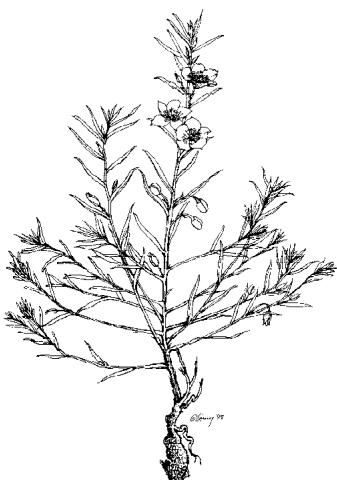
Portulaca oleracea [REE]



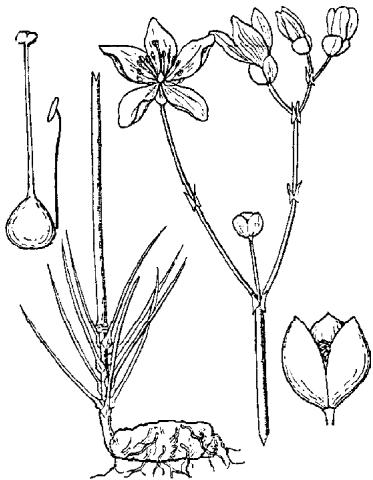
Portulaca pilosa [BB1]



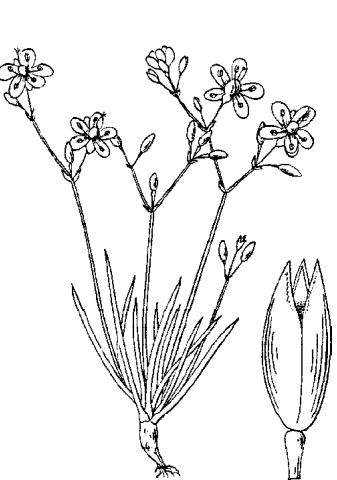
Portulaca umbraticola subsp. lanceolata [HEA]



Talinum aurantiacum [HEA]



Talinum calycinum [BB1]



Talinum parviflorum [BB1]

REFERENCES: Legrand 1962; Matthews & Levins 1985a, 1985b; Matthews 1986; Matthews & Ketron 1991; Matthews et al. 1992a, 1992b, 1993, 1994.

1. Stem leaves terete to subterete (definitely not flat), linear or linear-ob lanceolate; leaf axils and inflorescence conspicuously villous with long, white, kinky hairs; flowers subtended by an involucral ring of 6–10 small leaves.

2. Petals red-purple, 3–6(–7.5) mm long; capsules 2.5–3.5 mm in diam.: common in parts of nc

TX _____

P. pilosa

2. Petals yellow to bronze, < 3 mm long; capsules 1.5–2 mm in diam.: included here on basis of only one citation, apparently rare in nc TX _____

P. halimoides

1. Stem leaves thick but flat, oblong-lanceolate to oblong-elliptic or obovate; leaf axils and inflorescence glabrous or with inconspicuous hairs; flowers subtended by 2–4 small leaves.

3. Capsules with only a line around the wide rim at the point of dehiscence; leaves oblanceolate or obovate, the upper 2–4 times as long as wide; petals yellow _____

P. oleracea

3. Capsules with projecting, scarious wing 0.4–0.8 mm wide around the wide rim under the point of dehiscence; leaves oblong-lanceolate or oblanceolate, the upper 3–5 times as long as wide; petals yellow tipped with red or copper _____

P. umbraticola

Portulaca halimoides L., (resembling *Halimium* of the Cistaceae), SINKER-LEAF PORTULACA. Sandy or gravelly areas; included on basis of citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly c and w TX. Mar–Nov [P *parvula* A. Gray]

Portulaca oleracea L., (of the vegetable garden, a potherb used in cooking), COMMON PURSLANE, PURSLANE, PUSLEY, VERDOLAGA. Petals yellow, 3–10 mm long. Dried-up lake beds, disturbed areas; Grayson Co; nearly throughout TX. Jul–Sep. Cosmopolitan weed of uncertain origin but probably native to the Old World. While this species is often divided into many subspecies (e.g., Kartesz 1994), we are following Matthews et al. (1993) in not recognizing infraspecific taxa; they concluded *P. oleracea* is a polymorphic species not divisible based on seed surface characters (which were used to divide it in the past); chromosome number is variable, ranging from $2n=18$ to 36, 45, 52, or 54 (Matthews et al. 1993). This species can be an aggressive weed. It has been long cultivated, eaten as a potherb and salad, and used as fodder; however, the tart taste comes from oxalic acid, which in large quantities can be toxic (Matthews & Levin 1985a; Tveten & Tveten 1993). ☣ ☦

Portulaca pilosa L., (with long soft hairs), CHISME, SHAGGY PORTULACA. Loose sandy or gravelly soils; Burnet and Grayson cos., also Brown Co. (HPC); nearly throughout TX. Late Jun–Oct. Matthews et al. (1992b) concluded that [P *mundula* I.M. Johnst.] is a synonym.

Portulaca umbraticola Kunth subsp. **lanceolata** (Engelm.) J.F. Matthews & Ketron, (sp.: growing in shady places; subsp.: lance-shaped), WING-POD PORTULACA, CHINESE-HAT. Similar to *P. oleracea* but distinguished by the winged capsules and flower color. Typically in sandy soils, disturbed areas; Grayson Co., also Brown and Comanche cos. (HPC); nearly throughout TX. Jul–Sep. [P *lanceolata* Engelm.] Matthews and Ketron (1991) recognized three subspecies within this variable species. Subspecies *coronata* (Small) J.F. Matthews & Ketron has solid yellow petals, a chromosome number of $2n=36$, and is apparently endemic to South Carolina and Georgia. Subspecies *lanceolata*, "... is characterized by yellow petals tipped with red (copper), a chromosome number of $2n=54$, and a distribution generally west of the Mississippi River." Subspecies *umbraticola* "... is variable in flower color: pink, purple, red or yellow. It has a chromosome number of $2n=18$ " (Matthews & Ketron 1991); subspecies *umbraticola* is known from South America and the Antilles.

TALINUM FLAMEFLOWER

Succulent perennials with pithy root; leaves alternate or opposite, sometimes crowded on a short stem; flowers axillary or in terminal cymose panicles, open in late afternoon and evening or in cloudy weather; petals 5 (rarely more); stamens 4–30 or more.

☛ A genus of 39–40 species of the Americas and s Africa; some are cultivated as ornamentals and as pothebs. (Derivation obscure, possibly from an African vernacular name)

1. Flowers in terminal inflorescences; petals pink to purple (rarely reddish); leaves nearly as thick as wide, linear-lanceolate, usually rather crowded on a short stem (stems 10 cm or less long); wide-spread in nc TX.
 2. Petals 4–9 mm long; stamens 4–10; capsules 3–5 mm long; usually on sand _____ **T. parviflorum**
 2. Petals 9–15 mm long; stamens 25 or more; capsules 5–8 mm long; usually on limestone _____ **T. calycinum**
1. Flowers solitary, axillary; petals orange or reddish; leaves flat (but fleshy), linear-lanceolate to obovate, alternate or opposite, well separated up the entire length of the elongate stem; extreme w margin of nc TX _____ **T. aurantiacum**

Talinum aurantiacum Engelm., (orange-red), ORANGE FLAMEFLOWER. Plant 12–35 cm or more tall, stiffly branched, becoming woody toward base; sepals 6–9 mm long; petals 9–13 mm long; capsules 5–7 mm long. Sandy or rocky ground; Callahan, Stephens, and Throckmorton cos., also Brown Co. (HPC); extreme w part of nc TX s and w to w TX. Late Apr–Sep. ☒/107

Talinum calycinum Engelm., (calyx-like), ROCK-PINK. Stems ca. 3–10 cm; plant including inflorescence to ca. 33 cm tall; sepals 4.5–8 mm long. Gravelly or rocky limestone soils; n Fort Worth Prairie—Cooke, Parker, and Wise cos., also Montague Co. (R. O'Kennon, pers. obs.), also nw Grayson Co. on Goodland limestone outcrop; nc and nw TX. May–Jul. ☒/107

Talinum parviflorum Nutt., (small-flowered), PRAIRIE FLAMEFLOWER, DWARF FLAMEFLOWER. Plant with short stem or nearly acaulescent, including inflorescence to ca. 19 cm tall; sepals 2.7–4 mm long. Bare sandy or sandy clay soils; throughout most of TX. May–Sep.

PRIMULACEAE PRIMROSE FAMILY

Ours low, glabrous, annual or perennial herbs with fibrous roots; leaves basal, alternate, opposite, or whorled, sessile or indistinctly petioled, simple, entire; flowers axillary or terminal, solitary or in racemes or umbels; calyces 5-lobed; corollas moderately to very deeply 5-lobed, funneliform to rotate or with reflexed lobes; stamens 5; pistil 1; ovary superior; placentation free-central; fruit a dehiscent capsule.

☛ A medium-sized (825 species in 22 genera), nearly cosmopolitan, but mainly n temperate family of herbs or rarely subshrubs; it includes a number of ornamentals such as *Cyclamen* (CYCLAMENS) and *Primula* (PRIMROSES). ☠ Anagallis and Cyclamen species are used medicinally, but also contain a poisonous substance. Primulaceae are related to the woody tropical family Myrsinaceae (Judd et al. 1994). Family name from *Primula*, a genus of 400 species of perennial herbs native to the n hemisphere and s to Java, New Guinea, and s South America. (Latin: *primus*, first, in reference to the early flowers of some species) (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: herbs with simple entire leaves, sometimes in a basal rosette; corollas 5-lobed, radially symmetrical, short to long tubular; stamens epipetalous, opposite the corolla lobes; ovary superior; style and stigma single.

REFERENCE: Channell & Wood 1959.

1. Flowers in an umbel terminating a scape; leaves basal only (but the umbel can have leafy bracts at base).

2. Plants dwarf annuals 1–7 cm tall; corollas white, funnelform to subrotate, 0.8–1.5 mm long or broad, shorter than the calyces; stamens distinct, neither forming a cone nor exserted _____ **Androsace**
2. Plants perennials 30–60 cm tall; corollas lavender or purple-rose with yellow eye, the lobes reflexed, 12–28 mm long, much longer than the calyces; stamens with filaments joined below, the anthers forming a conspicuous exserted cone _____ **Dodecatheon**
1. Flowers in leaf axils (1 per leaf) OR in racemes; well-developed leaves extending up stem.
3. Corollas yellow; leaves opposite or whorled _____ **Lysimachia**
3. Corollas white to pink, scarlet, or blue; leaves alternate or opposite.
4. Flowers in terminal racemes with numerous flowers; corollas white; capsules valvate _____ **Samolus**
4. Flowers axillary, solitary per leaf axil; corollas white to pink, scarlet, or blue; capsules circumscissile _____ **Anagallis**

ANAGALLIS PIMPERNEL

Annuals; leaves sessile or subsessile; corollas rotate; capsules globose or subglobose, circumscissile.

☛ A genus of ca. 28 species of Europe, African mountains, and South America, with 1 pantropical. (Greek: *anagelao*, to laugh or delight; from belief they dispelled sadness)

1. Leaves opposite; corollas usually scarlet, rarely blue, with purple eye ring; flowers on pedicels exceeding the leaves _____ **A. arvensis**
1. Leaves alternate; corollas white or pinkish; flowers sessile or nearly so _____ **A. minima**

Anagallis arvensis L., (pertaining to cultivated fields), SCARLET PIMPERNEL, POORMAN'S-WEATHERGLASS, COMMON PIMPERNEL, HIERBA DEL PÁJARO, SHEPHERD'S -WEATHERGLASS. Erect to sprawling, usually freely branched annual; leaves sessile, elliptic or ovate; flowers 5-merous; corollas ca. 4–6 mm wide, closed at night or in cloudy weather, usually lasting one day; capsules ca. 4 mm in diam. Sandy disturbed ground; Dallas, Grayson, and Lampasas cos.; e 1/2 of TX. Native of Europe. The flowers quickly close at the approach of bad weather; thus the common name WEATHERGLASS. Formerly used medicinally (Mabberley 1987); apparently poisonous due to the presence of triterpene saponins (Cheatham & Johnston 1995). ☀️⚡

Anagallis minima (L.) E.H.L. Krause, (lesser, smaller), CHAFFWEED, FALSE PIMPERNEL. Inconspicuous small annual; leaves obovate; flowers sessile or nearly so, 4 or occasionally 5-merous; corollas minute, ca. 1 mm wide; capsules to 2 mm in diam. Damp sandy ground; Dallas and Denton cos., also Lamar Co. (Carr 1994); se and e TX w to nc TX, also Edwards Plateau. Apr–May. Native of Europe. Sometimes segregated into the genus *Centunculus* [as *C. minimus* L.] ☀️⚡

ANDROSACE ROCK-JASMINE

☛ A n temperate genus of 100 species, often xerophytic; some are cultivated as rock garden ornamentals. (Greek: *andros*, male, and *sakos*, buckle, alluding to the shape of the anthers)
REFERENCE: Robbins 1944.

Androsace occidentalis Pursh, (western), WESTERN ROCK-JASMINE. Dwarf annual 1–7 cm tall; leaves in a basal rosette, usually elliptic-ob lanceolate, to 2 cm long and 6 mm wide, white-pubescent above; scapes with stellate hairs; corollas ca. 2.5 mm wide, white; stamens distinct; capsules 5-valved. Sandy or silty ground; Blackland Prairie w to w TX. (Jan–)Feb–Apr. Very small, usually overlooked, and probably more widespread than reported.

DODECATHEON SHOOTING-STAR, AMERICAN COWSLIP

☛ A genus of 13 species, mainly North American with 1 in e Siberia; related to *Primula* but with reflexed corollas and self-pollination possible. Many are cultivated as ornamentals because of the showy, unusually shaped flowers. Members of this genus exhibit the “vibrator” or

"buzz" pollination syndrome; pollinators (such as bumblebees) shake the anthers by vibrating their thoracic flight muscles at a certain frequency; this sets up a resonance in the anthers or the space they enclose and the otherwise inaccessible pollen is released from the terminal pores of the anthers and collected by the insect (Macior 1964; Barth 1985; Proctor et al. 1996). The turned back (reflexed) corollas and exposed anther-cone of "vibrator"-type flowers may be an adaptation to minimize dampening of vibration resonance or it may be an adaptation related to microclimate in the flower (e.g., to keep the pollen in a dry powdery condition so that it is easily dispersed) (Corbet et al. 1988; Proctor et al. 1996). (Greek: *dodeca*, twelve, and *theos*, god, name given by Pliny to the related PRIMROSE, which was believed to be under the care of the twelve superior gods)

REFERENCES: Fassett 1944; Gleason 1952; Macior 1964.

Dodecatheon meadia L., (for Richard Mead, 1673–1754, English physician), COMMON SHOOTING-STAR, AMERICAN COWSLIP. Perennial scapose herb to ca. 60 cm tall; leaves to 20 cm long and 4 cm wide, usually tinged with red at base (all nc TX specimens we have observed have the leaves gradually tapering to the base—this corresponds with var or subsp. *media* if infraspecific taxa are recognized); scapes erect; inflorescence an umbel of few–many flowers; flowers extremely showy, nodding at anthesis; corollas lavender or purple-rose with yellow eye, the lobes reflexed, 12–28 mm long, much longer than the calyces; filaments connate below; anthers forming a conspicuous slender cone; capsules 7.5–18 mm long, 5-valved. Prairies, calcareous clay, on slopes or in low ground; Grand Prairie (Cooke, Montague, Tarrant, and Wise cos.), also Grayson Co.; e TX w to Grand Prairie and Edwards Plateau. Apr–May. Also cultivated as an ornamental. We are following Correll and Johnston (1970) and Hatch et al. (1990) in not recognizing infraspecific taxa in nc TX; Kartesz (1994) and Jones et al. (1997) recognized 2 subspecies in TX (subsp. *brachycarpum* (Small) R. Knuth and subsp. *media*). Gleason (1952) distinguished the 2 (as varieties) as follows: ☐/87/frontispiece

1. Leaves cordate at base or abruptly narrowed into the petiole; anthers (4–)5.5–6.6(–7) mm long; capsules 7.5–10 mm long var. *brachycarpum*
1. Leaves gradually tapering to the base; anthers (6.5–)7–8(–10) mm long, capsules 10.5–18 mm long var. *meadia*

LYSIMACHIA LOOSESTRIFE

— A temperate and warm area genus (especially the Himalayas, China, and Europe) of ca. 150 species of herbs or rarely shrubs; some are used locally as medicines or cultivated as ornamentals. (Greek *lysis*, releasing, and *mache*, strife; according to tradition, King Lysimachos of Thrace (ca. 360–281 BC), upon being chased by a maddened bull, was said to have pacified it by waving a LOOSESTRIFE plant)

REFERENCE: Coffee & Jones 1980.

Lysimachia lanceolata Walter, (lanceolate, lance-shaped), LANCE-LEAF LOOSESTRIFE. Perennial reproducing vegetatively by rhizomes; stems (10–)20–90 cm tall, erect; petioles of middle stem leaves pubescent from node to base of blade; stem leaves opposite or whorled, 3–14(–16) cm long, 4–16 mm wide, linear to lanceolate, entire, short-petiolate; basal leaves often persistent as a rosette; flowers solitary per leaf axil, on long pedicels 10–40 mm long; corollas deeply 5-lobed, the lobes 5–9 mm long, yellow; stamens 5; 5 small staminodia present; capsules 2–4.5 mm in diam., valvate. Moist to dry woods, slopes; Lamar Co. in Red River drainage; in TX known only from three other counties (Bowie, Cass, Red River) in extreme ne part of the state. May–Jun.

Lysimachia radicans Hook., (rooting), TRAILING LOOSESTRIFE, occurs in e TX just to the e of nc TX. It can be distinguished by its habit (reclining or trailing and rooting at the nodes), corolla lobes only 2–5 mm long, and by the petioles of the middle stem leaves pubescent only along the basal portion.

SAMOLUS BROOKWEED, WATER-PIMPERNEL

Perennial or annual [?], somewhat succulent herbs; leaves in basal rosettes; alternate stem leaves also present, entire; flowers pedicellate, in racemes, these often paniculately arranged; corollas 5-lobed, white in our species; ovary partially inferior; capsules 5-valved.

☛ A cosmopolitan genus of 15 species, especially in wet areas. (Ancient name probably of Celtic origin, said to refer to curative properties of the genus in diseases of cattle and swine)
REFERENCE: Henrickson 1983.

1. Racemes on long stout peduncles longer than the stems, no bracts close to the lowest flowers; corollas 4–6 mm wide, the lobes usually shorter than the tube; capsules 3–4 mm in diam.

S. ebracteatus

1. Racemes sessile or nearly so, leaf-like bracts near the lowest flowers; corollas 2–3 mm wide, the lobes longer than the tube; capsules 2–3 mm in diam.

S. valerandi

Samolus ebracteatus Kunth subsp. ***cuneatus*** (Small) R. Knuth, (sp.: without bracts; subsp.: wedge-shaped), LIMEROCK BROOKWEED. Plant to 60 cm tall; leaves obovate to oblanceolate to broadly spatulate; staminodia not present. Wet limestone, seepage areas, or along streams; Bell and Palo Pinto cos.; nc TX s and w to w TX. Mar-Oct. [*S. cuneatus* Small]

Samolus valerandi L. subsp. ***parviflorus*** (Raf.) Hultén, (sp: derivation unexplained by Linnaeus; subsp.: small-flowered), THIN-LEAF BROOKWEED. Plant to 60 cm tall, typically much smaller; leaves obovate, oblanceolate, elliptic to spatulate; 5 staminodia present in sinuses of corolla lobes. Along creeks, ditches, or seepage areas; throughout TX. Apr-Oct. [*S. parviflorus* Raf.]

RAFFLESIACEAE RAFFLESIA FAMILY

☛ A small family (50 species in 9 genera) of chlorophyll-less stem or root parasites of tropical areas with a few in temperate regions. The vegetative portion of the plant is ± thread-like and occurs within the host tissues like fungal mycelia. Family name from *Rafflesia*, a genus of 16 rare species in a few localities in Borneo, Sumatra, Java, Peninsula Malaysia, Thailand, and the Philippines; *Rafflesia arnoldii* R. Br., an endangered Sumatran parasite, has the largest flowers of any known plant; a single flower can be 97 cm (over 38 inches) in diam. and weigh 7 kg (over 15 pounds). The flowers smell of carrion and are visited by and probably pollinated by flies (Mat Salleh 1991). While placed in the Rosidae by Cronquist (1981), a relationship with Aristolochiaceae or some other Magnoliidae group seems more likely (Meijer 1993). (Named for Sir Thomas Stamford Raffles, the founder Governor of Singapore during the British East India Company's rule in southeast Asia; he was present when the first species was collected in Sumatra in 1818) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is a *stem parasite* with the *only structures visible* outside the host being the small, *bud-like* flowers and a few subtending, tiny, scale-like leaves.

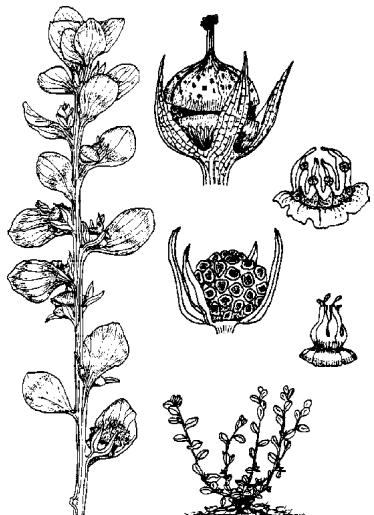
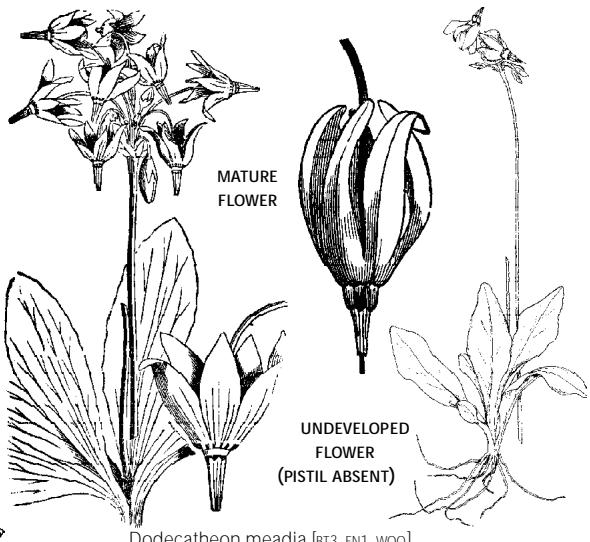
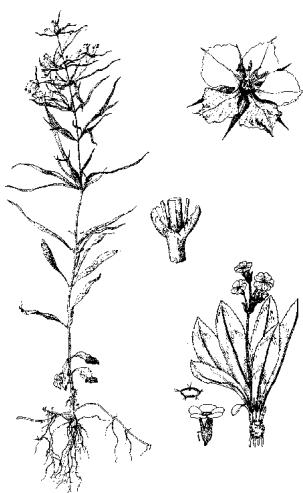
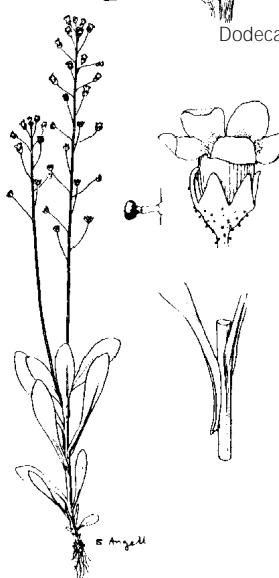
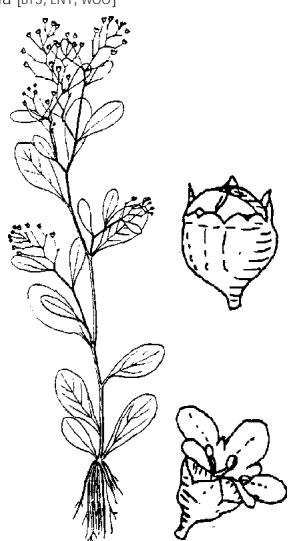
REFERENCES: Mat Salleh 1991; Meijer 1993.

PILOSTYLES

☛ A genus of ca. 11 species mainly of the New World (CA and TX to the tropics) but with 2 in sw Australia, 1 in Iran, and 1 in tropical Africa. They parasitize all three subfamilies of Fabaceae. (Greek: *pilos*, cap, and *stylus*, column, stake, or style; presumably from the shape of the style/stigma)

REFERENCE: Rose 1909.

Pilostyles thurberi A. Gray, (for George Thurber, 1821–1890, botanist and quartermaster with the U.S.-Mexican Boundary Survey), THURBER'S PILOSTYLES. Parasite with vegetative structures ± en-

*Anagallis arvensis* [MUE]*Anagallis minima* [c01]*Androsace occidentalis* [BB1]*Dodecatheon meadia* [BT3, EN1, WOO]*Lysimachia lanceolata* [c01]*Samolus ebracteatus* subsp. *cuneatus* [SWN]*Samolus valerandi* subsp. *parviflorus* [STE]

tirely within the tissues of the host plant with only the small flowers and sometimes a few subtending scale-like leaves visible externally (complete visible portion of plant bud-like); floral bracts 2–7, broadly ovate, 1–1.5 mm long; flowers unisexual, solitary per short (to 1.5 mm long) peduncle, brownish; calyx segments 4–5, similar to bracts, 1–1.5 mm long; petals absent; staminate flowers with many sessile anthers in 1–3 series around a column that is expanded at tip into a disk ca. 1 mm in diam.; pistillate flowers with stigmas in ring along disk margin; ovary inferior; fruit a globose capsule 1–1.5 mm in diam; seeds numerous. Parasitic on *Dalea frutescens* (Fabaceae) in nc TX and also on *D. formosata* the s and w; Bell, Brown, Comanche, Hamilton, and Mills cos. (HPC); sw part of nc TX s and w to w TX. May–Jul. [*P. covillei* Rose]

RANUNCULACEAE BUTTERCUP FAMILY

Ours annual or perennial herbs or seldom woody climbers (*Clematis*); leaves basal, alternate, opposite, or apparently whorled, simple or compound, entire, toothed, or lobed; flowers solitary or in spikes, racemes, or panicles, perfect or unisexual, often with a prominent, elongating receptacle, the flower parts closely spiral; perianth parts few to many, alike or differentiated into sepals and petals, the petals often producing nectar (sometimes called honey leaves); stamens usually many; pistils few to many; ovary superior; fruit in ours an achene or follicle.

— A large family of 2,500 species in ca. 60 genera (Whittemore & Parfitt 1997); it is a mainly temperate and boreal group of usually herbs with some lianas and small shrubs. The family contains numerous ornamentals including species of *Aconitum* (MONKSHOOD), *Anemone*, *Aquilegia*, *Caltha* (MARSH-MARIGOLD), *Clematis*, *Delphinium*, and *Ranunculus*. — A number are highly poisonous (e.g., *Aconitum*—WOLFSBANE, MONKSHOOD) due to the presence of alkaloids or other toxins such as glycosides or saponins. (subclass Magnoliidae)

FAMILY RECOGNITION IN THE FIELD: herbs (or 1 genus of woody climbers) with *cone- or dome-shaped* receptacles with *numerous spirally arranged* stamens and few to numerous *separate* pistils; leaves often variously divided or compound, the bases often sheathing.

REFERENCES: Keener 1977; Loconte & Estes 1989; Ziman & Keener 1989; Duncan & Keener 1991; Tamura 1993; Whittemore & Parfitt 1997.

1. Flowers with 1 or 5 large spurs; fruit a follicle.
 2. Perianth radially symmetrical, reddish to rose and yellow; conspicuous spurs 5, 1 from each of the petal-like perianth parts _____ ***Aquilegia***
 2. Perianth bilaterally symmetrical, white to blue, pink, or purple; conspicuous spur 1, from the upper perianth part of the outer whorl.
 3. Plants native perennials; upper leaves petioled (petioles sometimes short); carpels and later follicles 3(–4); lowest floral bracts not conspicuously dissected, with 1–few segments; inner series of perianth (= honey leaves) of 4 separate structures (2 upper included within spur of outer series, 2 lower short-clawed) _____ ***Delphinium***
 3. Plants introduced annuals; upper leaves sessile or nearly so; carpels and later follicles 1; lowest floral bracts conspicuously dissected into many filiform segments; inner whorl of perianth of 2 fused structures _____ ***Consolida***
1. Flowers with minute spurs or none; fruit an achene.
 4. Flowering stems with opposite or whorled leaves or leafy bracts; perianth of sepals only (these petal-like).
 5. Stems with 1 whorl of leafy bracts (at first close to the flower, somewhat calyx-like); plants erect herbs, small, to ca. 30 cm tall; styles short, < 3 mm long; sepals numerous, (7–)10–20 (–30) _____ ***Anemone***
 5. Stems with opposite leaves; plants climbing or scrambling vines, the stems > 30 cm long except when young; styles often very long, 10–100 mm long; sepals 4(–6) _____ ***Clematis***

4. Flowering stems with alternate leaves or none; perianth of sepals and petals OR of sepals only (these petal-like). _____
6. Leaves all basal, entire _____ **Myosurus**
6. Leaves alternate up the stems, varying from entire to toothed, lobed, or compound.
7. Perianth of 4 or 5 sepals, falling after the flowers open; sepals 5 mm or less long, whitish to purplish, rather inconspicuous; flowers all unisexual or some perfect; leaves 2–3 times distinctly ternately compound _____ **Thalictrum**
7. Perianth of 10 or more sepals and petals, in 2 or more rows (some sepals may be very small and inconspicuous); perianth parts 1–21 mm long, usually yellow, red, or red-purple (rarely green), often showy and conspicuous; flowers perfect; leaves various, often lobed or compound but not 2–3 times ternately compound.
8. Petals yellow or rarely green; leaves various; widespread native and naturalized species _____ **Ranunculus**
8. Petals red to red-purple; leaves much-dissected into numerous linear segments; rare escaped cultivar _____ **Adonis**

ADONIS PHEASANT'S-EYE

— A genus of ca. 35 species (Parfitt 1997) of temperate Eurasia. ☣ Adonis species contain glycosides with marked cardiac activity; some are used medicinally with effects similar to digitalin; lethal poisoning in livestock has been reported (Kingsbury 1964); some are cultivated as ornamentals. (Named for Adonis of Greek mythology, lover of Aphrodite and the god of plants, from whose blood the plant allegedly grew; based on the blood red flowers)

REFERENCES: Heyn & Pazy 1989; Parfitt 1997.

Adonis annua L., (annual), PHEASANT'S-EYE. Erect, glabrous annual with much-branched stems 20–70 cm tall; leaves alternate, much-dissected, the numerous segments linear; petioles with clasping base; flowers solitary, terminal, short-pedicelled; sepals 5–8, thin; petals 6–10, red to red-purple with dark base, 8–15 mm long; stamens 15–20; pistils many; achenes in cylindric heads 1–2 cm long, the individual achenes 3–5 mm long, glabrous. Cultivated as an ornamental, naturalized along roadsides, in waste places, and disturbed soils; Dallas, Denton, Grayson, McLennan, Williamson, and Wise cos., also Bosque Co. (Mahler 1988); mainly n part of e 1/3 of TX. Reverchon (1880) stated that it was imported by French colonists in 1855. Late Mar–May (–later). Native of Europe. Reportedly poisonous due to a glycoside (Burlage 1968). ☣

ANEMONE WINDFLOWER

Ours small perennial herbs to ca. 30 cm tall from a tuberous rootstock; basal leaves long-petioled, palmately compound, with toothed, lobed, or compound leaflets; flowers usually solitary in ours, 1.5–4.3 cm across, terminating an elongate scape; scapes naked except for a single set of apparently opposite or whorled, sessile, somewhat leaf-like, deeply divided bracts; perianth parts many, of 1 type (sepals), the sepals petal-like; stamens and pistils numerous; receptacle greatly elongating in age forming an elongate head-like structure with numerous achenes; achenes nearly covered with long, white, woolly hairs.

— A nearly cosmopolitan, especially n temperate and arctic genus of ca. 150 species (Dutton et al. 1997); a number are cultivated as ornamentals, while others are used medicinally. ☣ Some species contain the toxic irritating glycoside protoanemonin (Cheatham & Johnston 1995). Several fungal rusts (*Tranzschelia cohaesa* (Long) Arthur, *Tranzschelia ornata* López-Franco & J.F. Hennen—type specimen from Sherman, TX) are known to infect *Anemone* species. *Tranzschelia ornata* is heterocious—its life cycle requiring 2 hosts, *Anemone berlandieri* and *Prunus mexicana* (MEXICAN PLUM); it causes a systemic infection of the *Anemone* and is manifested by reddish brown spots on the leaves of *P. mexicana* (J. Hennen, pers. comm.). (Derivation

probably from Greek: *anemos*, wind; possibly from *Naaman*, Semitic name for Adonis, whose blood, according to myth, produced *Anemone coronaria* L.—Dutton et al. 1997)

REFERENCES: Britton 1891; Joseph & Heimberger 1966; Keener 1975a; Hoot et al. 1994; Keener & Dutton 1994; Dutton et al. 1997.

1. Involucle (of a single set of sessile, leaf-like, deeply divided bracts) above middle of otherwise naked scape at flowering time; scape densely pubescent below involucle; body of achenes 2.7–3.5 mm long, the style ca. 1/2 the length of the achene, slightly S-shaped, often largely concealed by the achene pubescence; all basal leaf blades lobed or dissected differently from involucral bracts; plants without rhizomes

A. berlandieri

1. Involucle below middle of otherwise scape at flowering time; scape nearly glabrous below involucle; body of achenes 1.5–2.5(–3) mm long, the style ca. the length of the achene, straight, often clearly projecting beyond the achene pubescence; one or more basal leaves dissected similarly to involucral bracts; plants with slender rhizomes

A. caroliniana

Anemone berlandieri Pritz., (for Jean Louis Berlandier, 1805–1851, French botanist who explored TX, NM, and Mexico, and one of the first botanists to make extensive collections in TX), TEN-PETAL ANEMONE. Nonrhizomatous from a tuberous root; sepals usually white within, blue-lavender to violet without, 7–15(–20) mm long; fruiting receptacle 11–28 mm long. Prairies, in calcareous clay, often a lawn weed; throughout much of TX. Late Feb–mid-Apr. [*Anemone decapetala* of authors, not Ard. var *heterophylla* (Torr. & A. Gray) Britton, *A. heterophylla* Nutt. ex Torr. & A. Gray] /78

Anemone caroliniana Walter, (of Carolina), CAROLINA ANEMONE. Rhizomatous from a small globose tuber; flowering stem glabrous or nearly so below the leafy bracts; sepals white to pink or lavender-blue within, pink to violet without, 10–22 mm long; fruiting receptacle 8–19(–22) mm long. Sandy open woods, roadsides, and prairies; se and e TX w to East Cross Timbers; in Red River drainage w to Rolling Plains; also e Edwards Plateau. Late Feb–mid-Apr.

Anemone edwardsiana Tharp, (of the Edwards Plateau), TWO-FLOWER ANEMONE, typically with 2, but sometimes up to 10 flowers per scape (in contrast to nc TX species which usually have a single flower), is endemic to the Edwards Plateau n to Travis Co. just s of nc TX. It has involucral bracts 2-tiered (vs. 1-tiered in nc TX species), basal leaves usually 1-ternate, and (8–) 10–20 sepals 2–3 mm wide. 

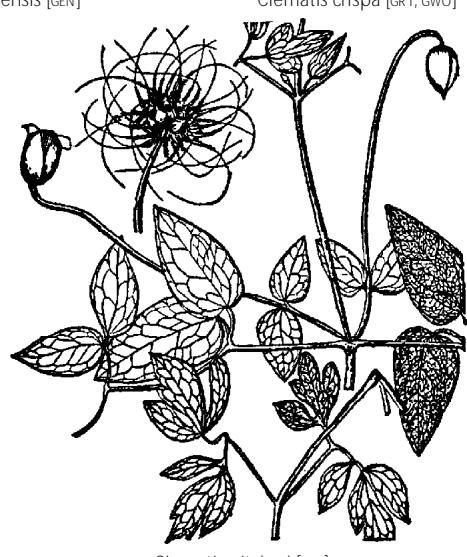
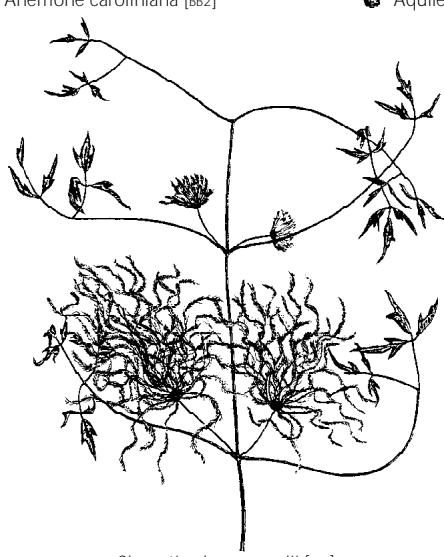
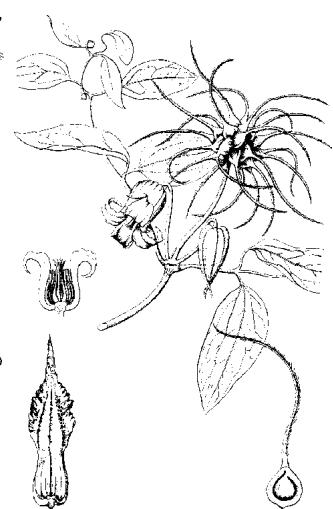
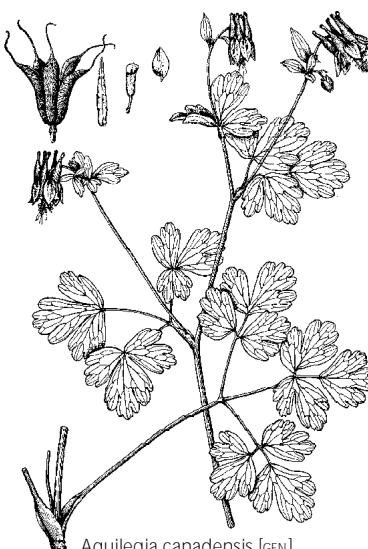
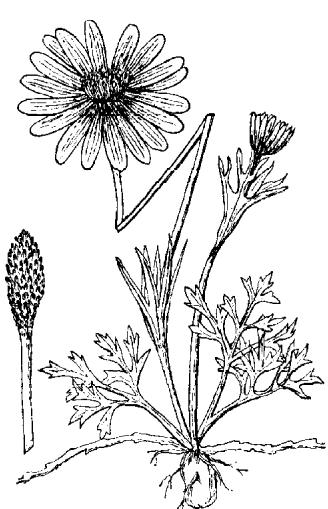
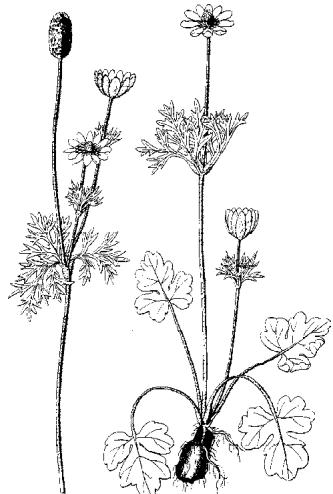
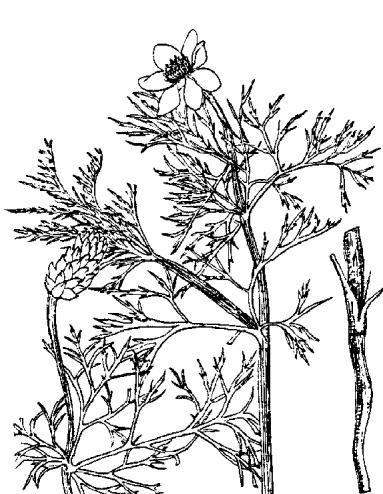
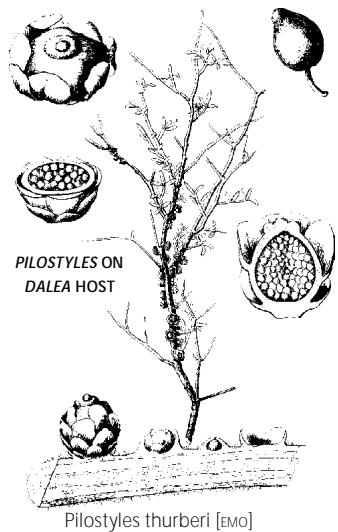
Anemone okennionii Keener & B.E. Dutton, (for Robert J. O'Kennon, 1942–, TX collector and co-author of this book), O'KENNON'S ANEMONE, is found to the sw of nc TX; endemic to TX. This species, which was recently named (Keener & Dutton 1994), can be distinguished from *A. edwardsiana* by the basal leaves 2–3 ternate and the 7–11 sepals 3–4.5 mm wide. [*A. tuberosa* Rydberg var. *texana* Enquist & Crozier] 

AQUILEGIA COLUMBINE

—A n temperate genus of ca. 70 species (Whittemore 1997c) with long perianth spurs and alkaloids. A number are cultivated as ornamentals for their showy flowers. (Perhaps from Latin: *aquila*, eagle, from supposed resemblance of the curved spurs to claws, or possibly from *aqua*, water, and *legere*, to collect, from the evident fluid at the base of the hollow spurs)

REFERENCES: Payson 1918; Munz 1946; Whittemore 1997c.

Aquilegia canadensis L., (of Canada), COMMON COLUMBINE, AMERICAN COLUMBINE, WILD COLUMBINE, CANADIAN COLUMBINE. Perennials 0.2–0.8(–1) m tall; leaves basal and alternate along the stems, palmately 2(–3)-compound; ultimate leaflets fan-shaped, toothed and lobed; flowers rather long-pedicelled, solitary and terminal on ascending branches, nodding, showy, 2–5 cm long (from end of stamens to base of spur); perianth parts in 2 rows, the sepals 5, red or rose, the



petals 5, red or rose at base passing to yellow at tips, with long, conspicuous basal spurs 18–25 mm long; stamens exserted; follicles 5 per flower, erect, 1.5–2(–3) cm long, usually slender-beaked. Limestone cliffs above streams; Bell and Williamson cos. in s part of nc TX s to Edwards Plateau. Late Mar–early May. [A. *canadensis* L. var. *latiuscula* (Greene) Munz] The flowers of this species are visited by and presumably pollinated by ruby-throated hummingbirds (*Archilochus colubris*) (James 1948). ■/78

CLEMATIS VIRGIN'S-BOWER

Ours mostly low- to high-climbing or sprawling, herbaceous or slightly woody, perennial vines (but can flower when small); leaves opposite, pinnately compound, the rachis sometimes ending in a tendril; leaflets entire, toothed, or lobed; dioecious or with perfect flowers; flowers frequently nodding, often solitary or 2–7 in cymose clusters or (1–)3–12 in cymose or paniculate inflorescences; pedicels often conspicuously elongate; perianth parts of 1 type (sepals); sepals 4(–6), all petal-like, often with densely white-pubescent margins; stamens numerous; pistils numerous; achenes with long, sometimes plumose, persistent style (often referred to as a beak).

— A genus of ca. 300 species (Pringle 1997) of lianas or herbs of the n temperate zone, s temperate zone, and tropical African mountains. The genus contains the only woody members of any size in the family; a number of the liana species and their hybrids are important ornamentals, often with very showy flowers. Several are used medicinally; — the plants should be considered poisonous due to the acrid juice (containing anemonin, a dilactone derived from protoanemonin) that can cause skin, mouth, or internal inflammations; all are apparently distasteful to animals though some are suspected of having caused livestock mortality; fortunately, mouth irritation usually prevents the ingestion of fatal doses (Kingsbury 1964; Lampe & McCann 1985; Spoerke & Smolinske 1990; Turner & Szczawinski 1991). (From *clematis*, a name used by Dioscorides for a climbing plant with long and lithe branches, from Greek: *clema*, twig or tendril)

REFERENCES: Erickson 1943; Hara 1975; Keener 1975b; Dennis 1976; Keener & Dennis 1982; Essig 1992; Moreno & Essig 1997; Pringle 1997.

1. Sepals white or whitish, mostly < 15 mm long, thin, neither fleshy nor leathery; perianth rotate, not at all tube-like in appearance, the sepals wide-spreading from their bases; flowers (1–)3–12 in cymose or paniculate inflorescences.

2. Leaflets entire or rarely with an entire lobe; mature styles relatively short, 1–3(–6) cm long; flowers bisexual; pistils 5–10 per flower; plants glabrous. *C. terniflora*

2. Leaflets conspicuously coarsely toothed; mature styles very long, 4–10 cm long; flowers unisexual; pistils 35–90 per flower; plants usually pubescent to almost glabrous. *C. drummondii*

1. Sepals partly to wholly lavender to blue-purple or red, mostly > 15 mm long, thick and fleshy or leathery; perianth bell-shaped to ovoid or urn-shaped, at least bottom part of sepals appressed together and tube-like in appearance; flowers often solitary or 2–7 in cymose clusters.

3. Sepals partly or wholly lavender to blue-purple; stems and leaves glabrous but not glaucous; apices of leaf blades rounded to acute; widespread in nc TX.

4. Tips of sepals with broad, thin, ruffled margins 2–6 mm wide distally; leaflets thin, not conspicuously reticulate-veined; rare in nc TX. *C. crispa*

4. Tips of sepals without broad, thin, ruffled margins (margins can be up to 1 mm wide); leaflets thick and firm, ± conspicuously reticulate-veined (= with a network of noticeable veins), the secondary and sometimes tertiary veins prominently raised on adaxial surface; including a species widespread in nc TX.

5. Achene tails plumose (= feathery, with long, slender, spreading, lateral hairs; however, tails can appear appressed-pubescent if achene is not mature), 4–6 cm long at maturity; pedicels usually with a pair of bracts at base (similar to the leaves except they are simple

rather than compound); leaflets finely reticulate-veined, even the tertiary and quaternary veins prominently raised on the abaxial blade surface, the ultimate closed areoles mostly < 2 mm in longer dimension; possibly on e or s margins of nc TX. _____

C. reticulata

5. Achene tails partially glabrous to long, silky, appressed-pubescent, but not plumose, 1–3.5 cm long; pedicels usually with a pair of compound leaves at base; leaflets less finely reticulate-veined, the tertiary and quaternary veins scarcely or not raised on the abaxial blade surface, the ultimate closed areoles mostly > 2 mm in longer dimension; widespread in nc TX _____

C. pitcheri

3. Sepals definitely red; stems and leaves glabrous and ± glaucous (especially on lower surfaces); apices of leaf blades rounded to obtuse or emarginate (and usually with a small mucro); Edwards Plateau n to Lampasas Co. in Lampasas Cut Plain _____

C. texensis

Clematis crispa L., (crisped, curled), CURLY CLEMATIS, BLUE-JASMINE. Climbing or ascending vine, but can flower when quite small; leaves with 5–9(–11) leaflets; pedicels usually with a pair of compound leaves at base; flowers solitary, terminal, bell-shaped; sepals 25–50 mm long, blue-purple to lavender at base, rosy purple to almost white at tips, distally strongly spreading to recurved; sepal margins broad, thin, 2–6 mm wide distally; mature styles 2–3.5 cm long. Stream banks, low open woods, and roadsides; rare nw to Dallas and Tarrant cos. (Mahler 1988), also Williamson Co. (Correll & Johnston 1970); mainly se and e to c TX. Apr–Sep.

Clematis drummondii Torr. & A. Gray, (for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), TEXAS VIRGIN’S-BOWER, OLD-MAN’S-BEARD, BARBAS DE CHIVATO, LOVE-IN-THE-MIST. Climbing vine, finely pubescent or almost glabrous; leaves usually with 5 or 7 leaflets; inflorescences usually axillary, of 3–12 flowers, cymose or paniculate, or flowers solitary or paired; flowers rotate; sepals (7–)9–13(–15) mm long, white or whitish, wide-spreading, not recurved distally; mature styles 4–9 cm long. Sandy or rocky ground, along fencerows; Grayson Co., also Dallas Co. (Mahler 1988); nearly throughout TX except extreme e part Jul–Sep. A number of the common names are derived from the plumose styles persistent on the achenes; a cluster of these has the appearance of a feathery ball (Ajilvsgi 1984).

Clematis pitcheri Torr. & A. Gray, (for its discoverer, Zina Pitcher, 1797–1872, physician, botanist, and mayor of Detroit), LEATHER-FLOWER, BLUEBELL, PITCHER’S CLEMATIS, PITCHER-FLOWER. Climbing ± herbaceous or somewhat woody vine; leaves usually with 3 or 5 leaflets, some simple; inflorescences axillary, 1–7-flowered; flowers ovoid to urn-shaped; sepals 10–35 mm long, dull-purple to brick-red-purple on outer surface, deeply colored or greenish on inner surface, recurved at tips; mature styles 1–3 cm long. Stream bottom thickets, open woods, and fencerows; widespread in TX. Late Apr–early Jul. This is the most common *Clematis* species in nc TX.

Clematis reticulata Walter, (netted), NET-LEAF CLEMATIS. Climbing herbaceous or slightly woody vine; leaves with 3–9 leaflets; inflorescences axillary, 1–3-flowered; flowers urn-shaped; sepals 15–25 mm long, purplish red to mauve or pink-lavender, recurved at tips; mature styles 4–6 cm long. Sandy soils of fields and thickets; e TX w to Red River and Travis cos. on e and s margins of nc TX; included because of likelihood of occurrence in nc TX. Apr–Jul.

Clematis terniflora DC., (flowers in threes), SWEET-AUTUMN CLEMATIS. High climbing or spreading vine to 3 m or more long, glabrous or nearly so; leaflets usually 5; inflorescences axillary, of 3–12 flowers, cymose or paniculate; flowers rotate; sepals 9–22 mm long, white, wide-spreading, not recurved distally; mature styles 1–3(–6) cm long. Frequently cultivated as an ornamental and escapes; Dallas and Tarrant cos., also Brown Co. (J. Stanford, pers. comm.); se, e, and c TX. Jul–Sep(–Dec). Native of Japan. [*C. dioscoreifolia* H. Lév. & Vaniot, *C. maximowicziana* Franch. & Sav., *C. paniculata* Thunb., not J.F. Gmel.] While showy, this species can spread extensively and has the potential of becoming problematic. ↗

Clematis texensis Buckley, (of Texas), SCARLET CLEMATIS, RED LEATHER-FLOWER. Herbaceous or somewhat woody climbing vine to 3 m or more long; leaves usually with 9–11 leaflets; inflorescences axillary, 1–7-flowered; flowers ovoid to urn-shaped; sepals 20–30 mm long, red, recurved at tips; mature styles 5–7 cm long. Rocky stream banks; Bosque Co., also Bell, Coryell (HPC), and Lampasas (Erickson 1943) cos; also Travis Co. just s of nc TX; Edwards Plateau n to Lampasas Cut Plain; endemic to TX. Late Mar–May. According to Pringle (1997), this is the only truly red-flowered species of *Clematis*. /84

CONSOLIDA LARKSPUR

— A genus of ca. 40 species (Warnock 1997b) native from the Mediterranean to c Asia; sometimes included in *Delphinium*, but with a number of well-defined differences (Keener 1976a). A number are cultivated as ornamentals. Like *Delphinium*, *Consolidaspecies* contain poisonous diterpenoid alkaloids (e.g., delphinine) which can cause death in livestock (Kingsbury 1964; Schmutz & Hamilton 1979). (Latin: *consolatio*, consolidate, alleviation, or to become solid or firm, from reported ability to heal wounds)

REFERENCES: Chater 1964; Keener 1976a; Warnock 1997b.

Consolida ajacis (L.) Schur, (for Ajax, the Greek hero, because of the shield-like marks on the petals), ROCKET LARKSPUR, ANNUAL LARKSPUR, ESPUELA DE CABALLERO. Annual similar to *Delphinium* (but flower structure different); stems to ca. 1 m tall; leaves basal and cauline, divided into numerous linear to filiform (= thread-like) segments except on lower leaves; bracteoles short, usually not reaching base of flower; flowers usually blue, sometimes violet, purple, pink, or white; spur 13–18 mm long; perianth segments 10–14(–20) mm long; stamens in 5 spirally arranged series; follicles 15–20 mm long, ca. 5 mm wide; seeds black. Commonly cultivated and escapes to roadsides and disturbed sites; Bell, Brown, Dallas, Grayson, Somervell, and Tarrant cos; nc TX to e and c TX. Apr–Jun. Native of the Mediterranean area. [*C. ambigua*(L.) P.W. Ball & Heywood] Often recognized in the genus *Delphinium* [as *D. ajacis* L. or *D. ambigua* L.]

Consolida orientalis (J. Gay) Schrödinger, (oriental, eastern), native to s Europe and n Africa, is also cultivated and known from the Edwards Plateau; it could possibly be found escaped in nc TX. It can be distinguished from the similar *C. ajacis* as follows: bracteoles (on pedicels) long, reaching to or beyond base of flower; spur (8–)10–12 mm long; flowers purple to purplish violet; and seeds reddish brown. [*Delphinium orientale* J. Gay]

DELPHINIUM LARKSPUR

— A genus of ca. 300 species; mainly n temperate but also the arctic, subtropical areas, and African mountains (Warnock 1997a); many are cultivated as ornamental herbaceous perennials.

In the w U.S. LARKSPURS are second only to the LOCOWEEDS as a cause of fatal cattle poisoning; they contain alkaloids such as delphinine and ajacine; while of variable toxicity, all species should be considered poisonous (Kingsbury 1964; Stephens 1980). The common name LARKSPUR is apparently an old English name referring to the resemblance of the spur to the elongate hind claw of the European crested lark (Tveten & Tveten 1993). (Latin: *delphinus*, dolphin, in allusion to the shape of flowers, which are sometimes not unlike the classical figures of dolphins)

REFERENCES: Marsh & Clawson 1916; Ewan 1945, 1951; Keener 1976a; Kral 1976; Warnock 1981, 1987a, 1995, 1997a; Brooks 1982; Olsen et al. 1990.

Delphinium carolinianum Walter, (of Carolina). Herbaceous perennial 0.3–1.5 m tall; stems simple or rarely branched; leaves mainly basal to mainly cauline, palmately deeply lobed or compound; flowers in terminal, spike-like racemes (rarely branched), bilaterally symmetrical; perianth parts in 2 series, all petal-like, the sepals (outer series) 5, showy, with dorsal green spot below apex, the upper with an elongate spur, the petals (inner series) 4, smaller, the upper 2



with spurs enclosed by large spur from the upper sepal, the lower pair short-clawed; stamens many, in 8 spirally arranged series; follicles 3(-4), erect. Extensive morphological variation and overlap make clear separation of taxa within the *D. carolinianum* complex difficult. While subsp. *carolinianum* can usually be fairly easily distinguished, the other 2 subspecies are more difficult. We are following Warnock's (1981, 1997a) treatment of these taxa. He (1981) noted that "In regions where they occur sympatrically [like nc TX], characters separating the subspecies become obscure and some plants are difficult to place subspecifically."

1. Basal leaves usually absent or rare at flowering; leaf segments usually < 2 mm wide; uppermost petiole usually < 1 cm long; flowers usually deep blue, blue-violet to purple, rarely white; extreme ne part of nc TX _____ subsp. **carolinianum**
1. Basal leaves usually present at flowering; leaf segments usually > 2 mm wide; uppermost petiole usually > 1 cm long; flowers white to blue; widespread in nc TX.
2. Leaves usually with (3-)5 or more major divisions, these often much further subdivided; flowers white to light lavender; roots ± horizontal with several major branches; widespread in nc TX _____ subsp. **virescens**
2. Leaves usually with 3 major divisions, these with relatively few subdivisions; flowers blue to white; roots usually ± vertical, often without major branches; s and e parts of nc TX _____ subsp. **vimineum**

subsp. **carolinianum**, WILD BLUE LARKSPUR, CAROLINA LARKSPUR, BLUE LARKSPUR. Sandy open woods and roadsides, dry to rather damp ground; Hopkins Co, also Fannin Co. (Warnock 1981); extreme ne TX. Apr-Jun.

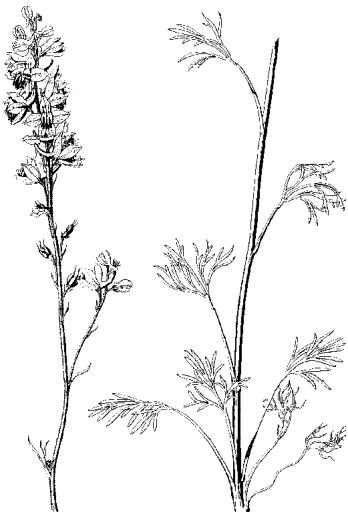
subsp. **vimineum** (D. Don) M.J. Warnock, (with long slender shoots, like *Salix*—willows or osiers), PINEWOODS LARKSPUR, BLUE LARKSPUR, GULF COAST LARKSPUR. Leaf segments often 4 mm or more wide; petioles 3-15 cm long. Clay or sandy soils, open to semi-open grassland; Lampasas, McLennan, Navarro, and Williamson cos. (Warnock 1981); s and se TX nw to s and e parts of nc TX. Mar-Jun. [*D. vimineum* D. Don]

subsp. **virescens** (Nutt.) R.E. Brooks, (light green), PRAIRIE LARKSPUR, PLAINS LARKSPUR, WHITE LARKSPUR, PENARD'S LARKSPUR, RABBIT-FACE. Glandular pubescence often present; leaf segments mostly 2-4 mm wide. Grasslands; ne TX w and s to Panhandle and Edwards Plateau; this is by far the most common subspecies in nc TX. Apr-Jun. [*D. carolinianum* Walter subsp. *penardii* (Huth) M.J. Warnock, *D. virescens* Nutt., *D. virescens* var. *macroceratilis* (Rydb.) Cory, *D. virescens* var. *penardii* (Huth) L.M. Perry] Brooks (1982) split this subspecies into 2, subsp. *penardii* and subsp. *virescens*, separated as follows: leaves mostly equally distributed and caulin, few basal; upper stem and rachis covered with yellow pustulate trichomes—subsp. *virescens*; versus distinct basal rosette of leaves present with caulin leaves few; upper stem caulescent and sparsely pustulate hairy; rachis canescent—subsp. *penardii*. We are following Warnock (1997a) in lumping the two. ■/87

MYOSURUS MOUSETAIL

• A genus of 15 species (Whittemore 1997b) of temperate areas; characterized by an elongate receptacle. (Greek: *myo*s of a mouse, and *oura*, a tail, from the long slender fruiting receptacle)
REFERENCES: Campbell 1952; Stone 1959; Whittemore 1997b.

Myosurus minimus L., (least, smallest), TINY MOUSE-TAIL, MOUSE-TAIL. Very small glabrous annual 4-16.5 cm tall; leaves basal, linear-ob lanceolate, entire; leafless flowering stem at first shorter, eventually longer, than the leaves; flower solitary, terminal, radially symmetrical; sepals 5, reflexed, greenish; petals often 5, linear, whitish (rarely pinkish), 2-3.5 mm long, often soon deciduous, sometimes absent; carpels numerous, usually more than 100 on a greatly elongating, narrowly cylindrical receptacle (2-5 cm long in fruit) that resembles a mouse's tail; achenes 0.9-



Delphinium carolinianum subsp. carolinianum [DEL]



Delphinium carolinianum subsp. vimineum [CUR]



Delphinium carolinianum subsp. virescens [BB1]



Myosurus minimus [MAS]



Ranunculus abortivus [BB2]

2 mm long, usually with short beak. Damp sand or clay soils; Dallas, Denton, Grayson, and Hunt cos; throughout much of TX, particularly the e 1/2. Mar-Apr. Inconspicuous and easily overlooked; it can occur with and superficially resemble *Plantago elongata* ■/100

RANUNCULUS BUTTERCUP, CROW'S-FOOT, PAIGLE

Small annual or perennial herbs; leaves simple or compound, entire, toothed, or lobed; petioles with widened margins toward base, not distinctly stipulate; flowers solitary and terminal or in upper leaf axils; sepals 3-5, green; petals (honey leaves) (1-)usually 5 or more, in ours usually yellow to greenish, often showy; stamens and pistils usually numerous; fruit an achene, these aggregated in clusters or head-like groups.

— A genus of ca. 300 species of herbs with yellow, greenish, white, or red flowers native nearly worldwide except in lowland tropics (Whittemore 1997a). ☣ All species are apparently poisonous and generally avoided by livestock; they contain the toxic glycoside protoanemonin which is irritating to the skin and mucous lining of the digestive tract; cows poisoned by BUTTERCUPS produce bitter or reddish milk (Schmutz & Hamilton 1979; Blackwell 1990). A number are cultivated as ornamentals and some are weeds. (Diminutive of Latin: *rana*, frog; name applied by Pliny to these plants, many of which grow in wet habitats)

REFERENCES: Benson 1940, 1948, 1954; Keener 1976b; Duncan 1980; Keener & Hoot 1987; Whittemore 1997a.

1. Stem leaves simple, entire or slightly toothed. ***R. pusillus***
1. Stem leaves (except uppermost) compound or deeply lobed.
 2. Petals greatly exceeding the sepals, 7–21 mm long; plants perennial.
 3. Uppermost leaves or bracts similar in appearance to lower leaves, compound; leaflets rhombic-ovate to ovate-lanceolate, toothed and often lobed; stems often rooting at the nodes; roots fleshy-fibrous, slender ***R. hispidus***
 3. Uppermost leaves or bracts often quite different in appearance from lower leaves, simple, the blades oblong-lanceolate to linear-lanceolate, entire or with few, irregular teeth or lobes (rarely uppermost leaves compound with narrow, mostly entire leaflets); stems not rooting at the nodes; roots fleshy-fibrous and some tuberous-thickened.
 4. Stems with appressed or ascending hairs; petals 5(–9), 7–12 mm long; sepals 5–7; achenes 1.8–2.2 mm wide; ne part of nc TX ***R. fascicularis***
 4. Stems with long hairs spreading at right angles; petals (8–)10–22, 10–21 mm long; sepals 7–10; achenes 2.8–3.4 mm wide; s and w parts of nc TX ***R. macranthus***
 2. Petals shorter than or equaling the sepals, 1–8 mm long; plants annual.
 5. Achenes 5–5.5 mm long at maturity including a conspicuous beak ca. 2–2.5 mm long; faces of achenes with stout prickles ***R. muricatus***
 5. Achenes ca. 1–2 mm long at maturity, the beak inconspicuous (absent or < 1 mm long); faces of achenes glabrous or with minute hooked bristles/prickles.
 6. Leaf blades sparsely or densely short pilose, with acute teeth or lobes ***R. parviflorus***
 6. Leaf blades glabrous, with obtuse teeth or lobes or none.
 7. Blades of lower leaves mostly or all divided half way to base or less; achenes ca. (1–)1.5 mm across ***R. abortivus***
 7. Blades of lower leaves all divided nearly or quite to base; achenes 0.8–1 mm across ***R. sceleratus***

Ranunculus abortivus L. (abortive, i.e., with reduced styles, petals, etc.), LITTLE-LEAF BUTTERCUP, KIDNEY-LEAF BUTTERCUP, EARLY WOODS BUTTERCUP. Glabrous, erect or nearly so, to 35 cm tall; petals 2.5–3.5 mm long; achenes smooth, 1.4–1.6 mm long, 10–35 in an ovoid head. Open areas, woods, damp shady ground; Dallas, Grayson, Hopkins, and Hunt cos., also Lamar Co. (Carr



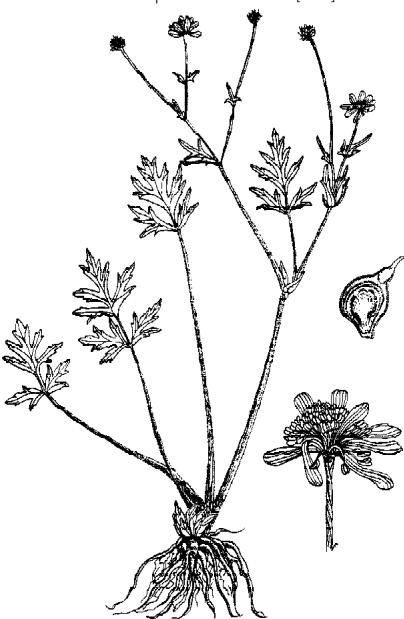
Ranunculus fascicularis [HO1]



Ranunculus hispidus var. nitidus [GWO]



Ranunculus parviflorus [GLE]



Ranunculus macranthus [CO1]



Ranunculus muricatus [MAS]

1994); e TX w to nc TX. Mar-Jun. Reportedly poisonous to livestock, with symptoms including gastrointestinal irritation, salivation, diarrhea, blindness, convulsions, and death (Burlage 1968). ☠

Ranunculus fascicularis Muhl. ex Bigelow, (fascicled, in clusters), TUFTED BUTTERCUP, PRAIRIE BUTTERCUP, EARLY BUTTERCUP. Stems erect or spreading, to 30 cm long; achenes 2–2.8 mm long. Sandy open woods and open ground; Grayson, Henderson, Hopkins, Kaufman, and Lamar cos.; se and e TX w to e Blackland Prairie. Late Feb–early Apr. [*R. fascicularis* Muhl. ex Bigelow var. *apricus* (Greene) Fernald]

Ranunculus hispidus Michx. var. *nitidus* (Chapm.) T. Duncan, (sp.: bristly; var: shining), BRISTLY BUTTERCUP, MARSH BUTTERCUP. Stems low-spreading or trailing, glabrous or sparsely pilose, to 60 cm long; petals 8–12 mm long. Stream bottoms and ditch banks; Dallas, Grayson, Kaufman, Lamar, and Rockwall cos.; se and e TX w to nc TX. Late Feb–Mar. [*Ranunculus carolinianus* DC.]

Ranunculus macranthus Scheele, (large-flowered), SHOWY BUTTERCUP, LARGE BUTTERCUP. Stems erect to reclining, to 50(–100) cm tall; achenes 2.2–4.2 mm long. Damp, silty or sandy clay ground; Bell, Burnet, McLennan, Parker, Somervell, and Williamson cos.; s and w parts of nc TX to s TX and w to Trans-Pecos. Late Mar–early May.

Ranunculus muricatus L., (roughened by means of hard points), ROUGH-SEED BUTTERCUP. Stems reclining to erect, to 50 cm long; petals 4–7 mm long; achenes 5–5.5 mm long, with stout prickles, 10–20 in a cluster. Grassy or wet areas; Dallas, Grayson, and Tarrant cos.; mainly se and e TX. Mar–May. Native of the Old World. ☠

Ranunculus parviflorus L., (small-flowered), STICKTIGHT BUTTERCUP. Beginning to flower when almost stemless; stems becoming as much as 30 cm long, trailing to erect; flowers inconspicuous, obscured by the leaves; petals 1–2 mm long; achenes 1.5–2 mm long, papillate and usually with minute hooked prickles, 10–20 in a globose head. Damp sandy ground, in woods, roadsides, and sometimes a lawn weed; Dallas and Hunt cos.; se and e TX w to nc TX. Mar–Apr. Native of Europe. Reported to have toxic properties similar to *R. abortivus* (Burlage 1968). ☠ ☠

Ranunculus pusillus Poir., (very small), WEAK BUTTERCUP. Ascending, glabrous and glaucous annual to 50 cm tall; stems usually rooting at lowest nodes; petals 1–3(–5), 1.5–2.5 mm long; achenes 1–1.2 mm long. Damp sand or silt, wet areas; Bell, Dallas, Grayson, Hopkins, and Red River cos., also Burnet (Correll & Johnston 1970) and Lamar (Carr 1994) cos.; se and e TX w to nc TX, also Edwards Plateau. Mar–Apr. While often recognized (Kartesz 1994; Jones et al. 1997), we are following Whittemore (1997a) in lumping [*R. pusillus* var. *angustifolius* (Engelm. ex Engelm. & A. Gray) L.D. Benson]. This species is often inconspicuous and easily overlooked.

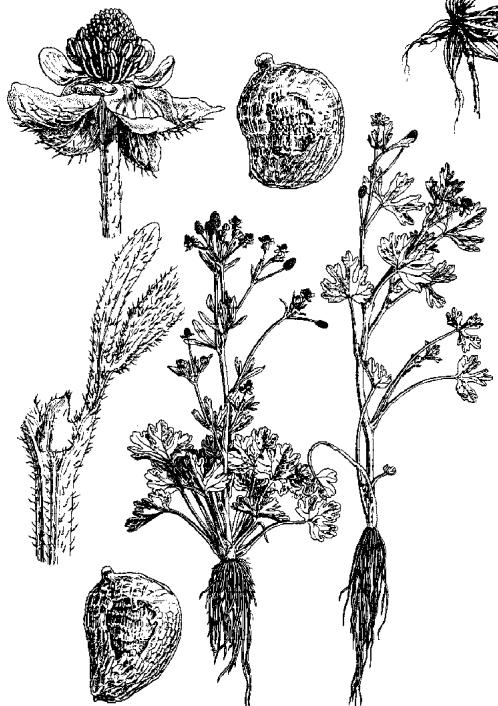
Ranunculus sceleratus L., (cursed, growing in vile places), BLISTER BUTTERCUP, ROUGE BUTTERCUP, CURSED CROW'S-FOOT, CELERY-LEAF BUTTERCUP. Resembling *R. abortivus*, but distinguished as in the key, more freely branched, and usually in different habitats; stems to 1 m long; petals 2–5 mm long; achenes not spiny, ± smooth, ca. 1–1.2 mm long, 40–300 in a cylindrical head. Ditches, sandy shores of lakes, ponds, and streams; Bell, Grayson, and Tarrant cos., also Hamilton (HPC) and Parker (R. O'Kennon, pers. obs.) cos.; nc and s TX, Edwards Plateau, and Rolling Plains. May–Jun. The acrid sap is reported to cause blisters on human skin and the plant is reportedly poisonous to livestock (Burlage 1968; Correll & Correll 1972). Moerman in Whittemore (1997a) indicated that *R. sceleratus* was used by Native Americans as a poison for arrow points. ☠

THALICTRUM MEADOW-RUE

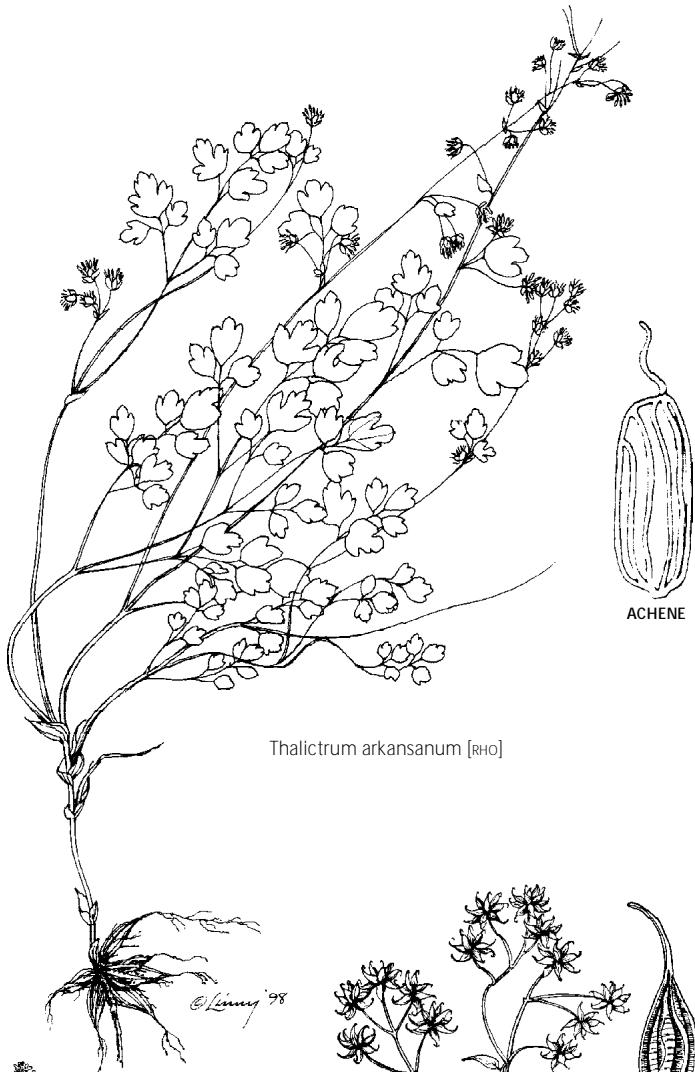
Ours herbaceous, usually dioecious perennials; leaves 2 or 3 times ternately compound, the numerous ultimate leaflets usually 3-lobed or several-toothed at apex; petioles with clasping



Ranunculus pusillus [co1]



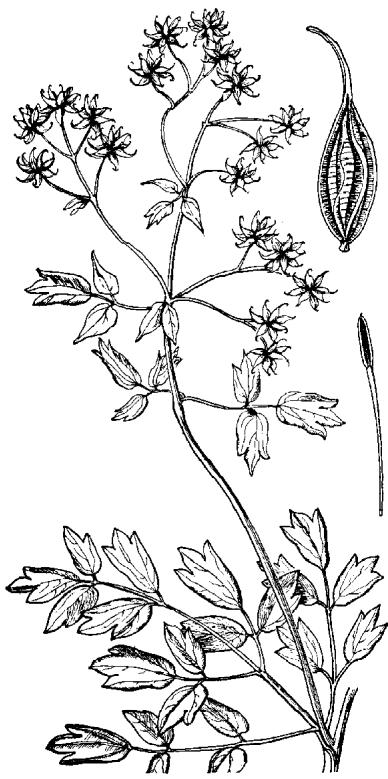
Ranunculus sceleratus [MAS]



Thalictrum arkansanum [RHO]



ACHENE



Thalictrum dasycarpum [GLE]

bases; flowers in terminal panicles, drooping; perianth parts in 1 series (sepals); sepals 4–5, whitish to purplish; stamens many; pistils few–15; fruit an achene.

— A genus of 120–200 species (Park & Festerling 1997) of herbs with alkaloids native to the n temperate zone, tropical areas of the Americas, and s Africa. Some are used medicinally and as ornamentals. (Greek: *thaliktron*, classical name used by Dioscorides)

REFERENCES: Boivin 1944; Park & Festerling 1997.

1. Plants decumbent, 15–30(–40) cm tall; stems 0.5–1.1 mm thick below middle; roots few, tuberous; ultimate leaflets 1.5 cm or less long; inflorescences few-flowered; leaflets glabrous _____ **T. arkansanum**
1. Plants erect, 60–150(–200) cm tall; stems 3–6 mm thick below middle; roots many, coarsely fibrous; ultimate leaflets 2–5.5 cm long; inflorescences many-flowered; leaflets typically pubescent on lower (= abaxial) surfaces _____ **T. dasycarpum**

Thalictrum arkansanum B. Boivin, (of Arkansas), ARKANSAS MEADOW-RUE. Roots ribbed, brown; lobes of leaflets often obtuse to rounded and often notched or toothed; perianth parts whitish, those of male flowers 2–3 mm long, of female flowers 1–1.5 mm long; filaments pink, 2–3 mm long; stigma 1.3–3 mm long; mature achenes sessile, ellipsoid, 3.5–4.5 mm long, 10–12-nerved. Damp sandy woods; rare in e Red River drainage, Grayson (Mahler 1988) and Red River cos., also Lamar Co. (TOES 1993); limited in TX to ne part of state; narrowly endemic to ne TX and adjacent AR and OK. Late Mar–early Apr. Park and Festerling (1997) indicated that *T. arkansanum* is poorly known, that it is closely related to *T. texanum* and *T. debile* Buckley (of se U.S.), and that it should possibly be considered a variety of *T. debile*. Robert Kral (pers. comm.) indicated that *T. arkansanum* is nearly indistinguishable from *T. debile*. Further study is need to clarify the relationships of these species. (TOES 1993: V) ▲

Thalictrum dasycarpum Fisch. & Avé-Lall., (thick-fruited), PURPLE MEADOW-RUE. Stems often purple; leaflets sometimes glaucous on lower surface, entire or usually 3-lobed, the lobes usually acute and entire; perianth parts 3–5 mm long, purplish to whitish; filaments white, 4–7 mm long; stigma 2–5 mm long; mature achenes sessile or nearly so, (2.5–)3.8–5.5 mm long. Damp thickets and open woods, sandy or silty ground; Hunt Co., also Dallas Co. (Hall 2, 1872 cited in Boivin 1944); se and e TX rare w to the Panhandle. Apr–May. [*Thalictrum dasycarpum* Fisch. & Avé-Lall. var. *hypoglaucum*(Rydb.) B. Boivin]

Thalictrum texanum (A. Gray) Small, (of Texas), HOUSTON MEADOW-RUE, native to se TX, is cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2). This species, which differs from *T. arkansanum* in being erect, having shorter stigmas (0.5–1 mm long), ovoid achenes, and black roots (when dry), apparently only occurs to the s and e of nc TX.

RHAMNACEAE BUCKTHORN FAMILY

Half-woody to woody shrubs, vines, or small trees; leaves usually alternate (opposite in 1 species rare in nc TX), short-petioled, simple, entire or toothed; stipules small, falling early; flowers small, radially symmetrical, usually perfect, axillary or terminal, solitary or few together, or many in compact, umbel-like racemes or small panicles; calyxes (4–)5-lobed; petals (4–)5 or absent, green, yellowish, or white (rarely pinkish), usually clawed or spatulate and often hood-shaped, delicate, inconspicuous (except in *Ceanothus*); stamens 5, alternate with the sepals, often hooded by the petals, attached around an often prominent, fleshy disk; pistil 1; ovary superior; fruit a drupe or capsule-like.

— A medium-sized (900 species in 49 genera), cosmopolitan, but especially tropical and warm area family of trees, shrubs, climbers, and rarely herbs including some ornamentals (e.g., *Ceanothus*). A number of species contain anthraquinone glycosides and alkaloids and have

been used medicinally; others have been used as dyes, for edible fruit, or as ornamentals. (sub-class Rosidae)

FAMILY RECOGNITION IN THE FIELD: woody plants usually with alternate (opposite in 1 species) simple leaves and sometimes with 3 *main veins* or with *secondary veins strikingly parallel*; stipules small; flowers usually small, 5-merous, with a hypanthium; stamens 5, opposite the petals.

REFERENCES: Brizicky 1964c; Johnston & Johnston 1969.

1. Plants twining, climbing woody vines; fruits ca. 2 times as long as wide _____ **Berchemia**
1. Plants shrubs or small trees; fruits usually nearly as wide as long.
 2. Leaves opposite; known only on extreme w margin of nc TX _____ **Karwinskia**
 2. Leaves alternate; including species widespread in nc TX.
 3. Petals absent; plants armed (branches ending in stout thorns); limited to extreme w and s parts of nc TX _____ **Condalia**
 3. Petals present (may be small); plants armed (in *Ziziphus*) OR unarmed in all other nc TX species; widespread in nc TX.
 4. Plants usually armed, the branches with terminal thorns or axillary spines; leaves 3-veined from the base; petals green to yellowish _____ **Ziziphus**
 4. Plants unarmed; leaves pinnately veined or with one main vein, not 3-veined from the base (except in *Ceanothus* with usually white or rarely pinkish petals); petals green to yellowish to white (rarely pinkish).
 5. Petals white (rarely pinkish), becoming much longer than the calyx lobes; flowers in umbel-like inflorescences at the end of elongate axillary peduncles or at the end of leafy branches, conspicuously surpassing the leaves; leaves usually 3-veined from base; enlarged cup and disk below fruit persistent on the pedicel as a roughly triangular structure _____ **Ceanothus**
 5. Petals green to yellowish, smaller than or equaling the calyx lobes; flowers axillary, single or in small clusters or glomerules, inconspicuously borne among the leaves; leaves usually pinnately veined or with 1 vein; without persistent cup and disk.
 6. Leaves 3–14 cm long; fruit juicy at maturity, a drupe; widespread in nc TX.
 7. Flowers 1–3 in the axils of new growth, at least some unisexual; leaf blades 3–7 (–9) cm long; calyx lobes, petals, and stamens 4; fruits with 2 stones _____ **Rhamnus**
 7. Flowers (1–)3–8 in umbel-like axillary clusters, perfect; leaf blades 5–15 cm long; calyx lobes, petals, and stamens 5; fruits with 3 stones _____ **Frangula**
 6. Leaves < 3 cm long; fruit dry at maturity, a slow-maturing capsule; found only in extreme s and possibly w parts of nc TX _____ **Colubrina**

BERCHEMIA SUPPLEJACK, RATTANVINE

• A genus of ca. 12 species of twiners, some used as ornamentals; native from e Africa to e Asia, and w North America. (Presumably named for Berthout van Berchem, 17th or 18th century Dutch or French botanist)

Berchemia scandens (Hill) K. Koch, (climbing), SUPPLEJACK, RATTANVINE, ALABAMA SUPPLEJACK. High climbing, twining, woody vine (= liana), sometimes forming a vining shrub if unsupported; stems conspicuously smooth, reddish brown or yellowish brown, with age to greenish or grayish; leaf blades oblong-elliptic, 3–6(–8) cm long, glabrous, entire or nearly so, pale or glaucous beneath, conspicuously pinnately veined, the veins parallel; inflorescence a small raceme or narrow panicle at the ends of lateral branches; flowers 5-merous, small (ca. 2 mm wide), yellowish or greenish; fruit a small, ellipsoidal, blue-black drupe ca. 6–8 mm long, juicy at maturity. Thickets or woods, stream bottoms or slopes; much of the e 1/2 of TX. Late Apr–early May. The smooth, greenish or grayish older stems make this vine easily recognizable in nc TX forests. In winter, the reddish brown or yellowish brown naked twigs are also quite conspicuous.

CEANOOTHUS BUCKBUSH

Ours unarmed, weak shrubs with leaves alternate, deciduous, usually 3-ribbed (= nerved or veined) basally; inflorescences dense, umbel-like panicles; petals in ours with claw and hooded blade each nearly 1 mm long; ovary 3(-4) celled; fruits capsule-like, the upper portions abscising and leaving the cup and disk (roughly triangular and shallowly bowl-like in shape) persistent on the pedicel.

— A North American genus of 55 species of shrubs and small trees, especially common in California, particularly in the chaparral. A number of species are cultivated for their showy inflorescences; nitrogen-fixing Ascomycete fungi occur in the roots. The burl-like "rootstocks" or "grubs" of nc TX species become greatly enlarged and pioneers had to dig these up prior to cultivation (Correll & Johnston 1970). (From a Greek name used by Theophrastus for a spiny plant not of this genus)

REFERENCES: Parry 1889; Brandegee 1894.

1. Inflorescences on elongate, axillary, essentially naked peduncles; leaves usually ovate to broadly elliptic, usually pilose above, usually acute _____ **C. americanus**
1. Inflorescences terminating leafy branches; leaves narrowly elliptic or elliptic-lanceolate, glabrous or nearly so above, obtuse or barely acute _____ **C. herbaceus**

Ceanothus americanus L., (of America), REDROOT, NEW JERSEY-TEA, JERSEY-TEA. Erect shrub to ca. 1 m tall; fruits 3(-4) -lobed, ca. 4-5 mm across. Sandy soils; woodlands, prairies; Grayson, Henderson, and Lamar cos; much of the e 1/2 of TX. Apr. The dried leaves have been used as a tea and also medicinally by Native Americans; they were also used by early settlers during the Revolutionary War when Asian tea could not be obtained (Correll & Correll 1969). [*C. americanus* L. var. *pitcheri* Torr. & A. Gray] We are following Kartesz (1994) and J. Kartesz (pers. comm. 1997) in lumping var. *pitcheri*; Jones et al. (1997) treated all TX material of this species as var. *pitcheri*.

Ceanothus herbaceus Raf., (herbaceous, not woody), REDROOT, INLAND CEANOOTHUS, FUZZY CEANOOTHUS. Similar to *C. americanus*; usually nearly glabrous. Limestone outcrops, gravelly prairies; from Post Oak Savannah s and w across most of TX. Apr. [*C. herbaceus* var. *pubescens* (Torr. & A. Gray ex S. Watson) Shinners]

COLUBRINA SNAKEWOOD

— A genus of 31 species of tropical and warm parts of the world, especially the New World. — Some species have been used as a fish poison and others medicinally. (Latin derived from French for serpent tree, for the snake-like shape of some species)

REFERENCES: Johnston & Johnston 1969; Johnston 1962, 1971.

Colubrina texensis (Torr. & A. Gray) A. Gray, (of Texas), TEXAS SNAKEWOOD, TEXAS COLUBRINA, HOG-PLUM. Unarmed rounded shrub 1-2 m tall; leaves small, ovate, thinly tomentose beneath, 1-nerved; flowers small, ca. 5-6 mm across, yellow-green, borne on short, twig-like condensed spur shoots, 1 per axil but appearing glomerate (some leaves also crowded together with flowers on the spur shoots); ovary 3-celled; fruits drupe-like, with stony endocarp becoming tardily dehiscent and capsule-like. Slopes or rocky hillsides; Brown and Burnet cos. (Johnston & Johnston 1969) on sw margin of nc TX s and w to w TX. May-Jul.

CONDALIA

— A genus of 18 species of warm areas of the New World. (Named for Antonio Condal, native of Barcelona, Spanish explorer of South America)

Condalia hookeri M.C. Johnst., (for Sir W.J. Hooker, 1785–1875, director of Kew Gardens or his son, Sir Joseph D. Hooker, 1817–1911, traveler in the Himalaya, who succeeded his father as director of Kew), BLUEWOOD, BRASIL, BRAZIL, CAPUL NEGRO. Armed shrubs to ca. 2 m tall; leaves obovate (10–)15–20 mm long, usually rounded apically to rarely slightly acute, basally acuminate, entire or rarely with 2–4 inconspicuous teeth; flowers inconspicuous; fruit a globose, dark blue or black, fleshy drupe 5–6 mm in diam. Thickets; Brown Co. (Stanford 1971), also Williamson Co. (Correll & Correll 1969; Little 1976); w and s margins of nc TX s to s TX. Summer–Sep. [C. *obovata* Hook.] The dense heartwood is a brilliant red color and has been used to make ornamental objects (Standley 1923a; Correll & Correll 1969); a blue dye was obtained in frontier days from the wood (Standley 1923a; Crosswhite 1980). The fruits were used during frontier days to make jelly (Crosswhite 1980).

FRANGULA BUCKTHORN

☛ A genus of ca. 40 species primarily in the New World but with some in e Asia, Europe, North Africa, and the Azores (Brizicky 1964c); it is often treated as a subgenus of *Rhamnus* but differs in having naked winter buds and flowers 5-merous and bisexual. ☠ Like *Rhamnus*, some species contain purgatives (anthraquinones). *Frangula purshiana* (DC.) Cooper [*Rhamnus purshiana* DC.], native to the nw U.S. and adjacent Canada, is commonly known as CASCARA SAGRADA; it is the source of commercial purgatives, with the annual sale of the bark valued at many tens of millions of dollars. According to Heiser (1993), it "... is generally thought to be the world's most widely used carthartic." (Latin: *frangere*, to break, because the wood of some species breaks easily)

Frangula caroliniana (Walter) A. Gray, (of Carolina), CAROLINA BUCKTHORN, INDIAN-CHERRY, YELLOWWOOD, POLECAT-TREE. Large shrub or small tree to ca. 6 m tall, unarmed; buds without scales, densely brown-hairy; leaf blades oblong-lanceolate, finely or indistinctly toothed, subacute, pinnately veined, at maturity glabrous beneath except on main veins to soft-pubescent over the lower surface; flowers small, yellow-green, in compact, axillary, umbel-like clusters shorter to slightly longer than the adjacent petiole; calyces 3–4 mm long; petals 1–1.3 mm long, appearing with emerging leaves or after the leaves have emerged; fruit a small drupe ca. 5–8 mm in diam., black at maturity, going through a red phase making the bicolored infructescence rather showy. Ravines and stream bottoms; in much of the e 1/2 of TX. May–early Jun. [R. *caroliniana* Walter] Given the close relationship to *Rhamnus* and other toxic species of *Frangula*, the bark, leaves, and fruits should be assumed to have toxins; reported to have laxative effects (Pammel 1911). ☠

KARWINSKIA

☛ A genus of 16 species ranging from the sw U.S. to Bolivia and the West Indies. Some are used for timber, others medicinally. (Named for Wilhelm Friedrich von Karwinski, 1780–1855, Bavarian botanist who collected in Mexico and Brazil)

Karwinskia humboldtiana (Schult.) Zucc., (named for Alexander von Humboldt, 1769–1859, German naturalist, traveller, and geographer; explored South America and Mexico from 1799–1804), COYOTILLO, HUMBOLDT'S COYOTILLO. Unarmed shrub usually 1–2 m tall, usually glabrous; leaves opposite, 3–7(–8) cm long, oblong or elliptic-oblong, entire or rarely slightly crenate, with numerous, conspicuously parallel secondary veins (leaves thus resembling those of *Berchemia*); secondary veins when viewed on abaxial (= lower) leaf surface often with a conspicuous alternating pattern of light and dark areas; inflorescence a few-flowered axillary cyme; flowers small, inconspicuous; petals present; fruit a globose drupe, black at maturity. Dry plains and prairies; Brown Co. (HPC); w margin of nc TX s to s TX and w to Trans-Pecos. Summer–fall. The

fruits (flesh) are reported to be edible but experimental evidence showed some toxicity; the stones in particular are dangerous—they contain a toxic substance that paralyzes the motor nerves of vertebrates; paralysis of the limbs results in humans and domestic animals; there may be a lengthy (weeks) lag period between poisoning and onset of symptoms; in Mexico, COYOTILLO is used in treating tetanus and the leaves and roots in treating fevers; however, the foliage can be fatally toxic to livestock and all parts of the plant should be considered poisonous (Standley 1923a; Vines 1960; Kingsbury 1964; Correll & Johnston 1970; Mabberley 1987). ☠

RHAMNUS BUCKTHORN

— A genus of 125 species of usually deciduous trees and shrubs ranging from the n hemisphere s to Brazil and s Africa; often treated as including *Frangula*, which is here recognized as a distinct genus. ☠ A European species, *R. cathartica* L. (PURGING BUCKTHORN), is the source of a powerful purgative (hydroxymethylanthraquinones); the toxins are present in the fruits and bark (Kingsbury 1964; Lampe & McCann 1985). A number of species, including *R. lanceolata*, are known to be alternate hosts for the fungus, *Puccinia coronata* Corda, crown rust of OATS (Brizicky 1964c). (Greek: *rhamnos*, the classical name for these plants)

REFERENCE: Gleason 1947

Rhamnus lanceolata Pursh subsp. **glabrata** (Gleason) Kartesz & Gandhi, (sp.: lanceolate, lance-shaped; subsp.: smooth, hairless), LANCE-LEAF BUCKTHORN. Large polygamodioecious shrub to small tree, unarmed; leaves and young branches glabrous; buds covered with scales; leaves lanceolate-elliptic, finely serrulate; flowers small, 4-merous, yellowish green, with petals 0.5-1.3 mm long, appearing before or with the emerging leaves, the leaves if present at flowering time only ca. 1 cm long; male flowers (1-)2-3 per axil; female flowers solitary; fruit a black drupe ca. 6 mm in diam. Low woods and blackland prairie; Hunt Co. (Clymer Meadow, O'Kennon 13247, BRIT); mainly e TX. Spring. [*R. lanceolata* var. *glabrata* Gleason] Subspecies *glabrata* has not been previously reported for TX; the subspecies supposedly occurring in the state (Jones et al. 1997; J. Kartesz, pers. comm. 1997) is subsp. *lanceolata* with the leaves and young branches pubescent at anthesis and the leaves permanently pubescent beneath, at least on the veins. However, all TX material we have observed is essentially glabrous and matches the description of subsp. *glabrata*. Given that the only difference between the subspecies is apparently pubescence (Gleason 1947 as varieties), the recognition of taxa below the level of species is questionable. The fruits are reported to have the same poisonous properties as *R. cathartica* (Pammel 1911). ☠

ZIZIPHUS

Shrubs or small trees, nearly glabrous, usually armed; leaves alternate, 3-veined, petioled; flowers usually axillary, solitary or in cymes; petals present; fruit a drupe with woody 2-celled stone.

— A genus of 86 species of trees and shrubs native to tropical and warm areas of the world. The related *Paliurus spina-christi* Mill. [*Ziziphus spina-christi* (L.) Willd.] (CHRIST'S-THORN, CROWN-OF-THORNS), a Mediterranean species, is reputed to have been used as Christ's crown of thorns; it is a naturalized pernicious weed in Gillespie Co. on the Edwards Plateau where eradication efforts are being undertaken (O'Kennon 1991). (Arabic: *zizouf*, the name for the lotus fruit of antiquity, *Z. lotus* Desf.)

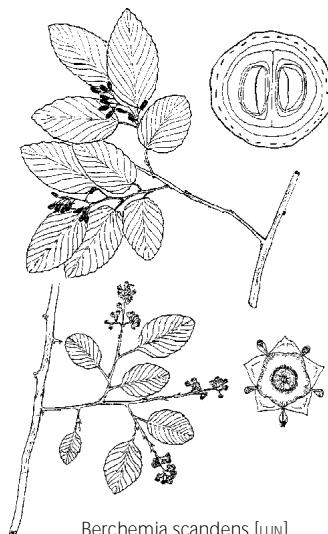
REFERENCES: Thomas 1936; Johnston 1963b.

1. Leaf blades usually 3 cm or less long, gray-green; branches terminating in straight thorny tip;

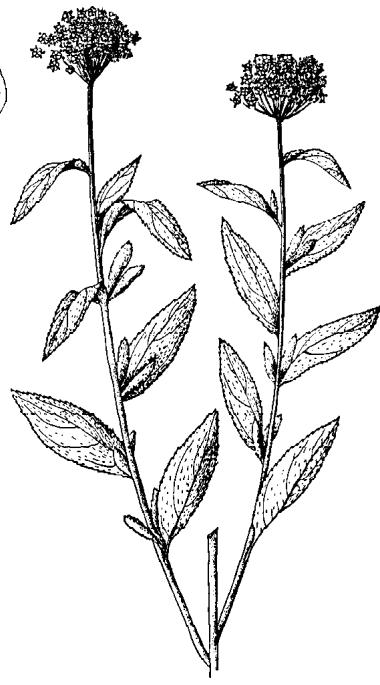
fruits pea-like, 1 cm or less long; branches glaucous _____ **Z. obtusifolia**

1. Leaf blades usually (2-)3-5 cm long, glossy green; branch tips not spiny, spines axillary when present, hooked or curved; fruits date-like, > 1.5 cm long (often much longer); branches not glaucous _____

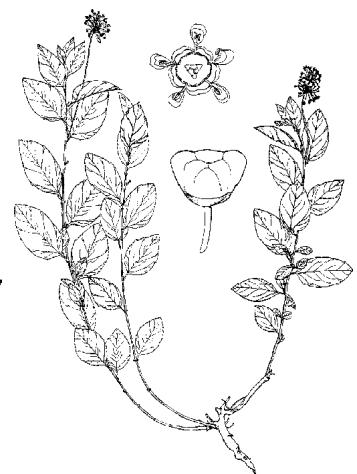
Z. zizyphus



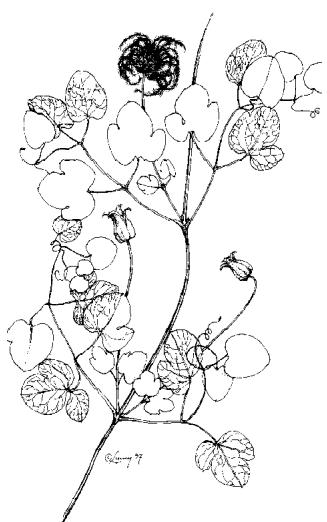
Berchemia scandens [LUN]



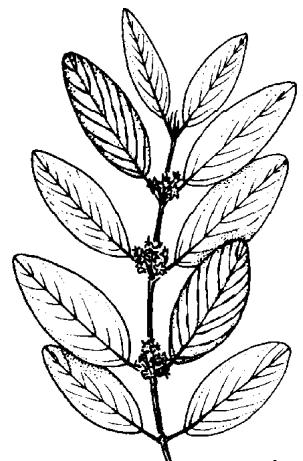
Ceanothus herbaceus [GLE]



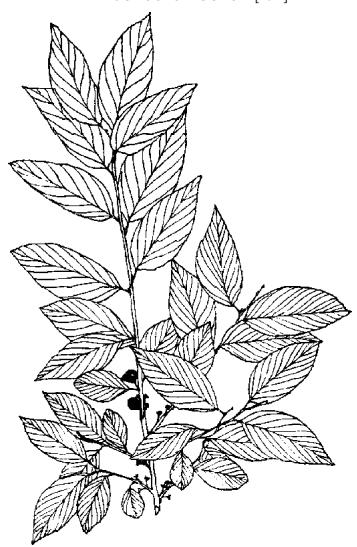
Ceanothus americanus [LUN]



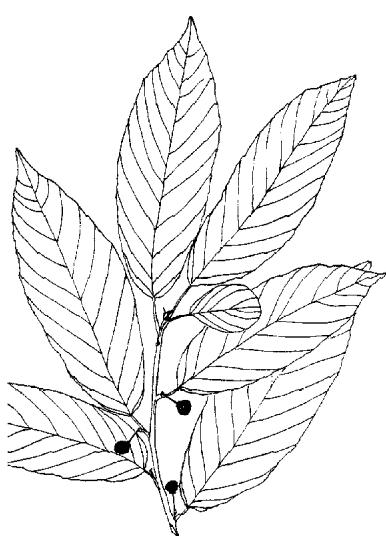
Colubrina texensis [LUN]



Condalia hookeri [LUN]



Rhamnus lanceolata subsp. *glabrata* [LUN]



Frangula caroliniana [LUN]



Karwinskyia humboldtiana [POW]

Ziziphus obtusifolia (Hook. ex. Torr. & A. Gray) A. Gray, (blunt-leaved), LOTEBOUSH, GUMDROP-TREE, GUMDROPBUSH, BLUETHORN, CLEPE. Densely and stiffly branched shrub to ca. 2 m tall; branches glaucous with a grayish or whitish, waxy bloom; leaves very variable, small, usually < 4 cm long, typically much smaller, oblong to elliptic to nearly linear, entire or indistinctly and bluntly toothed (leaves on sucker or root shoots ovate, bluntly toothed), very obtuse to slightly indented at apex, glabrous, often grayish green; flowers in small clusters or short, raceme-like, usually axillary inflorescences; petals ca. 1 mm long, early deciduous. Rocky or sandy ground; Brown, Clay, Coleman, Jack, and Palo Pinto cos., also Callahan and Shackelford cos. (Correll & Correll 1969); mainly West Cross Timbers s and w to w TX, also further e in Bell, Burnet, and Williamson cos. (Correll & Correll 1969). April and later according to rains. [*Condalia obtusifolia*(Hook. ex Torr. & A. Gray) Weberb.] *Condalia hookeri* is superficially similar to *Z. obtusifolia* because of its branch tips ending in thorns and its small leaves. Its bright green leaves broader towards the apex, non-glaucous branches, and lack of petals distinguish it from *Z. obtusifolia*

Ziziphus zizyphus (L.) H. Karst., (from an Arabic name), JUJUBE, JAPANESE-APPLE, COMMON JUJUBE, CHINESE JUJUBE, CHINESE-DATE. Large shrub or tree to 12 m tall; at least some branches usually with axillary spines; leaf blades ovate-lanceolate to ovate, shallowly and rather bluntly toothed, glabrous or nearly so; flowers on new growth, in very small axillary clusters or solitary. Occasionally cultivated, tending to spread from root-sprouts, and to self-sow; this species can form thorny thickets; Dallas, Grayson, and Tarrant cos., also Brown and Hamilton cos. (HPC) and Fort Hood (Bell or Coryell cos.—Sanchez 1997); se and e TX w to nc TX and Edwards Plateau. Early May. Native of se Europe and s Asia. [*Z. jujuba* Mill.] The flesh of the ripe fruit is edible raw or cooked and has a date-like taste; for this reason the species is widely cultivated in some parts of the world; it was cultivated in China many centuries B.C. (Thomas 1936). The National Champion JUJUBE (largest recorded in the U.S.) is located in the Fort Worth Botanic Gardens (American Forestry Association 1996). This species can spread and become problematic. ☠

ROSACEAE ROSE FAMILY

Plants herbaceous or woody, armed or unarmed; leaves basal or alternate (sometimes closely bunched), simple or compound, entire or usually toothed or lobed; stipules small to large and leafy, or minute and falling when leaves open, or absent; flowers terminal or axillary, solitary, in racemes, panicles, corymbs, or umbel-like clusters, radially symmetrical or nearly so, with a floral cup (= hypanthium) formed by fusion of bottom portion of flower parts (in taxa with inferior ovaries this appearing like outer ovary wall); sepals 5, sometimes subtended by bracteoles; petals 5; stamens 10-many, inserted with the petals on the edge of the floral cup; pistils separate or united, 1-many; ovary superior or inferior; fruits diverse, in ours achenes, drupes, pomes or an aggregates of achenes or drupelets.

☛ A large (2,825 species in 95 genera), economically important, subcosmopolitan, but especially temperate and warm hemisphere family of herbs, shrubs, and trees including many ornamentals (e.g., *Cotoneaster*, *Photinia*, *Pyracantha*, *Rosa*, and *Spiraea*) and temperate fruits such as APPLES (*Malus*), ALMONDS, CHERRIES, PLUMS, PEACHES (*Prunus*), BLACKBERRIES, RASPBERRIES (*Rubus*), and STRAWBERRIES (*Fragaria*). (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: usually alternate, simple or compound, usually toothed leaves, typically with stipules; flowers radially symmetrical, bisexual, 5-merous, with hypanthium and 10 to many, free stamens.

REFERENCES: Rydberg 1908, 1913, 1918; Robertson 1974; Phipps et al. 1990, 1991; Dickinson & Campbell 1991a, 1991b; Campbell et al. 1991; Robertson et al. 1991.

1. Annual or perennial unarmed herbs (base can be somewhat woody); leaves compound.
 2. Leaves pinnately compound with more than 3 leaflets.
 3. Petals absent; sepals 4; flowers numerous in dense subglobose to cylindric heads _____ **Sanguisorba**
 3. Petals 5, white or yellow; sepals 5; flowers solitary or few on long pedicels or in elongate spike-like racemes.
 4. Petals white; styles persistent on achenes and elongating into conspicuous beaks 4–7 mm long; hypanthium without hooked bristles; flowers solitary or few on long pedicels _____ **Geum**
 4. Petals yellow; achenes without beaks; hypanthium with hooked bristles; flowers in spike-like racemes _____ **Agrimonia**
 2. Leaves 3-foliate or palmately compound.
 5. Flowers with only 5 pistils; fruits follicles (dehiscent) with 2–4 seeds _____ **Porteranthus**
 5. Flowers with numerous pistils; fruits achenes (indehiscent) with a single seed inside.
 6. Styles persistent, elongating and forming a conspicuous beak 4–7 mm long on the fruits; petals white _____ **Geum**
 6. Styles usually deciduous, neither elongating nor forming a beak; petals white or yellow.
 7. Leaves with 3 leaflets; receptacles becoming enlarged, red, and conspicuously spongy or fleshy; petals white or yellow.
 8. Petals white; bracts below calyces similar in size to sepals, not toothed apically _____ **Fragaria**
 8. Petals yellow; bracts below calyces much larger than sepals, with 3(–5) apical teeth _____ **Duchesnia**
 7. Leaves palmately compound with 5 or more leaflets; receptacles neither becoming enlarged nor red nor spongy nor fleshy; petals yellow _____ **Potentilla**
 1. Perennial shrubs or trees or if somewhat herbaceous, then armed with thorns or prickles; leaves simple OR compound.
 9. Leaves simple, plant armed or unarmed.
 10. Ovary superior; style 1; fruit a drupe with a single stone _____ **Prunus**
 10. Ovary inferior; styles 2–5; fruit a pome with several separate seeds or seed-containing carpels.
 11. Plants usually armed with conspicuous woody spines; fruits 2 cm or less in diam.; mature carpels hard and bony; leaves deciduous with toothed margins or evergreen with entire margins.
 12. Leaves deciduous, the margins toothed; petals 6 mm or more long (often much longer) _____ **Crataegus**
 12. Leaves evergreen, the margins entire; petals ca. 4 mm long _____ **Pyracantha**
 11. Plants unarmed (if rarely armed, then fruits much > 2 cm in diam.); fruits small (6–12 mm in diam.) to very large; mature carpels not hard and bony; leaves deciduous with toothed margins.
 13. Flowers small, 8 mm or less across; inflorescences broad panicles 10–16 cm across; fruits 5–6 mm in diam.; leaves evergreen, somewhat leathery _____ **Photinia**
 13. Flowers larger, much > 8 mm across (petals ca. 10 mm or more long); inflorescences short racemes or umbel-like clusters; fruits 6 mm or more in diam., often much more; leaves deciduous, not leathery.
 14. Inflorescences umbel-like clusters; pedicels 15–30 mm long; leaf blades not cordate basally; fruits either small (ca. 6 mm in diam.) or large and much > 12 mm in diam. _____ **Pyrus**
 14. Inflorescences short racemes; pedicels 17 mm or less long; leaf blades usually slightly cordate basally; fruits small, 12 mm or less in diam. _____ **Amelanchier**
 9. Leaves compound, plant armed.
 15. Hypanthium globose to urn-shaped, with a constricted opening, the achenes concealed inside (the hypanthium is termed a hip, is smooth in outline, and typically red or reddish orange); ROSES _____ **Rosa**

15. Hypanthium flat or hemispheric, the ovules and drupelets conspicuously exposed (the cluster of druplets is commonly termed a blackberry or dewberry and is lumpy in outline and red to dark purple or black): BLACKBERRIES DEWBERRIES _____

Rubus

AGRIMONIA AGRIMONY, GROOVEBUR, COCKLEBUR, HARVEST-LICE

Pubescent, rhizomatous, erect, perennial herbs to 2 m tall; leaves pinnately compound, the leaflets dimorphic, the large primary leaflets sharply toothed, alternating with very small ones; stipules leafy, toothed or lobed, adnate to the sides of the petiole; inflorescences terminal, spike-like racemes; flowers 5-merous, small; petals (2-)3-4 mm long, yellow; stamens 5-15; hypanthium with small but conspicuous hooked bristles above, hardened at maturity, 1.5-5 mm long, containing an achene; calyx lobes incurved after flowering and forming a beak on the hypanthium.

—A genus of 15 species mainly in n temperate areas s to c and s Africa. All 3 nc TX species are limited to the ne part of nc TX. (Possibly a corruption of the genus name *Agremonia* used by the Greeks and derived from *argema*, a fleck in the eye; formerly used as a cure for eye disease)

1. Leaves with 11-19(-25) leaflets, these usually lanceolate or nearly so, sharply toothed and sharply pointed at apex (additional very small leaflets also present); lower stems conspicuously long hairy _____ **A. parviflora**
1. Leaves with 3-9 leaflets, these usually elliptic to obovate, either the teeth or the apex ± blunt or rounded (additional very small leaflets also present); lower stems either long hairy or glabrous or with scattered hairs.
 2. Axis of inflorescence and lower surfaces of leaflets without resin dots (but with pubescence); lower stems long hairy; leaves with 3-7 leaflets _____ **A. microcarpa**
 2. Axis of inflorescence and lower surfaces of leaflets with resin dots (use hand lens); lower stems glabrous or with scattered hairs; leaves with 5-9 leaflets _____ **A. rostellata**

Agrimonia microcarpa Wallr., (small-fruited), SLENDER GROOVEBUR, SMALL-FRUIT AGRIMONY. Stems 0.3-0.6(-1.2) m tall; leaflets coarsely toothed, rounded at summit; lower surface of leaflets velvety hairy; inflorescences loosely flowered, minutely pilose. Sandy woods, chiefly low ground; Lamar Co. (Mahler 1988); e TX w in Red River drainage to nc TX. Jul-Oct.

Agrimonia parviflora Aiton, (small-flowered), MANY-FLOWER GROOVEBUR, MANY-FLOWER AGRIMONY. Stems usually stout, typically in clumps, 0.3-2 m tall; undersurface of leaflets with resin dots and sparingly hairy, especially on the veins; axis of inflorescence with resin dots, finely pubescent with short hairs and often with long spreading hairs; flowers crowded; hypanthium ribbed. Edge of low woods, thickets; Grayson Co.; mainly extreme e TX and n Panhandle. Jul-Oct. This species usually has a much stouter appearance than the other 2 nc TX species.

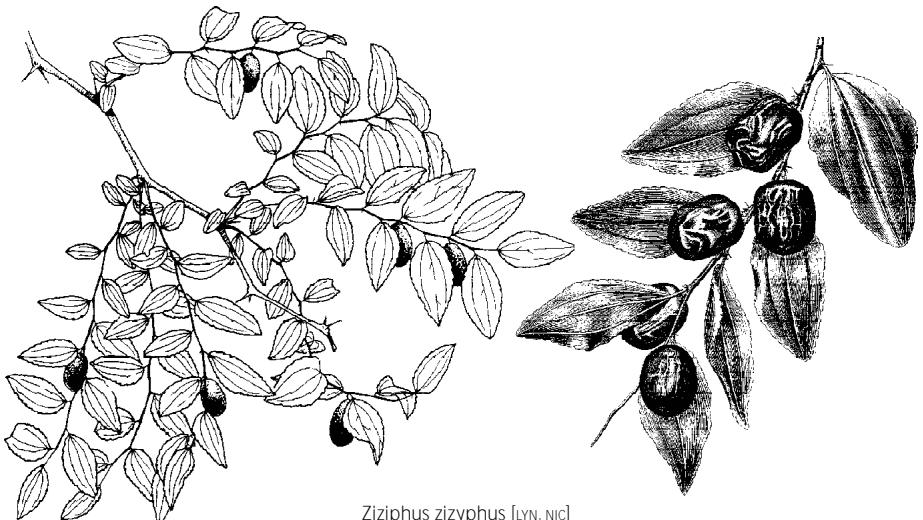
Agrimonia rostellata Wallr., (with a small beak), WOODLAND GROOVEBUR, WOODLAND AGRIMONY. Stems usually slender, typically solitary or 2-3 together, 0.3-0.6(-1) m tall; leaflets coarsely and ± bluntly serrate, the lower surfaces glabrous or some with hairs on the veins (in addition to the resin dots); axis of inflorescence glabrous or nearly so except for resin dots. Moist woods, sandy or clayey soils; Grayson Co.; e TX w in Red River drainage to nc TX. Jul-Sep.

AMELANCHIER

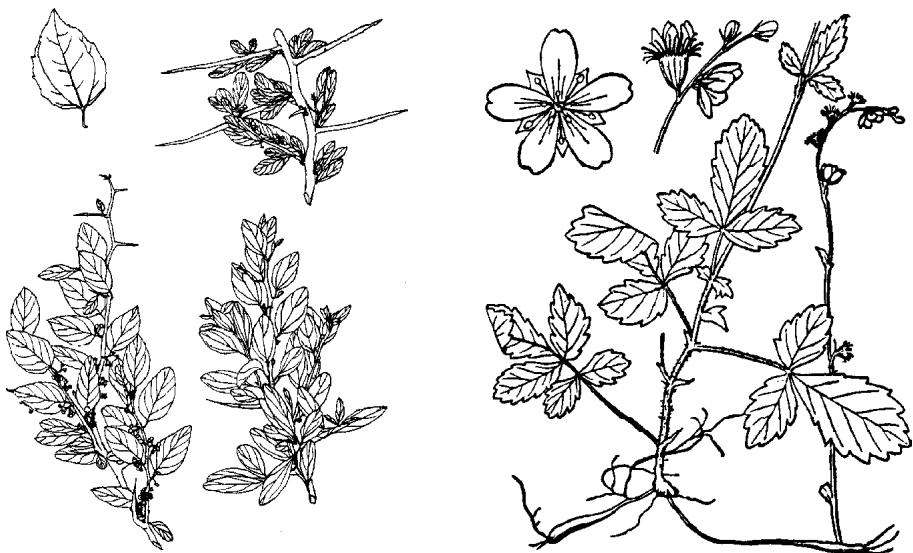
JUNE-BERRY, SUGAR-PLUM, SHAD-BUSH, SERVICE-BERRY, SARVICE-BERRY

—A n temperate genus of 33 species; some are cultivated as ornamentals or used for their edible fruit. (French: *am lanchier*, name for *A. ovalis* Medik.)

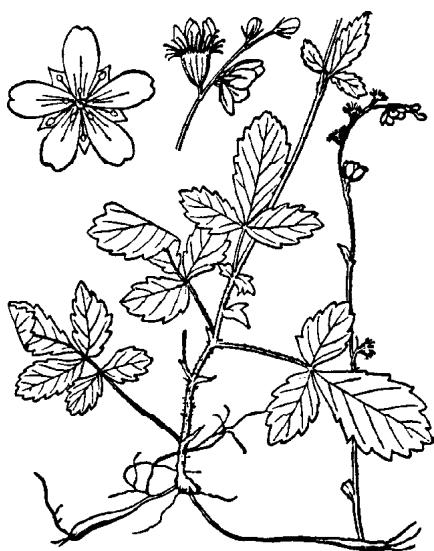
REFERENCES: Wiegand 1912; Jones 1946; Hess 1968.



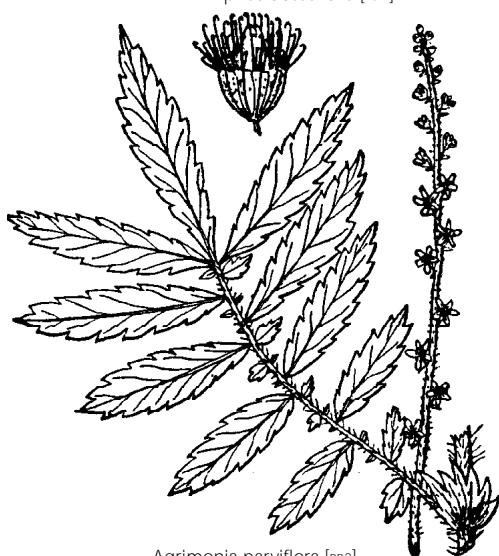
Ziziphus zizyphus [LYN, NIC]



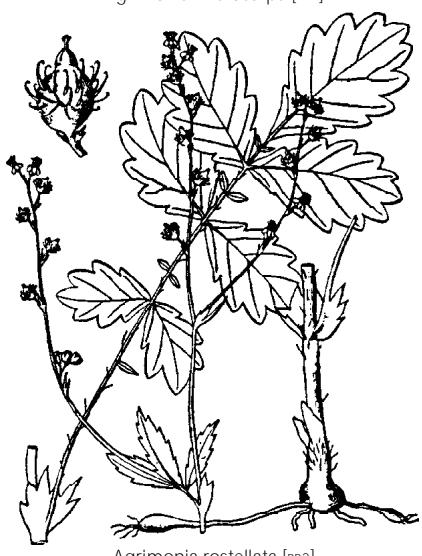
Ziziphus obtusifolia [LUN]



Agrimonia microcarpa [BB2]



Agrimonia parviflora [BB2]



Agrimonia rostellata [BB2]

Amelanchier arborea (F. Michx.) Fernald, (tree-like), JUNE-BERRY, SERVICE-BERRY, SHAD-BERRY, COMMON SERVICE-BERRY, DOWNY SERVICE-BERRY. Unarmed shrub or tree to 8(-20) m tall, usually with 1 trunk; leaves deciduous, simple, ovate to elliptic, oblong or obovate, 4-10 cm long, acute or acuminate at apex, slightly cordate or rounded basally, sharply serrate, often doubly so; petioles 1-3.5 cm long; racemes terminal, 3-5 cm long, pendant, 3-15-flowered; flowers 5-merous; hypanthium ± adnate to ovary; petals white, sometimes roseate, 10-20 mm long, 7 mm or less wide; stamens numerous; ovary wholly or partially inferior; fruit a dryish berry-like pome 6-12 mm in diam., reddish to reddish purple, edible. Wooded areas; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly e TX. Mar-May. The fruits were eaten by Native Americans and the wood is one of the heaviest in North America (Steyermark 1963).

CRATAEGUS HAWTHORN, REDHAW, THORN, THORN-APPLE

Deciduous shrubs or small trees, usually armed with thorns; branches often crooked; leaves alternate, simple, subentire, toothed, lobed, or dissected; stipules falcate, falling when the leaves expand, or large, leafy, and persistent on summer shoots; inflorescence a simple or compound, flattened, cyme-like panicle of few-many flowers or flowers solitary; flowers 5-merous, with rank or rank-sweet scent; petals white, occasionally pink in bud; stamens 5-20; ovary inferior; fruit a small pome with 1-5 bony nutlets (= pyrenes), the mature fruits of all nc TX species are some shade of red with the exception of the black- or bluish-fruited *C. brachyacantha*. The references to leaves in the descriptions and keys refer only to those leaves on short-shoots, that is those on previous years' woody growth (flowers are only produced on short-shoots). Leaves on long-shoots (= the current year's growth) are often variable and can lead to misinterpretations.

—A n temperate genus of ca. 180 species (J. Phipps, pers. comm.) of usually thorny deciduous shrubs or small trees. *Crataegus* is one of the most taxonomically complex genera in North America, apparently because of hybridization, polyploidy, and apomixis; over 1,100 species have been named with the vast majority of these probably not warranting specific recognition. Because of the lack of consistent distinguishing characters, we have lumped a number of taxa. The genus is being actively researched at the present time; e.g., a new species, *C. nananixonii* J.B. Phipps & O'Kennon, was named in 1997 from Nacogdoches Co. in e TX (Phipps & O'Kennon 1997); that species was named for Elray S. Nixon, a prominent TX botanist retired from Stephen F. Austin State Univ; the first part of the name, *nana*, refers to the dwarf stature of the plant. The fruits of many *Crataegus* species are used for preserves and jelly; the large-fruited e TX MAYHAW (*C. opaca* Hook. & Arn.) is particularly prized for making jelly. All species are alternate hosts of cedar apple rusts (*Gymnosporangium*spp.) and because of the abundance of cedars (*Juniperus* spp.) in nc TX, infected HAWTHORNS are commonly seen. (Greek: *kratos*, strength, alluding to the tough wood or thorns)

REFERENCES: Palmer 1925, 1946, 1960; Kruschke 1965; Phipps & Muniyamma 1980; Phipps 1983, 1988, 1997; Phipps et al. 1990.

1. Leaf blades deeply incised to dissected, the incisions cutting 1/2 the distance to the midrib or more, the overall appearance of the leaf parsley-like; main veins of well-developed leaf blades running to the sinuses as well as to the tips of the lobes; limited to the extreme ne portion of nc TX

C. marshallii

1. Leaf blades toothed to lobed but not deeply incised, definitely not parsley-like in appearance; main veins of well-developed leaf blades running only to the lobe tips (except also to the sinuses in *C. phaeopyrum* and *C. spathulata*): widespread throughout nc TX.
2. Leaf blades with a broad base, either rounded, truncate, or cordate.
3. Lower surface of leaf blades often velvety-pubescent to the touch, the pubescence sometimes lost with age and lower surface thus only slightly pubescent at maturity; calyxes

- densely woolly-pubescent outside; flowers 20–23 mm across; fruits 13–18 mm wide; widespread native species _____ **C. mollis**
3. Lower surface of leaf blades essentially glabrous, not velvety-pubescent to the touch; calyces glabrous outside; flowers ca. 13 mm across; fruits 4–6 mm wide; rare escape from cultivation _____ **C. phaeopyrum**
2. Leaf blades with a narrowed base, from wedge-shaped to tapering.
4. Thorns short, usually < 2 cm long; ripe fruits black, bluish when immature; found only in extreme ne corner of nc TX (Red River Co.) _____ **C. brachyacantha**
4. Thorns large, usually > 4 cm long, rarely absent; ripe fruits red, never bluish or black at any stage of maturation; widespread throughout nc TX.
5. Main veins of well-developed leaves running to the sinuses as well as to the tips of the lobes; bark usually ± smooth and mottled, flaking _____ **C. spathulata**
5. Main veins of well-developed leaves running only to the lobe tips; bark uniformly rough, not flaking OR ± smooth and mottled, flaking (only in *C. viridis*).
6. Calyces densely woolly-pubescent outside; leaf blades often ovate or deltoid in outline, often widest below the middle (*C. engelmannii* can have the calyces densely woolly-pubescent, but the leaf blades are typically spatulate to obovate and widest beyond the middle; it can therefore be keyed either here or under 6 below).
7. Leaf blades coarsely toothed to often shallowly lobed, the lower surface often velvety-pubescent to the touch; pubescence toward base of midrib on lower surface of blades matted or curled, partly directed forward or loosely appressed; leaf blades mostly ovate or deltoid, usually widest at or below the middle, < 2 times as long as wide, often nearly as wide as long, short-decurrent on petiole, the petiole barely or not at all winged for most of its length; stamens ca. 20 _____ **C. mollis**
7. Leaf blades finely toothed, not lobed, the lower surface not velvety-pubescent to the touch; pubescence toward base of midrib on lower surface of blades short and straight, spreading nearly at right angles; leaf blades spatulate to obovate, widest beyond the middle, normally 2 times or more as long as wide, long-decurrent on the petiole, the petiole noticeably winged for most of its length; stamens ca. 10 _____ **C. engelmannii**
6. Calyces glabrous or pubescent outside; leaf blades mostly spatulate to narrowly obovate, wedge-shaped or oblong-ovate, usually widest beyond the middle (leaf blades at branch tips sometimes broader).
8. Leaf blades coarsely toothed to shallowly lobed, often > 3 cm wide, with tufts of hairs beneath in the axils of main veins (often inconspicuous, rarely present only on new growth), otherwise glabrous, light to dark green, not very glossy above, at maturity firm but not thick; bark usually smooth and mottled, flaking; thorns short (typically ca. 3(–5) cm long), straight, usually few in number, sometimes absent (rarely numerous or large) _____ **C. viridis**
8. Leaf blades usually finely toothed, not lobed, usually < 3 cm wide, glabrous beneath or evenly pubescent along the veins, dark green, very glossy above, at maturity thick and leathery; bark uniformly rough, not flaking; thorns long (at least some typically 4–7 cm or more long), slightly curved, usually abundant.
9. Foliage and inflorescences glabrous or nearly so; calyces glabrous or nearly so.
10. Leaf blades on new growth (at branch tips) elliptic or lanceolate; branches stiffly and uniformly horizontal _____ **C. crus-galli**
10. Leaf blades on new growth suborbicular; branches irregularly horizontal _____ **C. reverchonii**
9. Foliage and inflorescences pubescent while young and usually throughout the season; calyces pubescent outside _____ **C. engelmannii**

Crataegus brachyacantha Sarg. & Engelm., (short-thorned), BLUEBERRY HAWTHORN. Tree to 15 m tall, armed with numerous, short, usually somewhat curved thorns; leaves to 5 cm long and 25 mm wide; flowers ca. 8 mm across; petals initially white, becoming orangish with age; fruits 8–13 mm wide, black when ripe, bluish when immature, glaucous. Stream margins, roadsides; a sterile specimen (Whitehouse 21448a BRIT/SMU) from s Red River Co., identified by Shinners as *C. brachyacantha*, seems to match this species. It is otherwise found only further e in e TX. Apr. Fruiting Aug–Sep.

Crataegus crus-galli L., (cock-spur), COCKSPUR HAWTHORN, BUSH'S HAWTHORN. Glabrous shrub or small tree 2–6(–8) m tall; thorns conspicuous, 3–8 cm long; flowers ca. 10–15 mm across; fruits short oblong to slightly obovoid (rarely subglobose), 8–10 mm wide, greenish or dull red. Lime-stone bluffs and hilltops; se and e TX w to West Cross Timbers and Edwards Plateau. Late Apr. Fruiting Oct–Nov. [*C. bushii* Sarg., *C. chenokeensis* Sarg., *C. pyracanthoides* (Aiton) Beadle]

Crataegus engelmannii Sarg., (for George Engelmann, 1809–1884, German-born botanist and physician of St. Louis). Similar to and possibly not specifically distinct from *C. crus-galli*; basically a pubescent type of *C. crus-galli*; fruits subglobose or short oblong, 6–8 mm wide, dull-crimson. Sandy upland or lowland woods; e TX w to e edge of Blackland Prairie (Mahler 1988). Apr. Fruiting Oct–Nov. [*C. berberifolia* Torr. & A. Gray is possibly a synonym (Phipps et al. 1988)]

Crataegus marshallii Eggl., (for botanist Humphrey Marshall, 1722–1801), PARSLEY HAWTHORN. Shrub or small tree to 8 m tall; leaves conspicuously incised and sharply serrate; flowers 10–15 mm across; fruits oblong to obovoid, 4–8 mm thick, bright red. Acidic sandy soils, woods, roadsides; Lamar Co. in Red River drainage; mainly se and e TX. Mar–Apr. Fruiting Sep–Oct.

Crataegus mollis Scheele, (soft, with soft hairs), REDHAW, SUMMERHAW, DOWNYHAW. Tree 3–12 m tall with scattered stout thorns to nearly thornless; leaf blades large, (3–)5–7(–10) cm long, variable in shape, usually wedge-shaped basally but sometimes rounded to even truncate (*C. mollis* can therefore be reached 2 ways in the key), tomentose to slightly pubescent beneath; flowers 20–23 mm across; fruits subglobose (rarely oblong or obovoid), 13–18 mm wide, scarlet or bright crimson. Stream bottoms or hillside woods and thickets; se and e TX w to West Cross Timbers and Edwards Plateau. Early and mid-Apr. Fruiting Aug–Oct. [*C. brachyphylla* Sarg., *C. dallasiana* Sarg. [probably = *C. brazoria* Sarg.], known from Dallas and Ellis cos., will key to *C. mollis* in our key. This entity is possibly a hybrid between *C. mollis* and *C. viridis*, and is intermediate in a number of characters between these 2 species.]

Crataegus phaeopyrum (L.f.) Medik., (with the appearance of a pear—*pyrus* in Latin means pear), WASHINGTON-THORN. Small tree 7–8(–12) m tall; leaves often 3-lobed or with 2–3 pairs of lateral lobes, the sinuses between the lobes usually < 1/2 the distance to the midrib (rarely but never consistently deeper); flowers 10–13 mm across; fruits shining scarlet. The 4–6 mm diam. fruits are the smallest of any *Crataegus* in nc TX. It is also the only nc TX species in which the calyces are deciduous from the mature fruits, resulting in the tops of the nutlets being exposed. Cultivated and escapes; Tarrant Co.; native further e in the e US. May–Jun. Fruiting fall.

Crataegus reverchonii Sarg., (for Julien Reverchon, 1837–1905, a French-American immigrant to Dallas and important botanical collector of early TX), REVERCHON'S HAWTHORN. Shrub or bushy small tree to 6 m tall; leaves normally glabrous, sometimes pubescent on stump sprouts; flowers ca. 10–15 mm across; fruits subglobose, ca. 12 mm wide, light scarlet. Similar to *C. crus-galli* except for leaf shape differences and possibly not specifically distinct. Rocky or sandy ground, on slopes or in drainage ways; mainly Blackland Prairie w to West Cross Timbers, also Edwards Plateau. Middle and late Apr. Fruiting Sep–Oct.

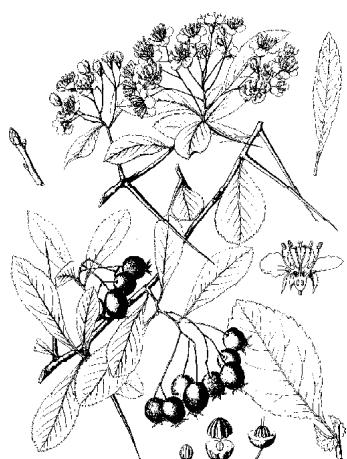
Crataegus spathulata Michx., (spoon-shaped, in reference to the leaves), LITTLE-HIP HAWTHORN, PASTURE HAWTHORN. Shrub or tree 5–7 m tall; branchlets usually thorny and horizontal; leaves



Amelanchier arborea [GLE]



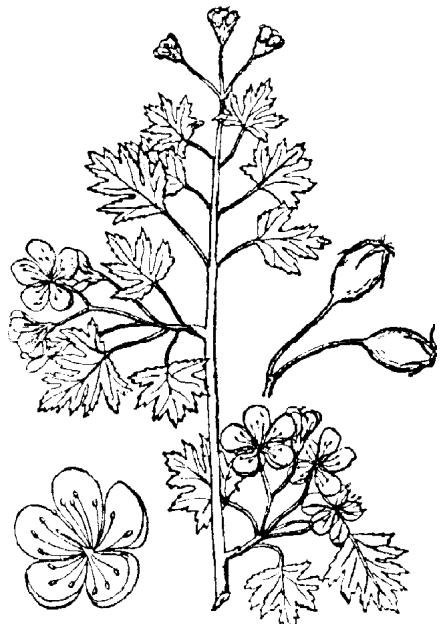
Crataegus brachyacantha [SA3]



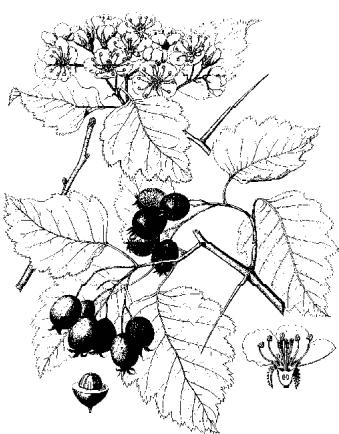
Crataegus crus-galli [SA3]



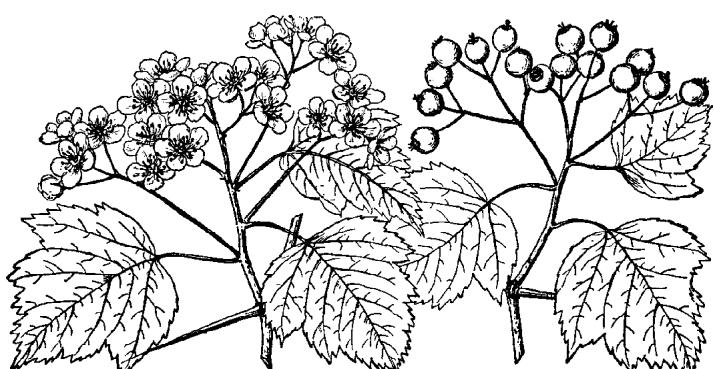
Crataegus engelmannii [SA3]



Crataegus marshallii [BB2]



Crataegus mollis [SA3]



Crataegus phaeopyrum [SA2]

of flowering branchlets usually 10–20 mm long, 10 mm or less wide, narrowly obovate with several coarse rounded teeth or small lobes beyond middle or near apex, gradually narrowed to entire base; flowers 6–8 mm across; fruits subglobose, 4–7 mm wide, red. Sandy woods, roadsides; se and e TX w to Bell, Grayson, Hunt, and Navarro cos. Apr. Fruiting Oct–Nov.

Crataegus viridis L., (green), GREENHAW. Small tree 3–6(–12) m tall with thorny to nearly thornless branches; leaf blades variable in shape and often asymmetrical, with tufts of hair beneath in axils of main veins; flowers ca. 12–15 mm across; fruits subglobose, 5–8 mm wide, red or orange-red. Stream bottoms, fields, slopes; se and e TX w to Rolling Plains and Edwards Plateau. Late Mar–Apr. Fruiting Sep–Nov. [*C. anamesa* Sarg., *C. antiplasta* Sarg., *C. glabriuscula* Sarg.] The state champion *C. viridis* is in Harry S. Moss Park in Dallas (R. May, pers. comm.).

DUCHESNEA INDIAN-STRAWBERRY, MOCK STRAWBERRY, SNAKEBERRY

☛ A genus of 2 species of s Asia (Mabberley 1987); sometimes lumped with *Potentilla* (e.g., Mabberley 1997); similar to *Fragaria* (STRAWBERRY) but with yellow flowers, dry receptacles, and toothed bracts associated with calyces. (Named for Antoine Nicolas Duchesne, 1747–1827, French botanist and early monographer of *Fragaria*)

Duchesnea indica (Andr.) Focke, (of India), INDIAN MOCK STRAWBERRY, YELLOW-STRAWBERRY. Perennial stoloniferous herb; leaves compound with 3 serrate-crenate leaflets, resembling those of STRAWBERRY; petioles long, to 30 cm; flowers solitary on axillary peduncles 3–10 cm long, 5-merous; calyx lobes alternating with 5 larger leafy 3(–5)-toothed bracts; petals yellow; stamens 20; pistils numerous; “fruit” an aggregate of achenes, the receptacle enlarged, spongy and red at maturity, not juicy, resembling a small STRAWBERRY, not poisonous but tasteless and not worth eating. Weedy, often wet areas, alleys in cities; naturalized mainly se and e TX w to at least Red River Co., also Dallas (E. McWilliams, pers. comm.) and Tarrant (R. O’Kennon, pers. obs) cos. Mar–Aug. Native of India. Sometimes cultivated in hanging baskets (Mabberley 1987). ☛

FRAGARIA STRAWBERRY

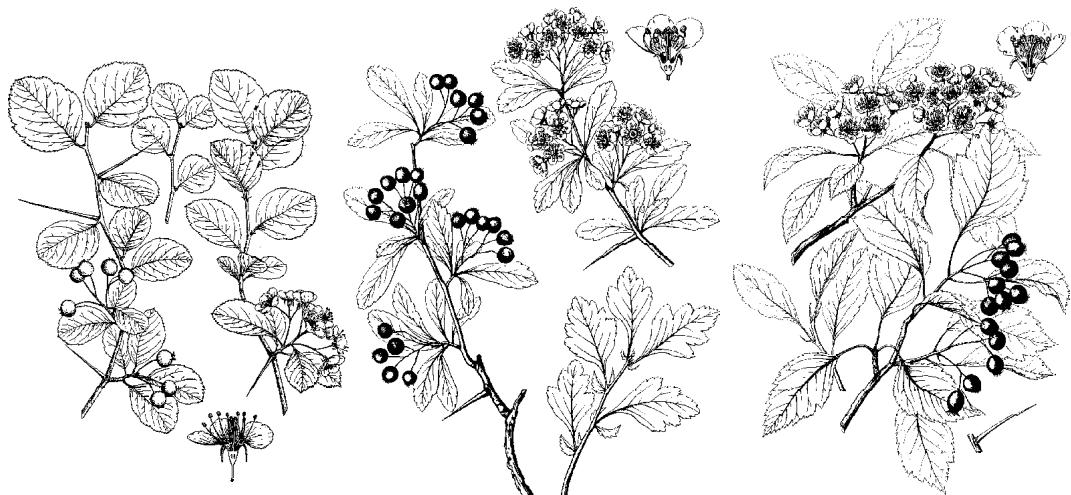
☛ A genus of ca. 12 species of herbs with rooting runners and usually red, fleshy receptacles; native to the n temperate zone and Chile. (Latin: *fraga*, the classical name for strawberry, from *fragrans*, fragrant, alluding to the fruit)

Fragaria virginiana Duchesne subsp. **grayana** (Vilm. ex J. Gay) Staudt, (sp.: of Virginia; subsp.: for Asa Gray, 1810–1888, botanist at Harvard and preeminent American plant taxonomist), VIRGINIA STRAWBERRY, WILD STRAWBERRY. Low perennial scapose herb with rhizomes and long stolons; leaves compound; leaflets 3, elliptic to obovate, toothed; petioles to 30 cm long; inflorescence an umbel-like cyme; flowers 5-merous, perfect or unisexual, the pistillate smaller than staminate; petals white, 6–15 mm long; stamens usually 20; pistils numerous; “fruit” an aggregate of minute dry achenes, these embedded in pits on the surface of a swollen, fleshy, red, edible, conical receptacle 5–20 mm in diam. (thus an accessory “fruit”—with fleshy parts derived from organs other than the pistil). Fields, prairies, forest margins, wooded areas; Grayson Co.; mainly e TX w to nc TX. Mar–Apr. The cultivated STRAWBERRY, *F. ×ananassa*, is a hybrid between *F. virginiana* and *F. chiloensis*(L.) Mill., native to w North America and South America, respectively.

GEUM AVENS

☛ A temperate and cold area genus of ca. 40 species; some are cultivated as ornamentals, others have glucosides and are used medicinally. (Classical Latin name for these plants)

Geum canadense Jacq., (of Canada), WHITE AVENS. Perennial rhizomatous herb, 30–100(–120) cm tall, usually with rather densely pilose stem (rarely glabrous) and sparsely appressed-pilose

*Crataegus reverchonii* [SA3]*Crataegus spathulata* [SA3]*Crataegus viridis* [SA3]*Duchesnea indica* [BB2]*Fragaria virginiana* subsp. *grayana* [BB2]*Geum canadense* var. *camporum* [STE]*Photinia serratifolia* [Lou]*Porteranthus stipulatus* [MTB]

leaves; basal leaves long-petioled, usually pinnately compound with 3 large terminal leaflets and 2–4 much smaller ones, or apparently palmate (only the terminal leaflets developed); stem leaves with shorter petioles, with 3 leaflets or the uppermost leaves simple; leaflets sharply toothed; stipules of stem leaves leafy, toothed or lobed; flowers solitary, long pedicellate, terminal on arched-spreading branches, 5-merous; petals white, fading yellowish, 5–9 mm long; stamens numerous; achenes numerous, in a spherical head-like aggregate 1–2 cm in diam., with persistent conspicuous beaks (= 4–7 mm long styles). Woods and thickets, various soils; e 1/2 of TX. Apr-May(-Jun).

1. Terminal leaflet of middle stem leaves usually acute; carpels broadly ovate, 3–4 mm long _____ var. **camporum**

1. Terminal leaflet of middle stem leaves usually obtuse; carpels narrowly obovate to wedge-shaped,

2–3 mm long _____ var. **texanum**

var. **camporum** (Rydb.) Fernald & Weath., (of the plains). E 1/2 of TX. This is the common variety in nc TX.

var. **texanum** Fernald & Weath., (of Texas). Included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); we have observed no specimens clearly distinguishable as this variety from nc TX; supposedly e 1/2 of TX.

PHOTINIA

—A genus of 65 species native from the Himalayas to Japan and Sumatra and e North America and Central America; a number are cultivated as evergreen or deciduous shrubs including use as hedge plants. (Greek: *photos* light, referring to the shiny leaves of some species)

REFERENCE: Robertson et al. 1991.

Photinia serratifolia (Desf.) Kalkman, (serrate-leaved). Evergreen shrub or tree to ca. 12 m tall; leaves simple, oblong, large, to ca. 20 cm long, serrate, somewhat leathery, dark green above, yellowish green beneath, reddish when young; petioles 2–3 cm long; panicles 10–16 cm across; flowers 5-merous, small (6–8 mm across); petals white; fruits globose, 5–6 mm in diam., red. Widely cultivated and escaping particularly in sandy soils; Grayson Co.; distribution in other parts of TX not known. Late spring-summer. Native of China, Taiwan, Japan, and Sumatra. [P. *serrulata* Lindl.] ☀

PORTERANTHUS INDIAN-PHYSIC

—A North American genus of 2 species, formerly recognized as *Gillenia*. (Named for Thomas Conrad Porter, 1822–1901, Professor at Lafayette College)

Porteranthus stipulatus (Muhl. ex Willd.) Britton, (having stipules), INDIAN-PHYSIC, AMERICAN IPECAC. Erect perennial herb; stems 0.4–1(–1.2) m tall; leaves alternate, compound; leaflets 3, lanceolate, acuminate, 4–8 cm long; leaflets of lower leaves deeply incised or laciniate; leaflets of upper usually sharply double-serrate; petioles 0–10 mm long; stipules 1–2(–3) cm long, 1–1.5 cm wide, leaf-like, ovate to orbicular; inflorescences leafy, panicle-like, each branch terminating in 1–7 long-pedicelled flowers; flowers 5-merous; petals white or pinkish, 10–15 mm long; stamens 20; pistils 5; follicles 6–8 mm long. Wooded slopes; Lamar Co. in Red River drainage; mainly e TX. Apr-Jun. Sometimes recognized in the genus *Gillenia* [as *G. stipulata* (Muhl. ex Willd.) Nutt.]. The glycosides in the roots and bark were formerly used medicinally (Mabberley 1987); they are potentially poisonous (Burlage 1968). ☀

POTENTILLA CINQUEFOIL, FIVE-FINGER

Pubescent annual, biennial, or perennial herbs; leaves in our species palmately compound with 5–7 sharply toothed leaflets; stipules conspicuous, 0.5–3 cm long; flowers 5-merous; calyces

subtended by 5 bractlets (epicalyx); petals yellow; stamens 20–30; achenes numerous, in head-like arrangement on a prolonged receptacle.

☛ A genus of ca. 500 species of herbs and shrubs with an epicalyx of bractlets alternating with the sepals; it is primarily a n temperate and boreal group, with a few in s temperate zone. Some are cultivated as ornamentals or used medicinally. (Diminutive of Latin: *potens* powerful, originally applied to *P. anserina* L., from its reputed medicinal value)

REFERENCE: Shinners 1955.

1. Pedicels shorter than or equaling the calyces in flower (up to 3 times as long in age): flowers

many in a terminal, cymose inflorescence; petals light sulfur yellow. *P. recta*

1. Pedicels 5–12 times as long as the calyces in flower; flowers axillary, solitary; petals deep yellow

P. simplex

Potentilla recta L., (upright), SULFUR CINQUEFOIL. Erect annual, biennial, or perennial to 70(–80) cm tall; leaflets 3–8 cm long, coarsely serrate; petals 7–11 mm long. Weedy areas; found at Polytechnic (now in Fort Worth), Tarrant Co. in May 1929, more recently (1995) at Fort Worth Nature Center; also known from Cass Co. (Correll & Johnston 1970) in e TX. Native of Europe. Reported to be poisonous (Burlage 1968). ☠ ☮

Potentilla simplex Michx., (unbranched, simple), OLDFIELD CINQUEFOIL. Perennial from short thick rhizomes; stems initially erect to ascending, later widely spreading, arching and rooting at tips to produce small tubers which become the rhizomes for the following year; leaflets 2–7 cm long, toothed; petals 4–7 mm long. Sandy open woods, upland or lowland; Lamar Co. in Red River drainage; mainly e TX. Apr.

PRUNUS CHERRY, PEACH, PLUM

Deciduous or evergreen (1 species) shrubs or small trees, sometimes rhizomatous and thicket-forming; leaves simple; leaf blades entire to sharply or bluntly toothed; petioles often with glands; stipules paired, small, soon deciduous; flowers in fascicles, umbels, racemes, or solitary, appearing before, with, or after the leaves, often numerous and showy; petals white to pink, rosy lavender, or red; stamens ca. 15–20; fruit a drupe, frequently edible, the exocarp fleshy or juicy, the endocarp hard, indehiscent.

☛ A temperate (especially n) and tropical mountain genus of 200+ species including important fruit and nut trees such as ALMONDS, APRICOTS, CHERRIES, NECTARINES, PEACHES, and PLUMS. *Prunus dulcis* (Mill.) D.A. Webb, ALMOND, native to w Asia, is the most widely grown of all “nuts.” The genus also has widely used ornamentals (e.g., the Eurasian *P. laurocerasus* L.—CHERRY-LAUREL) and is valued for its beautiful wood used in furniture, turnery, and cabinet-making. ☠ All parts of some species (e.g., *P. persica*, *P. serrulata*), particularly the seeds, twigs, and leaves may contain the cyanogenic glycoside amygdalin which breaks down to release dangerous levels of hydrogen cyanide (HCN); when the leaves are damaged, an enzymatic reaction releases hydrogen cyanide; death can result from animals eating the leaves; caution should therefore be taken where *Prunus* species occur in pastures. Children have been fatally poisoned by swallowing the cyanide-producing stones while eating wild cherries. HCN disrupts the metabolic pathway by which oxygen is utilized in the mitochondria of cells; death from HCN poisoning occurs within 12–20 minutes of exposure (Sperry et al. 1955; Hardin & Arena 1974; Schmutz & Hamilton 1979; Stephens 1980; Blackwell 1990; Turner & Szczawinski 1991; McGuffin et al. 1997). A single crushed leaf is sufficient to kill an insect in a jar (J. Phipps, pers. comm.) (Classical Latin name for a plum tree)

REFERENCES: Wight 1915; McVaugh 1951.

1. Plants with mature leaves (with or without flowers or fruits).
 2. Non-rhizomatous trees, usually a solitary individual, not forming thickets; fruits in racemes, solitary, or in *P. mexicana* in fascicles (= clusters) or umbels.
 3. Leaves evergreen, ± leathery, entire or with remotely spaced teeth. *P. caroliniana*
 3. Leaves deciduous, not leathery, with small teeth regularly and closely spaced.
 4. Lower surface of leaf blades with a mustache of hairs at base of midrib, otherwise glabrous (sometimes entirely glabrous in var. *eximia* on s margin of nc TX); flowers and fruits in an elongate raceme; fruits red when immature, becoming purple-black at maturity *P. serotina*
 4. Lower surface of leaf blades entirely glabrous or with scattered pubescence, lacking distinct mustache at base of midrib; flowers and fruits solitary or in fascicles or umbels; fruits yellow, red, or purplish.
 5. Leaf blades glabrous beneath, often folded lengthwise, 4–8 times as long as wide; fruits solitary, large (ca. 5–8 cm in diam.), and tomentose to velvety; flowers sessile or subsessile *P. persica*
 5. Leaf blades with scattered pubescence beneath, not folded lengthwise, ca. 1–3 times as long as wide; fruits in fascicles or umbels, smaller (1–3 cm long), glabrous, with a waxy bloom; flowers on pedicels 10–17 mm long
 6. Leaf blades 6–12 cm long, 3–6 cm wide, apically abruptly acuminate, basally rounded or subcordate, marginally sharply and often doubly serrate; fruits ellipsoid to ± globose, 2–3 cm long; widespread in nc TX *P. mexicana*
 6. Leaf blades usually 4–7(–7.5) cm long, < 3(–3.5) cm wide, apically acute or gradually acuminate, basally broadly cuneate to rounded, marginally finely serrate; fruits subglobose, 1–2 cm long; rare in nc TX *P. umbellata*
 2. Rhizomatous shrubs or trees usually forming thickets of numerous individuals; fruits in fascicles (clusters) or umbels, not in racemes.
 7. Leaf blades mostly (6–)7–10 cm long; shrub or tree to 10 m tall *P. munsoniana*
 7. Leaf blades mostly < 7 cm long; shrubs to 4 m tall.
 8. Leaf blades not folded lengthwise, spreading or partly drooping, the lower surface densely pubescent, the apex obtuse to acute; young branchlets (current year's growth) usually pubescent; petioles pubescent *P. gracilis*
 8. Leaf blades folded lengthwise, drooping, the lower surface pubescent only on veins, the apex acute to acuminate; young branchlets glabrous or rarely pubescent; petioles glabrous to pubescent.
 9. Leaf blades acute or acuminate, 1–2 cm wide, the leaf teeth each tipped with a large permanent gland; fruits 2–2.5 cm long; on sandy soils *P. angustifolia*
 9. Leaf blades acuminate, usually (1.5–)2–4 cm wide, the leaf teeth with or without a small deciduous gland; fruits 1.3–2 cm long; usually on calcareous clay soils or limestone outcrops *P. rivularis*
 1. Plants with flowers; mature leaves usually absent (except in evergreen *P. caroliniana*).
 10. Flowers in racemes.
 11. Racemes ca. 3 cm long, axillary; petals 2–3 mm long; leaves evergreen *P. caroliniana*
 11. Racemes (4–)6–15 cm long, terminating short branches; petals 2.5–6 mm long; leaves deciduous *P. serotina*
 10. Flowers solitary, fascicled, or in umbels.
 12. Petals 15–25 mm long, lavender-pink or red; flowers sessile or subsessile; ovary velvety hairy *P. persica*
 12. Petals 3–11 mm long, white or light pink; flowers pedicelled; ovary glabrous.
 13. Petals 3–7 mm long; flowers to ca. 15 mm across; leaf teeth usually ± obtuse, tipped with a gland (use hand lens on young leaves if present); calyx lobes usually subglabrous to pubescent below the middle on inner surfaces; rhizomatous shrubs or trees, usually forming thickets.

14. Calyx lobes entire; pedicels usually 2–6 mm long _____ **P. angustifolia**
14. Calyx lobes glandular-toothed; pedicels 5–15 mm long.
15. Hypanthium glabrous or pubescent only at summit; pedicels glabrous.
16. Shrubs 0.5–2(–3) m tall; calyx lobes oblong-lanceolate or ovate-lanceolate, shorter than hypanthium, 1.5–2 mm long; widespread in nc TX _____ **P. rivularis**
16. Trees or shrubs 3–10 m tall; calyx lobes ovate or oblong-ovate, as long as hypanthium, 2–4 mm long; rare in nc TX _____ **P. munsoniana**
15. Hypanthium and pedicels densely pubescent _____ **P. gracilis**
13. Petals 7–11 mm long; flowers 15–23 mm across; leaf teeth sharp, without a gland; calyx lobes usually densely pubescent on inner surfaces; non-rhizomatous usually solitary tree, not forming thickets.
17. Hypanthium sparsely to densely pubescent; pedicels of open flowers 6–11(–13) mm long; calyx lobes usually densely pubescent on inner surfaces and sparsely to densely pubescent on outer surfaces; tree to 12 m tall; widespread in nc TX _____ **P. mexicana**
17. Hypanthium glabrous to sparsely pubescent; pedicels of open flowers 9–17 mm long; calyx lobes usually densely pubescent on inner surfaces, but sparsely pubescent on outer surfaces; small tree to 6 m tall; mainly e TX, rare in nc TX _____ **P. umbellata**

Prunus angustifolia Marshall, (narrow-leaved), CHICKASAW PLUM, SANDHILL PLUM. Shrub (rarely a small tree) to ca. 4 m tall; branchlets usually zigzag, sometimes spine-tipped; leaf blades 2–6(–8) cm long, folded lengthwise; inflorescence a compact umbel of 2–4 flowers; flowers expanding with the leaves; calyces glandless; petals white to creamy-white, 3.5–6 mm long; fruits red or yellow, 2–2.5 cm long. Sandy open woods, roadsides, and fencerows; e 2/3 of TX. Late Feb–early Apr. The fruits of this species can be delicious and may be eaten raw or made into jelly or preserves; Native Americans are reported to have dried the fruits on hot rocks so that they could be stored for future use (Kirkpatrick 1992).

Prunus caroliniana (Mill.) Aiton, (of Carolina), LAUREL CHERRY, CAROLINA LAUREL CHERRY. Tree to ca. 12 m tall with evergreen leaves; leaf blades thick, glabrous, 5–12 cm long, to 4 cm wide, dark green and shiny above, paler below; axillary racemes ca. 3 cm long, densely flowered; pedicels 3–4 mm long; sepals ca. 1 mm long; petals cream, 2–3 mm long; fruits black, shiny, ripening in fall and long persistent. Low areas; cultivated more in the past than at present, escaping; Grayson and Tarrant cos., also Dallas Co. (E. McWilliams, pers. comm.); native to se and e TX disjunct w to McLennan Co. (Little 1976 [1977]); according to Mahler (1988) penetrating nc TX from e TX along rivers. Feb–Apr.

Prunus gracilis Engelm. & A. Gray, (graceful), SAND PLUM, OKLAHOMA PLUM. Small shrub to ca. 1.5 m tall; mature leaf blades oblong-elliptic or lanceolate, 2–5 cm long, 10–25 mm wide, stiff, prominently veiny and densely soft-pubescent beneath; flowers abundant and showy, expanding with the leaves, in clusters of 2–4(–8); petals white, 5–6.5 mm long; fruits 1.5–1.8 cm long, yellow-red to red. Sandy open woods or open ground; e 2/3 of TX. Mar–early Apr. The fruits are edible and were much dried by Native Americans for winter use (Mabberley 1987).

Prunus mexicana S. Watson, (of Mexico), WILD PLUM, MEXICAN PLUM, BIG-TREE PLUM. Tree to 12 m tall; leaf blades 6–12 cm long, 3–6 cm wide, obovate to oblong-ovate to ovate; flowers appearing before or with young leaves, in clusters of 2–4(–6); petals white; fruits 2–3 cm long, purplish red, with a bloom, seem to never ripen (or ripen quite late). Woods and thickets, various soils; se and e TX w to West Cross Timbers; also Edwards Plateau. Late Feb–early Apr. The National Champion MEXICAN PLUM (largest recorded in the U.S.) is located in Hood Co. (American Forestry Association 1996).

Prunus munsoniana W. Wight & Hedrick, (for Thomas Volney Munson, 1843–1913, who developed numerous grape varieties and is credited with saving the French wine industry in the

1870s from the root disease, grape phylloxera), WILDGOOSE PLUM, MUNSON'S PLUM. Shrub or tree to 10 m tall; similar to *P. rivularis* and doubtfully separable from it. Shinners identified Grayson, Lamar, and Rockwall co. specimens as *P. munsonianus*; Little (1976 [1977]) also mapped Burnet, Clay, Collin, Fannin, Hunt, and Lampasas cos.; said by Sargent (1922) to occur w to Clay and Lampasas cos.; mainly nc TX and Edwards Plateau. Possibly only a larger phase of *P. rivularis*; Simpson (1988) questioned this species. Mar.

Prunus persica (L.) Batsch, (Latin for peach), PEACH, DURAZNO. Small tree 3–10 m tall; leaf blades oblong-lanceolate, 7–15 cm long, finely toothed, glabrous; flowers appearing before the leaves, usually solitary, 2.5–3.5 cm across; fruits 5–8 cm in diam. Commonly cultivated, occasional as an escape on roadsides and in waste places; Bosque, Brown, Grayson, and Hill cos.; e TX w to nc TX and Edwards Plateau. Mar–early Apr. Native of e Asia. Second only to apple as the most widely grown tree fruit worldwide (Mabberley 1987). An introduced Old World rust fungus, *Tranzschelia discolor* (Fuckel) Tranzschel & Litv., forms lesions on the leaves of PEACH (J. Hennen, pers. comm.). The frost-damaged leaves and seeds have high concentrations of hydrogen cyanide and are potentially fatal to livestock (Burlage 1968; Schmutz & Hamilton 1979). ☠ ↗

Prunus rivularis Scheele, (growing by streams), THICKET PLUM, HOG PLUM, CREEK PLUM. Shrub with leaf blades 5–6(–7) cm long, usually (1.5–)2–4 cm wide, folded lengthwise; flowers with unfolding leaves, in clusters of 2–4(–8); petals white, 5–6.3 mm long; fruits 1.3–2 cm long, yellow with reddish areas or rarely red. Usually calcareous clay soils or limestone outcrops; Post Oak Savannah w to Rolling Plains and Edwards Plateau. Late Feb–early Apr. The fruits are generally quite tart and not as sweet as those of *P. angustifolia*

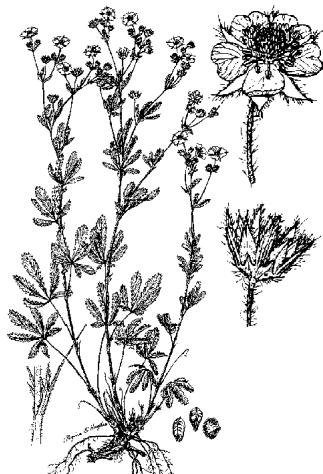
Prunus serotina Ehrend., (late-ripening), BLACKCHERRY, WILD BLACKCHERRY, RUM CHERRY, CAPULIN. Tree 10–15(–30) m tall; leaf blades 3.5–15 cm long, 2–5 cm wide; racemes (4–)6–15 cm long; petals white, 2.5–6 mm long; fruits 0.7–1(–1.2) cm in diam., dark red becoming purple-black, sweet or bitter. Mar–Apr. Highly prized for its beautiful wood, used for furniture and cabinet-making; also used as a flavoring for rum and brandy and the bark was formerly used medicinally (Mabberley 1987). After storms, some ranchers watch for fallen branches since cattle can be poisoned from eating wilted leaves which contain hydrocyanic or prussic acid (cyanide); poisoning in humans has been reported from ingesting seeds, chewing twigs, and from making tea from the leaves (Mulligan & Munro 1990). ☠

1. Plants from Lampasas Cut Plain and Edwards Plateau; lower surface of leaf blades sometimes entirely glabrous; leaf blades relatively more coarsely toothed (2nd floral leaf with about 5 teeth per cm of margin); petioles relatively longer, those of the 2nd floral leaf ca. 15 mm long but varying from 12–20 mm _____ var. **eximia**
1. Plants from n part of Blackland Prairie and Red River drainage; lower surface of leaf blades with a mustache of hairs at base of midrib; leaf blades relatively more finely toothed (floral leaves often with ca. 7 teeth per cm of margin); petioles relatively shorter, those of the 2nd floral leaf ca. 10–11 mm long but varying from 4–17 mm _____ var. **serotina**

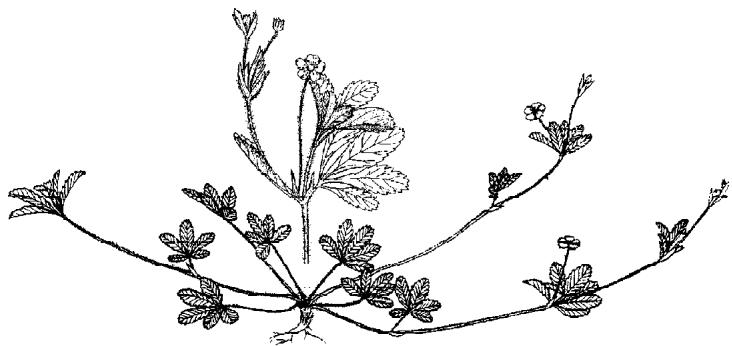
var. **eximia** (Small) Little, (out of the ordinary, distinguished), ESCARPMENT BLACKCHERRY. Burnet and Williamson cos. on s margin of nc TX (Balcones Canyonlands Nat. Wildlife Refuge, C. Sexton, pers. comm.); otherwise known only from the Edwards Plateau; endemic to TX. [*P. serotina* subsp. *eximia* (Small) McVaugh] ↗

var. **serotina**, BLACKCHERRY, WILD BLACKCHERRY. Woods, thickets; Fannin, Grayson, Hunt, Kaufman, and Lamar cos., also Dallas Co. (Little 1971); se and e TX w to ne part of nc TX.

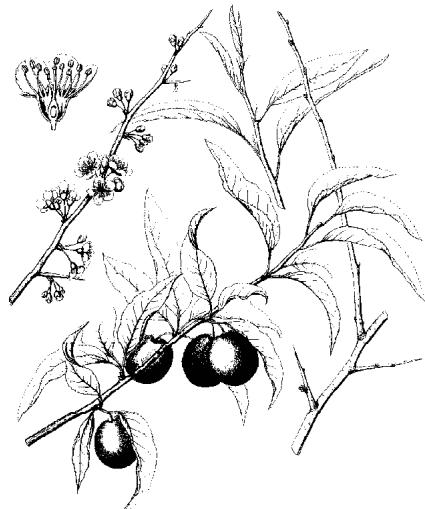
Prunus umbellata Elliott, (with umbels), FLATWOOD PLUM. Small tree to 6 m tall; leaf blades usually 4–7(–7.5) cm long, < 3(–3.5) cm wide, elliptic-oblong to elliptic or obovate; flowers before or



Potentilla recta [RE]



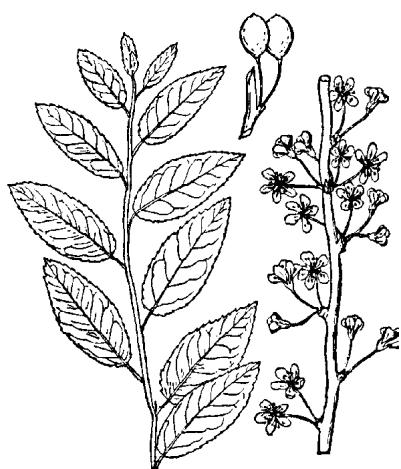
Potentilla simplex [RHO, STE]



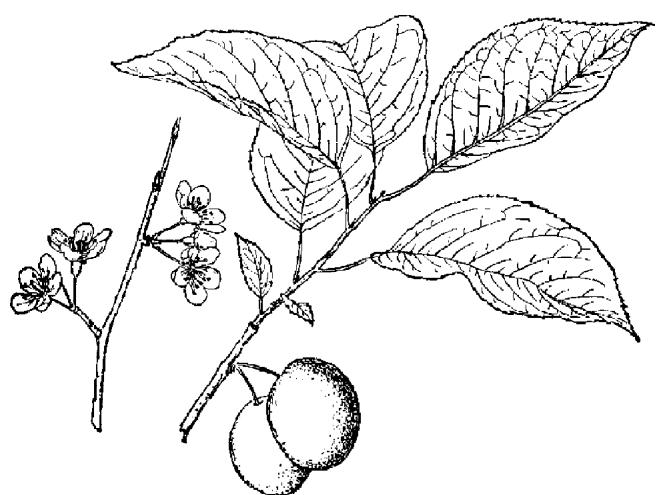
Prunus angustifolia [SA3]



Prunus caroliniana [SA3]



Prunus gracilis [BB2]



Prunus mexicana [SA2]

with young leaves, in clusters of 2–4(–5); petals white; fruits 1–2 cm long, red to yellow or dark purple, with a bloom. Forests, forest margins; Brown (HPC), Coleman (Correll & Johnston 1970), and Henderson (Little 1976 [1977]) cos; mainly e TX. Feb–Apr. While this species is usually easy to distinguish from *P. mexicana* when leaves are present, separating the two with only flowers is more difficult. It may be that this species is only present on the extreme e margin of nc TX. [*P. mitis* Beadle, *P. umbellata* var. *tarda* (Sarg.) W. Wight]

PYRACANTHA FIRE-THORN

— A genus of 9 species native to Asia and se Europe; it includes cultivated ornamentals. *Pyracantha* is similar to the Old World genus *Cotoneaster* (widely cultivated), but is distinguished by the presence of thorns and toothed leaves (Robertson et al. 1991) (Greek: *pyr*, fire, and *acantha*, a spine or thorn)

REFERENCE: Robertson et al. 1991

Pyracantha koidzumii (Hayata) Rehder, (for Gen'ichi Koidzumi, 1883–1953, Japanese botanist). Much branched, thorny, evergreen shrub to ca. 4 m tall; leaves simple, entire, ca. 2–3 cm long, rounded apically, clustered at tips of short branchlets; inflorescence a small corymb scarcely longer than the leaves; flowers 5-merous, small; petals ca. 4 mm long, white; stamens 20; ovary half-inferior; fertile ovules 2; fruit an orange-scarlet or red pome 6–8 mm in diam. Widely cultivated and escapes; Tarrant Co; we are not aware of other TX localities. Spring. Native of Taiwan. 

PYRUS PEAR

Ours trees with simple, alternate, deciduous, serrate to crenate leaves; inflorescences corymb- or umbel-like, appearing with or before the leaves; flowers 5-merous, showy; petals white or with a pink tinge; stamens numerous; styles 2–5; fruit a pome with numerous, small, hard stone (grit) cells; seeds black or nearly so.

— An Eurasian and Mediterranean genus of ca. 25 species; a number of species formerly treated in *Pyrus* are now placed in the related *Malus* (APPLE) or *Sorbus* (MOUNTAIN-ASH); *Pyrus* is currently restricted to trees with stone (sclerencyma) cells in the fruits (giving the flesh a gritty texture). The genus includes important fruit trees and showy ornamentals. (Classical Latin name for a pear)

1. Fruits globose, ca. 1 cm across; styles 2(–3); inflorescences glabrous; flowers 2–2.5 cm across _____ ***P. calleryana***
1. Fruits usually pear-shaped, much > 1 cm across; styles usually 5; inflorescences villous to nearly glabrous; flowers 2.5–3 cm across _____ ***P. communis***

Pyrus calleryana Decne., (for J.M.M. Callery, 1810–1862, missionary and botanist in Korea and China), CALLERY PEAR, BRADFORD PEAR. Small tree; leaves broadly ovate to ovate, crenate, very colorful (yellows to reds, often mixtures) in autumn. Widely cultivated in nc TX in form of cultivar Bradford or cultivar Aristocrat; escaping to weedy areas; Grayson Co. (weedy creekbank), also naturalized in Dallas Co. (E. McWilliams, pers. comm.). Spring. Native of China. 

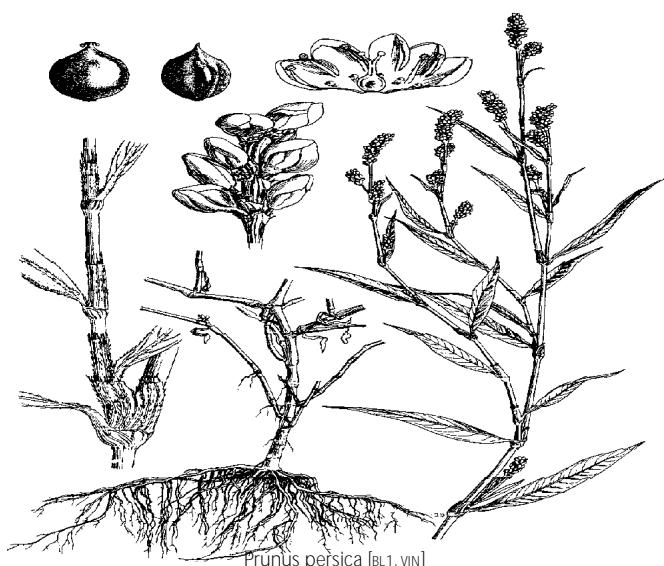
Pyrus communis L., (common, general), COMMON PEAR, PERA. Long-lived, usually small, sometimes spiny tree; leaves ovate to elliptic-ovate, to ca. 8 cm long, acute to acuminate apically, rounded to cuneate basally, crenate-serrulate; petioles 2–5 cm long; inflorescences umbel-like, appearing with first leaves; flowers 5-merous, with unpleasant odor; petals white, rarely with pinkish tint, broadly oblong, ca. 10 mm long, > 7 mm wide; stamens numerous; fruit a large edible pome with numerous small, hard stone (grit) cells. Cultivated and according to Correll and Johnston (1970) escaping in e TX; in nc TX persisting for many decades around old home sites; a Henderson Co. collection is probably an escape, also Brown and Callahan (HPC) cos. The seeds



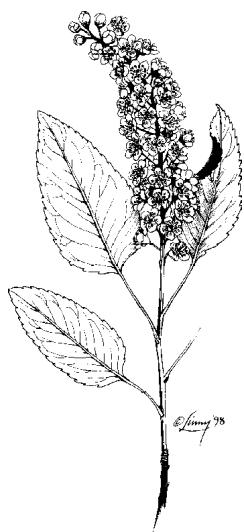
Prunus munsoniana [sa2]



Prunus serotina var. serotina [sa2]



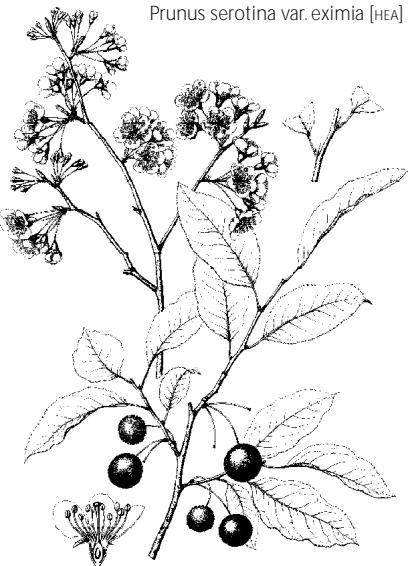
Prunus persica [BL1, VIN]



Prunus serotina var. eximia [HEA]



Prunus rivularis [LYN]



Prunus umbellata [sa3]

contain amygdalin, a cyanogenic glycoside (Lewis & Elvin-Lewis 1977). Apr-May. Native of Europe and w Asia. 

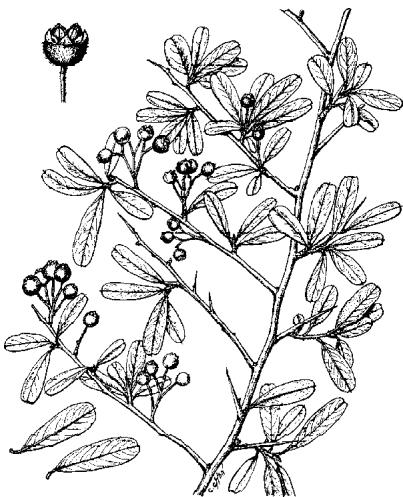
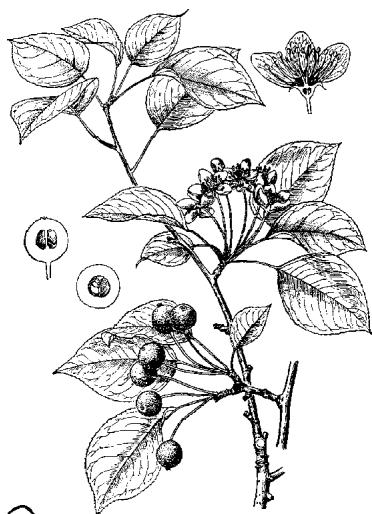
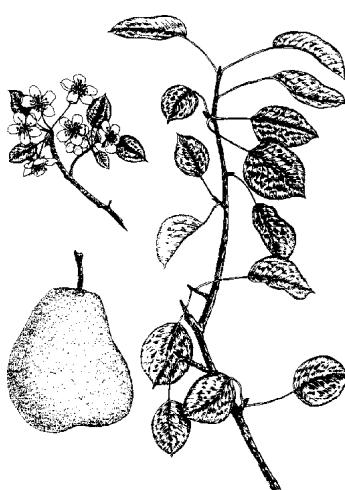
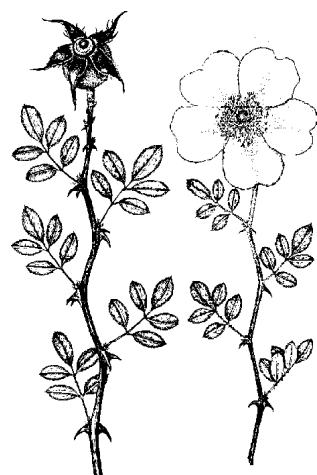
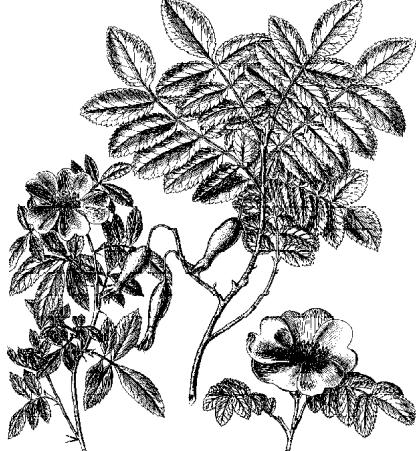
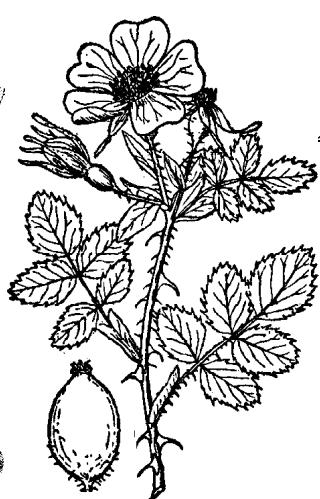
ROSA ROSE

Woody perennials, shrubby or vine-like, with prickles and often bristles as well; leaves 3-foliate or odd pinnately compound; leaflets sharply toothed; stipules paired, narrow, usually fused with petiole for part of their length; flowers mostly large and showy, solitary or in corymbose or paniculate inflorescences; petals usually 5 (numerous in cultivated forms), white, pink, or rose (red or yellow in cultivated forms); stamens numerous; ovaries numerous; hypanthium (called a hip) with a constricted opening, becoming fleshy and berry-like at maturity and often colored (e.g., red) (technically an accessory "fruit"—with fleshy parts derived from organs other than the pistil); fruits (inside enlarged hypanthium) achenes.

— A genus of 100–150 species native to the n temperate zone and tropical mountains; generally prickly shrubs, sometimes climbing or trailing, often with showy flowers. Species have been variously used as a source of essential oils, essences, or medicinally. The genus is particularly important ornamenteally having been cultivated since ancient times (e.g., Romans); there are currently thousands of cultivars. Tyler, in Smith Co., just e of nc TX, is a major center of rose cultivation. Unfortunately, except in the song, there is no native yellow rose of TX; the famous rose in the song refers to a young lady, not a flower. The armature of roses is technically referred to as prickles; they are epidermal outgrowths lacking vascular tissue and can be rather easily popped off the stems by lateral pressure. True thorns (e.g., in *Crataegus*) are modified branches (with vascular tissue) and true spines are modified leaf tissue (also with vascular tissue). (Classical Latin name for these plants, but the name is ancient and without a clear origin; possibly from Celtic: *r̥hod*, red—Tveten & Tveten 1993)

REFERENCES: Rydberg 1920, 1923.

1. Hypanthium densely velvety-pubescent; calyx closely subtended by an involucre of large, dissected, pubescent bracts (falling soon after flowering) **R. bracteata**
1. Hypanthium glandular- or hispid-pubescent, not velvety; calyx without an involucre of bracts.
 2. Styles united into a column, conspicuously exerted from the opening of the hypanthium and nearly equaling the stamens (look among the stamens).
 3. Stipules with widely spaced, long, narrow teeth; prickles usually only found just below the stipules; leaves of flowering branchlets with 7–9 leaflets **R. multiflora**
 3. Stipules entire or with minute teeth; prickles scattered along the stem; leaves of flowering branchlets with 3–5 leaflets.
 4. Petals pink, 2–3.5 cm long; stipules fused to petiole for > 1/2 stipule length; hypanthium glabrous or with short gland-tipped hairs **R. setigera**
 4. Petals white, 3–4 cm long; stipules free for > 1/2 stipule length; hypanthium conspicuously long-bristly **R. laevigata**
 2. Styles separate, not exerted or only slightly so, the stigmas often forming a dense brush-like structure closing the opening of the hypanthium, much shorter than the stamens.
 5. Leaves with 3, rarely 5 leaflets 3–6 cm long; hypanthium with conspicuous long bristles up to 4–5 mm long; flowers 6–8 cm across **R. laevigata**
 5. Leaves with 5–11 leaflets 1–4 cm long; hypanthium glabrous, glandular-pubescent, or with short bristles to 2 mm long; flowers 3–5.5 cm across.
 6. Leaflets with resin dots or glandular hairs on the lower surfaces; stems with conspicuously hooked prickles; outer sepals deeply pinnately divided
 7. Leaflets usually glandular on both sides, suborbicular to broadly elliptic, usually obtuse in outline apically (but with a small apical tooth); styles pubescent; sepals spreading or erect, persistent until full ripening of fruit **R. eglanteria**

*Pyracantha koidzumii* [LH]*Pyrus calleryana* [YUN]*Pyrus communis* [VIN]*Rosa arkansana* var. *suffulta* [BB2]*Rosa bracteata* [VIN]*Rosa carolina* [DIL]*Rosa eglanteria* [BB2]*Rosa foliolosa* [BA1]

7. Leaflets eglandular above, elliptic to ovate, acute or short acuminate apically; styles glabrous or nearly so; sepals reflexed, soon deciduous _____ **R. micrantha**
6. Leaflets without either resin dots or glandular hairs on the lower surfaces; stems with prickles and bristles straight or nearly so; outer sepals entire.
8. Pedicels and hypanthium with stalked glands; sepals with stalked glands, spreading after flowering, deciduous.
9. Flowers rose-colored; largest leaflets 8–19 mm wide; sepals 16–22 mm long; petals 20–25(–32) mm long _____ **R. carolina**
9. Flowers white or rose-colored; largest leaflets 3–8 mm wide; sepals 12–16 mm long; petals 15–20 mm long _____ **R. foliolosa**
8. Pedicels and hypanthium without stalked glands; sepals pubescent but without stalked glands, upright after flowering, usually persistent _____ **R. arkansana**

Rosa arkansana Porter var. **suffulta** (Greene) Cockerell, (sp. of Arkansas; var.: supported or propped), SUNSHINE ROSE, PRAIRIE WILD ROSE. Shrub to 2 m tall; stems with numerous slender prickles and bristles; leaflets 7–11, thick in texture; flowers few–many in corymbs, ca. 4 cm across; petals pink. Twice collected along railroad right-of-way in West Cross Timbers (Jack and Young cos.—Mahler 1988), also Comanche Co. (Stanford 1976); cited by Hatch et al. (1990) only from Area 5. May. [Rosa suffulta Greene]

Rosa bracteata J.C. Wendl., (with bracts), MACARTNEY ROSE. Stems trailing or arching, forming dense tangles to 3 m high, with curved, flattened, broad-based, paired prickles below the stipules; leaves evergreen, dark green; leaflets 5–9, leathery, glossy above, glabrous or pubescent on midrib beneath; flowers solitary or few together, subsessile at tips of leafy branchlets, 5–7 cm across; petals white; hips 2–2.5 cm long. Cultivated and escapes; Jack Co. in West Cross Timbers and Tarrant Co. in East Cross Timbers; se and e TX w to nc TX and Edwards Plateau; apt to freeze back in severe winters. May–Jun, sporadically to Nov. Native of China. ↗

Rosa carolina L., (of Carolina), CAROLINA ROSE, PASTURE ROSE. Shrub 0.2–0.7(–1) m tall; stems with ± straight, usually slender prickles and bristles; leaflets 5–9; flowers mostly solitary, 35–55 mm across; hips red. Roadsides, woods; Lamar Co. in Red River drainage; mainly e TX. May–Jul.

Rosa eglanteria L., (Latinization of the old English and French name), SWEET BRIAR ROSE, SWEET-BRIER, EGLANTINE. Shrub to ca. 2(–3) m tall, similar to *R. micrantha*; stems with curved prickles, sometimes mixed with bristles; leaves with 5–7 leaflets; leaflets 1–3 cm long, resinous aromatic; pedicels and hypanthium glandular-hispid; flowers 3–5 cm across; petals bright pink; hips orange to scarlet. Cultivated and escapes, disturbed grassland; Bell Co. (Fort Hood—Sanchez 1997); we are not aware of other TX localities. Summer–fall. [R. rubiginosa L.] The leaves when crushed have an odor like fermenting apples (Radford et al. 1968). Native of Europe. ↗

Rosa foliolosa Nutt. ex Torr. & A. Gray, (full of leaves, profusely-leaved), WHITE PRAIRIE ROSE, LEAFY ROSE. Dwarf, rhizomatous shrub to 0.5 m tall; prickles few, very small, slender, straight or nearly so; leaflets glabrous or pubescent on veins beneath, 7–11; stipules glandular-ciliate; flowers usually solitary, short-pedicelled, ca. 4 cm across; petals white or rarely light pink. Prairies and open thickets or roadsides, calcareous clay or less often sandy soils; Blackland Prairie w to Grand Prairie; mainly nc TX s to Edwards Plateau. Mid-May–early Jul. [R. ignota Shinners]

Rosa laevigata Michx., (smooth), CHEROKEE ROSE. Plant high-climbing, to 5 m; stems with curved, flattened, broad-based prickles, without bristles; leaves evergreen, usually with 3(–5) acute to acuminate leaflets; flowers large, fragrant; petals 3–4 cm long, usually white (rarely rose-colored); styles united, only exerted ca. 1 mm (therefore this species can be reached 2 ways in key); hips red, 3–4 mm long. Cultivated and escapes; included based on citation of vegeta-



Rosa laevigata [VIN]



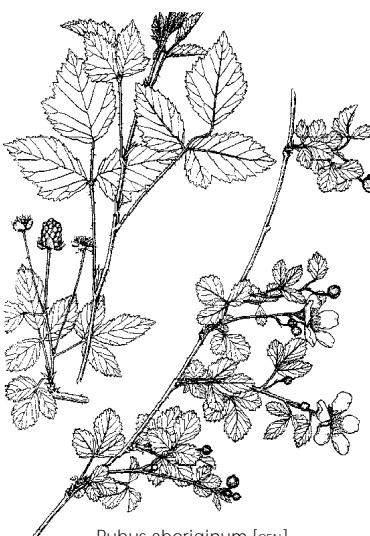
Rosa micrantha [VIN]



Rosa setigera [BB2]



Rosa multiflora [REE]



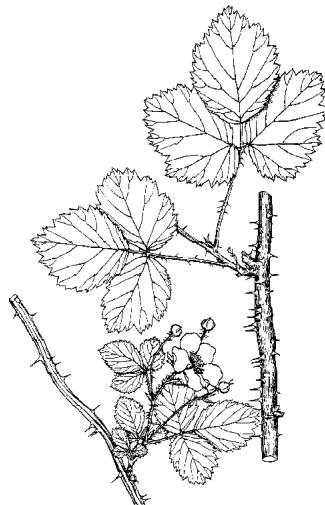
Rubus aboriginum [GEN]



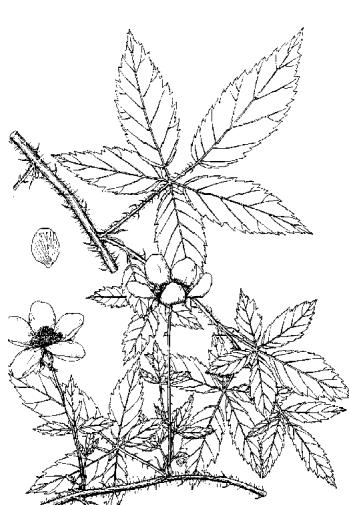
Rubus apogaeus [GEN]



Rubus bifrons [GEN]



Rubus oklahomus [GEN]



Rubus trivialis [GEN]

tional areas 4 and 5 (Fig. 2) by Hatch et al. (1990); mainly se and e TX, also Edwards Plateau. Spring. Native of China. ↗

Rosa micrantha Borrer ex Sm., (small-flowered). Shrub to 2 m tall; stems with curved prickles, without bristles; leaves with 5–7 leaflets; leaflets 1.5–3 long, not strongly aromatic; pedicels glandular-hispid; hypanthium glabrous or sparsely glandular-hispid; flowers ca. 3 cm across; petals pink to white. Cultivated and escapes; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); mainly se and e TX, also Edwards Plateau. Spring. Native of Europe, nw Africa, and sw Asia. Summer-fall. ↗

Rosa multiflora Thunb. ex Murr., (many-flowered), JAPANESE ROSE, MULTIFLORA ROSE. Shrub; stems erect and arching to trailing, with stout, recurved, flattened, broad-based prickles; stipules pectinate; flowers usually many, in rounded or pyramidal inflorescences; petals white (rarely pink), 7–15 mm long; hips red, 6–9 mm long. Cultivated and escapes, weedy areas; Dallas Co., also Fort Hood (Bell or Coryell cos.—Sanchez 1997); mainly e TX. May-Jun. Native of Asia. ↗

Rosa setigera Michx. var. **tomentosa** Torr. & A. Gray, (sp.: bristle-bearing; var.: densely woolly, with matted hairs), PRAIRIE ROSE, CLIMBING ROSE, CLIMBING PRAIRIE ROSE, FUZZY ROSE. Climbing, sprawling, or trailing shrub; stems to 5 m or more long, with remote, curved, flattened, broad-based prickles, occasionally also with bristles; leaves with 3–5 leaflets; leaflets 3.5–5(–10) cm long, tomentose below; stipules entire or remotely toothed; flowers 5–15 in a corymb, 4–7 cm across, roseate, fading to white; hips red, 8–12 mm long. Thickets, open woods; Collin, Dallas, Fannin, Grayson, Hopkins, Hunt, Kaufman, and Lamar cos.; e TX w to n part of nc TX, also Edwards Plateau. Apr-Jul.

RUBUS DEWBERRY, BLACKBERRY, BRAMBLE

Usually woody, ± prickly perennials, often reproducing vegetatively by suckers or rooting stem tips; the mostly biennial stems flowering the second year, then dying; mature plants have both first year, usually unbranched stems (= primocanes), and second year, flowering, branched stems (= floricanes); leaves petioled, sometimes partly simple on floricanes to usually pinnately or approximately palmately compound (central leaflet longer-stalked than the others), with 3–5 leaflets; stipules slender; flowers showy, solitary, racemose, corymbose, or paniced; petals usually white or pink (frequently pink in bud); stamens numerous; carpels many, separate, on an elongating receptacle; “fruit” an aggregate of red to black, 1-seeded juicy druplets, the whole structure commonly called a “berry.”

↖ A cosmopolitan, especially n hemisphere genus of 250 species, plus innumerable apomictic lines. Many are cultivated for the fruits or as ornamentals; the fruits are an important wildlife food (Martin et al. 1951); those of some species go from green to red to finally black. Both ripe (black) and pre-ripe (red) fruits are often present at the same time—this is an example of a bi-color fruit display, thought to be more effective than a single color at attracting birds which act as dispersal agents (Willson & Thompson 1982). The popular distinction (originating in the North) between blackberries (with erect or arched stems) and dewberries (with trailing stems) does not fit nc TX plants. *Rubus* taxonomy is notoriously difficult because of hybridization, polyploidy, and apomixis (= production of seeds without fertilization). Careful note of growth form (e.g., stem upright vs. trailing) is often important in making a definitive identification. (Classical Latin name for a blackberry or bramble)

REFERENCES: Bailey 1925, 1932, 1941–45; Mahler 1979.

1. Lower surface of leaflets whitish or grayish with dense, closely matted pubescence; petals usually pink, rarely white; inflorescence an open panicle; pedicels with small stout prickles _____ **R. bifrons**
1. Lower surface of leaflets green to gray, glabrous to with dense spreading pubescence; petals

usually white; inflorescence corymbose, racemose, a compact panicle, or flowers solitary; pedicels unarmed or with small prickles.

2. Plants (at least primocanes and usually floricanes) with red, glandular-tipped bristles in addition to prickles _____ **R. trivialis**

2. Plants without red, glandular-tipped bristles.

3. Stems upright, not trailing but sometimes arching such that the tips touch the ground (but usually not rooting); pedicels pubescent and armed; corollas ca. 3 cm across _____ **R. oklahomus**

3. Most stems trailing or lying on the ground, rooting at the tips; pedicels pubescent, scantily if at all armed; corollas 2–2.5 cm across.

4. Flowers 1–3(–5) per flowering branchlet, arising from terminal to middle parts of flowering branchlets; pedicels erect to ascending; prickles on stems hooked, 2–3 mm long; mature aggregates 15 mm or more long; common throughout nc TX _____ **R. aboriginum**

4. Flowers (4–)5–9 per flowering branchlet, arising from terminal, middle, and lower parts of flowering branchlets; pedicels ascending to widely spreading; prickles on stems often straight, to 3–5 mm long; mature aggregates ca. 10 mm long; extreme e margin of nc TX

_____ **R. apogaeus**

Rubus aboriginum Rydb., (derivation not given in type description but presumably meaning native or indigenous). Most stems trailing or lying on the ground, rooting at the tips; lower surface of leaflets usually densely soft-pubescent or velvety to the touch to sparsely pubescent; flowers 20–25 mm across; aggregates 15 mm or more long. Sandy woods, fencerows, and roadsides; e 1/2 of TX. Apr.

Rubus apogaeus L.H. Bailey, (derivation not given in type description but possibly from the floricanes rooting at the apex or apogee). Plant low, forming mounds, a few canes can be erect but growth in general bends toward the ground with the floricanes long-running and rooting at the tips; prickles nearly straight, 3–5 mm long; flowers 25 mm or less across; aggregates ca. 10 mm long. Roadsides, grassy areas, fencerows; Navarro Co.; mainly e TX; Hatch et al. (1990) also cited vegetational areas 5 and 7 (Fig. 2); endemic to TX. Apr–May. [R. uncus L.H. Bailey] 

Rubus bifrons Vest ex Tratt., (two-fronded). Stems low arching with tips reaching the ground, making clumps to 1.5 m high; flowers 20–25 mm across; aggregates to 20 mm long. Thickets, roadsides, pastures; Henderson, Lamar, and Milam cos. on e edge of nc TX, also Fort Hood (Bell or Coryell cos.—Sanchez 1997); naturalized mainly in e TX. May–Jun. Native of Europe. 

Rubus oklahomus L.H. Bailey, (of Oklahoma). Plant usually reaching 1–2 m in height, very prickly, the prickles straight or curved, 3–6 mm long; leaflets densely to sparsely soft-pubescent beneath; flowers large and showy, ca. 3 cm across, 3–5 per lateral branchlet. Thickets and fencerows, in stream bottoms or on slopes; Post Oak Savannah w to Rolling Plains and Edwards Plateau. Apr.

Rubus trivialis Michx., (common, ordinary), SOUTHERN DEWBERRY, ZARZAMORA. Stems trailing or low-arching, rooting at the tips, with recurved prickles; leaves half-evergreen; leaflets glabrous beneath or with pubescence only along the main veins, marginally without glands; flowers usually 1–3 per lateral branchlet; petals 15–25 mm long; aggregates 10–30 mm long. Roadsides, fencerows, and thickets, various soils; e TX w to West Cross Timbers, occasionally farther w. Late Mar–Apr. Jones et al. (1997) did not list *R. trivialis* for TX. This species is sometimes infected by “orange rust,” the rust fungus *Arthuriomyces peckianus* (Howe) Cummins & Y. Hirats., which causes a systemic infection resulting in a witches’ broom-like, dense, abnormal branching pattern and also orange masses of spores covering the leaves (J. Hennen, pers. comm.).

Rubus flagellaris Willd., (whip-like, having long, thin, supple shoots like whips), NORTHERN DEWBERRY, is an eastern species cited for vegetational areas 1 and 5 (Fig. 2) by Hatch et al. (1990);

we have seen no unambiguous specimens of this taxon from nc TX. The species differs from *R. aboriginum* in having the lower surface of the primocane leaves glabrous or with pubescence only on the veins, neither soft nor velvety to the touch.

Rubus riograndis L.H. Bailey, (of the Rio Grand River), [*R. trivialis* Michx. var. *duplaris* (Shinners) Mahler, *R. duplaris* Shinners] occurs in the Post Oak Savannah vegetational area just to the e of nc TX (Mahler 1979). It is similar to *R. trivialis* but differs in having scattered stalked glands along the margins of the leaflets and with the lower surface of primocane leaflets soft pubescent.

SANGUISORBA BURNET

— A n temperate genus of ca. 10 species including *S. officinalis*L. (BURNET), an Eurasian species cultivated as an ornamental and for its edible leaves. (Latin: *sanguis*, blood, and *sorbeo*, to drink up or absorb; it was said to stop bleeding or have styptic properties)

Sanguisorba annua (Nutt. ex Hook.) Torr. & A. Gray, (annual), PRAIRIE BURNET. Glabrous erect annual to 40 cm tall; leaves pinnately compound, the 7-15 leaflets divided nearly to midrib; stipules similar to leaflets; inflorescence a dense, short, thick, cylindrical spike or spike-like head to 2(-3) cm long, on naked peduncles terminating the stems; flowers with calyx-like involucre of 4 broad, scarious bracts; calyces with 4 broad lobes, the lobes 2-3 mm long, green, petaloid, with scarious margins; petals absent; fruit usually a solitary (rarely 2) achene enclosed in the dry, 4-angled hypanthium. Sandy or gravelly prairies, pastures, and roadsides, often in moist areas; Post Oak Savannah w to Rolling Plains, also Edwards Plateau; apparently spreading eastward. Late Mar-May. Probably native only from West Cross Timbers westward (Mahler 1988).

RUBIACEAE COFFEE OR MADDER FAMILY

Ours annual or perennial herbs or in 1 species (*Cephaelanthus*) shrubs or small trees; stems square or multiple-angled (rounded in woody plants); leaves opposite or whorled, sessile or petioled, simple, entire; stipules scarious or herbaceous, persistent or deciduous, or stipules modified into additional leaves in whorls; flowers axillary or terminal, solitary or in heads, cymes, or panicles; calyces 2-8-toothed or -lobed, or entire-margined; corollas funnelform, salverform, or rotate, with (3-)4(-6) lobes; stamens 3-6; pistil 1; styles and stigmas 2-4; ovary usually inferior; fruit a capsule or schizocarp.

— A huge (10,200 species in 630 genera) cosmopolitan family concentrated in the tropics and subtropics; tropical species are typically shrubs or trees while most temperate taxa are herbaceous; some are rarely aquatic, epiphytic, or inhabited by ants; the group includes a broad range of chemical defenses including alkaloids. The family is the source of coffee (seeds of African species of *Coffea*—with the alkaloid caffeine) and the malaria treatment quinine, an alkaloid derived from the bark of South American species of *Cinchona*. *Cinchona* bark (also known as Peru bark or Jesuits' bark) was long valued by South American natives and is still the source of quinine used medicinally and in flavoring tonic water. The family also includes ornamentals such as *Gardenia*, *Ixora*, and *Pentas*. Family name from *Rubia*, MADDER, a genus of 60 species native to the Mediterranean area, Africa, temperate Asia, and the Americas. (Latin: *ruber*, red, in reference to the red dye obtained from the roots of *R. tinctoria* L. of s Europe and w Asia) (sub-class Asteridae)

FAMILY RECOGNITION IN THE FIELD: usually herbs (1 woody) with opposite or whorled, simple, entire leaves; stipules present (sometimes modified into additional "leaves"); small often 4-mernous flowers; 2-celled *inferior* ovary.

REFERENCES: Standley 1918-1934; Darwin 1976; Rogers 1987.

1. Plants woody shrubs or small trees; flowers in peduncled globose heads ca. 15–35 mm in diam.

Cephalanthus

1. Plants herbaceous, annual or perennial; flowers not borne as above.

2. Leaves opposite or in 3s; stipules present, at least on young growth.

3. Stipules not bristly-margined; flowers terminal, solitary or corymbose; fruit usually a capsule with numerous seeds.

4. Corollas rotate (tube essentially absent), white, ca. 1 mm long; flowers axillary and subsessile; flowering May–Aug _____

Oldenlandia

4. Corollas salverform or funnelform (tube obvious), variously colored or sometimes white, 4 mm or more long OR if smaller (1–3 mm long) and white then flowering in early spring; flowers not axillary and subsessile, either terminal or if axillary then on stalks 3–15 mm long.

5. Plants perennial from a conspicuous stout taproot; stems 5–50 cm tall; flowers in leafy cymes _____

Hedyotis

5. Plants annual with fine taproot or fine fibrous roots; stems to ca. 30 cm tall, often much smaller; flowers in cymes OR solitary in the leaf axils OR 1 or 2 terminating the stem _____

Houstonia

3. Stipules bristly-margined (bristles usually conspicuous at the nodes); flowers in axillary pairs or whorls or terminal leafy-bracted clusters or heads; fruit usually separating into 1–4 one-seeded carpels.

6. Flowers in mostly terminal, leafy-bracted clusters or heads _____

Richardia

6. Flowers axillary.

7. Flowers 2–6 per node (1–3 per leaf axil); hairs present on some part of the stems, leaves, or fruit; corollas 4–10 mm long, the tube conspicuous and much longer than calyx lobes _____

Diodia

7. Flowers 10–30 per node; all parts of plant glabrous (but note bristly stipules); corollas 2–3 mm long, scarcely longer than calyx lobes _____

Spermacoce

2. Leaves in whorls of 4 or more; stipules absent (actually modified into leaves, the "leaves" thus in whorls).

8. Flowers solitary or in cymes or panicles, the inflorescences not involucrate; corollas rotate (tube obscure), white, yellow-green, or reddish brown _____

Galium

8. Flowers in sessile or subsessile, few-flowered, involucrate heads, the involucral bracts resembling leaves; corollas funnelform with conspicuous tube ca. as long as or longer than lobes, pink to lavender to blue.

9. Corollas pink to lavender; fruits 2–7 mm long, with short appressed bristles; sepals lanceolate, persistent in fruit; leaves 4–6 per whorl, obovate to lanceolate or elliptic, acute to acuminate at apex; widespread in nc TX _____

Sherardia

9. Corollas bright blue to blue-violet; fruits 2–3 mm long, smooth; sepals minute, not persistent; leaves 6–9 per whorl, linear, obtuse at apex; known in nc TX only from Dallas Co. _____

Asperula

ASPERULA

• A genus of ca. 90 species of Eurasia (especially the Mediterranean) and Australia. Some are cultivated as ornamentals or used as source of dye. (Latin: *asper*, rough, referring to the roughly hairy stems)

Asperula arvensis L., (pertaining to cultivated fields), WOODRUFF. Annual to ca. 30 cm tall, nearly glabrous; stems 4-angled; leaves 6–9 per whorl, linear, obtuse apically; flowers in sessile terminal heads; calyces inconspicuous; corollas bright blue to blue-violet, ca. 4(–6.5) mm long, funnelform, the tube equal or exceeding the (3–)4 lobes; fruits 2–3 mm long, smooth, of 2 one-

seeded nutlets. Disturbed areas; Dallas Co.; in TX apparently only known from the Blackland Prairie. Mar-May. Introduced from Old World. ↗

CEPHALANTHUS BUTTONBUSH

— A genus of 6 species (3 New World, 2 Asia, 1 Africa) of the tropics n to North America. (Greek: *cephale*, head, and *anthos*, flower, alluding to the globose flower clusters)

REFERENCE: Ridsdale 1976.

Cephalanthus occidentalis L., (western), COMMON BUTTONBUSH, HONEY-BALLS, GLOBEFLOWER. Shrub or small tree 1–5(–15) m tall; trunk rarely to 30 cm in diam.; leaves opposite or in 3s(–4s), short-petioled; leaf blades elliptic-lanceolate, entire; stipules triangular, falling early; flowers 4–5-merous, in terminal and axillary, naked-peduncled, conspicuous, globose heads; corollas white; stamens 4, exserted; fruits 4–8 mm long, splitting into indehiscent segments. Stream banks, ditches, and damp woods; throughout TX. Jun-Jul, sporadically later. [*C. occidentalis* var. *californicus* Benth., *C. occidentalis* var. *pubescens* Raf.] Cultivated as an ornamental but should be used with caution since it can become invasive; also used medicinally (Mabberley 1987); the leaves are reported to contain glucosides and are possibly poisonous to animals and humans; symptoms include vomiting, convulsions, chronic spasms, and muscular paralysis (Muenscher 1951; Burlage 1968; Crosswhite 1980). ☯/82

DIODIA BUTTONWEED

Erect to procumbent, annual or perennial herbs; leaves sessile; stipules bristly-margined; flowers sessile, axillary, usually 4-merous; corollas tubular-funnelform, rather small; fruits splitting into 2–3 indehiscent carpels or sometimes not splitting.

— A genus of ca. 30 species of tropical and warm areas of the Americas and Africa. (Greek: *diodos*, a thoroughfare, alluding to the species often growing by the wayside)

1. Stems usually pubescent; corollas pinkish purple (rarely white), 4–6 mm long; fruits not ribbed,
ca. 2.5–4 mm long; calyx teeth 4 **D. teres**
1. Stems glabrous; corollas white, 7–10 mm long; fruits strongly 6-ribbed, 5–8 mm long; calyx teeth
usually 2 **D. virginiana**

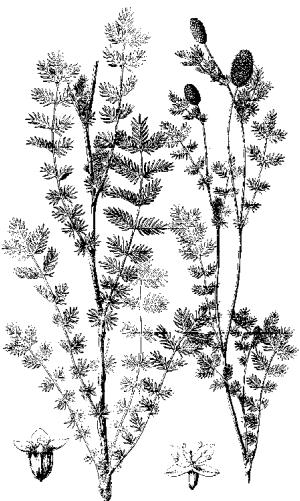
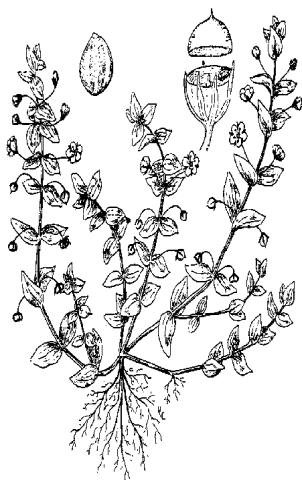
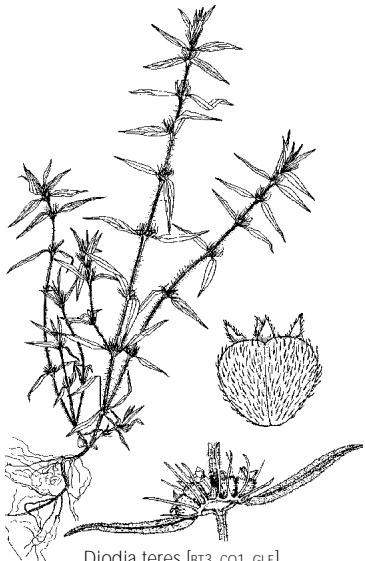
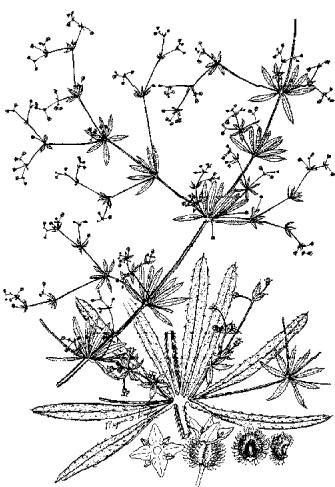
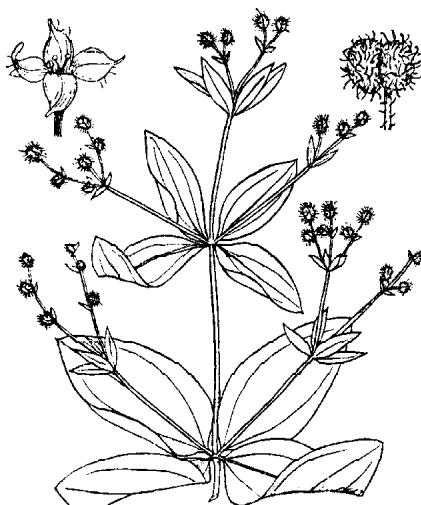
Diodia teres Walter, (terete, circular in cross-section), POOR-JOE, BUTTONWEED. Erect annual with prostrate or ascending branches to ca. 80 cm long; leaves linear to lanceolate. Sandy open woods, fields, and roadsides; se and e TX w to West Cross Timbers and Edwards Plateau. Jun-Oct.

Diodia virginiana L., (of Virginia), VIRGINIA BUTTONWEED, LARGE BUTTONWEED. Perennial; stems spreading or procumbent, rooting, to ca. 60 cm long; leaves linear-lanceolate to broadly lanceolate. Along streams or in marshy ground; Dallas, Grayson, Hopkins, Red River, and Tarrant cos., also Lamar Co. (Carr 1994); se and e TX w to nc TX. Jun-Sep.

GALIUM CLEAVERS, BEDSTRAW

Annuals or perennials with whorled, sessile, linear-lanceolate to oblanceolate or elliptic, entire leaves; flowers very small, terminal or axillary, solitary or in cymes or small panicles; calyx lobes not evident; corollas rotate, 3- to 4-lobed, white to green or brown-red; stamens usually 4; fruit a usually bristly or smooth schizocarp that when ripe splits into 2 seed-like, indeshiscent, 1-seeded segments.

— A cosmopolitan genus of ca. 300 species of usually slender herbs typically with square stems and whorled leaves and stipules. Some with fragrant foliage were formerly used to stuff

*Sanguisorba annua* [RBM]*Asperula arvensis* [GLE]*Cephalanthus occidentalis* [SA3]*Diodia teres* [BT3, CO1, GLE]*Diodia virginiana* [GLE, LAM]*Galium aparine* [REE]*Galium circaeans* [BB1]*Galium obtusum* [STE]

mattresses—hence the common name BEDSTRAW. The common name CLEAVERS comes from the hooked hairs of some that cause the plants to stick or cleave to clothing (Tveten & Tveten 1993). According to early Christian tradition, *G. verum* L., OUR LADY'S BEDSTRAW, was abundant about Bethlehem and was part of the “straw” used for cattle-bedding in stables; it supposedly formed the bed for the infant Jesus in the manger (Hausman 1950). (Greek: *gala*, milk, from use of some species in curdling milk)

REFERENCES: Weatherby & Blake 1916; Puff 1976, 1977.

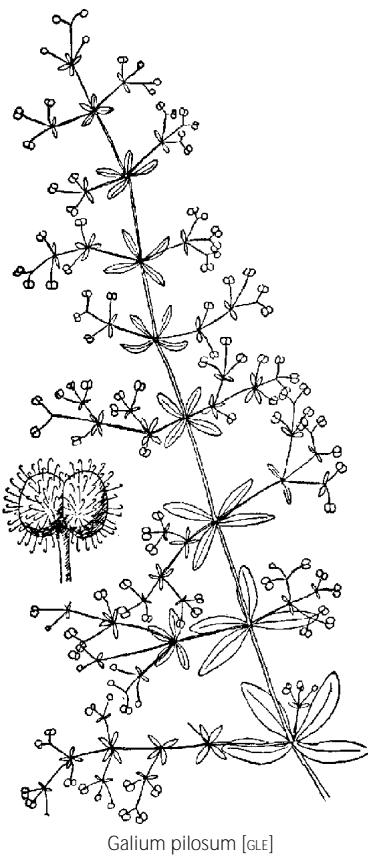
1. Leaves in whorls of 6–9, the blades widest beyond middle _____ ***G. aparine***
1. Leaves in whorls of 4–6, the blades widest near middle or below.
 2. Leaves scabrous or pubescent, at least on margins and midrib beneath.
 3. Flowers in leaf axils, subsessile, the very short pedicels quickly becoming reflexed; leaves 4–10 mm long _____ ***G. virgatum***
 3. Flowers in inflorescences at the ends of stems or branches, pedicellate, the pedicels not reflexed OR sessile or nearly so along branches of inflorescence; leaves variable in length, 5–50 mm long.
 4. Flowers on distinct pedicels; leaves usually 25 mm or less long.
 5. Middle stem leaves 5–13 mm long; pedicels becoming 5–30 mm long; leaves not minutely punctate on lower surfaces _____ ***G. texense***
 5. Middle stem leaves 10–25 mm long; pedicels becoming 2–5 mm long; leaves usually minutely punctate on lower surfaces (use hand lens) _____ ***G. pilosum***
 4. Flowers sessile or nearly so along branches of inflorescence (occasionally solitary at ends of branchlets); larger leaves usually > 25 mm long _____ ***G. circaeans***
 2. Leaves glabrous or with scabrous margins only.
 6. Leaves abruptly sharp-pointed; fruits densely bristly _____ ***G. triflorum***
 6. Leaves obtuse; fruits smooth, glabrous.
 7. Corollas 2–3 mm across, 4-lobed; leaves mostly 4 per node, rarely 5 or 6 _____ ***G. obtusum***
 7. Corollas < 2 mm across, 3-lobed; leaves mostly 5 or 6 per node, sometimes 4 _____ ***G. tinctorium***

Galium aparine L., (old generic name, long interpreted to mean catch, cling, or hold onto), CLEAVERS, CATCHWEED BEDSTRAW, GOOSEGRASS CLEAVERS, SWEETHEARTS. Weak-stemmed annual, scabrous with small, hooked hairs, catching on fingers and clothes; stems to ca. 100 cm long; flowers on small, axillary branchlets; corollas white; fruits bristly. Shady or damp ground, thickets; widespread in TX. Mar–Apr. Formerly used as a coffee substitute in Ireland (Mabberley 1987); the dried and roasted fruits are reported to be the best coffee substitute in North America (McGregor & Brooks 1986).

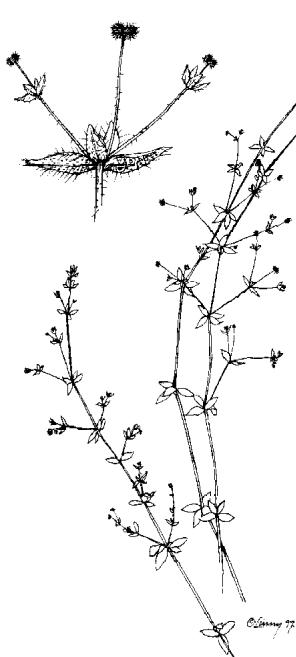
Galium circaeans Michx., (resembling *Ciraea*—enchanter’s nightshade, in the Onagraceae), WOODS BEDSTRAW, CROSS-CLOVER, WILD LICORICE. Clump-forming perennial with stems to ca. 45 cm tall; leaves 7–18 mm wide; flowers often 1 cm or more apart in inflorescence; corollas greenish or whitish; fruits bristly. Rocky or sandy woods; Bell, Cooke, Dallas, Denton, Grayson, and Tarrant cos., also Lamar Co. (Carr 1994); e TX w to nc TX, also Rolling Plains and Edwards Plateau. Apr–Oct.

Galium obtusum Bigelow, (blunt), BLUNT-LEAF BEDSTRAW. Rather delicate annual or perennial, usually freely branched; stems to 80 cm tall; leaves to 6 mm wide; corollas white, usually 4-lobed; fruits smooth. Damp sandy woods or open ground; Hunt Co. (Mahler 1988); se and e TX w to e part of nc TX. Apr–Jun.

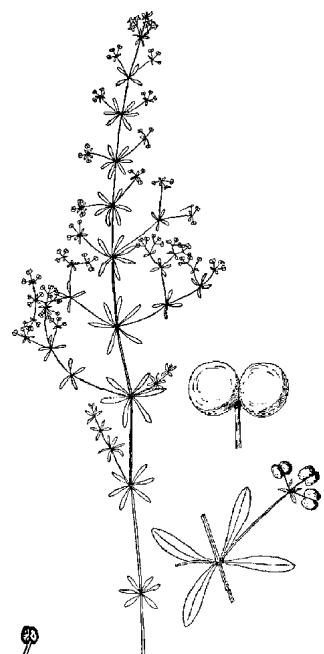
Galium pilosum Aiton, (with long soft hairs), HAIRY BEDSTRAW. Clump-forming low perennial; stems erect to ascending, to 90 cm tall, coarse, up to 1 mm thick near base, 1.2 mm thick near middle; corollas brown-red, rarely greenish yellow or whitish; fruits bristly. Sandy woods; se and e TX w to West Cross Timbers, also Trans-Pecos. May–Jun. Varieties based on differences in



Galium pilosum [GLE]



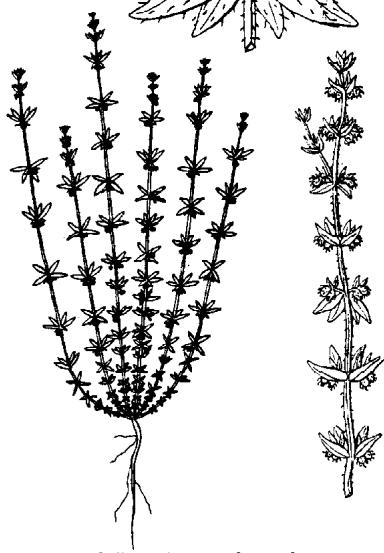
Galium texense [HEA]



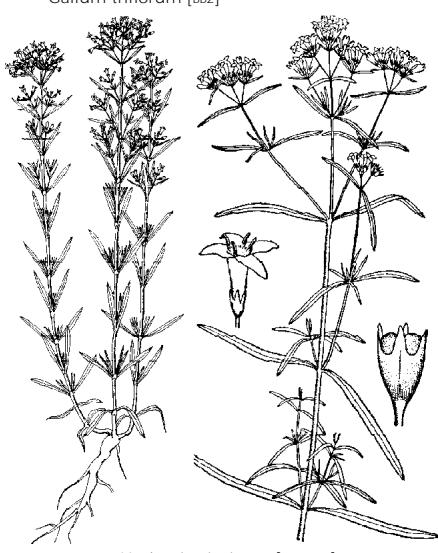
Galium tinctorium [GLE]



Galium triflorum [BB2]



Galium virgatum [BB1, STE]



Hedyotis nigricans [GLE, STE]

stem pubescence are sometimes recognized (e.g., Weatherby & Blake 1916; Kartesz 1994; Jones et al. 1997); however, we are not recognizing infraspecific taxa. [*G. pilosum* var. *laevicaule* Weath. & S.F. Blake; *G. pilosum* var. *puncticulatum* (Michx.) Torr. & A. Gray]

Galium texense A. Gray, (of Texas), TEXAS BEDSTRAW. Annual [or perennial?]; stems to 30 cm tall, weak, slender, up to 0.5 mm thick near base, 1 mm thick near middle; leaves usually < 8 mm long; flowers on axillary branchlets and terminal; corollas white to yellow; fruits bristly. Gravely limestone slopes, under trees and shrubs; Bell, Johnson, Lampasas, Palo Pinto, and Somervell cos., also Comanche and Hamilton cos. (HPC); s and c TX n to nc TX. Apr-May.

Galium tinctorium (L.) Scop., (used in dying, of the dyers), DYE BEDSTRAW, STIFF MARSH BEDSTRAW. Perennial; leaves to 2 cm long, usually 1–2(–4) mm wide; flowers on distinct pedicels; corollas white; fruits smooth. Swamps or moist areas; Collin, Grayson, Hopkins, Hunt, and Limestone cos., also Lamar Co. (Carr 1994); se and e TX w to nc TX, also Rolling Plains. Mar-Aug.

Galium triflorum Michx., (three-flowered), FRAGRANT BEDSTRAW, SWEET-SCENTED BEDSTRAW. Perennial with slender creeping rootstocks; flowering the first year; stems to 1 m or more long; corollas greenish or whitish; fruits bristly. Damp sandy woods; collected at Dallas by Reverchon (Mahler 1988), not found there recently; scattered in e 1/2 of TX. Jun-Jul.

Galium virgatum Nutt., (twiggy), SOUTHWEST BEDSTRAW. Erect annual, usually with several short, stiff stems to ca. 40 cm tall, usually smaller; corollas light green to yellowish or whitish; fruits bristly or rarely smooth. Eroding or disturbed ground, especially in calcareous clay; widespread in TX. Apr-May. This is the only nc TX species with axillary subsessile flowers.

HEDYOTIS BLUET, STAR-VIOLET

—A genus of 110 species of tropical and warm areas, especially the Old World (130 species if *Houstonia* is lumped into *Hedyotis* as is sometimes done); some are cultivated as ornamentals; Terrell (1991) recognized 21 species in North America. The genus is sometimes treated as including *Houstonia* and *Oldenlandia* which are here recognized as separate genera. (Greek: *hedys*, sweet, and *ous*, ear, significance not explained)

REFERENCES: Shinners 1949g; Terrell 1975, 1986b, 1991; Turner 1995c [1996].

Hedyotis nigricans (Lam.) Fosberg, (black, some plants blackening upon drying), PRAIRIE BLUETS, STAR-VIOLET, FINE-LEAF BLUETS. Glabrous perennial; stems 5–50 cm tall; leaves linear to oblanceolate, 1–4 cm long, 0.5–4 mm wide; flowers in leafy cymes; corollas funnelform, 4-lobed, white to lavender-pink, 5–8 mm long; capsules 2.5–3 mm long. Limestone outcrops, prairies; throughout TX. May-Oct. [*Gentiana nigricans* Lam., *H. nigricans* (Lam.) Fosberg var. *filifolia* (Chapm.) Shinners, *Houstonianigricans* (Lam.) Fernald] Turner (1995c [1996]) recognized 5 varieties in this species, of which 3 occur in TX. Only the type variety occurs in nc TX.

HOUSTONIA BLUET

Ours annual herbs; flowers axillary, 1 or 2 terminating the stem, or in cymes; flowers 4-merous; corollas salverform or funnelform, colorful or white; fruit a capsule.

—A genus of 20 species native to the U.S., Canada, and Mexico (Terrell 1996); sometimes included in the genus *Hedyotis* (Named for Dr. William Houstoun, 1695–1733, an English surgeon and botanist who collected in tropical America)

REFERENCES: Shinners 1949g; Lewis 1958 [1959]; Terrell 1975, 1986a, 1991, 1996; Terrell et al. 1986.

1. Calyx lobes long and quite narrow, apically subulate (= awl-shaped); pedicels recurved in fruit; flowers heterostylous (pin and thrum flowers with different length styles—see description); rare in nc TX, known only from extreme s margin (Burnet Co.)

H. humifusa

1. Calyx lobes subtriangular, ovate, lanceolate, or narrowly lanceolate, apically obtuse, acute, or sharply acute; pedicels usually straight or in 1 species recurved in fruit; flowers homostylous (= all styles equal in length); widespread in nc TX.
2. Flowers either in few-flowered terminal cymes OR solitary per axil on pedicels recurved in fruit; corollas 1–3 mm long, usually white, tips of lobes sometimes pink or whole corollas rarely light pink; very rare in nc TX.
3. Capsules usually hirtellous (use hand lens), on pedicels reflexed or bent at their base; corollas longer than calyx lobes; flowers solitary per axil _____ **H. subviscosa**
3. Capsules glabrous, on erect peduncles; corollas ca. as long as calyx lobes; flowers in few-flowered terminal cymes _____ **H. parviflora**
2. Flowers solitary per leaf axil or 1 or 2 terminating the often diminutive stem; pedicels straight in fruit; corollas 2–12.5 mm long, purple, blue-violet, lilac, light violet, pink, or white; widespread in nc TX.
 4. Corollas white with yellow center, 2–5.5 mm long; corolla tube 0.8–2.5 mm long, ca. as long as calyx lobes and ± concealed by them; corolla lobes 0.8–3 mm long. _____ **H. micrantha**
 4. Corollas white to pink, light violet, purple, blue-violet, or lilac, with yellow to brownish or reddish center, 3.5–12.5 mm long; corolla tube 2–8 mm long, usually longer than calyx lobes (sometimes much longer) and not concealed by them; corolla lobes 1–7 mm long.
 5. Corollas white to light pink or light violet, with yellow center, the tube 3.5–8 mm long, densely pubescent within; plants small, the stems to only 3(–7) cm long; leaves 0.3–3 mm wide, mostly oblanceolate _____ **H. rosea**
 5. Corollas usually purple to blue-violet or lilac, with reddish or brownish center or more rarely lavender to pink or white with yellowish or brownish yellow center, the tube 2–5.5 mm long, glabrous or sparsely pubescent within; plants larger, the stems 1.5–15(–25) cm long; leaves usually (0.5–)4–5(–9) mm wide, mostly elliptic, narrowly elliptic, ovate, or spatulate _____ **H. pusilla**

Houstonia humifusa (A. Gray) A. Gray, (sprawling on the ground), MAT BLUETS, Stems 1–15 cm tall; internodes 3–6; leaves 5–30(–45) mm long, 0.5–4(–6) mm wide, sessile; flowers heterostylous (= having styles of different lengths; in this case, distylos—2 different style lengths): pin flowers with anthers sessile and included, the styles long and stigmas thus exserted; thrum flowers with anthers exserted, the styles short and stigmas thus included; calyx lobes 1–4.7 mm long; corollas 3.5–10 mm long, usually purplish or pink, sometimes white, the tube 1–2 times longer than lobes. Sandy areas, sometimes over gypsum; Burnet Co. on s margin of nc TX (Terrell 1996); mainly c and w TX. Mar–Jun(–Oct). [Hedyotis humifusa A. Gray]

Houstonia micrantha (Shinners) Terrell, (small-flowered), SOUTHERN BLUETS. Vegetatively similar to *H. pusilla*, flowers are needed to distinguish the 2; stems 1–11 cm tall, usually with 2–4 internodes; basal leaves absent or few; $n = 16$. Grassy areas, roadsides, bottomlands, woodlands; included based on range map of Terrell (1996); apparently mainly e TX w to e part of nc TX. Feb–Apr. *Houstonia micrantha*, *H. pusilla*, and *H. rosea* can all be found growing together, but apparently do not hybridize, possibly due to differences in chromosome number (Terrell 1996). [Hedyotis crassifolia Raf. var. *micrantha* Shinners, *Hedyotis australis* W.H. Lewis & D.M. Moore]

Houstonia parviflora Holz ex Greenm., (small-flowered). Stems 3–15(–20) cm tall; internodes usually 3–8; leaves 5–22(–30) mm long, 0.5–3.5(–4.2) mm wide; corollas white with tips of lobes sometimes pink, 0.8–2.5 mm long. Grassy areas and bare spots; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); mainly c and s TX; according to Terrell (1996), this species extends north only to Travis Co. just s of nc TX; endemic to TX. Mid-Feb–mid-Apr. [Hedyotis greenmanii Fosberg] 

Houstonia pusilla Schoepf, (very small), TINY BLUET, LOW BLUET, STAR-VIOLET, SMALL BLUET,

SOUTHERN BLUET, INNOCENCE, ANGEL-EYES, QUAKER-LADIES. Stems with 2–5 internodes; basal leaves absent or few; $n = 8$. Grassy areas, roadsides, bottomlands, open woods; se and e TX w to West Cross Timbers, also Edwards Plateau. Feb–Apr. [*Hedyotis crassifolia* Raf.]

Houstonia rosea (Raf.) Terrell, (rose-colored), ROSE BLUET. Stems with 2–4 internodes; basal leaves sometimes present, similar but slightly larger than the stem leaves; $n = 7$. Grassy areas, roadsides, open woods; se and e TX w to West Cross Timbers, also Edwards Plateau and Trans-Pecos. Feb–early Apr. [*Hedyotis rosea* Raf.]

Houstonia subviscosa (C. Wright ex A. Gray) A. Gray, (somewhat sticky), NODDING BLUET. Stems erect to spreading, 3–20(–30) cm tall; internodes 4–9 or more; leaves 5–25 mm long, 0.2–1.5(–3) mm wide; corollas white or rarely light pink, 1.5–3 mm long. Sandy soils, prairies, roadsides; Milam Co. on the e margin of nc TX, also Erath Co. (Terrell 1996); in parts of e 1/2 of TX; endemic to TX. Mar–May(–Jun). [*Hedyotis subviscosa*(C. Wright ex A. Gray) Shinners] 

Houstonia longifolia Gaertn., (long-leaved), LONG-LEAF HOUSTONIA or SLENDER-LEAF BLUET, is cited by Hatch et al. (1990) (as *H. nuttalliana* Fosberg) as occurring in vegetational area 5 (Fig. 2); however, according to Terrell (1996), this species only occurs to the e and n of TX. It is a perennial—either cespitose or with slender rhizomes—in contrast to all other nc TX *Houstonia* species which are annuals; it also has flowers several to many in cymes.

OLDENLANDIA

• A genus of ca. 300 species of annual or perennial herbs of warm to tropical areas of the world, especially Africa; some are important as sources of dyes. (Named for H.B. Oldenland, ?–1699, a Danish botanist and superintendent of the Dutch East India Company's garden in Cape Town)
REFERENCES: Terrell 1975, 1990, 1991; Verdcourt 1976.

Oldenlandia boscii (DC.) Chapm., (for its discoverer, Louis Augustin Guillaume Bosc, 1759–1828, French naturalist). Perennial with prostrate or spreading stems to 30 cm long; leaves linear, 10–25 mm long, 1–3 mm wide, glabrous; flowers 4-merous, solitary or in small clusters; corollas white, the lobes can be tipped with pink, shorter than calyx lobes; capsule to 2.5 mm wide; seeds numerous. Edges of streams and ponds, ditches; Henderson and Milam cos. on the e margin of nc TX; mainly se and e TX, also Edwards Plateau. May–Aug. [*Hedyotis boscii* DC.]

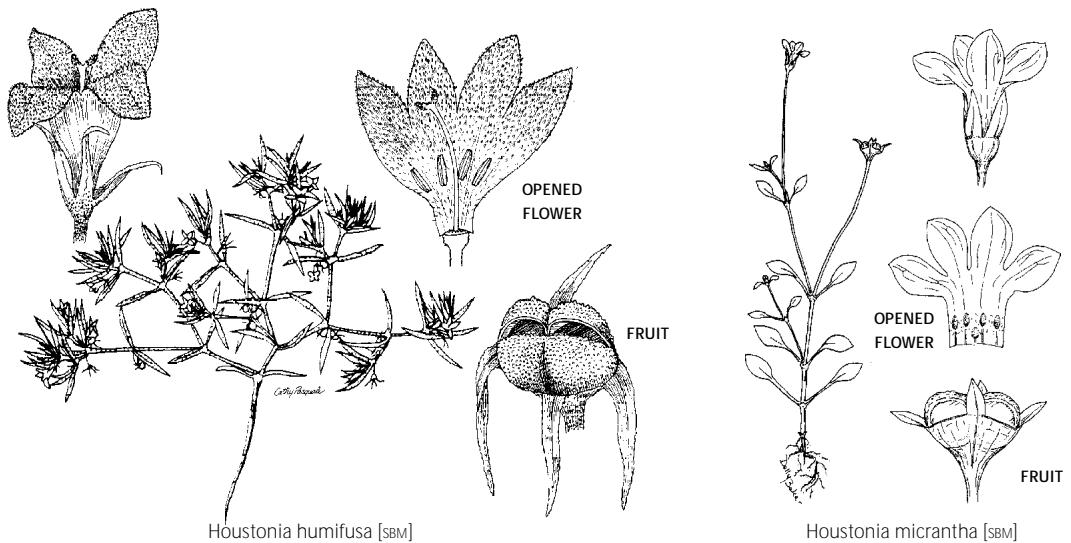
RICHARDIA MEXICAN-CLOVER

Ours annual or perennial herbs; flowers in mostly terminal, leafy-bracted clusters or heads; corollas funnelform or salverform, white; fruits usually separating into 3 indehiscent, 1-seeded segments.

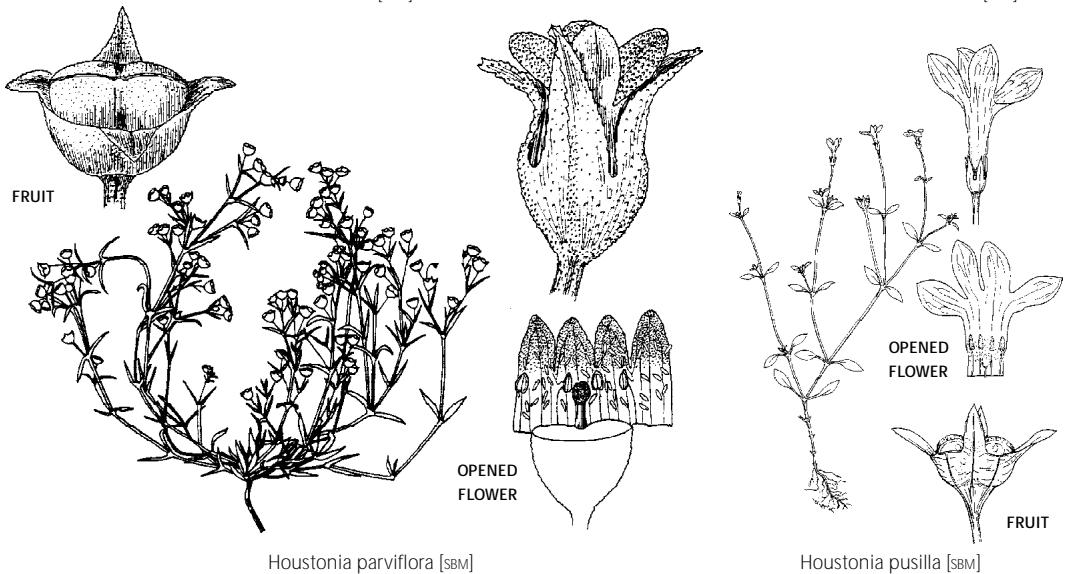
• A mainly tropical American genus of 15 species. (Named for Richard Richardson, 1663–1741, British botanist and physician at Yorkshire)
REFERENCE: Lewis & Oliver 1974.

1. Corollas 5–6 mm long, usually (4–)6-lobed; leaf blades ovate to elliptic-lanceolate, 20–60 mm long, up to ca. 19 mm wide; internodes often much > 2 cm long **R. scabra**
1. Corollas 2–4 mm long, 3–4-lobed; leaf blades linear to lanceolate, 25 mm or less long, ca. 5 mm or less wide; internodes usually < 2(–3) cm long **R. tricocca**

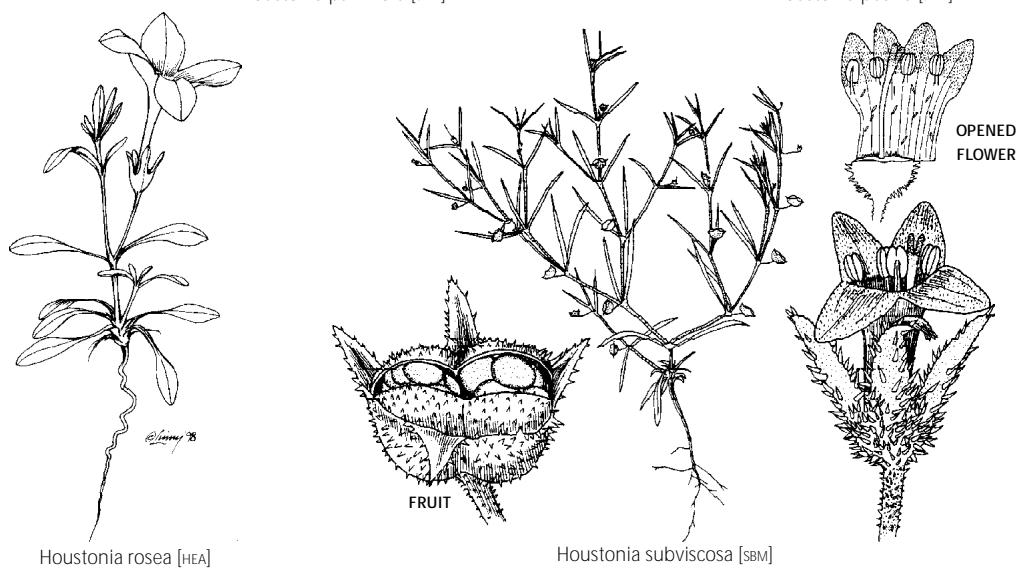
Richardia scabra L., (rough), ROUGH MEXICAN-CLOVER. Short-pilose annual to 85 cm tall; older plants becoming bushy-branched, partly decumbent; corollas usually (4–)6-lobed. Weed of roadsides and gardens; Dallas Co.; mainly se and e TX, also Edwards Plateau. Jun–Oct. Native of Brazil. 



Houstonia micrantha [SBM]



Houstonia pusilla [SBM]



Richardia tricocca (Torr. & A. Gray) Standl. (with three berries, from the fruit separating into three segments), PRAIRIE BUTTONWEED, PRAIRIE MEXICAN-CLOVER. Low perennial often forming mats 30 cm or more across; corollas 3–4-lobed. Brushy areas or open woods, in sand or sandy-clay; Bell and McLennan cos; mainly s TX n to s part of nc TX. Mar–Nov. Sometimes treated in the genus *Diodia* [as *D. tricocca* Torr. & A. Gray].

SHERARDIA SHERARD

☛ A monotypic genus native to Europe, the Mediterranean, and w Asia. (Named for Dr. William Sherard, 1659–1728, patron of Johann Jacob Dillenius and friend of John Ray)

Sherardia arvensis L., (pertaining to cultivated fields), SPURWORT, HERB SHERARD, FIELD-MADDER. Annual with slender reddish roots; stems prostrate or decumbent, to ca. 40 cm long; leaves acute to acuminate apically; flowers 4–8 in terminal heads subtended by involucres of 8–10 lanceolate leaf-like bracts; sepals 4–6; corollas pink to lavender, 4–5 mm across, the tube twice the length of the 4 or 5 lobes; stamens 4 or 5; fruits ca. 4 mm long, of 2 one-seeded segments, with short appressed bristles. Disturbed areas, lawn weed, rapidly spreading and becoming a lawn pest; Dallas, Grayson, Red River, and Williamson cos., also Hunt, Somervell, and Tarrant cos. (R. O'Kennon, pers. obs.); se and e TX w to nc TX. Mar–May. Introduced from the Old World. ☀

SPERMACOCE BUTTONWEED, BUTTONPLANT

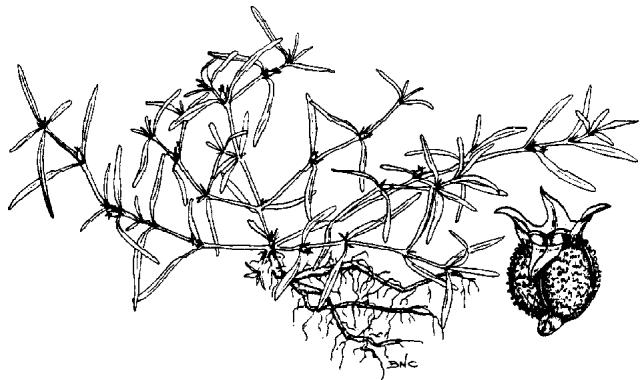
☛ A genus of 150 species of warm areas of the Americas. (Greek: *sperma*, seed, and *acoce*, a point, probably from the pointed calyx teeth on the fruit)

Spermacoce glabra Michx., (smooth, hairless), SMOOTH BUTTONWEED. Rhizomatous, glabrous, low perennial; stems freely branching, erect or partly decumbent, to 60 cm or more long; leaves short-petioled; leaf blades lanceolate to elliptic, to 8 cm long, to 1–2 cm wide; corollas white, 4-lobed, 2–3 mm long; fruits 2–4 mm long, splitting into 2 carpels, 1 open on inner surface, the other closed. Stream banks, ditches, and damp ground; collected at Dallas by Reverchon, but not found so far w recently; mainly se and e TX. May–Oct.

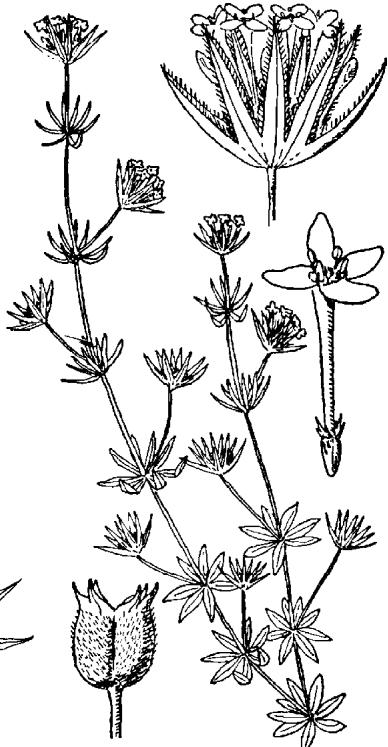
RUTACEAE CITRUS OR RUE FAMILY

Perennial herbs, shrubs, or small trees; leaves alternate, simple or compound; leaf blades entire or toothed, usually firm, thickish, aromatic, with oil dots (glands) usually visible when backlit; flowers terminal or lateral, perfect or unisexual, solitary or in racemes, cymes, or short broad panicles; sepals 3–5; petals 3–5; stamens 3–20; pistils 1–3, ovary superior, raised on a disk-like projection of the receptacle; fruits various.

☛ A medium-large (1,800 species in 156 genera), cosmopolitan, but especially tropical and warm temperate family of mainly trees and shrubs or rarely herbs including the economically important citrus fruits (genus *Citrus* native to se Asia and Malay Peninsula); they are sometimes thorny and often have bitter terpenoids or alkaloids; the tissues are usually aromatic due to the presence of essential oils. Some species are cultivated for their essential oils (e.g., *Ruta* for oil of RUE) or as ornamentals. Old World *Dictamnus albus* L. (GASPLANT, BURNINGBUSH) has so many glands releasing volatile inflammable oil vapors that in hot still weather the vapors can be ignited with a flash. Citrus fruits, including GRAPEFRUIT, LEMON, LIME, and ORANGE, are a type of specialized berry known as a hesperidium; the individual segments that we eat represent single carpels. The TEXAS RED GRAPEFRUIT, *Citrus × paradisi* (L.) Macfad. [*C. maxima* × *C. sinensis*] (cultivar “Ruby” (redblush)), was designated the **state fruit of Texas** in 1993; while this cultivar was developed in TX, the parents are introduced (Jones et al. 1997). ☣ *Citrus* species contain furocoumarins that can photosensitize the skin making it much more sensitive to sun-



Oldenlandia boscii [co1]



Sherardia arvensis [GLE]

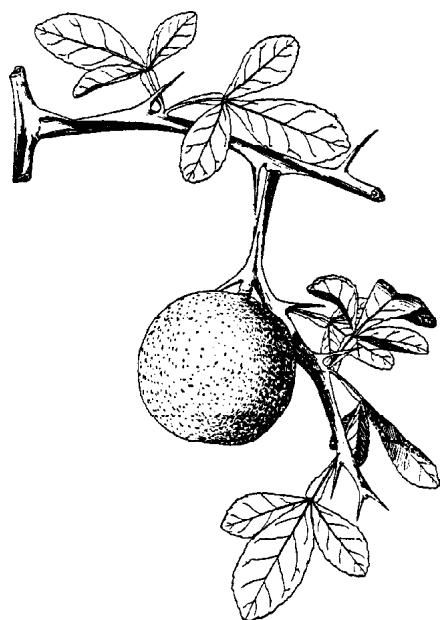


Richardia scabra [RCA]

Richardia tricocca [BT3]



Spermacoce glabra [co1]



Poncirus trifoliata [BA1]

light; the result is that sun exposure can sometimes result in reddening, swelling, and blistering (Fuller & McClintock 1986; D.M. Eggers-Ware, pers. comm.); after handling citrus fruits, the hands should be washed before extensive sun exposure; other Rutaceae (e.g., *Ptelea*, *Thamnosma*) are also capable of causing such phytophotodermatitis (Lampe 1986; L. Woodruff, pers. comm.). According to Lampe (1986), "... the affected skin becomes pigmented and may remain so for many months. Sometimes precise leaf patterns can be seen as dark tattoos on the skin." Family name from *Ruta*, RUE, a genus of 7 species native from Macaronesia and the Mediterranean to sw Asia; it has been cultivated since ancient times for its strong flavor and for medicinal uses (due to the presence of ethereal oils); ☣ however, it can cause dermatitis in some individuals. (Latin: *ruta*, rue, a bitter herb, bitterness, unpleasantness, in reference to the bitter taste) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: usually shrubs or trees (1 can be herbaceous) with alternate, scented, *gland-dotted* leaves (glands easily seen when the leaves are held up to a strong light)

REFERENCES: Wilson 1911; Brizicky 1962a.

1. Herbs or subshrubs usually less than 30 cm tall, unarmed; leaves simple, linear _____ **Thamnosma**
1. Shrubs or small trees, armed with thorns or spines OR unarmed: leaves compound, the leaflets broader than linear.
 2. Leaves pinnately compound with 5–17 leaflets; fruit a small, leathery, 1-seeded follicle 5–9 mm long _____ **Zanthoxylum**
 2. Leaves with 3 leaflets; fruit either flat and winged OR like a small orange.
 3. Plants unarmed; fruit a flat, circular, wind-dispersed samara with a thin wing all around, 22–28 mm across _____ **Ptelea**
 3. Plants usually armed with stout straight thorns; fruit orange-like, round or subglobose, ca. 40 mm in diam. _____ **Poncirus**

PONCIRUS BITTER ORANGE, TRIFOLIATE ORANGE

☛ A monotypic genus of c and n China; related to, hybridizes with, and sometimes placed in the Asiatic genus *Citrus* which includes the cultivated citrus fruits such as GRAPEFRUIT, LEMON, LIME, and ORANGE. (French: *poncire*, for a kind of citron)

Poncirus trifoliata (L.) Raf., (three-leaved), BITTER ORANGE, TRIFOLIATE ORANGE. Usually armed shrub or small tree, the armature often conspicuous; thorns often flattened basally; leaves with 3 leaflets; leaflets elliptic or obovate, gland-dotted and aromatic; flowers solitary, perfect; petals 4–5, whitish; stamens 15 or more; fruits like a small orange. Cultivated, escaped and naturalized in low woods at base of bluffs along the Red River, Grayson Co., also along White Rock Creek in Dallas Co. (R. O'Kennon, pers. obs.) and in Tarrant Co. (L. Woodruff, pers. comm.); mainly e and se TX. Mar-Apr. Native of c and n China. [*Citrus trifoliata* L.] Fruits fragrant, acidic; reportedly used for marmalade; also reported to be toxic possibly due to saponins (Mabberley 1987; Lampe & McCann 1985). ☣ ☺

PTELEA WAHOO, HOPTREE

☛ A North American genus of ca. 11 species of trees and shrubs containing alkaloids. (Greek: *ptelea*, name for an elm, used by Linnaeus for this genus with superficially similar winged fruits) REFERENCE: Bailey 1962.

Ptelea trifoliata L., (three-leaved), HOPTREE, WAFER-ASH, SKUNKBUSH, COLA DE ZORRILLO. Shrub or small tree 1–4 m tall; leaflets 3, broadly to narrowly elliptic-lanceolate, entire, gland-dotted, aromatic; flowers in terminal panicles, mostly unisexual by abortion of one sex, usually with vestigial parts of other sex; petals 4–5, greenish yellow, small. Hillsides, rocky ground, sandy woods, and woods along streams; nearly throughout TX. Apr. The fruits can be used as a hops

substitute in brewing beer. Reported to contain an alkaloid and a poisonous saponin (Burlage 1968); the species is also known to cause phytophotodermatitis (Lampe 1986—see discussion in family synopsis). There are a number of infraspecific taxa which intergrade and are sometimes distinguished with difficulty; the following 2 occur within nc TX: ☀

1. Leaflets glabrate, with glands 0.15–0.25 mm across; fruits often 3-carpellate; seed part of fruit often 2(–3) mm thick, sometimes located below middle of wings of fruit _____ *subsp. angustifolia* var. *persicifolia*
1. Leaflets pubescent, with glands < 0.1 mm across; fruits mostly 2-carpellate; seed part of fruit usually < 1 mm thick, located near center or above middle of wings of fruit _____ *subsp. trifoliata* var. *mollis*
subsp. angustifolia (Benth.) VL. Bailey var. *persicifolia* (Greene) VL. Bailey, (subsp: narrow-leaved; var: peach-leaved). Burnet, Coryell, Dallas, Grayson, McLennan, and Tarrant cos., also Erath, Hood, and Palo Pinto cos. (Bailey 1962); nc TX s to Edwards Plateau. [*P. persicifolia* Greene]
subsp. trifoliata var. *mollis* Torr. & A. Gray, (var: soft, soft t-hairy), WOOLLY HOPTREE. Bell, Tarrant, and Williamson cos., also Comanche (HPC) and McLennan (Bailey 1962) cos; se and e TX and Edwards Plateau n to nc TX. [*P. mollis* M.A. Curtis, *P. tomentosa*Raf., *P. trifoliata* var. *mollis* Torr. & A. Gray]

THAMNOSMA DUTCHMAN'S-BREECHES

— A genus of 11 species of herbs or shrubs of sw North America, s and c Africa, s Arabia, and the island of Socotra (L. Woodruff, pers. comm.). (Greek: *thamnos*, shrub or bush, and *osma*, smell or odor)

Thamnosma texanum (A. Gray) Torr., (of Texas), DUTCHMAN'S-BREECHES, TEXAS DESERT-RUE, RUDA DEL MONTE. Perennial; leaves strongly gland-dotted, aromatic; inflorescence a raceme or racemose cyme; flowers 4-merous, perfect; petals yellow or purple and creamy white; fruit a leathery 2-lobed capsule 3–7 mm long, the 2 lobes resembling the inflated legs of a dutchman's breeches. Rocky slopes, grasslands, on limestone; Bell, Shackelford, and Somervell cos., also Brown (Stanford 1971), Burnet, Coleman, and Dallas (L. Woodruff, pers. comm.) cos; s and w parts of nc TX, s and w to w TX. Feb–Apr (also in fall). While the epithet is often spelled *texana*, according to L. Woodruff (pers. comm.) who is studying the genus, the correct spelling is *texanum*. This species contains coumarins and can have a phototoxic effect on sheep (Oertli et al. 1983; Dominguez et al. 1984); it can also cause phytophotodermatitis in susceptible humans (L. Woodruff, pers. comm.). ☀

ZANTHOXYLUM PRICKLY-ASH, PEPPERBARK

Ours shrubs or small trees, dioecious or polygamous; older bark with short, sharp spines from conspicuous, cushion-like bases, the younger parts with slender-based, curved stipular spines; leaves odd-pinnately compound; leaflets 5–17, toothed to almost entire, gland-dotted; rachis often with prickles; flowers small, in short, wide, usually terminal panicles, 5-merous; petals yellow-green; carpels 2–5, each maturing into a dry follicle splitting open to reveal a single glossy black seed.

— A genus of ca. 250 species of aromatic trees and shrubs native to the Americas, Africa, Asia, and Australia. Chewing a small amount of bark from the twigs or a leaflet gives the tongue a tingling, numb sensation; some have been used medicinally; during frontier days, TX species were used for toothache or applied externally for rheumatism (Crosswhite 1980). The name has sometimes been incorrectly spelled as "Xanthoxylum." (Greek: *xanthos*, yellow, and *xylon*, wood)
 REFERENCES: Fosberg 1958, 1959; Brizicky 1962b; Porter 1976.

1. Leaflets of flowering branches 9–17, 3.5–9 cm long, acute or acuminate; leaves of flowering branches 10–30 cm long _____ *Z. clava-herculis*

1. Leaflets of flowering branches 5–11, 1–3.5 cm long, obtuse or subacute; leaves of flowering branches 2.5–12 cm long _____ **Z. hirsutum**

Zanthoxylum clava-herculis L., (club of Hercules), PRICKLY-ASH, SOUTHERN PRICKLY-ASH, TICKLETONGUE, TOOTHACHETREE, PEPPERCARB, HERCULES'-CLUB. Shrub, becoming a round-headed tree, 1.5–7 m tall; twigs and leaf rachises pubescent to glabrous; leaflets with indistinct, forward-pointing teeth; inflorescences 6–15 cm long, naked (= without flowers) in basal 1/4 to 1/2; ovaries 1, rarely 2 or 3. Sandy or rocky ground; se and e TX w to Grand Prairie. Apr-early May.

Zanthoxylum hirsutum Buckley, (hairy), PRICKLY-ASH, TICKLETONGUE, TOOTHACHETREE. Shrub or bushy tree to 5 m tall; twigs and leaf rachises densely to sparsely spreading-pubescent (latter extreme is the common form in nc TX); leaflets with shallow, rounded teeth; inflorescences 1–7 cm long, naked in basal 1/4 or less, commonly flower-bearing or branching nearly from base; ovaries 1 or often 2. Sandy or rocky ground; Bosque, Brown, Burnet, Montague, Parker, and Tarrant cos., also Grayson (Little 1976 [1977]) and Hamilton (HPC) cos; mainly w part of nc TX w to Rolling Plains and sw to w TX. Apr-early May. According to Porter (1976), this species appears to hybridize with *Z. clava-herculis* where their ranges overlap in c and n TX.

SALICACEAE WILLOW FAMILY

Shrubs or trees; bark bitter; leaves alternate, simple, entire or toothed, deciduous, often with basilaminar glands (= glands at base of leaf blade); stipules minute and falling early (or on summer shoots or suckers leafy and persistent); flowers each in axil of a small bract, grouped in erect to pendulous catkins (= aments), unisexual, the sexes on separate plants (= dioecious); perianth absent; basal disk or 1–2 glands present; stamens (1–)2–many; pistil 1, ovary superior; fruit a many-seeded capsule; seeds tufted with long, silky, white hairs.

—A medium-sized (ca. 435 species in 2 genera) nearly cosmopolitan, but mainly n hemisphere family of trees and shrubs, sometimes creeping, with wind-dispersed seeds. The number of species is questionable due to hybridization in *Salix*. Species are variously used for timber, pulp, medicinally, or as ornamentals. While *Salix* and *Populus* are somewhat different morphologically, their biochemical similarity and evolutionary relationship is reflected in the fact that the cottonwood borer (*Plectrodera scalator*) utilizes species of both genera for food (Linsley & Chemsak 1984); this is large (25–40 mm body length) long-horned beetle with a striking black and white checkered pattern; the conspicuous antennae are often nearly as long as or longer than the body. The Salicaceae are related to the tropical and subtropical family Flacourtiaceae (Judd et al. 1994). (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: shrubs or trees with alternate simple leaves with petioles often flattened or with glands at junction of petiole and blade; flowers unisexual, apetalous, in catkins; fruit a small capsule with *hairy, wind-dispersed* seeds.

1. Leaf blades nearly as wide as long or wider, rhomboid-ovate to deltoid-ovate or deltoid-reniform, abruptly narrowed to rounded-truncate, subcordate, or widely cuneate base; leaf buds covered by several imbricate bud scales; floral bracts with deeply and unevenly cut margins; flowers with saucer-like basal disk; stamens usually many; stigma with several wide lobes or fleshy branches _____ **Populus**

1. Leaf blades many times longer than wide, linear to lanceolate, usually gradually narrowed at base; leaf buds covered by a single bud scale; floral bracts entire or toothed; flowers without fleshy basal disk (but with 1 or 2 enlarged glands); stamens usually 2–8; stigma 2-lobed _____ **Salix**

POPULUS COTTONWOOD, ÁLAMO, POPLAR, ASPEN

Fast growing, often short-lived trees with soft wood; petioles sometimes conspicuously later-

ally compressed (= flattened), especially just below leaf blades, or petioles round; aments usually pendulous (= drooping), scentless; stamens up to ca. 60.

— A n temperate genus of 35 species of wind-pollinated trees. A number are used as ornamental shade and street trees, for shelter-belts, or for pulp, plywood, and excelsior; they are among the fastest growing trees in the n temperate zone. The common name POPLAR is said to have been derived from their growing around public squares and meeting-places (Mabberley 1997). The Spanish common name for POPLAR is ÁLAMO. It is thought by some that the historically famous Alamo of San Antonio got its name from a nearby grove of *Populus*. *Populus tremuloides* Michx. (QUAKING ASPEN), native to far w TX, may be the most widespread tree in North America, ranging from n Mexico throughout much of the U.S. and Canada to Alaska (Correll & Johnston 1970); its leaves quake or tremble in the slightest breeze due to the flexible flattened petioles; COTTONWOOD leaves do the same to a certain extent. (Classical Latin name for plants of this genus)

REFERENCES: Correll 1961b; Sudworth 1934; Eckenwalder 1977, 1986; Sokal et al. 1986.

1. Mature leaves conspicuously persistently white tomentose (= with densely matted hairs) on lower surface; young twigs and buds white tomentose; petioles rounded or nearly so _____ **P. alba**
1. Mature leaves glabrous on lower surface; young twigs and buds not white tomentose (at most pubescent); petioles distinctly flattened.
 2. Leaf blades usually truncate (= squared-off) or cordate at base, with the same light green color on both surfaces, often with 2 or more prominent glands on upper surface where blade joins petiole; trees with an open crown, not columnar-shaped; native species _____ **P. deltoides**
 2. Leaf blades usually widely cuneate (= wedge-shaped) at base, bright green above and paler on lower surface, without glands on upper surface where blade joins petiole; trees with a very slender, erect, columnar-shaped crown; persistent or escaped cultivar _____ **P. nigra**

Populus alba L., (white), WHITE POPLAR, SILVER-LEAF POPLAR, ÁLAMO BLANCO, ABELE. Tree to ca. 30 m tall with open crown, spreading by root sprouts; leaf blades deltoid-ovate, with small lobes or coarsely toothed, conspicuously white tomentose beneath; petioles 2–4 cm long; our plants apparently all pistillate, but not maturing seeds. Commonly cultivated, persists, and spreads vegetatively; in some instances its aggressive spread can be problematic; Grayson Co., also Erath, Lamar (Correll 1961b), Dallas, and Tarrant (R. O'Kennon, pers. obs.) cos; e TX w to nc TX, also Trans-Pecos. Mar-May. Native of Europe and Asia. The bark of this species can be rather striking—that of the lower trunk is light gray and furrowed, that of the upper trunk and branches white and smooth with gray areas where branches were formerly attached. 

Populus deltoides Bartram ex Marshall, (triangular), COTTONWOOD. Tree to 30 m or more tall with open crown; leaf blades deltoid (= triangular) to deltoid-ovate or deltoid-reniform, finely to coarsely crenate-serrate at least in middle portion of margins, glabrous; petioles 2.5–9 cm long; fruits 3–15 mm long. Along streams, in ditches or draws, around stock tanks, invading bare ground that is damp at seed-time; also cultivated. Mostly mid-Mar–early Apr. Under good conditions COTTONWOODS can grow extremely rapidly—up to 5 feet of height per year; however, like many fast-growing species, they are relatively short-lived (Cox & Leslie 1991). The leaves flutter in the breeze (due to the flexible flattened petioles) like those of QUAKING ASPEN.

1. Leaf blades usually with 10–20 coarse or fine teeth on each side; bud scales glabrous; glands present on upper blade surface where petiole attaches _____ subsp. **deltoides**
 1. Leaf blades usually with 5–10 coarse teeth on each side; bud scales pubescent to rarely glabrous; glands absent or present on upper blade surface where petiole attaches _____ subsp. **monilifera**
- subsp. **deltoides**, EASTERN COTTONWOOD, ÁLAMO, ALAMO COTTONWOOD. Roughly e 1/2 of TX w to Wichita Co. in Rolling Plains (Correll 1961b; Simpson 1988).

subsp. **monilifera** (Aiton) Eckenw. (bearing a necklace), TEXAS COTTONWOOD, PLAINS COTTONWOOD. Panhandle s and e to Clay, Eastland, Stevens, and Young cos., also in Cooke and Montague cos. It forms hybrid swarms with subsp. *deltoides* (Simpson 1988). Hatch et al. (1990) indicated this taxon comes e to the Blackland Prairie. [P. *deltoides* var. *occidentalis* Rydb., P. *sargentii* Dode, P. *texana* Sarg.]

Populus nigra L., (black), BLACK POPLAR, LOMBARDY POPLAR, SAUCE. Tree to 30 m tall with columnar crown (sometimes very narrow), spreading by root sprouts; leaf blades rhomboid-ovate to broadly deltoid-ovate, finely crenate-serrate along most of margin, glabrous; petioles 3–5 cm long. Commonly cultivated, persists, and spreads vegetatively (plants in nc TX apparently male only); included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); scattered in TX. Mar-May. Native of Europe and Asia. This species is commonly attacked by pests (including cotton root rot and long-horned beetles) and will die out in a few years (J. Stanford, pers. comm.). (☞)

SALIX WILLOW, OSIER, SALLOW

Shrubs and trees typically of moist to wet areas; aments erect, ascending or spreading, usually not pendulous (= drooping).

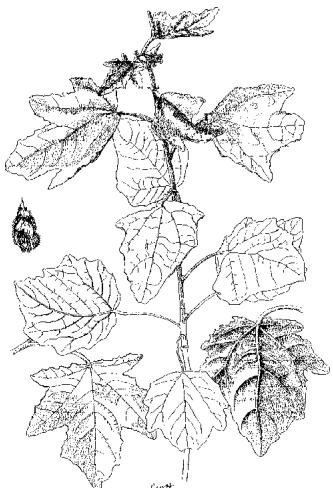
☞ A genus of ca. 400 species (Mabberley 1997; however, Argus 1997 estimated ca. 450 species), primarily in cold and temperate areas of the n hemisphere, with a few in the s hemisphere. WILLOWS vary from 30 m trees to dwarf shrubs only 1–2 cm tall in tundra regions. Glands in the flowers secrete nectar and attract insect pollinators. Native peoples in both the Old and New worlds chewed *Salix* twigs as a pain reliever. Salicylic acid, similar to the now synthesized acetylsalicylic acid (aspirin), is found in the twigs and was used medicinally for pain relief by native inhabitants. Species are variously cultivated as ornamentals for their form (weeping) or branch color (sometimes yellow or orange), used in basketry because of their pliable branches, or cut for timber. (Classical Latin name for plants of this genus)

REFERENCES: Sudworth 1934; Ball 1961; Dorn 1976; Argus 1986, 1997; Brunsfeld et al. 1992.

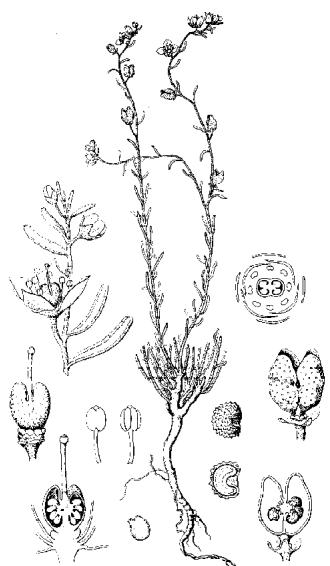
1. Plants with flowers and immature leaves.
2. Aments only 1 per peduncle; stamens 2–12; mature capsules 1.5–6 mm long; pistils glabrous; trees to 20 m or more tall or non-colonial shrubs; widespread in nc TX.
 3. Twigs not conspicuously elongate or pendulous; stamens 4–12 but usually 6; fruiting aments 20–100 mm long, 10–20 mm wide; mature capsules 4.5–6 mm long; bud apex sharp-pointed; bud scale margins free and overlapping; floral bracts deciduous after flowering; native species.
 4. Young unfolding leaves green on both sides; widespread species probably in every county in nc TX _____ **S. nigra**
 4. Young unfolding leaves pale to white-glaucous beneath; known in nc TX only from Hood, Johnson, and Somervell cos. _____ **S. caroliniana**
 3. Twigs conspicuously elongated and pendulous ("weeping willow"); stamens 2; fruiting aments 10–20 mm long, 5–10 mm wide; mature capsules 1–2.5 mm long; bud apex blunt; bud scale margins fused; floral bracts persistent after flowering; introduced species _____ **S. babylonica**
2. Aments (especially staminate) often 2–4 per peduncle, some developing later at base of the first; stamens 2; mature capsules 5–9 mm long; pistils glabrous or pubescent; colonial shrubs often forming thickets; in nc TX known only from sandy bottoms of Red and Sulfur rivers _____ **S. exigua**
1. Plants past flowering, with mature leaves.
 5. Leaves linear-lanceolate to lanceolate, up to 10–12 times longer than wide, the margins usually with ± closely and evenly spaced teeth; petioles sometimes with glands or dots near base of blade; trees to 20 m or more tall or non-colonial shrubs; widespread in nc TX.



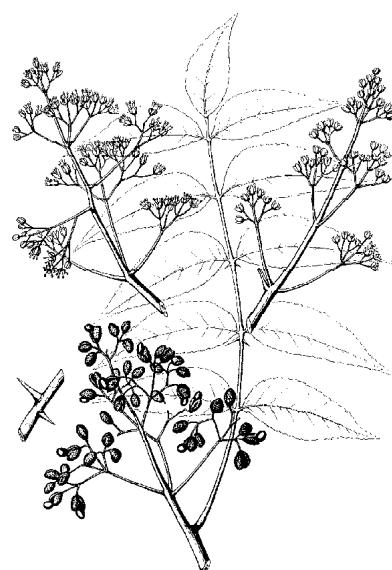
Ptelea trifoliata subsp. trifoliata var. mollis [SA3]



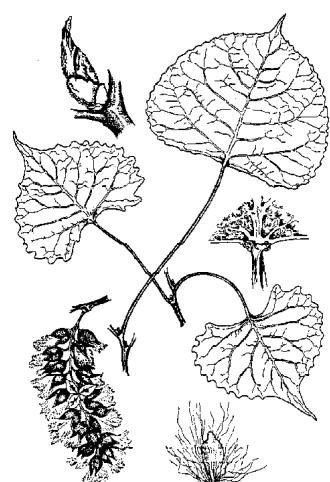
Populus alba [mos]



Thamnosma texanum [GR1]



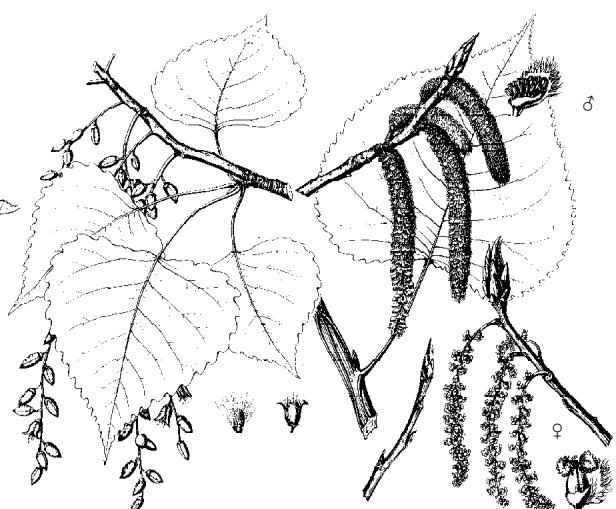
Zanthoxylum clava-herculis [SA3]



Populus deltoides subsp. monilifera [LUN]



Zanthoxylum hirsutum [LYN]



Populus deltoides subsp. deltoides [SA3]

6. Leaves green beneath (upper and lower leaf surfaces ± similar in appearance); widespread native species probably in every county in nc TX _____ **S. nigra**
6. Leaves pale to white-glaucous beneath (upper and lower surfaces conspicuously dissimilar); native species known in nc TX only from Hood, Johnson, and Somervell cos. OR escaped cultivated "weeping willow."
7. Twigs not conspicuously elongated or pendulous (not weeping), reddish brown to yellowish brown, usually pubescent; leaf blades dark green above; bud apex sharp-pointed; bud scale margins free and overlapping _____ **S. caroliniana**
7. Twigs conspicuously elongated and pendulous ("weeping"), yellowish to yellowish brown, glabrous; leaf blades yellowish green above; bud apex blunt; bud scale margins fused _____ **S. babylonica**
5. Leaves linear to linear-lanceolate, usually 8–20 times longer than wide, the margins subentire to with widely and unevenly spaced teeth; petioles without glands near base of blade; colonial shrubs often forming thickets; in nc TX known only in sandy bottoms of Red and Sulphur rivers _____ **S. exigua**

Salix babylonica L., (of Babylon), WEEPING WILLOW, BABYLON WEEPING WILLOW. Tree to ca. 10(–20) m tall; twigs/branchlets very long, slender and pendulous (weeping); buds flat-beaked, blunt; petioles eglandular or with 2 small dots near base of blade. Widely cultivated, persisting and possibly escaping; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990), also Hunt Co. (R. O'Kennon, pers. obs.). Mar–Apr. Native to Asia with center of distribution in China. Linnaeus named this species based on the mistaken assumption that it was the willow of Babylon (actually a poplar) referred to in the Bible (Moldenke & Moldenke 1952; Vines 1960). 

Salix caroliniana Michx., (of Carolina), COASTAL PLAIN WILLOW, CAROLINA WILLOW, LONG-PEDICEL WILLOW, SOUTHERN WILLOW, WARD'S WILLOW. Non-colonial shrub or tree to ca. 12 m tall; trunks 1–few; twigs reddish brown to yellowish brown; bud apex sharply pointed; bud scale margins free and overlapping; petioles with glandular dots or processes near base of blade; stipules usually prominent and persistent; stamens 4–12, usually 6. Along rocky streams; Hood, Johnson, and Somervell cos. (Little 1976 [1977]), also Edwards Plateau. Mar–Apr. This species is closely related to *S. nigra* and hybridization occurs in some areas where their ranges overlap; Argus (1986) concluded that because they are clearly separable over most of their ranges and because of the limited nature of hybridization, the 2 should be recognized as separate species.

Salix exigua Nutt., (little, small, poor), SANDBAR WILLOW, COYOTE WILLOW, NARROW-LEAF WILLOW, LONG-LEAF WILLOW, TEXAS SANDBAR WILLOW, TARAY, RIVERBANK WILLOW, OSIER WILLOW, SHRUB WILLOW, BASKET WILLOW. Multiple-stemmed rhizomatous shrub to 4(–5.5) m tall, colonial and often forming dense thickets; twigs yellowish brown to reddish brown; bud apex blunt; leaf blades at first silvery with appressed pubescence, later glabrous, linear or linear-lanceolate, 3–10 mm wide (to 15 mm wide on new shoots), the margins subentire or usually with teeth unevenly and widely spaced (teeth near middle of leaf blade 1.2–7 mm apart); petioles absent or up to 3 mm long (to 6 mm long on new shoots), eglandular; floral bracts deciduous after flowering. Damp sandy river bottoms; in nc TX in counties along the Red River—Grayson Co., also Clay, Cooke, and Montague cos. (Little 1976 [1977]), also Delta Co. along the Sulphur River; widely scattered in TX. Apr., sporadically later. Numerous infraspecific taxa of *S. exigua* and *S. interior* have been lumped into *S. exigua*. [*S. interior* Rowlee]

Salix nigra Marshall, (black), BLACK WILLOW, SAÚZ, LINDHEIMER'S BLACK WILLOW, SWAMP WILLOW, WESTERN BLACK WILLOW, SCYTHE-LEAF WILLOW, PUSSY WILLOW. Tree to 20 m or more tall; twigs reddish brown to yellowish brown; bud apex sharply pointed; bud scale margins free and overlapping; leaf blades lanceolate, 5–20 mm wide, non-glaucous beneath (rarely thinly glaucous),

the margins with teeth evenly close-set (teeth near middle of leaf blade 0.3–2.1 mm apart); petioles 2–6 mm long (to 15 mm long on new shoots), usually with glands near base of blade; stipules usually small and caducous; stamens 3–5. Stream banks, ditches, tanks, and low ground; widespread in TX, probably in every county in nc TX. Late Mar–Apr. [*S. nigra* Marsh var. *lindheimeri* C.K. Schneid.]

SANTALACEAE SANDALWOOD FAMILY

☛ A medium-sized (540 species in 34 genera), nearly cosmopolitan, especially tropical and warm dry area family of hemiparasitic trees, shrubs, and herbs; they usually parasitize the roots of other species. Family name from *Santalum*, a genus of 8–9 species native from Indomalesia to Australia, Hawaii, and Juan Fernandez. It includes the Asian *Santalum album* L., SANDALWOOD-TREE, known for its fragrant timber and sandal oil used medicinally, in making perfumes, cosmetics, and soaps, and as incense for Buddhist, Hindu, and Muslim religions. (Persian: *shandal*, name for the sandalwood-tree) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the single TX species is a herbaceous perennial root hemiparasite (green and photosynthetic); leaves alternate, simple, entire; flowers small, with a single white perianth whorl; fruits small, drupe-like.

COMANDRA BASTARD TOADFLAX

☛ A genus of a single species composed of 4 subspecies, 3 in North America, 1 Mediterranean. (Greek: *come*, hair, and *aner*, man, in allusion to the hairs of the sepal lobes which adhere to the anthers)

REFERENCE: Piehl 1965.

Comandra umbellata (L.) Nutt. subsp. **pallida** (A. DC.) Piehl, (sp.: with umbels; subsp.: pale), BASTARD TOADFLAX, WESTERN COMANDRA. Glabrous and glaucous, low (to 30 cm tall), herbaceous, rhizomatous, perennial hemiparasite; parasitizing the underground parts of other plants via modified roots (= haustoria); leaves alternate, sessile, lanceolate or narrowly oblong-lanceolate, green and photosynthetic; flowers in small, compact, terminal, rounded, corymbose inflorescences; sepals 5, petaloid, white, united below into a green tube, the lobes with epidermal hairs on inner surface that adhere to the anthers; petals 0; stamens 5, with a 5-lobed fleshy disk around their bases; pistil 1; ovary half inferior; fruits ovoid to nearly round, indehiscent, 1-seeded, drupe-like, ca. 4–8 mm long. Sandy or rocky open ground; Cooke and Montague cos. in nw part of nc TX s and w to w TX. Late Mar–early May. [*C. pallida* A. DC.] This species is known to parasitize over 200 species of hosts (Piehl 1965); its fruits are reported to be sweet and edible (Mabberley 1987).

SAPINDACEAE SOAPBERRY FAMILY

Shrubs, trees, or climbing vines; leaves alternate, compound; leaflets entire, toothed, or lobed; ours with flowers in lateral fascicles or in terminal panicles, radially symmetrical or bilaterally symmetrical, perfect or unisexual; sepals 4–5; petals 4–5, white to pink or purplish pink; stamens 7–10; ovary superior; fruit a capsule or berry.

☛ A medium-large (1,450 species in 131 genera) family of tropical and warm areas with a few in temperate regions; it includes trees, shrubs, lianas, and herbaceous climbers; ☣ toxic saponins are usually present. Several are important for their fruits (e.g., *Nephelium* (RAMBUTAN) and *Litchi* (LYCHEE)) or for timber; the family also includes ornamentals such as the frequently cultivated, *Koelreuteria paniculata* Lam., GOLDENRAIN-TREE or CHINATREE, with odd-pinnate leaves, coarsely toothed leaflets, bright yellow flowers, and an inflated, membranous capsule.

While the nc TX species of this family (including the cultivated *Koelreuteria*) are morphologically very dissimilar (e.g., annual vines to large trees), their biochemical similarity and evolutionary relationship is reflected in the fact that the soapberry bug (*Jadera haematoloma*) utilizes seeds of all the species (except possibly *Ungnadia*—no information available) as a food source (K. Walker, pers. comm.). The Sapindaceae are closely related to the Hippocastanaceae and Aceraceae and are probably paraphyletic when treated separately. The genus *Aesculus* here treated in the Hippocastanaceae, is often included in the Sapindaceae. From a cladistic standpoint these families should be lumped to form a more inclusive monophyletic Sapindaceae (Judd et al. 1994). (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: trees, shrubs, or vines with alternate compound leaves; stamen number variable, but often 8; fruit a berry or capsule, sometimes inflated.

REFERENCES: Brizicky 1963b; Judd et al. 1994.

1. Vines; fruit a membranous, inflated, balloon-like, 3-lobed capsule; flowers white, in small axillary inflorescences with tendrils _____ **Cardiospermum**
1. Trees or shrubs; fruit a fleshy berry or a somewhat woody 3-lobed capsule; flowers pink to purple or white (if white, in large terminal inflorescences); no tendrils present.
2. Flowers white, in large, dense, terminal panicles; leaflets entire; leaves usually even-pinnate (the terminal leaflet usually absent); fruit an amber or yellowish, 1-seeded, fleshy berry persisting over the winter _____ **Sapindus**
2. Flowers pink to purplish pink, in lateral fascicles (= clusters); leaflets sharply toothed; leaves odd-pinnate (with a terminal leaflet); fruit a somewhat woody capsule _____ **Ungnadia**

CARDIOSPERMUM BALLOONVINE, HEARTSEED

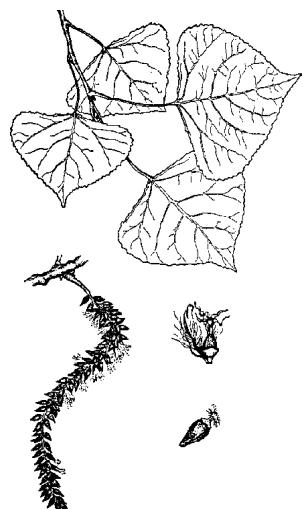
—A genus of 14 species of climbers with inflated, balloon-like fruits, mostly of the tropics, especially in the Americas. (Greek: *cardia*, heart, and *sperma*, seed, referring to the white, heart-shaped spot on the seed)

Cardiospermum halicacabum L., (old generic name, as *Halicacabum*), COMMON BALLOONVINE, FAROLITOS, HEARTSEEDVINE. Annual vine sprawling and trailing, with axillary tendrils; leaves alternate, usually twice ternately compound; leaflets toothed and lobed; flowers about 4 mm long; sepals 4, 2 large, 2 small; petals 4, obovate, often unequal; stamens 8; fruits membranaceous, inflated (balloon-like), 3-lobed, 3-celled, 3–4.5 cm broad; seeds 5 mm in diam., black at maturity, with conspicuously lighter tissue attaching them inside the fruit. Disturbed areas, sometimes extremely abundant; in e 1/2 of TX. Jun–Nov. Cultivated as an ornamental vine.

SAPINDUS SOAPBERRY

—A genus of ca. 13 species of tropical and warm areas of the world; all are cultivated as ornamentals. (Latin: *sapo*, soap, and *indicus*, Indian, alluding to the use of the fruits of *S. saponaria* as a soap by Native Americans)

Sapindus saponaria L. var. **drummondii** (Hook. & Arn.) L.D. Benson, (sp: soapy; var: for its discoverer, Thomas Drummond, 1780–1835, Scottish botanist and collector in North America), WESTERN SOAPBERRY, WILD CHINABERRY, JABONCILLO. Broad-topped tree to 10(–15) m tall; leaves usually even- or occasionally odd-pinnately compound; leaflets 10–18(–19), curved-lanceolate, glabrous to soft-pubescent beneath; flowers radially symmetrical, white; stamens 8 or 10; fruits globose, ca. 13 mm in diam., with amber or yellowish, translucent, foul-tasting flesh around the single seed; seed 8–9 mm long. Stream bottoms, forest margins, disturbed areas; scattered throughout TX. Late May–Jun. [*S. drummondii* Hook. & Arn.] The plant contains saponins (with soap-like properties) and the fruits have been used as a soap substitute; the fruits are considered poisonous and there are reports of contact dermatitis in some individuals from han-



Populus nigra [LUN]



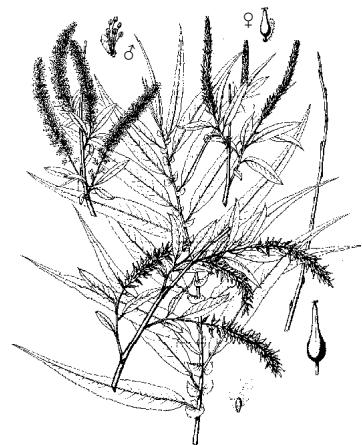
Salix babylonica [SBM]



Salix caroliniana [SA3]



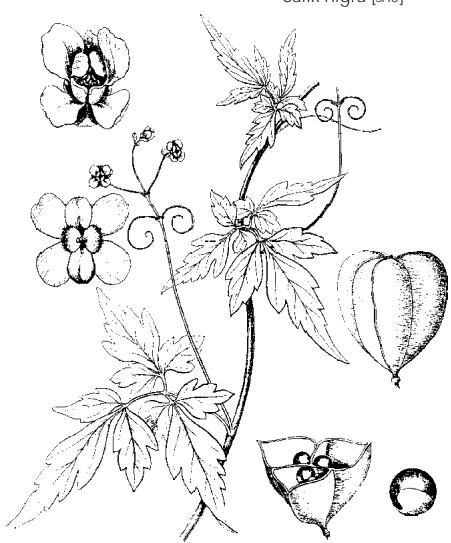
Salix exigua [SA2, SBM]



Salix nigra [SA3]



Comandra umbellata subsp. pallida [BB2]



Cardiospermum halicacabum [GR1]

dling the fruits; the crushed fruits have been used to poison fish (Lampe & McCann 1985; Fuller & McClintock 1986; Lampe 1986; McGregor 1986). ☠

UNGNADIA MEXICAN-BUCKEYE, TEXAS-BUCKEYE

— A monotypic genus of s North America. (Named for Baron Ungnad, who in 1576 introduced the COMMON HORSE-CHESTNUT to w Europe by sending seeds to Clusius at Vienna)

Ungnadia speciosa Endl., (showy, good-looking), MEXICAN-BUCKEYE, TEXAS-BUCKEYE, MONILLA. Shrub or small tree rarely to 10 m tall; leaves with (3-)5-9, ovate-lanceolate, prominently veined, glabrous leaflets (the apical 2-3 leaflets sometimes partly united); flowers appearing before or with the leaves, fragrant; petals 4 or 5, pink to purplish pink, drying darker, obovate, with pilose claw; stamens 7-10, anthers red; fruits 3-lobed, 3.5-5 cm thick, pale green, often with some reddish coloring; seeds 10-15 mm in diam., dark-brown to blackish. Limestone outcrops, rocky areas; Bell, Cooke, and Dallas cos., also Brown, Burnet, Coleman, Hamilton, Mills (HPC), Comanche, Coryell, McLennan, Tarrant, and Williamson (Little 1976) cos.; nc TX s and w across much of the w 1/2 of TX. Apr. Seeds poisonous (Burlage 1968; Correll & Johnston 1970). ☠ ☺/108

SAPOTACEAE

CHICLE, SAPOTE, OR SAPODILLA FAMILY

— A medium-sized (975 species in 53 genera) mainly tropical family of trees and shrubs with a few in temperate regions; a well-developed latex system bearing white latex is usually present. A number of the tropical species are cauliflorous (= flowers on the trunk) and bat-pollinated. Old World *Palaquium* species were famous as the source of gutta-percha, a non-elastic rubber-like substance (polymer of isoprene) once widely used in industry and still in dentistry for temporary fillings. Family name conserved from *Sapota*, a genus now treated as *Manilkara*, a group of 70 tropical species with milky latex; the genus includes *M. zapota* (L.) P. Royen, SAPODILLA, the source of chicle (the elastic component of early chewing gums) and an edible fruit. (Name derived from the South American native name for sapodilla) (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: the single nc TX species can be recognized as shrubs or small trees with leaves simple, entire, oblanceolate to elliptic, alternate or bunched on spur shoots; branchlets usually spine-pointed; flowers small, in axillary clusters; fruits small, purplish black, drupe-like.

REFERENCES: Cronquist 1946; Wood & Channell 1960; Pennington 1990, 1991.

SIDEROXYLON CHITTAMWOOD, IRONWOOD

— A tropical genus of 75 species; the New World taxa are sometimes segregated as the genus *Bumelia*. *Sideroxylon sessiliflorum*(Poir.) Aubrév. of Mauritius was supposedly dispersed by the now extinct dodo [flightless bird]; turkeys have been force-fed the seeds and germination has been improved. (Greek: *sidero*, iron, and *xylon*, wood, in reference to the hard wood)

REFERENCES: Clark 1942; Cronquist 1945.

Sideroxylon lanuginosum Michx. subsp. **oblongifolium** (Nutt.) T.D. Penn., (sp: woolly, downy; subsp: oblong-leaved), CHITTAMWOOD, COMA, GUM BUMELIA, WOOLLY-BUCKTHORN, GUM-ELASTIC. Shrub or small tree to 15 m or more tall, usually with spine-pointed branchlets; leaves alternate or bunched on spur branchlets, very short-petioled, simple; leaf blades oblanceolate to elliptic, entire, obtuse, stiff and leathery, thin to densely white to gray or tawny cobwebby pubescent beneath; flowers axillary, small, in umbel-like clusters; calyxes cup-like, with 5 orbicular-ovate, widely overlapping sepals; corollas slightly exceeding the calyxes, yellowish white, with cylindrical tube and 5 orbicular-ovate main lobes overlapping and alternating with short spreading

ones; calyces and corolla tubes densely pubescent; stamens 5, not exserted; staminodes 5, alternating with corolla lobes and nearly equaling the corolla lobes in length; pistil 1; ovary superior; fruits obovoid to broadly ellipsoid or subglobose, usually purplish black, 7–12 mm long. Woods, stream banks, hillsides, and rocky areas; e 1/2 of TX. May–Jul. [*Bumelia lanuginosa* (Michx.) Pers. var. *oblongifolia* (Nutt.) R.B. Clark, *S. lanuginosum* subsp. *albicans* (Sarg.) Kartesz & Gandhi] According to Tyrl et al. (1994), this species is a good bee-tree (in terms of honey production). Burlage (1968) reported that the fruits are edible but cause digestive disturbances and dizziness if eaten in quantity. Because of the apparent lack of consistent differences, we follow Jones et al. (1997) in including subsp. *albicans* within subsp. *oblongifolium* Barker (1986b) also lumped var. *albicans* with var. *oblongifolia* Clark (1942) separated the 2 (as varieties) as follows:

1. Pubescence dense, whitish tomentose; pedicels slender; seeds ellipsoid _____ var. *albicans*
1. Pubescence sparser, whitish becoming tawny; pedicels stoutish; seeds obovoid _____ var. *oblongifolia*

SARRACENIACEAE PITCHER PLANT FAMILY

☞ A very small (14 species in 3 genera) family of pitcher plant-type carnivorous plants of mainly North America and the n part of South America. Insects are lured into the pitchers by strong odors, nectar secretion, and usually reddish coloration on the pitchers. Inside the pitcher is a slick “slide zone,” down-pointing hairs to prevent escape, and a pool of liquid containing enzymes which digest the insect after drowning. As with other carnivorous plants, nutrients (especially nitrogen), rather than calories, are obtained through carnivory. (subclass Magnoliidae) FAMILY RECOGNITION IN THE FIELD: obvious pitcher-like leaves containing liquid that drowns insects; flowers solitary, down-facing, at the end of a naked scape.

REFERENCES: Wood 1960; Thanikaimoni & Vasanth 1972; Bayer et al. 1996.

SARRACENIA PITCHER PLANT, TRUMPET

☞ A genus of 8 species of e North America. (Named for Dr. Michel Sarrasin de l’Étang, 1659–1734, Quebec collector and physician)

REFERENCES: Bell 1949; McDaniel 1971; Schnell & Krider 1976; Pietropaolo & Pietropaolo 1986.

Sarracenia alata A.W. Wood, (winged), YELLOW TRUMPET, PITCHER PLANT. Insectivorous, rhizomatous perennial herb; leaves yellowish green, hollow, tubular-trumpet-shaped, to 70 cm long, rigidly erect, partially filled with liquid (which digests insects), with a ridge on 1 side and a terminal hood; flowers solitary, nodding at end of a long naked scape; sepals 5, 4–5 cm long; petals 5, greenish yellow, drooping, 5–6 cm long, to 4 cm wide near the rounded tips; stamens numerous; ovary superior; style disk expanded; fruit a capsule. Boggy areas; included based on label information for *Xyris baldwiniana* (Correll & Wasshausen 27469 BRIT/SMU) indicating occurrence of PITCHER PLANT in c Henderson Co. near e margin of nc TX. Mar–Apr. [S. *sledgei* Macfarl.] PITCHER PLANT, two *Utricularia* species (BLADDERWORTS, Lentibulariaceae), and *Drosera brevifolia* Pursh (ANNUAL SUNDEW—Droseraceae) are the only carnivorous plants in nc TX.

SAURURACEAE LIZARD’S-TAIL FAMILY

Rhizomatous perennial herbs; leaves alternate, simple, entire, with a distinct petiole; inflorescences dense, spike-like, subtended by involucral bracts or not so, with numerous small bisexual flowers, each flower subtended by a very small bract; perianth absent; stamens 3–8; ovary superior or inferior; fruit a capsule, sometimes somewhat succulent.

☞ The Saururaceae is a very small (6 species in 4 genera) family of perennial, often aromatic herbs of temperate and subtropical North America and e Asia; some are cultivated as ornamentals. It is closely related to the mostly tropical family Piperaceae (PEPPER family, source of

black pepper) (Judd et al. 1994), but the two families are apparently both monophyletic (Tucker et al. 1993). Saururaceae and Piperaceae have a number of characters linking them to monocots (e.g., scattered vascular bundles and monosulcate pollen). Some taxonomists refer to the family as “paleoherbs” (a group including Aristolochiales, Piperales, and Nymphaeales) and believe them to be an early branch off the evolutionary line leading to monocots (Zomlefer 1994). This view is supported by molecular data which place the paleoherbs as the immediate sister group of the monocots (Chase et al. 1993) (see Fig. 6 in Appendix 41). (subclass Magnoliidae)

FAMILY RECOGNITION IN THE FIELD: often wet area herbs with alternate, simple, entire leaves; flowers small, individually inconspicuous, but numerous in dense, spike-like inflorescences; colored bracts sometimes subtending inflorescences.

REFERENCES: Wood 1971; Cheng-Yih & Kubitzki 1993; Tucker et al. 1993; Buddell & Thieret 1997.

1. Leaves mostly basal (stem with a few small leaves subtended by sheathing bract-like leaves); leaf blades truncate or cordate basally, ± pinnately veined; inflorescence subtended by 6–8 white or reddish involucral bracts _____ **Anemopsis**
1. Leaves mostly cauline (scattered up the stem); leaf blades cordate basally, ± palmately veined; inflorescence either not subtended by bracts OR subtended by 4 white bracts.

 2. Spike-like inflorescence 2.5–5 cm long, subtended by 4 white involucral bracts ca. 13 mm long; leaf blades 5–ca. 8 cm long; stems < 40 cm tall; stamens 3 _____ **Houttuynia**
 2. Spike-like inflorescence 10–20(–30) cm long, not subtended by involucral bracts; leaf blades 5–15 cm long; stems 50–100(–150) cm tall; stamens 3–8 _____ **Saururus**

ANEMOPSIS YERBA MANSA

☛ A monotypic genus of the sw US. and Mexico; because of the conspicuous bracts, the inflorescence resembles a single flower. (From the genus name *Anemone* and Greek: *opsi*s likeness or similarity, alluding to the resemblance of the inflorescence to a flower of *Anemone* in the Ranunculaceae)

Anemopsis californica (Nutt.) Hook. & Arn., (of California), YERBA MANSA. Perennial herb with creeping, aromatic rootstocks; stems ca. 30 cm tall; leaves elliptic-oblong, to 15 cm long, with petioles ± as long as blades; inflorescence a dense, terminal spike 1.5–4 cm long, on a scape-like stalk; involucral bracts to 30 mm long, white or reddish; stamens 6(–8); carpels 3; fruits dry, dehiscent. Cultivated and escapes in wet areas; Dallas Co. (R. May, pers. comm.); Edwards Plateau, Trans-Pecos, and Panhandle. May–Jul. According to R. May (pers. comm.), seeds germinate exactly 5 weeks from the day they are put in water.

HOUTTUYNIA

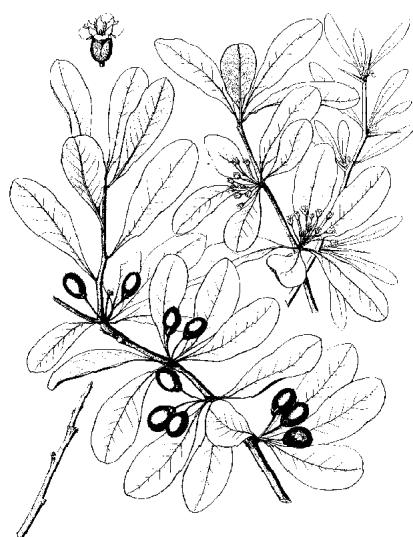
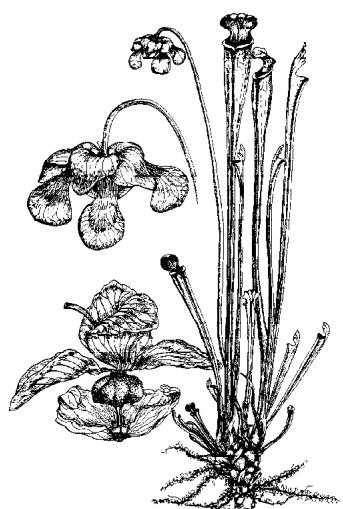
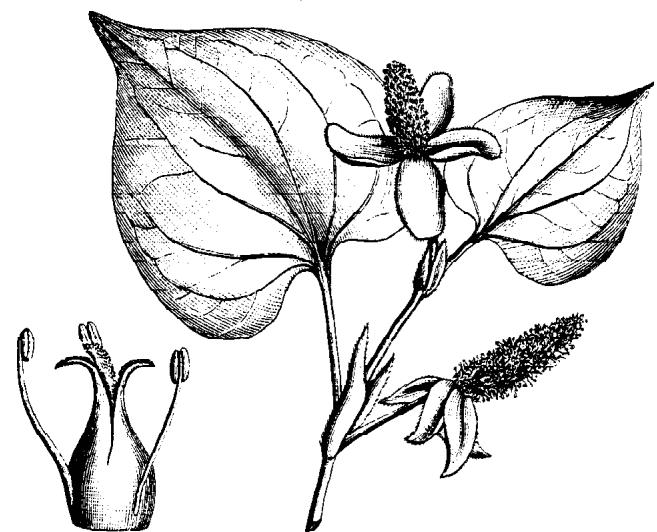
☛ A monotypic genus native from Japan s to mountains of Nepal and Java. (Named for Maarten Houttuyn, 1720–1798, Dutch naturalist and physician at Amsterdam)

Houttuynia cordata Thunb., (heart-shaped), Leaves ovate, basally cordate, 5-nerved from base, gland-dotted; inflorescence to ca. 4 cm long in flower, to 5 cm long in fruit; involucral bracts white, ca. 13 mm long; flowers small; stamens 3; stigmas 3; fruits dry, opening apically. Used as a ground cover, escaping cultivation in Tarrant Co. (Fort Worth Botanic Garden). May–?. Native of e Asia. The shoots are eaten as a vegetable in China (Mabberley 1987).

SAURURUS LIZARD'S-TAIL

☛ A genus of 2 species, 1 e North America, 1 e Asia; this disjunct distribution pattern is discussed under the genera *Campsis* (Bignoniaceae) and *Carya* (Juglandaceae). (Greek: *sauros*, a lizard, and *oura*, a tail, in allusion to the slender tail-like inflorescence)

REFERENCES: Hall 1940; Baldwin & Speese 1949.

*Sapindus saponaria* var. *drummondii* [SA3]*Ungnadia speciosa* [SA3]*Sideroxylon lanuginosum* subsp. *oblongifolium* [SA3]*Anemopsis californica* [ABR, GEO]*Sarracenia alata* [CO1]*Houttuynia cordata* [EN2]

Saururus cernuus L., (nodding), LIZARD'S-TAIL, WATER-DRAGON, SWAMP-LILY. Stems erect, 50–100(–150) cm tall, with well-developed, adventitious roots on lower half of stem; rhizomes long-creeping, aromatic; leaf blades ovate, 5–9 cm wide, cordate basally, usually longer than petioles; inflorescences terminal and/or opposite the leaves, 10–15 mm in diam., erect, the tip often drooping; peduncle 3–8 cm long; flowers small, numerous (to 300 per inflorescence), crowded, whitish; carpels 3–5; fruits somewhat fleshy, ca. 3 mm in diam., indehiscent. In water or muddy soils, swampy areas, oxbow or other lakes, streams; Henderson Co. on e margin of nc TX, also Lamar Co. in Red River drainage, also escaping cultivation in Tarrant Co. (Fort Worth Botanic Garden); se and e TX and Edwards Plateau. May–Aug.

SAXIFRAGACEAE SAXIFRAGE FAMILY

Ours annual or perennial herbs, not succulent; leaves basal or alternate, simple, entire, toothed or lobed; flowers solitary, in panicles, or cymes; sepals 5; petals 5; stamens 5–10; pistils united or partly so; ovary superior or partly inferior; fruit a capsule or follicle-like.

— A medium-sized (660 species in 35 genera), almost cosmopolitan, but especially n temperate and cold area family; most are perennial herbs and many are cultivated as ornamentals. *Ribes*, here treated in the Grossulariaceae, and *Philadelphus*, here treated in the Hydrangaceae, are sometimes placed in the Saxifragaceae. The genus *Penthorum*, here treated in the Crassulaceae, is sometimes put into the Saxifragaceae (e.g., Correll & Johnston 1970; Mahler 1988); other authors have separated it into its own family the Penthoraceae. Saxifragaceae show similarities to Crassulaceae and the two families are thought by some to be related (e.g., Heywood 1993). Saxifragaceae are also apparently related to the Rosaceae. (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: herbs often with a basal rosette and leafless flowering stem; similar to the Rosaceae (e.g., radially symmetrical, 5-merous flowers with separate petals) but *stipules usually absent*; stamens only as many as or twice as many as the petals; carpels fewer than sepals. The somewhat similar Crassulaceae can be distinguished by their typically succulent habit and the usually separate (at least above) carpels of the same number as the sepals.

REFERENCES: Small & Rydberg 1905a; Spongberg 1972; Morgan & Soltis 1993; Soltis et al. 1993; Johnson & Soltis 1995.

1. Flowers in an elongate inflorescence; plants perennial, > 2 cm tall, with basal rosette and erect, leafless, flowering stem; leaves (including petioles) usually much > 8 mm long, not entire, the margins undulate, toothed or lobed.

2. Leaf blades at maturity usually > 3 cm long (to 15 cm), basally cordate; inflorescences to ca. 100 cm tall; fertile stamens 5; ovary 1-celled _____

Heuchera

2. Leaf blades at maturity usually < 3 cm long (to 4 cm, but usually much smaller), abruptly narrowed at base, but not at all cordate; inflorescences to only ca. 20 cm tall; fertile stamens 10; ovary 3–4-celled _____

Saxifraga

1. Flowers solitary; plants annual, very small and inconspicuous, to ca. 2 cm tall; leaves to 8 mm long, entire _____

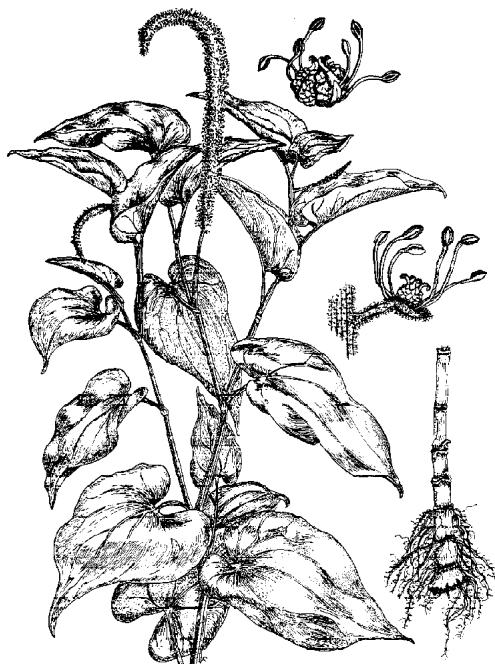
Lepuropetalon

HEUCHERA ALUMROOT

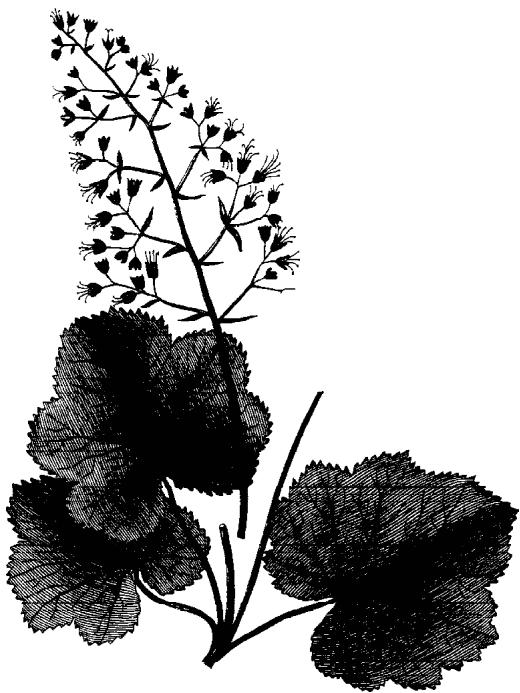
— A North American genus of 55 species; some are cultivated as tufted ground-covers including *H. sanguinea* Engelm. (CORALBELLS) of sw North America. (Named for Johann Heinrich Heucher, 1677–1747, German botanist and professor of medicine)

REFERENCES: Rosendahl et al. 1936; Wells 1984.

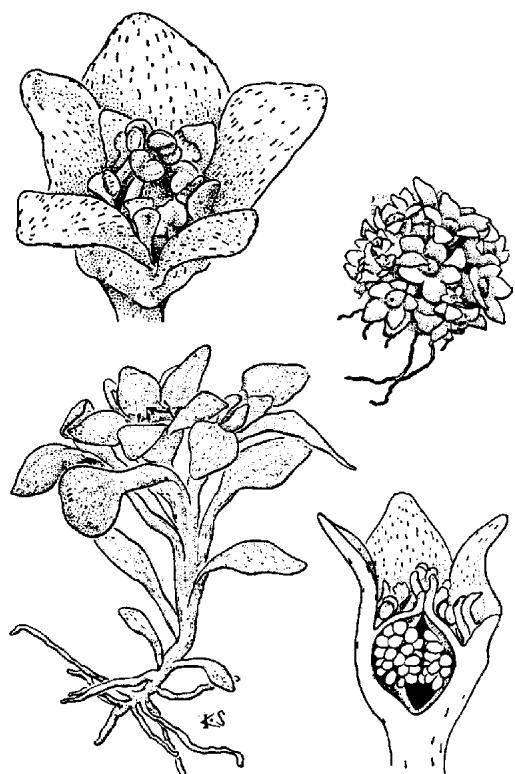
Heuchera americana L., (of America), ALUMROOT. Scapose perennial; leaves basal, long-petiolate; leaf blades suborbicular to ovate, with 6–9 rounded lobules, also toothed, basally cordate; flowering stem leafless, glabrous to with pubescence; panicle glandular-puberulent; flowers ca. 3–5



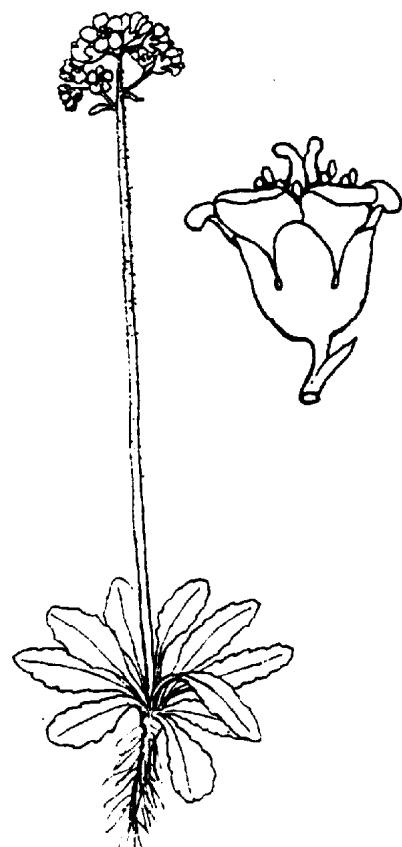
Saururus cernuus [co1]



Heuchera americana [LAM]



Lepuropetalon spathulatum [JAA]



Saxifraga texana [BB2, STE]

mm long; petals greenish to pinkish to purplish; fruit a capsule ca. 3–7 mm long. Woods; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); ne TX. Apr–Jun. [*H. americana* L. var. *brevipetala* Rosend., Butters & Lakela]

LEPUROPETALON

☛ A monotypic genus of the se U.S., Mexico, Chile, and Uruguay; some authorities recognize it as a monotypic family. (Greek: *lepto*, scaly, and *petalo*, petal, from the small, scale-like petals)
REFERENCES: Ward 1987; Ward & Gholson 1987.

Lepuropetalon spathulatum Elliott, (spoon-shaped). Very small, inconspicuous, glabrous, yellow-green annual to 2 cm tall; leaves alternate, 3–8 mm long, oblanceolate or obovate to spatulate, often with reddish glands; flowers solitary, terminal or nearly so; calyx lobes ovate, 1–2 mm long, appearing almost like the leaves; petals minute, white, or apparently absent; stamens 5; fruit a capsule. Damp sand or silt; Fannin, Grayson, Kaufman, and Lamar cos., also Hopkins and Hunt cos. (Ward & Gholson 1987); se and e TX w to ne part of nc TX, also Edwards Plateau. Mar. This species is very inconspicuous and seldom collected; it is one of the smallest terrestrial flowering plants; it is abundant on granite derived soils of the Central Mineral Region just s of nc TX (J. Stanford, pers. comm.).

SAXIFRAGA SAXIFRAGE, ROCKFOIL

☛ A genus of ca. 440 species of the n temperate zone to the arctic, with a few to Thailand, South America, and n African mountains; usually perennial or some annual herbs many of which are cultivated as ornamentals. According to Soltis et al. (1993), molecular data indicate that *Saxifraga* may be polyphyletic, being made up of two phylogenetically well-separated clades. (Latin: *saxum*, a stone, and *frangere*, to break, the name early applied through the Doctrine of Signatures to European species bearing granular bubbles, which were supposed to dissolve kidney stones)

REFERENCE: Gornall 1987.

Saxifraga texana Buckley, (of Texas), TEXAS SAXIFRAGE. Scapose perennial; leaves basal, long-petiolate; leaf blades rhombic- or elliptic-lanceolate to ovate, abruptly narrowed basally, the margins undulate to slightly toothed; flowering stems sparsely to densely pubescent; inflorescence of cymules aggregated into a head-like cluster, sometimes becoming looser at maturity; petals white or pink, 2–3 mm long; carpels partly united, dehiscing along the inner face of each carpel. Prairies or pastures, sandy or blackland soils; Fannin, Hopkins, and Kaufman cos., also Lamar Co. (Carr 1994); se and e TX w to ne part of nc TX. Mar. [*Saxifraga reevesii* Cory]

SCROPHULARIACEAE

FOXGLOVE, FIGWORT, OR SNAPDRAGON FAMILY

Ours annual or perennial herbs; leaves basal, alternate, or opposite, simple or compound, entire, toothed, or lobed; stipules absent; flowers axillary or terminal, solitary or in whorls, spikes, racemes, or panicles; sepals separate or united; corollas nearly radially symmetrical and 4- to 5-lobed, to very bilaterally symmetrical and 2-lipped (= bilabiate); stamens 2, 4 (in some genera there is also a staminode), or rarely 5 and slightly unequal; pistil 2-carpellate; ovary superior; style 1; stigmas 1 or 2; locules mostly 2; capsules many-seeded.

☛ A large (5,100 species in 269 genera), cosmopolitan, but especially temperate and tropical mountain family of mostly herbs with some trees and shrubs. A number of genera are grown as ornamentals including *Antirrhinum* (SNAPDRAGONS), *Calceolaria* (SLIPPER-FLOWERS), *Digitalis* (FOXGLOVE), *Leucophyllum* (e.g. *L. frutescens* (Berland.) I.M. Johnst., TEXAS PURPLE-SAGE, CENIZA),

and *Penstemon* (BEARDTONGUES). *Digitalis purpurea* L., COMMON FOXGLOVE, is also the source of the heart drugs digitalin and digoxin used to treat conditions including congestive heart failure by increasing the force of systolic contractions; its therapeutic use has been traced back to the 10th century; ~~but~~ all parts of the plant are potentially fatally poisonous to humans and animals due to the presence of cardiac glycosides (Morton 1977). Some species of Scrophulariaceae are hemiparasites and can be serious weeds in certain parts of the world (e.g., *Striga*—WITCHWEED). Many scrophs have flowers similar to those of mints; however, the capsular fruits clearly distinguish the Scrophulariaceae. The family also has affinities to the Gesneriaceae (AFRICAN-VIOLET FAMILY) and Bignoniaceae (CATALPA FAMILY). While we are treating it traditionally, according to Reeves and Olmstead (1993) and Olmstead and Reeves (1995), the Scrophulariaceae is polyphyletic; some members of the family as traditionally viewed are in a clade more closely related to the Acanthaceae, Lamiaceae, and Verbenaceae. Reeves and Olmstead (1993) and Olmstead and Reeves (1995) further indicated that the Plantaginaceae and Callitrichaceae are in a clade with some Scrophulariaceae; this would suggest that these families be included in the Scrophulariaceae. The uncertainty seen here in regard to the boundaries of families is indicative of the current dynamic nature of the study of plant evolution driven in part by recent work in molecular systematics. (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: herbs similar to the Lamiaceae (MINTS) (e.g., the usually bilaterally symmetrical, often 2-lipped corollas and stamens usually 2 or 4) but differing in usually having *many-seeded capsule* fruits (versus fruits usually of 4 one-seeded nutlets in the Lamiaceae); the corollas and stamen number distinguish the family from the somewhat similar Solanaceae which has radially symmetrical corollas and 5 stamens.

REFERENCES: Pennell 1920, 1935; Thieret 1967; De-Yuan 1983; Holmgren 1986; Reeves & Olmstead 1993; Olmstead & Reeves 1995.

1. Upper floral bracts colored, conspicuous, red to purple, pink, orange, yellow, or white, nearly concealing the flowers _____ **Castilleja**
1. Upper floral bracts neither conspicuously colored nor concealing the flowers.
 2. Plant a twining vine _____ **Maurandya**
 2. Plant not a twining vine.
 3. Stem leaves alternate or whorled (in circle of 3–7).
 4. Stem leaves whorled _____ **Veronicastrum**
 4. Stem leaves alternate.
 5. Corollas rotate (= more or less flat, without an elongate tube), only slightly bilaterally symmetrical; fertile (= anther-bearing) stamens 5 _____ **Verbascum**
 5. Corollas not rotate (not flat, the tube obvious), strongly bilaterally symmetrical (divided into upper and lower lips); fertile stamens 4.
 6. Corollas with a basal spur; leaves entire in outline (neither deeply parted nor pinnatifid).
 7. Plants glabrous to puberulent OR glandular-pubescent in inflorescences only; leaves ± sessile; inflorescences quite distinct; corollas 8–33 mm long (including 2–17 mm long spur); corolla spur straight or curved.
 8. Corollas pale bluish violet or bluish purple with whitish palate, 8–22 mm long including spur; spur very slender; lower lip of corollas longer than upper; plants annual; capsules 2–3.5 mm long _____ **Nuttallanthus**
 8. Corollas yellow with orangish yellow palate, (19–)25–33 mm long including spur; spur stout; lower lip of corollas shorter than upper; plants perennial; capsules 5–12 mm long _____ **Linaria**
 7. Plants glandular-pubescent nearly throughout; leaves short petiolate, at least below; inflorescences indistinct, the bracts not greatly different from leaves; corollas 4.5–9 mm long (including 1–3 mm long spur); corolla spur straight _____ **Chaenorhinum**
 6. Corollas without a spur; leaves deeply pinnately parted to pinnatifid. _____ **Pedicularis**

3. Stem leaves opposite (bracts subtending flowers may be alternate).
9. Leaf blades pinnatifid, at least on the lower leaves.
10. Corollas either pale lavender OR pink to lavender with purple spots inside throat.
11. Corollas 3–5 mm long, shorter than to scarcely exceeding calyces; calyces 2.8–5.5 mm long; plants small, to only ca. 20 cm tall _____ **Leucospora**
11. Corollas 20–35 mm long, greatly exceeding calyces; calyces 10–16 mm long; plants to 100 cm tall _____ **Agalinis**
10. Corollas yellow.
12. Plants to 2 m tall; upper lip of corollas not hooded; leaves conspicuous on the stem; flowers and fruits loosely arranged with spaces separating them in the inflorescences; widespread in nc TX.
13. Corollas 14–16 mm long; pedicels 1–4 mm long; capsules 6–11 mm long _____ **Dasistoma**
13. Corollas ca. 40 mm long; pedicels 5–14 mm long; capsules 15–20 mm long _____ **Aureolaria**
12. Plants 0.4 m or less tall; upper lip of corollas hooded; leaves mostly basal; flowers and fruits crowded in dense spike-like racemes; in nc TX limited to Red River drainage _____ **Pedicularis**
9. Leaf blades entire or toothed, not pinnatifid.
14. Plants usually mat-forming, rooting at nodes.
15. Calyx lobes or sepals 4; corollas with 4 lobes; fruits somewhat flattened, often with a notch at the tip _____ **Veronica**
15. Calyx lobes or sepals 5; corollas with 5 obvious or obscure lobes, the lobes either part of a 2-lipped corolla or all nearly equal; fruits not flattened, tapering to rounded at the tip, without a notch.
16. Calyx tube shorter than lobes; corollas almost radially symmetrical, white (sometimes with yellow throat), pale blue, or lilac _____ **Bacopa**
16. Calyx tube equal to or longer than lobes; corollas 2-lipped, yellow _____ **Mimulus**
14. Plants erect or nearly so, not rooting at the nodes.
17. Corollas with a small spur (but spur conspicuous when examined closely); corollas 4.5–9 mm long; rare introduced species _____ **Chaenorrhinum**
17. Corollas without a spur; corollas variously sized but often much larger than 9 mm long; native and introduced, often widespread species.
18. Glandular-pubescent annuals; inflorescence a dense spike-like raceme with showy flowers; corollas 20–25 mm long, white or white-lavender; calyx lobes 4, unequal _____ **Bellardia**
18. Plants without the above combination.
19. Flowers sessile (= without any stalk); corollas subsalverform with a very narrow, curved to straight tube 7–15 mm long; inflorescence a terminal spike well-separated from the leaves by a long, nearly naked peduncle _____ **Buchnera**
19. Flowers on pedicels (these may be either conspicuous or short); corollas and inflorescence not as above.
20. Calyx lobes or sepals 4; fruits often but not always with a notch at the tip _____ **Veronica**
20. Calyx lobes or sepals 5 (apparently 7 in *Gratiola* including 2 bractlets); fruits tapering to rounded at the tip, without a notch.
21. Fertile (= anther-bearing) stamens 2; calyces divided to base into separate sepals or nearly so; calyx tube absent or not evident.

22. Corollas blue to lavender; sterile (= without anthers) stamens
2, conspicuous; pedicels without bractlets just below calyces
(calyces of 5 sepals) _____ **Lindernia**
22. Corollas white to pale lavender to yellow; sterile stamens absent or minute; pedicels with 2 bractlets just below calyces (calyces thus appearing to be of 7 sepals) _____ **Gratiola**
21. Fertile (= anther-bearing) stamens 4; calyces divided to base
OR not divided to base; calyx tube absent OR present and well-developed.
23. Plants to only ca. 20 cm tall; most of the leaves in a basal rosette or near the stem base; corollas blue with yellow to white area on lip bordered by reddish brown _____ **Mazus**
23. Plants not as above.
24. Flowers 2–5 in axillary whorls; lower lip of corollas with a keel-like or pouch-like central fold, each half notched at tip, purple with white base _____ **Collinsia**
24. Flowers 1 per leaf or bract axil (bracts can be extremely reduced); lower lip of corollas not as above.
25. Plants 0.6–3 m tall; leaves with well-developed petioles 15–60(–80) mm long; inflorescence a large open panicle of small flowers; corollas 5–10 mm long, brown or reddish brown with pale green _____ **Scrophularia**
25. Plants usually 1 m or less tall (rarely to 2 m); leaves sessile or on petioles to only 25 mm long; inflorescence not as above; corollas 6–60 mm long, variously colored but never brown or reddish brown with pale green.
26. Corollas 10–35 mm long, pink to lavender, purple, blue, red, or rarely white; leaves not glandular-punctate.
27. Calyx segments (= sepals) divided nearly to base; staminode (= sterile 5th stamen) usually conspicuous _____ **Penstemon**
27. Calyx segments united for part (often most) of their length into a tube; staminode absent.
28. Leaf blades or leaf segments usually filiform to linear, sometimes wider; lower lip of corolla without a raised palate, the corolla throat round and open; calyx tube rounded, not 5-angled _____ **Agalinis**
28. Leaf blades ovate-lanceolate to ovate; lower lip of corolla with 2 ridges forming a raised palate that nearly closes the throat of the corolla; calyx tube strongly 5-angled _____ **Mimulus**
26. Corollas 6–12 mm long, yellow or white, often lined with purple; leaves minutely glandular-punctate (use lens) _____ **Mecardonia**

AGALINIS GERARDIA, AGALINIS

Erect annuals frequently blackening upon drying, often hemiparasitic (with green photosynthetic tissues but also parasitizing roots of other plants); leaves opposite or subopposite, sessile,

linear to ovate in outline, entire to auricled to pinnately divided into linear segments; inflorescences racemose or spicate; bracts leafy below, reduced upwards; calyces nearly radially symmetrical; corollas bilaterally symmetrical, weakly bilabiate, pink to purple (rarely white), often with yellow lines and darker purple or red-purple spots in throat; stamens 4, didynamous; filaments pubescent; capsules usually globose or nearly so.

—A genus of 40 species of tropical and warm areas of the Americas; ± parasitic on the roots of other plants. Two nc TX species were previously segregated into the genus *Tomanthera*; all were at one time placed in the no longer recognized genus *Gerardia*. (Greek: *aga*, wonder, and Latin: *linum*, flax; superficially some species thought to resemble flax)

REFERENCES: Pennell 1928, 1929; Canne 1979 [1980], 1980, 1981.

1. Leaf blades ± linear, usually entire (or sometimes lobed at base in *A. heterophylla*); calyces 3–10 mm long, the lobes 0.4–6.5 mm long, linear to subulate, slightly longer to much shorter than the tube; corollas usually with 2 yellow lines within throat; widespread in nc TX.
 3. Calyx lobes as long as or longer than calyx tube, the lobes 3.5–6.5 mm long *A. heterophylla*
 3. Calyx lobes much shorter than calyx tube, the lobes to only 2 mm long *A. fasciculata*
2. Flowering pedicels 4 mm or less long.
 4. Upper lobes of corollas very small, < 1/2 the length of the lower lobes; corollas 23–27 mm long; widespread in East and West cross timbers and Red River drainage; only in sandy soils
A. homalantha
 4. Upper lobes of corollas > 1/2 the length of the lower lobes; corollas 10–23 mm long; in nc TX known only from extreme ne part (Lamar Co.) or extreme s part (Burnet Co.); in various substrates.
 5. Upper corolla lobes reflexed spreading, not arching over the stamens; calyx tube reticulate-venose (use lens or scope); plants not darkening upon drying; known in nc TX only from Lamar Co.
A. gattingeri
 5. Upper corolla lobes arching over the stamens; calyx tube not reticulate-venose; plants often darkening or blackening upon drying; in nc TX known only from Lamar Co. or Burnet Co.
 6. Racemes relatively short, with 3–4 pairs of pedicels; inside of corollas pubescent in a narrow line below the posterior sinus; in nc TX known only from Burnet Co. on extreme s margin of area
A. edwardsiana
 6. Racemes relatively elongated, with more than 4 pairs of pedicels; inside of corollas glabrous below the posterior sinus; in nc TX known only from Lamar Co. in ne corner of area
A. tenuifolia
1. Leaf blades lanceolate to ovate in outline (can be highly divided), either usually with a pair of auricles at base or pinnately divided into linear segments; calyces 10–16 mm long, the lobes 6–10(–13) mm long, ovate to widely lanceolate, longer than the tube; corollas without yellow lines within throat; rare in nc TX.
 7. Leaf blades usually with a pair of lobes (= auricles) at base, otherwise entire; stems between the leaves (= internodes) with numerous long, spreading hairs; corollas 20–25(–27) mm long
A. auriculata
 7. Leaf blades pinnately divided into linear segments; stems retrorsely hispid, but without numerous long, spreading hairs; corollas (23)–25–33 mm long
A. densiflora

Agalinis auriculata (Michx.) S.F. Blake, (eared), EAR-LEAF GERARDIA, EARED FALSE FOXGLOVE. Plant 20–80 cm tall; stems 4-angled; leaf blades lanceolate to ovate-lanceolate, the uppermost basally auricled; calyx lobes 6–9(–12) mm long; corollas 20–25(–27) mm long, pink to purple with dark purple spots, the upper lobes longer; capsules ovoid, 1.0–1.4 cm long. Prairies, open woods; a Reverchon collection is reported for Tarrant Co. (Mahler 1988); supposedly limited in

TX to nc part. Aug–Sep. [*Gerardia auriculata* Michx., *Tomanthera auriculata* (Michx.) Raf.] (TOES 1993: V) 

Agalinis densiflora (Benth.) S.F. Blake, (densely-flowered), FINE-LEAF GERARDIA. Plant to ca. 50(–80) cm tall; leaves with 3–7 narrowly acute, linear divisions; calyx lobes 7–10 mm long; corollas (23–)25–33 mm long, pink to lavender with purple spots; capsules 8–10 mm long. Prairies, dry limestone soils; Cooke, Coryell, Montague, Palo Pinto, Parker, and Tarrant cos., also Brown and Hamilton cos. (Stanford 1971); nc TX w to Rolling Plains and s to Edwards Plateau. Aug–Oct. [*Gerardia densiflora* Benth., *Tomanthera densiflora* (Benth.) Pennell]

Agalinis edwardsiana Pennell, (of the Edwards Plateau), PLATEAU GERARDIA. Plant 40–80 cm tall; stems often with reddish purple coloration; pedicels to 30 mm long; calyx lobes to 0.5 mm long; corollas 20–23 mm long, pinkish to purplish with 2 yellow lines and many small red-purple dots in throat; capsules 6–7 mm long. Thin soils on limestone; Burnet Co. (Balcones Canyonlands National Wildlife Refuge, C. Sexton, pers. comm.); also Travis Co. just s of nc TX; mainly Edwards Plateau; endemic to TX. Aug–Oct. [A. *edwardsiana* var. *glabra* Pennell, *Gerardia edwardsiana* (Pennell) Pennell] 

Agalinis fasciculata (Elliott) Raf., (fascicled, in clustered), BEACH GERARDIA. Plant 40–70(–100) cm tall; pedicels 2–4 mm long at flowering time; calyx tube 3–4 mm long, the lobes acuminate; corollas rose-pink, with 2 yellow lines and many darker purple spots in throat, (16–)20–35 mm long; capsules 4.5–6(–7) mm long. Disturbed areas, woodlands; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); se and e TX w to nc TX. Sep–Oct.

Agalinis gattingeri (Small) Small ex Britton, (for its discoverer, Augustin Gattinger, 1825–1903, TN botanist), GATTINGER'S GERARDIA. Plant to ca. 70 cm tall; calyx lobes to ca. 1.8 mm long; corollas 12–20 mm long, rose-pink with 2 yellow lines and relatively large darker purple spots in throat; capsules 4–5 mm long. Open woods; Lamar Co. in Red River drainage; mainly se and e TX. Sep–Oct. [*Gerardia gattingeri* Small]

Agalinis heterophylla (Nutt.) Small ex Britton, (various-leaved), PRAIRIE AGALINIS. Plant 30–100 cm tall; pedicels 1–3 mm long; calyx tube 3.5–5 mm long, the lobes acute; corollas 20–32 mm long, deep pink to white and lavender-tinged with 2 yellow lines and many small darker purple spots in throat; capsules 5–8 mm long. Prairies or open woodlands; se and e TX w to Bell, Grayson, and Tarrant cos. Jun–Oct. [*Gerardia heterophylla* Nutt.]

Agalinis homalantha Pennell, (smooth- or flat-flowered), FLAT-FLOWER GERARDIA. Plant 40–70 cm tall; pedicels 10–20 mm long in flower, to 30 mm in fruit; calyx tube 3–3.5 mm long, the lobes 1–1.2 mm long; corollas 23–27 mm long, lavender to pink with 2 yellow lines and small darker purple spots in throat; capsules subglobose, 6 mm long. Sandy soils; East and West cross timbers and Red River drainage; also e TX. Aug–Oct. [*Gerardia homalantha* (Pennell) Pennell] /77

Agalinis tenuifolia (Vahl) Raf. var. **leucantha** (Raf.) Pennell, (sp.: slender-leaved; var.: white-anthered), SLENDER GERARDIA. Plant to ca. 50 cm tall; calyx lobes usually < 1(–2) mm long; corollas 10–20(–23) mm long, pink to purplish with 2 yellow lines and darker purple spots in throat; capsules 3–7 mm long. Moist open areas and low woods; Lamar Co. in Red River drainage; mainly e TX. Sep–Nov. [*Gerardia leucantha* Raf., *Gerardia tenuifolia* Vahl var. *leucantha* (Raf.) Shinners] Reputed to be poisonous to cattle and sheep (Burkage 1968). 

Agalinis aspera (Douglas ex Benth.) Britton, (rough), ROUGH GERARDIA, similar to A. *fasciculata* but with the calyx lobes acute to obtuse or nearly rounded, is reported by Hatch et al. (1990) for vegetational areas 4 and 5 (Fig. 2). **Agalinis caddoensis** Pennell, (presumably for the Caddo Lake area on the LA–TX border), STIFF-LEAF GERARDIA, reported from vegetational area 4 (Fig. 2) by Hatch et al. (1990), is similar to A. *tenuifolia* but differs in the upper corolla lobes spreading and

not arching over the stamens. We have seen no TX material of these 2 species; nor did Correll and Johnston (1970). Jones et al. (1997) did not list *A. caddoensis* occurring in TX.

AUREOLARIA FALSE FOXGLOVE, OAKLEECH

—A genus of 10 species of the e U.S. with 1 in Mexico; mostly hemiparasitic on Fagaceae, but sometimes on Ericaceae. (Greek: *aureo*, golden, in reference to the striking yellow flowers)
REFERENCES: Pennell 1928; Canne 1980.

Aureolaria grandiflora (Benth.) Pennell var. **serrata** (Torr. ex Benth.) Pennell, (sp.: large-flowered; var.: serrate, saw-toothed), DOWNY OAKLEECH. Erect perennial to 1.5 m tall, hemiparasitic (with green photosynthetic tissue but also parasitizing the roots of other plants); leaves opposite; lower leaf blades ovate in outline, pinnatifid; upper leaf blades abruptly smaller than lower; bracts serrate to entire, oblong, acute; inflorescence a raceme; pedicels slender, 5–14 mm long in fruit; calyx lobes linear to lanceolate, essentially entire; corollas weakly bilabiate, yellow, ca. 4 cm long and quite showy; stamens 4, didynamous; capsules glabrous, ovoid, 1.5–2 cm long. Sandy open woodlands; Cooke, Fannin, Grayson, and Montague cos. in Red River drainage, also Tarrant (Fort Worth Nature Center), and Parker cos., also collected at Dallas by Reverchon (Mahler 1988); se and e TX w to nc TX. May–Aug. Reported to be poisonous (Burlage 1968). ☣ 79

Variety *cinerea* Pennell, (ashy-gray), with upper leaf blades gradually smaller than the lower, bracts entire to shallowly serrate, lanceolate, acuminate-attenuate, and pedicels stout, 5–9 mm long in fruit—is also cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2); we have seen no nc TX material.

BACOPA WATER-HYSSOP

Perennial low herbs of wet areas, succulent; leaves opposite, entire, sessile; flowers axillary, 5-merous; corollas campanulate, slightly bilaterally symmetrical; stamens 4. (Presumed to be a South American aboriginal name)

—A genus of 56 species of warm areas, especially the Americas. Some are cultivated in aquaria or used medicinally.

REFERENCE: Pennell 1946.

1. Leaves 1-nerved, narrowed to wedge-shaped or narrow non-clasping base; pedicels with 2 linear bracts just below calyces, much exceeding the subtending leaves; flowers solitary per node _____ **B. monnieri**
1. Leaves palmately many-nerved, not so narrowed basally and ± clasping; pedicels without bracts, usually shorter than the subtending leaves; flowers usually 2–4 per upper node _____ **B. rotundifolia**

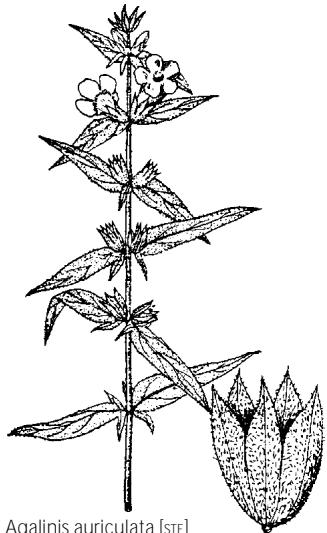
Bacopa monnieri (L.) Pennell, (for Louis Guillaume le Monnier, 1717–1799, French botanist, physician, and student of Jussieu), COASTAL WATER-HYSSOP. Plant mat-forming, fleshy, glabrous; leaves spatulate, to ca. 20 mm long, essentially entire; pedicels to 25 mm long; corollas white to pale blue or lilac, 8–10 mm long; capsules 5–7 mm long, shorter than sepals. In low wet areas, ditches, streams; Bell Co., apparently rare in nc TX; scattered in e 1/2 of TX. Apr–Sep.

Bacopa rotundifolia (Michx.) Wettst., (round-leaved), DISC WATER-HYSSOP. Plant mat-forming, on mud or floating; leaves suborbicular to ovate, to 35 mm long; pedicels to 20 mm long; corollas white with yellow throat, 6–10 mm long; capsules ca. as long as sepals. Mud and water of lakes and streams; Denton Co., apparently rare in nc TX; widespread in TX. May–Nov.

BELLARDIA

—A monotypic genus native to the Mediterranean. (Named for C.A.L. Bellardi, 1740–1826, Italian botany professor, Turin)

REFERENCES: Lipscomb & Ajilvsgi 1982; Do et al. 1996.



Agalinis auriculata [STE]



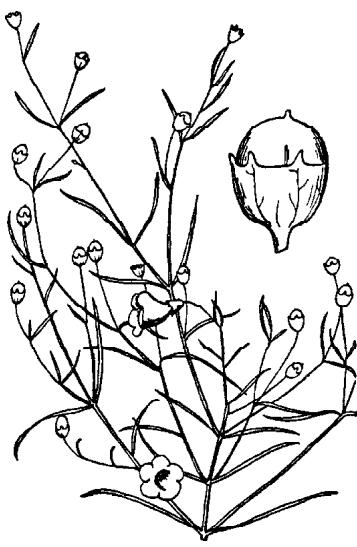
Agalinis densiflora [BB2]



Agalinis edwardsiana [HEA]



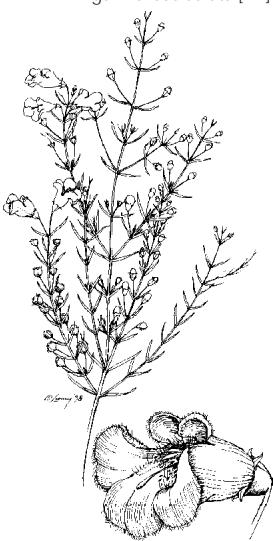
Agalinis fasciculata [BB2]



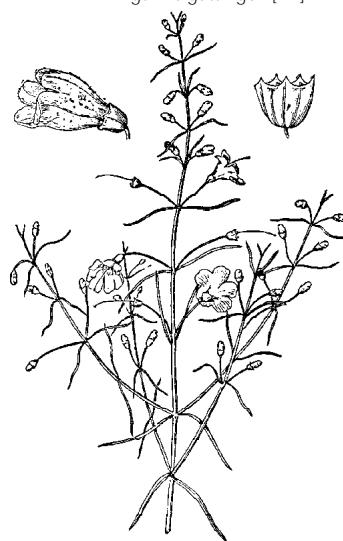
Agalinis gattingeri [BB2]



Agalinis heterophylla [BB2]



Agalinis homalantha [HEA]



Agalinis tenuifolia [GLE]



Aureolaria grandiflora var. serrata [BB2]

Bellardia trixago (L.) All., (Latin for germander—*Teucrium* in the Lamiaceae). Erect, usually glandular-pubescent annual 15–70 cm tall; stems unbranched below; leaves opposite; leaf blades linear to linear-lanceolate, 15–90 mm long, 1–15 mm wide, broadly and coarsely toothed; flowers in a terminal, bracteate, dense, spike-like raceme; calyces 8–10 mm long, the lobes 4, unequal, obtuse; corollas 20–25 mm long, white-lavender or white, conspicuous, the lower lip longer; capsules subglobose. Roadsides, open fields, and pastures, often in sandy soils; first collected in TX in Navarro Co. in 1980 (Lipscomb & Ajilvsgi 1982); now also known in nc TX from Henderson, Hill, Kaufman, Limestone, and Milam cos. (Do et al. 1996), also Ellis, Johnson, and Tarrant cos. (R. O'Kennon pers. obs.); other scattered localities are now known further s and e of nc TX; all other known U.S. populations are in California. Apr–May. A recent Old World invader of nc TX. ☿

BUCHNERA BLUEHEARTS

☛ A genus of ca. 100 species of warm areas; 16 are native to the New World; hemiparasitic. (Named for Johann Gottfried Büchner, 1695–1749, German botanist)

Buchnera americana L., (of America), AMERICAN BLUEHEARTS, FLORIDA BLUEHEARTS. Low, slender, scabrous-pilose perennial, hemiparasitic (with green photosynthetic tissues but also parasitizing the roots of other plants); stems erect, usually simple, to ca. 80 cm tall; leaves opposite or subopposite, sessile; leaf blades elliptic to linear-lanceolate, to 10 cm long, entire or with a few coarse teeth, dark green, blackening in drying, the larger prominently 3-ribbed; flowers in terminal, nearly naked spikes; corollas deep purple to lavender-pink or violet (rarely white), subsalverform, unequally 4-lobed, the lobes 3–8 mm long, the tube 7–15 mm long, straight or curved; capsules 5–7 mm long. Sandy soils, prairies, open woods, wet areas; Cooke, Erath, Grayson, Henderson, Lamar, Milam, and Montague cos.; se and e TX w to nc TX, also Edwards Plateau and Trans-Pecos. [*B. floridana* Gand.] Reported as apparently [hemip]parasitic on the roots of other plants (Ajilvsgi 1979).

CASTILLEJA INDIAN PAINTBRUSH, PAINTBRUSH, PAINTEDCUP

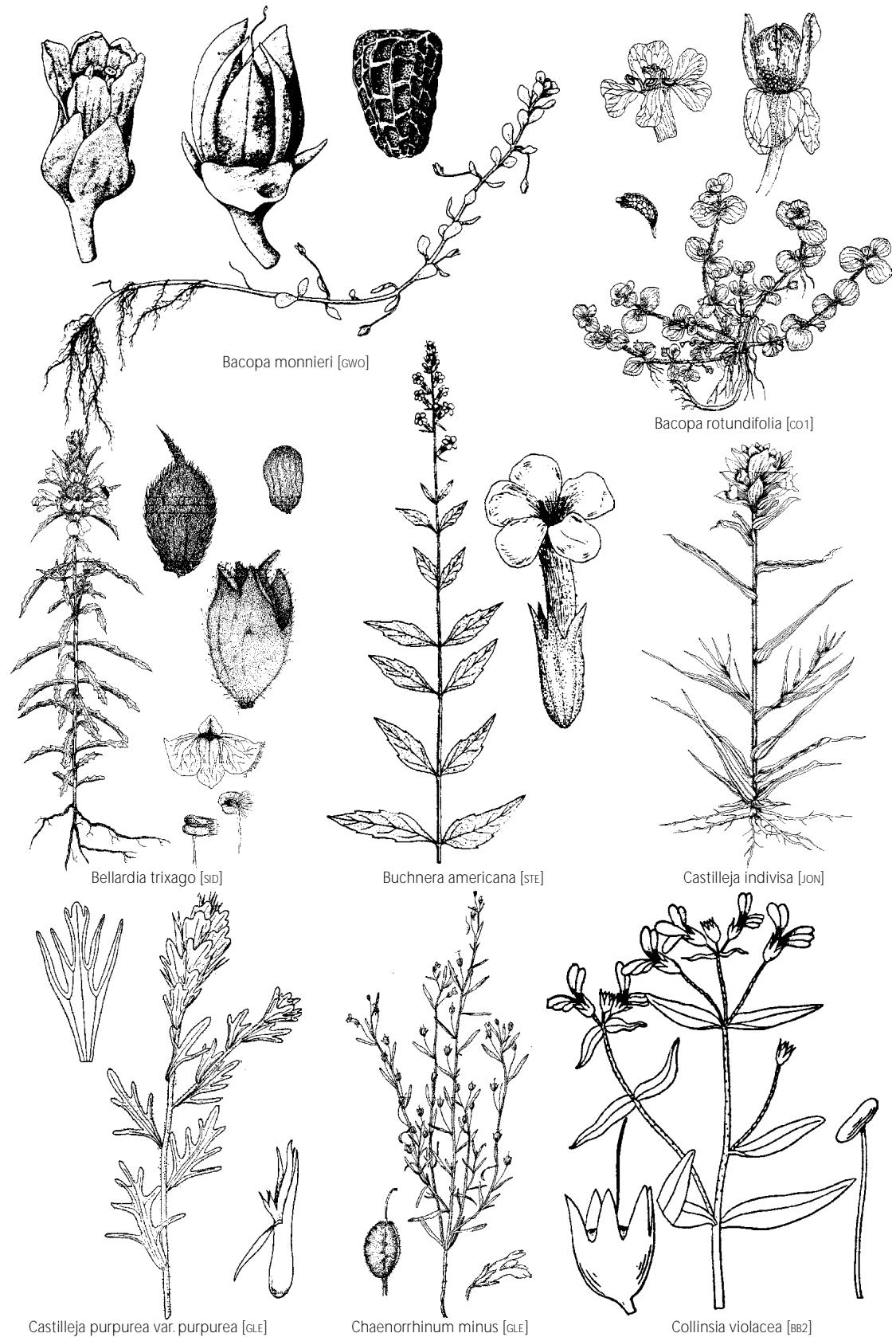
Low, pubescent annuals or perennials, hemiparasitic (with green photosynthetic tissues but also parasitizing the roots of other plants); leaves alternate, sessile or subsessile, narrow and entire or with narrow lobes; flowers in terminal, leafy-bracted spikes; upper floral bracts with the terminal portion colored, more conspicuous than the corollas; calyces narrowly tubular, colored at least at tip; corollas inconspicuous, narrow, 2-lipped, the upper lip long, slender, and hooded, the lower lip short and 3-lobed; stamens 4, didynamous; seeds numerous.

☛ A genus of 200 species mainly of w North America but some in e North America, Eurasia, Central America, and the Andes. Interspecific hybridization is well known in the genus and has contributed to its taxonomic complexity (Egger 1994 [1995]). According to Crosswhite (1983), *Castilleja* species are obligately hemiparasitic. ☠ Some species concentrate selenium and can have levels that cause poisoning in animals (Crosswhite 1983). The large populations and bright colors make the PAINTBRUSHES some of the most showy wildflowers in nc TX. (Named in 1781 for Domingo Castillejo, 18th century Spanish botanist at Cadiz)

REFERENCES: Nesom 1992a; Egger 1994 [1995].

1. Bracts with conspicuous lateral lobes: plants perennial, with woody root; tips of bracts and calyces purplish pink, purplish red, purple, red, orange, brownish orange, yellowish orange, bright yellow, or greenish yellow (rarely white); leaves with long, narrow lobes. **C. purpurea**
1. Bracts entire or with very short lobes near the apex: plants annual, with slender taproot; tips of bracts and calyces orange-red to bright red (very rarely light yellow); leaves (except lowest) entire. **C. indivisa**

Castilleja indivisa Engelm., (undivided), TEXAS PAINTBRUSH, ENTIRE-LEAF PAINTBRUSH. Very



rarely a light yellow individual is seen in a large population of orange-red or red individuals; corollas 20–28 mm long, the hood 6–9 mm long. Sandy or occasionally silty open woods, prairies, disturbed areas; se and e TX w to East Cross Timbers; now widely seeded by the Texas Highway Department. Apr-May. Austin (1975) considered this species adapted for pollination by ruby-throated hummingbirds (*Archilochus colubris*). It is reported to concentrate selenium on certain soils (Crosswhite 1980). /82

Castilleja purpurea (Nutt.) G. Don, (purple), PRAIRIE INDIAN PAINTBRUSH, PRAIRIE PAINTBRUSH, PURPLE PAINTBRUSH. Bracts and calyces very variable in terms of color; corollas 25–40 mm long, the hood 9–13 mm long. A variable species with the following 3 varieties in nc TX.

1. Tips of bracts and calyces bright lemon yellow to greenish yellow; lower lip of corollas ca. 3–7 mm long; w and s parts of nc TX _____ var. **citrina**
1. Tips of bracts and calyces usually ranging from purplish pink to purplish red, purple, red, orangish red, brownish orange, or yellowish orange (rarely lighter); lower lip of corollas ca. 1.5–3(–4) mm long; widespread in nc TX.
2. Tips of bracts and calyces yellowish orange to brownish orange, orangish red, or red; extreme s part of nc TX _____ var. **lindheimeri**
2. Tips of bracts and calyces usually purplish pink to purplish red or purple (rarely lighter); widespread in nc TX _____ var. **purpurea**

var. **citrina** (Pennell) Shinners, (*Citrus*—citron- or lemon-colored), YELLOW PAINTBRUSH, CITRON INDIAN PAINTBRUSH, LIPPED INDIAN PAINTBRUSH, CITRON PAINTBRUSH, LEMON PAINTEDCUP, LEMON PAINTBRUSH. Rocky or sandy soils; West Cross Timbers w to Rolling Plains and s to Edwards Plateau. Apr-May. This variety exhibits less color variation than the other two (Nesom 1992a). /82

var. **lindheimeri** (A. Gray) Shinners, (for Ferdinand Jacob Lindheimer, 1801–1879, German-born TX collector), LINDHEIMER'S INDIAN PAINTBRUSH, LINDHEIMER'S PAINTBRUSH. Calcareous gravelly, sandy or clay soils; Lampasas Cut Plain and s Blackland Prairie s to s TX; according to Nesom (1992a), in nc TX this variety occurs only in the s part of the area in Bell, Burnet, Lampasas, and Williamson cos; endemic to TX. Mar-May. Nesom (1992a) suggested that the color variation within this taxon is a subset of that in var. *purpurea*; however, he further indicated there is an apparent abrupt geographic transition between the two and they can thus be justifiably maintained as weakly delimited varieties. Based on field observations, J. Stanford (pers. comm.) indicated that this is a clearly distinct PAINTBRUSH. 

var. **purpurea**, PURPLE PAINTBRUSH. This variety is extremely variable in color; while the tips of bracts and calyces are predominantly purplish pink to purplish red or purple, they vary within a single population to red, reddish orange, burnt orange, peach, light yellow, creamy, and rarely white (Nesom 1992a). Limestone outcrops or prairies; Blackland Prairie w to West Cross Timbers and s to Central Mineral Region. Mar-May. In McCulloch Co., just s of nc TX, 17 color variants have been collected in less than 1/2 mile (J. Stanford, pers. comm.). /82

In some areas, such as the se corner of Montague Co., varieties *citrina* and *purpurea* occur together at the edge of their ranges and numerous colors are present from white to many different undescribed color phases as a result of apparent interbreeding in this vicinity (Mahler 1988).

While the above two *Castilleja* species are quite distinct morphologically and even in different sections of the genus, in nc TX (e.g., Coryell and Hill cos.) hybrids are known between them with introgression and character convergence (Nesom 1992a; Egger 1994 [1995]); hybrids are also known from Grayson Co.

CHAENORRHINUM DWARF-SNAPDRAGON

 A genus of 21 species of the Mediterranean area including cultivated ornamentals. Similar to

Linaria but differing in the capsule opening by narrow apical pores. (Greek: *chainen*, to gape, and *rhis*, snout, alluding to the open-mouthed flowers)

REFERENCES: Fernandes 1972; Arnold 1981a, 1981b; Widrlechner 1983; Diggs et al. 1997.

Chaenorhinum minus (L.) Lange, (lesser, smaller), SMALL-SNAPDRAGON, DWARF-SNAPDRAGON. Erect, glandular-pubescent, often branched annual herb with stems to 40 cm tall; leaves opposite below to opposite or alternate above; leaf blades linear to oblong-lanceolate, 5–20(–35) mm long, 1–3(–8) mm wide, entire; flowers in terminal, indistinct, bracteate racemes; pedicels conspicuous, 3–20 mm long in fruit; calyx lobes 2–5 mm long, linear, obtuse; corollas 4.5–9 mm long, pale lavender or lilac with yellow palate, with tube and 2-lipped limb, with a straight, ± cylindrical spur 1–3 mm long; stamens 4; capsules 3–6 mm long, dehiscing by irregular terminal pores. Roadsides, along railroads; a European weed moving w from the e U.S.; known in Texas only from Fannin (Taylor & Taylor 10570, 1972) and Grayson (Diggs 5748 1994) cos. (Diggs et al. 1997). May–Jul. [*Linaria minor* (L.) Desf.] This species was first reported (as *Linaria minor*) in the U.S. from New Jersey in 1874 (Martindale 1876). Widrlechner (1983) indicated that seeds were probably introduced in ship's ballast. Railroads are important in the dispersal of a number of introduced plants (Mühlenbach 1979) and *C. minus* seems an excellent example; Widrlechner (1983) noted that this species, "... has not been found in counties or census districts lacking railroads at the time of introduction to the corresponding state or province." Exclusion experiments showed that the species is capable of self-pollination (Arnold 1981b). ☰

COLLINSIA BLUE-EYED-MARY

⌚ A genus of ca. 20 species of North America, especially the w U.S.; some are cultivated as ornamentals. (Named for Zaccheus Collins, 1764–1831, Philadelphia botanist)

REFERENCE: Newsom 1929.

Collinsia violacea Nutt., (violet), VIOLET COLLINSIA. Minutely pubescent annual 5–35(–60) cm tall; stem leaves opposite, sessile, oblong- or ovate-lanceolate, entire or shallowly toothed; floral bracts often whorled; flowers 2–5 in axillary whorls, rather long-pedicelled (pedicels 6–14 mm long, to 25 mm in fruit); corollas bilabiate, showy, 9–13 mm long; lower lip of corollas large, with keel-like or pouch-like central fold, purple with white base, the halves each notched at tip; upper lip of corollas short, white with purple edge and yellow basal protuberance; stamens 4, didynamous, staminode gland-like; capsules globose, 4–5 mm long. Sandy open woods or open ground; Post Oak Savannah w to East Cross Timbers. Mar–May.

DASISTOMA MULLEIN SEYMERIA, MULLEIN FOXGLOVE

⌚ A monotypic genus of the se U.S.; hemiparasitic (with green photosynthetic tissues but also parasitizing the roots of other plants). (Greek: *dasy*, hairy, and *stoma*, mouth, referring to the pubescent corolla)

REFERENCES: Pennell 1928; Piehl 1962.

Dasisotoma macrophylla (Nutt.) Raf., (large-leaved), MULLEIN SEYMERIA, MULLEIN FOXGLOVE. Perennial to 2 m tall, hemiparasitic on roots of *Aesculus* and other taxa (e.g., *Ulmus americana*) through usually disc-like haustoria (Piehl 1962); stems pubescent above; leaves opposite; leaf blades ovate, 15–35 cm long, 8–22 cm wide, the lower pinnately divided, the upper pinnatifid to toothed or entire; flowers in elongated leafy spike-like racemes, weakly bilabiate; pedicels 1–4 mm long; corollas yellow, 14–16 mm long, pubescent inside; stamens 4, strongly didynamous; capsules globose, ca. 6–11 mm long. Woods along streams and rivers; Dallas and Grayson cos.; also e TX. Jun–Sep. [Seymeria macrophylla Nutt.] ☰/86

GRATIOLA HEDGE-HYSSOP

Small, erect, annual or perennial herbs mainly of wet areas; leaves opposite, sessile, narrowly ovate to oblong-lanceolate, entire or slightly toothed; flowers axillary; corollas bilabiate, 5-lobed, white to pale lavender or yellow; fertile stamens 2; capsules many-seeded.

☛ A genus of ca. 20 species of temperate areas and tropical mountains. (Latin: *gratia*, grace, favor, or thanks, from supposed medicinal properties)

1. Corollas golden to orange-yellow; capsules ca. 2 times as long as calyx lobes; stems < 10 cm tall, not fleshy _____ **G. flava**
1. Corollas white, pale lavender to honey-colored or pale yellow, sometimes with yellowish tube; capsules ca. same length as calyx lobes; stems usually > 10 cm tall, thick and fleshy.
 2. Stems glabrous or minutely glandular-puberulent; plants annual (rarely biennial); flowers and fruits pedicellate (pedicels short to long); calyx lobes equal or essentially so (do not confuse with 2 bractlets just below calyx); corollas much longer than calyces.
 3. Pedicels of upper flowers usually 1–5(–8) mm long, shorter than the sepals and adjacent leaves; plants glabrous _____ **G. virginiana**
 3. Pedicels of upper flowers 8–25 mm long, longer than the sepals and soon exceeding adjacent leaves; plants minutely glandular-puberulent _____ **G. neglecta**
 2. Stems with long, spreading pubescence; plants perennial; flowers and fruits subsessile or with very short pedicels; calyx lobes distinctly unequal; corollas only slightly longer than calyces _____ **G. pilosa**

Gratiola flava Leavenw., (yellow), GOLDEN HEDGE-HYSSOP. Annual; leaves linear-ob lanceolate, to 15 mm long and 5 mm wide; corollas ca. 12 mm long, the limb golden yellow, the tube orange-yellow. Prairies and fields, sandy soils; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); se and e TX w to nc TX. Feb–Apr.

Gratiola neglecta Torr., (neglected, overlooked), YELLOW-SEED HEDGE-HYSSOP. Annual to 40 cm tall; leaves rhombic-lanceolate to lanceolate; corollas to 8–12 mm long, the limb white, creamy white, pale yellow, or pale lavender, the tube yellowish. Muddy shores, damp ground, or shallow water; Bell and Lamar cos, also Dallas Co. (Mahler 1988); mainly e TX. Apr–early Jun.

Gratiola pilosa Michx., (with long soft hairs), SHAGGY HEDGE-HYSSOP, HAIRY HEDGE-HYSSOP. Perennial to 75 cm tall; stems square; leaves ovate-lanceolate to elliptic-ovate; flowers subsessile; corollas white or lavender-tinged, 5–9 mm long. Wet areas; Henderson Co. near e margin of nc TX, also collected by Reverchon at Dallas (La Réunion); se and e TX w to nc TX. Apr–Aug.

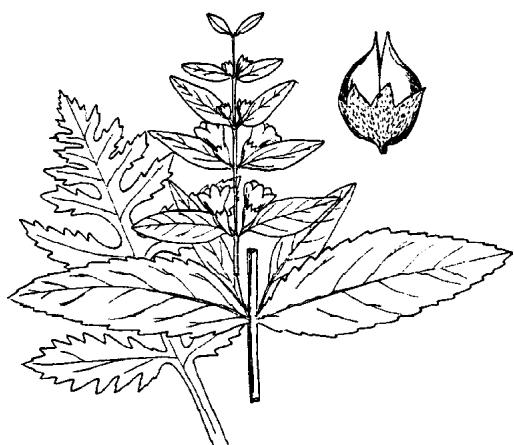
Gratiola virginiana L., (of Virginia), VIRGINIA HEDGE-HYSSOP. Annual (rarely biennial); base of stems fleshy; leaves lanceolate or elliptic, undulate to sharply serrate; corollas to 15 mm long, white with purplish lines. Muddy shores, damp ground, or shallow water; Grayson Co., also Tarrant Co. (Mahler 1988); se and e TX w to nc TX. Apr–May. Reported to be poisonous to cattle (Burlage 1968). ☣

LEUCOSPORA NARROW-LEAF CONOBEA

☛ A New World genus sometimes considered monotypic (e.g., Correll & Johnston 1970; Mabberley 1987) or as having ca. 4 species (Henrickson 1989) including the 2 in the genus *Schistophragma* it is sometimes lumped with *Stemodia*, a genus of ca. 55 species (Mabberley 1997). Further work on generic circumscription in this complex appears needed. (Greek: *leukos*, white, and *spora*, seed)

REFERENCE: Henrickson 1989.

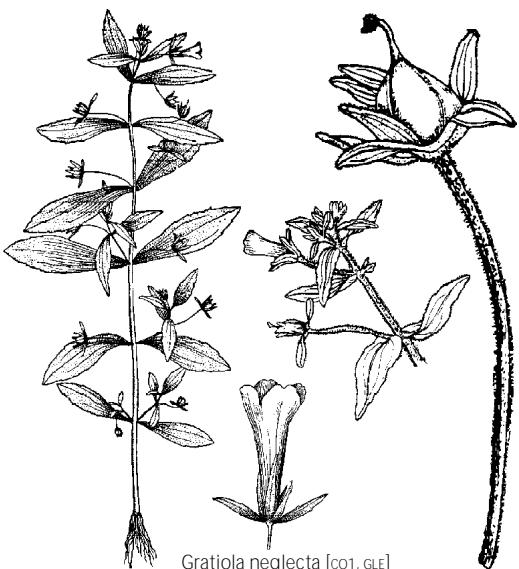
Leucospora multifida (Michx.) Nutt., (many times parted), NARROW-LEAF CONOBEA. Low, annual, simple to much-branched herb, 10–15(–20) cm tall; leaves opposite, petioled, triangular-ovate in



Dasistoma macrophylla [STE]



Gratiola flava [co1]



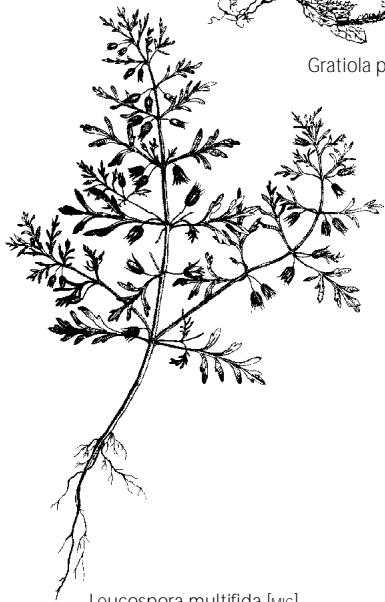
Gratiola neglecta [co1, GLE]



Gratiola pilosa [co1]



Gratiola virginiana [co1]



Leucospora multifida [MIC]

outline, pinnately to bipinnately parted, 1–3 cm long; flowers 5-merous, single or in pairs in the leaf axils, on pedicels 5–10 mm long; corollas pink or pale lavender, 3–5 mm long, tubular, shorter than to barely exceeding calyces; stamens 4, didynamous; capsules ovoid, 3.5–4.5 mm long. Low wet areas, city weed; e 1/2 of TX. Jun-Oct. [*Capraria multifida* Michx., *Conobea multifida* (Michx.) Benth., *Stemodia multifida* (Michx.) Spreng.]

LINARIA TOAD-FLAX, SPURRED-SNAPDRAGON

— An Old World, primarily temperate, especially Mediterranean genus of 150 species (Sutton 1988); some are used medicinally, others as ornamentals. (From genus *Linum*, FLAX, from the flax-like leaves of some species)

REFERENCES: Munz 1926; Sutton 1988.

Linaria vulgaris Mill. (common), BUTTER-AND-EGGS, COMMON TOAD-FLAX. Strong-scented rhizomatous perennial; stems erect or ascending, 0.3–0.6(–1.3) m tall; leaves alternate or subopposite below, numerous, linear or narrowly linear-lanceolate, 2.5–6 cm long, 2–6(–15) mm wide, subsessile, not clasping; racemes crowded, spike-like; pedicels 1–4 mm long; corollas 2-lipped, yellow with orangish yellow palate, (19–)25–33 mm long including 8–17 mm long spur; spur 2–3 mm wide at base. Cultivated and escaping; Hood (reported as an escape near Center Mills) and Tarrant cos., also Johnson Co. (R. O'Kennon, pers. obs.); in TX reported only from nc part of the state. May. Native of Europe and Asia. Suspected of being poisonous; the glucoside, linariin, is present (Burlage 1968). ☣ ☈

LINDERNIA FALSE PIMPERNEL

— A genus of 80 species of warm areas, especially the Old World. (Named for Franz Balthasar von Lindern, 1682–1755, German botanist and physician)

Lindernia dubia (L.) Pennell var. **anagallidea** (Michx.) Cooperr. (sp.: doubtful; var.: resembling *Anagallis*—pimpernel in the Primulaceae), CLASPING FALSE PIMPERNEL. Small glabrous annual 9–20(–30) cm tall; leaves opposite, to 20 mm long, 3–5-nerved; lowest leaves narrow-based, subsessile; middle and upper sessile, slightly clasping; flowers solitary in axils of leaves or the upper merely bracted, long-pedicelled; pedicels to 25 mm long, 1–3 times as long as the subtending leaf; corollas ca. 7–9 mm long, pale lavender, pale blue, or white with lavender tube; capsules ca. 4–5 mm long. Mud flats, wet ground, or shallow water; Grayson and Tarrant cos., also Dallas (R. O'Kennon, pers. obs.) and Lamar (Carr 1994) cos.; se and e TX w to Edwards Plateau and Plains Country. Late May–Oct. [*Lindernia anagallidea* (Michx.) Pennell] Because of the lack of consistent characters, Holmgren (1986) suggested var. *anagallidea* should possibly be lumped with var. *dubia*.

MAURANDYA

— A genus of 4 species of the sw U.S. and Mexico (Elisens 1985); sprawlers or vines with coiling petioles; sometimes cultivated. They are sometimes (e.g., Mabberley 1987) treated in *Asarina* (16 species, mostly in North America, 1 in Europe) (Named for Catherina Pancratia Maurandy, 18th century botany professor, Cartagena, Spain)

REFERENCES: Munz 1926; Elisens 1985; Sutton 1988.

Maurandya antirrhiniflora Humb. & Bonpl. ex Willd. (with flowers like *Antirrhinum*—snapdragon), SNAPDRAGON-VINE, SNAPDRAGON MAURANDELLA, VINE BLUE-SNAPDRAGON, VIOLET TWINING-SNAPDRAGON. Extensively twining, much-branched, glabrous, herbaceous, perennial vine; leaves subopposite to generally alternate; leaf blades hastate to sagittate, 15–25 mm long, the margins entire, on petioles 10–30 mm long; flowers solitary in axils, on pedicels 10–30(–47) mm long; corollas bilabiate, 20–25 mm long, the tube pale, the lobes violet to bluish to purple

(rarely whitish), the lower lip swollen, often with yellowish or whitish area; stamens 4; capsules ca. 6 mm long. Disturbed, sandy, and rocky areas; Burnet Co. (Elisens 1985) near s edge of nc TX, also Fort Hood (Bell or Coryell cos.—Sanchez 1997); also Travis Co. just s of nc TX; mainly s part of TX and Trans-Pecos. Feb–Oct. [*Asarina antirrhiniflora* (Humb. & Bonpl. ex Willd.) Pennell] While Kartesz (1994) recognized this taxon in the monotypic genus *Maurandella* [as *M. antirrhiniflora* (Humb. & Bonpl. ex Willd.) Rothm.], we are following Elisens (1985) and Jones et al. (1997) in treating it in *Maurandya*. Elisens (1985) gave detailed justification. ☒/99

MAZUS

☛ A genus of 10–15 species of mat-forming groundcovers native from Asia to Australia. (Greek: *mazos*, breast, from the swelling in throat of corolla)

Mazus pumilus (Burm. f.) Steenis, (dwarf). Low herb 5–20 cm tall from a basal rosette; leaves opposite, obovate to spatulate, with a few coarse teeth; inflorescence a loose few-flowered raceme; pedicels 4–7 mm long; corollas bilabiate, 7–10 mm long, blue with lower lip yellowish or whitish with reddish brown margins; stamens 4; capsules 3–4 mm long, shorter than calyces. Lawns, weedy areas, roadsides; Dallas Co., also Tarrant Co. (R. O'Kennon, pers. obs.); mainly se and e TX. Mar–Oct. Native of Asia. [*M. japonicus* (Thunb.) Kuntze] ☒

MECARDONIA WATER-HYSSOP

Perennial herbs, glabrous, often drying black; stems 4-angled; leaves opposite, toothed, glandular-punctate; flowers axillary; bractlets 2, at base of pedicel, shorter than floral bracts; flowers 5-merous; corollas bilabiate; capsules many-seeded.

☛ A genus of 10 species of warm areas of the Americas. (Named in 1794 for De Antonio de Meca et Cardona who gave the land for the botanical garden to the Royal College of Surgery of Barcelona)

1. Corollas white, often tinged or lined with purple; 3 outer sepals lanceolate; largest leaves usually
 > 25 mm long _____ **M. acuminata**
1. Corollas yellow; 3 outer sepals ovate; largest leaves usually < 25 mm long _____ **M. procumbens**

Mecardonia acuminata (Walter) Small, (tapering to a long narrow point), PURPLE MECARDONIA, SAW-TOOTH WATER-HYSSOP. Stems erect to ascending, to ca. 70 cm long; leaves oblanceolate, serrate above middle, 20–40 mm long; pedicels equal to or exceeding the subtending leaves; outer sepals usually < 2 times as wide as inner; corollas 7–10 mm long. Low wet areas; prairies, swamps, and pinelands; Bell and Grayson cos.; se and e TX w to nc TX, also Edwards Plateau. Aug–Oct.

Mecardonia procumbens (Mill.) Small, (prostrate), PROSTRATE MECARDONIA, PROSTRATE WATER-HYSSOP, STALKED WATER-HYSSOP. Stems procumbent to erect-ascending, often branched from base, to ca. 40 cm long; leaves ovate to obovate, 10–25 mm long, serrate above middle; pedicels usually much exceeding the subtending leaf; outer sepals usually > 3 times as wide as inner; corollas yellow with dark veins, 6–12 mm long. Low wet areas or in water; Bell Co.; widespread in TX. Mar–Nov. [*Mecardonia vandelliooides* of authors, not (Kunth) Pennell]

MIMULUS MONKEY-FLOWER

Ours perennial, rhizomatous or stoloniferous herbs, glabrous or nearly so; leaves opposite; flowers axillary, 5-merous; corollas bilabiate; stamens 4, didynamous; anthers with sacs divergent; capsules cylindric, many-seeded.

☛ A genus of 150 species of the Americas, s Africa, and Asia; many are cultivated as ornamentals. (Diminutive of Latin: *mimus*, mime, buffoon, or comic, from the face-like corollas of some species) REFERENCE: Grant 1924.

1. Corollas blue, lavender, or white, 20–28 mm long; plants erect; leaf blades to 5–15 cm long, cuneate to tapering at base; calyx teeth equal or nearly so _____ **M. alatus**
1. Corollas yellow, 8–16 mm long; plants creeping and rooting at lower nodes to decumbent; leaf blades to 7 cm long, usually much less, rounded to cordate at base; calyx teeth unequal, one tooth larger than the others _____ **M. glabratus**

Mimulus alatus Aiton, (winged), SHARP-WING MONKEY-FLOWER. Stems erect, 30–70(–100) cm tall, 4-angled, the angles ± winged; leaves broadly ovate to ovate-lanceolate, to 6 cm wide, serrate, petiolate; pedicels 2–8 mm long, to 14 mm in fruit; calyces 11–18 mm long; corollas often with lighter spots on lower lip, the palate nearly closing throat; stamens included; capsules 8–11 mm long. Low wet areas; Collin, Dallas, Fannin, Grayson, and Hunt cos., also Lamar Co. (Carr 1994); se and e TX w to Blackland Prairie. Jun–Nov.

Mimulus glabratus Kunth, (rather smooth, without hairs), ROUND-LEAF MONKEY-FLOWER. Stems weak, to 75 cm long, terete, hollow; leaves broadly ovate to suborbicular, to 6 cm wide, dentate, long-petiolate below to subsessile above; pedicels 10–40 mm long; calyces to 10 mm long; corollas sometimes with red brown spots, the tube slender. Low wet areas or in water; mainly Edwards Plateau and Trans-Pecos. Apr–May.

1. Corollas 12–16 mm long; calyces becoming 10–13 mm long _____ var. **glabratus**
1. Corollas 8–12 mm long; calyces becoming 5–11 mm long _____ var. **jamesii**

var. **glabratus**. Dallas and Williamson cos., also Somervell Co. (Mahler 1988). Jones et al. (1997) did not list this variety for TX.

var. **jamesii** (Torr. & A. Gray ex Benth.) A. Gray, (for Edwin James, 1797–1861, surgeon-naturalist, first botanical collector in CO and first known botanical collector in TX, with Major Long's expedition to the Rocky Mts. in 1819–1820), FREMONT'S MONKEY-FLOWER. Burnet Co.; also Bell Co. (Mahler 1988). [*M. glabratus* var. *fremontii* (Benth.) A.L. Grant, *M. jamesii* Torr. & A. Gray ex Benth.]

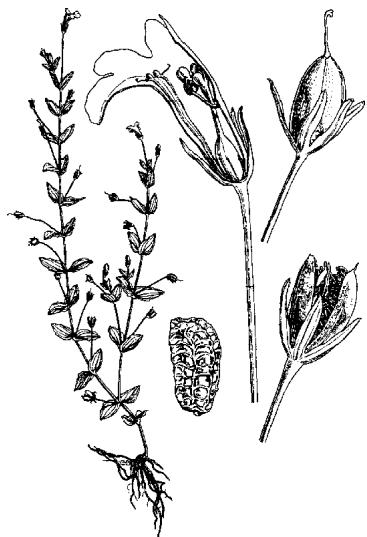
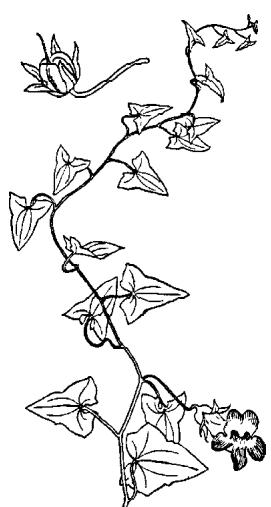
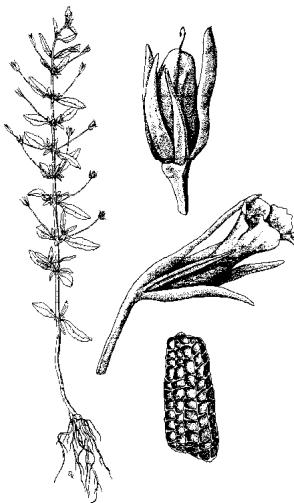
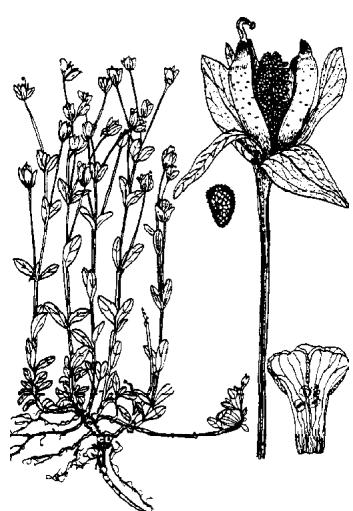
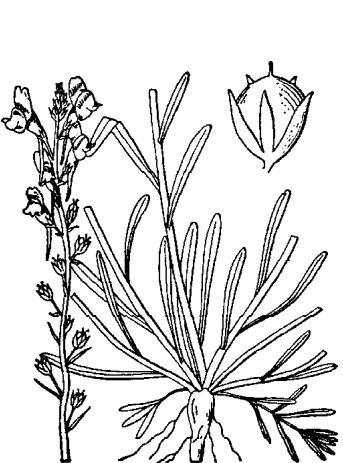
NUTTALLANTHUS TOAD-FLAX

Slender annuals or biennials to 70 cm tall, ± glabrous; leaves alternate or subopposite, subsessile, linear, entire; flowers in terminal, spike-like racemes; corollas 2-lipped, with slender, basal, usually curved spur, light lavender-blue with whitish palate.

—A genus of 4 species native to North and w South America; it has often been lumped into *Linaria* (Holmgren 1986; Wetherwax 1993). We, however, are following the recent treatment by Sutton (1988) who segregated *Nuttallanthus* (also Kartesz 1994). Seeds viewed under a strong lens or dissecting scope are helpful for definitive identification. (Named for Thomas Nuttall, 1789–1859, British-born botanist, ornithologist, and collector in w North America)
REFERENCES: Munz 1926; Kral 1955; Sutton 1988.

1. Corollas 8–11(–13) mm long, including 2–3.5 mm spur, the lower lip 2–6 mm long; seeds with low, entire longitudinal ridges, the intervening faces ± smooth or with sparse, low tubercles _____ **N. canadensis**
1. Corollas 14–22 mm long, including 6–11 mm spur, the lower lip 6–11 mm long; seeds densely tuberculate, without longitudinal ridges (use strong lens) _____ **N. texanus**

Nuttallanthus canadensis (L.) D.A. Sutton, (of Canada), OLDFIELD TOAD-FLAX, TOAD-FLAX. Capsules 2–3 mm long. Sandy open woods; Dallas Co., also Comanche-Eastland Co. line, McLennan, and Navarro cos. (Kral 1955); apparently rare in nc TX; se and e TX w to nc TX and Edwards Plateau. Mar–Apr. [*Linaria canadensis* (L.) Chaz.]

*Linaria vulgaris* [REE]*Lindernia dubia* var. *anagallidea* [MAS]*Maurandya antirrhiniflora* [BR2]*Mazus pumilus* [GWO]*Mecardonia acuminata* [GWO]*Mecardonia procumbens* [CO1]*Mimulus alatus* [GWO]*Mimulus glabratus* var. *jamesii* [BB1]*Nuttallanthus canadensis* [BB2]

Nuttallanthus texanus (Scheele) D.A. Sutton, (of Texas), TEXAS TOAD-FLAX, TOAD-FLAX. Capsules 2.5–3.5 mm long. Sandy open woods, old fields, and roadsides; widespread in TX, but mainly in e 2/3. Mar–May. This is the common TOAD-FLAX in nc TX. *Nuttallanthus texanus* has sometimes been treated as a variety of *N. canadensis* (e.g., Holmgren 1986; Wetherwax 1993). [*Linaria canadensis* var. *texana* (Scheele) Pennell, *L. texana* Scheele]

PEDICULARIS LOUSEWORT, WOOD-BETONY

— A n hemisphere genus of 350+ species with 1 in the Andes; alkaloid-containing hemiparasites (with green photosynthetic tissues but also parasitizing the roots of other plants). At one time LOUSEWORTS were presumed to become lice on sheep coming into contact with them—hence the common name. (Greek: *pediculus*, louse; the presence of these plants in pastures was thought to cause sheep or cattle to become infested with lice)

REFERENCES: Sprague 1962; Piehl 1963.

Pedicularis canadensis L., (of Canada), COMMON LOUSEWORT, EARLY LOUSEWORT, EARLY FERN-LEAF LOUSEWORT, WOOD-BETONY. Perennial herb 10–30(–40) cm tall; leaves mostly basal, pinnately parted to pinnatifid, fern-like in appearance, 4–15 cm long, 8–25(–50) mm wide; inflorescence a short (3–5 cm long), dense, spike-like raceme, later elongating; calyces 7–9 mm long; corollas yellowish, sometimes with lavender, 18–25 mm long, bilabiate, the upper lip hooded; capsules 12–16 mm long. Woods; Fannin (Talbot property) and Lamar cos. in Red River drainage; ne TX. Mar–May. Hemiparasitic on the roots of at least 80 species in 35 families; connections to the host are made by specialized enlargements of the parasite root known as haustoria (Piehl 1963). Jones et al. (1997) treated all TX material of this species as *P. canadensis* subsp. *canadensis* var. *dobbsii* Fernald. Reported to be poisonous to sheep (Burlage 1968). ☣

PENSTEMON BEARDTONGUE

Ours low to rather tall perennials; leaves opposite, toothed or entire, the lower petioled, the upper gradually reduced and sessile, sometimes clasping; flowers in terminal, narrow or spike-like panicles; corollas asymmetrical, distinctly 2-lipped to not so, with cylindrical basal tube, widened limb, and 5 rounded lobes, often quite showy, white to pink, lavender, or red, often with darker lines (= nectar-guides); fertile stamens 4, of 2 lengths; staminode (= sterile stamen) prominent and often bearded; seeds numerous in capsule.

— A genus of 250 species of perennial herbs and shrubs of North America with 1 species in ne Asia. Many are showy and cultivated as ornamentals. The common name is derived from the bearded staminode. Crosswhite and Crosswhite (1981) considered *Penstemon* the largest endemic genus of flowering plants in North America. They indicated that 40 of the species are red-flowered and emphasized the geographic correlation between the distribution of red-flowed Penstemons and hummingbirds in w North America. In hummingbird-pollinated species, sucrose-rich nectars are found, while in insect-pollinated species, the nectar is hexose-rich (Mabberley 1997). (Greek *pente*, five, and *stemon* stamen, the fifth stamen being present and conspicuous, although infertile and thus a staminode—5 stamens are unusual in the Scrophulariaceae whose flowers typically have either 2 or 4 stamens).

REFERENCES: Straw 1966; Crosswhite & Crosswhite 1981.

1. Flowers (except uppermost) borne on axillary or lateral branchlets (these sometimes short).

2. Corollas 35–60 mm long, widely inflated; sepals densely glandular-pubescent, 7–16 mm long;
flowering branchlets mostly shorter than flowers _____

P. cobaea

2. Corollas 34 mm or less long, narrow to moderately inflated; sepals glabrous or sparsely glandular-pubescent, 2–8 mm long; flowering branchlets mostly becoming nearly as long as the flowers or longer.

3. Staminode (= sterile 5th stamen) densely covered with yellow-orange hairs for more than half its length (for 8–10 mm), usually prominently exserted; stems usually puberulent near base; floor of corollas prominently pleated (folded with 2 ridges); corollas gradually enlarging from base _____ **P. laxiflorus**
3. Staminode usually sparsely covered with whitish or yellowish hairs in terminal 1/3, included or reaching the opening of the corolla but not exserted; stems glabrous or nearly so near base; floor of corollas not pleated or only slightly so; corollas gradually enlarging from base OR narrow in basal 1/3 and abruptly enlarged above.
4. Corollas usually 20–33 mm long, straight and cylindrical in basal 1/3, abruptly enlarged above; sepals 5–7 mm long; mid-stem leaves lanceolate, 15–25 mm wide _____ **P. digitalis**
4. Corollas 15–20(–23) mm long, gradually enlarging from base; sepals 2–4 mm long; mid-stem leaves broadly elliptic to elliptic lanceolate, 20–40 mm wide _____ **P. tubaeformis**
1. Flowers whorled or opposite, on the primary axis of the inflorescence.
5. Corollas white, lavender, pink, rose OR red with white throat with red lines; upper leaves broad, sessile, clasping, but not united around stem.
6. Inflorescences and stems completely glabrous; leaf blades thick and fleshy, glaucous.
7. Corollas 35–50 mm long; plants usually 0.5–1.2 m tall; sepals 7–11 mm long at flowering time _____ **P. grandiflorus**
7. Corollas 14–23(–28) mm long; plants 0.6 m or less tall; sepals 4.5–7 mm long at flowering time _____ **P. fendleri**
6. Inflorescences and stems with pubescence; leaf blades neither thick nor fleshy, not glaucous.
8. Stem leaves entire or sparsely and irregularly toothed; corollas 1.3–2 cm long, white or nearly so, sometimes with a few colored lines; basal and lower leaves linear, < 6 mm wide; sepals 5–7 mm long _____ **P. guadalupensis**
8. Stem leaves conspicuously toothed; corollas 3–3.5 cm long, lavender to pink or rose OR red with white throat with red lines; basal and lower leaves lanceolate or oblanceolate, > 6 mm wide; sepals 8–11 mm long _____ **P. triflorus**
5. Corollas red; upper leaves united around stem _____ **P. murrayanus**

Penstemon cobaea Nutt., (named for the showy-flowered tropical American genus *Cobaea* (Polemoniaceae) which was named for a Jesuit Father, Bernardo Cobo, 1572–1659, Spanish missionary and naturalist in Mexico and Peru), WILD FOXGLOVE, FOXGLOVE, FALSE FOXGLOVE, COBEEA PENSTEMON, BALMONY. Plant 20–50(–65) cm tall, finely and densely pubescent; leaf blades ovate-elliptic to ovate or obovate, sharply toothed or rarely subentire, those at mid-stem usually 25–50 mm wide; calyx lobes lanceolate to lance-ovate; corollas broad, white to light or deep lavender with red-purple lines inside, extremely showy. Limestone prairies and rock outcrops, sandy open woods; mainly Blackland Prairie w to Rolling Plains and Edwards Plateau, also s to coastal plain. Apr–May. One of the most striking wildflowers in nc TX. ☒/102

Penstemon digitalis Nutt. ex Sims, (of the finger, possibly from the flowers being somewhat like the finger of a glove, or from resemblance to flowers of the genus *Digitalis*—foxglove), SMOOTH PENSTEMON, BEARDTONGUE, SMOOTH BEARDTONGUE. Plant (25–)50–90 cm tall; leaf blades entire to rather finely and sharply toothed; calyx lobes lance-ovate to ovate; corollas pure white except sometimes with faint reddish purple lines, with glandular hairs outside; terminal 6–8 mm of staminode with whitish to yellowish, usually sparse hairs. Low open places in woods, fields, and on roadsides; Dallas and Grayson cos; e TX w to nc TX. May–Jun. ☒/102

Penstemon fendleri Torr. & A. Gray, (for August Fendler, 1813–1883, one of the first botanists to collect in New Mexico and Venezuela), FENDLER'S PENSTEMON, PURPLE FOXGLOVE. Plant 15–60 cm tall, glabrous, glaucous; leaf blades entire, those below the inflorescence 10–30 mm wide; sepals

4–7 mm long; corollas 14–20 mm long, lavender, usually lined inside. Rocky or sandy prairies and roadsides; Navarro Co., also Brown Co. (HPC); mainly w 1/2 of TX w of nc TX. Apr–May.

Penstemon grandiflorus Nutt., (large-flowered), LARGE BEARDTONGUE. Plant (35–)60–100(–120) cm tall, glabrous, glaucous; leaf blades entire, those at mid-stem 25–50 mm wide; corollas lavender (rarely white), inflated. Edge of sandy woods; Wise and Callahan cos. in West Cross Timbers; scattered in w 1/2 of TX; more common in n Great Plains. Apr–May. [*Penstemon bradburii* Pursh]

Penstemon guadalupensis A. Heller, (of the Guadalupe), GUADALUPE PENSTEMON. Plant 25–35 cm tall, puberulent; leaf blades linear to lanceolate, 2–10(–18) mm wide; corollas white or nearly so, sometimes with a few colored lines; staminode with a few white hairs. Calcareous soils; Comanche Co. in sw part of nc TX, also Brown Co. (HPC herbarium); endemic to e Edwards Plateau and sw part of nc TX. Mar–May. ↗

Penstemon laxiflorus Pennell, (loose-leaved), BEARDTONGUE. Plant 30–75 cm tall; leaf blades usually toothed to entire, those at mid-stem 4–17 mm wide; sepals lance-ovate to ovate; corollas 17–30 mm long, narrow, lavender or lavender pink to almost white, lined internally with reddish purple nectar guides, with glandular hairs outside; terminal 8–10 mm of staminode densely bearded. Sandy open woods and prairies; se and e TX w to West Cross Timbers and Edwards Plateau. Apr–May. [*P. australis* Small subsp. *laxiflorus* (Pennell) D.E. Bennett] While this taxon has often been treated as *P. australis* subsp. *laxiflorus* (e.g., Kartesz 1994; Jones et al. 1997), we are following J. Kartesz (pers. comm.) in recognizing it at the species level.

Penstemon murrayanus Hook., (for Johann Andreas Murray, 1740–1791, Swedish pupil of Linnaeus and Professor of Medicine and Botany Göttingen), CUP-LEAF PENSTEMON. Plant 50–200 cm tall, glabrous; leaves perfoliate; leaf blades entire, thickened, glaucous, 25–50 mm wide; corollas ca. 30 mm long, bright red (may dry yellowish). Sandy open woods; Henderson Co., also Ellis Co. (Mahler 1988); mainly se and e TX w to e part of nc TX, also Edwards Plateau. Apr–May. Exceedingly showy. Pollinated by hummingbirds (Pennell in Crosswhite & Crosswhite 1981).

Penstemon triflorus A. Heller subsp. *integripolius* Pennell, (sp.: three-flowered; subsp.: entire-leaved). Plant 30–65 cm tall, puberulent; middle stem leaves with blades toothed, (10–)15–30 mm wide; corollas lavender to pink or rose or red with white throat with red lines; staminode lightly bearded in terminal one-half with yellow hairs. Calcareous soils; Callahan, Coleman, and Burnet cos. in sw part of nc TX; endemic to Edwards Plateau and sw part of nc TX. Apr–May. [*Penstemon helleri* Small] ↗

While we are following Kartesz (1994) and Jones et al. (1997) in lumping *P. helleri*, J. Stanford (1976, pers. comm. 1998) indicated that *P. helleri* may deserve specific recognition; he suggested it and *P. triflorus* occur together and are sometimes confused. These two can be separated as follows (modified from Stanford 1976):

1. Corollas lavender to pink or rose; staminode lightly bearded with yellow hairs for half its length _____ *P. helleri*
1. Corollas red (throat white with red lines); staminode glabrous _____ *P. triflorus*

Penstemon tubaeformis Nutt., (with trumpet-shaped flowers), TUBE PENSTEMON. Plant 25–100 (150) cm tall, glabrous; leaf blades usually entire to obscurely serrate; calyx lobes lance-ovate to ovate; corollas white, unlined internally, with glandular hairs; terminal 3–4 mm of staminode with sparse yellowish hairs. Open to wooded areas; Lamar Co. in Red River drainage; mainly e TX. May–Jun.

SCROPHULARIA FIGWORT

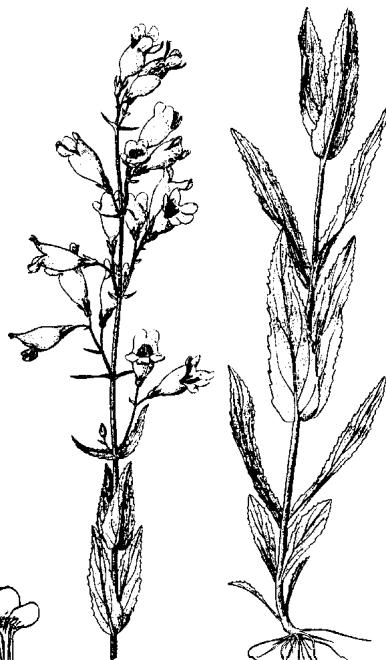
—A genus of 200 species native from the n temperate zone to the American tropics; some are used medicinally or cultivated as ornamentals. (Latin: *scrofula* disease characterized by swell-



Nuttallanthus texanus [ABR]



Pedicularis canadensis [co1]



Penstemon cobaeanus [STE]



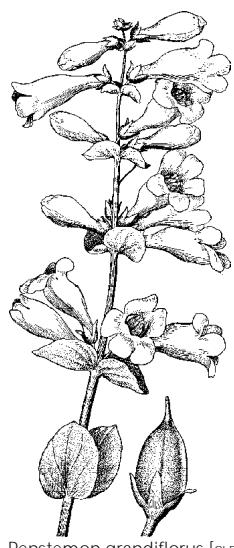
Penstemon digitalis [STE]



Penstemon fendleri [WE]



Penstemon laxiflorus [BT3]



Penstemon grandiflorus [GLE]



Penstemon guadalupensis [FMC]

ing of the neck glands; so called because by the Doctrine of Signatures, the fleshy bulbs on the rhizomes of some species were supposed to cure the disease)

Scrophularia marilandica L., (of Maryland), CARPENTER'S-SQUARE, MARYLAND FIGWORT. Robust herbaceous perennial with square stems to 2(-3) m tall; leaves opposite, simple; leaf blades lanceolate to ovate, 8-15(-20) cm long, 3-7(-10) cm wide, sharply toothed; petioles 1.5-5(-8) cm long; inflorescence a large panicle of small flowers; flowers bilabiate; corollas 5-10 mm long, brown or reddish brown with pale green; fertile stamens 4; staminode brown or brownish purple; capsules 4.5-7 mm long with numerous seeds. Rich woods, thickets; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); ne TX. Jul-Sep.

VERBASCUM MULLEIN

Erect biennials; leaves sessile or the lowest with winged-petiolar bases; flowers in terminal, bracted spikes or narrow racemes, open at night and in the morning; corollas with short tube and rotate limb, slightly bilaterally symmetrical, the upper 2 lobes slightly shorter than lower 3; stamens 5; capsules with numerous seeds.

—A genus of ca. 360 species mainly of Eurasia with a few to the Ethiopian and e African highlands; some are cultivated as ornamentals; others are used as fish poisons. The seeds of some have been known to germinate after 100 years. (Classical Latin name for these plants)

1. Flowers long-pedicelled, the pedicels 10-20(-25) mm long; corollas yellow to white, often with purplish center; stem leaves oblong- to ovate-lanceolate, toothed or shallowly lobed, glabrous or with few glandular, non-branched hairs _____ **V. blattaria**
1. Flowers subsessile; corollas yellow; stem leaves oblanceolate to elliptic or obovate, entire or subentire, densely felty-woolly, the hairs stellate or dendritic-branched _____ **V. thapsus**

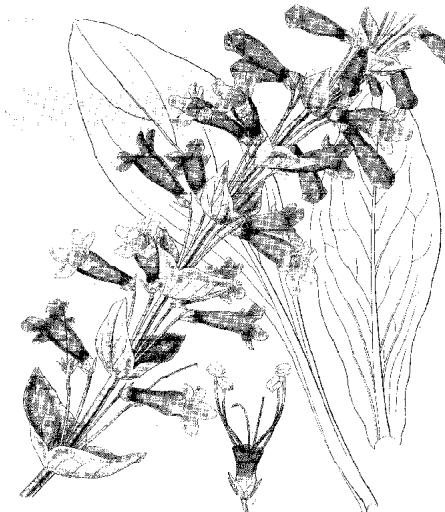
Verbascum blattaria L., (name used by Pliny, pertaining to a moth), MOTH MULLEIN. Plant 0.5-1.5 m tall, glandular-pubescent above, glabrate below; leaves to 20 cm long, reduced upward, upper partly clasping; corollas 20-30 mm across; capsules glabrous or glandular-pubescent. Roadsides and waste areas; Dallas and Grayson cos., also Lamar (Mahler 1988) and Somervell (R. O'Kennon, pers. obs.) cos; mainly e TX. May-Jun, rarely later. Native of Eurasia. Reported to be poisonous (Burlage 1968). ☣

Verbascum thapsus L., (classical name, from ancient Thapsus), COMMON MULLEIN, FLANNEL MULLEIN, FLANNEL-PLANT, FLANNEL-LEAF, INDIAN-TOBACCO, JUPITER'S-STAFF, VEILLET-DOCK, COWBOY'S-TOILET-PAPER. Plant stout, 0.7-2 m tall, conspicuously and densely grayish felty-woolly due to stellate or dendritic-branched hairs; leaves to 50 cm long; rosette leaves largest, reduced upwards; stem leaves sessile, decurrent; corollas 12-30(-35) mm across; capsules densely tomentose with stellate or dendritic-branched hairs. Roadsides, pastures, and waste areas; nearly throughout TX. May-Jul, rarely later. Native of Eurasia. The dense coating of hairs is particularly interesting under a lens or dissecting scope. The leaves are used medicinally, including in the form of cigarettes for treating asthma (Mabbberley 1987). ☣

VERONICA SPEEDWELL

Annuals or perennials; leaves mostly opposite or the upper leaves/bracts alternate; flowers axillary or in terminal racemes, bracted; calyces deeply 4-parted; corollas light blue, lavender, or white, unequally 4-lobed; stamens 2; capsules often with an apical notch and rather heart-shaped.

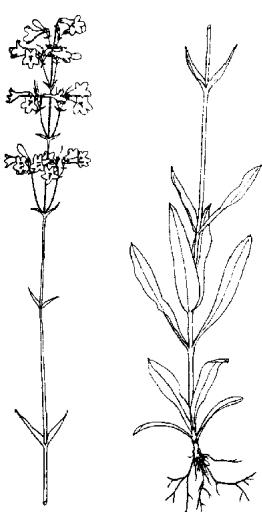
—A genus of ca. 180 species (J. Thieret, pers. comm.) mainly of the n temperate zone with a few on tropical mountains and in s temperate zone. Six of the 7 species occurring in nc TX are



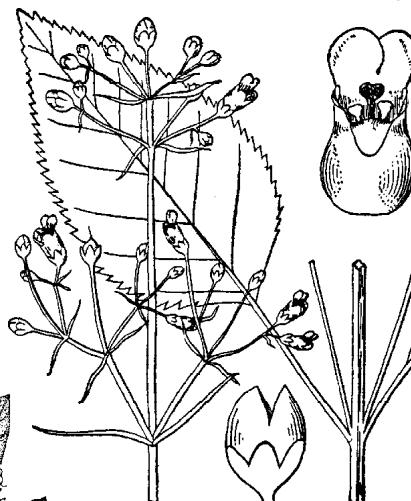
Penstemon murrayanus [CUR]



Penstemon triflorus [FMC]



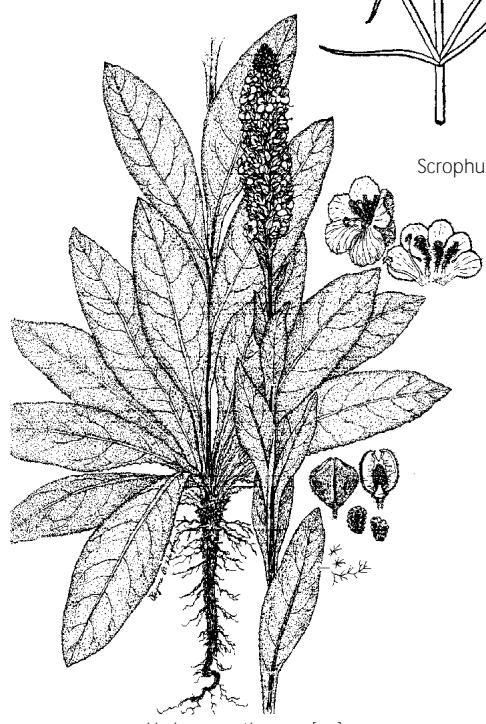
Penstemon tubaeformis [STE]



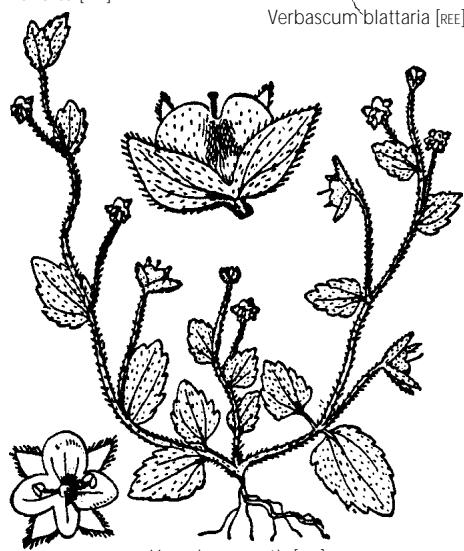
Scrophularia marilandica [BB2]



Verbascum blattaria [REE]



Verbascum thapsus [REE]



Veronica agrestis [BB2]

weedy Old World natives. (Named for St. Veronica, popularly thought to be from Latin: *vera*, true, and Greek: *eikon*, image or picture; an early Christian legend picturing St. Veronica, pitying Christ on the way to Calvary, wiping his face with her handkerchief which received a miraculous true image of his features)

REFERENCES: Pennell 1921; Thieret 1955; Walters & Webb 1972.

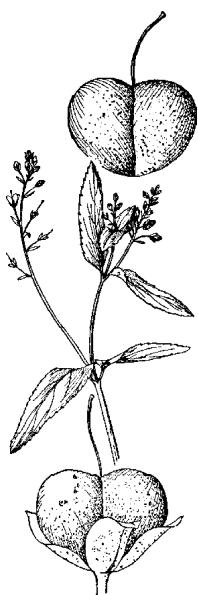
1. Flowers in axillary, peduncled racemes; leaves always opposite.
 2. Leaves all ± short-petioled; racemes 6–30-flowered _____ ***V. americana***
 2. Leaves, at least the upper ones on flowering stems, sessile and clasping; racemes often with more than 30 flowers _____ ***V. anagallis-aquatica***
1. Flowers in terminal racemes OR solitary in the axils of leaves; upper leaves/bracts alternate.
 3. Flowers sessile or very short-pedicelled (pedicels 0.5–2 mm long, shorter than the calyces), in racemes with the subtending leaves/bracts much reduced or modified and at least the uppermost very different from regular leaves; fruiting pedicels much shorter than subtending leaf/bract.
 4. Flowers white; stem leaves (except lowest) sessile, their blades narrowly oblong or oblanceolate, usually > 2 times as long as wide _____ ***V. peregrina***
 4. Flowers light blue or lavender-blue; stem leaves (except uppermost) short-petioled, their blades ovate or oblong-ovate, usually < 2 times as long as wide _____ ***V. arvensis***
 3. Flowers long-pedicelled (pedicels usually 5–30 mm long, longer than the calyces), solitary in the axils of leaves similar to regular stem leaves (except somewhat smaller); fruiting pedicels somewhat shorter to much longer than subtending leaf.
 5. Corollas relatively large, 8–12 mm across, much exceeding calyces, blue; pedicels much exceeding leaves, 15–30 mm long; 2 lobes of capsule spreading outward _____ ***V. persica***
 5. Corollas inconspicuous, 6 mm or less across, only slightly exceeding calyces, blue or white; pedicels shorter than or slightly exceeding leaves, 5–15 mm long; 2 lobes of capsule erect, not spreading.
 6. Corollas all blue; capsules with long glandular hairs and short eglandular hairs; style exceeding notch in capsule _____ ***V. polita***
 6. Corollas white with a blue or pink upper lobe; capsules sparsely glandular-hirsute only; style not exceeding notch in capsule _____ ***V. agrestis***

Veronica agrestis L., (of or pertaining to fields), WAYSIDE SPEEDWELL. Very similar to *V. polita* and distinguished primarily by characters in key (following Walters & Webb 1972). Included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); they, however, lump *V. polita* in *V. agrestis*. Holmgren (1986) also lumped the 2 species. *Veronica agrestis* is thus questionably present in nc TX. Native of Europe. ☺

Veronica americana Schwein. ex Benth., (of America), AMERICAN BROOKLIME. Perennial similar to *V. anagallis-aquatica*; stems 20–60 cm long; leaves petioled; pedicels to 10 mm long or more in fruit. Shallow water or stream banks; Coryell Co. (Fort Hood—Sanchez 1997); otherwise in TX known only from the Edwards Plateau. Jun–Sep.

Veronica anagallis-aquatica L., (aquatic *Anagallis*—pimpernel), WATER SPEEDWELL, BROOK-PIMPERNEL. Plant typically perennial; stems, sprawling to decumbent or erect, to 100 cm long; leaves sessile and clasping, oblong-lanceolate, shallowly toothed; flowers numerous; pedicels 4–6(–8) mm long; corollas 5–6 mm across, pale lavender to blue; capsules nearly orbicular. Wet ground or running water; Cooke and Tarrant cos; also Fannin (Correll & Johnston 1970) and Hamilton (HPC) cos; Post Oak Savannah w to nc TX, also Edwards Plateau. Apr–Jun. Native of Europe and n Asia. ☺

Veronica arvensis L., (pertaining to cultivated fields), COMMON SPEEDWELL, CORN SPEEDWELL, CORNSPERRY, NECKLACEWEED, NECKWEED. Pubescent, erect or semi-decumbent annual 3–20(–



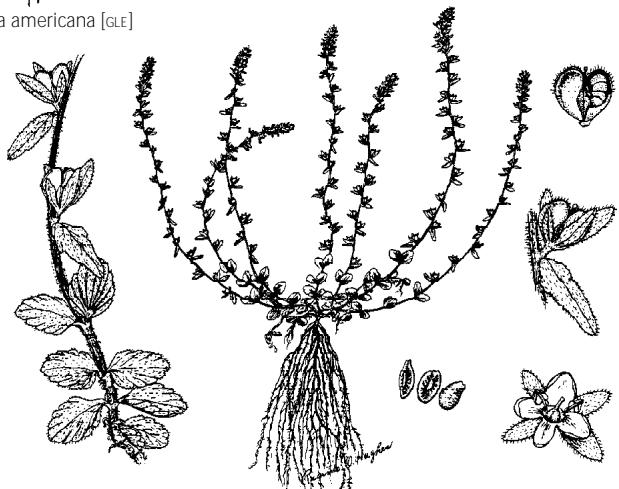
Veronica americana [GLE]



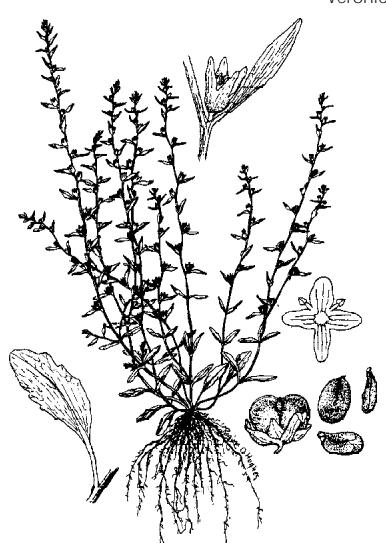
Veronica anagallis-aquatica [MAS]



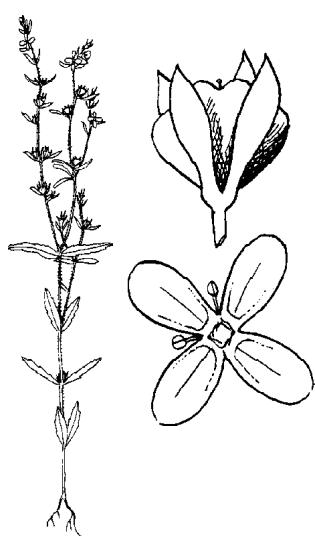
Veronica persica [GLE]



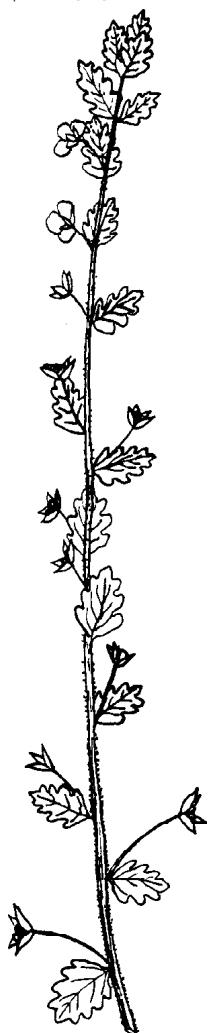
Veronica arvensis [REE]



Veronica peregrina subsp. peregrina [REE]



Veronica peregrina subsp. xalapensis [STE]



Veronica polita [STE]

30) cm tall; corollas 2–3 mm across. Roadsides, fields, and lawns, chiefly in sandy soils; se and e TX w to Dallas, Denton, Grayson, and Tarrant cos., also Brown Co. (HPC); also Edwards Plateau. Mar–May. Native of Europe. Jack Stanford (pers. comm.) indicated that this species is being spread with ST. AUGUSTINE GRASS. ☺

Veronica peregrina L., (wandering), NECKLACEWEED, NECKWEED, PURSLANE SPEEDWELL. Erect annual 3–30 cm tall; corollas 2–3 mm across. Stream banks, damp woods, roadsides, and disturbed areas. Mar–May.

1. Stems glabrous _____ subsp. **peregrina**
1. Stems glandular-pubescent with short, spreading hairs _____ subsp. **xalapensis**

subsp. **peregrina** Se and e TX w to Dallas and Montague cos.

subsp. **xalapensis** (Kunth) Pennell, (of Jalapa or Xalapa, Mexico), JALAPA SPEEDWELL. Throughout most of TX. [V. *peregrina* var. *xalapensis* (Kunth) Pennell, V. *xalapensis* Kunth]

Veronica persica Poir., (of Persia), PERSIAN SPEEDWELL, BIRD'S-EYE SPEEDWELL. Annual decumbent at base, ascending, to 40 cm tall; corollas violet-blue. Lawns and waste places; Dallas Co., also Tarrant Co. (R. O'Kennon, pers. obs.); mainly c and w TX. Feb–May. Native of Eurasia. ☺

Veronica polita Fr., (elegant, polished). Annual with prostrate or reclining stems to 30 cm long; pedicels in age 5–12 mm long; corollas 3–6 mm across. Lawns and waste places; Dallas and Grayson cos., also Tarrant Co. (R. O'Kennon, pers. obs.); se and e TX w to nc TX. Feb–Mar. Native of Europe. [V. *didyma* Ten. in part] Jones et al. (1997) lumped this species with V. *agrestis*. ☺

VERONICASTRUM CULVER'S-ROOT

☛ A genus of 2 species; 1 e Asia, 1 e North America; this disjunct distribution pattern is discussed under the genera *Campsis* (Bignoniaceae) and *Carya* (Juglandaceae). (From genus *Veronica* and Latin: *astrum*, indicating inferiority or incomplete resemblance, thus false *Veronica*)

REFERENCES: Pennell 1921; Thieret 1955.

Veronicastrum virginicum (L.) Farw., (of Virginia), CULVER'S-PHYSIC, CULVER'S-ROOT. Stout erect perennial herb 0.8–2 m tall, glabrous to villous; leaves in whorls of 3–7; leaf blades lanceolate to ovate-lanceolate, serrate, usually 7–14 cm long and 1–3 cm wide; inflorescence of panicles of spike-like racemes, the terminal one to 15 cm or more long; pedicels < 1 mm long; flowers numerous, crowded; corollas salverform, 4–5.5(–6.5) mm long, white or pinkish, the tube ca. 1 mm in diam.; stamens 2, well-exserted; capsules 3–5 mm long with numerous seeds. Rich woods; Lamar Co. in Red River drainage; ne TX. Jun–Sep. [Veronica *virginica* L.]

SIMAROUBACEAE QUASSIA OR SIMAROUBA FAMILY

☛ A small (110 species in 13 genera) family of mainly tropical trees and shrubs with a few extending to temperate Asia; simaroubilides—triterpenoid lactones—are usually present making the bark, wood, and seeds bitter. Some have been used medicinally, as insecticides, for timber, or as ornamentals. Simaroubaceae are similar to Rutaceae and Meliaceae and possibly similar to the ancestral group from which these families were derived. Family name conserved from *Simarouba*, a genus now treated as *Quassia*, a tropical genus of 35 species. (From the Caribbean name for one of the species) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the single introduced species in nc TX is easily recognized as a tree with large, alternate, pinnately compound leaves with leaflets having a few, basal, *gland-bearing teeth* (the leaflets are without the pellucid dots found in the similar Rutaceae); flowers small and numerous in panicles.

REFERENCES: Small 1911; Brizicky 1962c.

AILANTHUS TREE-OF-HEAVEN

• A genus of 5 trees native from Asia to Australia; fossils of *Ailanthus* are known from North America (Graham 1993a). (From *ailanto*, the Indonesian name for *A. moluccana*DC, meaning reaching for the sky, sky tree, or tree of heaven, in allusion to the height in its native habitat)

Ailanthus altissima (Mill.) Swingle, (very tall, tallest), TREE-OF-HEAVEN, COPALTREE, SMOKETREE. Rapidly growing tree to 20 m tall, propagated by seeds and root sprouts, forming colonies; branches brittle; leaves alternate, short-petioled, glabrous, odd- or occasionally even-pinnately compound with up to 27 leaflets, ill-smelling when crushed; leaflets lanceolate, acuminate, entire except for a few basal teeth, these teeth usually with a prominent gland on the lower surface near apex; flowers many, small, in terminal panicles over-topped by leaves, mostly unisexual, the sexes on separate trees or some perfect; the male flowers have an offensive odor; sepals 5, partly united; petals 5, yellow-green, pilose toward base; stamens 10; ovary 2- to 5-parted into flat 1-celled sections, superior; fruit a schizocarp with 2-5, one-seeded, samara-like, twisted mericarps 3-5 cm long, greenish or yellowish becoming pinkish or reddish brown. Cultivated as an ornamental tree, escaped, becoming weedy; Grayson and Tarrant cos., also Brown, Hamilton (HPC), and Parker (R. O'Kennon, pers. obs.) cos.; mainly e TX w to nc TX, also Edwards Plateau. Apr. Native of China, apparently introduced into the U.S. in Pennsylvania in 1784 (Tellman 1997). Pistillate trees with clusters of colorful fruits can be quite showy. This resilient species can withstand drought, is disease and insect resistant, can survive harsh urban environments, and tolerates smoke—hence one of the common names (McGregor 1986; Cox & Leslie 1991). The species also produces a highly phytotoxic herbicidal material (ailanthone) that has allelopathic effects on other plants (Heisey 1990, 1996). The leaves are toxic if ingested; cases of dermatitis have been reported from contact with the leaves (Fuller & McClintock 1986; Blackwell 1990) ☣

SOLANACEAE NIGHTSHADE OR POTATO FAMILY

Ours annual or perennial herbs or shrubs; leaves usually alternate or subopposite, simple or pinnately compound, entire, bluntly toothed or lobed; stipules absent; flowers axillary or terminal, solitary or in spikes, racemes, panicles, or cymes; calyces usually 5-toothed or -lobed; corollas radially symmetrical, sympetalous, rotate to campanulate, tubular, funnelform, salverform, or urceolate, 5-angled or -lobed; stamens 5; pistil 2-carpellate; ovary superior with axile placentation; style and stigma 1; fruit a many-seeded berry or capsule.

• A large ((ca. 2,200 species—M. Nee, pers. comm.) in 94 genera), nearly cosmopolitan, but especially South American family of mainly herbs with a few shrubs, trees, and lianas; it is sometimes treated as having up to 2,950 species (Mabberley 1997); branched hairs and prickles are often present. The family contains many important food crops (e.g., EGGPLANT, GREEN and CHILI PEPPERS, POTATOES, TOMATOES, TOMATILLOS). ☣ It also is rich in alkaloids (e.g., atropine, hyoscyamine, nicotine, scopolamine, and solanine) and many species are variously toxic, hallucinogenic, or medicinal. Examples include *Atropa* (BELLADONA, source of atropine), *Datura* (JIMSON WEED), *Hyoscyamus* (BLACK HENBANE, source of hyoscyamine), *Mandragora* (MANDRAKE) and *Nicotiana* (TOBACCO). Some of the tropane alkaloids (e.g., hyoscyamine) are hallucinogenic and were used by sorcerers in the Middle Ages; other solanaceous alkaloids have been used medicinally (Keeler 1979). (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: mostly herbs or some shrubs usually with alternate leaves; corollas sympetalous, *radially symmetrical* (in contrast to the bilaterally symmetrical flowers of the somewhat similar Scrophulariaceae), folded in bud (often folded lengthwise—accordion-like—below the ovary); stamens 5, attached to the corolla; fruit a many-seeded berry or capsule. REFERENCES: Heiser 1969, 1987; D'Arcy 1986; Nee 1986; Hawkes et al. 1979, 1991; Olmstead & Palmer 1992.

1. Corollas short-campanulate to rotate, or with reflexed lobes, broader than high or long; fruit a berry.
 2. Corollas 5-angled, the margin barely indented; calyces divided 1/10–2/3 to base, enlarged at maturity, about as long as fruits or longer, covering the fruits or nearly so; flowers solitary, axillary.
 3. Calyces divided 1/3–2/3, with ovate, subacute lobes, not greatly inflated at maturity, close fitting to fruits _____ **Chamaesaracha**
 3. Calyces divided less than 1/3, greatly inflated at maturity, very loose-fitting.
 4. Corollas blue-purple (rarely white); flowers erect (but fruits can be nodding) _____ **Quinculca**
 4. Corollas greenish or yellowish brown to white; flowers nodding _____ **Physalis**
 2. Corollas 5-lobed, divided 1/4 to base or more; calyces divided from ca. 1/2 to near base, much shorter than mature fruits, not covering the fruits; flowers solitary, racemose, cymose, or in axillary clusters.
 5. Often vine-like shrubs to 3 m tall with drooping branches and greenish purple to pink flowers; leaves spineless; filaments longer than anthers _____ **Lycium**
 5. Herbs (or if a shrub—*Capsicum* only, then flowers white); flowers bluish purple to yellow or white; leaves with spines or spineless; filaments shorter than anthers.
 6. Flowers in racemes or cymes; plants spiny or spineless; corollas bluish purple to yellow or white, from ca. 2–50 mm wide; anthers incurved to erect, usually yellowish; plants branching mainly alternately _____ **Solanum**
 6. Flowers solitary; plant spineless; corollas white, ca. 7 mm wide; anthers erect becoming wide-spreading usually bluish; plants branching dichotomously _____ **Capsicum**
 1. Corollas funnelform, salverform, tubular, or urceolate, longer than broad; fruit a capsule (or a berry in *Margaranthus*).
 7. Corollas cylindric-urceolate (urn-shaped), to 4 mm long; fruit a berry; calyces becoming inflated and enclosing fruits _____ **Margaranthus**
 7. Corollas funnelform, salverform, or tubular, 5–150 mm long; fruit a capsule; calyces neither inflated nor enclosing the fruits.
 8. Corolla lobes tipped by acuminate, almost thread-like points; capsules armed with spines _____ **Datura**
 8. Corolla lobes obtuse to subacute; capsules unarmed.
 9. Leaves < 2 mm wide; corollas blue with yellow eye, salverform; corolla tube < 1 mm in diam., conspicuously filiform _____ **Nierembergia**
 9. Leaves usually > 2 mm wide; corollas variously colored (including white) but not blue with yellow eye, funnelform to salverform; corolla tube > 1 mm in diam., not filiform.
 10. Flowers solitary, axillary; plants glandular-pubescent; capsules 2-valved; corollas variously brightly colored (including white), often with stripes or markings.
 11. Corollas (25–)50–90 mm long; leaves to 80 mm long; plants erect or decumbent _____ **Petunia**
 11. Corollas ca. 5–8 mm long; leaves 5–14 mm long; plants prostrate and rooting at the nodes _____ **Calibrachoa**
 10. Flowers solitary or in racemose to paniculate inflorescences; plants not glandular-pubescent; capsules 4-valved; corollas white (or tinged with rose or lavender or dorsally brown-striped).
 12. Corollas 12–18 mm long; leaves to ca. 1 cm wide _____ **Bouchetia**
 12. Corollas 45–75 mm long; leaves much more than 1 cm wide _____ **Nicotiana**

BOUCHETIA

☛ A genus of 3 species ranging from the s U.S. to Brazil. (Named for Dominici Bouchet Avenionensis, 1770–1845, French botanist at Montpellier)

Bouchetia erecta DC., (erect, upright), ERECT BOUCHETIA. Ascending much-branched perennial to ca. 23 cm tall; leaves oblong-spatulate to lanceolate or oval, to 5 cm long and 1 cm wide, usually much smaller; corollas funnelform, white, sometimes tinged with lavender, 12–18 mm long;

capsules unarmed, ca. 8 mm long. Prairies and rocky slopes; Bell (Fort Hood—Sanchez 1997) and Burnet (Balcones Canyonlands Nat. Wildlife Refuge, C. Sexton, pers. comm.) cos; mainly c and s TX; endemic to TX. May-Oct. ↗

CALIBRACHOA

☛ A New World genus of 7–15 species; often included in the genus *Petunia*. (Named for Antonio Cal y Bracho, 19th century Mexican botanist and professor, born in Spain)
REFERENCES: Sink 1984a, 1984b; Wijsman & de Jong 1985; Wijsman 1990.

Calibrachoa parviflora (Juss.) D'Arcy, (small-flowered), WILD PETUNIA, SEASIDE PETUNIA. Prostrate glandular-pubescent annual rooting at the nodes, diffusely branched and mat forming; leaves linear-oblong to spatulate, fleshy, 5–14 mm long, entire; flowers solitary, axillary; calyces 5-parted to below middle, the lobes 3–6 mm long at anthesis, to ca. 11 long in fruit; corollas funneliform, ca. 5–8 mm long, purple or reddish violet with yellow or whitish tube, the lobes short; stamens 5, often with 3 shorter and 2 longer filaments; fruit a 2-valved unarmed capsule 2–4 mm long. Moist or wet soils, stream beds, muddy flats; according to Hatch et al. (1990) in regions 4 and 5; the nearest specimens we have seen are from s Burnet (Marble Falls) and Travis cos. just s of nc TX; throughout much of TX. Apr–Sep. This species is known from South America and from Cuba, Mexico, and the s U.S. including TX; Sink (1984b) indicated that it is not clear whether the plants outside South America are indigenous or not. [*Petunia integrifolia* (Hook.) Schinz & Thell., *Petunia parviflora* Juss.]

CAPSICUM CAYENNE PEPPER, CHILI, CHILI PEPPER

☛ A mainly tropical American genus of 10 species. The common name CHILI is derived from Nahuatl (language of the Aztecs), *chilli* (Foster & Cordell 1992). (Greek: *kapto*, to bite, referring to the hot taste of the fruits)
REFERENCES: Irish 1898; Heiser & Smith 1953; Heiser & Pickersgill 1975; Andrews 1984, 1995; Bosland 1993.

Capsicum annuum L. var. **glabriuscum** (Dunal) Heiser & Pickersgill, (sp: annual; var: rather or somewhat smooth), BIRD PEPPER, CHILITEPÍN, CHILIPÍQUÍN, CHILE PIQUÍN, BUSH REDPEPPER. Small shrub, rather inconspicuously pubescent on young parts; leaf blades ovate to lanceolate, entire, longer than the petioles; calyces subentire; corollas white, ca. 7 mm wide; fruits ovoid to nearly globose, to ca. 15 mm long, reddish or yellowish, pungently aromatic. Cultivated; reported wild as far n as McLennan Co. (Mahler 1988); mainly Edwards Plateau and s TX southward. Jun–Nov. [C. annuum L. var. *minus* (Fingerh.) Shinners, C. annuum L. var. *aviculare* (Dierb.) D'Arcy & Eshbaugh] We are following Heiser and Pickersgill (1975) and Kartesz (1994) for nomenclature of this taxon; Jones et al. (1997) followed D'Arcy and Eshbaugh (1973) in treating it as C. *annuum* var. *aviculare* (Dierb.) D'Arcy & Eshbaugh. This variety is extremely “hot” or picante. According to Andrews (1998), “Francisco Hernández, the first European to collect American plants systematically, described the tiny Chiltepín in 1615. . . President Thomas Jefferson grew Chiltepin from Texas seed acquired in 1813.” Andrews (1998) also indicated that Texas House Concurrent Resolution 82 made the Chiltepín the official **native pepper of Texas** in 1997. The seeds are dispersed by birds which eat the fruits (Andrews 1998).

Other cultivated varieties of C. *annuum* provide the familiar GREEN or BELL PEPPERS, RED PEPPERS, and various HOT or CHILI PEPPERS. CHILI PEPPERS have been cultivated for thousands of years in Mexico. Their pungency is due to a volatile phenolic compound known as capsaicin. In addition to making food “hot,” the material has been used both as a torture and as a pain reliever for muscular aches (Heiser 1987). Black pepper comes from a completely unrelated Asian mem-

ber of the Piperaceae. The JALAPEÑO (*C. annuum* var. *annuum*) was designated as the **state pepper of Texas** by the 74th state legislature (Jones et al. 1997).

CHAMAESARACHA FALSE NIGHTSHADE

Rhizomatous perennial erect to spreading herbs; rhizomes partly woody; flowers solitary or in axillary pairs; calyces 5-lobed, somewhat enlarged but not greatly inflated with age, close-fitting to the fruit, not angled or ribbed; corollas rotate, white to yellowish, often purple-tinged; anthers longitudinally dehiscent; fruit a globose berry. Because hair characters are so important in this genus, a hand lens or dissecting scope is nearly essential for accurate identification.

☛ A genus of 7 species of the sw U.S. and n Mexico. (Greek: *chamai*, on the ground, and *Saracha*, name of a tropical American genus of Solanaceae)

REFERENCES: Averett 1972, 1973, 1979.

1. Stems glabrous to sparsely pubescent with short stellate (branched with several rays) or branched (2 rays) hairs.
 2. Leaves glabrous; pedicels with glandular hairs ***C. edwardsiana***
 2. Leaves sparsely pubescent with stellate hairs; pedicels without glandular hairs ***C. coronopus***
1. Stem pubescence glandular or hairs predominantly simple or both.
 3. Leaves essentially glabrous; stems purplish or grayish at base ***C. edwardsiana***
 3. Leaves with glandular and/or simple hairs; stems green at base.
 4. Leaves rhombic to broadly lanceolate or ovate, entire to undulate or somewhat lobed, with pubescence mainly of short glandular hairs (other hairs also often present) ***C. sordida***
 4. Leaves usually with numerous pinnate or irregular lobes, with pubescence of longer usually simple hairs, occasionally mixed with glandular hairs ***C. coniodes***

Chamaesaracha coniodes (Moric. ex Dunal) Britton, (cone-like), GROUND SARACHA, FALSE NIGHTSHADE, PROSTRATE GROUND-CHERRY. Plant usually pubescent with simple and occasionally also glandular hairs. Disturbed areas; Lampasas Cut Plain and West Cross Timbers s and w to w TX. Apr-Oct.

Chamaesaracha coronopus (Dunal) A. Gray, (Greek: *kōrone*, crow, and *pous*, foot, possibly from resemblance to *Coronopus*—wartcress in Brassicaceae), GREEN FALSE NIGHTSHADE. Plant glabrous to sparsely pubescent, hairs short, stellate, scurfy; leaves linear, usually pinnately lobed. Disturbed areas; Bell and Lampasas cos., also Brown Co. (HPC); Lampasas Cut Plain s and w to w TX. Apr-Oct.

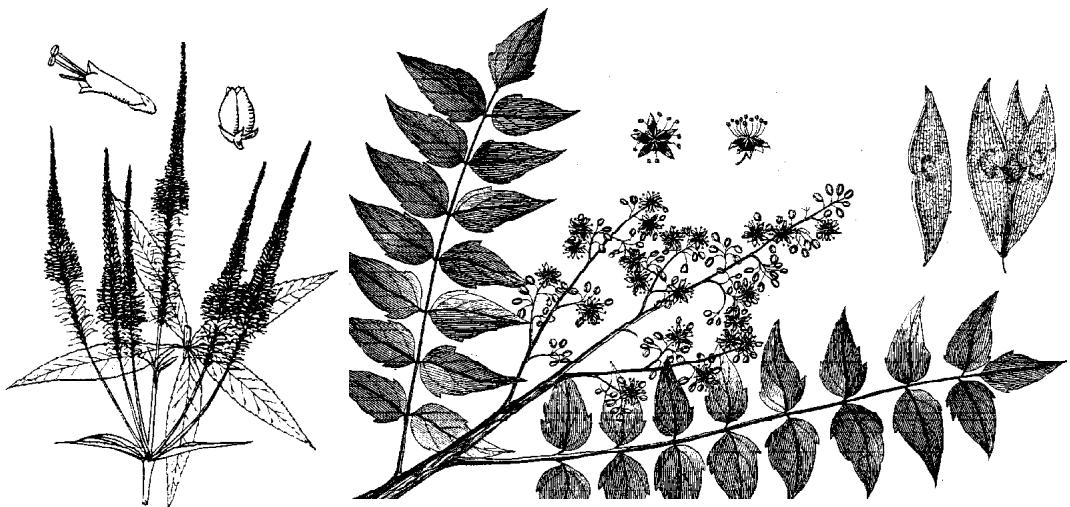
Chamaesaracha edwardsiana Averett, (of the Edwards Plateau), PLATEAU FALSE NIGHTSHADE. Stems glabrous to pubescent, hairs stellate, simple, or glandular; leaves essentially glabrous. Disturbed areas; Williamson Co.; s most part of nc TX s to Edwards Plateau. Apr-Oct.

Chamaesaracha sordida (Dunal) A. Gray, (dirty), HAIRY FALSE NIGHTSHADE. Plant densely pubescent with mainly glandular hairs, sometimes mixed with simple hairs. Dry plains, often on limestone; Fort Hood (Bell or Coryell cos.—Sanchez 1997); Hatch et al. (1990) cited both vegetational areas 4 and 5 (Fig. 2); mainly w 2/3 of TX. Mar-Nov.

DATURA JIMSONWEED, THORN-APPLE, STRAMONIUM

Rank-smelling, low but coarse annuals or perennials; leaf blades rhombic-ovate to oblong-elliptic, subentire to coarsely toothed; flowers very large and showy, solitary, terminal but ± overtopped by leafy branches, opening in late afternoon, closing about mid-morning; corollas white to lavender; capsules globular, prickly.

☛ A genus of 9 species of herbs native to s North America, but widely naturalized. ☛ *Datura*



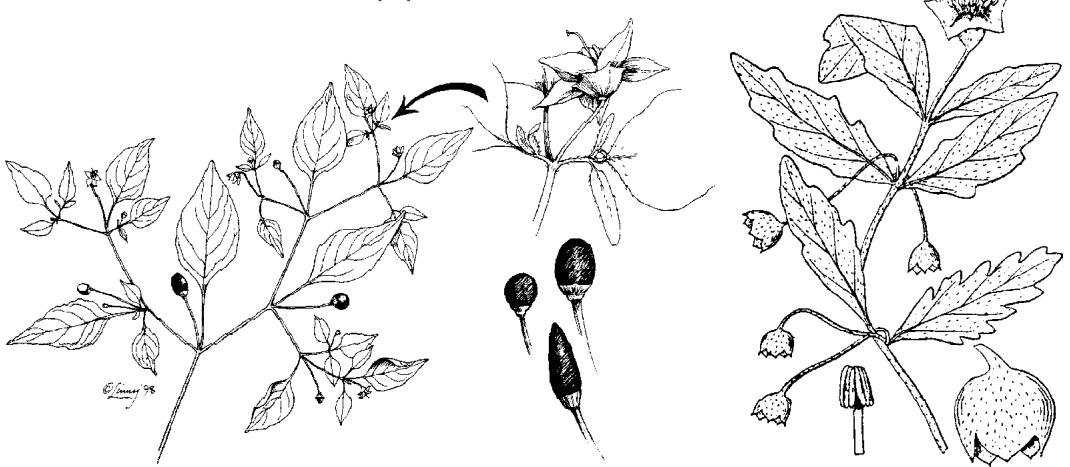
Veronicastrum virginicum [SM1, STE]

Ailanthus altissima [LAM]



Boucheitia erecta [HEA]

Calibrachoa parviflora [AJB]



Capsicum annuum var. glabriusculum [HEA]

Chamaesaracha conoides [BB1]

species contain hallucinogenic and extremely toxic tropane alkaloids (e.g., hyoscamine and hyoscine); all parts of the plant, including the nectar, are poisonous. Fatalities have been reported in Texas in recent years caused by the ingestion of *Datura* (Rivas 1994). The species have been used ritually by some Native Americans including the Aztecs and Algonquins. Some species are also used as ornamentals because of their large, moth-pollinated flowers. *Datura* is sometimes interpreted broadly to include the related South American genus *Brugmansia* (ANGEL'S-TRUMPETS), also with hallucinogenic alkaloids. ☠ *Brugmansia candida* Pers. (ANGEL'S-TRUMPET), is a well-known cause of poisoning in the se U.S.; Greene et al. (1996) reported numerous cases in Florida; the tropane alkaloids block the action of acetylcholine at nerve synapses resulting in anticholinergic poisoning; according to Greene et al. (1996), the mnemonic "hot as a hare, dry as a bone, blind as a bat, red as a beet, and mad as a hatter" describes such patients; coma and death can result; *Datura stramonium* causes an identical syndrome of anticholinergic intoxication (Greene et al. 1996). (Altered from the Arabic name, *tatorah*, or the Hindustani, *dhatura*)

REFERENCES: Safford 1921, 1922; Avery et al. 1959.

1. Plants largely glabrous; calyces 3.5–5 cm long; corollas 6–8(–10) cm long and 3–5 cm wide _____ ***D. stramonium***
1. Plants finely and densely gray-pubescent; calyces 7–12 cm long; corollas to 15 cm long and to 15 cm wide _____ ***D. wrightii***

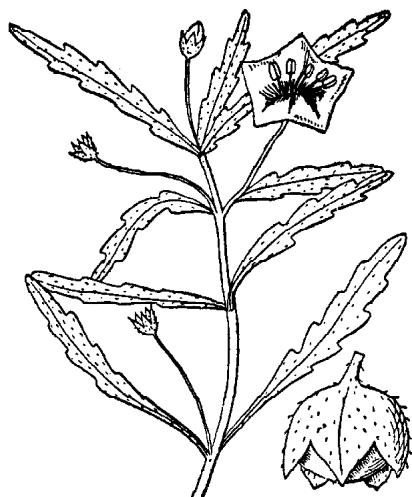
Datura stramonium L., (old generic name, said to be from Latin: *struma* or *strama*, a swelling), JIMSONWEED, JAMESTOWN WEED, STRAMONIUM, TOLOACHE, COMMON THORN-APPLE. Annual. Farmyards and fields; Coryell Co., also Grayson Co. (S. Crosthwaite, pers. obs.); widely scattered throughout TX. Jun-Oct. Native of tropical America. Used medicinally and as a narcotic by Native Americans including the Zuni Indians (Burlage 1968). However, the species is poisonous; all parts of the plant contain **POTENTIALLY FATAL** tropane alkaloids including hyoscine, hyoscyamine, scopolamine, and atropine; death following ingestion has occurred in all classes of livestock as well as humans; symptoms include dilation of pupils, impaired vision, dryness of the skin and mucous membranes, extreme thirst, hallucinations, and convulsions followed by coma and sometimes death (Kingsbury 1964; Burlage 1968; Keeler 1979; Urich et al. 1982). The common name JIMSONWEED results from a corruption of JAMESTOWN WEED; British soldiers sent to Jamestown to quell Bacon's rebellion in 1676 ate *D. stramonium* as greens and were intoxicated for several days (Morton 1982). ☠ ☡

Datura wrightii Regel, (for Charles Wright, 1811–1885, TX collector), INDIAN-APPLE, ANGEL-TRUMPET, SACRED DATURA. Pithy-rooted perennial flowering the first year. Sandy or rocky stream bottoms; Bell, Coleman, Denton, Grayson, Parker, and Tarrant cos., also Brown and Hamilton cos. (HPC) and Fort Hood (Bell or Coryell cos.—Sanchez 1997); according to Mahler (1988), probably native only from Hood Co. s and w; widespread in TX. Jun-Oct. [*D. meteloides* of authors, not Dunal] The flowers open at dusk and are pollinated by hawk moths (Wills & Irwin 1961). The plant was used medicinally and as a narcotic by Native Americans including the Aztecs (Burlage 1968); during frontier days small quantities of the leaves were smoked by asthmatics; however, it is poisonous and dangerous or fatal if not used properly (Crosswhite 1980). ☠ ☡ /87

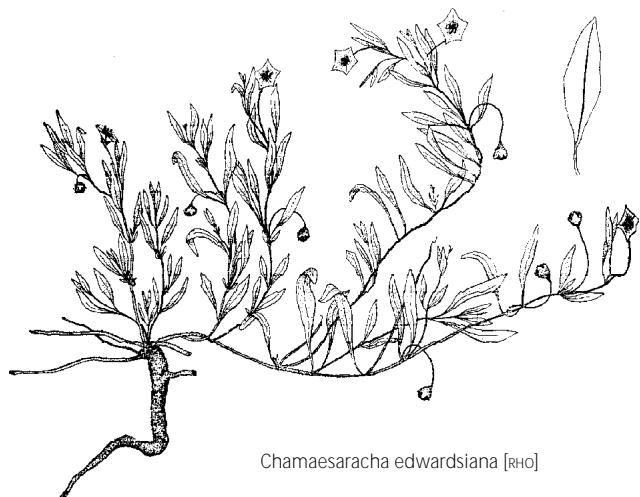
LYCIUM MATRIMONY-VINE, WOLFBERRY, DESERT-THORN, SQUAW-BERRY, TOMATILLO, CILINDRILLO

☛ A warm temperate, especially American genus of 100 species of often thorny shrubs. A number of species are native to c and w Texas. (Greek: *lykion*, after Lycia, ancient country of Asia Minor; the name was originally applied to a species of *Rhamnus*)

REFERENCES: Hitchcock 1932; Chiang 1981.



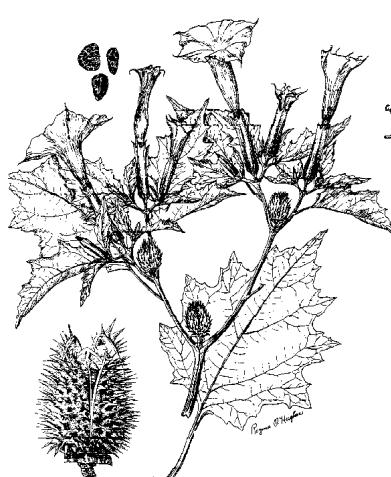
Chamaesaracha coronopus [BB2]



Chamaesaracha edwardsiana [RHO]



Chamaesaracha sordida [RHO]



Datura stramonium [NIC, REE]



Datura wrightii [NIC]



Lycium barbarum [coo]



Margananthus solanaceus [NEE]

Lycium barbarum L., (foreign), MATRIMONY-VINE, BOX-THORN, FALSE JESSAMINE. Shrub to ca. 3 m tall, often vine-like; branches long, arching, drooping, old growth can be armed at nodes; leaves elliptic to ovate or oblanceolate, 3–5(–7) cm long, glabrous, tapering to the petiole; flowers in axillary clusters of 2–7; corollas greenish purplish, purple, or pinkish to violet or pale lavender, 8–12 mm long; fruit a red or orangish (drying purplish or blackish) ovoid berry 1–2 cm long. Old-fashioned cultivar that occasionally long persists or spreads; Grayson (Hagerman N.W.R., long abandoned homesite) and Cook (hedgerow) cos; other TX localities not known. May–Aug. Introduced from the Old World. [*L. halimifolium* Mill.] Jones et al. (1997) did not list this species for TX. The leaves are poisonous, possibly due to alkaloids (Lampe & McCann 1985). ☣ ☦

MARGARANTHUS NETTED GLOBE-CHERRY

— A monotypic genus native from the sw U.S. to Central America. (Possibly from Greek: *margarites*, pearl, and *anthos*, flower)

REFERENCE: Averett 1979.

Margaranthus solanaceus Schltdl., (resembling *Solanum*—nightshade), NETTED GLOBE-CHERRY. Erect nearly glabrous annual to ca. 60 cm tall, resembling *Physalis*; corollas greenish, yellow, or purple, cylindric-urceolate (urn-shaped), to 4 mm long; berry entirely enclosed in the 8–12 mm long, membranous, inflated fruiting calyx. Fields and pastures; included based on citation for vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly s and w TX. Jul–Nov.

NICOTIANA TOBACCO

— A genus of 67 species native to the Americas, s Pacific, Australia, and sw Africa. While *Nicotiana tabacum* L., native of tropical America, is the primary source of TOBACCO products, containing the addictive alkaloid nicotine, probably all species in the genus contain nicotine; ☣ it is often used as a potent insecticide and is fatal to humans in rather small doses (Kingsbury 1964). Exposure to TOBACCO, through smoking, chewing, or other forms of ingestion, is widely considered to be a cause of various cancers including lung cancer. Numerous reports exist in the literature of the tetragenic effects (= causing birth defects) of TOBACCO (Keeler 1979). *Nicotiana tabacum* and *N. rustica* L. were cultivated by Native Americans in pre-Colombian times. (Named for Jean Nicot, 1530–1600, who sent the seeds of tobacco, *N. tabacum*, to France in 1560)

REFERENCE: Goodspeed 1954.

Nicotiana repanda Willd., (with wavy margins), WILD TOBACCO, FIDDLE-LEAF TOBACCO, TOBACCO CIMARRÓN. Pubescent annual to 0.9 m tall with large basal leaves; stem leaves wing-petioled or sessile, the upper auricled-clasping; calyces divided ca. 1/2 its length; corollas usually white, tubular-funnelform, 4.5–7.5 cm long; to 4 cm in diam.; capsules ca. 1 cm long. Stream bottoms, ravines, thickets, and roadsides; collected at Dallas by Letterman, not found there recently (Mahler 1988); s Texas n to Travis Co. Apr–Jun. The foliage is poisonous and was formerly used for smoking; it contains alkaloids including nicotine (Burlage 1968; Ajilvsgi 1984). ☣

NIEREMBERGIA CUPFLOWER

— A genus of 23 species native from Mexico to Chile, especially Argentina; characterized by a long slender corolla tube; a number are cultivated as ornamentals. (Named for John Eusebius Nieremberg, ca. 1595–1658, a Spanish Jesuit and first professor of natural history at Madrid)

REFERENCE: Millán 1941.

Nierembergia hippomanica Miers var. **coerulea** (Miers) Millán, (sp.: derivation not known, possibly Greek, *hippos* horse and Latin: *manica*, sleeve of a tunic or glove; var: blue), TEXAS CUPFLOWER. Perennial to ca. 20 cm tall, with non-glandular pubescence; leaves linear to linear-spatulate, < 2

mm wide, entire; flowers solitary, axillary, or in cymose inflorescences; pedicels 3–5 mm long at flowering; calyx tubular, 6–10 mm long, with 10 conspicuous green ribs, the lobes acuminate, > half as long as the calyx tube; corollas with filiform tube 7–10 mm long; corolla limb saucer-shaped, pleated, ca. 2 cm in diam., bright blue with yellow eye; stamens inserted on the upper part of the corolla tube; fertile stamens 4, these in 2 pairs; staminode 1, smaller; anthers yellow; fruit a 2-valved capsule. Several individuals apparently escaped from cultivation were found in an open weedy area of loose sand near the Texas welcome facility along Hwy. 75 just s of the Red River (Rabeler & Diggs 1316 1998) in Grayson Co., also Dallas Co. on a trash pile, also cited by Hatch et al. (1990) for vegetational area 4; mainly se and s TX and Edwards Plateau. Apr. Native of South America. The species is reported to be toxic to cattle (Cabrera 1965). ☣

PETUNIA

— A tropical and warm American genus of 35 species; at least 1 South American species is the source of a hallucinogen inducing a sense of flying or levitation; species now treated as *Calibrachoa* have often been lumped with *Petunia*. *Petunia axillaris* is an important cultivated ornamental; there are over 200 cultivars including some that are striped and doubled. The generic name *Petunia* is conserved (Wijnands et al. 1986; Brummitt 1989). (From *petun*, Brazilian vernacular name for tobacco in the related genus *Nicotiana*)

REFERENCES: Sink 1984a, 1984b; Wijsman & de Jong 1985; Brummitt 1989; Wijsman 1990.

Petunia axillaris (Lam.) Britton, Sterns, & Poggenb., (axillary), COMMON GARDEN PETUNIA. Erect to decumbent glandular-pubescent annual herb; lower (larger) leaves elliptic to ovate, to ca. 80 mm long, entire; flowers axillary, solitary; calyces 5-parted nearly to base; corollas ca. (25–)50–90 mm long, funnelform to salverform, the limb very broad, variously colored, white to deep reddish purple, sometimes with stripes or markings; stamens 5, 1 smaller or rudimentary; fruit a 2-valved unarmed capsule. Widely cultivated and rarely escapes, weedy areas, cracks in sidewalks; Grayson and Tarrant cos. Late spring onward. Native of South America. [*Nicotiana axillaris* Lam, *P. hybrida* Vilm., *P. violacea* of authors, not Juss., *P. ×atkinsiana* D. Don. ex J.W. Loudon, *Stimoryne axillaris* Wijsman] ☣

PHYSALIS GROUND-CHERRY

Glabrous or pubescent, erect or partly decumbent, low annuals or perennials; leaves petioled, alternate, the upper often subopposite; flowers axillary, solitary, drooping; corollas yellow, usually with dark (often brownish purple) eye; calyces inflated in age, enclosing the berries.

— A cosmopolitan, but especially American, genus of 80 species. ☣ All tissues of some species, but particularly the unripe fruits, contain toxic glycoalkaloids (e.g., solanine); children have been poisoned and cattle have been sickened (Stephens 1980; Lampe & McCann 1985). The TOMATILLO or JAMBERRY (*P. philadelphica* Lam.) is cultivated for its edible fruit, especially in Mexico. *Margaranthus*, with cylindric-urceolate corollas to only 4 mm long, resembles *Physalis*. (Greek: *physa* bladder, referring to the conspicuously inflated calyx)

REFERENCES: Rydberg 1896; Menzel 1951; Waterfall 1958; Sullivan 1985.

1. Plants with stellate (= star-like with a number of branch hairs from a central point) hairs or jointed hairs some of which are variously branched (use lens).

2. Flowering calyces 3–10 mm long; fruiting calyces 15–35 mm long; hairs stellate.

3. Flowering calyces (3–)5–7(–9) mm long; hairs usually relatively sparse, not mat-like, not obscuring leaf surface; pubescence of stellate hairs < 1 mm long only; leaf margins toothed, undulate, or entire _____

3. Flowering calyces (6–)7–10 mm long; hairs forming a dense mat at least on the lower surface of the leaf, obscuring the surface; pubescence of stellate hairs < 1 mm long and some-

P.cinerascens

- times branched or unbranched hairs 2–4 mm long; leaf margins coarsely and irregularly few-toothed _____ **P. mollis**
2. Flowering calyces 10–15 mm long; fruiting calyces 30–40 mm long; hairs jointed with some branched _____ **P. pumila**
1. Plants with simple, sometimes glandular hairs (stellate or otherwise branched pubescence small and inconspicuous if any present) to nearly glabrous.
4. Anthers blue or violet, 1–2.5(–3) mm long; plants annual.
5. Plants essentially glabrous; flowering calyces ca. 3(–4) mm long; fruiting calyces 10-angled or ribbed _____ **P. angulata**
5. Plants long pubescent, often viscid; flowering calyces (3)–4–10 mm long; fruiting calyces 5-angled.
6. Principal leaf blades usually 2–4 cm wide; fruiting calyces 15–30(–32) mm long, the lobes ovate-triangular to lanceolate _____ **P. pubescens**
6. Principal leaf blades usually 4–8 cm wide; fruiting calyces 30–40 mm long, the lobes usually narrowly lanceolate-attenuate _____ **P. turbinata**
4. Anthers yellow (sometimes with a bluish tinge or bluish edges, especially in *P. longifolia* var. *subglabrata*), (2–)2.5–5 mm long; plants perennial from deep horizontal root.
7. Stems usually with short viscid-glandular hairs and long-jointed hairs; leaf blades ovate _____ **P. heterophylla**
7. Stems eglandular; hairs long or short, incurved; leaf blades ovate or lanceolate.
8. Stems and leaves villous to short pubescent, at least some of the hairs reflexed or retrorse; calyces with spreading hairs; leaf blades ovate to lanceolate _____ **P. virginiana**
8. Stems and leaves sparsely pubescent with short antrorse hairs, sometimes nearly glabrous; calyces often with short antrorse appressed hairs in 10 lines or hairs nearly absent; leaf blades linear-lanceolate to lanceolate (rarely ovate) _____ **P. longifolia**

Physalis angulata L., (angular, angled), CUT-LEAF GROUND-CHERRY, SOUTHWEST GROUND-CHERRY, LANCE-LEAF GROUND-CHERRY, PURPLE-VEIN GROUND-CHERRY. Essentially glabrous annual; leaves ovate to ovate-lanceolate; anthers ca. 1–2.5 mm long; fruiting calyces ca. 3(–4) cm long; berry 10–12 mm in diam. Prairies, disturbed areas; nearly throughout TX. May–Oct. [*P. pendula* Rydb., *P. angulata* var. *pendula* (Rydb.) Waterf.]

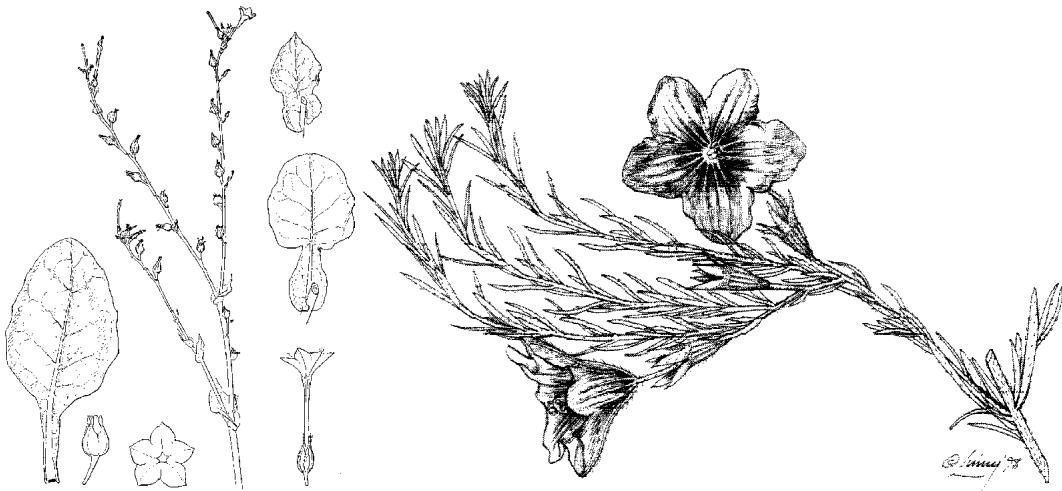
Physalis cinerascens (Dunal) Hitchc., (becoming ashy-gray), BEACH GROUND-CHERRY. Perennial with stellate pubescence of varying size and density; leaf blades ovate to reniform; anthers yellow, ca. 3 mm long; flowering calyces (3)–5–7(–9) mm long. Disturbed areas; throughout TX. Apr–Oct. [*P. viscosa* L. var. *cinerascens* (Dunal) Waterf.]

Physalis heterophylla Nees, (various-leaved), CLAMMY GROUND-CHERRY. Perennial with deep rootstock; stems with varying proportions of short, viscid-glandular hairs and long-jointed hairs; leaf blades ± ovate; flowering calyces 7–12 mm long; fruiting pedicels 15–40 mm long; anthers yellow, often bluish-tinged, usually 3–4.5 mm long; fruiting calyces 2.5–3 cm long. Sandy, disturbed areas; Bell and Palo Pinto cos; se and e TX w to nc TX and Edwards Plateau. Apr–Oct. Suspected of being poisonous (Burlage 1968). ☣

Physalis longifolia Nutt., (long-leaved), COMMON GROUND-CHERRY. Perennial, stems often purplish. Suspected of being poisonous (Burlage 1968). ☣

1. Leaf blades usually linear-lanceolate to lanceolate (rarely ovate); anthers yellow _____ var. **longifolia**
1. Leaf blades usually ovate to ovate-lanceolate; anthers light blue or tinged with light blue _____ var. **subglabrata**

var. **longifolia**. Open woods, prairies; Dallas, Grayson, and Rockwall cos; throughout most of TX. Apr–Oct. [*P. virginiana* var. *sonorae* (Torr.) Waterf.]



Nicotiana repanda [GOO]

Nierembergia hippomanica var. coerulea [HEA]



Petunia axillaris [BB2]

Physalis angulata [BB2]

Physalis cinerascens [HEA]



Physalis heterophylla [REE]

Physalis longifolia var. longifolia [BB1]

Physalis longifolia var. subglabrata [BB2]

var. **subglabrata** (Mack. & Bush) Cronquist, (somewhat smooth or hair-less), BLADDER GROUND-CHERRY. Some authors (e.g., McGregor et al. 1986) questioned the recognition of this variety. Included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990); Waterfall (1958) cited Tarrant Co; se and e TX, also Edwards Plateau. Jun-Oct. [*P. macrophysa* Rydb., *P. virginiana* Mill. forma *macrophysa*(Rydb.) Waterf., *P. virginiana* Mill. var. *subglabrata* (Mack. & Bush) Waterf.]

Physalis mollis Nutt., (soft, soft-hairy), FIELD GROUND-CHERRY. Perennial densely stellate-tomentose; leaves ovate; flowering calyces (6-)7-10 mm long. According to Waterfall (1972), *P. mollis* apparently intergrades with *P. cinerascens*. While we are following Kartesz (1994) in recognizing *P. mollis*, this species may not be specifically distinct from *P. cinerascens*. Sandy soils, roadsides, field, and woods; se and e TX w to West Cross Timbers and Edwards Plateau. May-Jul. [*P. viscosa* L. subsp. *mollis* (Nutt.) Waterf.]

Physalis pubescens L., (pubescent, downy), DOWNTY GROUND-CHERRY, LOW HAIR GROUND-CHERRY, TOMATE FRESADILLA. Villous to viscid-glandular or glabrate annuals; leaves ovate; fruiting calyces 1.8-3 cm long, usually hairy, 5-angled; fruiting pedicels 5-13 mm long. Disturbed areas. Apr-Nov. We are following Kartesz (1994) in recognizing 2 varieties. They, however, apparently intergrade and are questionably distinct.

1. Leaf blades usually toothed nearly to the base with 5-8 teeth on each side, seldom translucent _____

var. **integritolia**

1. Leaf blades with few teeth, 3-4 on each side, or entire, mostly flaccid and translucent _____ var. **pubescens**

var. **integritolia** (Dunal) Waterf., (entire-leaved). Waterfall (1958) cited Dallas Co; mainly se and e TX, also Edwards Plateau.

var. **pubescens**. Clay, Cooke, Fannin, and Tarrant cos, also Hamilton (HPC) and McLennan (Waterfall 1958) cos; se and e TX w to nc TX, also Edwards Plateau.

Physalis pumila Nutt., (dwarf), PRAIRIE GROUND-CHERRY, LOW GROUND-CHERRY. Perennial usually with jointed hairs mostly 1-2 mm long, some 1- to rarely 3-branched, wide-spreading; leaf blades ovate to lanceolate; anthers yellow, 2.5-3 mm long. Prairies, open woods; Dallas, Fannin, Grayson, and Kaufman cos. e TX w to Blackland Prairie. Apr-Jul.

Physalis turbinata Medik., (top-shaped), THICKET GROUND-CHERRY. Annual, similar to *P. pubescens* var. *pubescens* Open woods, brushy areas; Grayson Co, mainly se, e, and s TX and Edwards Plateau. Jul-Nov. Sometimes lumped into *P. pubescens*.

Physalis virginiana Mill., (of Virginia), VIRGINIA GROUND-CHERRY. Perennial; stems from deep rhizome; pubescence short and retrorse to villous; leaf blades ovate to lanceolate; anthers yellow, 2-4 mm long. Oak woods; Denton and Grayson cos; e TX w to nc TX. Apr-Jun. Suspected of being poisonous (Burlage 1968). ☣

QUINCULA PURPLE GROUND-CHERRY, CHINESE-LANTERN

—A monotypic North American genus related to *Physalis*. (Possibly from Latin: *quin*, five, and *cula*, little, from the five spots on the corolla mentioned in the type description; derivation unexplained by the author)

REFERENCE: Averett 1979.

Quincula lobata (Torr.) Raf., (lobed), PURPLE GROUND-CHERRY, CHINESE-LANTERN-OF-THE-PLAINS. Rhizomatous perennial herb, stems decumbent or low-spreading; plant nearly glabrous in age, young parts granulose-whitened (due to short-stalked white crystalline vesicles which collapse upon drying); leaves petioled; leaf blades oblong-lanceolate or -elliptic, subentire to coarsely toothed or pinnatifid, 4-10 cm long; flowers typically facing upward, conspicuous; co-

rollas rotate, 1.5–2 cm broad, blue-purple typically with deeper purple star-like pattern (rarely white—Stanford (1976) indicated that forma *albiflora* Waterf. is known in TX only from Brown and Val Verde cos.); calyces inflated in age, 1.5–2 cm long at maturity; anthers yellow; berry 4–8(–10) mm in diam. Sandy or gravelly open ground; Montague, Tarrant, and Wise cos. s and w to w TX. Apr-Jun, sporadically during summer, Sep-Oct. Sometimes lumped into the genus *Physalis* [as *P. lobata* Torr.] ☒/104

SOLANUM NIGHTSHADE

Ours annual or perennial herbs or half-shrubs, glabrous or variously pubescent, some with stellate hairs, some species prickly; flowers in lateral or terminal racemes, cymes, or umbels; anthers usually with terminal pores.

☛ A huge, nearly cosmopolitan genus of 1,200 species (M. Nee, pers. comm.) considered by some to have up to 1,700 species (Mabberley 1997). It includes *S. tuberosum* L. (POTATO), a South American species with edible underground stems (= tubers), and *S. melongena* L. (EGGPLANT), an Old World native with edible fruit. Hundreds of POTATO cultivars are grown in Andean South America; it is an ancient crop brought into cultivation high in the Andes ca. 8,000 years ago and is today the world's fourth most important crop after WHEAT, RICE, and CORN. POTATOES were first grown in Europe in the 16th century (Ireland in 1566), but soon became an important staple; collapse of POTATO cultivation in the middle 1800s as a result of the potato blight (*Phytophthora infestans*) caused tremendous social upheaval in Ireland (see Grun 1990 for a review of POTATO evolution). Recent molecular studies (Bohs & Olmstead 1997; Olmstead & Palmer 1997) indicated that two other economically important genera, *Lycopersicon* (TOMATOES) and *Cyphomandra* (TREE TOMATOES) are nested within the *Solanum* clade and are best considered part of that genus (as is done here for *Lycopersicon*). ☛ Many *Solanum* species contain toxic glycoalkaloids (e.g., solanine); leaves and/or fruits of all species growing in nc TX should be considered potentially fatally poisonous; even the foliage, green tubers (when exposed to light), and sprouts of the edible POTATO are poisonous; animals have died from ingesting POTATO foliage and humans have died from the green tubers (Sperry et al. 1955; Kingsbury 1965; Schmutz & Hamilton 1979; Lampe & McCann 1985). Gaffield et al. (1992) documented that POTATO sprout alkaloids are teratogenic (= cause birth defects) in test animals; high POTATO (and thus solanine) consumption in Britain by pregnant women is alleged to cause spina bifida in babies (Mabberley 1997). *Solanum* flowers are an example of the “vibrator” or “buzz” pollination syndrome; the flowers lack nectar and the abundant pollen is used as a reward; pollinators (such as bumblebees) shake the anthers by vibrating their thoracic flight muscles at a certain frequency; this sets up a resonance in the anthers or the space they enclose and the otherwise inaccessible pollen is released from the terminal pores of the anthers and collected by the insect (Barth 1985; Proctor et al. 1996). The turned back (reflexed) corollas and exposed anther-cone of “vibrator”-type flowers may be an adaptation to minimize dampening of vibration resonance or it may be an adaptation related to microclimate in the flower (e.g., to keep the pollen in a dry powdery condition so that it is easily dispersed) (Corbet et al. 1988; Proctor et al. 1996). (Classical Latin name for these plants, possibly from Latin: *solutum*, soothing, comforting, or quieting, from narcotic properties)

REFERENCES: Muller 1940; Luckwill 1943; Whalen 1979; Schilling 1981; Boyd et al. 1984; Lemke 1991; Bohs & Olmstead 1997; Olmstead & Palmer 1997.

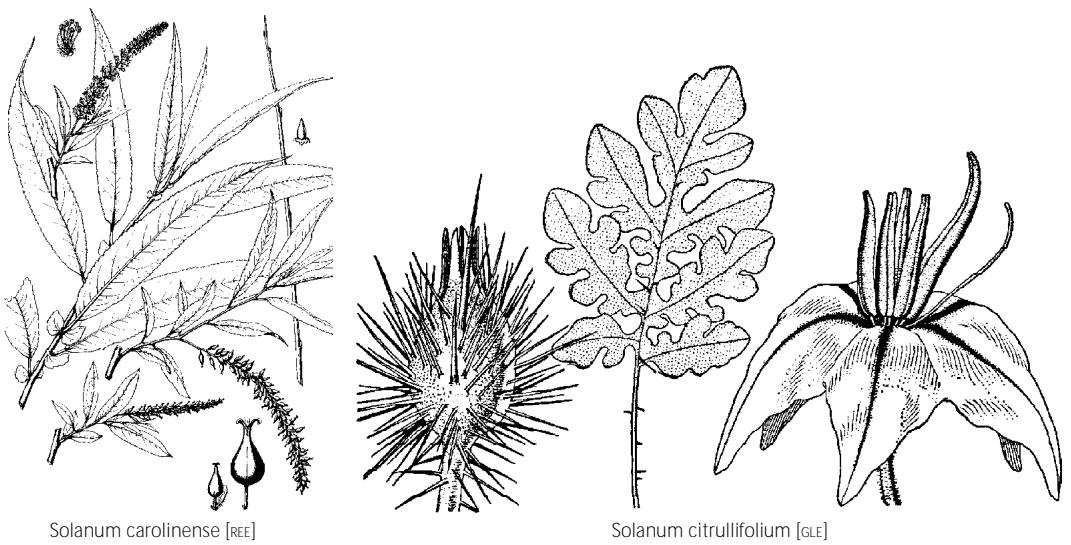
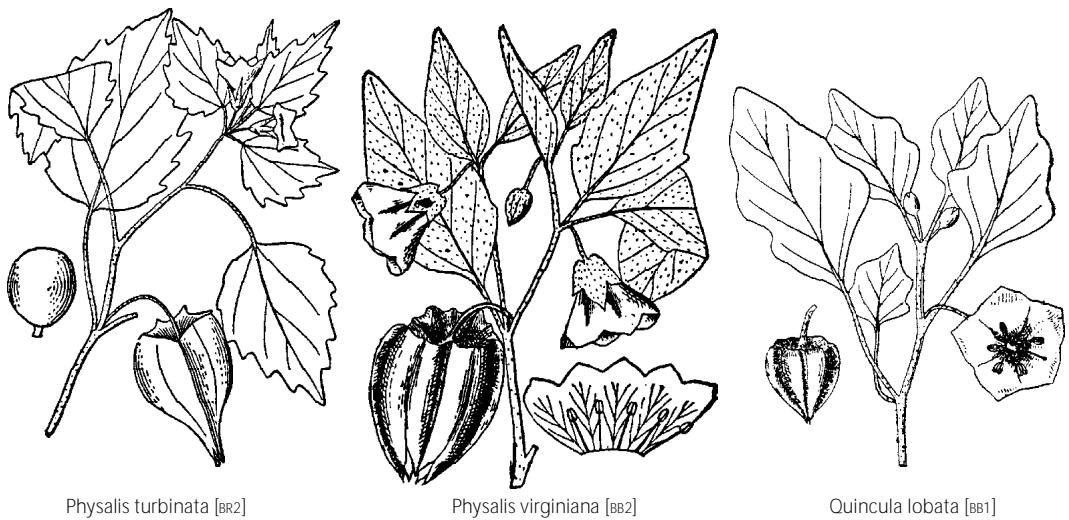
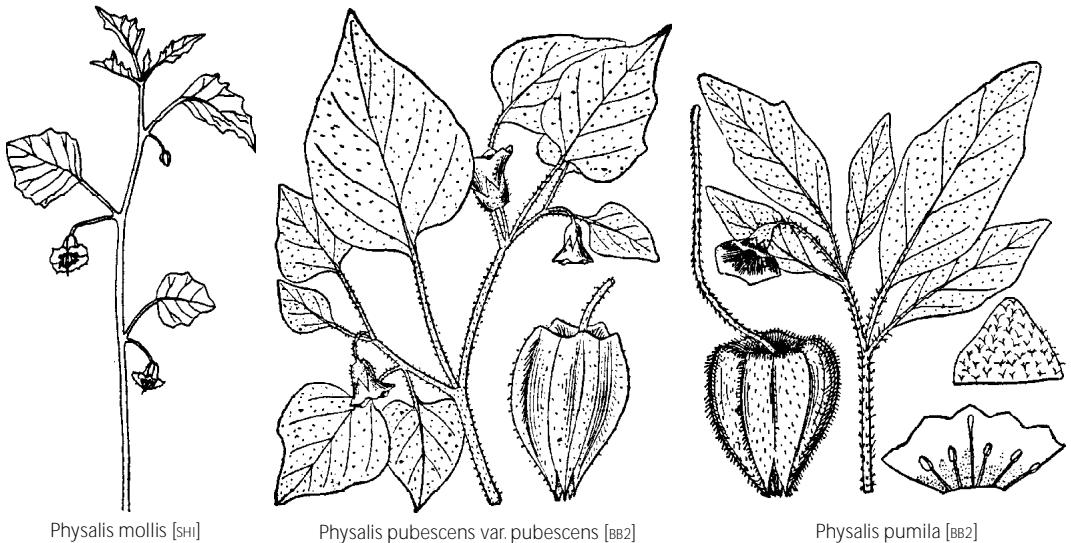
1. Anthers fused into a pointed cone terminated by a sterile tip, opening longitudinally down the inner face; corollas yellow; plants unarmed, with viscid-glandular hairs _____ ***S. lycopersicum***
1. Anthers converging around the style but not fused, opening at the tips by pores or slits; corollas usually bluish purple to white (yellow in 1 species); plants unarmed or armed with prickles, usually not viscid-glandular.

2. Leaves pinnately compound or deeply twice-pinnatifid; corollas yellow, violet, or blue.
3. Corollas yellow; stem hairs stellate; inflorescences stellate-hairy only _____ **S. rostratum**
3. Corollas violet or blue; stem hairs simple and glandular; inflorescences glandular-villous as well as somewhat stellate-hairy _____ **S. citrullifolium**
2. Leaves entire, toothed, or unevenly lobed; corollas white to purplish or bluish.
4. Plants usually armed (larger leaves usually prickly on midrib beneath; stems also usually prickly); anthers 5–10 mm long; leaves conspicuously stellate-pubescent (with a lens).
5. Leaf blades 3–5 times as long as wide, oblong-lanceolate, unlobed to sometimes with a strongly wavy margin, usually silvery or gray-green and often velvety in appearance due to the dense silvery pubescence _____ **S. elaeagnifolium**
5. Leaf blades 1.5–2.5 times as long as wide, rhombic to oblong-elliptic, often conspicuously lobed, dark green or grayish green, the usually tawny pubescence not so dense as to give a velvety appearance.
6. Corollas 1.5–2.7 cm across fully open, sparsely pubescent outside; calyces 4–7 mm long; stellate hairs on lower leaf surface sessile, usually with 4–8 rays; flowers usually white, rarely blue-lavender; fruits 1–2 cm in diam. _____ **S. carolinense**
6. Corollas 2.7–5 cm across fully open, felty-pubescent outside; calyces 7–17 mm long; stellate hairs on lower leaf surface stalked (at least some), usually with 8 or more rays; flowers blue-purple, rarely white; fruits 2.5–3 cm in diam. _____ **S. dimidiatum**
4. Plants unarmed (without prickles); anthers 1–4 mm long; leaves glabrous or sparsely pubescent.
7. Larger leaves often deeply 3- to 5-lobed, often roughly triangular in shape, sometimes cordate at base; corolla lobes 4.5–9 mm long; anthers 3–4 mm long; plants half-shrubby or vine-like perennials; mature fruits red _____ **S. triquetrum**
7. Larger leaves entire or shallowly lobed, neither triangular nor cordate at base; corolla lobes 1–4(–6) mm long; anthers 1–2 mm long; plants annuals; mature fruits black _____ **S. ptychanthum**

Solanum carolinense L., (of Carolina), HORSE-NETTLE, BALL-NETTLE. Perennial with creeping root; leaf blades angled, coarsely toothed, or lobed; corollas white, rarely blue-lavender. Sandy woods, roadsides; se and e TX w to Grayson and Tarrant cos., also Edwards Plateau. May-Oct. Animal and human poisonings have been reported including fatalities in children from eating the berries; chronic poisoning can occur in livestock from eating small quantities over a prolonged period (Kingsbury 1964; Burlage 1968; McGregor et al. 1986; Tveten & Tveten 1993). ☣

Solanum citrullifolium A. Braun, (with leaves of *Citrullus*—watermelon), MELON-LEAF NIGHT-SHADE. Annual, very prickly, much branched, to ca. 70 cm tall; corollas very striking violet or blue; one anther enlarged; fruits enclosed by very prickly calyces. Burnet Co. (Lemke 1991); mainly w 1/2 of TX. Jun-Oct. Poisonous. ☣ ☣/106

Solanum dimidiatum Raf., (divided into two dissimilar or unequal parts), WESTERN HORSE-NETTLE, POTATO-WEED. Similar to *S. carolinense* but coarser; corollas blue-purple, rarely white. Prairies, open woods, roadsides; widespread in TX. May-Jul, sporadically to Oct. [*S. perplexum* Small, *S. torreyi* A. Gray] Poisonous, can be lethal if eaten by livestock and suspected of causing birth defects and abortions in livestock. The species is also the cause of the neurological disease in cattle known as “Crazy Cow Syndrome”; symptoms include staggering and incoordination; if frightened, the cow will fall to the ground and struggle to regain its feet; once affected, while often living a normal lifespan, such cattle retain a tendency toward incoordination when disturbed or excited; they are thus accident prone and many have died from drowning; the disease occurs yearly in c and w TX in Concho, Mason, Nolan, Real, Runnels, and Taylor cos. (Menzies et al. 1979; Casteel & Bailey 1992). ☣ ☣/106



Solanum elaeagnifolium Cav. (with leaves like *Elaeagnus* in the Elaeagnaceae or Oleaster family), TROMPILLO, SILVER-LEAF NIGHTSHADE, BULL-NETTLE, WHITE HORSE-NETTLE, WHITEWEED, IRON-WEED. Perennial with creeping root; silvery-canescens throughout by many-rayed stellate hairs; stem varying from unarmed to densely prickly; corollas blue-purple, rarely white. Roadsides and waste places; throughout TX. May-Jun, less freely to Oct. Can be lethally poisonous if eaten by livestock due to the presence of the toxic glycoalkaloids solanine and solasonine; the fruits are a source of solasodine, used in the commercial manufacture of steroid hormones (Kingsbury 1964; Boyd et al. 1984). ☠

Solanum lycopersicum L. (Greek: *lykos*, wolf, and *persikon*, peach, suggesting that the fruit is inferior to a peach), TOMATO, LOVE-APPLE, GOLD-APPLE. Annual herb with unarmed decumbent stems to 2 m or more long; plant glandular-pubescent and strong smelling, also with spreading pubescence; leaves irregularly pinnate or pinnately lobed, pinnatifid, or bipinnatifid, the margins often inrolled; corollas yellow, nearly rotate to with recurved lobes, 1-2 cm broad; fruit a fleshy red or yellow berry; seeds numerous. Commonly cultivated for the edible fruit, sometimes found as a transient escape near dumps or picnic spots; Grayson Co. (open weedy area below abandoned dump), Kaufman Co. (shady riverbank); also Brown Co. (HPC) and Tarrant Co. near refuse dump (R. O'Kennon, pers. obs.). Late spring-fall. Probably native to Andean South America and possibly brought into cultivation there (Rick & Holle 1990) or in Mexico (Heiser 1987). [*Lycopersicon esculentum* Mill.] This species has traditionally been treated in *Lycopersicon* (TOMATO), a genus of 7 species native to w South America and the Galápagos Islands. However, TOMATOES are closely related to *Solanum* and can be hybridized with certain *Solanum* species. Recent molecular studies (Bohs & Olmstead 1997; Olmstead & Palmer 1997) indicated that *Lycopersiconis* nested within the *Solanum* clade and therefore best treated as part of the genus *Solanum*. We are thus following Bohs and Olmstead (1997), Olmstead and Palmer (1997), and J. Kartesz (pers. comm. 1997) in lumping *Lycopersicon* with *Solanum*. The common name TOMATO is derived from Nahuatl (language of the Aztecs), *tomatl* (Rupp 1987). The foliage is poisonous if eaten due to presence of toxic steroid alkaloids; animal deaths have been reported and human poisonings have occurred from drinking tea made from leaves (Kingsbury 1964, 1965; Keeler 1979; Schmutz & Hamilton 1979). Because it is in the same family as many toxic plants, when originally carried to Europe from the New World, even the fruits of the TOMATO were thought by many to be poisonous; this gave rise to interesting common names such as DEVIL'S WOLF-APPLE. ☠ ↗

Solanum ptychanthum Dunal, (folded flower), AMERICAN NIGHTSHADE, BLUE-FLOWER BUFFALO-BUR, HIERBA MORA NEGRA. Annual, larger plants widely bushy-branched; leaf blades thin, lanceolate or elliptic, entire or bluntly toothed (rarely shallowly lobed); corollas usually white; mature fruits 5-9 mm in diam. Stream bottom woods; throughout TX. Jun-Sep. The plant referred to here as *S. ptychanthum* has long commonly gone under the name *S. americanum*; however, because of nomenclatural rules, the correct name is apparently *S. ptychanthum* (Schilling 1981). [*S. americanum* of authors, not Mill., *S. nigrum* of authors, not L.] While the mature fruits of some strains are supposed to be edible when cooked, animal and human poisonings have been reported, probably due to solanine and saponins in immature fruits or foliage; both nervous system and digestive system symptoms have been reported (Kingsbury 1964; Morton 1982; Turner & Szczawinski 1991). ☠

Solanum rostratum Dunal, (rostrate, beaked), BUFFALO-BUR, KANSAS-THISTLE, MALA MUJER. Annual, very prickly, usually much-branched, to 70 cm tall, often low and broad; corollas yellow; 4 uppermost anthers yellow, 6-8 mm long, lowermost anther suffused with purple, enlarged, 10-14 mm long; fruits enclosed by prickly calyx. Overgrazed pastures, disturbed ground, various soils; throughout TX. Jun-Oct. The common name is presumably derived from the tendency of the prickly calyx enclosing the fruits to become tangled in the hair of buffaloes or

cattle; seed dispersal is thus accomplished (Kirkpatrick 1992). Poisonous and the burs may cause mechanical injury (Kingsbury 1964). ☠

Solanum triquetrum Cav. (three-edged or -cornered), TEXAS NIGHTSHADE, HIERBA MORA. Clump-forming, woody-based perennial from branching roots; longer stems twining; corollas usually white, sometimes pale blue; mature fruits 10–15 mm in diam. Stream banks, fencerows, and disturbed areas; Brown and Grayson cos.; also Dallas, Erath (Mahler 1988) and Somervell (R. O'Kennon, pers. obs.) cos. and Fort Hood (Bell or Coryell cos.—Sanchez 1997); nearly throughout TX. Apr–May. While information on toxicity was not found, this species should be considered poisonous. ☠

SPHENOCLEACEAE

SPHENOCLEA OR CHICKENSPIKE FAMILY

► A very small (2 species in a single genus) tropical family of annuals of wet places; treated by some in the Campanulaceae (e.g., Godfrey & Wooten 1981; Hatch et al. 1990; Taylor & Taylor 1994) and by others in its own family (e.g., Cronquist 1988; Lammers 1992; Kartesz 1994; Jones et al. 1997). According to N. Morin (pers. comm.), it is not closely related to Campanulaceae. (sub-class Asteridae)

FAMILY RECOGNITION IN THE FIELD: the single species occurring in TX can be recognized as a wet area herb with alternate simple leaves and small, white to yellowish flowers in erect cylindrical spikes.

REFERENCES: Rosatti 1986; Lammers 1992.

SPHENOCLEA

► A tropical genus of 2 species, 1 native to w Africa, the other pantropical (originally Africa?). (Derivation of generic name not explained by original author, possibly from Greek: *sphen*, wedge)

Sphenoclea zeylanica Gaertn., (of Ceylon), PIEFRUIT, CHICKENSPIKE, GOOSEWEED. Glabrous, usually branched, annual herb; stems erect, 0.5–1+ m tall, hollow, spongy- or corky-thickened when growing in water and producing numerous fibrous roots from the nodes; leaves alternate, simple; leaf blades elliptic, to ca. 12 cm long and 5 cm wide, marginally entire, apically acute, basally cuneate; petioles 5–20 mm long; inflorescences erect, terminal, cylindrical spikes 1.5–10 cm long, 0.5–1 cm in diam., so dense that the rachis is usually not visible; peduncles to 10 cm long; floral bracts 2–3 mm long and ca. 1 mm wide, not evident without close inspection because of the denseness of the spikes; flowers small, numerous, 5-merous, sessile; calyx lobes green, ca. 1.5 mm long, enlarged to 5 mm long in fruit; corollas sympetalous, radially symmetrical, white to yellowish, ca. 2.5 mm long, the lobes obtuse; stamens inserted near middle of corolla tube, distinct, deciduous with corolla soon after anthesis; anthers roundish; ovary inferior; capsules circumscissile, 2-locular; seeds 0.4–0.5 mm long. Wet places; can be a weed in areas of rice cultivation; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); possibly only to the se of nc TX; mainly se and e TX. Aug–Nov. Probably native of the Old World tropics, possibly Africa. ☺

STERCULIACEAE CHOCOLATE OR CACAO FAMILY

Ours trees or small shrubs; leaves alternate, simple; flowers radially symmetrical; sepals united at least at base; petals absent or present; stamens connate at base or higher; ovary superior; fruit a capsule or apparently follicle-like.

► A medium-large (1,500 species in 67 genera) family chiefly in tropical and warm areas with

a few in temperate regions; most are trees and shrubs or rarely herbs or lianas; stellate pubescence is usually present. The seeds of a tropical American member of the family, *Theobroma cacao* L., are the source of chocolate and cocoa, containing stimulating alkaloids including theobromine; African species of *Cola* provide flavoring and caffeine for various beverages. The family is related to the Bombacaceae (a mostly tropical family), Malvaceae, and Tiliaceae. Family name from *Sterculia*, a tropical genus of 200 species of monoecious or polygamous trees. (Named for Sterculius, the Roman god of privies, in reference to the dung-like odor of the flowers and leaves of some species; Latin: *stercus*, dung) (subfamily Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: trees or small ± herbaceous shrubs with alternate, simple, stipulate leaves; the 2 species occurring in nc TX are very different and best recognized individually.

REFERENCES: Brizicky 1966a; Whetstone 1983.

1. Trees to ca. 20 m tall; leaf blades 10–30 cm long, 3–5-lobed, the lobes entire; petals absent; sepals petaloid, yellow later becoming reddish, 8–12 mm long; flowers in elongate panicles often 50 cm or more long _____ **Firmiana**
1. Shrubs 2 m tall or less; leaf blades to 6 cm long (typically smaller), unlobed, serrate; petals 5, pink or violet with yellowish base, ca. 7 mm long; flowers solitary or in small axillary cymes _____ **Melochia**

FIRMIANA

—A genus of 12 species native to the Old World tropics; some are used as ornamentals or for timber. (Named for Karl Josef von Firmian, 1716–1782, Austrian statesman who was Governor of Lombardy and patron of the Padua botanical garden)

REFERENCES: Kostermans 1957, 1989.

Firmiana simplex W. Wight, (of one piece or series as opposed to compound, or simple, unbranched), CHINESE PARASOL-TREE, CHINESE BOTTLETREE, JAPANESE VARNISHTREE, PHOENIXTREE. Deciduous tree to nearly 20 m tall; leaves alternate, simple, conspicuously petiolate; leaf blades palmately 3–5 lobed, 10–30 cm long, often a little wider, cordate to sagittate basally, palmately veined; inflorescence a panicle; sepals 5; petals none; stamens 25–30; fruit of 5 stalked, follicle-like structures to ca. 13 cm long; seeds globose, 7–10 mm in diam., maturing on the open margins of the carpels. Cultivated and spreading from seed; downtown Fort Worth and Fort Worth Botanic Garden, Tarrant Co.; also escaping along Town Creek, near downtown Fredricksburg, Gillespie Co. on the Edwards Plateau. May–Jul. Native of e Asia. [*F. platanifolia* (L. f.) Schott & Endl.] ☎

MELOCHIA BROOMWOOD

—A mainly tropical, especially American genus of 54 species. (Derivation of generic name unknown)
REFERENCE: Goldberg 1967.

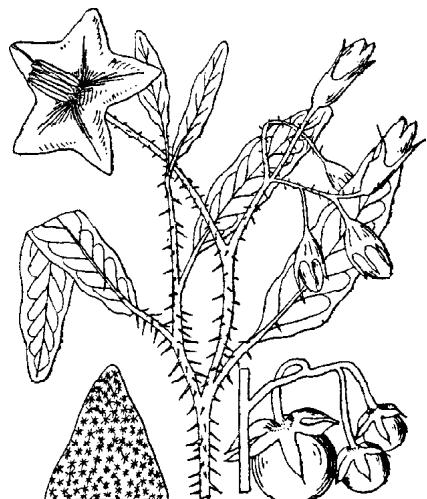
Melochia pyramidata L., (pyramid-shaped), ANGLE-POD MELOCHIA. Shrub, often ± herbaceous, to ca. (1.5–)2 m tall, glabrous or sparsely pubescent, superficially resembling a *Sida* (in the related Malvaceae); leaf blades ovate to lanceolate, with 5 veins from base but ± pinnately-veined in appearance; petioles to ca. 12 mm long; involucre absent; calyces 5-lobed, the lobes long acuminate; stamens 5; styles filiform; capsules 5-celled, 5 winged, somewhat star-shaped. Sandy or rocky soils, often in disturbed places or waste areas; lawn weed in Dallas, apparently brought in with sod (*Shinners* 15288), also weed in landscape in Tarrant Co.; native to the s 1/2 of TX. Apr–Nov.

STYRACACEAE STORAX FAMILY

—A small (160 species in 11 genera) family of trees and shrubs with resinous bark; they range from tropical and warm temperate areas of the New World to the Mediterranean, se Asia, and



Solanum dimidiatum [SHI]



Solanum elaeagnifolium [BB1]



Solanum lycopersicum [BB1]



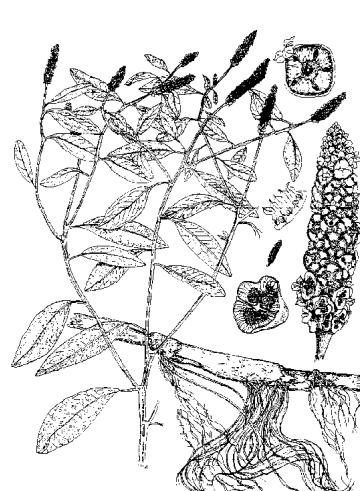
Solanum ptychanthum [REE]



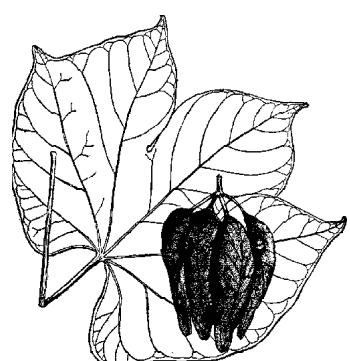
Solanum rostratum [DUN]



Solanum triquetrum [HEA]



Sphenoclea zeylanica [co1]



Firmiana simplex [BR1]

w Malesia. The small genus *Halesia* (SILVERBELL, SNOWDROPTREE, BELLTREE), with two species native to e TX, includes showy ornamental shrubs; its 4-lobed corollas and winged fruits easily distinguish *Halesia* from *Styrax* (with 5-lobed corollas and unwinged fruits). The family is possibly related to Ebenaceae and Sapotaceae. (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is a shrub or small tree with alternate, simple, entire, sometimes slightly lobed, exstipulate leaves; flowers white, showy, in ± drooping, few-flowered racemes.

REFERENCES: Wood & Channell 1960; Spongberg 1976.

STYRAX STORAX, SNOWBELL, SILVERBELL

— A genus of 120 species of trees and shrubs of the Mediterranean, se Asia, w Malesia, and tropical America n to the se U.S. The aromatic resins (benzoin, gum benjamin, storax) of some species, obtained by wounding the bark, are used medicinally (in friar's balsam, as an antiseptic, inhalant, and expectorant), in perfumes, and as incense in churches; other species are used ornamenteally. (Greek: *styrax*, ancient name for *S. officinalis* L., storax gum tree, native to the Mediterranean and source of storax, a fragrant resin used in incense)

REFERENCE: Cory 1943.

Styrax platanifolius Engelm. ex Torr. (with leaves like *Platanus*—sycamore), SYCAMORE-LEAF STYRAX, SYCAMORE-LEAF SNOWBELL. Many-branched shrub or small tree to 4 m tall; leaves alternate, simple, deciduous, petioled; leaf blades strongly reticulate-veined, broadly ovate to suborbicular, to ca. 10 cm long and wide, glabrous or nearly so, marginally undulate to angulate or with short lobes, basally truncate to subcordate, apically obtuse to abruptly acute; petioles 5–10(–13) mm long; flowers perfect, in short, 3–5-flowered, ± drooping, axillary racemes, these often appearing terminal; pedicels 8–12(–18) mm long; corollas with 5 petals united at base; petals white, showy, 12–14(–15) mm long, 4–6 mm wide; stamens 10; fruits globose or subglobose, 7–8 mm in diam., apically 3-valved; seed usually 1 per fruit. Along streams in limestone areas; Bell (Fort Hood—Sanchez 1997) and Burnet cos.; mainly on the Edwards Plateau; endemic to TX. Apr-May. 

TAMARICACEAE SALT-CEDAR OR TAMARIX FAMILY

— A small (78 species in 4 genera), mainly temperate and subtropical Old World family of trees and shrubs; many are halophytes or xerophytes; the leaves are small, often scale-like, and frequently have salt-excreting glands. (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: the only TX genus is an introduced group of shrubs or small trees with leaves alternate, very small, sessile, usually *scale-like* (giving the plant a *gymnosperm-like appearance*); flowers small, in spicate racemes; petals persistent after withering.

REFERENCE: Crins 1989.

TAMARIX SALT-CEDAR, TAMARISK

Ours introduced shrubs or small trees, much branched with slender branches, often evergreen; leaves alternate, entire, very small, scale-like, sessile (plants thus superficially gymnosperm-like in appearance); flowers small, 5-merous (our species) in spicate racemes usually clustered into panicles; petals white to pink to rosy-lavender (rarely reddish); anthers attached on or below a fleshy nectary-disk; ovary superior; fruit a capsule; seeds terminating in a tuft of hairs.

— An Eurasian and African genus of 54 species including cultivated ornamentals. Some species produce manna (a sweet hardened exudate) resulting from puncture of stems by scale-insects; it can be observed in the Dead Sea area and is considered to be the Biblical manna (Baum 1978); others produce galls from which tannin is obtained for treating leather. *Tamarix* species

are deep-rooted and weedy and are problematic invaders in many parts of the w U.S.; they crowd out native species along watercourses and are said to lower the water table along streams and irrigation canals through transpiration. They can form nearly monotypic stands which are considered by some to be “biological deserts” with low animal and plant diversity. Nurserymen in the early 1800s apparently made the first introductions of TAMARISKS into the U.S.; the U.S. Dept. of Agriculture also introduced a number of these Old World species (from the late 1860s to 1915) in a misguided attempt for use in erosion control and as windbreaks (Cox & Leslie 1991; Brock 1994; Luken & Thieret 1997). The common name SALT CEDAR is derived from the plants’ ability to tolerate salt and their CEDAR (*Juniperus*) -like appearance. The species are distinguished with difficulty. (Classical Latin name, possibly from Tamaris River in Spain)

REFERENCES: Baum 1966, 1967, 1978; Brock 1994.

1. Staminal filaments arising from the tips of the disk lobes; disk lobes longer than wide; petals caducous (= falling early) _____ **T. gallica**
1. Staminal filaments appearing to arise from between the disk lobes, inserted under the disk near the margin or inserted between the lobes; disk lobes wider than long; petals persistent.
 2. Petals ovate to elliptic; sepals ± entire; leaves oblong to narrowly lanceolate, acute; flowers of racemes on green branches with 1–2 of the filaments inserted between lobes of disk _____ **T. chinensis**
 2. Petals obovate; sepals eroded to irregularly denticulate; leaves ovate, acute to acuminate; all filaments inserted below disk near margin _____ **T. ramosissima**

Tamarix chinensis Lour, (Chinese), CHINESE TAMARISK. Bark brown to black-purple. *Tamarix chinensis* and *T. ramosissima* are often separated with difficulty; Baum (1967) indicated that some specimens cannot be distinguished and that hybridization may be a possibility. Cultivated and escapes, sandy soils; Cooke and Palo Pinto cos. along Red and Brazos rivers; also se TX. May-Jul. Native of Mongolia, China, and Japan. 

Tamarix gallica L., (of Gaul or France), FRENCH TAMARISK, ROMPEVIENTOS, SALT-CEDAR. Bark blackish brown to deep purple. Cultivated and escapes in some areas; sandy or silty stream bottoms. May-Jul, sporadically later. Native to s Europe. Mahler (1988) considered this the only species in nc TX. However, based on the work of Baum (1967), nc TX material seems to be *T. chinensis* and *T. ramosissima*. According to Baum (1967), while rare in the U.S., *T. gallica* is known from Texas. While no definitive collections of *T. gallica* have been seen from nc TX, it is included here for clarity and because it is cited as occurring in vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990). 

Tamarix ramosissima Ledeb., (much-branched), SALT-CEDAR. Bark reddish brown. Cultivated and escapes, in sand and silt, along rivers, reservoirs, disturbed areas; Brown, Grayson, Lamar, and Wise cos.; also se TX and Edwards Plateau. Jun-Jul, Oct. Native of Eurasia. 

TILIACEAE LINDEN FAMILY

The Tiliaceae is a medium-sized (680 species in 46 genera), subcosmopolitan, but mainly tropical family of trees, shrubs, or rarely herbs with a few temperate taxa; stellate pubescence or peltate scales are often present and the leaves are usually palmately veined. Some are important as sources of timber, as ornamentals, or for fiber. Asian species of *Cochchorus* are the source of jute (gunny), the fiber used in sacking, twine, carpeting, and paper. The family is related to the Bombacaceae (a mostly tropical family), Malvaceae, and Sterculiaceae. (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: the only nc TX species is a tree with few-flowered inflorescences attached by a peduncle to the middle of a distinctive, conspicuous, leafy, strap-shaped bract; leaves alternate, simple, toothed, asymmetric at base; fruits round, nut-like, pea-sized.

REFERENCE: Brizicky 1965b.

TILIA BASSWOOD, LINDEN, LIME

—A n temperate genus of 45 species with fragrant flowers on an inflorescence emerging from a prominent bract; a number are important as ornamentals or for timber; bees make a superb honey from the flowers of some. According to Strausbaugh and Core (1978), the inner bark is very tough and useful in making fabrics or baskets—thus the name bastwood (= basswood). (Classical Latin name)

REFERENCES: Sargent 1918; Jones 1968; Hardin 1990.

Tilia americana L. var. **caroliniana** (Mill.) Castigl., (sp: American; var: of Carolina), CAROLINA BASSWOOD, FLORIDA BASSWOOD, KENDALL BASSWOOD, FLORIDA LINDEN. Large tree to ca. 30 m tall; young twigs with tomentum; leaves deciduous, simple, alternate; leaf blades broadly ovate, to 13 cm long, stellate-tomentose or sparsely stellate-pubescent on abaxial (= lower) surface, basally asymmetric, truncate to cordate, marginally coarsely dentate; petioles to 35 mm long; flowers fragrant, white or yellowish, 5-merous, 10 mm or less long; peduncle adnate to middle of a distinctive, narrow, foliaceous bract, the bracts to 12 cm long and 3 cm wide; ovary superior; fruits globose, nutlike, ca. 6 mm in diam. Low woods; Fannin (Simpson, 1988) and Lamar (Little 1976 [1977]) cos. in ne part of nc TX; mainly se and e TX, also Edwards Plateau. Apr-Jun. The leaves are superficially similar to those of *Morus rubra*, RED MULBERRY, (which has leaves often lobed, usually symmetrical or nearly so basally). CAROLINA BASSWOOD can be distinguished by its never lobed, usually basally asymmetrical leaves.

ULMACEAE ELM FAMILY

Small to large, deciduous (in nc TX) trees; leaves alternate, simple, entire or serrate, often asymmetrical basally, short-petioled; stipules very small, falling when the leaves open; flowers in short, lateral racemes, fascicles (= clusters or bundles), or solitary, perfect or unisexual, small, greenish, not conspicuous; perianth 4- to 9-parted; stamens 4-9; pistil 1; ovary superior; fruit in ours a samara or drupe.

—A small (ca. 150 species in ca. 18 genera—Sherman-Broyles et al. 1997a) family of tropical and temperate, especially n temperate, trees and shrubs. According to Todzia (1993), the family is related to other members of the Urticales (e.g., Moraceae, Urticaceae); it appears to be basal in the order and paraphyletic as usually treated (Judd et al. 1994). (subclass Hamamelidae)

FAMILY RECOGNITION IN THE FIELD: trees with alternate, simple, pinnately veined, toothed leaves with *asymmetric bases*; flowers small, greenish, inconspicuous; fruits small, either flattened and winged, or rounded drupes.

REFERENCES: Elias 1970; Giannasi 1978; Todzia 1993; Judd et al. 1994; Sherman-Broyles et al. 1997a.

1. Flowers opening with the leaves in spring; leaves with 3 veins from base (2 basal lateral veins more prominent than other lateral veins), the veins curved; leaf margins entire or once serrate; fruit a small rounded drupe _____

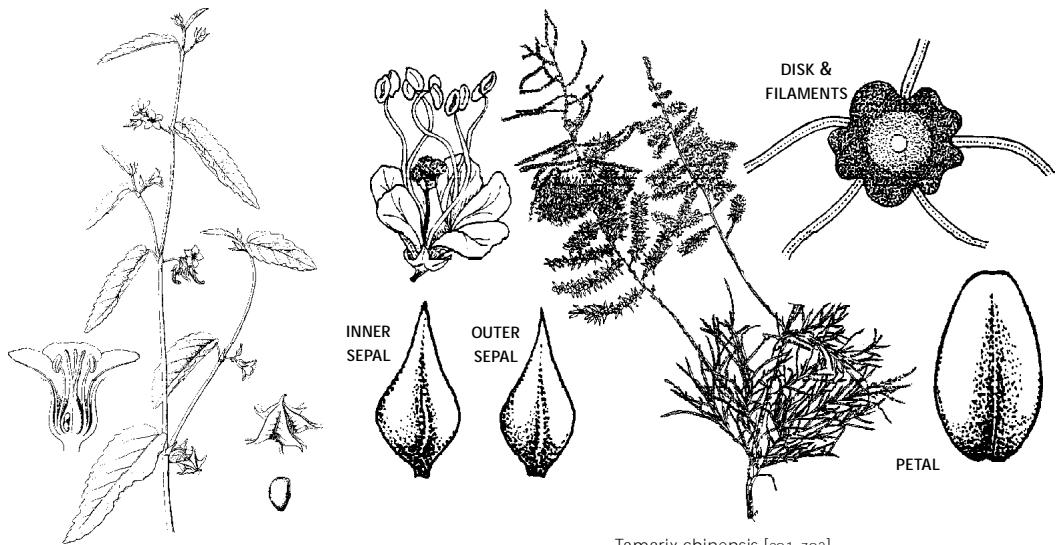
Celtis

1. Flowers open before the leaves (except fall flowering species); leaves with 1 main vein from base (basal lateral veins no more prominent than other lateral veins), the veins essentially straight, parallel; leaf margins doubly or once serrate; fruit a flattened and winged samara _____

Ulmus

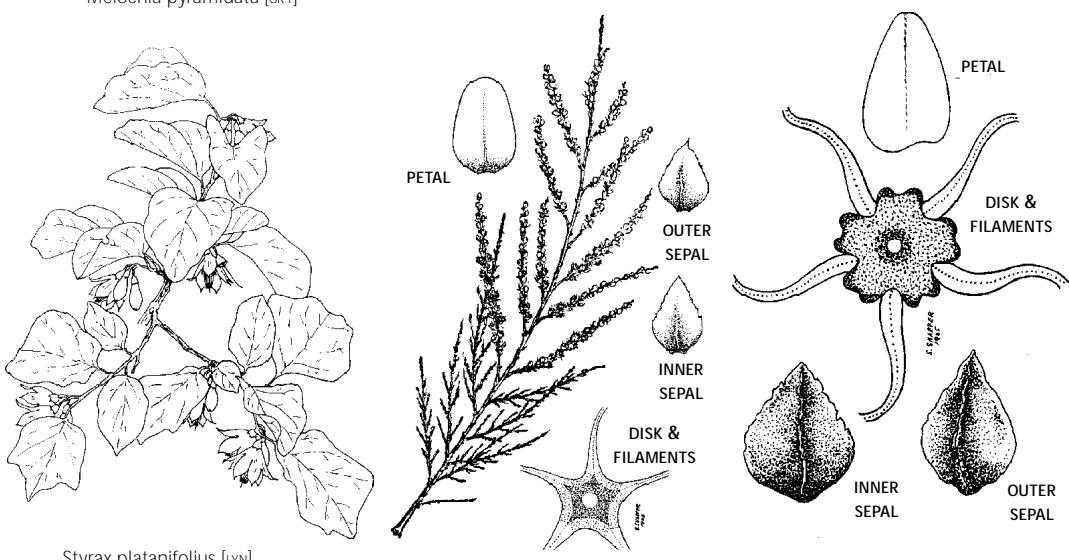
CELTIS HACKBERRY, SUGARBERRY, NETTLE-TREE

—A genus of ca. 60 species (Sherman-Broyles 1997b), mostly of the tropics, but also in temperate areas; the fruits are often edible. HACKBERRIES nearly always exhibit galls or other disease manifestations on the leaves or twigs. The fruits are popular as a food for winter birds such as cedar waxwings (Martin et al. 1951). Sherman-Broyles et al. (1997b) indicated that the group is



Melochia pyramidata [GR1]

Tamarix chinensis [ZO1, ZO2]



Styrax platanifolius [LYN]

Tamarix gallica [BR1, ZO2]

Tamarix ramosissima [ZO2]



Tilia americana var. caroliniana [SA3]

Celtis laevigata var. laevigata [GLE]

Celtis laevigata var. reticulata [SA3]

taxonomically complex and in need of revision. A conspicuous structure known as witches' broom (a dense mass of deformed twigs) is sometimes formed on HACKBERRIES by an infection involving both an insect and a non-rust fungus (J. Hennen, pers. comm.). (Latin: *celtis*, a kind of lotus; name used by Pliny for *Celtis australis* L., the lotus of the Ancients, with sweet fruits)
REFERENCE: Sherman-Broyles et al. 1997b.

Celtis laevigata Willd., (smooth), SUGARBERRY, SUGAR HACKBERRY, PALO BLANCO. Small to medium-large tree with gray, smooth or conspicuously warty-roughened bark; leaf blades ovate or lanceolate, 3–9 cm long, entire or few-toothed, cuneate to cordate basally, obtuse to acuminate apically; flowers small, both staminate and perfect present; calyces deeply lobed; fruits small, round, smooth drupes with a thin layer of flesh around a hard stone, orange, brown, dull or dark red to reddish black on pedicels equaling or exceeding the subtending petioles; the fruits persist after the leaves fall. Stream bottoms, slopes, rock hillsides. Late Mar–mid-Apr. The 3 varieties given below are not always clearly distinguishable. Varieties *laevigata* and *reticulata* can usually be told apart without difficulty. However, individuals that appear to be var. *texana* often seem intermediate between the other 2 varieties and thus difficult to place definitively. Variety *texana* may well not warrant recognition. Also, in e TX var. *laevigata* is commonly thinner-leaved than in most of nc TX, intergrading westward with the stiffer-leaved var. *texana*. Sherman-Broyles et al. (1997b) recognized var. *reticulata* as a separate species and lumped var. *texana* with var. *laevigata*. We are following Kartesz (1994) and J. Kartesz (pers. comm. 1997) in recognizing all three varieties. Additional taxonomic work is needed to clarify the situation.

1. Upper surface of mature leaf smooth or nearly so; petioles essentially glabrous _____ var. ***laevigata***
1. Upper surface of mature leaf slightly to harshly scabrous (rarely nearly smooth); petioles pubescent.
 2. Upper surface of leaf usually harshly scabrous; leaf base cordate to occasionally oblique; apex of mature leaves obtuse to acute (rarely subacuminate). _____ var. ***reticulata***
 2. Upper leaf surface usually slightly scabrous (rarely nearly smooth); leaf base usually cuneate to rounded; apex of mature leaves acute to acuminate _____ var. ***texana***

var. ***laevigata***, Mature leaf blades (4–)6–8(–15) cm long, entirely glabrous or pubescent on main veins beneath; fruits usually 5–8 mm in diam. Mainly e 2/3 of TX.

var. ***reticulata*** Torr., (netted), NET-LEAF HACKBERRY, PALO BLANCO. Leaf blades 2–4.5(–7) cm long, rather thick and stiff, dark green above, pale and with prominent raised veins (= strongly reticulate veined) and pubescent beneath; fruits usually (5–)8–10 mm in diam., dark red or reddish black, on pedicels exceeding the subtending petioles. Denton, Hill, McLennan, Parker, and Tarrant cos., also Bell, Coryell (Fort Hood–Sanchez 1997), Brown (HPC), Clay, Cooke, Dallas, Henderson, and Montague (Little 1976) cos.; mainly w 1/2 of TX. Late Mar–mid-Apr. [*Celtis reticulata* Torr.]

var. ***texana*** (Scheele) Sarg., (of Texas). Mature leaves usually pubescent on veins beneath; fruits usually 5–8 mm in diam. Clay, Cooke, McLennan, and Young cos., also Bell Co. (Fort Hood–Sanchez 1997 as *C. tenuifolia*); w part of nc TX s to the Edwards Plateau and w to w TX. Jones et al. (1997) did not list this variety for TX.

ULMUS ELM

Bark usually with deep furrows (except *U. parvifolia*); leaves short-petioled; leaf blades pinnately veined, sharply toothed, with slightly to strongly asymmetrical base; flowers small, perfect; calyces funnelform; fruit a flat, rounded samara with central seed surrounded by a thin wing.

• A genus of 20–40 species Sherman-Broyles 1997) occurring from the n temperate zone s to Central America and se Asia (Wiegrefe et al. 1994); some are important ornamental shade or street

trees while others are used for timber; many are susceptible to the beetle-borne fungus which causes Dutch Elm Disease. (Classical Latin name for elm)

REFERENCES: Sherman-Broyles et al. 1992; Wiegrefe et al. 1994; Sherman-Broyles 1997.

1. Plants with flowers and fruits only (in spring).
 2. Fruits glabrous marginally; flowers and fruits sessile or subsessile, in dense fascicles, neither drooping nor in racemes.
 3. Fruits pubescent over seed (in center of fruit); calyces pubescent _____ ***U. rubra***
 3. Fruits glabrous over entire surface; calyces glabrous _____ ***U. pumila***
 2. Fruits ciliate marginally; flowers and fruits either drooping on elongate pedicels OR in short racemes.
 4. Surface of fruits glabrous (but marginally ciliate); twigs without corky wings; fruits ovate; flowers and fruits in loose fascicles, drooping on elongate pedicels; calyces shallowly lobed, slightly asymmetric _____ ***U. americana***
 4. Surface of fruits pubescent (as well as marginally ciliate); twigs usually with corky wings; fruits lanceolate to oblong-elliptic; flowers and fruits in short racemes, not drooping; calyces deeply lobed, symmetric _____ ***U. alata***
1. Plants with mature leaves (including fall flowering species).
 5. Leaves mostly once serrate (teeth without a break or cut); leaf bases symmetrical to slightly asymmetrical; upper surface of leaf blades smooth or nearly so; twigs without corky wings; escaped introduced species.
 6. Plants flowering and fruiting in late summer-fall; bark mottled with orangish to salmon areas, thin and flaky _____ ***U. parvifolia***
 6. Plants flowering and fruiting in spring; bark not mottled with orangish to salmon areas, not thin and flaky _____ ***U. pumila***
 5. Leaves usually doubly serrate (teeth with a break or cut on one side); leaf bases usually strongly asymmetrical; upper surface of leaf blades smooth to scabrous (= like sandpaper); twigs with OR without corky wings; native species.
 7. Leaf blades mostly 1.5–2 times as long as wide, 2.5–12 cm long; twigs without corky wings.
 8. Leaf blades glabrous to densely soft-pubescent beneath, glabrous and smooth or slightly scabrous above; buds glabrous or slightly pale pubescent _____ ***U. americana***
 8. Leaf blades densely soft-pubescent beneath, densely and harshly scabrous above; buds with long yellowish or rusty hairs _____ ***U. rubra***
 7. Leaf blades mostly 2–2.5 times as long as wide, 2–7 cm long; twigs with OR without corky wings.
 9. Leaf blades acute or short-acuminate, smooth or slightly scabrous above; twigs usually with corky wings; plants flowering in spring _____ ***U. alata***
 9. Leaf blades obtuse or subacute, coarsely scabrous above; twigs with or without corky wings; plants flowering in fall _____ ***U. crassifolia***

Ulmus alata Michx., (winged), WINGED ELM, CORK ELM, WAHOO ELM. Small tree; leaf blades smooth or slightly scabrous above, acute or short acuminate; twigs usually conspicuously cork-winged; samaras ovate-elliptic to oblong, ca. 8 mm long. Sandy ground, lowlands or uplands; se and e TX w to East Cross Timbers, also Erath Co. (Little 1971); also Edwards Plateau. Mar.

Ulmus americana L., (of America), AMERICAN ELM, WHITE ELM. Large tree; leaf blades glabrous or in nc TX frequently ± pubescent beneath and slightly scabrous above; samaras elliptic, ca. 1 cm long. Stream bottoms; mainly se and e TX w to West Cross Timbers and Edwards Plateau. Feb-early Mar. This species is particularly susceptible to Dutch elm disease, caused by an introduced European ascomycete fungus, *Ophiostoma ulmi* (Buisman) Nannf. [*Ceratocystis ulmi* (Buisman) C. Moreau]. This fungus, the spores of which are carried by bark beetles, blocks the

vascular tissue and thus kills infected trees; it was first discovered in North America in Colorado in the 1930s (Sherman-Broyles 1997).

Ulmus crassifolia Nutt., (thick-leaved), CEDAR ELM, OLMO. Similar to *U. alata*; leaf blades thicker, stiffer, harshly scabrous above, obtuse or subacute; samaras oblong, ca. 1 cm long. Uplands or lowlands; e 1/2 of TX. This is our only native fall-flowering species. Under conditions of fire suppression, it can be an aggressive invader of native prairie remnants.

Ulmus parvifolia Jacq., (small-leaved), CHINESE ELM, LACE-BARK ELM. Small to medium tree; leaf blades 20-ca. 60 mm long, similar to those of *U. pumila*; samaras suborbicular to round-ovate, ca. 1 cm long, glabrous. Cultivated and rarely escapes; Dallas Co. (R. O'Kennon, pers. obs.). Late summer-fall. Native of China and Japan. ☎

Ulmus pumila L., (dwarf), SIBERIAN ELM, DWARF ELM, ASIATIC ELM, CHINESE ELM. Small to medium tree or shrub; leaf blades 20-75 mm long, smooth or nearly so above, short-pointed; samaras suborbicular to round-obovate, 1-1.5 cm in diam., glabrous. Widely cultivated and possibly escaping; included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990). Early spring. Introduced from n China and e Siberia. ☎

Ulmus rubra Muhl., (red), SLIPPERY ELM, RED ELM. Medium sized tree; leaf blades harshly scabrous above; samaras suborbicular to obovate or broadly elliptic, 1-2 cm long. Stream bottoms; e TX w to West Cross Timbers (Comanche Co.—Little 1976); also Edwards Plateau. Mar. [*U. fulva* Michx.] The mucilaginous, slimy or slippery inner bark was used medicinally in the past and gave rise to the common name.

URTICACEAE NETTLE FAMILY

Ours annual or perennial herbs sometimes with stinging hairs; leaves alternate or opposite, simple, entire or toothed, petioled; stipules small, narrow; inflorescences terminal or axillary; flowers very small, often unisexual, sometimes perfect; perianth greenish, 2- to 4-parted; stamens as many as perianth parts; pistil 1; ovary superior; fruit an achene.

— A medium-large family (1,050 species in 48 genera) of mainly wind-pollinated herbs, shrubs, and lianas (a few trees) occurring from the tropics to a few in temperate areas. The Urticaceae are closely related to the Moraceae and Cannabaceae. From a cladistic standpoint these families should be lumped to form a more inclusive monophyletic Urticaceae (Judd et al. 1994). *Fatoua*, an herbaceous alternate-leaved member of the Moraceae, is often confused with various Urticaceae, particularly *Boehmeria*. *Fatoua* differs from *Boehmeria* in having its flowers in axillary, pedunculate glomerules. (subclass Hamamelidae)

FAMILY RECOGNITION IN THE FIELD: herbs with simple usually toothed leaves with stipules and with or without stinging hairs; flowers *very small, greenish*, usually unisexual, in *string-like clusters or tufts at the nodes*; sap clear.

REFERENCES: Miller 1971a; Bassett et al. 1974; Friis 1993; Judd et al. 1994; Boufford 1997b.

1. Leaves alternate.

2. Margins of leaves entire; flower clusters sessile in the axils of leaves _____ **Parietaria**

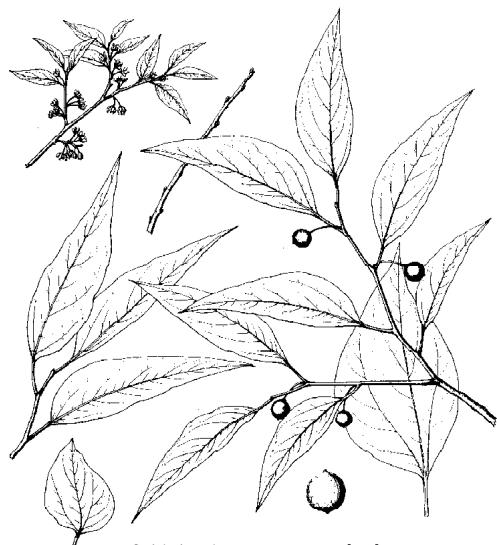
2. Margins of leaves toothed; inflorescences of numerous small compact clusters along leafless lateral branches (but these often terminated by leaves) _____ **Boehmeria**

1. Leaves opposite.

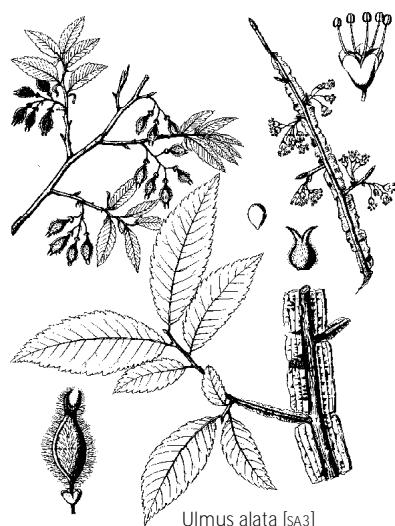
3. Plants with stinging hairs; flowers in axillary globular heads usually on short slender peduncles _____ **Urtica**

3. Plants without stinging hairs; flowers not arranged as above.

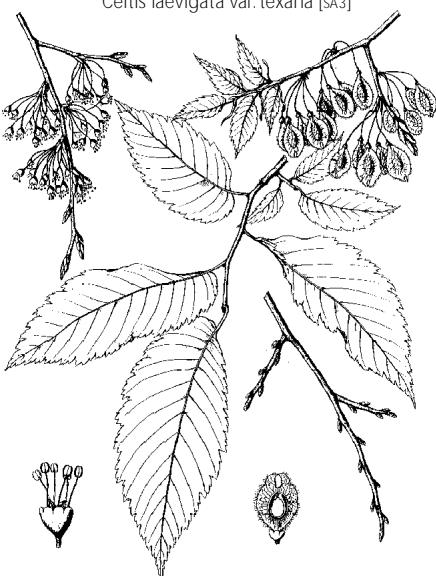
4. Inflorescences short paniculate (branched), from leaf axils of main stem; leaf blades glabrous _____ **Pilea**



Celtis laevigata var. *texana* [SA3]



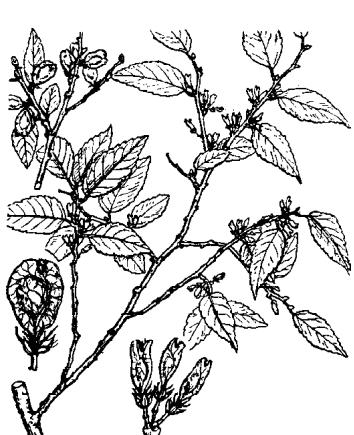
Ulmus alata [SA3]



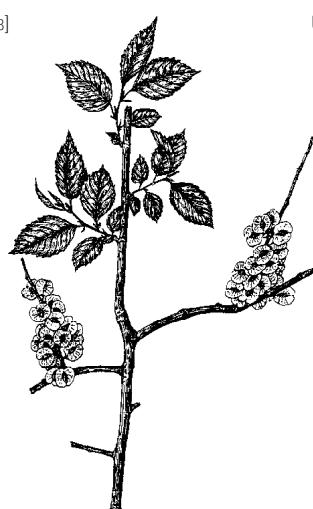
Ulmus americana [SA3]



Ulmus crassifolia [SA3]



Ulmus parvifolia [LIH]



Ulmus pumila [VIN]



Ulmus rubra [SA3]

4. Inflorescences spike-like (unbranched), of numerous small compact clusters along leafless lateral branches (but these often terminated by leaves); leaf blades glabrous to pubescent or scabrous _____

Boehmeria

BOEHMERIA FALSE NETTLE

— A genus of ca. 80 species of tropical and n subtropical areas; monoecious or dioecious trees to herbs without stinging hairs; *B. nivea* (L.) Gaudin (RAMIE, CHINA-GRASS) of tropical Asia is cultivated for its long fibers used in rope and Chinese linen. (Named for George Rudolph Boehmer, 1723–1803, professor of botany and anatomy at Wittenberg, Germany)

Boehmeria cylindrica (L.) Sw., (cylindrical), BOG-HEMP, SMALL-SPIKE FALSE NETTLE, BUTTON-HEMP. Monoecious or dioecious, erect perennial to ca. 1.2 m tall; leaves long-petioled; leaf blades ovate to ovate-lanceolate, to ca. 15 cm long and 8 cm wide, serrate, 3-nerved from the base; inflorescences spike-like (unbranched), of numerous, small, compact clusters along leafless lateral branches (but these often terminated by leaves); achenes ovate to round-ovate, 1–1.5 mm in diam., minutely winged, slightly beaked. Wet areas, low woods along streams; Cooke, Dallas, Grayson, Lamar, and Tarrant cos., also Fort Hood (Bell or Coryell cos.—Sanchez 1997); mainly se and e TX, scattered to the w. Jun–Oct.

PARIETARIA PELLITORY

— A genus of 20–30 species primarily in temperate and tropical regions (Boufford 1997b). (Ancient Latin name, from *paries*, wall, from the habitat of the first described species)

Parietaria pensylvanica Muhl. ex Willd., (of Pennsylvania), PENNSYLVANIA PELLITORY. Low monoecious or polygamous annual; leaf blades rhombic-lanceolate, minutely scabrous-pubescent, sticking to fingers and clothes; flowers in small axillary clusters, with prominent calyx-like green bracts. Sandy, silty, or rocky ground, in shade; se and e TX w to West Cross Timbers and Edwards Plateau, also Trans-Pecos. Apr-Jun, also occasionally again in Oct. The following 2 varieties are sometimes recognized; they intergrade and in many cases the characters separating them do not seem consistent.

1. Stems commonly much branched at base, densely pubescent with short, spreading, hooked hairs and few to many long, straight ones _____ var. **obtusa**
 1. Stems simple or sparsely branched, sparsely to rather densely pubescent with curled or hooked hairs, occasionally with a few long straight ones _____ var. **pensylvanica**

var. **obtusa** (Rydb. ex Small) Shinners, (blunt). Apparently mainly Edwards Plateau and Trans-Pecos. [*P. obtusa* Rydb. ex Small]

var. **pensylvanica**, HAMMERWORT. Most, if not all, nc TX material seems to be of this variety.

PILEA CLEARWEED, RICHWEED

— A genus of ca. 400 species of tropical and subtropical areas worldwide except Australia and New Zealand (Boufford 1997b); monoecious and dioecious herbs without stinging hairs; some used ornamenteally including *P. micropylla* (L.) Liebm. (ARTILLERY-PLANT, GUNPOWDER-PLANT) of tropical America whose anthers eject pollen explosively. (Latin: *pileus*, cap, alluding to the first described species' enlarged sepal, which partly covers the achene like the felt cap of the Romans)
 REFERENCE: Fernald 1936.

Pilea pumila (L.) A. Gray, var. **deamii** (Lunell) Fernald, (sp.: dwarf; var: for Charles C. Deam, 1865–1953, botanist of Indiana), CLEARWEED, CANADA CLEARWEED. Low monoecious annual to ca.

0.4(-0.7) m tall; stems watery, translucent; leaves long-petioled; leaf blades ovate, serrate; achenes ovate, 1.3-2 mm long, pale green, unspotted or with purple markings, unwinged and unbeaked. Moist woods, seepage areas and along streams; Fannin Co; mostly e TX. Jun-Nov.

URTICA NETTLE

— A genus of 45 species (Boufford 1997b); nearly cosmopolitan, but especially n temperate in distribution; usually herbaceous, monoecious or dioecious, and usually with alkaloids and stinging hairs; ☣ the hairs pierce the skin and inject histamine (causing itching), a neurotoxin (probably a sodium channel toxin), and acetylcholine (causing a burning sensation). (Classical Latin name, from *uv*, to burn, alluding to the stinging hairs)

REFERENCES: Woodland et al. 1976; Woodland 1982.

Urtica chamaedryoides Pursh, (presumably from resemblance to *Teucrium chamaedrys* L.—germander, in the Lamiaceae), STINGING NETTLE, HEART-LEAF NETTLE, ORTIQUILLA. Low monoecious annual with square stems; stems and leaves hispid with stinging hairs; leaf blades subcordate to lanceolate; flowers in small axillary clusters, the upper clusters forming a spike-like panicle with reduced leaves or bracts. Shady or damp ground; se and e TX w to West Cross Timbers and Edwards Plateau. Mar-May. Boufford (1997b) lumped [*U. chamaedryoides* var. *runyonii* Correll] from s TX. Jones et al. (1997) recognized var. *runyonii*. If touched, glass-like hairs on the foliage of this species break off in the skin and act like hypodermic needles; they release toxins which cause an intense burning sensation; this type of effect is known as contact urticaria. According to Lampe (1986), only four families (Euphorbiaceae, Hydrophyllaceae, Loasaceae, and Urticaceae) have such stinging hairs—nc TX has stinging representatives of all of these except the Hydrophyllaceae. ☣

VALERIANACEAE VALERIAN FAMILY

— A small (300 species in 10 genera), primarily herbaceous (rarely shrubby) family nearly cosmopolitan in distribution, but especially in n temperate areas and the Andes. Many have a characteristic “wet dog” odor due to the presence of valerenic acid and its derivatives. The Valerianaceae are closely related to the Caprifoliaceae and appear to represent an herbaceous clade within that mainly woody family. From a cladistic standpoint they should be lumped to form a more inclusive monophyletic Caprifoliaceae (Judd et al. 1994). Family name from *Valeriana*, a genus of ca. 250 species of herbs and shrubs with alkaloids, native to the n temperate zone, s Africa, and the Andes; some species of *Valeriana* have been used medicinally (e.g., *V. officinalis* L. to treat nervous disorders—Woodland 1997) (see *Valerianella* for derivation) (sub-class Asteridae).

FAMILY RECOGNITION IN THE FIELD: herbs with simple, opposite, often clasping leaves; flowers small, often crowded, in terminal, *dichotomously-branched* leafy-bracted inflorescences; corollas sympetalous, usually white; ovary obviously inferior, developing into a small but *distinctive fruit*—3-celled but only one cell maturing a seed (hand lens needed).

REFERENCES: Ferguson 1965; Donoghue et al. 1992; Judd et al. 1994.

VALERIANELLA LAMB'S-LETTUCE, CORNSALAD

Ours small annual herbs, dichotomously branched; often with a distinctive “wet dog” odor when dry; leaves, except lowest, sessile, often clasping, simple, opposite, entire or with few coarse, basal teeth or lobes; flowers small, terminal, in compact, head-like, dichotomous, leafy-bracted cymose inflorescences; calyx lobes absent; corollas usually white (rarely pale pinkish), funnelform to salverform, subequally 5-lobed, the tube saccate with nectary; stamens 3; pistil 3-carpellate, inferior, of 1 fertile locule (often somewhat flattened) and 2 sterile (= empty) loc-

ules (the sterile locules are sometimes inflated); fruits dry, 1-seeded, indehiscent, usually < 3 mm long.

—A genus of 50 species of the n temperate zone s to n Africa; some are used as potherbs; many North American taxa exhibit fruit polymorphisms in which a single population of a species may have up to three different genetically controlled fruit morphs. For *Valerianella* nomenclature we are following Eggers-Ware (1983). Mature fruits examined with a hand lens are necessary for positive identification of most of our taxa. Eggers-Ware has annotated a number of BRIT specimens without mature fruits as indistinguishable between *V. radiata* and *V. woodsiana* (Diminutive of *Valeriana*, a medieval name, perhaps from Latin: *valere*, to be strong or healthy, possibly alluding to medicinal properties of some species, or said by Linnaeus to honor Publius Aurelius Licinius Valerianus, Roman emperor from 253–260 B.C. and patron and friend of botanists)

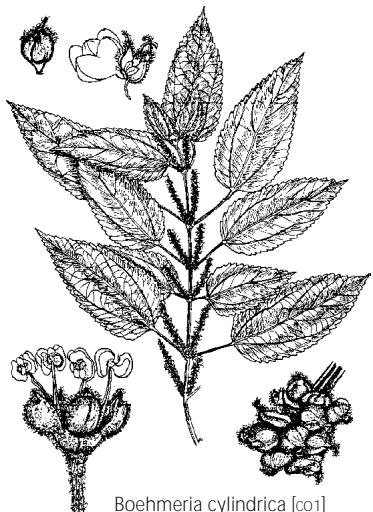
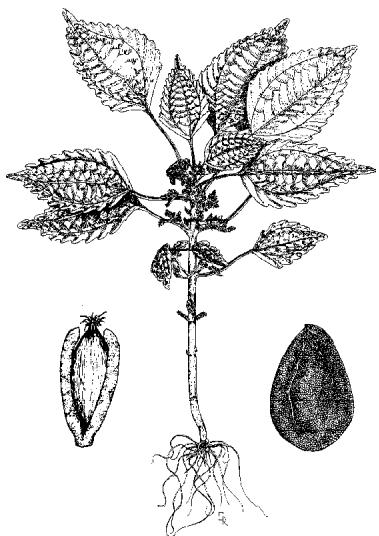
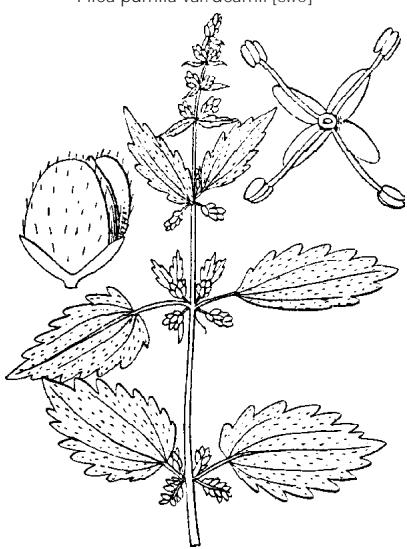
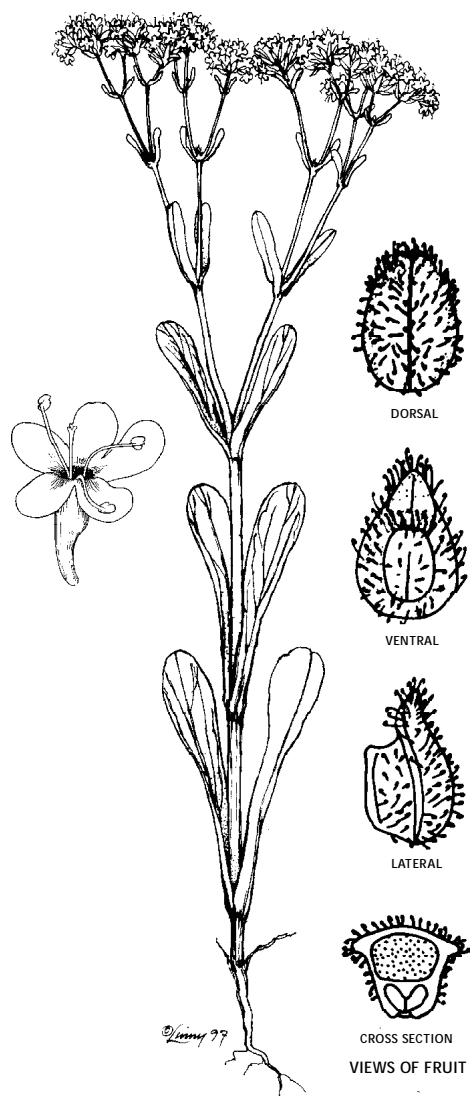
REFERENCES: Dyal 1938; Eggers 1969; Eggers-Ware 1983.

1. Flowers showy, the corollas 2.5–4.5 mm across; fruits with conspicuous hairs having a minute hook at their ends OR fruits glabrous or with straight hairs.
 2. Mature fruits broadly ovate to nearly round in outline, with conspicuous hairs having a minute hook at their ends; stems, leaves, and bracts essentially glabrous except for tufts of hairs on each side of leaf base; widespread on limestone in nc TX _____ ***V. amarella***
 2. Mature fruits narrowly elliptic or lanceolate in outline, glabrous or rarely with straight hairs; stems, leaves, and bracts with pubescence (on their margins or angles); rare if present in nc TX _____ ***V. stenocarpa***
1. Flowers not showy, the corollas 0.6–2 mm across; fruits glabrous or with straight hairs.
 3. Combined width of the 2 sterile locules distinctly wider than the single fertile locule (fertile locule conspicuously exceeded laterally by the widely divergent sterile locules); mature fruits wide, broadly elliptic to nearly round in outline _____ ***V. woodsiana***
 3. Combined width of the 2 sterile locules narrower to barely wider than fertile locule (fertile locule narrower to barely exceeded laterally by the sterile locules which are not divergent or only slightly so); mature fruits narrower, narrowly lanceolate to elliptic or ovate in outline _____ ***V. radiata***

Valerianella amarella (Lindh. ex Engelm.) Krok, (bitter, in reference to the taste of the leaves), HAIRY CORNSALAD. Plant 15–30 cm tall; stem glabrous; rather showy, usually many flowers open at once, over-topping the small bracts; corollas 3–4.5 mm across; fruits with the 2 sterile locules much smaller than the large fertile locule, the groove between sterile locules narrow, very shallow or inconspicuous. Limestone outcrops; Blackland Prairie–on Austin Chalk (Bell, Ellis, and Grayson cos.) s and w to w TX. Late Mar–May. Hundreds or even thousands of plants of *V. amarella* can make an extremely showy display when in flower on nearly bare limestone outcrops.

Valerianella radiata (L.) Dufr., (having rays), BEAKED CORNSALAD, NARROW-CELL CORNSALAD. Plant 15–60 cm tall; stems often pubescent along angles; upper leaves often lobed-toothed toward base; bracts mostly lanceolate to oblong-obovate, broadly pointed. Damp ground, disturbed areas; se and e TX w to West Cross Timbers. Mar–May. Eggers-Ware (1983) indicates that the 3 taxa of *V. radiata* found in nc TX are distinguishable only by fruit shape. Because they sometimes occur in mixed colonies and because of known genetically controlled fruit polymorphisms in other members of the genus, we are following her in recognizing these taxa at the forma level.

1. Single fertile locule somewhat humped across its width on outer surface; mature fruits narrowly lanceolate to narrowly elliptic in outline, usually more than twice as long as wide _____ ***V. radiata* forma *parviflora***
1. Single fertile locule nearly flat across its width on outer surface; mature fruits elliptic to ovate in outline, ca. twice as long as wide or less.

*Boehmeria cylindrica* [co1]*Parietaria pensylvanica* var. *pensylvanica* [GLE]*Pilea pumila* var. *deamii* [gwo]*Urtica chamaedryoides* [BB1]*Valerianella amarella* [EGG, HEA, RHO]

2. The 2 sterile locules slightly spreading apart from each other, with a deep valley-like groove between them; combined width of sterile locules ca. as wide as fertile locule (fertile locule not visible or only barely so when fruit viewed ventrally—from sterile locule side) common in nc TX

V. radiata forma radiata

2. The 2 sterile locules not spreading apart from each other, with only a shallow line-like groove between them; combined width of sterile locules distinctly narrower than fertile locule (fertile locule clearly visible when fruit viewed ventrally—from sterile locule side); rare in nc TX, mainly e TX

V. radiata forma fernaldii

forma **fernaldii** (Dyal) Egg. Ware, (for Merritt Lyndon Fernald, 1893–1950, author of *Gray's Manual of Botany*, 8th ed.) Kaufman Co.; otherwise in TX known only from Gonzales and Travis cos. [V. *radiata* (L.) Dufr. var. *fernaldii* Dyal]

forma **parviflora** (Dyal) Egg. Ware, (small-flowered). Se and e TX w to West Cross Timbers. [V. *stenocarpa* (Engelm. ex A. Gray) Krok var. *parviflora* Dyal] This taxon has a hump-backed fruit similar to that of V. *stenocarpa* however, based on a variety of other floral and vegetative characters (e.g., flower size), it is more appropriate to recognize it as a form of V. *radiata* (Eggers 1969).

forma **radiata**. Denton, Fannin, Grayson, Hopkins, Hunt, and Limestone cos; se and e TX w to West Cross Timbers. [V. *radiata* (L.) Dufr. var. *radiata*]

Valerianella stenocarpa (Engelm. ex A. Gray) Krok, (narrow-fruited). Plant 10–50 cm tall; stems often pubescent on angles; bracts glabrous or the middle and outer ± hispid-pubescent on margins, mostly linear- to oblong-lanceolate and rather narrowly pointed; corollas 2.5–4 mm across. Margins of thickets or woods, roadsides, fields, and fencerows; included based on Mahler (1988); according to D.M. Eggers-Ware (pers. comm.), this species, which is endemic to sc TX in a six county area along the Balcones Escarpment and on the edge of the Edwards Plateau, probably does not occur in nc TX. Apr–May. ↗

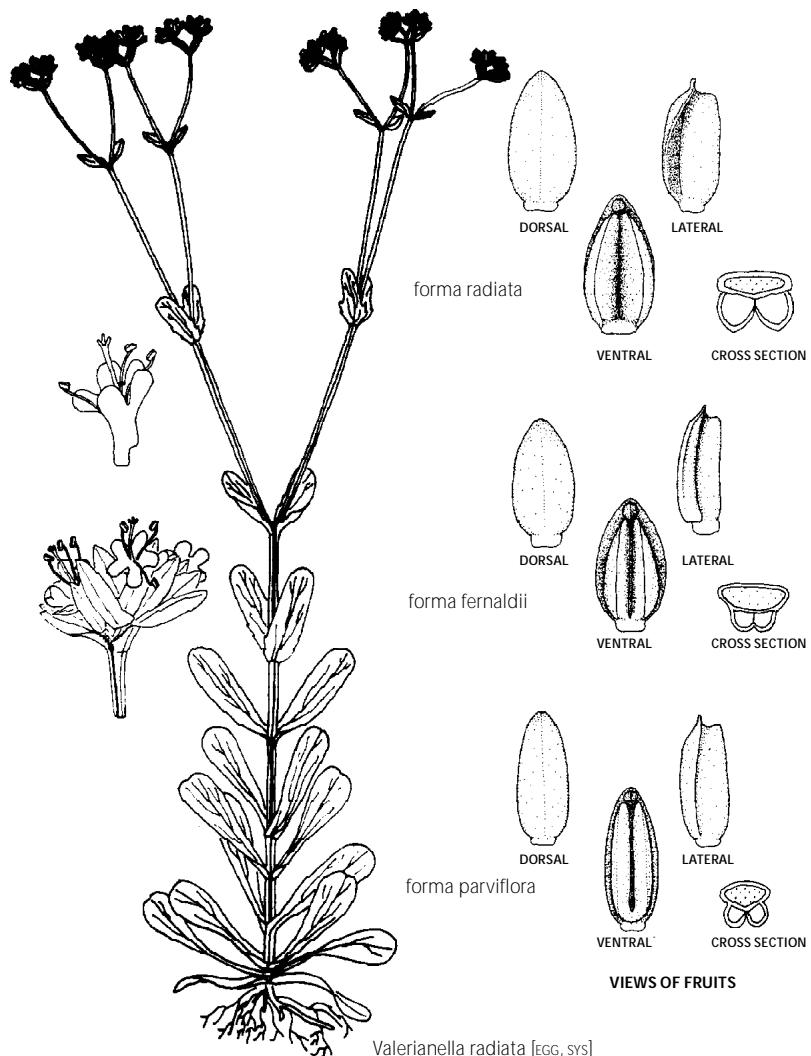
Valerianella woodsiana (Torr. & A. Gray) Walp., (for Joseph Woods, 1776–1864, British botanist and student of this genus), WOOD'S CORNSALAD. Plant 15–50 cm tall; stems often pubescent along the angles. Damp ground, especially sandy soils; Denton, Navarro, and Wise cos.; se and e TX w to nc TX. Apr–May. Eggers-Ware (1983) indicated that V. *woodsiana* can be reliably distinguished from V. *radiata* only by fruit characters and suggested the need for further study to determine whether it is a separate species or another fruit morph of V. *radiata*.

Valerianella *florifera* Shinners, (flower-bearing), was cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2), probably based on a Fayette Co. record to the se of nc TX. This species, which occurs on sandy soils, has relatively large corollas as in V. *amarella* and V. *stenocarpa*. Valerianella *florifera* differs from all other nc TX species in having margins of floral bracts conspicuously glandular-denticulate (vs. non-glandular or essentially so).

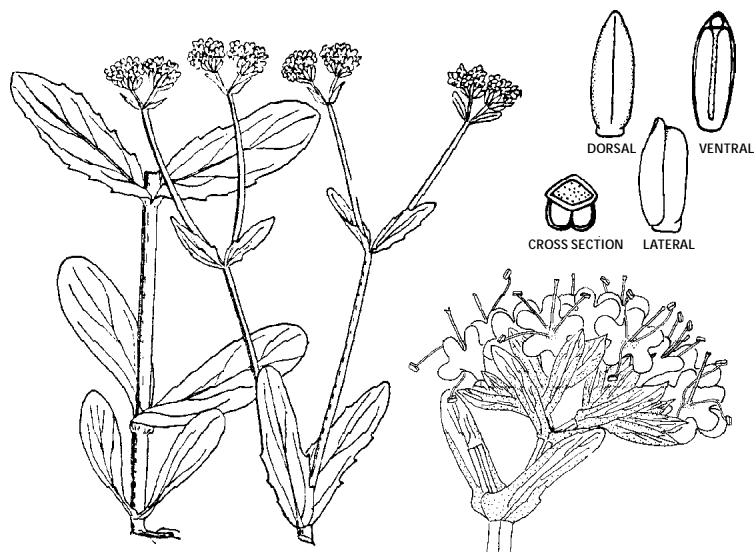
Valerianella *texana* Dyal, (of Texas), endemic to the Burnet, Gillespie, and Llano Co. area of the Edwards Plateau, is the only other Valerianella species in TX. This taxon has the relatively large corollas of V. *amarella* and V. *stenocarpa* but can be distinguished by its fruits < 1.5 mm long, with 4–6 irregular lines of clavate glands, and with the fertile locule grooved along the midline (vs. fruits > 1.5 mm long, glabrous, with cilia, or with hooked hairs, and the fertile locule not grooved along the midline). ↗

VERBENACEAE VERVAIN OR VERBENA FAMILY

Annual or perennial herbs, shrubs, or small trees; stems square (not distinctly so in woody species); leaves opposite or the uppermost alternate, simple or compound, entire, toothed, or lobed; flowers axillary or terminal, in heads, spikes, or panicles; sepals 5, united basally; corollas sal-



Valerianella radiata [EGG, SYS]



Valerianella stenocarpa [BB1, EGG]

verform or funnelform, 4- to 5-lobed, slightly or markedly bilaterally symmetrical; stamens 4, attached to corolla tube near or below middle; pistil 2-carpellate, usually 2-4-lobed; style 1 and stigmas 1 or 2; ovary superior; fruits dry and separating into 4 one-seeded nutlets or fleshy and drupe-like.

—A medium-large (950 species in 41 genera), mainly tropical family with a few species in temperate regions; it has often been treated more broadly to include groups now segregated into other families. It consists of herbs, shrubs, trees, and lianas and includes a number of ornamentals as well as the Asiatic *Tectona grandis* L. f. (TEAK), the source of a valuable, water-resistant wood. The family is related to the Lamiaceae and according to Judd et al. (1997), it appears to be paraphyletic. They suggested that from the cladistic standpoint, the Verbenaceae be limited to those taxa traditionally placed in the Verbenoideae (in nc TX this includes *Aloysia*, *Glandularia*, *Lantana*, *Lippia*, and *Verbena*), with the rest of the family put in a more inclusive, monophyletic Lamiaceae. However, recent molecular studies (Wagstaff & Olmstead 1997) do not support the monophyly of a clade composed of Lamiaceae sensu lato and Verbenaceae sensu stricto. Until the phylogeny of this group is more clearly resolved, we are treating these families in the traditional manner. *Phryma* has been placed in the Verbenaceae by a number of authorities (e.g., Cronquist 1981), but is here treated in its own family (see explanation under Phrymaceae). (subclass Asteridae)

FAMILY RECOGNITION IN THE FIELD: similar to the mint family (usually opposite leaves; stems often square; plants sometimes aromatic; sympetalous corollas) but differs in that the ovary has a single *terminal style* and the flowers are usually individually small.

REFERENCES: Moldenke 1948, 1961b; Judd et al. 1994; Wagstaff & Olmstead 1997.

1. Shrubs or small trees with large, conspicuous, palmately compound leaves with 3–9 distinct leaflets _____ **Vitex**
1. Herbs or shrubs with variously toothed to divided to bipinnatifid leaves, but not as above.
 2. Flowers and fruits in slender spikes; calyces with 3 slender, elongate (2–3 mm long) upper teeth ca. equaling the tube, and 2 short (0.3–0.5 mm long) lower teeth, in fruit the calyces dramatically reflexed and lying parallel to the inflorescence axis; herbs 30–100 cm tall _____ **Phryma** (see Phrymaceae)
 2. Flowers and fruits in heads or in solitary or panicled spikes or slender racemes or in axillary cymes; calyces without teeth as above, in fruit the calyces neither reflexed nor lying parallel to the inflorescence axis; small herbs to shrubs.
 3. Flowers in axillary cymes; stamens prominently exserted; corollas funnelform; shrubs to 3 m tall; leaf blades elliptic to ovate, 8–23 cm long; fruits rose-pink to violet or red-purple, globose, 3–6 mm in diam., in showy clusters _____ **Callicarpa**
 3. Flowers in heads or in solitary or panicled spikes or slender racemes; stamens barely or not exserted; corollas salverform, funnelform, or 2-lipped; herbs or shrubs; leaf blades various; fruits not as above.
 4. Leaf blades toothed, lobed, or deeply pinnatifid; herbs or shrubs, if shrubby, then the fruits drupe-like, with a ± fleshy outer layer; widespread in nc TX.
 5. Flowers in heads or spikes terminating leafy stems or branches; ovary 4-celled, the fruit separating into 4 nutlets.
 6. Nutlets completely enclosed by the twisted-closed calyces, not visible without dissecting calyces, grayish black to black at maturity, with a cavity at base; styles 6–20 mm long, 6 times as long as ovary or longer; inflorescence at flowering time of compact, flat-topped spikes (can elongate later); corollas salverform _____ **Glandularia**
 6. Nutlets barely included in the open calyces, their apices often visible, reddish brown, without a cavity at base; styles 2–3 mm long, 3 times as long as ovary or shorter;

- inflorescence at flowering time generally of elongated spikes (can sometimes be compact); corollas usually funnelform (some can be salverform) _____ **Verbena**
5. Flowers in heads or short spikes terminating leafless peduncles arising from the axils of leaves; ovary 2-celled, the fruit with 2 nutlets.
7. Shrubs to 2 m tall; leaf blades rotund to triangular-lanceolate, abruptly narrowed, rounded, or truncate basally, with distinct petioles; corolla tube 7–10 mm long, the limb 5–9 mm across; calyces nearly truncate with 2 short lateral teeth _____ **Lantana**
7. Herbs (base can be woody) with trailing or ascending stems rooting at the nodes; leaf blades oblong-lanceolate, oblanceolate, or obovate, sessile or gradually narrowed to short petiolar bases; corolla tube 2–5 mm long, the limb 1.5–4.5 mm across; calyces deeply 2-lobed or divided nearly to the base as 2 bracteole-like segments _____ **Lippia**
4. Leaf blades usually entire; shrubs with small dry fruits; rare in nc TX _____ **Aloysia**

ALOYSIA BEEBUSH

— A genus of 37 species native to the Americas. ☣ At least one species is toxic to livestock (Kingsbury 1964). (Named for Maria Louisa Teresa, died 1819, Princess of Asturias, Spain)

REFERENCE: Armada & Barra 1992.

Aloysia gratissima (Gillies & Hook.) Tronc., (very pleasing or agreeable), COMMON BEEBUSH, WHITEBRUSH, BEEBLOSSOM, PALO AMARILLO, CEDRÓN, POLEO, CEDRÓN DEL MONTE, NIÑARUPÁ, RESEDA DEL CAMPO, ANGEL FAVORITA, AZMIRILLO, ORGANILLO, ROMERILLO, VARA DULCE, HIERBA DE LA PRINCESA. Much branched shrub to 3 m tall, often with axillary fascicles of smaller leaves; young twigs minutely pubescent; leaves opposite, green, lanceolate to elliptic to narrowly oblong, 3–27 mm long, 2–8 mm wide, entire or with 1–4 teeth per side; flowers very sweet-scented with strong vanilla odor, in peduncled, erect, dense, spike-like racemes 2–7 cm long in the axils of reduced upper leaves, forming narrow panicles; corollas white or tinged with violet, with greenish yellow eye, with tube 3.5 mm long and limb 3.5 mm wide; fruits small, dry, 2-celled. Rocky or gravelly ground; Brown and Coleman cos., also Burnet (Moldenke 1948), Dallas, and Tarrant (Moldenke 1961b) cos; across much of the s 1/2 of TX rarely n to nc TX. Mar-Oct, according to rains. [*A. gratissima* var. *schulziae* (Standl.) L.D. Benson, *A. lycioides* Cham. var. *schulziae* (Standl.) Moldenke, *A. ligustrina* sensu Moldenke] Reported to produce weakness and death in horses when heavily grazed (Burlage 1968). While two varieties are often recognized (e.g., Kartesz 1994; Jones et al. 1997), we are not distinguishing infraspecific taxa within this species. However, all nc TX material seems to fall within var. *gratissima*. Moldenke (1961b) separated the two varieties (as *A. ligustrina*) as follows: ☣

1. Leaf blades narrowly oblong or elliptic, entire, appressed-puberulent beneath _____ var. *gratissima*
1. Leaf blades more broadly elliptic, obovate, or oblong-elliptic, the larger ones usually 2–8-toothed, densely strigillose beneath and shortly hispidulous along the venation _____ var. *schulziae*

CALLICARPA FRENCH-MULBERRY

— A genus of 140 species of the tropics and subtropics; some are used as ornamentals, ☣ others medicinally or as fish poisons. (Greek: *callos*, beauty, and *carpos*, fruit)

Callicarpa americana L., (of America), AMERICAN BEAUTY-BERRY, FRENCH-MULBERRY, BERMUDA-MULBERRY, SOURBUSH, BUNCHBERRY, FILIGRANA DE MAJORCA, FILAGRANA DE PIÑAR, FOXBERRY, PURPLE BEAUTY-BERRY, SPANISH-MULBERRY, TURKEY-BERRY. Soft-woody, stellate-pubescent shrub 0.7–3 m tall, with widely spreading branches; leaves with petioles to 38 mm long; leaf blades elliptic to ovate, 8–23 cm long, sharply toothed, aromatic; flowers in axillary cymes; corollas funnelform, obtusely 4-lobed, lavender-pink, to bluish, reddish, or white, small, the tube 2.6–2.9 mm long; fruits drupaceous, extremely showy, rose-pink to violet or red-purple, globose, 3–6

mm in diam., densely clustered, with a distinctive spicy odor. Woods, especially low ground; se and e TX w to East Cross Timbers, also Fort Hood (Bell or Coryell cos.—Sanchez 1997) in Lampasas Cut Plain; also Edwards Plateau. Jun-Jul. ☐/81

GLANDULARIA VERVAIN, VERBENA

Annual or perennial herbs; leaves opposite; calyces tubular, 5-lobed; corollas 5-lobed, salver-form; stamens 4; ovary 2-carpellate, 4-lobed; fruits separating at maturity into 4 one-seeded, linear nutlets; base chromosome number of 5.

While sometimes recognized as a section of *Verbena*, we are following Schnack and Covas (1944), Umber (1979), and Turner (1998) in recognizing *Glandularia* as a distinct genus based on consistent differences including seed morphology, chromosome number, and ratio of style versus ovary length. It is a New World genus of ca. 70 species. (Diminutive of Latin: *glandula*, glandular or glandulose, in reference to the glandular stigmatoid mass on the style branch)

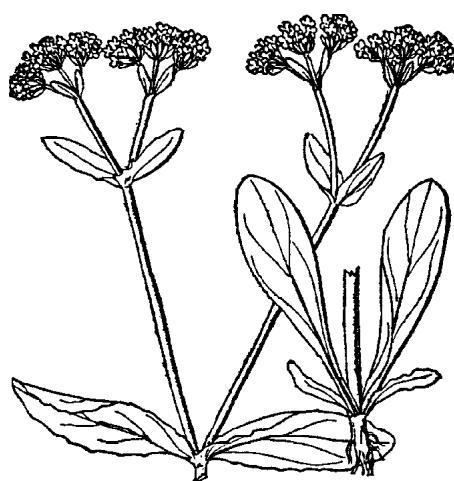
REFERENCES: Perry 1933; Schnack & Covas 1944; Umber 1979; Pruski & Nesom 1992; Turner 1998.

1. Flowers relatively small, the corolla tube 8–10 mm long, only slightly longer than calyx; corolla limb 3–5 mm wide; calyces 6 mm long; nutlets 2–2.8 mm long _____ **G. pumila**
1. Flowers relatively larger, the corolla tube 10–26 mm long, 1.5–2.5 times as long as calyx; corolla limb 7–15 mm wide; calyces 7–13 mm long; nutlets (2–)3–3.5 mm long.
 2. Corolla tube 15–30 mm long, the limb 10–24 mm wide; calyces 8–15 mm long; leaves merely toothed to incised, 3-parted, incised-pinnatifid, or 1-pinnatifid; inflorescences often conspicuously pedunculate.
 3. Leaves relatively little divided, irregularly deeply toothed from apex to base, densely soft pubescent on both surfaces; corolla limb 10–24 mm wide; escaped cultivar _____ **G. ×hybrida**
 3. Leaves much more divided, 3-parted to incised, incised-pinnatifid, or 1-pinnatifid, glabrate or with appressed hairs on both surfaces; corolla limb 10–15 mm wide; native species _____ **G. canadensis**
 2. Corolla tube usually 10–15 mm long, the limb 7–10(–15) mm wide; calyces 7–10 mm long; leaves 1–2-pinnatifid; inflorescences essentially sessile or on a short peduncle _____ **G. bipinnatifida**

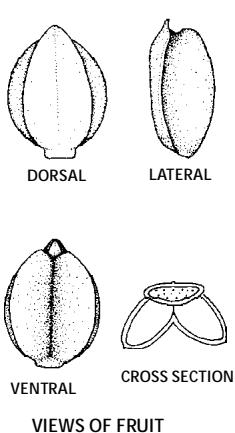
Glandularia bipinnatifida (Nutt.) Nutt., (twice pinnately cut), DAKOTA VERVAIN, PRAIRIE VERBENA, PRAIRIE VERVAIN, SWEET-WILLIAM, SMALL-FLOWER VERVAIN, COMMON VERVAIN, WILD VERVAIN, RAG-WEED VERVAIN, WESTERN PINK VERVAIN, WESTERN PINK VERBENA, MORADILLA. Perennial; stems ascending, densely hispid-hirsute; leaves variable; bracts usually exceeding calyces; calyces typically with non-glandular pubescence but without glandular pubescence or with only a few such hairs; corollas pink to lavender or purple. Disturbed areas; widespread in TX but mainly w 2/3 of the state. Late Mar-Jun, less freely to Oct. [*Verbena bipinnatifida* Nutt., *V. ciliata* Benth., *V. ciliata* var. *longidentata* L.M. Perry] ☐/91

Glandularia canadensis (L.) Nutt., (of Canada), ROSE VERVAIN. Perennial; stems decumbent to ascending; calyces typically with glandular pubescence in addition to non-glandular pubescence (in contrast to *G. bipinnatifida*); corollas showy, mostly pink to rose, varying to blue, lavender, purple, or white. Sandy open woods, roadsides; Henderson, Limestone, and Milam cos. on e margin of nc TX, also Grayson Co. in Red River drainage, also Denton, Lamar (Moldenke 1948), and Falls (Carr 1994) cos.; mainly se and e TX. Mar-May, sporadically later. [*Verbena canadensis* (L.) Britton, *V. ×oklahomensis* Moldenke]

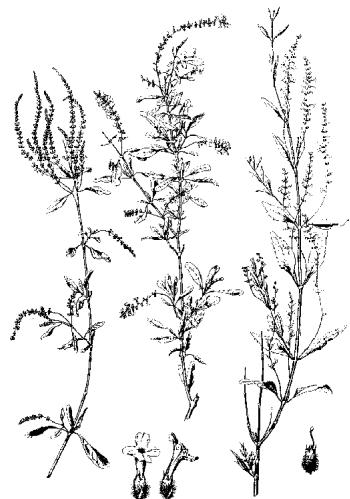
Glandularia ×hybrida (Groen. & Rümpler) G.L. Nesom & Pruski, (hybrid), HYBRID VERBENA, GARDEN VERBENA. Densely hirsute or villous perennial; stems procumbent or ascending, rooting at the nodes; spikes large and showy; flowers fragrant; calyces 8–15 mm long; corollas pink, red, white, yellow, blue, purple, or variegated, often with a white or yellow eye, the tube 15–30 mm long. Cultivated throughout the state as an ornamental and persisting or escaping; Dallas



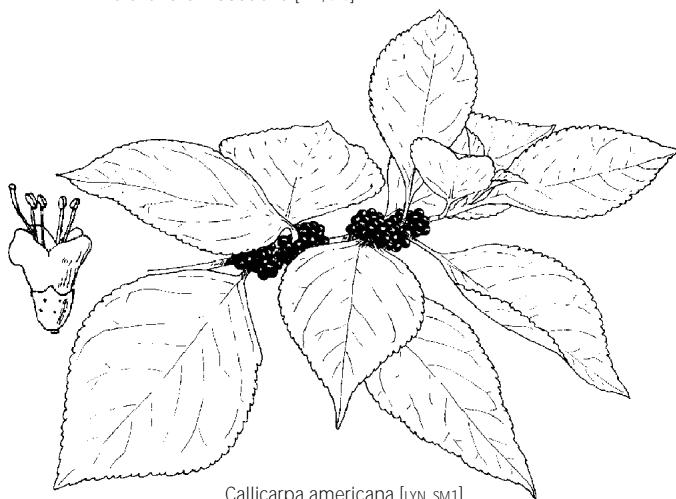
Valerianella woodsiana [BB2, SYS]



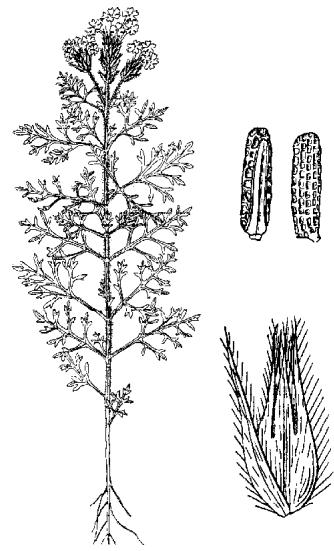
VIEWS OF FRUIT



Aloysia gratissima [MAR]



Callicarpa americana [LYN, SM1]



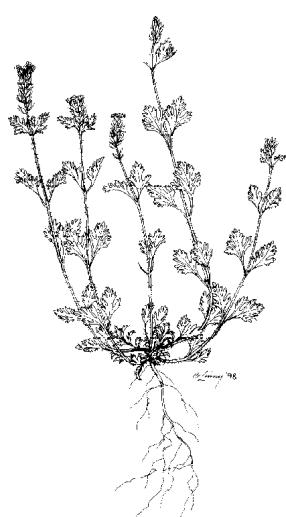
Glandularia bipinnatifida [BB1, STE]



Glandularia canadensis [BB1]



Glandularia xhybrida [GLE]



Glandularia pumila [HEA]

Co. (Moldenke 1948). [*Verbena × hybrida* Groen. & Rümpler] Probably a hybrid of *G. peruviana* (L.) Druce with other South American species (Pruski & Nesom 1992). We are following Pruski and Nesom (1992) for nomenclature of this species. Kartesz (1994) and Jones et al. (1997) placed this species in *Verbena* and did not treat it as a hybrid. ↗

Glandularia pumila (Rydb.) Umber, (dwarf), PINK VERVAIN, PINK VERBENA, HAIRY VERBENA, WILD VERBENA. Low annuals; stems usually decumbent-spreading to erect, hirsute, and often finely glandular; leaves three-parted, the divisions variously incised; spikes sessile or on short peduncles; corollas pink to lavender or pale blue, rarely white. Sandy or gravelly soils; widespread in TX, but mainly w 2/3. Late Mar-May. [*Verbena pumila* Rydb.]

Glandularia quadrangulata (A. Heller) Umber, (four-angled), native to the s 1/2 of TX, is cited for vegetational area 4 (Fig. 2) by Hatch et al. (1990). This species, which can be distinguished by its beaked nutlets (unbeaked in all other nc TX species) and usually white corollas, apparently occurs only to the s of nc TX.

LANTANA

Perennial shrubs to ca. 2 m tall, pubescent; leaves opposite or in threes, toothed, often rugose; flowers showy, in dense axillary heads on elongate peduncles; corollas with a slender cylindric tube expanding into a flat limb, radially symmetrical or obscurely 2-lipped, 4–5 parted; stamens 4; fruits drupaceous, usually with a fleshy outer layer, the 2 seed chambers of the hard inner layer remaining fused at maturity.

— A genus of 150 species of tropical America and tropical and s Africa; it includes ornamentals, some with edible fruit, and problematic weeds; ☣ all parts of some species, particularly the green fruits, are poisonous (Schmutz & Hamilton 1979). (Ancient Latin name for a member of the Caprifoliaceae, *Viburnum lantana* L., which has a similar inflorescence)

1. Corollas orange, deep yellow, or red, the tube to 10 mm long, the limb to 9 mm wide; leaf blades broad, mostly 20–70 mm wide; bracts subtending flowers narrowly triangular-lanceolate to oblanceolate or spatulate; heads large, mostly 2–3 cm wide.
2. Leaf blades broadly ovate to orbicular, with few coarse teeth mostly 2–5 mm high; bracts subtending flowers oblanceolate to spatulate and persistent into fruit; stem angles with long, hispid hairs _____ **L. urticoides**
2. Leaf blades cordate-ovate or triangular-ovate, with numerous fine crenate teeth mostly 0.5–1.5 mm high; bracts subtending flowers narrowly triangular-lanceolate (rarely a basal one spatulate or subfoliaceous), usually not persistent; stem angles with short, ± recurved, non-hispid hairs _____ **L. camara**
1. Corollas pale yellow or mostly white to pink, violet, purple, or blue, the tube 4–5 mm long, the limb ca. 3 mm wide; leaf blades narrow, mostly 6–15 mm wide; bracts subtending flowers broadly ovate; heads small, mostly 1–1.5 cm wide _____ **L. achyranthifolia**

Lantana achyranthifolia Desf., (with leaves like *Achyranthes* in the Amaranthaceae), VEIN-LEAF LANTANA, BRUSHLAND LANTANA, HIERBA NEGRA, MEJORANA, YERBA DEL CHRISTO, CARAQUITO BLANCO, CARIACO DE SAN JUAN, FRUTILLA BLANCA, ORGANILLO CIMARRON. Aromatic shrub to 1.5 m tall, pubescent; leaf blades ovate to lanceolate, 5–35 mm long; corollas pale yellow or white often with a yellow or orange eye, fading to pink, violet, purple, or blue; fruits with thin flesh, translucent, nearly dry. Rocky areas, pastures; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); probably only to the s of nc TX; s 1/2 of TX. Feb–Nov. [*L. macropoda* Torr.]

Lantana camara L., (South American vernacular name or possibly Latin: *camera*, arch, in reference to the stems), WEST INDIAN LANTANA, ALFOMBRILLA HEDIONA, LARGE-LEAF LANTANA. Un-

armed or sparingly armed shrub to 2 m tall; similar to *L. urticoides* but with larger leaves; corolla tube ca. 10 mm long; fruits black. Widely cultivated and escaped; Bell Co.; mainly s and c TX. Flowering nearly throughout the growing season. Native to West Indies, also Central and South America. [*L. camara* var. *mista* (L.) L.H. Bailey] This species can be a problematic weed in subtropical parts of the U.S.; in some areas of the world it invades disturbed habitats, forms impenetrable thickets, and can be a serious pest (Cronk & Fuller 1995). The species is also known to have allelopathic effects (= detrimental to other plants) due to the production of phytotoxic compounds (Casado 1995). It is toxic to livestock, probably due to the presence of a polycyclic triterpenoid; photosensitization may result; the fruits are suspected of being toxic and even lethal to children; contact with the plant can also cause dermatitis (Kingsbury 1964; Morton 1982; Spoerke & Smolinske 1990). ☣ ☦

Lantana urticoides Hayek, (resembling *Urtica*—nettle), COMMON LANTANA, TEXAS LANTANA, HIERBA DEL CRISTO, CALICO-BUSH, BUNCHBERRY. Armed to unarmed shrub to 2 m tall; leaf blades ovate to broadly so, very scabrous above; bractlets 4–9 mm long, 1–2 mm wide; corollas yellow or orange, changing to red, the tube 7–10 mm long, the limb 5–9 mm wide; fruits dark blue to black. Cultivated and escaped; open areas, thickets, woods, roadsides; Bell, Coryell, Somervell, and Tarrant cos.; native of c and s TX. Late Apr-Oct. [*L. horrida* of authors, not Kunth, *L. horrida* sensu Moldenke, *L. horrida* Kunth var. *latibracteata* Moldenke] Roger Sanders (pers. comm.) indicated that hybrids between *L. urticoides* and *L. camara* are to be expected. A decoction of the leaves has been used to treat snakebite in Mexico; the plant is reportedly toxic to cattle and sheep; an alkaloid, lantamine, is present (Powell 1988). ☣ ☦/95

LIPPIA FROGFRUIT, FOGFRUIT

Creeping or trailing to ascending, glabrous or inconspicuously pubescent perennials; floral bracts purplish; corollas very small, white to light lavender, pale blue, purple, or rose-purple, with yellow eye changing to orange-red; fruits included in the calyces, dividing into 2 nutlets at maturity, with a thin, dry outer layer.

☛ A tropical African and American genus of ca. 200 species, some are widely naturalized. The nc TX species are all in the portion of the genus that has often been segregated into the genus *Phyla* (e.g., Kartesz 1994; Jones et al. 1997). We, however, are following R. Sanders (unpublished manuscript for the *Generic Flora of the Southeastern U.S.*) in treating these species in *Lippia*. (Named for Agostino Lippi, 1678–1704, Italian naturalist)
REFERENCE: Kennedy 1992.

1. Leaf blades widest at or near middle, toothed from below middle to apex.
2. Leaf blades not folded like a fan, usually lanceolate or elliptic-lanceolate, widest at or near the middle, the teeth appressed and extending below the widest part of the blade; widespread in nc TX _____ **L. lanceolata**
2. Leaf blades often slightly folded like a fan, usually ovate to triangular-ovate to rhomboid, widest below the middle, the teeth divergent, not extending below the widest part of the leaf; reported for nc TX but no specimens seen _____ **L. strigulosa**
1. Leaf blades oblanceolate, widest near apex, toothed only near apex.
3. Leaf blades 4–25 mm wide, acute to rounded or blunt in general outline at apex (not counting apical tooth); small bracts just below heads 2–3 mm long; peduncles 1.5–4 times as long as adjacent leaves in flower; heads or spikes 6–10 mm thick, becoming cylindrical or oblong ovoid, in fruit to 3 cm long; widespread in nc TX. _____ **L. nodiflora**
3. Leaf blades 2–8 mm wide, acute or subacute in general outline at apex; small bracts just below heads 4–5 mm long; peduncles 0.7–1.5(–2) times as long as the adjacent leaves in flower; heads or spikes 7–12 mm thick, remaining short, globose to subcylindrical, to only 2 cm long; in nc TX reported only from Dallas and Tarrant cos. _____ **L. cuneifolia**

Lippia cuneifolia (Torr.) Steud., (wedge-leaved), WEDGE-LEAF FROGFRUIT. Leaf blades 15–20 mm long, with 1–4 sharp, forward-pointing teeth per side (all beyond the middle) or rarely entire; corollas whitish or purplish, the tube 4–5 mm long, the limb 2–4.5 mm wide. Low grasslands; reported by Moldenke (1961b) from Dallas and Tarrant cos; mainly w 1/2 of TX. May–Oct. [Phyla cuneifolia (Torr.) Greene]

Lippia lanceolata Michx., (lanceolate, lance-shaped), FROGFRUIT, LANCE-LEAF FROGFRUIT, NORTHERN FROGFRUIT. Leaf blades 18–75 mm long, 5–30 mm wide; corollas pale blue, purplish, or white, sometimes with yellow in center. Banks of streams and ponds, moist areas; nearly throughout TX except Trans-Pecos. May–Oct. [Phyla lanceolata (Michx.) Greene]

Lippia nodiflora (L.) Michx., (with flowers at nodes), FROGFRUIT, COMMON FROGFRUIT, TURKEY-TANGLE, CAPE-WEED, MAT-GRASS, HIERBA DE LA VIRGIN MARÍA, TEXAS FROGFRUIT, SAW-TOOTH FROGFRUIT, FOGFRUIT, SPATULATE-LEAF FOGFRUIT, WEIGHTY FOGFRUIT, WEDGE-LEAF FROGFRUIT, HOARY FROGFRUIT. Leaf blades 10–72 mm long; corollas white to rose-purple, often with yellow center. Low moist disturbed areas; throughout TX. May–Oct. [Phyla incisa Small, P. nodiflora (L.) Greene var. longifolia Moldenke, P. nodiflora var. reptans (Kunth) Moldenke, P. nodiflora var. wsea (D. Don) Moldenke]

Lippia strigulosa M. Martens & Galeotti, (with small or weak appressed hairs), DIAMOND-LEAF FROGFRUIT, TURRE HEMBRA, HIERBA BUENA MONTES. Leaf blades to 75 mm long and 20 mm wide; corollas white, sometimes lavender- or purple-tinged with age, ca. 3 mm long, the limb 1.5 mm wide. Open, usually moist areas; Burnet Co. (Moldenke 1948) near s margin of nc TX and Wood Co. just e of nc TX; mainly s TX. Feb–May. [Phyla strigulosa var. parviflora (Moldenke) Moldenke, Phyla strigulosa (M. Martens & Galeotti) Moldenke var. sericea (Kuntze) Moldenke] We are following R. Sanders (pers. comm.) in not recognizing varieties in this species.

Lippia canescens Kunth [L. nodiflora var. canescens (Kunth) Kuntze, *Phyla canescens* (Kunth) Greenel was recently discovered in a flower bed in Fort Worth (Tarrant Co.—O'Kennon 14085 BRIT), probably brought in with nursery stock. While sometimes lumped with *L. nodiflora* (e.g., Wilken 1993b—as *Phyla nodiflora*), this taxon was recognized as a distinct species (in the genus *Phyla*) by Kennedy (1992). It is native to South America and has become established in c Mexico and California; this is the first collection known from TX (identity confirmed by R. Sanders). 

Kennedy (1992) separated it from *L. nodiflora* as follows:

1. Floral bracts widely rhombic with straight-tapered membranous upper edges; flowers open in more than a single whorl; calyces glandular with uncinate hairs _____ *L. canescens*
1. Floral bracts widely obtrullate, the upper margins wide-membranous and distinctly undulate and ciliated; flowers presented in a single whorl; calyces eglandular with straight hairs _____ *L. nodiflora*

Lippia graveolens Kunth, (heavily scented), SCENTED LIPPIA, HIERBA DULCE, RED BRUSH LIPPIA, OREGANO CIMARRÓN, ROMERILLO DE MONTE, TÉ DE PAÍS, TARBAY, an aromatic shrub or small tree to 3(–9) m tall, is cited by Hatch et al. (1990) for vegetational area 4 (Fig. 2). This species, found mainly in s TX, apparently occurs only to the s of nc TX. It can be easily distinguished from all other nc TX *Lantana* and *Lippia* species which usually have 1(–2) peduncles per leaf axile (2(–4) per node) and the inflorescence usually projecting well beyond the subtending leaf; it has 2–3 peduncles per leaf axil (4–6 per node) and the inflorescence usually shorter than the subtending leaf.

VERBENA VERVAIN

Usually perennial herbs; stems prostrate to strictly erect; leaves mostly opposite; inflorescences

spicate, terminal, often greatly elongate; calyces tubular, 5-lobed; corollas 5-lobed, funnel-shaped (rarely salverform); stamens 4; ovary 2-carpellate, 4-lobed; fruits briefly enclosed by the open calyces, separating at maturity into 4 one-seeded, linear nutlets; base chromosome number of 7.

— A tropical and temperate American genus of 200 species; also 2–3 Old World species. *Verbena officinalis* L. (VERVAIN, JUNO'S-TEARS) has bright-eyed flowers and based on the Doctrine of Signatures was used historically in treating eye diseases; it has also been used in witchcraft and ritualistic ceremonies dating back to the Romans and Druids (Baumgardt 1982). *Glandularia*, here treated separately, has often been lumped into *Verbena*. (Latin: *verbena*, ancient name for the common Eurasian vervain, *V. officinalis* L.; possibly derived from Latin: *verbena*, the foliage of sacred, ceremonial, and medicinal plants such as olive, laurel, and myrtle)

REFERENCES: Perry 1933; Barber 1982.

1. Flowering spikes short and compact, crowded, usually not greatly elongating and never open in fruit, 6 cm or less long (often much less); leaves serrate to coarsely serrate, never divided into segments.
 2. Leaves subcordate and semiclasping at base; corolla tube 3 times as long as calyx or more; plant to ca. 0.6 m tall; bracts noticeably longer than calyx _____ ***V. rigida***
 2. Leaves tapering to a wedge-shaped or narrowed subsessile or petioled base; corolla tube slightly longer than calyx; plant to 2.5 m or more tall; bracts equal to or shorter than calyx _____ ***V. brasiliensis***
1. Flowering spikes slender and open or compact, greatly elongating and often becoming open in fruit (fruits often widely spaced), often > 6 cm long; leaves varying from crenate to serrate to 3-parted to pinnatifid.
 3. Spikes panicle at the ends of stems and branches, subtended mainly by inconspicuous bracts (at base of spikes); floral bracts (below each flower) inconspicuous.
 4. Middle stem leaves 1- or 2-pinnatifid or 3- or 5-cleft or deeply incised _____ ***V. halei***
 4. Leaves (all) merely serrate or crenate.
 5. Leaf blades very scabrous above; corollas blue to pink or lavender; fruiting calyces spreading, with calyx lobes converging or coming together so as to hide the apex of the enclosed fruit _____ ***V. scabra***
 5. Leaf blades not markedly scabrous above; corollas white; fruiting calyces ascending, the calyx lobes not converging in a manner that would hide the apex of the enclosed fruit, the fruit apex visible _____ ***V. urticifolia***
 3. Spikes solitary or in 3s at the ends of stems and branches OR panicle and subtended by leafy bracts; floral bracts conspicuous or not so.
 6. Leaf blades serrate-dentate or shallowly incised.
 7. Plants coarse; leaf blades ovate or ovate-orbicular, broad, to 44 mm wide; spikes stout, 7–10 mm wide in flower _____ ***V. stricta***
 7. Plants slender; leaf blades linear to narrowly elliptic, narrow, 20 mm or less wide; spikes relatively slender, 5–6 mm wide in flower _____ ***V. neomexicana***
 6. Leaf blades deeply incised-dentate to pinnatifid or 3-cleft.
 8. Spikes not conspicuously bracteose, the floral bracts not prominent (shorter to only slightly longer than calyces).
 9. Leaf blades (at least the lower) not narrowly elongate, instead, the blades oblong-ovate or obtusely elliptic-ovate, usually 3-parted with the segments incised-dentate.
 10. Leaves distinctly petiolate, the margin petiole often ± as long as the blade; leaf blades ± plicate (= folded fan-like), with venation noticeably whitish near margins; plants not coarsely hairy _____ ***V. plicata***
 10. Leaves sessile or at most very short petioled; leaf blades not plicate, with venation not noticeably whitish near margins; plants coarsely hairy (= hirsute) _____ ***V. xutha***

9. Leaf blades (at least the lower) narrowly elongate, oblong-lanceolate to spatulate, usually incised-pinnatifid or incised-dentate.
11. Plants coarse, with a low, ± compact habit; leaves with a broadly margined or semi-clasping subpetiolar base; bracts usually slightly longer than calyces _____ **V. canescens**
11. Plants more slender, with a taller and open habit; leaves with a narrowly margined petiolar base; bracts mostly equal or shorter than calyces _____ **V. neomexicana**
8. Spikes conspicuously bracteose, the floral bracts prominent (sometimes much longer than the calyces, particularly at base of inflorescence).
12. Leaf blades ± plicate (folded fan-like); venation noticeably whitish near leaf margins _____ **V. plicata**
12. Leaf blades neither plicate nor with conspicuous whitish venation near the leaf margins.
13. Leaves with a broadly margined subpetiolar or semi-clasping base; floral bracts ovate, abruptly acuminate, slightly longer than the flowers, ascending _____ **V. canescens**
13. Leaves narrowed to a margined petiole; floral bracts linear-lanceolate, much longer than the flowers, often reflexed with age _____ **V. bracteata**

Verbena bracteata Lag. & Rodr., (with bracts), BIG-BRACT VERVAIN, LARGE-BRACT VERVAIN, PROSTRATE VERVAIN. Usually prostrate to decumbent perennial, can flower as an annual; stems spreading-pilose; leaves coarsely toothed and lobed; spikes conspicuously bracteose; calyces 3–4 mm long; corollas inconspicuous, bluish to lavender or purple, the corolla tube slightly longer than calyx, the corolla limb 2.5–3 mm wide. Disturbed areas; widespread in TX. Late Apr–Oct.

Verbena brasiliensis Velloso, (of Brazil), BRAZILIAN VERVAIN. Large, stout perennial, stems erect, 1–2.5 m tall, conspicuously square; leaves elliptic or lanceolate; spikes 0.5–4 cm long; calyces 2.5–3.5 mm or more long; corollas purple or lilac, the corolla tube slightly longer than calyx, the corolla limb 2.5 mm wide. Waste places and along creeks; Grayson (RR yard), Lamar, and Tarrant cos., also Fort Hood (Bell or Coryell cos.—Sanchez 1997); apparently recently introduced into nc TX and now spreading; mainly se and e TX and Edwards Plateau. May–Oct. Native of South America. ↗

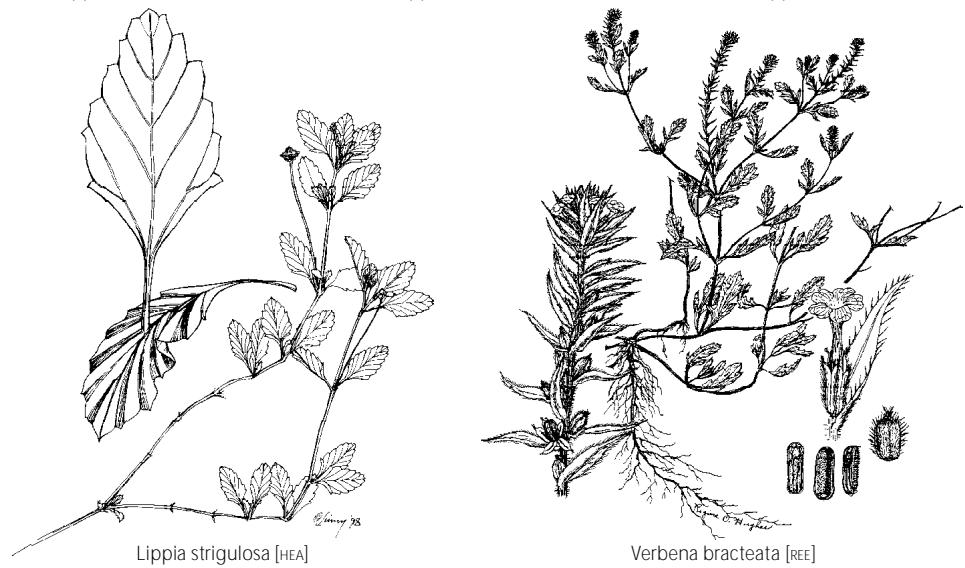
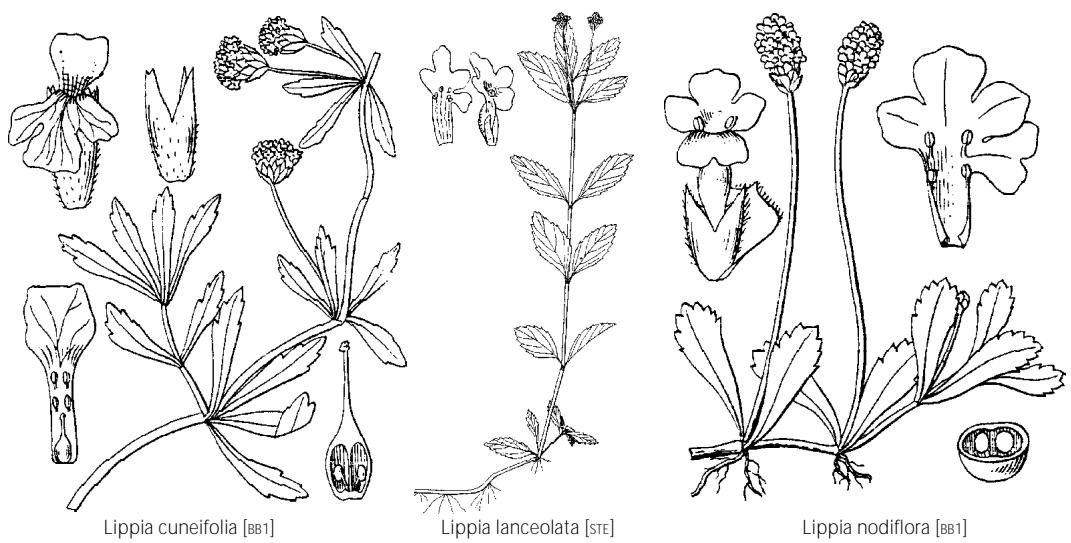
Verbena canescens Kunth, (gray-pubescent), GRAY VERVAIN. Perennial from a woody root; stems spreading to erect, to 46 cm tall; foliage canescent; calyces 2–3 mm long; corollas blue to lavender or purple, the corolla tube slightly longer than calyx, the corolla limb 4–6 mm wide. Limestone outcrops; Bell, Brown, Lampasas, Mills, Shackelford, and Williamson cos., also Comanche, Hamilton (HPC), and Somervell (R. O'Kennon, pers. obs.) cos.; widespread in TX. Apr–Oct. [V. canescens var. *wemeriana* (Scheele) L.M. Perry]

Verbena halei Small, (for J.P. Hale, ca. 1889, landowner in lower California who collected cacti with Mrs. M.K. Brandegee), SLENDER VERVAIN, BLUE VERVAIN, CANDELABRA VERVAIN, SANDING VERVAIN, TEXAS VERVAIN. Erect perennial, flowering the first year, to 1 m tall; leaves few, petioled; leaf blades oblanceolate or obovate, toothed or lobed; flowers becoming widely spaced; calyces 3–3.5 mm long; corollas lavender-blue (rarely white), the corolla tube only slightly longer than calyx, the corolla limb 6–7 mm wide. Prairies, disturbed areas; throughout TX. Apr–Oct. [V. officinalis L. subsp. *halei* (Small) S.C. Barber] ↗/108

Verbena neomexicana (A. Gray) Small, (of New Mexico), HILLSIDE VERVAIN. Stems erect, to 1 m tall; leaves variable; calyces 3 mm long; corollas blue to lavender or purple, the corolla tube slightly longer than calyx. Rocky areas. Apr–Nov.

1. Leaf blades only rather shallowly incised; floral bracts usually broadly ovate-acuminate; corolla limb ca. 8 mm wide; plants densely canescent-hirtellous _____ var. **hirtella**
1. Leaf blades pinnately parted or almost divided; floral bracts lanceolate-acuminate; corolla limb 4 mm wide; plants hirsute _____ var. **neomexicana**

var. **hirtella** L.M. Perry, (rather hairy), Bell Co; mainly w 2/3 of TX.



var. **neomexicana**. Included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); mainly w 2/3 of TX.

Verbena plicata Greene, (folded like a fan), FAN-LEAF VERVAIN. Perennial; stems decumbent to ascending; floral bracts equaling or surpassing the calyces; calyces 3.5–4 mm long; corollas blue to lavender or purple, the corolla tube ca. equal in length to calyx, the corolla limb 4–6 mm wide. Open or disturbed areas, sandy or rocky soils; Callahan, Coleman, and Young cos. on w margin of nc TX, also Brown Co. (HPC); mainly Rolling Plains s and w to w TX. Feb–Oct.

Verbena rigida Spreng., (rigid, stiff), VEINY VERVAIN, TUBER VERVAIN. Erect perennial; stems 0.2–0.6 m tall; leaf blades oblong to oblong-lanceolate or narrowly obovate; calyces 4 mm long; corollas purple to pink-purple, the corolla tube 3 times as long as calyx or more, the corolla limb 5–7 mm wide. Pastures, roadsides; Dallas Co.; mainly se and e TX, also Edwards Plateau. Apr–Oct. Native of South America. (☞)

Verbena scabra Vahl, (rough), HARSH VERVAIN, WHITE VERVAIN, SANDPAPER VERVAIN. Perennial; stems erect, 0.3–1(–1.5) m tall; leaf blades ovate, extremely scabrous above; spikes slender, elongate, graceful; calyces 2.5–3 mm long; corollas blue to pink or lavender, the corolla tube ca. equaling calyx in length, the corolla limb ca. 2 mm wide. Low areas; included based on citation of vegetational areas 4 and 5 (Fig. 2) by Hatch et al. (1990); supposedly widespread in the state; however, we have seen few TX specimens. Mar–Dec.

Verbena stricta Vent., (upright, erect), WOOLLY VERVAIN, HOARY VERVAIN, MULLEN-LEAF VERVAIN. Stout perennial; stems erect 0.2–2 m tall; leaves sessile or nearly so; leaf blades elliptic-ovate, to 8–20 cm long, irregularly toothed, hirsute-villous and often canescent beneath; flowers densely crowded; calyces (3–)4–5 mm long; corollas blue to purple, the corolla tube slightly longer than calyx, the corolla limb 8–9 mm wide. Open areas, waste places; Collin and Grayson cos., also Cook, Dallas, and Tarrant cos. (Moldenke 1948); se and e TX w to nc TX, also Rolling Plains. Jun–Sep.

Verbena urticifolia L., (with leaves like *Urtica*—nettle), WHITE VERVAIN, NETTLE-LEAF VERVAIN. Perennial; stems coarse, erect 0.5–2.5 m tall; leaf blades ovate, coarsely crenate-serrate, glabrous or sparsely hairy; inflorescences slender, elongate, and graceful; flowers very small; calyces 2 mm long; corollas white, the corolla tube ca. 2 mm long, the corolla limb ca. 2 mm wide. Bottomland woods; Dallas, Denton, Grayson, Tarrant, and Wise cos.; mainly se and e TX w to nc TX. Jun–Oct.

Verbena xutha Lehm., (yellowish, tawny), COARSE VERVAIN, GULF VERVAIN. Coarse and pubescent perennial; stems to 2 m tall; calyces 3–4 mm long; corollas blue to purple, the corolla tube ca. as long as calyx, the corolla limb 5–8 mm wide. Stream bottoms, roadsides; Bell, Dallas, Ellis, Grayson, McLennan, and Milam cos.; widespread in TX. Jun–Oct.

VITEX CHASTETREE

Shrubs or trees with opposite, palmately compound leaves with 3–9 leaflets, these darker above; inflorescences showy, of numerous lavender to lilac, blue, or white flowers; calyces 5-parted; corollas 5-lobed and 2-lipped; stamens 4; fruits drupaceous, ± fleshy.

☞ A genus of 250 species ranging from the tropics to a few in temperate regions; some are used as timber trees and ornamentals. (Classical Latin name for *Vitex agnus-castus*)

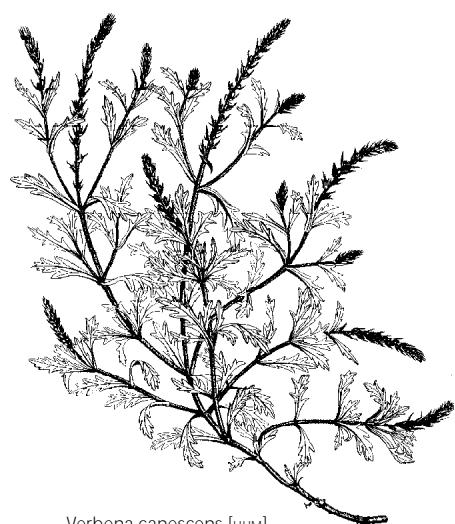
1. Leaflets usually entire; inflorescences appearing dense, the adjacent flower clusters (cymules)

nearly touching and sessile or nearly so _____ **V. agnus-castus**

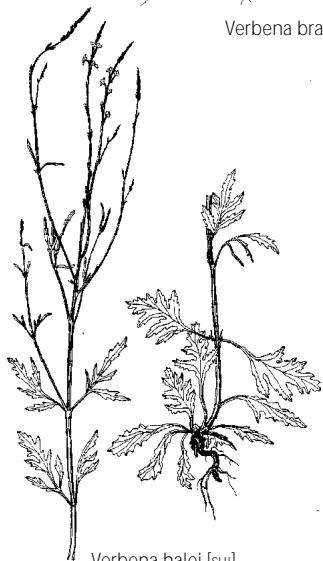
1. Leaflets conspicuously toothed to deeply pinnately divided; inflorescences appearing open, the



Verbena brasiliensis [GLE]



Verbena canescens [HUM]



Verbena halei [SHI]



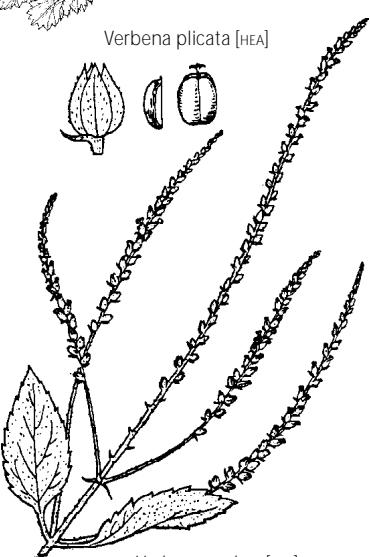
Verbena plicata [HEA]



Verbena rigida [BR2]



Verbena neomexicana var. hirtella [GLE]



Verbena scabra [BR2]

adjacent flower clusters separated from one another and at least the lower ones distinctly stalked

V. negundo

Vitex agnus-castus L. (ancient name meaning chaste), COMMON CHASTETREE, INDIAN-SPICE, WILD-LAVENDER, HEMPTREE, MONK'S PEPPER-TREE, WILD PEPPER, TRUE CHASTETREE, ABRAHAM'S-BALM, CHASTE-LAMB-TREE, SAGETREE, TREE-OF-CHASTITY. Shrub or small tree to 5 m tall, aromatic; leaves with (3-)5-9 leaflets; leaflets to ca. 12 cm long, dark green above, densely white puberulent below; petioles to 75 mm long; inflorescences to 31 cm long; calyces 2-2.5 mm long; corolla tube 6-7 mm long; corolla limb to 13 mm wide. Widely cultivated as an ornamental in TX, escapes, and naturalizes in moist habitats and waste places; Bell, Dallas, Erath, Hill, Grayson, and Tarrant cos., also Brown Co. (Moldenke 1961b). May-Oct. Native of s Europe. The fruits have been used as a pepper substitute; white-flowered forms have long been considered a symbol of chastity (Mabberley 1987). 

The following 2 varieties can apparently be told apart only by flower color.

1. Corollas lavender, lilac or white _____ var. **agnus-castus**
 1. Corollas blue _____ var. **caerulea**

var. **agnus-castus**. According to Hatch et al. (1990), widespread in the e 1/2 of TX.

var. **caerulea** Rehder, (cerulean, dark blue). Cited by Hatch et al. (1990) only for vegetational area 4 (Fig. 2).

Vitex negundo L. var. **heterophylla** (Franch.) Rehder, (a Malay word for chastetree; var: various-leaved), NEGUNO, CUT-LEAF CHASTETREE. Similar to *V. agnus-castus* leaves with 3-5 leaflets. Cultivated and escapes; Tarrant Co.; also e TX. Summer. Native of Asia. [*V. negundo* L. var. *incisa* (Lam.) C.B. Clarke] 

VIOLACEAE VIOLET FAMILY

Small annual or perennial herbs (ours), acaulescent or caulescent; leaves basal, alternate, or opposite, simple (sometimes with very leafy stipules and thus appearing compound), entire, toothed, or lobed; stipules absent, or slender and inconspicuous, or falling early, or large and leafy; flowers solitary, axillary or basal; sepals 5, slightly unequal; petals 5, unequal, the lowest one with widened or swollen base or projecting spur; stamens 5, separate, with large, separate or weakly united anthers and short filaments; pistil 3-carpellate; ovary superior; fruit a 3-valved capsule. Cleistogamous flowers (= closed with rudimentary petals, self-pollinating) are also usually produced, either under or above ground during summer and fall.

—A medium-sized (900 species in 20 genera—H. Ballard, pers. comm.) cosmopolitan family of herbs, shrubs or even lianas or trees; alkaloids are often present. The family includes the ornamental VIOLETS and PANSIES (*Viola*). It is possibly related to the mostly tropical Flacourtiaceae. (subclass Dilleniidae)

FAMILY RECOGNITION IN THE FIELD: small, sometimes stemless herbs with simple leaves; flowers bilaterally symmetrical, often nodding, with 5 separate petals, one of which is often *spurred*; stamens often with appendages or spurs; fruit a 3-valved capsule.

REFERENCE: Brizicky 1961b.

1. Leaves sessile to subsessile, linear to linear-lanceolate or broadly lanceolate, entire; sepals not auricled at base; lowest petal merely inflated basally, not spurred; stamens united (eventually separating), the lower 2 not spurred _____ **Hybanthus**
1. Leaves long-petioled (but leafy stipules sessile), the blades lanceolate to triangular to broadly ovate or broadly cordate, entire, toothed, or lobed; sepals with short-auricled base; lowest petal spurred; stamens separate, the lower 2 spurred _____ **Viola**

HYBANTHUS GREEN-VIOLET, NOD-VIOLET

— A genus of 150 species of tropical and warm areas of the world. (Greek: *hybos* hump-backed, and *anthos*, flower)

REFERENCE: Turner & Escobar 1991.

Hybanthus verticillatus (Ortega) Baill., (whorled), NODDING GREEN-VIOLET, WHORLED NOD-VIOLET. Leafy stemmed perennial with deep, branching root; stems usually clustered, to 25(–35) cm tall; leaves opposite or verticillate to alternate above; flowers axillary, nodding on short peduncles; lowest petal yellowish to greenish white, often with rosy or purple spot near the large tip; remaining petals smaller, rosy lavender to brown-red. Prairies, eroding slopes, rocky areas, or disturbed ground; widespread in TX. Apr–Jun, sometimes again in Oct. [*H. linearis* (Torr.) Shinners]

VIOLA VIOLET

Annuals with taproots or usually perennials from a caudex, some species rhizomatous; flowers basal or axillary, white-colored forms (= albinos) present in a number of species; seeds numerous, arillate, typically ant dispersed.

— A genus of ca. 550 species (H. Ballard, pers. comm.) of temperate regions, especially n temperate areas and the Andes; it includes the ornationally important *V. × wittrockiana* Gams (GARDEN PANSY); according to Woodland (1997), this is the largest genus of n temperate [dicot] herbs. Cleistogamous flowers are often present. Like many spring-flowering herbs of temperate deciduous forests, many *Viola* species have seeds with elaiosomes (= oily appendages) and are dispersed by ants which eat the elaiosomes but leave the seeds intact (Beattie et al. 1979; Culver & Beattie 1980; Beattie 1985). The taxonomy of *Viola* is complicated by the extensive morphological variation seen in some species due to growing conditions or season as well as by hybridization in certain groups. According to Ballard (1994), “Taxonomists who have attempted identification of native violets have usually come to see the cloak of romantic folklore and ‘innocence’ surrounding violets as sheeps’ clothing covering a pack of taxonomically incorrigible wolves.” (Classical Latin name for a scented flower)

REFERENCES: Brainerd 1911, 1921; Baird 1942; Valentine 1962; Russell 1961, 1965; Lacey 1969; McKinney 1992; Ballard 1994; Gil-ad 1997.

1. Plants with leafy stems (= caulescent): petals yellow OR violet-blue to lavender-blue to cream-white with yellow center; plants annual or perennial.
 2. Stipules large, leafy, deeply lobed: petals violet-blue or lavender-blue to cream-white with yellow center; plants annual with erect taproots _____ ***V. bicolor***
 2. Stipules small, entire; petals yellow; plants perennial with short prostrate rhizomes _____ ***V. pubescens***
1. Plants stemless (= acaulescent), the leaves all basal; petals light to dark blue-violet, rarely whitish; plants perennial.
 3. Leaf blades divided into 3 or more distinct segments or lobes.
 4. Lateral lobes large, comprising basal one-half to two-thirds of the leaf blade; leaf blades ca. 1–1.5 times as long as wide (in outline around lobes); capsules purple-spotted _____ ***V. palmata***
 4. Lateral lobes ± small, restricted to basal one-quarter or one-third of the leaf blade, giving it a sagittate/hastate base; leaf blades ca. 1.5–3 times as long as wide; capsules green _____ ***V. sagittata***
 3. Leaf blades completely unlobed (± heart-shaped and marginally crenate to serrate).
 5. Plants usually heavily short-pubescent on both leaf surfaces and along petioles; peduncles up to twice the petiole length; leaves held prostrate (flat on the ground) in life; leaf blades commonly elliptic, rounded at apex; capsules green; limited to sandy soils; apparently rare in nc TX _____ ***V. villosa***
 5. Plants glabrous to slightly long-pubescent (rarely heavily pubescent), the hairs most

evident on lower leaf surfaces and summit of petioles; peduncle length variable but if heavily pubescent the peduncles equaling or shorter than the petioles; leaves half erect (off the ground) in life; leaf blades broadly ovate to deltoid-ovate to narrowly triangular, acute to acuminate at apex; capsules purple-spotted; in a variety of soils; widespread in nc TX.

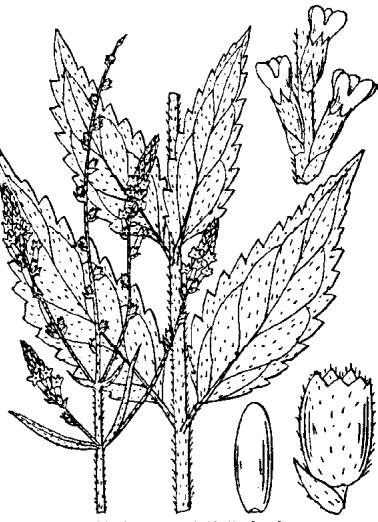
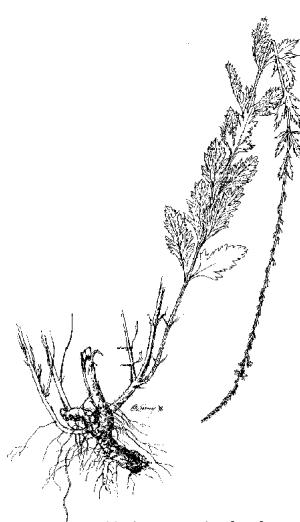
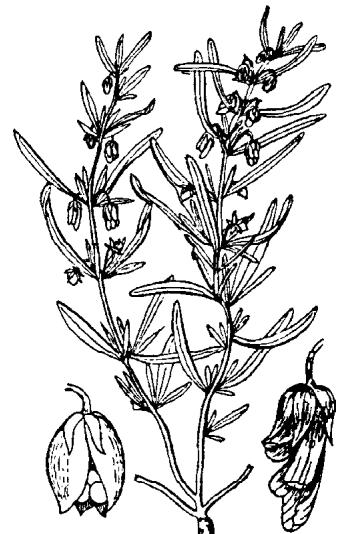
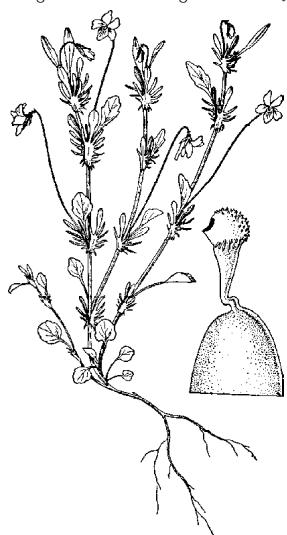
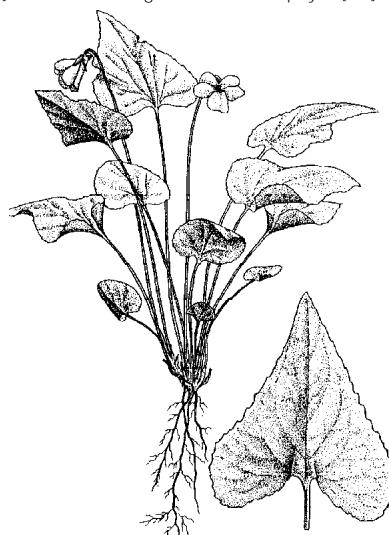
6. Foliage glabrous throughout; leaf blades broadly to narrowly triangular, usually longer than broad (at flowering time), gradually and uniformly tapering to an acuminate apex, truncate to subcordate or cordate at base _____ ***V. missouriensis***
6. Foliage usually long-pubescent on lower leaf surfaces and summit of petioles; leaf blades broadly ovate to deltoid-ovate, ca. as broad as long, concavely or abruptly tapering to an acute or short acuminate apex, shallowly to deeply cordate at base _____ ***V. sororia***

Viola bicolor Pursh, (two-colored), FIELD PANSY, WILD PANSY, JOHNNY-JUMP-UP, HEARTS-EASE, CUPID'S-DELIGHT. Minutely and inconspicuously pubescent taprooted annual or winter annual; stems 2-15(-25) cm tall; stipules 10-20 mm long, pectinate-palmately lobed; lower leaf blades orbicular to ovate, unlobed; upper leaf blades spatulate to obovate, broadly elliptic, or lanceolate, unlobed; petals violet-blue to light lavender-blue or whitish, paler and at least the lower ones darkly veined toward base, the lowest one + yellow toward center and base (or rarely the lower petals wholly dark-colored). Sandy soils; e TX w to Rolling Plains and Edwards Plateau. Mar-mid-Apr. [*V. rafinesquii* Greene]

Viola missouriensis Greene, (of Missouri), MISSOURI VIOLET. Petals deep to pale violet-blue with a white center, often bordered with a dark violet area around the center, lines on the lateral and spurred petals dark violet; petal trichomes borne on the lower lateral petals, absent on the spurred petal, cylindrical, gradually widened apically; capsules yellow-green sparsely spotted and dotted with red-purple; seeds dark orange-yellow to strong yellowish brown (Gil-ad 1997). Se and e TX w to West Cross Timbers, also Trans-Pecos. Mid-Mar-mid-Apr. [*V. soria* var. *missouriensis* (Greene) L.E. McKinney] This taxon has long been treated as a distinct species (e.g., Russell 1965); however, McKinney (1992) recognized it as a variety of *V. soria*. We are following Gil-ad (1997) in recognizing it at the specific level; he gave numerous characters (see description above and description of *V. soria* below) distinguishing it and cogently argued that it is a distinct species. Gil-ad (1997) did, however, note that hybrids and introgressants between the two are common and may complicate identification.

Viola palmata L., (palmate), TRI-LOBE VIOLET, LOVELL VIOLET, WOOD VIOLET. Leaf blades variable in shape, with 3-7 lobes, the lobes broad to nearly linear, the central lobe sometimes much larger to little different from the laterals; petals light to dark blue-violet. Dry to bottomland woods; Denton and Grayson cos.; mainly se and e TX, also Edwards Plateau. Mar-Apr. [*V. lovelliana* Brainerd, *V. palmata* var. *dilatata* Elliott, *V. palmata* var. *triloba* (Schwein.) Ging. ex DC, *V. triloba* Schwein., *V. triloba* Schwein var. *dilatata* (Elliott) Brainerd] While varieties are sometimes recognized in this species (e.g., Kartesz 1994), we are following McKinney (1992) in not recognizing infraspecific taxa. Gil-ad (1997) treated this taxon as *V. triloba* Schwein.; however, H. Ballard (pers. comm.) indicated that *V. palmata* is apparently the correct name; until nomenclatural issues are resolved, we are taking the conservative approach and using the name traditionally associated with this species.

Viola pubescens Aiton, (pubescent, downy), YELLOW VIOLET, SMOOTH YELLOW VIOLET. Plant glabrous in nc TX; stems erect or decumbent, 10-45 cm tall; leaf blades reniform-cordate to broadly ovate, unlobed; petals yellow, the lower 3 with purplish brown veins. In woods, low ground; Dallas (on the Austin Chalk), Grayson, Hunt, and Lamar cos.; se and e TX w to nc TX. Apr. [*V. eriocarpum* Schwein., *V. pensylvanica* Michx., *V. pubescens* var. *eriocarpum* Nutt.] If infraspecific taxa are recognized, according to H. Ballard (pers. comm.), nc TX material would be *V. pubescens* var. *scabriuscula* Schwein. ex Torr. & A. Gray.

*Verbena stricta* [REE]*Verbena urticifolia* [BB1]*Verbena xutha* [HEA]*Vitex agnus-castus* var. *agnus-castus* [VIN]*Vitex negundo* var. *heterophylla* [HEA]*Hybanthus verticillatus* [BB1]*Viola bicolor* [GLE]*Viola missouriensis* [SID]*Viola palmata* [SID]

Viola sagittata Aiton, (arrow-like), ARROW-LEAF VIOLET. Leaf blades with 4–6 usually small lobes or large teeth at base, pubescent; petals blue to violet-purple. Dry sandy woods and forest margins; included based on nc TX location (without county) mapped in McKinney (1992), also Lamar Co. (Carr 1994); mainly e TX. Apr–Jun.

Viola sororia Willd., (sisterly, possibly based on similarity to another violet species), SISTER VIOLET, BAYOU VIOLET, DOWNY BLUE VIOLET, BLUE PRAIRIE VIOLET. Petals violet with a white center and violet lines on the lateral and spurred petals; petal trichomes borne on the lateral petals, absent on the spurred petal, cylindrical; capsules blotched with dark overlapping red-purple patches on a yellow-green background; seeds dark grayish brown (Gil-ad 1997). Open woods, waste places, moist areas, often on sandy substrates; Dallas Co., also Montague and Tarrant cos. (as *V. pratincola* sensu Russell, not Greene—Russell 1965) and Hunt and Kaufman cos. (Mahler 1988); scattered mainly in e and c TX. Mar–May. [*V. papilionacea* Pursh, at least in part as to application of name]

Viola villosa Walter, (soft-hairy), CAROLINA VIOLET. Plant very low and compact; leaf blades commonly lying on the ground, dark green with red veins, usually with dense short pubescence on both surfaces but sometimes becoming glabrous late in the year; petals usually dark blue-violet. Sandy woods; Denton and Tarrant cos. (Russell 1965), also Lamar (Carr 1994) and Milam (McKinney 1992) cos.; scattered in e 1/2 of TX. Mar.

VISCACEAE

MISTLETOE OR CHRISTMAS MISTLETOE FAMILY

—A medium-sized (385 species in 7 genera), cosmopolitan, but especially tropical and warm area family of photosynthesizing parasites of trees; haustoria actually penetrate and branch in host tissue. The family was formerly recognized as a subfamily in the Loranthaceae. Some are problematic parasites while others are sources of Christmas mistletoe. Family name from *Viscum*, MISTLETOE, a genus of 100 species native from temperate regions to the Old World tropics. (Classical Latin name for mistletoe; possibly related to Latin: *visco* sticky) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: the single nc TX species is an *evergreen parasite* on tree branches often deforming the branch at point of attachment; fruits mucilaginous, translucent-whitish; this species becomes very conspicuous on deciduous trees when they lose their leaves for the winter.

REFERENCE: Kuijt 1982.

PHORADENDRON MISTLETOE

—An American, especially tropical genus of 190 species. — Various *Phoradendron* species are known to potentially be fatally poisonous to humans and animals; the toxins, present in all parts of the plant, but especially the whitish fruits, apparently include amines and toxic proteins; if eaten, acute gastroenteritis and heart failure can result; because MISTLETOES are widely used as Christmas decorations, care should be taken to prevent access by children or pets; however, some birds (e.g., cedar waxwings, bluebirds) relish the fruits (Martin et al. 1951; Kingsbury 1964; Schmutz & Hamilton 1979; Morton 1982; Hardin & Brownie 1993). (Greek: *phor*, a thief, and *dendron*, tree, from the parasitic habit)

REFERENCE: Wiens 1964.

Phoradendron tomentosum (DC.) Engelm. ex A. Gray, (densely woolly, with matted hairs), MISTLETOE, CHRISTMAS MISTLETOE, INJERTO, HAIRY MISTLETOE. **Official floral emblem of Oklahoma** as designated by the Assembly of the Territory of Oklahoma on 11 February 1893 (Tyrrell et al. 1994). Perennial, hemiparasitic (= parasitic but at least partly autotrophic) on tree branches;

whole plant yellow-green; leaves opposite, simple; leaf blades leathery, evergreen, entire, faintly 3-ribbed, obtuse; flowers unisexual, in axillary, simple or branched, somewhat interrupted spike-like inflorescences; the sexes on separate plants; perianth 2-4-parted; ovary inferior; fruit a small 1-seeded drupe with sticky, mucilaginous, translucent-whitish mesocarp. Parasitizing a variety of tree species including *Celtis*, *Maclura*, *Prosopis*, and *Ulmus*, deformities or death to branches of the host tree often result from the parasitism; MISTLETOE is sometimes abundant on a tree and in winter, when naked branches are visible, it is often very conspicuous; widespread in TX. Oct-Mar. [*P. sevotinum* (Raf.) M.C. Johnst. var. *pubescens* (Engelm. ex A. Gray) M.C. Johnst.] This species is often collected locally for use as Christmas mistletoe. Dispersed by birds wiping their beaks and feet on branches to clean off the sticky seeds (Wills & Irwin 1961) or perhaps by the seeds passing through the birds' digestive tracts. Poisonous. ☣

VITACEAE GRAPE FAMILY

Perennial, climbing or shrubby, woody vines (= lianas) with tendrils; leaves alternate, simple or palmately compound, toothed or palmately lobed; flowers small, in axillary, peduncled, racemose, paniculate, or compound umbel-like inflorescences; perianth in *Vitis* falling when the flowers open, in the other genera persistent; sepals (4-)5; petals (4-)5, green to whitish or yellowish; stamens (4-)5, attached around a prominent, fleshy disk, opposite the petals; pistil 1; ovary superior; fruit a 1-4-seeded berry.

— A medium-sized (850 species in 14 genera) largely tropical and warm area family of mostly woody climbers usually with tendrils opposite the leaves (rarely succulent treelets or herbs). The most important species economically is the Asian *Vitis vinifera* L. (GRAPE), the source of wine. Other species are used as ornamentals (e.g., *Parthenocissus*). (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: woody vines with *tendrils* and inflorescences of small inconspicuous flowers both borne *opposite* the usually large leaves; fruit a *berry* (e.g., grape) with 1-4 seeds.

REFERENCES: Bailey 1934; Brizicky 1965a.

1. All leaves simple.
 2. Leaf blades not fleshy; inflorescences paniculate, racemose, or cymose; flowers 5-merous.
 3. Tendrils with slender, pointed, curling tips: native species.
 4. Petals united at apex, falling together; inflorescence elongate, longer than wide, not dichotomously forking; plants densely pubescent to nearly glabrous; leaf blades cordate at base; pith white; bark usually shreddy _____ **Vitis**
 4. Petals separate, falling individually; inflorescence short, wider than long, dichotomously forking; plants essentially glabrous; leaf blades truncate to cordate at base; pith brown; bark tight, not shreddy _____ **Ampelopsis**
 3. Tendrils with small, disk-like tips; introduced ornamentals _____ **Parthenocissus**
 2. Leaf blades conspicuously fleshy; inflorescences resembling compound umbels; flowers 4-merous _____ **Cissus**
 1. Some or all of the leaves divided into separate leaflets.
 5. Leaves with (3-)5-many leaflets, usually not fleshy; inflorescences paniculate, racemose, or cymose; flowers 5-merous; leaflets and petioles usually not falling apart when pressed and dried.
 6. Leaves once palmately compound; leaflets 3-7 per leaf _____ **Parthenocissus**
 6. Leaves 2-3 times pinnately or ternately compound; leaflets usually (9-)11-34 or more per leaf _____ **Ampelopsis**
 5. Leaves with 3 leaflets, conspicuously fleshy; inflorescences resembling compound umbels; flowers 4-merous; leaflets and petioles falling apart when pressed and dried _____ **Cissus**

AMPELOPSIS

Plants bushy to high climbing; leaves simple or compound; tendrils opposite leaves when present, without adhesive disks at tips; flowers small, greenish, perfect; berry dry or pulpy; seeds 1-several.

—A genus of 25 species of climbers of temperate and subtropical America and Asia. (Greek: *ampelos* vine, and *opsis* appearance, from the habit)

1. Leaves 2–3 times compound; fruits black, 10–15 mm in diam. ***A. arborea***
1. Leaves simple; fruits green becoming orange-pink or purplish, eventually turquoise-blue, < 10 mm in diam. ***A. cordata***

Ampelopsis arborea (L.) Koehne, (tending to be woody, tree-like), PEPPERVINE. Varying from low, half-woody, and bushy to moderately high-climbing; leaflets usually (9–)11–34 or more per leaf, dark green, oblong-elliptic, to 3–7 cm long, coarsely and sharply toothed, often also lobed, glabrous. Stream bottoms, fencerows, and disturbed areas; Dallas and Grayson cos., also Bell, Brown (HPC), Lamar (Carr 1994) and Tarrant (R. O'Kennon, pers. obs.) cos.; se and e TX w to nc TX and Edwards Plateau. Late Jun-Jul.

Ampelopsis cordata Michx., (heart-shaped), HEART-LEAF AMPELOPSIS, RACOON-GRAPE. Low- to high-climbing vine, closely resembling species of *Vitis*; leaf blades cordate- or triangular-ovate, to 15 cm long and wide, coarsely and sharply toothed, sometimes shallowly lobed, glabrous. Stream bottom woods; se and e TX w to Edwards Plateau and Panhandle. Late May-Jun. [*Cissus ampelopsis* Pers.] The fruits are sometimes confused with grapes, but are not edible (McGregor 1986).

CISSUS COWITCH, POSSUM-GRAPE

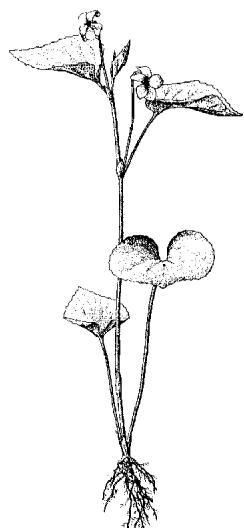
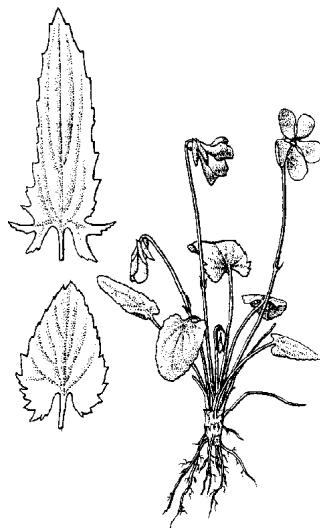
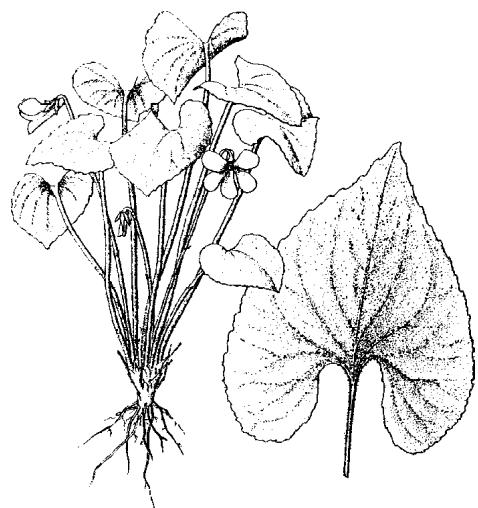
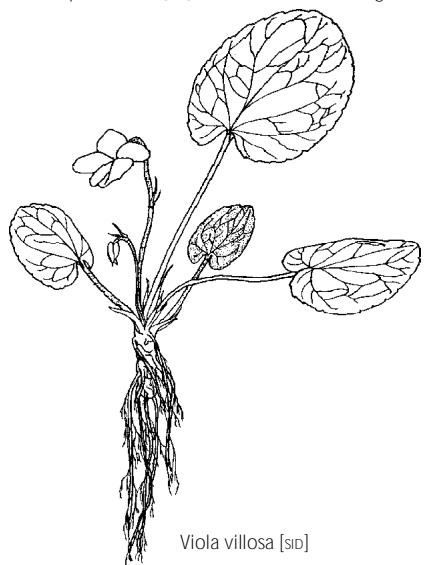
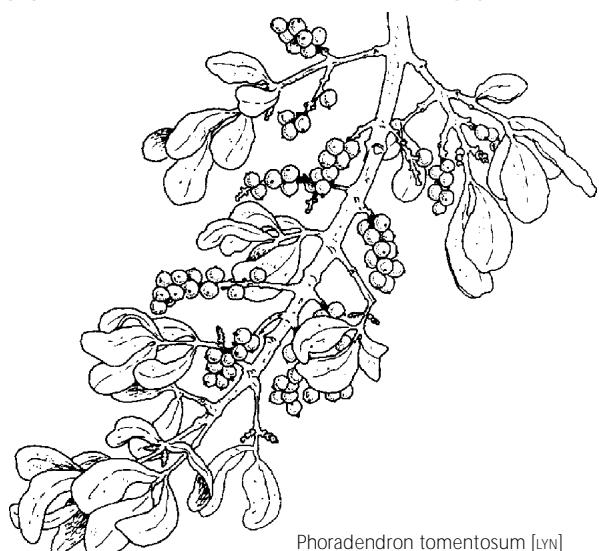
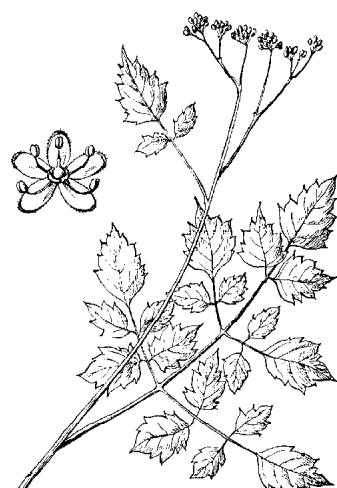
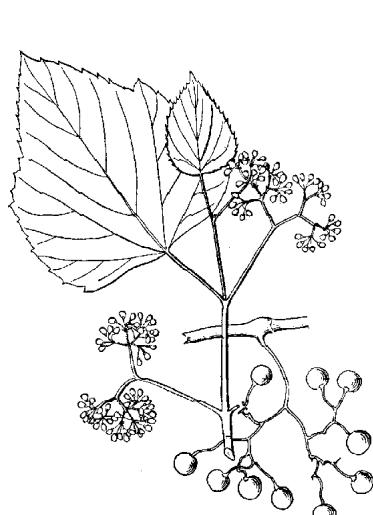
—A genus of ca. 200 species of mainly vines with tendrils found in tropical and warm parts of the world. (Greek: *kiccos* classical name of the ivy, alluding to the climbing habit of many species)

Cissus incisa Des Moul., (incised, cut), COWITCH, IVY-TREEBINE, MARINEVINE, MARINE-IVY, HIERBA DEL BUEY. Vines, deciduous or semi-evergreen; pith white; tendrils opposite leaves; leaves alternate, variable, simple to usually palmately 3-foliate, to 8 cm long, reported to have a burnt rubber or sharp nitrogenous odor; leaflets conspicuously fleshy, coarsely toothed, obtuse apically; flowers 4-merous, perfect or unisexual, greenish; stamens 4; disk a 4-lobed cup; style 1, capitate; berries dry, black, 1–4-seeded. Stream banks or in disturbed areas; Grayson, Lamar, and Tarrant cos., also Brown (HPC), Dallas (G. Diggs, pers. obs.), Hood, Parker, Somervell, and Wise (R. O'Kennon, pers. obs.) cos.; throughout most of TX. Late Jun-Jul. According to McGregor (1986), the roots of the related *C. trifoliata* (L.) L. of Arizona and Mexico are poisonous and cause dermatitis (McGregor 1986); this is apparently the result of calcium oxalate crystals in the tissues (Lampe 1986); caution should thus be taken with *C. incisa*. ☣

PARTHENOCISSUS VIRGINIA-CREEPER, WOODBINE

Woody climbing or trailing vines; branched tendrils with adhesive disks or twining tips present; leaves simple to usually palmately compound with 3–7 serrate leaflets; inflorescence a group of cymes; flowers small; calyxes of united sepals; petals separate; fruit a black to dark blue, often glaucous berry with thin flesh and 1–4 seeds.

—A genus of 10 species of deciduous climbers native to temperate Asia and North America. Several species are used ornamentals. *Parthenocissus* species often display very early fall foliage color (often strikingly red); this is considered to serve as a “foliar fruit flag” which attracts birds that act as dispersal agents for the fall-ripening fruits (Stiles 1984). (Greek: *parthenos*, virgin, and genus name *Cissus* from *kissos* ivy; based on the French name *vigne-vierge* or the English virginia creeper)

*Viola pubescens* [SID]*Viola sagittata* [SID]*Viola sororia* [SID]*Viola villosa* [SID]*Phoradendron tomentosum* [LYN]*Ampelopsis arborea* [GLE]*Ampelopsis cordata* [BB1]*Cissus incisa* [GLE]

1. Leaves simple (but 3-lobed) or with 3 leaflets _____ **P. tricuspidata**
 1. Leaves with 5–7 leaflets.
 2. Leaves usually with 7 leaflets (sometimes 5–6), the leaflets usually 3–5(–6) cm long and to ca. 2(–3) cm wide, fleshy-thickened: in nc TX limited to Lampasas Cut Plain _____ **P. heptaphylla**
 2. Leaves usually with 5–6 leaflets, the leaflets usually much more than 5 cm long and 2 cm wide, not fleshy-thickened: widespread in nc TX _____ **P. quinquefolia**

Parthenocissus heptaphylla (Buckley) Britton ex Small, (seven-leaved), SEVENLEAF-CREEPER. Vine to 10 m with long forking tendrils; leaves glossy above; fruits ca. 1 cm in diam; seeds 1–4. Climbing on vegetation, rocky or sandy soils; Bell, Lampasas, and Williamson cos., also Brown, Hamilton (HPC), and Burnet (C. Sexton, pers. comm.) cos; endemic to Edwards Plateau and Lampasas Cut Plain of TX. Apr-May (-later?). The texture of the leaves resembles that in *Cissus* 

Parthenocissus quinquefolia (L.) Planch., (five-leaved), VIRGINIA-CREEPER, WOODBINE, AMERICAN-IVY, HIEDRA, PARRA, REDTWIG-CREEPER. Deciduous, high-climbing vine; tendrils branched, tipped by adhesive disks; leaflets to 15 cm long and 5 cm wide, thin herbaceous; flowers 25–200 per inflorescence; berries 5–9 mm in diam.; seeds 1–3(–4), 35–4 mm long. Along creeks, wooded areas, also cultivated; e 1/2 of TX. May-Jul. The leaves turn a striking red in the fall. This species does not cause contact dermatitis; sometimes falsely accused because of its association in the same habitat (sometimes on the same tree) as POISON IVY; however, the berries are suspected of being lethally poisonous to children and the tissues of the plant are known to contain microscopic, irritating, needle-like crystals known as raphides (Kingsbury 1964; Burlage 1968; Turner & Szczawinski 1991). 

Parthenocissus tricuspidata (Siebold & Zucc.) Planch., (having three cusps or points), JAPANESE-IVY, BOSTON-IVY. High-climbing vine; adhesive disks present; leaves variable, simple on young material, often 3-foliate on older, glossy above; fruits ca. 7 mm in diam. Widely cultivated in TX on buildings and walls; long persists and spreads vegetatively from cultivation; Grayson Co.; wider TX distribution not known. May?–Jun–later? Native of China and Japan. Potentially toxic as in the case of *P. quinquefolia* (Turner & Szczawinski 1991).  

VITIS GRAPE

Vine-like shrubs or high climbing polygamo-dioecious vines, often with large woody stems; leaf blades cordate or ovate, variously toothed or lobed; inflorescence a compact compound panicle opposite a leaf; flowers small, fragrant; calyces minute or absent; petals 5, united at apex, falling together; fruit a pulpy berry with 2–4 seeds.

— A n hemisphere genus of ca. 65 species. The tendrils are negatively phototropic and force themselves into cracks or crevices in supporting structures; the ends can become enlarged and sticky (Heywood 1993). *Vitis vinifera* L. (GRAPE VINE) is the source of most wine, grape juice, table grapes, and raisins (=dried grapes); some nc TX wild species are edible and can be used in making wine and jelly. North Central Texas is famous in the history of grape cultivation because of the work of T.V. Munson (e.g., Munson 1909) in Grayson Co. Munson experimented extensively with native grapes and developed 300 new varieties including a number still used today. Through some of his disease-resistant varieties, Munson is credited with saving the French wine industry in the 1870s from the root disease known as grape phylloxera (Sperry 1994). The T.V. Munson Memorial Vineyard and Viticulture-Enology Center at Grayson County College continues this legacy and is presently propagating ca. 65 varieties; many of these are also apparently resistant to Pierce's Disease, a bacterial infection problematic in some parts of the U.S. including Texas (W. Martin, pers. comm.). The stems of a number of species have been used in making wreaths. (Classical Latin name for the grape)

REFERENCES: Munson 1909; Bailey 1934; Duncan 1967; Moore 1987, 1991; Gandhi 1989; Mullins et al. 1992.

1. Underside (= abaxial surface) of fully expanded leaf blades ± covered with thin to dense cobwebby, woolly, or erect-spreading pubescence until well after flowering; younger shoots, petioles, and peduncles thinly to densely woolly or pubescent.
 2. Underside of fully expanded leaf blades white to cream with dense, matted hairs completely concealing the surface ***V. mustangensis***
 2. Underside of fully expanded leaf blades green, gray, whitish, yellowish, or rusty with rather dense to sparse pubescence, the surface visible.
 3. Underside of leaf blades with long, web-like or matted hairs (these often becoming loosened and curling into small tufts or tangles), sometimes with short straight hairs in addition: grapes without lenticels; infructescences usually with > 25 grapes (sometimes less); widespread in nc TX.
 4. Leaf blades with shallow, acute or rounded, and abruptly small-pointed teeth as wide as high or wider; pubescence gray, yellowish, or rusty; widespread in nc TX.
 5. Leaf blades of flowering shoots shallowly to deeply lobed, the deeply lobed ones entire in the sinuses of the lobes; underside of mature leaf blades glaucous; nodes often glaucous ***V. aestivalis***
 5. Leaf blades of flowering shoots unlobed or shallowly lobed, the lobes toothed to base; underside of mature leaf blades not glaucous; nodes not glaucous ***V. cinerea* var. *cinerea***
 4. Leaf blades with coarse, uneven, acute or acuminate teeth, the larger teeth longer than wide; pubescence gray or whitish; Grand Prairie and w _____ ***V. acerifolia***
 3. Underside of leaf blades with short, straight, erect-spreading hairs, sometimes the main veins with longer matted hairs as well; grapes usually with lenticels; infructescences usually with < 25 grapes; West Cross Timbers and Lampasas Cut Plain s to Edwards Plateau ***V. monticola***
 1. Underside of fully expanded leaf blades glabrous OR (only along main veins or in their axils) thinly cobwebby or thinly woolly or with short, erect-spreading pubescence; younger shoots, petioles, and peduncles glabrous OR thinly woolly or with short, erect-spreading pubescence, soon becoming largely glabrous.
 6. Tendrils not branched; leaf blades unlobed, 5–10(–12) cm long; bark tight, not shredding; lenticels evident on older stems; e TX w to e part of nc TX ***V. rotundifolia***
 6. Tendrils branched; leaf blades lobed or unlobed, 5–18 cm long; bark loosening and shredding with age; lenticels inconspicuous or absent on older stems; widespread in nc TX.
 7. Leaf blades (at least some) deeply lobed.
 8. Margins of leaf blades often ciliolate (= with fringe of short hairs); new branches green to brown; grapes gray-bluish, glaucous; inflorescence axis glabrous to sparsely and loosely long-pubescent ***V. riparia***
 8. Margins of leaf blades not fringed; new branches reddish; grapes black, not glaucous; inflorescence axis densely short-pubescent ***V. palmata***
 7. Leaf blades entire or at most shallowly lobed.
 9. Leaf teeth usually longer than wide, coarse, uneven, and acute or acuminate; Grand Prairie and West Cross Timbers s to Edwards Plateau ***V. acerifolia***
 9. Leaf teeth usually ca. as wide as long or wider, shallow, acute or rounded and often abruptly pointed; including species widespread in nc TX.
 10. Leaf blades usually 8(–10) cm or less long; inflorescences usually 6 cm or less long; tendrils absent or only opposite uppermost leaves or at tips of fertile branches; infructescences typically with < 25 grapes; grapes usually with lenticels; Lampasas Cut Plain s to Edwards Plateau ***V. monticola***
 10. Leaf blades usually 8 cm or more long; inflorescences usually much more than 6 cm

long; tendrils present; infructescences typically with > 25 grapes; grapes without lenticels; widespread in nc TX.

11. Petioles, vein axils, and veins on underside of leaf blades glabrous or with short, erect-spreading hairs _____ **V. vulpina**
11. Petioles, vein axils, and often veins on underside of leaf blades with cobwebby or woolly hairs.
12. Leaf blades often wider than long; leaves developing fully as branches elongate; grapes purplish or blackish; mainly Lampasas Cut Plain s to Edwards Plateau _____ **V. cinerea** var. **helleri**
12. Leaf blades longer than wide; new growth rapidly produced, the new branch slender and elongate with very immature leaves; grapes black; widespread in nc TX _____ **V. vulpina**

Vitis acerifolia Raf., (with leaves like *Acer*—maple), PANHANDLE GRAPE, BUSH GRAPE, LONG'S GRAPE. Rarely climbing, but covering rocks and shrubs; leaf blades often shallowly lobed as well as irregularly and very sharply toothed; grapes 8–12 mm in diam., black, with heavy bloom, becoming sweet. Stream bottoms and rocky slopes; Cooke Co, also Erath Co. (Mahler 1988); Grand Prairie w to Panhandle. Late Apr–early May. Fruiting Jul–Aug.

Vitis aestivalis Michx., (summer), PIGEON GRAPE. Clump forming to low or high climbing vine; leaf blades suborbicular-ovate, almost as wide as long or wider; grapes 5–20 mm in diam., dark purple or black with thin bloom, taste variable, often sweet. Stream bottom woods, usually on sand. May. Fruiting Sep–Oct.

1. Mature 3- or 4-seeded grapes usually 9–14 mm in diam.; stipules usually > 1.5 mm long; young branches and petioles with whitish or light brownish pubescence; lower leaves of fertile branches obtuse to acute; high climbing vines; widespread in nc TX _____ var. **aestivalis**
1. Mature 3- or 4-seeded grapes usually > 14 mm in diam.; stipules usually < 1.5 mm long; young branches and petioles with rusty or reddish pubescence; lower leaves of fertile branches acute to acuminate; clump forming shrubby vines or low climbing vines; e TX w to e margin of nc TX _____ var. **lincecumii**

var. **aestivalis**, SUMMER GRAPE, PIGEON GRAPE. Dallas, Henderson, and Limestone cos, also Hood Co. (Mahler 1988); se and e TX w to nc TX. [V. *lincecumii* Buckley var. *glauca* Munson, V. *lincecumii* Buckley var. *lactea* Small]

var. **lincecumii** (Buckley) Munson, (for Gideon Lincecum, 1793–1874, early TX naturalist and physician; see Lincecum et al. 1997—*Science on the Texas Frontier*), PINEWOODS GRAPE, POST OAK GRAPE, BLUE-LEAF GRAPE. E TX w to Limestone and Milam cos. at e edge of nc TX. [V. *lincecumii* Buckley] The spelling of the epithet was originally given by Buckley (1861 [1862]) as *linsecomii* but has been corrected to *lincecumii* to conform with the family's spelling of the name.

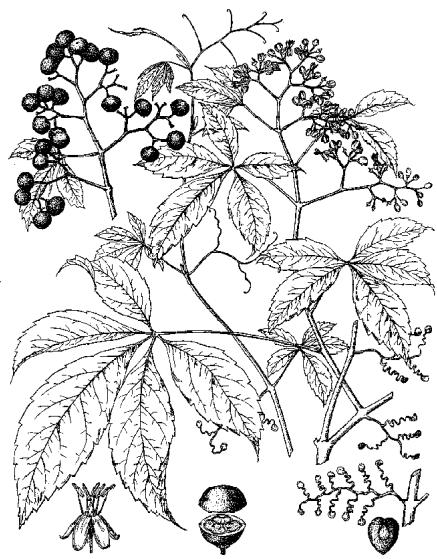
Vitis cinerea (Engelm.) Millardet, (ashy-gray), SUMMER GRAPE, GRAY-BARK GRAPE, SWEET GRAPE. Moderate or high climbing vine; leaf blade (or its lobes) acute, the basal sinus variable; grapes 4–9 mm in diam., blackish or purplish, with a slight bloom. Stream bottom woods. May–early Jun. Fruiting Sep–Nov.

1. Underside of leaf blades cobwebby, woolly, soft-pubescent, or densely canescent; leaf blades usually > 10 cm long; grapes only slightly to not glaucous _____ var. **cinerea**
1. Underside of leaf blades with pubescence when young but eventually nearly glabrous and glossy, although retaining some cobwebby or woolly pubescence on the veins; leaf blades usually < 10 cm long; grapes moderately to heavily glaucous _____ var. **helleri**

var. **cinerea**, SWEET GRAPE, GRAY-BARK GRAPE, PARRA SILVESTRE. Se and e TX w to West Cross Timbers, also Edwards Plateau. [V. *aestivalis* var. *cinerea* Engelm., V. *cinerea* var. *canescens* Engelm.]



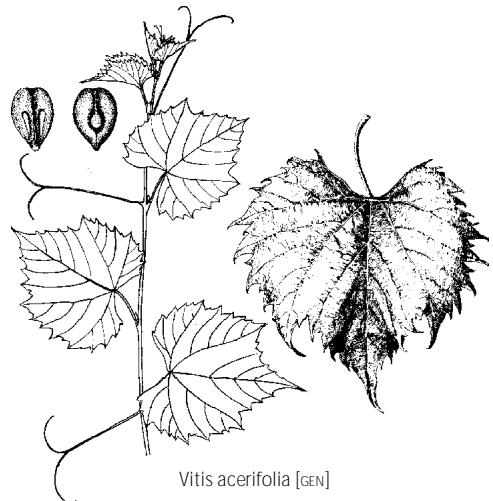
Parthenocissus heptaphylla [VIN]



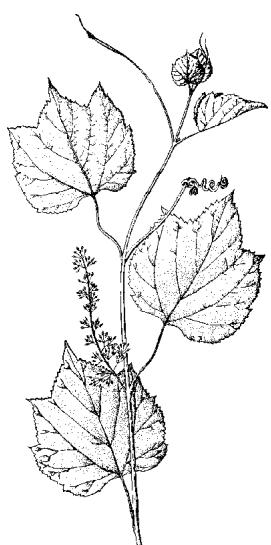
Parthenocissus quinquefolia [SA1]



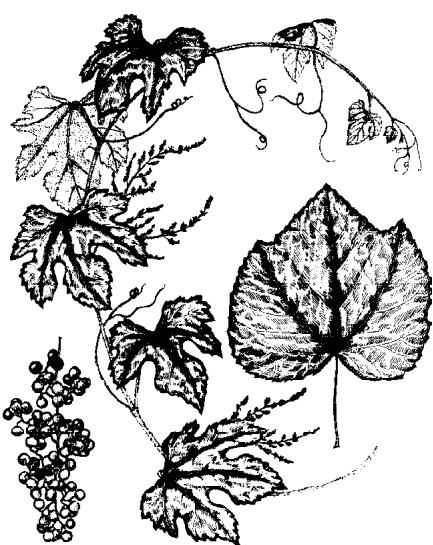
Parthenocissus tricuspidata [BA1]



Vitis acerifolia [GEN]



Vitis aestivalis var. *aestivalis* [GLE]



Vitis aestivalis var. *lincecumii* [VIN]

var. **helleri** (L.H. Bailey) M.O. Moore, (for Amos Arthur Heller, 1867–1944, Pennsylvania botanist and collector of w American plants), WINTER GRAPE, ROUND-LEAF GRAPE, SPANISH GRAPE, UVA CIMARRONA. Southern part of West Cross Timbers and Lampasas Cut Plain s to Edwards Plateau. [V. *berlandieri* Planch.]

Vitis monticola Buckley, (inhabiting mountains), SWEET MOUNTAIN GRAPE, CHAMPIN GRAPE. Climber; leaf blades relatively small, ca. 5–8(–10) cm long above attachment of petiole, cordate-ovate to suborbicular, acute or obtuse, indistinctly to sharply toothed, often slightly lobed; grapes 6–12 mm in diam., black or rarely red or pinkish, thinly glaucous, sweet. Stream bottoms, limestone areas; Coryell Co., also Bosque and Palo Pinto cos. (Mahler 1988); w part of nc TX, also Edwards Plateau; endemic to TX. Late May. Fruiting Sep–Oct. ♀

Vitis mustangensis Buckley, (according to the type description, “This is called the Mustang grape in Texas, where it is very common.” (Buckley 1861 [1862])—thus the epithet is apparently derived from the common name), MUSTANG GRAPE. High climbing vine, often rampant; leaf blades cordate-suborbicular to broadly triangular-ovate, subacute or obtuse, subentire to deeply lobed, becoming glabrous and dark green on upper surface, lower surface with strikingly thick tomentum; grapes 15–20 mm in diam., purple-black to light-colored, without bloom, pungent or with a fiery taste, especially if skin is chewed. Stream bottoms, thickets, fencerows, and disturbed areas, often on sandy soils; se and e TX w to West Cross Timbers and Edwards Plateau. Apr. Fruiting Aug–Sep. [V. *candidans* Engelm. ex A. Gray] This species sometimes literally covers other vegetation. Buckley (1861 [1862]) said that, “It makes an excellent wine; but is little esteemed for eating on account of an acrid juice beneath the skin, which, if swallowed, gives a burning pain in the throat.”

Vitis palmata Vahl, (palmate), CATBIRD GRAPE, MISSOURI GRAPE, RED GRAPE. High climber; shoots, flowering branchlets, and petioles red; leaf blades 7–12 cm long above attachment of petiole, ovate, long acuminate; grapes 5–10 mm in diam., black or bluish black, without bloom, sweet at maturity. Low woods; Lamar Co. in Red River drainage; se and e TX. Jun. Fruiting Sep–Oct.

Vitis riparia Michx., (of river banks), RIVER GRAPE, RIVERBANK GRAPE, FROST GRAPE. High climber; petioles glabrous; leaf blades cordate-ovate, prolonged acuminate apically; grapes 8–12 mm in diam., purple-black, with heavy bloom, acidic. Stream bottoms; Trans-Pecos e to Grayson and Van Zandt cos. (Mahler 1988). Early May. Fruiting Aug–Oct.

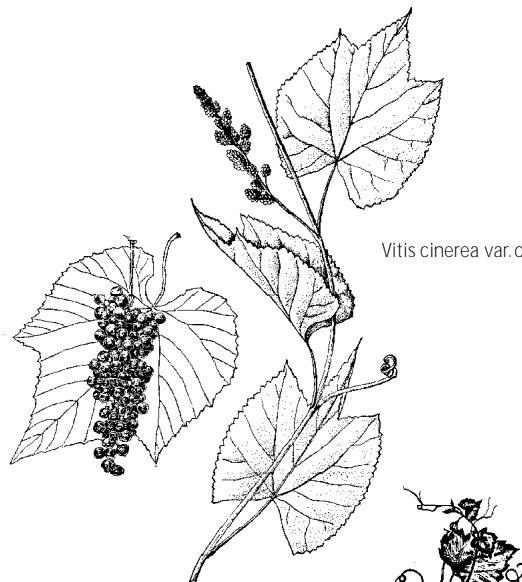
Vitis rotundifolia Michx., (round-leaved), MUSCADINE GRAPE, SCUPPERNONG, BULLACE GRAPE. Vigorous very high climber; leaf blades relatively small, 5–10(–12) cm long above attachment of petiole, about as wide as long, with broad teeth, usually unlobed; grapes 12–25 mm in diam., purple-black to bronze, without bloom, falling rapidly, flesh musky-tasting. Woods; Henderson, Hopkins, and Lamar cos. in e part of nc TX; mainly se and e TX. May(–Jun). Fruiting Sep–Oct.

Vitis vulpina L., (of the fox), FOX GRAPE. High climber; leaf blades longer than wide, the basal sinus open and broadly U-shaped; grapes 5–10 mm in diam., black, often glaucous. Stream bottoms and hillsides; se and e TX w to West Cross Timbers and Edwards Plateau. Late Apr–mid-May. Fruiting Oct–Nov. [V. *cordifolia* Michx.]

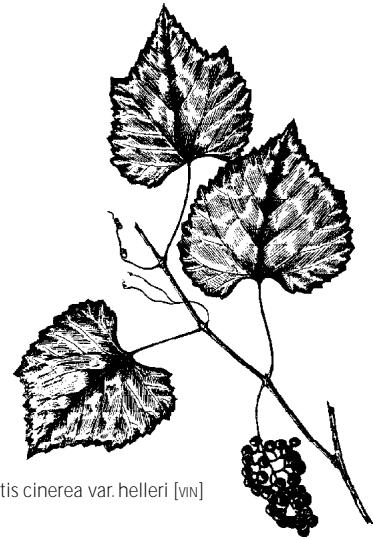
Several hybrids are also known:

Vitis ×champinii Planch. [V. *mustangensis* × V. *rupestris*—Moore 1991], (for Aimé Champin, ?–1894, viticulturalist at the agricultural university of Montpellier, France). Leaves only slightly arachnoid pubescent beneath and lacking hirtellous trichomes; grapes not glaucous. Moore (1991) cited Bell, Burnet, and Coryell cos.

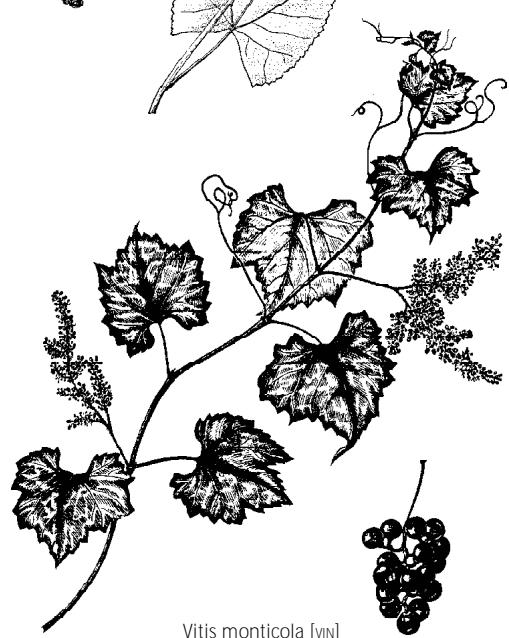
Vitis ×doaniana Munson ex Viala [V. *acerifolia* × V. *mustangensis*], (for Judge Jonathan Doan of Wilbarger, TX, who started a trading post in 1878—now Doans, TX, and who for years manufac-



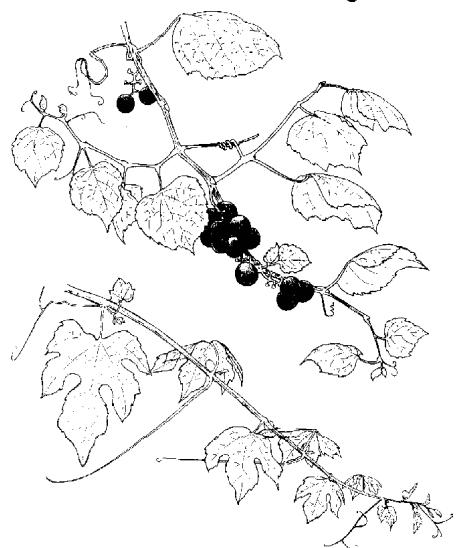
Vitis cinerea var. *cinerea* [BA1, GLE]



Vitis cinerea var. *helleri* [VIN]



Vitis monticola [VIN]



Vitis mustangensis [LYN]



Vitis palmata [BB2, GLE]



Vitis riparia [GLE]

tured fine wine from this grape which had been gathered in Greer Co., OK). Leaves moderately to heavily arachnoid pubescent beneath, also with hirtellous trichomes; grapes glaucous. Moore annotated a Montague Co. Whitehouse collection at BRIT/SMU (15027) as *V. ×doaniana*.

ZYGOPHYLLACEAE CALTROP FAMILY

Ours pubescent to pilose, prostrate to decumbent annuals or evergreen shrubs or small trees; leaves opposite or crowded in fascicles at the nodes, even-pinnately compound; leaflets 3–8 pairs, with asymmetrical bases, entire, folding together at night or in bad weather or in *Guajacum* sometimes in heat of day; stipules linear-lanceolate or subulate; flowers solitary or in small clusters, pedunculate; sepals 5; petals 5, yellow or orange or in *Guajacum* blue to purple, pink, or white; stamens 10 (bristles on ovary sometimes resemble additional filaments); ovary superior, 2–5-carpellate; fruit a schizocarp, 2(–3–4) or 5- or 10-lobed or -loculed, separating at maturity into 5 or 10 sections (mericarps) or a septicidal capsule.

—A small (285 species in 27 genera) mostly tropical and warm, especially dry area family of mainly shrubs, herbs, and a few trees; alkaloids or mustard-oils are sometimes present. The family includes *Gaujacum officinale*L. and *Guajacum sanctum* L. (both referred to as Lignum Vitae), producing some of the world's hardest wood and a medicinal resin. The family also includes the abundant aromatic *Larrea tridentata* (Sessé & Moç. ex DC.) Coville (CREOSOTE-BUSH) of w TX. Family name from *Zygophyllum* a genus of 80 species native from the Mediterranean region to c Asia, s Africa, and Australia, often in desert or arid regions. (Greek: zygo, yoke, and phylon, leaf, in reference to the paired leaflets) (subclass Rosidae)

FAMILY RECOGNITION IN THE FIELD: opposite, even-pinnately compound leaves, the entire, asymmetrically-based leaflets in 3–8 pairs; fruit a small schizocarp or a capsule.

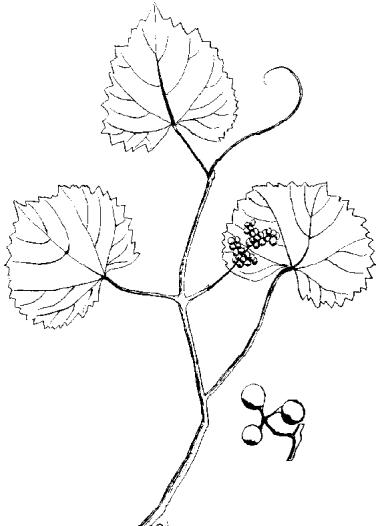
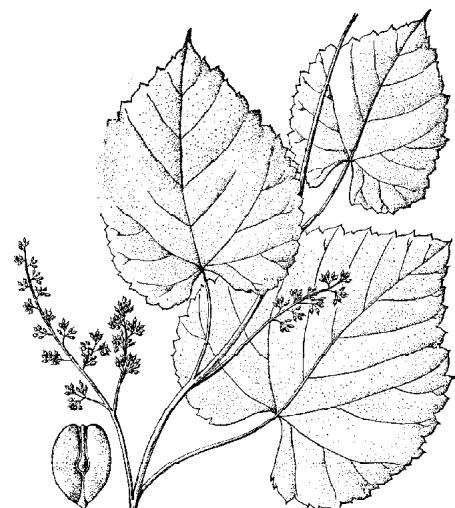
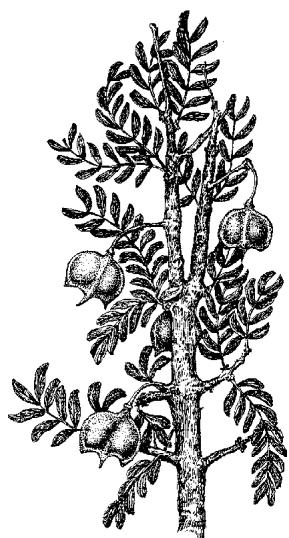
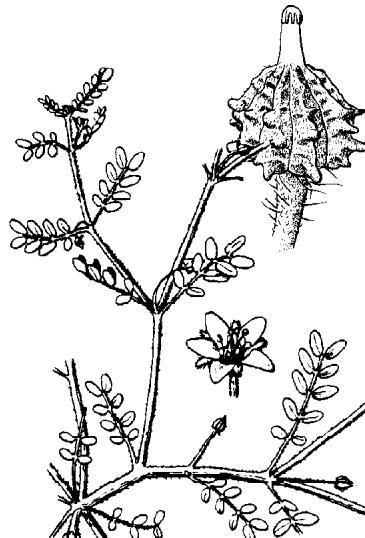
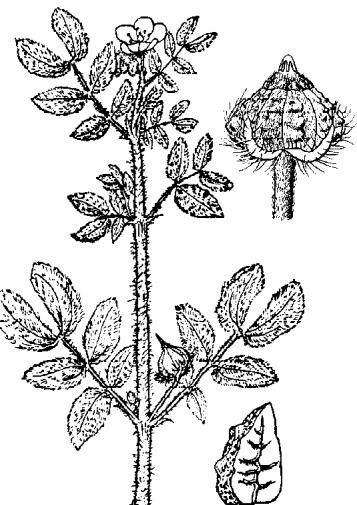
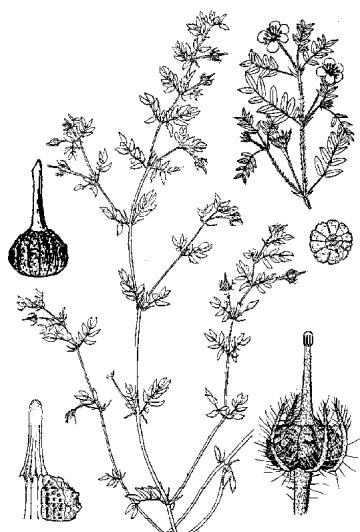
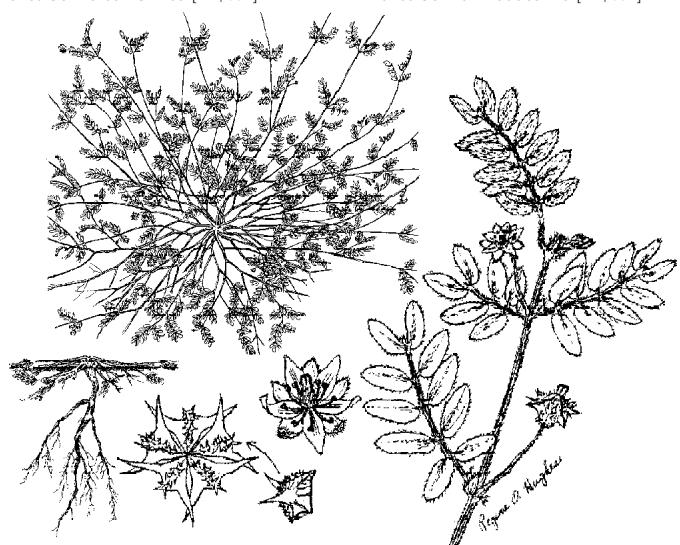
REFERENCES: Vail & Rydberg 1910; Porter 1972.

1. Prostrate to decumbent annual herbs; petals yellow to orange; fruits ovoid to globose, with stout spines or unarmed, 5- or 10-lobed or -loculed.
2. Petals lemon-yellow; fruits with two conspicuous stout, spreading prickles on each of the 5 sections; beak of fruit falling with sections _____ **Tribulus**
2. Petals orange to yellow; fruits roughened or warty but not prickly, separating into 10 sections; beak of fruit persistent after sections fall _____ **Kallstroemia**
1. Erect distinctly woody shrubs or small trees; petals blue to purple, pink, or white; fruits flat, unarmed (but with apiculate tip), 2(–3–4)-lobed or -loculed _____ **Guajacum**

GUAJACUM

—A genus of 6 species of trees and shrubs of dry areas in warm parts of the Americas. Lignum Vitae, obtained from *G. officinale*L. and *G. sanctum*L., is the hardest commercial hardwood; it was used in the lock gate hinges on the Erie Canal where they lasted for a century. It was also used medicinally, hence the common name meaning wood of life. Previously spelled *Guaiacum*. (From the South American vernacular word *guaiac*, the name for lignum vitae, *G. officinalis*) REFERENCE: Porter 1974.

Guajacum angustifolium Engelm., (narrow-leaved), GUAYACÁN, SOAPBUSH. Evergreen shrub or small tree, 1–7 m tall; leaves opposite or crowded in fascicles at the nodes, folded at night and in heat of day; leaflets 4–8 pairs, 5–15 mm long, 2–3 mm wide; flowers solitary or in small clusters, 12–20 mm in diam., fragrant; petals ca. 10 mm long; capsules 2(–3–4)-lobed, obcordate, 1–2 cm in diam., the margin + winged, abruptly contracted to an elongate apiculate tip; seeds with scarlet aril. Brushy areas; included based on citation of vegetational area 5 (Fig. 2) by Hatch et al. (1990); mainly s 1/2 of TX. Mar–Sep. [*Porlieria angustifolia*(Engelm.) A. Gray] The bark from the roots has been used to make soap (Powell 1988), hence the common name.

*Vitis rotundifolia* [ROE]*Vitis vulpina* [GLE]*Guajacum angustifolium* [WIN]*Kallstroemia californica* [ABR, CGH]*Kallstroemia hirsutissima* [BB2, CGH]*Kallstroemia parviflora* [ARM, BB2]*Tribulus terrestris* [REE]

KALLSTROEMIA CALTROP

Prostrate to decumbent (= branch tips ascending) annuals; stems hirsute; leaves opposite, 1 of each pair smaller; flowers solitary, in the axils of the smaller leaf of the pair; intrastaminal glands absent; fruits ovoid, 10-lobed, separating into 10 one-seeded prickleless sections (mericarps); mericarps rugose to tubercled.

—A genus of 17 species native to tropical and warm parts of the Americas. The wet mericarps secrete a mucilaginous sheath that may adhere to animals and thus aid in dispersal (Porter 1969). (Named for Kallstroem, obscure scholar and contemporary of Austrian botanist J.A. Scopoli, 1723–1788, author of the genus)

REFERENCE: Porter 1969.

1. Beak of fruit 4–9 mm long, longer than fruit body; petals orange, 5–11 mm long; peduncles equaling or commonly longer than subtending leaves; widespread in nc TX _____ ***K. parviflora***
1. Beak of fruit 1–4 mm long, shorter than fruit body; petals yellow, 2–6 mm long; peduncles usually shorter than subtending leaves; rare in nc TX
 2. Beak broadly conical, its base surrounded by a conspicuous ring of short white trichomes; sepals persistent; petals 2–4 mm long, ca. 1.5 mm wide; fruit body 6–8 mm wide _____ ***K. hirsutissima***
 2. Beak cylindrical, its base glabrous to pubescent but without a ring of trichomes; sepals deciduous; petals 4–6 mm long, 2.5–3 mm wide; fruit body 3–5 mm wide _____ ***K. californica***

Kallstroemia californica (S. Watson) Vail, (of California). Stems 10–65 cm long; leaves 1.5–6 cm long; leaflets up to 12 (3–6 pairs); fruits with 4–5 blunt oblong tubercles up to 1.5 mm long. Disturbed habitats; included based on citation of vegetational area 4 (Fig. 2) by Hatch et al. (1990); mainly s 1/2 of TX. Mar–Nov.

Kallstroemia hirsutissima Vail ex Small, (very hairy), CARPETWEED. Stems 15–70 cm long; leaves 1–4 cm long; leaflets 6–12(–14), in 3–6(–7) pairs; fruits tubercled. Disturbed habitats; Bell and Coryell cos. (Fort Hood–Sanchez 1997); se and s TX w to the Lampasas Cut Plain, Edwards Plateau, and Trans-Pecos. Jun–Nov. Poisonous to sheep, goats, and cattle; it can cause weakness of the hind legs, paralysis, and even death (Kingsbury 1964; Burlage 1968). ☠

Kallstroemia parviflora Norton, (small-flowered), WARTY CALTROP. Stems hirsute, becoming glabrate, to ca. 100 cm long; leaves to ca. 6 cm long; leaflets up to 10(–12), in 3–5(–6) pairs; sepals persistent; petals 3.5–6 mm wide; fruits rugose to tubercled; beak of fruit strongly conic at base. Disturbed habitats; widespread in TX. Apr–Nov.

TRIBULUS CALTROP

—A genus of 25 species of tropical and warm areas, especially dry areas of Africa. The common name comes from the Greek, *caltrop*, a pointed weapon placed on the ground to impede cavalry, in reference the armed fruit. (Greek: *tribulus*, three-pointed, apparently referring to the prickly fruit).

Tribulus terrestris L., (of the earth or ground), GOATHEAD, PUNCTUREWEED, PUNCTUREVINE, BULL-HEAD, CADILLO, ABROJO DE FLOR AMARILLO. Annual with prostrate stems to > 1 m long; leaves opposite, 1 of each pair smaller, 1–4.5 cm long; leaflets up to 12 (3–6 pairs); flowers solitary, in the axils of the smaller leaf of the pair; peduncles usually shorter than the subtending leaves; petals 3–5 mm long, 2–3 mm wide; intrastaminal glands present; fruits globose, beaked, 5-lobed, separating into 5, 3- to 5-seeded sections with stout prickles. Disturbed sites; throughout most of TX. May–Nov. Native of the Mediterranean region; said by Reverchon to have appeared at Dallas around 1860 (Mahler 1988). The prickly fruits are very painful to both animal and human feet, damage even tires, and are injurious and occasionally fatal to livestock if eaten; they are reported to contain a saponin and to produce photosensitization and swelling of the head and ears (Burlage 1968; Correll & Johnston 1970). ☠ ⚡