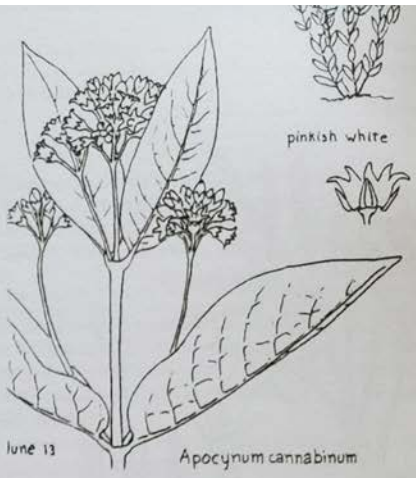
Easter Egg Hunt #1 for Plant Taxonomy Lab August 28, 2020

Highway 152 all within 4 miles of US 180. All sites south side of road. Be careful and watch traffic!!!

Site #1. NAD83 12S 0768900 3632546 el 6159 ft

South side of road at edge of shoulder. Across street from power pole. About 2 miles from US 180.

Disturbed roadside in juniper woodland. **Plant #1**-- You are looking for an herbaceous plant that is erect and about 1-2 feet tall. Most of the plant is green, the inflorescence consists of many small whitish flowers in clusters at the top of the stems. Mostly the plants have only one or two stems from the base. The fruit is a follicle, which looks like a "pod" but differs in that a follicle opens on only one side, while pods in the Fabaceae at least open on two side like a peanut.



Asclepias [classical Greek name] MILKWEED [25].

Plants usually with milky latex (except *A. tuberosa*), the stems erect or decumbent, never twining; inflorescences terminal or lateral umbellate cymes; sepal lobes reflexed; corolla lobed nearly to the base, lobes usually reflexed or spreading (rarely erect); a corona of five hoods is attached to the staminal column, each usually bearing an internal horn or crest; stamens adnate to the peltate stigma head, forming a gynostegium; fruit a follicle. ♦With about 400 species in the New World and Africa. Pollen is clustered into pollinia, which catch on the feet or mouthparts of insects as they forage on the flower, and are then carried to the next flower; some small insects, unable to lift the pollinia free, are trapped on the flower and expire. Reports of *Asclepias cutleri* Woodson, *A. emoryi* (Greene) Vail, and *A. ruthiae* Maguire have been based on misidentified material; these species are not yet known in New Mexico.

■Allred, K.W. 1999. New plant distribution records [*Asclepias verticillata*]. The New Mexico Botanist 13:7. ■Iowa State Univ. Press. 600 pp. ■Heil, K. & S. O'Kane. 2007. Plant distribution reports [*Asclepias cutleri, Asclepias ruthiae*]. The New Mexico Botanist 41:7. ■Heil, K.D., J.M. Porter, and S.L. Welsh. 1989. A new species of *Asclepias* (Asclepiadaceae) from northwestern New Mexico [*Asclepias sanjuanensis*]. Great Basin Naturalist 49:100-103. ■Holmgren, P.K. & N.H. Holmgren. 1984. Asclepiadaceae, pp. 31-50 [*Asclepias hallii, Asclepias macrosperma*]. IN: Intermountain Flora, vol. 4. New York Botanical Garden. ■Jercinovic, E. 2010. The status of the genus *Asclepias* in New Mexico. The New Mexico Botanist 49:1-5. ■Kephart, S.R., R.Wyatt, & D. Parrella. 1988. Hybridization in North American *Asclepias*. I. Morphological evidence. Syst. Bot. 13(3):456-473. ■Liede, S. 1997. Subtribes and genera of the tribe Asclepiadeae (Apocynaceae, Asclepiadoideae) - a synopsis. Taxon 46:233-248. ■Rintz, Richard E. 2014. A closer look at *Asclepias engelmanniana* Woodson and *Asclepias rusbyi* (Vail) Woodson (Apocynaceae, Asclepiadoideae). Phytologia 96(4):241-246. ■Sundell, E. 1990. Notes on Arizona *Asclepias* (Asclepiadaceae) with a new combination. Phytologia 69(4):265-270. ■Sundell, E. 1994. Asclepiadaceae. J. Ariz.-Nev. Acad. Sci. 27(2):169-187. ■Woodson, R.E. 1954. The North American species of *Asclepias*. Ann. Missouri Bot. Gard. 41:1-211.

1 Corolla lobes erect or spreading at anthesis..... ***A. asperula***
1 Corolla lobes reflexed at anthesis
  2 Horn absent from hoods or reduced to a small crest
    3 Leaves linear or filiform
      4 Hoods containing a small (sometimes horn-like) crest; anther wings with a spur at the base..... ***A. rusbyi***
      4 Hoods lacking horn or crest; anther wings without a spur at the base..... ***A. engelmanniana***
    3 Leaves narrowly lanceolate or broader
      5 Leaves opposite, ovate to oval; flowers dark red..... ***A. hypoleuca***
      5 Leaves opposite to irregularly approximate; oval to narrowly lanceolate; flowers pale green..... ***A. viridiflora***
  2 Horn well developed
    6 Hoods or apical portion widespread from anther head
      7 Leaves filiform; hoods narrowly acuminate, 3-6 mm long..... ***A. macrotis***
      7 Leaves ovate to ovate-lanceolate or oval; hoods narrowly attenuate, 10-14 mm long..... ***A. speciosa***
    6 Hoods erect to suberect, not spreading away from anther head
      8 Corolla lobes and hoods orange, rarely reddish or yellow..... ***A. tuberosa***
      8 Corolla lobes whitish, pinkish, greenish or purplish
        9 Hoods not longer than 2.5 mm
          10 Leaves filiform or linear
            11 Leaves whorled, occasionally opposite above..... ***A. subverticilliata***
            11 Leaves approximate to alternate or spiral, occasionally verticillate below..... ***A. pumila***
          10 Leaves narrowly lanceolate or broader (distal cauline leaves sometimes linear in *A. uncialis*)
            12 Plants low, mostly less than 10 cm above ground, prostrate to somewhat ascending
              13 Hoods reddish-violet..... ***A. sanjuanensis***
              13 Hoods pale
                14 Corolla lobes purple or purplish rose; hoods white..... ***A. uncialis***
                14 Corolla lobes pale yellow or yellowish green; hoods yellowish..... ***A. macrosperma***
            12 Plants taller, erect or strongly ascending
              15 Stems (branches) 40-150 cm tall..... ***A. incarnata***
              15 Stems (branches) 10-30 cm tall

So…in the **Apocynaceae** (formerly Asclepiadaceae), genus *Asclepias*. We'll key out the species…

Site #1 Plant #2:

This is a viney plant found climbing and twining around the stems of other plants on the shoulder of the road. The flowers are pinkish and will be closed after late morning. It is in the **Convolvulaceae**, the morning glory family after all! In fact, it is in the genus that gives its name to the family, the genus ***Convolvulus*****.** The leaves are arrow shaped with lobes at the base. The flowers have 5 fused petals (sympetalous) and the fruit is dry, opens on its own and is formed of at least 2 carpels: a capsule.

the calyx, saccate basally; calyces 14-16 mm long; corollas white, rarely pinkish, 4-8 cm long. ●Moist roadsides, fields, along creeks and streams; scattered locales in the state. ♦Our plants belong to subsp. ***fraterniflora*** (
Brummitt [brotherly flowers] [*Convolvulus fraternifloras* (Mackenzie & Bush) Mackenzie & Bush, *Convolvulus sepium* Linnaeus var
& Bush], the native element with glabrous or pubescent herbage, strongly angled leaf lobes, often paired flowers
than the typical subspecies, which is native to Europe and Eurasia.

Convolvulus [entwined] BINDWEED [2].

Shrubs, subshrubs, or annual to perennial herbs (ours) from rhizomes, caudices, or taproots, the stems often twining or trailing, the herbage commonly ± glabrous; leaves alternate, simple, commonly entire but sometimes 3-5-lobed, sessile or petiolate, commonly cordate, sagittate, or hastate at the base; flowers showy, mostly white or pink (ours), but also blue, violet, purple, or yellow, solitary, paired, or in cymose clusters, subtended by a pair of small floral bracts remote from the calyx and not obscuring it; calyces deeply 5-lobed, the segments nearly free from each other; corollas funnelform, pleated, with a spreading limb; stamens 5, included, epipetalous; style simple, with 2 apical linear stigma lobes; fruit a capsule, somewhat inflated, 1-2-loculed, commonly with 4 seeds. ♦With 190 species, worldwide, many of which are invasive weeds, but some are attractive ornamentals. In its current configuration, *Convolvulus* is paraphyletic, and recent work argues for its expansion to include the genus *Calystegia* (see Carine et al. 2004; Stefanovic et al. 2003).

■Wood, J.R.I, B.R.M. Williams, T.C. Mitchell, M.A. Carine, D.J. Harris, & R.W. Scotland. 2015. A foundation monograph of *Convolvulus* L. (Convolvulaceae). PhytoKeys 51: 1-282.

1 Calyx 3-5 mm long, inconspicuously pubescent or glabrate; plants pubescent to glabrate; leaf blades entire except for basal lobes; perennial from deeply set creeping rootstocks ..... ***C. arvensis***

1 Calyx 6-12 mm long, densely pubescent; plants densely gray-pubescent; leaf blades entire, toothed, or deeply lobed; perennial from a taproot ..... ***C. equitans***

****Convolvulus arvensis*** Linnaeus [of fields] FIELD BINDWEED [*Convolvulus ambigens* House]. Perennial herbs from extensive creeping rootstocks, the stems angular, twining, to about 1 m long, the herbage glabrous to pubescent; leaves petiolate to 3 cm, the blades 2-5 cm long, to nearly 4 cm wide, broadly lanceolate, oblong, to broadly ovate in outline, sagittate- or hastate-lobed basally, the lobes divergent or not, rounded, angled, to pointed, sometimes apiculate, the bases truncate to cordate; flowers solitary, the peduncles to 3 cm long, the floral bracts 1-3 mm long; calyx lobes 3-5 mm long, broadly obovate, hyaline-margined, ciliolate; corollas 1.5-3 cm long, broadly funnelform, to 3.5 cm across, white, pink, sometimes bicolored, the limb not markedly lobed, the mid-petal bands pink and pubescent; capsules spherical, 5-7 mm long. ●A widespread weed of roadsides, fields, gardens, and other disturbed ground; native to Europe and Asia, but naturalized ± throughout the world. ♦Extensive variation in flower coloration, pubescence, and leaf shape have given rise to 28 synonyms listed in Wood et al. (2015). This is a serious, noxious weed found in every county of the state and every state of the Union. §

Convolvulus equitans Bentham [astride, overlapping] [*Convolvulus incanus* auctores non Vahl]. Perennial herbs from stout taproots, the stems decumbent to trailing, sometimes twining, to 1 m or more long, the herbage finely canescent-pubescent, grayish; leaves petiolate to 2.5 cm, the blades 1.5-4(6) cm long, to 2.5 cm wide, linear, narrowly lanceolate, to narrowly ovate in outline, the basal lobes divergent or not, entire to cleft or palmatisect, the bases truncate to cordate; flowers solitary or 2-3 together, the peduncles to 9 cm long, the floral bracts 2-3 mm long; calyx lobes 6-12 mm long, elliptic, truncate to auriculate basally, densely pubescent; corollas 1.5-3 cm long, white, pink, sometimes bicolored, the limb shallowly lobed, the mid-petal bands pubescent; capsules spherical, 4-6 mm long. ●Foothills, rocky hills, plains, flats, washes; this is our widespread, native bindweed. ♦Wood et al. (2015) recognize a variety *lindheimeri* Wood & Scotland in Texas, with larger flower parts than typical. §

from Crete]. ALKALI-WEED [1].

Site #1 Plant #3. This group of plants is growing along the fenceline a few dozen feet from the shoulder. There are dense terminal lusters of small white flowers. The corolla is 4-merous. The fruit is a silicle. There are 6 stamens, 4 long and 2 short ones: tetradynamous. The plant is annual. It belongs to the mustard family, the **Brassicaceae**. It is in the genus ***Lepidium***.

pilose, reflexed, 5-10 mm [illegible] yellow; fruits dark brown to black, 1-2.5 cm long, pendulous. ♦Fields and roadsides; known as yet only from Sandoval County; native to Eurasia. ♦Woad is listed by several western states as a noxious weed, but it is scarcely present in New Mexico.

Lepidium [a little scale] PEPPERWEED, HOARY CRESS [19].

Annual to perennial, rarely subshrubs, glabrous to pubescent with simple hairs, the stems erect, ascending, to decumbent or prostrate; leaves basal (rosette-forming or not) and cauline, the blades entire, toothed, lobed, to divided; inflorescence a raceme; petals white or sometimes yellowish; fruit a silicle, cordate-ovate-obovate in outline, sometimes inflated, the valves glabrous to hairy, the seeds usually profusely mucilaginous when wet. ♦About 220 species, in most parts of the world. Al-Shehbaz et al. (2002) merged the polyphyletic genera *Cardaria* and *Coronopus* into *Lepidium*.

■Allred, K.W. 1999. New plant distribution records [*Lepidium latifolium*]. The New Mexico Botanist 13:7. ■Al-Shehbaz, I.A. 1986. The genera of Lepidieae (Cruciferae; Brassicaceae) in the southeastern United States [*Lepidium austrinum*]. J. Arnold Arboretum 67:265-311. ■Al-Shehbaz, I.A. & J.F. Gaskin. 2010. *Lepidium*, p. 570-595. IN: Flora of North America, vol. 7. Oxford University Press, New York. ■Al-Shehbaz, I.A., K. Mummenhoff, & O. Appel. 2002. *Cardaria, Coronopus*, and *Stroganowia* are united with *Lepidium* (Brassicaceae). Novon 12:5-11. ■Atwood, N.D. & S.L. Welsh. 2007. New taxa of *Camissonia* (Onagraceae); *Erigeron, Hymenoxys*, and *Tetradymia* (Compositae); *Lepidium* and *Physaria* (Cruciferae) from Arizona, New Mexico, and Utah [*Lepidium montanum todiltoensis*]. Rhodora 109 (940):395-414. ■Bleakly, D. 2003. Plant distribution reports [*Lepidium appelianum*]. The New Mexico Botanist 25:7. ■Great Plains Flora Association. 1977. Atlas of the Flora of the Great Plains [*Lepidium campestre*]. Iowa State Univ. Press. 600 pp. ■Hartman, R.L., B. Reif, B.E. Nelson, & B. Jacobs. 2006. New vascular plant records for New Mexico [*Lepidium ramosissimum bourgeauanum*]. Sida 22(2):1225-1233. ■Heil, K.D., S.L. O'Kane, & A. Clifford. 2002. Additions to the flora of New Mexico from the San Juan Basin Flora project [*Lepidium montanum montanum*]. The New Mexico Botanist 24:1-4. ■Hitchcock, C.L. 1936. The genus *Lepidium* in the United States. Madroño 3:265-320. ■Mulligan, G.A. & J.N. Findlay. 1974. *The biology of Canadian weeds. 3. Cardaria draba, C. chalepensis, and C. pubescens*. Canadian Journal of Plant Science 54(1):149-160. ■Sivinski, R.C., T. Lowrey and R. Peterson. 1994. Additions to the native and adventive flora of New Mexico [*Lepidium chalepense*]. Phytologia 76(6):473-479. ■Spellenberg, R., L. McIntosh, and L. Brouillet. 1993. New records of angiosperms from southern New Mexico [*Lepidium didymum*]. Phytologia 75:224-230. ■Strahan, R. 2007. Plant distribution reports [*Lepidium sordidum*]. The New Mexico Botanist 40:16. ■Wagner, W.L. 1983. Noteworthy collections (New Mexico) [*Lepidium oblongum*]. Madroño 30:126.

[Key partly adapted from Al-Shehbaz & Gaskin 2010]

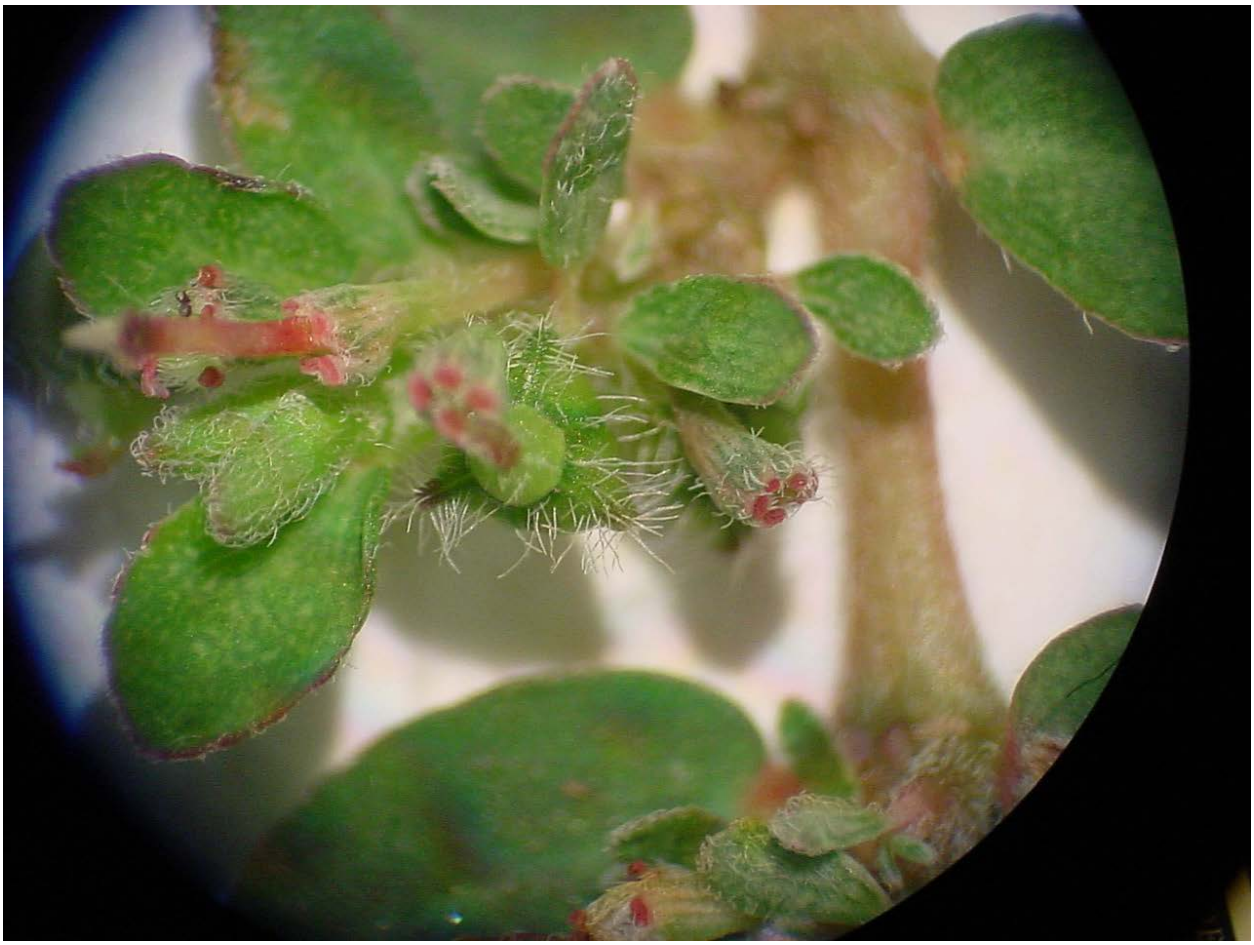
1 Plants rhizomatous, forming colonies (*Cardaria*)
2 Upper cauline leaves cuneate to truncate at the base, neither auriculate nor perfoliate; plants 1-3 m tall; flowers purplish; basal leaves up to 30 cm long and 10 cm wide ..... ***L. latifolium***
2 Upper cauline leaves auriculate or perfoliate
3 Silicles densely pubescent with minute simple trichomes, globose to subglobose; sepals pubescent ..... ***L. appelianum***
3 Silicles glabrous, cordate to depressed subglobose or broadly obovate; sepals glabrous
4 Silicles cordate, usually constricted at the septum ..... ***L. draba***
4 Silicles transversely oval to slightly reniform or broadly obovate, not constricted at the septum ..... ***L. chalepense***
1 Plants with a taproot or woody caudex, not rhizomatous and not forming colonies
5 Upper cauline leaves auriculate or perfoliate
6 Leaves sharply dimorphic, the middle and upper cauline leaves perfoliate, the lower pinnatisect ..... ***L. perfoliatum***
6 Leaves not as above, the middle and upper cauline leaves auriculate-sagittate, the lower entire to toothed ..... ***L. campestre***
5 Upper cauline leaves cuneate to truncate at the base, neither auriculate nor perfoliate
7 Racemes axillary, spreading or drooping; fruit coarsely wrinkled ..... ***L. didymum***
7 Racemes mostly terminal, erect or ascending; fruit not wrinkled
8 Plants subshrubs or herbaceous perennials, with at least a woody caudex and sometimes with persistent remains of the petioles
9 Basal and lowermost stem leaves entire to toothed, but not lobed ..... ***L. crenatum***
9 Basal and often the lowermost stem leaves pinnatifid to pinnately lobed
10 Fruits usually ovate to nearly orbicular, rarely oblong; basal blades 1- to 2-pinnatifid; stem blades often pinnately lobed ..... ***L. montanum***
10 Fruits broadly ovate; basal blades pinnately lobed; stem blades entire or rarely toothed
11 Plants often woody-based, 10-50 cm tall; middle stem blades 1-3 mm wide ..... ***L. alyssoides***
11 Plants rarely woody-based, 45-180 cm tall; middle stem blades 3-10 mm wide ..... ***L. eastwoodiae***
8 Plants annual or biennial, lacking a woody caudex and without persistent remains of the petioles
12 Stamens 6 in number
13 Plants annual; rachises pilose, the trichomes straight ..... ***L. thurberi***
13 Plants annual or biennial; rachises puberulent, the trichomes straight or curved
14 Petals 1.5-2.5 mm wide; stem blades lanceolate to linear; plants 45-180 cm tall ..... ***L. eastwoodiae***
14 Petals 1.3-1.8 mm wide; stem blades often pinnatifid; plants 10-50 cm tall ..... ***L. montanum***
12 Stamens 2 in number
15 Herbage granular-puberulent, the hairs flattened, scurfy-like, and tiny; rosettes usually present at flowering time, the leaves pinnatifid; silicles less than 2 mm long; stems erect ..... ***L. sordidum***

Site 2 Plant 1.

East end of DOT turnout across the street from a big pile of asphalt looking stuff. South side of road. At mailbox 5274 for NMDOT and just up the road from it.

NAD83 12S 0769644 3633221 el 6283 ft

The first plant from this site is growing in the cracks in the driveway next to the mailbox. It is flat to the ground and many branched from the base. The flowers are very inconspicuous and actually are borne in minute cups called cyathia (singular, cyathium). A cyathium holds one female flower that is 3-carpellate, and usually 3-5 male (staminate) flowers. All the individual flowers held by the cyathium are highly reduced and unisexual. They can only be well seen under a microscope. The fruit is a three lobed capsule. This plant is in the **Euphorbiaceae** and is in the genus ***Euphorbia*** (previously, *Chamaesyce*). Both the fruits and the foliage is pubescent, it is annual, and the leaf apices are minutely serrulate. **Key is added at end of document.**



Site 2 Plant 2. Near the driveway where you found plant 1 at this site, are low growing, spreading plants with opposite leaves and inflorescences that consist of nearly spherical small clusters (glomerules) of very nifty but minute purplish-red flowers. This plant is perennial. The fruit is called an anthocarp—it is a fruit type in the **Nyctaginaceae** in which part of the perianth remains attached to the mature fruit. This plant is in the genus ***Boerhavia***. **Key is added at end of document**.

Site 2 Plant 3.

The next plant at site 3 is dense like a mat and low to the ground. It's hard to even tell it has flowers on it, because they are small and hidden in modified whitish leaves. The plant looks mostly green above, but from below it is quite white wooly. This plant is in the **Amaranthaceae** , in the genus ***Guilleminia*.** Since there is only one species of *Guilleminia* in this state, you don't really need to key anything out—it is ***G*. densa.**

Site 2 Plant 4.

The last plant at this site is rather a nuisance—it is poisonous (as was the first plant of the day) and is densely prickly making it hard to collect without a good digging tool. The leaves are densely pubescent (have hairs) making them look gray instead of green. The flowers are purple, with five connate (fused) petals (sympetalous). There are 5 stamens (five merous corolla, calyx and androecium) that open by a terminal pore instead of by a slit that is more common. The fruit is a berry that starts out green, turns orange then purple and finally black.

Quincula [in fives] CHINESE LANTERNS [1].

Perennial herbs, unarmed, sparsely to densely scurfy on young growth; leaves alternate, elliptic to obovate in outline, the petioles generally shorter than the blades, the margins coarsely lobed to toothed, or sinuate; flowers solitary in the axils, 5-merous, actinomorphic, rotate; corollas blue to purple, the centers whitish; anthers yellow; fruit a berry, surrounded by an inflated persistent calyx, the fruiting calyx ovoid to nearly globose. ♦A monotypic genus. Sometimes included in *Physalis*, but we accept the classifications of Whitson & Manos (2005) and Zamora-Tavares et al. (2016).

Quincula lobata (Torrey) Rafinesque [lobed] [*Physalis lobata* Torrey]. Stems usually trailing-procumbent, to 35 cm long; leaves 2-8 cm long, 1-4 cm wide, the petioles often winged; peduncles erect, 2-4 cm long; flowers about 2 cm wide; calyces 4-7 mm long in flower; anthers about 2 mm long; fruiting calyces 1-1.5 cm long and nearly as wide; berries 5-6 mm diam. ●Weedy plains and roadsides, widespread. §

Solanum [comforting] NIGHTSHADE [13].

Annual to perennial herbs, vines, shrubs, or small trees, unarmed to prickly, tuber-bearing or not; leaves alternate or sometimes paired, simple, entire to toothed to deeply lobed or pinnately compound; flowers solitary to cymose or racemose, the calyces sometimes enlarging but never inflated, the corollas rotate to pentagonal, the stamens 5, spreading to connivent or adherent around the style, in some species the lower anther markedly enlarged; fruit a mostly juicy (sometimes nearly dry) berry. ♦Species 1500-2000, worldwide. The genus includes the important food crops potato (*Solanum tuberosum* Linnaeus), tomato (*S. lycopersicum* Linnaeus), and eggplant (*S. melongena* Linnaeus). Following recent morphologic phylogenetic studies, the segregate genus *Lycopersicon* is brought back into *Solanum*. Several of our wild species produce toxic berries. The classification herein should be considered tentative, particularly for the species of the *Solanum nigrum* group, which we segregate into separate species (*S. douglassii*, *S. physalifolium*, & *S. ptychanthum*); a convincing case can be made for including them all in a single species.

■Correll, D.S. 1962. The potato and its wild relatives : section *Tuberarium* of the genus *Solanum* [*Solanum bulbocastanum*?]. Texas Research Foundation, Renner, Texas. ■Heil, K.D., S.L. O'Kane, & A. Clifford. 2002. Additions to the flora of New Mexico from the San Juan Basin Flora project [*Solanum dulcamara*]. The New Mexico Botanist 24:1-4. ■Schilling, E.E. 1981. Systematics of *Solanum* sect. *Solanum* (Solanaceae) in North America. Syst. Bot. 6(2):172-185. ■Schilling, E.E. & C.B. Heiser. 1979. Crossing relationships among diploid species of the *Solanum nigrum* complex in North America. Amer. J. Bot. 66:709-716. ■Spellenberg, R. 2001. New plant distribution records [*Solanum dimidiatum*]. The New Mexico Botanist 19:3. ■Spellenberg, R. 2003. Prickly problems [*Solanum carolinense*]. The New Mexico Botanist 25:8. ■Spooner, D.M., R.G. van den Berg, A. Rodriguez, J. Bamberg, R.J. Hijmans, & S.I. Lara Cabrera. 2004. Wild potatoes (*Solanum* section *Petota*; Solanaceae) of North and Central America. Systematic Botany Monographs 68:1-209. ■Stebbins, G.L. & E.F. Paddock. 1949. The *Solanum nigrum* complex in Pacific North America. Madroño 10:70-81. ■Whalen, M.D. 1976. New taxa of *Solanum*, section *Androceras* from Mexico and adjacent United States. Wrightia 5(7):228-239. ■Whalen, M.D. 1979. Taxonomy of *Solanum* sect. *Androceras*. Gent. Herb. 11:359-426.

1 Stems and leaves with prickles
- 2 Leaves highly pinnately or bipinnately dissected; anthers dissimilar, one purple, beaked, and much longer than the others
  - 3 Herbage densely covered with stellate hairs, glandular and simple hairs absent; corollas yellow ..... ***S. rostratum***
  - 3 Herbage densely covered with glandular hairs, these mixed to some degree with both simple and stellate hairs; corollas purplish
    - 4 Stems densely pubescent with simple glandular hairs, also sparsely prickly, seldom with more than 20 prickles per cm of stem, the prickles often up to 1 mm wide at the base ..... ***S. novomexicanum***
    - 4 Stems sparsely pubescent with simple glandular hairs, also densely bristly, with 30 or more prickles per cm of stem, the prickles mostly less than 0.5 mm in diameter at the base ..... ***S. setigeroides***
- 2 Leaves simple, entire to sinuate lobed; anthers all alike
  - 5 Leaves silvery gray-canescent, the stellate hairs scale-like, the rays fused at the center ..... ***S. elaeagnifolium***
  - 5 Leaves greenish, the stellate hairs not scale-like, the rays free above the stalk
    - 6 Corolla pale violet (sometimes white); stellate hairs fine, generally sessile; inflorescence generally raceme-like; fruit 8-20 mm in diameter ..... ***S. carolinense***
    - 6 Corolla usually purplish (sometimes white); stellate hairs coarse, some stalked; inflorescence generally branched; fruit more than 20 mm in diameter ..... ***S. dimidiatum***

1 Stems and leaves lacking prickles
- 7 Leaf blades pinnatifid, pinnately compound, or evidently hastate-lobed
  - 8 Flowers yellow; anthers connivent; leaflets prominently toothed, lobed, or compound themselves; berries generally greater than 2 cm diam at maturity; the cultivated tomato ..... *S. lycopersicum*
  - 8 Flowers violet, bluish, purplish, to white; anthers spreading or at least not connivent; leaflets never compound themselves; berries generally less than 1.5 cm diam; wild and/or weedy plants
    - 9 Plants sprawling, vine-like, climbing over other plants and fences; leaves 3-lobed or hastate; corolla bright violet or blue purple; fruit red when ripe ..... ***S. dulcamara***
    - 9 Plants neither sprawling nor vine-like; leaves pinnately compound or pinnatifid; corolla white to purplish
      - 10 Leaves deeply pinnatifid, but not at all compound; corolla white ..... ***S. triflorum***
      - 10 Leaves compound or essentially so; corolla white or purplish
        - 11 Tubers large, to 15 cm long or more; plants seldom producing berries; cultivated for the edible tubers (potato) ..... *S. tuberosum*
        - 11 Tubers commonly small and inconspicuous, but to 3 cm long; plants usually producing berries; wild plants
          - 12 Corolla purplish, shallowly lobed; terminal leaflets ovate to nearly orbicular, mostly 2-6 cm wide ..... ***S. stoloniferum***
          - 12 Corolla white, deeply lobed; terminal leaflets mostly lanceolate, mostly 1-2 cm wide ..... ***S. jamesii***
- 7 Leaf blades entire or merely toothed, not lobed
  - 13 Stems villous-pubescent with spreading hairs, the hairs glandular or not; calyces enlarging in fruit or scarcely so
    - 14 Calyces enlarging in fruit to about ½ the length of the berry; hairs both glandular and non-glandular; anthers 1-2 mm long ..... ***S. physalifolium***
    - 14 Calyces not enlarging in fruit, about ¼ or so the length of the berry; glandular hairs absent; anthers 3-6 mm long ..... *S. bulbocastanum*
  - 13 Stems glabrous to puberulent with mostly incurved-appressed, the hairs not glandular; calyces scarcely enlarging in fruit
    - 15 Anthers 1-1.5 mm long; corolla 1.5-2.5 mm long, 2-6 mm across; berries 4-8 mm wide ..... ***S. ptychanthum***
    - 15 Anthers 2-5 mm long; corolla 8-25 mm across; berries 6-12 mm wide ..... ***S. douglasii***

Site 3 Plant 1.

This site is a sloping gravely, rocky roadside across the street from a small Hwy 152 roadsign that you can only read going back to town. We're about 3.5 miles from hwy 180 at this site.

UTM NAD83 12S 0769871 3633695

This perennial plant belongs to the ***Orobanchaceae*** family, which is a family of parasitic plants. They are parasitic on the roots of other plants by means of haustoria, roots that are highly modified for this purpose. This particular plant that we are collecting is hemiparasitic, meaning that it contains chlorophyll and is not totally dependent on the host plant for all of its needs. Plants that are totally dependent are called holoparasites. The brightly colored modified leaves called bracts hide the smaller actual flowers, though the calyx is the same color as the bracts.

status of [illegible] index to unpublished "herbarium [illegible] synonymous names from [illegible] States [Castilleja tomentosa]. Phytoneuron 2012-72: 1-7. ■Egger, [illegible] 2002. Additions to the flora of New Mexico from the San Juan Basin Flora project [*Castilleja scabrida*]. The New Mexico Botanist 24:1-4. ■Holmgren, N.H. 1984. Scrophulariaceae, p. 344-506. IN: Intermountain Flora, vol. 4. New York Botanical Garden. ■McIntosh, L. 1994. First report of *Castilleja ornata* (Scrophulariaceae) from the United States. Phytologia 76:329-332. ■Spellenberg, R., L. McIntosh, & L. Brouillet. 1993. New records of angiosperms from southern New Mexico [*Castilleja exserta*]. Phytologia 75:224-230. ■Tank, D.C., J.M. Egger, & R.G. Olmstead. 2009. Phylogenetic classification of subtribe Castillejinae (Orobanchaceae). Syst. Bot. 34(1): 182-197. ■Turner, B.L., H. Nichols, G. Denny, & O. Doron. 2003. Atlas of the Vascular Plants of Texas, vol. 1. Sida, Botanical Miscellany, No. 24.

1 Plants annual
2 Inflorescence predominantly yellowish, sometimes tinged with red or purple
3 Leaves and floral bracts cleft into narrow lobes, not wavy-margined .... *C. mexicana*
3 Leaves and floral bracts entire, not cleft or dissected, wavy-margined or not
4 Leaves and floral bracts not at all wavy-margined (var. *exilis*) .... ***C. minor***
4 Leaves and floral bracts both strongly wavy-margined .... ***C. ornata***
2 Inflorescence predominantly reddish to purplish
5 Leaves and floral bracts deeply lobed with narrow segments; inflorescence purplish; corollas purplish, with white, yellow, or pinkish tips .... ***C. exserta***
5 Leaves and floral bracts entire; inflorescence reddish; corollas pale yellow throughout (var. *minor*) .... ***C. minor***
1 Plants perennial
6 Inflorescence predominantly yellowish, sometimes pale greenish white or tinged with red or purple
7 Herbage densely hairy
8 Corolla tube not exserted or only slightly so .... ***C. lineata***
8 Corolla tube greatly exserted
9 Calyx segments 2-6 mm long; lower lip of the corolla 6-9 mm long, glandular-puberulent; stems hispid-hirsute .... *C. mexicana*
9 Calyx segments 8-14 mm long; lower lip of the corolla 5-6 mm long, not glandular-pubescent; stems short-villous to somewhat lanate .... ***C. sessiliflora***
7 Herbage glabrous or only sparsely hairy
10 Plants less than 20 cm tall, the stems decumbent to ascending at the base; bracts tinged with purple .... ***C. occidentalis***
10 Plants more than 20 cm tall, the stems erect; bracts never tinged with purple .... ***C. septentrionalis***
6 Inflorescence predominantly orangish, reddish, to purplish
11 Mid- and upper stem leaves mostly cleft and deeply lobed
12 Inflorescence racemose, the individual flowers easily distinguished, loosely arranged on slender pedicels; leaves greenish, glabrous to weakly short-hispid; calyx asymmetrical, deeply cleft on one side but not on the other .... ***C. patriotica***
12 Inflorescence compact, the individual flowers not easily distinguished and more densely arranged, sessile or nearly so; leaves grayish, short-hispid to villous; calyx symmetrical, ± equally cleft front and back
13 Plants of alpine areas above timberline; inflorescence pinkish; plants 5-20 cm tall .... ***C. haydenii***
13 Plants of usually much lower elevations well below timberline; inflorescence pinkish, reddish, purplish; plants 4-45 cm tall
14 Corolla beak and lower lip usually included in the calyx tube and obscured .... ***C. chromosa***
14 Corolla beak and lower lip usually exserted from the calyx tube and visible
15 Lowermost leaves smaller than the others and scale-like; root crown massive; inflorescence bright reddish to orangish; lower lip of corolla 1-2 mm long; Four Corners region .... ***C. scabrida***
15 Lowermost leaves not markedly reduced as above; root crown not particularly enlarged; inflorescence pale reddish to pale purplish; lower lip of corolla 5-6 mm long; absent from Four Corners region .... ***C. sessiliflora***
11 Mid- and upper stem leaves mostly entire
16 Most of the coloration of the inflorescence borne by the calyx (rather than the bracts); calyx cleft in front 2-4 times more than in back; calyx greatly exceeding bracts when fully developed; older stems commonly branched in the upper portions .... ***C. linariifolia***
16 Most of the coloration of the inflorescence borne by the bracts (rather than the calyx); calyx cleft in front 1-2 times more than in back; calyx not or only somewhat exceeding the bracts when fully developed; older stems rarely branched in the upper portions
17 Uppermost leaves immediately below the inflorescence mostly cleft or incised, the rest entire
18 Inflorescences pinkish, lavender; bracts shaggy-hairy; calyx equally cleft front and back; northern mountains .... ***C. haydenii***
18 Inflorescences reddish, orangish; bracts puberulent, not shaggy; calyx cleft much deeper in front than in back; southern mountains .... ***C. wootonii***
17 Uppermost leaves below the inflorescence mostly entire
19 Upper stems (at least) villous-canescent to woolly, giving a gray cast, the stem surface usually obscured by the hairs
20 Bracts usually entire and distally broadly rounded, but some often with a pair of short lateral lobes in the upper third of the bract; bracts green proximally .... ***C. integra***
20 Bracts usually deeply divided with one pair of much longer, narrow lobes usually originating from well below the middle of the bract; bracts grey-green to greenish tinged with pale root-beer brown proximally
21 Calyx lobes rounded apically; stem pubescence usually densely lanate, with branched or unbranched hairs. .... ***C. lanata***
21 Calyx lobes sharply pointed apically; stem pubescence usually less dense, with unbranched hairs .... ***C. tomentosa***

Site 3 Plant 2.

This plant is a shrub/woody species. If you have or are taking Dendro, this one might overlap but you are still allowed to collect it for plant taxonomy class because it is the only representative of its family in this area. You may use it for your collection even though it looks like all the fruits are gone off the plants here. Notice that the leaves are rather thick and leathery. They are opposite and have a rather characteristic stance on the stems that make it look like they are "praying". This plant is in the **Garryaceae**, and is in the genus ***Garrya***. When flowering it has an elongate flowering shoot with many inconspicuous small flowers on it. The fruit is a purple berry.

distinct; stamens 4; pistil single, inferior, 1-carpellate; fruit a 1- or 2-seeded drupe or berry. ♦Genera 2, with about 27 species in all, North and Central America, Asia. The family has been recently expanded to include *Aucuba*, a common ornamental (*A. japonica*) in the state.

Garrya [for Nicholas Garry (1782-1856), Deputy-Governor of the Hudson's Bay Company] SILKTASSEL [3].

Shrubs or small trees; leaves leathery, the margins entire to minutely denticulate; inflorescence axillary, an ament, the staminate pendulous, the pistillate ascending to pendulous, strigose-sericeous to tomentulose; staminate flowers with 4 sepals and 0 petals; pistillate flowers with 2 sepals and 0 petals; fruit a berry, becoming brittle in age. ♦About 17 species, North and Central America. Some species are occasionally found in cultivation. In our experience, the boundaries among species are not nearly as clear as implied by current keys and treatments, especially between *G. flavescens* and *G. goldmanii*, of which we have few specimens.

■Dahling, G.V. 1978. Systematics and evolution of *Garrya*. Contr. Gray Herb. No. 209. ■Nesom, G.L. 2012. Notes on the *Garrya ovata* complex (Garryaceae). Phytoneuron 2012-97: 1-6.
■Nesom, G.L. 2016. Garryaceae, pp. 548-554. IN: Flora of North America, vol. 12. Oxford University Press.

1 Mature leaves essentially glabrous or inconspicuously appressed short-sericeous when young ..... ***G. wrightii***
1 Mature leaves wooly-pubescent or strigose-sericeous
2 Leaf surfaces densely tomentulose, the hairs coiling to recurved, sometimes erect; abaxial leaf epidermis gray-greenish; leaf margins usually callose-muricate-roughened; internodes of pistillate aments 4+ mm long ..... ***G. goldmanii***
2 Leaf surfaces strigose-sericeous, the hairs antrorsely appressed; abaxial leaf epidermis whitish; leaf margins smooth, not callose-muricate-roughened; internodes of pistillate aments about 1 mm long ..... *G. flavescens*

Garrya flavescens S. Watson [yellowish]. Shrubs, 1.5-6 m tall, the branchlets strigose-sericeous, glabrescent; leaves whitish abaxially because of whitish epidermis, yellow-green to gray-green adaxially, flat to concave, elliptic to broadly ovate, 2-8 cm long, sparsely to densely strigose-sericeous abaxially with appressed hairs, sparsely strigose to glabrate adaxially, the margins flat to undulate, the apices rounded to obtuse; staminate aments 3-8 cm long; pistillate aments 2-5 cm long, pendulous, the internodes to 1 mm long; berries 5-8 mm diam. ●Reported by various works, but authentic specimens are unknown to us. ♦All plants called this that we have seen belong to either *Garry goldmanii* or *G. wrightii*. Occasional specimens are encountered with rather dense appressed strigose hairs on the leaves, supposedly typical of *flavescens* and generally identified as that, but they also possess long internodes in the pistillate aments, gray-green leaf epidermis, undulate leaf blades, and callose-muricate-roughened margins, all typical of *goldmanii*; we refer these to *G. goldmanii*. Whether they represent past hybridizations or just inherent variability is not known. Since *G. flavescens* is known from south-central Arizona, one might look for this in the far western regions of New Mexico.

Garrya goldmanii Wooton & Standley [for Edward Alphonso Goldman (1873-1946), American mammologist and field biologist] [*Garrya* ovata Bentham subsp. *goldmanii* (Wooton & Standley) Dahling, *Garrya* ovata Bentham var. *goldmanii* (Wooton & Standley) B.L. Turner]. Shrubs, 0.5-2 m tall, the branchlets puberulent, glabrescent; leaves gray-green, flat to concave, elliptic to ovate, 1.5-5.5 cm long, usually densely tomentulose on both surfaces (sometimes glabrescent adaxially) with coiled or recurved hairs, the margins undulate, callose-muricate-roughened, the apices obtuse to mucronate; staminate aments 2-3 cm long; pistillate aments 2-3 cm long, the internodes 4+ mm long; berries 4-8 mm diam. ●Pine-oak-juniper woodlands, bluffs and slopes; foothills of the southern mountains. ♦The type is from Eddy County, near Queen. We include here specimens usually identified as *G. flavescens* because of dense straight-ish hairs on the leaves, but with other features of *goldmanii*; see above. §

Garrya wrightii Torrey [for Charles Wright (1811-1885), outstanding American botanical collector of the 1800s]. Shrubs or small trees 1-4 m tall, the branchlets sparsely strigose; leaves yellowish green, flat, elliptic to oblong or ovate, 2.5-3 cm long, glabrous or very sparsely strigose and glabrate, the margins flat, muriculate-roughened, the apices often mucronate; staminate aments 1-2 cm long; pistillate aments 2-4 cm long, the internodes 4+ mm long; berries 5-7 mm diam. ●Pine-oak-juniper woodlands, bajadas, foothills, and low mountain slopes, our common *Garrya*.

GENTIANACEAE GENTIAN FAMILY [13/24/24]

Herbs (sometimes mycoparasites with reduced leaves and lacking chlorophyll), shrubs, or small trees, the stems often winged, the herbage often glabrous; leaves usually opposite or whorled, simple, entire, often sessile; stipules absent; flowers actinomorphic, perfect; sepals 4-5, connate; petals 4-5, connate into a corolla tube, sometimes with a fringed corona, the sinuses sometimes plicate; stamens 4-5, the filaments adnate to the tube; pistil single, superior, of 2 united carpels, with a single style, the stigmas capitate or bifid; fruit a septicidal capsule (rarely a berry). ♦With about 95 genera, 1850 species; worldwide, especially temperate and montane tropical regions. Several species in the genera *Gentiana*, *Centaurium*/*Zeltnera*, *Eustoma*, and *Sabatia* provide exceptional ornamental plants. The family has undergone extensive systematic and phylogenetic analysis in recent years, resulting in numerous changes in classification and nomenclature, many of them in the genus *Gentiana*, and all of them supported by phylogenetic and morphologic comparisons (see references below). We accept the conclusions herein (leaving *Gentiana* s.s. an Old World genus and absent in New Mexico).

■Allred, K.W. 1976. The plant family Gentianaceae in Utah. Great Basin Naturalist 36: 483-495. ■Gentian Research Network. 2019 (see date below). Newest Classification of Gentianaceae. Gentian Research Network website, accessed February 2019. (http://www.rci.rutgers.edu/~gentian/ classNEW123.htm). ■Gillett, J. M. 1957. A revision of the North American species of *Gentianella* Moench. Ann. Missouri Bot. Gard. 44: 195-269. ■Judd, W.S., C.S. Campbell, E.A. Kellogg, P.F. Stevens, & M.J. Donoghue. 2016. Plant Systematics: A Phylogenetic Approach, 4th ed. Sinauer Associates, Inc., Sunderland, Massachusetts. 677 pp. ■Mason, C.T. Jr. 1998. Gentianaceae [of Arizona]. J. Ariz.-Nev. Acad. Sci. 30(2): 84-95. ■Struwe, L., J.W. Kadereit, J. Klackenberg, S. Nilsson, M. Thiv, K.B. von Hagen, & V.A. Albert. 2002. Systematics, character evolution, and biogeography of Gentianaceae, including a new tribal and subtribal classification, p. 21-309. IN: L. Struwe & V.A. Albert (eds.), Gentianaceae: Systematics and Natural History, Cambridge University Press, Cambridge. ■Struwe L. 2014. Classification and Evolution of the Family Gentianaceae. p. 13-35. IN: J. Rybczyński, M. Davey, A. Mikuła (eds). The Gentianaceae - Volume 1: Characterization and Ecology. Springer, Berlin, Heidelberg.

1 Petals free nearly to the base, the lobes much longer than the short tube
2 Corolla large, 3 cm or more long, blue or purple ..... ***Eustoma***
2 Corolla smaller, 2 cm or less long, blue, whitish, pink, or greenish
3 Flowers greenish to greenish white, 4-merous; style filamentous; plants of relatively dry habitats ..... ***Frasera***
3 Flowers blue, pink, or white, but not greenish, 4- or 5-merous; style short or absent; plants of relatively wet or moist habitats ..... ***Swertia***
4 Plants perennial from a sub-rhizomatous base; basal leaves 4-22 cm long
4 Plants annual or biennial; basal leaves 1-5 cm long

Site 3 Plant 3.

Right across from that hwy152 sign, you all will recognize this a cactus. It is full of fruits right now, those purplish cylinders on the "pads". The pads are actually stems, or shoots. The spines are modified leaves. The fruits contain many small black seeds. The **Cactaceae** (and the **Nyctaginaceae** as well) are part of a large clade called the Caryophyllales. Most families of this large clade contain pigments called betalains, and not the anthocyanin type of pigments found in nearly all other angiosperms. This cactus is in the genus ***Opuntia***. Don't try to collect this plant, instead use your cellphone or a camera to take a pic of it. Print off the picture and you can use that for your collection instead of the actual plant.

Opuntia [referring to Opus, Greece] PRICKLY-PEAR, NOPAL [16].

Trees or shrubs, usually many-branched, the stems erect to trailing; stem segments (pads, "nopales" or "nopalitos") green, blue-green, yellow-green or sometimes reddish to purplish, usually flattened, circular to lanceolate or oblanceolate, the areoles with wool; spines not sheathed, terete to angular or flattened; glochids present; flowers yellow, orange, pink to red or nearly purplish, the anthers touch-sensitive; fruits ("tunas") usually not proliferating, fleshy or dry, smooth or tuberculate, spiny or spineless; x=11. ♦About 150 species, native to the New World, introduced elsewhere. Many species formerly treated in *Opuntia* are now assigned to the genera *Corynopuntia* and *Cylindropuntia*. The key below will guide one to the general groups of prickly-pears in New Mexico. Variation is extensive, and heightened by natural plasticity in populations, hybridization, and habitat and climate influences. Many more names exist than what is recognized here, but many of those apply to plants that are sometimes quite easy to recognize (such as having strikingly white spines), but that fail to correlate in any meaningful way with other features. As with many cactus genera, the taxonomy suffers from emphasizing differences, while ignoring similarities. Young non-fruiting plants can be especially troublesome.

■Denham, R.A. 1996. New plant distribution records [*Opuntia chihuahuensis*]. The New Mexico Botanist 4:6. ■Ferguson, D.J. 1987. *Opuntia cymochila* Eng. & Bigelow: A species lost in the shuffle. Cactus & Succulent J. (U.S.) 59:256-260. ■Ferguson, D.J. 1988. *Opuntia macrocentra* Eng. and *Opuntia chlorotica* Eng. & Big. Cactus and Succulent Journal (U.S.) 60(3):155-160. ■Grant, V. & K.A. Grant. 1979. Systematics of the *Opuntia phaeacantha* group in Texas. Bot. Gaz. (Crawfordsville) 140:199-207. ■Green, C.W. & D.J. Ferguson. 2011. Pricklypears Commonly Found in the United States and Mexico. Publ. by the authors. ■Leuenberger, B.E. 1971. Interpretation and typification of *Cactus ficus-indica* Linnaeus and *Opuntia ficus-indica* (Linnaeus) Miller (Cactaceae). Taxon 40:621-627. ■Majure, L.C., R. Puente, M.P. Griffith, W.S. Judd, P.S. Soltis, & D.E. Soltis. 2012. Phylogeny of *Opuntia* s.s. (Cactaceae): Clade delineation, geographic origins, and reticulate evolution. Amer. J. Bot. 99(5): 847-864. ■Parfitt, B.D. 1998. New nomenclatural combinations in the *Opuntia polyacantha* complex. Cactus & Succulent J. (U.S.) 70(4):188. ■Parfitt, B.D. and D.J. Pinkava. 1988. Nomenclatural and systematic reassessment of *Opuntia engelmannii* and *O. lindheimeri* (Cactaceae). Madroño 35(4):342-349. ■Pinkava, D.J. 2003. *Opuntia*, pp. 123-148. IN: Flora of North America, vol. 4, pt.1. Oxford University Press, New York. ■Pinkava, D.J. and B.D. Parfitt. 1988. Nomenclatural changes in Chihuahuan Desert *Opuntia* (Cactaceae). Sida 13(2):125-130. ■Sivinski, R.C. and K. Lightfoot, eds. 1994. Inventory of rare and endangered plants of New Mexico [*Opuntia valida*]. New Mexico Forestry and Resources Conservation Division, Misc. Publ. No. 3.

1 Plants tree-like, with a single main trunk at the base, generally taller than wide, 1-6 m tall
2 Stem segments 20-60 cm long, 10-25 cm wide; potentially large trees to 6 m tall; not known outside of cultivation in New Mexico. ..... *O. ficus-indica*
2 Stem segments 15-20 cm long, 12-18 cm wide; small trees or generally shrubs 1-2.5 m tall; known in the wild as well as occasionally in cultivation ..... ***O. chorotica***
1 Plants commonly shrubs, not or scarcely tree-like with a trunk, often wider than tall, infrequently taller than 2 m
3 Fruits dry at maturity, tan to gray, usually bearing spines; plants low-growing, 2-25 cm tall
4 Stem segments flattened to nearly cylindrical, easily detached, 2-5 cm long, 1-3 cm wide; plants 2-10 cm tall; San Juan County . ..... ***O. fragilis***
4 Stem segments flattened, firmly attached, 5-27 cm long, 3-18 cm wide; plants 8-40 cm tall; throughout the state, including San Juan County
5 Stem segments puberulent (use a lens); plants completely spineless; seeds nearly spherical and angular ..... *O. basilaris*
5 Stem segments glabrous; plants densely spiny; seeds flattened ..... ***O. polyacantha***
3 Fruits fleshy or juicy, various colors, spiny to spineless; plants low-growing to shrubby, 10 cm to 2 m tall
6 Stem segments puberulent (use a lens); plants completely spineless; glochids dense, filling the areole; areoles 11-16 per diagonal row across the midstem segment ..... ***O. microdasys***
6 Stem segments glabrous; plants spineless or spiny; glochids not filling the areole; areoles number various across the midstem segment
7 Stem segments nearly completely purplish, or at least purplish around the areoles and on the margins of the pads
8 Plants typically 1-2 m tall, 3-5 or more pads high, forming ± erect shrubs from a few pad bases; flowers lemmon yellow throughout (var. *santa-rita*) ..... ***O. chlorotica***
8 Plants typically 0.3-0.6 m tall, sometimes taller, 1-3 pads high, forming spreading clumps from laterally spreading pads; flowers bright yellow with bright-red centers ..... ***O. macrocentra***
7 Stem segments typically greenish and not purplish, or only slightly purplish under stress
9 Plants prostrate, sprawling and bush-like, to erect and tree-like; stem segments mostly 10-35 cm or more long
10 Plants 1-2(3) pads high, 15-50 cm tall, the stems commonly prostrate to low-spreading with few branches rising upward
11 Larger spines 3-7 per areole ..... ***O. camanchica***
11 Larger spines usually 1-2 per areole
12 Spines reddish brown to blackish, never yellow (rarely whitish), mostly around the margins of the pads, few inward ..... ***O. macrocentra***
12 Spines tan, brown, pinkish, white, yellow, mostly with many spines inward on the pad ..... ***O. phaeacantha***
10 Plants (2)3-6 pads high, 50-200 cm tall, at least somewhat bushy with some to many branches rising upward, to tree-like
13 Spines typically yellow (sometimes dark in age)
14 Plants tree-like, with a single trunk at the base, with spines on the trunk; southwestern region ..... ***O. chlorotica***
14 Plants bushy, with many branches at the base; mostly southeastern region ..... ***O. lindheimeri***
13 Spines of various colors, but not yellow
15 Stem segments mostly medium-sized, 12-25 cm long
16 Pads blue-green; spines 4-8 cm long, typically two-toned, darker below, lighter above ..... *O. dulcis*
16 Pads yellow-green; spines 2-3 cm long, generally not two-toned, typically whitish or light brown ..... ***O. gilvescens***
15 Stem segments mostly larger, 20-55 cm or more long
17 Pads conspicuously elongated, many pads 2 times longer than wide; areoles with 3-6 large spines; older stems/trunks spiny ..... *O. valida*
17 Pads ovate, nearly orbicular, to obovate, not much elongated, most 1-1.5 times longer than wide; areoles with 1-3 large spines; older stems/trunks generally not spiny
18 Pads nearly orbicular to diamond-shaped and about as wide as long; main spines mostly angled and not much flattened ..... ***O. orbiculata***

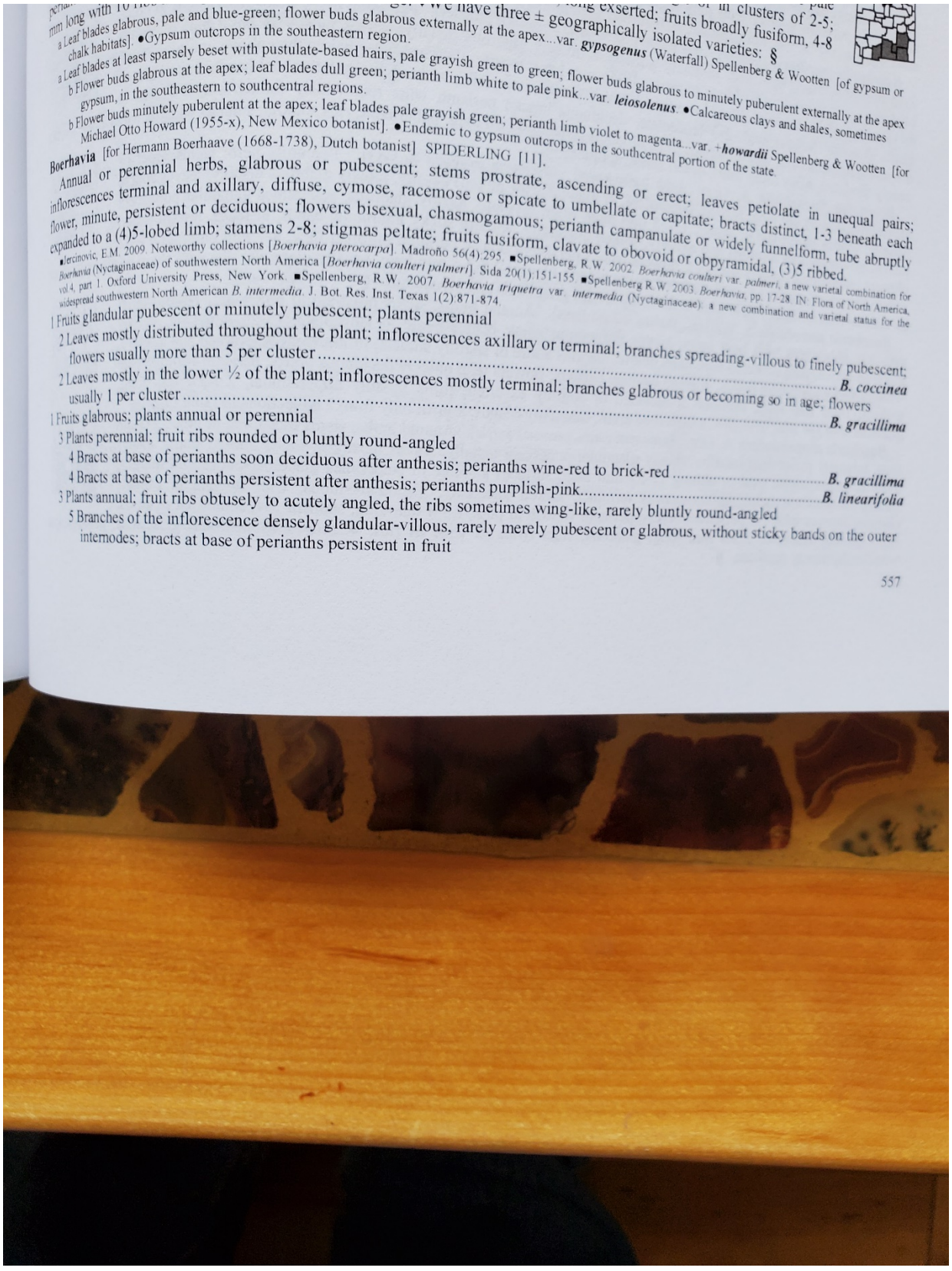
Euphorbia Key (2 pages):

■Allred, K.W. & J. Travis Columbus. 1988. [illegible] ■Allred, K.W. [illegible] The New Mexico Botanist 19:3. ■[illegible] hirta]. The New Mexico [illegible] Allred, K.W. [illegible] records [Euphorbia peplus]. The New Mexico Botanist 4:6. ■Allred, K.W. [illegible] records [Euphorbia cyathophora]. The New Mexico Botanist [illegible] [Euphorbia myrsinites]. The New Mexico Botanist 20:8. ■Cronquist, A., N.H. Holmgren, & P.K. Holmgren. 1997. [illegible] 2001. New plant distribution records [Euphorbia cyathophora]. 2001. New plant distribution records [Euphorbia myrsinites]. The New Mexico Botanist 24:7. ■Cox, G.W. 2001. New plant distribution records. The New Mexico Botanist 34:7. Euphorbia. pp 268-276. IN: Intermountain Flora, vol. 3A. New York Botanical Garden. ■Geltman, D.V., R. Riina, P.E. Berry, & J. Peirson. 2011. Typification and synonymy of the species of Euphorbia subgenus Esula (Euphorbiaceae) native to the United States and Canada. J. Bot. Res. Inst. Texas 5(1):143-151. ■Hartman, R.L. 1973. New plant records for New Mexico [Euphorbia esula]. Southwestern Naturalist 18(2):241-242. ■Hershey, A.L. & P.J. Leyendecker, Jr. 1944. Notes on plants of New Mexico III [Euphorbia antisyphilitica]. Leafl. West. Bot. 4(2):31-35. ■Jercinovic, E. 2005. Plant distribution reports [Euphorbia lathyris]. The New Mexico Botanist 34:7. ■Jercinovic, E. 2007. Chamaesyce villifera in New Mexico? The New Mexico Botanist 37:7. ■Jercinovic, E. 2007. The status of the genus Chamaesyce in New Mexico. The New Mexico Botanist 40:1-14. ■Johnston, M.C. 1975. Studies of the Euphorbia species of the Chihuahuan Desert region and adjacent areas. Wrightia 5:120-143. ■Krochmal, A. 1952. Seeds of weedy Euphorbia species and their identification [Euphorbia esula]. Weeds 1:243-255. ■Mayfield, M.H. 1993. New combinations in Chamaesyce A. Gray (Euphorbiaceae) from Texas and the Chihuahuan Desert. Phytologia 75(2):178-183. ■Oudejans, R. 1989. New names and new combinations in the genus Euphorbia Linnaeus (Euphorbiaceae). Phytologia 67(1):43-49. ■Park, K. 1998. Monograph of Euphorbia sect. Tithymalopsis (Euphorbiaceae). Edinb. J. Bot. 55:161-208. ■Riina R, J.A. Peirson, D.V. Geltman, J. Molero, B. Fragman, A. Pahlivani, L. Barres, J.J. Morawetz, Y. Salmaki, S. Zarre, A. Kryukov, P.V. Bruyns & P.E. Berry. 2013. A worldwide molecular phylogeny and classification of the leafy spurges, Euphorbia subg. Esula (Euphoprbiaceae). Taxon 62:316-342. ■Sivinski, R.C., T. Lowrey, & R. Peterson. 1994. Additions to the native and adventive flora of New Mexico [Chamaesyce carunculata]. Phytologia 76(6):473-479. ■Spellenberg, R., R. Worthington, P. Knight, & R. Fletcher. 1986. Additions to the flora of New Mexico [Euphorbia eriantha]. Sida 11(4):455-470. ■Spellenberg, R., R. Worthington, P. Knight, & R. Fletcher. 1986. Additions to the flora of New Mexico [Chamaesyce geyeri wheeleriana]. Sida 11(4):455-470. ■Steinmann, V.W. & E. Jercinovic. 2013. Euporbia rayturneri (Euphorbiaceae), a new species from southwestern New Mexico. Novon 22(4):482-485. ■Subils, R. 1984. Una nueva especie de Euphorbia sect. Poinsettia (Euphorbiaceae) [Euphorbia davidii]. Kurtziana 17:125-130. ■Tidestrom, I. & T. Kittell. 1941. A Flora of Arizona and New Mexico [Euphorbia crenulata]. The Catholic University of America Press, Washington, D.C. 897 pp. ■Webster, G.L. 1994. Synopsis of the genera and suprageneric taxa of Euphorbiaceae. Ann. Missouri Bot. Gard. 81:33-144. ■Wheeler, L.C. 1941. Euphorbia subgenus Chamaesyce in Canada and the United States exclusive of southern Florida. Rhodora 43:97-154, 168-205, 223-286. ■Worthington, R.D. 2007. Plant distribution reports [Chamaesyce theriaca]. The New Mexico Botanist 39:7. ■Yang, Y., R. Riina, J.J. Morawetz, T. Haevermans, X. Aubriot, & P.E. Berry. 2012. Molecular phylogenetics and classification of Euphorbia subgenus Chamaesyce (Euphorbiaceae). Taxon 61:764-789.

1 Plants shrubby; stems leafless .... *E. antisyphilitica*
1 Plants herbaceous; stems leafy (though sometimes very small)
2 Stems usually prostrate, sometimes erect or ascending; leaves opposite, blades asymmetric at the base, stipules present and interpetiolar (species previously placed in Chamaesyce)
3 Plants perennial
4 Plants pubescent or glandular
5 Herbage and capsules glandular .... *E. arizonica*
5 Herbage and capsules pubescent, not glandular (capsules glabrous in *E. villifera*)
6 Cyathia borne in dense glomerules (a few also solitary) .... *E. capitellata*
6 Cyathia solitary
7 Capsules glabrous .... *E. villifera*
7 Capsules pubescent
8 Blades finely (almost minutely) puberulent above and below, the margins decidedly revolute (rolled downwards), the herbage with a pale purplish cast; capsules greater than 2.8 mm long .... *E. lata*
8 Blades finely puberulent below, ± glabrous above, the margins flat or slightly involute (rolled upwards), the herbage with a grayish cast; capsules less than 2.5 mm long .... *E. acuta*
4 Plants glabrous
9 Adjacent stipules united to form a whitish or pinkish scale, this entire to lacerate .... *E. albomarginata*
9 Adjacent stipules distinct, bristle- or awl-like, not united
10 Blades broadly ovate to nearly orbicular .... *E. fendleri*
10 Blades lanceolate to oblong-lanceolate, but decidedly narrower than ovate... .... *E. chaetocalyx*
3 Plants annual
11 Largest leaves more than 1.5 cm long
12 Stems conspicuously pubescent, at least toward the tips, often densely so, easily visible without a lens
13 Ovary and capsule hairy; hairs of the stems stiff, yellowish, broadest at the base and tapering to the tip .... *E. hirta*
13 Ovary and capsule glabrous; hairs of stems crisp to pilose, whitish, thread-like and not tapering .... *E. nutans*
12 Stems glabrous or only sparsely pubescent, not at all conspicuous, when pubescent then hardly visible without a lens
14 Leaves toothed
15 Cyathia in capitate glomerules; capsules 1.3-1.4 mm long .... *E. hypericifolia*
15 Cyathia solitary or in small cymose clusters; capsules 1.5-1.6 mm long .... *E. hyssopifolia*
14 Leaves entire
16 Plants usually erect; leaves linear, 2-5 times longer than wide; capsules 2-2.5 mm long .... *E. missurica*
16 Plants prostrate; leaves ± ovate, at most 2 times longer than wide; capsules 4.5-6.5 mm long .... *E. carunculata*
11 Largest leaves less than 1.5 cm long
17 Herbage (stems and/or leaves) pubescent
18 Leaves entire
19 Capsules and cyathia pubescent; petal-like appendages divided into 3-5 attenuate segments, very noticeable .... *E. setiloba*
19 Capsules and cyathia glabrous; petal-like appendages undivided, not very noticeable .... *E. abramsiana*
18 Leaves toothed, at least toward the apex
20 Capsules glabrous
21 Stems puberulent, the hairs very short, only about 0.1-0.2 mm long .... *E. abramsiana*
21 Stems pubescent to pilose, though sometimes sparsely, the hairs at least 0.5 mm long
22 Capsules 2-2.6 mm long, 3-3.6 mm in diameter; plants prostrate to ascending .... *E. serrula*
22 Capsules 1.4-1.8 mm long, 1.7-2.1 mm in diameter; plants prostrate .... *E. vermiculata*
20 Capsules puberulent or pubescent

23 Petal-like appendages absent or vestigial; styles entire ..... *E. rayturneri*
23 Petal-like appendages easily noticeable
24 One pair of appendages much larger than the other pair, often obscuring the capsules..... *E. indivisa*
24 All appendages of similar size
25 Styles entire to slightly emarginate; seeds pitted and mottled ..... *E. stictospora*
25 Styles bifid
26 Capsules ± uniformly strigulose with appressed hairs; seeds with low, transverse, subregular ridges..... *E. maculata*
26 Capsules with at least some spreading hairs, pubescence usually concentrated on the angles, but deciduous on the sides; seeds with 5-7 low, sharp, irregular, transverse ridges..... *E. prostrata*
17 Herbage (stems and leaves) glabrous or nearly so
27 Leaves toothed, at least at the tip
28 Stems erect to strongly ascending ..... *E. serpyllifolia*
28 Stems prostrate
29 Seeds with prominent transverse ridges which are continuous through the raised angles of the seed..... *E. glyptosperma*
29 Seeds with transverse wrinkles or faint ridges interrupted by the raised angles of the seed ..... *E. serpyllifolia*
27 Leaves entire
30 Leaves linear, 5 or more times as long as broad; plants annual
31 Leaves with revolute margins; styles undivided; capsules less than 1.8 mm long at maturity ..... *E. revoluta*
31 Leaves flat or folded, but not with revolute margins; styles bifid; capsules more than 2 mm long at maturity
32 Plants erect to ascending; gland appendages conspicuously larger than the glands, whitish, petal-like..... *E. missurica*
32 Plants prostrate; gland appendages smaller than the glands, not petal-like ..... *E. parryi*
30 Leaves not linear, less than 3 times as long as broad
33 Capsules longer than 4 mm..... *E. carunculata*
33 Capsules less than 3 mm long
34 Seeds with 3 or 4 strong transverse ridges ..... *E. theriaca*
34 Seeds smooth or wrinkled, but without transverse ridges
35 Glands without appendages ..... *E. micromera*
35 Glands with appendages (sometimes absent in *E. geyeri*)
36 Stipules united into a membranous scale ..... *E. serpens*
36 Stipules distinct or united, but not scale-like
37 Seeds terete to bluntly sub-angled in cross section, smooth..... *E. geyeri*
37 Seeds narrowly pyramidal-ovoid, four-angled in cross section, with faint transverse ridges or wrinkles ..... *E. golondrina*
2 Stems ascending to erect; leaves symmetric at the base, stipules absent or minute and gland-like
38 Floral leaves with conspicuous white to pinkish margins 1-2 mm wide..... *E. marginata*
38 Floral leaves without such margins
39 Plants perennial from taproots or creeping roots or rhizomes
40 Involucres crinkly puberulent, with peduncles 4-12 mm long; glands surrounded by a minute yellowish appendage ..... **E. strictior**
40 Involucres glabrous, with peduncles less than 3 mm long; glands without appendages
41 Stems succulent, mostly 6-8 mm wide; leaves fleshy, prominently mucronate; involucral glands with horns, horns thick and dilated at the tip; capsules 5-7 mm long..... *E. myrsinites*
41 Stems not succulent; leaves not fleshy or mucronate; capsules less than 5 mm long
42 Plants from thick, woody rootstock; seeds shallowly pitted ..... *E. chamaesula*
43 Peduncles of cyathia 1-3 mm long; capsules 4.3-5 mm long..... *E. brachycera*
43 Peduncles of cyathia 0.3-1 mm long; capsules 2.8-4 mm long
44 Involucral gland margins entire to sometimes slightly crenate or dentate; horns longer than any marginal teeth..... *E. lurida*
44 Involucral gland margins distinctly crenate or dentate; horns absent or equaling to slightly longer than marginal teeth..... *E. cyparissias*
42 Plants from slender rhizomes; seeds smooth
45 Stems 10-30(-40) cm tall; mature leaves 0.5-3 mm wide ..... *E. virgata*
45 Stems 30-90 cm long; mature leaves 3-8 mm wide..... *E. bifurcata*
39 Plants annual or biennial from taproots
46 Stem leaves mostly opposite
47 Leaf bl

Boerhavia Key:



rum long with 10 ... we have three ± geographically isolated varieties: § ... exserted; fruits broadly fusiform, 4-8 ... or in clusters of 2-5; ... pale
a Leaf blades glabrous, pale and blue-green; flower buds glabrous externally at the apex...var. ***gypsogenus*** (Waterfall) Spellenberg & Wootten [of gypsum or chalk habitats]. •Gypsum outcrops in the southeastern region.
a Leaf blades at least sparsely beset with pustulate-based hairs, pale grayish green to green; flower buds glabrous to minutely puberulent externally at the apex
b Flower buds glabrous at the apex; leaf blades dull green; perianth limb white to pale pink...var. ***leiosolenus***. •Calcareous clays and shales, sometimes gypsum, in the southeastern to southcentral regions.
b Flower buds minutely puberulent at the apex; leaf blades pale grayish green; perianth limb violet to magenta...var. ÷***howardii*** Spellenberg & Wootten [for Michael Otto Howard (1955-x), New Mexico botanist]. •Endemic to gypsum outcrops in the southcentral portion of the state.

Boerhavia [for Hermann Boerhaave (1668-1738), Dutch botanist] SPIDERLING [11].

Annual or perennial herbs, glabrous or pubescent; stems prostrate, ascending or erect; leaves petiolate in unequal pairs; inflorescences terminal and axillary, diffuse, cymose, racemose or spicate to umbellate or capitate; bracts distinct, 1-3 beneath each flower, minute, persistent or deciduous; flowers bisexual, chasmogamous; perianth campanulate or widely funnelform, tube abruptly expanded to a (4)5-lobed limb; stamens 2-8; stigmas peltate; fruits fusiform, clavate to obovoid or obpyramidal, (3)5 ribbed.

■Ercinovic, E.M. 2009. Noteworthy collections [*Boerhavia pterocarpa*]. Madroño 56(4):295. ■Spellenberg, R.W. 2002. *Boerhavia coulteri* var. *palmeri*, a new varietal combination for *Boerhavia* (Nyctaginaceae) of southwestern North America [*Boerhavia coulteri palmeri*]. Sida 20(1):151-155. ■Spellenberg R.W. 2003. *Boerhavia*, pp. 17-28. IN: Flora of North America, vol 4, part 1. Oxford University Press, New York. ■Spellenberg, R.W. 2007. *Boerhavia triquetra* var. *intermedia* (Nyctaginaceae): a new combination and varietal status for the widespread southwestern North American *B. intermedia*. J. Bot. Res. Inst. Texas 1(2):871-874.

1 Fruits glandular pubescent or minutely pubescent; plants perennial
2 Leaves mostly distributed throughout the plant; inflorescences axillary or terminal; branches spreading-villous to finely pubescent; flowers usually more than 5 per cluster ..... ***B. coccinea***
2 Leaves mostly in the lower ½ of the plant; inflorescences mostly terminal; branches glabrous or becoming so in age; flowers usually 1 per cluster ..... ***B. gracillima***
1 Fruits glabrous; plants annual or perennial
3 Plants perennial; fruit ribs rounded or bluntly round-angled
4 Bracts at base of perianths soon deciduous after anthesis; perianths wine-red to brick-red ..... ***B. gracillima***
4 Bracts at base of perianths persistent after anthesis; perianths purplish-pink ..... ***B. linearifolia***
3 Plants annual; fruit ribs obtusely to acutely angled, the ribs sometimes wing-like, rarely bluntly round-angled
5 Branches of the inflorescence densely glandular-villous, rarely merely pubescent or glabrous, without sticky bands on the outer internodes; bracts at base of perianths persistent in fruit