

## CUCURBITACEAE GOURD FAMILY

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Herbaceous vines (or compact tufted herbs in some cultivars of *Cucurbita*), annuals or perennials from taproot or fibrous or tuberous roots, monoecious or dioecious. STEMS climbing or trailing, glabrous or variously pubescent, often scabrous. TENDRILS usually one at each node, branched or unbranched. LEAVES alternate, usually petiolate (occasionally sessile in *Sicyosperma*), the blades simple, entire to angular to variously lobed or pedately compound; stipules absent. INFLORESCENCES fascicles, racemes, panicles, corymbs, solitary or paired in leaf axils, the pistillate flowers more commonly solitary than the staminate flowers. FLOWERS small or large, regular, mostly pentamerous, the hypanthium and corolla white, yellow, or greenish yellow in ours, the calyx lobes usually green; in staminate flowers hypanthium very shallow to elongated, rotate to campanulate to funnelform to subcylindric; in pistillate flowers that portion of the hypanthium prolonged beyond the ovary rotate to campanulate to funnelform to subcylindric; calyx lobes 5(–6), borne on hypanthium rim, sometimes vestigial; corolla lobes 5(–6), borne on hypanthium rim or petals connate into a corolla tube and with 5(–6) distinct lobes; stamens 3 or 5, in ours, inserted on hypanthium, the filaments, when present, free or united into a column, the anthers free, coherent, or connate, the thecae straight or variously bent or folded or united in a horizontal ring (*Cyclanthera*); ovary inferior, the carpels (2–)3(–5); style 1, the stigmas 1–3, each 2–3-lobed. FRUITS variable in type, shape and size, dry or fleshy, armed or unarmed, indehiscent or variously dehiscent; fruit types include: pepos (indehiscent fleshy, many seeded fruits with a thick or thin rind; *Cucurbita*, *Lagenaria*, *Apodanthera*, *Citrullus*, *Cucumis*), berries (*Ibervillea*, *Tumamoca*), dehiscent capsules (*Cyclanthera*, *Brandegea*, *Echinocystis*, *Marah*, *Echinopepon*), and dry, single-seeded, indehiscent fruits (*Sicyos*, *Sicyosperma*); seeds variable in size and number, smooth or rough or sculptured, with or without differentiated margins. —About 120 genera, 825 spp. (14 genera, 21 species in AZ), chiefly in warm or tropical regions in both hemispheres. A family of great economic importance, yielding the world's melons, squashes, pumpkins, cucumbers, and gourds. This account includes 9 introduced species in 5 genera that occur here as rare, spontaneous escapes. The species cultivated for food are *Citrullus lanatus*, *Cucumis anguria*, *Cucumis melo*, *Cucumis sativus*, *Cucurbita maxima*, *Cucurbita moschata*, and *Cucurbita pepo*. *Lagenaria siceraria* and *Echinocystis lobata* are planted as ornamentals.

1. Flowers white.....2
  2. Flowers 40–55 mm long; leaves with a pair of large, marginal, annular glands at base of leaf blades; fruits 100–500 mm long, woody at maturity, smooth..... **Lagenaria**
  - 2' Flowers <15 mm long; leaves without glands at base of leaf blades; fruits ≤50 mm long, not woody at maturity, echinate (except *Sicyosperma*).....3
  3. Fruits indehiscent.....4
    4. Fruits solitary or in racemes, each fruit subtended by and enveloped in sessile bracts, glabrous.....**Sicyosperma**
    - 4' Fruits clustered on a common peduncle, without bracts, conspicuously echinate with retrorsely barbed bristles ..... **Sicyos**
  - 3' Fruits variously dehiscent .....5
    5. Fruits operculate; prickles stipitate glandular .....**Echinopepon**
    - 5' Fruits not operculate; prickles glabrous .....6
    6. Fruits asymmetric, oblique.....7
      7. Leaves 3-foliolate; anther thecae fused into a ring; fruits 16–23 mm long ..... **Cyclanthera**
      - 7' Leaves 3–5-lobed; anther thecae horse-shoe shaped, distinct; fruits 9–11 mm long.....**Brandegea**
    - 6' Fruits symmetric, not oblique .....8
      8. Plants perennial; sepals and petals 5; fruits beaked; seeds ovoid, the margins grooved, the surfaces smooth.....**Marah**
      - 8' Plants annual; sepals and petals 6; fruits not beaked; seeds strongly flattened, the margins not differentiated, the surfaces pitted-roughened .....**Echinocystis**
- 1' Flowers yellow or greenish-yellow.....9
  9. Fruits soft, fleshy, red, indehiscent; seeds arillate .....10
  10. Plants dioecious; corolla lobes puberulent, bifid at apex; seeds tumid, rounded at apex, the lateral faces smooth or variously textured, not tuberculate-rugose, the margins prominent, raised; thickened root often solitary.....**Ibervillea**
  - 10' Plants monoecious; corolla lobes glabrous, acute at apex; seeds compressed, truncate at apex, the lateral faces tuberculate-rugose, without differentiated margins; thickened roots often clustered .....**Tumamoca**
  - 9' Fruits various, if fleshy and indehiscent, not red; seeds not arillate .....11
  11. Staminate flowers in racemes or fascicles; pistillate flowers solitary .....12
    12. Plants perennial; leaves reniform, wider than long, the margins undulate; fruits hard-shelled at maturity; seeds with broad, flat margins.....**Apodanthera**
    - 12' Plants annual; leaves various, not reniform with undulate margins; fruits not hard-shelled at maturity; seeds without differentiated margins.....**Cucumis**

- 11' Staminate and pistillate flowers solitary .....13  
 13. Flowers of moderate size, perianth  $\leq$  20 mm long; flesh of fruits juicy, sweet; seeds black .....*Citrullus*  
 13' Flowers large, perianth  $>$  50 mm long; fruits firm-fleshed or fibrous, neither juicy nor sweet; seeds variously colored, usually white to light beige, not black in ours .....*Cucurbita*

### **Apodanthera** Arn. Melon Loco

Perennial vines from tuberous roots, dioecious or monoecious. STEMS trailing or climbing. TENDRILS simple or 2-branched. LEAVES with blades entire or shallowly to deeply lobed, variously pubescent. STAMINATE flowers in racemes or corymbs in leaf axils; corolla yellow; anthers 3, free or coherent, sessile, one anther 1-celled, two anthers 2-celled. PISTILLATE flowers in different axils from the staminate flowers, solitary in ours; perianth similar to that of staminate flowers; style surrounded at base by an annular disk, the stigmas 3. FRUITS pepos, ovoid to oblong to subspherical, hard-shelled at maturity, longitudinally ribbed or striped, smooth or nearly so, many-seeded; seeds ovate, slightly flattened in ours, with a broad flattened margin. The roots of *Apodanthera biflora* Cogn. ("yuca del monte") of Peru and Ecuador are edible after cooking. *Apodanthera undulata* is a source of seed oil (Earle and Jones 1962). —Ca. 19 spp. (1 in AZ) in warm sw U.S.; Mex.; C. Amer.; S. Amer. (Greek: *a* = without + *podos* = foot + Latin: *anthera* = anther)

*Apodanthera undulata* A. Gray var. *undulata* (wavy, in reference to leaf margin). —Strong-smelling vines from large, fleshy roots, monoecious. STEMS coarse, usually trailing, 3–5 mm in diameter, with appressed, spreading, and undulate hairs to 0.75 mm long, occasionally muriculate. TENDRILS simple or 2-branched. LEAVES with blades reniform, 28–102 mm long, very shallowly lobed, dentate, or only with undulate-cripsed margins, the upper surfaces sparsely to densely strigose, the lower surfaces often cinereous and prominently muriculate along veins. STAMINATE flowers subtended by linear bracts 6–19 mm long; hypanthium subcylindric, 11–33 mm long; calyx lobes linear-lanceolate, 4–12 mm long; corolla tube absent, the lobes 17–27 mm long. PISTILLATE flowers solitary in leaf axils; hypanthium subcylindric, 20–24 mm long; calyx lobes linear-lanceolate, 10–12 mm long; corolla tube absent, the lobes 23–24 mm long. FRUITS yellowish at maturity, subspherical, often 10-ribbed, 65–70 mm in diameter, 65–76 mm long; seeds beige to light brown, 12–13 mm long, 8.5–9 mm wide.  $2n = 28$ . (Fig. 10A, B). —Along roadsides, on alluvial terraces, arid plains and mesas: Cochise, Graham, Maricopa, Pima, Pinal, Santa Cruz, Yavapai cos. (Fig. 1A); 500–1850 m (1500–5500 ft); May–Oct; NM, TX; Mex. (Chih., Coah., Dur., Son.).

### **Brandegea** Cogn. Desert Starvine

Perennial vines from taproot, monoecious. STEMS climbing, slender, 0.3–1.5 mm in diameter, sulcate, glabrous or occasionally with white scale-like protuberances 0.2–0.8 mm long on angles. TENDRILS simple. LEAVES with blades ovate to circular

in outline, usually deeply 3–5-lobed, the upper surfaces scabrous with short strigose hairs 0.1–0.3 mm long from prominent white crystalline bases, the lower surfaces glabrous and punctate, the lobes linear, triangular, or ovate, mucronate, entire, the central lobe 6–40(–75) mm long. STAMINATE flowers 11–16 in glabrous racemes or panicles 6–15 mm long; hypanthium shallowly campanulate or rotate, <1 mm long; calyx lobes 0.1 mm long; corolla white, the tube absent, the lobes 5, 1–1.8 mm long, 0.5–1 mm wide at base, the upper surface papillate; stamens 3, the anthers horseshoe-shaped, distinct but sessile on a short column of fused filaments. PISTILLATE flowers solitary or in pairs at nodes; hypanthium not prolonged beyond ovary; calyx and corolla similar to that of staminate flowers; ovary oblique, long-rostrate, the ovule 1(–2), the style 0.1–0.2 mm long, the stigma 1, hemispherical, 0.5 mm wide. FRUITS capsules, oblique, slightly compressed laterally, beaked, 9–11 mm long, sparsely echinate with antrorse prickles 0.4–1.3 mm long; seeds brown, 1(–2), clavate, muriculate, 5 mm long, 2.5 mm wide, 1 mm thick. Monospecific genus. (for Townshend Stith Brandegee, 1843–1925, California botanist, explorer and collector, civil engineer, topographer).

*Brandegea bigelovii* (S. Watson) Cogn. (for Jacob Bigelow, 1787–1879, American botanist and physician) (Fig. 5A, 10D). —Along washes in sandy and clay-loam alluvium, often climbing on *Prosopis*, *Atriplex*, and *Parkinsonia*: La Paz, Maricopa, Pima, Yuma cos. (Fig. 1B); 500 m or lower (1500 ft); Dec–May; s CA; Mex. (Son., Baja C.). Reportedly collected in Pinal Co. near the Maricopa Co. line.

#### **Citrullus** Schrad. Watermelon, Citron, Preserving Melon

Annual vines from fibrous roots, monoecious. STEMS climbing or trailing, villous. TENDRILS 2–3-branched. LEAVES with blades ovate to lanceolate-ovate to ovate-triangular, 3–5-lobed, 30–200 mm long, the upper surfaces hirsute, hispid on veins, the lower surfaces glabrous or scabrous with translucent dots, the lobes pinnately shallowly sinuate-lobulate. STAMINATE flowers solitary; hypanthium campanulate, 2–4 mm long; calyx lobes 5, lanceolate, 3–5 mm long; corolla yellow, 6–16 mm long, the tube connate in proximal ½, the lobes 5; stamens 3, the filaments distinct, the thecae distinct, replicate, forming a head. PISTILLATE flowers similar to that of staminate flowers; style 1, short-columnar, the stigmas 3, each 2-lobed. FRUITS pepos, green, yellow, or variegated green and whitish or green and yellow, +/- longitudinally striped, globose or subglobose to ellipsoid, smooth; seeds 50–300+, ovoid to oblong, compressed, the margin not differentiated, the surface smooth. —5 spp. (1 in AZ) in Afr.; Asia; introduced widely. (Latin: *citrus* = citron-tree, a plant of the Rutaceae + *ule* = a diminutive suffix, alluding to resemblance of fruits).

Due to the paucity of materials from Arizona, much of the data in both the generic and species descriptions herein are based on Nesom (2015).

*Citrullus lanatus* (Thunb.) Matsum. & Nakai (woolly). Watermelon. — LEAVES with blades ovate to lanceolate-ovate or ovate-triangular, mostly 80–200 mm long. FRUITS green, mottled with paler green and yellowish to whitish stripes, globose to oblong-ellipsoid, 120–350+ mm in diameter, the rind tough, not durable, the mesocarp red to orange, yellow, or greenish, juicy, sweet; seeds black, ovoid to oblong

ovoid, 7–15 mm long.  $2n = 22$ . (Fig. 8B). —Spontaneous escape along rivers and margins of lakes and ponds: Apache, Cochise, Greenlee, Maricopa, Mohave, Pima, Santa Cruz, Yavapai cos. (Fig. 4C); 900–1750 m (3000–5700 ft); Aug–Nov; introduced in AL, AR, CA, CT, FL, GA, IL, KA, KY, LA, ME, MD, MA, MI, MS, MO, NV, NJ, NM, NY, NC, OH, OK, PA, RI, SC, TN, TX, UT, VT, VA, NV, WI; Asia; Afr.; Mex.; W. Ind.; C. Amer.; S. Amer; Eur.; Australia. Widely cultivated. A report of 5000-year old seeds of *Citrullus lanatus* in Libya indicates its domestication might have occurred in northern Afr. (Wasylikowa and Van der Veen 2004).

### **Cucumis** L. Melon, Cucumber

Annual or perennial vines from taproot, monoecious. STEMS trailing or climbing, sulcate, hispid or retrorse-strigose. TENDRILS solitary, simple. LEAVES with blades ovate to broadly ovate in outline, entire or palmately 3–6-lobed, variously pubescent. STAMINATE flowers in fascicles, racemes, or panicles; hypanthium campanulate or funnelform; calyx lobes 5; corollas yellow, the tube funnelform, the lobes 5, elliptic to ovate to obovate; anthers free. PISTILLATE flowers usually solitary; portion of hypanthium fused to ovary ellipsoid to cylindrical; calyx lobes 5; corolla yellow, the tube when present funnelform, the lobes elliptic or obovate; style 1, short-columnar, the stigma 1, lobate with finger-like projections. FRUITS pepos, variously colored, ellipsoid, cylindric, globose, ovoid or obovoid, surface prickly or not; seeds yellowish-white, many, elliptic to ovate, compressed, smooth, without a differentiated margin. —Ca. 52 spp. (3 in AZ). Native in Afr.; Asia; Australia and cultivated throughout the world. (Latin: *cucumis* = cucumber).

Due to the paucity of materials from Arizona, much of the data in both the generic and species descriptions herein are based on Kirkbride (1993).

- 1. Fruits prickly ..... *C. anguria*
- 1' Fruits reticulate, ridged, scaly, warty, or smooth, not prickly ..... 2
- 2. Leaf lobes triangular; corolla tube of staminate flowers 3.5–5(–6) mm long; corolla tube of pistillate flowers 3.5–6.5 mm long ..... *C. sativus*
- 2' Leaf lobes elliptic or oblong to ovate; corolla tube of staminate flowers 0.8–2 mm long; corolla tube of pistillate flowers 1–1.6(–3) mm. long ..... *C. melo*

*Cucumis anguria* L. (watermelon) West Indian or Bur Gherkin. —Annual vines. STEMS trailing or climbing, sulcate, hispid. LEAVES with blades deeply palmately 3–5-lobed, ovate to broadly ovate in outline, 30–120(–150) mm long, 25–120(–150) mm wide, the upper surfaces hispidulous. STAMINATE flowers 3–10 per raceme; hypanthium funnelform, 3.5–4 mm long; calyx lobes narrowly triangular 1.5–2.5 mm long; corolla funnelform, the tube 1.5 mm long, the lobes broadly ovate to elliptic, 4–6.5 mm long, 3.5–5.6 mm wide. PISTILLATE flowers solitary, the lower 2/3 of hypanthium fused to ovary, ellipsoid to cylindrical, 7–13 mm long, the upper 1/3 hypanthium free from ovary, 3–5 mm long; calyx lobes narrowly triangular, 1.8–4 mm long; corolla tube, if present, ca. 1 mm long, the lobes obovate to broadly obovate 6–8 mm long, 4–5 mm wide. FRUITS light yellowish green to light yellow, sometimes with light green stripes, usually ellipsoid, 20–70 mm long, 15–40 mm wide, surface prickly

at maturity, the flesh greenish white to yellowish green; seeds elliptic, 5–6 mm long, 2–2.5 mm wide, 1 mm thick.  $2n = 24$ . (Fig. 7D). —Single collection from a disturbed area in an equipment yard of a pecan orchard likely a spontaneous escape: Cochise Co. (Fig. 4D); 1200 m (3950 ft.); Jul–Oct; introduced in CA, GA, MA, NY; Afr.; Mex.; W. Ind.; C. Amer.; S. Amer.; Marquesas Islands; Australia. Widely cultivated in the New World tropics; possibly of Afr. origin. Young tender fruits are said to be used like cucumbers, raw or prepared as pickles (Dieterle 1976).

*Cucumis melo* L. (melon) Canteloupe, Honey Dew, Muskmelon. —Annual or perennial vines. STEMS trailing, sulcate, hispid or retrorse strigose. LEAVES with blades broadly ovate in outline, entire or palmately 3–5-lobed, 20–140(–260) mm long, 20–150(–260) mm wide, the surfaces hispid, hispidulous, or pilose, the lobes elliptic or oblong to ovate. STAMINATE flowers in fascicles or panicles of 2–7(–18) flowers; hypanthium campanulate or funnelform, 2.8–4(–5.6) mm long; calyx lobes linear, 1.2–3.6 mm long; corolla funnelform, deeply 5-parted, the tube 0.8–2 mm long, the lobes elliptic, broadly elliptic, or broadly ovate, 2–9(–24) mm long, 2–5(–20) mm wide. PISTILLATE flowers solitary; lower 2/3 of hypanthium fused to the ovary, ellipsoid, 4–11(–14) mm long, the upper 1/3 of hypanthium free from ovary, 2.4–4.5 mm long; calyx lobes linear, triangular, or narrowly elliptic in outline, 1.6–2.8(–8) mm long; corolla tube 0.8–1.6(–2.8) mm long, the lobes broadly obovate, elliptic, or ovate in outline, 3.6–9.2(–20) mm long, 3.2–6.4(–17) mm wide. FRUITS monocolored or bicolored with longitudinal stripes from base to apex, green, red, yellow, white or brown, ellipsoid, globose, cylindrical, ovoid, or obovoid, 20–120+ mm long, 20–50+ mm in diameter, surface reticulate, warty, scaly ridged or smooth, not prickly, the flesh orange to yellowish or green, juicy, sweet; seeds ovate or elliptic, 4–8(–18) mm long, 2.5–4(–13) mm wide, 1–2 mm thick.  $2n = 24$ . (Fig. 7A). —Possibly naturalized in Sycamore Canyon in Ruby Mts. with riparian woodland in canyon bottom; additional AZ collections in Maricopa and Pima cos. apparently from garden settings: Santa Cruz Co. (Fig. 4D); 1150–1200 m (3800–4000 ft); Jul–Oct; introduced in AL, AK, CA, CT, FL, GA, IL, KY, LA, MA, MI, MS, MO, NV, NH, NM, NY, NC, OH, OK, PA, RI, SC, TX, UT, VA, WV; Can. (Ont.); Asia; Afr.; W. Ind. Widely cultivated all over the world. An Asian origin has been demonstrated for *Cucumis melo* (Sebastian et al. 2010).

*Cucumis sativus* L. (sown, planted, cultivated) Garden Cucumber. —Annual vines. STEMS trailing or climbing, sulcate, hispid or retrorse-strigose. LEAVES with blades broadly ovate, palmately 5–6-lobed, 60–150(–400) mm long, 60–150(–350) mm wide, hispid on upper surface, the margins serrate, the lobes triangular. STAMINATE flowers (1–)3–7(–10) in fascicles; hypanthium campanulate, 3.5–5(–6) mm long; calyx lobes narrowly oblong to linear, 2.7–4.1(–5.1) mm long; corolla funnelform, the tube 3.4–4.9 mm long, the lobes elliptic, 7–18(–22) mm long, 5–11(–13) mm wide. PISTILLATE flowers usually solitary; lower ¾ of hypanthium fused to the ovary, ellipsoid or ovoid, 9.5–10.5 mm long, upper ¼ of hypanthium free from ovary, 3.2–3.6 mm long; calyx lobes narrowly elliptic, 2.8–3.6(–12) mm long; corolla tube 3.5–6.5 mm long, the lobes broadly elliptic 10–15(–25) mm long, 9.5–15(–18) mm wide. FRUITS green, white, yellow, or brown, monocolored or with light green to whitish

stripes, elliptic to cylindric, 50–200(–250) mm long, 30–50(–120) mm wide, smooth, the flesh whitish; seeds elliptic to ovate, 7.2–11.2 mm long, 3.2–4.9 mm wide, 1.3–1.6 mm thick.  $2n = 14$ . (Fig. 7C). —Rare spontaneous escape from cultivation in relatively moist areas with *Populus fremontii*, *Lycium*, *Suaeda*, *Prosopis*, *Parkinsonia*, *Atriplex*, *Solanum*: Maricopa Co. (Fig. 4D); ca. 300 m (950–1000 ft.); Aug–Nov; introduced in AR, FL, GA, HI, IL, KS, KY, LA, MA, MI, MS, MO, NY, NC, OW, PA, SC, UT, VA; Ontario, Can.; Asia; W. Ind.. Cultivated worldwide. An Asian origin has been demonstrated for *Cucumis sativus* (Sebastian et al. 2010).

### **Cucurbita** L. Gourd, Squash

Annual or perennial vines (or compact tufted herbs with reduced tendrils in some cultivars) from taproot or fibrous or tuberous roots, monoecious. STEMS trailing or climbing, angled, sulcate. TENDRILS simple or 2–7-branched. LEAVES with blades suborbicular to broadly ovate, ovate-lanceolate, reniform, or triangular, lobed or unlobed, commonly pilose or scabrous, muriculate in ours. STAMINATE flowers solitary, 5-merous; hypanthium campanulate; calyx lobes linear; corolla yellow, prominently veined and ribbed, campanulate, connate ca. ½ its length into a tube, the lobes apiculate; stamens 3, the filaments separate, the anthers linear, connivent to form a cylindrical twisted column. PISTILLATE flowers solitary; perianth like that of staminate flowers; ovary ellipsoid, ovoid, or globose, the ovules numerous; style 1, short-columnar, the stigmas 3, each 2-lobed. FRUITS pepos, fleshy or fibrous; seeds white or light beige in ours, numerous, ovate or ovate-oblong, strongly compressed, smooth, with or without a differentiated margin. —14–22 spp. (6 in AZ) in warm Amer., 5 of which are widely cultivated. Three cultivated species, *Cucurbita maxima*, *C. moschata*, and *C. pepo*, are included here on the basis of single collections that likely represent spontaneous escapes, not naturalized occurrences. Much of the data in these species descriptions are based on Nesom (2015) and McVaugh (2001). (Latin: *cucurbita* = gourd).

1. Plants perennial; roots tuberous; plants native.....2
  2. Leaf blades longer than wide, unlobed or shallowly lobed at base; tendrils branched at apex of tendril stalk ..... *C. foetidissima*
  - 2' Leaf blades not longer than wide, distinctly palmately lobed; tendrils branched near base, without tendril stalk .....3
    3. Leaves lobed nearly to base of blade, the lobes linear-lanceolate, the central lobe usually at least 5 times longer than wide ..... *C. digitata*
    - 3' Leaves not lobed to base of blade, the lobes triangular or lanceolate, the central lobe usually less than 3.3 times longer than wide..... *C. palmata*
- 1' Plants annual; roots not tuberous; plants cultivated, rarely spontaneous escapes ...4
  4. Stems hirsute with pustulate-based hairs ..... *C. pepo*
  - 4' Stems pilose to hirsute without pustulate-based hairs .....5
    5. Peduncles in fruit relatively soft, corky-thickened, terete, neither prominently ribbed nor abruptly expanded at point of fruit attachment ..... *C. maxima*

- 5' Peduncles in fruit hardened, woody, 5-ribbed, abruptly expanded at point of fruit attachment ..... *C. moschata*

*Cucurbita digitata* A. Gray (finger, in reference to the narrowly lobed leaves) Finger-leaved Gourd. —Perennial vines from large tuberous roots. STEMS trailing or climbing, relatively slender, 1–3 mm in diameter, sparsely strigose with hairs 0.5–1 mm long or glabrate. TENDRILS slender, 3–4-branched near axil, the branches loose or coiled into heads along stem. LEAVES with blades grayish-dark-green (midribs usually distinctly lighter in color), about as long as wide, pedate, the 3 main lobes extending to base of blade, the 2 lateral lobes divided again nearly to base, the lobes linear-lanceolate, the central lobe 70–145 mm long, 11–20 mm wide; upper surfaces strigose, with scattered hairs 0.5 mm long, densely and prominently strigose along veins; lower surfaces scabrous with stiff spreading and appressed pustulate-based hairs 0.2–1 mm long. STAMINATE flowers with hypanthium ca. 33 mm long; calyx lobes 6–8 mm long; corolla tube 20–22 mm long, the lobes 18–20 mm long. PISTILLATE flowers with hypanthium 12–16 mm long; calyx lobes 3–5 mm long; corolla tube ca. 20 mm long, the lobes 20–25 mm long. PEDUNCLES in fruit shallowly 5-ribbed, not abruptly expanded at point of fruit attachment, spongy. FRUITS pale yellow at maturity, globose to depressed-globose, 750–850 mm across, the rind thin, hard shelled, with 10 narrow and well-defined longitudinal stripes; seeds white, 10–11 mm long, 6–7 mm wide, without a differentiated margin, the surface smooth.  $2n = 40$ . (Fig. 6). —Along roadsides and in sandy alluvium of valleys and washes: Cochise, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai, Yuma cos. (Fig. 2A); 1650 m (5000 ft) or lower; Jul–Nov; s CA, NM, w TX; Mex. (n Son., Baja C. Norte). Natural hybridization between *Cucurbita digitata* and *C. palmata* has been reported south of Quartzite near the La Paz/Yuma Co. line (Fig. 2D) (Bemis and Whitaker, 1965).

*Cucurbita foetidissima* Kunth (very foul) Buffalo Gourd, Calabazilla. —Perennial vines, strong-smelling, from large tuberous roots. STEMS coarse, trailing, 3–5 mm in diameter, sulcate, prominently muriculate with stout, stiff, spreading or curved pustulate-based hairs to 0.5 mm long and variously pubescent with curved and appressed hairs 0.2–0.3 mm long. TENDRILS stout, 3–7-branched, mostly coiled into a head at apex of stalk 40–60 mm long. LEAVES with blades coarse and thick, gray-green, triangular-ovate, (85–)145–220(–250) mm long, 75–155(–170) mm wide, unlobed or occasionally shallowly lobed at base, the base cordate to nearly truncate, the apex usually acute and mucronate, the margins dentate, prominently veined, the upper surfaces scabrous with hirsute to strigose hairs 0.3–0.5 mm long, the lower surfaces similar but often grayer, more densely scabrous, the veins muriculate. STAMINATE flowers with hypanthium 10–20 mm long; calyx lobes 8–18 mm long; corolla with spreading or curved hairs to 1.3 mm long, muriculate along veins, the tube 32–45 mm long, the lobes 36–48 mm long, apiculate. PISTILLATE flowers with hypanthium 16–30 mm long; calyx lobes 9–11 mm long; corolla similar to that of staminate flowers, the tube 48–90 mm long, the lobes 30–50 mm long, apiculate. PEDUNCLES in fruit 5-ribbed, slightly expanded or not at point of fruit attachment, hardened, woody. FRUITS yellow at maturity with 5–6 main cream-white longitudinal



stripes, globose to depressed-globose, 50–100 mm across, the rind thin, hard-shelled; seeds white, 9 mm long, 4.5–5 mm wide, without a differentiated margin, surface smooth.  $2n = 40, 42$ . (Fig. 5D, 10F). —In disturbed sandy or gravelly alluvial sites along streams, roadsides or in fallow fields: Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai cos. (Fig. 2B); 350–2350 m (1000–7000 ft); May–Aug; WY, NE, MO, KS to CO, UT, NV, TX, NM, CA; Mex. Indigenous cultures of Arizona ate the cooked fruit and the seed in the form of a mush. The species has the potential of becoming a cultivated food crop because the seeds are rich in oil and protein and the large storage roots contain abundant starch resources (DeVeaux and Shultz 1985, Bemis et al. 1978).

***Cucurbita maxima*** Duchesne (greatest, in reference to the immense fruits of certain cultivars) Hubbard Squash. —Annual vines or herbs from fibrous roots. STEMS climbing, or compact and tufted in some forms, striate, short pilose to villous or hirsute-villous without pustulate-based hairs. TENDRILS 2–5-branched. LEAVES with blades green, occasionally with white blotches, orbicular to reniform, unlobed to shallowly 5–7-lobed, 150–300 mm long, 200–360 mm wide, hispid-aculeate primarily on veins, without pustulate-based hairs. FLOWERS with hypanthium 20–25 mm long; calyx lobes 5–20 mm long; corolla 50–70(–80) mm long. PEDUNCLES in fruit cylindric, smooth, not ribbed, not expanded at point of attachment, spongy. FRUITS yellow, red, orange, or green, variously globose, obovoid, oblong cylindric, or flattened cylindric, 100–400 mm long, smooth, the flesh yellow to orange, not bitter; seeds white, whitish-gray, or pale brown, suborbiculate to broadly elliptic or obovate, 12–22 mm long, the margin raised-thickened or not, the surface smooth or slightly rough.  $2n = 40$ . (Fig. 9C). —Single collection from roadside in Apache Co. likely a spontaneous escape (Fig. 4A). Introduced in AR, GA, ME, MA, MI, NY, NC, OH, PA, SC, UT, VT, VA, WI; W. Ind.; S. Amer.; Eur. (Denmark, England, Germany, Hungary, Spain); New Zealand; Australia. Widely cultivated; cultivars include: Winter, Hubbard, Blue Hubbard, Golden Hubbard, Turk’s Turban, Banana, Queensland Blue, Buttercup, Winter Marrow, Atlantic Giant, and Mammoth Pumpkin. *Cucurbita maxima* reportedly arose from the wild *C. andreana* Naudin of S. Amer. (Sanjur et al. 2002).

***Cucurbita moschata*** Duchesne (perfumed with musk) Butternut Squash. —Annual vines or herbs from taproot or fibrous roots. STEMS climbing or compact and tufted in some forms, villous-hirsute, without pustulate-based hairs. TENDRILS 3–5-branched 15–80 mm above base or reduced in tufted forms. LEAVES ovate to suborbicular or reniform, often shallowly 3–5-lobed, wider than long, 50–250 mm long, (80–)100–250(–300) mm wide, the upper surfaces densely villous-hirsute without pustulate-based hairs, the lower surfaces less densely hairy. STAMINATE flowers campanulate; hypanthium 3–10 mm long; calyx lobes 10–40 mm long; corolla 50–123(–135) mm long, the tube 18–72 mm long, the lobes 35–54 mm long. PISTILLATE flowers like that of staminate flowers; calyx lobes up to 75 mm long. PEDUNCLES in fruit 5-ribbed, widely expanded at point of fruit attachment, hardened, woody. FRUITS green, cream-speckled to evenly brown, or wholly white, globose or depressed globose to ovoid conic, cylindric, pyriform, or lageniform, 100–400(–1200) mm long, smooth or with rounded ribs, the flesh yellow to orange, lightly to very sweet; seeds whitish to

cream or light brown, ovate elliptic to elliptic or obovate, 8–21 mm long, the margin golden yellow to silvery, raised-thickened, the surface punctate-sculptured.  $2n = 40$ . (Fig. 9B) —Single collection from Apache Co. likely a spontaneous escape (Fig. 4D). Introduced in FL, GA, KY, LA, MS, NC, PA, SC, TN, TX, VA; w S. Amer.; Mex.; W. Ind.; C. Amer.; Galapagos Islands; elsewhere in S. Amer. in French Guiana, Guyana, and Surinam. Widely cultivated; cultivars include: Butternut, Tahitian Squash, Golden Cushaw, Calabaza, Neck or West Indian or Seminole or Large Cheese, Long Island Cheese, Kentucky Field, Dickinson Pumpkin, and Tennessee Sweet Potato. Recent studies suggest that cultivation of *Cucurbita moschata* originated in the lowlands of northern S. Amer. (Sanjur et al. 2002).

***Cucurbita palmata*** S. Watson (hand, in reference to the 5-lobed leaves that resemble a human hand) Coyote Melon. —Perennial vines from long, fusiform tubers deep underground. STEMS trailing, 1–2.5 mm in diameter, angled and sulcate, strigose, the hairs 0.25–1 mm long, often muriculate. TENDRILS 3–4-branched near axil, the branches loose or coiled into heads along stem. LEAVES with blades grayish green (primary veins distinctly lighter in color) about as wide as long, 5-lobed, the upper surfaces with strigose hairs 0.25–0.75 mm long, densely and prominently strigose along veins, the lower surfaces scabrous with stiff spreading and appressed hairs 0.2–0.8 mm long, many hairs pustulate-based, the lobes lanceolate, not extending to base of blade, the central lobe 30–100 mm long, 12–39 mm wide at base. STAMINATE flowers with hypanthium 21–22 mm long; calyx lobes 4–8 mm long; corolla tube 18–19 mm long, the lobes 5, short woolly-pilose, 12–14 mm long, apiculate. PISTILLATE flowers with hypanthium 17–25 mm long; calyx lobes 4–6 mm long; corolla tube 35–36 mm long, the lobes short woolly-pilose, 10–25 mm long, apiculate. PEDUNCLES in fruit shallowly 5-ribbed, not abruptly expanded at point of fruit attachment, spongy. FRUITS pale yellow to beige at maturity, globose or depressed-globose, 75–85 mm in diameter, 75–87 mm high, the rind thin, hard-shelled, with 10 longitudinal stripes; seeds white to light beige, ovate to oblong, 11–12 mm long, 7.5–8 mm wide, without a differentiated margin, the surface smooth or slightly rough.  $2n = 40, 42$ . (Fig. 5B, 10E). —Along roadsides and in sandy alluvium of valleys and streams: Coconino, La Paz, Mohave, Maricopa, Yavapai, Yuma cos. (Fig. 2C); 1050 m (3200 ft) or lower; May–Nov; s CA, NV; Mex. (Baja C. Norte).

***Cucurbita pepo*** L. (melon, in reference to the fleshy berry-like fruit with a rind and spongy seedy interior) Pumpkin. —Annual vines or herbs from taproot or fibrous roots. STEMS trailing or climbing or compact and tufted in some forms, hispid with persistent, strongly pustulate-based hairs. TENDRILS 2–7-branched 10–50 mm above base or reduced in tufted forms. LEAVES broadly ovate-cordate to triangular-cordate or reniform, shallowly to deeply palmately (3–)5–7-lobed, 200–300 mm long, 200–350 mm wide, usually wider than long, the surfaces hirsute, hirsute-strigillose, villous-strigose, or hispidulous-scabrous. STAMINATE flowers with hypanthium 9–10 mm long; calyx lobes 8–12 mm long; corolla 82–97 mm long, including lobes 39–52 mm long, apiculate. PISTILLATE flowers similar staminate flowers; hypanthium 34–61 mm long, fused to the ovary for most of its length; calyx lobes 7–21 mm long; corolla 50–97 mm long, including lobes 20–55 mm long, apiculate. PEDUNCLES in fruit

strongly angled, 5-ribbed, not or very gradually expanded at point of fruit attachment, hardened, woody. FRUITS green, green with white stripes, yellow, or orange, globose, depressed globose to ovoid, obovoid, ellipsoid ovoid, pyriform, cylindrical, 50–100(–250) mm long, smooth or with rounded ribs, the flesh whitish to yellowish or pale orange, not bitter; seeds white to cream or tawny, elliptic to obovate, 7–15(–26) mm long, the margin raised-thickened, the surface smooth.  $2n = 40$ . (Fig. 9A). —Single collection from a side canyon west of Chilchinbito in Navajo Co. likely a spontaneous escape from cultivation (Fig. 4C); introduced in AL, CA, CT, KS, KY, LA, MA, MI, NV, NH, NM, NY, OH, PA, SC, TN, UT, VA; Mex.; S. Amer.; W. Ind.; C. Amer.; Eurasia; and Atlantic Islands. Widely cultivated; cultivars include: Field or Jack-o-lantern Pumpkin, Cocozelle, Vegetable Marrow, Zucchini, and Citrouille. The wild ancestor of *Cucurbita pepo* is unknown and possibly extinct. Domestication of *Cucurbita pepo* probably occurred in southern Mexico, the site of the oldest *C. pepo* remains (Smith 1997).

### **Cyclanthera** Schrad. Bur Cucumber

Annual or weak perennial vines from fibrous roots, monoecious. STEMS climbing, sulcate, glabrous or pubescent. TENDRILS simple to unequally 3-branched. LEAVES lanceolate to orbicular, nearly entire to 3–9 lobed to pedately 3–5-foliolate, glabrous or pubescent. STAMINATE flowers in few to many flowered axillary racemes or panicles; hypanthium cupulate or salverform; calyx lobes vestigial in ours; corolla white, rotate, the tube <1 mm long, the lobes 5, oblong-ovate to triangular, 1–5 mm long; stamen filaments united into a central column, the anthers connate into a horizontal orbicular head, dehiscing in a ring around anther head. PISTILLATE flowers usually solitary, in same axil with staminate inflorescence; perianth similar to that of staminate flowers but usually larger; ovary obliquely ovoid, rostrate, the style 1, sessile or stalked, the stigma 1, hemispherical. FRUITS capsules, oblique-ovoid, somewhat fleshy, usually echinate, explosively dehiscent the entire length in ours, with few to many seeds; seeds usually turtle-shaped, somewhat flattened. —Ca. 35 spp. (1 in AZ), CO, KS, NM, OK, TX; Mex.; C. Amer.; S. Amer. (Greek: *cyclos* = circle + *anthera* = anther).

*Cyclanthera gracillima* Cogn. (slender, thin) Slender Cyclanthera. —Annual vines. STEMS slender, 0.6–1.5 mm in diameter, the internodes glabrous, the nodes sparsely pubescent with spreading flexuose hairs. TENDRILS unbranched or 2-branched. LEAVES with blades broadly ovate to circular, pedately trifoliolate, the upper surfaces scabrous with crystalline, papillate, protuberances and short hirsute to strigose hairs along primary veins, the hairs more dense at juncture of leaflets, the lower surfaces essentially glabrous, the central leaflet 10–50 mm long, 3–23 mm wide, the lateral leaflets usually deeply bisected. STAMINATE flowers in racemes or panicles with most flowers in upper 5–10 mm of inflorescence; hypanthium 0.8–1 mm long; corolla lobes triangular, 1.2–2.5 mm long, smooth to minutely papillate on both surfaces; filament column 0.2–0.5 mm long, the anther head 0.6–1.1 mm in diameter. PISTILLATE perianths similar to staminate flowers; ovary 5.5–13 mm long, including beak, the style to 0.2 mm long, the stigma 1.1 mm wide. FRUITS 16–23 mm long,

glabrous, prominently echinate with smooth prickles 2.5–5 mm long; seeds dark brown to black, with bases rounded to truncate, the apex narrowed, the margin often toothed, the surface variously sculpted, 5–7 mm long, 4–5.5 mm wide, 1–1.5 mm thick. (Fig. 10C). —Along canyons and streams: Pima Co. (Fig. 1C); 1350 m (4000 ft); Sep–Oct; AZ, CO, KS, NM, OK, TX; Mex. *Cyclanthera* in Arizona was treated by Kearney et al. (1960) as *C. dissecta* (Torr. & A. Gray) Arn. Nesom (2014) treated *C. dissecta* as endemic to the southeastern Texas coastal plain.

### **Echinocystis** Torr. & A. Gray Wild Mock-Cucumber

Annual vines from taproot or fibrous roots, monoecious. STEMS climbing, sulcate, 1.2–3 mm in diameter, glabrous to sparsely pubescent with flexuose hairs to 1 mm long. TENDRILS 3-branched. LEAVES with blades suborbicular to ovate in outline, to 150 mm long and wide, deeply 5-lobed, the lobes triangular to ovate, the margins subentire to denticulate to serrulate, the upper surfaces scabrous with tuberculate strigose hairs, the lower surfaces sparsely scabrous. STAMINATE flowers in narrow, many-flowered panicles, 25–315 mm long, the peduncle and pedicels with soft, flexuose hairs to 0.5 mm long; hypanthium white, broadly campanulate, 1–2 mm long, 2–3 mm wide; calyx 6-lobed, the lobes linear, 1–2 mm long; corolla white, rotate, connate  $\frac{1}{4}$  length into a tube, 6-lobed, the lobes erect or spreading, lanceolate, to 7 mm long, 0.7–1.5 mm wide at base, the upper surface with stipitate glandular hairs; stamens united into cylindrical anther head 0.7–1 mm long, 0.5–0.8 mm in diameter. PISTILLATE flowers usually solitary in axil of staminate inflorescence or at base of lowest branch of staminate panicle; perianth similar to that of staminate flowers; hypanthium 1–1.5 mm long; calyx lobes 2–3.2 mm long; corolla lobes 6.5–12 mm long, 1.1–1.8 mm wide at base; ovary 2-celled, the style 1, nearly vestigial, the stigmas 3, subglobose to 1 mm wide. FRUITS capsules, ovoid, 35–50 mm long, 20–37 mm wide, bladdery-inflated, glabrous with slender glabrous prickles 2–11 mm long, dehiscing irregularly at apex; seeds brown with irregular beige sculpturing, broadly oblong-ellipsoid, flattened, obtuse at apex, narrowed at base, 16–18 mm long, 8–9 mm wide, 3 mm thick.  $2n = 32$ . —Monospecific genus. (Greek: *echinos* = spiny + *kystis* = bladder, in reference to the prickly, bladdery-inflated fruit).

The description above has been augmented with data from Stocking (1955a).

***Echinocystis lobata*** (Mich.) Torr. & A. Gray (in reference to the lobed leaves) (Fig. 5C). —In alluvial soil along streams and canyon floors, climbing over shrubs and trees: Coconino Co. (Fig. 3A); 1700 m (5200 ft); May–Sep; primarily in s Can. and U.S. e of Rocky Mountains and n of Ohio River, apparently escaped from cultivation and sporadic in w U.S.

### **Echinopepon** Naud. Wild Balsam Apple

Annual vines from taproot or fibrous roots, monoecious. STEMS climbing or trailing, mostly slender, sulcate, glabrous or variously pubescent. TENDRILS 2–3-branched. LEAVES with blades reniform to orbiculate, the margins entire to denticulate to  $\pm$  deeply 3–5(–7)-lobed, the surfaces hispid to hispidulous.

STAMINATE flowers in racemes or narrow panicles, pedicels persistent; hypanthium campanulate; sepals small or minute; corolla white, campanulate or rotate; anthers 5, almost fused or fused into a globose or discoid head, the filaments fused. PISTILLATE flowers solitary or in 2's or 3's, from same node as staminate inflorescences; hypanthium beyond the beaked ovary campanulate; corolla similar to but larger than those of staminate flowers; ovary 2-celled, the style 1, the stigma 1, subglobose. FRUITS capsules, ovoid or ellipsoidal, beak slender and tapering to a point, glabrous or hairy, conspicuously echinate, operculate; seeds 2–5 per carpel, quadrangular or angular-ovate, flattened, more or less rugose. —19 spp. (1 in AZ) in sw U.S.; Mex.; C. Amer.; S. Amer. (Greek: *echinos* = spiny + *pepon* = melon, in reference to the prickly fruit)

The description above is augmented with data from Stocking (1955a) and Monro and Stafford (1998).

*Echinopepon wrightii* (A. Gray) S. Watson. (for Charles Wright, 1811–1885, botanist on several surveys of the Mexican boundary region, 1847–1852). —STEMS 0.5–2 mm wide, densely pilose with glandular and eglandular hairs. LEAVES with blades 20–100 mm long, 25–80(–150) mm wide, the apex acuminate, the margins subentire to undulate to shallowly 3–5-lobed, both surfaces hirsute and glandular-pilose primarily along veins and margins. STAMINATE flowers in 13–37 flowered racemes 50–150 mm long; pedicels densely pilose with glandular and eglandular hairs, 1–17 mm long; hypanthium 0.75–1.5 mm long; calyx lobes linear-lanceolate, 0.25–0.5 mm long; corolla rotate, the tube 0.5–1.0 mm long, the lobes triangular to ovate, 1.75–4 mm long, 1.25–1.5 mm wide at base, with margins and upper surfaces conspicuously glandular; anther head 0.5–1 mm wide, the column of filaments 0.75 mm long. PISTILLATE flowers with pedicels 3–15 mm long, pilose with glandular and eglandular hairs; hypanthium beyond the ovary 1–1.5 mm long; corolla tube 0.5–1 mm long, the lobes 2–4 mm long, 1.5–2 mm wide at base; ovary, obovoid, the prickles and beak pilose with glandular and eglandular hairs. FRUITS capsules, obovoid, 20–39 mm long, the beak 9–11 mm long, stipitate glandular, the prickles to 2 cm long; seeds light brown, 6–7 mm long, 3.5–5 mm wide, 1–2 mm thick, compressed, quadrangular above narrowed base.  $2n = 24$ . (Fig. 10K, L). —Along streams and canyon floors, climbing over shrubs and small trees: Cochise, Gila, Graham, Maricopa, Pima, Pinal, Santa Cruz, Yavapai cos. (Fig. 1D); 1000–2650 m (3000–8000 ft); Jul–Oct; NM; Mex. (Son.).

### **Ibervillea** Greene Globe-berry

Perennial vines from thickened (napiform) or branched tuberous roots, dioecious. STEMS climbing, terete or sulcate, strigose, tomentose, or glabrous. TENDRILS simple. LEAVES with blades reniform to broadly ovate in outline, shallowly to deeply 3–5-lobed to pedate, glabrous, tomentose, or variously hispid, the lobes often lobulate or coarsely toothed. STAMINATE flowers in axillary racemes or fascicles; hypanthium narrowly campanulate or tubular; calyx lobes 5; corolla yellow or greenish-yellow, salverform, the lobes with bifid apices, the margins undulate; stamens 3, free, inserted near hypanthium rim. PISTILLATE flowers solitary, similar to that of staminate flowers; ovary fusiform, the style 1, the stigmas 3. FRUITS yellow,

orange, or red at maturity, the berries, globose, ovoid, or ellipsoid, smooth; seeds arillate, ovoid or pyriform, narrowed at base, tumid, the lateral faces smooth or corky-pleated, the margin prominent, raised. —Ca. 5 spp. (1 in AZ); sw U.S.; Mex. (Possibly named for Pierre LeMoyne Sieur D'Iberville, a 17<sup>th</sup> century explorer and settler in America).

The description is augmented with data from Kearns (1994a).

***Ibervillea tenuisecta*** (A. Gray) Small (cut thin, in reference to the narrowly dissected leaves). —STEMS slender, 0.5–1 mm in diameter, sulcate, glabrous. LEAVES with blades to 47 mm long, deeply 3-lobed or pedate, usually narrowly so, the upper surfaces glabrous, the lower surfaces sparsely strigose often from conspicuous cystolithic bases, the lobes lobulate and coarsely toothed. STAMINATE flowers in racemes 4–17 mm long; hypanthium 4–6 mm long; calyx lobes 1–1.5 mm long; corolla lobes puberulent, 2–4 mm long. PISTILLATE flowers on pedicels 10–33 mm long; hypanthium tubular-campanulate, 8–12 mm long, prolonged 4–8 mm beyond the ovary; calyx lobes 1–2 mm long; corolla lobes to 3.5 mm long. FRUITS bright-red when mature, globose, 11–20 mm in diameter; seeds brown or brownish black, ovoid, 5.5–6 mm long, 3.5–4.5 mm wide, 2.8 mm thick, rounded at tip. [*Maximowiczia lindheimeri* Cogn. var. *tenuisecta* (A. Gray) Cogn., *Ibervillea lindheimeri* (A. Gray) Greene var. *tenuisecta* (A. Gray) M. C. Johnston]. (Fig. 10G, H). —On rocky, limestone hillsides and on alluvium along tributaries with *Larrea divaricata*: Cochise, Pima cos. (Fig. 4A); 1150–1350 m (3500–4000 ft); Aug–Oct; s NM, w TX; n Mex.

It is unknown whether two collections (*Shreve 6386* and *Parker s.n.*, ARIZ) of *I. tenuisecta* from Tumamoc Hill in Pima Co., the type locality of *Tumamoca macdougalii*, represent natural occurrences or transplants. The species is known elsewhere in Arizona from southeastern Cochise Co. more than 100 miles distant.

### Lagenaria Ser. Bottle Gourd

Annual vines from taproot, monoecious. STEMS climbing or trailing, densely villous to puberulent. TENDRILS 2-branched. LEAVES with a pair of large marginal annular glands near the bases of the primary lateral veins; blades broadly reniform or ovate, palmately 3–5(–7)-lobed, the surfaces puberulous or pubescent, the lobes triangular to widely obovate. STAMINATE flowers solitary, axillary; hypanthium white to cream, campanulate to funnellform; calyx lobes 5, subulate to triangular or linear; corolla lobes white to cream, 5, obovate to oblong-obovate, (15–)20–25(–45) mm long, puberulent or glabrous; stamens 3, the filaments inserted in hypanthium tube, distinct, the thecae connate, forming a head, usually much contorted. PISTILLATE flowers solitary, in same axils as staminate; perianth similar to that of staminate flowers; ovary subglobose to ellipsoid, ovoid or cylindrical, the style 1, short columnar, the stigmas 3, each 2-lobed. FRUITS pepos, green to greenish yellow maturing yellowish or pale brown, commonly mottled or with light green to white longitudinal stripes, subglobose to cylindrical, ellipsoid or flask-shaped, usually smooth, woody at maturity; seeds oblong to ovoid-oblong, compressed, with marginal groove, the surface smooth. —6 spp. (1 in AZ); introduced widely. (Greek: *lagenos* = flask, alluding to shape and use of fruit).

Due to the paucity of materials from Arizona, much of the data in both the generic and species descriptions herein are based on McVaugh (2001) and Nesom (2015).

*Lagenaria siceraria* (Molina) Standl. (a spirituous or fermented liquor) Bottle Gourd. —STEMS 1–7 m long, rooting at nodes. LEAVES with blades 30–250(–400) mm long, 40–250(–400) mm wide. STAMINATE flowers with hypanthium 13–18 mm long; calyx lobes 5–9 mm long; corolla lobes 35–47 mm long, spreading, broadly obovate, strongly green-veined on the outer surface; margins often ruffled. PISTILLATE flowers with perianth similar to that of staminate flowers but smaller; corolla lobes 20–25 mm long. FRUITS terete, smooth, very variable in size and shape, 100–500 mm long.  $2n = 22$ . (Fig. 8A). —Included here based on a single collection from a dump area, presumably an escape from plantings in the adjacent Desert Botanical Garden in Phoenix: Maricopa Co. (Fig. 4B); introduced in AK, AR, FL, GA, IL, KY, LA, MA, MS, MO, NY, NC, OK, PA, SC, TX, VA; Asia; Afr.; W. Ind.; S. Amer.; Eur.; Australia. DNA analysis of archeological rind fragments from North American bottle gourds indicate an Asian source of the early introduction to the New World (Clark 2006, Erikson 2005).

#### **Marah** Kellogg Big-Root, Wild Cucumber

Perennial vines from large tuberous roots, monoecious. STEMS climbing or trailing, annual, sulcate, glabrous to sparsely hirsute. TENDRILS slender, simple to 3-branched. LEAVES with blades broadly ovate to suborbicular, variously palmately 5–7-lobed, the surfaces subglabrous or pubescent. STAMINATE flowers in a raceme or narrow panicle; hypanthium shallowly campanulate to cupulate; calyx lobes diminutive; corolla white, cream-yellow, greenish yellow, or greenish, campanulate or rotate, the margins and upper surfaces glandular-punctate; anthers normally 3, folded, fused into a globose head with a short column of united filaments. PISTILLATE flowers solitary, in same axils as staminate flowers; perianth similar to but often larger than staminate flowers; style 1; stigma 1, discoid to subglobose. FRUITS capsules, ovoid to globose, beaked, densely to sparsely echinate, dehiscing irregularly at or near the apex; seeds grey, brown, or olive, large, globose or somewhat flattened, smooth, the margin usually not differentiated, slightly grooved in several species. —7 spp. (1 in AZ) in w U.S.; Mex. (Latin: *amarus* = bitter).

The description is augmented with data from Stocking (1955b).

*Marah gilensis* (Greene) Greene (of the Gila River). —LEAVES with blades 40–84 mm wide, deeply lobed, the upper surfaces scabrous with minute protuberances or short strigose hairs from disk-like or bulbous bases, the lower surfaces sparsely hirsute or strigose along primary veins and margins. STAMINATE inflorescence to 250 mm long; hypanthium <1mm long; corollas white, rotate, 6–10 mm wide, the lobes triangular to lanceolate, 3–3.5 mm long. PISTILLATE hypanthium 5–10 mm long; corollas white, rotate, 8–12 mm wide, the lobes 2–4 mm long; carpels and ovules usually 4. FRUITS globose, 25–35 mm wide; seeds brown, 4, somewhat flattened, ovoid, 12–14 mm long, encircled with a grooved ridge.  $2n = 30$ . (Fig. 100). —Among

shrubs and rocks of canyons and streams: Cochise, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai cos. (Fig. 3B); below 1500 m (4500 ft); Feb–May; sw NM, s NV. Tuberous roots of *Marah fabaceus* (Naud.) Greene are used in a laxative called Stroughton's Bitters; tuberous roots and seeds of *Marah* are potential sources of starch and oil, respectively (Stocking 1955b).

### **Sicyos** L. One-Seeded Bur-Cucumber

Annual vines from fibrous roots, monoecious. STEMS climbing or trailing, glabrous or pubescent, with or without glands. TENDRILS 2–5-branched. LEAVES with blades ovate, orbiculate, or reniform, 3–7-angled to palmately 3–9-lobed, the surfaces glabrous or pubescent. STAMINATE flowers numerous in racemes or panicles; hypanthium shallowly cup shaped or subtovate; calyx lobes 5, diminutive; corolla white, cream, yellowish or green, campanulate to cupulate; stamens 3, united, the filaments connate into a column, the anthers curved or flexuous, more or less coherent and twisted in a head. PISTILLATE flowers capitate on a common peduncle; perianth similar to that of staminate flowers, usually smaller; ovary ovoid to fusiform, the ovule 1, the style 1, the stigma 1, capitate or 2–3-lobed. FRUITS clustered on a common peduncle, ovoid, 1-seeded, sometimes attenuate into a beak, angled, ribbed, glabrous, spiny, bristly, or variously pubescent, indehiscent; seeds solitary, smooth, shiny, without a differentiated margin. —Ca. 50 spp. (1 in AZ); N. Amer.; C. Amer.; S. Amer.; sw Pacific; Australia; New Zealand; introduced in Eur., Asia. (Greek: *sicyos* = cucumber)

*Sicyos laciniatus* L. (refers to the deeply lobed leaves, a common morphology in populations in the southern part of the range of the species in Mex.) Cut-leaf Bur Cucumber. —STEMS climbing, slender 1–1.8 mm in diameter, sulcate, scabrate with stiff spreading to appressed hairs 0.1–0.7 mm long. TENDRILS 3–4-branched. LEAVES with blades triangular to ovate, shallowly 3-lobed; margins dentate; apices attenuate; both leaf surfaces scabrous with spreading and appressed hairs 0.1–0.5 mm long; hairs often from prominent white crystalline bases; central lobe 50–55 mm long; lateral lobes 55–70 mm wide, sometimes again shallowly 2-lobed. STAMINATE flowers in racemes 7–15 mm long; hypanthium shallowly campanulate, 1 mm long; calyx lobes 0.2–0.5 mm long; corolla lobes 1.0–2.5 mm long, 1.2–2 mm wide at base, white; stamens united, the filaments forming a central column with the anthers sessile at its apex. PISTILLATE flowers usually from same leaf axil as the staminate flowers, 4–6, sessile at apex of peduncle 4.5–6 mm long; hypanthium 1 mm long; calyx lobes diminutive; corolla lobes 1 mm long, 0.6–0.8 mm wide at base, white; stigma 2-lobed. FRUITS dry, ovoid to ellipsoid, 5–6 mm long, conspicuously setose, setae stramineous, retrorsely barbed, 2–3 mm long. [*S. laciniatus* L. var. *subinteger* Cogn., *S. ampelophyllus* Woot. & Standl.]. (Fig. 10J). —In shaded areas on rocky slopes and along streams: Apache, Cochise, Greenlee, Navajo, Pima, Yavapai cos. (Fig. 3C); 1200–2400 m (3900–7900 ft); Aug–Oct.; NM, w TX; Mex.

*Sicyos* in Arizona was treated by Kearney et al. (1960) as including *S. laciniatus* and *S. ampelophyllus* Woot. & Standl. Nesom (2011) treated *S. ampelophyllus* as a synonym of *S. laciniatus*.



**Sicyosperma** A. Gray Climbing Arrowheads

Annual vines from fibrous roots, monoecious. STEMS climbing, slender, 0.5–1.2 mm in diameter, sulcate, glabrous or variously pubescent with prominent, spreading hairs 0.3–0.9 mm long and more delicate appressed hairs 0.1–0.5 mm long. TENDRILS 2-branched. LEAVES petiolate or occasionally sessile; blades triangular to ovate to orbicular, 11–80 mm long, 15–102 mm wide, usually 3-lobed, the margins crenate to serrate, the upper surfaces and margins scabrous with strigose hairs 0.1–0.4 mm long from white crystalline bases, the lower surfaces sparsely strigose, primarily along veins. STAMINATE flowers 14–19 in racemes or panicles to 15 mm long; hypanthium rotate to openly campanulate, 0.5 mm long; calyx lobes diminutive 0.2–0.3 mm long; corolla white, the lobes lanceolate, 0.5–1.2 mm long, 0.6–0.7 mm wide at base, apically bifid with linear lobes 0.3–0.8 mm long; anthers united in cylindric head 0.2 mm wide, 0.2–0.3 mm long, the column of united filaments 0.2–0.4 mm long. PISTILLATE flowers often in same axils as staminate flowers, solitary or in bracteate racemes of 3–6 flowers, the flowers subtended and loosely enveloped in sessile, deltate bracts with crenate to dentate-serrate margins; perianth like that of staminate flowers; ovary 1-locular, ovoid, with 1 ovule; style 1; stigma 1, capitate, 3-lobed. FRUITS brown with whitish exocarp, glabrous, smooth, dry, 1-seeded, 4 mm long, 2.9 mm wide, 2 mm thick, narrowed at both ends, enclosed in bracts, indehiscent. —Monospecific genus. (Greek: *sicyos* = cucumber + *sperma* = seed).

*Sicyosperma gracile* A. Gray (thin, slender, in reference to the stems) (Fig. 10M, N). —In shaded areas on slopes, along streams, and in canyons: Cochise, Gila, Graham, Pima, Pinal, Santa Cruz cos.; 1150–1850 m (3500–5500 ft) (Fig. 3D); Aug–Oct; Mex. (n Son.).

**Tumamoca** Rose Tumamoc Globeberry

Perennial vines from a cluster of shallow tuberous roots, united into a short woody crown, monoecious. STEMS climbing, woody at base, the stems annual above, delicate, 0.5–1 mm in diameter, sulcate, glabrous. TENDRILS simple. LEAVES with blades deeply and narrowly pedate, the upper surfaces glabrous, the lower surfaces sparsely to densely strigose, with hairs often from prominent crystalline bases, the lobes spreading, variously and irregularly lobulate, acute to obtuse at tip, the central lobe to 60 mm long. STAMINATE flowers in racemes of 6–15 flowers from leaf axils; hypanthium narrowly funnel-shaped, 6.5–11.5 mm long; calyx lobes lanceolate, 0.5–1 mm long; corolla yellow or greenish-yellow, the lobes entire, linear-lanceolate, acute at apex, 3.5–9 mm long, glabrous; stamens 3. PISTILLATE flowers solitary, often in same leaf axils as staminate flowers; hypanthium narrowly tubular, 5–10 mm long; sepals 1 mm long; corolla yellow or greenish yellow, the lobes entire, linear-lanceolate, acute at apex, 3–4 mm long, glabrous; style 1 with 3 stigmas. FRUITS red at maturity, berries, spherical to ovoid, 8–12 mm in diameter; seeds light to dark brown to black, 1–9, arillate, obovoid, compressed, 5–8 mm long, 3.2–5 mm wide, 2–3 mm thick, narrowed at base, often truncate at apex, lateral faces tuberculate-rugose, often prominently so, without a differentiated margin. —2 spp. (1 in AZ); Mex. (Son., n

Zac.). (for Tumamoc Hill, the Amerindian name of the hill which is the former site of the Carnegie Institute Desert Laboratory which now houses the University of Arizona Palynological Laboratory and the U. S. Geological Survey.)

Description augmented with data from Rose (1912) and Kearns (1994b).

*Tumamoca macdougali* Rose (for Daniel Trembly MacDougal, 1865–1958, plant physiologist and founder of the Carnegie Desert Laboratory and collector of the type specimen from Tumamoc Hill.) (Fig. 7B, 10I). —On sandy, gravelly, or clay loams of valley bottoms, often adjacent to tributaries or on rocky soils of upper bajadas in association with Sonoran desertscrub and semidesert grassland with *Larrea*, *Parkinsonia*, *Prosopis*, and *Atriplex*: Pima Co. (Fig. 4B); additional sightings in Pinal Co. according to SEINET Sonoran Atlas Collection Statistics; 550–800 m (1600–2700 ft); May–Nov; Mex. (Son.).

#### ACKNOWLEDGEMENTS

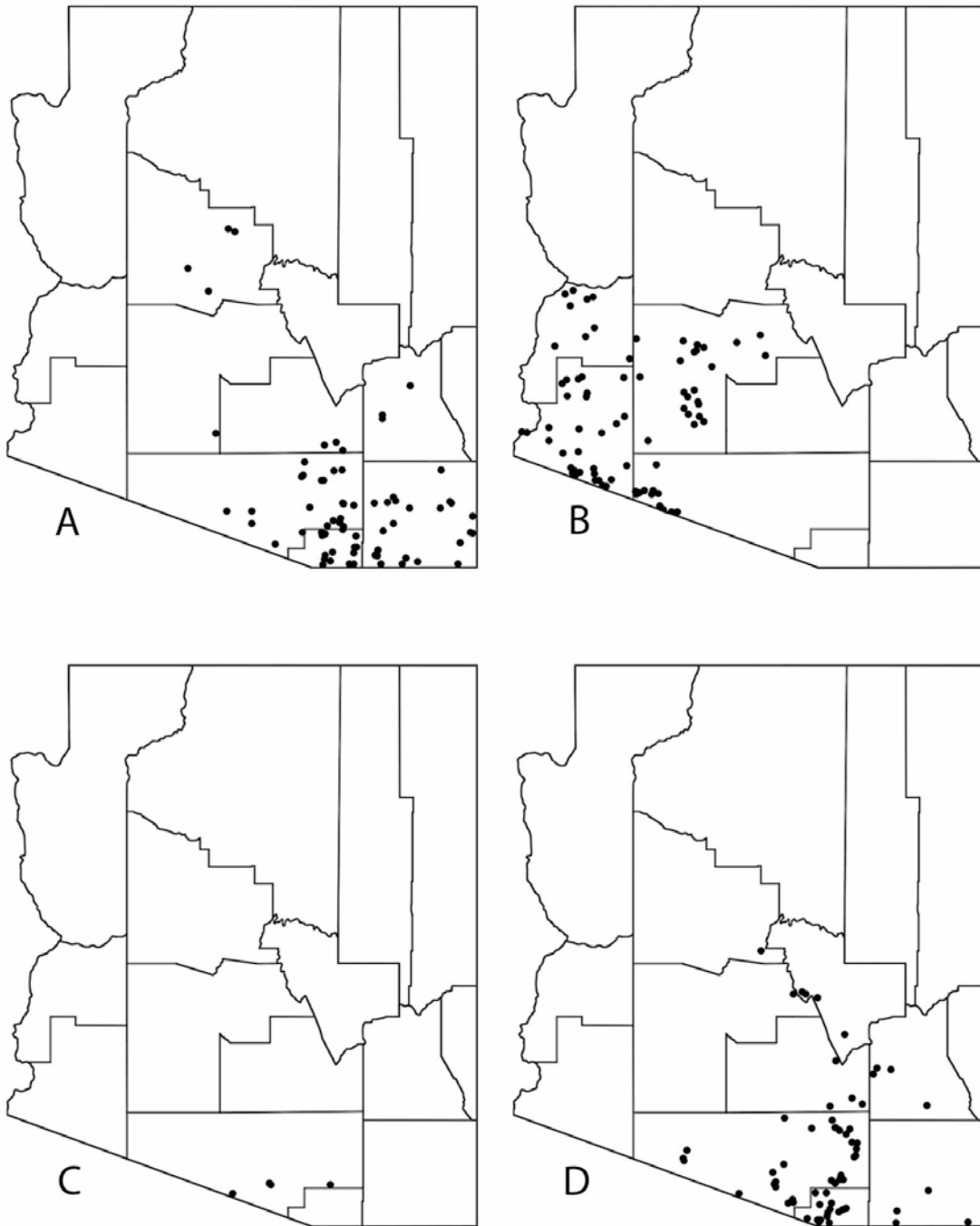
I thank the following individuals for their assistance with this treatment: T. Daniel, G. Nesom, D. Hillyard, B. Parfitt, D. Ducote, P. Fischer, T. Van Devender, E. Moore, and D. Pinkava. Specimens were generously made available from the following herbaria: ARIZ, ASC, ASU, CAS, DES, NAVA, and RM. Images of specimens were provided by the following herbaria: GCNP, MNA, and SJNM. The illustrations of *Cucurbita palmata* and *Echinocystis lobata* in Figure 5 were reproduced from Abrams and Ferris (1960) with permission from the Board of Trustees of the Leland Stanford Jr. University. The illustration of *Brandegea bigelovii* in Figure 5 was reproduced from Baldwin et al. (2012) with permission from the Jepson Herbarium, University of California Berkeley. The illustration of *Cucurbita digitata* in Figure 6 was reproduced from Parker (1958) with permission from the Arizona Cooperative Extension, the University of Arizona College of Agriculture and Life Sciences. The illustration of *Lagenaria siceraria* in Figure 8 was reproduced from Dieterle (1976) with permission from Fieldiana at the Field Museum of Natural History. The images in Figure 9 and contributed by P. Alexander, M. Baker, F. Coburn, J. Cowles, J. Fonseca, M. Licher, K. Morse, and R. Sivinski were made available in the SOUTHWEST ENVIRONMENTAL INFORMATION NETWORK, SEINet website ([www.swbiodiversity.org/seinet/imagelib/index.php](http://www.swbiodiversity.org/seinet/imagelib/index.php)).

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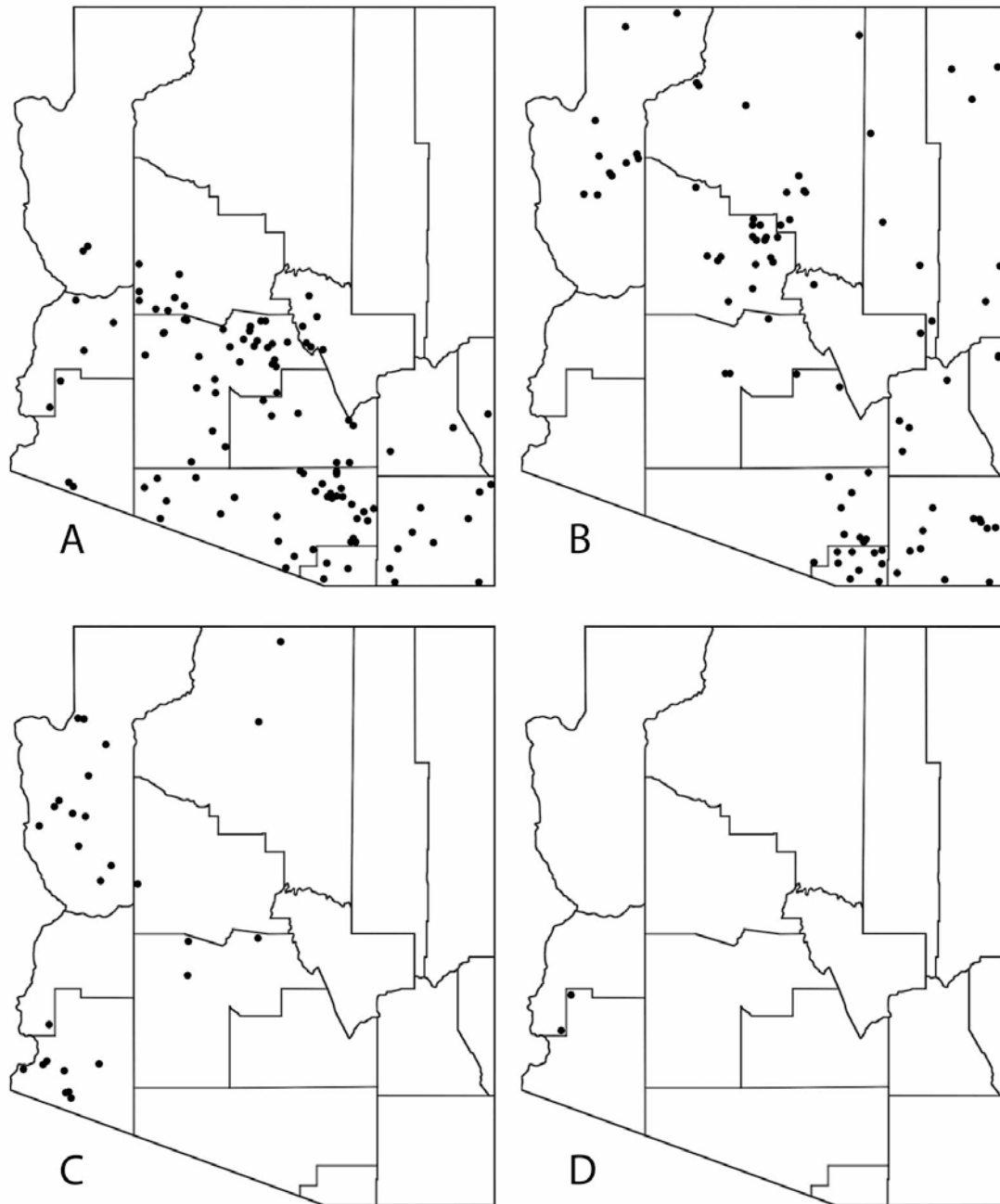
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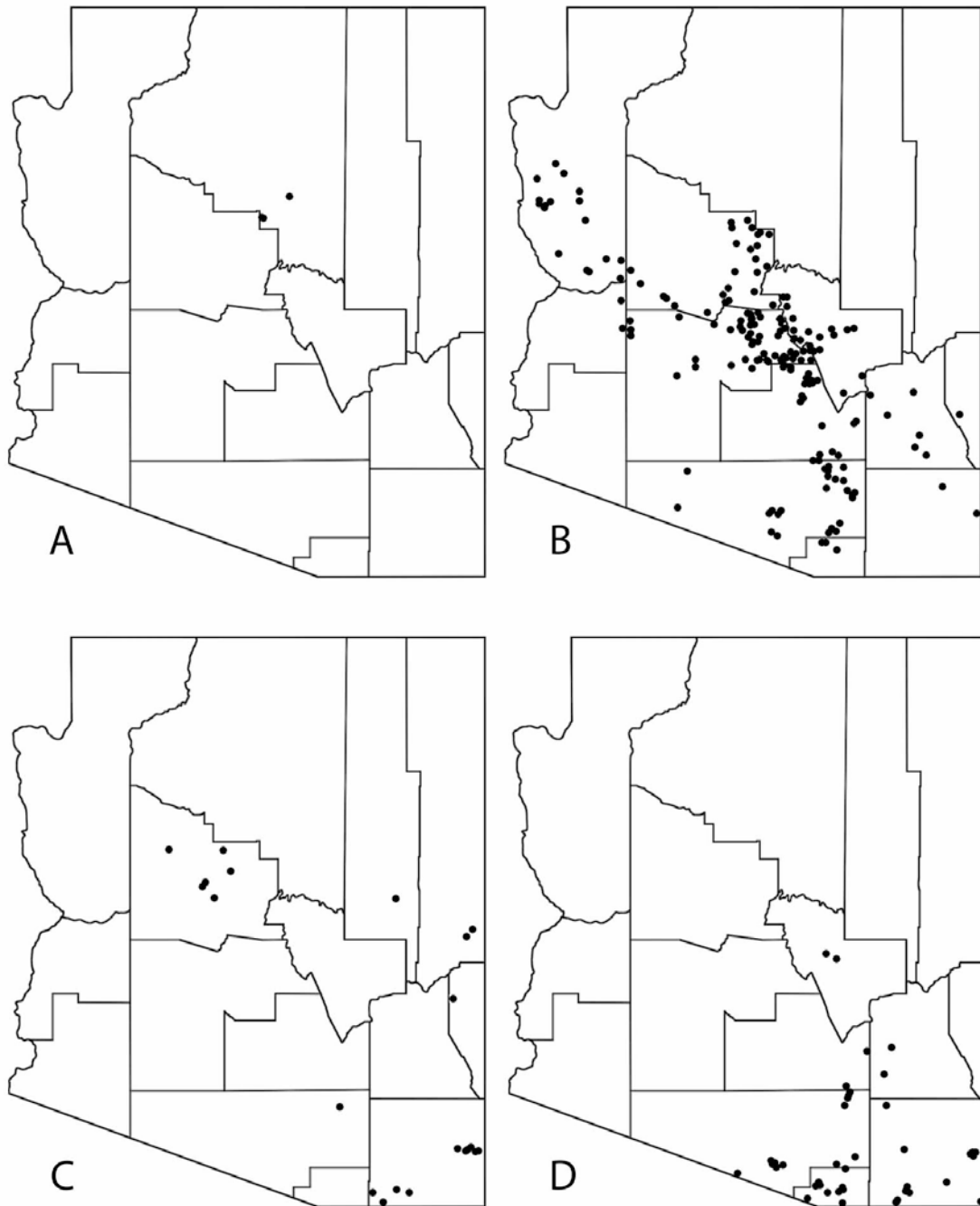
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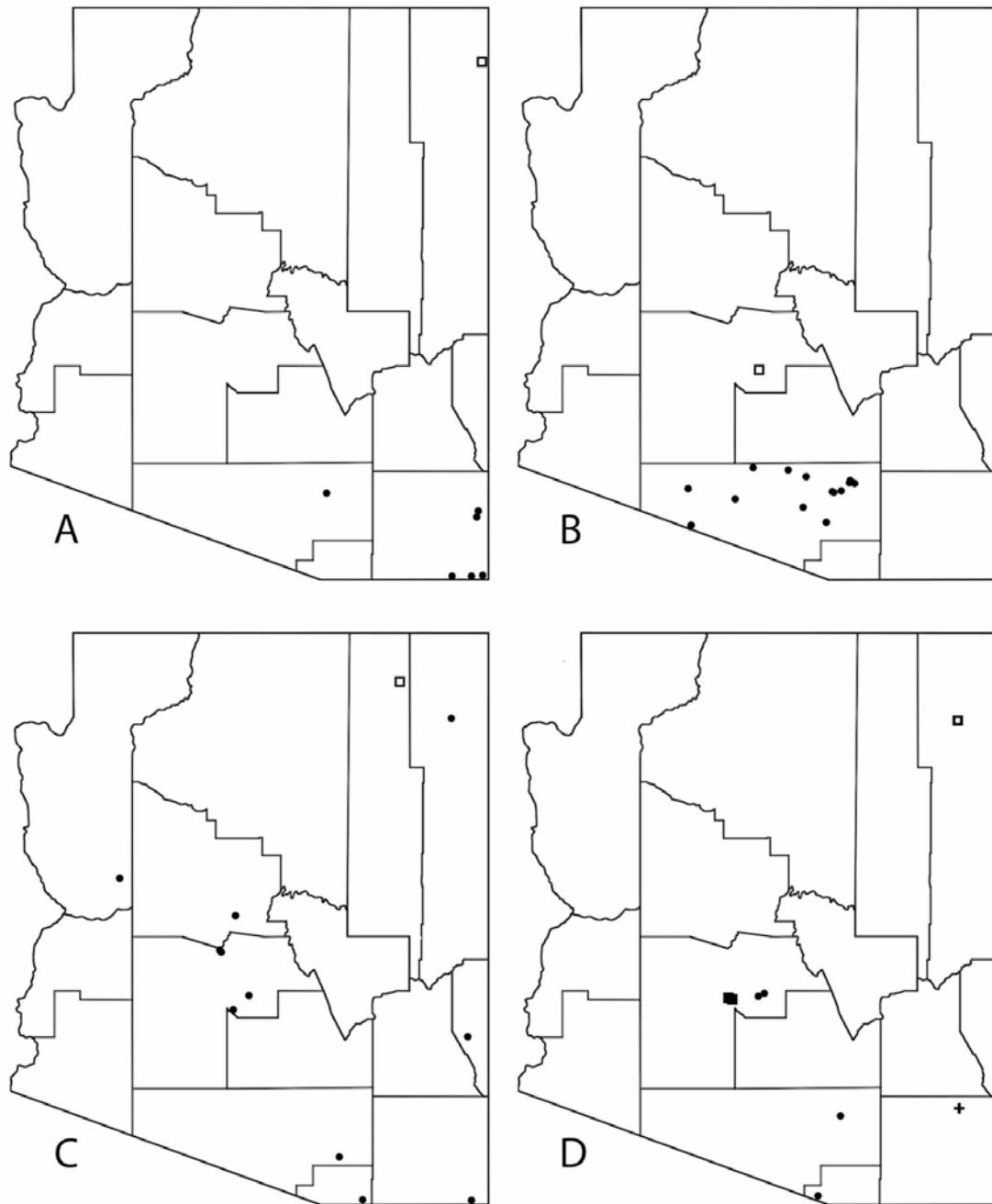
**Cucurbitaceae.** Figure 1. Distributions of: (A) *Apodanthera undulata* var. *undulata*; (B) *Brandegea bigelovii*; (C) *Cyclanthera gracillima*; (D) *Echinopepon wrightii*.



**Cucurbitaceae.** Figure 2. Distributions of: (A) *Cucurbita digitata*; (B) *Cucurbita foetidissima*; (C) *Cucurbita palmata*; (D) *Cucurbita digitata* × *C. palmata*.

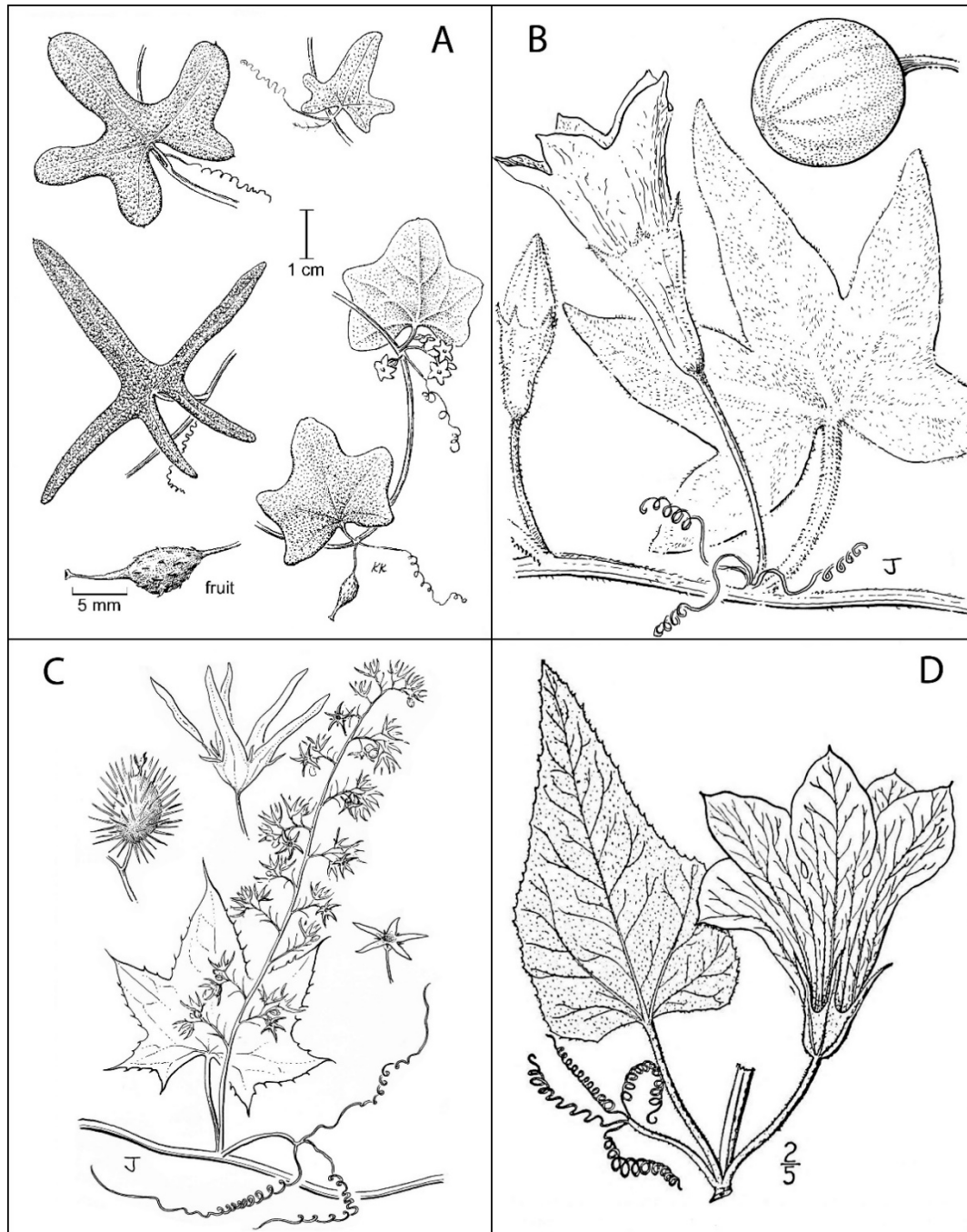


**Cucurbitaceae.** Figure 3. Distributions of: (A) *Echinocystis lobata*; (B) *Marah gilensis*; (C) *Sicyos laciniatus*; (D) *Sicyosperma gracile*.

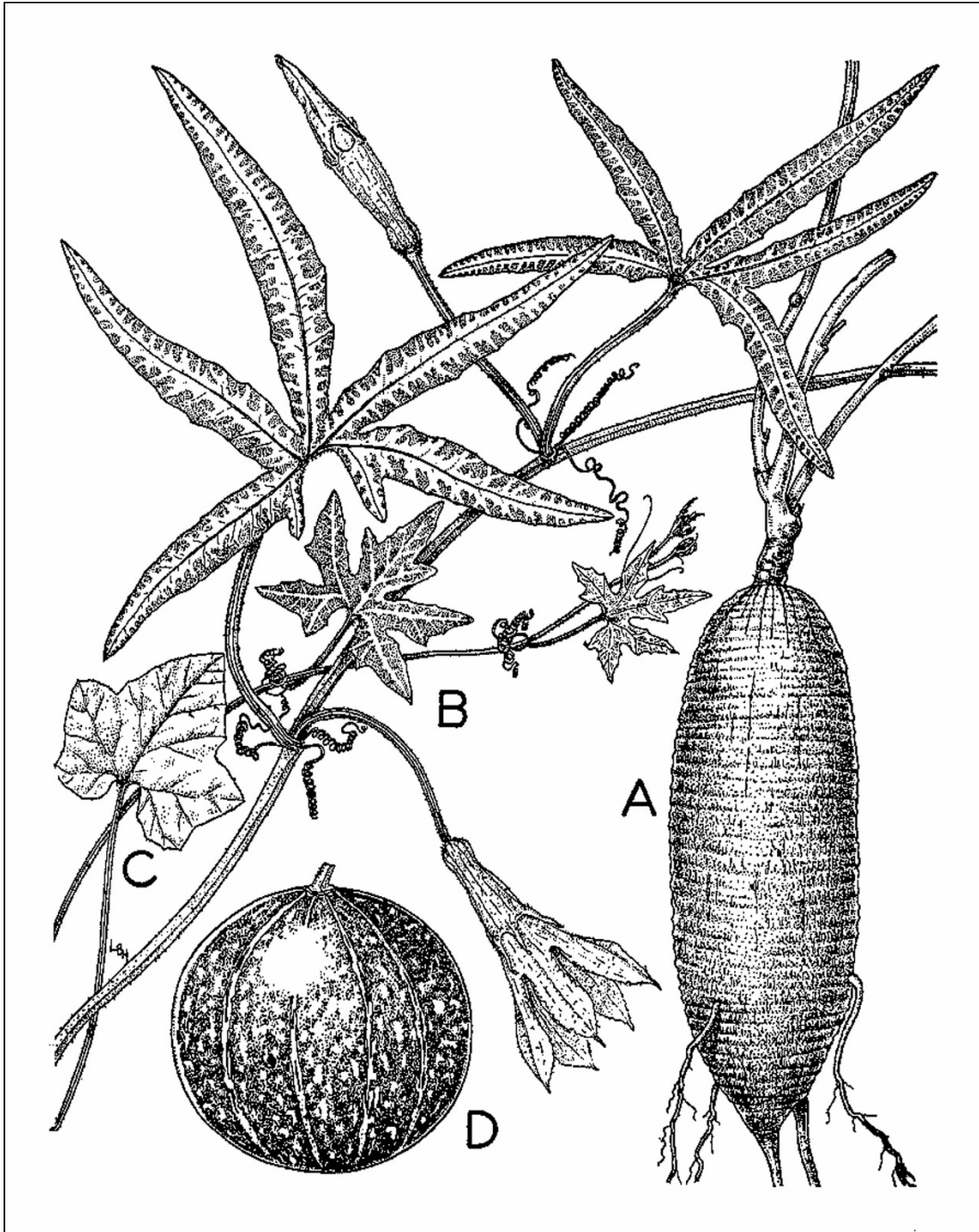


**Cucurbitaceae.** Figure 4. Distributions of: (A) *Ibervillea tenuisecta* (solid dots) and *Cucurbita maxima* (open square); (B) *Tumamoca macdougalii* (solid dots) and *Lagenaria siceraria* (open square); (C) *Citrullus lanatus* (solid dots) and *Cucurbita pepo* (open square); (D) *Cucumis anguria* (plus sign), *Cucumis melo* (solid dots), *Cucumis sativus* (closed square), and *Cucurbita moschata* (open square).

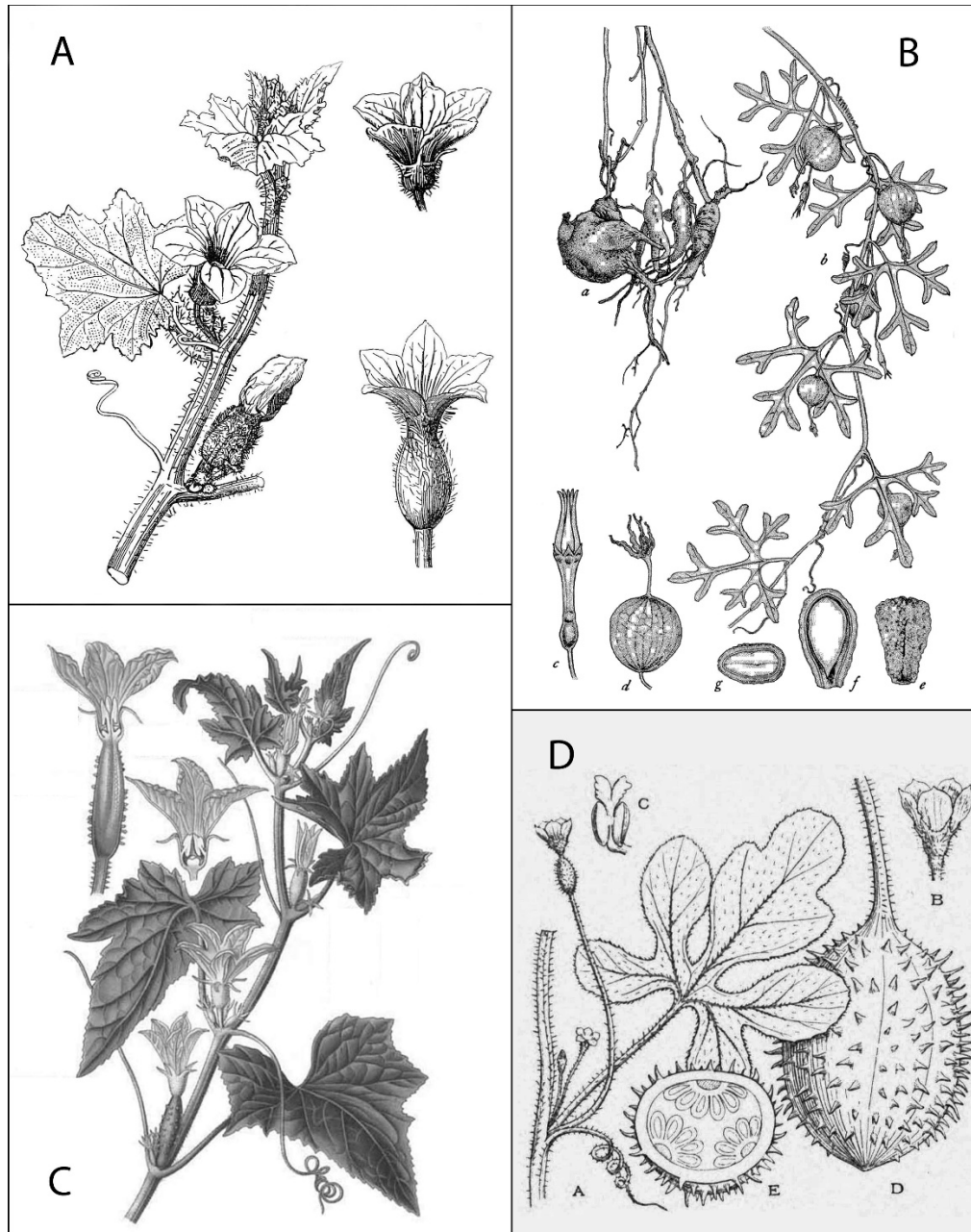




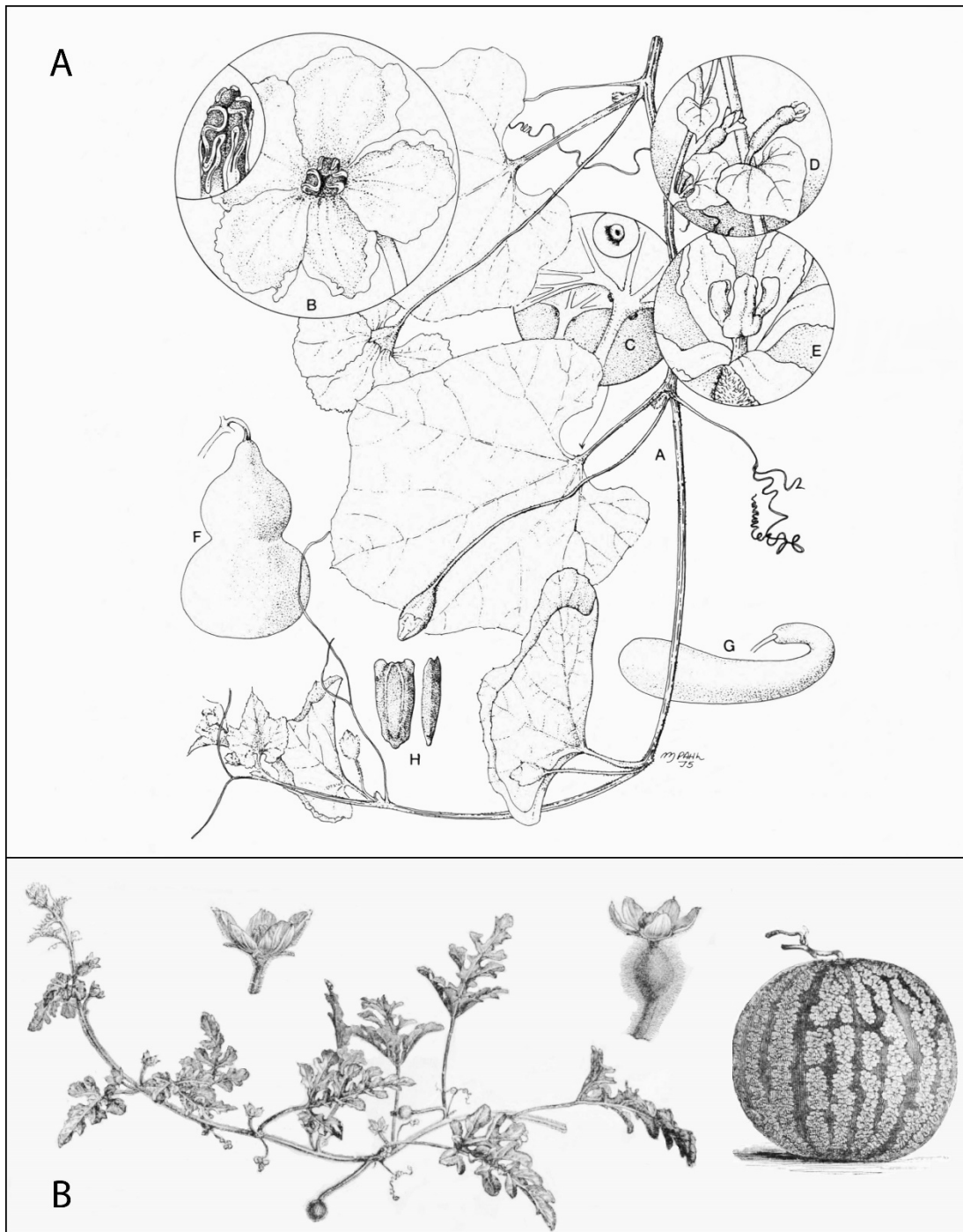
**Cucurbitaceae.** Figure 5. (A) *Brandegea bigelovii*: various leaf shapes; stem with tendril, staminate inflorescence, and pistillate flower; fruit in lower left. (B) *Cucurbita palmata*: stem with tendril, leaf, and staminate flower; pepo. (C) *Echinocystis lobata*: stem with tendril, leaf, and staminate inflorescence; individual staminate flower; prickly fruit. (D) *Cucurbita foetidissima* (as *Pepo foetidissima*): stem with tendril, leaf, and staminate flower. (A) reproduced with permission from Baldwin et al. (2012), drawn by Karen Klitz; (B)(C) reproduced with permission from Abrams and Ferris (1960), drawn by Jeanne Russell Janish; (D) reproduced with permission from Britton and Brown (1913).



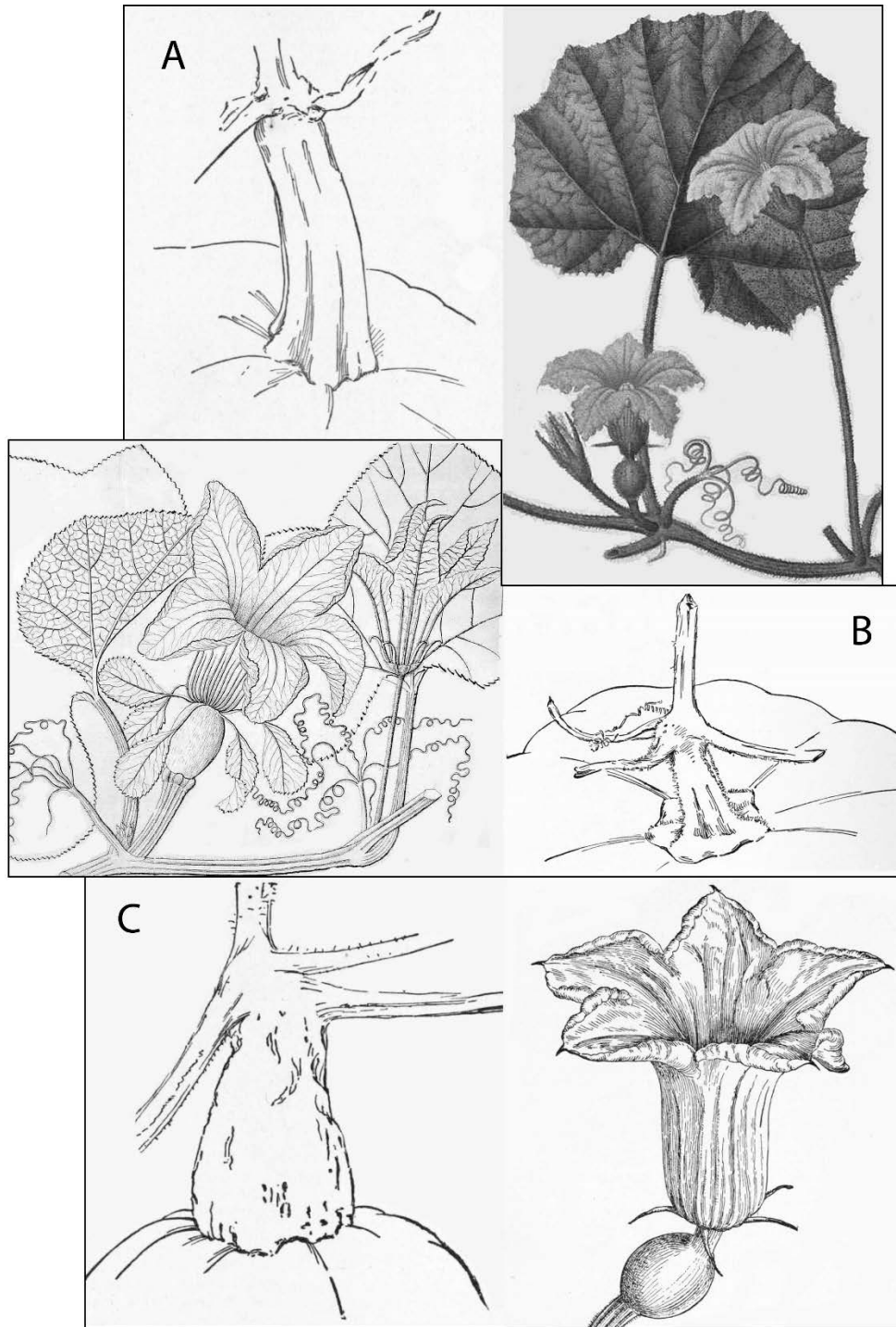
**Cucurbitaceae.** Figure 6. *Cucurbita digitata*: a, root; b, stem with tendrils, leaves, and two staminate flowers; c, juvenile leaf; d, fruit. Reproduced with permission from Parker (1958), drawn by Lucretia Breseale Hamilton.



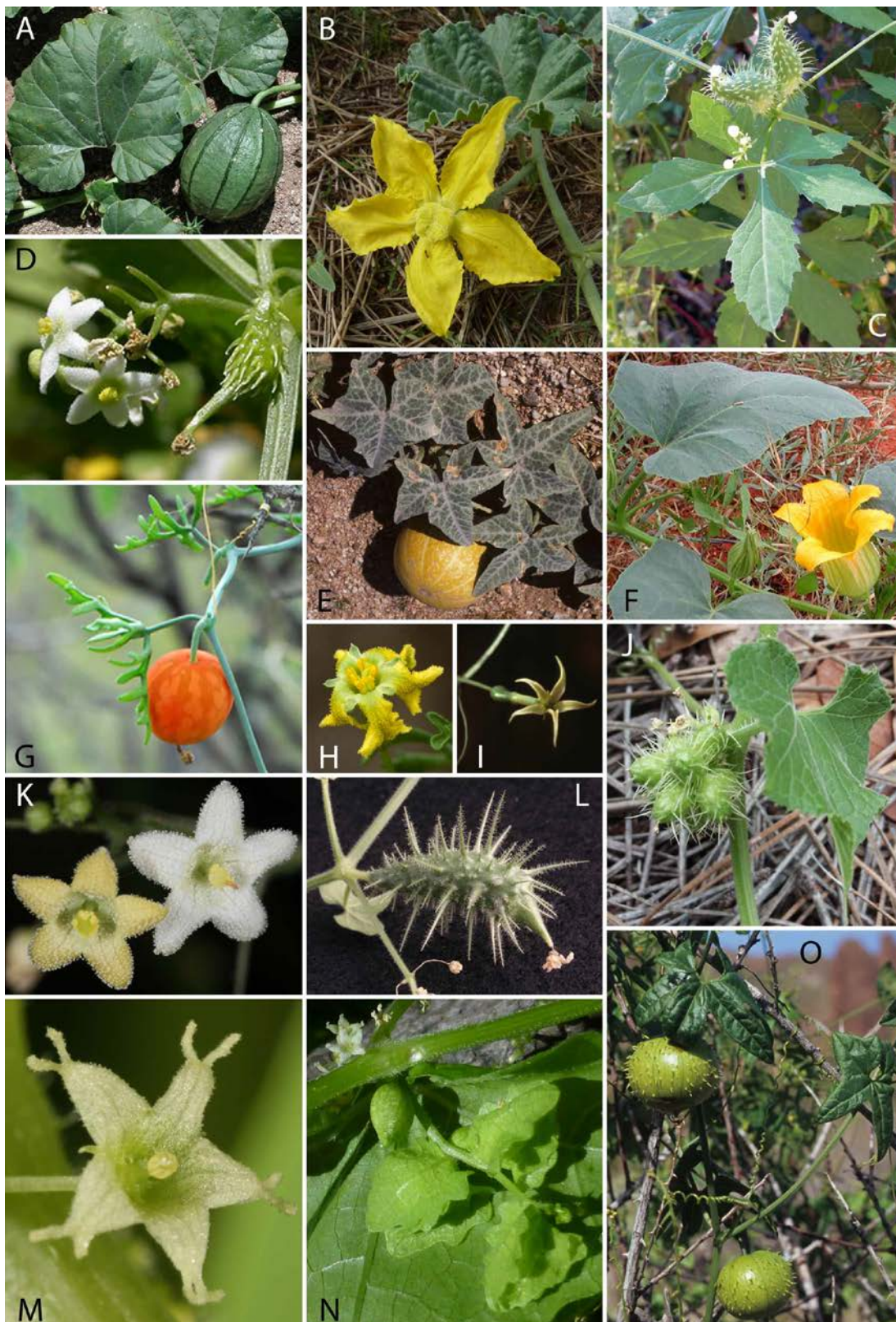
**Cucurbitaceae.** Figure 7. (A) *Cucumis melo*: stem with tendril, leaf, and pistillate flower; staminate flower upper right; pistillate flower lower right. (B) *Tumamoca macdougalii*: a, roots; b, stem with leaves and fruits; c, staminate flower; d, pistillate flower; e-g, seed. (C) *Cucumis sativus*: stem with tendril, leaf, pistillate flower in lowest leaf axil, and staminate flower in next leaf axil up; vertical cross-sections of pistillate flower (upper left) and staminate flower (center). (D) *Cucumis anguria*: a, stem with tendril, leaf, raceme of staminate flowers, and solitary pistillate flower; b, staminate flower; c, anther with appendage; d, prickly fruit; e, horizontal cross-section of fruit. (A) reproduced from LeMaout and Decaisne (1873); (B) reproduced from Rose (1912); (C) reproduced from Masclaf (1891); (D) reproduced from Faucett and Rendle (1926). See Lit. cited.



**Cucurbitaceae.** Figure 8. (A) *Lagenaria siceraria*: a, stem with tendril, leaves, and two flowers; b, staminate flower (inset of anthers); c, leaf bases with petiolar glands; d, pistillate flowers; e, stigmas; f and g, two fruits; h two views of seeds. (B) *Citrullus lanatus*: stem with tendril and pinnately-lobed leaves; staminate flower (upper left); pistillate flower (upper right); fruit (far right). (A) reproduced with permission from Dieterle (1976), drawn by M. Pahl; (B) reproduced from Nicholson (1884).



**Cucurbitaceae.** Figure 9. (A) *Cucurbita pepo*, pedicel in fruit on left; stem on right with leaf, pistillate flower (left) and staminate flower (right). (B) *Cucurbita moschata*, stem with leaves and pistillate flower with expanded calyx lobes (left); pedicel in fruit (right). (C) *Cucurbita maxima*, pedicel in fruit (left); pistillate flower with narrow calyx lobes (right). (A) and (B) pedicels in fruit reproduced from Bailey (1909); (A) stem reproduced from Chaumeton et al. (1830); (B) stem reproduced from Kirtikar and Basu (1918; as *Cucurbita maxima*); (C) reproduced from Bailey (1909).



**Cucurbitaceae.** Figure 10. Images of: (A) *Apodanthera undulata* var. *undulata*; (B) *Apodanthera undulata* var. *undulata*; (C) *Cyclanthera gracillima*; (D) *Brandegea bigelovii*; (E) *Cucurbita palmata*; (F) *Cucurbita foetidissima*; (G) *Ibervillea tenuisecta*; (H) *Ibervillea tenuisecta*; (I) *Tumamoca macdougalii*; (J) *Sicyos laciniatus*; (K) *Echinopepon wrightii*; (L) *Echinopepon wrightii*; (M) *Sicyosperma gracile*; (N) *Sicyosperma gracile*; (O) *Marah gilensis*. Photos (A), (E), (N), and (O) by T. Daniel; (B), (F), (J) by M. Licher; (C) by F. Coburn; (D) by K. Morse; (G) by R. Sivinski; (H) by P. Alexander; (I) by M. Butterwick; (J) by J. Fonseca; (L) by M. Baker; (M) by J. Cowles.