

RHAMNACEAE BUCKTHORN FAMILY

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Shrubs or small trees, unarmed or armed, with perfect flowers or less often monoecious. LEAVES alternate, subopposite or opposite, solitary or fascicled, simple, deciduous or evergreen; stipules present; bud scales present or absent. INFLORESCENCES of terminal or axillary cymose clusters. FLOWERS actinomorphic, perfect or imperfect; sepals 4-5, triangular, deciduous or persistent (in *Colubrina californica*); petals (0-) 4-5, free, usually concave or hooded, clawed; stamens 4-5, in 1 whorl, opposite the petals and often enshrouded by them; filaments adnate to petals; nectar-disc well-developed; ovary superior or partially inferior, of 2-3 united carpels; placentation basal; style entire, lobed, or deeply cleft; ovules basal, 1 or 2 per locule. FRUITS capsules or drupes with 1-3 stones, these 1(-2)-seeded. SEEDS sometimes with a dorsal groove. Ca. 50 genera, 875 spp., cosmopolitan but mainly tropical and subtropical.

Rhamnus catharticus L. has been used as a potent purgative. Some AZ species are used medicinally by Southwestern Native Americans (Moerman 1998).

1. Plants with conspicuous thorns.
 2. Plants essentially leafless; of extreme se Cochise Co. *Adolphia*
 - 2' Plants leafy.
 3. Leaves prominently palmately 3-veined from leaf base *Ceanothus* (in part)
 - 3' Leaves pinnately-veined or veins obscure.
 4. Leaves opposite *Ceanothus* (*C. vestitus*)
 - 4' Leaves alternate.
 5. Leaves of short shoots crowded, often in clusters; petals absent; fruit beaked *Condalia*
 - 5' Leaves of short shoots sparse, usually solitary; petals present; fruit not beaked *Ziziphus*
 - 1' Plants without thorns or thorns inconspicuous.
 6. Leaves prominently palmately 3-veined from leaf base *Ceanothus* (in part)
 - 6' Leaves pinnately veined or veins obscure.
 7. Leaves opposite or subopposite.
 8. Leaves thick, dull green; flowers showy conspicuous; perianth white to blue or lavender; fruit a capsule *Ceanothus* (*C. vestitus*)
 - 8' Leaves thin, shiny, bright green; flowers inconspicuous; perianth yellowish-green or cream; fruit a drupe *Sageretia*
 - 7' Leaves alternate or fascicled.
 9. Fruit a capsule; leaves 0.4-1.7 (3.5) cm long; plants of La Paz, Yuma, Maricopa, and Pinal cos. *Colubrina*
 - 9' Fruit a drupe; leaves 2-14 cm long or if less than 2 cm long then confined to Pima Co. (*Rhamnus crocea*).

10. Flowers 4-merous, imperfect; stigma branched; seeds grooved; bud scales present; leaves 0.7-6 cm long.....*Rhamnus*
 10' Flowers 5-merous, perfect; stigma lobed; seeds smooth; bud scales absent; leaves 2.8-14 cm long.....*Frangula*

Adolphia Meisn. Junco

Kyle Christie

Shrubs, armed. STEMS several to many, erect to ascending, green, rigid; branches mostly opposite, jointed, thorn-tipped, villous when young, glabrescent with age; bud-scales absent. LEAVES early deciduous, opposite, subopposite, or fascicled, short-petiolate; blades lanceolate to ovate, pinnately veined, entire, sparsely to densely villous.

INFLORESCENCES axillary, cymose, of several flowers. FLOWERS perfect, pedicellate; hypanthium hemispheric, 2-3 mm in diameter, slightly villous; sepals 5, triangular, whitish and petaloid; petals 5; stamens 5; ovary superior; stigma obscurely 3-parted. FRUITS dry, loculicidal capsules, 3-loculed, tan, spheric, 5 mm long, 5 mm wide, beaked by a persistent style, glabrous; seeds 3, 1 per locule, plano-convex. –2 spp. in the Southwestern U.S. and Mex. (1 in AZ). (named for Adolphe Brongniart, Rhamnaceae taxonomist, 1801-1876). An essentially leafless plant with photosynthetic stems. Both species are seemingly rare.

Adolphia infesta (Kunth) Meisn. (dangerous). Junco, Texas Adolphia. –Shrub, erect, 0.5-2 m tall. STEMS with somewhat slender, spreading, lateral branches. Thorns up to 6 cm long. LEAVES with decurrent whitish petioles less than 2 mm long; blades narrowly oblanceolate to linear, 3-10 mm long, 1-3 mm wide, villous to glabrous, light green; apices mucronate; bases tapering. INFLORESCENCES of 1-4 flowers; pedicels 4-7 mm long. – Open slopes and washes: extreme se AZ in the vicinity of Guadalupe Canyon, Cochise Co.; 1200-1500 m (4000-5000 ft.); flowering late spring and summer; s NM, s TX, and n Mex.

Adolphia infesta has an extremely narrow distribution in AZ. This description is based upon a single collection (*R.M. Turner & J.B. Turner 89-1*, ARIZ 285077, ASU 172509) from near the AZ-NM state border. Another specimen from NM, (*W.J. Hess 2432*, housed at MOR), has been collected in Guadalupe Canyon on the w side of the Peloncillo Mountains. Additional searches for *A. infesta* should be conducted throughout the area.

Ceanothus L.

Michael Currie and Tina Ayers

Shrubs, armed or unarmed. STEMS spreading to erect, green-brown to gray, pubescent to glabrous. LEAVES evergreen or deciduous, alternate or opposite, entire or dentate, acute to rounded, palmately to pinnately veined. INFLORESCENCES of cymose panicles.

FLOWERS perfect, pedicellate; sepals 5, white to light blue or purple; petals 5, 3-5 mm long, long-clawed, white to light blue or purple. FRUITS 3-chambered capsules, green maturing dark brown to black, globose, roughened; seeds 1 per chamber.

Ceanothus is prized as a honey plant, and is used medicinally and ceremonially by many native American tribes (Moerman 1998). Many species of *Ceanothus* have been cultivated as ornamentals, most commonly known as wild-lilac or mountain-lilac. –62 spp. in N. Amer. (4 in AZ).

1. Leaves opposite, pinnately veined.....*C. vestitus*
- 1' Leaves alternate, palmately 3-veined
 2. Leaves usually longer than 4 cm, glabrous above; inflorescence terminal on long branches, 5-25 cm long.....*C. integerrimus*
 - 2' Leaves 1-4 cm long, pubescent to glabrous above; inflorescence axillary and terminating short branches, usually not more than 4 cm long
 3. Plants with obvious thorns; leaves dark green above, often light green to whitish below*C. fendleri*
 - 3' Plants generally without thorns; leaves bright green above and below.*C. martinii*

Ceanothus fendleri A. Gray (for August Fendler, 1813-1883, NM naturalist). Fendler's Ceanothus. –Shrubs, armed, to 2 m tall. STEMS low, spreading to erect, pubescent, green-brown to gray; thorns 1-5 cm long, sometimes absent in young plants. LEAVES evergreen, alternate; petioles 2-4 mm long; blades oblanceolate to oblong, palmately veined, 0.8-3 cm long, 0.4–1.9 cm wide, palmately 3-veined, with margins entire, dark green above, light green to whitish below, pubescent to glabrous. INFLORESCENCES terminal or axillary, 3-10 flowers per cluster. FLOWERS white to light green. FRUITS 3-5 mm wide. [*C. fendleri* var. *venosus* Trelease]. –Open coniferous forest: Cochise, Coconino, Gila, Graham, Greenlee, Mohave, Navajo, Pima, Santa Cruz, Yavapai cos.; 1600-2800 m (5300-9200 ft); Apr-Sep; SD s to WY, UT, CO, NM and TX ; Chih., Mex.

Plants with broadly elliptic to obovate, pubescent leaf blades from s AZ have been recognized as *C. fendleri* var. *venosus* Trelease.

Ceanothus integerrimus Hook. & Arn. (undivided or entire). Deerbrush. – Shrubs, unarmed, 1 to 3 m tall. STEMS erect, green-brown to gray at maturity. LEAVES alternate, deciduous; petioles 1-2 cm long; blades broadly elliptic to ovate or oblong, 2-8 cm long, 1-5 cm wide, dark green above, light green below, often pubescent; margins entire. INFLORESCENCES of axillary clusters, 3-15 flowers per cluster, usually exceeding the leaves. FLOWERS white to dark blue. FRUITS 3-5 mm wide. 2-3 varieties; WA, OR, CA, AZ, NM; n Mex.

Var. **macrothyrus** (Torrey) G. T. Benson (large-panicled). –Leaves palmately 3-veined from the base. –Chaparral, open coniferous forest: Cochise, Coconino, Graham, Mohave, Pima cos.; 914–2133 m (3500-7000 ft); Mar-May. CA, AZ, NM; n Mex.

Ceanothus martinii M. E. Jones (for Martin). –Shrubs to 1 m tall. STEMS widely spreading, pubescent, green-brown to gray. LEAVES deciduous, alternate; petioles 1-3 mm long; blades oval to elliptic or obovate, 1-2.5 cm long, 0.5-1.9 wide, palmately 3-veined, bright green above and below, mostly glabrous, pubescent along veins; margins entire. INFLORESCENCES of axillary clusters, 3-10 flowers per cluster. FLOWERS white. FRUITS 3-5 mm wide. –Open coniferous forest: Coconino, Mohave cos.; 1600-3100 m (5200-10000 ft); Apr-Sep; WY, UT, CO, NV.

Ceanothus vestitus E. L. Greene (covered, clothed in hairs) Mohave Ceanothus. – Shrubs to 2 m tall. STEMS erect, greenbrown to gray, tomentose to glabrous at maturity. LEAVES evergreen, opposite; petioles 1-3 mm long; blades elliptic to obovate, pinnately veined, 0.6-1.9 cm long, 0.5-1 cm wide, gray-green, pilose to glabrate; margins entire to spinose-dentate. INFLORESCENCES axillary, 3-10 flowers per cluster, usually not exceeding the leaves. FLOWERS often white, sometimes blue to purple. FRUITS 3-5 mm wide. [*C. greggii* A. Gray var. *vestitus* (E. L. Greene) McMinn; *C. greggii* A. Gray var.

orbicularis E.H. Kelso] –Desert mountains, chaparral: Coconino, Cochise, Gila, Graham, La Paz, Mohave, Pima, Mohave, Yavapai cos.; 900-2100m (3000-6900ft); Mar-May. CA, NM, NV, UT, sw TX; n Mex.

McVaugh (1998) presents evidence that *Ceanothus greggii* A. Gray cannot be recognized as it is a later heterotypic synonym of *C. pauciflorus* DeCandolle. Furthermore AZ populations of this complex apparently all belong to *C. vestitus*.

Some authorities list *Ceanothus greggii* var. *greggii* (now correctly referred to as *C. pauciflorus*) and *C. greggii* var. *perplexans* (now correctly named *C. perplexans*) as occurring in AZ. *Ceanothus pauciflorus* occurs broadly in n Mex. from Son., Chih., Coah. and N. L. s to Tamps. and S. L. P. It can be recognized by convex or flat upper leaf surfaces, tomentulose lower leaf surfaces, and thick to revolute margins. Typical *Ceanothus perplexans* is restricted to the Peninsular Ranges of CA s to Baja C., Mex. and can be recognized by broadly obovate to orbicular leaf blades that are usually flat with 5-11 weakly spinulose teeth on the margins. Recognition of either *C. pauciflorus* or *C. perplexans* in AZ or documentation of possible introgression with *C. vestitus* must await a thorough revision of this entire group.

Colubrina Rich.

Laura Smith Davis

Shrubs, ours weakly armed. STEMS several to many, intricately branched, widely spreading; branches alternate or opposite; twigs woolly to glabrous with age. LEAVES evergreen or deciduous, alternate or fascicled, petiolate; blades elliptic to oblong or ovate to obovate, pinnately-veined, entire to serrate, sparsely pubescent. INFLORESCENCES axillary clusters. FLOWERS perfect, pedicellate; hypanthium hemispheric; sepals triangular; petals 5; stamens 5, ovary less than to one third inferior; style 3-lobed. FRUITS capsules, 3-loculed; seeds 3, 1 per locule. –31 spp. worldwide (1 in AZ), especially in warm places. (*Coluber*; an ancient Latin name meaning snake-like).

Colubrina californica I. M. Johnst. California Colubrina. –Shrub, 1.0-2 (-3) m tall; branches widely spreading. STEMS weakly armed or unarmed, alternate; bark reddish brown, gray to whitish, covered with dense, matted, wool-like hairs, becoming less so with age. LEAVES deciduous, alternate or fascicled; stipules triangular; petiole 0.5-4 mm long, woolly; blades 4-17 (-35) mm long, 4-11 (-20) mm wide, dull gray-green to yellowish-green, pubescent, entire or occasionally with 1 or 2 teeth. INFLORESCENCES of (1-) 2-12 flowers, dense; pedicels 1-1.5 mm long. FLOWERS inconspicuous; hypanthium 2.0-2.5 mm wide, woolly; sepals 1 mm long, light green; petals ca. 1 mm long, yellowish, green. FRUITS persistent, woody, three-lobed, dark purple to black capsules, 6-9 mm long, 7-8.5 mm broad, with persistent sepals; pedicels becoming woody and stouter in fruit. [*Colubrina texensis* (Torr. & A. Gray) A. Gray var. *californica* (I. M. Johnst.) L. D. Benson]. –Along washes and dry slopes: La Paz, Maricopa, Pinal and Yuma cos.; 500-1000 m (1500 –3000 ft); spring and summer; se CA; Baja C, Mex.

Benson and Darrow noted that *Colubrina californica* is a relict of interest as it occurs in widely separated areas. (Benson and Darrow 1954).

Condalia Cav. Snakewood

Kyle Christie

Thorny shrubs or small trees. STEMS several to many, ascending; bark slightly furrowed to striated; branches alternate, the primary lateral branches thorn-tipped; twigs hispidulous; bud scales absent. LEAVES deciduous, alternate or fascicled in clusters of 2-8 on lateral short shoots, sessile to subsessile; blades spatulate to obovate, pinnately veined, with 2-3 pairs of lateral veins, entire, hispidulous. INFLORESCENCE axillary, cymose of 2-8 flowers, borne on lateral short shoots. FLOWERS perfect, sessile to pedicellate, inconspicuous; hypanthium hemispheric, 1-1.5 mm wide, hispidulous to glabrous; sepals 5, greenish outside, yellowish within, deltate, 1 mm long; apetalous, stamens 5; ovary superior; style entire. FRUIT a fleshy drupe, green, maturing to purple-black, globose or slightly elongate, glabrous to slightly pubescent; stones 1, smooth, distinctly beaked by a persistent style base, black to tan; seeds 1(-2). –18 species in the Americas. (named for the Spanish physician Antonio Condal, 1745-1804).

There has been debate about which *Condalia* species occur in AZ. Both regional floras and various herbarium collections have cited *C. ericoides*, *C. correllii*, *C. mexicana*, *C. globosa* var. *pubescens*, *C. spathulata*, and *C. warnockii* var. *kearneyana* as occurring in AZ.

Condalia can be broadly segregated into three groups based on leaf shape: a linear-leaved group, a broad-leaved group, and a spatulate-leaved group. *Condalia ericoides* (*Microrhamnus ericoides*) is quite unusual and can be identified by its light green, linear, revolute leaves; its distinctly football-shaped fruit; and its petal-bearing flowers. *Condalia ericoides* is primarily a Chihuahuan species that occurs in e NM, TX, and n Mex. The accounts of *C. ericoides* in AZ have arisen from misidentification and this species has not been vouchered within our range.

The broad-leaved *Condalia correllii* and *C. mexicana* are also cited as occurring in AZ. M. C. Johnston (1962) separates these species by nuances of leaf color and venation, a slight difference in fruit length, as well as by overlapping characters of leaf size. These distinct taxa are closely related; however only *C. correllii* occurs in AZ. Some floras have mistakenly cited *C. mexicana* as occurring in AZ or at least mistakenly used the name *C. mexicana* for AZ material, however this taxon does not occur in the state. *Condalia correllii* occurs in AZ in s Cochise and Santa Cruz cos., and in Pima Co. in the Baboquivari Mountains and Chimena Canyon of the Rincon Mountains.

Previous floristic treatments of the spatulate-leaved group of *Condalia* species have been problematic. M. C. Johnston separated *C. globosa*, *C. warnockii*, and *C. spathulata* based on characters of pedicel length, stone length to width ratio, internode length, leaf pubescence, and abaxial leaf venation. AZ specimens have been variously identified as all three of these species. *Condalia spathulata* has completely glabrous leaves and does not occur in AZ.

Condalia globosa and *C. warnockii* share various overlapping morphological characters, and these very characters have often been used to separate the two species. Previous difficulty in identification may have also stemmed from the quality of herbarium material. *Condalia* is usually densely and diffusely branched and almost impenetrable; however it is extremely important to collect mature branches of *Condalia*. Immature material often displays unusual traits, especially with respect to leaf venation. Traits of the abaxial leaf venation have been used to differentiate between these two species, however

venation is extremely variable as a result of environment and age. Characters of the abaxial leaf veins should not be used to differentiate between *C. globosa* and *C. warnockii*.

Condalia globosa and *C. warnockii* are very similar species and no single character readily separates the two. It is best to use a suite of character traits to identify these species. *C. globosa* has deciduous sepals, medium to long pedicels, usually cuneate leaf bases, often obtuse leaf apices, more or less smooth leaf surfaces (which are often yellow to orange beneath), a globose stone, and a bitter drupe. *C. warnockii* has persistent sepals, short to medium pedicels, attenuate leaf bases, usually acute leaf apices, distinctly wrinkled to slightly wrinkled leaf surfaces (which are not yellow to orange beneath), a somewhat elongate stone, and a less bitter drupe. The two species can overlap with respect to any of these characters, however they occur almost allopatrically. *C. globosa* generally inhabits the w portion of s AZ, whereas *C. warnockii* generally inhabits the e portion of s AZ. Both species occur in the Ajo area and in the Batomote Mountains east of Childs.

1. Flowers and fruits sessile or subsessile; leaves usually more than 4 mm wide, the abaxial leaf veins inconspicuous; plants somewhat openly branched; secondary branches distinctly thorned*C. correllii*
- 1' Flowers and fruits pedicellate; leaves usually less than 4 mm wide, the abaxial leaf veins conspicuous; plants densely and diffusely branched; secondary branches usually suppressed.
 2. Sepals predominantly deciduous in fruit; stone more or less globose; pedicels usually 3-4 mm long; leaf bases attenuate to cuneate; apices usually obtuse to mucronate; leaf surface smooth; drupe quite bitter*C. globosa*
 - 2' Sepals predominantly persistent in fruit; stone somewhat elongate; pedicels usually 1-2.5 mm long; leaf bases acute to sometimes attenuate; apices acute to occasionally obtuse; leaf surface slightly wrinkled; drupe not bitter or mildly bitter*C. warnockii*

Condalia correllii M.C. Johnst. (honors D.S. Correll, Texas botanist, 1908-1983). Correll's Snakewood. –Openly branched, 1-2(-2.5) m tall, 1-1.5 m wide. STEMS several, bark light gray to whitish; primary lateral branches spreading to divergent; secondary lateral branches conspicuous as thorns. LEAVES obovate to oblanceolate, 8-16 mm long, 4-6 mm wide, acute to mucronate, bright green, slightly but distinctly wrinkled above, sparsely hispidulous, veins thin and inconspicuous; base acute. INFLORESCENCE borne on suppressed secondary shoots, usually 1-2 flowers reaching maturity per fascicle. FLOWERS sessile, or with pedicels less than 0.5 mm; sepals persistent. FRUIT not distinctly bitter, with the stone distinctly longer than wide, 5-7 mm long, 3-5 mm wide, brown to tan. –Dry slopes, drainages, canyons: s Cochise, s Santa Cruz, and Pima cos. (Baboquivari Mountains and Chimena Canyon); 1200-1500 m (4000-5000 ft); flowering Jul-Sep; AZ, NM, n Mex.

Condalia globosa I. M. Johnst. (globose). Bitter *Condalia*. –Diffusely branched, 1-4 m tall, 1-4 m wide. STEMS many; bark gray-brown; primary lateral branches spreading to ascending; secondary lateral branches suppressed. LEAVES spatulate or young leaves occasionally elliptic, (3-)5-13(-17) mm long, (1-)2-4(-5) mm wide, obtuse to mucronate or occasionally acute, with base cuneate to distinctly attenuate, dull green, smooth above, occasionally yellowish or orangish beneath, sparsely to densely hispidulous, veins thick and

prominent, becoming thinner and flattened with age. INFLORESCENCE borne on suppressed secondary shoots, usually several flowers reaching maturity per fascicle. FLOWERS with pedicels (2.5-)3-4.5(-5.5) mm; sepals predominantly deciduous. FRUIT bitter; with the stone globose or occasionally slightly longer than wide, 2-4.5 mm long, 2-4 mm wide, black to brown. 2 subspp; AZ, NM, CA, Mex.

Var. **pubescens** I.M. Johnst. (hairy). –STEMS hispidulous when young. LEAVES densely to sparsely hispidulous. –Dry desert washes, drainages, canyons, occasionally open slopes: Pima, Maricopa, Yuma, La Paz, cos.; 500-1500 m (1600-5000 ft); flowering throughout the year; AZ, CA, n Mex.

Condalia warnockii M.C. Johnst. (honors B.H. Warnock, Texas botanist, 1911-1998). Warnock's Snakewood. –Diffusely branched, 1-3.5 m tall, 1-3.5 m wide. STEMS many, bark gray-brown; primary lateral branches spreading to ascending; secondary lateral branches suppressed. LEAVES oblanceolate to elliptic to obovate or occasionally spatulate, 3-8(-9) mm long, 1-2.5(-3.5) mm wide, acute to occasionally obtuse, with base acute to somewhat attenuate, dull green to gray, slightly but distinctly wrinkled above, dull green beneath, sparsely to densely hispidulous; veins thick, somewhat raised and prominent, occupying much of the underside of young leaves. INFLORESCENCE borne on suppressed secondary shoots, usually 1-2 flowers reaching maturity per fascicle. FLOWERS with pedicels (0.5-)1-2.5(-3) mm; sepals predominantly persistent. FRUIT mildly or not bitter, with the stone slightly elongate, 2-4.5 mm long, 2-4 mm wide, black to light brown. 2 subspp; AZ, NM, TX, Mex.

Var. **kearneyana** M.C. Johnst. (honors T. H. Kearney, AZ botanist, 1874-1956). –LEAVES 1-3.5 mm wide. –Dry desert washes, drainages, canyons, occasionally open slopes: Greenlee, Graham, Cochise, Maricopa, Pinal, Pima cos.; 500-1500 m (1600-5000 ft); flowering throughout the year; AZ; Mex.

Frangula Mill.

Mar-Elise Hill

Shrubs or small trees, unarmed. STEMS several to many, erect to ascending, smooth; branches mostly alternate; twigs canescent; bud scales absent. LEAVES evergreen or deciduous, alternate, petiolate; blades elliptic to oblong or obovate, pinnately-veined, serrate to entire, pubescent to tomentose. INFLORESCENCES axillary cymes of 2-35 flowers. FLOWERS perfect, pedicellate; hypanthium hemispheric, 2 mm in diameter, loosely villous; sepals 5, yellow, triangular; petals 5, ca. 1 mm long; stamens 5; stigma 2-3-lobed. FRUITS drupes, purplish-black when ripe, spherical, glabrous; stones 2-3, smooth. –8 spp. in N. Amer. (2 in AZ). (Fragile; medieval name refers to the brittle twigs of alder buckthorn.) *Frangula* was formerly treated as a subgenus or section of the genus *Rhamnus*.

1. Leaves evergreen, usually white-tomentose beneath, elliptic; stigma 2-lobed; fruits 2-stoned *F. californica*
- 1' Leaves deciduous, green beneath, elliptic to ovate or obovate; stigma 3-lobed; fruit usually 3-stoned. *F. betulifolia*

Frangula betulifolia (Greene) Grubov. (birch-leaved). Birchleaf Buckthorn. –Shrubs to 3 m tall. STEMS brown to gray-brown. LEAVES thin or thick, deciduous; petioles (0.2-) 0.5-1.6 cm long; blades elliptic or oblong to obovate, 4.5-14.1 cm long, 1.9-9.3 cm wide,

green and pubescent (hirtellous when young) on both surfaces; margins serrate to subcrenate. FLOWERS 2-20(-38) per inflorescence; sepals 1-2 mm long; petals light yellow becoming brownish with age; stigma 3-lobed. FRUITS 0.5-1 cm wide; stones (2-)3(-4). [*Rhamnus betulifolia* Greene]. –2 subspp; NV to UT, s to NM, TX, and Mex.

1. Leaves obovate; plants of Colorado River Canyon and tributaries (Coconino, Mohave, and Navajo cos.).....subsp. **obovata**
- 1' Leaves oblong to elliptic; plants of streams and creeks in Apache, Cochise, Gila, Graham, Greenlee, Navajo, Pima cos. subsp. **betulifolia**

Subsp. **betulifolia** –Leaves thin, oblong to elliptic, usually more than 1¾ times as long as wide; veins thin, not prominent. –Stream and creek banks: Apache, Cochise, Gila, Graham, Greenlee, Navajo, Pima cos.; 1347-2341 m (4420-8800 ft); Apr-Sep; NV, UT, s to TX.

Subsp. **obovata** (Kearney & Peebles) Kartesz & Gandhi. –Leaves thick, obovate, usually less than 1½ times as long as wide; veins thick, prominent. –Hanging gardens, canyons, stream banks: Coconino, Mohave, Navajo cos.; 884-1433 m (2900-4700 ft); Apr; NV, NM.

Frangula californica A. Gray. California Coffeeberry. –Shrubs to 5.5 m tall. STEMS gray to red. LEAVES thick, evergreen; petioles 0.5-1.7 cm long; blades elliptic to obovate, 2.8-8.5 cm long, 1.4-3.8 (-4.5) cm wide, green, glabrous on the upper surface and glabrous to white-tomentose on the lower surface. FLOWERS 4-27 (-34) per inflorescence; sepals 2 mm long; petals brownish; stigma 2-lobed. FRUITS 0.6-1.2 cm wide; seeds 2. [*Rhamnus californica* Eschsch.]. –6 subspp. (1 in AZ); OR, CA & NV, west to NM.

Subsp. **ursina** (Greene) Kartesz & Gandhi. (type from Bear Mtn., NM). –LEAVES green and nearly glabrous on upper surface, paler green and white-tomentose beneath; margins slightly revolute, serrate to entire. [*R. ursina* Greene, *R. californica* Eschsch. subsp. *ursina* (Greene) C.B. Wolf, *R. tomentella* Benth. subsp. *ursinus* (Greene) Sawyer]. –Chaparral, coniferous woodlands, riparian: Apache, Coconino, Cochise, Gila, Graham, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai cos.; 762-2545 m (2500-8350 ft); May-Sep; NV, CA, NM.

Frangula ×blumeri (Greene) Kartesz & Gandhi (pro sp.) [= *F. betulifolia* × *californica*] was based upon type material collected from the Chiricahua Mountains (*Blumer 1290*, in part). It was thought to be a hybrid between this variety and *F. betulifolia*. All AZ specimens examined for this treatment from the Chiricahua Mountains fit well into *F. californica* subsp. *ursina* and do not appear to be hybrids.

Rhamnus L. Buckthorn

Suzanne Neal

Shrubs to small trees, unarmed. STEMS several to many, ascending to erect, rigid, gray to brown, pubescent to glabrous; bud scales present, 3 mm long. LEAVES evergreen or deciduous; alternate to nearly opposite, petiolate; blades lanceolate, oblong or ovate to round, serrulate, toothed, spinescent or entire, glabrous to pubescent, pinnately veined. INFLORESCENCES axillary, cymose, of 1-10 flowers. FLOWERS imperfect, pedicellate; hypanthium hemispheric; sepals 4, greenish-yellow, triangular; petals 0 or 4; stamens 4; style branched. FRUITS drupes, red or black at maturity, globose; stones 2, tan, rounded; seeds

grooved. –125 spp. (3 in AZ); cosmopolitan. (Greek: *Rhamnus*, ‘various prickly shrubs’). Some members are valued for medicine or dyes. The fruit is eaten by several species of birds.

Rhamnus cathartica L. (Common Buckthorn) is a commonly cultivated species often armed with blunt thorns. It is readily separated from the native species by its opposite leaves, 5-merous flowers and a black drupe with four stones. This species may persist from cultivated plants. *Rhamnus cathartica* may also naturalize, especially in riparian areas, although there are no herbarium specimens to document this in AZ.

1. Leaves deciduous; blades oblong to lanceolate; petals present; drupes black at maturity ...
..... *R. serrata*
- 1' Leaves evergreen; blades ovate to round; petals absent; drupes red at maturity.
 2. Leaf blade < 20 mm long, flat; margins toothed to entire; Pima co. *R. crocea*
 - 2' Leaf blade mostly > 20 mm long, undulate; margins spinescent; widespread
..... *R. ilicifolia*

Rhamnus crocea Nutt. (saffron-colored). Redberry Buckthorn. –Shrubs 1.5-4 m (ours less than 2 m) tall. STEMS gray-green, glabrous, ascending, sometimes branching from base. LEAVES evergreen, alternate, with petioles 2-3 mm long; blades obovate to ovate, 7-20 mm long, 8-15 mm wide, toothed or entire, glabrous, flat; apex obtuse to emarginate. FLOWERS: petals absent, with pedicels 2-3 mm long. FRUITS red at maturity, 3-5 mm long. –Dry washes and canyons: Pima co.; 640-1,100 m (2,100-3600 ft); Mar-Apr; CA.

Rhamnus ilicifolia Kellogg (leaves resembling those of holly, *Ilex*). Hollyleaf Redberry. –Shrubs < 4 m tall. STEMS ascending, gray-brown, glabrous to densely hairy. LEAVES evergreen, alternate; petioles 2-6 mm long; blades ovate to round, 2-4 cm long, 1.2 –3 (-4) cm wide, spinescent to spinose-dentate, glabrous or pubescent, concave below, undulate; apex obtuse to rounded. INFLORESCENCES of 1-10 flowers. FLOWERS with pedicels 2-4 mm long; petals absent. FRUITS 4-6 mm, red at maturity. [*Rhamnus crocea* Nutt. ssp. *ilicifolia* (Kellogg) C. B. Wolf; *Rhamnus crocea* Nutt. var. *ilicifolia* (Kellogg) Greene]. –Dry slopes, mountain canyons and open hillsides: Coconino, Gila, Graham, Maricopa, Mohave, Pima, Pinal, Yavapai cos.; 646-2000 m (2,120-6,300 ft); Mar-Jun; CA, NV, OR; Mex.

Rhamnus serrata Humb. & Bonpl. ex J. A. Schultes (serrate leaves). Saw-leaf Buckthorn. –Shrubs to small trees, 2-5 m tall. STEMS erect, gray-brown, slender, young stems pubescent becoming glabrous, often smooth and lustrous. LEAVES deciduous, alternate to nearly opposite; petioles 3-4 mm long; blades oblong, lanceolate or elliptic; 2-5 (5.8) cm long, 1.0-1.6 cm wide, serrulate to crenulate, yellowish-brown and pubescent below; apex obtuse. INFLORESCENCES of 1-5 flowers. FLOWERS with pedicels 2-5 mm long; petals 4, greenish-yellow, ca. 2 mm long. FRUITS 4-6 mm long, black at maturity. [*R. fasciculata* Greene; *R. smithii* Greene subsp. *fasciculata* (Greene) C.B. Wolf]. –Mountain canyons, open hillsides and stream banks: Apache, Cochise, Coconino cos.; 1,520-2,300 m (5,000-7,500 ft); Apr-Jun; CO, TX, NM; Mex.

Sageretia Brongn.

Laura Smith Davis

Shrubs, ours weakly armed. STEMS several to many, arching, lightly furrowed; branches opposite to subopposite, pubescent when young; bud scales absent. LEAVES deciduous, opposite to subopposite, petiolate; blades elliptic, oblong or obovate, pinnately-veined, serrate to entire, tomentulose, becoming glabrous. INFLORESCENCES of axillary clusters and terminal panicles. FLOWERS perfect, sessile to nearly sessile, hypanthium hemispheric, shallow; sepals 5, triangular; petals 5; stamens 5; style 3-lobed; ovary superior. FRUITS somewhat fleshy black drupes, spherical to obovoid; stones 3. – More than 30 spp. worldwide (1 in AZ). (For French botanist, Augustin Sageret, 1763-1851).

The fruits of many species are edible. In China the leaves of *Sageretia theezans* (L.) Brongn. are used as a tea substitute.

Sageretia wrightii S. Wats. (in honor of Botanist and surveyor Charles Wright 1811-1885). Wright's Mock Buckthorn. –Shrub, slender, spreading, weakly armed, 1-4 m tall. STEMS brown to gray-brown, branching becoming very dense with age, pubescent when young, glabrescent with age. LEAVES stipules black to brown; petioles pubescent, 1-2 mm long; blade 8-15(-30) mm long, 4-11(-18) mm wide, thin, shiny green, villous, pinnately-veined, entire to serrate, woolly when young, soon glabrous; midvein prominent beneath. FLOWERS minute; hypanthium 1.2-1.8 mm diameter; sepals yellowish green; petals creamy white to yellow, ca. 0.5 mm long. FRUITS flattened, star-shaped, the floral cup persisting on proximal end of fruit. – Dry rocky canyons and hillsides, desert grassland and sw oak woodlands: Cochise, Gila, Graham, Greenlee, Maricopa, Navajo, Pima, Pinal, Santa Cruz cos.; 900-1525 m (3000 – 5000 ft); Mar -Sep; NM, Trans-Pecos region TX; Son. to Jal., Mex.

Some branches have opposite to subopposite slender thorns, whereas others may be more leafy and less thorny. Leaf margins vary within an individual from entire to serrate. Leaves are larger and more numerous on plants in riparian areas and dry washes. In some instances *Sageretia wrightii* has been confused with *Colubrina californica*, however, the leaves of *Sageretia wrightii* are shiny green and thin, whereas the leaves of *Colubrina californica* are thicker and dull gray-green to yellowish green. The fruits of *C. californica* are woody capsules whereas the fruits of *S. wrightii* are fleshy drupes.

Ziziphus P. Mill. Jujube, Gray Thorn

Laura Smith Davis

Armed shrubs (in ours). STEMS several to many, becoming dense with age, divaricate, rigid; bark smooth to lightly furrowed to striate; twigs canescent to glabrate to glaucous; bud scales absent. LEAVES deciduous or evergreen, alternate or fascicled, petiolate; blades elliptic to linear-oblong to ovate, pinnately-veined, entire to crenate to serrate, glabrate to canescent; stipules brown. INFLORESCENCES of axillary clusters. FLOWERS perfect, pedicellate; hypanthium hemispheric; sepals, triangular; petals 5; stamens 5; style 2-lobed. FRUITS 1-seeded drupes. – 150 spp. worldwide (1 in AZ), in warmer parts of the Old and New world. (from zizufun, a Persian word, from which the an ancient Greek name is derived).

The fruits of *Ziziphus jujuba* are edible and used either fresh, dried or preserved in cooking and candy making. *Ziziphus jujuba* was collected in the Tonto National Forest in

Gila Co. in 1992. Natural recruitment of the escaped cultivar occurred near a campground. The tree, *Z. jujuba*, may be distinguished from *Z. obtusifolia* by its larger glossy serrate leaves, which are usually 2-5 cm long, and its paired recurved stipular spines.

Ziziphus obtusifolia (Hook. ex Torr. & A. Gray) A. Gray (obtuse-leaved). Lotebush, Gumdrop Bush, Gray Thorn. –Shrubs to 4 m tall, armed. STEMS green to gray, or brown, canescent to glaucous; branchlets thorn-tipped, occasionally with axillary recurved thorns, the thorn tips mostly glabrous and brown. LEAVES thin or thick, deciduous; stipules triangular; petioles 0.5- 5 mm long; blades linear to narrowly elliptic to oblong or ovate, 5-20 (-27) mm long, 2-15 mm wide, green to pale green, glabrous to canescent; margins entire to serrate or crenate. FLOWERS inconspicuous, (1-) 2-15 (sometimes more) per inflorescence; hypanthium 1.0-2 mm long, glabrous to canescent; sepals yellowish green, glabrous to canescent; petals ca. 1 mm, white to light green; stigma 2-lobed. FRUITS blue to purple to black with white waxy bloom, 5-8 mm wide; pedicels becoming thicker in fruit, the floral cup persistent. –2 vars., both in AZ, CA to OK; s to Mex.

The leaf and branch morphology of *Z. obtusifolia* is variable. Solitary serrate to crenate ovate leaves with marginal glands on thorn-tipped canescent branchlets are representative of the new growth; older stems have leaves that are entire, oblong, elliptical or linear and are arranged in short shoots. The short shoots may become woody with age. Elongation of the short shoot into new thorn-tipped branches may occur, being evident by a leaf scar. The leaf size is dependent upon climate, habitat and season.

1. Stems canescent to glabrate; leaves thick, mostly canescent; hypanthium canescent, found throughout AZ var. *canescens*
- 1' Stems mostly glabrous; leaves thin, mostly glabrous; hypanthium glabrous, Cochise Co. var. *obtusifolia*

Var. **canescens** (A.Gray) M.C. Johnst. –Shrubs to 4 m tall. Leaves thick, mostly canescent. FLOWERS: hypanthium canescent. FRUITS 5-8 mm wide. [*Condalia lycioides* (A. Gray) Weberb. var. *canescens* (A. Gray) Trel.] – Mesas, canyon slopes and desert grasslands; Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai, Yuma cos.; 330-1500 meters (1000-5000ft); May – Sep; NM,CA, NV, UT; Sonoran Desert, Mex.

A decoction made from the roots of *Z. obtusifolia* var. *canescens* was used as a treatment for sore eyes by the Pima Indians and the roots have been used in place of soap in parts of Mex. and the Grand Canyon region of n AZ.

Var. **obtusifolia** (Hook. ex Torr. & A.Gray) A. Gray . –Shrubs to 3m tall. LEAVES thin, mostly glabrous. FLOWER: hypanthium glabrous. FRUITS 7-8 mm wide. [*Condalia lycioides* (Gray) Weberb.] –Occurring on gypsum soils in Cochise co.; 1150– 1250 meters (3800-4100 ft); May-Sep; NM, TX, OK; Chihuahuan Desert, Mex.

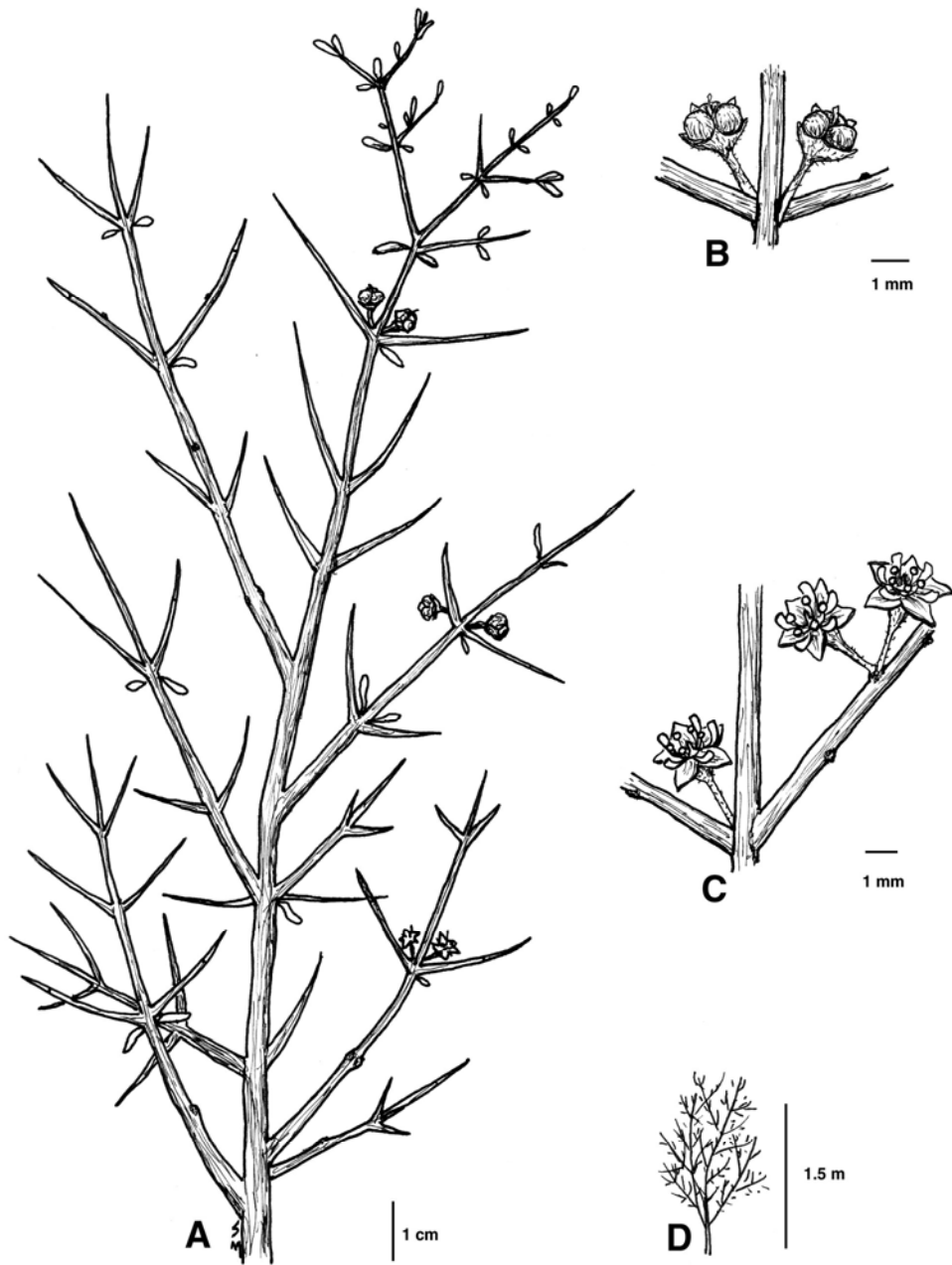
ACKNOWLEDGEMENTS

We thank the staff of ARIZ, ASC, ASU and MNA for making representative specimens available for study. Maps were modified using the specimen data available on SEINet (<http://seinet.asu.edu/>). Sheila Murray drew the original illustrations and H. David

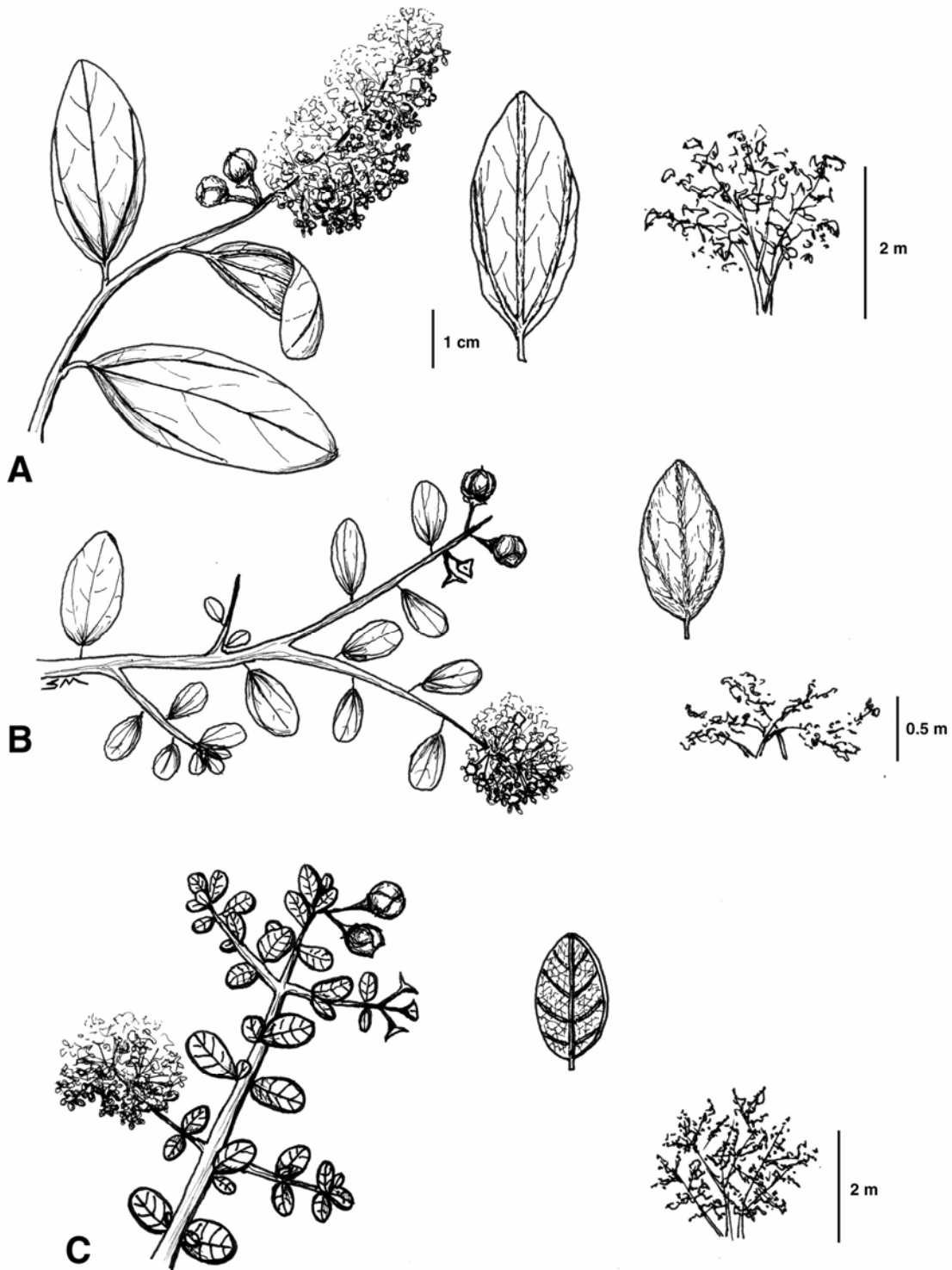
Hammond reviewed the treatment. Special thanks to Dieter Wilken for bringing Rogers McVaugh's discussion of *Ceanothus* to our attention.

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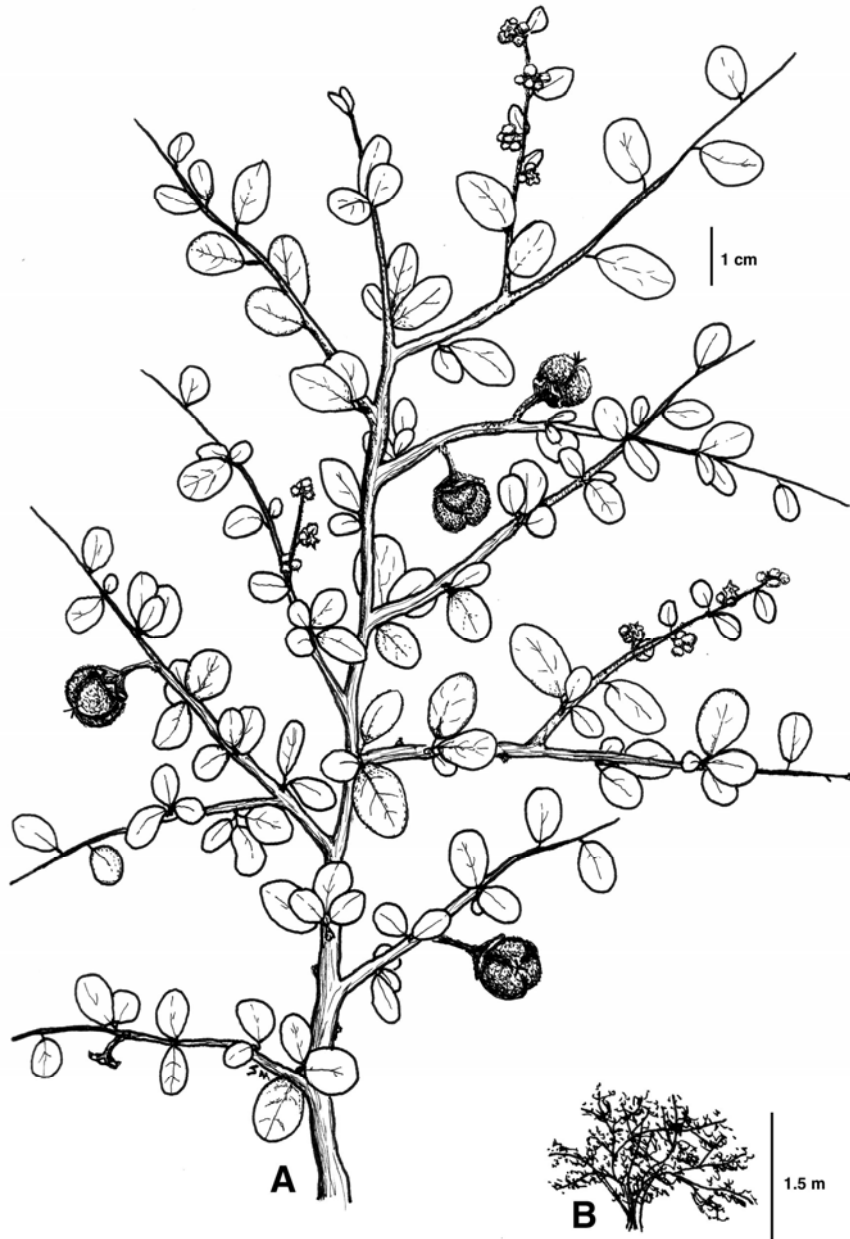
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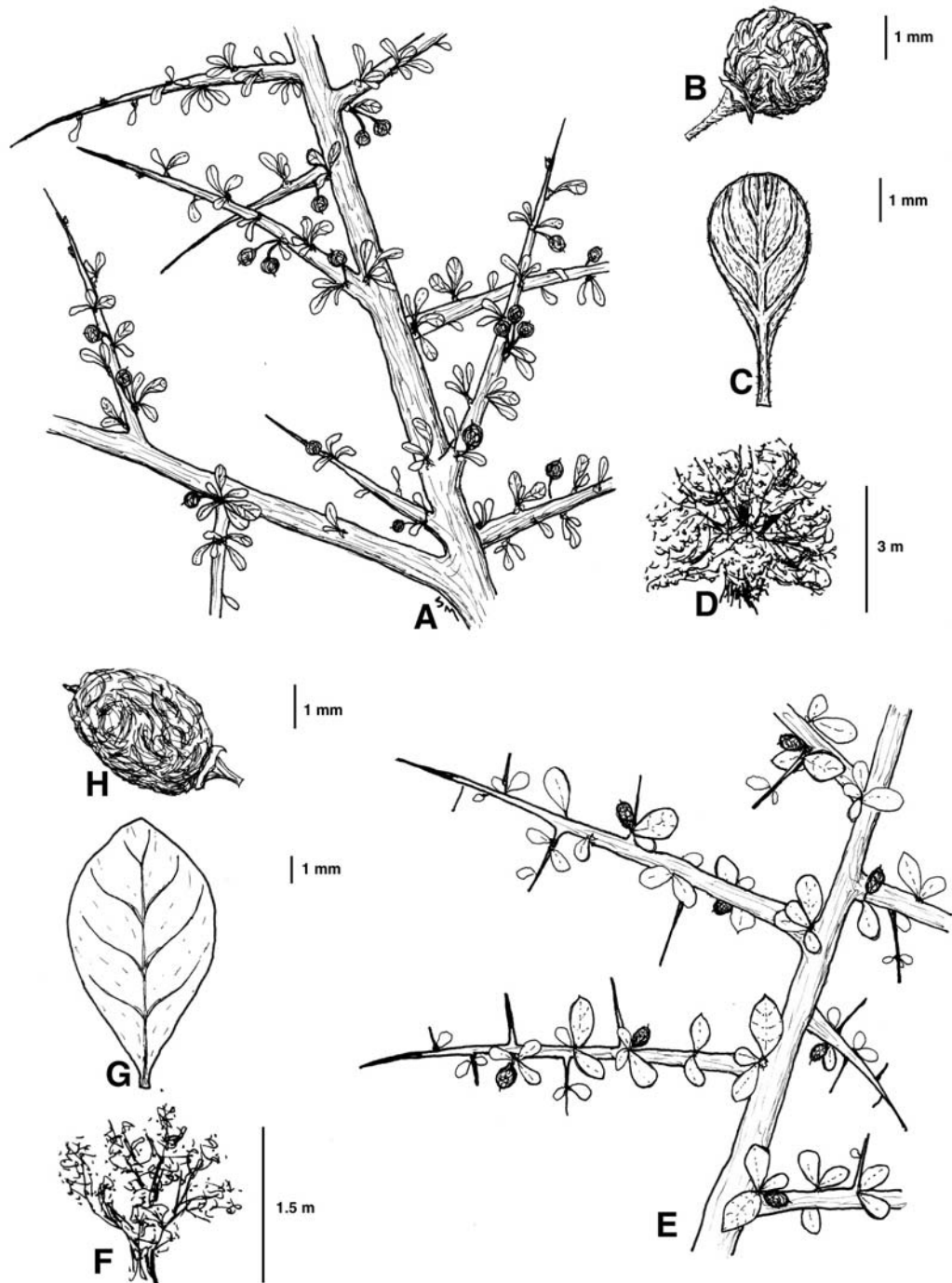
Rhamnaceae Fig 1. *Adolphia infesta*. A, branch; B, fruit close-up; C, flower close-up; D, habit.



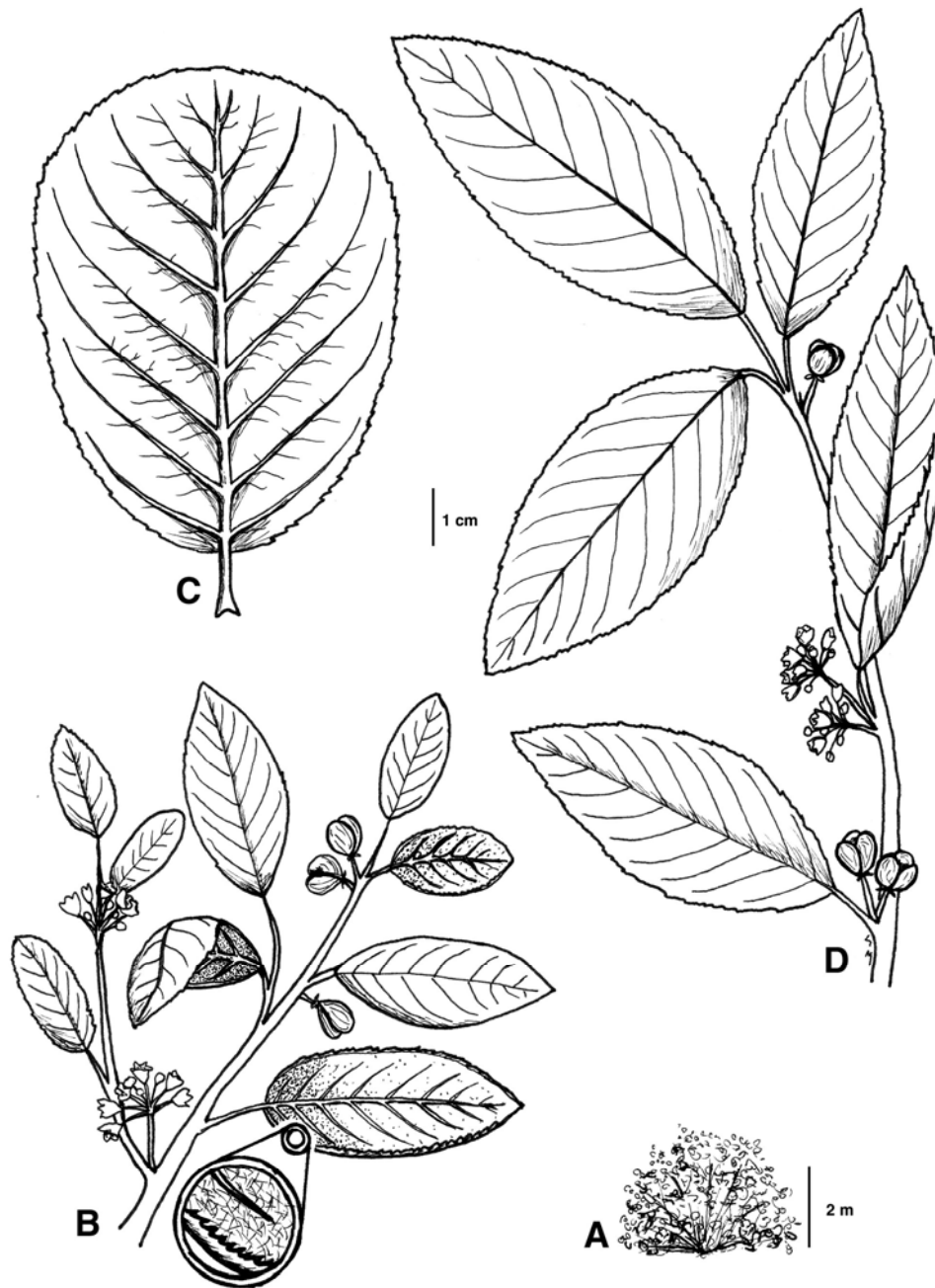
Rhamnaceae Fig 2. *Ceanothus*. A, *C. integerrimus* branch, leaf, habit; B, *C. fendleri* branch, leaf, habit; C, *C. vestitus* branch, leaf, habit.



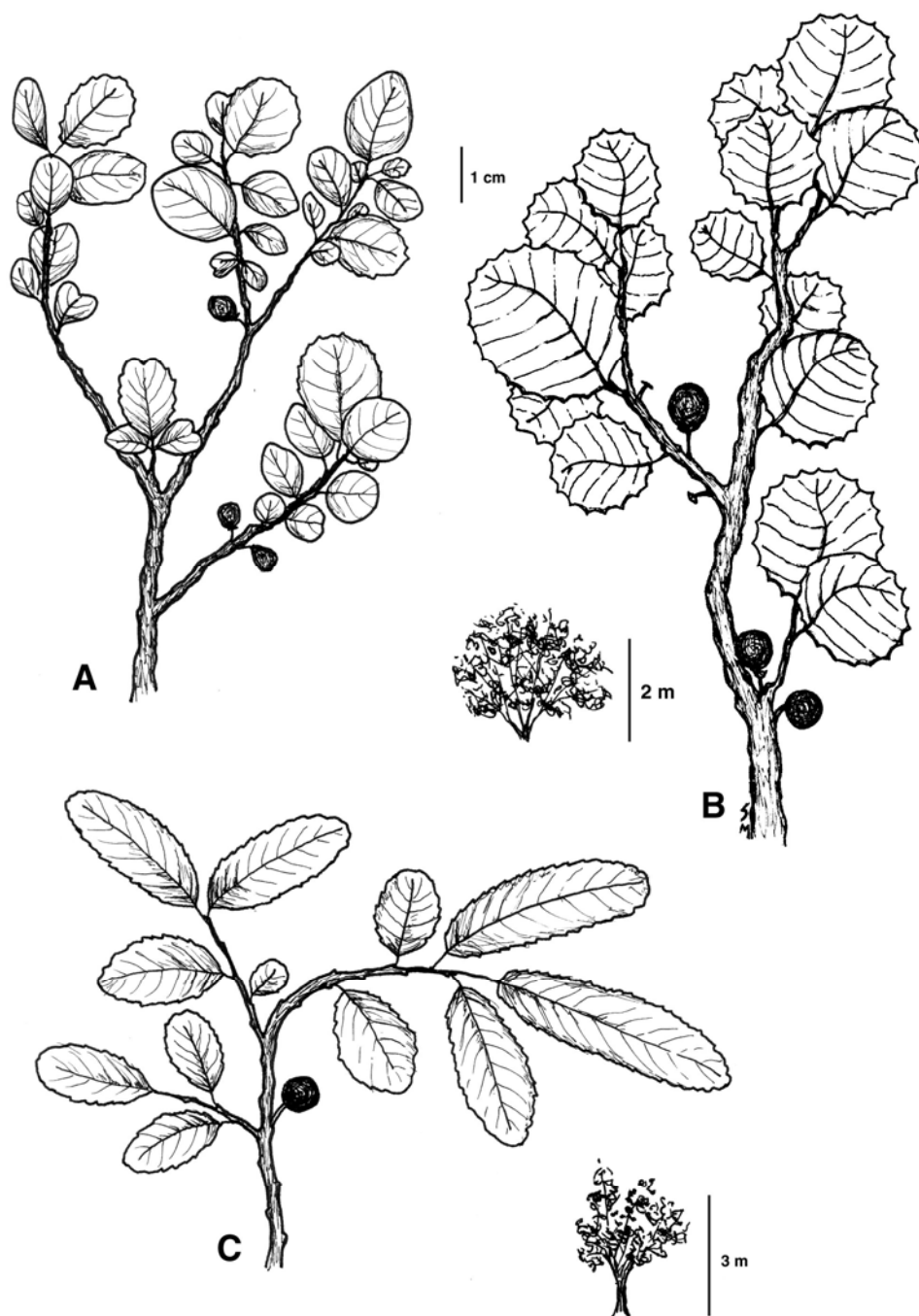
Rhamnaceae Fig 3. *Colubrina*. A, *C. californica* branch; B, typical habit.



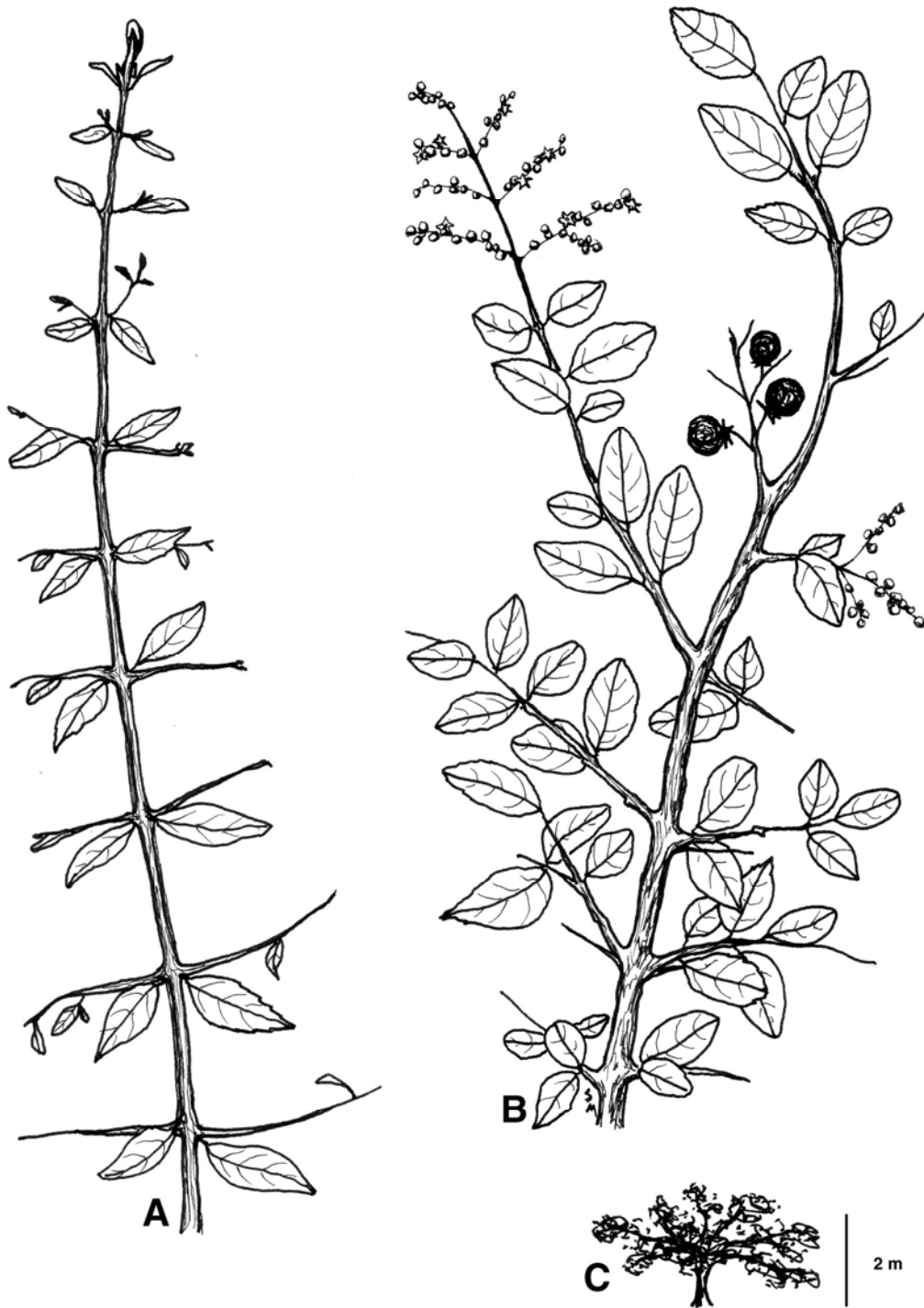
Rhamnaceae Fig 4. *Condalia*. A-D, *C. warnockii* var. *kearneyana*. A, branch; B, fruit close-up; C, leaf close-up; D, habit. E-H, *C. correllii*. E, branch; F, habit; G, leaf close-up; H, fruit close-up.



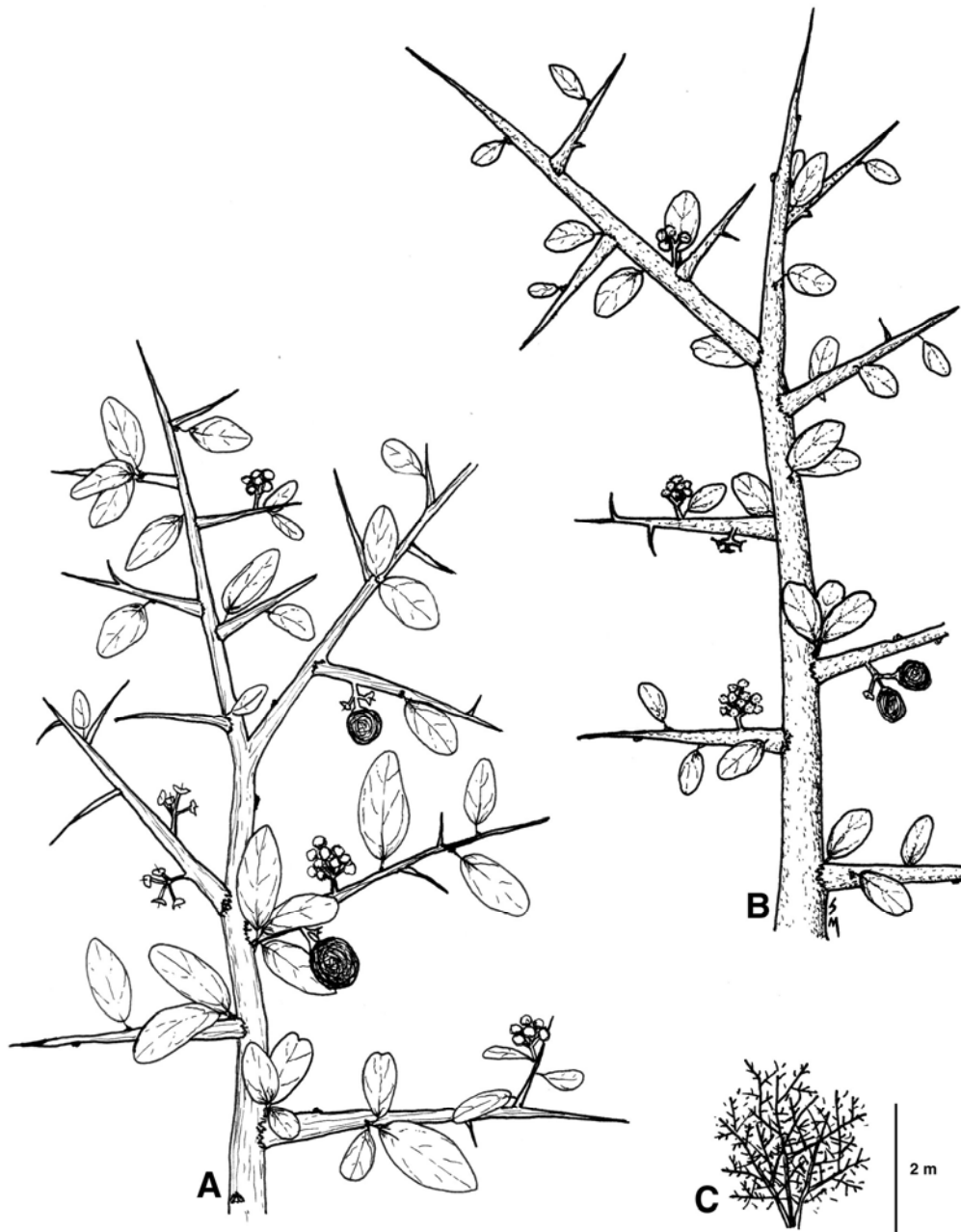
Rhamnaceae Fig 5. *Frangula*. A, typical habit; B, *F. californica* subsp. *ursina* branch (inset detail of lower leaf surface); C, *F. betulifolia* subsp. *obovata* leaf; D, *F. betulifolia* subsp. *betulifolia* branch.



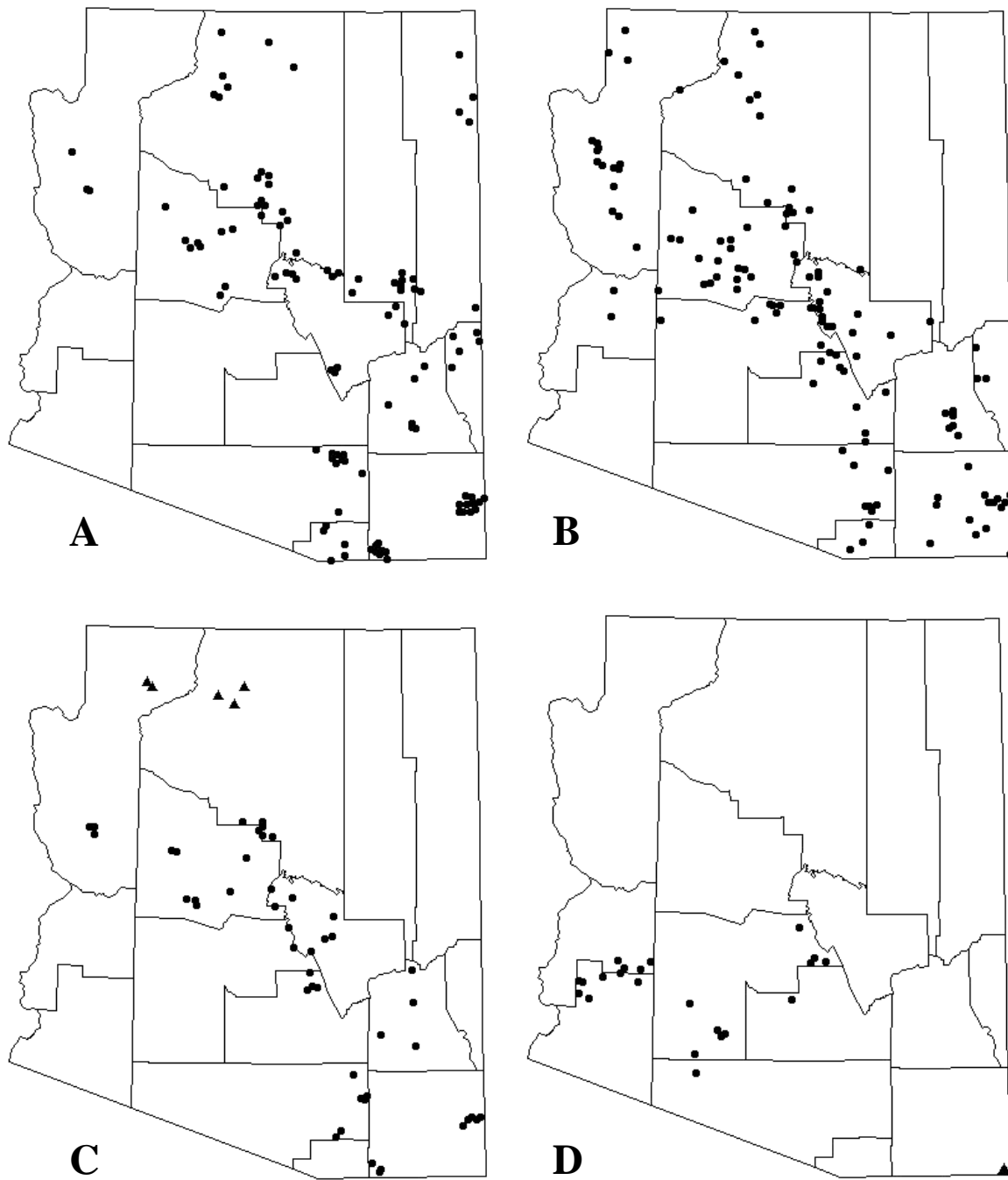
Rhamnaceae Fig 6. *Rhamnus*. A, *R. crocea* branch; B, *R. ilicifolia* branch and typical habit; C, *R. serrata* branch and typical habit.



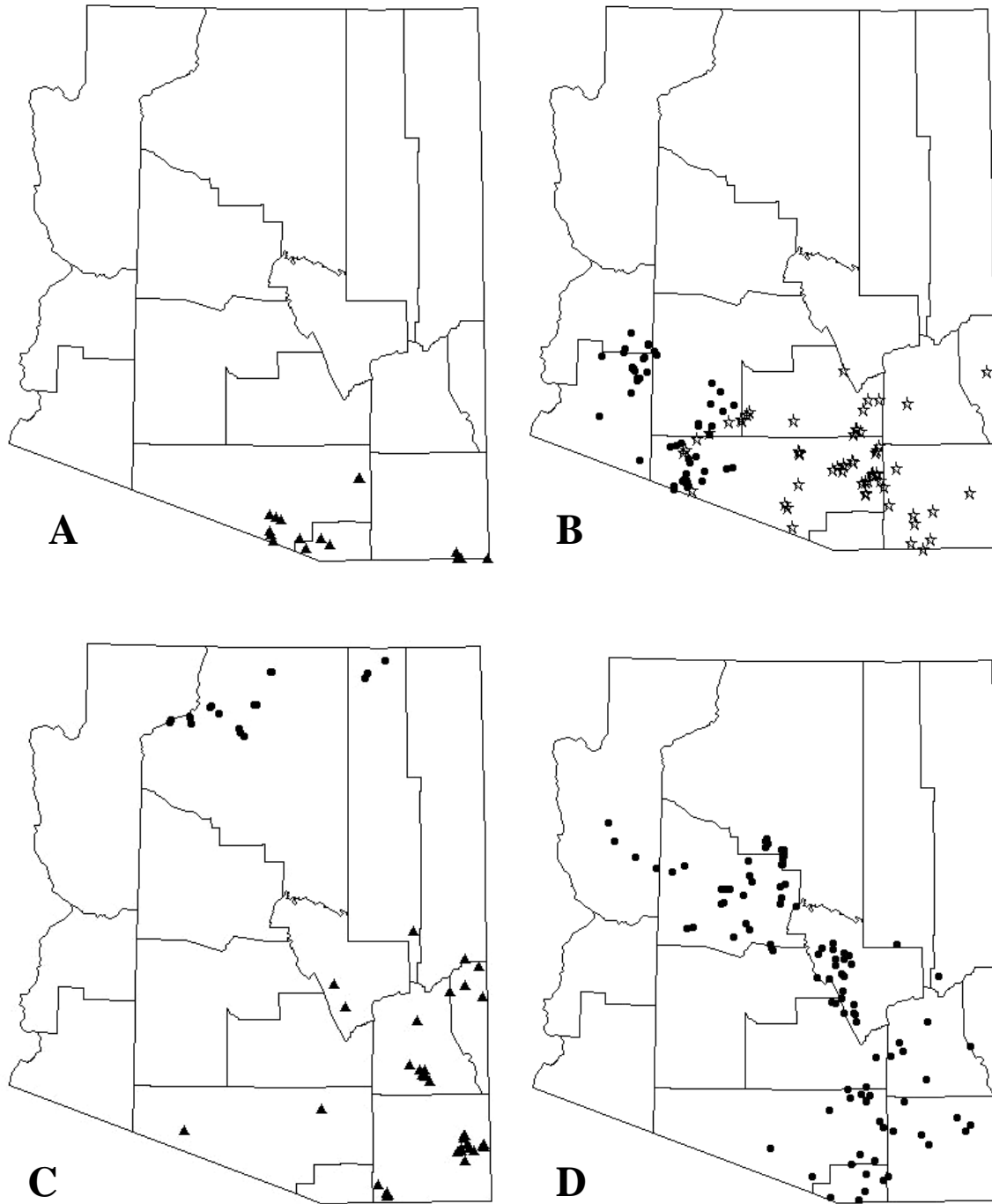
Rhamnaceae Fig 7. *Sageretia*. A, *S. wrightii* new growth; B, *S. wrightii* mature branch; C, typical habit.



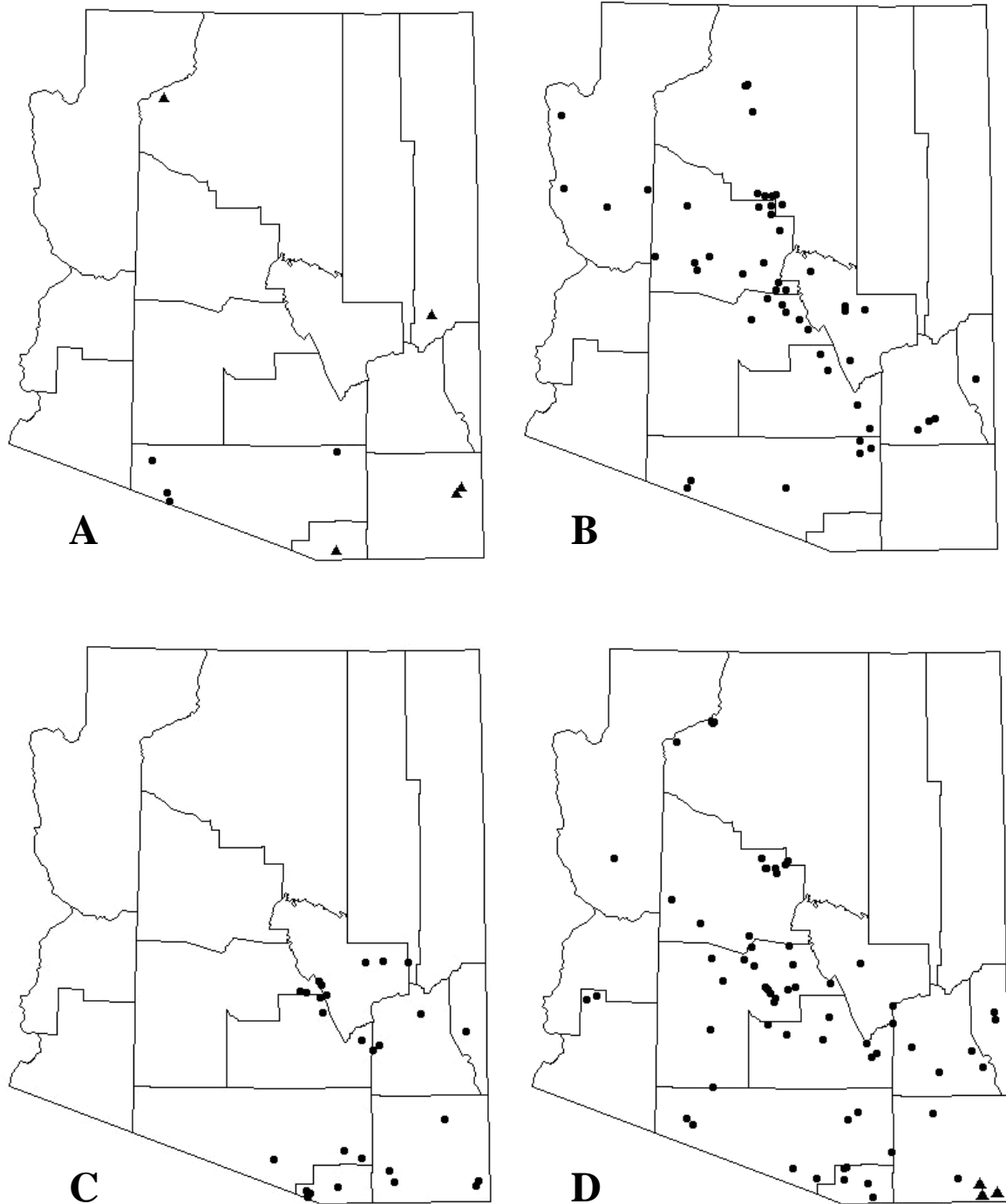
Rhamnaceae Fig 8. *Ziziphus*. A. *Z. obtusifolia* var. *obtusifolia* branch; B, *Z. obtusifolia* var. *canescens* branch; C, typical habit of *Z. obtusifolia* var. *canescens*.



Rhamnaceae Fig 9. Distribution of *Ceanothus*. A, *C. fendleri*; B, *C. vestitus*; C, *C. integerrimus* (●), *C. martini*(▲); D, Distribution of *Adolphia infesta* (▲), and *Colubrina californica* (●).



Rhamnaceae Fig 10. A, Distribution of *Condalia correllii*; B, Distribution of *Condalia globosa* var. *pubescens* (●), *C. warnockii* var. *kearneyana* (*); C, Distribution of *Frangula betulifolia* subsp. *obovata* (●); *Frangula betulifolia* subsp. *betulifolia* (▲); D, Distribution of *Frangula californica*.



Rhamnaceae Fig 11. A, Distribution of *Rhamnus crocea* (●) and *R. serrata* (▲); B, Distribution of *Rhamnus ilicifolia*; C, Distribution of *Sageretia wrightii*; D, Distribution of *Ziziphus obtusifolia* var. *canescens* (●) and *Z. obtusifolia* var. *obtusifolia* (▲).



Rhamnaceae Fig. 12. A-B, *Ceanothus fendleri*: A, flowers; B, fruit. C-D, *Ceanothus integerrimus*: C, flowers; D, fruit. E-F, *Ceanothus vestitus*: E, flowers; F, fruit. G, *Condalia globosa*. H-I, *Frangula californica*: H, flowers; I, fruit. J-K: *Rhamnus ilicifolia*: J, flowers; K, fruit. L, *Ziziphus obtusifolia*. Photos A-F, H-L by Max Licher; photo G by Kyle Christie.