LAMIACEAE MINT FAMILY
Part One.
Agastache Gronov., *Hyptis* Jacq., *Lamium* L., *Leonurus* L., *Marrubium* L., Monarda L., *Monardella* Benth., *Nepeta* L., *Salazaria* Torr., *Stachys* L., *Teucrium* L., and *Trichostema* L.

Charlotte M. Christy
Department of Biology
Augusta State University
Augusta, GA 30904-2200

with contributions by

Dixie Z. Damrel
April M. Henry
Amy E. Trauth Nare
Raul Puente-Martinez
Gretchen M. Walters
Department of Plant Biology
Arizona State University
Box 871601
Tempe, AZ 85287-1601

Annual, biennial and perennial herbs or shrubs (rarely small trees), often variously pubescent, mostly aromatic; stems mostly 4-angled. LEAVES opposite (rarely alternate or whorled), simple (rarely pinnately compound), mostly toothed to lobed, exstipulate. INFLORESCENCES cymose, or less often racemose to paniculate, the cymes often congested as axillary verticils, these sometimes forming spikes or interrupted spikes, the internodes then clearly visible. FLOWERS mostly perfect; sepals 5, connate, the calyx appearing 2-5 lobed or toothed, actinomorphic to zygomorphic, mostly persistent; petals 5, connate, the corolla (4-)5-lobed, mostly strongly zygomorphic, often bilabiate; stamens epipetalous, 2 (2 staminodes sometimes also present) or 4 (then of two lengths); pistil 1; carpels 2; ovary superior, sessile to stalked, deeply 4-lobed, each lobe with 1 ovule; style 1, the stigma usually 2-lobed. FRUIT of 4 1-seeded nutlets. –Ca. 200 genera, ca. 3500 spp., cosmopolitan; frequented by many pollinators, especially bees. Volatile oils are produced by most species. Many are cultivated as culinary herbs, including *Mentha* (mints), *Lavandula* (lavender), *Salvia* (sage), *Thymus* (thyme), *Ocimum* (basil), *Origanum* (oregano), and *Rosmarinus* (rosemary). Others are cultivated for ornament (*Solenostemon*, *Monarda*, *Salvia*) and the alkaloids of a few have known psychoactive or medicinal properties. As traditionally defined, a group that is mostly easy to recognize, but considered polyphyletic by Cantino (1992) *Ann. Missouri Bot. Gard.* 79:361-379.

1. Calyx distinctly zygomorphic, the teeth or lobes quite unevenly fused, or held in markedly different positions, or 1 or more of them at least twice as long or wide as the others.
   2. Stamens 2.
      3. Calyx teeth apparently 3, if 5 then with a 3-toothed upper lip; stamen connective markedly elongate, the stamens appearing forked or jointed; only one half of each anther developed ..... ***Salvia***
      3' Calyx teeth 5, the lower pair exceeding the others; stamen connective not unusually large, the stamens appearing linear; both anther halves fully developed ... ***Hedeoma***

Vascular Plants of Arizona: Lamiaceae. Part One: *Agastache* Gronov., *Hyptis* Jacq., *Lamium* L., *Leonurus* L., *Marrubium* L., *Monarda* L., *Monardella* Benth., *Nepeta* L., *Salazaria* Torr., *Stachys* L., *Teucrium* L., and *Trichostema* L. *JOURNAL OF ARIZONA-NEVADA ACADEMY OF SCIENCE* 35(2):151-169, 2003.

2' Stamens 4.
4. Calyx with 2 rounded lips; flowers solitary in the axils; 1 pair of stamens with half of each anther strongly reduced and often sterile.
5. Calyx balloon-like in fruit, intact at maturity, the upper half not crested; shrub . . . . . ***Salazaria***
5' Calyx enlarged but not balloon-like in fruit, the upper half crested, falling away at maturity; herb or subshrub . . . . . ***Scutellaria***
4' Calyx with 5 teeth or lobes, these forming 0-1 lips; flowers several to many per axil; all stamens with normally developed anthers.
6. Inflorescence a short, broad spike, longer than wide.
7. Upper calyx lip consisting of 3 tooth-like lobes, these almost completely fused together; additional smaller calyx lobes 2 . . . . . ***Prunella***
7' Uppermost calyx lip of a single lobe; additional smaller calyx lobes 4 . . . . . ***Dracocephalum***
6' Inflorescence of 1-many interrupted verticils, if only 1 then hemispheric.
8. Verticils 1-2, many-flowered; upper 3 calyx teeth partly fused . . ***Clinopodium***
8' Verticils many, few-flowered; calyx with all teeth separate.
9. Calyx teeth spinose, the lower 2 reflexed but otherwise similar to the others . . . . . ***Leonurus***
9' Calyx teeth apiculate, the lower 2 erect and longer and narrower than the others . . . . . ***Teucrium***

1' Calyx actinomorphic or nearly so, the teeth or lobes all identical or only slightly differing in fusion, position, length and/or width.
10. Stamens 2.
11. Corolla actinomorphic or only slightly zygomorphic, 4-lobed . . . . . ***Lycopus***
11' Corolla distinctly zygomorphic, 5-lobed.
12. Herb; verticils 1-few, their flowers many . . . . . ***Monarda***
12' Shrub; verticils many, their flowers 1-3 . . . . . ***Poliomintha***
10' Stamens 4.
13. Style branches equal or nearly so.
14. Calyx teeth usually 10, their tips hooked; plant woolly . . . . . ***Marrubium***
14' Calyx teeth 5, their tips straight; plant glabrous to hairy but not woolly.
15. Flowers 1-3 per axil.
16. Corolla appearing 1-lipped, the upper lip deeply cleft . . ***Teucrium***
16' Corolla bilabiate, the upper lip entire or shallowly notched . . ***Stachys***
15' Flowers more than 5 per axil.
17. Shrubs; hairs dendritic; leaves gray-green . . . . . ***Hyptis***
17' Herbs; glabrous or hairs various but not dendritic; leaves green.
18. Anther sacs parallel; calyx bicolored . . . . . ***Agastache***
18' Anther sacs widely divergent, often placed end-to-end; calyx uniformly green.
19. Inflorescence bracts conspicuous; stems branching only near base; corolla upper lip hooded, enclosing the stamens ***Lamium***
19' Inflorescence bracts mostly reduced, only the lowest conspicuous; stems branching throughout; corolla upper lip flattened or slightly concave, not enclosing the stamens ***Nepeta***
13' Style branches markedly unequal, in some appearing unbranched.
20. Lowest corolla lobe markedly unlike others; inflorescences panicles of elongate cymes . . . . . ***Trichostema***
20' Corolla lobes all similar; inflorescences verticillate.
21. Verticils many, sometimes congested and together appearing spicate . . . . . ***Mentha***
21' Verticil single, terminal . . . . . ***Monardella***

Agastache Gronov. Giant-hyssop, Horsemint
Dixie Z. Damrel and Raul Puente-Martinez

Perennial herbs, pubescent, glandular, the hairs straight, the glands sunken; stems erect or sometimes prostrate. LEAVES opposite, linear, lanceolate or triangular, green; margin entire, serrate or crenate. INFLORESCENCE an indeterminate spike or raceme. FLOWERS: calyx membranous, bicolored, actinomorphic or nearly so, 5-toothed, the teeth free (or 3 upper teeth partially connate), deltoid to attenuate; corolla tubular, zygomorphic, white, yellow, orange, pinkish or purple, the upper lip of 2 fused lobes, the lateral lobes 2, more fused to the upper lip than the lower lobe, the lower lobe clawed with its limb repand, erose or lacerated; stamens 4, exserted from corolla tube but not always exceeding corolla lobes, the filaments adnate to corolla, the anther sacs parallel; style branches equal; ovary lobes nestled in depressions atop the gynophore. NUTLETS ovoid to oblong, triangular in cross section, with hairs on upper half. x = 9.–22 spp.; sw U.S. and n Mex. (Greek: agan = much, stachys = spikes). Sanders, R. W. 1987. *Syst. Bot. Monogr.* 15:1-92.

1. Calyx tube 2 mm long or shorter; corolla tube 2.5-5 mm long.
   2. Spikes interrupted, the verticils distinct; leaf blades mostly 1.5-2 times longer than wide; corolla pale violet to pale blue, the tube 3-5 mm long ..... ***A. wrightii***
   2' Spikes more or less continuous, at least toward apex; leaf blades mostly 2.5-3 times longer than wide; corolla white, the tube 2.5-3 mm long ..... ***A. micrantha***
1' Calyx tube usually more than 3 mm long; corolla tube 6-33 mm long.
   3. Leaves linear or linear-lanceolate; margins entire; corolla dark pink with purple tinge in lower half, the tube 25-33 mm long ..... ***A. rupestris***
   3' Leaves deltoid-ovate or deltoid-lanceolate; margins dentate, crenate or serrate; corolla purple, rose, pink, blue-lavender, flesh-colored, or white, the tube 6-28 mm long.
      4. Corolla tube 6-7 mm long; secondary and primary costae of calyx equally thick and rigid, the tube appearing plicate ..... ***A. breviflora***
      4' Corolla tube longer than 7 mm; secondary costae of calyx thinner than the primary costae, the tube not appearing plicate.
         5. Corolla tube (12-)15-30 mm long; calyx usually deep rosy-lavender; teeth tips cucullate (hood-shaped); filaments often bristly ..... ***A. pallida***
         5' Corolla tube 8.7-15 mm long; calyx light green to pink, to rosy-lavender; the teeth tips never cucullate; filaments usually glabrous ..... ***A. pallidiflora***

Agastache breviflora (A. Gray) Epling (short flowered). –Herbs to 30-75 cm tall, suffrutescent; stems pilose, 1-2.5 mm in diameter at midpoint, ascending, 1 to several, with lateral branches. LEAVES deltoid-ovate to deltoid-lanceolate, 1.5-4.5 cm long, obscurely glandular, darker green above than below, the lower surfaces hirsute, the veins pilose, the blades 1-1.6 times longer than wide; base truncate to truncate-cordate; margin dentate to crenate-serrate; apex acuminate to obtuse. INFLORESCENCES continuous to interrupted, usually of fewer than 20 verticils. FLOWERS: calyx rosy-lavender, 5-7.5 mm long, the tube 3.5-5 mm long, appearing plicate, the secondary and primary costae equally thick and rigid; corolla tube 6-7 mm long, purple to rosy-lavender; anthers ca. 0.4 mm long; stamens and style not exceeding the corolla. NUTLETS 1.5 mm long, 1 mm wide, oval to oblong. n = 9. –In mesic or riparian sites or transitional zones of *Pinus ponderosa*, slopes of mixed conifer forests and some mts. in se AZ: Cochise, Graham, Pima, Santa Cruz cos.; 1600-2450 m (5300-8000 ft); July-Oct; ne Son., nw Chih., Mex.

Agastache micrantha (A. Gray) Wooton & Standl. (small flower). –Herbs to 60 cm tall, with a woody caudex; stems erect, 2-3 mm in diameter at midpoint, numerous. LEAVES lanceolate, 1.5-4.5 cm long, pale green above, gray-green below, the blades mostly 2.5-3 times longer than wide; base truncate to acute; margin serrate; apex acute. INFLORESCENCES continuous spikes 8-10(-15) cm long, with 10-15 verticils. FLOWERS: calyx green to tan, 2.5-3.5 mm long, the tube 2(-3) mm long, not appearing plicate, the secondary costae thinner

than or equalling the primary costae or indistinct; corolla tube 2.5-3.5 mm long, white; stamens and pistil slightly exserted. NUTLETS ca. 1 mm long, ca. 0.5 mm wide, ovoid to oblong, light brown, with hairs in upper half. $n = 9$. –Granitic outcrops, along washes on oak-grassland areas and pinyon-juniper zones: Apache, Coconino cos.; 1600-2300 m (5200-7500 ft); Aug-Oct; NM and TX to nc Mex.

Agastache pallida (Lindl.) Cory (pale). –Herbs 40-130 cm tall, with a somewhat woody caudex; stems erect or ascendingly branched, 1-3 mm in diameter at midpoint. LEAVES broadly ovate to ovate-triangular, 2-6 cm long, dark or bright green above, paler or purplish below, the blades 1-2.3 times longer than wide; base cordate to truncate; margins crenate-serrate; apex obtuse to attenuate or acuminate. INFLORESCENCES continuous to interrupted, usually with 8-15 verticils. FLOWERS: calyx usually deep rosy-lavender, 8-12 mm long, the tube 6-10 mm long, not appearing plicate, the secondary costae thinner than the primary costae, the tooth tips cucullate; corolla tube (12-)15-30 mm long, rose-pink to flesh-colored; stamens usually exserted, the filaments often bristly, the anthers 0.8-1.2 mm long; style usually exserted. NUTLETS 1.5-2.2 mm long, 0.8-1.2 mm wide, ovoid-ellipsoid, with apical hairs. $n = 9$. –2 vars.; AZ; Sierra Madre Occidental s to Dgo., Mex.

Var. **pallida**. –LEAVES: blades herbaceous, middle and distal ones mostly 1.0-1.8 times longer than wide, apically obtuse to acute. INFLORESCENCES: cymes mostly panicle-like; bracteoles averaging less than 2 mm long. FLOWERS: upper calyx teeth averaging 1.2-2.0 times longer than wide. [*A. barberi* (B.L.Rob.) Epling]. –Pine-oak woodlands and canyon bottoms in the shade of oaks: Patagonia Mts., Santa Cruz co.; 1700-1750 m (5600-5700 ft); Aug-Sep; Sierra Madre Occidental in Son. and Chih., Mex.

Agastache pallidiflora (A. Heller) Rydb. (pale flowers). –Herbs 30-100 cm tall, with a woody caudex or rhizome; stems erect or ascending, 1-4 mm in diameter at midpoint. LEAVES triangular to ovate, 1-7 cm long, dull green above and below, the blades 1-2 times longer than wide; base obtuse or truncate to cordate; margin crenate-serrate; apex obtuse to acute. INFLORESCENCES usually continuous, usually with 4-15 verticils. FLOWERS: calyx light green to pink or rosy-lavender, 6.5-13 mm long, the tube 4.5-8 mm long, not appearing plicate, the secondary costae thinner than the primary costae, the tooth tips not cucullate; corolla tube 8.7-15 mm long, pinkish purple, blue-lavender, or white; filaments usually glabrous, the upper ones usually exserted; anthers 0.4-0.7 mm long; style usually exserted. NUTLETS 1.5-2 mm long, ca. 1 mm wide, ovoid, with hairs at the apex. –4-5 vars.; AZ, CO, NM, TX; nw Coah., Mex.

1. Calyx usually light green; margins of teeth paleaceous with whitish translucence frequently radiating to entire tooth or beyond; corolla usually white; inflorescence generally continuous and dense, the cymal clusters crowded and radiating ..... var. ***pallidiflora***
1' Calyx light green to rosy-purple; margins of teeth not paleaceous nor translucent; corolla varying from deep rosy-lavender to pinkish (rarely white); inflorescence often with lower cyme separated from the upper continuous cymal clusters, these clusters few- to densely flowered, more erect than radiating ..... var. ***gilensis***

Var. **pallidiflora**. –INFLORESCENCES dense, occasionally interrupted once at lowest internode; cymal clusters crowded and radiating. FLOWERS: calyx usually light green, rarely tinged with purple; tooth margins paleaceous with whitish translucence, frequently radiating to entire tooth or beyond; costae generally pigmented as surrounding tissue; corolla white, rarely tinged with purple at distal portions of lobes. $n = 9$. –*Quercus gambelii*, pine, and mixed conifer forests including: moist gullies with *Picea*, open fields and meadows near spruce-fir, sedge-grass communities, and small fertile bottoms: Apache, Coconino, Gila, Greenlee, Yavapai cos.; 1800-3100 m (5900-10200 ft); (May?-)Jul-Oct; w NM.

Var. **gilensis** R. W. Sanders (of the Gila River). –INFLORESCENCES occasionally interrupted once or more at lowest internodes; cymal clusters varying from few-flowered to

densely-flowered, generally less crowded and radiating. FLOWERS: calyx varying from light green to purple, or combination thereof; tooth margins without whitish translucence, triangular to acuminate; costae pigmentation varying from similar to surrounding tissue, to green on purple calyx, to unpigmented; corolla varying from dark rosy-lavender to pinkish (rarely white). $n = 9$. –Pine-oak (*Pinus engelmannii-Quercus rugosa*) forest, meadows in mixed conifer-aspen areas, sandy soil on canyon floors and mountain drainages: Apache, Cochise, Graham cos.; 1700-2400 m (5500-7800 ft); Jul-Oct; w NM.

Morphological variation and numerous intermediates between the varieties of *A. pallidiflora* (and related species) have led to taxonomic confusion. Intermediates between *A. pallidiflora* var. *gilensis* and *A. breviflora* have been reported for AZ (Sanders 1981). Besides *A. pallidiflora* var. *gilensis*, Sanders recognizes *A. pallidiflora* var. *greenei* (Briq.) R. W. Sanders; we do not because the differences between the two are small, inconsistent and overlapping.

Agastache rupestris (Greene) Standl. (rock dwelling). –Herbs to 1 m tall, with a woody caudex; stems erect to prostrate, 3-4 mm in diameter at midpoint, with divergent ramification. LEAVES linear or linear-lanceolate, 2-5 cm long, densely glandular, bright green and sparsely tomentose above, gray and densely tomentose below, the blades (6-)8-15 times longer than wide; base cuneate; margin entire; apex acute to truncate. INFLORESCENCES racemes, 13-15 cm long. FLOWERS: calyx tomentose, with abundant glands, 6-8(-9) mm long, the tube 4.5-7 mm long, not appearing plicate, the secondary costae thinner than the primary costae; corolla dark pink with purple tinge in lower half, the tube 25-33 mm long; stamens exserted; filaments purple; anthers dark purple, 1-1.5 mm long, with dorsal insertion and longitudinal dehiscence; pistil to 30 mm long. NUTLETS 2 mm long, 1 mm wide, oblong, light brown, punctate, with hairs on upper third. $n = 9$. –Open mountain forests and canyons with ponderosa pine, oaks, granitic substrate: Gila, Graham, Pima, Pinal, Santa Cruz, Yavapai cos.; 450-2300 m (1500-7600 ft); Aug-Oct; sw NM. Forms hybrids with *A. wrightii*.

Agastache wrightii (Greenm.) Wooton & Standl. (for C. Wright). –Herbs to 75-100(-150) cm tall, canescent; stems erect to sprawling, 2-3 mm in diameter at midpoint, grayish green, with abundant odoriferous glands; ramification divergent. LEAVES deltoid to lanceolate, 1.5-4.5(-6) cm long, 1-3 cm wide, bright green above, grayish below, the blades mostly 1.5-2 times longer than wide, the basal leaves forming a rosette; base truncate to attenuate; margin serrate to dentate; apex acute. INFLORESCENCES usually interrupted spikes with distinct verticils, 12-30 cm long. FLOWERS: calyx light green to tan, (3.2-)3.5-5.5 mm long, the tube (1.5-)2-3 mm long, not appearing plicate, the secondary costae thinner than to equaling the primary costae; corolla pale violet to pale blue, the tube 3.5-5 mm long; anthers light pink with purple lines, ca. 0.3 mm long. NUTLETS 0.7-1 mm long, ca. 0.5 mm wide, oblong, light brown with hairs on apical end. –Canyon slopes and bottoms on igneous substrate with oaks, ponderosa pine, and grasses: Cochise, Gila, Graham, Greenlee, Maricopa, Pima, Pinal, Santa Cruz, Yavapai cos.; 1100-2000 m (3600-6600 ft); Aug-Oct; sw NM; nw Mex. Forms hybrids with *A. rupestris*.

Hyptis Jacq. Desert Lavender

Gretchen M. Walters

Annual or perennial herbs or shrubs, glabrous to canescent, the hairs branching; stems erect to spreading, branched. LEAVES simple, ovate, toothed, usually petiolate. INFLORESCENCES dense axillary cymes or verticils. FLOWERS sessile or pedicillate; calyx tubular, usually 10-veined, enlarging slightly in fruit, 5-toothed, the teeth subequal and acute to acuminate; corolla zygomorphic, tubular, blue-purple, exserted from calyx, 2 lipped, 5-lobed, the two upper lobes united nearly to the apex, the side lobes reflexed, the lower lobe saccate and retaining the anthers until explosively released; stamens 4, paired, declining towards lower corolla lobe, the anthers of 2 connate cells with none abortive; style glabrous, the stigma evenly or unevenly 2-lobed. NUTLETS oblong, smooth or rough. –Ca. 400 spp., tropical and temperate Amer. and Afr. (Greek: resupinate or turned back, referring to saccate corolla lobe).

Hyptis emoryi Torr. (for Lt. W. H. Emory). –Aromatic shrub to 3 m tall, canescent. LEAVES 0.7-2.4(-4.6) cm long, 0.5-1.5(-3.5) cm wide; petioles 0.2-0.8(-1.5) cm long; margins crenate; abaxial surface rugose, the lateral veins arching towards leaf apex, the tertiary veins reticulate between lateral veins. INFLORESCENCES sometimes congested into spikes; peduncles absent or to 1 cm long; cymes 1-2 cm wide. FLOWERS: pedicels 1-3 mm long; calyx 1.5-5 mm long, canescent, persistent; corolla 4-6(-8) mm long, whitish towards center; filaments white, pilose; anthers purple; style purple, exserted after being released from saccate corolla lobe. NUTLETS oblong, 1.5-2 mm long, ca. 1 mm wide, brown at maturity. –Desert washes and hillsides: Cochise, Graham, Greenlee, La Paz, Maricopa, Mohave, Pima, Pinal, Yuma, Yavapai cos.; 200-1150 m (600-3800 ft); all year; CA, NV; nw Mex.

Purported to inhibit tumors (*J. Pharm. Sci.* 61(11): 1819).

Lamium L. Dead-nettle

Charlotte M. Christy

Annual or perennial taprooted herbs, glabrous or pubescent; stems usually decumbent and branching near base. LEAVES mainly petiolate, the upper ones often sessile; blades ovate or reniform to orbicular; margins entire, variously toothed or coarsely incised. INFLORESCENCES verticillate, interrupted; bracts leafy. FLOWERS sessile or subsessile; calyx actinomorphic, enlarging slightly in fruit, the lobe apices acuminate to awned; corolla zygomorphic, 2-lipped, the upper lip hooded, 2-lobed, the lower lip 3-lobed, the tube much exceeding calyx; stamens 4, usually included in hood, the anther sacs divaricate with none abortive; ovary sessile, lobed to base; stigma evenly 2-lobed. NUTLETS obconic or obtriangular, glabrous, smooth or tuberculate. $x = 9$. –Ca. 40 spp.; Eurasia and n Afr. (name variously interpreted as Greek: lamium = throat, referring to the corolla shape; or, as Latin: name from Pliny of a nettle-like plant).

Lamium amplexicaule L. (stem-clasping). Henbit .–Plants annual; hairs non-glandular; stems 4-45 cm tall. LEAVES: petioles 10-35 mm long; blades 5-18 mm long, 5-20 mm wide, mostly triangular-ovate, rarely longer than wide; bases mostly cordate; margins coarsely and irregularly crenate or serrate, rarely lobed. INFLORESCENCE: bracts ascending to horizontal, sessile or the lowest with a short petiole, 6-30 mm long, 8-40 mm wide, reniform to broadly ovate, the base truncate to somewhat clasping, the margin shallowly lobed and coarsely and irregularly crenate. FLOWERS: calyx 4-7 mm long, pilose; corolla red-purple, 10-20 mm long, the hood with red-purple trichomes dorsally, the lower lip white with red-purple margin and spots with middle lobe contracted near base. NUTLETS ca. 2 mm long, shiny brown with white patches. $2n = 18, 36$. –Lawns, roadsides, riparian and disturbed areas: to be expected in most populated areas of AZ but specimens only document Cochise, Coconino, Gila, Greenlee, Maricopa, Pima, Pinal, Santa Cruz, Yavapai cos.; 350-2150 m (1100-7000 ft); Feb-May; extensively naturalized in the New World, including nearly all of the continental U.S.; Eur. This species is easily recognized by its long-exserted flowers and the broad, overlapping, sessile bracts that form a platform or bowl below each of the widely-spaced verticils.

The other widely naturalized species of this genus, *L. purpureum* L., occurs in most of the states bordering AZ. It can be easily distinguished by its petiolate, reflexed bracts which usually overlap the bracts of the subjacent verticil.

Leonurus L. Motherwort

Charlotte M. Christy

Biennial or perennial taprooted herbs, pubescent; stems erect, single or branched freely from crown. LEAVES long-petiolate; blades obovate or elliptic to linear-lanceolate; margins palmately 3-5-lobed or cleft, coarsely toothed. INFLORESCENCES verticillate, interrupted; bracts leafy. FLOWERS sessile; calyx zygomorphic, enlarging slightly in fruit, the lobe apices spinose or aristate; corolla zygomorphic, 2-lipped, the tube equaling or shorter than calyx, the upper lip entire and slightly concave, the lower lip 3-lobed; stamens 4, held alongside upper lip, the anther sacs parallel with none abortive; ovary sessile, lobed to base; stigma evenly 2-lobed.

NUTLETS obconic, smooth except apex densely hairy. $x = 9, 10$. –12 spp.; Eurasian. (Greek: leon = lion + oura = tail).

Leonurus cardiaca L. (of the heart). Common Motherwort. –Perennial herbs; stems single or several from a crown, 25-90 cm tall. LEAVES: petioles 2-5 cm long; blades 3.5-5 (-10) cm long, 4-5.5(-10) cm wide, orbicular to broadly ovate or cordate, palmately lobed and irregularly toothed, the uppermost narrowly elliptic to linear-lanceolate and merely toothed or entire. INFLORESCENCE: bracts petiolate, much exceeding the flowers. FLOWERS: calyx 3-4(-7) mm long, the lower two lobes broader and reflexed; corolla red-purple, the lower lip 8-10 mm long, whitish with red-purple spots, with an internal ring of hairs near its mid point. NUTLETS ca. 2 mm long, tan to dark brown. $2n = 18$. –Shady, moist areas in ponderosa pine and Gambel oak communities: Coconino, Mohave, Navajo, Yavapai cos.; 2000-2300 m (6500-7500 ft); Jun-Oct; extensively naturalized throughout the contiguous U.S. except CA, FL, LA; Eur. The combination of long petioles, palmately lobed leaves with irregular teeth and nutlets with densely hairy apices distinguish this species from other AZ mints.

Marrubium L. Horehound
Charlotte M. Christy

Biennial or perennial taprooted herbs, pubescent; stems usually erect, often much branched from crown. LEAVES long-petiolate to subsessile; blades ovate to orbicular; margin mostly toothed. INFLORESCENCES verticillate, interrupted; bracts leafy. FLOWERS subsessile; calyx zygomorphic or actinomorphic, enlarging slightly in fruit, the teeth 5 or 10, the apices spinose, straight or curled; corolla zygomorphic, 2-lipped, the tube shorter than calyx, the upper lip flat, 2-lobed, the lower lip 3-lobed; stamens 4, included in corolla tube, the anther sacs divaricate with none abortive; ovary sessile, lobed to base; stigma evenly 2-lobed. NUTLETS oblong to ovoid, glabrous, the epidermis cells rounded or depressed. –Ca. 40 spp.; Eurasian. (Hebrew: marrob = bitter juice).

Marrubium vulgare L. (common). Common Horehound. –Perennial herbs; trichomes glandular and stellate, often woolly; stems 10-100 cm tall. LEAVES: petioles 0.5-5 cm long; blades strongly rugose, broadly ovate to orbicular, 1.5-5 cm long, 1.5-5 cm wide, reduced distally; margins crenate to dentate; bases slightly cordate, truncate or broadly tapering. INFLORESCENCES: bracts petiolate, much exceeding the verticils. FLOWERS: calyx actinomorphic, 3-6 mm long, with an internal fringe of hairs at the throat of the tube, the teeth usually 10, alternating large and smaller, the apices curled hooks; corolla white, 5-10 mm long. NUTLETS ca. 2 mm long, black to dark brown, bumpy. $2n = 34$ (36). –Along roads and in riparian zones from Sonoran Desert to ponderosa pine communities: expected in all AZ cos.; documented in: Apache, Cochise, Coconino, Gila, Graham, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma cos.; 300-2450 m (1000-8100 ft); Mar-Oct; extensively naturalized in the New World, including all states of the U.S. except FL, LA, ND and NH; Eur. Introduced for medicinal uses and as a flavoring for horehound candy. The combination of woolly pubescence, strongly rugose and often nearly circular leaf blades and curled sepal tips distinguishes this plant from other AZ mints.

Monarda L. Bee-balm
April M. Henry

Herbaceous perennials and annuals 15-120 cm tall; stems simple or branching, variously pubescent with simple hairs. LEAVES petiolate, usually ovate or lanceolate, the margins dentate or serrate. INFLORESCENCES of 1-6 verticils each subtended by involucre of whorled bracts. FLOWERS perfect, zygomorphic; calyx tubular, 13-15-veined, the teeth 5, the apices aristate or deltoid; corolla white to pink or purple, bilabiate, the tube longer than the lips, the upper lip galeate, arched, or straight, the lower lip spreading, 3-lobed; stamens 2 (and sometimes 2 staminodes), seated within the throat, often exserted, the anther sacs linear; style exserted;

stigma unequally 2-lobed. NUTLETS ovoid, smooth to somewhat reticulate. –Ca. 17 spp.; N. Amer. (for N. Monardes, Spanish physician and botanist).

1. Inflorescence a single terminal head; corolla purplish, 25-35 mm long; stems simple ..... ***M. fistulosa***
1' Inflorescence of 2 or more dense verticils forming an interrupted spike; corolla whitish (rarely purplish), 8-15 mm long; stems branching.
   2. Bracts reflexed, the margins slightly ciliate ..... ***M. citriodora***
   2' Bracts speading or ascending, the margins pectinate ..... ***M. pectinata***

Monarda citriodora Cerv. ex Lag. (odor of citrus). –Annual herb 25-70 cm tall; stems usually branching from base or sometimes within the inflorescence. LEAVES lanceolate to oblong-lanceolate, 25-70 mm long, 4-15 mm wide, puberulent, the margins serrate to nearly entire, the petioles 4-20 mm long. INFLORESCENCES interrupted spikes of 3-6 verticils; bracts reflexed with somewhat ciliate margins. FLOWERS: calyx 8-10 mm long, the orifice bearded, the teeth aristate and 3-5 mm long; corolla 8-12 mm long, white (rarely purplish). $n = 9$. [*M. austromontana* Epling]. –2 subspp.; AZ, NM, KS, MO, IL, TN, GA, FL s to Tamps. and Mich., Mex.

Subsp. **austromontana** (Epling) Scora (of southern Mtns.). –INFLORESCENCES: bracts lanceolate to linear-lanceolate, gradually acuminate to spinose bristle, not more than 4 mm wide, strongly reflexed from base. –Oak woodland, chaparral, ponderosa pine, pinyon-juniper: Apache, Cochise, Graham, Greenlee, Navajo, Pima, Santa Cruz, Yavapai cos.; 900-2950 m (3000-9600 ft); Jul-Oct; NM s to Sin. and Dgo., Mex.

Monarda fistulosa L. (hollow like a pipe, but closed at both ends). –Perennial herb 30-120 cm tall; stems simple (rarely branching). LEAVES ovate-lanceolate, 20-120 mm long, 8-38 mm wide, glabrous to hirsute or subtomentose, the margins serrate to nearly entire, the petioles generally less than 7 mm long. INFLORESCENCES single terminal heads; bracts reflexed and often pink-tinted. FLOWERS: calyx 5.5-11.5 mm long, the orifice hirsute within, the teeth acuminate and ca. 1 mm long; corolla 25-35 mm long, rose to lavender (rarely white). $n = 16, 18$. –5 vars.; British Columbia e to Quebec, Can. s to AZ, GA, and Coah., Mex.

Var. **menthifolia** (Graham) Fernald (mint-leafed). –Plants usually 30-80 cm tall; stem simple, less often branched, pubescent with short downward-curled (rarely spreading) hairs. LEAVES ovate-lanceolate to ovate, firm, pale green, 30-90 mm long, 10-38 mm wide, subsessile to short-petioled, with short appressed canescent hairs. INFLORESCENCE: bracts frequently pink-tinted. FLOWERS: calyx 7-10(-12) mm long, the orifice densely hirsute; corolla lavender to rose (rarely white). $n =$ ca. 18. [*M. menthaefolia* Graham]. –Ponderosa pine, oak woodland, riparian forest, mixed conifer forest: Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Navajo, Pima, Santa Cruz, Yavapai cos.; 900-2450 m (3000-8000 ft); Jun-Aug; British Columbia e to Ontario, Can. s to AZ, NM, TX, and Coah., Mex.

Monarda pectinata Nutt. (pectinate, referring to margins of bracts). –Annual herb 15-30 cm tall; stems branching several times from the base. LEAVES oblong to oblong-lanceolate, 20-40 mm long, 4-10 mm wide, puberulent, the margins nearly entire to serrate, often ciliate, the petioles 2-15 mm long. INFLORESCENCES interrupted spikes of 3-6 dense verticils; bracts spreading or ascending with pectinate margins. FLOWERS: calyx 6-8 mm long, the orifice hirsute within, the teeth slender and 2-3 mm long; corolla 8-14 mm long, white to slightly pink. $n = 9, 18$. –Pine forest, pinyon-juniper, grassland: Apache, Cochise, Coconino, Greenlee, Navajo, cos.; 1200-2450 m (4000-8000 ft); May-Oct; CA e to CO, NB, TX; n Mex.

Editor's note: *M. pectinata* and *M. citriodora* subsp. *austromontana* may not be clearly distinct. More studies would be useful.

Monardella Benth. Little Bee-balm
Amy E. Trauth Nare

Perennial, suffrutescent herbs; stems 1 to many from base, erect or decumbent. LEAVES sessile or short-petiolate, glandular-punctate, linear, lanceolate, elliptic, or ovate; base acuminate; margins entire or serrulate. INFLORESCENCES subhemispheric heads, many-flowered, dense, 1 to several per stem; bracts subtending inflorescences. FLOWERS perfect, sessile; calyx actinomorphic, the teeth triangular, subequal, erect; corolla 5-lobed, sub-bilabiate, the upper lip 2-lobed, the lower lip 3-lobed, the lobes all similar, the lobe apices with punctate glands; stamens 4, erect, distinct, exserted, 1 pair longer than the other or subequal, the anther sacs subparallel to divaricate; ovary 4-lobed; stigma unevenly 2-lobed. NUTLETS oblong to oval, brown at maturity, smooth. $x = 21$.–Ca. 19 spp.; w N. Amer. (Latin: little Monarda). Bentham, G. 1834. *Labiat. gen. spec.* 331; Epling, C. C. 1925. *Ann. Missouri Bot. Gard.* 12:1-107. Most commonly growing in rocky areas.

1. Bracts of two sizes, the larger ones external, spreading, leaf-like, the smaller ones internal, erect, forming an involucre; lateral branches sterile; inflorescences one per stem ..... ***M. odoratissima***
1' Bracts of one size, spreading, not leaflike, not forming an involucre; lateral branches usually fertile; inflorescences one to several per stem ..... ***M. arizonica***

Monardella arizonica Epling (of Arizona). –Stems one to many, (15-)20-35(-50) cm long, terete to four-angled, moderately to densely pubescent, greenish-gray to tan, erect, the lateral branches fertile; rhizome stout, with peeling bark. LEAVES sessile, linear, elliptic, or lanceolate, 0.5-2.5 cm long, 0.1-1.2 cm wide, moderately to densely pubescent, often with stalked glands; margins entire or deticulate; apex acute or obtuse. INFLORESCENCES terminal or axillary, one to several per stem; bracts 5 or more, sparsely ciliate, spreading, lanceolate, 0.3-1.5 cm long, 1-5 mm wide, at least half as long as calyx, green or tinged purplish. FLOWERS: calyx tubular, 5-8 mm long, half the length of the corolla or less, sparsely to densely pubescent, the lobes acuminate, to 0.5 mm long; corolla tubular, 1.0-1.5 cm long, pale pink or white with purple spots, retrorsely puberulent; stamens equal, the anthers divergent and pale to purple; ovary 0.7-1.5 cm long; style 0.8-1.5 cm long. NUTLETS ovate to oblong, to 2 mm long, brown or tan with black spots. –Rocky ledges and canyon bottoms in Sonoran Desert scrub and chaparral: Coconino, Maricopa, Pima, Pinal, Mohave, Yavapai, Yuma cos.; 600-2250 m (2000-7400 ft); Apr-Oct; known only from Arizona.

Monardella odoratissima Benth. (very fragrant). –Stems several, (10-)25-35(-50) cm long, terete to 4-angled, sparsely to densely puberulent, tan, green, or gray, erect or decumbent, often with sterile lateral branches; rhizome stout, with peeling bark. LEAVES: petiole none, or up to 3 mm long; blades lanceolate to ovate, 0.7-3.5 cm long, 0.2-1.0 cm wide, sparsely puberulent, without stalked glands, the margin entire to serrulate, the apex acute or obtuse. INFLORESCENCES terminal, 1 per stem; all bracts sparsely pubescent to tomentose; bracts of outer whorl 2-5, spreading, leaf-like, lanceolate or elliptic, 5-25 mm long, 2-10 mm wide; bracts of inner whorl 5 or more, erect, forming an involucre, longer than calyces, ovate, 5- 12 mm long, 3-8 mm wide, with moderately to densely ciliate margins, often tinged purplish. FLOWERS: calyx tubular, 5-9 mm long, at least half as long as corolla, moderately to densely villous, the lobes acute, linear to lanceolate; corolla tubular, 7-12 mm long, pink, or purple, rarely white, glabrous or minutely puberulent; stamens slightly unequal, the anthers divergent, often purple-colored; ovary 1-2 mm long; style to 1 cm long. NUTLETS oval to oblong, to 2 mm long, brown or tan, smooth. –Mostly in ponderosa pine and other coniferous forests: Coconino, Cochise, Mohave, Yavapai cos.; 1700-3350 m (5500-11000 ft); Mar-Oct; CA, CO, ID, MT, NV, OR, UT, WA. Infraspecific taxa are recognized by some to explain extensive morphologic variation within the species. These variants appear to be merely ecotypes, thus their taxonomic validity is dubious.

Nepeta L. Catnip
Gretchen M. Walters

Perennials herbs, aromatic. LEAVES often sessile at plant apex. INFLORESCENCES verticillate bracteate cymes. FLOWERS: calyx zygomorphic, tubular or rarely campanulate, 13-17-veined; corolla zygomorphic, 2-lipped, the upper lip 2-lobed, the lower lip 3-lobed, the tube exceeding calyx; stamens 4, the upper pair longer than lower, the anther cells ellipsoid, divergent; ovary 4-parted; stigma subequally 2-lobed. NUTLETS oblong, glabrous, smooth or tuberculate to rugose. –Ca. 250 spp.; temperate Eurasia and Afr. (Latin: namesake for Etrurian city Nepete [present day Nepi, Italy]; Pliny's name for one of the Lamiaceae). Linnaeus, C. 1753. *Species Plantarum* 570.

Nepeta cataria L. (of a cat). –Plants perennial herbs, sparsely pubescent; stems 3-15 dm tall. LEAVES 1-3.5(-5) mm wide, 1.5-4.5(-7) mm long, deltoid, stipulate; petioles 1-4 cm long; base subcordate; margin crenate with veins terminating between marginal teeth. INFLORESCENCES: verticils tightly clustered at branch tips forming a large leafy panicle. FLOWERS: pedicels 0.5-2.5(-3.5) cm long; calyx urceolate, persistent, ca. 4 mm long, pubescent with short glandular hairs, the lobes acuminate, with magenta veins; corolla white to pink, the lower lip crenate, with magenta spots; stamens with white filaments, the anthers purple, declining towards lower corolla lip; pistil magenta. NUTLETS 2 mm long, 1 mm wide, longitudinally concave towards center, oval-concave in cross-section. –Oak and pine forest, stream banks, roadsides, waste places: Cochise, Coconino, Greenlee, Navajo, Pima, Yavapai cos.; 1200-2150 m (4000-7000 ft); May-Sep; widely naturalized in N. Amer., all U.S. states except FL and HI; introduced from Medit. region. Historically cultivated as a medicinal; odor attracts cats.

Salazaria Torr. Bladder-sage
Charlotte M. Christy

Shrubs 35-100(-150) cm high, often broader than tall, pubescent; stems much branched; lateral branches often clustered, divaricate, with rigid, spinose tips. LEAVES sessile to short-petiolate, 3-25 mm long, 2-8 mm wide; blade narrowly ovate to elliptic or lanceolate; margin entire; base tapering. INFLORESCENCES racemose; bracts reduced or absent; flowers 1 per axil. FLOWERS pedicellate; calyx strongly zygomorphic, tan to purplish, the 2 lips rounded and entire, the basal portion in fruit much inflated, bladder-like, 14-20 mm long, approaching spherical; corolla zygomorphic, 10-25 mm long, the tube exceeding calyx, the upper lip whitish and hooded, the lower lip 3-lobed with its central lobe dark purple with a central white line; stamens 4, included in hood, the longer pair of stamens with 1 anther sac strongly reduced or abortive, the anther sacs slightly divaricate, blue, ciliate along margins and with sac-like glandular hairs around connective; ovary stalked, deeply lobed; stigma with one lobe nearly obsolete, appearing pointed. NUTLETS broadly ovoid, 2-3 mm long, glabrous, irregularly papillate, olive-green, on a stalk ca. 2 mm long. –A monotypic genus. (for José Salazar, Mexican astronomer and diplomat).

Salazaria mexicana Torr. (of Mexico). [*Scutellaria mexicana* (Torr.) Paton]. –Sandy and rocky areas and washes of the Sonoran Desert to pinyon-juniper chaparral: Coconino (Grand Canyon), La Paz, Maricopa, Mohave, Yavapai, Yuma cos.; 350-1350 m (1200-5200 ft); Mar-Oct; se CA, s NV, s TX, sw UT; n Mex. Kearney et al. (1960) reported this species from w Gila Co., but did not cite a specimen or a more specific locality. The balloon-like fruiting calyces are an unmistakable character of this species.

Stachys L. Betony, Hedge-nettle
Charlotte M. Christy

Annual, biennial or mostly perennial herbs, mostly rhizomatous, usually pubescent; stems erect or decumbent, branched at base or along lower part of stem. LEAVES mostly petiolate, the upper ones petiolate or sessile; blade mostly ovate or oblong; margins variously toothed or crenate to entire. INFLORESCENCES verticillate, interrupted or spicate; bracts leafy.

FLOWERS sessile or subsessile; calyx zygomorphic or actinomorphic, enlarging somewhat in fruit, the lobes or teeth with spinose apices; corolla zygomorphic, 2-lipped, the tube longer or shorter than calyx, the upper lip concave or hooded and mostly entire, the lower lip (2-)3-lobed; stamens 4, included under upper lip or exserted, the anther sacs strongly divaricate with none abortive; ovary sessile, deeply lobed; stigma evenly 2-lobed. NUTLETS obovate to oblong-ovoid, glabrous, smooth or roughened. x = mostly 8, 17 .–Ca. 300 spp., mostly in temperate areas world-wide. (Greek: stachys = spike). Epling, C. 1934. *Repert. Spec. Nov. Regni Veg.* 80:1-73; Mulligan, G. A., and D. B. Munro. 1989. *Naturaliste Can. (Rev. Ecol. Syst.)* 116:35-51.

1. Corolla scarlet-red to orange-red, 18-24 mm long; petioles more than 1 cm long ***S. coccinea***
1' Corolla brownish-orange or pink to purple, 4-17 mm long; petioles less than 1 cm long or the leaves sessile.
   2. Corolla brownish-orange, the markings purplish; plant gray-green ..... ***S. rothrockii***
   2' Corolla pink to purple with darker markings; plant green.
      3. Calyx 5-10 mm long; corolla more than 1 cm long ..... ***S. palustris***
      3' Calyx 4-5 mm long; corolla 5-6 mm long ..... ****S. agraria***

***Stachys agraria** Schlecht. & Cham. (of fields). –Annual herbs, fibrous-rooted, green; hairs sparse, spreading; stems 10-45 cm long. LEAVES 5-15 mm long, 2-5 mm wide; petioles winged, absent to 3 mm long; blade ovate to elliptic; margin evenly serrate; base short-attenuate. INFLORESCENCES with petiolate to subsessile bracts, the lowest leafy, the others reduced, usually equaling or longer than sepals. FLOWERS: calyx nearly actinomorphic, 4-5 mm long; corolla medium red-purple, 5-6 mm long, the tube not exserted from calyx. NUTLETS ca. 1-1.5 mm long and wide, broadly obovate, smooth. $2n = 32$. [*S. crenata* Raf.]. –Disturbed habitats: Apache, Navajo cos.; 2150-2300 m (7000-7500 ft); Jul-Sep; e TX to FL, KY; Mex. This species apparently is documented in AZ by only three collections (ASU, ASC) made by V. D. Rhoton during Jul 1961 and Sep 1962. These specimens appear quite depauperate, none exceeding 20 cm tall. These facts, and the disjunction from its native range, strongly suggest that this species was a localized and nonpersistent introduction, not truly a part of the AZ flora.

Stachys coccinea Ortega (red). –Perennial herbs, rhizomatous, green; hairs sparse, spreading; stems to 1 m, sometimes taller. LEAVES 1.5-6 cm long; petiole long, often broad or winged; blade triangular-ovate; margin coarsely serrate or crenate; base cordate, attenuate at petiole or truncate. INFLORESCENCES with petiolate bracts, the lowest leafy, the uppermost shorter than the sepals. FLOWERS: calyx nearly actinomorphic, 7-12 mm long; corolla scarlet-red to orange-red, 2-3 cm long, the tube long-exserted. NUTLETS 2 mm long and wide, bumpy. $2n = 84$. --Moist areas from Sonoran Desert scrub to ponderosa pine: Cochise, Gila, Graham, Greenlee, Maricopa, Pima, Pinal, Santa Cruz cos.; 450-2450 m (1500-8000 ft); Jan-Nov; NM, TX; Mex. Kearney et al. (1960) also report this plant in s Apache Co., but do not cite a specimen or a more precise locality. An ornamental plant with several forms available in cultivation.

Stachys palustris L. (swampy). –Perennial herbs, rhizomatous; hairs sparse, spreading or appressed; stems 10-100 cm tall. LEAVES 4-7 cm long, 1-2.5 cm wide; petioles mostly winged, absent to 7 mm long; blades broadly triangular-ovate to oblong; margins evenly serrate; bases cordate to truncate. INFLORESCENCES with petiolate bracts, the lower leafy, the others reduced, usually longer than sepals. FLOWERS: calyx nearly actinomorphic, 5-10 mm long; corolla pink-purple to red-purple, 1-1.8 cm long, the tube slightly exserted. NUTLETS ca. 2 mm long and wide, broadly oblong, smooth. $2n = 68, 102$. –3+ subspp., 1 in AZ. This is a widespread and variable circumpolar species which is reported to produce edible tubers. Mulligan and Munro (1989) recognize *S. pilosa* Nutt. as a widespread N. Amer. native that is tetraploid and consider *S. palustris* an introduced European hexaploid that has naturalized in the n-c and ne U.S. and adjacent Canada. These taxa are questionably distinct morphologically and they are here considered conspecific.

Subsp. **pilosa** (Nutt.) Epling (hairy). –Hairs spreading; stems to 50 cm tall. FLOWERS: corolla pink-purple. –Mostly in damp areas: s Apache, Coconino, n Greenlee cos.; 2300-2900 m (7500-9500 ft); Jul-Sep; more-or-less throughout U.S. except se; Can., Mex. In many specimens the calyx is bicolored – purple above and green below.

Stachys rothrockii A. Gray (for J. Rothrock). –Perennial, rhizomatous herbs, gray-green; hairs dense, appressed; stems to 19 cm tall. LEAVES 3-4 cm long, 0.5-1.2 cm wide; petioles broad, to 1 mm long; blades oblong to narrowly elliptic; margins finely, shallowly serrate, to entire; bases short-attenuate at petiole. INFLORESCENCES with the lower bracts leafy, the others reduced, the uppermost longer than the sepals. FLOWERS: calyx nearly actinomorphic, 5-7 mm long; corolla dull brownish-orange with purplish markings, 7-11 mm long, the tube included or slightly exserted. NUTLETS 1.5-2.5 mm long, 1.5 mm wide, obovate, slightly roughened. $2n = 34$. –Grassland to ponderosa pine: Apache, Coconino, Navajo, Yavapai cos.; 1500-2500 m (5000-8200 ft); Jun-Sep; NM, UT. Kearney et al. (1960) also report this plant in e Mohave Co., but do not cite a specimen or a more precise locality.

Teucrium L. Germander

Charlotte M. Christy

Annual or perennial taprooted or rhizomatous herbs, glabrous to pubescent; stems erect or ascending, simple or variously branched. LEAVES petiolate; blades ovate, oblong, elliptic, or lanceolate; margins deeply lobed to serrate or crenate. INFLORESCENCES racemose; bracts leafy or reduced. FLOWERS pedicellate; calyx actinomorphic or zygomorphic, enlarging slightly in fruit, the teeth or lobes with acuminate apices; corolla zygomorphic, 5-lobed, not bilabiate due to deeply lobed upper lip, the tube included or slightly exserted; stamens 4, exserted, the anther sacs strongly divaricate with none abortive; ovary sessile, lobed in upper 2 -2/3; stigma mostly evenly 2-lobed. NUTLETS obovoid, pubescent or glabrous, roughened. $x = 5, 8, 13$. –Ca. 300 spp., temperate areas world-wide. (Name from Dioscorides, apparently for Teucer, the first King of Troy). The commonly cultivated germander, *T. chamaedrys* L., has a history of medicinal usage. McClintock, E., and C. Epling. 1946. *Brittonia* 5:491-510.

1. Leaves more than 5 cm long, toothed but not lobed nor deeply cut; calyx lobes shorter than tube ..... ***T. canadense***
1' Leaves to 4 cm long, usually toothed, often lobed and/or deeply cut; calyx lobes longer than tube.
   2. Corolla less than 15 mm long; pedicels 1-5(-12) mm long; usually annual; leaves withered in fruit ..... ***T. cubense***
   2' Corolla more than 15 mm long; pedicels 8-25(-40) mm long; perennial; leaves persistent ..... ***T. glandulosum***

Teucrium canadense L. (of Canada). –Perennial rhizomatous herbs; stems mostly 1-1.5 m tall, branched near inflorescence. LEAVES: petioles narrowly winged, 6-10 mm long; blades mostly narrowly elliptic, 5-9 cm long, 1-2.4 cm wide; margins evenly serrate. INFLORESCENCES with lowest bracts leafy, the others much smaller but usually exceeding calyx. FLOWERS: pedicels 2 mm long; calyx zygomorphic, 5-7 mm long, the teeth shorter than tube, the apices acute; corolla 8-15 mm long, white with red-purple markings. NUTLETS ca. 2 mm long and 2 mm wide, brown, glabrous. $2n = 16$. –Riparian areas from upper Sonoran Desert to oak woodland: Graham, Pima, Pinal, Santa Cruz, Yavapai cos.; 750-1350 m (2400-4500 ft); May-Oct; nearly throughout the continental U.S.; s Can. to W. Ind., s Mex. Kearney et al. (1960) also reported this species from Navajo Co., but without specifying a locality.

McClintock and Epling (1946) considered the variation within this species to be too complex to allow division by ordinary morphological means. They did not recognize any of the many named regional variants, recognizing instead only three wide-ranging varieties (*T. c.* var. *angustatum* A. Gray, *T. c.* var. *occidentale* (A. Gray) McClintock and Epling and the typical

form), which possess overlapping combinations of intergrading characters of pubescence, leaf shape and leaf margin. These varieties are not recognized here.

Teucrium cubense Jacq. (of Cuba). –Annual taprooted herbs; stems 15-70 cm tall, branched throughout. LEAVES mostly sessile, the basal ones with winged petioles 1-2 cm long; blades obovate to elliptic, overall 2-4 cm long, 1-6 cm wide; margins deeply palmately 3-lobed or shallowly pinnately lobed or toothed. INFLORESCENCE bracts leaf-like. FLOWERS: pedicels 1.5-4(-12) mm long; calyx actinomorphic, 5-10 mm long, the lobes longer than tube, the apices spinose; corolla 7-15 mm long, pale bluish with darker lines. NUTLETS ca. 2-3 mm long and 1 mm wide, brown or greenish-tan, the apices glabrous or pubescent. –4 subspp., 1 in AZ; CA, NM, TX; n and c Mex., W. Ind., s S. Amer.

Subsp. **depressum** (Small) McClintock & Epling (flattened). –Plant 15-37 cm tall, glabrous below. INFLORESCENCES with curled hairs. FLOWERS: calyx 5-6 mm long, the lobes spreading; corolla 8-12 mm long. NUTLETS apically pubescent, exceeding the calyx tube. –Weed of alluvial soils in the Sonoran Desert: La Paz, Maricopa, Pima, Pinal, Santa Cruz, Yuma cos.; 50-900 m (200-3000 ft); Jan-Jul(-Oct); NM, TX; Son. to Chih. and N. L., Mex.

Teucrium glandulosum Kellogg (with glands). –Suffrutescent or sometimes a small shrub; stems to 1 m tall, variously branched. LEAVES subsessile or tapering to a short, winged petiole; blades oblong, narrowly elliptic or lanceolate, overall 2-4.5 cm long, 0.3-1(-5) cm wide; margins with 0-3 large palmate lobes or pinnatifid to few-toothed or entire. INFLORESCENCES: bracts deeply 2-3-lobed to simple and entire or 2-toothed. FLOWERS: pedicels 1-3 cm long; calyx 5-9 mm long, the lobes slightly longer than tube, apiculate; corolla 5-20 mm long, white or bluish. NUTLETS ca. 2-3 mm long and wide, light brown to greenish-tan, the apices densely pubescent. –Sonoran Desert scrub, typically in canyons: Mohave, Pinal, Yuma cos.; 150-850 m (450-2800 ft); Jan-Jun (-Oct); s CA; Baja C., Mex.

Trichostema L. Blue-curls

Charlotte M. Christy

Annual taprooted herbs or suffrutescent perennials, pubescent; stems erect or decumbent at base, freely branched. LEAVES petiolate or subsessile; blades linear to ovate; margins entire or dentate, rarely lobed. INFLORESCENCES panicles of cymes; bracts leafy or reduced. FLOWERS pedicellate; calyx actinomorphic or zygomorphic, slightly enlarging in fruit, the lobe apices acuminate; corolla zygomorphic, 5-lobed, not bilabiate due to deeply lobed upper lip, the tube shorter or longer than calyx; stamens 4, exserted, the anther sacs slightly to strongly divaricate with none abortive; ovary sessile, lobed in upper ⅔; stigma unevenly 2-lobed. NUTLETS obovoid, rugose-reticulate or irregularly ridged, often pubescent. $x = 7, 10, 19$. –17 spp.; se Can. to Pue., Mex. (Greek.: thrix = hair and stema = stamen, referring to the thin, elongate filaments). Lewis, H. 1945. *Brittonia* 5:276-303.

1. Suffrutescent perennial; corolla at least 7 mm long; stamens at least 10 mm long ..... ***T. arizonicum***
1' Annual; corolla less than 6 mm long; stamens less than 5 mm long ..... ***T. brachiatum***

Trichostema arizonicum A. Gray (of Arizona). –Suffrutescent perennial herbs; stems 25-50 cm tall. LEAVES: petioles 2(-5) mm long, winged; blades 13-30 mm long, 8-12 mm wide, broadly elliptic to ovate, oblong or obovate, 1-nerved; margin entire or few-toothed. FLOWERS: pedicels 8-11 mm long, calyx actinomorphic, 1.5-2 mm long; corolla 7-12 mm long, the tube slightly exserted, white except the middle lobe of the lower lip blue; stamens ca. twice corolla length, arching above the corolla, the filaments white, anther sacs strongly divaricate. NUTLETS ca. 2.5 mm long, brownish to greenish-tan, the apex with a few short-stalked glands. $2n = 20$. –Desert grassland to woodlands: Cochise, Graham, Greenlee, Pima, Santa Cruz cos.; 1200-2000 m (4000-6600 ft); Jul-Oct; s NM; Chih., Coah., Son., Mex. Readily recognized by the showy flowers with long-exserted stamens.

Trichostema brachiatum L. (arm-like branches). –Annual herbs; stems 6-35 cm tall. LEAVES subsessile; blades 13-36 mm long, 2-7 mm wide, linear to narrowly oblong to elliptic, 3-nerved; margins entire. FLOWERS: pedicels 0.5-1.5(-5) mm long; calyx actinomorphic, 3-6 mm long; corolla 4-5 mm long, the tube included, white except the middle lobe of the lower lip pink-purple; stamens only slightly exceeding corolla, the filaments blue, the anther sacs slightly divaricate. NUTLETS ca. 2.5 mm long, dark brown to greenish-tan, the apex with a few short curled hairs. $2n = 14$. [*Isanthus brachiatus* (L.) B. S. P.] –Mesquite scrub to pine-oak woodland, often in riparian zones: Gila, Yavapai cos.; 1150-1650 m (3800-5400 ft); Jul-Oct; s Can to n FL, c TX, w NE. Kearney et al. (1960) report this species in Cochise Co. and Lewis (1945) reports it in extreme s Navajo Co., but neither cite a specimen nor a more precise locality.

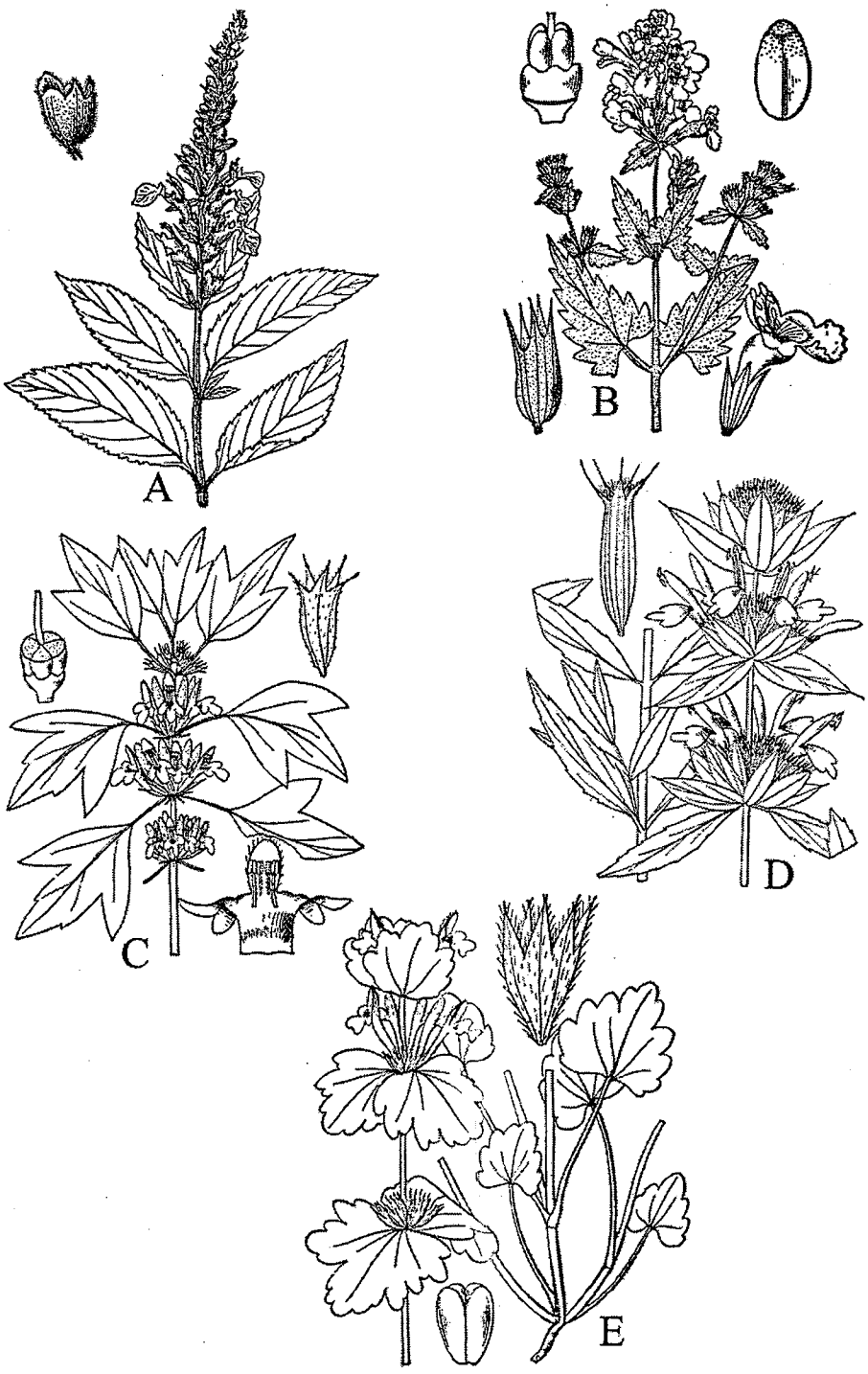
Trichostema micranthum A. Gray has been reported (Kearney et al. 1960) to occur in Arizona, based on a single collection made near Mt. Trumbull (Mohave Co.) by Jaeger in 1941. This species is very similar to *T. brachiatum*, differing in that the leaves are 1-nerved, the corolla tube curves upward, and it otherwise ranges from Baja C. to the San Bernardino Mts. of CA. I have not seen this specimen. However, since it is well out of range and apparently has never been re-collected in AZ, I do not consider this species to be an element of the AZ flora.

ACKNOWLEDGMENTS

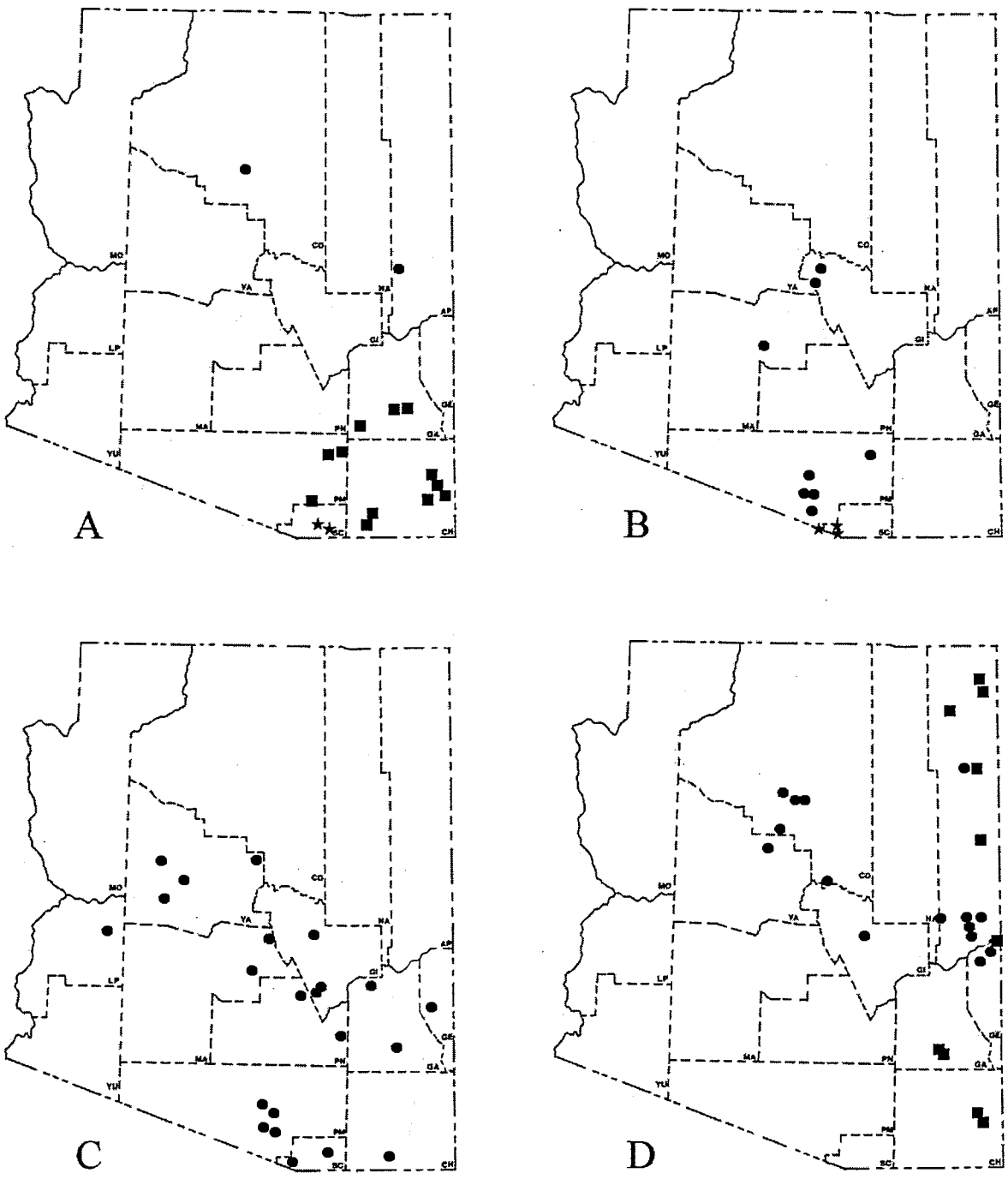
We thank the curators of the following herbaria for kindly allowing the use of their specimens: ARIZ, ASC, ASU, DES and MO. Gretchen Walters thanks Leslie Landrum for help with the manuscript and Phil Cantino and Ray Harley for additional descriptions.

REFERENCES

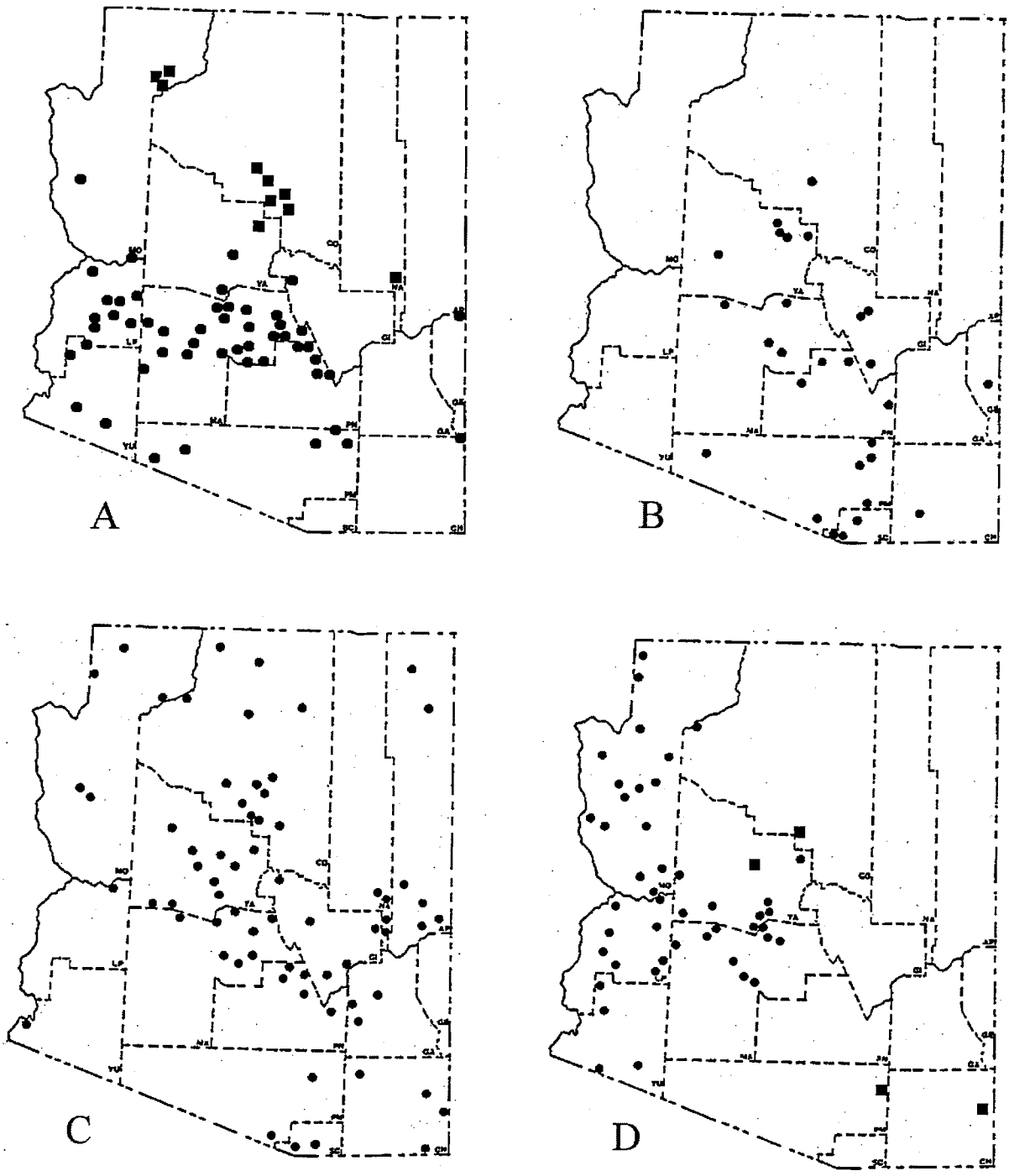
KEARNEY, T. H., and R.H. PEEBLES AND COLLABORATORS. 1960. *Arizona Flora.* University of California Press, Berkeley.



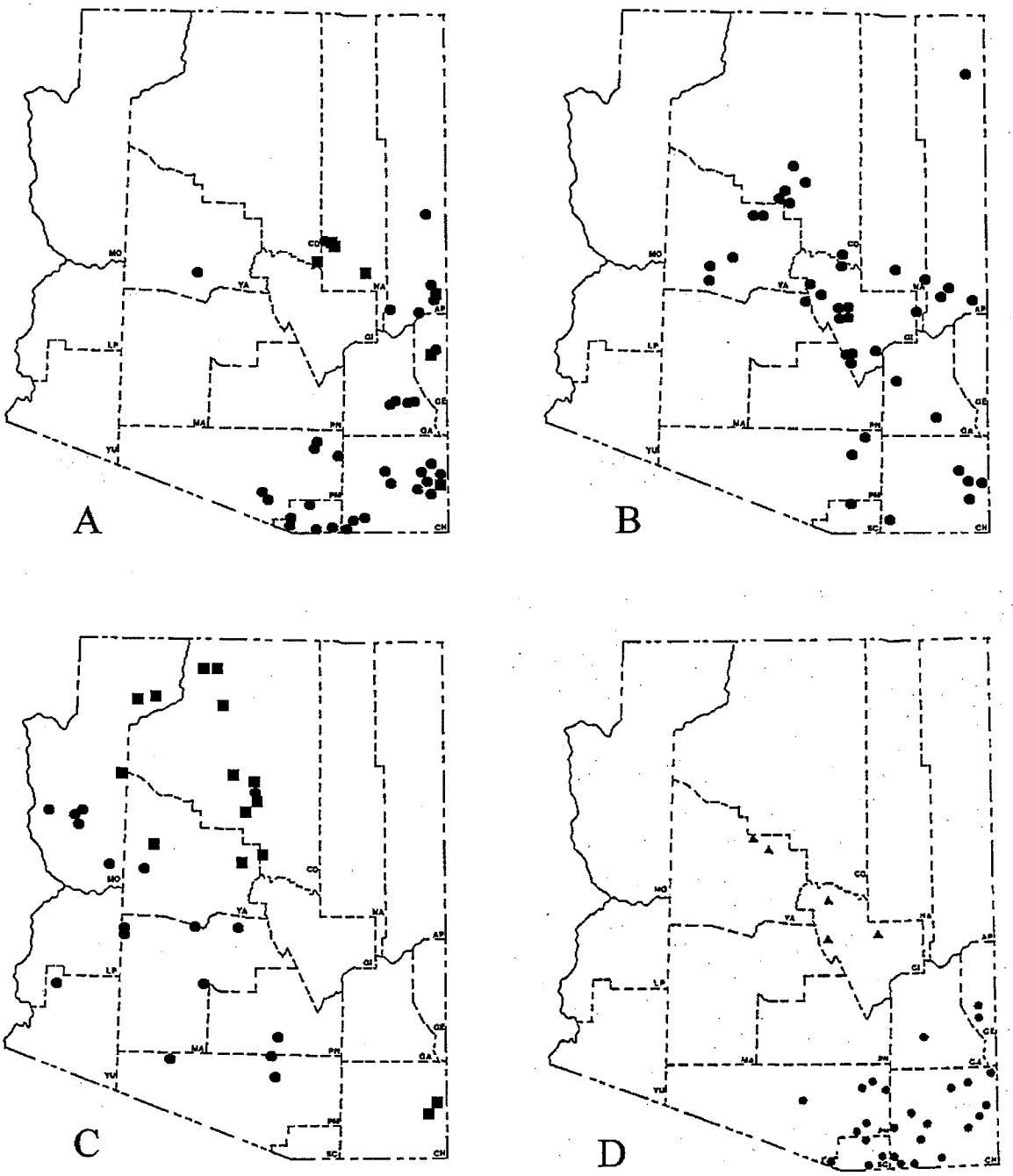
Lamiaceae Fig. 1. A, *Teucrium canadense* (habit × 0.5); B, *Nepeta cataria* (habit × 0.6); C, *Leonurus cardiaca* (habit × 0.5); D, *Monarda pectinata* (habit × 0.5); E, *Lamium amplexicaule* (habit × 0.65). Reproduced from *An Illustrated Flora of the Northern United States and Canada*, second edition, by N. L. Britton and A. Brown (1923).



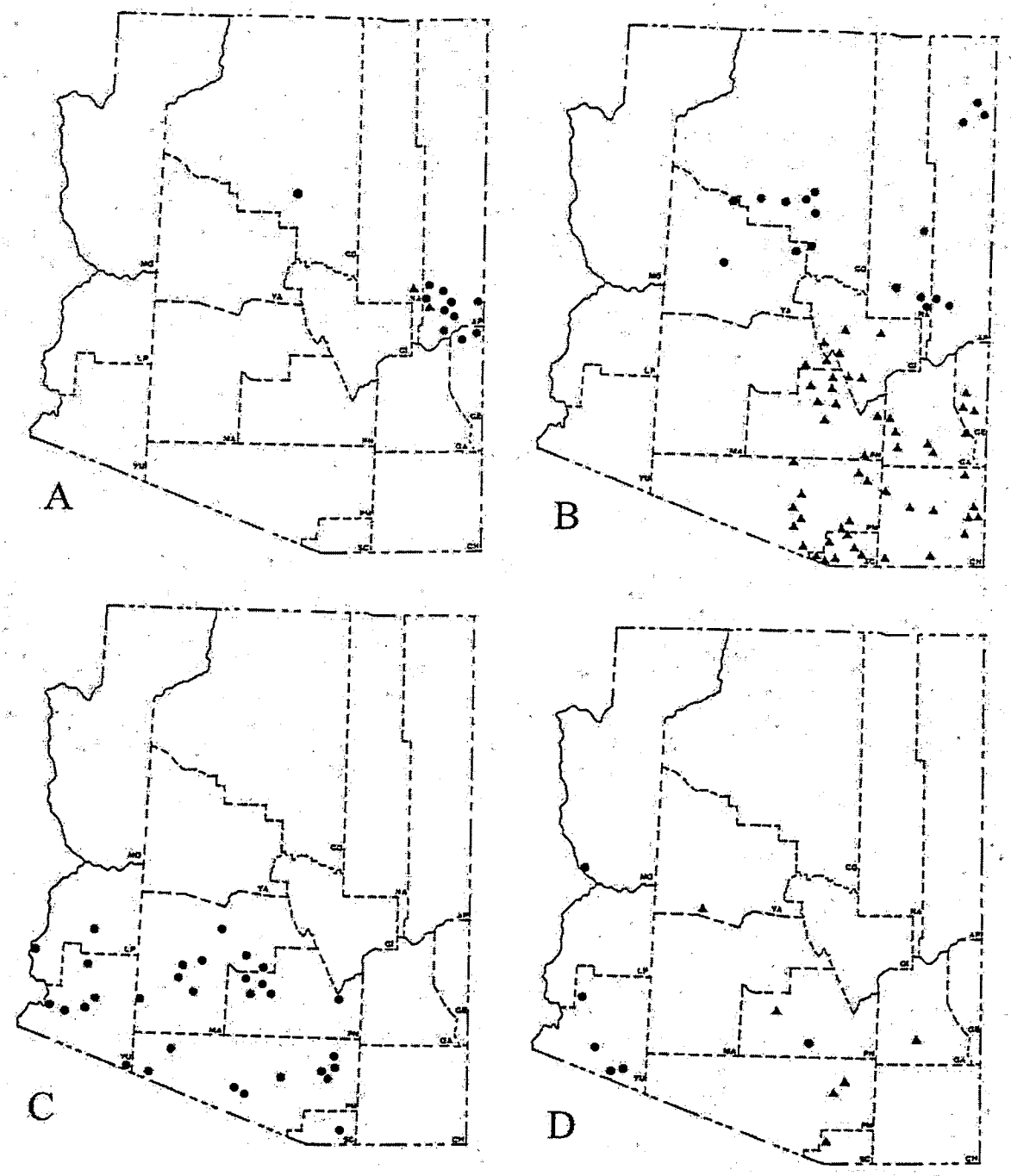
Lamiaceae Fig. 2. Distributions of: A, *Agastache micrantha* (dots), *A. breviflora* (squares), *A. pallida* (stars); B, *A. rupestris* (dots), *A. rupestris* × *wrightii* (stars); C, *A. wrightii*; D, *A. pallidiflora* var. *palidiflora* (dots), *A. pallidiflora* var. *gilensis* (squares).



Lamiaceae Fig. 3. Distributions of A, *Hyptis emoryi* (dots), *Leonurus cardiaca* (squares); B, *Lamium amplexicaule*; C, *Marrubium vulgare*; D, *Salazaria mexicana* (dots), *Nepeta cataria* (squares).



Lamiaceae Fig. 4. Distributions of: A, *Monarda citrodora* subsp. *austromotana* (dots), *M. pectinata* (squares); B, *M. fistulosa* var. *menthifolia*; C, *Monardella arizonica* (dots), *M. odoratissima* (squares); D, *Trichostema arizonicum* (dots), *T. brachiatum* (triangles).



Lamiaceae Fig. 5. Distributions of: A, *Stachys agraria* (triangles), *Stachys palustris* subsp. *pilosa* (dots); B, *Stachys coccinea* (triangles), *Stachys rothrockii* (dots); C, *Teucrium cubense*; D, *Teucrium glandulosum* (dots), *Teucrium canadense* (triangles).