

VIOLACEAE VIOLET FAMILY

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Small tree-like shrubs, vines or herbs, perennial or annual. LEAVES simple, entire to deeply lobed or compound. INFLORESCENCES axillary or scapose, with flowers solitary or in clusters of 2-4. FLOWERS perfect, zygomorphic in ours, chasmogamous (opening) or sometimes cleistogamous (fertilized in bud, never opening); sepals 5, the base of sepals auriculate (with ear like lobes) or not; petals 5, the base of lower petal elongated into a spur, or gibbous (swollen); stamens 5, alternate with petals, surrounding the ovary, the filaments short, wide, the 2 lowest anthers often with nectaries at their bases extending into the spur; pistil 3-carpelled and 1 locular, the style 1; ovary superior. FRUITS capsules in ours, explosively dehiscent. SEEDS of many spp. appendaged with a caruncle by which they are ant-dispersed. —23 genera, 830 spp., chiefly of temperate, subtropical, and tropical regions worldwide. Some spp. cultivated e.g., *Viola tricolor* and *V. × wittrockiana*, pansy.

1. Plants caulescent; sepals not auriculate; seeds usually 6 or less per capsule; upper petals not showy, 5 mm long or less; lower petal twice as long as upper petals, the blade distinctly narrowed to 0.5-1 mm in middle, the tip wide spatulate *Hybanthus*
- 1' Plants caulescent or acaulescent; sepals auriculate; seeds usually more than 6 per capsule; upper petals usually showy, longer than 5 mm; lower petal not twice as long as upper petals, the blade not narrowed in middle *Viola*

Hybanthus Jacq.

Caulescent annuals or subshrubs (in AZ). LEAVES simple, cauline, stipulate, petiolate or sessile, the lower usually opposite, the upper alternate in ours. INFLORESCENCES: flowers solitary or in axillary clusters of 2-4; pedicels of ours with distinct abscission joint from which the flower usually bends outward or deflexes downward. FLOWERS: sepals subequal, not auriculate; petals unequal, the lower petal much larger than the others, more or less gibbous on underside, narrowed in middle of blade, the tip wide-spatulate. FRUITS globose to ovoid, glabrous; cleistogamous flowers and fruits present in ours. SEEDS ca. 4-6, globose to slightly flattened, with a prominent whitish caruncle. —Ca. 150 spp. primarily of tropical and subtropical areas, N. and S. Amer., Australia, Africa, Asia; 2 spp. in AZ. (Greek: *hybos* = humpbacked + *anthos* = flower). Morton, C.V. 1944. *Cont. U.S. Nat Herb* 29:74-82; Schulze, G. K. 1934. *Notizblatt Bot. Gard. Berlin* 12:108-114.

1. Plants annual; leaves petiolate; flowers 2-4 per axil, erect to horizontal *H. attenuatus*
- 1' Plants perennial; leaves sessile or subsessile; flowers 1 per axil, usually horizontal or pendant *H. verticillatus*

Hybanthus attenuatus (Humb. & Bonpl.) G. K. Schulze. (tapering). —Annuals 11-46 cm tall. STEMS erect, leafy with few branches, glabrous to pilose (especially upper half), often purple-mottled. LEAVES: stipules 1-5 mm long, to 0.5 mm wide, linear, glabrous; petioles 4-7 mm long; blades 1.5-10.5 cm long, 3-23 mm wide, elliptic to lanceolate, coarsely pubescent to glabrous, the tips and bases attenuate, the margins crenate to usually serrate, ciliate; lower leaves opposite, the upper leaves alternate. INFLORESCENCES: flowers (1-)2-4 per leaf axil, often with 1-2 aborting, the pedicels 0.2-2 cm long, pubescent, erect to horizontal. FLOWERS: sepals narrow, long acuminate, entire, ciliate, 2-5 mm long, 0.5 mm wide at the base, the lower petals 7-12 mm long, spatulate, the

tip 4-7 mm wide above a median constriction, this 1-2 mm wide, the petal base 2-3 mm wide, glabrous to pubescent on upper surface, petal edges and veins purple; lateral petals 0.5-2 mm long, thin, white or purple-tinged; upper petals ca. 2 mm long, purple tipped. Cleistogamous flowers present on short pedicels. FRUITS 3-5.5 mm long, ovoid, usually short-beaked, glabrous. SEEDS ca. 6 per capsule, globose to somewhat flattened with angular edges, dark brown to black with white to gray patches; caruncle white to cream-colored, hood-shaped. $2n = 24, 32$. —Shaded areas in canyons, near water: Cochise, Pima, Santa Cruz cos.; ca. 1200-1850 m (4000-6000 ft); Aug-Oct; s AZ to S. Amer.

Hybanthus verticillatus (Ortega) Baill. (whorled). —Small shrubs 13-40 cm tall. STEMS erect, leafy, often many branched from a slightly woody base, glabrous to strigose or pilose. LEAVES: stipules 3-40 mm long, 0.5 mm wide, leaf-like, but smaller, linear to lanceolate, glabrous to hirsute, gland-tipped; petioles none to ca. 1 mm long; blades 1.5-5 cm long, 1.5-8 mm wide, linear, lanceolate to oblanceolate, glabrous to pubescent; tip acute; margins usually entire, ciliate or not; lower and upper leaves alternate. INFLORESCENCES: flowers 1 in leaf axil, the pedicels 0.7-1.4 cm long, hirsute to densely pubescent, erect, horizontal, or usually pendant. FLOWERS: sepals ovate to lanceolate, with midrib often slightly inflated and forming a keel, entire to ciliate, 1.5-3 mm long, 0.5-1 mm wide at base; petals greenish white or yellowish with purple tips, the lower petals 2.5-6 mm long, spatulate, the tip 1-3 mm wide above a median constriction, this 0.5 mm wide, the petal base 1-2 mm wide, glabrous to short-pilose on both surfaces; lateral petals ca. 3 mm long, purple-tinged; upper petals ca. 2-3 mm long, purple-tipped. Presence of cleistogamous flowers not determined. FRUITS 4-6 mm long, globose to ovoid, usually short-beaked, glabrous. SEEDS usually 6 per capsule, globose to somewhat flattened with angular edges, dark brown to shiny black; caruncle white to cream, hood shaped. $2n = 16, 32$. —2 var., 1 in AZ; CO, KS, NM, OK, w TX; Mex.

Var. **verticillatus**. —LEAVES: blades 1.5-6 cm long, 1.5-11 mm wide, about 5 to 10 times as long as broad, linear, lanceolate to oblanceolate, glabrous to pubescent. —Dry plains and mesas, desert grasslands, chaparral, and riparian habitats: Cochise, Coconino, Gila, Graham, Maricopa, Mohave, Pima, Santa Cruz, Yavapai cos.; 350-1650 m (1100-5400 ft); Apr-Oct; CO, KS, NM, OK, w TX; Mex.

Viola L. Violet

Cauliscent or acaulescent annual or perennial herbs. LEAVES simple, dissected or compound, basal, cauline or both, stipulate, petiolate, alternate or opposite. INFLORESCENCES: flowers solitary, axillary or scapose. FLOWERS: sepals subequal, auriculate at base; petals unequal, the lower petal shorter or longer than others, the base elongated into a spur or gibbous on underside; lateral 2 petals generally spreading, generally bearded at base; upper 2 petals equal, erect or spreading; lower 2 stamens with nectaries projecting into the spur or sac; cleistogamous flowers present in many spp. FRUITS ovoid to oblong, glabrous or hairy. SEEDS ca. 15-20, usually ovoid, with a prominent caruncle. —Ca. 400 spp.; worldwide. (Latin: *Viola*, a classical name.) Clausen, J. 1964. *Madroño* 17:173-197.

1. Plants annual; stipules large, leaf-like, one half to nearly as large as the leaf blade, palmately lobed, the middle lobe leaf-like.
 2. Stipules pinnate; petals as long as or usually shorter than sepals; all flowers chasmogamous *V. arvensis*
 - 2' Stipules pectinate-palmately divided; petals much longer than sepals; both chasmogamous and cleistogamous flowers present *V. rafinesquii*
- 1' Plants perennial; stipules small, much smaller than the leaf blade, not leaf-like, unlobed.
 3. Plants stemless, without internodes.
 4. Leaves divided *V. pedatifida*
 - 4' Leaves entire, not divided.

- 5. Petals white to pale blue; plants of wet places; rhizomes thin *V. macloskeyi*
- 5' Petals blue to deep blue-violet; plants of wet or dry places; rhizome, when present thick and fleshy.
- 6. Plants of dry places; petals blue- to violet-tipped, whitish at base; leaves often with purple dots; taproot woody *V. umbraticola*
- 6' Plants of wet places; petals deep blue-violet; leaves without purple dots; rhizomes thick and fleshy *V. sororia*
- 3' Plants with stems and internodes.
 - 7. Petals blue *V. adunca*
 - 7' Petals yellow or white.
 - 8. Petals white with purple markings *V. canadensis*
 - 8' Petals yellow with brown markings.
 - 9. Capsules glabrous; leaf blades usually lobed or toothed *V. nuttallii*
 - 9' Capsule pubescent; leaf blades entire, sinuate or subserrate; often purplish, especially beneath.
 - 10. Leaf blades entire, sinuate or subserrate; spur glabrous *V. purpurea*
 - 10' Leaf blades all entire; spur pubescent *V. charlestonensis*

Viola adunca Smith ex Rees (hooked). Western Dog Violet. —Perennial herbs 6-30 cm tall. STEMS branched, at first short, usually elongating later in season, usually pubescent, clustered on thin much branched rhizomes. LEAVES simple, basal and cauline; petioles 5-70 mm long; blades 5-40 mm long, 4-45 mm wide, round-ovate, glabrous to pubescent; margins usually crenate; base truncate to cordate; tip obtuse. INFLORESCENCES axillary; pedicels to 10 cm long. FLOWERS: sepals to 7 mm long; petals pale to deep violet, the lower 3 purple-veined, white-bearded at base, the lateral 2 white bearded, the lowest petal (including spur) 8-16 mm long, the spur elongated, conspicuous, straight, curved, pointed or hooked at tip, 5-12 mm long to 3 mm wide. FRUITS 6-11 mm long, glabrous. $2n = 20$. —Damp banks, meadow edges in coniferous forests, usually in shade: Apache, Coconino, Greenlee, Mohave cos.; 2050-2900 m (6700-9500 ft); May-Jul; AK, n and e U.S., WA s to CA, e to CO, NM; Can. A widespread, highly polymorphic sp. with many named variants.

Viola arvensis Murray (in cultivated fields). —Annuals 5-42 cm tall. STEMS prostrate to erect, much branched from base, glabrous to short strigose. LEAVES simple, cauline, alternate, glabrous to pubescent; stipules 20-39 mm long, palmately lobed, the middle lobe leaf-like, oblanceolate to obovate, lanceolate, the lower lobes shorter, dissected, the margins ciliate; petioles 10-20 mm long; lower blades 25-36 mm long, orbicular to lanceolate, the margins crenate to subserrate; upper blades 15-44 mm long, 3-16 mm wide, narrowly lanceolate to ovate, the margins coarsely to regularly crenate-serrate. INFLORESCENCES axillary, the pedicels to 8.5 cm long. FLOWERS: sepals to 15 mm long, with 2-4 mm long ear-like lobes at base; petals as long as, or usually shorter than sepals, mainly cream or tinged blue-violet on the upper 4 petals, the lowest petal (including spur) 7-15 mm long. FRUITS 5-9 mm long, glabrous. $2n = 34$. —A weedy plant of waste areas and roadsides: Pima co. expected in others; 750 m (2400 ft); Mar-Jun; native of Eur.; widespread in N. Amer. Cleistogamous flowers absent. Confused with *V. rafinesquii*; seldom collected.

Viola canadensis L. (of Canada) —Perennial herbs 15-23 cm tall. STEMS erect, branched above, glabrous to puberulent, from vertical rootstalks or creeping rhizomes. LEAVES simple, basal and cauline; blades with sparse hairs along major veins, the margins ciliate especially at base; basal leaf petioles 50-120 mm long, puberulent, the blades 22-62 mm long, 24-67 mm wide, ovate-reniform, serrate, the base cordate, the tip attenuate, acute; cauline leaf petioles 5-52 mm long, the blades 31-55 mm long, 21-43 mm wide, ovate to triangular, serrate, the base cuneate, truncate or cordate, the tip acute. INFLORESCENCES: axillary, the pedicels to 2.2 cm long, glabrous to puberulent. FLOWERS from upper leaf axils; sepals to 6 mm long; petals white, the lower 3 with yellow eyespot and purple-

veined, the lateral 2 white-bearded, the outer side of petals often purple-tinged, the lowest petal (including spur) 8-9 mm long, the spur short, gibbous. FRUITS 3-6.5 mm long, glabrous. $2n = 24$. [*V. canadensis* var. *rydbergii* (Greene) House]. —Riparian habitats in coniferous or aspen forests, or moist, shaded slopes in sandy, rich, or rocky soil: all cos. except Yuma; 1200-3550 m (4000-11,600 ft); Mar-Oct; AK, to e U.S.; Can., Mex.

Viola charlestonensis M. Baker & J. Clausen. (of Charleston Mts., NV). —Perennial herbs to 10 cm tall. STEMS branched, clustered on a deep taproot, mostly short, usually partly buried and barely extending above surface of leaf litter, gray puberulent. LEAVES simple, basal and cauline, entire, the lower surfaces purplish; basal leaves 1-5, the petioles 40-60 mm long, the blades 10-25 mm long, 11-23 mm wide, rounded, broadly ovate, often succulent, the bases truncate or slightly cuneate, the upper surface puberulent with whitish veins, the lower puberulent; cauline blades narrower than basal, ovate, puberulent, the base cuneate. INFLORESCENCES axillary; pedicels 1.5-2.5 cm long. FLOWERS: sepals to 4 mm long; petals yellow on face, the lower 3 brown- to purple-veined, faintly darkened on back, the upper 2 usually brownish-purple on back, the lateral 2 bearded, the lowest petal (including spur) 8-11 mm long, the spur short, covered with hairs. FRUITS 8 mm long, densely puberulent. $2n = 12$. —Partial shade of shrubs in juniper and ponderosa pine woodlands; limestone soils: Coconino co.; 1500-2900 m (5000-9500 ft); Jun-Jul; NV, UT. Reported from Jacob's Pool, Kaibab Plateau, although data on single AZ collection may be incorrect.

Viola macloskeyi F. E. Lloyd. (for G. Macloskey). —Perennial herbs, 5-22 cm tall. STEMS none; plants arising from thin, creeping rhizomes, forming late-season stolons, glabrous. LEAVES simple, basal, erect; stipules reddish; petioles 20-170 mm long; blades 20-65 mm long, 22-56 mm wide, ovate to round, crenate, the base cordate, the tip obtuse. INFLORESCENCES scapose, the pedicels to 21 cm long. FLOWERS: sepal lobes 1-2 mm long, ear-like; petals almost white to pale blue or violet, the tips acute, the 3 lower petals purple-veined at base, the lateral 2 usually white-bearded, the lowest petal (including spur) 8-17 mm long. FRUITS 6-7 mm long, glabrous. $2n = 48$. —Bogs, stream sides: Coconino co.; 2200-2400 m (7200-7900 ft); May-Jul; circumboreal, n Eur. and Asia, AK to Labrador; WA s to n CA, e to CO, ME, NH. Known in AZ only from vicinity of Woods Canyon Lake; confused with *V. palustris* L.

Viola nuttallii Pursh (for T. Nuttall). —Perennial herbs 2-27 cm tall. STEMS branched, clustered on short, vertical rootstalks, at first short, usually elongating later in season, erect to spreading or compressed, suberect in shade, depressed in sun; usually partly buried; upper stems usually puberulent, the lower ones glabrate. LEAVES simple, basal and cauline, the blades glabrous to puberulent, the margins ciliate; basal leaf petioles 2-17 cm long, the blades 1.5-9 cm long, 10-25 mm wide, ovate, lanceolate to elliptic, entire, sinuate, or subserrate, the base attenuate, cuneate, or truncate, the tip obtuse to acute; cauline leaf petioles 0.7-7 cm long, the blades 1.4-7.2 cm long, 5-18 mm wide, ovate, lanceolate to elliptic, entire, sinuate, or subserrate, the base attenuate, the tip acute. INFLORESCENCES axillary, the pedicels to 13 cm long. FLOWERS: sepals to 8 mm long; petals yellow on the face, the lower 3 brown- to purple-veined, the upper 2 usually brownish purple on back, the lateral 2 petals bearded, the lowest petal (including spur) 9-13 mm long, the spur gibbous. FRUITS ca. 5 mm long, glabrous. $2n = 24, 54$. —Sagebrush flats: Apache, Coconino, Yavapai cos.; 1650-1850 m (5500-6000 ft); Apr-Jun; CO, ID, KS, MN, MT, ND, NM, NV, UT, WA, WY; Alta., B.C., Can.

Viola pedatifida G. Don (leaves cleft like a bird's foot). —Perennial herbs 4-30 cm tall. STEMS none; plants arising from a short, vertical rhizome, glabrous to sparsely pilose. LEAVES basal, erect, glabrous to short hirsute, the margins ciliate; palmately divided into 5-9 linear, spatulate, obovate, or falcate segments, each cleft or parted toward apex; apices obtuse, acute to mucro tipped; bases truncate, reniform or cordate. INFLORESCENCES scapose; pedicels to 18 cm long. FLOWERS:

petals light to dark blue-violet on face, the lower 3 bearded. FRUITS glabrous. $2n = 54$. —2 subspp, 1 in AZ; AR, CO, IA, KS, MI, MN, MT, ND, NE, NM, OK, SD, WY; Alta to Que, Can.

Subsp. **pedatifida** —LEAVES: petioles 30-160 mm long; blades 25-45 mm long, 35-75 mm wide, the segments spatulate to linear in outline; apices acute to mucro tipped; bases truncate to reniform. FLOWERS: sepals to 7 mm long; lowest petal (including spur) 13-25 mm long. FRUITS 8-13 mm long. Coniferous forests: Apache co.; 2400 m (7800 ft); May-Jun; normally of prairie habitats, rarely in open woods.

Viola purpurea Kellogg non Stev. (purple for leaves). —Perennial herbs 4-22 cm tall. STEMS branched, clustered on short, vertical rootstalks, at first short, elongating or not later in season, erect to spreading or compressed, suberect in shade, depressed in sun, partly buried or not, usually pubescent. LEAVES simple, basal and cauline, entire to toothed; basal leaves 1-5, the petioles 30-145 mm long, the blades 10-50 mm long, 10-35 mm wide, round, ovate or hemispheric, often quite succulent, the base tapered, truncate or cordate, the margins usually crenate to serrate with rounded lobes, or deeply dentate-serrate with 2-4 mm acute or acuminate teeth, the upper surface glabrous to puberulent, the lower puberulent, purplish; cauline leaf petioles 1-11 cm long, the blades shorter than on basal leaves, ovate, crenate, serrate or entire, usually puberulent, purplish especially below, the base truncate or tapered. INFLORESCENCES axillary; pedicels to 15.5 cm long. FLOWERS: sepals to 9 mm long; petals yellow on the face, the lower 3 petals brown- to purple-veined, the upper 2 usually brownish-purple on back, the lateral 2 bearded, the lowest petal (including spur) to 15 mm long, the spur gibbous. FRUITS 5-12 mm long, puberulent. —5 subspp, 2 in AZ; CO, NV, OR, UT, WA, WY; n Baja C., Mex.

1. Pedicels to 15.5 cm long; plants 8-22 cm, the stems usually elongating later in season subsp. *mohavensis*
 1' Pedicels usually less than 7 cm long; plants 4-11 cm, the stems usually not elongating later in season subsp. *venosa*

Subsp. **mohavensis** (M.Baker & J.Clausen) J.Clausen (of Mohave Desert). —Usually tall plants with elongated stems. STEMS 8-22 cm long, usually extending above surface of leaf litter, usually elongated at end of growing season. LEAVES: basal blades ovate, deltate, or round, the base tapered or truncate, the tip obtuse, the margin deeply dentate-serrate with 2-4 mm acute or acuminate teeth, or obtuse lobes; cauline blades broad to narrow ovate, elliptic to lanceolate, the base tapered, the tip acute, the margin with 1-2 mm teeth or lobes as in basal leaves. FLOWERS: pedicel to 15.5 cm long. $2n = 12$ [*V. aurea* subsp. *mohavensis* M. Baker & J. Clausen; *V. purpurea* subsp. *arizonensis* M. Baker & J. Clausen]. —Shaded slopes and riparian areas: Gila, Yavapai cos.; 1400-1500 m (4600-4900 ft); Apr-May; CA. Rare in AZ.

Subsp. **venosa** (S. Watson) M. Baker & J. Clausen (veiny). —Usually small, often rosette-like plants. STEMS 4-11 cm long, barely extending above surface of leaf litter, little elongated at end of growing season. LEAVES: basal blades often more or less rounded or hemispheric, often quite succulent, often appressed to ground, the margins usually crenate; cauline blades ovate to lanceolate, crenate, dentate, scalloped or more or less serrate. FLOWERS: pedicel usually less than 7 cm long. $2n = 12$. [*V. purpurea* subsp. *geophyta* M. Baker & J. Clausen; *V. purpurea* subsp. *atriplicifolia* M. Baker & J. Clausen]. —In brush, sagebrush flats, dense shade of forests: Yavapai co.; 1300-1500 m (4200-5000 ft); Apr-May; CA, CO, NV, UT, WA, WY.

Viola rafinesquii Greene (for C. S. Rafinesque). Johnny Jump-up. —Annuals 2.5-25 cm tall. STEMS erect, often much branched from the base, glabrous or short strigose on the angles or surface. LEAVES simple, cauline, alternate, glabrous to sparsely pubescent; stipules 8-22 mm long, palmately lobed, the middle lobe leaf-like, oblanceolate to elongate, spatulate, the lower lobes shorter, dissected, the margins usually ciliate; petioles 3-20 mm long; lower blades 4-14 mm long, orbicular

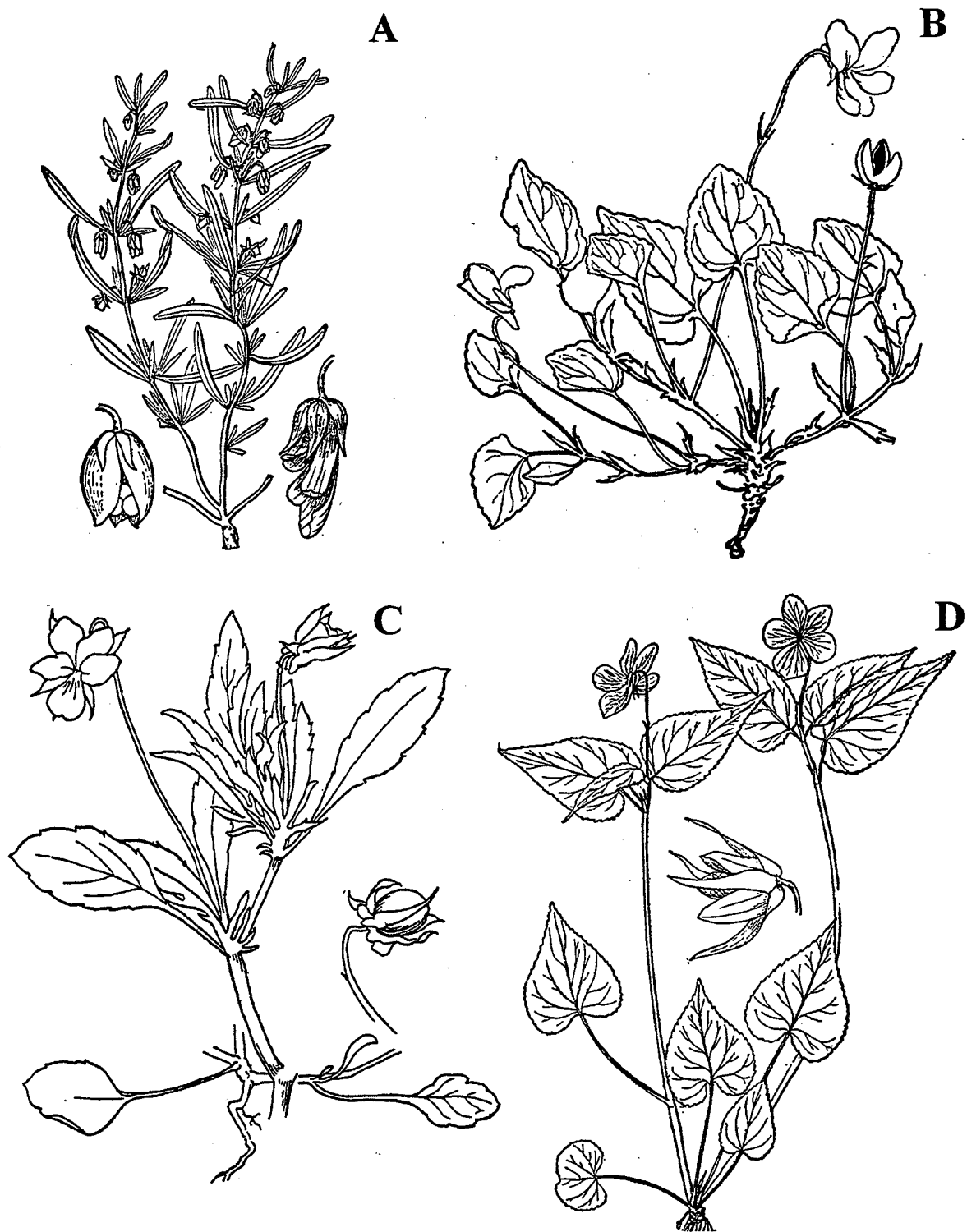
to ovate, the margins entire to irregularly notched; upper blades 11-30 mm long, 3-13 mm wide, spatulate to obovate, or broadly elliptic, seldom lanceolate, the margins nearly entire to notched. INFLORESCENCES axillary, the pedicels to 6.3 cm long. FLOWERS: sepals to 7 mm long, with 1-2 mm long ear-like lobes at the base; petals much longer than sepals, bluish white or blue, the lowest petal (including spur) 7-13 mm long; cleistogamous flowers present. FRUITS 4-7 mm long, glabrous. $2n = 34$. [*V. bicolor* Pursh; *V. kitaibeliana* Roem. & Schult. var. *rafinesquii* (Greene) Fern.]. —Woodlands, fields, roadsides: Gila, Pima, Pinal cos.; 1200-1600 m (4000-5200 ft); Mar-May; CO, KS, MI, MO, NE, NY, s to GA, NM, OK, SC, TX. Often confused with *V. arvensis*.

Viola sororia Willd. (sister, resembling other species). —Perennial herbs to 50 cm tall. STEMS none; plants arising from short, thick rhizomes with long fibrous roots. LEAVES simple, basal; blades to 10 cm wide, cordate to reniform, widely ovate to elliptic, triangular to deltate, glabrous to strigose throughout; margins crenate to serrate, ciliate or not; tip acute to obtuse. INFLORESCENCES: scapose, the pedicels elongated. FLOWERS: sepal auricles of cleistogamous flowers elongated or not; petals light to dark blue-violet, the lower 3 purple-veined, the lateral 2 white-bearded, the lowest petal sometimes spurred; cleistogamous pedicels prostrate to ascending. FRUITS 5-10 mm long, glabrous. $2n = 54$. 4 subspp, 1 in AZ; AK(Yukon), w and e U.S.; Can.

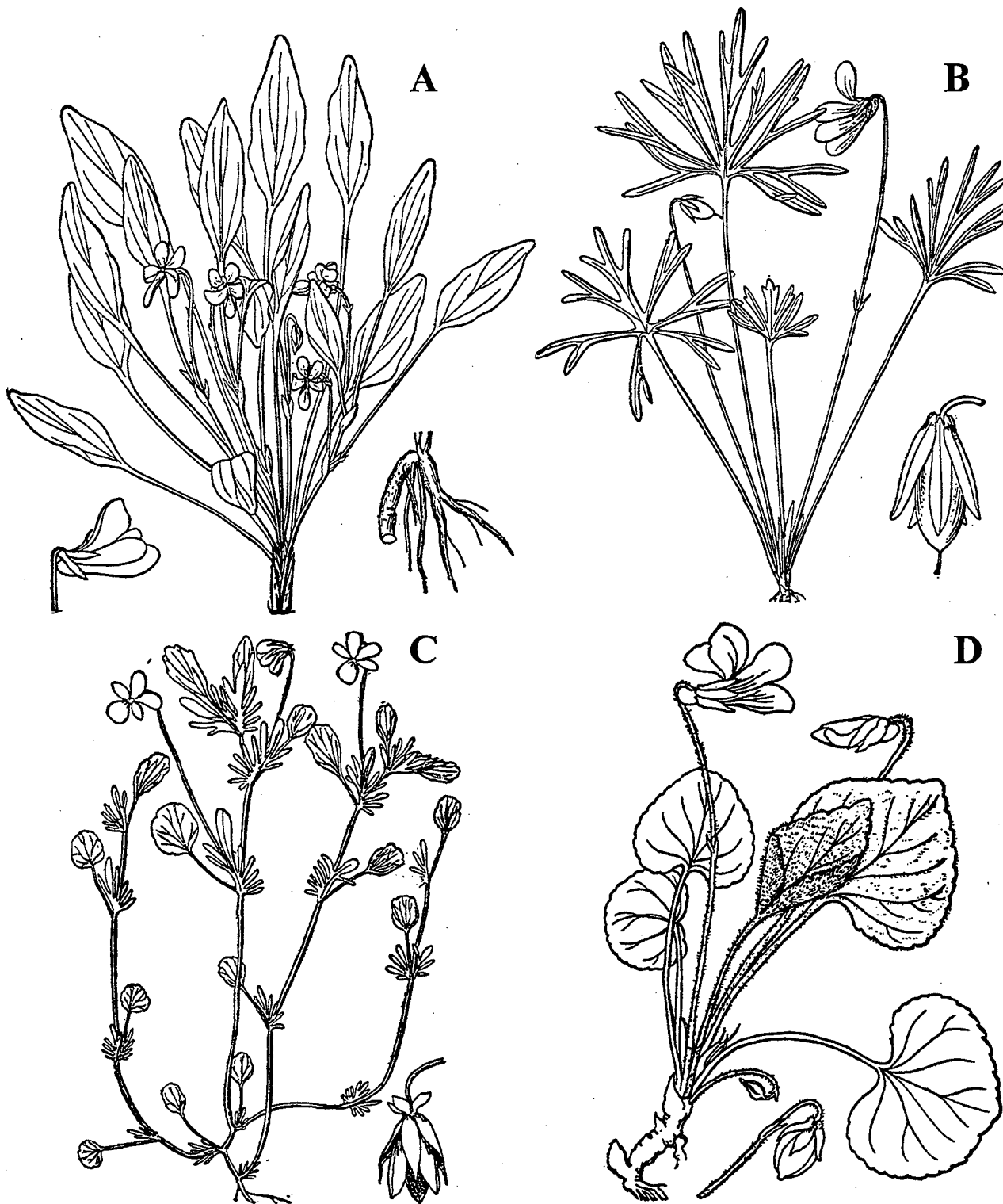
Subsp. **affinis** (Leconte) R.J.Little (similar to). —Plants 3-25 cm tall. LEAVES: petioles 5-23 cm long; midseasonal leaf blades cordiform to very widely ovate, 10-45 mm long, 1.5-7 mm wide, glabrous but occasionally strigose-pubescent at leaf base, ciliate or not. INFLORESCENCES: pedicels to 17 cm long. FLOWERS: sepals to 8 mm long; sepal auricles of cleistogamous flowers elongated; petals deep blue-violet; lowest petals (including spur) 10-19 mm long, the spur blunt, ca 5 mm long, 3 mm wide, straight; cleistogamous pedicels ascending. Wet or damp soil along creeks and streams, and shady hillsides of coniferous forests: Apache, Cochise, Coconino, Gila, Graham, Greenlee, Mohave, Pima, Santa Cruz, Yavapai cos. 1200-2900 m (4000-9500 ft); Mar-Jul; AK (Yukon), w U.S. to IA, WI to ME; Can. Often confused with *V. adunca* which has branching stems and *V. umbraticola* which inhabits dry sites. Mistakenly called *V. nephrophylla* Greene by Kearney and Peebles.

Viola umbraticola Humb. Bonpl. & Kunth (inhabits shade). —Perennial herbs to 11 cm tall from a woody taproot. STEMS none. LEAVES simple, basal, the older usually flattened to the ground; petioles 10-80 mm long, pubescent; leaf blade 10-40 mm long, 10-35 mm wide, ovate to oblong, often purple-dotted on upper and lower surfaces, the upper surface usually glabrous, the lower pubescent, the margin crenate to serrate, the base truncate to cordate, the tip obtuse. INFLORESCENCES scapose, the pedicels to 8 cm long, pubescent. FLOWERS: sepals 4-8 mm long including the 1 mm long auricle; petals blue to violet tipped, whitish at base with nectar guides, the lateral 2 petals light blue, purple tipped, bearded, the lowest petal (including spur) 9-16 mm long, the spur elongated, conspicuous, straight, 2.5-4 mm long. FRUITS 4-11 mm long, glabrous. —2 vars., 1 in AZ; AZ and Mex.

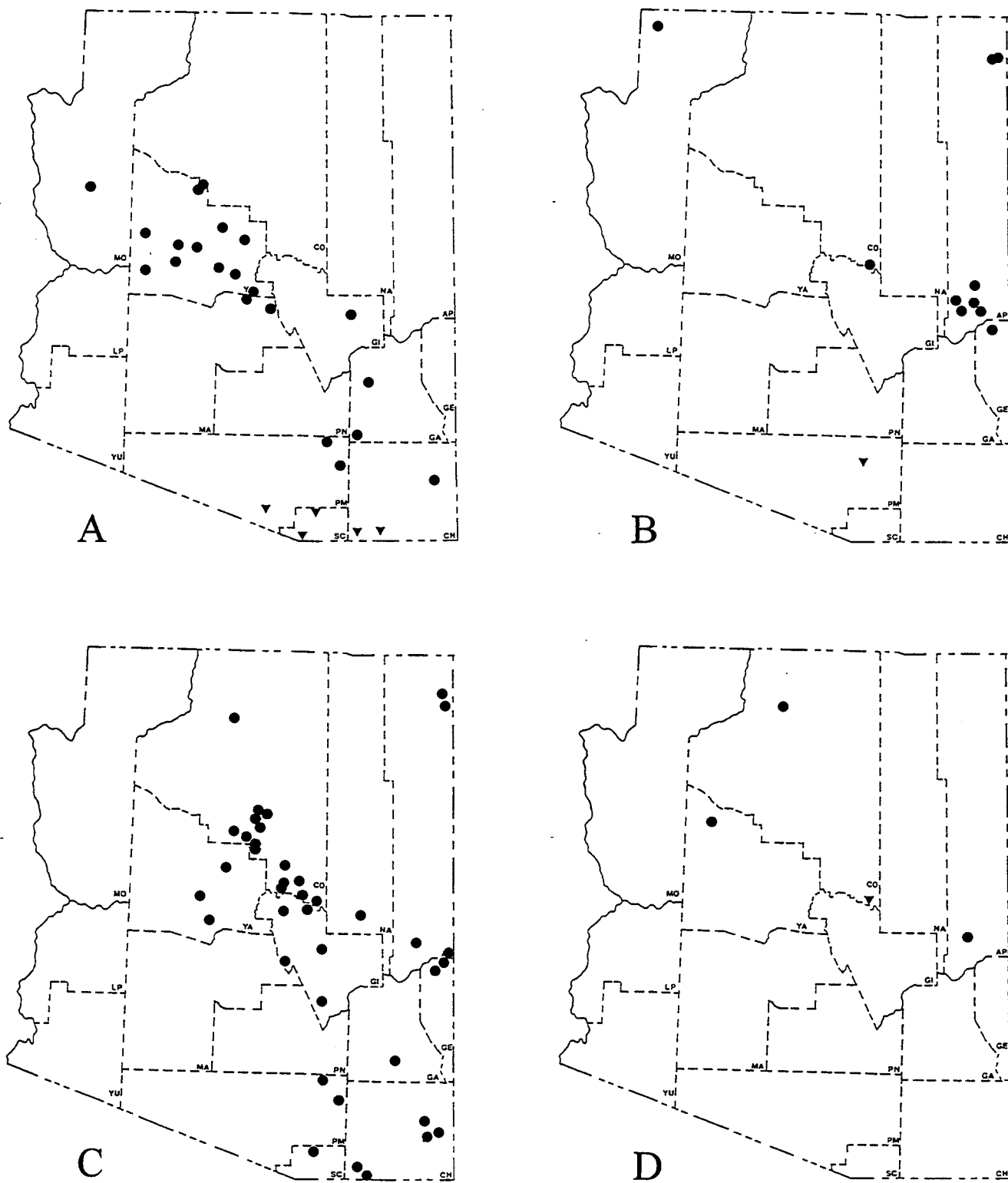
Var. **glaberrima** W.Becker (glabrous) —Plants glabrous. —In coniferous forests, often at base of shrubs or trees in dense pine duff. Cochise, Pima, Santa Cruz cos.; 1600-2400 m (5200-7800 ft); May-Aug; Mex.



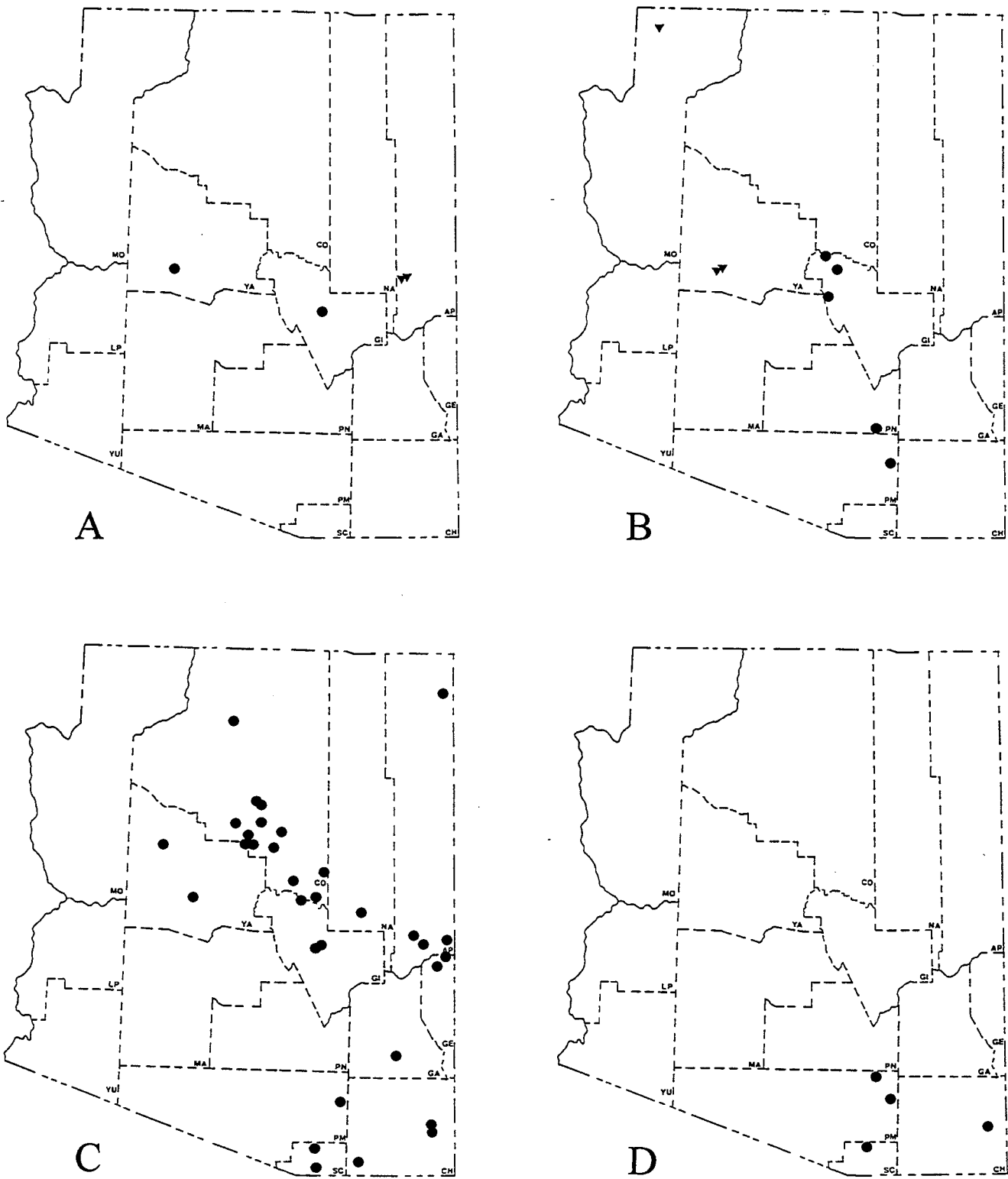
Violaceae. Fig.1. A, *Hybanthus verticillatus* (habit $\times 0.65$). B, *Viola adunca* (habit $\times 1$). C, *V. arvensis* (habit $\times 0.85$). D, *V. canadensis* (habit $\times 0.5$). Reproduced from *An Illustrated Flora of the Northern United States and Canada* by N. L. Britton and A. Brown (1913) where figure in A appeared as *Calceolaria verticillata*.



Violaceae. Fig. 2. A, *Viola nutallii* (habit $\times 0.65$). B, *V. pedatifida* (habit $\times 0.65$). C, *V. rafinesquii* (habit $\times 0.85$). D, *V. sororia* (habit $\times 0.85$). Reproduced from *An Illustrated Flora of the Northern United States and Canada* by N. L. Britton and A. Brown (1913).



Violaceae. Fig. 3. Distribution of: A, *Hybanthus attenuatus* (triangles), *Hybanthus verticillatus* (dots); B, *Viola adunca* (dots), *Viola arvensis* (triangle); C, *Viola canadensis*; D, *Viola macloskeyi* (triangle), *Viola nuttallii* (dots).



Violaceae. Fig. 4. Distribution of: A, *Viola pedatifida* ssp. *pedatifida* (triangles), *Viola purpurea* ssp. *mohavensis* (dots); B, *Viola purpurea* ssp. *venosa* (triangles), *Viola rafinesquii* (dots); C, *Viola sororia* ssp. *affinis*; D, *Viola umbraticola* var. *glaberrima*.