

PORTULACACEAE PURSLANE FAMILY

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Annual or perennial herbs; stems simple or branched, prostrate to erect. LEAVES cauline and opposite or alternate, or all basal, often fleshy; stipules present as axillary hairs or absent. INFLORESCENCE racemose or cymose, terminal or axillary, or flowers solitary; bracts present or absent. FLOWERS actinomorphic, perfect; pedicellate or sessile; sepals 2 (rarely 5-9); petals 5-18; stamens 1-many; ovary superior or inferior (in *Portulaca*), of 1-many fused carpels, 1-loculed; placentation basal or free-central. FRUIT a 1-many-seeded capsule, splitting at apex by 2-3 valves or circumscissile. SEEDS smooth or sculptured. – Ca. 30 genera, 500 spp., cosmopolitan, especially w. N. Amer. Some genera are cultivated as ornamentals (*Lewisia*, *Portulaca*); leaves of a few species can be eaten as greens or pot herbs; roots of *Lewisia* were historically used by Native Americans as a starchy staple (Moerman 1998).

1. Ovary wholly or partially inferior; capsule circumscissile near middle..... ***Portulaca***
- 1' Ovary superior; capsule with 2-3 valves or circumscissile from base.
 2. Plants perennial with fleshy taproots; leaves in a tight basal rosette ***Lewisia***
 - 2' Plants annual or perennial with corms, rhizomes or stolons; leaves both basal and cauline.
 3. Sepals mostly deciduous; inflorescences not appearing secund; leaves articulate at base, not clasping, the attachment points round; capsule valves wholly or partly deciduous.
 4. Leaf blades terete or semiterete, 1-3 mm wide, or narrowly planate, 1(-2) cm wide (in *P. aurantiacus*); capsules promptly dehiscent, exocarp and endocarp not macroscopically differentiated and not separating, the valves deciduous; seeds smooth or ridged, with covering membrane.. ***Phemeranthus***
 - 4' Leaf blades broadly planate, 1-7 cm wide; capsules tardily dehiscent, exocarp and endocarp macroscopically differentiated and separating, exocarp valves deciduous, the endocarp valves persistent; seeds minutely tuberculate, without covering membrane ***Talinum***

- 3' Sepals persistent; inflorescences somewhat to markedly secund (at least distally); leaves not articulate at base, somewhat to markedly clasping, the attachment points linear; capsule valves not deciduous.
5. Cauline leaves opposite or absent; plants annual or perennial.
6. Inflorescence subtended by perfoliate to linear bracts; cauline leaves generally 2; plants annual or perennial *Claytonia*
- 6' Inflorescence bractless; cauline leaves generally more than 4; plants perennial..... *Montia*
- 5' Cauline leaves alternate; plants annual.
7. Inflorescence a simple elongate raceme; petals red to purple; capsules 3-valved *Calandrinia*
- 7' Inflorescence a raceme or panicle of umbellate clusters; petals white to pink; capsules 2-valved (3-valved in *C. ambigua*) *Cistanthe*

Calandrinia Kunth

Allison Bair

Annual herbs. STEMS branched, several to many, prostrate to erect. LEAVES alternate, linear to spatulate, entire, succulent. INFLORESENCE an elongated raceme; bracts leaf-like. FLOWERS few to many, pedicellate; sepals 2, ovate; petals 5, red to purple, rarely white; stamens 3-15. CAPSULE with 3 valves. SEEDS ovate to elliptic, black, smooth to finely reticulate. —Ca. 14 spp. in the temperate w. Americas. (for J. L. Calandrini, 1703-1758, Swiss botanist).

Calandrinia ciliata (Ruiz & Pav.) DC. ([leaves] ciliate). Red Maids. —Herbs to 30 cm tall, from slender to thick taproot. STEMS spreading, prostrate to ascending. LEAVES linear to oblanceolate, to 10 cm long, glabrous or ciliate. FLOWERS 2-15; pedicels 4-13 mm long; sepals 2.5 – 8 mm long; petals 4-11 mm long, red to purple. SEEDS 5-20, elliptic, finely reticulate, 1-2.5 mm long. —Sandy to loamy soil, sand and gravel washes, rocky slopes: Cochise, Gila, Graham, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai cos.; 425-1550 m (1400 - 5100 ft); Feb-Jun; CA, OR, WA; w Mex., Guatemala, w S. Amer.

Cistanthe Spach Pussypaws

Allison Bair

Annual, biennial, or perennial herbs. STEMS simple or branched, spreading to ascending or erect. LEAVES in basal rosette or basal and cauline, linear to spatulate, entire, generally succulent. INFLORESENCE a raceme or panicle of umbellate clusters, generally one-sided. FLOWERS few to many, pedicellate or sessile, each subtended by two unequal bracts; petals white to pink; sepals ovate, scarious or scarious-margined; petals 2-12; stamens 1-23; styles present or absent; stigmas 2-3, sessile or stalked. CAPSULE with 2-3 valves. SEEDS one to many, elliptic to round, black, smooth to sculptured. —Ca. 35 spp. distributed from N. to S. Amer.

Spach (1836) described the genus *Cistanthe* to accommodate several Chilean species that he segregated from *Calandrinia*. Recent cladistic investigations (HersHKovitz 1991) indicate that many other species also belong in *Cistanthe*. These include the Arizona species

formerly recognized as *Calandrinia ambigua*, *Calyptridium monandrum*, and *Calyptridium parryi*.

1. Basal rosette absent; flowers pedicellate; capsule 3-valved *C. ambigua*
- 1' Basal rosette well-developed (although withering at anthesis); flowers sessile; capsule 2-valved
 2. Sepals 1.5-5 mm long; capsules not more than twice as long as sepals *C. parryi*
 - 2' Sepals 1-3 mm long; capsules two and a half or more times as long as sepals
..... *C. monandra*

Cistanthe ambigua (S. Wats.) Carolin ex Hershk. (of uncertain relationship). Desert pussypaws. —Annual herbs to 10 cm tall. STEMS spreading to erect. LEAVES all cauline, linear to spatulate, 1.5-5 cm long. INFLORESCENCE a panicle of umbellate clusters, up to 4 cm long; bracts leaf-like. FLOWERS pedicellate; pedicels 1-5 mm; sepals scarious-margined, ovate, 2.5-5 mm long; petals 3-5, white, 2-5 mm long; stamens 5-10; stigmas 3, stalked. CAPSULE with 3 valves, ovoid, 3-6 mm long, equal to or less than length of calyx. SEEDS 6-15, black, smooth, shiny. [*Calandrinia ambigua* (S. Wats.) T.J. Howell]. —Sand and gravel washes, rocky slopes, in desert scrub communities; La Paz, Mohave, Yuma cos.; 0 – 500 m (0 – 1700 ft); Feb-May; CA, Mex.

Cistanthe monandra (Nutt.) Hershk. (one-stamened). Common pussypaws. —Annual herbs to 16 cm tall. STEMS spreading to ascending. LEAVES in an ephemeral basal rosette, spatulate, to 7.5 cm long. INFLORESCENCE a 1-sided raceme, up to 3.5 cm; bracts ovate to elliptic. FLOWERS sessile; sepals scarious or scarious-margined, ovate, 1-3 mm long; petals 3, white to pinkish, 1-3 mm long; stamen 1; styles absent; stigmas 2, sessile. CAPSULE with 2 valves, ovoid to cylindric, 2.5- 8 mm long, two and a half or more times as long as sepals. SEEDS 1-10, black, smooth, shiny. [*Calyptridium monandrum* Nutt.] —Sand and gravel washes, rocky slopes, roadsides: Cochise, Gila, Graham, Maricopa, Mohave, Pima, Pinal, Santa Cruz, Yavapai, Yuma cos.; 400 – 1550 m (1400 – 5000 ft); Feb-May; CA, NV, Mex. (Baja C.).

Cistanthe parryi (A. Gray) Hershk. (for Charles Parry [1823-1890], surgeon and naturalist on Mexican Boundary Surveys). Parry's Pussypaws. —Annual herbs to 10 cm tall. STEMS spreading to ascending. LEAVES in an ephemeral basal rosette, spatulate, up to 7.5 cm long. INFLORESCENCE a 1-sided raceme, to 4.5 cm long; bracts ovate to elliptic. FLOWERS sessile; sepals scarious or scarious-margined, ovate, 1.5-5 mm long; petals 3, white to pinkish, 1.5-3 mm long; stamens 1-3; styles absent; stigmas 2, sessile. CAPSULE with 2 valves, ovoid to cylindric, 2-8 mm long, not more than twice as long as sepals. SEEDS 5-15, black, tuberculate to smooth, dull to shiny. —4 vars. (1 in AZ); CA to UT .

Var. **arizonica** (J.T. Howell) Kartesz & Gandhi (from Arizona). Arizona Pussypaws. —Seeds smooth, shiny. [*Calyptridium parryi* Gray var. *arizonicum* J.T. Howell]. —Sand and gravel washes, open areas: Graham, Pima, Pinal, Yavapai cos.; 800 – 1300 m (2600 – 4200 ft); Feb. - May; CA; Mex. (Baja C.).

Claytonia L. Spring Beauty
Marissa Howe

Annual or perennial herbs, with corms or taproots. STEMS simple or branched, erect. LEAVES: basal leaves none to many, entire; cauline leaves 2, opposite, distinct to fully

connate into a perfoliate disk; margins entire or cleft; apex sometimes apiculate. INFLORESCENCE a stalked or sessile raceme or cyme, dense or open; bracts present, minute. FLOWERS 1-28; sepals 2, ovate; petals 5, pink or white; stamens 5. CAPSULE with 3 valves. SEEDS lens-shaped, brown to black, shiny. —Ca. 26 spp. (3 in AZ) distributed from N. Amer. to e. Asia. Corms of *C. lanceolata* var. *rosea* and leaves of *C. parviflora* and *C. perfoliata* are edible (Moerman 1998). (for John Clayton, 1694-1773, plant collector).

1. Perennial herbs with corms; basal leaves none to few; cauline leaves free....*C. lanceolata*
- 1' Annual herbs with fibrous roots; basal leaves few to many; cauline leaves free, or connate and perfoliate.
 2. Basal leaves linear to narrowly oblanceolate, tapered gradually to petiole *C. parviflora*
 - 2' Basal leaves ovate, deltate or rhomboidal, truncate to cordate *C. perfoliata*

Claytonia lanceolata Pall. ex Pursh (lance-shaped [leaves]). Western Spring Beauty. — Erect perennial herbs to 21 cm tall, arising from a spherical corm, 0.8 – 2.6 cm wide. LEAVES: basal leaves none to few, ovate to lanceolate, cauline leaves usually 2, sessile to short-petiolate, linear to narrowly lanceolate. INFLORESCENCE a short simple or branched raceme or cyme. FLOWERS 1-9; sepals 2.7-8 mm long; petals 5 – 20 mm long, smooth at tip, white or pink, the base sometimes yellow. SEEDS 2.2 – 2.5 mm long, black. Widespread, woodlands and meadows throughout w N. Amer.

Var. **rosea** (Rydb.) R. J. Davis (rose-colored). —Basal leaves 1-2, attached to corm, ovate to lanceolate, 3.1-13.8 cm long, 0.6-1.8 cm wide. INFLORESCENCE subtended by a leafy bract with minute upper bracts in the inflorescence reduced to membranous scales. FLOWER petals 5-16 mm long. [*Claytonia rosea* Rydb.]. — Ponderosa pine and pinyon-juniper forests, in moist soil, often near the Mogollon Rim: Cochise, Coconino, Gila, Maricopa, Mohave, Navajo, Yavapai cos.; 1300-2300 m (4200–7500 ft); Feb-May; CO, MT, NM, UT, w Can.

The Arizona specimens are here all referred to *Claytonia lanceolata* var. *rosea*. In some recent floristic treatments (Weber 1990, Miller 2003) this taxon is recognized as *C. rosea* and separated from *C. lanceolata* based on the presence of basal leaves (vs. absent in *C. lanceolata*), multiple minute bractlets within the inflorescence (vs. bractlets absent in *C. lanceolata*), and petal length 8-10 mm (vs. 5-20 mm in *C. lanceolata*). Of these three characters, only the presence of basal leaves distinguishes the Arizona specimens as a distinct taxon, recognized here as a geographical variety. Basal leaves originate from the corm, so when the corm is absent from herbarium specimens the basal leaves are absent or disconnected. Thus lack of basal leaves is often a reflection of the quality of the collection (i.e., whether the specimen was dug up vs. pulled up). Out of the 32 specimens examined that had corms, only 4 were missing basal leaves. *Claytonia lanceolata* var. *rosea* needs experimental work to substantiate its recognition at the specific level.

Claytonia parviflora Douglas ex Hook. (small-flowered). Streambank Spring Beauty. —Annual herbs, to 15 cm tall, spreading to erect. LEAVES: basal leaves linear to narrowly oblanceolate, 1.9-12.8 cm long, 0.1-4 cm wide, tapering gradually to petiole; cauline leaves 2, free, or connate into a perfoliate disk with margins entire, sometimes with 2 apiculate or

mucronate tips. INFLORESCENCE a stalked or sessile raceme, dense or open, subtended by a single, often obscure bract. FLOWERS 3 –19; sepals 1 – 2.5 mm long; petals 2.5 – 5 mm long, oblong, notched at tip, pink or white. SEEDS 1 – 1.5 mm long, black. —4 subspp. (3 in AZ); w N. Amer.

Based upon Miller's treatment for Flora of North America (2003) and annotated herbarium specimens, three subspecies of *Claytonia parviflora* have been recognized in Arizona. Subspecies *viridis* is morphologically distinct from the others because its cauline leaves are distinct vs. connate-perfoliate as in the other two subspecies. Subspecies *parviflora* and *utahensis* seem to be distinct only in their respective geographic ranges. Subspecies *utahensis* is found north of the Mogollon Rim, whereas subsp. *parviflora* is found s of the Mogollon Rim. We observed a large amount of variability in basal leaf shape, which, according to Miller, delimits these subspecies (see key below).

1. Cauline leaves free..... subsp. *viridis*
- 1' Cauline leaves connate.
 2. Basal leaves linear to narrowly oblanceolate; plants found south of the Mogollon Rim subsp. *parviflora*
 - 2' Basal leaves narrowly oblanceolate to spatulate; plants found north of the Mogollon Rimsubsp. *utahensis*

Subsp. **parviflora** —LEAVES: basal leaves linear to narrowly oblanceolate, 6.3 – 12.8 cm long, 0.15-1 cm wide; cauline leaves connate and perfoliate. FLOWERS 4 – 14; sepals 1.2 – 2.5 mm long; petals 2.5-3 mm long, pink or white. SEEDS 1.2-1.5 mm long. $2n = 24, 36, 48$. [*Claytonia perfoliata* var. *parviflora* (Douglas ex Hook.) Torr.; *Montia perfoliata* var. *parviflora* (Douglas ex Hook.) Jeps.; *M. perfoliata* forma *parviflora* (Douglas ex Hook.) J. T. Howell]. —Moist areas: Gila, Maricopa, Pinal cos.; 800-1050 m (2600-3500 ft); Mar-May; CA, ID, MT, NV, OR, UT, WA; British Columbia, Can.; Mex. This subspecies may intergrade with other species of the *C. perfoliata* complex (Miller 2003).

Subsp. **utahensis** (Rydb.) John M. Mill. & K.L. Chambers (of the Utah region). Mohave Indian-lettuce. —LEAVES: basal leaves narrowly oblanceolate to spatulate, 2.2-12.4 cm long, 0.6-4 cm wide; cauline leaves connate and perfoliate. FLOWERS 6-19; sepals 1-2.3 mm long; petals 3-3.5 mm long, white. SEEDS 1.0-1.5 mm long. [*Limnia utahensis* Rydb.; *Claytonia perfoliata* var. *utahensis* (Rydb.) Poelln.; *Montia utahensis* (Rydb.) Pax & K. Hoffm.]. —Moist areas: Coconino, Mohave, Yavapai cos.; 900-1200 m (3000-3900 ft); Mar-Apr; CA, NV; Mex.

Subsp. **viridis** (Davidson) John M. Mill. & K.L. Chambers (green). Davidson's Indian-lettuce. —LEAVES: basal leaves linear to narrowly oblanceolate, 1.9-9.1 cm long, 0.1-0.5 cm wide; cauline leaves free. FLOWERS 3-9; sepals 1.9-2.5 mm long; petals 2.8-5 mm long, white or pink. SEEDS 1.3-1.4 mm long. $2n = 24, 36$. [*Montia spathulata* var. *viridis* Davidson, *M. spathulata* var. *tenuifolia* (Torr. & A.Gray) Munz]. —Decomposed granite or sandstone, nw corner of AZ: Mohave Co.; 1200-1550 m (4000-5100 ft); Apr; CA, NV; Mex. This taxon intergrades with subspecies *parviflora* (Miller 2003).

Claytonia perfoliata Donn ex Willd. (connate-leaved). Miner's-lettuce. —Annual herbs to 30 cm tall, spreading to erect. LEAVES: basal leaves several, narrowly oblanceolate to ovate to deltate or rhomboidal, 1.2 - 19 cm long, 0.3 – 4.5 cm wide, the base abruptly tapered; cauline leaves 2, connate, perfoliate, disk-like, subtending the inflorescence; apex

apiculate or mucronate; margin entire or occasionally notched or cleft. INFLORESCENCE a stalked or sessile raceme, dense or open, subtended by a single, often obscure bract. FLOWERS 5-28; sepals 1.5-4.5 mm long, ovate; petals oblong, 1-3 mm long, pink or white, notched at tip. SEEDS 1.0-1.8 mm long, brown to black. [*Montia perfoliata* (Donn ex Willd.) Howell]. Moist areas, stream banks, or riparian areas in desert scrub to Ponderosa Pine/Gambel Oak habitat: Apache, Coconino, Gila, Graham, Maricopa, Mohave, Pima, Pinal, Yavapai cos.; 350-2200 m (1200-7300 ft); Feb-Jun; CA, CO, ID, MT, NV, OR, UT, WA, WY; British Columbia, Can. to C. Amer.

Based upon annotated herbarium specimens and the recent Flora of North America treatment (Miller 2003), two subspecies of *Claytonia perfoliata* have been recognized in Arizona, subsp. *intermontana* and subsp. *mexicana*. They are not recognized as distinct entities here because the characteristics used to delimit these subspecies are not consistent or are extremely difficult to see. Subspecies *intermontana* is distinguished from subsp. *mexicana* by beet red or green herbage and gas pockets on the basal leaves (vs. green herbage only and no gas pockets). These subspecies have different geographical ranges (Chambers 1993, Miller 1978); subsp. *intermontana* grows in northwestern Arizona (Yavapai and Mohave Cos.), and subsp. *mexicana* grows in central to southern Arizona. It has been suggested that the subspecies of *C. perfoliata* may be difficult to identify due to environmental plasticity, genetic mixing among polyploids, and geographic overlap of distinct self-pollinating forms (Miller 1978).

Lewisia Pursh Bitter Root

Robin Taylor

Perennial herbs with fleshy taproots. STEMS simple or branched, prostrate to erect. LEAVES all basal, sessile or petiolate, linear to spatulate, glabrous; margins entire. INFLORESCENCE solitary or cymose; bracts present. FLOWERS 1-60, sepals 2 and green or 5-9 and petal-like, orbicular-ovate; petals 5-15, white to dark pink; stamens 5-50; styles 3-9, branched. CAPSULE circumscissile near base. SEEDS many, round, black, smooth. 16 species throughout w N. Amer. (for Meriwether Lewis, 1774-1809, of the Lewis and Clark expedition). Roots of most species were peeled and dried as a winter food by Native Americans (Moerman 1998).

1. Sepals 6-8, cream to pink; leaves ephemeral, withering before flowers appear.....
..... *L. rediviva*
- 1' Sepals 2, green; leaves persistent.
 2. Bracts appearing sepal-like, closely subtending flowers; leaves 1-12 mm wide;
capsules 6-9 mm wide *L. brachycalyx*
 - 2' Bracts leaf-like, well below flowers; leaves 0.5-4 mm wide; capsules 4-5 mm wide
..... *L. pygmaea*

Lewisia brachycalyx (Engelm.) A. Gray (short-sepaled). —TAPROOT 1.2-9.8 cm long. STEMS prostrate to sub-erect, 0.5-4.6 cm tall. LEAVES persistent, sessile, oblanceolate, 1.5-8.2 cm long, 0.1-1.2 cm wide; base truncate; apex rounded at tip. INFLORESCENCE bracts sepal-like, closely subtending the flowers. FLOWERS 2-26; sepals 2, ovate, 0.3-1 cm long, the tip acute, the margins entire; petals 5-8, white with pink veins, 0.6-2.6 cm long; stamens 9-15; styles 5-8. CAPSULE 6-9 mm long. SEEDS 1-1.8

mm long. –Sandy loam/sandstone slopes in conifer forests, often in streambeds: Apache, Coconino, Gila, Navajo, Yavapai cos.; 1100-2300 m (3,400-7,500 ft); Mar-Jun; CA, UT; Mex.

Lewisia pygmaea (A. Gray) B.L. Robins (dwarf). Pygmy Bitter Root or Alpine Lewisia. —TAPROOT 1-15 cm long. STEMS prostrate to suberect, 1-6 cm tall. LEAVES persistent, petiolate, linear to narrowly spatulate, 1.2-10.2 cm long, 0.5-4 mm wide; base long attenuate; apex acute to rounded. INFLORESCENCE bracts leaf-like, positioned well below flowers. FLOWERS 1-60; sepals 2, orbicular to ovate, 0.4-1.1 cm long; petals 5-9, white to dark pink, 0.4-1.3 cm long; stamens 5-8; styles 3-6. CAPSULE 4-5 mm long. SEEDS 1 mm long. —Meadows and conifer forests often among oaks and ferns: Apache, Coconino, Navajo cos.; 2400-3500 m (8,000-11,600 ft); May–Aug.; w U. S.; Can.

Lewisia rediviva Pursh (reviving from a dry state). —TAPROOT 6.0 – 8.3 cm long. STEMS prostrate to erect, 1.0-4.8 cm tall. LEAVES withering at anthesis, sessile, linear to oblanceolate, acute to rounded at apex. FLOWERS 1-7; sepals 6-8, ovate, 0.9-1.7 cm long; petals 10-15, creamy-pink, 1-2.2 cm long; stamens 20-50; styles 4-9. CAPSULE 5-6 mm long. SEEDS 2-2.1 mm long. –2 vars. in western N. Amer. (1 in AZ).

Var. **rediviva** —LEAVES linear, cylindrical, 1.0-1.4 cm long, 1.5-2 mm wide. —Rocky substrates in pinyon-juniper woodlands: Coconino Co.; 1676-1850 m (5,500-6,069 ft); May-June; CA, CO, MO (w U.S.).

Montia L. Water-chickweed

Tina Ayers

Perennial herbs, with rhizomes and stolons. STEMS erect or decumbent, often rooting at nodes. LEAVES alternate or opposite, petiolate. INFLORESCENCE a 1-sided raceme, bractless above first flower. FLOWERS 2 to many; sepals ovate; petals 3-5; stamens 3-5. CAPSULE with 3 valves. SEEDS 1-3, black, smooth or warty. —Ca. 12 species, cosmopolitan; 8 in N. America. (for Guiseppe Monti, 1682-1760, Italian botanist).

Montia chamissoi (Ledeb.) Spreng. (for L.K.A. Chamisso (1781-1838)). Water miners-lettuce. —Stems 3-27 cm long, from rhizomes with pink bulblets. LEAVES opposite, oblanceolate to obovate, 0.5-5 cm long, 0.1-1.7 cm wide, entire, glabrous, attenuate; apex acute to round. FLOWERS 2-14; sepals 2-3 mm long; petals 5, white to pinkish, 5-8 mm long; stamens 5. CAPSULE 2-3 mm long. SEEDS warty, 1-1.5 mm long. —Moist areas, often in wet meadows: Apache, Coconino, Gila, Navajo cos.; 2100-3000 m (7,000 – 9,500 ft); May–Sep; Pacific States e to the Rocky Mountains, also IA, MN, PA.

Phemeranthus Raf. Fameflower, Flameflower

Robert W. Kiger

Perennial herbs, caulescent, glabrous. ROOTS fleshy to woody, sometimes tuberous. STEMS simple or branching, spreading to erect, very short to elongate, sometimes suffrutescent. LEAVES alternate or subopposite, sometimes subrosulate, sessile or petiolate, sometimes subtended by free basal enations; blades terete to narrowly planate, succulent or semisucculent. INFLORESCENCE in ours terminal or lateral cymes or cymules, or flowers solitary in leaf axils; peduncles sometimes scape-like. FLOWERS pedicellate or subsessile, sometimes sessile in *P. parviflorus*, each opening for 2-4 hours in the afternoon to early evening of a single day, sometimes facultatively cleistogamous in *P. aurantiacus*; sepals 2,

distinct, deciduous or persistent through capsule dehiscence; petals 5 or rarely more, distinct or sometimes basally connate, fugacious; stamens 4-many, the filaments distinct or basally coherent in several clusters; ovary superior, 3-carpellate, the ovules many, the placentation free-central; style 1; stigma(s) 1 and subcapitate or 3 and linear. CAPSULE promptly loculicidal from the apex, 3-valved; exocarp and endocarp not macroscopically differentiated and not separating; valves deciduous. SEEDS many, small circular-reniform and compressed, smooth or with parallel arcuate ridges, black or brown, covered with white or pale gray membrane. $x = 12$. –25-30 spp. Amer. (from Greek *ephemoros*, living for one day, and *anthos*, flower). Kiger, R.W. 2001. *Novon* 11:319-321.

Morphological and molecular data support the separation of *Phemeranthus* from *Talinum*. All of our species of this complex, except *Talinum paniculatum*, are placed in *Phemeranthus*.

1. Petals yellow to reddish-orange; seeds with arcuate ridges on sides.
 2. Flowers single or in 2-3-flowered cymules in the leaf axils *P. aurantiacus*
 - 2' Flowers in cymes borne on scape-like peduncles.
 3. Leaves terete, not appearing petiolate *P. humilis*
 - 3' Leaves flattened, appearing petiolate *P. marginatus*
- 1' Petals white, pink, or purplish; seeds without arcuate ridges.
 4. Sepals 5 mm or more long, persistent, equaling or exceeding mature capsule
..... *P. brevicaulis*
 - 4' Sepals 4.5 mm or less long, deciduous or persistent and shorter than mature capsule.
 5. Stamens 5(-6) *P. parviflorus*
 - 5' Stamens (7-)10 or more.
 6. Leaves 15 mm or longer; stigma 1 *P. validulus*
 - 6' Leaves shorter than 15 mm; stigmas 3 *P. brevifolius*

Phemeranthus aurantiacus (Engelm.) Kiger (orange [-flowered]). —Herbs to 5 dm tall. ROOTS woody tuberous. STEMS simple or branching, erect, sometimes suffrutescent. LEAVES subsessile; blades linear to lanceolate, rarely oblanceolate, basally attenuate, to 6 cm long. INFLORESCENCE lateral with flowers inserted singly or occasionally in cymules; pedicels often recurving in fruit. FLOWERS: sepals ovate, sometimes cuspidate, 5-10 mm long, deciduous; petals obovate, 9-15(-25) mm long, yellow to reddish-orange; stamens usually 20-30; stigmas 3, linear. CAPSULES ovoid to globose, 4-7 mm long. SEEDS with arcuate ridges on sides, 1.2-1.7 mm long. [*Talinum angustissimum* (A. Gray) Wootton & Standl.; *T. aurantiacum* Engelm.; *T. aurantiacum* var. *angustissimum* A. Gray]. —Desert scrub and grasslands, savannahs and open woodlands, in rocky soil, often granitic, sometimes calcareous: Cochise, Gila, Graham, Greenlee, Maricopa, Pima, Pinal, Santa Cruz, Yavapai cos.; 750-2000 m (2400-6600 ft); May-Oct; NM, TX; Chih., Coah., Dgo., N.L., S.L.P., Tamp., Zac., Mex. Quite variable in size, flower color, and capsule shape, with a continuum of intergradation over its range. Plants from s AZ with petals yellow, leaves very narrow, stems short and slender, and capsules small and globose are an extreme form sometimes recognized separately as *T. angustissimum*.

Phemeranthus brevicaulis (S. Wats.) Kiger (short-stemmed). —Herbs to ca. 6 cm tall. ROOTS fusiform, somewhat woody. STEMS branching, spreading-ascending, sometimes suffrutescent. LEAVES sessile, to 25 mm long, the upper terete or subterete, the lower

flatter, wider, somewhat shorter. INFLORESCENCE terminal cymes or cymules, sometimes from very short sub-branches and appearing lateral, sometimes only 1-flowered, slightly to distinctly overtopping the leaves; peduncles to ca. 15 mm long. FLOWERS: sepals ovate to elliptic-lanceolate, 5-8 mm long, persistent beyond capsule dehiscence, equaling or exceeding mature capsules; petals obovate, 9-16 mm long, light rose to purplish-red; stamens usually 20 or more; stigma 1, subcapitate. CAPSULES ellipsoid, 4-6 mm long. SEEDS smooth, ca. 1 mm long. [*Talinum brevicaulis* S. Wats.; *T. pulchellum* Wootton & Standl.]. — Dry woodlands on rocky canyon slopes: mts of sw Cochise Co.; ca. 1900 m (ca. 6200 ft); May-Sep; NM, w TX; Chih., Coah., Mex.

Phemeranthus brevifolius (Torr.) Hershk. (short-leaved). —Herbs to ca. 6 cm tall. ROOTS elongate, woody. STEMS branching, spreading-ascending, sometimes suffrutescent. LEAVES crowded, sessile, to 15 mm long, subterete, linear to spatulate. INFLORESCENCE terminal cymules, sometimes on very short sub-branches and appearing lateral, often only 1-flowered, usually slightly overtopping the leaves; peduncles to ca. 3 mm long, sometimes obsolete. FLOWERS: sepals oval to orbiculate, 3-4 mm long, deciduous; petals obovate, 8-10 mm long, rose, lavender, or rarely white; stamens ca. 20; stigmas 3, sublinear. CAPSULES subglobose, 3.5-4 mm long. SEEDS smooth, ca. 1 mm long. [*Talinum brevifolium* Torr.]. —Dry rocky slopes and ledges in sand pockets: Apache, Coconino, Navajo cos.; 1600-2150 m (5200-7000 ft); Jun-Sep; NM, UT.

Phemeranthus humilis (Greene) Kiger (low-growing). —Herbs to 8 cm tall. ROOTS tuberous, sometimes forked. STEMS usually simple, erect overall, very short. LEAVES congested, sessile, terete, to 8 cm long. INFLORESCENCE lateral or terminal cymes, erect, overtopped by leaves; peduncles scape-like. FLOWERS: sepals ovate, ca. 3 mm long, deciduous; petals elliptic to obovate, ca. 4 mm long, yellow; stamens usually 5-8; stigma 1, subcapitate. CAPSULES ellipsoid to subglobose, sometimes triquetrous, 4-6 mm long. SEEDS with arcuate ridges on sides, ca. 1 mm long. [*Talinum humile* Greene]. —Dry shallow soil on or near rock outcrops: Santa Cruz Co.; ca. 1600 m (ca. 5200 ft); Jul-Aug; sw NM; Chih., D.F., Dgo., Mex.

Phemeranthus marginatus (Greene) Kiger ([leaves] margined). —Herbs to 5 cm tall. ROOTS tuberous. STEMS simple, erect overall, very short. LEAVES congested, strongly contracted at or below middle and appearing petiolate, to 4 cm long; distal portion flattened, oblong-spatulate. INFLORESCENCE lateral or terminal cymes, erect, usually overtopping the leaves; peduncles scape-like. FLOWERS: sepals broadly lanceolate to ovate, 2-3 mm long, deciduous; petals obovate 3-5 mm long, yellow; stamens 5; stigma 1, subcapitate. CAPSULES ellipsoid, ca. 3 mm long. SEEDS with arcuate ridges on sides, ca. 1 mm long. [*Talinum marginatum* Greene]. —Dry, rocky slopes, ridges and ledges: Cochise, Santa Cruz cos.; 1600-2150 m (5200-7000 ft.); Jul-Aug; Chih., Dgo., Nay., Son., Mex.

Phemeranthus parviflorus (Nutt.) Kiger (small-flowered). —Herbs to 2 dm tall. ROOTS elongate, becoming stout, somewhat woody. STEMS simple or branching, more or less erect, sometimes suffrutescent. LEAVES usually congested, sessile, terete, to 5 cm long. INFLORESCENCE lateral or terminal cymes, erect, greatly overtopping the leaves; peduncles scape-like. FLOWERS: sepals ovate, sometimes acuminate-cornate, 2.5-4.5 mm long, deciduous or sometimes persistent beyond capsule dehiscence and slightly shorter than mature capsule; petals obovate to elliptic, 5-7 mm long, pink to purple; stamens (4-)5(-6); stigma 1, subcapitate. CAPSULES ellipsoid or sometimes ovoid, sometimes obtusely triquetrous, 3.5-5 mm long. SEEDS smooth, ca. 1 mm long. [*Talinum confertiflorum*

Greene; *T. gooddingii* P. Wilson; *T. parviflorum* Nutt.]. —Dry woodlands, chaparral, scrub and grassland, on outcrops and in rocky soil; all counties except Graham, La Paz, Maricopa, Pinal, Yuma; 1200-2400 m (4000-7800 ft); Jun-Sep; AL, & MN, w to NM & WY; Chih., Coah., Mex. Varying considerable over its wide range. Plants from AZ with stems slender and tending to elongate, sepals apically cornate, and capsules ovoid have been recognized as *T. gooddingii* but intermediates of all degrees are found.

Phemeranthus validulus (Greene) Kiger (diminutively robust). —Herbs to 12 cm tall. ROOTS elongate, becoming stout, woody. STEMS branching, spreading-ascending overall, sometimes basally decumbent. LEAVES somewhat congested, sessile, terete, to 45 mm long. INFLORESCENCE lateral or terminal cymes, erect, slightly to greatly overtopping the leaves; peduncles to 6 cm long, sometimes scape-like. FLOWERS: sepals broadly lanceolate, 4 mm long, persistent beyond capsule dehiscence, shorter than mature capsules; petals elliptic-ovate, ca. 9 mm long, purplish pink, paler at base; stamens (7-)10-18; stigma 1, subcapitate. CAPSULES ovoid, strongly triquetrous, 5-7 mm long. SEEDS smooth, ca. 1 mm long. [*Talinum validulum* Greene]. —Woodland openings in rocky soil: Coconino, Mohave, Yavapai cos.; 1700-2300 m (5600-7500 ft); May-Sep.

Portulaca L. Purslane

Daniela Roth

Annual or perennial herbs. STEMS prostrate to ascending or erect. LEAVES alternate to subopposite, short-petioled or sessile, flat, cylindrical, subterete, linear or spatulate; margins entire; hairy nodes present or absent. INFLORESCENCE typically a cyme subtended by involucreal leaves with flowers crowded at the branch ends or rarely solitary. FLOWERS perfect; sepals 2, united below, deciduous with the top of the capsule; petals mostly 5; ovary partly or wholly inferior; stamens 5 to many; stigmatic branches 2-9. CAPSULE membranaceous, circumscissile. SEEDS numerous, round-reniform, tuberculate, gray, brown, or black, often iridescent. —Ca. 125 spp. worldwide, mostly in the tropics and subtropics. (*portula*, latin for little door, referring to lid of capsule).

1. Lower portion of capsule with an expanded circular membranaceous wing just below the rim.....*P. umbraticola*
- 1' Lower portion of capsule without membranaceous wing.
 2. Leaf nodes and inflorescence glabrous or with inconspicuous hairs; leaves flat, obovate-cuneate or spatulate, typically more than 3 mm wide*P. oleracea*
 - 2' Leaf nodes and inflorescence with conspicuous hairs; leaves terete to subterete, typically less than 3 mm wide.
 3. Petals pink to purple *P. pilosa*
 3. Petals yellow, orange or copper.
 4. Plants perennial, erect; petals 3 – 10 mm long; capsules 2 – 4.2 mm in diameter*P. suffrutescens*
 4. Plants annual, prostrate to suberect; petals 2 – 2.5 mm long; capsules 1 – 2 mm in diameter*P. halimoides*

Portulaca halimoides L. (possibly referring to similarity with *Halimione*, an old name for *Atriplex*). Dwarf Purslane. —Annual herbs from a slender, fibrous root. STEMS much branched, prostrate to somewhat ascending, 2-16 cm long, often reddish, glabrous. LEAVES

alternate, linear, cylindrical or nearly so, 4-15 (18) mm long, 0.5-3 mm wide; nodes with conspicuous white-villous hairs. INFLORESCENCE white-villous; involucre bracts 6-8, 3-8 mm long, 0.5-3 mm wide. FLOWERS solitary or clustered at the ends of branches; sepals typically turning reddish at maturity; petals 2-2.5 mm long, yellow to copper colored; stigmatic branches 3-4. CAPSULE 1-2 mm in diameter; stipe 1-1.5 mm long. SEEDS iridescent grayish or blackish at maturity, rounded or stellate-tuberculate. [*Portulaca parvula* A. Gray]. —Sandy or gravelly soils, in open or brushy sites, often in disturbed places: Cochise, Coconino, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma cos.; 350-2050 m (1100-6800 ft); Mar–Nov; MO to CO; s to TX and NM.

Portulaca oleracea L. (kitchen or pot herb). Common Purslane. —Annual herbs from a taproot. STEMS prostrate to somewhat ascending with radially spreading branches, 4-25 cm long or more often reddish, glabrous. LEAVES alternate, flat, ovate-cuneate or spatulate, 10-17 mm long, 5-12 mm wide; nodes with a few inconspicuous hairs in the axils. INFLORESCENCE glabrous or with a few inconspicuous hairs; involucre leaves 1-4, 6-20 mm long, 2-8 mm wide. FLOWERS solitary or clustered at the ends of branches; petals yellowish, 2-5 mm long; stigmatic branches 3-6. CAPSULE 2-6 mm in diameter; slightly stipitate. SEEDS black, finely granulate, stellate, or rounded-tuberculate. [*Portulaca retusa* Engelm.; *P. neglecta* Mack. & Bush]. —Disturbed areas, especially roadsides: reported from all AZ cos. except LaPaz; 450 – 2400 m (1400 – 7800 ft); Jun–Oct. Introduced. Worldwide in temperate to warm regions; throughout the U.S. (including AK) and Canada. Young leaves and stems edible raw or cooked. *Portulaca retusa* has been previously recognized as a separate species, based on seed morphological characteristics, growth habit, sepal shape, and number of stigmatic branches (Correll & Johnston 1970, W.B. McDougall 1973, Martin & Hutchins 2001, Kearney & Peebles 1960, Welsh et. al. 2003). Positive identification from herbarium specimens is only possible with mature seeds (rounded-tuberculate vs. sharply echinate or stellate in *P. retusa*). Intergradation of seed morphological characteristics between the two species has also been observed. Other characteristics such as growth habit, sepal shape, and number of style lobes, previously thought to distinguish *P. retusa* from *P. oleracea*, have been found highly variable (Correll & Johnston 1970, Martin & Hutchins 2001, Kearney & Peebles 1960, Welsh et. al. 2003, W.B. McDougall 1973). More work, especially with fresh intact specimens, is needed to substantiate recognition of *P. retusa* at the specific level.

Portulaca pilosa L. ([nodes] with long soft hairs). Kiss Me Quick. —Annual or weakly perennial herbs from a fibrous root. STEMS prostrate to somewhat ascending, much branched, 3-16 cm long. LEAVES alternate, linear, cylindrical or nearly so, 3-13 mm long, 0.5-1.5 mm wide; nodes with conspicuous white-villous hairs. INFLORESCENCE white-villous; involucre leaves 6-10, 5-12 mm long, 0.5-1 mm wide. FLOWERS solitary or clustered at the ends of branches; petals reddish pink, 3-7 mm long; stigmatic branches 3-5. CAPSULES 2-5 mm in diameter; slightly stipitate. SEEDS black, stellate-tuberculate. [*Portulaca mundula* I.M. Johnst.]. —Gravelly or sandy soils, slopes and dry washes: Cochise, Santa Cruz, Yavapai cos.; 1200-1600 m (4000-5200 ft); Apr–Sep; MO to KS, TX, CA, NM, n Mex.

Portulaca pilosa can be confused with *P. suffrutescens* when not in flower. *P. suffrutescens* is stiffly erect while *P. pilosa* tends to be prostrate or only somewhat ascending. Also, the distance between leaf nodes in *P. suffrutescens* is generally longer than in *P. pilosa*

(5-25 mm vs. 1-7 mm). The density of hairs in the nodes gives *P. pilosa* a more hairy appearance and the involucre hairs are whitish rather than tan or brownish. Some of these characteristics might not be apparent in young plants, plants grown under difficult conditions, or herbarium specimens.

Portulaca suffrutescens Engelm. (slightly woody). Shrubby Purslane. —Perennial herb from tuberous thickened rootstocks. STEMS erect or ascending 10-23 cm high, somewhat suffrutescens. LEAVES alternate, sometimes subopposite, the blades cylindrical, linear, 7-20 mm long, 0.5-1.5 mm wide; nodes with long hairs. INFLORESCENCE villous with conspicuous, mostly tan or brownish hairs; involucre leaves 6-10, 6-30 mm long, 0.5-2 mm wide. FLOWERS clustered at the ends of branches; petals orange or copper colored, 3-10 mm long; stigmatic branches 5-6. CAPSULE 2-4.5 mm in diameter; stipe to 1 mm long. SEEDS black, sometimes iridescent, rounded-tuberculate. [*Portulaca stelliformis* Moc. & Sesse ex DC.]. —Rocky slopes, flats, grasslands, roadsides, disturbed places, and in sandy, gravelly places along streams: Cochise, Gila, Graham, Pima, Pinal, Santa Cruz, Yavapai cos.; 600-1850 m (2000-6000 ft); May-Sep; NM, TX; n Mex.

Portulaca umbraticola Kunth (shade-dwelling). Wingpod Purslane. —Annual herbs with a fibrous root. STEMS prostrate to erect or ascending, 4-20 cm long, glabrous. LEAVES few, mostly alternate, sometimes subopposite, flat, lanceolate or spatulate, 10-35 mm long, 2-15 mm wide, glabrous; nodes sometimes with a few inconspicuous hairs. INFLORESCENCE glabrous, with 4-5 conspicuous involucre leaves, 10-30 mm long, 1-7 mm wide. FLOWERS clustered at the ends of branches; petals pink, purple, yellow or orange tipped with red, 5-10 mm long; stigmatic branches 5-18. CAPSULE 3-5 mm in diameter with an expanded circular membranaceous wing just below the rim; stipe 1-1.5 mm long. SEEDS gray, tuberculate. AZ to NC, s to TX; S. Amer.

Subsp. **lanceolata** J.F. Matthews & Ketron. (lance-shaped [leaves]). —Flower diameter 8-15 mm; petals bi-colored. [*P. lanceolata* J.F. Matthews & Ketron]. —Dry sandy or rocky soils, desert grasslands, oak woodlands, wash bottoms, disturbed sites: Cochise, Gila, Graham, Pima, Santa Cruz cos.; 900-1850 m (3000-6000 ft). Jun-Oct. NM e to AR, LA.

Talinum Adanson

Robert W. Kiger

Perennial herbs, caulescent, sometimes suffrutescens, glabrous. ROOTS fleshy to woody. STEMS simple or branching. LEAVES alternate or subopposite, subsessile or short-petiolate; blades broadly planate, succulent or semi-succulent; margin entire. INFLORESCENCE in ours terminal and/or lateral panicles; peduncles very short to elongate. FLOWERS pedicellate; sepals 2, deciduous, distinct; petals 5 or rarely more, distinct, fugacious; stamens distinct; ovary superior, 3-carpellate; ovules many; placentation free-central; style 1; stigmas 3, linear in ours. CAPSULE tardily loculicidal from the apex, 3-valved, the exocarp and endocarp macroscopically differentiated and separating after dehiscence, the endocarp valves remaining connate at apex, attached to receptacle by vascular strands from capsule apex, persistent, the exocarp valves deciduous separately. SEEDS many, small, in ours circular reniform and more or less compressed, minutely tuberculate, black, not covered by membrane. $x = 12$. —Ca. 15 spp., primarily Amer., Afr. (Apparently from an African vernacular name.)

Talinum paniculatum (Jacq.) Gaertn. (with panicles). Pink baby breath. —Herbs to 1 m tall. ROOTS tuberous. STEMS erect. LEAVES short-petiolate; blades elliptic to obovate, basally attenuate, to 12 cm long, reduced upward. INFLORESCENCE spreading, to 25 cm long. FLOWERS: sepals ovate to suborbiculate, 2.5-4 mm long, sometimes reflexed; petals ovate to suborbiculate, 3-5 mm long, red or pink, sometimes orangish, yellowish, or purplish; stamens ca. 15-20; stigmas 3, linear. CAPSULES subglobose, sometimes obtusely triquetrous, 3-5 mm long. SEEDS ca. 1 mm long. [*Talinum patens* (L.) Willd.]. —Moist to dry habitats in woodlands and savannas, also desert scrub and grasslands, in rocky soil and crevices, in open and often in shade: Cochise, Greenlee, Pima, Santa Cruz cos.; 750-1600 m (2500-5200 ft); Jul-Oct; NC to FL, w through NM; Chih., Coah., Son., Mex. s to Argentina.

ACKNOWLEDGEMENTS

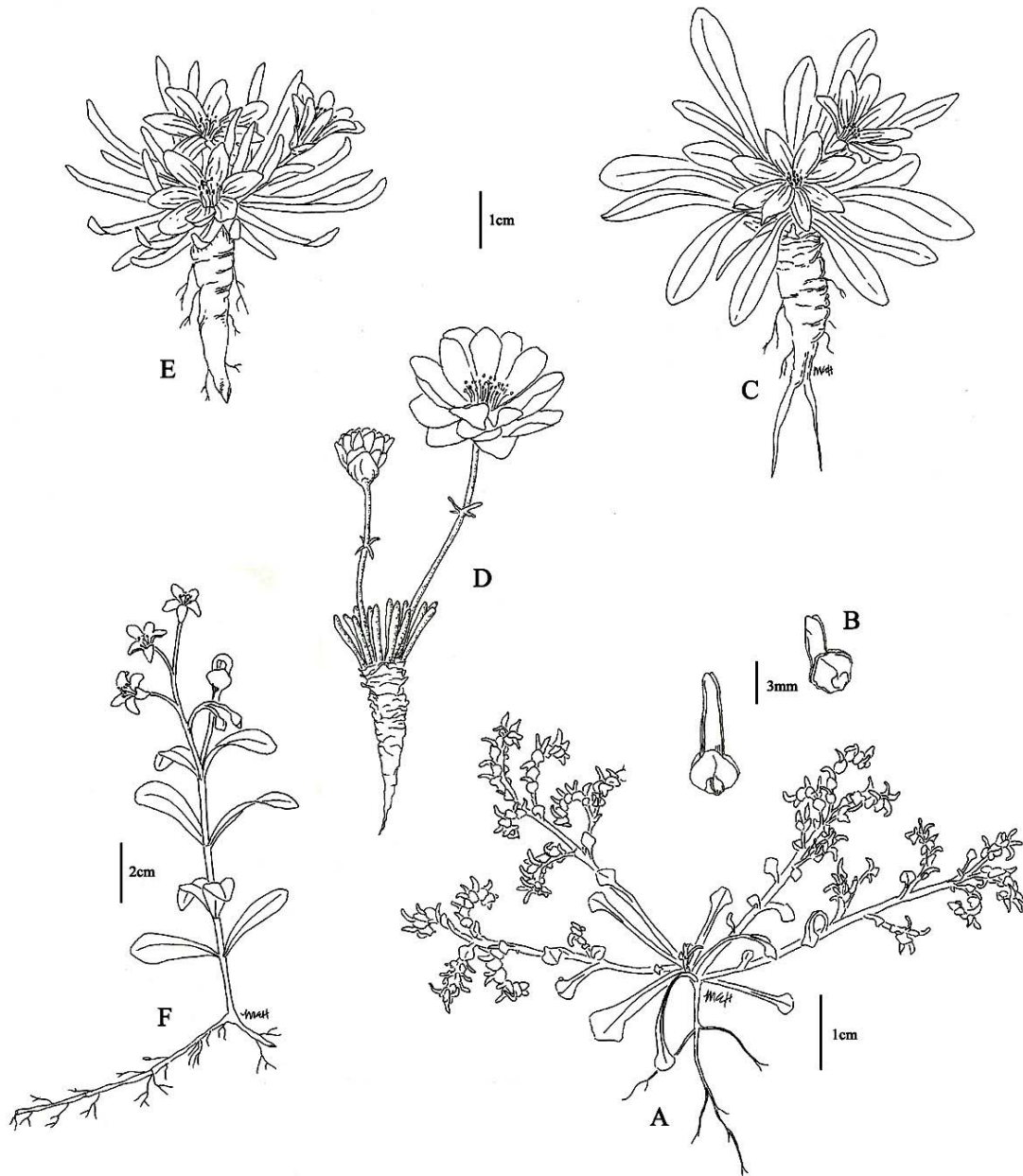
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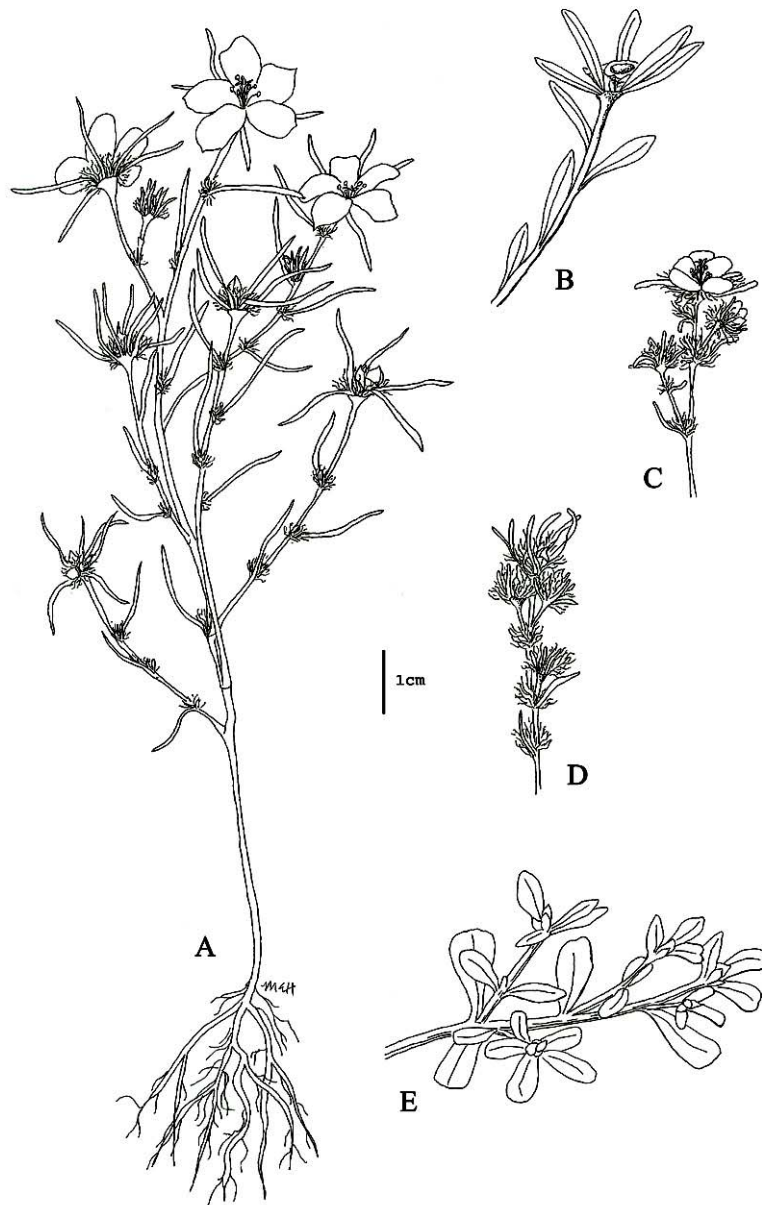
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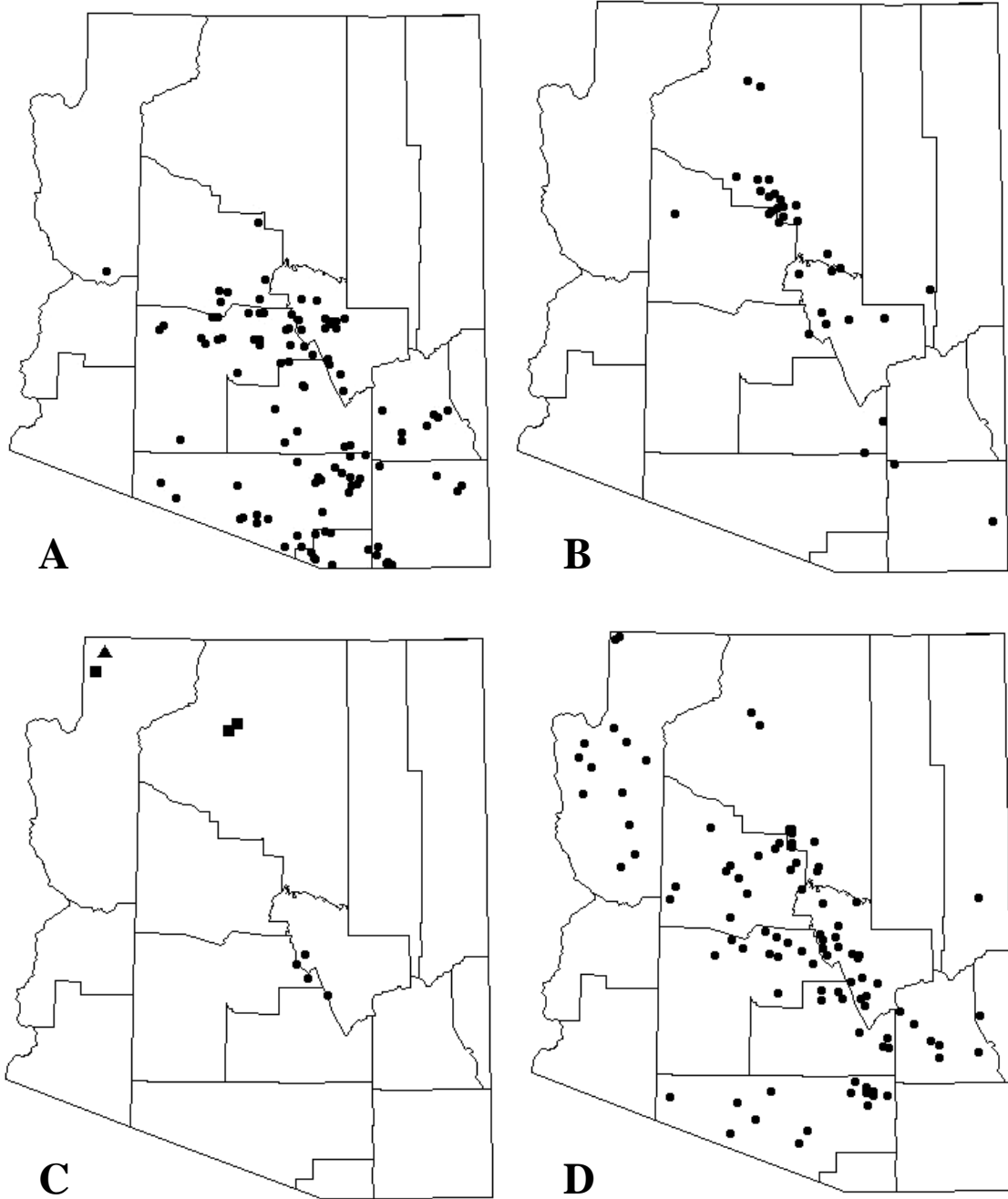
Portulacaceae Fig. 1. A, *Calandrinia ciliata*, habit, flower, leaf; B, *Claytonia lanceolata* var. *rosea*, habit; C, *Claytonia parviflora* subsp. *viridis*, habit; D, *Claytonia perfoliata*, habit, leaf.



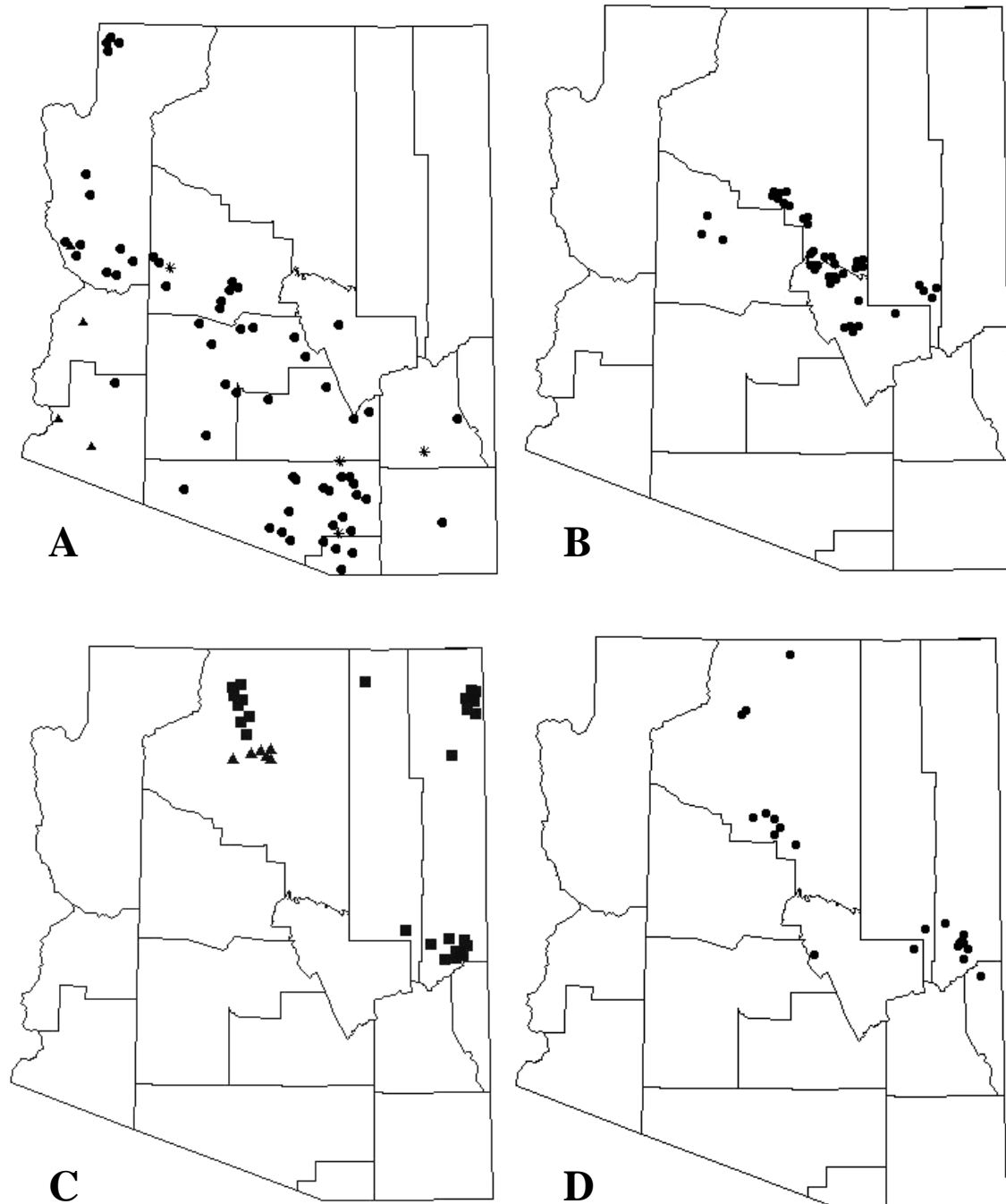
Portulacaceae Fig. 2. A, *Cistanthe monandra*, habit, fruit enclosed in sepals; B, *Cistanthe parryi*, fruit enclosed in sepals; C, *Lewisia brachycalyx*, habit; D, *Lewisia rediviva*, habit reconstruction showing leaves present with flowers; E, *Lewisia pygmaea*, habit; F, *Montia chamissoi*, habit.



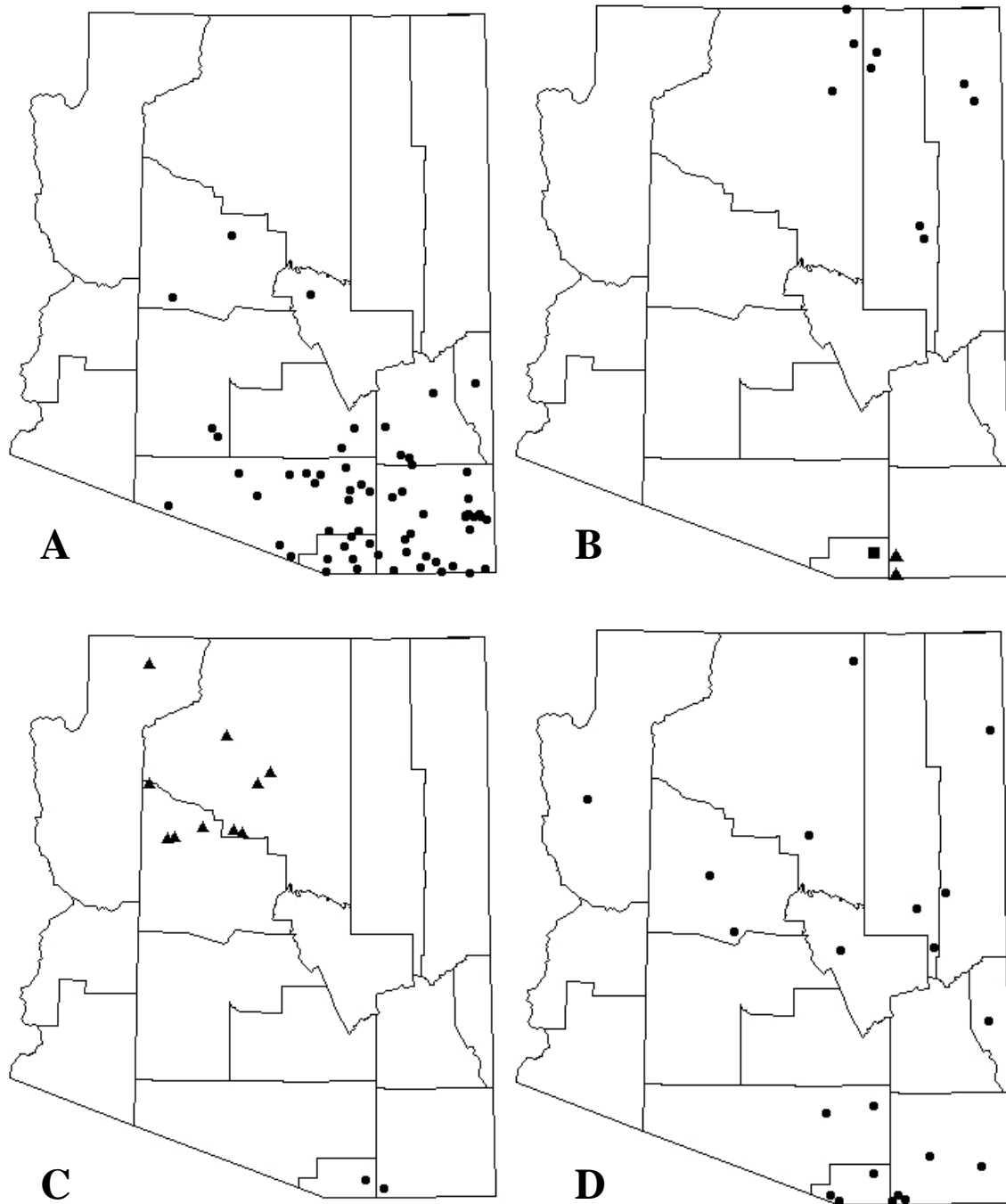
Portulacaceae Fig. 3. *Portulaca*. A, *P. suffrutescens*, habit; B, *P. umbraticola*, flowering stem; C, *P. pilosa*, flowering stem; D, *P. halimoides*, flowering stem; E, *P. oleracea*, flowering stem.



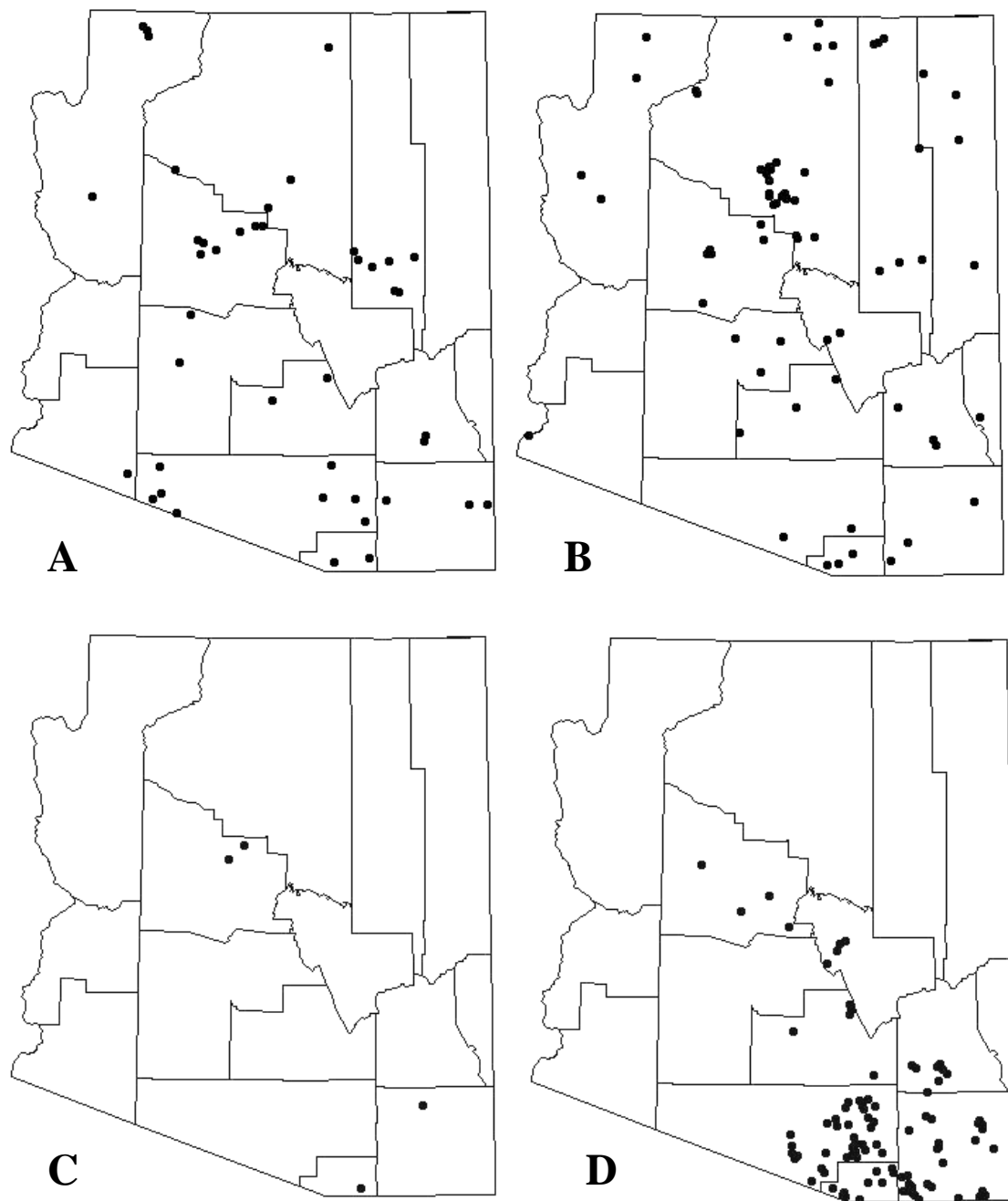
Portulacaceae Fig. 4. Distributions of: A, *Calandrinia ciliata*; B, *Claytonia lanceolata* var. *rosea*; C, *Claytonia parviflora* subsp. *parviflora* (●), subsp. *utahensis* (■), subsp. *viridis* (▲); D, *Claytonia perfoliata*.



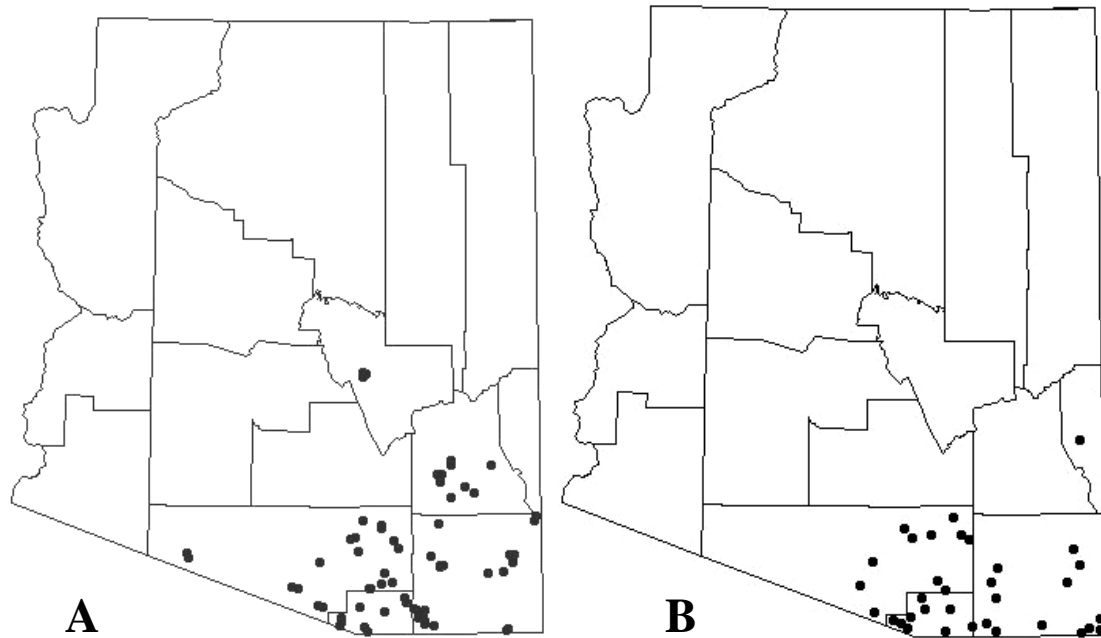
Portulacaceae Fig. 5. Distributions of: A, *Cistanthe ambigua* (▲), *C. monandra* (●), *C. parryi* (*); B, *Lewisia brachycalyx* (●); C, *L. pygmaea* (■), *L. rediviva* (▲); D, *Montia chamissoi*.



Portulacaceae Fig. 6. Distributions of *Phemeranthus*: A, *P. aurantiacus*; B, *P. brevicaulis* (▲), *P. brevifolius* (●), *P. humilis* (■); C, *P. marginatus* (●), *P. validulus* (▲); D, *P. parviflorus*.



Portulacaceae Fig. 7. Distributions of *Portulaca*: A, *P. halimoides*; B, *P. oleracea*; C, *P. pilosa*; D, *P. suffrutescens*.



Portulacaceae Fig. 8. Distributions of: A, *Portulaca umbraticola*; B, *Talinum paniculatum*.



Portulacaceae Fig. 9. A, *Cistanthe monandra* habit. B, *Cistanthe monandra* fruit. C, *Calandrinia ciliata*. D, *Claytonia parviflora*. E, *Claytonia perfoliata*. F, *Claytonia lanceolata* var. *rosea*. G, *Lewisia brachycalyx*. H, *Phemeranthus aurantiacus*. I, *Phemeranthus parviflorus*. J, *Portulaca halimoides*. K, *Portulaca oleracea*. L, *Portulaca suffrutescens*. Photos by Max Licher.