

SAXIFRAGACEAE SAXIFRAGE FAMILY

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Perennial herbs; commonly hairy or glandular hairy. CAUDEX or rhizome rarely woody, often branched. STEMS erect in ours. LEAVES simple, basal or sometimes cauline, alternate in ours, the veins basically palmate. INFLORESCENCES primarily scapose racemes, panicles, cymes, or flowers 1 or 2; bracts scale-like. FLOWERS perfect, actinomorphic in ours; hypanthium free to more or less fused to ovary; sepals usually 5, fused below; petals usually 5, free, clawed, white to pink, sometimes falling early; stamens usually 5 or 10, the anthers yellow to orange, the filaments white; pistil 1 in ours, generally with 1 or 2 locules; placentae 2-4, axile or parietal; ovary superior to inferior, sometimes more superior in fruit; styles 2 or 3(-4). FRUITS capsules in ours, dehiscent longitudinally into 2 or 3(-4) valves. SEEDS many, small, spheric to ovoid, smooth, ridged or rarely winged in ours. --40 genera, 600 spp., chiefly of n temperate, arctic, alpine regions. Cultivated members include *Bergenia*, *Heuchera*, *Saxifraga*, *Tellima*, *Tolmeia*.

1. Peduncle 1-flowered, the flower more than 1.5 cm across; staminodia in 5 clusters, alternating with the stamens, each with several slender lobes or divisions; stigmas 4; styles minute or not apparent; placentae 4, parietal *Parnassia*
- 1' Peduncles 2 or more flowered, the flowers less than 1.5 cm across; staminodia 0; stigmas 2 or 3; styles apparent; placentae 2 or 3, parietal or axile.
 2. Stamens 5(-6); styles 2 *Heuchera*
 - 2' Stamens 10; styles 2 or 3.
 3. Petals lobed; styles typically 3; locule 1; placentae parietal *Lithophragma*
 - 3' Petals entire; styles and locules typically 2, rarely 3; placentae axile *Saxifraga*

Heuchera L. Alumroot

RHIZOMES somewhat woody, scaly, without bulblets. LEAVES all basal or rarely 1 or 2 cauline and smaller; blade circular to ovate, the base cordate, the margin irregularly lobed and dentate to crenate, the crenations usually apiculate. INFLORESCENCES raceme-like panicles in ours. FLOWERS actinomorphic, rarely slightly zygomorphic; hypanthium partly fused to ovary; sepals 5 (rarely 6), green or white to pink or reddish, erect to spreading; petals 5 (rarely 6 or 0), entire; stamens 5, rarely 6; ovary more than half inferior, unilocular; nectaries usually obscure; placentae 2, parietal; styles 2. FRUITS 2-valved. SEEDS smooth to ridged. --Ca. 50 spp. in N Amer.; *H. sanguinea* cultivated as garden ornamental. (For J. H. von Heucher, German botanist). Rosendahl, Butters, & Lakela. 1936. *Minn. Stud. Pl. Sci.* 2: 1-180. A very difficult genus, highly variable at many levels and needing much additional research.

1. Stamens and styles strongly exerted in flower; sepals white to rose with green tips, unequal; flowers somewhat zygomorphic *H. rubescens*
- 1' Stamens and styles more or less included in flower; sepals bright pink to deep red or yellow to cream-green, equal; flowers actinomorphic.
 2. Sepals bright pink to deep red; inflorescences open panicles, conical; leaves ovate, the margins dentate, the teeth aristate *H. sanguinea*
 - 2' Sepals yellow to cream, sometimes tipped with green or tinged with pink; inflorescences elongate, contracted panicles, more or less cylindrical; leaves circular to broadly cordate, the margins usually crenate, the crenations apiculate.
 3. Sepals and stamens 6; petals usually absent, rarely minute and linear *H. eastwoodiae*

- 3' Sepals and stamens 5; petals present, more or less obvious, oblanceolate to obovate.
4. Petals usually longer than sepals; sepals triangular, somewhat spreading; hypanthium more or less pyramidal, broadly campanulate, the portion fused to ovary generally longer than free part *H. parvifolia*
- 4' Petals usually shorter than or equal to sepals; sepals oblong to ovate, more or less erect; hypanthium usually ovoid, cylindrical to campanulate, the portion fused to ovary generally shorter than free part.
5. Petioles glabrous or minutely pubescent; inflorescences usually strongly condensed, nearly racemose; flowers generally densely hirsute or pilose; anthers usually purple, sometimes yellow *H. glomerulata*
- 5' Petioles glandular hairy to hirsute; inflorescences contracted panicles, often open below; flowers with short glandular hairs; anthers yellow *H. novomexicana*

Heuchera eastwoodiae Rosendahl, Butters, & Lakela (for Alice Eastwood). --LEAVES: blades 1.5-1.7 cm long, circular to broadly cordate, the margins shallowly 7-10 lobed, the lobes crenate; petioles somewhat glandular pubescent, 4-18 cm long. INFLORESCENCES contracted elongate panicles, almost racemose above, 45-75 cm tall. FLOWERS 3-7 mm long, yellow-cream, with short glandular hairs; portion of hypanthium fused to ovary 1-2.5 mm long, more or less ovoid, shorter than free part; sepals 6, equal, broadly ovate, more or less erect, sometimes green or pink-tipped; petals absent or 6, minute and linear, if present; stamens 6, shorter than sepals; mature styles shorter than sepals. --Rocky slopes and cliffs: Gila, Maricopa, Yavapai cos.; 1350-2300 m (4500-7500 ft); Apr-Jun.

Heuchera glomerulata Rosendahl, Butters, & Lakela (with several heads). --LEAVES: blades 1.5-5 cm long, broadly ovate-cordate, shallowly 7-10 lobed, the lobes crenate; petioles glabrous or with some small hairs, 2-9 cm long. INFLORESCENCES condensed racemes, slightly paniculate below, 30-60 cm tall. FLOWERS 3-5 mm long, mostly pale yellow-cream, densely hirsute to pilose; portion of hypanthium fused to ovary 1-1.5 mm long, ovoid, about equal to free part; sepals equal, oblong, occasionally pink-tipped, erect; petals 1-2 mm long, shorter than sepals, obovate to oblanceolate, occasionally pink tinged; stamens shorter than sepals, the anthers usually purple, sometimes yellow; mature styles shorter than sepals. --Rocky woodlands and near streams: s Apache, Cochise, Graham, Greenlee, s Navajo cos.; 1200-2750 m (4000-9000 ft); May-Aug. Forms intermediate with *H. novomexicana* occasionally occur in Greenlee, s Apache and s Navajo cos. and may be of hybrid origin.

Heuchera novomexicana Wheelock (of New Mexico). --LEAVES: blades 2-6 cm long, circular-cordate, moderately 7-10 lobed, the lobes crenate; petioles usually densely glandular hairy to hirsute, 2-15 cm long. INFLORESCENCES contracted elongate panicles, almost racemose above, 30-40 cm tall. FLOWERS 4-6 mm long, cream to yellow-green, glandular puberulent; portion of hypanthium fused to ovary 1-2 mm long, ovoid, shorter than free part; sepals equal, oblong-ovate, occasionally green-tipped, erect; petals 1.5-2.5 mm long, more or less equal to sepals, narrowly oblanceolate; stamens shorter than sepals, the anthers yellow; mature styles shorter than sepals. --Chaparral hillsides and rocky woodlands: Pinal Mts., Gila Co.; 1500-2450 m (5000-8000 ft); Apr-Jun; NM. Forms intermediate with *H. glomerulata* may occur in s Apache, Greenlee, and s Navajo cos.

Heuchera parvifolia Nutt. (small-leaved). --LEAVES: blades 0.5-6 cm long, ovate to circular-cordate, shallowly 5-7 lobed, the lobes crenate; petioles pubescent, 1-15 cm long. INFLORESCENCES contracted, elongate panicles, 20-75 cm tall. FLOWERS 3-6 mm long, cream to greenish, occasionally pink tinged, glandular hairy; portion of hypanthium fused to ovary 1-1.5 mm long, pyramidal to somewhat ovoid, mostly longer than free part; sepals equal, broadly to sharply triangular, sometimes green-tipped, generally spreading; petals 1.5-3 mm long, usually longer than sepals, oblanceolate to broadly obovate or circular; stamens shorter than sepals; mature styles equal to or shorter than sepals. --5 to 7 vars. in AZ, CO, ID, MT, NM, NV, UT, WY.

Var. *arizonica* Rosendahl, Butters, & Lakela (of Arizona). --Petioles long hirsute to pilose; petals oblanceolate to narrowly obovate, equal to or longer than sepals; nectary disk prominent. -- Limestone outcrops and ledges: Coconino, Gila, Navajo cos.; 1350-2700 m (4500-8800 ft); May-Jul; UT.

Var. *flavescens* (Rydberg) Rosendahl, Butters, & Lakela (yellowish). --Petioles glandular pubescent to almost glabrous; petals obovate to almost circular, usually much longer than sepals; nectary disk obscure. [*H. flavescens* Rydberg]. --Rocky outcrops: Apache, Coconino, Gila, Greenlee, Navajo, Yavapai cos.; 1500-3550 m (5000-11600 ft); May-Aug; CO, NM, UT.

Heuchera rubescens Torrey (turning red). --LEAVES: blades 0.8-6 cm long, circular to broadly ovate, more or less deeply 5-9 lobed, the lobes crenate to dentate and apiculate to aristate; petioles glandular pubescent to densely hirsute, 1-11 cm long. INFLORESCENCES narrow, cylindrical to conical, often more or less secund, 7-53 cm tall. FLOWERS 3-5 mm long, somewhat zygomorphic, white to pink or rose, with short glandular hairs below becoming more or less pilose above; portion of hypanthium fused to ovary 1.2-2.5 mm long, pyramidal, about equal to free part; sepals unequal, more or less oblong-ovate, white to pink with green tips becoming more deeply red with age, more or less erect; petals 4-6 mm long, longer than sepals, narrowly oblanceolate or thread-like; stamens longer than sepals; mature styles much longer than the sepals. --Dry, rocky areas. --6 intergrading vars.; AZ, CA, CO, ID, NM, NV, OR, TX. UT, and n Mex. Apparently closely related to *H. parishii* Rydberg of CA and *H. mexicana* Rydberg of Mex. Appears to hybridize with other spp. and needs monographic study.

Var. *rubescens*. --Petioles almost glabrous to glandular puberulent; part of hypanthium fused to ovary usually wider than long in flower; styles mostly papillose. --Dry rocky areas: n Coconino and Mohave cos. and possibly n Apache and Navajo cos.; 1200-3650 m (4000-12000 ft); May-Aug; CO, NV, UT. Intergrades with var. *versicolor*.

Var. *versicolor* (E. Greene) M. G. Stewart (variously colored). --Petioles usually more or less densely hirsute; portion of hypanthium fused to ovary usually about as long or longer than wide in flower; styles smooth. [*H. clutei* A. Nelson; *H. leptomeria* E. Greene; *H. v.* var. *leptomeria* (E. Greene) Kearney & Peebles; *H. v.* forma *pumila* Rosendahl, Butters, & Lakela; *H. nana* Rydberg]. --Dry rocky areas: Apache, Cochise, Coconino, Gila, Graham, Greenlee, Mohave, Pima, Santa Cruz, Yavapai cos.; 1200-3650 m (4000-12000 ft); May-Sep; CA, NM, TX; n Mex.

Heuchera sanguinea Engelm. (blood-red). Coral Bells. --LEAVES: blades 1-7 cm long, ovate, moderately 7-10 lobed, the lobes dentate and aristate; petioles pubescent, 1.5-20 cm long. INFLORESCENCES open, cylindrical to pyramidal panicles with 0 to 2 leaf-like bracts below, 20-60 cm tall. FLOWERS 4-12 mm long, bright pink to deep red, glandular hairy; portion of hypanthium fused to ovary 1-3 mm long, pyramidal, shorter than free part; sepals 1-4 mm long, equal, ovate-oblong, erect; petals 0.5-3.5 mm long, shorter than sepals, oblanceolate, white to pink; stamens shorter than sepals; mature styles shorter than sepals. [*H. s.* var. *pulchra* (Rydberg) Rosendahl]. --Rocky canyon walls and outcrops to moist rocky banks: Cochise, Pima, Pinal, Santa Cruz cos.; 1050-2900 m (3500-9500 ft); Mar-Oct; sw NM, n MEX. Attractive rock garden plant.

Lithophragma Nutt. Woodland Star

RHIZOMES slender, with bulblets, without scales. LEAVES basal and cauline, lobed to compound, fewer and smaller upward; blades more or less circular-cordate, the margin lobed to crenate. INFLORESCENCES racemes. FLOWERS actinomorphic; hypanthium partly fused to ovary; sepals green, erect; petals lobed or toothed in ours; stamens 10; ovary less than half inferior in ours, unilocular; nectaries obscure; placentae 3, parietal; styles 3. FRUITS 3-valved. SEEDS smooth in ours. --12 spp. in w N. Amer. (Greek: *litho* = rock + *phragma* = partition, from habitats). Taylor, D. 1965. *Univ. Calif. Publs. Bot.* 37:1-122. Generic names ending in "phragma" are considered of neuter, not feminine, gender.

Lithophragma tenellum Nutt. (delicate). --LEAVES: blades 0.5-3 cm long, deeply 3-lobed to compound, the lobes further lobed to crenate; petioles 1-7 cm long. INFLORESCENCES 6-35 cm tall. FLOWERS 3-

12; pedicels 3-10 mm; hypanthium spheric to campanulate, part fused to ovary shorter than free part; sepals triangular; petals 3-8 mm, longer than sepals, ovate, 5-7 lobed, white to pink. [*L. brevilobum* Rydberg; *L. rupicolum* E. Greene; *L. australe* Rydberg]. --Vernally moist meadows, slopes, open forests: Apache, Coconino, Gila, Maricopa, Mohave, Navajo, Yavapai cos.; below 2750 m (9000 ft); Apr-Jun; CA, CO, ID, MT, OR, UT, WA, WY; British Columbia, Can.

Parnassia L. Grass-of-Parnassus

PLANTS glabrous. CAUDEX without scales or bulblets. LEAVES all basal; blades ovate, the margin entire. INFLORESCENCES 1-flowered scapes with 1 leaf-like, sessile bract. FLOWERS actinomorphic; hypanthium minute, free of ovary; sepals green, almost free, erect to spreading; petals entire in ours, white; stamens 5; staminodia in 5 clusters alternating with the stamens; ovary superior; locule 1; placentae 4, parietal; stigmas 4, more or less sessile. FRUITS 4-valved. SEEDS winged. --25 spp.; n temperate, arctic, alpine regions. (For Mount Parnassus, Greece).

Parnassia parviflora DC. (small-flowered). --LEAVES 2-7 cm long; blades 1-3.5 cm long, the base more or less truncate. INFLORESCENCES 10-35 cm tall; bract below middle of peduncle. FLOWERS: sepals 4-7 mm, elliptic; petals 5-13 mm, ovate-elliptic; staminodia 3.5-6 mm long, each with 5-12 slender divisions and a globose glandular tip. [*P. palustris* L. var. *parviflora* (DC.) J. Boivin]. --Rocky seeps: Apache, Coconino cos.; 1500-2700 m (5000-9000 ft); Jul-Sep; e CA to e Can.

Saxifraga L. Saxifrage

CAUDEX or rhizome usually with scales, sometimes with bulblets. LEAVES basal, sometimes also cauline; blade ovate to circular in ours, the base attenuate to cordate, the margin entire to lobed, dentate, or serrate. INFLORESCENCES generally cymes or panicles covered with cream-yellow to pink or purple glandular hairs. FLOWERS actinomorphic in ours, sometimes only 1 or 2; hypanthium more or less fused to ovary in ours; sepals usually green, erect to spreading or reflexed; petals white, rarely yellow or spotted, entire; stamens 10, anthers usually pale-yellow to orange; ovary superior to more or less inferior, sometimes more superior in fruit; nectaries disk-like, ribbon-like or obscure; locules, placentae, styles 2(-3), the placentae axile. FRUITS 2(-3) valved. SEEDS smooth to ridged. --Ca. 300 spp., chiefly n temperate, arctic, alpine regions. (Latin: *saxum* = stone + *frangere* = to break, referring to bulblets which were thought to dissolve urinary concretions). Elvander, P. 1984. *Syst. Bot. Monogr.* 3:1-44.

1. Leaves basal and cauline; flowers 1 or 2, sometimes 3.
 2. Petals yellow; leaf margins entire, glandular-ciliate *S. flagellaris*
 - 2' Petals white; leaf margins lobed, not glandular-ciliate.
 3. Plants growing in tufts; stems trailing, slightly woody; leaves sessile *S. caespitosa*
 - 3' Plants more or less solitary; stems erect, herbaceous; leaves with petioles *S. rivularis*
- 1' Leaves all basal (sometimes 1-2 leaf-like bracts on peduncle); flowers usually more than 10.
 4. Leaf blades circular, dentate; sepals reflexed; filaments obovoid; petals with 2 yellow spots
..... *S. odontoloma*
 - 4' Leaf blades elliptic to triangular, serrate; sepals more or less erect; filaments lanceolate; petals spotless.
 5. Ovary more or less superior; inflorescences quite open, covered with pink to purple-tipped glandular hairs; sepals, petals, filaments, anthers often pink-red to purple; nectaries ribbon-like
..... *S. eriophora*
 - 5' Ovary more than half inferior, sometimes appearing more superior in fruit; inflorescences usually condensed into 1-3 (-7) glomerules, covered with pale yellow-tipped glandular hairs; sepals green, sometimes with purple tips; petals and filaments white; anthers yellow to orange; nectaries disk-like *S. rhomboidea*

Saxifraga caespitosa L. (growing in tufts). --CAUDEX much branched, slender, somewhat woody; bulblets 0. LEAVES cauline, usually crowded, sessile; blades obovate, 0.5-1 cm long, 3-5 lobed at tip, the base attenuate. INFLORESCENCES 2-5 cm tall, sparsely covered with pink to pale yellow-tipped glandular hairs; peduncle mostly with 1 leaf-like bract near middle. FLOWERS usually 1-3; sepals erect to spreading, elliptic; petals 3-5 mm long, longer than sepals, elliptic to obovate, falling early; filaments lanceolate; ovary inferior in flower; nectaries inconspicuous or 0. [*S. c.* subsp. *exaratooides* (Simmons) Engler & Irmischer var. *lemmonii* Engler & Irmischer]. --Damp rocky areas: San Francisco Peaks, Coconino Co.; above 3200 m (10500 ft); Jul-Aug; circumboreal to ne U.S., through the Cascade Mts to n CA and through the Rocky Mts. Extremely variable with many poorly defined subspp. and vars. and much in need of additional study.

Saxifraga eriophora S. Watson (wool-bearing). --CAUDEX simple to branched; bulblets 0. LEAVES all basal, lower surface covered with brown, woolly hairs; blades ovate-elliptic, 1-3 cm long, the base attenuate, the margin serrate; petiole 0.6-2.5 cm long, flattened. INFLORESCENCES 6-25 cm tall, usually much branched and open, covered with pink to purple-tipped glandular hairs. FLOWERS more than 10; sepals erect, triangular, pink to reddish; petals 4-7 mm long, 2-3 times longer than sepals, oblanceolate-obovate, white to pink; filaments lanceolate, sometimes pink; anthers usually pink-purple; ovary more or less superior; nectaries ribbon-like. --Wet banks and slopes: Cochise, Graham, Pima, Pinal, Santa Cruz cos.; 1200-2700 m (4000-9000 ft); Mar-Jul; NM, TX; n Mex.

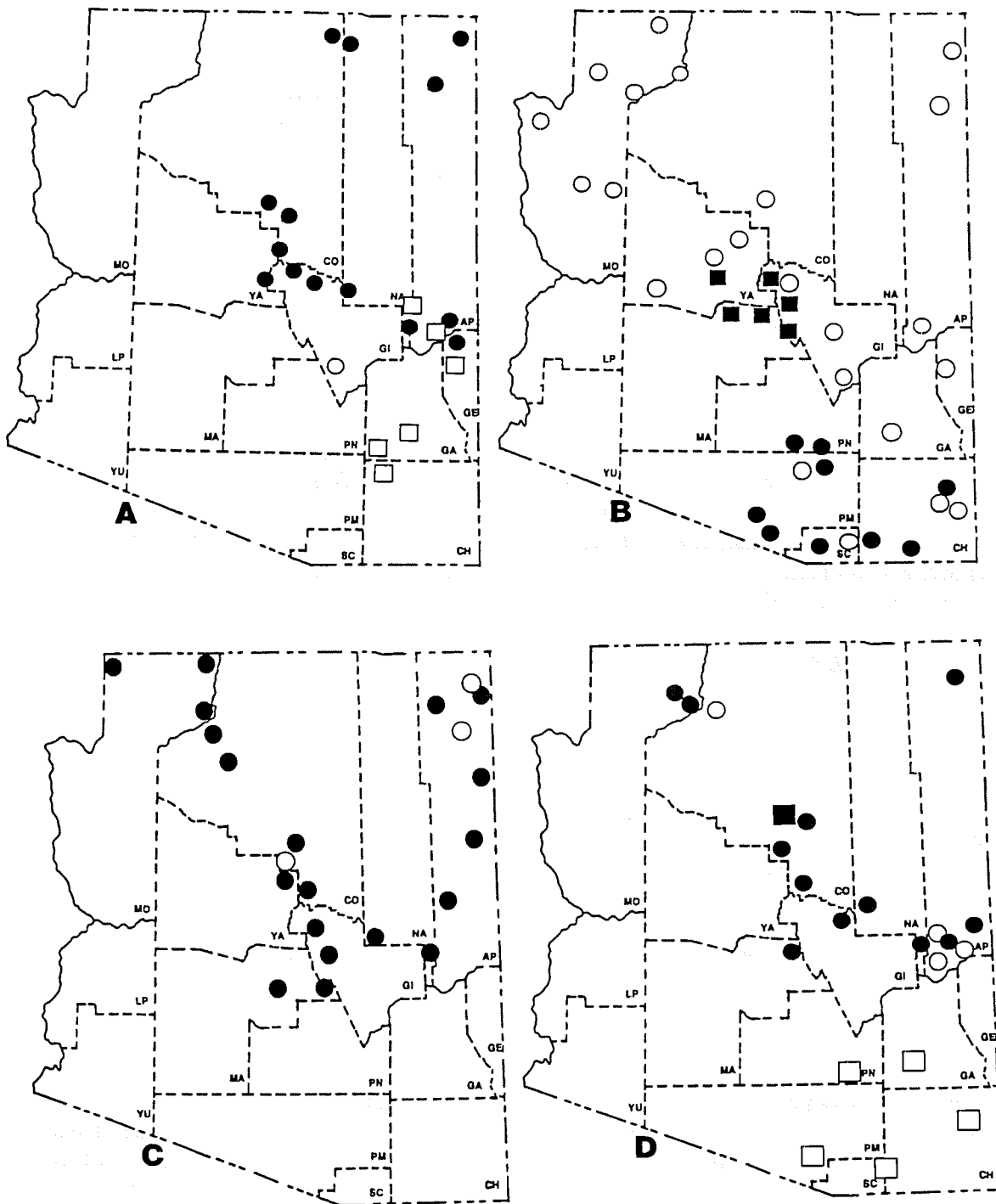
Saxifraga flagellaris Willd. (whip-shaped). --CAUDEX fragile, with stolons; bulblets 0. LEAVES basal and cauline, sessile; blades elliptic-obovate, 0.5-2 cm long, the margin entire, glandular-ciliate. INFLORESCENCES 2-15 cm tall, covered with pink to pale yellow-tipped glandular hairs. FLOWERS usually 1-3; sepals erect, elliptic-ovate; petals 4-9 mm long, longer than sepals, broadly obovate, not clawed, yellow; filaments lanceolate; ovary about half inferior; nectaries inconspicuous or 0. --Moist rocky slopes, ridges, and meadows: San Francisco Peaks, Coconino Co.; above 3050 m (10000 ft); Jul-Sep; circumboreal to ne U.S. and through the Rocky Mts.

Saxifraga odontoloma Piper (toothed margin). --CAUDEX with rhizomes; bulblets 0. LEAVES all basal; blades more or less circular, 5-10 cm long, the base cordate, the margin dentate; petiole 2-30 cm long, usually expanded, sheathing at base. INFLORESCENCES 20-50 cm tall, open, sparsely covered with short, purple-tipped glandular hairs. FLOWERS more than 10; sepals reflexed, ovate to elliptic; petals 3-4.5 mm long, about equal to sepals, circular to elliptic, with 2 yellow spots, falling early; filaments obovoid; ovary superior; nectaries ribbon-like. [*S. aestivalis* Fischer; *S. arguta* sensu Kearney & Peebles non D. Don]. --Wet meadows and ledges: Apache, Coconino cos.; above 1200 m (4000 ft); Jun-Sep; CA, CO, ID, MT, NM, OR, UT, WA, WY; through w Can. to AK.

Saxifraga rhomboidea E. Greene (diamond-shaped). --CAUDEX simple, sometimes branched; bulblets 0. LEAVES all basal; blades ovate to rhombic, 1-4 cm long, the base attenuate, the margin usually serrate-serrulate; petiole 1-4 cm long, flattened. INFLORESCENCES 3-30 cm tall, condensed into 1-3 (-7) glomerules, sometimes more open, covered with pale yellow-tipped, glandular hairs. FLOWERS more than 10; sepals erect, ovate, sometimes purple-tipped; petals 2-4 mm long, longer than sepals, elliptic to slightly obovate; filaments lanceolate; ovary at least half inferior in flower, more superior in fruit; nectaries disk-like. [*S. r.* var. *austrina* A. Nelson and var. *franciscana* (Small) Kearney & Peebles]. --Alpine and subalpine meadows; Apache, Coconino, Gila, Maricopa, Navajo cos.; above 1500 m (5000 ft); Apr-Aug; CO, MT, NM, UT, WY.

Saxifraga rivularis L. (concerning brooklets). --CAUDEX fragile; bulblets few. LEAVES basal and cauline, reduced upwards; blades circular to broader than long, 0.4-1.5 cm long, the base usually cordate, the margin usually 3-5 lobed; petioles 0.5-3.5 cm long, flattened. INFLORESCENCES 3-10 cm tall, very sparsely covered with pink to purple-tipped glandular hairs in ours. FLOWERS usually 1-3; sepals erect, elliptic-ovate; petals 2-6 mm long, longer than sepals, elliptic-obovate; filaments lanceolate; ovary more than

half inferior in flower, appearing more superior in fruit; nectaries inconspicuous or 0. [*S. debilis* Engelmann]. --Moist crevices, shaded, rocky areas: San Francisco Peaks, Coconino Co.; above 3050 m (10000 ft); Jul-Aug; Circumboreal to ne U.S. through the Cascade Mts. to the Sierra Nevada and through the Rocky Mts. Quite variable with many poorly defined vars. and segregate species.



Saxifragaceae Fig. 1. A, distributions of *Heuchera parvifolia* (closed circles), *H. glomerulata* (open squares), and *H. novomexicana* (open circle). B, distributions of *Heuchera sanguinea* (closed circles), *H. rubescens* (open circles), and *H. eastwoodiae* (closed squares). C, distributions of *Lithophragma tenellum* (closed circles), and *Parnassia parvifolia* (open circles). D, distributions of *Saxifraga rhomboidea* (closed circles), *S. odontoloma* (open circles), *S. eriophora* (open squares), *S. caespitosa*, *S. flagellaris*, and *S. rivularis* (all closed square).