

KRAMERIACEAE RATANY FAMILY

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Shrubs and perennial herbs, hemiparasitic at least in AZ, vestiture variable, usually very dense on new growth. LEAVES alternate, exstipulate, simple (in ours) or trifoliolate, sessile, linear to linear-lanceolate (in ours), the margins entire; apices acute or mucronate. INFLORESCENCES uniflorous in leaf axils, terminal racemes or open panicles. FLOWERS zygomorphic, perfect; peduncles and pedicels separated from each other by a pair of opposite, linear or lanceolate, leaf-like bractlets; sepals 4-5, of different lengths, showy, lanceolate to ovate, acute, imbricate, variably vestitured on the outer surfaces; petals 4 or 5, small, not showy, dimorphic; upper 3(2) petals petaloid, clawed or lanceolate, clustered at the base of the upper side of the ovary forming a "flag," either free or connate basally; lower 2 petals smaller, fleshy, sessile, and dorsally modified into oil-secreting glands called elaiophores; stamens 3 or 4, the filaments stout, inserted at the junction of the upper petals and the ovary or on the connate portion of the petaloid petals, the anthers conical, the base slightly larger in diameter than the filaments, dehiscing by terminal, membranous pores; ovary superior, ovoid, densely pubescent, 1-loculed at maturity; style stout, about the same length as the ovary, glabrous (in ours); stigma minute; ovules 2, apical. FRUIT a 1-seeded hard capsule, bladder-like when seeds abortive or fruit immature, bearing spines (rarely spineless) usually with retrorse barbs or glochids along the terminal end of the spines. SEEDS globose, gray-brown, smooth, lacking endosperm. $n = 6$ (in ours). --A monogeneric family, 18 spp., s US to n Argentina and n Chile, primarily neotropical in open arid or seasonally dry habitats.

Krameria Löfiling Ratany

Characters of the family (Presumably for J. Kramer). Simpson, B. B. 1989. *Flora Neotropica* 49:1-109.

Probably all the species of the genus are hemiparasites, with the roots forming haustoria upon the roots of a variety of (mostly woody) hosts. The flowers of *Krameria* are nectarless and the rewards provided pollinators are fatty oils produced by the modified external surfaces of the lower two petals, the elaiophores. The pollination syndrome for the plants is an obligate mutualism with female digger bees of the genus *Centris* (Anthophoridae) which use the oils mixed with pollen for their larval food.

1. Perennial sprawling herbs; flowers secund; filaments connate 1-2.5 mm beyond the point of insertion; fruit spines appearing roughened, without barbs *K. lanceolata*
- 1' Shrubs, with upright stems; flowers not secund; filaments distinct beyond the point of insertion; fruit spines mostly with barbs.
2. Petaloid petals connate basally for 1-3 mm of their length, their blades triangular; filaments inserted on the connate portion of the petaloid petals; fruit spines most often with a few to

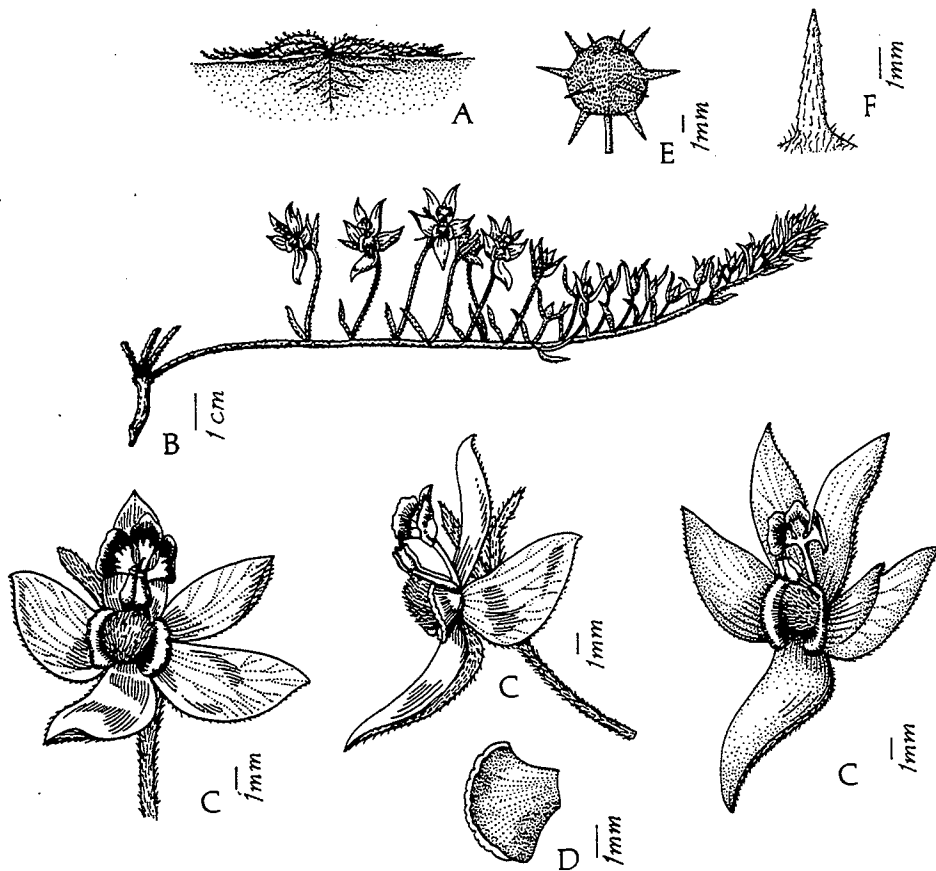
- several retrorse barbs near, but not at the tip; old stems gray, striate; stipitate glands sometimes present on young growth *K. erecta*
- 2' Petaloid petals not at all connate, their blades oblanceolate; filaments inserted at the base of the petaloid petals; fruit spines with a whorl of recurved barbs at the tip; old stems blue-green; stipitate glands never present on young growth *K. grayi*

Krameria erecta Willdenow ex Schultes (presumably for the rigid habit). Little-leaved Ratany, Range Ratany. --Much branched shrub 1-2 m high; young stems strigose, occasionally bearing glandular capitate trichomes, these especially dense on the youngest branch tips and foliage; old stems gray, with striate bark. LEAVES borne in long and short shoots, (0.5-)1.0-12(-27) mm long, 0.5-2 mm wide, variably strigose, sometimes bearing glandular, capitate trichomes. FLOWERS solitary in the leaf axils of short shoots, often clustered; flowering stalks 5-12(-20) mm long; bractlets linear, 5-7(-12) mm long, medial on the flowering stalk; sepals (4)5, bright pink, rose, or magenta, strigose and sometimes also with glandular capitate trichomes on the outer surfaces; lowermost sepal 8-10 mm long, 4-6 mm wide, gibbous; elaiophores oblanceolate, 2-3 mm long, pink to light purple, bearing vertical, saccate blisters on the surface that tend to be most prominent on, or restricted to, the upper portion of the outer face; petaloid petals 3, clawed, 4-6 mm long, connate basally for 1-3 mm, the distinct portions of the lateral petals expanded into acute, minutely serrate triangular blades 2.3-4 mm long and 1.5-3 mm wide, the distinct portion of the central petal smaller, oblanceolate, green basally, pink or pink with purple edges distally; stamens 4, ca. 4 mm long, inserted near the distal end of the connate portion of the petaloid petals, distinct from the point of insertion, strongly curved upward, mainly white, pink distally; ovary ca. 3 mm long; style curved upward, pink. FRUIT cordate in outline, laterally compressed, ca. 6 mm wide excluding the spines, densely strigose to glabrous, the spines 2-5 mm long, most often with a few to several retrorse barbs near but not at the tip. [*K. parvifolia* Benth. var. *glandulosa* (Rose & Painter) Macbr. and *K. parvifolia* Benth. var. *imparata* Macbr.] --Deserts to oak savanna and chaparral: all cos. except Apache, Greenlee and Navajo; below 1650 m (5400 ft.); (Jan-) Mar.-Oct.(-Nov.); CA, NV, UT; Baja C., Baja C. Sur, Chih., Coah., Dur., S.L.P., Sin., Son., Zac., Mex.

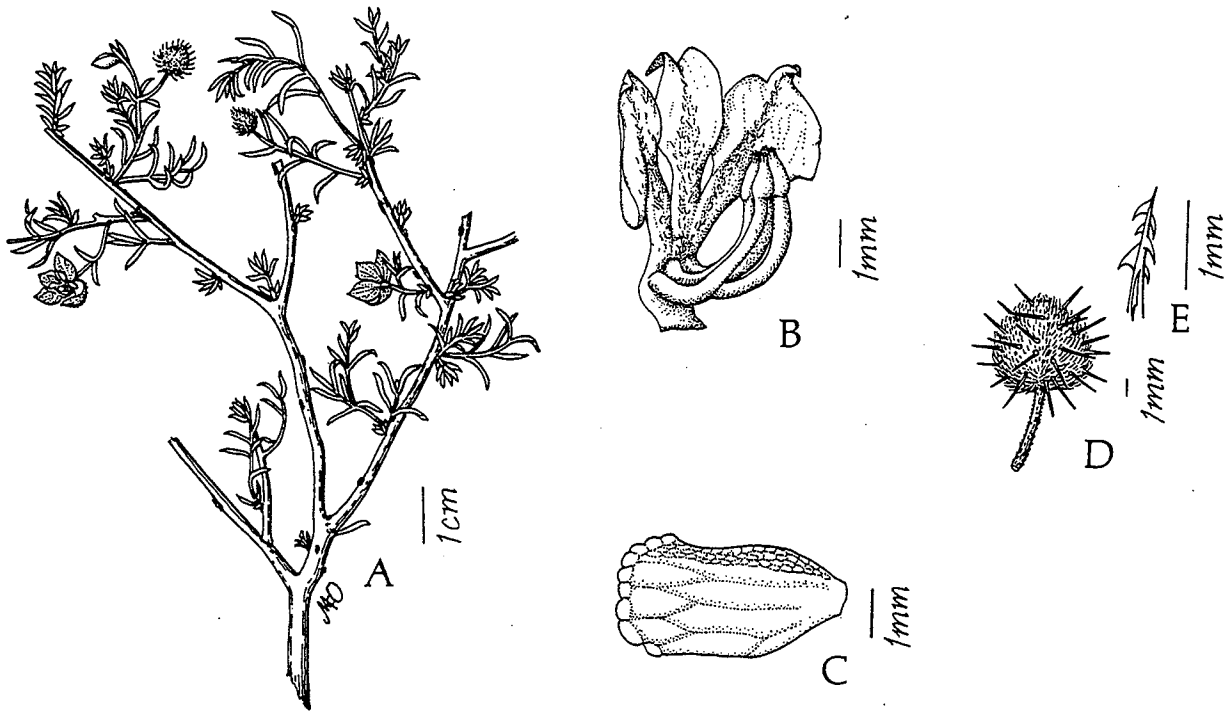
Krameria grayi Rose & Painter (for A. Gray). White Ratany. --Stiff, angular, mound forming shrubs 0.2-0.8(-1.5) m high; young branches canescent; old stems terete, blue-green, rigid with acute spinose tips. LEAVES usually sparse, occasionally almost completely lacking, 4-20 mm long, 1-5 mm wide, canescent throughout. FLOWERS solitary, flowering stalks to 25 mm long, canescent; bractlets 4-10 mm long, 0.5-3 mm wide, medial on flowering stalk; sepals 5, reflexed, purple or deep red-pink, canescent or strigose on the outer surfaces; lowermost sepal 9-12(-15) mm long, 2.5-5 mm wide; elaiophores orbicular to reniform, 1.5-3(-4.5) mm long, 1.5-3(-5) mm wide, deep purple, red-brown, pink or yellow, the dorsal surfaces bullate and entirely covered with round blisters; petaloid petals 3, pink or purple at the tip, green basally, distinct to base, narrowly oblanceolate, 3-6 mm long, 0.4-2 mm wide, the terminal expanded portion entire, minutely serrate or shallowly notched; stamens 4, didynamous, curved upward, inserted at the base of the petaloid petals, the upper pair 3.5-6 mm long, the lower pair 5-8 mm long; ovary 3-4 mm long; style red or pink. FRUITS cordate to circular in outline, 5.5-10 mm wide excluding spines, canescent, sericeous, or strigose with white or brown trichomes; individual spines (1.5-)2.5-5(-6) mm long, bearing a whorl of amber-colored, recurved barbs up to 1 mm long at the apex. --Deserts; La Paz, Maricopa, Mohave, Pima, Pinal, Yuma cos.; below 1100 m (3600 ft.); (Mar)Apr.-Sept.(-Nov); CA, NV, TX; Baja C., Baja C. Sur, Chih., Coah., Dur., Hid., Jal., Mich., Nay., S.L.P., Sin., Son., Zac., Mex.

Krameria lanceolata Torrey (lanceolate leaves) --Sprawling, decumbent, perennial herbs with branches generally radiating from a central woody underground stem, the branches to 1 m long, green,

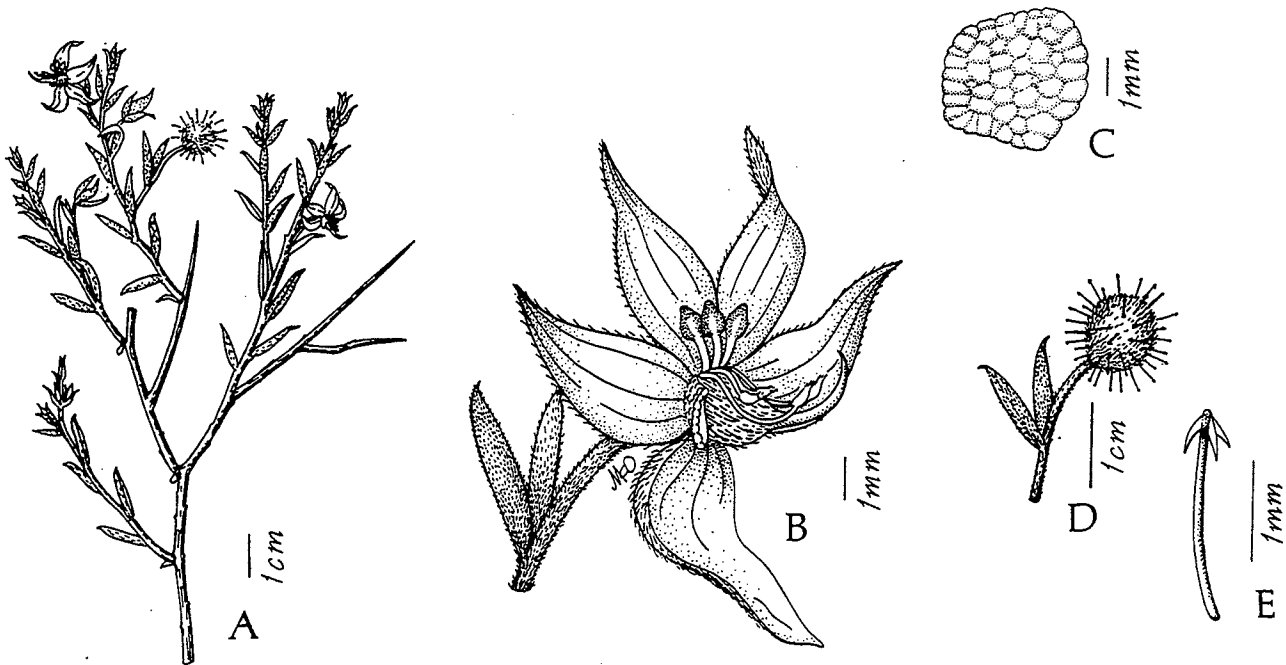
densely tomentose to sparsely strigose. LEAVES 5-25 mm long, 0.9-4 mm wide, variably strigose. FLOWERS borne in secund racemes (rarely in panicles) that terminate branches; flowering stalks 1-3 cm long; bractlets (7-)10-15 mm long, 0.5-2 mm wide, distal on the flowering stalk; sepals 5, spreading, densely strigose on the outer surfaces, deep purple; lowermost sepal 10-16 mm long, 3-6 mm wide; elaiophores cuneate, 1.5-3 mm long, pink, apricot-colored, or reddish with secretory blisters restricted to the upper half or quarter of the outer and distal faces; petaloid petals 3, clawed, 5-7 mm long, basally connate for about 4 mm with the connate portion cream-colored or pink, the terminal, distinct portions expanded into reniform blades, these crenulate, 1.5-2 mm long, 2-3 mm wide, purple, or pink and purple-edged; stamens 4, 3-4 mm long, inserted on the connate base of the petaloid petals with lateral pair connate for 1-2.5 mm beyond the point of insertion, pale pink; ovary 3-4 mm long; style pink. FRUITS globose (rarely slightly cordate) in outline, 5.5-8 mm wide excluding spines, variously pubescent, bearing stout, scattered spines; individual spines yellow, 1.8-5.3 mm long appearing roughened at the distal ends. --Usually in open grassy habitats with oak, or oak and pine: Cochise, Graham, Pima, Santa Cruz cos.; 1200-1700 m (4000-5500 ft.); May-Aug.; CO, FL, GA, KN, NM, OK, TX; Chih., Coah., Mex.



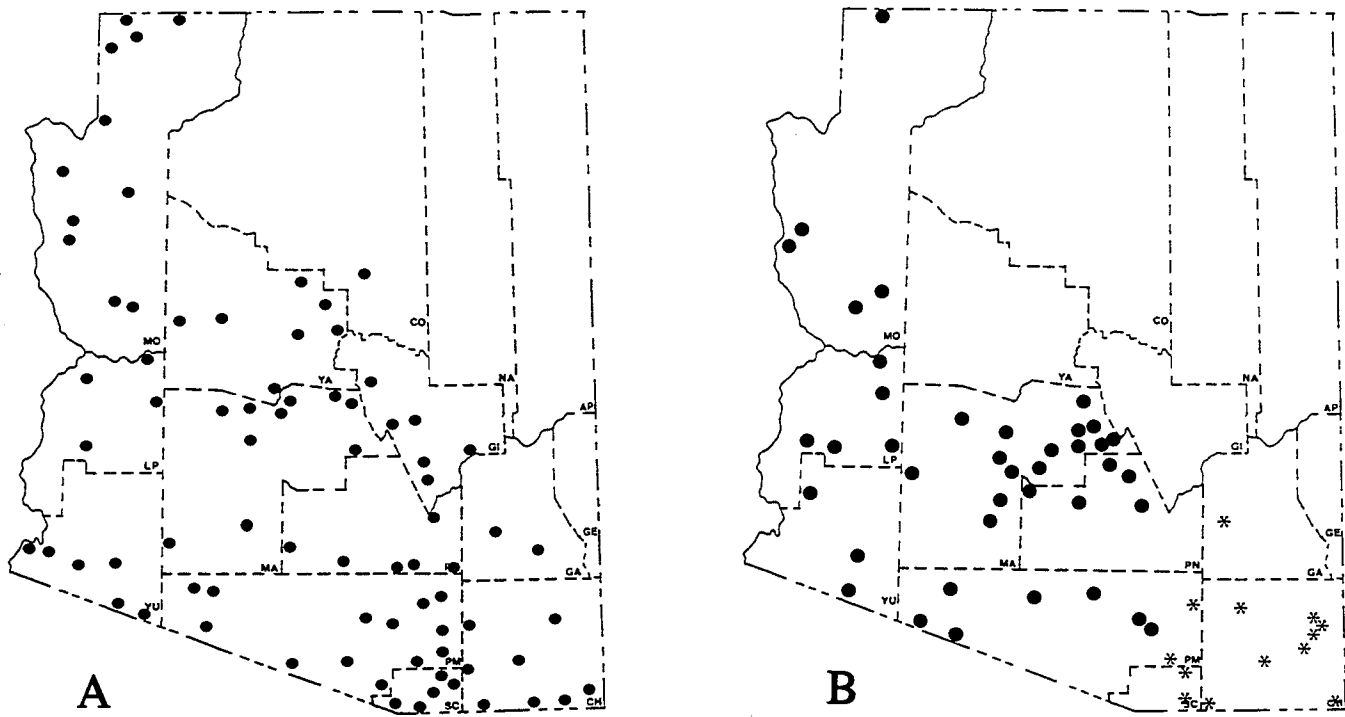
Krameriaceae Fig. 1. *Krameria lanceolata*. A, habit; B, flowering branch; C, three views of the flower; D, elaiophore; E, fruit; F, fruit spine. Illustration by M. C. Ogorzaly.



Krameriaceae Fig. 2. *Krameria erecta*. A, flowering branch; B, basally connate petaloid petals with the four equal stamens arching upward from their point of insertion; C, elaiophore; D, fruit; E, fruit spine.



Krameriaceae Fig. 3. *Krameria grayi*. A, flowering; B, flower; C, elaiophore; D, fruit; E, fruit spine.



Krameriaceae Fig. 4. Distribution of: A, *Krameria erecta*. B, *Krameria grayi* (dots); *Krameria lanceolata* (stars).