

appressed to the flattened rachis, oblique at the base, strongly gibbous, the 3 lower (outer) segments pustulate-setose but nearly or quite without shorter hairs, the 2 upper (axial) ones set lower down on the receptacle, connate for part of their length, short-hairy but scarcely or not at all pustulate-setose; corolla minute, white; nutlets mostly 4, lanceolate, tuberculate, all reaching to about the same height, but the axial one decidedly unlike the others, reaching distinctly farther down at the base, mostly 2–3 mm long, and with a broadly open scar, the other 3 mostly 1.5–2 mm long and with a closed or very narrowly open scar; style from not quite reaching to barely surpassing the tips of the nutlets.

Mostly in the *Larrea* desert, sometimes extending upwards to the *Coleogyne* or juniper zone; s. Calif., e. through s. Nev. to sw. Utah (Washington Co.), Apr–May.

This is a very distinctive species, which need not be confused with anything else.

### 61. *Cryptantha racemosa* (S. Wats.) Greene

*Eritrichium racemosum* S. Wats. ex A. Gray, Proc. Amer. Acad. Arts 17: 226. 1882. *Krynitzkia ramosissima* A. Gray, ibid. 20: 277. 1885. *Krynitzkia racemosa* Greene, Bull. Calif. Acad. Sci. 1: 208. 1885. *Cryptanthe racemosa* Greene, Pittonia 1: 115. 1887. *Johnstonella racemosa* A. Brand, Repert. Spec. Nov. Regni Veg. 21: 250. 1925. (*S. B. & W. F. Parish 775*, Mesquite Cañon, San Bernardino Co., Calif.; isotype at US!)

*Cryptantha suffruticosa* Piper, Proc. Biol. Soc. Wash. 32: 42. 1919. (*Orcutt 2070*, Camp Muchacho, Colorado Desert, San Diego Co., Calif.; holotype at US!)

*C. racemosa* var. *lignosa* I. M. Johnston, Univ. Calif. Publ. Bot. 7: 445. 1922. *Johnstonella racemosa* var. *lignosa* A. Brand, Repert. Spec. Nov. Regni Veg. 21: 250. 1925. (*Hall & Chandler 7034*, Panamint Canyon, Calif.; isotype at US!)

#### Bushy cryptantha.

Winter-annual, freely or often diffusely branched, often becoming coarse and woody toward the base (but the branches or branchlets slender), 1–10 dm tall, often with the form of a rounded, diffusely branched shrub; stems mainly strigose, but often with a few spreading hairs as well; leaves linear or oblanceolate, the early ones mostly 3–6 cm long and 6–12 mm wide, but soon deciduous, the later and more numerous ones mostly 1–4 cm long and 1–2.5 mm wide, strigose or hirsute-strigose and usually with some pustulate-based bristles especially along the margins; inflorescence often in part of slender spikes as in other species, but also in part (or largely) irregularly branched and bracteate; bractless flowers and flowers opposite to bracts intermingled along the axis with short, very few-flowered branches axillary to bracts, the inflorescence unique in the genus in this regard; flowers borne on distinct, slender pedicels, these becoming 1–4 mm long in fruit, variously ascending to loosely recurved; fruiting calyx 2–3 mm long, bristly-hispid and more shortly hirsute or hirsute-strigose, only very tardily deciduous; corolla white, small, mostly 1–2 mm wide; nutlets generally 4, lanceolate, white-tuberculate on a darker background, the margins well defined, marked by a raised line, but scarcely winged, the scar closed above, opening out at the base into a distinct, triangular areola; one abaxial nutlet more persistent than the other 3 nutlets and distinctly (though not greatly) larger, the odd nutlet mostly 1–2 mm long, the others 0.8–1.5 mm; style well

surpassing the nutlets, almost equaling the calyx.

Rocky or gravelly slopes and canyon-bottoms, less often in sand; deserts and lower reaches of the desert mts. (up to ca 1200 m) in s. Calif. and n. Baja Calif., e. to w. Ariz. and s. Nev., entering our range about the base of the White Mts. in Inyo Co., Calif. Apr–June.

This sharply delimited species is so distinctive in habit and inflorescence that it need not be confused with anything else.

### 62. *Cryptantha angustifolia* (Torr.) Greene

*Eritrichium angustifolium* Torr. in Williamson, Explor. & Surv. Railroad Route from Mississippi River to Pacific Ocean 5(2): 363. 1858. *Krynitzkia angustifolia* A. Gray, Proc. Amer. Acad. Arts 20: 272. 1885. *Cryptanthe angustifolia* Greene, Pittonia 1: 112. 1887. (*Thomas*, Fort Yuma, Ariz.; holotype at NY!)

*Cryptantha inaequata* I. M. Johnston, Univ. Calif. Publ. Bot. 7: 444. 1922. *Johnstonella inaequata* A. Brand, Repert. Spec. Nov. Regni Veg. 21: 250. 1925. (*Hall & Chandler 6925*, Pleasant Canyon, Panamint Mts., Calif.)

#### Creosote-bush cryptantha.

Winter-annual, mostly 0.5–2 (4) dm tall, freely (even diffusely) branched when well developed, and often with several stems from the base, the lowermost branches or outer stems commonly decumbent or curved-ascending; herbage spreading-hirsute with hairs of mixed lengths, or some of the hairs (especially of the stems) appressed and others spreading, the larger hairs of the leaves commonly pustulate at the base; leaves scattered, linear or nearly so, mostly 1–5 cm long and 1–5 mm wide; spikes numerous, terminating the branches, often paired, naked or bracteate at the base, elongating to 1.5–5 cm at maturity (but often remaining dense even as elongated); flowers virtually sessile, the pedicel (if any) stout and less than 1 mm long; fruiting calyces ascending-spreading, biseriate on the axis of the spike, only tardily deciduous at full maturity, 2.5–4 mm long (the abaxial segments often a little longer than the others), the segments spreading-setose along the eventually thickened midrib, and more finely hairy especially toward the margins; corolla white, small, mostly 1–2.5 mm wide; nutlets generally 4, finely white-tuberculate on a darker (often brown or lead-colored) background, the margins well defined, commonly marked by a raised line, but not winged, the upper part of the scar closed or narrowly open, the lower part gradually opening out into an elongate-triangular areola toward the base; one nutlet (in abaxial position) more persistent and somewhat larger than the other 3, these generally about 1 mm long or a little less; style evidently surpassing all the nutlets.

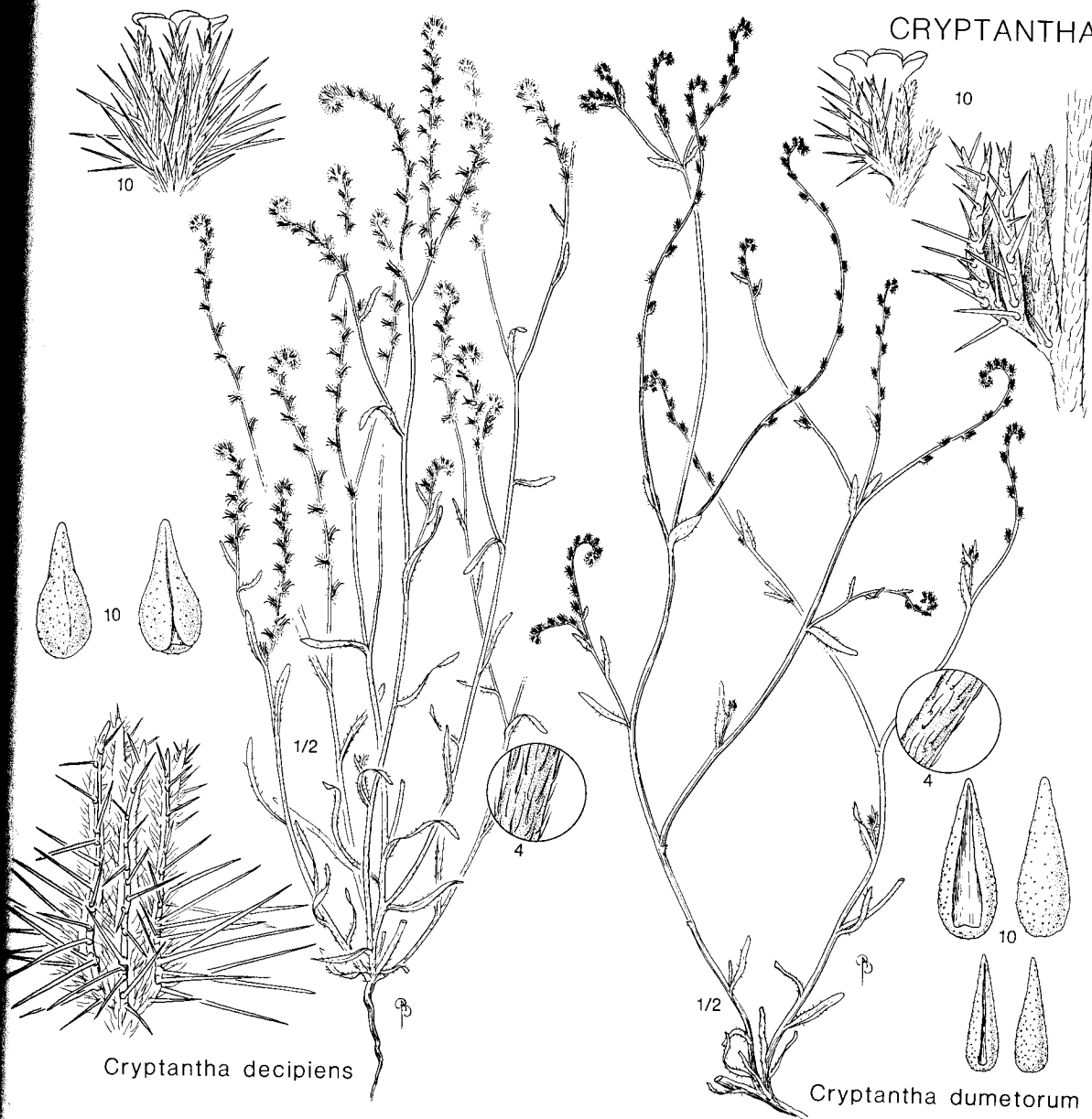
A common and characteristic sp. of the *Larrea* desert; s. Calif. and s. Nev. to sw. Utah (Washington Co.), Ariz., N.M., w. Texas, and n. Mex. Apr–May.

### 63. *Cryptantha micrantha* (Torr.) I. M. Johnston

*Eritrichium micranthum* Torr. in Emory, Rep. U.S. & Mex. Boundary Surv. 2(1): 141. 1858. *Krynitzkia micrantha* A. Gray, Proc. Amer. Acad. Arts 20: 275. 1885. *Eremocarya micrantha* Greene, Pittonia 1: 59. 1887. *Cryptantha micrantha* I. M. Johnston, Contr. Gray Herb. 68: 56. 1923. (*Thurber 181*, El Paso, Texas; holotype at NY!)

*Eritrichium micranthum* var. *lepidum* A. Gray, Syn. Fl. N. Amer. 2(1): 193. 1878. *Krynitzkia micrantha* var. *lepada* A. Gray, Proc. Amer. Acad. Arts 20: 275. 1885. *Eremocarya lepada* Greene, Pittonia 1: 59. 1887. *Eremocarya micrantha* var. *lepada* J. F. Macbr. Proc. Amer. Acad. Arts 51: 545. 1916. *C. micrantha* var. *lepada* I. M. Johnston,

CRYPTANTHA



*Cryptantha decipiens*

*Cryptantha dumetorum*

Contr. Gray Herb. 68: 57. 1923. *C. micrantha* subsp. *lepida* K. Mathew & Raven, Madroño 16: 171. 1962. (Cleveland s.n., San Diego Co., Calif., in 1876; holotype at GH!) A large-flowered phase (corolla-limb 4–6 mm wide).  
*Eremocarya muricata* Rydb. Bull. Torrey Bot. Club 36: 677. 1909. (Parry 164, valley of the Virgin River, near St. George, Utah; holotype at NY!)

Redroot cryptantha.

Slender winter-annual 5–15 cm tall from a red taproot, freely branched (at least when well developed), often with several or rather many stems from the base, tending to form rounded open mounds; stems slender, wiry, strigose; leaves chiefly or all cauline (often some of them crowded at the base, but not markedly different from those above, and soon dying), small, linear or nearly so, mostly 4–9 mm long and 0.5–1.5 mm wide, strigose, and tending to be ciliate toward the base; flow-

ers minute, in small, compact, leafy-bracteate, cymose clusters at the tips of the branches; calyx persistent, mostly 1.5–2 mm long; corolla white, salverform, the tube about equaling the calyx, the limb 0.5–1.5 mm wide; gynobase elongate, evidently surpassing the nutlets, capped by the sessile stigma, without a differentiated style; nutlets 4, slender, lanceolate, rounded on the back, 1.0–1.2 mm long, variously all smooth, or all finely tuberculate, or 3 smooth and the abaxial one tuberculate, the abaxial one often a little larger and more persistent than the others; scar elongate, running the full length of the nutlet, closed or narrowly open;  $2n = 24$ .

Mostly in sandy soil or on dunes in the *Larrea* zone, occasionally extending upward into the *Coleogyne* or sagebrush-juniper zone; s. Calif. and adj. Baja Calif., e. across Ariz. and N.M. to w. Texas, n. to the edge of our range in Nev., and entering s. Utah in Washington,

Kane, and Garfield cos.; disjunct (?) in Churchill Co. and in nw. Humboldt Co., Nev. Mar–May.

This is a distinctive species, which need not be confused with anything else. Our plants as here described, belong to the widespread var. *micrantha*. The var. *lepida* (A. Gray) I. M. Johnston, with a larger corolla-limb, is confined to southern California and adjacent Baja California; it may prove to be a distinct species.

**64. *Cryptantha circumscissa* (Hook. & Arn.) I. M. Johnston**

*Lithospermum circumscissum* Hook. & Arn. Bot. Beechey's Voyage 370. 1839. *Piptocalyx circumscissus* Torr. in King, Rep. Geol. Explor. 40th Parallel 5: 240. 1871. *Eritrichium circumscissum* A. Gray, Proc. Amer. Acad. Arts 10: 58. 1874. *Krynitzkia circumscissa* A. Gray, ibid. 20: 275. 1885. *Wheelerella circumscissa* G. B. Grant, Bull. S. Calif. Acad. Sci. 5: 28. 1906. *Greeneocharis circumscissa* Rydb. Bull. Torrey Bot. Club 36: 677. 1909. *Cryptantha circumscissa* I. M. Johnston, Contr. Gray Herb. 68: 55. 1923. (*Tolmie* 75, Snake Fort, Snake Country, Idaho; holotype at K!)

*Krynitzkia dichotoma* Greene, Bull. Calif. Acad. Sci. 1: 206. 1885. *Piptocalyx dichotomus* Greene, Pittonia 1: 60. 1887. *Wheelerella dichotoma* G. B. Grant, Bull. S. Calif. Acad. Sci. 5: 28. 1906. *Greeneocharis dichotoma* J. F. Macbr. Proc. Amer. Acad. Arts 51: 546. 1916. (*Curran* s.n., eastern base of the Sierra Nevada, between Boca and Verdi, in 1884; isotype at GH!)

*Cryptantha depressa* A. Nels. Bot. Gaz. 34: 29. 1902. (*Merrill & Wilcox* 873, 7 mi. w. of St. Anthony, Idaho; holotype at RM!)

*Greeneocharis circumscissa* var. *hispida* J. F. Macbr. Proc. Amer. Acad. Arts 51: 546. 1916. *Cryptantha circumscissa* var. *hispida* I. M. Johnston, Contr. Gray Herb. 74: 42. 1925. (*Culbertson* 4243, trail to Mt. Whitney, 10,000 ft alt., Calif.; holotype at GH!)

Cushion cryptantha.

Dwarf annual, much-branched from the base when

well developed, forming cushions 1–6 cm high; taproot generally red; herbage coarsely strigose-hirsute with subappressed or ascending-spreading to seldom mainly spreading hairs; leaves linear, 5–13 mm long, densely crowded toward the ends of the branches, the lower usually more remote; flowers crowded, sessile, solitary in or alongside the axils of the upper leaves or in the forks of the branches; fruiting calyx 2–3 mm long, circumscissile a little below the middle, the persistent, cupulate basal portion white-scarious, obviously of different texture from the more herbaceous deciduous portion, the sinuses between the lobes not quite reaching the zone of dehiscence; corolla 0.5–1.5 mm wide; nutlets ordinarily 4, nearly or quite alike, smooth or finely roughened, rather narrowly triangular-ovate, 1.0–1.3 mm long, the scar closed; style nearly or quite equaling the nutlets;  $2n = 24, 36$ .

Dry, open, usually sandy places, most commonly on the desert plains and in the desert valleys and in dry foothills, but sometimes ascending to as much as 3000 m, as in the White Mts. of Calif.; c. Wash. (and reputedly s. B.C.) to Baja Calif., largely e. of the Cascade-Sierran axis (or e. of the summits), extending e. throughout the Snake River Plains (and in the Salmon River valley) of Idaho, virtually throughout Nev. and occasionally in w. and n. Ariz.; in Utah mainly in the s. tier of cos., but occasionally n. to Great Salt Lake and to Uintah and Duchesne cos.; and in nw. Colo. and sw. Wyo.; also in Chile and Argentina. Apr–July.

Most of the plants of this species have the pubescence largely subappressed. The more distinctly spreading-hairy plants have been segregated as var. *hispida* (J. F. Macbr.) I. M. Johnston, supposedly restricted to the base and east side of the Sierra Nevada in California and adjacent Nevada. The orientation of the pubescence is actually more variable and geographically less well correlated than has been supposed, and I do not find it useful to try to draw a taxonomic distinction.

**8. PLAGIOBOTHRYS Fischer & C. Meyer**

Annual or less often perennial herbs, mostly rather small; leaves mostly narrow, the lower often opposite; flowers borne in a series of sympodial, helicoid, naked or irregularly bracteate false racemes or spikes, these sometimes condensed into glomerules, but in most species elongating with age; calyx evidently cleft, in most species to below the middle or near the base, sometimes moderately accrescent; corolla white (rarely pinkish), the well developed fornications sometimes yellow, the limb usually more or less rotately spreading, not large; stamens included, the filaments short; nutlets 4, or 1–3 by abortion, tending to be keeled on the back, and with a well developed ventral keel extending from the tip to near the middle or nearly to the base; scar generally elevated and caruncle-like, mostly small, lateral to virtually basal, placed at the end of the ventral keel, or sometimes extending along part of the length of the keel; gynobase short and broad to pyramidal. (*Allocarya*, *Maccoya*, *Sonnea*)

A genus of perhaps as many as 50 species, native to w. N. Amer. and S. Amer., with one outlying species in e. Asia and another in Australia. (From the Greek *plagios*, placed sideways, and *bothros*, pit or excavation, referring to the position of the scar of the nutlet.)

*Plagiobothrys* consists mainly of two well marked sections or subgenera that have often (and not without reason) been treated as distinct genera. The circumscription here adopted has been vigorously defended by Johnston, who further points out that the *Allocarya* group, if recognized as a genus, must take the older name *Maccoya*. The treatment here presented is more nearly concordant with Johnston's first (1923) revision than with his second (1932), in which he recedes toward the position earlier taken by Piper that minor technical variations in the nutlets, unsupported by other characters or by geography, furnish sufficient basis of the establishment of species. The species as recognized in the present treatment are sharply defined. Those of the *Allocarya* group are extraordinarily variable in the ornamentation of the nutlets, but an effort at further subdivision on this basis leads only into confusion.

References:

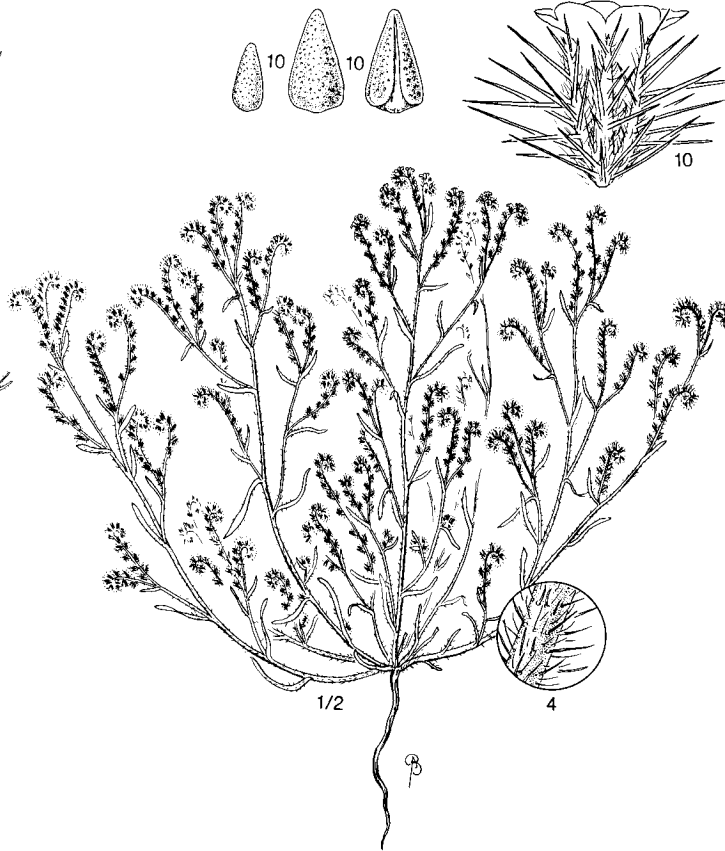
- Johnston, I. M. 1923. Studies in the Boraginaceae. 4. A synopsis and redefinition of *Plagiobothrys*. Contr. Gray Herb. 68: 57–80.  
 ———. 1932. Studies in the Boraginaceae. IX. The *Allocarya* section of *Plagiobothrys* in the western United States. Contr. Arnold Arbor. 3: 5–82.  
 Piper, C. V. 1920. A study of *Allocarya*. Contr. U.S. Natl. Herb. 22: 79–113.

- 1 Lower cauline leaves, like the others, ordinarily alternate; scar lateral, near the middle of the nutlet; herbage more or less markedly spreading-hairy; plants definitely taprooted, mostly occurring in well drained soils (subg. or sect. *Plagiobothrys*).
- 2 Scar of the nutlet short, not appreciably longer than wide, placed just below the end of the ventral keel; corolla small, the limb mostly 1–4 mm wide.
- 3 Nutlets ordinarily 4, thick-cruciform (unique in the genus in this regard); inflorescence elongating in age; calyx not circumscissile; chiefly northern and western in our range . . . . 1. *P. tenellus*

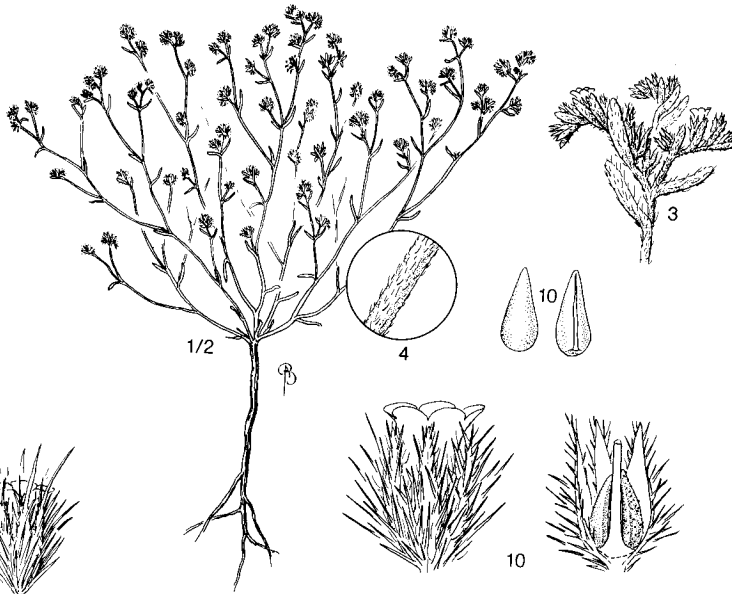
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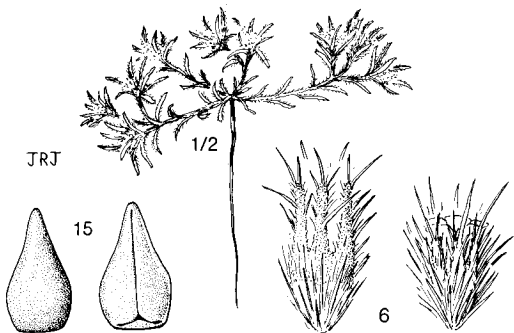
*Cryptantha racemosa*



*Cryptantha angustifolia*



*Cryptantha micrantha*



*Cryptantha circumscissa*

JRJ