The Boraginaceae of Utah

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THE BORAGINACEAE OF UTAH

by

Larry C. Higgins
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BIOLOGICAL SERIES — VOLUME XVI, NUMBER 3

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>TAXONOMY</td>
<td>1</td>
</tr>
<tr>
<td>Boraginaceae</td>
<td>1</td>
</tr>
<tr>
<td>Ausinia</td>
<td>2</td>
</tr>
<tr>
<td>Anclusa</td>
<td>4</td>
</tr>
<tr>
<td>Asperugo</td>
<td>5</td>
</tr>
<tr>
<td>Borago</td>
<td>5</td>
</tr>
<tr>
<td>Coldenia</td>
<td>6</td>
</tr>
<tr>
<td>Cryptantha</td>
<td>8</td>
</tr>
<tr>
<td>Echinum</td>
<td>54</td>
</tr>
<tr>
<td>Eritrichium</td>
<td>54</td>
</tr>
<tr>
<td>Hackelia</td>
<td>55</td>
</tr>
<tr>
<td>Heliotropium</td>
<td>58</td>
</tr>
<tr>
<td>Lappula</td>
<td>60</td>
</tr>
<tr>
<td>Lithospermum</td>
<td>62</td>
</tr>
<tr>
<td>Mentheista</td>
<td>66</td>
</tr>
<tr>
<td>Myosotis</td>
<td>75</td>
</tr>
<tr>
<td>Pectocarya</td>
<td>75</td>
</tr>
<tr>
<td>Plagiothryptys</td>
<td>77</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>81</td>
</tr>
<tr>
<td>LITERATURE CITED</td>
<td>81</td>
</tr>
</tbody>
</table>
THE BORAGINACEAE OF UTAH

by

LARRY C. HIGGINS

ABSTRACT

This paper presents a revision of the family Boraginaceae for the state of Utah. Ninety-three species in seventeen genera are recognized. The treatment includes keys, synonymy, descriptions, and citations of representative specimens found in the various herbaria in the state of Utah. The new combination Lappula occidentalis (Wats.) Greene var. cupulata (Gray) Higgins is presented.

INTRODUCTION

For the last six years I have been engaged in research leading to a revision of the Utah Boraginaceae. This family of flowering plants has long been a stumbling block for beginning students in plant taxonomy and anyone interested in plant identification. For many years the literature encompassing the Utah borages has been inadequate or nonexistent. Investigators have had to resort to many different publications to possibly identify the plants at hand. At any rate, no single work has been available which could be used to identify the native borages of Utah. This work is an attempt to provide keys and descriptions for all the Boraginaceae found in Utah.

TAXONOMY

Boraginaceae Lindl.


Plants herbaceous, shrubby or sometimes tropical trees, usually bristly; leaves simple, alternate, or sometimes opposite or whorled, entire and pubescent, hispid or setose; flowers perfect, regular, solitary or cymose; cymes glomerate-racemose or spicate, frequently unilateral and coiled (scorpioid), usually with bracts between, to one side of, or opposite the flowers; calyx usually 5-lobed or 5-parted, usually persistent, the lobes valvate; corolla 5-lobed, sometimes crested or appendaged in the throat; stamens 5, borne on the corolla-tube alternate with the lobes; ovary superior, bicarpellate, usually 4-ovulate, entire or lobed, becoming tough or bony at maturity; fruit commonly breaking up into 4 single-seeded lobes (nutlets); style simple or 2-cleft, seated in the pericarp at the apex of the fruit or borne between the fruit-lobes (nutlets) on the receptacle, or on an upward prolongation thereof (gynobase); endosperm absent or scarce; embryo straight or curved.

The classification of this family is based primarily upon the structure of the fruit. In many cases it is difficult to recognize the genus and almost impossible to obtain a precise identification of the species if the specimens lack mature fruiting structures.

The Boraginaceae are of little or no economic value, but the family has numerous species that are cultivated as ornamentals, principally in the genera Heliotropium (heliotrope), Anchusa, Echium, and Myosotis (forget me not).

1. Style 2-cleft; stigmas 2, distinct; flowers solitary or clustered in the stem forks ............... 5. Coldenia
2. Style simple; stigmas united (2).
3. Style arising from the pericarp at the apex of the fruit, falling away with the nutlets; stigma annular-peltate, surmounted by a conical or cylindrical, simple or lobed appendage ......... 11. Heliotropium
4. Style borne between the lobes of the fruit (nutlets),
and attached to the receptacle or gynobase; stigma capitate, unappendaged (3).

3. Nutlets with uncinate, glochidiate or barbed prickers on the back, margins or the apex (4).

3. Nutlets without hooked or barbed prickers (7).

4. Nutlets subglobose, with dorsal surface rather uniformly covered with barbed prickers, no definite margins present ........................................ 7. Cynoglossum

4. Nutlets with a definite margin, the prickers confined to this (back may be muricate or tuberculate) (5).

5. Nutlets stellately spreading, attached at the apical (radicle) end, armed with hooked appendages. Small slender annuals ................................ 16. Pectocarya

5. Nutlets erect, incurved or weakly divergent, attached at or below the middle, i.e., toward the cotyledon end (6).

6. Plants annual; pedicels erect or nearly so; styles surpassing the nutlets; subulate gynobase about as long as the nutlets ........................................ 12. Lappula

6. Plants perennial or biennial; pedicels reflexed in fruit; styles usually shorter than the nutlets; pyramidal gynobase about half as long as the nutlets ........................................ 10. Hackelia

7. Corolla irregular, the upper lobes usually longer than the lower ones; stamens not all equal in length .......... 8. Echium

7. Corolla regular or nearly so (8).

8. Calyx in fruit much enlarged, becoming conspicuously veiny, folded and flattened; stems procumbent, angled, with stiff retrorse bristles on the angles ........................................ 3. Asperugo

8. Calyx in fruit little if any enlarged, not becoming veiny, folded and flattened; stems various but not as above (9).

9. Nutlet attachment surrounded by a swollen ring, leaving a distinct pit on the gynobase; plants of fields and waste places (10).

9. Nutlet attachment not surrounded by a rim nor leaving a pit (11).

10. Stamens appended dorsally, closely crowded around the style; corolla rotate .......... 4. Borago

10. Stamens unappended, included within the tubular corolla ........................................ 2. Anchusa

11. Corolla normally blue (aberrant white-flowered plants occasionally are found), or reddish in the bud stage (12).

11. Corolla white, greenish-white, yellow or orange (14).

12. Nutlets with an oblique dorsal face encircled by an upturned flange or rim, this often irregularly toothed; depressed-pulvinate plants seldom over 7 cm tall, of alpine areas in Utah .... 9. Eritrichium

12. Dorsal face of nutlet (if present) not encircled by an upturned flange or rim; plants not depressed-pulvinate, usually over 7 cm tall, most species growing below alpine areas in Utah (13).

13. Corolla lobes convolute in the bud; nutlets basally attached to a flat gynobase; corolla salverform .................................................. 15. Mysoritis

13. Corolla lobes imbricate in the bud; nutlets obliquely attached to a convex gynobase; corolla with a tube and usually a campanulate throat, not salverform .................................................. 14. Mertensia

14. Nutlets attached above the base along a usually open and generally basally forked ventral groove or slit, or by a triangular opening in the pericarp ........................................ 6. Cryptantha

14. Nutlets lacking a distinct ventral groove or opening in the pericarp, this usually replaced by an elevated ventral keel (15).

15. Plants perennial; nutlets attached by a broad, rounded, quite basal noncaruncular attachment, nutlets ovoid, smooth and shiny; corolla usually yellow or orange ....................... 13. Lithaspermum

15. Plants annual; nutlets attached by a caruncular scar borne upon or at the basal end of the ventral keel, the attachment usually lateral or suprabasal; nutlets usually rough (16).

16. Corolla white; cotyledons entire .. 17. Plagiobothrys

16. Corolla orange or yellow, the tube definitely longer than the calyx; cotyledons 2-lobed ......... 1. Amsinckia

1. Amsinckia Lehm.


Annual, pungent-bristly, herbaceous plants; stems erect or with spreading branches, leafy; leaves alternate, linear to ovate, usually veinless; racemes usually bracteate; calyx cut to base into erect lanceolate or oblone lobes; corolla tubular or salverform, heterostyled, yellow or orange, tube cylindrical, glabrous, unappendaged; lobes spreading, rounded, imbricate; stamens included, affixed in the tube, filaments very short, anthers oblong; obtuse style filiform, included; stigma capitate, marginate; ovules 4; cotyledons 2-parted; nutlets 4, erect, angulate-ovoid, smooth or rough, unmargin, strongly keeled ventrally; gynobase pyramidal, truncate, about half the height of the nutlet.

A genus of considerable difficulty which is found mainly in western North America.

Type species: Amsinckia lycosoides Lehm.

1. Corolla-tube 20-nerved below attachment of stamens; calyx-lobes unequal in width and reduced in numbers (2, 3, or 4) by fusion; nutlets tesselate ........................................ 3. A. tessellata

1. Corolla-tube 10-nerved below insertion of stamens; calyx-lobes 5, distinct (2).

2. Corolla orange-yellow, 7-20 mm long, well exerted beyond the calyx; plants usually green; stems hispid-bristly, but with little or no fine-appressed hairs ........................................ 1. A. intermedius

2. Corolla pale-yellow, 4-7 mm long, little or not at all exerted beyond the calyx-lobes; leaves pubescent with appressed or ascending hairs .. 2. A. retrorsa
*Amsinckia integerrima* Macbride, op. cit. 13. 
*Amsinckia arvensis* Suksd., Werenda 1:32. 1927.

Stems simple or much branched, erect to widely spreading, 3-9 dm tall, sparsely bristly otherwise usually glabrous except for a tomentose pubescence near the base of the spikes; basal and lower cauline leaves linear or linear-lanceolate, the upper lanceolate to nearly ovate, usually clasping at base and acute at apex, thinly hirsute on both sides with spreading, often pubulate hairs; spikes short or usually elongating in fruit, usually leafy-bracted at base; calyx-lobes linear attenuate, about half as long as the corolla, rufous-hispid on the back, densely white-hirsute on the margins; corolla orange-yellow, 8-10 mm long, the limb 3-6 mm wide; nutlets 2.5-3 mm long, incurved, grayish, narrowly keeled on the back and sharply rugose with the surface between papillate or muriculate. A common field and roadside weed; Washington to Idaho, and south to Arizona and northern Baja California. Type locality: near Bodega Bay, California. March-June. Fig. 1.

*A. intermedia* is a highly variable species of wide geographical range. Suksdorf (Werenda 1:48-113. 1931) in a study of the genus proposed over one hundred new species that fall within this species. In Utah *A. intermedia* is located almost entirely in Washington County, with a few scattered records in the western tier of counties.

Millard Co., Wah Wah Mountains. Cottam 5659 (UT); Washington Co., St. George, Law s.n. (UT); Terry’s Ranch, J.B. Karen 18 (BRY); Beaverdam Mountains, L.C. Higgins 365, 402. 1222 (BRY); Dixie State Park, L.C. Higgins 869 (BRY).

*Amsinckia parviflora* Heller, Muhlenbergia 2:313. 1907 not Bernh. 1833.

Stems strictly erect, 3-8 dm tall, usually simple below the inflorescence, bristly-hirsute and often more or less cinereous with fine appressed hairs; leaves linear or the upper linear-lanceolate, hirsute on both sides with ascending or appressed hairs; inflorescence of 1 or few, strict, erect or ascending racemes, bractless; calyx-lobes 5, distinct, 7-13 mm long, linear or linear-lanceolate; corolla light-yellow, 5-7 mm long, the tube included or only slightly exserted beyond the calyx-lobes; style 2.5-3 mm long; nutlets 2.5-3 mm long, broadly ovoid, densely tuberculate all over, with scattered larger tubercules intermixed, the latter on the central and lateral ridges when these are present. Moist slopes and fields or sometimes dry ground. Washington to Idaho and south to Utah and southern California. Type locality: near Bingen, Klickitat County, Washington. April-August. Fig. 2.

Cache Co., 2 miles southwest of Hyrum, T. Jensen 589 (UTC); Pine Canyon, Wellsville Range, B. Maguire 3111 (UTC); Foot of Sardine Canyon, B. Maguire 13788 (UTC); South of Hardware Ranch and Randolph Road Bldg. W.P. Cottam 16001B (UTC); Davis Co., Centerville, S. Flowers 1192 (UT); Farmington, B. Maguire 12990 (UTC); Salt Lake Co., Salt Lake City, I.E. Diehl s.n. (BRY); Salt Lake City, K. Brizzee 7780 (UT); Salt Lake City, A.O. Garrett 3640C (UTC); City Creek Canyon, K. Brizzee 7845 (UT); Summit Co., Canyon near Gorgoza, A.O. Garrett 8646 (UTC); Tooele Co., Stansbury Range, South Willow Creek, B. Maguire 21807 (UTC); Tooele, just northwest of city limits, L.C. Higgins 4092 (BRY); Weber Co., Huntsville, C.P. Smith 1944 (UTC).

Amisinckia tessellata (UT); taproot; little Amisinckia the mile (BRY); median Anchusa miles a Anchusa apex, Hurricane, Nish narrowly Welcome when one Flowers 3 Diablo, em-versely densely ovoid, and at spreading Washington Eastern limb mm broader.5-12 basal cm Beaverdam. Stems long, Davis.s 2.243. species scried. 1894. 1931. (In publication fifteen other species referable to tessellata were described.)

Stems stout, branched throughout or sometimes simple below, 3-6 dm high, hirsip with spreading bristles; leaves linear-lanceolate, 2-7 cm long, rather thinly hirsip, the hairs postulate at base, sessile except the narrowly obovate basal ones; spikes elongating with age, often 5-12 mm long; calyx lobes 3 or 4, when 4 one broader and notched or 2-lobed at apex, when 3 a little broader and notched at apex, hirsip and on the margins densely white hirsute, 8-13 mm long; corolla orange, tube 5-10 mm long, limb 2.5-5 mm wide; nutlets 3-3.5 mm long, ovoid, the back low usually with a median line, densely tessellate or papillate, and often transversely rugose. Dry, usually sandy or rocky soils, Eastern Washington to Utah, Arizona and northern Baja California. Type locality: near Mount Diablo, California. March-June. Fig. 3.

Davis Co., near Centerville, S. Flowers s.n. (UT); Washington Co., St. George, F.W. Gould 1479 (BRY); Beaverdam Wash, L.K. Shumway 23 (BRY); Beaver-

dam Wash, W.P. Cottam 5093 (UT); St. George, M.E. Jones 1640 (UT); Beaverdam Slope, Fisk 3 (UT); West slope of the Beaverdam Mountains, D. Nish 69 (UTC); 4 miles northwest of Welcome Springs, B. Maguire 20495 (UTC); 1 mile east of Hurricane, B. Maguire & Blood 1537 (UTC).

2. Anchusa L.

Anchusa L., Sp. Pl. 133. 1753.

Annual, biennial or perennial herbs with blue or purple flowers in paniced, scorpioid racemes; calyx divided into narrow lobes; corolla trumpet-shaped, the tube straight, the throat closed by scales, the limb with widely spreading lobes; stamens included, style slender, ovary 4-parted, nutlets 4, their attachment surrounded by an annular ring leaving a pit on the low gynobase.


Plants perennial, from a taproot; stems erect, branched from near the base, 30-100 cm high; coarsely hirsute, the hairs often pustulate at base; basal leaves 8-20 cm long, obovate, stem leaves lanceolate; calyx 5-8 mm long, the lobes lanceolate to narrowly triangular, about as long as the tube; corolla about 10 mm long, dark blue; nutlets 2-3 mm long, rugose or granulate; inserted by their bases on a flat gynobase. Roadsides and waste places. Native to Eurasia
and introduced into the eastern United States as far west as Utah. June-August. Fig. 4.

Salt Lake Co., Salt Lake City, L. Arnow 327 (UT); Utah Co., Rock Canyon, C. Sanders s.n. (UT); Rock Canyon, Cottam s.n. (UT); Rock Canyon, A.O. Garrett 2783 (UT); BYU campus, K. Shaw 29 (BRY); Rock Canyon, P.A. Replogle 85 (BRY); Rock Canyon, L. Hartman 126 (BRY); Rock Canyon, B.F. Harrison 8380 (BRY); Provo, L. Woodbury 33 (BRY); Hobble Creek, L.C. Higgins 3512 (BRY, WTSU).

3. Asperugo L.


Rough-hispid, annual, procumbent plants, with stiff bristly hairs; leaves alternate, or the upper sometimes opposite, entire; calyx campanulate, unequally 5-cleft, much enlarged and reticulate-veiny in fruit, lobes incised-dentate, the teeth often appearing as extra lobes in the sinuses; corolla tubular-campanulate, 5-lobed, 1 to 3 together on short, recurved pedicels in the upper leaf axis; stamens 5, inserted on the corolla tube, included; filaments very short; ovary capitate; nutlets 4, ovoid, erect, granular-tuberculate, attached laterally above the middle to the elongate-conic receptacle, the scar not leaving a pit.


Stems 2-6 dm long; diffusely branched, slender and procumbent or ascending, retrorsely short-hispid; leaves 1-4 cm long, obovate to oblanceolate, scabrous, obtuse to acutish at apex; fruiting calyx 8-15 mm wide; corolla small, 2-3 mm long, blue, purple or purplish-red; nutlets obliquely ovoid, about 4 mm long, granulate-tuberculate. Waste places. Introduced from Europe in various parts of Canada and the United States. May-August. Fig. 5.

Cache Co., Logan, in garden, N.H. Holmgren 39 (UTC); USU Campus, B. Maguire 3697 (UTC); 1 mile below Dry Canyon, B. Maguire 13787 (UTC); 1 mile west of Benson, B. Maguire 2417 (UTC); Green Canyon, Melvin Burke 3696 (UTC); Davis Co., Barton Creek, mouth of Holbrook Canyon, B. Anderson 51 (UTC); Bountiful, S. Flowers s.n. (UT); Salt Lake Co., Salt Lake City, Maguire & Blood 1538 (UTC); Salt Lake City, A. Bleak 20 (UT); Red Butte Canyon, G. Swanson 103 (UT); Salt Lake City, A.O. Garrett 8697 (UT); Salt Lake City, W.J. Stubbs s.n. (BRY); Tooele Co., Tooele, just northwest of the city limits, L.C. Higgins 4091 (BRY, WTSU); Weber Co., Weber State College Campus, A. Collozzi 76 (UTC); Foothills east of Ogden, E.L. Miner s.n. (UTC).

4. Borago (Tourn.) L.

Borago (Tourn.) L., Sp. Pl. 137. 1753.

Hirsute or hispid annual or biennial herbs with alternate, entire leaves and blue flowers in
terminal leafy racemes; calyx deeply 5-cleft or 5-parted; corolla rotate, the tube very short, throat closed by scales, limb 5-lobed, the lobes imbricated, acute; stamens 5, inserted on the corolla tube; filaments dilated below, narrowed above to a slender appendage; anthers linear, erect, and connivent with a beak-like cone; ovary 4-divided; style filiform; nutlets 4, ovoid, erect, attached by their bases to the flat receptacle; scar of attachment large, concave.


Stems erect, 5-8 dm tall, with ascending or spreading branches; leaves oblong to obovate, 5-11 cm long, rounded to acute at apex, the upper ones clasping, lower narrowed to a winged petiole; pedicels spreading or recurving, 2-5 cm long; calyx-lobes linear-lanceolate, 7-10 mm long; corolla 15-20 mm broad, bright blue; anther-beak dark purple, about 6-7 mm long; nutlets 4 mm long. An escape from gardens and sparingly naturalized in the western United States, a native of Europe. June-August. Fig. 6.

Cache Co., Logan J. Thieret 209 (UTC).

5. *Coldenia* L.


Herbaceous or suffruticose plants with slender, forking, usually prostrate or widely spreading stems; leaves small, entire, usually strongly veined, subsessile or petiolate; flowers small, generally white, generally extra-axillary, along leafy twigs or at the forks of the branches, sometimes glomerate; commonly opening in late afternoon; corolla with a short, cylindrical or ampullate tube and spreading lobes, throat naked or sometimes appended; stamens 4-5, included, their filaments adnate to the corolla-tube; style terminal on the ovary, short to long, bilobed or biparted; stigmas 2, not much differentiated from the style-branch; ovary 2-celled or sometimes 4-celled by the septum-like placenta, entire or 4-lobed; fruit dry, pyramidal or hemispheric, divided into usually 4 single-seeded nutlets; nutlets more or less broadly united ventrally or joined to a central prolongation of the receptacle.

Except for a single old world species, entirely confined to arid regions of America. Type species: *Coldenia procumbens* L.

1. Fruit nearly globose, unlobed, breaking apart at maturity into quarter-segments, each quarter forming maturity into quarter sections, each quarter forming a nutlet; leaves ovate to elliptic, white-tomentose, obscurely veined ........................................ 1. *C. canescens* var.  
   1. Fruit deeply 4-lobed, the lobes joined only by their inner angle, each lobe forming a nutlet, leaves not tomentose (2).

2. Plants perennial; leaves not evidently nerved, lanceolate to linear, usually very pungently setose; base of petiole expanded, indurate, usually villous; flowers solitary in the leaf axils; nutlets finely warty, ovate ........................................ 2. *C. hispidissima*  
   2. Plants annual; leaves with evident impressed nerves, ovate or obovate to nearly orbicular; base of petiole not expanded or indurate or villous; flowers in dense clusters at the forks of the stem; nutlets smooth or granulate ........................................ 3. *C. nuttallii*

1. *Coldenia canescens* DC., Prodr. 9:559. 1845. Type from between Santander (ie., Jimenez) and Victoria, Tamaulipas, Mexico, Berlandier 2256.


Plant suffrutescent, perennial, often forming mats 2-6 dm in diameter; stems several to numerous, mostly prostrate but sometimes ascending, intricately branched; old stems decorticating, rough, dark-colored; leafy stems and
branches pallid, tomentose; leaves numerous, white tomentose; petiole slender, 2-7 mm long, in extreme maturity usually breaking off near the middle leaving a stub attached to the stem; leaf blade ovate to elliptic-lanceolate, obtuse to broadly acute at the ends, 7-10 (15) mm long, 2-7 (9) mm wide, thickish, the margins somewhat revolute tomentose; flowers usually solitary in the axils of the leaves and along the main stem and branches; calyx sessile, persistent, at anthesis 3-4 mm long, lobes about as long as the corolla tube, unequal, united above the base; lobes of the fruiting calyx lanceolate, usually long-attenuate, 4-7 mm long; corolla 5-6 (8) mm in total length, pink, rose or rarely white, the lobes broad and rounded, 1.8-3 (4.5) mm wide, 1.5-2 (3.5) mm long, usually villous in the buds, margins frequently erose; filaments all differing slightly in length and height of attachment; ovary 4-ovulate, at anthesis subglobose, about 0.8 mm high, marked with 4 longitudinal grooves; fruit at maturity glabrous or hairy, ovoid-globose, 2.5-3 mm in diameter, 2-2.5 mm high, not lobed; nutlets bony, back convex, densely and minutely tuberculate; style seated in the pericarp at the apex of the fruit, persistent until the fruit breaks up into 4 nutlets 1.5-2.5 mm long. Rocky ridges and benches. Southwestern Utah, east to Texas, and south to Baja California and northern Mexico. In Utah *C. canescens* is limited and very rare in Washington County. April-June. Fig. 7.

Washington Co., West slope of the Beaverdam Mountains, D. Nish 43 (UTC).


_Type is C. Wright 485._

Plants prostrate, forming mats 2-6 dm in diameter; stems several to numerous, dicotomously branched, spreading from a woody taproot; younger branchlets villulose-hispidulous; leaves clustered, borne mostly on very short branchlets along the main stem; petioles 1-2 mm long, broadest (1-1.5) mm at the base, becoming indurate, usually pallid, margin hispid-ciliolate and the back usually glabrous or nearly so; leaf blades usually linear revolute (rarely ovate or elliptic), 4-10 mm long, 0.6-1 mm wide, usually narrower than the indurate petiole-base; flowers borne among the leaves; calyx sessile, broadly and permanently attached in the leaf axil, at anthesis about 3 mm long, lanceolate, united at the base, villulose-ciliate below the middle, frequently terminated with a stiff bristle; corolla usually pink, about 7.5 mm long; corolla lobes rounded, spreading, about 2 mm long and 3 mm broad; stamens 5, unequal in length and position within the corolla tube; style 1.5-2.2 mm long, somewhat flattened, apex bilobed; nutlets ovoid, usually only 1 or 2 maturing, 1.1-1.4 mm long, 0.8-1 mm broad, papillate, back convex, ventral rounded or somewhat flattened; scar open, 1.5-2 mm wide at base, nearly as long as the nutlet, surrounded by a narrow band of smooth non-papillate pericarp, traversed down the center by a lineate ridge. Nevada, southern Utah, northern Arizona, and east to Texas and south to northern Mexico. Usually growing on sand dunes and dry slopes. April-September. Fig. 8.

Emery Co., San Raphael Desert, Bryan & Redd 12-8 (UTC); 6 miles north of Hanksville, B. Maguire 19386 (UTC); Garfield Co., Clay Point, J.C. Pederson 49 (BRY); 2 miles downstream from Hite, B.F. Harrison 11737 (BRY); Hite, W.P. Cottam 14769 (UT); Grand Co., Castle Valley, S.L. Welsh & D. Atwood 9954 (BRY); 1 mile north of Moab, B. Maguire 5722 (UTC); 6 miles up river from Moab, Bryant & Moab School 6-8 (UTC); Kane Co., Bullfrog Canyon, D.W. Lindsay 93 (UT); San Juan Co., West of Bluff, W.P. Cottam 2560 (BRY); along the San Juan River, Rydberg & Garrett 9942 (UT); Middle Blue Notch Canyon, L. Wilson 273 (UTC); 9 miles southwest of Bluff, B.
ovoid, smooth and shining. Sandy or alkaline soil, on plains and hillsides. Washington, east through Idaho to Wyoming and south to Utah, Arizona, and southern California. May-August.

Fig. 9.

Beaver Co., Pine Valley, W.P. Cottam 5701 (UT); Box Elder Co., Copper Mountain, W.P. Cottam 4551 (BRY, UT); Iron Co., Hamblin Valley, W.P. Cottam 3335 (BRY, UT); sand dune areas, W.D. Stanton s.n. (UT); Millard Co., desert area, W.P. Cottam 5701 (UT); 6 miles north of Gandy, Maguire & Richards 2752 (UTC); 2 miles south of Desert Range Experiment Station Headquarters, B. Maguire 20913 (UTC); 3 miles south of Garrison, B. Maguire 20854 (UTC); Uintah Co. Willow Creek, 16 miles south of Ouray, B.C. Hollings 1724 (UTC); Washington Co., Beaverdam Mountains, L.C. Higgins 649 (BRY).


Annual or perennial, herbaceous or fruticose plants, usually with coarse stiff pubescence; leaves opposite at base, or alternate throughout, firm, veinless; flowers white or rare-


Tiquila parviflora Nutt. ex Hook., loc. cit. as a synonym.


Prostrate annual with slender, somewhat brittle, dichotomously branched stems forming mats 1-3.5 dm broad, finely strigose; leaves ovate, to nearly suborbicular, 4-8 mm long, narrowly revolute, and often hispid on the margins, with 2-3 pairs of distinct veins on the back, thinly strigose on the upper surface with somewhat stiff hairs, hirsute on the lower surface; petioles slender, usually as long or longer than the blade; flowers in compact clusters in the forks and at the ends of the branches; calyx lobes linear-subulate, 4-5 mm long, villous or setulose on the back, sparsely but conspicuously hispid on the margins; corolla pink or nearly white, little exceeding the calyx, the limb 2-2.5 mm broad, the tube with 5 triangular scales near the base; nutlets oblong.

Fig. 8. Coldenia hispidissima

Maguire 5719 (UTC); 35 miles southwest of Bluff, B. Maguire 5722 (UTC); Washington Co., Beaverdam Mountains, L.C. Higgins 838 (BRY); Wayne Co., Hanksville, R.V. Hardy 41 (BRY); 5 miles north of Hanksville, S.L. Welsh & G. Moore 3611 (BRY); desert between Hanksville and mountains, W.P. Cottam 5126 (BRY).

Fig. 9. Coldenia nuttallii
ly yellow, in bractless or bracted spikes or racemes; calyx divided to the base, the lobes erect or connivent, linear or oblong; mature calyx investing the nutlets and falling away entire, or the calyx persistent and the nutlets falling away separately; corolla with a short to somewhat elongate cylindrical tube with or without scales at the base of the tube, the throat with intruded appendages; corolla lobes imbricate, rounded, spreading; style slender, short or long, included; stigma capititate; ovules 2-4; nutlets 1-4, erect, ovate to triangular, roughened or smooth, winged, margined or marginless, affixed laterally through a medial ventral and commonly basally forked groove to a usually columnar, subulate or pyramidal gynobase.

This is one of the most perplexing genera in the entire family. It is exclusively American, mostly in the western United States, but common in the deserts of South America as well. Several species are reported to have some value as a forage for sheep.

Type species: Cryptantha glomerata Lehman.

1. Plants annual; stems slender; Subgenus Krynnitzkia (3).
2. Plants biennial or perennial; stems coarse; Subgenus Oreocarya (31).

3. Nutlets with the margins decidedly winged or knifelike (3).
4. Nutlets with the margins rounded or angled, never with a marginal wing or knifelike edge (6).

5. Nutlets heteromorphous. 
6. Nutlets homomorphous or if slightly heteromorphous the odd nutlet axial (5).
7. Nutlets solitary or rarely 2; calyx obliquely conical at base; corolla conspicuous (22). Subgenus Utahensis
8. Nutlets 4; calyx symmetrical; corolla inconspicuous.

10. Nutlets oblong-ovate to lanceolate (12).
11. Spikes usually solitary, not sharply differentiated from the leafy peduncular stems (11).
12. Style reaching ½ to ⅔ the height of the nutlets; calyx densely appressed hispid-villous, commonly lacking conspicuous spreading bristles. 
13. Margin of nutlets acute, at least above the middle.
15. Mature calyces strongly appressed to the flattened rachis, decidedly gibbous on the axial side, persistent (19). Subgenus Angelotrophii
16. Odd nutlet abaxial, surpassed by style (17).
17. Odd nutlet axial; style surpassed or occasionally reaching to the nutlet-tips (20).
18. Pedicels slender, 1-4 mm long (18).
19. Pedicels stout and obscure, less than 1 mm long (19).
20. Nutlets 1.3-1.7 mm long; calyx 2-3 mm long (12).
21. Nutlets about 1 mm long; calyx 3-4 mm long (3).
22. Calyx circumsiccisile (5).
23. Calyx not circumsiccisile (23).
24. Style surpassing the nutlets (14).
25. Style not surpassing the nutlets but not reaching to the tips of the nutlets (24).
26. Ovules 2; nutlet and calyx bent (19).
27. Nutlets usually solitary, abaxial, gynobase reaching ½ to ⅔ the height of the nutlet (7).
27. Nutlets usually 4 (28).
28. Nutlets decidedly ovate, with low rounded tuberculations .................... 2. C. ambigua
29. Nutlets more or less lanceolate (29).
30. Nutlets verrucose or verrucose-muricate................................. 30. Brachia
32. Corolla tube elongate, distinctly surpassing the calyx; flowers usually heterostyled (32).
33. Corolla tube short, scarcely if at all surpassing the calyx; flowers not heterostyled (46).
34. Nutlets smooth and shining (33).
35. Nutlets more or less roughened (38).
36. Corolla yellow (34).
37. Corolla white (35).
38. Inflorescence an elongate, cylindrical thyrse; nutlets lanceolate with acute margins, usually only 1 developing .................... 33. C. flavus
39. Inflorescence consisting of a large terminal cluster with 1 or more remote, at maturity frequently stalked much smaller lateral clusters; nutlets broadly ovate, with winged margins, all 4 usually maturing ............... 31. C. confertiflora
40. Inflorescence capitate, 0.1-0.4 dm long; corolla limb 6-8 mm broad, the tube little surpassing the calyx; nutlets lanceolate ............... 29. C. capitata
41. Inflorescence elongate, 0.4-4.4 dm long; corolla limb 8-17 mm broad, the tube distinctly surpassing the calyx except in C. barnesbyi; nutlets ovate (36).
42. Nutlets uniformly muricate or papillosus, or occasionally in C. jonesiana also with some inconspicuous ridges (39).
43. Nutlets more or less rugose or tuberculate, or sometimes with a few inconspicuous murications (40).
44. Leaves obtuse; stipules postulate hairs small or lacking; corolla 7-10 mm long; fornices elongate .......... 35. C. fulgicans
45. Leaves spatulate, hispid with postulate bristles; corolla 10-15 mm long, fornices low and broad ............... 40. C. jonesiana
46. Ventral or inner surface of the nutlets smooth or nearly so ......... 46. C. rolinski
47. Ventral surface of the nutlets distinctly roughened (41).
48. Nutlets conspicuously papillose ventrally; corolla tube 12-16 mm long, calyx segments 7-10 mm long in anthesis ................................ 41. C. longiflora
49. Nutlets softly papillose or at all postulate ventrally; corolla tube 5.5-12 mm long; calyx segments 3.5-7 mm long in anthesis (42).
50. Inflorescence 0.1-0.4 dm long; corolla tube 10-12 mm long; margin of nutlets not in contact; plants less than 1.5 dm tall ............... 45. C. paradoxus
51. Inflorescence 0.5-3 dm long; corolla tube 5-10 mm long; margin of nutlets in contact or nearly so; plants usually over 1.5 dm tall (43).
52. Scar of nutlets surrounded by an elevated margin but tightly closed; style 1-2 mm long, calyx 3.5-4 mm long in anthesis ............... 25. C. bakeri
53. Scar of nutlets conspicuously open; style 3-8 mm long, calyx 4.5-7 mm long in anthesis (44).
54. Scar of nutlets conspicuously open and surrounded by a definite elevated margin .... 34. C. flavoculata
55. Scar of nutlets slightly open and with only an inconspicuous elevated margin if any (45).
56. Leaves linear-spatulate; nutlets sharply and deeply rugose; corolla tube 5.5-7 mm long; fornices low and broad .......... 52. C. tenuis
57. Leaves obovate or broadly oblongulate; nutlets with rounded ridges and tubercles; corolla tube 7-10 mm long, fornices long papillosus ........................................ 54. C. wetherillii
58. Nutlets smooth on their dorsal surface, not rugose, muricate or tuberculate (47).
59. Nutlets more or less roughened, muricate, rugose or tuberculate at least on the dorsal surface (48).
60. Fruit depressed globular, nutlets not in contact by their margins; style exceeding mature fruit 1-3 mm; corolla tube 2.5-3 mm long ............... 38. C. jonesii
61. Fruit conical, ovoid or lanceolate, nutlets in contact by their margins or nearly so; style exceeding mature fruit 5-6 mm; corolla tube 5-7 mm long .......... 26. C. barnesbyi
62. Ventral surface of nutlets smooth or nearly so (49).
63. Ventral surface of nutlets rugose or variously wrinkled (52).
64. Nutlets bordered by a conspicuous wing, robust plants 5-10 dm tall, with long bracteate spikes ............... 50. C. setosissima
65. Nutlets never conspicuously winged, sometimes with an acute margin; plants usually lower and caespitose (50).
66. Corolla tube 7-9 mm long; calyx 6-9 mm long in anthesis ....................... 46. C. rolinski
67. Corolla tube 2.6-6 mm long; calyx 2.5-6 mm long in anthesis (51).
68. Nutlets scarcely or not at all muricate between the rugae; strictly erect, conspicuously hispid perennial; from northeastern Utah ............... 51. C. stricta
69. Nutlets distinctly muricate or tuberculate between the rugae and near the margins; western Utah .......... 47. C. rugosa
70. Nutlets conspicuously muricate, or in C. humilis also with a few irregular ridges (53).
71. Nutlets not exclusively muricate, but rugose or tuberculate (55).
53. Pubescence of the leaves silky-strigose or strigillose but not subtomentose or tomentose ........................................ 37. C. breviflora

53. Leaves distinctly subtomentose or tomentose, also setose in C. humilis (54).

54. Plants 0.3-1 dm tall; leaves 0.5-2.5 cm long; calyx 2.2-5 mm long in anthesis; corolla tube 1.8-2.2 mm long, Millard County, Utah ....... 30. C. compacta

54. Plants 0.4-2.5 dm tall; leaves 2.5 cm long or longer, calyx 3-5 mm long in anthesis; corolla tube 3.5 mm long; plants widespread ....... 37. C. humilis

55. Scar of nutlets open some distance above the base (56).

55. Scar of nutlets closed or nearly so, without a conspicuous triangular opening toward the base (63).

56. Scar somewhat constricted some distance below the middle of the open portion (57).

56. Scar triangular and not constricted below the middle (58).

57. Elevated margin of the scar definitely limited; pustules present on both leaf surfaces ........................................ 42. C. mensana

57. Elevated margin indeterminately limited; pustules present only on dorsal surface of the leaves .................................. 44. C. osterhoutii

58. Some tendency to an elevated margin evident around the scar (59).

58. No tendency to an elevated margin around the scar (60).

59. Cymules elongating and so the inflorescence broad, biennial or short-lived perennials; nutlets usually with an evident dorsal ridge ........................................ 53. C. virginicus

59. Cymules shorter and the inflorescence narrow; long-lived caespitose perennials; nutlets with only a slight dorsal ridge if any ........... 24. C. abata

60. Style not exceeding the mature nutlets by more than 0.5 mm, plants usually less than 1.3 dm tall (61).

60. Style exceeding the mature nutlets 1.6 mm or more, plants usually taller than 1.3 dm ........... 37. C. humilis

61. Corolla tube 2.2-2.6 mm long; nutlets 2.3-3 mm long ........................................ 43. C. ochroleuca

61. Corolla tube 3-4 mm long; nutlets 3-3.5 mm long (62).

62. Ventral surface of nutlets deeply rugose and tuberculate ........................................ 24. C. abata

62. Ventral surface of nutlets indeterminately muricate; near the Utah border in Summit and Daggett counties .......... 28. C. caespitosa

63. Upper surface of the leaves uniformly appressed strigose and without pubescent hairs (64).

63. Upper surface of the leaves with two distinct kinds of hairs; pubescent at base (66).

64. Nutlets sharply rugose and tuberculate, scar closed, and surrounded by an elevated margin ................................. 25. C. bakerti

64. Nutlets not so sharply rugose or tuberculate; scar not surrounded by an elevated margin (65).

65. Corolla tube 2-2.5 mm long; style exceeding nutlets by 1 mm or less; endemic to Garfield County ........................................ 37. C. humilis

65. Corolla tube 3.5 mm long or longer; style exceeding nutlets by more than 1 mm; northeastern Utah .................... 40. C. sericea

66. Mature calyx exceeding the nutlets by 2-4 mm; inflorescence broad-topped; Grand County ........................................ 32. C. elata

66. Mature calyx exceeding the nutlets by 4-8 mm (67).

67. Nutlets tuberculate, scarcely if at all rugose; mostly in the Uintah Basin ........................................ 36. C. grahamii

67. Nutlets more or less rugose, widespread but mostly in the western tier of counties ........... 37. C. humilis

1. Cryptantha affinis (Gray) Greene, Pittonia 1:119. 1887.


Cryptantha geminata Greene, Pittonia 1:119. 1887.


Cryptantha castwoodiae St. John, Fl. S.E. Washington 342. 1937.

Usually sparsely branched herb 1-2 (4) dm tall; branches commonly few and ascending but plant occasionally much branched from the base, hirsute to short-hirsute throughout; leaves narrowly to broadly oblanceolate, 1-4 (5) cm long, 2.5-6 (8) mm broad, few, short-hirsute, usually minutely pustulate, obtuse or rounded at tip, lowest pair clearly opposite; spikes geminate or solitary, usually 2 to 8 becoming 15 mm long, slender, remotely flowered, commonly with a very few large leafy bracts below; corolla inconspicuous, 1-2 mm long, limb about 1.5 mm broad; fruiting calyx 2.5-4 mm long, usually about as broad as long, laterally compressed, ascending; pedicels 0.5-1 mm long; mature calyx lobes lanceolate, somewhat connivent, not greatly surpassing the nutlets, midrib weakly thickened on the abaxial lobe, sparsely hirsute, margins appressed hirsut; nutlets 4, homomorphous, smooth or very finely granulate, shiny, brownish to greenish, frequently mottled, 1.8-2.5 mm long, ovate, obliquely compressed, back low-convex, margins rounded; groove evidently excentric, closed, simple or shortly and unequally forked at the base; gynobase short, stout, about 1/2 height of nutlets; style evidently surpassed by nutlets or rarely equalling them. Usually in sandy to rocky soils. Washington and western Montana, south to Wyoming, Utah, and southern California. June-September. Fig. 10.
The most obvious characteristics of this species are the obliquely compressed nutlets which result in the excentric position of the groove.

Cache Co., 10 miles up Smithfield Canyon, Hobson & Pirianan 13775 (UTC); Intervale, Spring Hollow, B. Maguire 13839 (UTC); White Pine Lake, B. Maguire 16256 (UTC); Logan Canyon, Spring Hollow, B. Maguire 13778 (UTC); Daggett Co., Flaming Gorge, L. Williams 473 (UTC); Duchesne Co., 10 miles north of Altonah, J. Brotherson 646 (BRY); Juab Co., Granite Canyon, Deep Creek Mountains, Maguire & Beeraft 2765 (UTC); Utah Co., Spring Dell, Provo Canyon, A.O. Garrett 2778 (UT); Weber Co., Summit of Little Bear River Canyon, B. Maguire 12976 (UTC).

2. Cryptantha ambiguua (Gray) Greene, Pittonia 1:113. 1887.

Eritrichium muricatum var. ambiguua
Type: probably in the Walla Walla region of southeastern Washington, collected by the Wilkes expedition.


Cryptantha polycarpa Greene, Pittonia 1:114. 1887.


Cryptantha ambiguua var. robustior Brand, Pflanzenreich 4, 252:69, 1931.

Stems usually loosely branched from the base, ascending, 1-2.5 dm tall, hirsute and somewhat strigose; leaves linear to narrowly lanceolate, 2-3 (5) cm long, 1-4 (5) mm broad, obtuse to acute, usually somewhat appressed hispid-hirsute, the hairs commonly pustulate at base; spikes often solitary, 5-15 cm long, bractless, or with the lowermost flowers bracteate, commonly not projecting clear of the leafy mass of the plant and not clearly differentiated from the leafy branches; corolla 1-2 mm broad, inconspicuous; fruiting calyces ovate-oblong, 4-7 mm long, crowded or distant, the tube rounded-obconic at base, lobes linear or linear-lanceolate, more or less connivent, midrib thickened, tawny-hirsute, margins strigose-hirsute; pedicels 0.5-0.9 mm long; nutlets 4, broadly ovoid, 1.6-2 mm long, granulate and coarsely tuberculate or rarely tending to be smooth toward the base, back low-convex, sides obtuse and rounded, groove closed or somewhat open at the always broadly forked base; gynobase narrow, 1-1.2 mm long, 2/3 height of nutlets; style reaching 4/5 to 5/5 height of nutlets. Dry slopes and ridges, open pine forests and sagebrush flats. Southern Washington to southern Montana and then south to northern Colorado, western Nevada, and northeastern California. June-August. Fig. 11.

C. ambiguua is nearly always distinguishable by its habit of growth, but in a few cases is dif-
ficult to distinguish from *C. kelseyana* and *C. pattersonii*.

Beaver Co., 11.5 miles east of Milford at the Granite Mountain Pass, B. Maguire 20895 (UTC); Box Elder Co., Raft River Mountains, G.M. Alder 132 (UT); Juab Co., Deep Creek Range, Granite Creek, Maguire & Holmgren 21904 (UTC); Utah Co., Thistle, M.E. Jones 5370 (UC).


Stems diffusely branched from the base, 0.5-3 dm tall; canescent, villous-hirsute, with light ashy gray hairs, the lowest branches decumbent or ascending; leaves narrowly linear, 1.5-4 cm long, 1-2 mm wide, hispid or strigose, somewhat pustulate; spikes usually geminate, about 5 cm long, rather dense, bractless or with 1-2 bracts near the base; corolla minute, the tube 1-2 mm long, limb 1.2-5 mm broad; fruiting calyces ovate-oblong, 3-4 mm long, stiffly ascending, strongly biseriate, slightly asymmetrical; pedicels less than 0.5 mm long; mature calyx-lobes linear-lanceolate, slightly connivent, hispid on the thickened midrib, short villous on the margins, abaxial lobe longest and most hirsute; nutlets usually 4, heteromorphous, ovate-oblong, brown or plumbeous with pale tuberculations or rarely murications, back convex, face flattish, margins somewhat angular; odd nutlet next to the abaxial calyx-lobe, a little larger and more persistent than the similarly colored and shaped consimil nutlets which are about 1 mm long; groove slightly open above, broadening at the base; gynobase columnar, equalled by consimil nutlets but shorter than odd nutlet; style usually surpassing even the odd nutlet. Sandy or gravelly washes, Lower Sonoran Zone. Southern California to Southern Utah and south to Baja California, Sonora, and western Texas. March-June. Fig. 12.

I have not seen any specimens of *C. angustifolia* from Utah, but the species has been collected within a few miles of the Utah border in both Arizona and Nevada. This species would most likely be found in the Beaverdam Wash or the valleys of the Virgin River.


Southern Utah south to southern California, Baja California, Arizona, southern New Mexico, and northern Sonora. February-June. Fig. 13.

San Juan Co., 2 miles west of Bluff, B. Maguire 16279 (UTC); Washington Co., St. George, F.W. Gould 1478 (DIX, UTC); 2 miles west of Rockville, B. Maguire 4978 (UTC); 4 miles northwest of Welcome Springs, B. Maguire 20527 (UTC); 40 miles west of St. George, B. Maguire 20506 (UTC); 10 miles west of Rockville, C.L. Hitchcock 3003 (UTC); St. George, M.E. Jones 1621 (UT); St. George, F.W. Gould 1539 (UT); Black Hill west of St. George, D.E. Beck s.n. (DIX); Red hill north of St. George, S. Wilson s.n. (DIX); Beaverdam Mountains at junction of hwy 91 and the Jackson road, L.C. Higgins 447 (BRY); Dixie State Park, L.C. Higgins 930 (BRY); 3 miles south of Touquerville, R.R. Stahmann & J.L. Jacobs 21 (BRY); St. George, south slope of Black Hill, F.W. Gould 1478 (BRY); about 5 miles west of hwy 91 along the Jackson road, L.C. Higgins 500 (BRY); St. George, D.H. Galway 8485 (BRY).


Stems few to many from the base, strigose, more or less branched above, often forming a dense hemispherical mass 2-10 cm high, the outer ones often decumbent; leaves oblanceolate, 3-15 mm long, 1-2 mm broad, obtuse, surface siliceous especially toward the pale base, strigose or short-hispid, obscurely pubescent; flowers in the axils of foliaceous bracts in short somewhat indefinite racelike clusters; corolla inconspicuous, 1.2-3 (mm) broad; fruiting calyx 2.5-4 mm long, oblong-ovoid, united to near the middle, at maturity the upper half falling away by a circumscission just below the sinuses, basal part persistent, cupulate, appressed-hispid; mature calyx lobes narrowly linear-lanceolate, firm, herbaceous, scarcely ribbed, more or less hispid; pedicels obscure, about 0.5 mm long; nutlets 4, homomorphous, or with the abaxial one slightly longer, smooth or inconspicuously mucronate, triangular-ovoid or oblong-lanceolate, 1.2-1.7 mm long, back flattened, especially near the apex.

Fig. 13. Cryptantha barigera margins angled, groove closed and forked at base, gymnosulcus about 2/3 height of nutlets; style equalling or barely exceeded by nutlets. Sandy to gravelly soils, Sonoran to arid Transition Zone. Southern British Columbia and Idaho, south to Arizona and Baja California. April-August. Fig. 14.

Beaver Co., 8.5 miles east of Milford, B. Maguire 21020 (UTC); Garfield Co., Egnog Spring, Bullfrog Creek west of Henry Mountains, Welsh 3984 (BRY); Iron Co., 16 miles south of Lund, L. Anderson 711 (UTC); Juab Co., 3 miles from Trout Creek, Maguire & Beecraft 2769 (UTC); Kane Co., 6 miles south of Grand View Arch, J. L. Reveal 809 (UTC); 57 miles east of Kanab, A. Cronquist 10163 (BRY, UTC); ½ mile west of Paria River Bridge along hwy 89, Welsh & Atwood 9747 (BRY); 25 miles southeast of Escalante, Holmgren, Reveal & LaFrance 2068 (BRY); Johnson Canyon northeast of Kanab, D. Atwood 1791A (BRY); Millard Co., 60 miles west of Delta, Maguire & Beecraft 2768 (UTC); 20 miles west of Hinkley, B. Maguire 20761 (UTC); Desert Range Exp. Station, M. Barlow 47 (BRY); Desert Range Exp. Station, S. Brewster 22 (BRY); San Juan Co., 8 miles east of Hite, A. Cronquist 9041 (UTC); Tooele Co., Little Granite Mountain, S. Flowers 1855 (UTC); Washington Co., 20 miles southeast of Hurricane, A. Cronquist 10096 (UTC); St. George, M.E. Jones s.n. (UTC); Anderson’s Ranch, 32 miles south of Cedar City, B. Maguire 13561 (UTC); west slope of the Beaverdam Mountains, D. Nichols 12 (UTC); 11 miles south of Hurricane, F.W. Gould 1685 (UTC); St. George, M.E. Jones 1652 (UTC); St. George, Red Hill north of town, D. Hall s.n. (BRY, DIX); 1 mile southeast of Ivins Reservoir along hwy 91, L.C. Higgins 4102 (BRY, WTSU); Santa Clara, W.P. Cot-
The miles Cn/ptanthci Quitman Harris-(BRY); 2 rarely 30 Bamett Davidse Hall Bamett east 8» miles 8 Temple; miles L.C. Harrison BRY, Gray) or Moore (HanksviUe. Cresent Vickery Green Cryptantha 15 io I (BRY); of miles miles fc» burg, von, tarn hispid, above, calyces corolla scarcely obtuse, branched, stems late mm 0.5-1.2 inahire what neger, normally midrib the” midrib strongly thickened and indurate, hispid, the margins short hispid; pedicels short. 0.5-1.2 mm long; nutlets 4 (1 or 2 rarely aborted), distinctly heteromorphous; odd nutlet next to the axial calyx lobe, persistent, 2-2.5 (3) mm long, brownish, ovoid, acute, finely granulate and spinular-muricate; consimilar nutlets.


Erect or widely spreading herb 5-15 cm high, stems normally numerous, loosely ascending, branched, hisrute to hispid; leaves oblong-ovate, 2-3 (6) cm long, 3-4 (6) mm wide, rounded or obtuse, thickish, hisrute, pubescent, the upper scarcely reduced; spikes solitary or rarely geminate, naked or few bracted below, 5-8 (15) cm long, frequently produced from the lowest axes; corolla inconspicuous, 1-1.5 mm wide; fruiting calyxes 6-7 (10) mm long, oblong-ovoid, somewhat asymmetrical, becoming distant below; mature calyx lobes linear-lanceolate, connivent above, midrib strongly thickened and indurate, hispid, the margins short hispid; pedicels short. 0.5-1.2 mm long; nutlets 4 (1 or 2 rarely aborted), distinctly heteromorphous; odd nutlet next to the axial calyx lobe, persistent, 2-2.5 (3) mm long, brownish, ovoid, acute, finely granulate and spinular-muricate; consimilar nutlets.

Carbon Co., east of Wellington, W.P. Cottam 2067 (BRY); Emery Co., 20 miles north of Green River, B. Maguire s.n. (UTC); San Raphael Swell, B. Maguire 18297 (UTC); Robbers Roost, W.A. Shands s.n. (UT); Buckhorn Wash, 22 miles southeast of Lawerence, Pyrah, Pitts & Barnett 15 (BRY); 5 miles southwest of Temple Mountain, L.C. Higgin 1327 (BRY); 13 miles east of Buckhorn Wash, Welsh & Atwood 9852 (BRY); Garfield Co., Upper Cottonwood Wash near Cannonville, Reveal, Gentry & Davidse 1757 (BRY, UTC); 8 miles southeast of Escalante, Holmgren, Reveal & LaFrance 2036 (BRY, UTC); 25 miles south of Hanksville, Welsh, Atwood & Higgin 8961 (BRY, UTC); east side of Mount Ellen, W.P. Cottam 5288 (UT); Sandy Ranch, B.F. Harrison 11476 (BRY); Willow Tank. 45 miles south of Escalante, Beck & Tanner s.n. (BRY); Grand Co., Milton, 4/10 mile from Dead Horse Point, A. Carter 1564 (UTC); northwest of Moab, A.H. Holmgren 3309 (UTC); entrance to Arches Natl. Monument, R. Vickery 735 (UTC); 7 miles east of Crescent Junction, Floy Canyon, W.A. Shands (UT); Arches Natl. Monument, Pitts, Pyrah & Barnett 64 (BRY); Arches Natl. Monument, B.F. Harrison 11127 (BRY);
Gunnison Butte, W.P. Cottam 2094 (BRY); 5 miles west of the mouth of Seven Mile Canyon, R.F. Harrison 12026 (BRY); 22 miles north west of Crescent Junction, D. Atwood 2428 (BRY); Kane Co., 0.5 miles east of Kodachrome Flat road, J.L. Reveal 802 (UTC); 57 miles east of Kanab, A. Cronquist 10157 (UTC); Glen Canyon road across Paria River, J.R. Murdock 324 (BRY); Escalante Desert near Willow Tank, B.F. Harrison 9025 (BRY); 50 Mile Spring south of Escalante, J.R. Murdock 351 (BRY); 5.5 miles west of Paria River bridge along hwy 89, Welsh & Atwood 9748 (BRY); just east of Kanab, D. Atwood 1797 (BRY); San Juan Co., 17 miles west of Blanding, B. Maguire & Redd 2061 (UTC); 7 miles northwest of Mexican Hat, B. Maguire 16293 (UTC); west of Bluff, S. Flowers s.n. (UT); between Moab and Monticello, W.C. Twiss s.n. (UT); 5.5 miles north of Bluff along hwy 47, C.A. Hanson 80 (BRY); 3 miles west of Bluff, B.F. Harrison 10331 (BRY); vicinity of Dead Horse Point, G.L. Richards s.n. (BRY); Island in the Sky area, G. Moore 233 (BRY); Blanding, Cottam & Hutchinson 2504 (BRY); Squaw Canyon, 1 mile west of Castle Spring, Welsh, Moore & Canter 2834 (BRY); Canyonlands Natl. Park, Virginia Park, G. Moore 318 (BRY); 2 miles west of Dugout Rock, Welsh, Atwood & Higgins 8886 (BRY); 7.5 miles west of Bluff, D. Atwood 2470 (BRY); 21 miles southwest of Bluff, D. Atwood 2493 (BRY); 15 miles south of Blanding, D. Atwood 2440 (BRY); Wayne Co., Fremont Canyon west of Fruita, B. Maguire 18116 (UTC).


Stems 1-4 dm high, slender, loosely branched, strigose and frequently short-hispid; leaves few, linear, obtuse, 1-3 cm long, 1.3-4 (4) mm wide, strigose and sometimes hispid, minutely pustulate; spikes slender, geminate or rarely solitary or ternate, bractless, usually becoming loosely flowered, 4-10 cm long; corolla inconspicuous in ours, 0.8-1 mm broad; fruiting calyx ovoid to ovoid-oblong, strictly ascending, asymmetrical, 2.5-7 (9) mm long, deciduous, sessile; mature calyx lobes lance-linear, decidedly connivent above with the tips frequently spreading or even recurving, midrib thickened and usually evidently hisrate, the margins strigose, abaxial lobe evidently the longest and most hisrate; nutlets 1 or rarely 2, next the abaxial calyx lobe, ovoid-lanceolate, 1.5-2.4 mm long, muriculate-granulate to tuberculate, usually brownish, back convex, sides rounded, groove open or closed but always dilated below to form a definite areola; gynobase half to a third as high as nutlet; style much surpassed by nutlet, half to two-thirds the height of nutlet. Sandy to gravelly slopes and ridges, Lower Sonoran Zone, Southwestern Utah, southern Nevada, western Arizona and southern California. March-May. Fig. 16.

Washington Co., 4 miles northwest of Welcome Springs, B. Maguire 20499 (UTC); 1 mile southwest of St. George, south slope of Black Hill, D.H. Galway 8528 (BRY).

8. Cryptanthus dumetorum Greene, Pittonia 1:112. 1887. Type: California, half climbing among bushes at Tehachapi Pass, 1884, Curran.


Laxly branched closely strigose herb; stems at first erect but later commonly much elongated and sprawling or climbing among bushes; leaves lanceolate, thickish, 2.4 cm long, 2.4 (8) mm wide, sparingly appressed hisrate-villous, closely pustulate below and finely so above; spikes solitary or geminate, usually remotely flowered, 5-15 cm long, occasionally with foliaceous bracts toward base, rachis brittle and tortuously flattened; corolla inconspicuous, about 1 mm broad; fruiting calyx closely appressed to rachis, 2-3 mm long, very asymmetrical, not deciduous, base very oblique and downwardly gibbous on axial side; mature calyx lobes connivent and reaching about equal height; 3 abaxial lobes lanceolate, somewhat strigose, with the thickened midribs deflexed hisrate; 2 axial lobes partly united, hisrate only on outer margins; nutlets 4, heteromorphous, granulate and muricate, odd
nutlet persistent, axil, broadly lanceolate, 2-3 mm long, base much developed and distorting the calyx, groove open and broad, consimilar nutlets 1.5-2 mm long, deciduous, lanceolate, groove closed or very narrow; gynobase narrow, style shortly surpassed by nutlets or reaching to their tips. Sandy to gravelly deserts, Southwestern Utah to southern California. March-May. Fig. 17.

Washington Co., Black sandy soil just west of Ivins Reservoir, E.C. Higgins 4130 (BRY, WTSU).

Fig. 17. Cryptantha dunetorum

9. Cryptantha fendleri (Gray) Greene, Pittonia 1:120. 1887. Type: Probably New Mexico, Fendler s.n. 1847.
Cryptantha ramulosissima A. Nels. Erythea 7:68. 1899.

Stems erect, usually evident throughout and bearing lateral branches mostly above the middle, sometimes rather bushy-branched from near the base, 1-5 dm tall, more or less densely hispid and frequently appressed so; leaves narrowly oblanceolate to linear, 2-5 cm long, 2-4 mm broad, appressed-hirsute, often pubescent on the lower surface; spikes solitary or gynemate, 2-12 cm long, loosely flowered, bractless or rarely bracted below; corolla inconspicuous, about 1 mm broad; fruiting calyces ovate-oblong, 4-5 (7) mm long, ascending, slightly asymmetrical, obscurely biserial; pedicels about 0.5 mm long; mature calyx lobes linear to lance-linear, usually loosely connivent with the tips somewhat spreading, midrib hirsute, thickened, margins strigose; nutlets 4, homomorphous, or sometimes reduced to 1-3, smooth, somewhat shiny, lanceolate, acuminate, 1.5-2 mm long, convex on dorsal face, sides rounded or somewhat obtuse; groove closed above, but at base opening into a definite deltoid areola; gynobase subulate, twice the length of the style, at least two-thirds height of nutlets; style equalling or barely surpassing the nutlets. Sagebrush plains or Pinyon-Juniper association. Southern Alberta and Saskatchewan to eastern Nebraska, northern New Mexico and Arizona to eastern Oregon and Washington. June-August. Fig. 18.

Fig. 18. Cryptantha fendleri

Duchesne Co., 5 miles south of Moon Lake, Magnaure & Piranian 12524 (UTC); Garfield Co., Juniper-Plum reservation, Holmgren & Nielsen 7747 (UTC); Iron Co., 5 miles west of Cedar City, B. Magniure 12979 (UTC); Kane Co., 10 miles north of Kanab, B. Magniure 18771 (UTC); 6 miles north of Kanab, Holmgren & Nielsen 7188 (UTC); 3 miles south of Mount Carmel junction, B. Magniure 18894 (UTC); 3 miles south
of Mount Carmel junction, D. Atwood 1382 (BRY); 1 mile west of Mount Carmel junction, L.C. Higgins 3375 (BRY); Orderville, Cottam & Hutchings 2725 (BRY); Rich Co., south end of Bear Lake, B. Maguire 227 (UTC); Washington Co., vicinity of Pine Valley, Maguire & Richards 12978 (UTC).


Cryptantha multicaule Howell, Fl. N. W. Amer. 1:487. 1901.


Subsimple or ascendingly branched pallid strigose herb 1.5-4.5 dm high; stems sparsely closely strigose with short pallid encrusted hairs; leaves oblance-linear to nearly linear of filiform, 2-6 cm long, 1.2 mm wide, closely strigose, strict or ascending firm, basal portion of lower leaves somewhat persistent; spikes quinate to solitary, naked, usually stiffer, 4-8 (16) cm long; corolla inconspicuous or medium sized, 1-4 mm broad; fruiting calyces oblong-ovate, 2-4 mm long, evidently asymmetrical, usually strict and closely hugging the stem, commonly firm and stiff, sessile or subsessile, base broadly conic; mature calyx lobes lance-linear, connivent above with the tips commonly spreading, margins ciliate or strigose, midrib thickened and armed with pale spreading coarse encrusted areolate or uncinate bristles, axilary lobe longest and most hirsute; nutlet 1, lance-ovate, rostrate-acuminate, subterete or only slightly compressed, smooth or very finely granulate; groove closed; style ½ to ½ as high as nutlet. Washington and Idaho to southern California and east to Utah (?). April-June. Fig. 19.

Washington Co., Black Lava Hill west of St. George, G.W. Cottam s.n. (BRY, DIX). This collection fits the description of C. flaccida but may be only an immature C. decipiens.


Stems slender, 1-2 dm high, erectly branched, usually solitary, densely spreading short-hirsute; leaves linear or narrowly oblanceolate, the lower 1.5-3 cm long, 1-3 mm broad, the upper usually much reduced, obtuse or rounded, ascendingly short-hirsute, minutely pubescent; spikes solitary or geminate, usually dense, 1-2 dm long, naked; corolla minute, the limb 0.6-1 mm broad; fruiting calyx ovate, divaricate, 2.2-2.8 mm long, early deciduous, base evidently conical, sessile; mature calyx lobes lanceolate, densely appressed tawny hispid-villosus, tips erect, midrib slightly thickened and inconspicuously short-hirsute; nutlets 1 or rarely 2-3 and unequally developed, lanceolate, 1.5-2 mm long, 0.8-1 mm broad, smooth and shiny, acute, back nearly flat, sides rounded at least near the apex, groove mostly opened to above the middle and scarcely forked below; style reaching to ½-2/3 height of nutlet. Dry usually brushy slopes and ridges. Southern Idaho and Colorado to northern Arizona and southern California. April-July. Fig. 20.

Beaver Co., Wah Wah Mountains, Pine Canyon Pass, B. Maguire 20960 (UTC); Daggett Co., Green River at Hideout Forest Camp, S. Flowers s.n. (UT); Juab Co., just north of the Sanpete-Juab County line, T.J. Jensen 503 (UTC); Kane Co., 25 airline miles southeast of Escalante, Holmgren, Revel & LaFrance 2005 (BRY, UTC); Kanab Fairgrounds, McClain s.n. (UTC); Clay-loam ridge, B.F. Harrison 9070A (BRY).
northeast slope of Kaiparowits south of Willow Tank, B.F. Harrison 9070 (BRY); Johnson Canyon, northeast of Kanab, D. Atwood 1789D (BRY); Millard Co., 43 miles north of Beaver, Maguire & Holmgren 23076 (UTC); Black Rock Volcano west of Kanosh, C. McMillan 1453 (UT); 10 miles west of Fillmore, W.P. Cottam 9568 (UT); San Juan Co., Fry Canyon Mesa, L. Wilson 23 (UTC); Canyonlands Natl. Park, Squaw Flat Campground, G. Moore 279 (BRY); Sanpete Co., Ephraim Canyon, B. Crane s.n. (UTC); Utah Co., below Timp Cave, s.n. (UTC); Uintah Co., Dinosaur Natl. Monument, J. Brotheron 804 (BRY); Hill Creek, 12 miles south of Ouray, J. Brotheron 1063 (BRY); 3.6 miles north of Brush Creek along the Manila hwy, L.C. Higgins 1872 (BRY); 35 miles south of Ouray along the Hill Creek road, L.C. Higgins 1879 (BRY); Washington Co., 10 miles east of Hurricane, W.P. Cottam 8469 (UT); north of Enterprise, D. Hall EN35 (UTC); Black Hill west of St. George, J.W. Harrison s.n. (BRY); north of St. George, D.H. Galway s.n. (BRY); Terry’s Ranch on the Beaverdam Wash, E. Matthews 86 (BRY).


Stems erect or ascending, 3-4 dm high, branched throughout, or sometimes the basal branches elongated and simple or nearly so, hispid and strigose or hisurate toward the base; leaves linear to narrowly-oblong-lanceolate, 2-4 cm long, acute, often becoming more or less convolute, more or less hispid, pubescent, especially beneath; spikes geminate or solitary, 4-12 cm long, at times sparsely bracted below; corolla inconspicuous, the tube shorter than the calyx, limb 1-2.5 mm broad; fruiting calyx ovoid-oblong, 2.5-3 mm long, ascending; pedicels less than 0.5 mm long; mature calyx-lobes lanceolate, midrib thickened and hisurate, villous-ciliate on the margins; nutlets 4, heteromorphous, triangular-ovate, dark with small pale tuberculations, margins acute, groove closed above but below gradually enlarging into a shallow triangular areola, odd nutlet about 1.7 mm long, somewhat persistent, slightly lighter than the others, next the abaxial calyx-lobe; consimilar nutlets about 1.3 mm long; gynobase equalling consimilar nutlets but surpassed by odd nutlet; style much surpassing the nutlets. Among rocks and shrubs. Southwestern Utah to northwestern Arizona and southeastern California. March-May, Fig. 21.
Spreading or ascending hirsute herb 5-25 cm high; stems 1-several, hirsute and also hispid-strigose; leaves linear or narrowly oblong-obovate, 1.5-3 (4) cm long, 2-4 mm wide, rounded or obtuse, thickish, hirsute, pustulate, the upper ones scarcely reduced; spikes usually solitary, 4-9 cm long, naked or with a few bracts near the base; corolla minute, 1-2 mm broad; fruiting calyces 4-6 mm long, ovate-oblong, spreading, loose or dense, somewhat asymmetrical; pedicels short but definite, about 0.8 mm long; mature calyx lobes linear, weakly connivent above, midrib thickened, hirsute to hispid, margins inconspicuously villous-strigose; nutlets 4, heteromorphous; odd nutlet next to the axial calyx-lobe, broadly lance-ovoid, 2-2.6 mm long, smoothish or granulate or muriculate-granulate or rarely somewhat tuberculate, standing off slightly from the gynobase, consimilar nutlets lance or oblong-ovoid, 1.8-2.3 mm long, coarsely tuberculate and usually granulate darker than the odd nutlet, sides rounded, groove narrow or closed, near base abruptly dilated to form a small triangular areola; gynobase subulate, a little longer than the style, 1/2 to 2/3 height of consimilar nutlets; style surmounted by odd nutlet and just surpassing or even exceeded by consimilar ones. Sandy plains to rocky hillsides. Saskatchewan and Montana southward through Wyoming to northern Colorado and Utah. May-July. Fig. 22.


Eremocarya micrantha Greene, Pittonia 1:59 1887.


Slender, dichotomously branched herb 5-15 cm high, drying brownish; root and lower parts of the stem stained with a purple dye; leaves oblong-oblong-ovoid, 3-7 mm long, 0.8-1.4 mm wide, whitish-strigose or short hirsute, rounded at apex, uppermost scarcely reduced and extending through the inflorescence; spikes numerous, solitary or gerninate, densely flowered and strongly unilateral, leafy-bracted throughout, 1-4 cm long; corolla inconspicuous to medium-sized, limb 0.5-2.5 mm broad; fruiting calyx ovoid-oblung, 1.8-2.5 mm long, slightly asymmetrical, decidedly biseriate, base broadly conical; pedicels 0.5-0.8 mm long; mature calyx lobes oblong-ovate-oblung, broad, erect, hirsute, midrib not evidently thickened; nutlets 4, 1.1-3.3 mm long, smooth or tuberculate, 1 nutlet sometimes a little longer and more persistent than the others, groove extending full length of nutlet, narrow, scarcely broadened at base; gynobase subulate, nearly as long as the calyx, much surpassing the nutlets and bearing at its summit the sessile stigma. Dry sandy soils in the Lower Sonoran Zone. Southeastern Oregon to Utah, southward to Baja California, Arizona, New Mexico, and Texas. March-June. Fig. 23.

Garfield Co., Egnog Spring. Bullfrog Creek, west of Henry Mountains, S.L. Welsh 3983 (BRY); Kane Co., 23 miles south of Alton, A. Cronquist 10192 (BRY, UTC); sand dunes north of Kanah, W.P. Cottam 4304 (BRY); 3/4 mile west of Paria River bridge along Hwy 89, Welsh & Atwood 9746 (BRY); Washington Co., 12 miles northeast of St. George, A. Cronquist 10103 (BRY, UTC); Beaverdam Mountains, D. Nish 64 (UTC); 8 miles southwest of St. George, Holmgren & Thieret 8329 (UTC); 3/4 mile north of Toquerville, B. Maguire 20475 (UTC); 32 miles south of Cedar City, B. Maguire 13562 (UTC); St. George, M.E. Jones s.s.
bracted toward the base, congested and somewhat glomerate or elongate and becoming 15 cm long; corolla inconspicuous, limb 1-2 mm broad; fruiting calyx oblong-ovoid to lanceolate, 5-12 mm long, ascending, slightly asymmetrical; pedicels about 0.5 mm long; mature calyx-lobes lanceolate or linear, connivent above with the slender tips usually recurving, margins more or less villous and hispid on the somewhat thickened midrib; nutlets 4, homomorphous, verrucose or muriculate toward the tip, lanceolate to lance-ovoid, 2-2.9 mm long, back convex, margins somewhat angled, groove open or closed, dilated below into a small areola; gynobase narrow; style reaching to or almost to the tips of the nutlets. Sandy to gravelly slopes and washes in the Lower Sonoran Zone. Deserts of Utah and Nevada to Arizona and Baja California. March-June. Fig. 24.


Stems slender, 1-5 dm high, 1 to several, erect or usually flexuous, appressed short-strigose, mostly laxy branched; leaves linear-oblanceolate to linear, acute or obtuse, 1-4 cm long, 1-5 (7) mm broad, not numerous, appressed short-hispid, more or less pustulate; spikes geminate or ternate, terminal, also scattered along the stem on short, slender, axillary branches, occasionally
16. Cryptantha pattersonii (Gray) Greene, Pittonia 1:120. 1887. Type: Without locality, 1875 Patterson, but probably came from the Rocky Mountains near Golden, Colorado.


Stems usually several, 1-1.5 dm high, loosely branched, hirsute and somewhat strigose; leaves oblong-lanceolate, 1-3 cm long, 2-4 mm broad, rather firm, obtuse, hirsute, with somewhat postulate bases, upper ones little reduced; spikes solitary or geminate, naked, 2-5 (7) cm long; corolla inconspicuous, 1-1.5 mm broad; fruiting calyx oblong-ovoid, 4-5 mm long, spreading, slightly asymmetrical, evidently biseriate, lower-most becoming 2-6 mm distant; pedicels about 0.5 mm long; mature calyx-lobes linear-lanceolate, tips more or less connivent, the midrib hirsute and thickened, margins appressed hispid; nutlets 4, heteromorphous, odd nutlet next to the axial calyx-lobe, slightly the largest, about 1.9 mm long, ovate, acute, smooth or obscurely rugulose or sparsely tuberculate, somewhat persistent, standing off slightly from the gynobase; consimilar nutlets oblong-ovoid, about 1.6 mm long, deciduous, closely appressed to gynobase, smooth, back convex, sides rounded or obtuse, groove opened or closed and abruptly broadened below into a small triangular areola; gynobase narrow, reaching to about ½ height of consimilar nutlets; style exceeded by odd nutlet, equalling or a little shorter than consimilar nutlets. Dry, usually somewhat sandy or gravelly soil, mostly in the mountains. Wyoming, northern Colorado, and northeastern Utah. May-July. Fig. 25.

Duchesne Co., 10 miles north of Altonah, J. Brotherson 651 (BRY).

C. pattersonii is rarely collected. It is also very closely related to C. kelseyana and C. ambiguа and intergrades with both. In habit it is similar to C. ambiguа and immature specimens are nearly impossible to distinguish.

17. Cryptantha pterocarya (Torr.) Greene, Pittonia 1:120. 1887.

Stems erect, branched throughout with ascending branches, 1-5 dm high, short hirsute with either appressed or ascending slender strigose hairs; leaves linear or the reduced uppermost ones lanceolate or oblong, strigose, 1-2.5 (4) cm long, 1-3 (5) mm broad, obtuse, conspicuously postulate below but usually finely so above; spikes geminate or rarely ternate or solitary, naked or bracted below, 2-6 (12) cm long, becoming loosely flowered, corolla inconspicuous, 0.5-1 (2) mm broad; fruiting calyces distinctly accrescent, (2) 3-5 mm long, symmetrical, ascending on short pedicels 0.5-1 mm long; mature calyx-lobes ovate to lanceolate, somewhat connivent, thin, margins more or less tawny, appressed hispid, midrib slightly thickened and sparsely hispid; nutlets 4, homomorphous and all winged, or heteromorphous with axial nutlet wingless; body of nutlet oblong-lanceolate or lanceolate, 2-2.5 (3) mm long, muricate or verrucose, wing-margin of nutlet broad or narrow, entire or crenate or lobed, extending completely around the nutlet or only down the sides, groove open or closed (even in the same plant) and dilated below into an open excavated areola; gynobase slender, about ½ height of nutlets; style subulate, slightly surpassing or somewhat surpassed by the wing-margin of the nutlets but always exceeding the body proper.

1. Nutlets heteromorphous, axial one wingless .......................... 17A. var. pterocarya

1. Nutlets homomorphous, all winged ....................................... 17B. var. cycloptera


Fig. 25. Cryptantha pattersonii
Eritrichium pterocaryum var. pectinatum
Krynitzkia pterocaryata var. pectinata
Gray, op. cit. 20:276, 1885.

Nutlets heteromorphous, axial one wingless. Sandy or gravelly places, Upper and Lower Sonoran Zones. Southern Washington, southern Idaho, Utah, Arizona, and northern Sonora. April-June. Fig. 26.

Bluff, B.F. Harrison 11947 (BRY); 1 mile east of Moab bridge, Deming 1-24 (BRY); 15 miles south of Blanding, N.D. Atwood 2439 (BRY); Sevier Co., 2 miles north of Elsinore, Reveal, Gentry & Davidge 735 (BRY, UTC); Washington Co., St. George, D.H. Galway s.n. (UTC); Diamond Valley, F.W. Gould 1705 (BRY, UTC); St. George, M.E. Jones 2034 (UTC); Zion Natl. Park, B. Maguire 13575 (UTC); 1 mile east of Hurricane, Maguire & Blood 1534 (UTC); 5 miles west of Springdale, A. Cronquist s.n. (UTC); 32 miles south of Cedar City, B. Maguire 16250 (UTC); Price Bench, R. Hardy s.n. (DIX); St. George, C.W. Cottam s.n. (BRY, DIX); Diamond Valley, D.H. Galway s.n. (BRY); Diamond Valley, W.P. Cottam 4044 (BRY); 4 miles east of Harrisburg, Welsh & Moore 6845A (BRY); 15 miles south of Enterprise, L.C. Higgins 3480 (BRY); Dixie State Park, L.C. Higgins 934 (BRY); Beaverdam Mountains, near the Utah-Arizona border along hwy 91, L.C. Higgins 334 (BRY); about 5 miles west of hwy 91 along the Jackson road, L.C. Higgins 501 (BRY); 4 miles west of Hurricane, L.C. Higgins 4218 (BRY); Diamond Valley, L.C. Higgins 4190 (BRY, WTSU).

Cryptantha cycloperta Greene, Pittonia 1:120. 1887.

Nutlets homomorphous, all winged, otherwise like the typical material. Sandy or gravelly deserts. Southern California east to southern Utah, Arizona, New Mexico, and southwestern Texas. April-June. Fig. 27.

Kane Co., Kaiparowits Plateau, about 25 airline miles southeast of Escalante, Holmgren, Reveal & LaFrance 2064 (BRY, UTC); red ledges, north of St. George, D.H. Galway s.n. (BRY).


Long-lived annual, often decidedly suffruticos near the base. 1-10 dm high; stems single
with numerous ascending branches or many and diffusely branched younger parts, green, strigose and commonly hirsute, epidermis at length exfoliating leaving the older woody stems glabrous and brown; leaves ob lanceolate, acute, hirsute, pubescent, the early ones 3-6 cm long, 6-12 mm broad; racemes apparently forked and paniculately disposed, minutely bracteate, 3-15 cm long; corolla very inconspicuous, limb about 1 mm wide; fruiting calyces oblong-ovoid, 2.4 mm long, slightly asymmetrical, ascending, tardily deciduous; pedicels usually well developed, 1-4 mm long, slender, frequently nodding; mature calyx-lobes lance-linear, somewhat strigose, hirsute along the thickened midrib; nutlets 4, heteromorphous, triangular-ovate, the acute tips slightly outcurved, groove open or closed above but below broadening out into a shallow broadly triangular areola; odd nutlet next to the abaxial calyx-lobe, 1.2 mm long, somewhat persistent, finely muricate or tuberculate, light or dark, consimilar nutlets 0.8-1.5 mm long, acute, tending to be very narrowly wing-margined, dark with pallid tuberculations; gynobase subulate, ⚯ the length of odd nutlet and about equaling consimilar nutlets; style much surpassing the nutlets. Sandy flats and rocky ridges of the Lower Sonoran Zone. Southwestern Utah, southern Nevada, western Arizona, and southwest to Baja California, March-June. Fig. 28.

Washington Co., Black Lava Hill west of St. George, J. W. Harrison s.n. (DIX).


Stems branched from the base, slender, ascending or decumbent at base, 1-3 dm high, strigose, root often dye-stained, basal leaves oblanceolate or spatulate, 1.5-2 cm long, those of the stem remote, linear or lanceolate, 5-10 mm long, rounded or obtuse, rather finely appressed-hispid and minutely pubescent; spikes bractless, slender, loose, 2-10 cm long, solitary or geminate; corolla inconspicuous, about 2 mm long, subtubular, not exserted, lobes short; fruiting calyx slender, asymmetrical, bent and recurved, 3-4 mm long, tardily deciduous, sessile; mature calyx-lobes linear, midrib somewhat thickened and hirsute, rarely merely strigose, axial lobe longest, thickest and most hirsute; ovules 2, nutlet 1, subpersistent, oblong-lanceolate, curved inwardly, dull brownish, granulate-muricate, next to the axial calyx-lobe, edges obtusish, groove somewhat oblique, narrow or closed, opening into a small basal areola; gynobase slender, about ⚯ the length of the mature nutlet and about as long as the abortive ones; style commonly much surpassed by nutlet. Sandy or
Cryptantha muriculata var. montana Nels. Erythea 7:69. 1899.

Stems with several to many stiffly erect branches 1-3.5 dm high; stems closely short-stri- gose and frequently also sparsely hispid; leaves linear to lance-linear, 2-4 cm long, obtuse, 1-3 mm broad, strictly ascending, strigose or ap- pressed hisrute, finely pubescent, spikes stiff, braceless, solitary or semipinnate, 2-10 cm long; corolla inconspicuous, about 1 mm wide, tube about equalling calyx, fruiting calyx ovate-ob- long, 5-6 mm long, strictly ascending sub sessile, slightly asymmetrical, becoming rather obscurely biserial at maturity and 5-10 mm distant; ma- ture calyx-lobes linear-lanceolate, rather stiff, somewhat connivent above with the tips slightly spreading, midrib thickened and hisrute, mar- gins ascending-hispidulous, axial lobe slightly the longest; nutlets 4, homomorphous, lanceolate to broadly lanceolate, 1.8-2.2 mm long, antro- rely spinulose-muriculata, especially toward the apex, margins and base rounded, groove narrow and forked below where occasionally open to form a small triangular areola; gynobase subulate, about 3/ height of nutlets; style reaching to tips of nutlets. Dry sagebrush plains, usually in sandy soils. Washington and eastern Oregon, al- so in Idaho, Wyoming, and northern Utah. May-July. Fig. 30.

Weber Co., Ogden Hot Springs, Stokes s.n. (UC).


*Cryptantha* torreyana var. calycosa Gray, loc. cit.

*Cryptantha* torreyana var. calycosa Greene, Pittonia 1:119. 1887.


Stems erect, 1-4 dm high, solitary or several with erect or more often spreading branches, finely strigose and sparsely hirsutulose; leaves oblanccolate to linear, strict or ascending, 2-5 (7) cm long, 3-6 (8) mm wide, obtuse or rounded, hispid, inconspicuously pubescent if at all so; spikes commonly geminate, bractless, 4-8 (15) cm long, more or less projected from the leafy mass of the plant, very elongate and loosely flowered or congested and glomerate; corolla inconspicuous, about 1 mm broad; fruiting calyx ovoid or oblong-ovoid, 2-7 mm long, ascending, asymmetrical, base rounded or broadly conic; pedicels about 0.5 mm long; mature calyx-lobes lanceolate to linear-lanceolate, connivent above with tips usually spreading, midrib slightly thickened and hispid-hirsute, margins hispid-strigose; nutlets 4, occasionally 1 or more aborted, usually broadly ovate, 1.5-2.2 (2.5) mm long, 0.8-1.3 mm broad, smooth and polished, usually mottled, rarely finely granulate, back low and convex, sides rounded or obtuse, groove broadly forked below and closed throughout; gynobase about ½ height of nutlets, about 1 mm tall; style reaching to ¾ height of nutlets or rarely even to their tips. Open slopes or sometimes growing in partial shade, mainly transition zones. Extreme western Wyoming and northern Utah to northern California and northward to British Columbia and Alaska. May-August. Fig. 31.

Box Elder Co., Raft River Mountains, Dunn Canyon, Maguire & Holtingren 22233 (UTC); Cache Co., Tony Grove Lake, B. Maguire 21665 (UTC); 12 miles southwest of Laketown, Harrison & Larsen 7963 (BRY); Intervale in Providence Canyon, B. Maguire 13838 (UTC); Logan Canyon, H.B. Passey 108 (UTC); Blacksmith Fork Canyon, B. Maguire 3701 (UTC); Wellsville Range, Pine Canyon B. Maguire 3110 (UTC); Davis Co., Lagoon, s.n. (UTC); Salt Lake Co., north slope of Mount Olympus, Vickery 832 (UTC); Red Butte, A.O. Garrett 1869 (UTC); Red Butte Canyon, L. Arnow 1534 (UT, BRY); Sanpete Co., vicinity of Ephraim, R. Olsen s.n. (UTC); Sevier Co., 5 miles southeast of Sigurd, B. Maguire 18097 (UTC); Tooele Co., South Willow Creek, B. Maguire 21775 (UTC); Utah Co., north fork of Provo River, S. Flowers 24 (UT); Aspen Grove, A.O. Garrett 3448 (UT); Mount Timpanogos, A.O. Garrett 5551 (UT); 2 miles below Aspen Grove, B.F. Harrison 9392 (BRY); Mount Timpanogos loop road, E. Larsen 7165 (BRY); Aspen Grove B.F. Harrison 6776 (BRY); American Fork Canyon, L.E. Diehl D3 (BRY); hills around Castilla, L.E. Diehl D4 (BRY); Provo Canyon near Deer Creek, D.H. Galway s.n. (BRY); Aspen Grove, J.D. Walker s.n. (BRY); head of Rock Canyon, B.F. Harrison 9403 (BRY); Washington Co., Pine Valley, W.P. Cottam 8916 (UT); Brose Area Ranger Station, R.K. Giersch 332 (UTC); Weber Co., near Ogden, A.O. Garrett 6278 (UT).

22. *Cryptantha utahensis* (Gray) Greene, Pittonia 1:120. 1887. Type: St. George, Palmer 352.


Plant usually with a main erect stem with a few scattered ascending or erect branches, 1-3 dm high, strigose or appressed short-hispid; leaves not numerous, strongly reduced above.
linear to oblanceolate-linear, 1-5 (7) cm long, 1-4 mm wide, rounded at apex, commonly pus-
tulate and short-hirsute especially beneath; spikes usually geminate, commonly 1-2.5 (5) cm long, dense, bractless; corolla rather conspicuous, 2-3 mm broad; fruiting calyx ovoid or ovoid-oblong, 2-3 (4) mm long, subsessile, spreading or somewhat recurved, deciduous, usually densely ap-
pressed hirsute and silky; mature calyx-lobes lanceolate, connivent, midrib thick and usually brownish, and frequently bearing spreading or recurved hairs; ovules 4, nutlets 1 or rarely 2, next to the abaxial calyx-lobe, 1.7-2.5 mm long, 1-1.5 mm broad, pale, broadly lanceolate, granu-
late, muricate-papillate or rarely spinulose, back low-convex or flat, margins sharply angled or with a very narrow knifelike margin, groove open, narrow, opening into a small areola below; gynobase subulate, about ½ height of nutlet, not markedly differentiated from style; style usually a trifle shorter than the nutlet. Desert washes and ridges, sandy to rocky soils. Southern Utah and western Arizona, then westward into southern Nevada and the desert regions of California. March-May. Fig. 32.

Washington Co., St. George, Palmer 352 (G); 1 mile east of Hurricane, Maguire & Blood 1532 (UTC); 2 miles north of St. George, E. Cox s.n. (DIX); Terry’s Ranch on the Beaverdam Wash, A.H. Barnum 988 (DIX); Terry’s Ranch, L.C. Higgins 1225 (BRY); Castle Cliffs, along hwy 91, L.C. Higgins 4168 (BRY). WTSU); Terry’s Ranch on the Beaverdam Wash, L.C. Higgins 292 (BRY).

23. Cryptantha watsoni (Gray) Greene, Pittonia 1:120. 1887. Type: Utah, Wasatch Moun-
tains, Watson SS8.


Slender strictly branched hispid herb 1-3 dm high; stems solitary, sparsely or loosely branched, spreading short-hispid; leaves linear to oblanceo-
late, 1-4 (5) cm long, 1-4 (5) mm broad, obtuse or rounded, ascending hispid, and merely pus-
tulate; spikes solitary or in pairs, 1-4 (6) cm long, bractless or rarely bracted below; corolla inconspicuous, about 1 mm broad; fruiting calyx ovoid to oblong-ovoid, 2.3-5 (4) mm long, subsessile, rounded at base, early deciduous, oldest ones becoming distant; mature calyx-lobes lanceolate, tips usually connivent, hirsute with ascending hairs, the midrib also with a few spreading bristles and scarcely thickened; nutlets 4, homomorphous or practically so, lanceolate, 1.5-2 mm long, about 0.8 mm broad, smooth, shiny or at times dulled by minute granulations, back nearly flat, margins definitely angled, groove closed or nearly so and forked at base; gynobase subulate, about ½ height of nutlets; style equalling nutlets or a trifle surpassed by them. Sandy or rocky slopes and plains of the arid Transition Zone. Eastern Washington, south through Oregon and Nevada to California, and east to Montana, Wyoming, and Colorado. May-September. Fig. 33.

Beaver Co., 11.5 miles east of Milford, B. Maguire 21013 (UTC); Juab Co., Deep Creek Mountains, Maguire & Bectraft 2275 (UTC); Tooele Co., near the Great Salt Lake, A.O. Garrett 2864a (UT); Utah Co., Rock Canyon A.O. Garrett 3316 (UT).


Plants perennial, arising from a strong, woody taproot, 0.5-1.8 dm high; stems many, 0.2-1.5 dm long, strigose and weakly setose; leaves ob-
lanceolate to spatulate, obtuse, strigose, setose
and subtomentose, the petioles ciliate margined; inflorescence narrow, 0.2-0.8 dm long; calyx segments lanceolate to ovate, 2.5-4 mm long in anthesis, in fruit becoming 5-8 mm long, setose; corolla white, the tube 3-4 mm long, crests at base of tube conspicuous, fornices yellow, rounded, papillose, about 0.5 mm long, limb 7-8 mm wide; style exceeding mature fruit 0.5-1 mm; nutlets ovate, 3.3-5.5 mm long, 2.2-5.5 mm wide, usually all 4 maturing, margins in contact, obtuse to acute, dorsal surface ciliate, tuberculate, muricate and sometimes with low inconspicuous ridges, ventral surface deeply and irregularly rugose, scar open, triangular, surrounded by a slightly elevated margin. Growing on sandy or gravelly soil usually in the Transition Zone. South central Utah, northwestern Arizona, and eastern Nevada. April-July. Fig. 34.

Garfield Co., Bryce Canyon, K.E. Weight B-32 (UT); 25 miles north of Panguitch, B.F. Harrison 9009 (BRY); about 800 yards northwest of Sunset Point, W.S. Boyle 1117 (BRY, UTC); 17 miles southwest of Escalante, A. Cranquist 9152 (UTC); 2.4 miles east of Red Canyon Campground, D. Atwood 1888 (BRY); Iron Co., 10 miles northeast of Pinto, P. Plummer 7410 (UT); Pinto Co., Maryvale, M.E. Jones 6679 (POM); Sevier Co., about 28.3 miles north of Fremont, Welsh, Atwood & Higgins 8973 (BRY); Wayne Co., 10 miles south of Fish Lake, L.C. Higgins 1015 (BRY); about 5 miles south of Torrey, L.C. Higgins 1016 (BRY); 5 miles north of Fremont, B.F. Harrison 7364 (BRY); about 8 miles west of Loa, L.C. Higgins 1346 (BRY).


Oreocarya bakeri Greene, Pittonia 4:92. 1899.


Biennial or short-lived perennials, 1-4 dm tall; stems 1-4 (6), 0.5-1.5 dm long, spreading setose-hirsute; leaves oblong-lanceolate, obtuse, mostly basal, 3-6 (8) cm long, 0.5-1.2 (2) cm wide, dorsal surface strigose and spreading setose, pustulate, ventral surface uniformly strigose and with few or no pustulate hairs; inflorescence narrow, 0.6-2.5 (3) dm long, setose-hirsute, foliar bracts evident, slightly surpassing the individual cymes; calyx segments broadly lanceolate or ovoid, in anthesis 3.5-4 mm long, in fruit becoming 6-8 mm long, conspicuously setose; corolla white, the tube 4-6 mm long, crests at base of tube lacking, fornices yellow, emarginate, 1.5-5 mm long, limb 6-8 mm broad; nutlets ovate-lanceolate, 2.5-3 mm long, 1.5-2 mm wide, 3 to 4 usually maturing, margins obtuse, nearly in contact, dorsal surface deeply and sharply rugose, scar closed, surrounded by a definitely elevated margin; style exceeding mature fruit 1-2 mm. Growing on sandy or clay soil in the Pin-
von-Juniper community. Southeastern Utah, southwestern Colorado, northwestern New Mexico, and northeastern Arizona. May-August. Fig. 35.

Carfield Co., Bryce Canyon Natl. Park, B. Maguire 19101 (UTC); about 17 miles southwest of Escalante, A. Cronquist 9153 (UTC); Bryce Canyon Natl. Park, K. Weight s.n. (BRY); Kane Co., headwaters of the Virgin River, 15 miles north of Orderville, B. Maguire 18855 (UTC); San Juan Co., La Sal Ranger Station, B. Maguire 2059 (UTC); 5 miles west of Blanding, B. Maguire 5101 (UTC); 8 miles north of Blanding, A.H. Holmgren 3374 (BRY. UTC); 18 miles southwest of Blanding, A. Cronquist 9015 (UTC); 12 miles north of junction 47-261, D. Atwood 1539a (BRY); Natural Bridges Natl. Monument, Welsh, Atwood & Higgins 8949 (BRY); about 15 miles south of junction of Utah hwy 95-261, Welsh & Atwood 9979 (BRY); 10 miles south of Monticello, L.C. Higgins 3558 (BRY); 8 miles south of La Sal, L.C. Higgins 3548 (BRY); about 16 miles west of Blanding, Welsh, Atwood & Higgins 8927 (BRY).


Perennial, 1.5-3.5 dm tall; stems stout, erect, several, 0.8-1.2 dm long, conspicuously yellowish-hispid; leaves oblanceolate, thick, acute, 5-9 cm long, 0.5-1.4 cm wide, coarsely appressed hispid-pustulate on both sides, and with some finer hairs beneath, the petioles conspicuously ciliate; inflorescence narrow, 1-1.5 dm long, densely yellowish-hispid, foliar bracts evident to conspicuous; calyx segments lanceolate, in anthesis 5-7 mm long, in fruit becoming 8-13 mm long, yellowish-hirsute; corolla white or light yellow; the tube 5-7 mm long, crests at base of tube very conspicuous, fornices yellow, emarginate, distinctly papillose, 0.5 mm long, limb 8-11 mm wide; style exceeding mature fruit 5-6 mm; nutlets ovate, 3.5-4 mm long, 2.5 mm wide, all 4 usually maturing, margins of nutlets in contact, acute, smooth and glossy on both surfaces, scar closed, straight, and without an elevated margin. Growing on white barren shale knolls. Endemic to the lower part of the Uintah Basin in Uintah County, Utah. May-June. Fig. 36.

 Uintah Co., 8 miles west of Bitter Creek along the Watson-Ouray road, L.C. Higgins 1887 (BRY); about 27 miles south of Ouray along the Hill Creek road, L.C. Higgins 1877 (BRY); along the Watson-Ouray road at Buck Canyon, L.C. Higgins 1884 (BRY); 8 miles west of Bitter Creek, L.C. Higgins 1587 (BRY); about 6.5 miles west of Bitter Creek, L.C. Higgins 1586 (BRY); about 2 miles south of the Knolls, L.C. Higgins 1584 (BRY).


Long-lived perennials, 1.6-3 dm tall; stems several, slender, 0.7-1.7 dm long, densely white setose at the base, strigose above; leaves oblong-lanceolate to spatulate, 2.5-9 cm long, 0.4-1.4 cm wide, clustered at the ends of the branched caiudes the apices obtuse, dorsal surface densely and uniformly silky-strigose with many very small pustules, ventral surface similar but with fewer pustules; inflorescence in flower narrow but becoming broad and open at maturity, 0.6-2.7 dm long, setose; calyx segments linear-lanceolate, 4.5-6 mm long in anthesis, in fruit becoming 7-9 mm long, setose; corolla white, 3.5-4.5 mm long, crests at base of tube evident, fornices yellow, rounded, about 0.5 mm long, limb 8-12 mm wide; nutlets lanceolate, 3.4-4 mm long, 2.2-5 mm wide, less than 4 nutlets maturing, margins in contact, knifelike, dorsal surface uniformly muricate or tuberculate, ventral surface similar, scar open, narrowly triangular, margin not elevated; style exceeding mature fruit by 2 mm or less. Growing on heavy clay soils. Northeastern Utah in Duchesne and Uintah counties. May-July. Fig. 37.

Duchesne Co., Red Creek, 3 miles east of Fruitland, L.C. Higgins 1044 (BRY); Bluebell, L.C. Higgins 1060 (BRY); 5 miles east of Red Creek, S.L. Welsh 1774 (BRY); about 2 miles east of Fruitland Higgins & Welsh 1018 (BRY); Uintah Co., 2 miles north of Brush Creek sheep pens, D. Atwood 1611 (BRY); 3.5 miles north of Brush Creek sheep pens, Higgins & Atwood 1868 (BRY); 8 miles south of hwy 40 on the road to Bonanza, L.C. Higgins 1084 (BRY); Dinosaur Natl. Monument, S.L. Welsh 193 (BRY); Red Wash Oil Field, S.L. Welsh 3901 (BRY); Dinosaur Natl. Monument, J. Brotherston 806 (BRY); Dinosaur Natl. Monument, S.L. Welsh 119. 148 (BRY); Split Mountain Gorge, J. Brotherston 993 (BRY); 14 miles west of Vernal. R.C. Rollins 1736 (UTC).


**Oreocarya caespitosa** A. Nels. Erythea 7:65. 1859.

Densely caespitose or mat forming perennials, 0.5-1.5 dm tall; stems 1-many, arising from a much-branched woody caudex, 0.2-0.9 dm long, weakly setose and appressed strigose; leaves oblong-lanceolate to spatulate, 1-3 cm long, 0.3-0.7 cm wide, pubescence of two kinds, stri- gose and appressed setose, becoming tomentu- lose toward the petiole; inflorescence narrow, 0.3-1 dm long, foliar bracts inconspicuous; calyx segments lanceolate, in anthesis 3-4 mm long, in fruit becoming 5-8 mm long, strigose and weakly setose, also somewhat tomentulose; corolla white, the tube 3-4 mm long, crests at base of tube conspicuous, fornices yellow, rounded, about 0.5 mm long, limb 4-7 mm wide; nutlets lanceolate, 3-3.5 mm long, 2-2.5 mm wide, the margins acute, in contact, dorsal surface with low rounded rugae, also tuberculate, and with numerous murications between the ridges, ventral surface muricate, scar open, narrowly tri- angular, margin of scar not elevated; style equalling or 0.5 mm longer than mature fruit. Growing on heavy clay soils. Southern Wyoming and probably northeastern Utah. May-July. Fig. 38.

**Cryptantha caespitosa** occurs within a few miles of the Utah border near McKinnon and Lonetree. With additional collections, this species will without question be found in Utah in either Summit or Daggett counties or maybe both.


Perennial, 1.5-2.7 dm tall; stems weak, 1-sev- eral, 1.2-2.4 dm long, appressed setose; leaves
linear or very narrowly oblong-ovate, 3-8 cm long, 0.3-0.5 (0.8) cm wide, dorsal surface appressed setose-pustulate, ventral surface uniformly strigose and without pustules; inflorescence capitate, or with 1 or 2 glomerules below the terminal cluster, 0.1-0.4 dm long, spreading white setose; calyx segments linear-lanceolate, 7-9 mm long in anthesis, in fruit becoming 11-16 mm long, conspicuously setose-pustulate; corolla white, the tube 9-12 mm long, crests at base of tube conspicuous, fonnices yellow, emarginate, about 1 mm long, papilllose, limb 6-8 mm wide; nutlets lanceolate, 4.5 mm long, 2-3 mm wide, 2-4 usually maturing, the margins in contact, knife-like, both surfaces glossy-smooth, scar closed, straight, and without an elevated margin; style exceeding mature fruit 4-5 mm. Growing in sandy to sandy-loam soil in the transition zone. South central Utah and north central Arizona. April-July. Fig. 39.

Garfield Co., Bull Creek, a little southwest of Bull Mountain, Henry Mountains, 20 miles south of Hanksville, 8,000 feet, Cronquist & Holmgren 9299 (UTC); Wayne Co., with scattered Ponderosa Pine on the northeast slope of Aquarius Plateau southeast of Torrey, Cronquist & Holmgren 9365 (UTC).


Densely caespitose perennials, 0.3-1 dm tall; stems numerous, arising from a woody root, 0.1-0.4 dm long, tomentose below, weakly strigose above, leaves oblanceolate to spatulate, obtuse, 0.5-1.5 (2) cm long, 0.2-0.4 cm wide, dorsal surface with appressed setose-pustulate bristles, also densely strigose or subtomentose, ventral surface similar but with fewer pustulate hairs, the petioles tomentose; inflorescence narrow, nearly capitate, 1.5 cm long; foliar bracts evident but not conspicuous; calyx segments lanceolate, 2-2.5 mm long in anthesis, in fruit becoming 3.5-4.5 mm long, densely white setose and tomentose; corolla white, the tube 1.8-2.2 mm long, crests at base of tube evident, fonnices yellow, rounded, papilllose, about 0.5 mm long, limb 4.5-5.5 mm wide; nutlets lance-ovate, acute, 2.5-3 mm long, 1.5-1.8 mm wide, only 1

or 2 maturing, dorsal surface muricate or weakly tuberculate-rugulose, ventral surface muricate, scar open, subulate to narrowly triangular, elevated margin lacking; style equalling or shorter than mature fruit. Open slopes and ridges, growing on gravelly loam soil. Known only from southwestern Millard County, Utah. May-July. Fig. 40.
about 1 mm long, crests at base of tube evident or sometimes lacking, limb 8-10 mm wide; nutlets triangular or ovate, 3.5-4 mm long, 2.5-3 mm wide, usually all 4 maturing, margins narrowly winged, in contact, surfaces smooth and glossy, scar straight, closed, and lacking an elevated margin; plants distinctly heterostyled. Growing in a wide variety of soil types. Western Utah, northern Arizona, southern Nevada, and west to southern and western California. April-July. Fig. 41.

Garfield Co., about 8 miles southeast of Escalante, Holmgren, Reveal & LaFrance 2036 (BRY); Bryce Canyon Natl. Park, B. Maguire 19100 (UTC); near Granite Ranch, W.P. Cottam 5543 (BRY); Tropic Canyon, H. Buchanan 122 (UT); 5 miles south of Boulder, L.C. Higgins 1013 (BRY); Juab Co., between Callao and Trout Creek, Maguire & Holmgren 21857 (UTC); 15 miles east of Trout Creek B. Maguire 2753 (UTC); 18 miles east of Trout Creek, B. Maguire 2754 (UTC); Kane Co., Kanab Dunes, J.R. Murdock 101 (BRY); Kanab, Anderson 16 (UTC); Cottonwood Canyon, 20 miles south of Cannonville, L.C. Higgins 1007 (BRY); 6 miles west from head of Callets Wash, D. Atwood 1873 (BRY); Millard Co., north of Paddocks, P. Plummer 131 (UTC); Desert Range Experiment Station, M. G. Barlow 84 (BRY); White Sage Valley, B.F. Harrison 6365 (BRY); Sanpete Co., Manti Canyon, 1 mile east of Manti, A.H. Barnum 1291 (DIX); 1 mile northwest of Mayfield, R.S. Bjerregaard 39 (BRY); Sevier Co., west of Richfield, B.F. Harrison 260 (BRY); Washington Co., entrance to Zion Natl. Park, R. Maguire 13557 (UTC); 0.5 miles north of Anderson’s Ranch, B. Maguire 16289 (UTC); Zion Natl. Park, trail to Angels Landing, B.


Oreocarya confertiflora Greene, Pittonia 3:112. 1896.

Oreocarya lutea Greene, Muhlenbergia 2:240. 1906.


Perennial herbs, 1.7-4.3 dm tall; stems 1-7, slender, 1.5-2.5 dm long, tomentose at the base, strigose and setose upward; leaves linear to oblong-lanceolate, 3-12 cm long, 0.2-1.6 cm wide, acute, dorsal surface densely strigose and appressed setose with pustulate bases, ventral surface uniformly strigose, and with few or no pubescences; inflorcescence subcapitate, 0.3-2 dm long, strigose and with twisted setose hairs, bracts inconspicuous; calyx segments linear-lanceolate, in anthesis 6-8 mm long, in fruit becoming 10-14 mm long, strigose and spreading setose; corolla yellow, the tube 9-13 mm long, fornices broad, emarginate.
Cryptantha obtuse, 4, nearly spatulate, (Jeorge, maturing, lutescens mm 33 80 age, Grand St. Ma-
4 Crtiptantha miles the Fam. (DIX); abrupt and hills spreading tall;
P;irk, Diamond H.iwkins miirc cm F.VV. elevated dense nutlets rounded, 39 Colorado
4 Cottam hwv
16287 (UTC); Beaverdam Mountains, B. Mag-
20511 (UTC); 5 miles west of Virgin, C.L. Hitch-
cock 3015 (UTC); Pine Valley. M. Cox s.n. (DIX); hills north of St. George, V. Worthen 42 (BRY); Santa Clara, W.P. Cottam 1163 (BRY); between Hurricane and Kanab, J.W. Harrison s.n. (DIX); Diamond Valley. F.W. Gould 1550 (BRY, UT, UTC); Diamond Valley. L.C. Higgins 4206 (BRY, WTSU); Zion Natl. Park, B. Johnson s.n. (DIX); 7 miles north of St. George, E. Hawkins s.n. (DIX); Zion Natl. Park, A.M. Woodbury s.n. (DIX); Zion Natl. Park, W.P. Cottam 5149 (UT); Diamond Valley, W.P. Cottam 4038 (BRY); Zion Natl. Park, W.P. Cottam 4754 (BRY); 5 miles south of Veyo, B.F. Harrison 10207 (BRY); 9 miles east of Hurricane, L.C. Higgins 4224 (BRY, WTSU).


Biennial or short-lived perennials, 3-5 dm tall; stems 1-6, erect, stout, weakly setose with spreading white hairs, 0.9-1.5 dm long; leaves oblong to spathulate, 2-5 cm long, 0.4-1.3 cm wide, apices acute to obtuse, the blade abruptly tapering to the narrow petiole, dorsal surface strigose and appressed setose, ventral surface strigose, both surfaces pubescent; inflorescence spreading or open in age. 1.5-3.5 dm long, setose, foliar bracts inconspicuous; calyx segments lanceolate, in anthesis 3-4.5 mm long, in fruit becoming 7-8 mm long, hisrate; corolla white, the tube 3.5-5 mm long, frownes yellow, roemled, papillos, about 1 mm long, crests at base of tube well developed, limb 6-8 mm wide; nutlets lanceolate-ovate, 4.4-5 mm long, 2.25 mm wide, usually all 4 maturing, margins in contact, dorsal surface densely tuberculate and somewhat rugulose, the surface also covered with dense minute papillae, ventral surface similar but the roughenings less prominent, scar closed, or narrowly open at the base, and without an elevated margin; style exceeding mature fruit 0.5-2 mm. Growing on heavy clay soils. Western Colorado and eastern Utah in Grand County. May-June. Fig. 42.

Grand Co., about 3 miles south of U.S. hwy 50-6 along hwy 128, S.L. Welsh 6952 (BRY); near milepost 39 along hwy 128, L.C. Higgins 1479 (BRY).


smooth and glossy, scar straight, closed, elevated margin lacking; style exceeding mature fruit 3-7 mm (heterostyled). Usually growing in sandy soils. Southern Wyoming, south through western Colorado and eastern Utah to northern New Mexico and Arizona. April-August. Fig. 43.

**U T A H**

Carbon Co., 2 miles east of roadside geyser, R.K. Vickery 721 (UT); Duchesne Co., 2 miles west of Duchesne, A. Collotzi 545 (UTC); 8 miles north of Duchesne, L.C. Higgins 1057 (BRY); 1 mile west of Duchesne, L.C. Higgins 1051 (BRY); 12 miles north of Duchesne, J. Brotherston 925 (BRY); Emery Co., about 15 miles west of hwy 50-6 along the road to Huntington, L.C. Higgins 1305 (BRY); about 5 miles west of Temple Mountain, L.C. Higgins 1325a (BRY); 50 miles south of Green River, A. Cronquist 9086 (UTC); Gohlin Valley, S.L. Welsh 3925 (BRY); San Raphael Swell, B. Maguire 18302 (UTC); 20 miles east of Hanksville, B. Maguire 18211 (UTC); along hwy 24, 10 miles south of San Raphael River bridge, L.B. Barnett 22 (BRY, UTC); Temple Mountain, V.P. Allman s.n. (BRY); San Raphael River, B.F. Harrison 5858 (BRY); 18 miles east of Wellington, L.C. Higgins 988 (BRY); Green River, W.P. Cottam s.n. (BRY); east of Wellington, W.P. Cottam 2650 (BRY); 50 miles south of San Raphael River, B.F. Harrison 9627 (BRY); 20 miles east of Price, Welsh & Moore 2791 (BRY); Garfield Co., 25 miles southeast of Hanksville, C. Parry s.n. (UTC); 50 miles southwest of San Raphael, B.F. Harrison 7441 (BRY); 4 about 7 miles south of Trachyte Ranch, S.L. Welsh 3940 (BRY); Sandy Ranch, B.F. Harrison 11489 (BRY, UTC); Calf Creek on the Escalante River, M. Arthur & Beck 195 (BRY); 23 miles north of North Wash from Hite, B.F. Harrison 11550 (BRY); 5 miles south of Boulder, G.E. Bohart s.n. (UTC); east Henry Mountains, near Granite Ranch, B.F. Harrison 5554 (BRY); 14 miles south of the Kane County line on Hwy in Rock road, J.B. Karen 89 (BRY); Escalante near town, M.E. Jones 4408 (BRY); Grand Co., Arches Natl. Monument, L.C. Anderson 48 (UTC); Dead Horse Point, A. Carter 1560 (UTC); Arches Natl. Monument, B.F. Harrison 11129 (BRY); Arches Natl. Monument, L.B. Barnett 44, 57 (BRY, UTC); Dead Horse Point, B.F. Harrison 10293 (BRY); Kane Co., Willow Tank, about 17 miles south of Garfield County line, D.H. White 95 (BRY); Glen Canyon area, F. Wright s.n. (ARIZ); about 3 miles north of U.S. hwy 89 in Duckin Gulch, S.L. Welsh 5319 (BRY); Cockescomb Ridge, about 40 miles east of Kanab, S.L. Welsh 5342 (BRY); Plateau near head of Rock Creek, B.F. Harrison 9033 (BRY); Escalante Desert near Willow Tank, B.F. Harrison 9033 (BRY); San Juan Co., White Canyon, L.O. Wilson 51 (UTC); 5 miles north-west of Mexican Hat, B. Maguire 16290 (UTC); 16 miles east of Hite, A. Cronquist 9026 (UTC); Hatch Butte, S.K. Flowers 2071 (UTC); Rainbow Bridge Trail, J.T. Howell 24671 (ARIZ); about 10 miles east of Halls Crossing, L.C. Higgins 527 (BRY); Natural Bridges Natl. Monument, G. Moore 140 (BRY); Island in the Sky area, G. Moore 190 (BRY); La Sal Range, W.P. Cottam 2197 (BRY); 4 miles above Cow Canyon, L.K. Shumway 64 (BRY); 6 miles south of Bluff, D.E. Bright 114 (BRY); 2 miles north-west of Bluff, B. Maguire 13531 (UTC); 18 miles southwest of Blanding, A. Cronquist 8996 (UTC); 7 miles north-west of Mexican Hat, A. Cronquist 9133 (UTC); Cow Canyon, A.H. Holmgren 3212 (UTC); Bobbers Roost, L.A. Stoddart s.n. (UTC); Rock House, Monument Valley, A.H. Holmgren 3220 (UTC); 19 miles southwest of Blanding, B. Maguire 5104 (UTC); 14 miles south of Bluff, B. Maguire 5103 (UTC); Natural Bridges Natl Monument, B. Maguire 2058 (UTC); Squaw Canyon, 1 mile west of Cany Creek, Welsh, Moore & Canter 2864 (BRY); about 5 miles north of Bluff, S.L. Welsh 1493 (BRY); about 5.5 miles north of Bluff, C.A. Hansan 81 (BRY); west rim of Browns Canyon, L.K. Shumway 133 (BRY); ledges north of San Juan River just east of Johnus Canyon, B.F. Harrison 11954 (BRY, UTC); 10 miles west of Bluff, B.F. Harrison 10363 (UTC); Uintah Co., 14 miles west of Vernal, R.C. Rollins 1734 (UTC); Dinosaur Natl. Monument, I. Brotherston 1190 (BRY); desert west of Vernal, L.O. Williams 619 (UTC); about 5 miles west of Vernal, L.C. Higgins 1069 (BRY); 7 miles south of Fort Duchesne, I. Brotherston 1105 (BRY); about 8 miles south of hwy 40 along the road to Bonsanza, L.C. Higgins 1082 (BRY); about 3 miles north-west of Vernal, L.C. Higgins 1073 (BRY); Dinosaur Natl. Monument, S.L. Welsh 176 (BRY); Wayne Co., Fruitia Arch Canyon, B. Maguire 18134 (UTC); 17 miles south of Hanksville, B. Maguire 18190 (UTC); 13 miles west of Hanksville, B. Maguire 18149 (UTC); Fruitia, D.F. Beck s.n. (BRY).


Oreocarya castuwoodae Nels. & Kenn. Mukkonbergia 3:141. 1908.

Caespitose perennial, 1-3.7 dm tall; stems 1-several, slender, 0.5-2 dm long, strivise and spreading setose with slender bristles; leaves linear-oblanclate to spatulate, obtuse or sometimes acute, 3-11 cm long, 0.3-1.5 cm wide, densely striovise and weaby setose, dorsal surface conspicuously pubescent, ventral surface with few pubesces or sometimes silky-strigose; inflorescence narrow or sometimes slightly open and lax, 0.5-3 dm long, foliar bracts evident but not conspicuous; calyx segments in anthesis linear-lanceolate, 5-6 mm long, in fruit becoming 8-10 mm long and becoming broadly lanceolate to ovate; corolla white or pale-yellow, the tube 7-10 mm long, crests at base of tube lacking, farnices yellow, minutely papillate, 1.2 mm long, limb 8-12 mm wide; nutlets lanceolate to lance-ovate, 2.5-3.5 mm long, 1.8-2 mm wide, usually all 4 maturing, margins obtuse, in contact or slightly separated, dorsal surface muriate, tubercululate, and with conspicuous ridges, sometimes nearly foveolate, ventral surface tubercululate, rarely with ridges, scar open, constricted near the middle and surrounded by a highly elevated margin; style exceeding mature fruit 4-8 mm (heterostyled). Open slopes and ridges mostly in the Pinyon-Juniper community. Growing on a wide variety of soils. Southern Wyoming, western Colorado, Utah, Nevada, and southeastern California, south to Arizona and New Mexico. April-July. Fig. 44.

Beaver Co., about 5 miles north of Cove Fort, L.C. Higgins 903 (BRY); Wah Wah Mountains, 4.5 miles up Pine Canyon, B. Maguire 20941 (UTC); Wah Wah Mountains, Pine Grove, W.P. Cottam 8031 (UT); Carbon Co., 5 miles east of Wellington, L.C. Higgins 997 (BRY); near Carbon-Emery county line along hwy 50-6, L.C. Higgins 3324 (BRY); Daggett Co., 2 miles east of Sheep Creek Junction with hwy 44, D. Atwood 1589 (BRY); 15 miles south of Maudia, B.C. Rollins 2250 (UTC); Carter Creek, E.E. Jensen s.n. (UTC); Duchesne Co., Indian Canyon, 3.5 miles south of Duchesne, Holmgen, Revael & Lafrance 1760 (BRY); 27 miles south of Myton, A. Cronquist & Holmgen 9238 (UTC); about 6 miles south of Tabiona, L.C. Higgins 1046 (BRY); about 20 miles south of Myton, L.C. Higgins 1065 (BRY); about 2 miles east of Fruitland, Higgins & Welsh 1020 (BRY); north rim of Nine Mile Creek, Holmgen, Revael & LaFrance 1950 (BRY, UTC); about 5 miles west of Fruitland, L.C. Higgins 1086 (BRY); about 6 miles west of Duchesne, L.C. Higgins 1040 (BRY); about 2 miles east of Fruitland, L.C. Higgins 1019 (BRY); Red Creek 5 miles north of Fruitland, J. Brotherson 1128 (BRY); Rock Creek, J. Brotherson 965 (BRY); Bluelick, L.C. Higgins 1006 (BRY); Red Creek 3 miles east of Fruitland, L.C. Higgins 1045 (BRY); Emery Co., 10 miles up Huntington Canyon, B.F. Harrison 8167 (BRY); about 9 miles south of Lawrence, L.M. Pitts 23 (BRY); Grand Co., Arches Natl. Monument, L.B. Barnett 41 (BRY); Iron Co., Kanarraville, W.P. Cottam 5009 (UT); Juab Co., south base of Topaz Mountain, near Thomas Pass, Welsh & Atwood 9667 (BRY); foothills east of Mona, D. Hatch 109 (UTC); Deep Creek Mountains, mouth of Thomas Creek, D.W. Lindsay 206 (UTC); Millard Co., Fillmore, D.M. Leidig 237 (UTC); Horse Range, 44 miles west of Delta, Maguire & Bercraft 2755 (UTC); Warm Point, Desert Range Experiment Station, V.B. Matthews 1 (BRY); Warm Point Ridge, F. Coles 6 (BRY); Desert Range Experiment Station, Tunnel Springs, W.P. Cottam 8523 (UT); Prues Lake, V.B. Matthews 25 (BRY); Rich Co., Stanley Gesell s.n. (UTC); San Juan Co., 10 miles north of Blanding, B. Maguire 13505 (UTC); Natural Bridges Natl. Monument, L.C. Higgins 522 (BRY); head of Gravel Canyon, L.O. Wilson 235 (UTC); 13 miles south of Moab, A. Cronquist 9001 (UTC); 8 miles north of Monticello, B.F. Harrison 5891 (BRY); about 5 miles southwest of Blanding, L.C. Higgins 517 (BRY); Sampete Co., 0.5 miles north of upper power plant in Ephraim Canyon, T. Jensen s.n. (DIX); Ephraim Canyon, K. Peterson s.n. (DIX); 5 miles east of Ephraim, A.H. Barnum 1259 (DIX); between Ephraim and Great Basin Experiment Station, A.H. Holmgen 7655 (UTC); about 8 miles southeast of Mt. Pleasant, L.C. Higgins 112 (BRY); Sevier Co., Salina Canyon, R. Stevens 33 (BRY); 40 miles north of Fremont, B.F. Harrison 7341 (BRY); 5 miles southeast of Sigurd, B. Maguire 18098 (UTC); Summit Co., 1 mile west of Upton along hwy 133, Welsh & Murdock 6264 (BRY); Tooele Co., Deep Creek Mountains, Johnson Canyon 10 miles southeast of Ibapah, W.P. Cottam 7218 (UT); Stansbury Range, up Willow Creek, B. Maguire 21824 (UTC); Uintah Co., 5 miles northwest of Whiterocks, J. Brotherson 1027 (BRY); between Two Waters Creek and the Horlick mountains.

Densely cespitose perennials from a strongly lignified taproot, 0.8-3 dm tall; stems many from a multiple candex, 0.5-1.3 dm long, white hairy at the base, setose-hispid upward; leaves ob lanceolate to spatulate, acute to obtuse, 1.5-7 cm long, 0.4-1.2 cm wide, uniformly strigose, pustules mainly confined to the dorsal surface; inflorescence narrow or somewhat open at maturity, 0.3-1.9 dm long, white or yellowish setose, foliar bracts inconspicuous; calyx segments linear, 4-6 mm long in anthesis, in fruit becoming 9-13 mm long, densely white or yellowish setose, pedicels 2-10 mm long; corolla white, the tube 7-11 mm long, crests at base of tube evident or lacking, fornices yellow, emarginate or rounded, 0.3-1.3 mm long, limb 7-9 mm broad, nutlets lance-ovate, 3.5-4.5 mm long, 2-3 mm broad, 1 or 2 usually maturing, margins acute to obtuse, in contact when more than 1 nutlet matures, both surfaces densely and uniformly muricate, scar open or nearly closed, elevated margin lacking; style exceeding mature fruit 3-7 mm.

1. Murications on the nutlet rounded; corolla 9-13 mm long; inflorescence narrow, white setose at maturity ... 35A. var. fulvocanescens

1. Murications on the nutlet with 1 or 2 setose projections; corolla 7-9 mm long; inflorescence broader and usually yellowish setose at maturity ... 35B. var. echinoides

35A. Cryptantha fulvocanescens (Wats.) Payson, var. fulvocanescens Type: near Santa Fe, New Mexico, Fendler 632.


Oreocarya fulvocanescens Greene, Pittonia 1:58. 1887.


Densely cespitose perennial, 1-3 dm tall; inflorescence narrow, white setose; pedicels 2-3 mm long; corolla white, the tube 9-13 mm long, crests at base of tube evident or lacking, fornices yellow, rounded to acute; nutlets lanceolate, 3.5-4 mm long, 2-2.5 mm wide, the dorsal surface with rounded murications, scar straight, closed or slightly open. Sandy to sandy clay-loam soils, on open slopes and ridges. Western Colorado, northwestern New Mexico, northeastern Arizona, and southern Utah. April-August. Fig. 45.

Fig. 45. Cryptantha fulvocanescens var. fulvocanescens

Emery Co., Mouth of Huntington Canyon, B.F. Harrison 8136 (BRY); about 15 miles west of hwy 50-6 along the road to Huntington, L.C. Higgins 10306 (BRY); Grand Co., about 7 miles south of Moab, L.C. Higgins 909 (BRY); 5 miles south of Moab, B.F. Harrison 11635 (BRY); Arches Natl. Monument, B.F. Harrison 10306 (BRY); Arches Natl. Monument, B.F. Harrison 11635 (BRY); Arches Natl. Monument, C.L. Pirah 48 (BRY); 16 miles northwest of Moab, A. Crumpist 9064 (UTC); Arches Natl. Monument, L.C. Anderson 49 (UTC); San Juan Co., 16 miles east of White Canyon on hwy 95, D.E. Bright 75 (BRY); Squaw Canyon, 1 mile east of Cave Spring, Welsh & Moore 2549 (BRY); 30 miles south of Mexican Hat, J.R. Murdock 30B (BRY); 2 miles west of Bluff, B. Maguire 15350 (UTC); 18 miles southwest of Blanding, A. Crumpist 9049 (UTC); Monument Valley, A.H. Holgemnt 3225 (UTC); Wayne Co., 28 miles southeast of Hanksville, A. Crumpist 91881 (UTC); 32 miles east of Fruita, B. Maguire 18156 (UTC).


Caespitose perennials, 0.8-3.6 dm tall; inflorescence narrow to somewhat open at maturity, yellowish setose; pedicels 3-10 mm long; corolla white, the tube 7-9 mm long, crests at base of tube lacking, or sometimes evident, fornices yellow, emarginate; nutlets lance-ovoid, 4-4.7 mm long, 2.5-3 mm broad, the dorsal surface with 1 or 2 setose projections terminating each muri- cation, scar asymmetrical, and without an elevated margin. Usually growing on heavy clay soils charged with alkali or salts. South central Utah and north central Arizona. April-July. Fig. 46.

![Map of Utah showing locations of Cryptantha fulvoacens var. echinoides](image)

**Fig. 46. Cryptantha fulvoacens var. echinoides**

Emitry Co., near Cedar Mountain, about 39 miles west of Green River along road to Castle Dale, A. Cronquist 9096 (UTC); 50 miles south of San Raphael River, B.F. Harrison 9626 (BRY); Garfield Co., west side of Henry Mountains, B.F. Harrison 11695 (BRY); Kane Co., 5 miles from Mount Carmel, Eastwood & Howell 9265 (UTC); Cottonwood Canyon, 20 miles south of Cameronville, L.C. Higgins 1008 (BRY); 20 miles east of Kanab, D. Atwood 1792 (BRY); 3.7 miles east of Skutumpah-Alton Junction at head of Johnson Canyon, D. Atwood 1802 (BRY); Washington Co., west entrance to Zion Natl. Park, H.A. Gannings 2288 (ARIZ); Wayne Co., 1 mile east of Bicknell, A. Cronquist 9171 (UTC); 9 miles east of Torrey, B. Maguire 1811 (UTC); about 2 miles west of River Bridge, at junction of Buckhorn Wash and San Raphael River, Welsh & Atwood 9904 (BRY); about 5 miles east of Torrey, L.C. Higgins 1344 (BRY).


Long-lived perennial from a thick woody taproot, 1.5-2.5 dm tall; stems several, 0.4-1.2 dm long, weakly spreading setose; leaves spatulate to oblanccolate, 2.4-5 cm long, 0.4-1 cm wide, con- spicuously setose pustulate on both surfaces, with some finer pubescence beneath; inflorescence narrow, 0.4-1 dm long setose, foliar bracts evident but not conspicuous; calyx segments lanceolate, in anthesis 5-7 mm long, in fruit becoming 7-9 mm long, very setose; corolla white, the tube 3.5-5 mm long, constricted at the mid- dle, crests at base of tube evident, fornices yellow, emarginate, papillose, 0.5-1 mm long, limb 11-15 mm wide; nutlets lanceolate, 3-3.8 mm long, 1.7-2 mm wide, 2-4 maturing, margins in contact, acute, both surfaces of nut with incon- spicuous, small, low-rounded tubereles, or some of these confluent into short irregular ridges, scar straight, open, narrowly linear, the margin not elevated; style coarse, exceeding mature fruit 1.8-2.2 mm. Found growing only on Green River Shale. Endemic to the Uinta Basin, Uintah County, Utah, May-June. Fig. 47.

Uintah Co., Sunday School Canyon of Willow Creek drainage, Holmgen & Reveal 1879 (BRY, UTC); Willow Creek, R.C. Rollins 1707 (UTC); 30 miles south of Ouray along the Hill Creek Road, Higgins & Atwood 1878 (BRY); Buck Canyon along the Watson-Ouray Road, Higgins & Atwood 1885 (BRY); along Willow Creek 5 miles north of the mouth of Agency Draw, L.C. Higgins 1608 (BRY); 35 miles south of Ouray along the Hill Creek Road, Higgins & Atwood 1881 (BRY); about 18 miles south of Ouray along the Hill Creek Road, Higgins & Atwood 1876 (BRY).


Perennials, more or less densely caespitose, 0.5-3 dm tall; stems many, arising from the ends of the branched candel, 0.2-1.5 dm long, strigose to spreading setose; leaves oblanccolate to spatulate, 1-6 cm long, 0.2-1.2 cm wide, strigose, setose or submentose, pustulate on both surfaces; inflorescence narrowly cylindrical to open and lax, 0.2-1.8 dm long, tomentose to conspicuously


Caespitose perennials, 1-2.7 dm tall; stems 1-several, arising from the ends of the branched caudex, 0.3-1 dm long, weakly strigose and spreading setose; leaves spatulate to broadly ob lanceolate, 2.5-6 cm long, 0.5-1.2 cm wide, strigose and spreading setose; inflorescence open, 0.8-1.8 dm long, foliar bracts evident on lower part of stem; calyx segments linear-lanceolate, in anthesis 3.5-4.5 mm long, in fruit becoming 7-10 mm long, setose; nutlets lance-ovate, 3.5-4 mm long, muricate, tuberculate, or sometimes with the murications joined to form short irregular ridges, scar subulate or nearly closed; style exceeding mature fruit 0.7-1.6 mm. Usually growing on gravelly soil or talus slopes in the Pinyon-Juniper community. Central Utah to eastern Nevada. May-July. Fig. 48.

Beaver Co., Summit of Wah Wah Mountains along hwy 21, L.C. Higgins 1017, 1468 (BRW); Juab Co., Juab, Goolding 1074 (RM); Millard Co., Ca. 70 miles west

Fig. 47. Cryptantha gubii
of Delta, L.C. Higgins 1612 (BRY); Payant Butte, 17 miles northwest of Fillmore, Cottam & McMillan 9392 (UT); Piute Co., Marysvale, M.E. Jones 3588 (UT); 6 miles east of Kingston along Hwy 62, L.C. Higgins 1618 (BRY); Sevier Co., near the Big Rock Candy Mountain, L.C. Higgins 1620 (BRY); Tooele Co., Stansbury Island, G. Saccomanno 7680 (UT).


Caespitose perennial, 0.5-1.5 dm tall; stems several, 0.2-0.7 dm long, setose; leaves oblong to spatulate, 0.5-4 cm long, 0.2-0.6 cm wide, strigose to subtomentose, spreading setose; inflorescence narrow, cylindrical, 0.2-1 dm long, setose; calyx segments linear-lanceolate, in anthesis 2.5-3.5 mm long, in fruit becoming 6-8 mm long, setose; corolla white, the tube 2.5-3.5 mm long, crests at base of tube evident; nutlets muricate or sometimes tuberculate or rugulose; style shorter to slightly longer than mature fruit. Growing mostly in heavy clay soils but occasionally on sandy-loam soil. Western Colorado and eastern Utah. April-July. Fig. 49.

Duchesne Co., west of Duchesne, Ripley & Barney 4675 (CAS); north of Duchesne, G.E. Osterhout 6290 (RM); Summit Co., Echo Canyon, G.E. Osterhout 6291 (RM); San Juan Co., 13 miles south of Moab, A. Cranquist 9198 (NY); Uintah Co., 1 mile west of Red Pine, Book Cliffs, L.C. Higgins 1598 (BRY).


Caespitose perennial, 1-2 dm tall; stems I-many from the ends of the much-branched caudex. 0.3-1 dm long, weakly setose and strigose; leaves spatulate to oblanceolate, obtuse, 2-5 cm long, 0.3-0.7 cm wide, tomentose and appressed setose, with slender more or less appressed bristles; inflorescence usually narrow, but the cymes usually elongating, lower foliar bracts rather conspicuous in the young inflorescence; calyx segments densely setose and subtomentose; style scarcely exceeding the nature, muricate nutlets. Open, sandy to gravelly slopes and ridges. Southwestern Montana, eastern Idaho, and northern Utah. April-July. Fig. 50.

Box Elder Co., Kelton Pass, Maguire & Holmgren 26247 (UTC); Ralt River Mountains, S.J. Preese 889 (UT); Cache Co., Providence Canyon, B. Maguire 12952 (UTC); College Bench, B. Maguire 3700 (UTC); College Bench, L.C. Higgins 1087 (BRY); Logan River Bench, W.C. Muenscher 2415 (UTC); Davis Co., Mueller Park, K. Brizcze 7876 (UT); Salt Lake Co., City Creek Canyon, s.n. (UT); Bonneville Terrace, S. Flowers 444 (UT); City Creek, M.E. Jones s.n. (RM); Dry Fork Canyon, P.C. Farnsworth s.n. (UT); Utah Co., west side of Mount Timpanogos, R. Gourley 8086 (UT).


Densely caespitose long-lived perennials, 0.5-1.5 dm tall; stems several, 0.2-0.7 dm long; leaves spatulate to oblanceolate, obtuse, 2-4 cm
long, tomentose and appressed setose with rather weak bristles; inflorescence narrow, cylindrical, lower foliar bracts inconspicuous; calyx segments linear-lanceolate, densely tomentose and hirsute; style exceeding the mature fruit 0.5-1 mm. Growing on gravelly loam to clay soils, in the Pinyon-Juniper community, Southwestern Utah, southern Nevada, and southeastern California. April-July. Fig. 51.

Only a few of the several hundred specimens of the various varieties of *C. humilis* have been cited in this paper for two reasons: (1) most collections are so immature that it is almost impossible to assign them to a particular variety; (2) in order to conserve space in the paper. Future collections of Cryptantha would be much more adequate if flowering plants rather than flowering specimens were collected, particularly with members of this species.

Washington Co., Beaverdam Mountains, L.C. Higgins 1234 (BRY); summit of the Beaverdam Mountains, L.C. Higgins 1409 (BRY).


Perennials, 1-6 dm tall; stems 1-many, 0.4-4 dm long, glabrous to conspicuously hirsute; leaves linear to broadly oblanceolate, obtuse to acute, 2-15 cm long, 0.2-1.5 cm wide, glabrous to hirsute, usually pustulate dorsally, ventral surface lacking pustules or the pustules very inconspicuous; inflorescence open, cymules usually elongating, tomentose to setose-hirsute, floral bracts inconspicuous to very conspicuous; calyx segments ovate-lanceolate, acute, in anthesis 3-4 mm long; in fruit 5-7 mm long, subtomentose to setose-hirsute; pedicels 1-3 mm long; corolla white, the tube 2.5-3 mm long, crests at base of tube conspicuous, fornices light yellow, emarginate, 0.5-1 mm long, limb 5-8 mm broad; fruit oblata=ovoid, 1-4 nutlets maturing, ovate-lanceolate, margins acute, 2-2.5 mm long, 1.5-2 mm wide, the margins not in contact, both surfaces smooth and glossy, scar straight, closed, extending from the base to near the apex; style exceeding mature fruit 1-3 mm.

1. Ventral surface of the leaves glabrous, the petioles not ciliate-margined, nor the leaves tufted at the base ............................................. 38A. var. *pustulosa*

2. Ventral surface of the leaves strigose or setose, the petioles ciliate-margined; leaves tufted at the base (2).

2. Stems simple, not branched above the base (3).

3. Stems 1-4.4 dm long, usually twice as long as the basal tuft of leaves .......... 38B. var. *disticha*

3. Stems 0.2-0.9 dm long, usually not exceeding the basal tuft of leaves .......... 38D. var. *setosa*
38A. Cryptantha jamesii (Torr.) Payson, var. pustulosa (Rydb.) Harringt. Man. P. Colo. 466: 641. 1954. Type: San Juan County, Utah.


Erect perennials, 2-5.8 dm tall, branched from the base, simple above; stems slender, 1-3.9 dm long, glabrous or finely strigose; leaves linear to broadly oblanceolate, 2.9 cm long, 0.4-1.5 cm wide, the dorsal surface appressed setose-pustulate, ventral surface glabrous, the petioles not ciliate-margined; inflorescence open, 0.4-2 dm long, floral bracts inconspicuous. Sandy to gravelly soils, mainly in the Pinyon-Juniper community. Southwestern Colorado, northwestern New Mexico, northeastern Arizona, and southeastern Utah. May-August. Fig. 52.

UTAH
County Lines and river drainages

Fig. 52. Cryptantha jamesii var. pustulosa

Garfield Co., King Ranch, Boulder, Utah, Beck & Tanner 8204 (BRY); about 4 miles south of Boulder, D. Atwood 1864 (BRY); Kane Co., Mokié Tanks, DE. Beck s.n. (BRY); San Juan Co., east slope of Elk Ridge, Maguire & Redd 2066 (UTC); between Blanding and Kiggia Ranger Station, A.H. Holmgren 3489 (BRY); 10 miles west of Blanding, D. Henríques H-9 (UT); Hammond Canyon, Elk Mountains, Rydberg & Garrett 9569 (UT); Arch Canyon, 18 miles west of Blanding, Cronquist & Holmgren 9372 (UTC); bottom of Comb Wash about 20 miles west of Blanding along hwy 95, Welsh, Atwood & Higgins 8933 (BRY).


Erect perennials, branched from the base as well as above, 2.5-4.2 dm tall; stems somewhat woody near the base, 1.2-2.9 dm long, strigose and weakly setose; leaves narrowly oblanceolate, 3-12 cm long, dorsal surface setose-pustulate and strigose, ventral surface strigose to setose or silky-strigose, without pustulate hairs or the pustules inconspicuous, the petioles ciliate-margined; inflorescence open, 0.5-2 dm long, foliar bracts not very conspicuous. Southwestern Colorado, northeastern Arizona, northwestern New Mexico, and southeastern Utah. Usually found growing on sandy soils. April-September. Fig. 53.

Emery Co., 4 miles up Calf Spring Wash, San Raphael Swell, B. Maguire 18446 (UTC); first fork of Calf Spring Canyon, San Raphael Swell, B. Maguire 18298 (UTC); Buckhorn Wash, B.F. Harrison 9643 (BRY); junction of Buckhorn Wash and San Raphael River, Welsh & Atwood 9829 (BRY); Garfield Co., 5 miles south of Boulder, L.C. Higgins 1011 (BRY); 4

UTAH
County Lines and river drainages

Fig. 53. Cryptantha jamesii var. disticha
miles south of Henryville. L.C. Higgins 1010 (BRY); 16 miles west of Bryce Canyon Natl. Park, R.C. Rollins 2449 (UTC); 5 miles east of Escalante, A.H. Holmgren 7716 (UTC); 10 miles east of Escalante, A.H. Holmgren 7748 (UTC); Kane Co., 3.7 miles east of Skutumpah-Alton junction at head of Johnson Canyon, D. Atwood 1809 (BRY); about 7 miles east of Skutumpah-Alton junction, D. Atwood 1807 (BRY); one half mile west of Paria River bridge along hwy 89, Welsh & Atwood 9748 (BRY); 47 miles east of Kanab, B.F. Harrison 12092 (BRY); San Juan Co., bottom of Comb Wash along hwy 47 west of Bluff, Welsh & Atwood 9970 (BRY); Monument Valley, Eastwood & Howell 6674 (UTC); near summit of Navajo Mt., A.H. Holmgren 10661 (UTC); Mexican Hat, B. Maguire 16291 (UTC); Monument Valley, A.H. Holmgren 3243 (BRY, UTC); 10 miles west of Bluff, C.A. Hanson 87 (BRY); mesa north of Bluff, B. Maguire 5101 (UTC); head of Cow Canyon, 2 miles north of Bluff, A.H. Holmgren 3213 (UTC); Wayne Co., junction of road to Ekker Ranch, Welsh & Atwood 9859 (BRY); 3 miles north of Grover, D. Atwood 1862 (BRY); 3 miles southeast of Torrey, Holmgren, Reveal & LaFrance 1091 (BRY, UTC); about 2 miles south of Lyman, L.C. Higgins 1014 (BRY); 5 miles east of Teesdale, Holmgren, Reveal & LaFrance 2551 (BRY).


Eritrichium multicaule Torr. in Marcy, Exp. Red River 262. 1854.

Oreocarya multicaulis (Torr.) Greene, Pittonia 3:114. 1896.


Perennial, 2-5.5 dm tall, branched from the base, simple above; stems slender, 1-4 dm long, weakly strigose-setose; leaves mostly basal, oblanceolate, 5-15 cm long, 0.4-1 cm wide, dorsal surface strigose and appressed setose, or sometimes setose-hirsute, pubescent, venral surface uniformly strigose or subpubescent, without pustules, or the pustules small and inconspicuous, the peltioles conspicuously ciliate on the margins; inflorescence open, 0.5-1.5 dm long, bracts inconspicuous. Growing on a wide variety of soils, but mainly in sands in Utah. Southern Colorado and eastern New Mexico, south to western Oklahoma and Texas into northern Mexico, and north through central Arizona to southern Utah. April-September. Fig. 54.

Salt Lake City, canyon above Tropic, M.E. Jones 5900 (US); Kane Co., 4 miles north of Kanab, Ripley & Barnaby 4854 (GH); plateau near head of Rock Creek, B.F. Harrison 10400 (BRB); on slopes southeast of dunes, Knudsen 44 (BRB); Coral Pink Sand Dunes, S.L. Welsh 5299 (BRY); 23 miles south of Alton, A. Cromquist 10191 (UTC); Johnson Canyon, D. Atwood 17896 (BRY); Washington Co., Zion Canyon Natl. Park, east tunnel road, W.P. Cotton 4763 (BRY); Zion Natl. Park, Clear Creek Canyon, Eastwood & Howell 9219 (GH).


Oreocarya multicaulis var. cinerea (Greene) Macbr. Proc. Amer. Acad. 51:54. 1916.


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Fig. 54. Cryptantha jamesii var. multicaulis
Perennial, 1-3 dm tall, branched from the base, simple above; stems slender, 0.2-0.9 dm long, strigose and weakly setose; leaves mostly basal, oblanceolate, obtuse, 3.5-13 cm long, 0.4-1.5 cm wide, dorsal surface finely strigose, usually conspicuously pustulate, ventral surface uniformly and densely strigose, the petioles conspicuously ciliate on the margins; inflorescence open, 0.4-2 dm long, bracts evident, especially near the base of the inflorescence. Growing on a wide variety of soils, especially in the Pinyon-Juniper community. South central Colorado, northern New Mexico, northern Arizona, eastern Nevada, and southern Utah. May-September. Fig. 55.


Caespitose perennial 1-2.5 dm tall; stems several, arising from the branched caudex, 0.6-1.3 dm long, very weakly strigose; leaves oblanceolate, the apices obtuse to acute, 2.6-5 cm long, 0.4-1 cm wide, dorsal surface strigose with conspicuous pustulate hairs; inflorescence somewhat open, 0.5-2 dm long; floral bracts evident but not conspicuous, 1-2 cm long; calyx segments linear-lanceolate, in anthesis 5-6 mm long, in fruit becoming 8-10 mm long, strigose and spreading white-setose; pedicels 0.5-1 mm long; corolla white, the tube 12-15 mm long, flaring in the throat, crests at base of tube lacking, fornices yellow, 1-1.5 mm long, emarginate, papillose, limb 13-17 mm broad; nutlets ovate, 3.3-5 mm long, 2.3-2.7 mm wide, usually all 4 maturing, margins acute and knife-like, in contact, both surfaces smooth and glossy, scar straight, closed, elevated margin lacking; style exceeding mature fruit 3-5 mm (heterostyled). Growing in clay or clay-loam soils. Known only from the type locality near the head of Cottonwood Wash on the San Raphael Swell. May-June. Fig. 56.

Emery Co., about 15 miles west of hwy 50-6 along the road from Woodside to Castle Dale, L.C. Higgins 1310 (BRY); San Raphael Swell, B.F. Harrison 5628 (BRY); about 6 miles down Cottonwood Wash, L.C. Higgins 3522 (BRY); San Raphael Swell, at the north end of Cottonwood Wash, L.C. Higgins 3520 (BRY, WTSU).


Coarse caespitose perennials, 0.5-1.5 dm tall; stems many, arising from a thick woody multiple caudex, 0.2-0.7 dm long, setose; leaves spatulate, 1-4 cm long, 0.4-1.3 cm wide, coarsely apressed setose-pustulate, leaf bases also setose with dense white hairs; inflorescence narrow, somewhat capitate, with 1-3 flowers in the axils of the bracts below the terminal cluster; calyx segments lanceolate to nearly linear, in anthesis 5-7 mm long, in fruit becoming 7-10 mm long, densely setose, with ascending yellowish bristles; corolla white, the tube 10-15 mm long, campanu-
late in the throat, fornice low and broad, papillose, crests at base of tube lacking, limb 9-13 mm wide; nutlets lanceolate, 3.5-4.5 mm long, densely and uniformly muricate, or with a few short, low ridges, scar narrow, open, and without an elevated margin; style exceeding mature fruit 4-6 mm. Barren clay hills. Endemic to the San Raphael Swell, Emery County, Utah. April-May. Fig. 57.

Emery Co., San Raphael Swell, W.P. Cottam 5247 (UT); about 10 miles south of the San Raphael River bridge, San Raphael Swell, L.C. Higgins 1322 (BRY); about 15 miles west of hwy 50-6 along the road from Woodside to Castle Dale, L.C. Higgins 1308 (BRY); San Raphael Swell, about 1 mile south of river bridge, Higgins & Reveal 1265 (BRY); San Raphael Swell, D. Atwood 1301 (BRY).


Short-lived perennial or possibly biennials, 0.5-3 (5) dm tall; stems 1-several, 0.5-1 dm long, setose and spreading hirsute; leaves spatulate, obovate or oblanceolate, 2-7 cm long, 0.5-1.5 cm wide, both surfaces strigose and strongly hirsute, postulate; inflorescence broad and open, 0.7-2.5 dm long, setose, foliar bracts inconspicuous; calyx segments linear-lanceolate, in anthesis 7-10 mm long, in fruit becoming 10-16 mm long, setose; corolla white, the tube 12-14 mm long, crests at base of tube lacking, fornice yellow, emarginate, broad, rounded, papillose, 0.5-1 mm long, limb 9-11 mm wide; style exceeding mature fruit 4-9 mm (heterostyled); nutlets lanceolate-ovate 3-4 mm long, 2.2-2.6 mm wide, 2-4 maturing, both surfaces with tubercles and low rounded ridges, scar straight, closed or very narrowly open, with a slightly elevated margin. Sandy to clayey open ridges and flats. Western Colorado and eastern Utah along the Colorado River drainage. May-June. Fig. 58.

Grand Co., bluffs along the Colorado River, about 10 miles south of U.S. hwy 50-6 along hwy 24, S.L. Welsh 6966 (BRY); Morrison Formation along the Colorado River about 32.5 miles from Moab, S.L. Welsh 6989 (BRY); near Cisco, L.C. Higgins 3314 (BRY); near milepost 32 along hwy 128, L.C. Higgins 1478 (BRY).


43. Cryptantha ochroleuca Higgins, Great Basin Naturalist 28:197. 1968. Type: Garfield County, Utah, on outcrop 100 meters south of Red Canyon Campground along hwy 12, L. C. Higgins 1785.

Low caespitose perennial, 0.2-1.3 dm tall; stems several, 0.1-0.4 dm long, strigose and weakly setose; leaves linear-ob lanceolate to oblanceolate, the apices acute or sometimes obtuse, 1-2.5 mm long, 0.1-0.3 cm wide, basal leaves uniformly and densely strigose, sparsely setose, the petioles white-hairy, caulescent leaves strigose and with some setose-pustulate bristles; inflorescence narrow, 0.2-0.7 dm long, weakly setose; calyx segments linear-lanceolate, 2-2.5 (3) mm long in anthesis, in fruit becoming 4-6 mm long, setose; corolla pale-yellow, the tube 2-2.5 mm long,

Higgins 996 (BRY); 5 miles east of Wellington, Higgins & Welsh 1043, 1044 (BRY); near Carbon-Emery County line along hwy 50-6, Higgins 3323 (BRY, WTSU); Emery Co., about 15 miles west of hwy 50-6 along the road from Woodside to Castle Dale, L.C. Higgins 1306 (BRY); about 7 miles south of the San Raphael River bridge, San Raphael Swell, L.C. Higgins 1318 (BRY); Carbon-Emery County line along hwy 50-6, Higgins & Welsh 1039 (BRY); San Raphael River, B.F. Harrison 8060 (BRY); about 9 miles south of Lawrenceville, L.L. Pyrah 15 (BRY); Grand Co., vicinity of Sego, about 5 miles north of Thompson, S.L. Welsh 6015 (BRY); Wayne Co., 5 miles east of Buckhorn Wash, Welsh & Atwood 9006 (BRY).


Short-lived perennials, 1-1.5 (2) dm tall; stems 1-several, 0.5-1.2 dm long, setose-hirsute, with some finer strigose hairs beneath; leaves oblanceolate to spatulate, obtuse, 3-8 cm long, 0.5-1.4 cm wide, lower surface setose with pustulate hairs, also finely strigose, ventral surface strigose, less setose and with fewer pustules; inflorescence broad, open, 0.4-1.2 dm long, setose, foliar bracts well developed; calyx segments lanceolate, in anthesis 4-5 mm long, in fruit becoming 7-8 mm long, setose-hirsute; corolla white, the tube 3-4 mm long, crests at base of tube lacking or nearly so, fornices yellow, rounded, slightly papillose, about 0.5 mm long, limb 5-8 mm wide; nutlets ovoid, 3-3.5 mm long, 1.6-1.9 mm wide, margins obtuse, not in contact, dorsal surface rugose, tuberculate and somewhat muricate, ventral surface conspicuously tuberculate, scar open, constricted at the middle and surrounded by a high, elevated margin; style exceeding mature fruit 1.5-2 mm. Clay to clay-loam soils. Central and eastern Utah in Emery, Carbon, and Grand counties. April-July. Fig. 59.

Carbon Co., 20 miles north of Wellington, B. Maguire 18536 (UTC); left fork of Minnie-Maud Creek, B. Maguire 18596 (UTC); West Tavaputs Plateau, B. Maguire 18503 (UTC); 5 miles east of Wellington, L.C.
crests at base of tube conspicuous, fomices yellow, rounded, about 0.3 mm long, limb 4-5 mm wide; nutlets lanceolate, 2.5-3 mm long, 1.4-1.6 mm wide, usually only 1 maturing, margin acute, dorsal surface irregularly rugose with low rounded ridges, ventral surface only slightly uneven, scar open, narrowly triangular, extending ¾ the length of the nutlet, and lacking an elevated margin; style scarcely surpassing the mature fruit. Limited to the red Wasatch Formation near Red Canyon Campground in southwestern Garfield County, Utah. May-August. Fig. 60.

![Map of Utah showing the location of Cryptantha ochroleuca](image1)

Fig. 60. *Cryptantha ochroleuca*

Garfield Co., on outcrop 100 meters south of Red Canyon Campground, L.C. Higgins 17588 (BRY); Red Canyon Campground, Reveal & Reveal 1031 (BRY); Rocky outcrops north of Red Canyon Campground, D. Atwood 1891 (BRY); 2.4 miles east of Red Canyon Campground, D. Atwood 1879 (BRY).


Densely caespitose perennials, 0.7-1.2 dm tall; stems slender, many, arising from the densely branched multiple caudex, 0.3-0.6 dm long, strigose and spreading setose; leaves spatulate to oblanceolate, obtuse, 1-3 cm long, 0.3-0.8 cm wide, dorsal surface strigose and appressed setose, pustulate, ventral surface strigose, not pustulate or the pustules inconspicuous, the petioles ciliate-margined; inflorescence open, 0.3-0.8 dm long, weakly white setose, foliar bracts inconspicuous; cilyx segments lanceolate, in anthesis 2.5-4 mm long, in fruit becoming 5.6-5.5 mm long, strigose and spreading white setose; corolla white, the tube 2-3 mm long, crest at base of tube usually evident but poorly developed, fomices yellow, broad, emarginate, papillose, about 0.5 mm long, limb 5-7 mm wide; nutlets lanceolate, 2.7-3.2 mm long, 1.8-2.2 mm broad, usually less than 4 nutlets maturing, margins obtuse, not in contact, dorsal surface carinate, sharply tuberculate and rugose, ventral surface sharply tuberculate, scar open, constricted above the base, elevated margin evident but not conspicuous; style exceeding mature fruit 0.2-0.7 mm. Sandy soil or rocky ledges and slopes of the Pinyon-Juniper community. Mesa County, Colorado, Wayne and San Juan counties, Utah. May-June. Fig. 61.

![Map of Utah showing the location of Cryptantha osterhoutii](image2)

Fig. 61. *Cryptantha osterhoutii*

San Juan Co., Elephant Hill, Canyonlands Natl. Park, Welsh Atwood & Higgins 8875 (BRY); 25 miles west of Bluff near Johns Canyon, B.F. Harrison 11923 (BRY); nine miles north of junction 47-261 at summit of dogway, D. Atwood 1538A (BRY); Wayne Co., North Point, about 8 miles northwest of road to Flint Trail, above Orange Cliffs, Welsh & Atwood 9872 (BRY).


Caespitose perennial, 0.4-1.2 dm tall; stems 1-many, slender, 0.2-0.8 dm long, subomentumose near the base, weakly setose above; leaves oblongate to spatulate, usually folded, obtuse, 1.5-4 cm long, 0.2-0.4 cm wide, dorsal surface with appressed setose-pustulate hairs, ventral surface uniformly strigose and without pustulate hairs, the petals eiliate-margined; inflorescence subcapitate, 0.1-0.4 dm long, setose, foliar bracts inconspicuous; calyx segments linear-lanceolate in anthesis 5-6 mm long, in fruit becoming 6-8 mm long, weakly setose; corolla white, usually with a yellow tube 10-12 mm long, crests at base of tube lacking, fornices yellow, broad, emarginate, papillose, about 0.5 mm long, limb 10-12 (15) mm wide; nutlets lanceolate, turgid, 2-3 mm long, 1.3-1.6 mm wide, all 4 usually maturing, margins acute to obtuse, not in contact, dorsal surface densely tuberculate and conspicuously rugose, ventral surface tuberculate, also somewhat papillose, scar open, constricted below the middle, the margin elevated; style exceeding mature fruit 4-9 mm. Sandy to heavy clay soils on flats and open ridges. Western Colorado, northwestern New Mexico, and eastern Utah. May-June. Fig. 62.

Emery Co., 5 miles south of the San Raphael River, B.F. Harrison 9007 (BRY); San Raphael Swell, 50 miles north of Hanksville, A. Cronquist 9204 (UTC); San Raphael Swell, B. Maguire 18282 (UTC); 3 miles south of San Raphael River Bridge, San Raphael Swell, L.C. Higgins 1314 (BRY); 10 miles south of the San Raphael River Bridge, San Raphael Swell, L.C. Higgins 1319 (BRY).


Biennial herbs, 1-3.5 dm tall; stems 1-several, 0.2-1 dm long, setose, leaves clustered at the base, gradually reduced upward, oblanceolate to spatulate, obtuse to acute, 2.5 cm long, 0.5-1.5 cm wide, setose and hispid, pustulate on both surfaces; inflorescence narrow to somewhat open at maturity, cylindrical or obovoid, racemes in dense glomerules, 3-6 flowered, hispid, 0.5-2 dm long; calyx segments linear, in anthesis 7-8 mm long, in fruit becoming 8-10 mm long, hispid; corolla white, campanulate, the tube 7-9 mm long, crests at base of tube evident, fornices yellow, papillose, about 0.5-1 mm long, limb 7-8 mm wide; plants slightly heterostyled; nutlets lancelolate, 3-4 mm long, 1.1-1.5 mm wide, obsercely rugulose and tuberculate on the dorsal surface, ventral surface smooth, scar closed, and without an elevated margin. Open hills and ridges, growing on white or red shale. Central and northeastern Utah in Emery, Uintah, and Duchesne counties. May-July. Fig. 63.

Duchesne Co., about 10 miles south of Myton, L.C. Higgins 1067 (BRY); 10 miles south of Duchesne, L.C. Higgins 1052 (BRY); Indian Canyon, 10 miles south of Duchesne, B.F. Harrison 4091 (BRY); between Myton and Wellington, 10 miles south of junction with U.S. hwy 40, Holungren, Reveall & LaFrance 1946 (BRY); 2 miles south of Bridgeland, L.C. Higgins 1068 (BRY); 20 miles south of Myton, L.C. Higgins 1063 (BRY); Parley Canyon, tributary to Argyle Canyon, south end of county, Welsh & Christensen 6623 (BRY); 1 mile south of Duchesne, L.C. Higgins 1056 (BRY); about 8 miles north of Duchesne, L.C. Higgins 1058 (BRY); Emery Co., near Temple Mountain, L.C. Higgins 1324 (BRY); west of Hidden Splendor Mine, D. Atwood 1846 (BRY); 8 miles north of Goblin Valley turnoff on Temple Mountain road, D. Atwood 1850 (BRY); about 5 miles east of Buckhorn Wash, along road north of San Raphael River, Welsh & Atwood 9843 (BRY); 11 miles north of Goblin Valley turnoff on Temple Mt. road, theuce 40 miles west-southwest on mining road, D. Atwood 1858 (BRY); Uintah Co., Hill Creek, about 12 miles south of Ouray, J. Brotherson 541 (BRY); Hill Creek, 33 miles south of Ouray, J. Brotherson 473

Fig. 62. Cryptantha paradoxa

Biennial or short-lived perennial, 1.2-3 dm tall; stems slender, 1-several, 0.8-1.6 dm long, spreading setose-hispid; leaves oblanceolate to spatulate, obtuse to acute, strigose and conspicuously setose-hispid, pubescent on both surfaces; inflorescence 0.2-2 dm long, hispid; foliar bracts inconspicuous; calyx segments linear-lanceolate, in anthesis 4.5 mm long, in fruit becoming 7.9 mm long, strigose and spreading hispid; corolla white, the tube 3.4 mm long, erect at base of tube conspicuous, fornices rounded, distinctly papillose, about 0.5 mm long, limb 5.7 mm broad, nutlets lanceolate, 2.8-3.2 mm long, 1.3-1.7 mm wide, all 4 usually maturing, margins in contact, acute, dorsal surface with short low ridges, also somewhat tuberculate, ventral surface smooth or nearly so, scar open, subulate, without an elevated margin; style exceeding mature fruit 1-1.5 mm. Upper Sonoran Zone in gravelly loam to clay soils. Central Utah to northeastern Nevada. May-July. Fig. 64.

Juab Co., 7 miles east of Trout Creek, Maguire & Beraft 2761 (UTC); 13 miles east of Trout Creek, Maguire & Beraft 2760 (UTC); near Toquima Reservoir, B.F. Harrison 11756 (BRY); Millard Co., Desert Range Experiment Station, W.P. Cottam 8523 (UTC); 10 miles west of Fillmore, Ice Spring Crater, W.P. Cottam 9569 (UTC); 26 miles west of Delta, Maguire & Beraft 3943 (UTC); 9 miles north of Desert Range Experiment Station Headquarters, R.C. Holmgren 519 (BRY); 1 mile south of Grandy, B.F. Harrison 11658 (BRY); Cinder Cones, W.P. Cottam 8003 (UTC); Horse Range, 37 miles west of Delta, Maguire & Beraft 2758 (UTC); Cowboy Pass, Q. A. Hare 130F (UTC); 20 miles west of Hinekley, B. Maguire 20759 (UTC); about 15 miles west of Desert Range Experiment Station, L.C. Higgins 1614, 1463 (BRY); Sevier Co., about 1 mile southeast of Sigurd, L.C. Higgins 1623 (BRY); 6 miles south of Big Rock Candy Mountain, D. Atwood 1775 (BRY); 1 mile south of Sevier, L.C. Higgins 1474, 1621 (BRY); Tooele Co., 4 miles north of Gold Hill, B. Maguire 22024 (UTC); 2 miles west of Gold Hill, Maguire & Beraft 2762 (UTC); near Ibapah, W.P. Cottam 3159 (BRY); about 3 miles east of Wendover, L.C. Higgins 1720 (BRY).


Erect perennials, 2-3 (4) dm tall; stems 1-several, 0.9-1.8 (2) dm long, retrorsely strigose
and weakly spreading setose; leaves ob lanceolate, acute; 3-7 cm long, 0.3-0.6 cm wide, dorsal surface appressed setose-pustulate, ventral surface glabrous, the old leaf bases long white-hairy; inflorescence narrow to somewhat open, 0.4-1.3 dm long, foliar bracts slightly surpassing the cymes, 1.5-2 cm long; calyx segments lanceolate, in anthesis 5-8 mm long, in fruit becoming 10-13 mm long, setose; pedicels 1-2 mm long; corolla white, the tube 10-12 mm long, crests at base of tube conspicuous, fornices yellow, rounded, 1-1.2 mm long, obscurely papillose, limb 8-10 mm wide: nutlets ovate, 3.5-4 mm long, 2.2-5 mm wide, usually all 4 maturing, margins acute, in contact, both surfaces smooth and glossy, scar closed, elevated margin lacking, style surpassing the mature fruit 5-7 mm. Clay soils. Upper Sonoran Zone. Northern Arizona and southwestern Utah. May-July. Fig. 65.


Oreocarya sericea Greene, Pittomia 1:58. 1887.

Oreocarya affinis perennis A. Nels. Erythea 7:67. 1899.


Perennials, 1.5-1.3 (5) dm tall; stems 1-several, branched from near the base, 0.5-1.2 (3) dm long, setose with spreading hairs; leaves ob lanceolate to spatulate, obtuse, 2.5-10 (15) cm long, 0.5-2 cm wide, dorsal surface strigose and weakly appressed to spreading setose, pustulate, ventral surface silky-strigose, pustules lacking or very inconspicuous; inflorescence narrow to somewhat open, 0.5-3.2 dm long, setose-hispid, foliar bracts 2-5 cm long; calyx segments lanceolate, 2.5-4 mm long in anthesis, in fruit becoming 6-8 mm long; pedicels 0.5-1 mm long; corolla white, the tube 2.5-3.5 mm long, crests at base of tube conspicuous, fornices yellow, broad, depressed, 0.5-0.6 mm long, limb 7-9 mm wide; nutlets lanceolate, 2.5-3.5 mm long, 1.5-2 mm wide, usually all 4 maturing, margins acute or narrowly winged, in contact, dorsal surface with low rounded tuberculations, also somewhat rugulose and muriculate, ventral surface similar but the markings less evident, scar straight, closed and without an elevated margin; style exceeding mature fruit 0.5-1.3 mm. Growing on heavy clay soils in the Pinyon-Juniper community. Southwestern Wyoming, northwestern Colorado, and northeastern Utah. May-August. Fig. 66.

Carbon Co., West Tavaputs Plateau, Welch & Christensen 6572 (BRY); Daggett Co., 7 miles south of Manila, R.C. Rollins 1772 (UTC); 6 miles south of Manila, B. Magnuire 12378 (UTC); Duchesne Co., Indian Canyon, A.O. Garrett 8330 (UT); Indian Canyon, R.S. Ferris 11391 (UTC); about 2 miles south of Duchesne, L.C. Higgins 1055 (BRY); 10 miles east of Fruitland, L.C. Higgins 1048 (BRY); about 14 miles west of Duchesne, Higgins & Welsh 1023 (BRY); Rich Co., about 5 miles west of Evanston just across the Utah line, L.C. Higgins 1571 (BRY); Uintah Co., Brush Creek, 1 mile east of sheep corrals, D. Atwood 1585 (BRY); 1 mile north of Brush Creek sheep pens, D. Atwood 1589 (BRY); 5 miles west of White River bridge, D. Atwood 1620 (BRY); about 1 mile west of Rainbow Holmgren, Reveal & LaFrance 1806 (BRY); 3 miles north of Brush Creek sheep corrals, L.C. Higgins 1867 (BRY); Book Cliffs, about 8 miles south of the junction to Cook Ridge, L.C. Higgins 1906 (BRY).


Fig. 65. Cryptantha semiglabra
Biennial or short-lived perennials, 3-10 dm tall; stems usually 1-3, erect, 1.5-5 (6) dm long, hirsute; leaves clustered at the base, reduced upward, oblong-lanceolate, the apex obtuse to acute, 3-13 cm long, 0.5-1.5 cm wide, setose, and with some finer twisted pubescence beneath, pustulate hairs numerous on both surfaces; inflorescence broad-topped due to the elongation of the scorpioid racemes, 1-5 dm long; calyx segments broadly lanceolate, 4-6 mm long in anthesis, in fruit becoming 9-11 mm long, setose, and striate; corolla white, the tube 3-5 mm long, constricted above the ovary by the conspicuous ring of crests, fimbriate yellow, emarginate, 0.5 mm long, limb 7-9 mm broad, nutlets ovate, 5-6 mm long, 3.5-4.5 mm wide, papery, with a broad, winged margin, dorsal surface muricate, and inconspicuously rugulose or tuberculate, ventral surface smooth or nearly so, scar straight, narrow, slightly open, elevated margin lacking; style exceeding mature fruit 1-2 mm. Sandy to gravelly soils in the Transition Zone, Central Utah, south through most of Arizona in the mountainous areas, west to Nye County, Nevada. June-September. Fig. 67.

Garfield Co., east side of Mount Ellen, Henry Mountains, W.D. Stanton 516 (UT); Piute Co., 10 miles west of junction along hwy 153, L.C. Higgins 1785 (BRY); Sevier Co., Bowery Camp, Fish Lake, B. Maguire 19890 (UTC); Fish Lake, Bowery Creek Campground, L.C. Higgins 1117 (BRY); Fish Lake, Main Lodge, L.C. Higgins 1125 (BRY); Washington Co., about 6 miles west of the town of Pine Valley, L.C. Higgins 1440 (BRY).


Strict perennial, 1-3.9 dm tall; stems 1-several, 0.4-2 dm long, strigose and conspicuously setose-hispid; leaves mostly basal, reduced upward, oblong-lanceolate, acute, 2-7 cm long, 0.4-0.9 cm wide; retrorsely strigose and spreading setose-hispid, pustulate; inflorescence narrow, interrupted below the terminal cluster, 0.5-2 dm long, setose-hispid, foliar bracts conspicuous, especially near the base; calyx segments lanceolate, 4-6 mm long in anthesis, in fruit becoming 7-9 mm long, setose-hispid; corolla white, the
tube 3-4 mm long, crests at base of tube conspicuous, fornice yellow, rounded, papillose, limb 7-10 mm wide; nutlets lanceolate to elliptic, 3-3.5 mm long, 1.5-2 mm wide, usually all 4 maturing, margins in contact, knifelike, dorsal surface with definite transverse ridges, also somewhat tuberculate or nearly smooth, ventral surface smooth or nearly so, scar open, very narrowly linear, elevated margin lacking; style exceeding mature fruit 1-1.5 mm. Growing on clay or shale in the Transition Zone. Southwestern Wyoming, northwestern Colorado, and northeastern Utah. June-August. Fig. 68.


Caespitose perennials, 1.3-2.5 dm tall; stems slender, 1-many, 0.8-1.2 dm long, strigose and weakly spreading setose; leaves linear-spatulate, mostly basal, obtuse, 2.5 cm long, 0.3-0.6 cm wide; dorsal surface strigose and weakly spreading setose, conspicuously pustulate, ventral surface uniformly strigose and without pustules; inflorescence narrow, interrupted, 0.6-1.4 dm long, weakly setose, foliar bracts inconspicuous; calyx segments linear-lanceolate, in anthesis 4.5-6 mm long, in fruit becoming 7-9 mm long, white setose; corolla white, the tube 5.5-7 mm long, crests at base of tube lacking or sometimes evident, fornice yellow, broad, emarginate, papillose, about 0.5 mm long, limb campanulate, 5-8 mm wide; nutlets lanceolate, 3.4 mm long, 1.8-2 mm wide, all 4 nutlets usually maturing, margin acute to somewhat obtuse, nearly in contact, dorsal surface carinate, sharply and deeply rugose, ventral surface rugose, scar open, constricted above the base, and with an elevated margin; style exceeding mature fruit 3-4 mm. Sandy or sandy-loam soils in the Upper Sonoran Zone. southeastern Utah in Emery, Grand, Wayne, and San Juan counties. April-July. Fig. 69.
Towers, Welsh & Atwood 9961 (BRY); Castle Valley, Welsh & Atwood 9950 (BRY); northeast of Moab, just below Salt Wash, A. Cronquist 8978 (UTC); 1 mile east of Moab bridge, Bryan & Moab School s.n. (UTC); San Juan Co., 14 miles southeast of Moab along power transmission line, L.C. Higgins 3547 (BRY, WTSU); 2 miles west of Hite, Welsh, Atwood & Higgins 8952 (BRY); Fry Canyon, Welsh, Atwood & Higgins 8951 (BRY); about 2 miles west of Dugout Rock, Welsh, Atwood & Higgins 8853 (BRY); 1 mile southeast of Natural Bridges Natl. Monument visiting center, D. Atwood 1541 (BRY); north slope of divide into Monument Valley, A.H. Holmgren 3237 (UTC); 10 miles east of Hite, A. Cronquist 9035 (UTC); about 12 miles south of Moab, L.C. Higgins 1000 (BRY); 19 miles west of Fry Canyon Post Office, L.C. Higgins 537 (BRY); 2 miles up road to Dead Horse Point, R.K. Vickery 751 (UT); Wayne Co., about 1 mile east of Hanksville, L.C. Higgins 1334 (BRY); Three Canyon, along road about 25 miles south of Green River along county road, Welsh & Atwood 9895 (BRY),


Biennial, 1.5-3.5 (4) dm tall; stems 1-3, 0.5-0.8 dm long, branched from the base with 1 stout and usually several low slender ascending stems; leaves clustered at the base, gradually reduced upward, spatulate to broadly oblanceolate, the apices obtuse to rounded, 2.5-5 cm long, 0.7-1.6 cm wide, striate and appressed setose, dorsal surface conspicuously pustulate, ventral surface with few or no pustules; inflorescence becoming broad in age due to the elongation of the cymes, 0.6-3 dm long, calyx segments lanceolate, in anthesis 5-7 mm long, in fruit becoming 7-13 mm long, calyx segments linear-lanceolate, in anthesis 3-4 mm long, in fruit becoming 7-11 mm long, hirsute; corolla white, the tube 3-4 mm long, crests at base of tube conspicuous, fomices yellow, emarginate, papillose, about 1 mm long, limb 7-9 mm broad; nutlets ovate, 3.5-4.5 mm long, 2.4-2.6 mm wide, usually only 1-2 nutlets maturing, margins in contact, acute, dorsal surface with a distinct ridge, the surface tuberulose and usually rugulose, ventral surface very uneven with indeterminate rugae and tubercles, scar open and triangular with an elevated margin; style exceeding mature fruit 1-1.5 mm. Usually growing on clay or clay-loam soils in the Lower Sonoran Zone. Southwestern Utah, southern Nevada, northwestern Arizona, and southeastern California. March-July. Fig. 70.

Washington Co., about 5 miles southwest of St. George, L.C. Higgins 1243 (BRY); Beaverdam Mountains, L.C. Higgins 1232 (BRY); 11 miles east of St. George F.W. Gould 1580 (BRY, DIX); north of Gunlock, P. Nyberg s.n. (DIX); 4 miles west of St. George, A. Terrill s.n. (DIX); near the Shiuwits Indian Reservation, E. Hawkins s.n. (DIX); Beaverdam Mountains, R.W. Christian 863 (UT); 8 miles north of Santa Clara, A.H. Holmgren 8224 (UTC); Virgin River above Hot Mineral Springs, Laverkin, Utah, B. Maguire 4470 (UTC); Jackson Wash, Beaverdam Mountains, D.H. Nish 36 (UTC); about 4 miles west of the Shiuwits Indian Reservation, L.C. Higgins 4154 (BRY, WTSU).


Krynitzkia glomerata var. acuta Jones, Zoe 2:250. 1891.


Biennial or short-lived perennials, 1-3.5 (4) dm tall; stems 1-6, 0.5-0.8 dm long, branched from the base with 1 stout and usually several low slender ascending stems; leaves clustered at the base, gradually reduced upward, spatulate to broadly oblanceolate, the apices obtuse to rounded, 2.5-5 cm long, 0.7-1.6 cm wide, striate and appressed setose, dorsal surface conspicuously pustulate, ventral surface with few or no pustules; inflorescence becoming broad in age due to the elongation of the cymes, 0.6-3 dm long, calyx segments lanceolate, in anthesis 5-7 mm long, in fruit becoming 7-13 mm long.
white setose; corolla white, the tube 7-10 mm long, crests at base of tube lacking, fornices light-yellow, emarginate, papillose, about 1 mm long, limb 6-13 mm wide; nutlets lanceolate, or ovate-lanceolate, 3.5-4 mm long, 2-2.5 mm wide, usually all 4 maturing, margins acute, in contact, dorsal surface distinctly tuberculate and often rugulose as well, scar open, linear, surrounded by a slightly elevated margin; style exceeding mature fruit 3-5 mm. Usually growing on heavy clay soils associated with Atriplex. East central Utah in Grand, Carbon, Emery, Wayne, and Garfield counties. April-June. Fig. 71.

7. Cynoglossum (Tourn.) L.

Biennial or perennial or rarely annuals; leaves alternate, the basal ones long petioled; racemes elongating, usually without bracts, or rarely bracted at base; calyx cut to beyond the middle, somewhat accrescent, segments often spreading or reflexed in fruit; corolla cylindrical or funnel-form, the tube short, lobes broad, spreading, imbricate, throat with trapeziform oblong or subulate appendages; stamens included; filaments short, anthers oblong or elliptic; ovules 4; nutlets 4, equally divergent, depressed ovoid or orbicular, glochidiate, back flat or convex, frequently with an elevated margin, attached by a small or large medial to apical scar to a convex or pyramidal gynobase and frequently with a free subulate prolongation decurrent on the short entire style.

Type Species: Cynoglossum officinale L. A cosmopolitan genus of about 50 species.

Type: Europe.

Biennial, villous-tomentose throughout; stems stout, erect, leafy to the top, 4-5 dm high; lower leaves oblong to oblong-lanceolate, slender petiolate, 15-30 cm long, 2-7 cm wide; upper leaves lanceolate, acute or acuminate, sessile or the upper mostly clasping; racemes several to many, simple or branched, sparingly bracted or bractless; much elongating in fruit; pedicels 5-12 mm long; calyx segments ovate-lanceolate, obtuse to acutish, 5-7 mm long in fruit, corolla reddish-purple, the broad tube 3-5 mm long, the limb 6-8 mm broad; nutlets ascending on the pyramidal gynobase, about 6 mm high, flatish on the upper surface and margined, splitting away from the gynobase at maturity but hanging attached to the subulate style. Native to Europe and Asia but widely distributed over North America. May-July. Fig. 72.
shaggy coarse-hirsute; leaves appressed-hispid and along the margin and midrib somewhat hirsute, with a strong midrib but very obscure or absent veins; lower leaves 8-16 cm long, oblong-lanceolate, broadly stalked, forming a rosette which withers away at anthesis; cauline leaves reduced up the stem, the middle ones linear-lanceolate, 3-9 cm long, contracted to a rounded sessile base; racemes short, lateral, disposed in a long narrow thyrs or open panicle; corolla bright blue, rarely rose or white, pubescent and sparsely setose, rather firm in texture, 10-15 mm long, the tube about equaling the calyx; stamens very unequal, the two pair slightly unequal but both surpassing the lower corolla lobe, the odd stamen included; nutlets about 2 mm long, erect, rugose. Native of Europe, introduced into eastern United States where it has spread westward to the Rocky Mountains. June-August. Fig. 73.

**S. Echium L.**


Biennial or possibly perennial, hispid, herbaceous plants; leaves alternate, entire; flowers blue to violet-purple, in leafy bracted scorpioid, spikelike racemes; calyx 5-parted; corolla tubular-funnelform, irregular, usually 5-lobed, the throat not appended; stamens unequal, at least the longer ones exerted on long filaments; ovary 4-lobed, these separating in fruit; style 2-cleft at apex; nutlets erect, rugose, attached by their bases to a flat gynobase, the scar flat or somewhat concave, not leaving a pit.

Type Species: *Echium italicum* L.


Stems 3-9 dm tall, erect, solitary or occasionally several, finely hispid-villous as well as

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Fig. 72. *Cynoglossum officinale*

s.n. (UT): Sanpete Co., Ephraim Canyon, A.H. Barnum s.n. (DIX); 4 miles east of Ephraim, R. Stevens 30 (BRY); 5 miles up Manti Canyon, A. Collotzi 511 (UTC); Tooele Co., south of Vernon, R.H. Foster 22 (BRY); Utah Co., Timp Haven, K. Shaw 95 (BRY); 2 miles east of Thistle, J. Gentry 2001 (UTC); Wasatch Co., 5.7 miles east of Heber, L. Arnow 676 (UT); 5 miles southwest of Heber, L.C. Higgins 1863 (BRY); Washington Co., no locality, J.W. Harrison s.n. (BRY); Weber Co., Weber River, W.S.F. 755 (UT); Ogden, on south Harrison Blvd., A. Collotzi 51 (UTC).

Fig. 73. *Echium vulgare*

Summit Co., Echo Canyon, C.H. Field 37 (UTC); Echo Canyon, 2 miles above town of Echo on old road, J.R. Moore s.n. (UTC); Echo Canyon, S. Flowers s.n. (UT).


Low depressed cushion-like perennials, with the short stems densely clothed with small often
imbricate leaves; flowers few in a racemelike cluster terminating the slender flowering stem; calyx-lobes ascending, linear; corolla blue, funnelform, with a short tube; nutlets obliquely attached to the conical gynobase, smooth, the apex obliquely truncate, with a distinct, entire or toothed margin.

Type Species: *Eritrichium nanum* Schrad.


Plants villous often silvery looking, forming a tuft about 2-4 cm tall (not counting the flowering branches); leaves closely overlapping, 5-10 mm long, narrowly ovate to oblong or ob-lanceolate, 1.5-2 mm broad, acute or obtuse, pilose, especially on the margins and tips, with long white hairs; flower cluster compact when sessile among the leaves or sometimes racemelike when borne on a leafy flowering branch up to 7 cm long; calyx-lobes linear, 1.5-3 mm long; corolla tube equaling the calyx-lobes, limb variable in size (1) 4-5 (7) mm broad, bright blue (rarely white), crests in the throat puberulent; nutlets smooth, with an entire margin to the truncated oblique portion, rarely with a few obscured teeth. Rocky ridges in high alpine areas, 10,000 to 13,000 feet. Oregon, east to Idaho, Montana, Wyoming, Utah, and Colorado. July-September. Fig. 74.

Box Elder Co., Raft River Range, W.P. Cottam 2849 (BRY, UT); Raft River Mountains, S.J. Preece 640 (UT); Duchesne Co., Uintah Mountains, J.R. Murdock 554 (BRY); Summit of Mt. Agazziz, W.P. Cottam 3718 (UT); Summit Co., Upper Henrys Fork, north of Lake Blanchard, B. Maguire 14346 (UTC); about Henrys Fork Lake, B. Maguire 14385 (UTC).


Coarse biennial or perennial or rarely annual herbs; leaves alternate, broad and veiny, flowers in naked or inconspicuous bracted racemes panicularly disposed; pedicels slender, recurving in fruit; calyx cut to the base into spreading ovate to oblong or lanceolate lobes; corolla white or blue, with a short or elongate tube, lobes rounded, imbricate; throat with trapeziform intruded appendages; stamens included, affixed at middle of tube; filaments slender, short; anthers oblong to elliptic, style slender, scarcely if at all surpassing the nutlets; stigma capitate; ovules 4; nutlets 4, erect, ovate, affixed ventrally to the pyramidal gynobase by a broad medial or submedial areola, margin with subulate glabridiate appendages which are frequently confluent at the base, back smooth or with glabridiate appendages.

Type Species: *Hackelia deflexa* (Wahl.) Opiz (Myosotis deflexa Wahl.)

1. Surface of nutlet more or less ridged but without prickles; branches many flowered 1. *H. floribunda* 1. Surface of nutlet more or less prickly (may be ridged); branches fewer and with fewer flowers 2. (2)

2. Nutlets broadly ovate; basal leaves few, stems leafy above, not conspicuously reduced in size; corolla blue 2. *H. jessicae* 2. Nutlets narrowly ovate; basal leaves many, stem leaves few and reduced in size; corolla white 3. *H. patens* 2.

1. *Hackelia floribunda* (Lehm.) Johnst. Contr. Gray Herb. 68:46. 1923. Type: 'Lake Pentaguisheen to the Rocky Mountains, Drum-

Fig. 74. *Eritrichium nanum*

Lappula floribunda (Lehm.) Greene, Pittonia 2:182. 1891.

Stem erect, stout, from a short-lived perennial root, 5-12 dm high, the rough pubescence deflexed, mixed with some spreading hairs; leaves oblongate to linear or oblong, hirsutulous-appressed, the basal leaves petiolar, with spreading hairs, the stem leaves sessile above; racemes of the inflorescence many, rather strict, densely flowered, pedicels short, 5-7 mm long in fruit; corolla blue, 4-7 mm broad, appendages small, obscurely papillate, not closing the throat; nutlets 3-5 mm long, the face with a medial ridge, muricate, hirsutulous, without short glochidiate prickles, the marginal spines much flattened at base, distinct or somewhat confluent, 4 to 6 on each side, mostly exceeding in width the face of the nutlet. Brushy slopes and edge of woods. Mostly western United States and Canada, east to Ontario and Minnesota to western Texas. June-August. Fig. 75.

Cache Co., Logan, C.P. Smith 1766b (UTC); Logan Canyon, B. Maguire 12981 (UTC); Tony Grove, Logan Canyon, F.B. Wann 3705 (UTC); City Park, Logan Canyon, B. Maguire 21540 (UTC); West Hodges pasture, Logan Canyon, H.B. Passey 2 (UTC); Logan, Logan River. Northrop & Crockett s.n. (UTC); Emery Co., Huntington Canyon, W.P. Cottam 7437 (UTC); Garfield Co., Henry Mountains, 22.9 miles southwest of Hanksville, J. Gentry 1753 (UTC); east slope of Mount Ellen, B. Maguire 19322 (UTC); 15 miles southwest of Escalante, H. Hall s.n. (UTC); Henry Mountains, W.D. Stanton 4888 (BRY); Juab Co., Thomas Creek, W.P. Cottam 3244 (BRY); Salt Lake Co., Little Cottonwood Canyon, W.P. Cottam 3543 (BRY); Sanpete Co., vicinity of Ephraim, B. Olson s.n. (UTC); 10 miles up Ephraim Canyon, J.D. Walker s.n. (BRY); Sevier Co., Fish Lake, Maguire & Richards 12982 (UTC); 20 miles west of Richfield, F. Coles 53 (BRY); Wasatch Co., Cascade Terraces, E.G. Davenport 23 (UTC); Utah Co., Mount Timpanogos, B. Maguire 3704 (UTC); Mount Timpanogos, W.P. Cottam 1265 (BRY).


Stems erect or ascending from a stout root, sparingly to rather densely villous-hirsute; basal leaves 8-15 cm long, the blades oblongate, 15-20 mm wide, narrowed to a winged petiole of about equal length; upper stem leaves sessile, lanceolate, acute, the reduced ones subtending the lower racemes often ovate-lanceolate; racemes several in an open panicle, pedicels slender, at length recurved reflexed, 5-10 mm long; calyx-lobes oblong to oblong-lanceolate, 2-3 mm long; corolla small, pale blue, 3.5-5 mm broad, tube often whitish, 1.5-2 mm long, lobes oblong-ovate, crests yellowish, rounded, puberulent; nutlets 4-6 mm long, marginal prickles broadly dilated at base, about 10, distinct, often with a shorter one in between; dorsal face broadly ovate, usually flattened with a distinct median ridge, puberulent and in age more or less muricate, usually with 1 or more short barbed prickles near the center. Usually on moist banks or slopes. British Columbia, Washington, and Idaho, south to Utah, Nevada, and California. May-August. Fig. 76.

Cache Co., 5 miles up road to Tony Grove, Cen-try & Davids 1729 (UTC); Pine Canyon, B. Maguire 3101 (UTC); Logan Canyon, C.P. Smith 2227 (UTC); Saraline Canyon, B. Maguire 12985 (UTC); 12 miles up Smithfield Canyon, B. Maguire 13777 (UTC); Davis Co., Centerville Canyon, A.C. Hall s.n. (UTC); Salt Lake Co., Little Cottonwood Canyon, R.D. Day 35 (BRY); Summit Co., north slope of Big Mountain, D.H. Calway 2382 (BRY); Utah Co., divide between Ameri-
can Fork and Snake Creek canyons, Welsh, Murdock & Stocks 6348 (BRY); Mount Timpanogos, Little Basin above falls, B. Maguire 17-496 (UTC); Wasatch Co., Daniels Canyon, B.F. Harrison 8717 (UTC); Strawberry Valley, D.H. Galway 8717 (BRY).


Stems 2 or 3 short, deflexed hirsute, with some hairs spreading, arising from a woody caulex covered with old leaf bases; basal leaves many, oblanceolate to lanceolate, stem leaves reduced upward, pubescent rather dense, short, appressed; branches of the inflorescence 5-10 flowered, pedicels short, elongating somewhat in fruit; corolla whitish or light blue, usually quite large, appendages somewhat broader than long, obscurely papillos; nutlets small, marginal glochidiate prickles 3-5 on each side, a few short prickles interspersed, the longest prickles surpassing the body of the nutlet, face of nutlet with a faint median ridge, mucrurate and occasionally bearing 1 or 2 prickles. Sandy or gravelly slopes and foothills. Western Montana and Idaho to Utah and Nevada. May-August. Fig. 77.

Box Elder Co., Cold Water Canyon, L. Williams 636 (UTC); Bench east of Honeyville, M. Burke 3102 (UTC); Smithfield junkpile, D. Stocks 12 (BRY); Raft River Mountains, J. Berryman 35 (UT); Perry Canyon, Cottam, Allen, & Rowland 16244 (UT); Beaver Co., Pine Canyon Pass, south ridge, B. Maguire 20962a (UTC); Cache Co., vicinity of Green Canyon, Maguire & Firanian 12987 (UTC); 8 mile east of the fish hatchery, B. Maguire 3708 (UTC); Sardine Canyon, B. Maguire 12986 (UTC); mouth of Logan Canyon, C.P. Smith s.n. (UTC); Intervale, Logan Canyon, Muencher & Maguire 2422 (UTC); Providence Bench, Logan, C.P. Smith 1593 (UTC); 4 miles up Logan Canyon, B. Maguire 12988 (UTC); Logan Bench, B. Maguire 13771 (UTC); Davis Co., mouth of Holbrook Canyon, R. & B. Anderson s.n. (UTC); Muehler Park, Cottam s.n. (UT); Garfield Co., Henry Mountains, (UT); Juab Co., Granite Canyon. Trout Creek, Maguire & Becraft 2779 (UTC); Deep Creek. W.P. Cottam 3231 (BRY, UT); Iron Co., 12 miles east of Cedar City, B. Maguire s.n. (UTC); Kane Co., vicinity of Glendale, F.B. Wann 36 (UTC); Millard Co., Confusion Range, 21.8 miles east of the Utah-Nevada line, J. Gentry 2003 (UTC); Salt Lake Co., Mill Creek Canyon, L. Eyre 57 (BRY); Jordan Narrows, E. Young s.n. (BRY); Dry Creek Canyon J. Ludwig 193 (UT); City Creek Canyon, R.K. Vickery 1918 (UT); Big Cottonwood Canyon, H.K. Harrison 68 (UT); Fort Douglas, R.K. Vickery 563 (UT); Sanpete Co., 8 miles southeast of Mt. Pleasant, L.C. Higgins 1095 (BRY); 10 miles west of Moroni, B. Maguire 18657 (UTC); Tooele Co., Intermountain Forest and Range Experiment Station, N. Frischknecht 25 (UTC); Benmore Experiment Station, W.H. Blackburn 39 (BRY); Utah Co., 3 miles south of Thistle, B. Maguire s.n. (UTC); Rock Canyon, P.A. Replogle 80 (BRY); Y Mountain, Decker & Eggertson 347 (BRY); Wasatch Co., 1 mile east of Heber City,
B.F. Harrison 8709 (BRY); Weber Co., Ben Lomond Trail, W. Call 17 (UT); North Ogden, A. Collozzi 77 (UTC).

The following citations are for the variety harrisonii Gentry, which has recently been described. Utah Co., near Tucker, Spanish Fork Canyon, L. Mason 4323 (BRY); hogs back between right fork of Hobble Creek and Shingle (Mill) Creek, B.F. Harrison 8323 (BRY); Spanish Fork Canyon, 2 miles east of Thistle, J. Gentry 2000 (UTC); Washington Co., Pine Valley, 1.5 miles up Forthys Trail, J. Gentry 2002 (UTC).

11. Heliotropium L.


Annual or perennial, herbaceous or more or less shrubby plants; leaves small to large, sessile or petiolate; cymes unilaterial and usually distinct scorpionid, with or without bracts; corolla white, yellow or purple, variable in form, throat frequently pubescent inside; anthers included, filaments extremely short; style present or absent; stigma usually frustulose or conic, mostly sterile, receptive only in a band around the base; fruit dry, at maturity breaking up into single-seeded or 2 biseminous nutlets; seeds with a thin endosperm. A large genus widely distributed in the warmer parts of the world, also arid regions.

Type species: Heliotropium europaeum L.

1. Plant not succulent, hairy, never glaucous; fruit 2-lobed, each lobe splitting into 2 nutlets; stigma caped by a tuft of bristles .... 1. H. convolutaeum

1. Plants very succulent, glabrous, usually glaucous; fruit not lobed, stigma discoid, naked; perennials (2).

2. Fruit 2.5 mm wide; corolla 5-16 mm, at most only purplish-tinted at the throat .......................... 2a. H. curassavicum var. obtusatum

2. Fruit 1.5-2 mm wide; corolla 3-5 (7) mm broad, usually becoming distinctly purple or purplish at the throat .... 2b. H. curassavicum var. ovatum


Euploca grandiflora Torr. in Emory. Noles Mil. Reconm. 147. 1848.

Annual, 1-4 dm tall, stems at first usually simple, but later developing elongate branches, which are ascending or sprawling; strigose and ciliate; leaves numerous, strigose, postulate, lanceolate to ovate, 10-14 mm long, 4-15 mm broad, apex acute, base acute to rounded, petiole slender, 3-5 mm long, midrib evident; flowers extra axillary, appearing to be borne along the elongating leafy branches, bracts leaflike, numerous; calyx 5-lobed, at anthesis 4-6 mm long, becoming 6-9 mm long at maturity; lobes linear-lanceolate or linear, unequal; pedicels at anthesis 1-3 mm long, in fruit 3-5 mm long, corolla white with a yellow throat, fragrant, opening during the morning and evening, limb widely funneliform, expanded, 15-22 mm broad, not lobed pentagonal, plicate in the bud with the sinus inflexed; tubular portion of corolla 8-11 mm long, strigose on the outside; anthers lanceolate, basifixed, 2.5-2.5 mm long; filaments about 1 mm long; ovary globose, glabrous; style slender, 3-4 mm long; stigmatic head with a prominent stigmatic band 0.5 mm in diameter at the base, and this surmounted by a truncate appendage bearing a cluster of hairs; fruit laterally compressed, hairy, 2-lobed, 3-4 mm long, 2.25 mm thick, 2.25 mm high; at maturity first dividing transversely and the lobes separating, forming halves, each with a broad flat commissural face; each half next dividing on the narrow longitudinal axis to form the asymmetrical single seeded nutlets. In sandy soils, Nebraska and Wyoming, south to northern Chihuahua and Texas, and westward into Arizona and Nevada. June-September. Fig. 78.

Emery Co., 20 miles north of Hanksville, B. Maguire 1937 (UTC); San Raphael Desert. A. Smith s.n. (UTC); 25 miles southwest of Green River, W.P. Cottam 17740 (UT); Garfield Co., 30 miles south of Hanks-ville, Cronquist & Holmgren 9316 (UTC); 8 miles down Shinta Marine Creek, J.C. Pederson 16 (BRY); Hite, D. Lindsay 2 (UT); Grand Co., 5 miles west of Moab, Maguire & Redd 2067 (UTC); north of Moab, B.F. Harrison 12024 (BRY); Juab Co., near Champlin railroad stop, B.F. Harrison 352 (BRY); Millard Co., sand dunes, W.P. Cottam 3792 (UT); San Juan Co., Bluff Cemetery, Holmgren & Hansen 3442 (UTC); 5 miles north of the Chocolate Drop Butte, L.O. Wilson 155 (UTC); 5 miles east of Hite, Holmgren & Maguire 10615 (UTC); 8 miles northeast of Hite, Cronquist & Holmgren 9490 (UTC); Bluff, W.P. Cottam 2547 (BRY, UT); Bluff, W.C. Twiss s.n. (UTC); Tooele Co., Dugway Valley, S. Flowers 46 (UT); Wayne Co., 5 miles north of Hanksville, Cronquist & Holmgren 9424 (UTC); between Hanksville and Hite, A.H. Holmgren 7799 (UTC); 10 miles north of Hanksville, S. Flowers 57 (UT); Washington Co., 2.5 miles west of Toquerville, Maguire & Piranian 12316 (UTC); 2 miles south of Anderson's Ranch Maguire & Richards 15927 (UTC); Santa Clara, W.P. Cottam 1519 (BRY); Lees, W.P. Cottam 5391 (UT); Guylock, W.P. Cottam 5718 (UT); Santa Clara Bench, W.P. Cottam 12752 (UT); Zion Ntl. Park, W.P. Cottam (UT).
2. **Heliotropium curassavicum** L. Sp. Pl. 130. 1753.

Annual or short-lived perennial, fleshy, glaucous, glabrous throughout, stems diffusely branched, 1-6 dm long; leaves succulent, varying from linear to obovate, but commonly spatulate, 1-4 cm long, obtuse, narrow to a thick petiole; spike mostly in pairs, sometimes 3-5, often 6-12 cm long; calyx-segments ovate-lanceolate, acute, 2-3 mm long; corolla 3-5 mm long, white with a violet-purple eye on the throat; stigma glabrous; stamens included, the anthers subsessile; fruit subglobose, at length separating into 4 nutlets.

2A. **Heliotropium curassavicum** var. **obovatum** A. DC. Prod. 9:538. 1845. Type: Columbia River, probably near the Blue Mountains, Oregon


Leaves spatulate to obovate; corolla white or slightly tinged with purple, 6-8 mm long, the limb about as broad; nutlets 2.5-3 mm long. Alkaline or saline places. Eastern Washington, eastern Oregon, and northwestern Nevada, east to the Rocky Mountains. June-October. Fig. 79.

Box Elder Co., Bear River Refuge, D. Hobson 14839 (UTC); Kindsen Marsh, Jensen & Dargan s.n. (UTC); Cache Co., Pelican Pond, J. Thieraet 60 (UTC); Daggett Co., Linwood Bridge, S. Flowers 127 (UTC); Garfield Co., Bakers Ranch, B. Markham B-9 (UTC); Millard Co., between Delta and Hinckley, Maguire & Bectard 3941 (UTC); Salt Lake Co., Salt Lake City, W.P. Cottam s.n. (UT); Tooele Co., Smelter Bench, C.P. Smith 1893 (UTC); Utah Co., near Provo, W.P. Cottam 3171 (UTC); Uintah Co., 8.5 miles north of Ouray, N. Folks 235 (UTC).


**Heliotropium oculatum** Heller, Muhlenbergia 1:58, 191.


Middle cauline leaves oblanceolate to spatulate, smaller lower and upper ones commonly oblong and acutish; corolla limb about 4 mm wide, the lobes white or bluish and the throat with a violet-purple eye. Southwestern Utah, south to Baja California, and east to New Mexico and Texas. March-September. Fig. 50.

Washington Co., Arizona Strip, B. McAllister s.n. (UTC); St. George, F.B. Wann 32 (UTC); Santa Clara, W.P. Cottam 6900 (UTC); 2 miles southeast of Santa Clara, R. Christian 934 (UTC); St. George, W.P. Cott-
1. Nutlets with the marginal prickles definitely in a single row (2).

2. Marginal prickles distinct to the base or nearly so, not confluent to form a cupulate structure.

2A. *L. occidentalis* var. *occidentalis*

2. Marginal prickles confluent, forming a conspicuous smooth cupulate structure on the back of some or all the nutlets.... 2B. *L. occidentalis* var. *cupulata*


*Type*: Europe.


*Lappula myosotis* Moench Meth. 417. 1794.


*Echinopspermum lappula* Lel. Asperif. 121. 1818.

Annual, with erect, simple to freely branched stems 1.5-8 dm tall, villous-hirsute with upwardly more or less appressed hairs; lower leaves linear to linear-lanceolate or oblong, acute to obtuse, narrowed to a sessile base, closely ascending, 2-5 cm long, roughly pubescent like the stem, passing above into the linear or lanceolate bracts of the usually numerous racemes; pedicels 1-3 mm long; calyx-lobes broadly linear, appressed bristly, in fruit spreading, 2.5-3 mm long; corolla bright blue, the limb 2.4 mm broad, the tube surpassing the calyx; nutlets 3-4 mm long, sharply verrucose or mucrate dorsally, with 2 marginal rows of long slender bristles not confluent at the base, these sometimes irregularly distributed over the back. Dry plains, hillsides, and waste places, also cultivated ground. Native of Eurasia. Widespread as a weed in the United States and Canada. June-August. Fig. 81.


*Echinopspermum redowskii* var. *occidentalis*


Annual, the stems simple or few branched at base and erect or sometimes diffuse, 15-35 cm tall, herbage more or less canescent with a striose and also a villous pubescence; leaves narrowly linear to narrowly lanceolate or the lower narrowly oblanceolate, 1.3 cm long; flowers in the axis of the small foliaceous bracts forming open and at length elongated terminal racemes; pedicels 1-2 mm long; calyx-segments narrowly...
lanceolate, erect, or but little spreading in fruit, a little shorter than the corolla-tube, corolla blue, 3-4 mm long, conspicuously crested on the throat; nutlets 2.2-5 mm long, bordered by a single row of barbed prickles, the prickles distinct at base or joined to form a cupulate margin, the dorsal area of nutlets distinctly tuberculate.

2A. *Lappula occidentalis* (Wats.) Greene, var. *occidentalis*

Distinguished by the marginal prickles which are not united at the base, or do not form a cupulate structure of any kind. Dry hillsides and valleys. British Columbia southward to Mexico and eastward to the Dakotas and Texas. April-July. Fig. 82.

Box Elder Co., Hardup, G.F. Knowlton 332 (UTC); Bear River Canyon, C.P. Smith 1678a (UTC); Cottonwood Grove, M. Burke 3104 (UTC); Raft River Mountains, S.J. Preece 752 (UTC); Beaver Co., Wah Wah Range, Stahmann & Hutchings 40 (UTC); Little Reservoir, Beaver Canyon, R.G. Wamock s.n. (UTC); Wah Wah Mountains, F. Coles 22 (BRY); Cache Co., Pine Canyon, B. Maguire 3105 (UTC); Logan, Maenchefer & Maguire 2421 (UTC); intervalle, Logan Canyon, B. Maguire 3713 (UTC); above Pelican Pond, J. Thieret 17 (UTC); Carbon Co., 4 miles north of Price, B. Maguire 18348 (UTC); Price Canyon, S. Flowers 6422 (UTC); 5 miles east of Price, B.F. Harrison 10262 (BRY); road to Mounds. D. Atwood 1265 (BRY); Daggett Co., vicinity of Flaming Gorge, L. Williams 478 (UTC); 12 miles south of Manila, B.F. Harrison 7901 (BRY); Duchesne Co., Indian Canyon, A.O. Garrett 8329 (UTC); 15 miles southwest of Myton, J. Brotherson 1074 (BRY); 5 miles north of Fruitland, J. Brotherson 503 (BRY); 6 miles south of Duchesne, B.F. Harrison 3981 (BRY); 3.5 miles southwest of Duchesne, N.H. Holmgren 1771 (BRY); west of Fruitland, B.F. Harrison 5750b (BRY); Emery Co., 20 miles north of Green River, B. Maguire 18234 (UTC); San Raphael Swell, B. Maguire 18284 (UTC); Huntington Canyon, A.O. Garrett 7018 (UTC); Horse Canyon Junction, J.L. Pederson 8 (BRY); 5 miles south of the San Raphael River, B.F. Harrison 9613 (BRY); 5 miles southwest of Temple Mountain, L.C. Higgins 1328 (BRY); Temple Mountain, V.P. Allman s.n. (BRY); Garfield Co., 5 miles south of Hatch, B. Maguire 18270 (UTC); Bromide Peak, Henry Mountains, B.F. Harrison 7450 (UTC); Bryce Canyon Natl. Park, H. Buchanan 70 (UTC); Cannonville, J. Beved 752 (BRY); Mt. Ellen, Henry Mountains, W.D. Stanton 4863 (BRY); Grand Co., near Moab, B.F. Harrison 5997 (BRY); Hill Creek Ranger Station, Vickery & Wiens 1634 (UTC); 4 miles east of Green River, J.L. Pederson 10 (BRY); 2 miles north of Thompson, S.L. Welsh 6898 (BRY); Iron Co., Modena, L.N. Goodding 1010 (UTC); Juab Co., Deep Creek Mountains, Maguire & Bectraft 2783 (UTC); Mt. Nebo Ranger Station, R.K. Giersch 274 (UTC); Trout Creek, Maguire & Bectraft 2782 (TC); north of Fumeroles, Cottam & MacMillan 9646 (UTC); Kane Co., vicinity of Glendale, F.B. Wann 37 (UTC); 2 miles southeast of Kanab, McClain s.n. (UTC); Buckskin Gulch, S.L. Welsh 5312 (BRY); Millard Co., 37 miles west of Delta, Maguire & Bectraft 2781 (UTC); 5 miles southwest of Desert Range Exp. Station, B. Maguire 20808 (UTC); 27 miles west of Delta, Maguire & Bectraft 2780 (UTC); Desert Range Exp. Station. P. Plummer 30.

Distinguished from the typical species by having the marginal prickles confluent to about the middle, forming a definite cupulate margin. Southeastern Washington, southward east of the Cascade-Sierra Divide to southern California, eastward to Montana, Wyoming, and New Mexico. April-August. Fig. 83.

Carbon Co., 3 miles north of Price, R. Hardy s.n. (UT); 1 mile east of Roadside Geysers R.K. Vickery 718 (UT); Duggett Co., 1 mile south of Manila, B. Maguire 12373 (UTC); Emery Co., 10 miles west of Green River, B. Maguire 2056 (UTC); Grand Co., 3 miles north of Dewey, R.K. Vickery 238 (UT); Kane Co., 47 miles east of Kanab, A. Croquist 10203 (BRY. UTC); Millard Co., Confusion Range, J. Gentry 2033 (UTC); Washington Co., St. George, W.P. Cottam s.n. (UT).

13. Lithospermum L.


Annual or perennial, herbaceous or fruticose plants with alternate leaves; flowers white, yellow, or violet, in bracted racemes; calyx usually undivided; corolla tubular or salverform, the tube cylindrical, lobes spreading and imbricate, the throat with intruded appendages or with pubescent or glandular areas; stamens affixed in

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**Fig. 83. Lappula occidentalis var. cupulata**

Carbon Co., 3 miles north of Price, R. Hardy s.n. (UT); 1 mile east of Roadside Geysers R.K. Vickery 718 (UT); Duggett Co., 1 mile south of Manila, B. Maguire 12373 (UTC); Emery Co., 10 miles west of Green River, B. Maguire 2056 (UTC); Grand Co., 3 miles north of Dewey, R.K. Vickery 238 (UT); Kane Co., 47 miles east of Kanab, A. Croquist 10203 (BRY. UTC); Millard Co., Confusion Range, J. Gentry 2033 (UTC); Washington Co., St. George, W.P. Cottam s.n. (UT).

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*Echinospermum redowskii* var. *cupulatum* A. Gray, Bot. Calif. 1:530. 1876.


*Lappula redowskii* var. *desertorum*...
the tube, included; filaments short, anthers obo-
long, usually with apiculate connectives; style
filiform; stigmas gennate; ovules 4; nutlets 4
or rarely fewer, erect, ovoid or angular, smooth
or verrucose, affixed by a broad horizontal or
slightly oblique basal areola; gynobase flat or
very broadly pyramidal.

Type Species: Lithospermum officinale L.

1. Annual; flowers white; nutlets densely tubercu-
late and dull ........................................ 1. L. arcuense

1. Perennial; flowers greenish to yellow, nutlets white, 
smooth (2).

2. Corolla 10 mm long or more, tube definitely ex-
ceeding the calyx, green or pale yellow, nutlets
4-6 mm long ........................................ 2. L. incisum

2. Corolla 10 mm long or more, tube definitely ex-
ceeding the calyx, yellow (3).

3. Styles of all flowers about the same length; stamens
all borne near the top of corolla tube; corolla bright
yellow, usually over 20 mm long, its lobes toothed
or with a fringe of hairs; later flowers cleistoga-
mous, much smaller, in fruit with recurved pedi-
cels .................................................. 2. L. incisum

3. Styles of flowers of 2 lengths (heterostyled); sta-
mens borne either about at the middle or near the
top of the corolla tube; corolla deep yellow or
orange, not over 20 mm long, its lobes entire or
nearly so; smaller cleistogamous flowers absent;
root thick, containing a purple dye ........................................ 3. L. multiflorum

Type: Europe.

Annual; stems erect, 2-7 dm tall, one to
several simple or sparsely branched above, hoary
strigose; leaves 2-5 cm long, 2-8 mm broad,
closely appressed-hispid, firm, veinless, with
prominent midrib, pale beneath, basal leaves
roseulate, ob lanceolate, or spatulate, those of
the stem acute and lanceolate or linear; racemes
bracted, becoming loosely flowered; calyx parted
into linear-subulate lobes, hispid, mature calyx
with the erect or ascending lobes becoming 8-13
mm long, the very short tube oblique, pale and
chartaceous, pedicels short and stout, about 1
mm long, corolla white or yellowish or even
purplish, 5-7 mm long, tubular-funnelform, the
tube glabrous within and scarcely if at all sur-
passing the calyx; corolla-throat gradually ex-
panded, without protuberances, merely pubes-
cent; corolla-lobes ascending ovate, obtuse; nut-
lets brown, dull, roughened, tuberculate, or
rough-wrinkled or pitted, about 3 mm long,
ovate. Grassy hillside and grain fields. Natural-
ized from Europe, widely introduced in the
United States. June-August. Fig. 84.

Cache Co.: 3 mile south of Providence, B. Maguire
21658 (UTC); Davis Co., north of Bountiful, R.K. Vickery
1910 (UTC); Tooele Co., south of Tooele, A.F. Leads
3907 (UTC); about 12 miles southeast of Tooele, L.C. Higgins
3345 (BRY); Salt Lake Co., Dry Creek Canyon, J. Ludvig
233 (UTC); 5 miles east of Salt Lake City, L. Arrow
291 (UTC); Fort Douglas, R.K. Vickery 561 (UTC); Utah
Co., mouth of Hobble Creek Canyon, B.F. Harrison
12216 (BRY).

1818.

Lithospermum angustifolium Michx. Fl.
Bor. Amer. 1:130. 1903. not Forsk 1775.
Lithospermum linearifolium Coldie, Edinb.
FIl. Journ. 6:322. 1822.
Batschia longiflora Nutt. in Pursh, Fl. Sept.
Amer. 1:132. 1814.
Lithospermum longiflorum (Prush) Spreng.
Syst. 1:544. 1825.
Lithospermum decumbens (Nutt.) Torr.
Lithospermum cryptanthiflorum Brand in
Lithospermum boreale Brand in Fedde, Re-
Lithospermum breviflorum Engelm. & Gray,

Perennial plants from a thick woody root, stems 1-5 dm tall, usually several, erect or as-

![Fig. 84. Lithospermum arcuense](attachment://Lithospermum_arcuense.png)


Perennial plants from a thick woody root containing a purple dye; stem 3-6 dm tall, more or less tufted, often virgately branched above, striose-hispid; leaves 2-6 cm long, linear or linear-lanceolate, appressed-striose above, hisrate beneath, becoming smaller and bractlike near the flowers, scarcely if at all longer than the calyx lobes and simulating them; flowers racemose, short-pedicelled, often on several ascending corylablilke branches, calyx lobes about 4-6 mm long; corolla yellow or orange-yellow, tubular funnelform, the tube about 8-13 mm long, the lobes short, about 2 mm long, rounded, not fimbriate; nutlets about 3 mm long, white and shining; cleistogamous flowers absent; flowers heterostyled and dimorphic. Hills, canyons and mountain slopes. Wyoming to Mexico. May-July. Fig. 86.


Lithospermum torreyi Nutt. op. cit. 44.

Lithospermum laxum Greene, Pittonia 3:263. 1898.


Stems usually several from a large root, erect or decumbent, rather stout, 2-5 dm high, simple or branched, hirsute and somewhat hispid to densely villous; leaves numerous, usually crowded above, mostly ascending or sometimes reflexed, linear-lanceolate to lanceolate, 3-8 cm long, 2-12 mm wide, softly to rather harshly pubescent on both sides, scabrous on the margins, flowers in the axils of the upper leaves; pedicels stout, 1-3 mm long; calyx lobes in fruit subulate, 7-10 mm long; corolla pale, often greenish-yellow, 9-12 mm long, tube broad, scarcely dilated at the throat, lobes about 3 mm long; nutlets broadly ovoid, 5-6 mm long, usually abruptly attenuate at the apex into a stout beak, whitish, smooth and highly polished. Dry plains and hillsides. British Columbia, south in the Pacific States east of the Cascade and Sierra Ranges, east to Alberta, Montana, Wyoming, Colorado, and Utah. April-July. Fig. 87.
Co., Johnsons Canyon, Deep Creek Mountains, W.P. Cottam 7184 (UT); Mt. Nebo Ranger Station, R.K. Gierisch 286 (UTC); Robinson, I.E. Diedl D1 (BRY); Salt Lake Co., Dry Creek Canyon, J. Ludwig 20 (UT); San Juan Co., 1 mile west of Monticello, Holmgren & Hansen 3384 (UTC); 3.5 miles south of Monticello, J. Christensen s.n. (UTC); Sevier Co., summit east of Cove- Fort, D. Atwood 1516 (BRY); Summit Co., Peoa Cemetery, S.L. Welsh 541 (BRY); Tooele Co., Sheep Rock Mountains, E.M. Christensen s.n. (BRY); Uintah Co., 5 miles north of White Rocks, A.D. Youngberg 1017 (BRY); Dinosaur Natl. Monument, S.L. Welsh 459 (BRY); Utah Co., right fork of Hobble Creek Canyon, L.C. Higgins 3504 (BRY); mouth of Hobble Creek Canyon. Condom s.n. (UT); 3 miles south of Thistle, B. Maguire 18645 (UTC); Diamond Fork, J.W. Thomas 141 (BRY); east of Provo. B.F. Harrison 6582 (BRY); southeast of Spanish Fork, E. Nixon 64 (BRY); east Tintic Mountains, R. Coombs 132 (BRY); 10 miles east of Springville, W.M. Tingey 146 (BRY); Wasatch Co., southeast slope of Bear Canyon. A.C. Blauer 50 (BRY).

14. Mertensia Roth.

Mertensia Roth, Cat. Bot. 1:34. 1797.

Glabrous or pubescent caulescent perennial herbs with fleshy, fusiform, rhizomelike or corn-like roots; leaves entire, linear to cordate, sessile or petiolate; alternate: stems 1-many from each root, decumbent or erect, usually branched below the inflorescence, 0.3-17 dm tall; inflorescence a lax or congested, ebracteate, unilaterial, modified scorpioid cyme, or with the lowest flowers often single and subtended by leaves, often becoming panicked in age; calyx 5-parted, occasionally campanulate, the expanded limb exceeding or exceeded by the tube, with or without fomices in the throat, blue, occasionally white or pink; filaments attached below the throat, the anthers exerted or included; style shorter or longer than the corolla, in some dio- or trimorphic; stigma entire or slightly lobed; ovary 2-celled, each cell 2-lobed; nectlets 4, attached laterally to the gynobase, usually rugose or pectinately rugose, coriaceous or smooth and shining, utricelike.

Type species: Mertensia virginica (L.) Pers.

1. Plants usually with prominent lateral veins in the cauline leaves; stems usually 4 dm or more tall (1-17); normally flowering in late spring and in the summer, mostly occurring in moist, shaded situations (2).

1. Plants usually without lateral veins in the cauline leaves, some specimens of M. oblongifolia var. nevadensis excepted; stems usually less than 4 dm tall, normally flowering in early spring, later when growing in the mountains, but commonly as soon as the snow and temperatures permit, mostly in fairly open habitats (7).

2. Limb of the corolla longer than the tube; leaves usually acuminate (3).

2. Limb of the corolla shorter than the tube, or the two about subequal; leaves usually not acuminate (6).

3. Leaves pubescent at least on one surface (4).

3. Leaves glabrous on both surfaces (5).

4. Calyx not accrescent, margins densely ciliate, backs pubescent or glabrous ................. 5. M. francesiana

4. Calyx accrescent, margins not densely ciliate, backs glabrous ................. 1C. M. arizonica var. subnuda

5. Calyx campanulate, lobes shorter than the tube ............... 1A. M. arizonica var. arizonica

5. Calyx not campanulate, the lobes longer than the tube ............... 1B. M. arizonica var. leonardii

6. Leaves pubescent at least on one surface .................. 5. M. franciscana

6. Leaves glabrous on both surfaces, sometimes the upper surface papillate .... 4. M. ciliata

7. Filaments attached in the corolla tube, the anthers not projecting beyond the throat, contained within the tube .................... 5. M. brevistyla

7. Filaments attached near the throat of the corolla tube, anthers projecting beyond the throat, not contained within the tube (8).

8. Limb of the corolla longer than or subequal to the tube (8).

8. Limb of the corolla shorter than the tube (11).

9. Leaves pubescent on both surfaces, usually unilateral .................. 8B. M. viridis var. cana

9. Leaves strigose only above or glabrous on both surfaces (10).

10. Filaments shorter than the anthers; calyx divided nearly to the base; style usually not reaching the anthers; anthers straight; plants alpine .................. 8A. M. viridis var. viridis

10. Filaments longer than the anthers; calyx not divided to the base; style usually reaching or surpassing the anthers; anthers usually curved; plants usually not alpine or subalpine .... 6. M. fusiformis

11. Tube of the mature corolla only slightly longer than the limb, plants of the high mountains (12).

11. Tube of the mature corolla usually much longer than the limb, plains and low hills (15).

12. Leaves pubescent only above, or glabrous on both surfaces (13).

12. Leaves pubescent on both surfaces (14).

13. Leaves glabrous on both surfaces, Uinta Mountains .................. 8C. M. viridis var. dilatata

13. Leaves strigose above .... 8A. M. viridis var. viridis

14. Leaves usually unilateral, 1.5-3 cm long, stems ascending .......... 8B. M. viridis var. cana

14. Leaves not unilateral, usually larger than above; stems more erect; Uinta Mountains – 2. M. bakeri

15. Leaves glabrous on both surfaces .................. 7C. M. oblongifolia var. nevadensis

15. Leaves pubescent, at least on one surface (16).

16. Leaves pubescent above, glabrous below .................. 7A. M. oblongifolia var. oblongifolia

16. Leaves pubescent on both surfaces .................. 7B. M. oblongifolia var. amoena
1A. *Mertensia arizonicci* Greene, Pittonia 3:197. 1897.

Plants erect or ascending, 3-8 dm tall or more; stems 1-several from each root stock, basal leaves narrowly to broadly ovate or oblong-lanceolate, 7.5-15 cm long, 2.6 cm broad, slightly decurrent on the petiole, petiole as long as the blade, glabrous but slightly papilulate, margin ciliate; lower cauline leaves spatulate to elliptical, usually petiolate, the petiole winged, upper cauline leaves usually sessile, elliptical to narrowly ovate, acute, 1.2-15 cm long, 1.5 cm broad, base attenuate, apex acute; inflorescence of axillary peduncles with branches elongating in age; calyx 4.5-8 mm long, campanulate, glabrous on the back, hairy within, the lobes ½ or less the entire length of the calyx, 2.4-8 mm long, acute or obtuse, ciliate; pedicels 2-30 mm long, glabrous, papillose or sometimes the papillae developing short hairs; corolla tube 6-9 mm long, with a definite ring of hairs at the base within; corolla-limb 7-11 mm long, always longer than tube, moderately expanded; anthers 2.5-3.5 mm long, as long as or shorter and narrower than the filaments, filaments 3-4 mm long, fimbriate conspicuously, pubescent; style 10-15 mm long, usually shorter than the corolla; nutlets rugose, shorter than the calyx. Central to southwestern Utah. Moist stream banks and shaded areas. May-August. Fig. 88.

Beaver Co., Big Flat, 5 miles south of Puffer Lake, F.H. Coles 88 (BRY); Tushar Mountains, vicinity of Puffer Lake, M. L. Morris 147 (BRY); Garfield Co., 16 miles south of Escalante, N.H. Holmgren 2519 (UTC); Iron Co., Cedar Breaks Natl. Monument, A. Bruhn 43 (UT); Cedar Breaks Natl. Monument, near Point Supreme, W. S. Boyle 731 (BRY); Cedar Mountain, Duck Creek, A. M. Woodbury s.n. (BRY); Cedar Breaks, W. P. Cottam 3960 (BRY); Cedar Breaks, C. L. Hitchcock 4553; 4572 (UTC); 10.5 miles east of Cedar City, B. Maguire 19469 (UTC); Cedar Breaks, Brian Head Peak, B. Maguire 18995; 17577 (UTC); Kane Co., south side of Navajo Lake, R. K. Gierisch 491 (UTC); Pine Co., Tushar Mountains, Bullion Creek, N. H. Holmgren 2147 (BRY, UTC); Washington Co., Pine Valley Campground, L. C. Higgins 1438 (BRY); Pine Valley Mountains, along middle fork of the Santa Clara River, J. L. Gentry 2251 (BRY, UTC); Zion Natl. Park, N. H. Holmgren 1994 (BRY, UTC); Pine Valley, W. P. Cottam 8874 (UTC).


Plants similar to the species; calyx 4-8 mm long, divided almost to the base, lobes 3-7 mm long, lanceolate, acute, ciliate; anthers and filaments averaging slightly shorter than in the species. Central and north central Utah and southwestern Wyoming. Moist slopes and bottoms and shaded areas. May-August. Fig. 89.

Beaver Co., Puffer Lake, W. P. Cottam 3490 (BRY, UT); headwaters of the Beaver River, B. Maguire 19793 (UTC); Cache Co., Spring Hollow, B. Maguire 12996 (UTC); Logan Canyon, C. P. Smith 2216 (UTC); 1 mile above Tony Grove, B. Maguire 16711 (UTC); Duchesne Co., head of Blind Stream Canyon, B. F. Harrison 8839 (BRY); Emery Co., Huntington Canyon, W. P. Cottam 7452 (UT); Garfield Co., Aquarius Plateau, N. H. Holmgren 2112 (BRY, UTC); 15 miles north of Escalante, N. H. Holmgren 2439 (UTC); Posey Lake, Escalante Road, I. McArthur 173 (BRY); Aquarius Plateau, B. Maguire 19175 (UTC); Iron Co., Cedar Breaks, A. Eastwood & J. T. Howell 7277 (UTC); Iron Co., north of Mt. Nebo, W. P. Cottam 15648 (UTC); Millard Co., 2 miles above Adelphi Park, P. Plummer 178 (UTC); Robins Valley 20 miles west of Salina, F. H. Coles 42 (BRY); Piute Co., Tushar Mountains, Bullion Creek, N. H. Holmgren 2144 (BRY, UTC); Salt Lake Co., Big Cottonwood Canyon, E. B. Robinson s.n. (UTC); above Alta, L. Arnow 458 (UTC); Parleys Canyon, G. Davidsen 402 (UTC); Emigration Canyon, C. P. Smith 1846 (UTC); Brighton Guard Station, L. Eyre 12 (UTC); Sumpete Co., 15 miles east of Ephraim, R. D. Jorgensen 44 (UTC); vicinity of Ephraim, R. Olsen s.n. (UTC); head of Mayfield Canyon, B. Maguire 19992 (UTC); Manti Canyon, N. H. Holmgren 235 (UTC); Horseshoe Flats, H. Johnson s.n. (BRY); 10 miles up Ephraim Canyon, J. D. Walker s.n. (BRY); Sevier Co.
on the back or sparingly pubescent, ciliate; anthers 2.2-2.5 mm long. Sevier County, Utah, to White Pine County, Nevada. May-August. Fig. 89.

Sevier Co., head of Nioche Creek, M.I. Morris 139 (BRY); Fish Lake Plateau, 8 miles up Goose Creek road from highway 10, Salina Canyon, N.H. Holmgren 1970 (BRY).


Plants with erect or ascending stems, 1-4 dm tall, simple or rarely branched, pubescent with soft hairs; basal leaves linear-lanceolate to ovate elliptic, more or less densely canescent on both surfaces, 2.1-4.6 cm long, 0.5-3.5 (1.5-1.5) cm broad, petiole longer or shorter than the blade; cauline leaves linear-lanceolate to ovate, usually more or less densely canescent on both surfaces, some plants from the Uinta Mountains sparsely so, sessile or nearly so, semiamplexicaule, 1.5-8 cm long (mostly 3-4) cm, 0.5-2.5 cm broad; inflorescence congested to loosely panicled; pedicels usually canescent, often reflexed in fruit, 1.5 cm or less long; calyx 2.5-5 mm long, divided almost to the base, sparsely to usually densely pubescent on the back and margins of lobes, lobes linear-lanceolate to lanceolate, acute, about 0.5 mm shorter than the entire calyx; flowers di-, possibly trimorphic, the tube typically longer than the limb; corolla-tube with more or less definite ring of hairs toward the base within, 3.5-9 mm long; corolla-limb moderately expanded, 4-6 mm long; anthers 1.2-2 mm long, shorter and narrower than the normal phase, longer and broader in dimorphic phases; stamens usually prominent, glabrous, papillose, or pubescent; style reaching or surpassing the anthers; nutlets rugose, 2.5-3.5 mm long. Mountains of Colorado, and the Uinta Mountains, Utah to northern New Mexico. June-September. Fig. 90.

Daggett Co., north slope of the Uinta Mountains, V. Richens 52 (UTC); Duchesne Co., Mount Emmons,
west meadow, J.R. Murdock 600 (BRY); Atwood Lake, C.L. Hayward 26 (BRY); divide above Daggett Lake, A.O. Spear 145 (BRY); Mount Agassiz, rocky summit, W.P. Cottam 3713 (BRY, UT); Bald Mountain, A.H. Holmgren 7035 (UTC); Mount Agassiz, B. Maguire 4240 (UTC); Summit Co., Mount Lofty, B. Maguire 4238 (UTC); Red Castle Lake, N.H. Holmgren 318 (UTC); 7 miles south of China Lake, N.H. Holmgren 308 (UTC).


Plants with erect or ascending stems, 1-4 dm tall; 1-many from each fusiform rootstalk, more or less pubescent; basal leaves broadly lanceolate to oblong, acute or obtuse, strigillose above, glabrous below, 5-13 cm long, 2-4 cm broad, petioles longer than the blade; cauline leaves oblong-oblong to narrowly elliptic, obtuse to acute, densely strigillose above, glabrous below, 2.6 cm long 0.5-3 cm broad; inflorescence congested at first, becoming panicked in age; pedicels strigose, 1-14 mm long; calyx 2-5 mm long, divided almost to the base, strigose, the lobes narrowly triangular to linear, acute, 1.5-4 mm long, 0.5-1 mm broad at the base; corolla-tube 2-4 mm long, slightly shorter to a little longer than the calyx-lobes, with or without a ring of scattered hairs toward the base within; corolla-limb rotate, 4-6 mm long; anthers 1-1.3 mm long, longer than the filaments, inserted on the tube and not exceeding the throat; forniceae more or less prominent; style shorter than the calyx-lobes; nutlets rugose, 2.3-3.5 mm long. Southern Wyoming, west central Colorado, Utah, and southeastern Idaho. May-July. Fig. 91.

Box Elder Co., southeast of Deweyville, G. Firanian s.n. (UTC); Cache Co., Logan Canyon, H. Richardson 2 (UTC); Sardine Canyon, B. Maguire 21662 (UTC); 5 mi. west of Mendon, Thomas & Marshall 44 (UT); Davis Co., head of Chicken Creek, S.L. Clark 517 (UTC); Bountiful Peak, W.P. Cottam 15012 (UTC); Duchesne Co., head of Blindstream Canyon, Harrison & Nisson 8835 (BRY); Juab Co., north of Mount Nebo Ranger Station, R.K. Eriech 267 (UTC); Salt Lake Co., Parleys Canyon, G. Davidsen 40 (UTC); Lamb Canyon, R.K. Vickery 1934 (UTC); south fork of Mill Creek Canyon, W.J. Stubble 84 (BRY); Summit Co., 3 miles east of Kamas on highway 150, R.J. Eastmond 218 (BRY); Tooele Co., 12 miles southeast of Tooele, L.C. Higgins 3334 (BRY); Utah Co., ridge southwest of Payson, G. Davidsen 312.5 (UTC); Payson Canyon, W.P. Cottam s.n. (UTC); Rock Canyon, A.O. Garrett 7550 (BRY); 4 miles up Pole Canyon, L.K. Shumway 46A (BRY); Hope Picnic Grounds, Pole Canyon, C.L. Hayward 20 (BRY); Deer Creek Canyon, B.F. Harrison 8311 (BRY); 1 mile east of Soldier Summit, R.F. Harrison 7323 (BRY); Pole Canyon Exclosure, R.J. Eastmond 254 (BRY); Hobble Creek Canyon, B.F. Harrison 2514 (BRY); Squaw Peak, J.B. Karren 63 (BRY); Provo Canyon, C.A. Hanson 14 (BRY); Wasatch Co., Soldier Summit, B. Maguire 18386 (UTC); Cascade

*Mertensia polyphylla* Greene, Pittonia 4:87. 1899.

*Mertensia punctata* Greene, loc. cit. 88.


Plants erect or ascending, 1-12 dm tall, usually with many stems from each rootstock; basal leaves variable, oblong to ovate, or lanceolate, subcordate, 4-15 cm long, 3-10 cm broad, ciliate on the margin, often papillate on the upper surface, petioles longer or shorter than the blades; cauline leaves lanceolate to ovate, acute, acuminate or obtuse at apex, attenuate to subcordate at the base, the lowermost short-petiolate, the uppermost sessile, ciliate on the margins, often papillate on the upper surface, often quite glaucous, thin in texture; pedicels 1-10 mm long, glabrous, papillose or rarely with a few short strigose hairs; inflorescence from the axis of leaves, the peduncles elongated in mature or well-developed plants, in young plants the flowers aggregated at the top of the plant, each peduncle terminated in a modified ebracteate scrophuliaceous cyme, or occasionally subumbellate; calyx-lobes 1.5-3 mm long, glabrous on the back, ciliate to papillate on the margins, more or less strigose within, obtuse or rarely somewhat acute, divided almost or quite to the base, rarely enlarged in fruit; corolla tube 6-8 mm long, glabrous or with crisped hairs within; corolla-limb 4-10 mm long, sometimes longer than the tube, moderately expanded; anthers 1-2.5 mm long, as long as or shorter and narrower than the expanded part of the filament; fomices prominent, glabrous, papillate or pubescent; style about as long as the corolla or exceeding it; nutlets rugose or mamilate. Foothills and mountains up to 12,000 feet. Montana, Colorado, and Wyoming to eastern Oregon and south to northern New Mexico. May-July. Fig. 92.

Mertensia pratensis Heller loc. cit. 550.


Plants with erect or ascending stems, 1-10 (17) dm tall, usually with several from each rootstock; basal leaves oblong-elliptic to elliptic, 6-20 cm long, 5-9 cm broad, base subcordate to obtuse, apex acuminate, acute or obtuse, upper surface short strigillose, lower surface glabrous or with spreading pubescence; petals longer or shorter than the blade; calyx leaves elliptical to narrowly ovate, 4-14 cm long, 1-5 cm broad, obtuse to acuminate, the lowermost petiolate, becoming sessile toward the inflorescence, strigillose on the upper surface, glabrous to densely pubescent with spreading hairs below; flowers of the inflorescence panically disposed in an ebracteate modified scorpioid cyme, the branches of the inflorescence elongating in age; pedicels strigose, 1-20 mm long; calyx 2.5-5 mm long, divided almost to the base, the lobes linear to lanceolate, 1-2 mm wide at the base, acute, rarely obtuse, glabrous or pubescent on the back, strongly ciliate; corolla-tube 5-9 mm long, glabrous or pubescent within; corolla limb 4-6 (9) mm long, subequal to or slightly shorter or longer than the corolla-tube, moderately expanded; anthers 2.5-3 mm long, longer than the filaments; filaments 2-2.5 mm long, glabrous or with spreading hairs; fornices prominent, usually pubescent, style 9-20 mm long, usually shorter than the corolla, sometimes exceeding it; nutlets rugose and papiliferous. Southern Colorado, New Mexico, Arizona, southern Utah, eastern Nevada, and California. June-August. Fig. 93.


Plants with erect stems or nearly so, 1-3 dm tall, glabrous or sparingly pubescent, 1-2 cm broad, usually densely strigose above, glabrous below, petiole 5-12 cm long; calyx leaves linear-oblong to ovate-oblong, 1.5-10 cm long, 0.4-3 cm broad, sessile or the lowermost short-petiolate, more or less densely strigose above, glabrous below, usually quite obtuse, rarely somewhat acute; inflorescence usually congested, sometimes slightly panicled; ped.
icels 1-15 mm long, densely strigose; calyx 3-6 mm long, slightly accrescent, the lobes lanceolate to lanceolate-ovate, 2-5 mm long, acute, ciliate, usually pubescent on the backs, occasionally nearly glabrous, not divided to the base; corolla-tube 4-7 mm long, with a ring of crisp hairs within at the base; corolla-limb 5-7 mm long, moderately expanded, usually subequal to or shorter than the limb, but sometimes longer; anthers 1.5-2.5 mm long; filaments 1-3 mm long fornices present but usually not conspicuous, glabrous or nearly so; style usually surpassing the anthers, sometimes shorter; nutlets rugose, about 3 mm long. Wyoming, Utah, and Colorado in the mountains. June-September. Fig. 94.

UTAH

Fig. 94. Mertensia fusiformis

Plants with erect or ascending stems, 1-3 dm tall, one to many from each elongated rootstock; blade of basal leaves 3-8 cm long, 0.5-2 cm broad, oblong or spatulate to narrowly oblong-ovate, usually obtuse, strigose on the upper surface, glabrous below, petiole longer or shorter than the blade; cauleine leaves sessile or the lowermost short-petiolate, linear to oblong-elliptical, 2-8 cm long, 0.3-1.5 cm broad, pubescent as of basal leaves; inflorescence congested, becoming panicled with age; pedicels strigose to essentially glabrous, 1-10 mm long; calyx 3-7 mm long, divided to within about 1 mm of the base, the lobes linear to lanceolate-triangular, acute, ciliate, glabrous dorsally or rarely with a few hairs; corolla-tube 5-12 mm long, usually quite glabrous within, occasionally with a few scattered hairs; corolla-limb 4-7 mm broad; anthers 1.2-2 mm long, oblong and straight; filaments 2-4 mm long, usually longer and broader than the anthers; style exceeding the anthers; fornices prominent, glabrous or occasionally sparsely hairy; immature nutlets 3-4 mm long, rugose. Western Montana, Wyoming, and Utah to Washington and northern California. June-July. Fig. 95.

Salt Lake Co., Little Cottonwood Canyon, W.P. Cottam 33532 (BRY); Uintah Co., Split Mountain Gorge, S.L. Welsh 244 (BRY); Utah Co., Silver Lake, American Fork Canyon, I.E. Diehl s.n. (BRY).


Similar to the species, often more robust; leaves more or less densely pubescent on both surfaces. Sporadic with the species and variety nevadensis. Fig. 95.

UTAH
County lines and river drainages

Fig. 95. Mertensia oblongifolia var. oblongifolia

Rich Co., among sagebrush, north slope of a small canyon about 3 miles east of Laketown, 28 May 1935 Williams & Williams 2152 (NY).


Mertensia nutans Howell, Fl. N.W. Amer.-91. 1901.
Mertensia symphytoides Greene, l.c. non Fisch. 1872.
Mertensia foliosa var. nevadensis Macbr. l.c. 19.
Mertensia nelsonii Macbr. l.c. in part as to type specimen.

Similar to the species but often more robust; cauline leaves 2-10 cm long, 0.8-6 cm broad, lanceolate-oblong to ovate, glabrous or the upper surface pustulate, sometimes the pustules toward the apex of the leaves developing mucros, some specimens, particularly from northeastern Utah; with lateral veins in the well-developed cauline leaves; corolla extremely variable as to size in different localities. Western Montana, Wyoming, and Utah west to Washington and northern California. April-July. Fig. 96.

Box Elder Co., Goose Creek Mountains, 3 miles northwest of Divide, K.S. Erdman 1644 (BRY); Rosvere, top of mesa, W.P. Cottam 2847 (BRY); Raft River Mountains, at summit, N.H. Holmgren 2850 (BRY); above Cottonwood Grove, M. Burke 3118 (UTC); Raft River Mountains, C. McMillan 1503 (UTC); Cache Co., Logan Canyon, B. Maguire s.n. (UTC); Providence Canyon, B. Maguire 3719 (UTC); Logan Canyon, M. Burke 3725 (UTC); 11 miles up Smithfield Canyon, B. Maguire 13776 (UTC); Juab Co., Deep Creek Range, Maguire & Holmgrn 22050 (UTC); Shasta Mine, Deep Creek Mountains, W.P. Cottam 3176 (BRY, UT); Deep Creek Mountains, Maguire & Beckraft 2784 (UTC); Deep Creek Range, A.H. Holmgren 3746 (UTC); Salt Lake Co., Big Cottonwood Canyon, R.J. Eastmond 186 (BRY); Big Cottonwood Canyon, B. Fowler s.n. (UT); Summit Co., Henrys Fork, A. Collotzi 45 (UTC); Weber Co., Snow Basin, A. Collotzi 50 (UTC); Pine View Dam, J. McNedly 40 (BRY); Tooele Co., 3 miles south of Tooele, L. Arnow 266 (UT); trail to Mount Deseret, B. Maguire 21767 (BRY); Bennon Canyon, N.C. Frischknecht 81 (BRY); Muir Trail, Oquirrh Mountains, Cottam, Allen & Rowland 16857 (BRY); Black Bunch, 1 mile north of Miner Fork Road, M.E. Lewis 1115 (BRY); Utah Co., Springville, R. Dugall 97 (UT); Provo Canyon, M.E. Jones s.n. (UTC); Hobble Creek Canyon, L.C. Page 7 (BRY); along Timp Creek, L.K. Shumway 92 (BRY); Bridal Veil Falls, S.L. Welsh 3053 (BRY); north end of Lake Mountain, Welsh & Moore 1927 (BRY); Hobble Creek Canyon, B.F. Harrison 264 (BRY); just east of...

*Mertensia lanceolata* var. *viridis* A. Nels.
First Rept. Fl. Wyo. 158. 1896.


*Mertensia lineariloba* Rydb. 1c.


*Mertensia perplexa* Rydb. 1c.

*Mertensia viridula* Rydb. 1c.

*Mertensia papillosa lineariloba* A. Nels.

*Mertensia lanceolata* var. *lineariloba* Macbr.

*Mertensia alpina* var. *perplexa* Macbr. 1c. 20.

Stems erect or ascending, 5-35 cm tall, 1-5 several from each rootstalk; basal leaves lanceolate to ovate, 2-10 cm long, 1-4 cm broad, strigillose above, glabrous below, lateral veins sometimes apparent, petioles longer or shorter than the blade; cauline leaves sessile or nearly so, lanceolate to broadly ovate, 2-7 cm long, 0.7-2.5 cm broad, strigillose above, glabrous below, lateral veins rarely visible; inflorescence a crowded, modified, scorpioid cyme; pedicels strigose or glabrous, 1-10 mm long; calyx 2-6 mm long; the lobes divided almost to the base, linear-lanceolate to narrowly ovate-lanceolate, acute or obtuse, glabrous on the backs, ciliate, somewhat accrescent in fruit; corolla-tube, 3-9 mm long, usually with a ring of crisped hairs near the base within, occasionally also with scattered hairs; corolla-limb 4-9 mm long, moderately expanded, usually a little shorter than the tube in flowers having a long style and filaments longer than the anthers, in flowers having a short style and filaments about the same length as or shorter than the anthers, the tube may be much shorter than the limb; anthers 1-2.5 mm long; filaments 1-3.5 mm long, longer to shorter than the anthers; fornices conspicuous, glabrous to densely pubescent; style various, exceeding the anthers and about as long as the corolla to shorter than the tube of the corolla; nutlets 2-3 mm long, rugose. Montana, south through Utah and Colorado. July-September. Fig. 97.

Garfield Co., 25 miles south of Hanksville, Henry Mountains, Cronquist & Holmgren 9435 (UTC); south rim of Bull Creek Basin, Henry Mountains, B. Maguire 19662 (UTC); Grand Co., north side of Gold Mountain, B. Maguire 5113 (UTC); saddle between Castle and Wasatch mountains, B. Maguire 5112 (UTC); west...


Cauline leaves linear to narrowly ovate, more or less densely canescent on both surfaces; calyx lobes usually glabrous on the backs but sometimes slightly pubescent. Bald Mountain, Utah. Fig. 97.

Bald Mountain. 11 August 1911. Clemons s.n. (POM).


*Mertensia coriacea* var. *dilatata* A. Nels. le. 403.

Similar to the species but the leaves glabrous on both sides. Uinta Mountains, Utah. Fig. 97.

Daggett Co., Uinta Mountains, 10,000 feet, 11 June 1932, L. Williams 599 (UTC).

15. *Myosotis* (Dill.) L.


Annual or perennial herbs; leaves alternate; racemose, bractless or bracted, calyx cut to beyond the middle into lanceolate or triangular lobes; corolla blue, white or rarely rose, with a short tube; lobes contorted, rounded, spreading; throat with intruded appendages; stamens affixed on the tube, included or exserted, the filaments filiform; anthers oblanceolate or ovate, obtuse; ovules 4; nutlets 4, erect, ellipsoid, smooth and shiny, with a basal areola; gynobase flat or high convex; style filiform; a stigma disciform.

Type species: *Myosotis scorpioides* L.


*Myosotis scorpioides* var. *palustris* L. Lc.

*Myosotis palustris* Lem. Fl. Fr. 2:283. 1778.

Perennial, with slender rootstocks or stolons, herbage appressed-pubescent with straight pointed hairs; stems slender, 1.5-4 dm long, decumbent or ascending, rooting at the lower nodes; leaves oblanceolate to oblong-lanceolate, 2.5-8 cm long, 4-12 mm wide, upper stem leaves sessile, the lower narrowed to a winged petiole; racemes loosely many flowered; fruiting pedicels longer than the calyx; calyx with straight appressed hairs, the lobes equal, ovate triangular, acute, shorter than the tube, more or less spreading in fruit; corolla blue with a yellow eye, the limb flat, 6-8 mm broad; nutlets angled and keeled on the inside. Wet meadows and margins of streams. Native of Europe and Asia, well established in the United States. June-August. Fig. 98.

![Map of Utah showing the location of *Myosotis scorpioides*](image_url)

Cach Co., ½ mile west of Logan, B. Maguire 20100 (UTC); 1 mile west of Logan along canal, B Maguire 21579 (UTC); Logan, ditch bank, W.S.F. 544 (UT).


*Pectocarya* DC. ex Meisn. Gen. 279. 1840.

Low, often spreading annual herbs, with slender stems and narrowly linear leaves, canescent with a close-appressed pubescence; flowers scattered along the stems or branches, on short pedicels, solitary in the axils; calyx 5-parted, the
lobes narrow, spreading or reflexed in fruit; corolla white, the tube shorter than the calyx; lobes broadly oval, the throat nearly closed by prominent crests; stamens included, style very short; nutlets flattened, thin, widely divergent either radiately or in pairs, their margins, at least toward the apex, with a row of hooked bristles.

Type species: Cynoglossum lateriflorum Lam.

1. Nutlets orbicular or nearly so, both the body and the very thin conspicuous wing beset with slender uncinate bristles .................................................. 4. P. setosa

1. Nutlets oblong or linear, the body without uncinate bristles (2).

2. Nutlets heteromorphic, 1 of each divergent pair wingless, or merely margined, the other with a broad somewhat incurved uncinate-toothed wing

2. Nutlets not heteromorphic, all 4 winged-margined or toothed (3).

3. Margin of nutlet conspicuous, the teeth confluent at base .................................. 2. P. platycarpa

3. Margin of the nutlet very narrow or wanting, the teeth being nearly or quite distinct, subulate, nutlets strongly recurved .................. 3. P. recurvata


Diffusely branched from the base; stems slender, ascending or spreading, 3-15 cm long, strigose and canescent throughout; leaves narrowly linear, 1-3 cm long, 1-2 mm wide, the hairs on the basal ones often pustulate at base; corolla minute, its limb about 1.5 mm broad; fruiting nutlets widely divergent, dissimilar, 2 narrower and with or without a narrow margin, and 2 prominently winged-margined, the wings pectinately bristly at the apex, irregular, few toothed and with or without scattered bristles on the sides. Sandy or gravelly slopes and benches. Southwestern Utah, southern Nevada south through Arizona and southern California to Sonora, Mexico. January-May. Fig. 99.

Washington Co., 1 mile east of Hurricane, B. Maguire 1522 (UTC); volcanic hills west of Hurricane, B. Maguire 1525 (UTC); St. George, M.E. Jones s.n. (UTC); Dixie State Park, L.C. Higgins 918 (BRY); Beaverdam Mountains, L.C. Higgins 284 352 (BRY); Black Hills west of St. George, C.W. Cottam s.n. (DIX).


Pectocarya gracilis var. platycarpa Munz


Stems slender, diffusely branched from the base, prostrate or widely ascending, 5-20 cm long, cinerous-strigillose throughout; leaves narrowly linear to linear-oblancoate, 0.5-1.5 mm wide, 1-3.5 cm long; calyx-lobes nearly as long as the nutlets; corolla 2 mm long; nutlets divergent in pairs, sometimes heteromorphous, linear-oblong or spatulate-oblong, 2.5-3 mm long, with a wide conspicuous stramineous margin bearing irregular uncinate-tipped teeth, the odd nutlet when differentiated, with more deeply dissected wing and with more pubescent body. Dry gravelly slopes and benches. Southwestern Utah, south and west through Arizona, southern Nevada and California. February-May. Fig. 100.

Washington Co., Watercress Springs, D.H. Galway s.n. (DIX); north of St. George, D. Hall s.n. (DIX); Beaverdam Mountains, L.C. Higgins 350 (BRY); St. George, D.H. Galway 6286 (BRY); Black Hill west of St. George, D. Hall s.n. (BRY).


Stems slender, simple below, with 2 to several erect or ascending branches above, or sometimes diffusely branched throughout and more
The Boracinaceae of Utah

Fig. 100. Pectocarya platycarpa

spreading. 5-25 cm long; herbage cinereous-strigose; leaves narrowly linear, acute, 1-3.5 cm long, 0.5-2 mm broad; calyx-lobes barely 2 mm long in fruit, acute; nutlets divergent in pairs, linear, strongly recurved, the wing divided to or almost to the body into prominent subulate straw-colored uncinate bristles, at the apex the wing prolonged into a short scarios tip, uncinate bristly on the margin. Sandy or gravelly slopes and ridges, Lower Sonoran Zone. Southern Nevada, western Utah, Arizona, and southern California. March-May. Fig. 101 (semi-circle).

I have seen no Utah specimens of P. recurvata, but the species has been collected a few miles from the Utah border in Mohave County, Arizona.


Pectocarya setosa var. holoptera Johnst. op cit. 39.


Stems usually diffusely branched from the base, ascending, slender to rather stout, 5-20 cm tall, herbage rather thinly strigose and setose with spreading bristle-like hairs; leaves linear to linear-oblancoate, 5-20 mm long; calyx-lobes narrowly linear, 3-4 mm long in fruit, armed with 3 to 6 straight divergent bristles; nutlets divergent in pairs, broadly obovate to orbicular, 2 borders all around with a thin scarios wing, 2 wingless, the body of the nutlets and usually the wing bearing slender uncinate bristles, the wing usually slightly undulate and slightly curved upward saucerlike. Usually fine sandy areas. Eastern Washington and central Idaho, southward to Utah, Arizona, Nevada, and Baja California. April-June. Fig. 101 (circles).

Washington Co., Diamond Valley, F.W. Gould 1557 (DIX); 10 miles north of St. George, F.W. Gould 1557 (UTC); Diamond Valley, L.N. Goodding 815 (UTC); Welcome Springs, Beaverdam Mountains, B. Maguire 20521 (UTC); Beaverdam Mountains, B. Maguire 4952 (UTC); Diamond Valley, 10 miles north of St. George, L.C. Higgins 4203 (BRY, WTSU).

17. Plagiobothrys Fisch. & Mey.


Slender, glabrate or mostly soft-pubescent, annual or perennial herbs; leaves mostly linear or linear-lanceolate, alternate above and either opposite at base or forming a rosette; flowers
in bractless or bracteate spikelike racemes, the racemes more or less scorpioid and usually elongated in fruit; corolla white, small, salverform, with crests at the mouth of the throat; nutlets rugose, erect or incurved, attached at or below the middle to a depressed gynobase through a caruncular scar, this decurrent on the lower part of the ventral keel or situated at the lower end of the keel and sunken below its crest.

Type species: *Plagiobothrys rufescens* Fisch. & Mey.

1. Plants glabrous or nearly so; nutlets attached basally or nearly so ........................................ 3. *P. leptoecladus*

1. Plants hirsute-hispid or bristly hairy; nutlets attached laterally or obliquely basal (2).

2. Nutlets checkered with broad flattened, contiguous, pavementlike raised areas; plants erect, hispid with terminal bractless scorpioid cymes ........ 2. *P. jonessii*

2. Nutlets not checkered, the back rugose, the raised areas scattered or none (3).

3. Leaves charged with purple dye, particularly at midrib and margins; calyx with a weakened ring which allows it to break loose, lobes short, strongly pressed together at maturity .......... 1. *P. arizonicus*

3. Leaves lacking conspicuous purple dye, green; calyx without weakened ring (4).

4. Basal leaves crowded into a rosette, none opposite, plants slender, erect, loosely branched, not producing flowers near the base; nutlets incurved, contracted at both ends, somewhat cruciform, transverse ridges very broad ................................ 5. *P. teneilus*

4. Basal leaves distinct, at least not in well-developed rosettes, lower leaves opposite; nutlets not incurved, but highly variable .................. 4. *P. scouleri*


Stems slender, several from the base, ascending, simple or few branched, 1-4 dm high, hirsute-hispid with spreading hairs and also rather sparingly villous pubescent; leaves hirsute-hispid with more or less appressed hairs, pustulate at base, without shorter pubescence, the lower linear-lanceolate, 1.5-5 cm long, upper linear-oblong to lanceolate; roots, lower parts of stems and veins of the leaves, or sometimes the whole plant purplish; spikes at length elongated, remotely flowered and bractless or with a few foliaceous bracts; calyx about 3 mm long, cleft to about the middle, lobes narrow-attenuate, coninvent, hirsute-hispid, the tube at length usually circumsicissile near the base; corolla 2-2.5 mm broad; nutlets 1-4 commonly 2, aovoid and abruptly acute at apex, median and lateral keels often tuberculate, and with connecting transverse rugae, the areolae between smooth or minutely papillate; scar median, seated in a sunken area at the base of the keel. Sandy to gravelly slopes and plains. Southwestern Utah, south to southern California, Sonora, and New Mexico. March-June. Fig. 102.

Fig. 102. *Plagiobothrys arizonicus*

Washington Co., west slope of the Beaverdam Mountains, W.P. Cottam 7545 (UTC); east of Laverkin, W.P. Cottam 5165 (UTC); west slope of the Beaverdam Mountains, D. Nishi 68 (UTC); Beaverdam Mountains, B. Maguire 20508 (UTC); St. George, D.H. Galway 8451 (BRY); Black Hill west of St. George, F.W. Gould 1481 (BRY); Beaverdam Wash at Terry's Ranch, L.C. Higgins 300 (BRY); Dixie State Park, L.C. Higgins 850 (BRY).


*Sonnea jonessii* Greene, Pittonia 1:23. 1887.

Stems erect, 1-several from the base, divergently branched, 1-3 dm high, hispid with spreading bristly hairs pustulate at base, and also retrorsely-pubescent; basal leaves linear or narrowly oblanceolate, cuneate mostly lanceolate with pubescence similar to the stem but thinner; racemes terminating the branches, mostly conspicuously leafy-bracted at base, 1.5-3 cm long, the lower leaves of the branches often
bearing one or few axillary flowers, calyx lobes subulate-linear, 6-8 mm long, corolla 1-2 mm broad; nutlets 3 mm long, incurved and 4-angled by the dorsal and ventral keels and the 2 lateral ridges, abruptly pointed at apex, the keel and lateral angles tuberculate, the concave surface between densely tessellate; scar narrow or medial-narrow merging into the keel above, and with a diverging lateral ridge extending to either side. Washes and rocky desert slopes. Southwestern Utah, south to southern California, and Arizona to Sonora. April-May. Fig. 103.


Allocarya orthocarpa Greene, op. cit. 4:235. 1901.

Stems branched from the base, the branches prostrate. 1-3 dm long, straight, slender, and somewhat wiry, thinly strigose or glabrate, often floriferous nearly to the base; leaves narrowly linear, the lower 3-10 cm long, glabrous or nearly so above, thinly strigose beneath, the hairs mostly pubescent at base; racemes simple, becoming loosely flowered; mature calyx-lobes usually accrescent, 3-8 mm long, about 1 mm wide, connivent or sometimes spreading, more or less definitely curved toward one side; corolla 1-2 mm broad; nutlets narrowly to broadly lanceolate, acute; dorsal side keeled only above the middle, more or less obliquely or transversely rugose, smooth, granulate or penicillate-hairy; ventral side keeled down to the basal scar, this horizontal or slightly oblique, not surrounded by a ridge, but frequently with a downwardly directed dorsal flange. In heavy, usually alkaline soils. Eastern Oregon to southern Idaho and northern Utah, south to southern California. March-July. Fig. 104.


Allocarya scouleri Greene, Pittonia 1:18. 1887.

Allocarya cusickii Greene, Pittonia 1:17. 1887.

Allocarya hispidula Greene, op. cit.

Allocarya penicillata Greene, op. cit.

Allocarya nitens Greene, Pittonia 3:108. 1896.

Allocarya cognata Greene, Pittonia 4:235. 1901.


Plagiobothrys cusickii Johnst. op. cit. 3:63. 1932.

Plagiobothrys cognatus Johnst. op. cit. 3:59. 1932.

Plants more or less densely branched from the base; stems 5-25 cm tall, ascending or spreading, with stiff appressed hairs; leaves 1-8 cm long, linear to oblanceolate, strigose to somewhat setose; racemes rather lax, the bracts resembling the leaves; calyx 1-1.5 (2) mm long in flower, in fruit becoming 1.5-2.5 mm long; corolla about 1.5 mm long, inconspicuous; nutlets 1.5-2 mm long, variously roughened, with or without setose projections. Moist soils in sandy to clayey areas. Widely scattered over the western United States. May-July. Fig. 105.

Box Elder Co., Raft River Mountains, W.P. Cottam 3051 (BRY); Raft River Mountains, S.J. Peece 752 (UT); Cache Co., 3 miles west of Logan Airport, B. Maguire 2412 (UTC); Davis Co., Farmington Waterfowl Refuge, B. Maguire 13905 (UT); Centerville, S. Flowers 1193 (UT); Garfield Co., Panguitch Lake, B. Maguire 12958 (UTC); Aquarius Plateau, 19 miles north of Escalante, N.H. Holmgren 2442 (BRY); Salt Lake Co., Big Cottonwood Canyon, A.O. Garrett 1629a (UT); Sanpete Co., 2 miles south of Indianola, B.F. Harrison 10422 (BRY); Ephraim, W.P. Cottam 2783 (UT); Sevier Co., Fish Lake, mud flats, B. Maguire 12957 (UTC); Kooshare Reservoir, W.P. Cottam 9472 (UT); Summit Co., north slope of Big Mountain, D.H. Galway 2375 (BRY); north slope of the Uinta Mountains, Welsh, Moore & Matthews 9171 (BRY); Gorgeza, A.O. Garrett 2291 (UT); Snyderville, A.O. Garrett 7758 (UT); Tooele Co., Pilot Mountain, W.P. Cottam 13812 (UT); Uintah Co., Upper Bear River, B.F. Harrison 10968 (BRY); Utah Co., east slope of Mount Timpanogos, B.F. Harrison 11447 (BRY); American Fork Canyon, A.O. Garrett 3800a (UT); Wasatch Co., summit of Daniels Canyon, A.O. Garrett 8050 (UT); Washington Co., Pine Valley Mountains, B. Ma-

Fig. 105. Plagiobothrys scouleri

Fig. 106. Plagiobothrys texellus

Stems slender, erect, freely branched from the base or sometimes simple, 5-25 cm high, soft villous with spreading and reflexed hairs; leaves of the basal rosette oblong-lanceolate or oblong-oblancoate, obtuse or acutish, villous, 1-2.5 cm long, cauline distinct, the lower ones linear-oblong, the upper becoming lanceolate or ovate-lanceolate, gradually reduced in size; spikes elongated in age and loosely flowered, only the lowest flowers bracteate; calyx densely short-villous with whitish or more often rufous hairs, about 3 mm long in age; corolla limb about 2.3 mm broad; nutlets 1.5-2 mm long, thick cruciform, light colored, sharply ridged dorsally and on the margins, the ridges commonly tuberculate. Grassy slopes and meadows. British Columbia and Idaho, south to Arizona, Utah, and northern lower California. March-June. Fig. 106.

Salt Lake Co., near mouth of Big Cottonwood Canyon, A.O. Garrett 2233 (UT).

ACKNOWLEDGMENTS

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The help of the curators of the following herbaria which have so graciously provided me with assistance and the use of their facilities is greatly appreciated.

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<td>WTSU</td>
<td>West Texas State University, Canyon</td>
<td>Texas</td>
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