

STUDIES IN THE BORAGINACEAE, XIII
NEW OR OTHERWISE NOTEWORTHY SPECIES,
CHIEFLY FROM WESTERN UNITED STATES

IVAN M. JOHNSTON

***Heliotropium molle* (Torr.), comb. nov.**

Helioophytum molle Torr. U. S. & Mex. Bound. Bot. 138 (1859).

Tournefortia mollis Gray, Proc. Am. Acad. 10: 50 (1875); not Muell. (1858).

Tournefortia monclovana Wats. Proc. Am. Acad. 18: 120 (1883).

TEXAS: plains south of Santiago Peak, 1883, *Havard* 46½ (G).
COAHUILA: mountains 24 mi. north of Monclova, Sept. 1880, *Palmer* 887 (TYPE of *T. monclovana*, G); Movano, July 1910, *Purpus* 4555 (G); 19 mi. south of Laguna del Rey, a colony on silty floor of a broad valley, with *H. Greggii*, fl. white, leaves thickish, gray, crisped, Sept. 20, 1938, *Johnston* 7803 (G).

The type of *H. molle* was collected by Bigelow near Presidio del Norte (i.e. near Ojinaga), northern Chihuahua. The collection made by Palmer (no. 887) north of Monclova, Coahuila, the type of *T. monclovana*, is unquestionably conspecific. During my travels in Coahuila and Chihuahua, last year, I observed this species at only three localities. In each, it formed large though restricted colonies on dry silty valley-floors or dry sandy stream-ways. The plant spreads underground by rhizomes. The herbaceous stems, 2-3 dm. tall, were numerous at each station but may have come from the rhizomes of a relatively small number of individual plants. I noted the species (1) south of Laguna del Rey near Mohovano (specimen cited above), (2) near the Coahuila-Chihuahua boundary near Guimbalete, and (3) in northern Chihuahua in the type-region between Mula and Ojinaga. The species has a dry velvety fruit which breaks into two-seeded halves at maturity. The halves of the fruit contain two well-developed fertile cells and no infertile cavities. The plant unquestionably belongs to *Heliotropium* and can not possibly be kept in *Tournefortia*.

***Heliotropium assurgens*, nom. nov.**

Heliotropium phyllostachyum var. *erectum* Macbride, Proc. Am. Acad. 51: 542 (1916); not *H. erectum* Lam. (1778).

Anchusa incana Sesse & Mociño, Fl. Mex. 33 (1893) and ed. 2, 30 (1894); not Ledeb. (1847), nor *H. incanum* R. & P. (1799).

P. myosotoides, which was recently collected by John Thomas Howell at The Pinacles, San Benito Co., 1937, no. 12905, and at Santa Lucia Camp, Santa Lucia Mts., Monterey Co., 1936, no. 2416. These are plants having the dye-stained herbage, the slender branching habit, and the nutlets of *P. myosotoides*. In fact they differ only by having the calyx armed with uncinatè bristles. The collections came from opposite sides of the Salinas Valley. The uncinatè hairs are not developed in the South American forms of *P. myosotoides* and, furthermore, are probably unique in the genus. Consequently this plant, otherwise similar to *P. myosotoides*, can not be an introduction from South America, and if it is native to California I can not see why the collections of *P. myosotoides* from Santa Clara and Fresno counties can not be accepted as native also.

***Cryptantha dissita*, sp. nov.**

Herba annua erecta 5-25 cm. alta; caulibus simplicibus vel non raro medium versus ramulos ascendentes breves 1-2 gerentibus, villosio-hispidis, pilis gracilibus haud pungentibus 0.5-1 mm. longis erectis et appressis; foliis oblongis ligulatis vel lineari-oblongis 6-20 mm. longis 2-3 mm. latis utrinque villosio-hispidis, supremis paullo reductis, infimis subcongestis, reliquis 3-15 mm. distantibus; pilis folii 1-1.5 mm. longis gracilibus saepe curvatis griseis haud abundantibus erectis vel ascendentibus e basi subbulbosa orientibus; cymis ternatis ebracteatis pedunculum nudum 1-6 cm. longum terminantibus 3-10 cm. longis; floribus numerosis, maturitate 5-15 mm. distantibus; corolla alba, limbo 4-6 mm. diametro, tubo (in sicco brunneo) ca. 2 mm. longo, lobis calycis floriferi aequilongo; calycibus fructiferis 5-6 mm. longis basim versus 2-2.5 mm. crassis, lobis supra nuculis conniventibus deinde erectis vel ascendentibus, costa incrassata pilis 1-2.5 mm. longis rigidis pungentibus 5-10 e basi bulbosa orientibus armata, alibi praesertim marginem versus lorum villosis (pilis 0.5-1 mm. longis adpressis); ovulis 4; nuculis 1-4 (saepe 2-4), abaxialari semper maturante, 2-2.5 mm. longis laevibus nitidis maculatis 2.5-plo longioribus quam latis, dorso convexis, latere rotundis, ventre subplanis vel late obtusis, sulco omnino clauso imam ad basim late furcato; gynobasi ca. 1 mm. longo; stylo apicem nuculi distincte attingente vel breviter sed distincte superante.

CALIFORNIA (Lake County): hills about Scotts Valley, 6 mi. northwest of Lakeport, May 30, 1902, *J. P. Tracy 1744* (G); near foot of grade west of Lakeport, May 1, 1938, *M. S. Baker 8956* (TYPE, Gray Herb.); on Hopland highway a few miles west of Lakeport, May 5, 1934, *M. S. Baker 7648* (G); near Lakeport, May 1, 1930, *M. S. Baker 4939* (G).

The three collections by M. S. Baker, above cited, came from a single locality where the plant is locally very common on a tuffaceous outcrop of about an acre in extent. Growing with this *Cryptantha*, and also confined to this outcrop, are a number of plants with disrupted ranges along the inner Coast Ranges. The *Cryptantha* is evidently related to that variable plant of west-central California, south of San Francisco Bay, which I have called *C. hispidissima* Greene. It differs in its erect sparingly branched stems, its subequal leaves which tend to be congested below, its conspicuous corollas, and its well formed naked terminal ternate cymes which are projected above the leaves on a naked peduncle. This proposed species is obviously an outlying relative of *C. hispidissima*, local in a special habitat over a hundred miles north of the range of that more southern species.

Cryptantha hispidula Greene ex Baker, West Amer. P. 2: 10 (1903), nomen; Brand, Pflanzenr. [Heft 97] IV. 252: 60 (1931).

CALIFORNIA. N A P A C O . : Knoxville, colonies on rocky slopes, May 8, 1903, *C. F. Baker 2966* (G, ISOTYPE); about 2 mi. north of Knoxville on road to Lower Lake, April 1936, *M. S. Baker 8172*; Pope Creek, on serpentine hill on road near Pope Valley, April 1937, *M. S. Baker 7816*; Pope Valley road near Pope Valley, 1936, *M. S. Baker 8758* (G); serpentine east of Pope Valley along road to Monticello, April 1938, *M. S. Baker 8939*. C O L U S A C O . : serpentine hill along Highway no. 20 (Clearlake to Williams), May 17, 1937, *M. S. Baker 8656* (G). S O N O M A C O . : near entrance to Sulphur Creek Canyon near highway, 1934 and 1936, *M. S. Baker 7775* and *8608* (G). L A K E C O . : Binkley Ranch, between Cobb Mt. and Adams Springs, June 25, 1933, *Jussel* (G); serpentine hill a few miles east of Middletown, along highway, 1935, *M. S. Baker 8128*; dry slope of lava-gravel, 3 mi. north of Middletown on road to Lower Lake, May 1935, *Clausen 1035* (G); a mile east of Lower Lake near highway, April 1934, *M. S. Baker 7764* (G); summit of ridge west of Leesville, Colusa Co., in gravel among chaparral, 2000 ft., May 1919, *Heller 13124* (G).

The name *Cryptantha hispidula* Greene was first published in a list of exsiccatae distributed by C. F. Baker and subsequently appeared on the printed specimen-label associated with his no. 2966 which had been collected near Knoxville, Napa County. Greene never published a description of this species. Brand, finding the unpublished name on Baker's specimen at Berlin, adopted the name and described three varieties of this species, namely, the var. *eu-hispidula* (including *Baker 2966* from Napa Co. and *Elmer 3936* and *Eastwood 67a* from Santa Barbara Co.),

the var. *Elmeri* (from Washington and Oregon), and finally the var. *Abramsii* (based upon *C. Abramsii* Johnst. from near San Pedro, Los Angeles Co.). I have accepted *Baker 2966* as the obvious type of *Cryptantha hispidula* Greene ex Brand. The collections from Santa Barbara are *C. Clevelandii* var. *florosa* Johnst. The specimens cited under the var. *Elmeri* Brand, represent forms of *C. Hendersonii* (Nels.) Piper having a single polished nutlet. The var. *Abramsii* is a synonym of *C. Clevelandii* Greene.

The species, *C. hispidula*, replaces *C. Clevelandii* Greene and *C. hispidissima* Greene in the North Coast Ranges. These two relatives of *C. hispidula* are known only from the region south of San Francisco Bay. From them *C. hispidula* differs in its short style, which never reaches to the tip of the nutlets, in the very short inconspicuous hairs of the stem, which are never distinctly bristly, and in the consistently dimerous or trimerous slender elongate cymes. The species seems to be a plant of serpentine. Dr. Milo S. Baker writes me, "regarding the influence of serpentine on the borage flora of the North Bay counties. I know of only two species that seem to have a definite serpentine habitat. These are *C. hispidula* and *Allocarya tenera*. In Lake and Napa counties one may confidently expect to find *C. hispidula* somewhere on a serpentine outcrop. As for *A. tenera* I have collected it only in two localities and both of these are serpentine."

***Cryptantha spithamaea*, sp. nov.**

Herba annua erecta 5–20 cm. alta; ramis numerosis ascendentibus saepe simplicibus 1–2 mm. crassis plus minusve brunnescentibus cum pilis 0.4–1 mm. longis plerumque appressis haud abundanter vestitis; foliis firmiusculis lineari-oblongatis vel linearibus 5–15 mm. longis 1–3 mm. latis, utrinque pilis saepe e pustulis orientibus appressis haud abundantibus vestitis, inferioribus oppositis mox deciduis majoribus 1–10 mm. distantibus, superioribus quam inferioribus dimidio minoribus saepe angustioribus; cymulis scorpioideis 3–6 cm. longis geminatis ebracteatis 1–2 cm. longe pedunculatis vel solitariis, floribus inferioribus bracteatis; floribus ut videtur uniseriatis, superioribus congestis, inferioribus non raro ad 1 cm. distantibus; corolla alba, limbo 1.5–2 mm. diametro, tubo ca. 2 mm. longo lobis calycis aequilongo; calycibus fructiferis strictis vel stricte ascendentibus 3–5 mm. longis, lobis linearibus quam nuculis saepe duplo longioribus, in costa pilis rigidis curvatis vel sinuosis armatis alibi pilis gracilibus mollibus appressis vestitis, apice erectis vel maturitate plus minusve divergentibus; ovulis 4, abaxiali semper maturante; nuculis 1 vel rariter 2 lanceoideis 2–2.5 mm. longis

laevibus nitidis, basi truncatis, apice acuminatis, dorso convexis, ventre obtusis, sulco clauso imam ad basim in areolam triangularem aperto; gynobasi ca. 1.5 mm. alto; stylo ca. 0.5 mm. longo, ad 0.5 mm. infra apicem nuculae attingente.

CALIFORNIA. Mariposa Co.: 3 mi. northwest of Coulterville, locally quite abundant on serpentine, May 16, 1937, *R. F. Hoover 2169* (TYPE, Gray Herb.); 2 mi. northwest of Coulterville, May 9, 1938, *Hoover 3394* (G). Tuolumne Co.: near Moccasin Creek near power-house, May 9, 1938, *Hoover 3388* (G); 3 mi. south of Chinese Camp, May 9, 1938, *Hoover 3380* (G).

This species is a member of the Leiocarpae and is probably most closely related to *C. hispidula* Greene of the serpentine areas of the inner North Coast Ranges. It is the only member of its group known from the Sierran foothills. From *C. hispidula* it differs in its solitary or geminate spikes and more elongate calyx-lobes. The plants are smaller and more abundantly and strictly branched.

Cryptantha Ganderi, sp. nov.

Herba annua e basi ramosa 1-4 dm. alta; ramis dichotome ramosis pilis saepe 1-2 mm. longis divaricatis munitis; foliis elongatis angustis 2-5 cm. longis 2-3 mm. latis, apicem versus aliquantum attenuatis, apice saepe obtusis, utrinque hispidis; pilis 1-2 mm. longis ascendentibus vel erectis saepe e basi pustulato-bulbosa orientibus; cymis scorpioideis solitariis terminalibus vel ex axillis foliorum caulinarum superiorum orientibus ebracteatis 5-15 cm. longis maturitate laxifloris; corolla alba inconspicua 2.5 mm. longa; calycibus subsessilibus sub anthesi 2-5 mm. longis mox accrescentibus fructiferis 6-10 mm. longis; lobis maturitate linearibus rigidis costatis, infra medium conspicue (2.5 mm. longe) flavescenteque hispidis, supra nuculis conniventibus deinde erectis vel divergentibus; ovulis 4, saepissime 3 abortis; nuculis laevibus vel obscurissime et sparsissime subrugulosis nitidis plus minusve maculatis solitariis vel raro duobus lanceoideis acuminatis 1.5-2 mm. longis, dorso convexis, margine rotundis, ventre late obtusis vel rotundis, sulco clauso basim versus saepe in areolam triangularem parvam apertam furcato; gynobasi 1-1.5 mm. longo; stylo ca. 0.5 mm. longo ad 0.8-1 mm. infra apicem nuculae attingente.

CALIFORNIA: near school at Borego Valley, Larrea-Franseria association, 500 ft. alt., April 15, 1938, *Frank Gander 5328* (TYPE, Gray Herb.); Borego Spring, San Diego County, April 9, 1932, *Epling & Robinson* (G). BAJA CALIFORNIA: sandy wash 23 miles east of Pozo Aleman on road to Barril, March 3, 1935, *Wiggins 7844* (G). SONORA:

22 miles south of Sonoyta on road to Punta Peñasco, semistabilized dunes with *Abronia*, March 14, 1936, *Keck 4163* (G).

A desert relative of the characteristically coastal *C. Clevelandii*. It is readily distinguished by its larger nutlets, much accrescent calyx, and very slender elongate calyx-lobes. The abaxial nutlet is always developed and is usually twice the length of the gynobase. The style reaches up to only 2/3 to 3/5 the height of the nutlet.

***Cryptantha Wigginsii*, sp. nov.**

Herba annua laxe ascenderet ramosa 1-2 dm. alta; caulibus 1-2 mm. crassis, pilis 0.5-1 mm. longis saepe appressis falcatis inconspicue sparse vestitis; foliis 1-4 cm. longis 1.8-4 mm. latis linearibus vel lineariblongis, pilis appressis rectis utrinque vestitis, apice obtusis; cymulis scorpioideis simplicibus bracteis foliaceis 1-2 ornatis densifloris 1-3 mm. longe pedunculatis; calycibus subsessilibus fructiferis ca. 4 mm. longis, lobis costatis infra medium ca. 0.7 mm. latis apicem obtusum versus 0.3 mm. latis, in costa pilos e basi bulboso-pustulata orientes rigidos divaricatos 1-2 mm. longos gerentibus, alibi pilos gracillimos appressos gerentibus; corolla alba, tubo ca. 2 mm. longo 1 mm. crasso lobis calycis subaequilongo, limbo 3-3.5 mm. diametro; nuculis 1-4 ca. 2.1 mm. longis 0.9 mm. latis homomorphis (nucula abaxiali subpersistente) cinereis plus minusve maculatis, basi truncatis, apice acutis, margine infra medium acutis et supra medium rotundis, dorse convexis supra medium dense verrucosis vel congeste sinuateque rugulosis subopacis et infra medium laevibus nitidis, ventre apicem versus verrucosis alibi laevibus et nitidis; sulco clauso imam ad basim abrupte furcato; gynobasi 1.3 mm. longo; stylo ca. 0.4 mm. longo ca. 0.2 mm. infra apicem nuculae attingente.

BAJA CALIFORNIA: Rancho Cuevas, 18 mi. south of Tia Juana, gentle slope along ocean, very rocky red-clay soil, April 2, 1931, *Ira L. Wiggins 5107* (TYPE, Gray Herb.).

This is probably a relative of *C. Clevelandii* Greene but is readily distinguished from that species and allies by its roughened nutlets. Below the middle the back of the nutlet is smooth lustrous and somewhat mottled. Above the middle the back is roughened by minute wart-like tuberculations or by low sinuous ridges resulting from the confluence of the warts. There are 4 ovules and all frequently mature into nutlets. The abaxial nutlet is always present. The scorpioid cymes are solitary or rarely geminate and are always leafy bracted towards the base.

***Cryptantha Clokeyi*, sp. nov.**

Herba annua 10-15 cm. alta erecta; caulibus solitariis praesertim

medium versus longe ascenderet ramosis, pilos 0.5–1.3 mm. longos graciles rigidiusculos caulis basim versus erectos alibi appressos gerentibus; foliis lineari-lanceolatis crassiusculis infimis plus minusve congestis 2–3 cm. longis 2 mm. latis, supremis conspicue reductis, medianis 1–3 cm. distantibus, faciebus laminae pilos 0.7–1.5 mm. longos erectos vel appressos saepe (praesertim faciebus superioribus) e pustulis manifestis erumpentes gerentibus; cymis 3–6 cm. longis solitariis vel geminatis, floribus perspicue uniseriatis inferioribus ad 5–9 mm. distantibus, infimis bracteis subulatis 5–10 mm. longis oppositis; corolla alba, limbo (lobis ascendentibus) 2 mm. diametro, tubo ca. 2 mm. longo quam lobis calycis linearibus 0.5–1 mm. brevioribus; calycibus fructiferis 7–10 mm. longis 1–2 mm. longe pedicellatis; lobis lanceolatis longe attenuatis quam nuculis 2–3-plo longioribus (basim versus usque ad 2 mm. latis, supra medium minus quam 0.6 mm. latis) supra nuculos conniventibus deinde erectis vel curvato-ascendentibus, plus minusve costatis in costa pilis gracilibus 2–3 mm. longis ornatis reliquo pills numerosis adpressis praesertim marginem versus villosis; nuculis 4 aequalibus triangulari-ovatis ca. 2 mm. latis et 3 mm. longis minute granulatis et conspicue papillatis vel tuberculatis, apice acutis, basi truncatis, dorso convexis, margine angulatis vix incrassatis, ventre obtusis; sulco clauso vel aperto basim versus late furcato; gynobasi apicem nucularum vix attingente; stylo nuculas evidenter superante.

CALIFORNIA: north of Barstow, San Bernardino Co., 2800 ft., April 25, 1935, *I. W. Clokey & E. Ganderson 6859* (TYPE, Gray Herb.).

A very distinct species belonging to the Muricatae and perhaps most closely related to *C. Hooveri* Johnst. of the Sierran foothills of central California. The new species differs in its much coarser habit, elongate cymes of much larger flowers, broad leaves, larger and more elongate nutlets, and protruding style. The gross habit of *C. Clokeyi* suggests a very coarse form of *C. nevadensis* var. *rigida* Johnst. The coarse broad nutlets of *C. Clokeyi*, however, are very different from the slender attenuate nutlets of *C. nevadensis*. The discovery of this unusually distinct new species in the middle Mohave Desert is most unexpected. The plant is probably rare and local since Mr. Clokey has failed to rediscover it along the road north of Barstow where he originally found it.

***Cryptantha fastigiata*, sp. nov.**

Planta herbacea vel suffruticosa annua vel saepissime subpersistens 1–10 dm. alta; caulibus erectis vel ascendentibus solitariis vel pluribus abundanter ascenderetque ramosis, pilis antrorse valdeque appressis 0.5–1 mm. longis et pilis sparsioribus erectis rigidis 1–2 mm. longis e

basi pustulata erumpentibus vestitis; caulibus vetustis basim versus non raro plus minusve duris et lignosis ad 8 mm. crassis; foliis numerosis anguste oblanceolatis vel lineari-oblanceolatis caulibus apicem versus gradatim reductis, inferioribus 3-10 mm. latis 4-6.5 mm. longis, supra medium latoribus, basim versus in petiolum 1-10 cm. longum gradatim attenuatis, apice acutis, utrinque sparse hirsutis (pilis 1-1.5 mm. longis e basi plus minusve conspicue pustulata erumpentibus), subtus prominenter mediocostatis sed enervatis; cymis unilateralibus scorpioides solitariis vel geminatis laxifloris sparse minuteque bracteatis; corolla alba, tubo ca. 1 mm. longo quam lobis calycis tertia parte brevior, limbo 3-4 mm. diametro; calyce fructifero 3 mm. longo 1-2 mm. longe pedicellato, lobis infra medium costatis lineari-oblongis pilos rectos rigidos erectos 1-1.5 mm. longos et pilos 0.5 mm. longos appressos gerentibus haud villosis; ovulis 4; nuculis heteromorphis triangulari-ovatis nigris tuberculis et margine pallidis ornatis compressis, dorso convexis, ventre late obtusis; sulco apicem versus nuculae angustato, infra medium nuculae in areolam conspicuam expanso; nucula abaxiali maxima persistente majore 1.5-1.9 mm. longa; nuculis 3 consimilibus 1-1.5 mm. longis; gynobasi elongato ca. 1 mm. longo; stylo rigido nuculas maximas 0.5-1 mm. longe superante.

BAJA CALIFORNIA: Puerto Refugio, Angel de la Guardia Island, 1921, *Johnston 3374* (G); Las Animas Bay, 1921, *Johnston 3505* (TYPE, Gray Herb.); San Esteban Island, 1921, *Johnston 3175* (G); South San Lorenzo Island, 1921, *Johnston 4192* (G); 5-6 m. west of Barril, March 1935, *Wiggins 7828* and *Shreve 6992* (G); 40 mi. east of San Ignacio, March 1935, *Shreve 7055* (G); Santa Rosalia, 1889 and 1938, *Palmer 188* and *Gentry 3779* (G); San Marcos Island, 1921, *Johnston 3621* (G); Carmen Island, 1890 and 1931, *Palmer 846* and *Collins, Kearney & Kempton 238* (G).

This species ranges in the middle third of the peninsula of Baja California and on the adjacent islands in the Gulf of California. It has passed as a form of *C. racemosa* (Wats.) Greene and was so treated in my monograph of the genus, *Contr. Gray Herb.* 74: 32-3 (1925), and in my report on the flora of the islands in the Gulf of California, *Proc. Calif. Acad.*, ser. 4, 12: 1147 (1924). Notes on the habit of the plant may be found in the latter report. This plant is most certainly not a form of *C. racemosa*! That latter species has a very different range. From the northernmost part of Baja California *C. racemosa* extends through the hottest and driest parts of the Colorado and Mohave deserts in eastern California, western Arizona and southern Nevada. It becomes a loosely and repeatedly much branched small bush and bears its slenderly long-

pedicellate flowers in a unique type of loose sympodium that is very much more racemose than scorpioid. The well developed biseriate scorpioid cymes, the shorter pedicels, and the long fastigiate stems quickly distinguish *C. fastigiata* from *C. racemosa*. In habit and in most details *C. fastigiata* is very similar to *C. holoptera* (Gray) Macbr., but that latter has larger, very broadly winged, homomorphic nutlets. The closest relative of *C. fastigiata* is *C. inaequalis* Johnst., of southernmost Nevada and adjacent California. In all details, save range and growth-form, it is remarkably similar to *C. fastigiata*. However, *C. inaequalis* is a slender herbaceous annual 1-3 dm. tall with the stems proportionately better branched. The young stems in the inflorescence are clothed with very slender, 0.5-1 mm. long, loosely appressed hairs. In the peninsular species the younger parts of the stem are covered with coarser shorter closely appressed hairs and the hairs are more conspicuously encrusted and hence duller than in *C. inaequalis*.

Cryptantha Rattani Greene, *Pittonia* 1: 760 (1888).

CALIFORNIA (Monterey Co.): along the Carmel River 20 mi. south-east of Carmel, July 1929, *Wolf 3772* (G); right bank of the Carmel River 3 mi. above the Mission, April 1903, *Heller 6587* (G); Soledad, May 1881, *Congdon 72* (G); "Monterey County," 1887, *Hickman* (TYPE, Herb. Greene).

When he published *C. Rattani*, Greene stated that he had received his first material of the species from Rattan, who thought it was undescribed. This material came from near San Jose and Greene then considered it "a state of the common *C. flaccida* with larger corollas and more spreading habit, for the specimens were young and only beginning to flower." Subsequently Hickman sent Greene "a plant in good fruit" which revealed the characters of the species. There is no collection from Rattan, labeled "*C. Rattani*," in the Greene Herbarium at Notre Dame University, though the Hickman plant, so labeled, is preserved there. I suspect that Rattan's immature specimens were not preserved by Greene and that his identification of the Rattan and Hickman collections was based on his recollection of the former. In any case the description of *C. Rattani* was based upon the fruiting plants supplied by Hickman and, despite the name of the species, the Hickman plant from Monterey County must be taken as type. The few specimens of this interesting species, at hand, all come from the country just inland from Monterey, California, and suggest that it may be endemic in that area. Perhaps after all Rattan's plant from San Jose may not have been conspecific with the plant of Hickman. The species has the gross aspect of a plant of

C. hispidissima Greene but has tuberculate nutlets, and well developed corollas indicating its affinities with *C. intermedia* (Gray) Greene. West of the Coast Ranges, *C. intermedia* or its relatives is not known between San Luis Obispo County and San Francisco Bay. This local relative of *C. intermedia* in the Monterey area is of some interest and it is hoped that collectors will watch for it when working in the region.

***Cryptantha pterocarya* (Torr.) Greene var. *stenoloba*, var. nov.**

A forma typica speciei differt lobis calycis fructiferi conspicue elongatis lanceolatis 5-8 mm. longis ca. 1 mm. latis quam nuculis 1.5-2.5-plo longioribus.

ARIZONA: between Mesquite and Littlefield, Mohave Co., 1500 ft. alt., April 17, 1937, *Kearney & Peebles 13184* (G); near Arizona-Nevada line, sandy desert, April 4, 1934, *Maguire 4972* (G). NEVADA: 15 mi. east of Glendale, Clark Co., 4000 ft., May 19, 1933, *Maguire & Blood 4466* (TYPE, Gray Herb.).

A plant of the valley of the lower Virgin River in Nevada and adjacent Arizona where it appears to replace the ordinary form of the species. It has the one wingless and the three broadly winged nutlets of typical *C. pterocarya*, but differs conspicuously in its very elongate narrower calyx-lobes.

***Cryptantha Grahamsii* Johnston, Jour. Arnold Arb. 18: 231 (1937).**

UTAH: shale hillside near Willow Creek, 22 mi. south of Ouray, 5500 ft. alt., June 16, 1937, *R. C. Rollins 1716* (G); very dry knoll, east slope of Big Pack Mt., 4 mi. west of Willow Creek, 6000 ft., stems one to few, June 15, 1937, *Rollins 1707* (G).

This remarkable species was described from flowering material, but now, thanks to Mr. Rollins, I can supply a description of the fruit from new material obtained at the type locality. The species keys out in Payson's monograph to *C. sobolifera* Payson, *C. aperta* Payson or *C. Sheldonii* Payson, but it is not related closely to any of these. The species is truly a very distinct one.

Fruit ovoid, the coarse style surpassing it by about 2 mm.; nutlets 4, oblong-lanceolate, 3.5-4 mm. long, 1.8-2 mm. wide, margins touching, knife-like, both faces of nutlets with inconspicuous small low rounded tuberculations, these distinct or somewhat confluent into short irregular rounded ridges; groove straight, extending from near base to near apex, open, very narrowly linear or cuneate-linear, edges not thickened.

***Cryptantha Rollinsii*, sp. nov.**

Planta biennis griseo-viridis hispida; caulibus erectis 1-2 dm. altis

simplicibus solitariis vel raro 2-3 e radice simplice palari erumpentibus; foliis crassiusculis rigidis evidenter costatis utrinque pilos breves graciles erectos vel ascendentes et pilos rigidos longos e basi pustulata orientes erectos conspicue gerentibus; foliis basalibus abundanter pustulatis dense rosulatis sub anthesi desiccatis ca. 3 cm. longis ca. 6 mm. latis paullo infra apicem latioribus deinde basim versus in petiolum 1-2 mm. latum gradatim attenuatis; foliis caulinis 3-5 cm. longis, 5-8 mm. latis, pluribus, superioribus paullo reductis, 1-2 cm. distantibus, oblanceo-spathulatis vel anguste oblongis, apice obtusis; floribus in glomerulis densis 3-6 floris 1-2 mm. longe pedunculatis ex axillis bractearum foliacearum 1-2(-3) cm. longarum erumpentibus; thyrso obovoideo vel subcylindrico 2-3 cm. crasso 3-5 cm. longo infra medium interrupto; calyce sub anthesi 7-8 mm. longo, lobis lineari-cuneatis extus villosulis et hispidis ad 2 mm. infra appendiculam corollae attingentibus; calycibus fructiferis 8-9 mm. longis induratis, basi in pedicellum crassum rigidum ca. 1 mm. longum abrupte contractis; corolla alba, tubo 7-9 mm. longo subcylindrico, limbo 7-8 mm. diametro ascendente, lobis suborbicularibus 2.5-3 mm. latis, appendiculis faucis trapeziformibus puberulentibus; staminibus infra medium vel apicem versus tubi affixis; nuculis 4 elongatis ca. 3.5 mm. longis 1.5 mm. latis utrinque sublaevibus solo marginem versus obscurissime sparse rugulosis et tuberculatis, dorso convexis, margine anguste alatis, ventre obtusis, sulco recto a basi usque ad apicem nuculae gestis, clauso vel anguste aperto, basi abrupte lateque furcato, margine nullo modo incrassato.

UTAH (Uinta Basin, Uinta Co.): shale hillside on Thornes Ranch near Walker Creek, 22 mi. south of Ouray, 5500 ft., June 16, 1937, *Reed C. Rollins 1715* (TYPE, Gray Herb.); shale breaks, east side of Willow Creek, about 5 mi. north of mouth of Agency Draw, 5500 ft., fl. white, May 22, 1935, *E. H. Graham 8938* (G); talus slope, fl. white with green tube, west side of Green River, south of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7870* (G).

This plant was first sent me by Dr. Graham and though I believed it to be new I did not then publish it as a new species since both of his specimens were flowering plants lacking mature nutlets. Thanks to Mr. Rollins, however, I have since received excellent mature specimens from the same region in which Graham first encountered it. It proves to be a very distinct species having elongate exerted white tubular-funnelform corollas, simple bristly stems, and small nearly smooth nutlets. The gross aspect of the plant is most suggestive of *C. Bradburiana* Payson. The nutlets most suggest those of the Sierran *C. nubigena* Payson. In Payson's monograph it keys out to *C. oblata* Payson. None of these

species can be considered as a close relative of *C. Rollinsii*. In truth the species is such a distinct one that I can find no species that is clearly an immediate relative of it.

Cryptantha nubigena (Greene) Payson, Ann. Missouri Bot. Gard. 14: 265 (1927).

Orocarya nubigena Greene, Pittonia 3: 112 (1896).

Cryptantha Clemensae Payson, Ann. Missouri Bot. Gard. 14: 267, fig. 26-28 (1927).

This is a species endemic to the high Sierras, from Tulare and Inyo north to Mono and Tuolumne counties, California, chiefly between 10,000 and 12,000 ft. The type of *Orocarya nubigena* came from the summit of "Clouds Rest" in Yosemite National Park from an altitude of about 9900 ft. The material of the species available to past monographers of this group has been very poor and scanty. Payson saw a poor isotype of the species and mistakenly identified it with plants of eastern Oregon and adjacent northernmost California. The few reasonably good specimens of this plant of the southern Sierras available to Payson he described as a new species, *C. Clemensae*. This latter name consequently falls into the synonymy of *C. nubigena* and the plant of Oregon, mistakenly called "*C. nubigena*," being without name, may be described as a new species, as follows:

Cryptantha subretusa, sp. nov.

Herba perennis caespitosa; caulibus pluribus e radice lignosa erumpentibus 5-18 mm. altis simplicibus pilos 1-2 mm. longos et pilos abundantiores 0.5-1 mm. longos conspicue gerentibus basi persistentibus foliis marcescentibus dense vestitis; foliis basalibus congestis late spathulatis 1-4 cm. longis crassis persistentibus tomentulosi maturitate griseis, lamina orbiculata vel transverse elliptica 4-8 mm. lata apice rotunda vel truncata vel subretusa basi in petiolum 0.7-2 mm. latum abrupte contracta; foliis caulinis spathulatis vel lineari-oblongis numerosis quam internodiis conspicue longioribus; faciebus folii setas appressas 1-2 mm. longas e basi pustulata orientes et pilos rigidos 0.5-1 mm. longos saepe plus minusve tortuosos et appressos valde abundantes gerentibus; inflorescentia subcylindrica densa saepe 2-3-plo longiore quam crassa 1-2.2 cm. diametro; cymis congestis numerosis scorpioideis saepe 7-9-floris in tertia parte superiore caulis gestis; rhachi cymae 5-12 mm. longa; corolla alba, limbo 3-6 mm. diametro, tubo 3-4 mm. longo lobis calycis villosis et hispidis subaequilongo; calycibus maturitate elongatis 5-7 mm. longis 3-4 mm. diametro 0.5-1.5 mm. longe pedicella-

tis; nuculis oblongo-lanceolatis 2.8-3.7 (-4.8) mm. longis, 1.6-1.9 (-2.2) mm. latis basim obtusam versus latioribus anguste marginatis, dorso convexis inconspicue tuberculatis vel breviter rugulosis, facie interiore sublaeve vel inconspicue sparseque tuberculata vel rugulosa obtusa fere per totam longitudinem sulcata; sulco lineari vel subulato basim versus inconspicue expanso.

NEVADA: Santa Rosa Mts., Humboldt Co., July 11, 1898, *Cusick 2028* (G). CALIFORNIA (Siskiyou Co.): crest of long bare easterly slope of Mt. Eddy, 7500 ft., in compact gravel, July 9, 1920, *Heller 13435* (NY); near summit of Redshale Mt., east of Medicine Lake, pumice sand, 8000 ft., Aug. 18, 1923, *Applegate 3869 A* (G). OREGON: Crater Lake, Klamath Co., pumice slope of Cloud Gap, 8000 ft., 1934 and 1936, *Applegate 8198* (St.), *10875* and *10878* (G); Crater Lake, pumice slope on rim, 7000 ft., 1935, *Thompson 12206* (TYPE, Gray Herb.); Crater Lake, eastern rim in deep sand, 1924, *M. S. Baker 629* (G); Crater Lake, pumice near rim, 1929, *Wynd 1637* (G); about 4 mi. northwest of Adel, Lake Co., high sterile slope, June 1937, *Peck 18480* (G); above Blitzen Gorge, open rocky crest of Steens Mt., Harney Co., 9000 ft., July 1935, *Thompson 12152* (G); Pine Creek, Baker Co., alpine perennial, Sept. 1879, *Cusick* (G); east side of Lostine Canyon, 18 mi. above Lostine, Wallowa Co., July 1933, *Peck 17854* (St.; NY); above Jewett Lake, dry talus slope a mile south of Arenoid Lake, Wallowa Co., July 1933, *Peck 18063* (NY, St.); above Ice Lake, on high sterile slope, Wallowa Co., July 1934, *Peck 18511* (NY, St.).

The account of *C. nubigena* given in Payson's monograph applies almost entirely to this new species. Most of the specimens he cites, his description of the species, and his illustration of the nutlet, belong to *C. subretusa*. As I have indicated above, *C. nubigena* is endemic to the crests of the southern Sierras of California and does not approach, within 250 miles, the range of *C. subretusa*. The Californian plant differs from *C. subretusa* in being a weaker, more slender, more bristly plant with less firm, green, acute or obtuse basal leaves, much smaller smoother nutlets and a more interrupted inflorescence with a capitate terminal cluster and scattered smaller lateral ones below.

The present plant though evidently distinct from the Sierran *C. nubigena* is involved in the puzzling complex of forms containing *C. Sheldoni* (Brand) Payson and *C. celosioides* (Eastw.) Payson. These latter species need more study. I am of the opinion that the name *C. celosioides* should be extended to cover most of the coarse large-flowered plants of low altitudes found in Washington and Oregon and consequently most of the forms which Payson has referred to *C. Sheldoni*. The type of *C.*

Sheldoni represents one of several peculiar forms, probably local species, found in northeastern Oregon. Generally *C. subretusa* may be distinguished from the other species of Oregon by its elongate nutlet, and tomentulose thickish obtuse, truncate or subretuse basal leaves. Perhaps to it belong certain robust plants from southern Oregon (near Paisley, Lake Co., *Peck 15648*) and adjacent California (Lava Beds Nat. Monument, Siskiyou Co., *Applegate 9486* and *10514*). Flowering material from Warner Mts., Oregon (*Austin & Bruce 2270*) and from Steens Mt. (*Applegate 5645*) seems to have the habit of *C. subretusa* but the corollas are large and suggest those of *C. celosioides*.

***Cryptantha hypsophila*, sp. nov.**

Herba perennis caespitosa; caulibus pluribus e radice profundo lignoso erumpentibus 5–15 cm. longis simplicibus hispidis pilos 2–3 mm. longos rigidos divaricatos et pilos abundantes 0.5–1 mm. longos tortuosos conspicue gerentibus; foliis basalibus 1–2.2 cm. longis 2–4.5 mm. latis spathulatis marcescentibus infra apicem latioribus deinde basim versus gradatim attenuatis apice rotundis utrinque tomentulosis pilis brevibus abundantibus et setis appressis e basi pustulata orientibus vestitis; foliis caulinis pluribus conspicuis saepe hispidis spathulatis vel lineari-spathulatis; inflorescentia thyrsoida 1.5–2 cm. crassa 2–5 cm. longa densiflora subglobosa vel subcylindrica; cymis numerosis congestis glomeratis 3–7-floris; corolla ca. 7 mm. longa, tubo ad 4 mm. crasso lobis calycis aequilongo, limbo ad 5 mm. diametro; calyces fructifero 6–8 mm. longo; nuculis oblongo-lanceolatis 3–4 mm. longis 1.4–1.8 mm. latis anguste marginatis apice acutis, basi obtusis, dorse convexis inconspicue tuberculatis, ventre sublaevibus obtusis fere per totam longitudinem sulcatis; sulco lineari vel cuneato basi late furcato.

IDAHO (Blaine Co.): crest of high barren ridge at head of Boulder Creek, Sawtooth Mts., 11,000 ft., Aug. 6, 1937, *J. W. Thompson 14129* (TYPE, Gray Herb.); alpine rocky slopes of Mt. Hyndman, Sawtooth Range, 9500 ft., July 30, 1936, *Thompson 13628* (G); loose slide rock, Smoky Mts., 9500 ft., *Macbride & Payson 3771*, in pt. (G).

This species is known only from south-central Idaho, Blaine County, over 150 miles east of the range of *C. subretusa*. Macbride, *Contr. Gray Herb.* 49: 65 (1917), and Payson, *Ann. Missouri Bot. Gard.* 14: 265 (1927), identified this isolated plant of Idaho as a form of *C. nubigena*. Its relations, however, are not with the true *C. nubigena* of California but with the plant of Oregon formerly confused with it, namely *C. subretusa*. The Idaho plant is more spreading and bristly and has smaller nutlets and narrower less firm leaves that are obtuse or acute at apex.

Cryptantha Coryi, sp. nov.

Planta biennis saepe robusta e radice palari valida lignosa erumpens; caulibus pluribus erectis rigidis 15–45 cm. altis (basim versus 2.5–5 mm. crassis) saepe hispidis setas rigidas appressas vel patentes et pilos minutos flexuosos abundantes gerentibus; foliis basalibus 5–14 cm. longis crassiusculis lineari-oblancoelatis apicem acutum vel obtusum versus 4–10 mm. latis saepe strigoso-tomentulosis setas appressas 1.5–3 mm. longas rigidas e basi pustulata erumpentes et pilos minutos appressos gerentibus; foliis caulinis numerosis saepe 1.5–2 cm. distantibus saepe 2–3 cm. longis lineari-oblongis vel oblongo-lanceolatis 3–4 mm. latis acutis; cymis 3–10 scorpioideis ascendentibus elongatis e axillis foliorum supremorum erumpentibus 10–20-floris, maturitate 5–20 mm. distantibus, supremis 5–13 cm. longis, inferioribus gradatim brevioribus, thyrsum 7–18 cm. longum 4–9 cm. crassum haud densum formantibus; floribus fructiferis 3–10 mm. distantibus; bracteis cymae 5–10 mm. longis evidentibus lineari-lanceolatis; calyce sub anthesi 4–6 mm. longo sessili, maturitate 6–10 mm. longo 1–5 mm. longe rigideque pedicellato setis et pilis minutis vestito saepe hispido; corolla alba 6–8 mm. longa, limbo 6–7 mm. diametro patente, tubo 4–5 mm. longo quam lobis calycis paullo longiore; nuculis 4 laevibus angulatis 2.5–3 mm. altis et latis eis *C. Jamesii* similibus margine haud conniventibus.

TEXAS: 16 mi. northeast of Ft. Stockton, Pecos Co., 1933, *Cory 5509* (G); about 2 mi. west of Longfellow, Pecos Co., Apr. 15, 1936, *V. L. Cory* (TYPE, Gray Herb.); near Persimmon Gap, Brewster Co., fl. white, 1931, *McKelvey 1979* (G); 55.8 mi. south of Alpine, Brewster Co., Apr. 13, 1936, *Cory* (G); Feodora, Terrell Co., dry rocky plain, 1928, *E. J. Palmer 33575* (G); 8 mi. east of Langtry, Val Verde Co., Apr. 6, 1939, *Cory* (G); 7 mi. southeast of Del Rio, Val Verde Co., April 1, 1939, *Cory* (G); Big Spring, Howard Co., stony hills, June 11, 1900, *Eggert* (G); Big Spring, deep sand, 1928, *E. J. Palmer 34009* (G); Ross Place, Tom Green Co., 1929, *Cory 651* (G); Upper Concho, sandy hills and plains, *Reverchon 2120* (G); between Uvalde and Del Rio, fl. white, 1931, *McKelvey 1891* (G); without data, *Wright 1566*, in pt. (G).

This is the plant of Texas which Payson treated as "*C. Palmeri*." It is known from Reeves and Brewster east to Howard, Tom Green and Kinney counties, Texas, and is evidently different from the type and only known collection of *C. Palmeri* (Gray) Payson, from the mountains south of Saltillo, Coahuila. The Mexican plant is a perennial with a slender multicapital caudex producing more slender and more densely strigose basal leaves, more slender stems, smaller corollas with a dis-

tinctly narrower limb, and finally an inflorescence of glomerules rather than elongating scorpioid cymes. The coarse habit, the biennial root and the very well developed elongate scorpioid cymes quickly distinguish *C. Coryi* from true *C. Palmeri* of Mexico. I do not believe that these two species are even immediately related. As Payson has indicated this Texan plant has affinities with *C. Jamesii* var. *multicaulis* (Torr.) Payson. The true Mexican, *C. Palmeri* has its closest relation in *C. crassipes* described below.

***Cryptantha crassipes*, sp. nov.**

Herba cinerea e radice perenni valida cortice nigrescente oblecta oriens; caulibus pluribus erectis simplicibus 6-30 cm. altis plus minusve hispidis setis longis et pilis mollibus brevibus laxe appressequae vestitis, basi ima persistentibus induratis, basibus petiolorum marcidis crasse squamoso-vestitis caudicem crassum multicapitalem conspicuum formantibus; foliis basalibus congestis crassiusculis lineari-spathulatis vel anguste lineari-oblongolatis 4-6 cm. longis 2-6 mm. latis utrinque dense pallideque strigosis (indumento e setis 1-2 mm. longis rigidis e basi pustulata orientibus et pilis ca. 0.5 mm. longis flexuosis mollibus composito) apice obtusis vel rotundis; foliis caulinis sparsis 1.5-3 cm. distantibus 1-2 cm. longis indumento laxo appresso vestitis plus minusve hispidis; floribus glomeratis sub anthesi in inflorescentiam capitatam densam 1-2.5 cm. diametro caulem sparse foliatum terminantem aggregatis; inflorescentia fructifera ambitu obovata vel oblongo-obovata ex glomerulo terminali multiflora 2.5-3 cm. diametro congesto latiore quam longo et infra glomerulum maximum ex glomerulis 1-3 parvis 1-5-floris 1-2 cm. longe pedunculatis in axillis foliorum supremorum 1-2 cm. longorum 5-25 mm. distantium gestis composita; cymis omnino glomeratis fructiferis congestis vix longioribus quam latis haud elongato-scorpioideis; corolla ut videtur alba conspicua, limbo patente ca. 8 mm. diametro, lobis orbicularibus ca. 2.2 mm. diametro, tubo ca. 9 mm. longo; calyce sub anthesi ca. 9 mm. longo, lobis cuneatis fere apicem tubi corollae attingentibus setis et pilis laxo appressis dense vestitis, maturitate paulo accrescentibus, 1-3 mm. longe pedicellatis; nuculis 4 fructum hemisphaericum formantibus crassis angulatis 3.5-4 mm. longis ca. 3 mm. latis a dorso visum orbiculari-triangularibus vel ovato-triangularibus, margine lateraliter conniventibus dorso convexis opacis inconspicue rugulosis, ventre angulatis sublaevibus, sulco angustissimo lineato.

TEXAS (Brewster Co.): tributary of Alamo de Caesario, 18 mi. north of Terlingua, April 3, 1939, *V. L. Cory* (G); 55 mi. south of Alpine,

April 13, 1936, *Cory* (G); 6.5 mi. east of Agua Fria Springs, April 13, 1936, *Cory 18613* (TYPE, Gray Herb.).

This interesting species comes from the Big Bend region of Texas. It is probably most closely related to the plant collected by Edward Palmer in the mountains south of Saltillo, Coahuila, and the one properly bearing the name, *C. Palmeri* (Gray) Payson. Both species are perennials having a multicapital caudex, narrow pallid densely strigose basal leaves and an inflorescence of glomerules rather than elongating scorpioid cymes. The Texan plant, however, is coarser than the Mexican plant and has a much coarser heavier caudex, non-bristly calyx-lobes, and a corolla-limb nearly twice as broad. The type and only known collection of *C. Palmeri* is immature and ripe nutlets are unknown. The mature nutlets of *C. crassipes* are rugulose. The only other member of the group of *C. Jamesii* (Torr.) Payson, to which *C. crassipes* and *C. Palmeri* belong, which has roughened nutlets is *C. oblata* (Jones) Payson. This latter species ranges in Texas from El Paso southeastward into Presidio County. It has elongating scorpioid cymes, exerted corolla-tube, tuberculate nutlets, and a less persisting root.

***Hackelia Sharsmithii*, sp. nov.**

Herba perennis; caulibus gracillimis pluribus simplicibus rigidiusculis fragilibus 1-2 mm. crassis inconspicue strigosis 1-3 cm. altis erectis vel ascendentibus, basi vestigiis petiolorum emarcidorum fuscis conspicue obtectis, caudicem multicapitem formantibus; foliis viridibus obscure nervatis utrinque inconspicue strigosis; foliis inferioribus majoribus, lamina lanceo-elliptica vel oblongo-lanceolata 4-7 cm. longa 14-30 mm. lata, apice acuta vel obtusa, basi in petiolum alatum 2-6 cm. longum contracta; foliis caulinis 6-9 sessilibus oblongis vel ovatis vel lanceo-ovatis 2-3.5 cm. longis 8-18 mm. latis, apice acutis, basi rotundis vel cordatis; cymis racemiformibus terminalibus geminatis vel ternatis (raro solitariis in axillis foliorum superiorum) maturitate 2-10 cm. longis 2-14-floris plus minusve bracteatis, bracteis saepe omnino subulatis inconspicuis 1-2 mm. longis rariter 1-2 grandibus foliaceis 5-20 mm. longis et 3-10 mm. latis; calyce sub anthesi 2-2.7 mm. longo sparse strigoso, lobis lanceolatis, pedicellis 1-6 mm. longis; corolla azurea ca. 4 mm. longa, limbo ad 6 mm. diametro, tubo ca. 2 mm. longo non raro medium versus constricto, lobis ca. 1.7 mm. longis apice rotundis; appendiculis forniculibus lunatis, margine superiore ciliolatis, latere inferiore valde convexus; antheris ca. 0.2 mm. longis apice fere sinus lorum corollae attingentibus; pedicellis fructiferis laxe recurvatis ad 12 mm. longis; nuculis 4 sine margine 2.6-3 mm. longis et 1.1-1.4 mm.