STUDIES IN THE BORAGINACEAE. XIV*

MISCELLANEOUS SPECIES FROM ASIA, MALAYSIA AND AMERICA

IVAN M. JOHNSTON

Bourreria superba, sp. nov.

Arbor 4–8 m. alta; ramis hornis fuscis laevibus abundanter breviterque villulosis subvelutinis; laminis foliorum late obovatis vel late ellipticis 8–12 cm. longis 5–8.5 cm. latis integris, basi in petiolum 1.5–2.3 cm. longum 1–1.5 mm. crassum abrupte contractis, apice obtusis vel rotundis, supra sublucidis secus costam impressam et nervos primarios basim versus minute inconspicueque villulosis alibi glabris, subtus pallidioribus opacis minute abundanterque villulosis subvelutinis, nervis primariis utroque latere costae subtus prominentis 7–9 prominulis cum nervis secondariis et tertiaris transverse conjunctis; inflorescentia terminali 1–3 cm. longe pedunculata paniculato-corymbosa ut videtur 5–10-flora; alabastro obovoideo glaberrimo ca. 8 mm. crasso ca. 14 mm. longo; calyce ad anthesin campanulato 12–16 mm. longo extus glabro intus abundanter strigoso a basi rotundata 4–5 mm. crassa sursum gradatim ampliato, apice ca. 13 mm. diametro, lobis triangularibus ad 4 mm. longis; corolla grandi infundibuliformi alba 3.5–5 cm. longa (limbo 4–5 cm. diametro), extus praesertim supra medium glandulis stipitatis minutis abundanter obsita, tubo a basi 2–3 mm. crassa sursum gradatim ampliato 2.5–3 cm. longo (apice 2–3 cm. crasso) intus basim versus villoso, lobis ascendentibus latioribus quam longis ca. 1.5 cm. longis ca. 2.2 cm. latis apice rotundis infra medium basim 1 cm. latam versus abrupte contractis; filamentis ca. 5 mm. supra basim tubi corollae affixis, partibus liberis 2.5 cm. longis apice sinus loborum corollae attingentibus, basim versus conspicue abundanterque villoso-ciliatis, infra medium glandulis stipitatis obsitis, supra medium glaberrimis; antheris ca. 5 mm. longis 1 mm. crassis basim versus affixis; stylo glabro, ramis 1 cm. longis, stigmate 1.5 mm. diametro ramis subduplo latiori; ovario glabro; drupis ignotis.

MEXICO: San José, Coalcoman Dist., Michoacan, 750 m. alt., llano by river, tree 8 m. tall, fl. white, June 22, 1939, *Geo. Hinton 13834* (TYPE, Gray Herb.); Villa Victoria, Coalcoman Dist., Michoacan, 700 m.

*For STUDIES IN THE BORAGINACEAE. XIII. see Jour. Arnold Arb. **20**: 375. 1939.

alt., wooded hill, spreading tree 4 m. tall, fl. white, July 10, 1939, *Hinton 13905* (G).

This remarkable species comes from southwestern Michoacan. It is most closely related to *B. huanita* (Llav. & Lex.) Hemsl. but differs conspicuously in its very large funnelform corollas and broad obtuse or rounded leaves. The outside of the corolla-tube and both surfaces of the lobes are glandular puberulent. The huge size and the funnelshape of the corolla in this species are unique, not only in the genus, but even in the subfamily, Ehretioideae, to which the genus belongs.

Heliotropium michoacanum, sp. nov.

Herba "5 dm. alta" basim versus suffruticosa; ramis gracilibus 1–2.5 mm. crassis 15–40 cm. longis stricte longeque pauciramosis pilos minutos 0.2–0.7 mm. longos adpressos saepe curvatos vel contortos et setas rigidas adpressas vel stricte ascendentes saepe e basi subbulbosa orientes gerentibus, internodiis plerumque 2–5 cm. longis; foliis haud firmis viridibus utroque cum setis 0.2–1.2 mm. longis adpressis (supra nonnullis e basi pustulata minuta orientibus) sparse strigosis; lamina 3–7 cm. longa 1–2.5 cm. lata paulo infra medium latioribus utrinque attenuata, apice acuta, basi in petiolum gracilem 3–11 mm. longum abrupte attenuata, subtus costa et nervis (utraque 3–4) prominulis donata, nervis secondariis perinconspicuis; inflorescentiis ebracteatis terminalibus (sed caulibus sympodialibus, ergo cymis maturis tandem pseudolateralibus) maturitate elongatis gracilibus ascendentibus 10–15 cm. longis usque ad 1–5 cm. supra basim nudis alibi abundanter floriferis, rhachi juventate dense albo-strigosa mox sparse strigosa et viridiore; calyce ad anthesin subsessili solum basim versus dense strigoso, lobis distincte inaequalibus lanceolatis, lobo majore ad 3.5 mm. longo et 1 mm. lato quam tubo corollae paulo longiore, ceteris ad 3 mm. longis lineari-lanceolatis 0.2–0.5 mm. latis tubo corollae subaequilongis; calyce fructifero paulo accrescente sparse strigoso viridi ca. 1 mm. longe pedicellato, inferioribus 9–14 mm. distantibus, medialibus 3–5 mm. distantibus; corolla alba inconspicua 4–5 mm. longa intus glabra extus sparse strigosa, limbo patente ad 5 mm. diametro, tubo cylindrico 3 mm. longo; antheris subsessilibus inclusis ca. 1 mm. supra basim tubi corollae affixis ad 1.4 mm. longis elongatis rectis in tertia parte superiore angustioribus, apice liberis glabris glandulosis obtusiusculis; ovario glabro; stigmate sursum attenuato ad 0.9 mm. longo ca. 4-plo longiore quam lato quam stylo 4–5-plo longiore; fructu depresso haud lobato 2.5 mm. diametro 1.5 mm. alto sparse strigoso stigmate subsessili coronato.

MEXICO: Barroloso, Coalcoman Dist., Michoacan, 1300 m. alt., in

woods, becoming 5 dm. tall, fl. white, Aug. 7, 1939, *Geo. Hinton 15069* (TYPE, Gray Herb.).

A well marked species related to *H. fallax* Johnston of Guatemala and Chiapas and particularly to **H. Hintonii,** comb. nov. (*H. fallax* var. *Hintonii* Johnston, Jour. Arnold Arb. **18:** 15. 1937) of central Guerrero (Rio Balsas, *Orcutt 4385*) and southern parts (Temascaltepec Dist.) of the state of Mexico. The new species comes from extreme western Michoacan. From its relatives the proposed species differs in having a short corolla-tube and unjoined anthers, glabrous at the apex. The plant is green rather than pallid. The sepals equal or even surpass the corolla-tube in *H. michoacanum*. In *H. fallax* and *H. Hintonii* the tube conspicuously surpasses the calyx.

Onosma kashmirica, sp. nov.

Planta biennis vel perennis erecta; caulibus ad 5 dm. longis basim versus ad 8 mm. crassis simplicibus foliosis pallidulis hirsutis (setulis patentibus minutis et setis rigidis patentibus pallidulis conspicuis 2–5 mm. longis donatis) apicem versus cymas 1–3 gerentibus; foliis viridibus medio costatis enervatis conspicue hirsutis et minute echinatis; foliis basalibus 15–20 cm. longis 10–14 mm. latis apicem versus latioribus deinde basim versus gradatim attenuatis apice acutiusculis; foliis caulinis numerosis ascendentibus ligulatis, infra medium caulis majoribus 6–9 cm. longis 8–18 mm. latis basim versus abrupte contractis sessilibus apice acutis vel obtusis, superioribus gradatim minoribus; cymis scorpioideis ad anthesin dense congestis, fructiferis elongatis ad 15 cm. longis (floribus 5–10 mm. distantibus), bracteis foliis supremis caulis similibus sed gradatim minoribus plus minusve lanceolatis 1–3 cm. longis 4–10 mm. latis sessilibus apice saepe attenuatis; calyce ad anthesin 12–16 mm. longo 2–5 mm. longe pedicellato, lobis linearibus ca. 1.5 mm. latis acutis adpresse flavescenterque hispidis et minute echinatis; calyce fructifero 5–12 mm. longe pedicellato 16–25 mm. longo, tubo cupulato 2–5 mm. profundo, lobis erectis 14–19 mm. longis cuneato-lanceolatis mediocostatis acutis setas ascendentes conspicuas flavescentes pungentes gerentibus infra medium 2–3.5 mm. latis; corolla flava 2–3 cm. longa granulato-puberulenta apicem versus 8–10 mm. diametro imo ad basim ca. 4 mm. crassa, lobis 3.5 mm. latis ad 2 mm. longis late triangularibus margine reflexis minute sparseque ciliolatis; filamentis ca. 10 mm. longis 5–10 mm. supra basim tubi corollae orientibus infra medium in tubum corollae decurrentibus; antheris ca. 1 mm. longis apice e corolla 2–3 mm. longe exsertis, connectivo dorse pilis brevibus et crassis abundanter donato; nuculis nitidis albidis 5–6 mm. altis.

BRITISH INDIA: Pan Dras, Ladak road, Kashmir, 3000 m., Aug. 1928, *R. R. Stewart 10053* (TYPE, Gray Herb.); Dartse to Tsanskar Sumdo, Lahul, Punjab, June 17, 1856, *Schlagintweit 4432* (G); Jashrang cliffs, Simla District, Bashahr State, Punjab, 2940 m., May 29, 1928, *R. N. Parker 2914* (G); Muksi (T.), Kolong, Chenab Valley, Lahul, Kangra, Punjab, 3300 m., July 16, 1933, *T. R. Chand 115;* western Himalayas, 1500–2400 m., *Thomson* (G); no locality given, *ex herb. Falconer* (G).

This is the plant of the western Himalayas treated by Clarke in Hook. f. Fl. Brit. India **4:** 178 (1883), as *Onosma echioides*. It is given as ranging from Kashmir to Kumaon at 1500–3000 m. alt. It has been illustrated and described, as *O. echioides* Linn., by Blatter, Beautiful Flowers of Kashmir **2:** 60, t. 45, fig. 3 (1929). The plant, however, is not closely related to the European *O. echioides*. Its closest relations are with *O. setosum* Ledeb. of central Asia, from which it differs in its less branched and less abundantly bristly stems and in its broader, coarser and yellow-bristly fruiting calyces.

Lasiocaryum densiflorum (Duthie), comb. nov.

Eritrichium densiflorum Duthie, Kew Bull. **1912:** 39.
? Oreogenia Duthieana Brand in Fedde, Repert. **22:** 103 (1925); Pflanzenr. IV. **252**[2][Heft 97]: 186 (1931).
Microcaryum Duthieanum Brand in Fedde, Repert. **22:** 101 (1925); Pflanzenr. IV. **252**[2][Heft 97]: 202 (1931).

The binomial, *M. Duthieanum* Brand, is essentially a new name for *E. densiflorum* Duthie. Brand seems to have discarded Duthie's trivial name since he believed Duthie's species was an aggregate. Duthie's description, however, applies well to the readily recognizable *Lasiocaryum* of the central and western Himalayas which is related to *L. Munroi* but is coarser and more spreading, and has larger (2–3 mm. rather than ca. 1.5 mm. wide) corollas. It is similar to *M. trichocarpum* of southwestern China but that erect plant has larger (3–5 mm.) corollas and the lower flowers of its cymes are distinctly (3–5 mm. long) pedicellate.

Lasiocaryum diffusum (Brand), comb. nov.

Microcaryum diffusum Brand in Fedde, Repert. **22:** 101 (1925); Pflanzenr. IV. **252**[2][Heft 97]: 202 (1931).

This plant has the habit of *L. Munroi* but is more slender and is greener and much more sparsely hairy throughout, particularly so on the calyx. The pedicels are usually very elongate. Its fruit is covered with more rigid, less appressed, trichomes and its dorsal surfaces are usually more prominently rugose than in *L. Munroi*. The differences in nutlet

attachment, however, is most striking. The elongate broad ventral opening in the pericarp, found in all other species of the genus, is in *L. diffusum* closed except near the base.

The genera *Microcaryum* and *Oreogenia* (the latter a homonym, later changed to *Lasiocaryum*) were originally proposed as monotypic genera to include the Himalayan *Eritrichium pygmaeum* Clarke and *E. Munroi* Clarke. In his treatments of the eritrichioid Boraginaceae, Brand expanded and redefined these two genera to include a total of eleven species, four in *Microcaryum* and seven in *Oreogenia*. His concept of these genera was evidently artificial and confused. Three of the species he placed in these genera, *Oreogenia persica* (Boiss.) Brand, *O. Paulsenii* (Fedtsch.) Brand, and *O. ferghanica* Brand, are undoubtedly species of *Lappula* and probably synonyms of *L. microcarpa* (Ledeb.) Brand, while two others, *Microcaryum turkestanicum* (Franch.) Brand, and *Oreogenia arassanica* (Fedtsch.) Brand, can readily be accommodated in the genus *Eritrichium*.

The illustrations given by Brand, Pflanzenr. Heft **97**: 186 and 202 (1931), show the very different nutlets that characterize *Lasiocaryum* and *Microcaryum*. The nutlets of true *Microcaryum* are angulate and have a firm glabrous pericarp. There is a small oblique suprabasal attachment. The ventral keel is prominent and from the apex is a suture-keel formed by the adhesion of thickened pericarpial edges. These thickened pericarpial edges continue as a rim about the nutlet attachment.

In true *Lasiocaryum* (the correct name for *Oreogenia*) the rounded nutlets have a thin pericarp producing unique short straight or curved bristles which are commonly more or less appressed. In all species, except *L. diffusum*, the attachment-area is narrowly oblong, distinctly lateral and extends over the lower two-thirds of the ventral face. It is not surrounded by thickened pericarpial edges. The short weak keel which extends from the attachment area to the nutlet apex is not a suture but an angle in the pericarp. In *L. diffusum* the conditions are essentially similar. The elongate lateral attachment area found in other species, however, has in *L. diffusum* been narrowed by the encroachment of the pericarpial margins. Above the middle, the attachment area is nearly closed, while below the middle, it has become triangular or subulate in outline. The principal attachment surface, hence, occurs in the lower third of the nutlet ventrum. Above it is a groove formed by the approach of pericarpial walls and in the upper third of the nutlet there is a keel formed by an angle in the unbroken pericarp. Brand placed *L. diffusum* in the genus *Microcaryum*, but in habit and all technical details it is evidently a congener of *Lasiocaryum Munroi*.

Actinocarya acaulis (W. W. Smith), comb. nov.

Eritrichium acaule W. W. Smith, Rec. Bot. Surv. India **4**: 225 (1911).

The nutlets of this species have a crown-like dorsal margin, made up of somewhat confluent glochidiate appendages, and hence roughly suggest those of *Eritrichium*. They have, however, a subapical attachment. Furthermore, they bear, particularly about the basal end, an additional series of distinct glochidiate appendages outside of the primary coronate dorsal margin. The species is most certainly not a member of the genus *Eritrichium*. It is, in fact, an additional member of the *Actinocarya*, a Himalayan genus previously considered monotypic.

The two species of *Actinocarya* are very similar in gross habit. Both are widely distributed in the Indian Himalaya. The original species *A. tibetica* Benth., is apparently glabrous though in reality the leaves are pustulate and strigose beneath. The dimorphic fruits bear numerous minute frequently uncinate hairs as well as numerous glochidiate appendages. In *A. acaulis* the stems and leaves bear relatively coarse elongate loosely appressed hairs. The fruit is nearly glabrous and the secondary glochidiate appendages are fewer and tend to be crowded just outside of the coarse dorsal margin of the nutlets.

The fruits of *A. tibetica* are dimorphic. Those borne along the stems are long-pedicellate and are composed of apically attached nutlets bearing a small crown perched on the back towards the base. Outside this small crown are numerous scattered glochidiate appendages. The fruit produced about the base of the plant has short stout pedicels and more compressed nutlets. The dorsal crown is incomplete or entirely absent. Numerous scattered glochidiate appendages, however, are always present. Depauperate plants of *A. tibetica* may produce only the basal type of fruits. The species, indeed, has a synonym in *Hackelia minima* Brand in Repert. Sp. Nov. **22**: 104 (1925), which was based upon such a depauperate plant.

Eritrichium Thomsoni (Clarke), comb. nov.

Omphalodes Thomsoni Clarke in Hook. f. Fl. Brit. India **4**: 155 (1883).

This Himalayan plant is most certainly not a member of *Omphalodes*. It has fruit which, in shape, attachment and appendages is thoroughly characteristic of *Eritrichium*, in the strict sense, and there is no reason for not treating the plant under that genus.

Amblynotus dauricum (Pallas), comb. nov.

Myosotis daurica Pallas ex R. & S. Syst. **4**: 774 (1819).
Eritrichium dauricum Brand, Pflanzenr. IV. **252**[2][Heft 97]: 193 (1931).
Myosotis obovata Ledeb. Fl. Altaica **1**: 190 (1829).

Eritrichium obovatum DC. Prodr. **10**: 128 (1846).
Amblynotus obovatus Johnston, Contr. Gray Herb. **73**: 64 (1924).

Hackelia thymifolia (A. DC.), comb. nov.

Echinospermum thymifolium DC. Prodr. **10**: 136 (1846).
E. deflexum var. *pumilum* Ledeb. Fl. Ross. **3**: 155 (1847).
Hackelia deflexa var. *pumila* Brand, Pflanzenr. IV. **252**[2][Heft 97]: 126 (1931).

Though confused with *Hackelia deflexa* Opiz, this plant of eastern Siberia and Manchuria is evidently distinct. It is a much smaller, more slender and much branched plant with tiny corollas, smaller fruit and proportionately much shorter pedicels.

Hackelia echinocarya, sp. nov.

Herba ut videtur annua strigosa viridis gracilis; caulibus ascendentibus vel erectis 3–4 dm. altis sparse ascendenterque ramosis basim versus 1–1.5 mm. crassis strigosis (pilis 0.5–1 mm. longis rigidis); foliis basalibus non visis; foliis caulinis viridibus oblanceolatis 2–4 cm. longis 3–6 mm. latis medium versus vel supra medium latioribus apice acutis; foliis inferioribus basi in petiolum gracilem ad 1 cm. longum gradatim attenuatis; foliis medialibus majoribus breviter petiolatis vel subsessilibus; lamina folii medio-costata sed enervata margine inconspicue revoluta utrinque strigosa; cymis gracilibus ramos foliatos terminantibus imam ad basim bracteatis alibi ebracteatis maturitate 10–15 cm. longis; floribus ad 1 cm. distantibus; pedicellis rigidis erectis 1–7 mm. longis apice plus minusve cernuis; calycibus fructiferis patentibus, lobis oblongis 2–2.5 mm. longis 0.5–0.8 mm. latis apice acutiusculis; nuculis 4 homomorphis opacis (minute irregulariterque verrucosis) pilos minutos rigidos erectos numerosos proferentibus, margine aculeos uniseriatos glochidiatos rariter denticulatos 1–1.5 mm. longos compressos basim versus paullo confluentes gerentibus, facie exteriore 2.2–2.5 mm. longis infra medium 1.5–1.8 mm. latis obtusis medio-carinatis, facie interiore angulatis subtrifacialibus paulo supra medium areolam ovatam 0.5 mm. longam gerentibus; gynobasi depresse pyramidali cum stylo ca. 0.5 mm. longo instructo; stylo apices nucularum haud attingente.

CHINA: A-tun-tze, Yunnan, 2700 m., herb on open slope, corolla greenish yellow, Sept. 1935, *Wang 70292* (TYPE, Gray Herb.).

This very distinct species seems to be most closely related to *H. thymifolia* (A. DC.) Johnston, of Manchuria and adjacent Siberia. It differs in having homomorphous nutlets which are verrucose on all surfaces and echinate (with minute stiff erect bristles) on the back and face and even on the marginal appendages. The hairs on the leaves are longer and

more closely appressed than in *H. thymifolia*. The fruit of this latter, more northern species, has heteromorphic nutlets. One nutlet is muricate while the remaining three are more broadly margined and smooth. The odd nutlet has the bristles springing from bulbous bases. These are not present on the margin. In the proposed species the bristles on the nutlets do not have bulbous bases. They are present even on the nutlet-margin and frequently give the latter a ciliate appearance.

I have seen only old withered corollas of *H. echinocarya*. These are about 2 mm. long and have orbicular lobes almost 1 mm. long. The tube is broadly cylindrical and about 0.8 mm. thick. The minute nearly orbicular anthers reach to almost two-thirds the height of the tube. The minute trapeziform faucal appendages are puberulent. Their apices slightly surpass the level of the corolla sinus. They bear a minute ellipsoidal gland. The collector gives the flower-color as greenish yellow. The very similar corollas of *H. thymifolia* seem to be white or even slightly yellowish or bluish.

Rochelia laxa, sp. nov.

Herba annua erecta 5–20 cm. alta e basi laxe ascendenterque longiramosa cum pilis tenuibus rigidis adpressis vel ascendentibus vestita; foliis inferioribus oblanceolatis basim versus attenuatis ceteris linearibus vel oblongis; cymis racemiformibus parvibracteatis unilateralibus; corolla purpureo-caerulea ad 2.5 mm. longa, lobis orbiculari-ovatis ad 0.8 mm. longis; calycibus fructiferis 3–5 mm. longis 5–20 mm. distantibus basi rotundis (haud auriculatis vel gibbosis); lobis 5 ligulatis vel oblongo-lanceolatis 2.5–4 mm. longis 0.5–0.8 mm. latis ascendentibus vel arcuato-decurvatis apices nucularum 0.5–1 mm. longe superantibus, supra medium herbaceis inconspicue costatis, apice acutis, infra medium crasse costatis et membranaceo-marginatis extus pilos rigidos uncinatos e basi bulbosa orientes 1–3 mm. longos proferentibus; pedicellis fructiferis 3–8 mm. longis cum pilis uncinatis rigidis obsitis imam ad basim refractis rectis patentibus apicem versus vix incrassatis; nuculis binis 3–3.3 mm. longis abundanter minuteque tuberculatis, tuberculis pilos perinconspicuos stellatos mox deciduos gerentibus; stigmate 0.2–0.5 mm. apicem nucularum superante.

British India. Kashmir: Mitsahoi, Ladak Road, 3150 m., Aug. 1928, *R. R. Stewart 10002A* (G); Rachogba, Rupshu, 4020 m., dry ground, fl. baby blue with whitish eye, June 24, 1931, *Koelz 2104* (G); Bok, Zanskar, 3450 m., camp-ground, Sept. 13, 1931, *Koelz 2946 a* (type, Gray Herb.). Punjab: Jispa, Lahul, 3150 m., dry plain, fl. baby blue with narrow white eye, June 15, 1931, *Koelz 2042* (G);

Sisu, Lahul, 3600 m., lawn of dak bungalow, fl. blue-purple, June 11, 1931, *Koelz 2030* (G); Rarig, Lahul, 3600 m., fl. purple-blue, July 7, 1933, *Koelz 5304* (G).

This very well marked species appears to have its closest relative in *R. macrocalyx* Boiss. (includes *R. rectipes* Stocks). It differs in its much more loosely branched habit, elongate inflorescences, and deflexed-spreading rather than ascending pedicels, as well as in its coarser obtusish calyx-lobes which only very shortly surpass the nutlets. It also has smaller nutlets and a shorter style. There are now five species of *Rochelia* known from India,— *R. laxa* Johnston, *R. macrocalyx* Boiss., *R. cardiosepala* Bunge, *R. stylaris* Boiss. and *R. disperma* (L.) Wettst. Only *R. laxa* and *R. macrocalyx* bear uncinate hairs on the pedicels and calyx.

Trigonotis tenera, sp. nov.

Planta herbacea strigosa; caulibus pluribus subsimplicibus strigosis 1–2.5 dm. longis 0.5–1 mm. crassis gracillimis ut videtur prostratis vel laxe decumbentibus e radice gracili orientibus; foliis basalibus 4–7 mm. longe petiolatis, lamina triangulari- vel oblongo-ovata vel subcordata 2–4 cm. longa 1.4–2.2 cm. lata apice acuta vel obtusiuscula basi truncata vel subcordata; foliis superioribus valde sed gradatim reductis, supremis (ad basim inflorescentiae) 5–10 mm. longis et 1–4 mm. longe petiolatis; inflorescentia gracillima simplice 7–20-flora racemosa unilaterali caulem foliosum terminante 8–16 cm. longa; floribus infimis (2–3) bracteatis, ceteris ebracteatis; floribus fructiferis 5–10 mm. distantibus; pedicellis ascendentibus gracillimis ad anthesin 2–3 mm. longis fructiferis 3–4-plo longioribus; corolla 2 mm. longa caerulea, tubo ca. 1.2 mm. longo glabro; calyce strigoso lobis ad anthesin ca. 2 mm. longis ascendentibus lanceolatis, lobis calycis fructiferi paulo accrescentibus ad 3 mm. longis, tubo calycis fructiferi 0.5–0.8 mm. longo plus minusve distincto pallido cupulato; nuculis 1–1.3 mm. longis haud tetrahedralibus bifacialibus sparse breviter pilosis, dorse subplanis in ambitu ovatis, basi rotundis vel obtusis, apice acuminatis, margine inconspicue incrassatis obtusiusculis, antice valde angulatis acutis, carina infra medium nuculae in stipitem 0.3–0.5 mm. longum divergentem abrupte transmutata.

CHINA: Meng Shan, Fei Hsien, Shantung Prov., 900 m., very tender herb on side of wall, fl. small blue, Aug. 4, 1936, *Cheo & Yen 312* (TYPE, Gray Herb.); Meng Shan, Fei Hsien, 1100 m., herb in shade, fl. blue, Aug. 6, 1936, *Cheo & Yen 342* (G).

A delicate perennial herb with numerous very slender stems. The leaves are thin and inconspicuously strigose. Those about the base of

the plant have slender elongate petioles. The slender unilateral inflorescence terminates the nearly simple stems. Since the inflorescence is bractless except at the base, the plants appear to be leafy up to the middle and leafless above. The nutlets are elongate with a flattish obscurely margined back and a sharply angulate inner face. The ventral keel diverges at an acute angle from the plane of the dorsal face and below the middle of the nutlet continues off as a well developed divergent stipe. This stipe is straight or slightly incurved. The basal anterior portion of the nutlet (corresponding to the basal triangular anterior face in tetrahedral nutlets) is not conspicuous. The nutlets are evidently elongate and bifacial.

Trigonotis Archboldii, sp. nov.

Herba decumbens; caulibus foliosis assurgentibus 1–2 dm. altis simplicibus vel sparse ascendenterque ramosis 1–2.5 mm. crassis cum pilis fulvis crassis rigidis ca. 1 mm. longis adpressis vel ascendentibus vestitis; foliis firmis evidenter costatis sed enervatis, supra glabris vel laminae apicem versus sparse strigosis, subtus pallidioribus secus costam et marginem strigosis alibi saepissime glabris, setis folii valde adpressis rigidis 0.3–0.5 mm. longis non rariter e basi pustulata orientibus; lamina elliptica vel lanceo-elliptica 1.5–4 cm. longa 0.9–1.5(–1.9) cm. lata, apice rotunda vel obtusa apiculata, basi in petiolum ad 2 mm. latum 1–2.5 cm. longum abrupte contracta; cymis terminalibus (sed perspicue lateralibus) 10–40-floris racemosis ebracteatis vel rariter imam ad basim bracteatis, fructiferis 3–8 cm. longis ad 1 cm. crassis cylindraceis; corolla 6–8(–"12") mm. diametro, tubo ad 2 mm. longo; calyce ad anthesin 2 mm. longo 2–4 mm. longe pedicellato, lobis ovatis acutis ca. 1 mm. longis apice ca. 0.4 mm. infra appendiculas faucium corollae attingentibus; calycibus fructiferis 2.5–3 mm. longis ca. 5 mm. longe ascendenterque pedicellatis, lobis ellipticis quam nuculis ca. 3–4-plo longioribus; nuculis erectis tetrahedralibus ca. 1 mm. altis laevibus nitidis angulatis acutis basi affixis.

British New Guinea: Mt. Albert Edward, headwaters of Chirima River, 3550 m., common, massed between boulders on river-bottom, ascending herb, fl. pink ca. 12 mm. diameter, June 29, 1933, *Brass 4381* (G); Murray Pass, Wharton Range, 2840 m., grassland bordering forest and on banks of streams flowing through forest, common, fl. white, July 25, 1933, *Brass 4598* (G); Mt. Tafa, 2310 m., edge of road and resthouse clearing, common, fl. white, May 24, 1933, *Brass 4024* (type, Gray Herb.).

This is a conventional *Trigonotis* with the flowers in an elongate naked

racemose cyme. Only two other species of this group are known from New Guinea. These are *T. inoblita* F. v. Muell., Trans. Roy. Soc. Victoria, ser. 2, **1:** pt. 2, p. 31 (1889), from the crest of the Owen Standley Ranges, and *T. Haackei* F. v. Muell. l.c. 30, from Mt. Victoria. The types were collected by Sir William MacGregor in 1889. The present species is most closely related to *T. inoblita* from which it differs in its very much larger corollas, longer pedicels, and more elongate leaf-blades. *Trigonotis inoblita*, judging from description, has orbicular- to elliptic-ovate leaf-blades, petiolate below and sessile above, corollas 2–3 mm. broad, and pedicels 1–2 mm. long. The other Papuan species, *T. Haackei*, has the leaves "linear- to elongate-lanceolate or the lower more ovate, broadly sessile," crowded, 18–36 mm. long and the naked "corymbiform" cymes 2–5 cm. long. The pedicels are as long as the calyx (ca. 4 mm.) or soon somewhat longer. The nutlets are 2–2.5 mm. long and apparently bifacial. The corolla must be over 5 mm. broad. This latter species is evidently a distinct one and very different from *T. inoblita* and *T. Archboldii*. The present species is named in honor of Mr. Richard Archbold, well known explorer. The type was collected during his first expedition to New Guinea.

Trigonotis abata, sp. nov.

Herba repens; caulibus 0.5–1 mm. crassis elongatis longe dichotome ramosis strigosis; foliis alternis 3–20 mm. distantibus asymmetricis ovatis vel ellipticis 8–20 mm. longis 8–15 mm. latis, utrinque setis 0.5–1 mm. longis rigidis (in facie superiore laminae ascendentibus, in facie inferiore adpressis) e basi pustulata orientibus obsitis, costatis (costa curvata) sed enervatis, apice obtusis apiculatis, basi laminae obliquis, in petiolum subvaginatum ad 2 mm. longum et latum abrupte contractis; floribus caulinis solitariis extra-axillaribus saepe infra petiolos gestis; pedicellis strigosis ad anthesin 1–2 mm. longis maturitate 2–3 mm. longis recurvatis; calycibus ca. 2 mm. longis strigosis, lobis lanceolatis ca. 1 mm. longis quam tubo corollae duplo longioribus; lobis calycis fructiferi oblongo-ovatis acutis ad 3 mm. longis 1.5 mm. latis, apice acuminatis nuculas paulo superantibus; corolla alba, limbo ad 5 mm. diametro; nuculis 4 angulatis erectis nigris laevibus (vel sub lente minutissime punctulatis) 1.5 mm. latis ca. 2.1 mm. longis dorsi-ventraliter compressis ergo duplo latioribus quam crassis, dorso in ambitu ovatis 1.5 mm. latis ca. 2 mm. longis, ventre carinatis obtusis, ima ad basim carinae cicatrice obliqua minuta triangulata donatis; gynobasi late pyramidali; stigmate ca. $\frac{2}{3}$ altitudinem nuculae attingente.

DUTCH NEW GUINEA: 7 km. NE. of Wilhelmina-top, 3560 m. alt.

creeping in ground-moss of forest-edge, locally common, fl. white, Sept. 1938, *Brass & Myer-Drees 9838* (TYPE, Gray Herb.); Lake Habbema, 3225 m., creeping in ground-moss, shrubbery bordering forest, fl. white, Aug. 1938, *Brass 9477* (G); 9 km. NE. of Lake Habbema, 2800 m., prostrate and creeping on open sandy bed of a stream, rare, fl. white, Oct. 1938, *Brass 10818* (G).

This very distinct species is remarkably similar in all vegetative details to the plant of northeastern New Guinea described as *Zoelleria procumbens* Warb. The only obvious difference is in the length of the petioles. This creeping plant roots at its nodes and clings close to the ground. Its leaves, alternating on either side of the slender stems, are flattened against the substratum. So flattened against the soil is the plant that the stem and leaf-blades lie in a single plane. In accommodating a basic 3/5 phyllotaxy to this flattened dorsi-ventral distichous arrangement the short petioles have become slightly twisted and the blade obliquely reflexed at its base.

The discovery of this and the following Papuan species has forced a consideration of the precise relationship existing between the Malaysian genera *Zoelleria* Warb. (1892) and *Havilandia* Stapf (1894), and the more widely distributed genus *Trigonotis*. As a result I am now of the opinion that these three genera are so closely and intimately related that their continued separation can no longer be justified. *Zoelleria* and *Havilandia* agree in all vegetative and floral details except the number of ovules. The only justification for separating them from *Trigonotis* must rest in their type of inflorescence and in the form of their nutlets. The flowers of these Malaysian genera are borne singly along leafy prostrate or creeping stems. In *Trigonotis* the flowers are borne in terminal racemose cymes. These cymes are usually naked but in some species (e.g. *T. radicans* Maxim. and *T. delicatula* Hand.-Mazz.) they bear numerous conspicuous leafy bracts scattered throughout. These leafy bracts oppose the pedicels or are borne above them. The flowers of *Zoelleria* and *Havilandia* are also extra-axillary. There is accordingly no real morphological difference between *Zoelleria* and *Havilandia* and the species of *Trigonotis* mentioned, either in inflorescence or growth-habit.

The nutlets of the species of *Zoelleria* and *Havilandia*, previously known, are very uniform in structure and shape. In the particular case of *Zoelleria procumbens* and *Havilandia papuana* they are so similar as to be almost indistinguishable. They are somewhat compressed laterally and have a rounded back. They have no ridges, wings, nor angles which distinctly separate the dorsal and ventral surfaces and thus form

the so-called "bifacial" nutlet. The tetrahedral form, which prevails in *Trigonotis*, and which develops by the formation of a transverse angle or ridge across the back of a bifacial nutlet, is not known in these older species of *Havilandia* or *Zoelleria*. These details in nutlet-form perhaps could have justified the continued recognition of *Zoelleria* and *Havilandia* had not the present species been discovered. In *Trigonotis abata*, n. sp., we have a species which agrees with *Zoelleria procumbens* in almost all, even the most minor details, except only in the number and form of its nutlets. Such extended agreement can only be the result of a very strong and intimate relationship. Yet though giving every evidence of a close relationship with *Zoelleria procumbens* our new species has only four nutlets and these bifacial in form. In type and form its nutlets agree perfectly with those of such indubitable members of *Trigonotis* as, *T. heliotropifolia* Hand.-Mazz., *T. delicatula* Hand.-Mazz. and *T. Rockii* Johnston. The Papuan plant falls naturally and inevitably into *Trigonotis*. With *T. abata* established as an indubitable species of *Trigonotis*, all the supposed peculiarities in habit, which might have been used to justify the continued recognition of *Zoelleria* and *Havilandia*, have been completely destroyed. These small putative genera and *Trigonotis* can be distinguished only by the presence or absence of a marginal wrinkle or ridge in the pericarp. When the obviously close affinity of *Zoelleria procumbens* and *Trigonotis abata* is considered, the difference in the presence or absence of a wrinkle seems trivial indeed. These small Malaysian genera are consequently submerged in *Trigonotis*.

In submerging *Zoelleria* in *Trigonotis* I am aware that Gürke, Engl. & Prantl, Nat. Pflanzenf. IV. **3a:** 81 and 131 (1893) considered it so remarkable that he placed it in a special tribe (the *Zoelleriae*) as the culmination of evolution in the *Boraginaceae*. His sole reason for doing this was found in the pleiomerous gynoecium. The original species, *Zoelleria procumbens*, has flowers producing 10 ovules and 10 nutlets. Another species, which must go into *Zoelleria* if that genus continues to be recognized, is described below as *Trigonotis pleiomera*. It develops 8–10 ovules and nutlets. Both species come from northeastern New Guinea. It is an interesting fact, however, that both of these species, which are obviously different, show strong affinities with species that have a normal gynoecium and so are excluded from the genus. As has been mentioned, *Zoelleria procumbens* agrees with *Trigonotis abata* in all characters save only the shape and number of nutlets. Similarly, *Trigonotis pleiomera* agrees with *Havilandia robusta* Johnston in practically all details except the number, form and markings of the nutlets. The agreement between *Trigonotis pleiomera* and each species of *Havi-*

landia is so extensive and so detailed that mere differences in number of ovules developed seem trivial and rather specific than generic in value. In fact, I am of the opinion that the pleiomerous gynoecium of *Zoelleria*, far from being the survival of a condition in the ancestors of the *Boraginaceae*, is merely a recent reversion to that condition. It is interesting, but is merely a secondary character of recent origin, present in two species both of which have other evident relatives with normal gynoecia.

Eight Malaysian species are known to belong to the *Zoelleria* and *Havilandia* groups of *Trigonotis*. These prostrate plants with cauline flowers may be readily keyed as follows:

Ovules and nutlets 8–10.
  Corolla 7–9 mm. broad; leaves elliptic- to obovate-oblong, strigose on margin and midrib, otherwise glabrous. ....*T. pleiomera.*
  Corolla ca. 4 mm. broad; leaves orbicular to ovate, conspicuously strigose on both faces. .....*T. procumbens.*
Ovules and nutlets 4.
  Nutlets angulate, dorso-ventrally compressed, margined. .....*T. abata.*
  Nutlets with rounded back, somewhat laterally compressed, not margined.
    Leaves linear-lanceolate, acute. .....*T. minuta.*
    Leaves oblong-obovate to oblanceolate, apex obtuse or rounded.
      Fruit opaque, minutely tuberculate.
        Corolla 8–10 mm. broad; pedicels 8–12 mm. long; leaves oblanceolate. .....*T. robusta.*
        Corolla 4 mm. broad; pedicels 1–2 mm. long; leaves elliptic or obovate. .....*T. opaca.*
      Fruit lustrous, smooth.
        Leaves oblanceolate, gradually contracted into the petiole; nutlets lanceolate; Borneo. .....*T. borneensis.*
        Leaves obovate or elliptic, abruptly contracted to a short sheathing petiole; nutlets short; Papua. ...*T. papuana.*

Trigonotis pleiomera, sp. nov.

Herba prostrata; ramis gracilibus 0.5–1 mm. crassis elongatis ascendenter ramulosis strigosis; foliis alternis elliptico- vel obovato-oblongis 1–2 cm. longis 3–9 mm. latis medium versus vel supra medium latioribus, apice rotundis vel late obtusis obscure apiculatis, basi in petiolum ca. 2 mm. latum gradatim vel abrupte contractis, subtus secus costam cum setis adpressis numerosis 0.5–0.8 mm. longis ornatis alibi glabris, supra glabris, margine setas adpressas vel ascendentes gerentibus; floribus caulinis saepissime extra-axillaribus; pedicellis 10–15 mm. longis

gracilibus strigosis; corolla alba, limbo 7–9 mm. diametro; calyce 4–5 mm. longo basim versus lobato fructifero vix accrescente, lobis oblongis secus lineam centralem strigosis alibi glabris quam tubo corollae subduplo longioribus; ovulis 8–10; nuculis 8–10 plus minusve pallidis laevibus, a latere visis ca. 1.1–1.4 mm. altis et 0.8–1 mm. latis paulo infra medium latioribus, margine ventrali rectis erectis, dorso rotundis (haud angulatis), nuculis *ab apice visis* cuneatis ad 0.5 mm. crassis, ventre acutis; cicatrice plus minusve obliqua vel subbasali elongata minuta imam ad basim carinae nuculae gesto; gynobasi concava vel subplana.

NORTHEAST NEW GUINEA: Sarawaket, Morobe Prov., 3600–3900 m., April 7, 1937, *Clemens 5989* (TYPE, Gray Herb.); Samanzing, Morobe Prov., 2400–2700 m., creeper, edge of bush, fl. white, Feb. 15, 1939, *Clemens sine no.* (G).

This plant has the habit and general appearance of *T. papuana*, *T. robusta* and *T. opaca*, but has the numerous nutlets of *T. procumbens*. Its habit is that of *Havilandia* but the polymerous gynoecium belongs to *Zoelleria*.

Trigonotis procumbens (Warb.), comb. nov.

Zoelleria procumbens Warburg, Bot. Jahrb. **17**: 28 (1893).

NORTHEAST NEW GUINEA: Finisterre mountains, 1400 m., creeping, Oct. 15, 1888, *Hellweg 331* (TYPE, Berlin); Sarawaket, 2400–2700 m., 1937, *Clemens 5987* (G); Samanzing, Morobe Prov., creeper, wet ground, steep mountain, 1500–1800 m., Sept. 23, 1938, *Clemens 8862* (G).

Trigonotis minuta (Wernh.) Johnston, Contr. Gray Herb. **81**: 81 (1928).

Lithospermum minutus Wernh. Trans. Linn. Soc. London, ser. 2, 9: 118 (1916).

Plagiobothrys minutus (Wernh.) Johnston, Contr. Gray Herb. **73**: 68 (1924).

This species remains known from a tiny inadequate specimen collected by Kloss, between 3100 and 3700 m., on Mt. Carstensz, Dutch New Guinea, during the Wollaston Expedition of 1912–13. The fruit is not known.

Trigonotis robusta (Johnston), comb. nov.

Havilandia robusta Johnston, Jour. Arnold Arb. **16**: 191 (1935).

Known only from the type (*Brass 5681*) collected at 3680 m., Mt. Albert Edward, British New Guinea.

Trigonotis opaca (Johnston), comb. nov.

Havilandia opaca Johnston, Jour. Arnold Arb. **16**: 190 (1935).

Known only from the type collected by *Brass no. 4178*, in the Murray Pass, Wharton Range, 2840 m., British New Guinea.

Trigonotis borneensis (Stapf), comb. nov.

Havilandia borneensis Stapf, Trans. Linn. Soc. London, ser. 2, **4**: 209, tab. 16 (1894).
Lithospermum borneense (Stapf) Boerl. Handl. Fl. Nederl. Ind. **2**: 488 (1899).
Plagiobothrys borneensis (Stapf) Johnston, Contr. Gray Herb. **73**: 68 (1924).

Known only from the higher altitudes on Mt. Kinabalu, British North Borneo, where it has been found by various collectors.

Trigonotis papuana (Hemsl.), comb. nov.

Havilandia papuana Hemsley, Kew Bull. **1899**: 107.

BRITISH NEW GUINEA: Mt. Albert Edward, 3680 m., *Brass 4245* (G). NORTHEAST NEW GUINEA: vicinity Samanzing, upper camp, prov. Morobe, 2400–2700 m., creeping, marshy grassland with *T. pleiomera*, Feb. 15, 1939, *Clemens sine no.* (G). DUTCH NEW GUINEA: Mt. Wilhelmina, 3800–4100 m., among grass-tussocks, wet soil, Sept. 1938, *Brass & Myer-Drees 10042, 10105, 10106* and *10215* (G); Lake Habbema, 3225 m., sandy banks of grassland streams, Aug. 1938, *Brass 9176* (G).

This species was originally based upon collections made from British New Guinea, obtained on Mt. Scratchley, 3660 m., and in the Wharton Range at 3330 m. Possibly also referable to this species is a collection (*Kjellberg 3911*) at Buitenzorg collected at 3200 m. in central Celebes. The habit of this plant is certainly that of the present species but no nutlets have been seen and the identification must remain doubtful.

Cryptantha Milobakeri, sp. nov.

Planta erecta herbacea annua 2–4.5 dm. alta; caulibus viridibus ramos plures rigidos stricte ascendentes elongatos proferentibus pilis rigidis saepe 0.3–0.8 mm. longis et setis divaricatis 0.5–1 mm. longis sparsioribus ornatis; foliis caulinis viridibus 1–3 cm. longis 1.5–5 mm. latis lineari-oblongis vel lineari-lanceolatis, setis rigidis ascendentibus vel erectis e basi pustulata orientibus ca. 1 mm. longis obsitis; cymis terminalibus ebracteatis, eis caulis et ramorum majorum geminatis vel non rariter ternatis juventate brevibus et densis mox elongatis 5–15 cm. longis dissitifloris; calyce fructifero saepe pallide sericeo-villoso ca. 4 mm. (rariter ad 5 mm.) longo ascendente, lobis lanceolatis (apice conniventibus) pilis multis gracilibus mollibus adpressis ad 1 mm. longis

saepe conspicue vestitis, costa inconspicue debiliterque armata, setis costae pilis partium reliquarum lobi similibus saepe adpressis, basi calycis saepe oblique attenuata rariter subrotundata ad 0.5 mm. longe pedicellata; corolla 2–4 mm. diametro 2.5–4 mm. longa; ovulis 4; nuculis saepe solitariis et abaxialibus rariter 2–4, lanceo-ovatis laevibus nitidis inconspicuissime vel haud granulatis 1.8–2.5 mm. longis 1–1.2 mm. latis, dorse convexis, margine rotundis, ventre obtusis, sulco clauso basim versus furcatis; stigmate $\frac{2}{3}$–$\frac{3}{4}$ altitudinis nuculae attingenti.

CALIFORNIA: burnt region along Bottle Rock road, Lake Co., May 16, 1936, *Milo S. Baker 8268* (G); open places in chaparral about midway between Kelseyville and Lower Lake, Lake Co., May 5, 1934, *Milo S. Baker 7629* (TYPE, Gray Herb.); southeast side of Snow Mt., above Bonnie View, Lake Co., shale in Yellow Pine Belt, June 7, 1919, *Heller 13236* (G); between Mud Flat and Bennett Spring, on Newville-Covelo road, Glenn Co., northerly slope, open gravelly places, 2500 ft., June 5, 1915, *Heller 11928* (G); at river-bridge near Redding, Shasta Co., gravel and sand, May 29, 1905, *Heller 7883* in pt. (G); New River Bluffs, Trinity Co., warm rocky slopes, 1500 ft., Jan. 28, 1923, *Tracy 6388* (G); New River Bluffs, 1400 ft., April 27, 1924, *Tracy 6659* (G); hills west of mouth of South Fork of Trinity River, Humboldt Co., 2000 ft., among scattered brush especially on serpentine, June 14, 1932, *Tracy 10141* (G); hills west of South Fork Trinity River, near mouth, 2100 ft., prairies on hill and in open woods, June 10, 1936, *Harris & Tracy 3270* (G); Supply Creek, west of Hoopa Valley, Humboldt Co., 1000 ft., sunny warm slope, May 15, 1927, *Tracy 8050* (G); Grouse Mt., Humboldt Co., 4700 ft. edge of brush in grassy open country, June 27, 1934, *Tracy 11060* (G); Smith River, Del Norte Co., abundant along roadsides and on open gravelly prairie lands, June 4, 1937, *Parks 24011* (G).

This plant of northwestern California is most closely related to *C. grandiflora* Rydb., which ranges in the warm valleys of the Snake River and its tributaries in western Idaho and adjacent Washington and Oregon, and in the upper John Day Valley in northeastern Oregon. The Californian plant is taller, more freely branched, and very much less bristly, and its corollas are distinctly smaller than in its northern relative. The weakly differentiated usually appressed trichomes on the calyx-ribs, the relatively well developed corollas, the usually solitary broad polished nutlet, and the well developed geminate or ternate naked cymes serve to characterize the species. The specimens of *C. Milobakeri* from the eastern slopes of the Coast Ranges are very uniform and distinctive. The calyx is appressed villous and somewhat silky and the ribs have no well developed bristles. The material from Humboldt County,

however, is less extreme. Plants from this latter area tend to have the trichomes borne on the calyx-ribs weakly differentiated and somewhat coarser and less appressed than those borne on the other parts of the calyx.

In my monograph of the genus the present plant was included in *C. Hendersonii.* Subsequent study, however, has shown my former concept of *C. Hendersonii* to be complex and that, most certainly, forms with smooth and forms with roughened nutlets were improperly associated under one species. The names *C. grandiflora* and *C. Milobakeri* cover most of the smooth-fruited plants formerly referred to *C. Hendersonii* (Nels.) Piper. There remains, however, two other smooth-fruited plants, the poorly understood *C. incana* Greene from the southern Sierras (Tulare Co.) and *C. trifurca* Eastw., of Siskiyou County. These are probably distinct. I know them, however, only from the type-collections.

Cryptantha crymophila, sp. nov.

Herba perennis; caulibus pluribus 1.5–3 dm. altis erectis simplicibus minute villosis et hirsutis; foliis griseis cum pilis minutis villosis plus minusve vestitis et cum setis 2–3 mm. longis e basi minuta pustulata orientibus obsitis, in facie inferiore (et non rariter secus marginem folii) setis ascendentibus vel erectis (alibi adpressis) donatis; foliis inferioribus elongatis 7–9 cm. longis spathulato-oblanceolatis in tertia parte superiore latioribus 7–9 mm. latis deinde basim versus gradatim attenuatis apice obtusis; foliis caulinis superioribus oblanceo-ligularibus vel ligularibus 4–5 cm. longis 4–5 mm. latis acutis cymulas infimas valde reductas suffulcientibus et eas conspicue (saepe 3–5-plo) superantibus; cymis glomeratis supra medium caulis gestis, inferioribus reductis inconspicuis distantibus deinde sursum gradatim majoribus, supremis maximis (rhachibus cymarum maturum 5–15 mm. longis) 3–7-floris congestis partem principalem inflorescentiae fructiferae 2–3 cm. crassam formantibus; corolla alba ca. 8 mm. longa, limbo ad 5 mm. diametro; calyce ad anthesin ca. 5 mm. longo, lobis lineari-oblongis apice altitudinem appendicularum faucium corollae attingentibus; calyce fructifero accrescente 13–15 mm. longo, lobis subaequalibus elongatis quam nuculis ad 3-plo longioribus basim versus ca. 2 mm. latis deinde apicem versus gradatim attenuatis in margine et costa inconspicua setas sparsas 2–4 mm. longas pungentes gerentibus alibi sparse inconspicueque villosis (pilis 0.4–1 mm. longis), basi calycis maturi rotunda 1–2 mm. longe pedicellata; nuculis 4 in ambitu ovatis 4.5–5 mm. longis et 3 mm. latis, margine 0.25 mm. late alatis, basi rotundis, apice obtusiusculis, dorso irregulariter rugosis (rugis prominentibus interruptis plus minusve trans-

versis), ventre laevibus, sulco anguste aperto subulato a basi fere apicem corporis veri nuculae attingente; gynobasi subulata nuculis subaequilonga; stigmate apicem nuculae fere ad 1 mm. superante.

CALIFORNIA: Red Peak, Alpine Co., July 28, 1939, *R. F. Hoover 4193* (TYPE, Gray Herb.).

This very well marked species is most closely related to *C. nubigena* (Greene) Payson, of the southern Sierras. It differs from its relative in its taller habit of growth, its less firm more elongate leaves, its very large more elongate fruiting calyces, and its much larger ovate (rather than oblong) definitely winged-margined more prominently rugose nutlets. The type was collected on Red Peak which lies about seven miles west-northwest of Sonora Pass. Payson reports *C. nubigena* from Sonora Pass, and I have seen a coarse form of the species (*Sharsmith 2902*) from Leavitt Peak, a few miles south of the Pass. *Cryptantha nubigena*, like various other alpine plants of the southern Sierras, may reach its northern limit at Sonora Pass. The new species is perhaps a more northerly ranging plant which reaches its southern limit near the same floristic boundary.

According to Mr. Hoover, *Cryptantha crymophila* grows in loose rocks about the summit of Red Peak (about 9950 ft.) down to about 9500 ft. altitude. Associated species include *Lupinus meionanthus, Senecio canus* and *Erigeron compositus*. Red Peak is composed of dark, fine-grained rock said to be of volcanic origin. Some scattered shrubs of *Pinus albicaulis* grow up to the very summit. Mr. Hoover writes me that he collected the present species on the adjacent Bald Peak in 1936. The material, however, was in early flowering condition.

Cryptantha capitata (Eastw.), comb. nov.

Oreocarya capitata Eastwood, Leaflets West. Bot. **1**: 9 (1937).

This relative of *C. confertiflora* (Greene) Payson remains known only from the localities in the Grand Canyon where it was originally found by Miss Eastwood.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.