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TAXONOMIC NOTES ON THE CALIFORNIA FLORA

DAVID D. KECK

The New York Botanical Garden

In anticipation of the forthcoming California Flora written by P. A. Munz and the writer, it is desirable to put on record here nomenclatural notes, and certain new species, subspecies, varieties and combinations in the family Compositae to be referred to in that work.

Encelia virginensis* A. Nels. subsp. *actoni* (Elmer), comb. nov.Encelia actoni* Elmer, Bot. Gaz. 39: 47, 1905.

Typical *E. virginensis* is a plant of the eastern Mojave Desert and eastward; subsp. *actoni*, with larger more densely canescent leaves, occurs along the western side of the Colorado and Mojave deserts and in adjacent cismontane valleys north to Owens Valley, thence east to the White Mountains, the Death Valley region, and adjacent Nevada.

Dicoria canescens* T. & G. subsp. *hispidula* (Rydb.), comb. nov.Dicoria hispidula* Rydb., N. Am. Fl. 33: 12, 1922.***Dicoria canescens* T. & G. subsp. *clarkiae* (Kenn.), comb. nov.***Dicoria clarkiae* (pro *clarkae*) Kenn., Muhlenb. 4: 2, 1908.***Laphamia megacephala* Wats. subsp. *intricata* (Bdg.), comb. nov.***Laphamia intricata* Bdg., Bot. Gaz. 27: 450, 1899.*Monothrix intricata* Rydb., N. Amer. Fl. 34: 20, 1914.***Hulsea californica* T. & G. subsp. *inyoensis*, subsp. nov.**

A subsp. *californica* involucri squamis late lanceolatis acuminatis; acheniis 7.5 mm. longis; pappo 1 mm. longo, paleis subaequalibus quadratis differt.

Type. *Annie M. Alexander* and *Louise Kellogg 3003*, on black slate talus, north slope, Mazourka Canyon, Inyo Mts., Inyo County, California, at 6500 feet elevation, June 18, 1942 (NY).

This plant was distributed as *H. algida* Gray, but its affinities are rather with *H. californica*. On the basis of the limited collections available it appears to be assignable to the latter as a subspecies, but further study may serve to elevate it to specific rank. *H. californica* has linear-oblong short- or long-acuminate phyllaries, akenes 5 mm. long with unequal pappus-paleae, those over the angles being 2-3 mm. long, and a distribution from San Diego County into Lower California.

Baeria macrantha* (Gray) Gray var. *bakeri* (J. T. Howell), comb. nov.Baeria bakeri* J. T. Howell, Leaflet West. Bot. 1: 7, 1932.***Chaenactis glabriuscula* DC. var. *gracilentata* (Greene), comb. nov.***Chaenactis gracilentata* Greene, Fl. Fran. 447, 1897.*C. tanacetifolia* Gray, Proc. Amer. Acad. 6: 545, 1865.*C. tanacetifolia* var. *gracilentata* Stockw., Contr. Dudl. Herb. 3: 124, 1940.

Grindelia hirsutula H. & A. subsp. **rubricaulis** (DC.), comb. nov.*Grindelia rubricaulis* DC., Prodr. 5: 316, 1836.**Grindelia stricta** DC. subsp. **venulosa** (Jeps.), comb. nov.*Grindelia venulosa* Jeps., Man. Fl. Pl. Calif. 1021, 1925.**Grindelia stricta** DC. subsp. **blakei** (Steys.), comb. nov.*Grindelia blakei* Steys., Ann. Mo. Bot. Gard. 21: 567, 1934.**Grindelia latifolia** Kell. subsp. **platyphylla** (Greene), comb. nov.*Grindelia robusta* var. *platyphylla* Greene, Pitt. 2: 289, 1892.**Grindelia robusta** var. **bracteosa** (J. T. Howell), comb. nov.*Grindelia bracteosa* J. T. Howell, Madroño 2: 22, 1931.**Amphipappus fremontii** T. & G. subsp. **spinosa** (A. Nels.), comb. nov.*Amphiachyris fremontii* var. *spinosa* A. Nels., Bot. Gaz. 47: 431, 1909.*Amphipappus spinosa* A. Nels., Amer. Jour. Bot. 21: 579, 1934.*A. fremontii* var. *spinosa* C. L. Porter, Amer. Jour. Bot. 30: 483, 1943.**Chrysopsis oregona** (Nutt.) Gray var. **compacta**, var. nov.

Suffruticulosa rotunda compacta 1.5-4 dm. alta pallida dense hispida-canescens et glandulosa-atomifera, pilis pustulosus; foliis plerisque 1-2 cm. longis dense confertis oblongo-lanceolatis; capitulis confertis juxta summitatem ramorum; involucre 8-10 mm. alto squamis glandulosis sed sparse pubescentibus.

Type. A. A. Heller 13736, plentiful in the gravelly bed of a dry wash near Newville, Tehama County, California, in the *Quercus douglasii* belt, October 15, 1922 (NY). This variety occurs on both sides of the Central Valley of California, below 1000 feet, from Tehama County to Fresno County, and it flowers from June to October.

The genus *Pentachaeta* Gray, endemic to the California floristic province and with six recognized species, is found to be morphologically untenable as distinct from *Chaetopappa* DC., a group of about ten species centering in Texas and northern Mexico. The morphological transition occurs between such forms as *Chaetopappa asteroides* DC. and *Pentachaeta aurea* Nutt., the genotypes of their respective genera, and is more pronounced in details of habit between *C. asteroides* and *P. exilis* (Gray) Greene and in flower-color between *asteroides* and *P. bellidiflora* Greene. No characters of generic value in the Compositae remain to sustain the generic distinction, hence the following transfers. In 1946 Shinnery started the consolidation of *Chaetopappa* by transferring the Grayan genera *Keerlia* and *Diplostelma* to it. The inclusion of *Pentachaeta* follows naturally.

Chaetopappa lyonii (Gray), comb. nov.*Pentachaeta lyonii* Gray, Syn. Fl. 1(2): 446, 1886.**Chaetopappa aurea** (Nutt.), comb. nov.*Pentachaeta aurea* Nutt. Trans. Amer. Phil. Soc. II, 7: 336, 1841.**Chaetopappa fragilis** (Bdg.), comb. nov.*Pentachaeta fragilis* Bdg., Univ. Calif. Publ. Bot. 6: 170, 1915.**Chaetopappa bellidiflora** (Greene), comb. nov.*Pentachaeta bellidiflora* Greene, Bull. Calif. Acad. 1: 86, 1885.

Chaetopappa exilis (Gray), comb. nov.*Aphantochaeta exilis* Gray, Pacif. Rail. Rep. 4: 100, t. 11, 1857.*Pentachaeta exilis* Gray, Proc. Amer. Acad. 8: 633, 1873.*P. exilis* var. *aphantochaeta* Gray, Bot. Calif. 1: 305, 1876.*P. aphantochaeta* Greene, Bot. Gaz. 8: 255, 1883.**Chaetopappa alsinoides** (Greene), comb. nov.*Pentachaeta exilis* var. *discoidea* Gray, Bot. Calif. 1: 305, 1876, in part.*P. alsinoides* Greene, Bull. Calif. Acad. 1: 86, 1885.**Haplopappus uniflorus** (Hook.) T. & G. subsp. *linearis*, subsp. nov.

A subsp. *uniflorus* foliis radicalibus graminioides 8-12 cm. longis 1.5-4 mm. latis integerrimis differt.

Type. *J. H. Christ 14081*, from mountain meadows at Mud Flats, 44 miles sw. of Grandview, Owyhee County, Idaho, June 17, 1943 (NY). Occurs in marshy land from Owyhee County, Idaho to Harney County, Oregon. This taxon has commonly gone under the name of *H. howellii* Gray (*H. uniflorus* subsp. *howellii* Hall), but the type of that name is clearly referable to *H. uniflorus* subsp. *uniflorus*.

Haplopappus racemosus (Nutt.) Torr. subsp. *liatriformis* (Greene), comb. nov.*Pyrrocoma liatriformis* Greene, Leaf. Bot. Obs. 2: 17, 1909.*Haplopappus integrifolius* subsp. *liatriformis* Hall, Carnegie Inst. Wash. Publ. 389: 111, 1928.**Haplopappus lucidus** (Keck), comb. nov.*Haplopappus racemosus* subsp. *lucidus* Keck, Madroño 5: 167, 1940.**Haplopappus whitneyi** Gray subsp. *discoideus* (J. T. Howell), comb. nov.*Haplopappus whitneyi* var. *discoideus* J. T. Howell, Leaf. West. Bot. 6: 84, 1950.**Haplopappus ophitidis** (J. T. Howell), comb. nov.*Haplopappus bloomeri* var. *ophitidis* J. T. Howell, Leaf. West. Bot. 6: 85, 1950.**Haplopappus venetus** (HBK.) Blake var. *argutus* (Greene), comb. nov.*Isocoma arguta* Greene, Man. Bay Region 175, 1894.*I. veneta* var. *arguta* Jeps., Fl. W. Mid. Calif. 560, 1901.**Haplopappus squarrosus** H. & A. subsp. *grindelioides* (DC.), comb. nov.*Pyrrocoma grindelioides* DC., Prodr. 5: 350, 1836.*Aster grindelioides* Kuntze, Rev. Gen. 316, 1891.

Hall removed two strongly marked subspecies from this well-known species in his monograph of the genus in 1928, but he did not comment on the fact that in the Coast Ranges from Monterey to the mountains back of Santa Barbara the collections are morphologically readily distinguishable from those occurring from Santa Barbara to northern Lower California. The type of the species belongs to the southern form, which is marked by scanty pubescence, large heads, involucre 11-15 mm. high, prominently glandular-scurfy phyllaries, and yellow-tawny pappus. The northern subsp. *grindelioides* is more strongly hairy, with smaller heads, the involucre usually being 8-11 mm. high and having prominently cinereous phyllaries that are glandular only marginally if at all, and red-brown pappus.

Solidago canadensis L. subsp. *elongata* (Nutt.), comb. nov.*Solidago elongata* Nutt., Trans. Amer. Phil. Soc. II, 7: 327, 1841.*Aster elongatus* Kuntze, Rev. Gen. 1: 318, 1891.*S. lepida* var. *elongata* Fern., Rhodora 17: 9, 1915.

***Solidago canadensis* L. subsp. *salebrosa* (Piper), comb. nov.**

Solidago serotina var. *salebrosa* Piper, Fl. Palouse Region 185, 1901.

S. canadensis var. *salebrosa* Jones, Bull. U. Mont. Biol. 15: 49, 1910.

S. salebrosa Rydb., Fl. Rocky Mts. 870, 1917.

S. gigantea var. *salebrosa* Friesn., Butler U. Bot. Stud. 4: 196, 1940.

***Solidago spathulata* DC. subsp. *glutinosa* (Nutt.), comb. nov.**

Solidago confertiflora DC., Prodr. 5: 339, 1836; not *S. c.* Nutt., 1834.

S. glutinosa Nutt., Trans. Amer. Phil. Soc. II, 7: 328, 1840.

***Chrysothamnus axillaris*, sp. nov.**

Fruticosa rotunda 3-6 dm. alta, ramis intricatis tenuibus glabris cum cortice alba, cum alabastris parvis in axillis foliorum seniorum; foliis arte involutis teretis viridibus extendis filiformibus 0.5 mm. latis mucrone callosio apiculatis; paniculae terminales subcorymbosae ramis subumbellatis; capitulis 3-5-floris; involuacro turbinato 5-6 mm. alto, squamis 4-seriatis valde graduatis late linearibus acris acris vel apiculatis apice ciliolatis; corolla ca. 5 mm. longa, lobis 1-1.2 mm. longis; achenio sericeo; pappo moderate breve.

Type. *Roxana S. Ferris* 6924, from desert slopes in granitic sand at the head of Deep Springs Valley, Inyo County, California, in late flower October 22, 1927, NY; isotype DS. It was also collected as a common undershrub on the limestone wall of a canyon above Loretto Mine, on the Loretto road, northern Inyo Mts., Inyo Co., at 5600 ft. elev., in flower Sept. 18, 1954, *Munz & Roos* 20148 (NY), and is known from adjacent Esmeralda County, Nevada. It is a member of the Shadscale Scrub, Sagebrush Scrub, and Joshua Tree Woodland plant communities.

This species is related to *C. albidus* (Jones) Greene, from which it differs in having too few leaves and these not at all impressed-punctate, and in the smaller involucre and florets. It is probably more distantly related to *C. greenei* (Gray) Greene subsp. *filifolius* (Rydb.) Hall & Clem., a plant known only from eastern Nevada and eastward, which has plane rather than tightly involute leaves.

***Chrysothamnus nauseosus* (Pall.) Britt. subsp. *viscosus*, subsp. nov.**

Fruticosa densa rotunda 5-20 dm. alta flavoviridis vel cinereoviridis; foliis extrorsis vel recurvatis crassiusculis 1-5 cm. longis 1-2 mm. latis permanente pannosis flavoglandulosis; ramulis divaricatis pedunculis involucrisque flavoglandulosis; involuacro 5-8 mm. alto, squamis angustis sed obtusis plus minusve glanduloso-tomentosis, glandula costae prominenti; corolla 7-8 mm. longa, tubo sparse puberulenti, lobis 0.4-0.6 mm. longis.

Type. *P. A. Munz* 12689, from a canyon 7.7 miles east of Laws, Inyo County, California, at 8000 ft. elev., Oct. 6, 1948 (NY); isotypes CAS, RSA.

This subspecies occurs on sandy flats and washes from 4000-8000 ft. elevation, in Sagebrush Scrub, Chaparral and Pinyon-Juniper Woodland plant communities, from Esmeralda and Nye counties, Nevada and southern Mono County, California, south through the White Mountains and along the east flank of the Sierra Nevada to Walker Pass and the western fringes of the Mojave Desert. The pannose tomentum of the twigs is sometimes obscured by the glandular exudate of this subspecies, which in the past has been confused with *C. nauseosus* subsp. *gnaphalodes* (Greene) Hall & Clem., a form referred by the present writer to *C. n.* subsp. *hololeucus* (Gray) Hall & Clem.

***Chrysothamnus nauseosus* subsp. *nanus* (Cronq.), comb. nov.**

Chrysothamnus nauseosus var. *nanus* Cronq., Vasc. Pl. Pacif. N. W. 5: 129, 1955.

Aster oregonensis (Nutt.) Cronq. subsp. **californicus** (Durand), comb. nov.
Sericocarpus californicus Durand, Jour. Acad. Phila. II, 3: 90, 1855.
S. rigidus var. *californicus* Blake, Proc. Amer. Acad. 51: 515, 1916.

Corethrogyne filaginifolia (H. & A.) Nutt. var. **viscidula**
 (Greene), comb. nov.

Corethrogyne viscidula Greene, Fl. Fran. 378, 1897.

Corethrogyne filaginifolia var. **hamiltonensis**, var. nov.

Tenuis erecta 4.5-6.5 dm. alta decidue tomentosa; foliis anguste oblanceolatis apice serratis, summis lineari-lanceolatis multo redactis; capitulis paucis paniculatis; involucri obconico 7.5-11 mm. alto 6-7-seriato vix glanduloso sed persistente tomentoso.

Type. H. M. Hall 9865, Mt. Hamilton, Santa Clara County, California, at 300 feet elevation, August 1914 (NY). This taxon is frequent on dry slopes on the western flank of the Mount Hamilton Range, extending south to San Benito County. It occurs only occasionally on the interior slopes.

Erigeron bloomeri Gray var. **pubens**, var. nov.

A var. *bloomeri* piloso-hirsutiusculum differt.

Type. C. L. Hitchcock and J. S. Martin 5329, in decomposing marble, ½ miles se. of King's Castle, Marble Mts., Siskiyou County, California, at 6000 feet elevation, July 9, 1939 (NY). A second collection comes from Marble Rim, Marble Mts., at 6200 feet elev., August 4, 1939, J. T. Howell 15052 (NY).

The new variety differs from the finely white-strigose typical *E. bloomeri* in having soft-pilose herbage with spreading hairs. The var. *nudatus* (Gray) Cronq. is glabrous or finely and sparsely strigose.

Lessingia ramulosa Gray in Benth. var. **glabrata**, var. nov.

A var. *micradenia* (Greene) J. T. Howell involucri squamis glabris vel externis apice glandulam sessilem gerentibus et secus margines prope apicem glandulas paucas parvas gerentibus differt.

Type. A. A. Heller 13529, plentiful on dry gravelly open slopes in the oak belt, "Top Notch" between Los Gatos and Almaden, Santa Clara County, California, Sept. 9, 1920 (NY). Another collection comes from a serpentine slope just west of Madrone, Santa Clara County, *Belshaw* 2668 (NY).

This variety appears to be geographically separated from the other varieties of *L. ramulosa* by *L. hololeuca* and its variety *arachnoidea*, to which it bears considerable resemblance. But it is exactly like *L. ramulosa* var. *micradenia* except that the phyllaries are not glandular-puberulent as in that but are glabrous or the outer ones are tipped with a sessile gland and often bear a few small sessile glands on and near the margin. The narrowly cylindro-turbinate involucre, the 3-5-flowered heads, the different tips of the phyllaries, and absence of all tomentum from the involucre serve to separate this from *L. hololeuca*, and the persistent dense tomentum on the upper surface of the leaves removes it from both *hololeuca* and *nemaclada*.

Lagophylla minor (Keck), comb. nov.

Lagophylla dichotoma subsp. *minor* Keck, Madroño 3: 16, 1935.

Lagophylla glandulosa Gray subsp. **serrata** (Greene), comb. nov.

Lagophylla serrata Greene, Bull. Calif. Acad. 1: 280, 1886.

This sparingly glandular subspecies is the spring-flowering ecotype of a typically

summer- and fall-flowering distinctly glandular species. The ranges of the two seasonal ecotypes coincide.

***Layia chrysanthemoides* (DC.) Gray subsp. *maritima*, subsp. nov.**

A subsp. *chrysanthemoides* caulibus prostratissimis; pedunculo centrale horizontale, foliis succulentis, radicalibus plus minusve purpurascensibus pinnatifidis, lobis orbiculatis integris; involucri squamis apicibus dilatatis orbiculatis differt.

Type. Jens Clausen 1090, from coastal bluffs 6.2 miles south of Jenner, Sonoma County, California, May 24, 1935 (UC); isotypes CI, F, MO, OSC, WS. Also known from Ft. Bragg, Mendocino County. This is the late-flowering maritime ecotype of the species.

***Layia platyglossa* (Fisch. & Mey.) Gray subsp. *campestris*, subsp. nov.**

A subsp. *platyglossa* caulibus erectis vel aliquanto laxis subsimplicibus vel corymboso-ramoso, pedunculo centrale elongato differt.

Type. David D. Keck 2286, about 5 miles west of Pacheco Pass, Santa Clara County, California, at 300 feet elevation, May 8, 1933 (DS); isotypes CI, POM, UC.

Layia platyglossa subsp. *platyglossa* occurs on the headlands of the immediate coast from Mendocino County to Santa Cruz Island. It is a succulent prostrate plant with stout horizontal stems radiating from the base and with the central leader reduced to a short horizontal peduncle in extreme cases or remaining erect. It blooms mostly in June in contrast with the widespread inland subsp. *campestris* which blooms from March to May.

***Layia septentrionalis*, sp. nov.**

Caule saepe corymboso-ramoso 1.5-4 dm. alto; foliis hirsutis glandulosis, inferioribus pinnatifidis vel dentatis; involucrio 7-12 mm. alto plus minusve dense piloso et glanduloso; corollis radii 6-8, ligulis conspicuis luteis 8-16 mm. longis 7-9 mm. latis, disci 35-60, 5.5-8 mm. longis; achaeniis radii 3.8-5.2 mm. longis, disci 4.5-7.5 mm. longis; pappo candido, setis 16-21 vix compressis ad mediam partem plumosis intus tomentosis.

Type. David D. Keck 2384, from sandy soil 2.5 miles s. of Lakeport on road to Kelseyville, Lake County, California, May 29, 1933 (DS); isotypes ARIZ, B, BKL, BM, BR, BRY, C, CAN, CAS, CI, COLO, CU, E, F, G, GH, HEL, IA, ILL, K, L, LA, MICH, MIN, MO, MT, NY, OC, ORE, OS, OSC, P, PENN, PH, POM, RM, S, TEX, U, UC, US, WIS, WS, WTU. This showy spring annual with 8 pairs of chromosomes forms local patches in Valley Grassland, Foothill Woodland and Northern Oak Woodland plant communities along the western side of Sacramento Valley from Sutter Buttes to Yolo County and in the inner North Coast Ranges from Colusa County to Sonoma County. Because of its woolly pappus it has been confused with the southern California *elegans* form of *L. platyglossa*, a 7-chromosome species having shorter florets and akenes, but morphologically *septentrionalis* is more similar to *L. glandulosa* subsp. *lutea* of the South Coast Ranges. The latter has a distinctive pappus of merely 10 flattened bristles that broaden toward the base.

***Layia discoidea*, sp. nov.**

Caule simplici vel corymboso-ramoso 5-15 cm. alto; foliis albo-hispidis moderate nigro-glandulosis, radicalibus pinnatifidis, lobis brevi-oblongis, caulinis paucidentatis vel plerumque subintegerrimis; capitulis discoideis; involucrio turbinato-campanulato purpurascens 5-6 mm. alto moderate villosa cum multis nigris stipitatis glandulis ornatis; floris 10-25, corollis 3.5-4 mm. longis flavis; achaeniis 3.5-4.5 mm. longis

pilosissimis; pappo paleaceo fulvo 1-1.5 mm. longo, squamis 11-15 lineari-lanceolatis enerviis plumosis.

Type. *Ira L. Wiggins and Roxana S. Ferris 9380*, on a serpentine knob $\frac{1}{4}$ mile from Aurora Mine, San Carlos Peak region, San Benito County, California, April 28, 1940 (NY); isotype DS. Collected at the type locality April 19, 1941, *Keck 5239* (CI). Also taken in serpentine at Benchmark X3046 along Crater Creek about 7 miles from Hernandez on the road to New Idria (which is perhaps identical with the type station), May 5, 1956, *Raven, Stebbins, Tomich et al. 9190* (NY).

This discoid 8-chromosome *Layia* has already received some mention in the literature by Clausen¹ and Keck², where its characteristics and genetic nature are discussed together with its probable affinities.

Layia pentachaeta Gray subsp. *albida*, subsp. nov.

A subsp. *pentachaeta* corollis radii albis differt.

Type. *David D. Keck and J. Clausen 3106*, from summit of Polonio Pass, 5 miles east of Cholame, San Luis Obispo County, California, in gravelly soil at 1900 feet elevation, April 9, 1935 (DS); isotypes ARIZ, B, BM, BR, C, CAN, CAS, CI, CU, E, F, G, GH, IA, K, L, LA, MICH, MIN, MO, NY, OC, ORE, OS, OSC, P, PENN, PH, POM, RM, S, TEX, UC, US, WIS, WS, WTU. This showy plant is frequent on the plains and hills bordering the head of the San Joaquin Valley, from western Fresno County southward and eastward to the Tehachapi foothills, Kern County. It is separable from subsp. *pentachaeta*, the yellow-rayed *Layia* of the Sierran foothills to the north of it, principally by the flower-color. On the other hand, subsp. *albida* is suggestive of *L. glandulosa* subsp. *glandulosa*, which occurs in the same geographic area, for the two possess in common whitish rays, hirsute or hispid herbage, and a similar habit. In fact *albida* is readily separable from that form of *glandulosa* bearing no inner wool on the pappus only by its more numerous and slenderer pappus-bristles. Usually, however, the herbage, leaf-cut and odor are also distinctive guides, and no true intergrades between the species have been discovered.

Layia paniculata, sp. nov.

Caule tenue erecto 1-8 dm. alto supra stricte ramoso; foliis lineari-oblongolatis, inferioribus inciso-dentatis, superioribus subintegerrimis; capitulis corymboso-paniculatis parvis; corollis flavis, radii inconspicuis 1-2 mm. longis, disci 3-4.3 mm. longis; achaeniis radii 3.5-4 mm. longis, disci 3.8-5 mm. longis; $n=16$.

Type. *David D. Keck and Wm. M. Hiesey 5092*, from summit of Jolon Grade, Santa Lucia Mountains, Monterey County, California, in light soil at 1450 feet elevation, May 29, 1940 (NY); isotypes CAS, CI, DS, K, POM, UC, US. This tetraploid species has been confused with the diploid *L. hieracioides* (DC.) H. & A., but it differs in its more slender habit, narrower and more cut leaves, and heads that are usually smaller in all their members. Experimental data indicate that it is not of autopolyploid, but of amphiploid origin, with *L. hieracioides* the only known parent. Its range is wholly to the south of the latter species, extending principally in the outer Coast Ranges from Monterey to Santa Barbara.

¹Clausen, Jens. 1951. Stages in the Evolution of Plant Species. 206 pp. Cornell University Press, Ithaca, N. Y. (pp. 80-83)

²Keck, David D. 1957. Trends in Systematic Botany, in Survey of Biological Progress, vol. III. Academic Press, New York. (p. 79-80)

***Madia elegans* D. Don subsp. *vernalis*, subsp. nov.**

Caule simplici vel corymboso-ramoso 3-8 dm. alto parce pubescenti vel a basi hispido vel piloso vix glanduloso infra mediam partem; capitulis magnis; floris flavis; antheris nigris.

Type. David D. Keck 2442, from one mile east of Clarksville, Eldorado County, California, in a grassy field at 1000 feet elevation, June 1, 1933 (DS); isotypes CI, GH, MO, POM, UC. Distributed from northwestern Oregon, where uncommon, southward with increasing frequency through the valleys and foothills of the Coast Ranges and western flanks of the Sierra Nevada to Kern County, California, mostly below 3000 feet elevation.

This lowland subspecies is a spring-flowered ecotype as contrasted with the summer-flowering montane subsp. *elegans* and the fall-flowering lowland subsp. *densifolia*. The basal rosette is scarcely developed in subsp. *vernalis* and the cauline leaves are scattered, the herbage is sparsely glandular below the inflorescence, the heads remain open longer through the day than the other subspecies, and only rarely is there a maroon blotch at the base of the ligules.

***Madia elegans* subsp. *wheeleri* (Gray), comb. nov.**

Hemizonia wheeleri Gray, Bot. Calif. 1: 617, 1880.

Madia tenella Greene, Pittonia 3: 167, 1897.

M. wheeleri Keck, Madroño 3: 4, 1935.

Two considerations reduce this taxon to subspecific rank. Garden experiments demonstrated the complete infertility of the Mineral King population of it (representing the morphologically typical form of *wheeleri*) with subsp. *elegans* without resulting diminution of vigor in the second hybrid generation. These two morphologically well separated plants are apparently kept apart by physiological barriers, for they occupy different environments and have distinct geographical ranges in the southern Sierra Nevada. Subsp. *wheeleri* occurs at higher elevations and extends northeastward to the east flank of the range in Inyo and Mono counties. The second consideration is that in the mountains south of the Sierra Nevada, from Big Pine Mountain, Santa Barbara County eastward to the San Bernardino Mountains and southward to the Sierra Juarez, Lower California, *wheeleri* is morphologically less clearly separable from *elegans*. Present-day hybridization is apparently playing a role in this. On the other hand, the writer is unable to make a taxonomic separation between the more distinctive Sierran state of *wheeleri* and the southern one. Among other characters, subsp. *wheeleri* is distinguishable from the other subspecies of *elegans* by its triquetrous ray-akenes and yellow anthers.

***Madia gracilis* (Sm.) Keck subsp. *collina*, subsp. nov.**

A subsp. *gracilis* robustiore, caule infra mediam partem eglanduloso apud apicem ramoso, inflorescenti viscidissimo, capitulis spicatis vel glomerulatis magnis, involucri globoso-urceolato 8-10 mm. alto, squamis ad apicem elongatis differt.

Type. David D. Keck 1527, from north city limits of Vallecita (east of Angels Camp on road to Murphy), Calaveras County, California, June 28, 1932 (DS); isotypes B, C, CAS, CI, GH, K, LA, MO, MONTU, POM, RSA. This robust plant, which stands out distinctly from the slender subsp. *gracilis* of the region, is confined to the Sierra Nevada foothills of Amador and Calaveras counties, California, in the Foothill Woodland plant community.

***Madia gracilis* subsp. *pilosa*, subsp. nov.**

Subsp. *gracilis* facie, moderate pilosa praesertim in pedunculis involucrisque parce

glandulosis sed glandulosis adversum basim; foliis paucis magnis, superioribus aliquantum latis; capitulis magnis solitariis vel racemosis pedunculosis nudulos apice terminantiis; involucreo depresso-globoso supra achaenia contracto, squamis aliquanto dilatatis apice erecto elongato.

Type. *Joseph P. Tracy 9588*, from Buck Mountain, lower foothills of its northwest slope, Humboldt County, California, June 28, 1931 (UC); isotypes CI, DS. This subspecies is local in Humboldt County in the Bald Hills region and the valley of the Van Duzen River.

Hemizonia arida, sp. nov.

Annua pallida omnino hispida-hirsuta hirsutulaque parce glandulosa; caule erecto 2-4 dm. alto a basi mox intricate divaricato-ramoso; foliis alternis, inferioribus linearibus vel oblanceolatis parce lobatis, superioribus integerrimis gradatim reductis; capitulis multis brevi-pedunculatis; involucreo 4 mm. alto 5 mm. lato, squamis plus minusve hispido-hirsutis et glandulari-puberulis; corollis luteis, radii 8-10, 5-6 mm. longis, 3-4 mm. latis, disci 20-25; antheris flavis; achaeniis radii ca. 3 mm. longis anguste obovatis ventriculosis 4-angulosis transverse rugulosis albidis (vel nigrescentibus), areola breviter et robuste rostrata, stipite inverso albo-callosa; achaeniis disci sterilibus; pappo rudimentari vel plerumque nullo; $n=12$.

Type. *David D. Keck and Palmer Stockwell 3279*, from the mouth of Red Rock Canyon, Mojave Desert, Kern County, California, in hard-baked alkali-sand mix in wash, Creosote Bush Scrub plant community, at 2300 feet elevation, May 11, 1935 (DS); isotypes ARIZ, B, BKL, BM, BR, BRY, C, CAN, CAS, CI, COLO, CU, E, F, G, GH, HEL, IA, ILL, IND, K, L, LA, LD, MICH, MIN, MO, MT, NY, OC, OKL, ORE, OS, OSC, P, PENN, PH, POM, RM, S, SBC, TEX, U, UC, UPS, US, UTC, WIS, WS, WTU. Known only from the type locality, where it has been collected in flower from May to November. This distinctive species was at first confused with *H. pallida* Keck, a 9-chromosome species from the head of the San Joaquin Valley that has longer rays, evident pappus, lighter yellow flowers and more deeply lobed basal leaves.

Hemizonia corymbosa subsp. **macrocephala** (Nutt.), comb. nov.

Hemizonia macrocephala Nutt., Jour. Acad. Phila., II, 1: 175, 1848.

H. angustifolia subsp. *macrocephala* Keck, Madroño 3: 12, 1935.

Hemizonia pentactis (Keck), comb. nov.

Hemizonia lobbii subsp. *pentactis* Keck, Madroño 3: 8, 1935.

Hemizonia conjugens, sp. nov.

Annua erecta aliquante hirsuta interdum hispida cum pilis subpustulatis sursum glandulosa; caule 2-8 dm. alto superne divaricato-ramoso; capitulis ad apices ramorum solitariis vel dense glomerulis; involucreo 5.5-6 mm. alto cum glandulis, multis magnis subsessilibus ornatis; corollis luteis, radii 8(-10), disci 13-21; achaeniis disci sterilibus; pappo ca. 8 paleaceo, paleis inaequalibus laciniatis vel parce fimbriatis 0.6-0.8 mm. longis.

Type. *L. R. Abrams 3521*, in river-bottom land near Otay, San Diego County, California, May 16, 1903 (UC); isotypes CAS, NY, POM. Known only from San Diego County, where the following collections were made: on mesa near La Presa, June 6, 1903, *Abrams 3902* (DS, NY, POM); near Sweetwater Dam, June 20, 1895, *Stokes* (DS); mesas near San Diego, *Hall 3916* (DS, UC), *3891* (UC); Telegraph Canyon, between Chula Vista and Otay Lake, June 18, 1936; *Wolf 7969* (NY, RSA).

From its characters one would suspect *H. conjugens* of being of amphiploid origin, with *H. fasciculata* and *H. paniculata*, both of which grow in the area where it is found, as possible parents. Characters of the former are: habit and general appearance, including a yellowish cast to the foliage, almost a complete absence of stalked glands, the somewhat keeled phyllaries, the stiffish hispidulous pubescence and the sterile and glabrate disk-akenes. Characters of the latter are: the number of ray-florets (7 or 8 to 10) and disk-florets (13 to 21) and correspondingly broad involucre. It is intermediate between these species in the relative amount of pubescence in the upper part of the plant, the number of glands on the involucre, and in the shape of the pappus-paleae. The plant has not been cultivated in the experimental garden.

Hemizonia pungens (H. & A.) T. & G. subsp. **maritima** (Greene), comb. nov.
Centromadia maritima Greene, Man. Bay Region 196, 1894.

Hemizonia pungens subsp. **septentrionalis**, subsp. nov.

Planta magna 5-10 dm. alta; ramis elongatis et saepe laxis; foliis et bracteis haud scabris; capitulis effusis parvis.

Type. *H. M. Hall 12907*, from Shasta Valley, Siskiyou County, California (DS); isotype CI. Distributed in California from central Sacramento Valley (Colusa, Sutter and Yolo counties) to Shasta Valley; introduced northward through eastern and especially northern Oregon to Walla Walla County, Washington.

Hemizonia laevis (Keck), comb. nov.

Hemizonia pungens subsp. *laevis* Keck, Madroño 3: 14, 1935.

Hemizonia australis (Keck), comb. nov.

Hemizonia parryi subsp. *australis* Keck, Madroño 3: 15, 1935.

Hemizonia multicaulis H. & A. subsp. **vernalis**, subsp. nov.

A subsp. multicaule caule erecto tenue supra corymboso-ramoso, foliis gramineoidibus angustioribus plerisque argenteo-sericeis differt.

Type. *Harriet A. Walker 1721* in UC exsiccati set 185, from Tiburon, Marin County, California, May 31, 1909 (UC); isotypes DS, F, GH, MO, NY, ORE, POM, RM, US. Occurring mostly away from the immediate coast in Sonoma and Marin counties. Probably *Hemizonia citrina* Greene (*H. luzulaefolia* var. *citrina* Jeps.) is the same, but there is some doubt as to the type of that entity. The Tomales Bay specimen collected by Greene on April 16, 1886 (UC) and presumed to be the type by Babcock and Hall is subsp. *vernalis*.

The Babcock and Hall treatment of the *Hemizonia congesta* complex (Univ. Calif. Publ. Bot. 13: 15-100, 1924) has undergone considerable modification as a result of intensive cytogenetic study of the group at the Carnegie Institution of Washington laboratory at Stanford. The realignments are brought out in forthcoming treatments in two floras that cover the group. Suffice it to mention here that the yellow-flowered forms are now found to fall in two species. Described above is subsp. *vernalis*, the earliest spring-flowering ecotype of the three that are readily distinguishable. It is found to be conspecific with a maritime ecotype, a dark green, glandular and often decumbent form occurring on the immediate coast of Sonoma and northern Marin counties and blooming in early summer. The type of *Hemizonia multicaulis* clearly is of this maritime ecotype. The fall-flowering yellow-flowered plant that occurs still farther inland than subsp. *vernalis* in the same region but also over a considerably more extended range is shown to be more than a mere late-flowering ecotype of this

species. The hybrid combination between *H. multicaulis* subsp. *multicaulis* and this plant gave a partially sterile F_1 and a weakened F_2 . While this is not a strong genetic barrier, nevertheless specific separation is indicated, which calls for the following new combination.

***Hemizonia lutescens* (Greene), comb. nov.**

Hemizonia luzulaefolia var. *lutescens* Greene, Bull. Torr. Club 9: 16, 1882.

H. congesta subsp. *lutescens* Babc. & Hall, Univ. Calif. Publ. Bot. 13: 38, 1924.

H. congesta var. *lutescens* Jeps., Man. Fl. Pl. Calif. 1089, 1925.

***Hemizonia tracyi* (Babc. & Hall), comb. nov.**

Hemizonia congesta subsp. *tracyi* Babc. & Hall, Univ. Calif. Publ. Bot. 13: 46, 1924.

H. congesta var. *tracyi* Jeps., Man. Fl. Pl. Calif. 1089, 1925.

***Hemizonia luzulaefolia* DC. subsp. *rudis* (Benth.), comb. nov.**

Hemizonia rudis Benth., Bot. Voy. Sulph. 31, 1844.

***Hemizonia calyculata* (Babc. & Hall), comb. nov.**

Hemizonia congesta subsp. *calyculata* Babc. & Hall, Univ. Calif. Publ. Bot. 13: 42, 1924.

H. congesta var. *calyculata* Jeps., Man. Fl. Pl. Calif. 1089, 1925.

***Holocarpa virgata* (Gray), comb. nov.**

Hemizonia virgata Gray in Torr., Bot. Mex. Bound. 100, 1859.

Deinandra virgata Greene, Fl. Fran. 425, 1897.

Experimental results in the gardens and cytological laboratory of the Carnegie Institution of Washington at Stanford have shown that this and the following species are congeneric with *Holocarpa macradenia* (DC.) Greene but not closely related to any species of *Hemizonia*, from which they must now be separated. Cytologically, the members of *Holocarpa* have either 4 or 6 pairs of chromosomes, whereas the haploid numbers in *Hemizonia* run from 9 to 14 inclusive. The distinctive type of gland-tipped processes found on the involucre of members of the genus *Holocarpa* are not duplicated in any other member of the subtribe.

***Holocarpa virgata* subsp. *elongata*, subsp. nov.**

Caule tenui 5-12 dm. alto multiramoso; ramis ultimis arcuatis elongatis; capitulis effusioribus in pedunculis minus foliosis usque ad 15 cm. longis.

Type. David D. Keck 1932, from San Diego, California, Oct. 2, 1932 (NY); isotypes CAS, CI, DS, GH, MO, PH, POM. Limited to southwestern San Diego County. This graceful subspecies with scattered heads is well separated from the stiffly branched typical *virgata* which occurs through the Central Valley of California no farther south than Fresno County.

***Holocarpa obconica* (Clausen & Keck), comb. nov.**

Hemizonia obconica Clausen & Keck, Madroño 3: 7, 1935.

H. vernalis Keck, Madroño 3: 7, 1935.

When *vernalis* was described from the Sierran foothills of Tulare County, it appeared to be a strongly marked species, with its early spring flowering (the type collection was made March 10), its unusually large and relatively few heads, its evident hirsute pubescence and relatively few glands. Transplants were brought into the experimental garden of the Carnegie Institution at Stanford and there unexpectedly continued to bloom through the summer and into the fall, changing considerably in aspect as the season progressed and becoming like the strains of *obconica* from the foothills on the western side of the San Joaquin Valley. It is not known whether many strains of *obconica* bloom so early, but apparently the majority do not begin flowering before early summer. The type collection of *obconica* was made August 23.

Holocarpha obconica subsp. **autumnalis**, subsp. nov.

Caule stricto erecto cum ramulis brevibus sterilibus dense foliaceis numerosis confertibusque gerentibus; foliis principiis angustissimis; $n=6$.

Type. David D. Keck and Jens Clausen 2567, from 1.6 miles west of Byron, Contra Costa County, California, in a fallow field, October 27, 1933 (DS); isotypes B, BM, CAN, CAS, CI, F, G, GH, K, MICH, MIN, MO, NY, PH, POM, UC, US, WS, WTU. Abundant on plains north and east of Mount Diablo, flowering from September to November.

Subsp. *obconica* has a short central shaft replaced by several divaricate branches below the middle; these in turn are paniculately compound and form a rather dense divaricate twiggery. Subsp. *autumnalis* has a taller central shaft quite concealed by short sterile shoots densely clothed with bract-like leaves and progressively shorter upward, so that before anthesis the plants form tapering green columns. The heads are borne apically and often singly on the short lateral shoots and in narrow racemose terminal panicles.

Holocarpha heermannii (Greene), comb. nov.

Hemizonia heermannii Greene, Bull. Torr. Club 9: 15, 1882.

Deinandra heermannii Greene, Fl. Fran. 425, 1897.

Hemizonia virgata var. *heermannii* Jeps., Man. Fl. Pl. Calif. 1090, 1925.

CALYCADENIA MOLLIS Gray grows on the west flank of the Sierra Nevada, California, from Tuolumne County to Tulare County, and is unusual even among the Madiinae in having three distinct color forms in the flowers. These forms at times occur in pure colonies and at times in mixed ones. The type of *mollis* was white-flowered, and colonies of it extend throughout the range of the species. Colonies with golden yellow flowers (f. *aurea*) occur in pure stands from Mariposa County southward, most abundantly in Madera County, and colonies with pure rose to deep claret flowers (f. *rosea*) are best developed in Tuolumne County. These previously unnamed forms are described as follows:

Calycadenia mollis f. **aurea**, f. nov.

Floris aureis.

Type. H. M. Hall 10041 in UC exsiccati set 268, from Raymond, Madera County, California, June 14, 1915 (UC); isotypes CAS, DS, F, LA, MO, NY, ORE, POM, RM, US.

Calycadenia mollis f. **rosea**, f. nov.

Floris roseis usque ad roseo-purpureis.

Type. David D. Keck 1344, from 10 miles west of Mather, Stanislaus National Forest, Tuolumne County, California, at ca. 3800 feet elevation, Oct. 22, 1931 (DS); isotypes B, C, CAS, CI, LA, MONTU, POM.

Calycadenia ciliosa Greene f. **alba**, f. nov.

Floris albis.

Type. David D. Keck 4886, from Burney, Shasta County, California, in fields of red clay soil at 3100 feet elevation, August 9, 1938 (NY); isotypes B, C, CAS, CI, DS, F, GH, K, MO, ND, PH, POM, RM, UC, US. This species ranges from southern Oregon to Butte and Lake counties, California, and it is most frequently found with yellow flowers as originally described. Colonies of the white-flowered form occur throughout the range of the species.

CALYCADENIA MULTIGLANDULOSA DC. is a variable California species separable into three geographic subspecies, but the type, collected by David Douglas, cannot with assurance be included in any one of them, so nomenclaturally it stands alone as a fourth one. It is the writer's suspicion that it was collected in the hills south of San Francisco, and it is probably closest to subsp. *cephalotes*.

Calycadenia multiglandulosa subsp. bicolor (Greene), comb. nov.

Calycadenia bicolor Greene, Fl. Fran. 421, 1897.

This is the commonest *Calycadenia* in the Sierran foothills. Usually it is found as a slender plant with the small heads arranged in spicate racemes. Sometimes, as particularly in Eldorado County, the heads tend to be aggregated in glomerules at the apex of the stem, but they also extend a short distance down the stem.

Calycadenia multiglandulosa subsp. cephalotes (DC.), comb. nov.

Calycadenia cephalotes DC., Prodr. 5: 695, 1836.

C. multiglandulosa var. *cephalotes* Jeps., Man. Fl. Pl. Calif. 1095, 1925.

Hemizonia cephalotes Greene, Bull. Torr. Club 9: 110, 1882.

H. multiglandulosa var. *cephalotes* Gray, Syn. Fl. 1(2): 312, 1884.

This form occurs in the Coast Ranges from southern Mendocino County to Napa and San Mateo counties, and in it the heads are congested in a terminal glomerule that is usually overtopped by the uppermost leaves.

Calycadenia multiglandulosa subsp. robusta, subsp. nov.

Caule valido saepe alto; foliis longis floralibus plus minusve calyciformi recurvatis flavoviridibus; capitulis nunc ad apices ramulorum brevissimorum aggregatis subsessilibus, nunc ad apicem caulis congestis; $n = 6$.

Type. David D. Keck and Palmer Stockwell 2486, from an exposed sunny slope on the east flank of Mount Hamilton, west of Isabel Creek, on the San Antonio Road, Santa Clara County, California, at 2200 feet elevation, August 22, 1933 (DS); isotypes ARIZ, B, BKL, BM, BR, BRY, C, CAN, CAS, CI, COLO, CU, E, F, G, GH, HEL, IA, K, L, LA, MICH, MIN, MO, NY, OC, ORE, OS, OSC, P, PENN, PH, POM, RM, S, TEX, UC, US, WIS, WS, WTU. This plant occurs in both the outer and inner Coast Ranges of Santa Clara County, in Foothill Woodland, Chaparral and Mixed Evergreen Forest plant communities. The floral leaves tend to exceed the heads and to recurve, and the bracts around the heads are yellow-green and bear honey-colored glands.

CALYCADENIA HISPIDA (Greene) Greene is a rare species of the Central Valley and adjacent foothills of California. It occurs as scattered colonies, several of which have been exterminated through agricultural encroachment. Of the relatively few colonies known scarcely two are alike, although the plants within an individual colony are quite uniform. The differences, however, are small and it is necessary to maintain within subsp. *hispida* colonies of golden-yellow-flowered plants with villous herbage together with colonies of cream-yellow-flowered plants having a harsher more hispid pubescence, and still other combinations. Flower-color in the species runs the gamut from golden yellow to cream to pure white to white fading rose. The red "eye" spot found in some other *Calycadenias*, however, does not occur. Only two variants from typical *hispida* (which was yellow-flowered) seem worthy of recognition.

Calycadenia hispida f. albiflora, f. nov.

Corollis radii albis demum roseis.

Type. H. M. Hall 11770, from summit of Parkfield Grade, Diablo Range, Mon-

terey County, California, on open serpentine slopes (UC); isotypes B, CI. A second collection from the type locality is *Hall 12242* (UC). In other respects, including the large many-flowered heads, this form resembles subsp. *hispida* rather than the following.

***Calycadenia hispida* subsp. *reducta*, subsp. nov.**

A subsp. *hispida* graciliore, foliis effusis apud basim non rosulatis, bracteis quam capitulis brevioribus, corollis radii 1-4 albis brevibus, disci 4-8, 6-6.8 mm. longis, pappo 4-4.8 mm. longo differt; $n=6$.

Type. David D. Keck and Palmer Stockwell 2487, from Colorado Creek, North Fork of Arroyo Bayo, Mount Hamilton Range, Santa Clara County, California, at 2750 feet elevation, August 22, 1933 (DS); isotypes CAS, CI, F, G, GH, K, MICH, MIN, MO, NY, PH, POM, RM, UC, US, WS. This subspecies grows on grassy slopes in the Foothill Woodland plant community from Antioch, Contra Costa County, to the east side of Mount Hamilton Range, Santa Clara County. Morphologically it is allied to both *hispida* and *multiglandulosa* and arguments could be brought forth for considering it an incipient species. It seems best, however, to consider it a reduced subspecies of *hispida*, more slender in habit and having smaller, fewer-flowered heads with pure white ray-florets.

***Blepharizonia plumosa* (Kell.) Greene subsp. *viscida*, subsp. nov.**

Flavoviridis moderate vel dense hispida conspicuissima glandulosa; involucri hispido; pappo ad minus quam 1 mm. longo reducto frequenter obsoleto; $n=14$.

Type. David D. Keck 1814, from a weedy field 3.8 miles south of Tres Pinos, in San Benito River Canyon, San Benito County, California, Sept. 27, 1932 (NY); isotypes B, CAS, CI, DS, GH, MO, POM, US. This subspecies occurs in dry open places up to 3000 feet elevation in the Foothill Woodland and Chaparral plant communities in the inner South Coast Ranges from San Benito County to Kern County, and locally in the Santa Lucia Mountains, Monterey County, California.

***Blepharipappus scaber* Hook. subsp. *laevis* (Gray), comb. nov.**

Blepharipappus scaber var. *laevis* Gray, Bot. Calif. 1: 358, 1876.

B. laevis Gray, Bot. Gaz. 13: 73, 1888.

Ptilonella laevis Greene, Fl. Fran. 433, 1897.