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A REVISION OF THE NORTH AMERICAN SPECIES OF THE GENUS *CHORIZANTHE*¹

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HISTORY OF THE GENUS

When Bentham² treated the tribe Eriogoneae in 1836, three genera were considered, namely, *Eriogonum*, *Chorizanthé*, and the then-monotypic *Mucronea*. The latter two were described as new, *Chorizanthé* having been a manuscript name of Robert Brown. Eleven species of *Chorizanthé* were described at this time, seven from South America and four from North America. Bentham³ also elaborated the genus for De Candolle's 'Prodromus,' eighteen species being considered there.

In 1870 Torrey and Gray⁴ revised the North American members of the genus. It was in this paper that *Acanthogonum* was reduced to synonymy under *Chorizanthé*, and *Mucronea* had already suffered a similar fate at the hands of the junior author.⁵ Torrey and Gray's revision appears in a condensed

¹ An investigation carried out at the Missouri Botanical Garden in the Graduate Laboratory of the Henry Shaw School of Botany of Washington University, and submitted as a thesis in partial fulfillment of the requirements for the degree of doctor of philosophy in the Henry Shaw School of Botany of Washington University.

² Benth. Trans. Linn. Soc. Lond. 17: 401-420. pl. 17-20. 1836.

³ Benth. in DC. Prodr. 14: 24-27. 1857.

⁴ Torr. & Gray, Proc. Am. Acad. 8: 192-199. 1870.

⁵ Gray, Proc. Bost. Soc. Nat. Hist. 7: 149. 1859.

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form in the appendix of Watson's⁶ 'Botany of the United States Geological Exploration of the Fortieth Parallel.'

Numerous collections from the western states were accumulating in herbaria during this time, resulting in the discovery of many new species. In 1877 Watson⁷ found it advisable to revise again the North American members of the genus, together with the other genera of the Eriogoneae. Twenty-five species were recognized in this revision, and *Centrostegia* Gray was relegated to *Chorizanthe*.

The last revision was made by Parry⁸ in 1884, and Dammer's⁹ brief treatment of the genus in Engler and Prantl's 'Natürlichen Pflanzenfamilien' is patterned in some part after Parry's work. Several desultory descriptions have appeared since Parry's revision, bringing the total number of described species for this country, including the six species from other genera which were united with *Chorizanthe*, to something over fifty.

Four related genera, *Mucronea* Benth., *Acanthogonum* Torr., *Centrostegia* Gray, and *Lastarriaea* Remy, have at various times been considered by some taxonomists as synonymous with *Chorizanthe*. The genus *Lastarriaea* is considered congeneric with *Chorizanthe* in the present work, and the other three genera are held to be distinct.

The genus *Hamaria* Kunze, Poepp. Coll. Chil. I, is cited by Reichenbach¹⁰ in his 'Conspectus' as of the family Rosaceae. The leading subsequent bibliographic works in which *Hamaria* Kunze appears also have definitely or questionably referred the genus to the Rosaceae. However, Baillon¹¹ places the genus in the Polygonaceae, with *Lastarriaea* as its synonym. Some basis is found for this in an article by Parry¹² in which he states that a sheet of *Lastarriaea* at Kew is marked "50 Poppig, Pl. Chil. *Hamaria* Poppigii, Ky. . . . Parony-

⁶ Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484-485. 1871.

⁷ Wats. Proc. Am. Acad. 12: 269-273. 1877.

⁸ Parry, Proc. Davenp. Acad. Sci. 4: 45-63. 1884.

⁹ Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 11-12. 1891.

¹⁰ Reichenb. Conspectus, 212b. 1828.

¹¹ Baillon, Hist. d. Pl. 11: 397. 1892.

¹² Parry, West. Am. Sci. 1: 29. 1885.

chiaceae? . . .” With this evidence at hand, the name is listed in the generic synonymy.

In Torrey and Gray’s revision, *Chorizanthë membranacea* Benth. is listed as the first species of section *Euchorizanthë*. Watson followed this precedent, while Parry chose *C. stellulata* Benth. as the first species in the group of typical *Chorizanthës*. However, *Chorizanthë virgata* Benth., a South American species, is listed first in Bentham’s original work, where it is both described and figured, so it must be accepted as the type species. There is a fortunate aspect to this change in that *C. virgata* is a typical *Chorizanthë* and *C. membranacea* is considered by the present writer as a member of a new genus.

The history of the South American members is brief. In addition to the species of Bentham, there are two by Remy¹³ and sixteen by Philippi, five of the latter appearing in 1864-65,¹⁴ one in 1873,¹⁵ and the remainder in 1895.¹⁶

The tribe *Eriogoneae* is a very distinct one of the *Polygonaceae*. Meisner¹⁷ gave the group of genera, *Pterostegia*, *Mucronea*, *Chorizanthë*, and *Eriogonum*, family rank. However, the floral structure, as well as other morphological characteristics, indicates the natural affinities of the genus with the *Polygonaceae*.

The additional amount of North American material of the genus which has accumulated in herbaria during the past few years allows a study to be much more comprehensive than heretofore, and makes such a study advisable.

GENERAL MORPHOLOGY

Roots.—All of the North American representatives of the genus are annuals, and the root system consists of but a slender tap-root with small lateral roots.

Stems.—The stems vary from erect to prostrate, and are from one to several from the base. They are dichotomously branched or, in some species, frequently trichotomously

¹³ Remy in Gay, Fl. Chili 5: 287, 288. 1849.

¹⁴ Philippi, Linnaea 33: 225-227. 1864-1865.

¹⁵ Philippi, Anal. Univ. Chili 1873: 536. 1873.

¹⁶ Philippi, l. c. 91: 494-500. 1895.

¹⁷ Meisn. Pl. Vasc. Gen. 1: 317; 2: 229. 1836-1843.

branched at the first node. The stems are from a half to five decimeters long, and nearly always slender and rather stiff. They vary from hirsute to glabrate.

Leaves.—The leaves are always basal or nearly so, and entire. Commonly they are petiolate, oblanceolate, and obtuse, and two to ten centimeters long. In some of the species, the leaves may be scantily pubescent but usually they are tomentose or densely short-villous beneath and short-villous above. The leaves are very prone to fall from the mature plants.

Bracts.—The bracts are characteristically opposite, although the foliaceous bracts of some species, as *C. interposita*, *C. Douglasii*, and *C. stellulata*, are verticillate. The bracts subtending the involucre are regularly narrowly lanceolate-acerose and ciliate, and sometimes all the bracts are of this type, as is manifested by certain species in the subsections Staticoideae and Flavae. Very frequently the lower bracts are foliaceous and often simulate the leaves very closely. Opposite, oblanceolate, foliaceous bracts are characteristic of the subsection Pungentes.

Pubescence.—The pubescence is of unicellular white hairs, and the various species are prevailingly canescent with straight or curly, appressed or spreading hairs. The pubescence on the stems is often characteristic for a subsection—widely spreading hairs prevailing in the Pungentes, while an unusual type of pubescence is found on the stems of members of the subsection Staticoideae. Here the hairs are down-curved for a short distance, then abruptly appressed, giving them a hook-like appearance. Thicker, crystal-clear hairs are unique in *C. Wheeleri*, where they are found upon the involucre.

Inflorescence.—The inflorescence is always cymose, and the involucre is sessile in the axils. Most commonly the involucre is borne in clusters or dense heads, this structure being attained, of course, through the great foreshortening of the internodes. In some species, as *C. staticoides*, for example, this foreshortening takes place about equally, and at first gradually, on each branch of the cyme, making the whole inflorescence more or less flat-topped. Again, the foreshortening may occur very abruptly, resulting in a single dense head, as is

often found in *C. stellulata*. One of the most common modifications of the inflorescence, however, has resulted in the development of a sort of uniparous cyme. Here but one branch develops in an elongate manner from each node, and the development occurs alternately at each successive node. The opposite, or foreshortened, branch from each node, instead of subtending only a flower, or bearing a flower, subtends one and bears several in a close cluster. For convenience, this type of inflorescence has been termed a compound uniparous cyme. It is prevalent in the Pungentes and Procumbentes.

Involucres.—The involucres, composed usually of six connate bracts, form a more or less tubular protective organ for the perianth. They are two to seven millimeters long, and six-toothed, except in the subsection Flavae, where the smaller three teeth are sometimes obsolete, and in some of the subsection Chorizanthella, where the number is three, or, in the unusual *C. Watsoni*, five.

The involucres are usually dimorphic. The few solitary ones in the lower axils are larger and less modified than the ultimate ones, and are thought to possess the characters of more or less immediate ancestors. They do not have characters suitable for taxonomic diagnosis. The involucres hereafter referred to are the typical ultimate ones.

Of the six-toothed involucres, three of the teeth, including the anterior one, are usually larger than the alternating trio, and are spoken of as the "outer" or "larger" teeth, while the alternating three are known as the "inner" or "smaller" teeth. The teeth are spine-pointed, and the spines are down-curved or uncinat except in a few species, as *C. Howellii*, *C. villosa*, and *C. valida*.

In many species, the anterior involucreal tooth is detectably longer than any of the others. Inasmuch as this condition is found in the species whose involucres are in dense clusters, it is thought that perhaps the lack of pressure on the anterior tooth has permitted or caused its additional growth. This mechanical explanation alone would hardly account for the development of the very long spines of *C. Clevelandii* and *C. uniaristata*. Possibly the germ plasm of plants is affected

by environmental stimuli, and the long anterior teeth of these last two species of the *Uniaristatae* now have a genetic cause—a theory which harkens back to Erasmus Darwin.

In one North American representative, *C. Lastarriaea* var. *californica*, the involucre are entirely lacking. This entity, commonly known heretofore as *Lastarriaea chilensis* Remy, has given rise to considerable discussion concerning its morphology. Authors prior to Parry had considered the structure which contained the reproductive organs as an involucre-like perianth. Parry,¹⁸ in his revision, placed the species in *Chorizanthë*, stating that he had observed small structures in the so-called involucre-like perianth which represented a true, though vestigial, perianth, and hence the “involucre-like perianth” was a true involucre. Parry¹⁹ maintains his position in a short article in the ‘Western American Scientist.’ The same year Mrs. Curran²⁰ criticised Parry’s view, and stated: “As to the theory which has been advanced, that the perigonium of *Lastarriaea* is to be considered as an involucre, with adnate, nearly obsolete perianth, I can only say, that with some slight skill in the use of the microscope, I have been unable to find any trace of such organ” [p. 273]. Both were right, for the structures in question are present in some instances and quite lacking in others. Mrs. Curran was answered a little testily by Parry,²¹ who still felt that he was correct. The next year, however, Parry²² decided that Mrs. Curran was more nearly right than himself, and again recognized the genus *Lastarriaea*.

The present writer accepts, essentially, Parry’s temporary disposition of *Lastarriaea* under *Chorizanthë*, but for very different reasons. The contention of Mrs. Curran, and earlier and subsequent workers, that the envelope surrounding the reproductive organs of the species in question was an involucre-like perianth is certainly correct. This involucre-like

¹⁸ Parry, Proc. Davenp. Acad. Sci. 4: 47. 1884.

¹⁹ Parry, West. Am. Sci. 1: 29-31. 1885.

²⁰ Curran, Bull. Cal. Acad. Sci. 1: 272-275. 1885.

²¹ Parry, Bot. Gaz. 11: 54-56. 1886.

²² Parry, Proc. Davenp. Acad. Sci. 5: 35-36. 1887.

perianth is subtended by four or five bracts which are subverticillate but distinct—that is, they do not form a tubular involucre. A most interesting connecting link has been observed (described below as *C. interposita*) which possesses the more or less involucriform perianth plus a true involucre! The situation may be explained by referring to diagram *a* of fig. 1. Here two pairs of bracts of a typical *C. Lastarriaca* var.

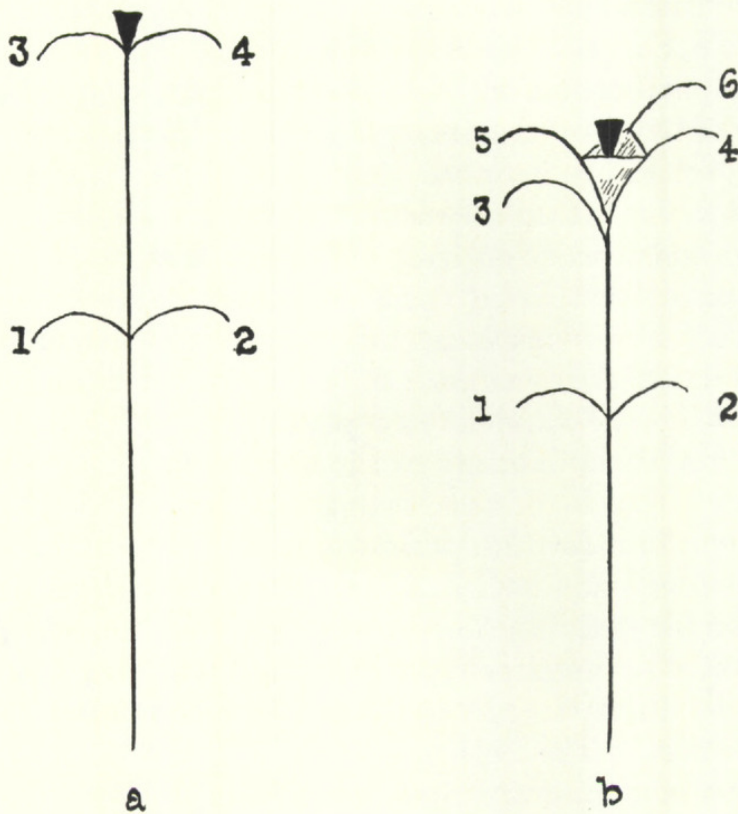


Fig. 1. Diagrammatic representation of the bracts subtending the perianths of (a) *C. Lastarriaca* var. *californica* and (b) *C. interposita*.

californica are indicated, and numbered 1 and 2, and 3 and 4. The position of the perianth is indicated by the triangle. In *C. interposita*, another pair of bracts is present (diagram *b* of fig. 1), numbered 5 and 6. Bracts 1, 2, and 3 are still distinct, as in fig. *a*, but bract number 4 and the pair of bracts 5 and 6 are united below, forming a true involucral tube of a three-toothed

involucre. In the diagrams, the internodes have been elongated for the sake of clarity. *C. interposita* is quite inseparable morphologically from *Chorizanthella*, but it closely resembles *C. Lastarriaea* var. *californica*.

Perianths.—The perianths have as their most important character a tubular portion which constitutes at least half of the length of the flower. They are commonly sessile or nearly so, and subcylindric. The lobes or segments are six in number, or but five in the unusual *C. Lastarriaea* var. *californica*. The six lobes are in two whorls of three each, and are commonly sparsely pubescent along the midveins. The shape and relative size of the outer and inner whorls often characterize entire subsections. For instance, in subsections *Chorizanthella*, *Pungentes*, *Flavae*, and *Procumbentes*, the lobes are equal or subequal and usually entire. In the subsection *Staticoideae*, the lobes are prevailingly entire but the inner are smaller. In the subsection *Uniaristatae*, the outer lobes are entire or bilobed, and the inner smaller and fimbriate to erose.

Stamens.—The stamens are prevailingly nine in number, and the glabrous filaments are inserted at the base of the perianth. Occasionally the stamens are but six or three, but usually constant for the species. All but the first two species of the subsection *Chorizanthella* have the stamens inserted well up on the perianth tube, just below the lobes. An unusual development is manifested in the subsection *Procumbentes*, where the filaments are united into a short, pilose-ciliate, staminal tube. The anthers are orbicular to linear-oblong, versatile, and dehisce longitudinally on the lateral faces. The pollen is spherical, small, and smooth.

Fruit.—The fruit consists of a dry achene which is triangular in cross-section, elongated, and smooth or rarely papillose. The achenes are tri-carpellary and one-celled. The styles are three, and commonly at least half as long as the achene, and terminated by a small, capitate stigma. The ovule is solitary, basal, and orthotropous, containing at maturity abundant mealy endosperm and a straight or nearly straight embryo with essentially linear cotyledons.

RELATIONSHIP OF THE GENUS, AND THE GENERIC CONCEPT

The genus *Chorizanthe* falls definitely in the tribe Eriogoneae of the Polygonaceae because of the prevailing presence of a more or less tubular involucre and the absence of ochreae. Of the genera of the tribe which possess tubular involucres, *Chorizanthe* is differentiated from all but two, *Acanthogonum* and *Eriogonella*, by the prevalence of but one flower in an involucre.²³ It is differentiated from all but *Acanthogonum* by the possession of a perianth tube, and from this latter genus it differs constantly in the shape of the embryo, and prevailing in the six-toothed, rather than three-toothed, involucres, and the basal, rather than faucial, insertion of the stamens.

In delimiting the genera of this group which possess cup-shaped or tubular involucres, the condition of the perianth is considered to be of primary importance. This organ may be either parted or divided, or lobed. Whether the cotyledons are accumbent or straight is also of paramount importance. The morphology of the involucres, the lobing of the bracts, and the nature of the tomentum, are also significant in delimiting the genera concerned.

A glance at the accompanying diagram (fig. 2) will indicate the occurrence of two fundamental characters which have helped cause *Mucronea*, *Acanthogonum*, *Centrostegia*, and the new genus *Eriogonella* to be recognized generically in the present work. *Centrostegia*, for example, has long been united by taxonomists with *Chorizanthe*, but the parted perianth segments, the accumbent cotyledons, the glandular pubescence, and the three-cleft bracts, all show the genus to be much more closely related to *Oxytheca*. *Mucronea* has essentially the same characters except that involucreal spurs are always lacking and the cotyledons are straight—thereby differentiating it from *Centrostegia* or *Oxytheca*. The former *Chorizanthe membranacea* and *Chorizanthe spinosa* each have parted perianth segments and accumbent cotyledons, definitely barring them

²³ Parry reports two flowers in some specimens of *C. Orcuttiana*, and Greene says that there are "2 or more" in his *C. Nortoni*. The author has never seen but one flower in an involucre.

from *Chorizanthe*. The entire bracts, the non-glandular pubescence, and the solitary flowers prevent them from being united to *Oxytheca* or *Centrostegia*. It is thought that their nearest relative is *Eriogonum*. From this large genus they

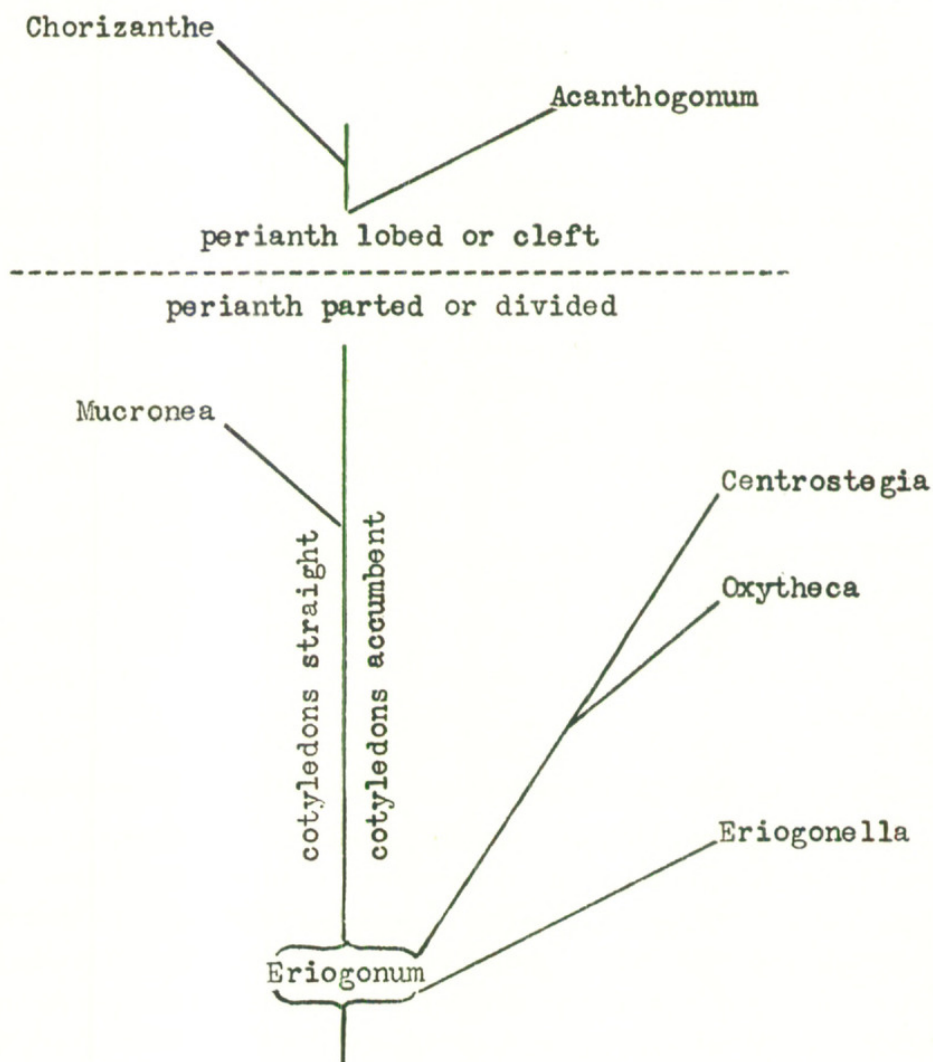


Fig. 2. Diagram to show relationships of seven related genera of the Eriogoneae.

are differentiated by the solitary flowers and spine-toothed involucre. The genus *Eriogonella*, to which these two species are referred, is formally characterized on page 90. These several smaller genera will be treated taxonomically in a subsequent paper.

Superficial resemblances can not be too greatly depended upon in this group because epiharmonic evolution has too often played a part. For example, the morphology of *Centrostegia* and *Oxytheca* is very similar, as already explained, yet *Centrostegia* has been referred to *Chorizanth*e on the basis, largely, of appearance. *Oxytheca perfoliata* and *Mucronea perfoliata* have developed very similar aspects, yet are certainly generically distinct. Perhaps it is the environment which has governed in part these similar developments, because certain southern California species of *Gilia* and *Nemacladus* simulate surprisingly annual members of the Eriogoneae.

While the detailed phylogeny of the tribe is reserved for the next paper on the Eriogoneae, it might be remarked here that a reduction series can be traced from many-flowered, fruticose forms (as in many Eriogonums) to few- or one-flowered annuals. An accurate phylogeny is thought to be more similar to that depicted by Gross²⁴ in his morphologic study of the Polygonaceae than the one outlined by Dammer.²⁵ Gross considers such genera as *Oxytheca*, *Centrostegia*, and *Chorizanth*e as derived from *Eriogonum*, whereas Dammer would reverse the sequence, with *Eriogonum* as the most "advanced" member.

PHYLOGENY OF THE SPECIES: THE SUBGENERIC CATEGORIES

The South American perennial members of the genus possess several characters which, when compared with characters manifested by North American species, are accepted to-day by morphologists as being primitive. Some of the characters found in this South American group are, besides the perennial habit, the six subsimilar teeth of the involucre, which are short in comparison with the length of the involucre tube, the similar perianth lobes, and the nine stamens, which are attached below the middle of the perianth tube. In the North American species the annual habit is constant, and variations in the other characters are prevalent or frequent.

²⁴ H. Gross in Engl. Bot. Jahrb. 49: 234-339. 1913.

²⁵ Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 11-12. 1891.

A list of the significant characters are contrasted as follows:

PRIMITIVE	ADVANCED
Perennial habit	Annual habit
Leaves cauline	Leaves basal
Involucral teeth subsimilar and short	Involucral teeth alternately long and short
Involucral teeth six	Involucral teeth five or three
Perianth lobes similar	Perianth lobes dissimilar
Perianth lobes entire	Perianth lobes not entire
Stamens inserted at the base of the perianth	Stamens inserted on the perianth tube, or forming a staminal tube
Stamens 9	Stamens 6 or 3

The subsection *Chorizanthella* (section *Suffrutices*) is considered very close to the South American perennials, and does, indeed, contain the South American annuals. *Chorizanthe brevicornu* and *C. spathulata*, North American members of subsection *Chorizanthella*, are separable from the austral perennials only in the annual habit and reduced number of stamens—the latter character not characterizing their subsection, however.

The ancestor of section *Herbaceae* is probably to be considered as an intermediate extinct group between the *Perennes* and *Herbaceae*, rather than in the *Chorizanthella* series. Figure 3 illustrates the probable relationship of the several subsections.

The subsection *Pungentes* is considered relatively primitive in the section because of the morphology of the flower. The lobes of the flower are entire and subequal, and the stamens are inserted at the base of the perianth. The large, foliaceous bracts, the compound uniparous cymes, and the margined involucre are thought to indicate, on the other hand, advanced characters.

Of the *Herbaceae* which do not possess involucre margins the subsection *Staticoideae* is considered the most primitive. The involucre teeth are always six, as they are in the entire section *Herbaceae* except part of subsection *Flavae*. The perianth lobes are prevailingly entire but of two different sizes. In the *Uniaristatae* the inner perianth lobes are fimbriate or

at least erose, and the anterior involucral tooth is unusually long. The relationship of the members of this subsection is depicted in fig. 4.

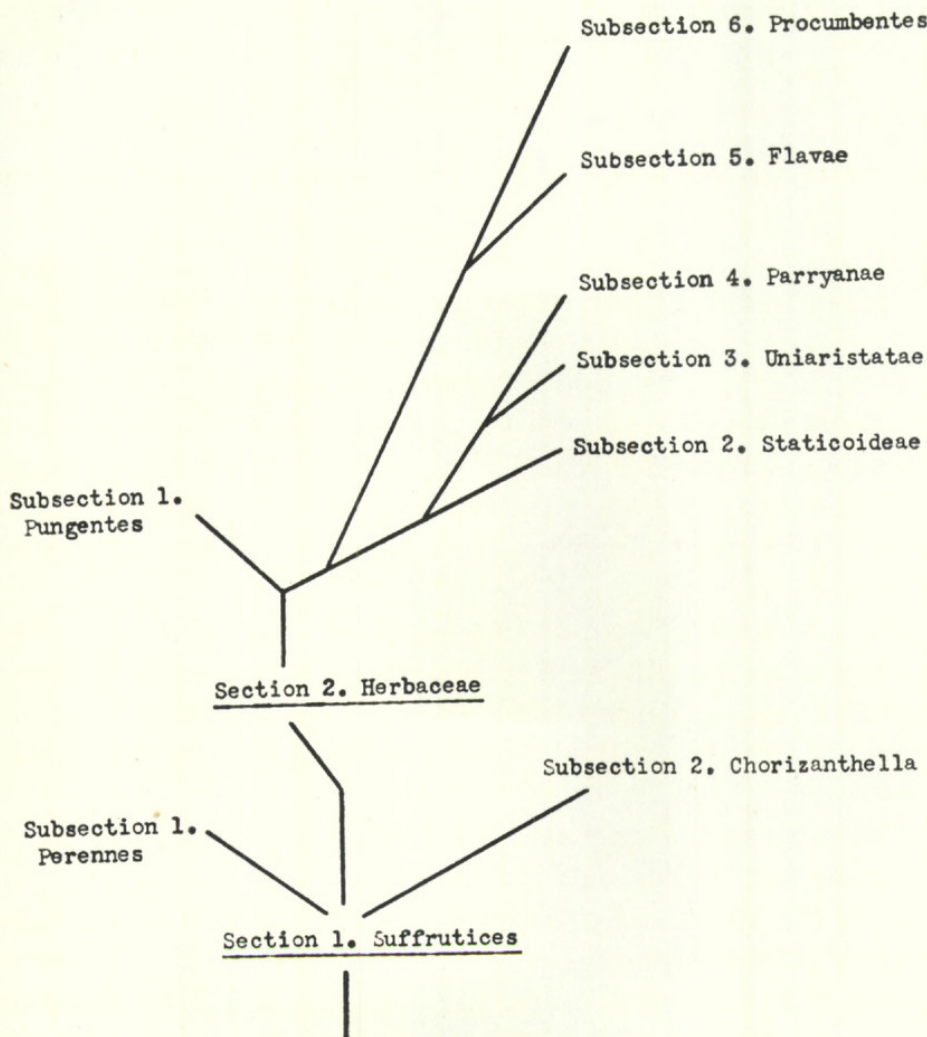


Fig. 3. Diagram illustrating the probable phylogeny of the genus *Chorizanthe*.

Subsection *Flavae* is considered advanced because of the obsolete inner involucral teeth of two of the three species, and because of the reduced condition of the uniparous cymes. Certain less important characters of this group call to mind the last subsection, the *Procumbentes*. This terminal group is

considered the most advanced chiefly because of the presence of the staminal tube, which is constant in the group.

THE SPECIFIC AND SUBSPECIFIC CONCEPTS

A few statements might be made concerning the specific and subspecific concepts used in this treatise. Two kinds of char-

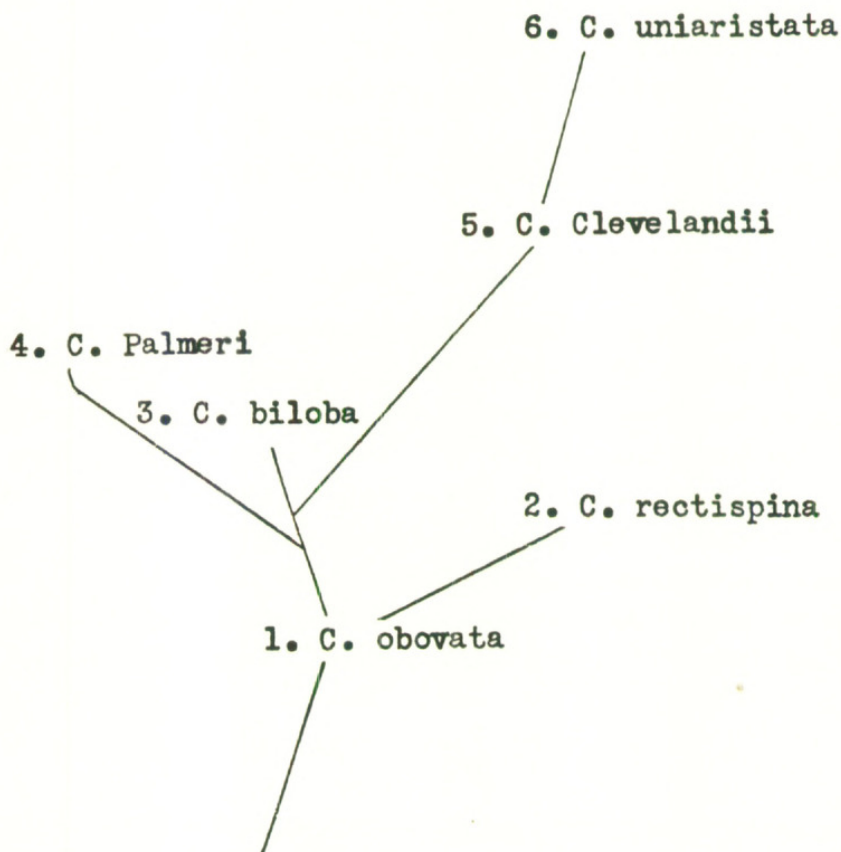


Fig. 4. Diagram depicting the relationship of the members of the subsection Uniaristatae.

acteristics have been considered which are popular among present-day taxonomists, namely, the morphologic characters and the geographic distribution. As a working basis, at least two morphologic characters have been considered necessary to differentiate a species from its morphologically nearest relative. In all instances, species delimited in this way have been

found to possess a geographic range largely or quite different from that of the morphologically nearest relative.

Varieties have been established on a minimum of one constantly different character, providing the geographic range is not intermittent through the range of the parent species. More than one morphologic character has been considered necessary when the distribution is sporadic in the range of the species.

There is nothing new in this method of delimitation, and the course followed, it is thought, is neither that of a "splitter" nor a "lumper," but rather, it is an intermediate course. It was chosen because it seemed to incorporate best those qualities which are so desirable to taxonomists—namely, accuracy and convenience.

THE GEOGRAPHIC DISTRIBUTION

Both the North and South American members of the genus inhabit xerophytic habitats which, for the most part, lie between the Pacific Coast and the first ranges to the eastward. The South American species are found west of the Andes in the northern part of Chili. Subsection *Chorizanthella*, of the section *Suffrutices*, contains the South American annuals and the most widely distributed of the North American species. This subsection is represented in North America from Idaho and Washington to Arizona and Lower California.

All of the section *Herbaceae* is native to California and Lower California, and very rarely extends its distribution east of the coast ranges.

Each subsection is quite as much of a unit geographically as it is morphologically. The *Pungentes* have their center of distribution in Santa Cruz County, and at present no species is known from north of Mendocino County or south of Santa Barbara County, unless it be *C. angustifolia* Nutt., the type of which is said to have been collected at "Pueblo de los Angeles." In the light of subsequent collections, it is difficult to believe that the data are correct.

The *Staticoideae* have their center of distribution in Los Angeles County, and species are found north to Monterey County and south to Lower California. The two inland species

of the Herbaceae belong to this group—*C. Xanti* inhabiting the San Joaquin Valley, and *C. laciniata* being found in the eastern half of San Diego County and in western Imperial County. One species of this group, *C. Wheeleri*, is almost endemic to the Santa Barbara Islands.

The Uniaristatae have as their center of distribution San Luis Obispo County, while subsections Parryanae and Procumbentes range from Los Angeles County into Lower California. The subsection Flavae is confined to Lower California.

ACKNOWLEDGMENTS

The author is deeply indebted to numerous people whose aid and advice have been invaluable in the present study. For the privileges incident to studying at the Missouri Botanical Garden, the writer expresses his thanks to Dr. G. T. Moore, Director of that institution. Appreciation is due also to Miss Nell Horner, Librarian, for aid in assembling the bibliographic data. Most primarily are thanks due to Dr. J. M. Greenman, who has so generously given of his time in wisely and critically guiding the entire study.

Entire or partial collections of *Chorizanthe* have been borrowed from several herbaria, and certain herbaria have been visited, that the specimens of the genus might be examined. To those in charge of these collections, acknowledgments of gratitude are hereby made. The herbaria are the following:

- CAS = Herbarium of the California Academy of Sciences.
- CU = Herbarium of Columbia University.
- D = Dudley Herbarium of Leland Stanford, Jr. University.
- E = Herbarium of J. A. Ewan, Los Angeles.
- F = Herbarium of the Field Museum of Natural History.
- G = Gray Herbarium of Harvard University.
- ISC = Herbarium of Iowa State College.
- K = Herbarium of the Royal Botanic Gardens, Kew.
- M = Herbarium of the Missouri Botanical Garden.
- Par = Parry Herbarium of Iowa State College.
- Pe = Herbarium of F. W. Peirson.

Ph = Herbarium of the Academy of Natural Sciences, Philadelphia.

Pom = Herbarium of Pomona College.

RMt = Rocky Mountain Herbarium, University of Wyoming.

UC = Herbarium of the University of California.

US = United States National Herbarium.

Preceding the name of each herbarium is its abbreviation as used in the taxonomic portion of this study.

TAXONOMY

Chorizanthe R. Br. ex Benth. Trans. Linn. Soc. Lond. **17**: 416. 1836; Spach, Veg. Phan. **10**: 521. 1841; Meisn. Pl. Vasc. Gen. **1**: 317; **2**: 229. 1836-1843; Benth. in DC. Prodr. **14**: 24. 1857; Torr. & Gray, Proc. Am. Acad. **8**: 192. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] **5**: 484. 1871; Wats. Proc. Am. Acad. **12**: 269. 1877; Benth. & Hook. Gen. Pl. **3**: 93. 1880; Wats. Botany [of California] **2**: 33. 1880; F. Philippi, Cat. Pl. Vasc. Chil. 253. 1881; Parry, Proc. Davenp. Acad. Sci. **4**: 45. 1884; Behr, Fl. Vicinity San Francis. 277. 1888; Dammer in Engl. & Prantl, Nat. Pflanzenfam. **3**^{1a}: 11. 1891; Greene, Fl. Francis. 153. 1891; Baillon, Hist. d. Pl. **11**: 399. 1892; Greene, Man. Bot. Reg. San Francis. Bay, 48. 1894; Heller, Cat. N. Am. Pl. 41. 1898; Jepson, Fl. West. Mid. Calif. 149. 1901, and ed. 2. 129. 1911; Howell, Fl. N. W. Am. 575. 1902; Abrams, Fl. Los Angeles & Vicinity, 112. 1904, and ed. 2. 103. 1917; Piper, Contr. U. S. Nat. Herb. [Fl. Wash.] **11**: 239. 1906; Jepson, Fl. Calif. 389. 1914; Rydberg, Fl. Rocky Mts. 229. 1917, and ed. 2. 229. 1922; Davidson & Moxley, Fl. So. Calif. 112. 1923; Jepson, Man. Fl. Pl. Calif. 295. 1923; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] **25**: 144. 1925.

Trigonocarpus Bertero ex Steudel, Nom. ed. 2, **2**: 710, 1841, according to Hooker f. & Jackson, Ind. Kew. **2**: 1118. 1895, and de Dalle Torre & Harms, Gen. Siphon. 139. 1900-1907, not *Trigonocarpus* Vell. Fl. Flum. 153. 1825, and 145. 1881, nor of Wall.

Lastarriaea Remy in Gay, Fl. Chili 5: 289. 1849; Meisn. in DC. Prodr. 14: 186. 1857; Torr. & Gray, Proc. Am. Acad. 8: 199. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 477. 1871; Benth. & Hook. Gen. Pl. 3: 94. 1880; Wats. Botany [of California] 2: 39. 1880; Parry, Proc. Davenp. Acad. Sci. 5: 35. 1887; Behr, Fl. Vicinity San Francis. 278. 1888; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 10. 1891; Greene, Fl. Francis. 159. 1891; Heller, Cat. N. Am. Pl. 43. 1898; Jepson, Fl. West. Mid. Calif. 149. 1901, and ed. 2. 128. 1911; Abrams, Fl. Los Angeles & Vicinity, 112. 1904, and ed. 2. 103. 1917; Jepson, Fl. Calif. 389. 1914; Davidson & Moxley, Fl. So. Calif. 105. 1923; Jepson, Man. Fl. Pl. Calif. 294. 1923.

Hamaria Kunze, as to *Lastarriaea*, in Baillon, Hist. d. Pl. 11: 397. 1892.

Fruticose or suffruticose perennials or herbaceous annuals, softly pubescent to tomentose. Stems erect to prostrate, dichotomously, or less frequently trichotomously, branched. Leaves basal, or cauline and alternate, entire, sometimes sheathing. Inflorescence of spreading, capitate, or uniparous cymes. Bracts foliaceous to subulate, opposite or, less frequently, whorled, entire. Involucres sessile at the forks of the branches, or rarely lacking, tube circular to triangular in cross-section, 3-6-ribbed, terminated by 6, or less frequently 3 (rarely 5), spines or teeth, these usually uncinatate and spreading. Flowers solitary, commonly sessile or nearly so, included in the involucre or partially exserted, bractlets lacking; perianth frequently inconspicuously short-villous on the outer surface, 6-lobed (very rarely 5-lobed) or cleft, never parted, the lobes similar, or in two unequal sets of 3 each, entire or not. Stamens usually 9 (or 6 or 3), inserted at base of the perianth or, less frequently, on the tube, or united by the filaments into a short ciliate staminal tube, usually included; filaments glabrous; anthers orbicular to linear, 2-celled, longitudinally dehiscent. Achene 3-carpellate, 3-angled, glabrous; styles 3, stigmas capitate; ovule orthotropous, cotyledons linear and straight or nearly so.

Type species: *Chorizanthe virgata* Benth. Trans. Linn. Soc. Lond. **17**: 416, *pl. 19, fig. 1*. 1836.

ARTIFICIAL KEY TO THE SPECIES AND VARIETIES

- A. Involucres present.
- B. Involucral teeth 6.
- C. Involucral teeth not scarious-margined.
- D. Anterior tooth usually shorter than the involucral tube, or if as long or longer, sharing this character with the other two teeth of the outer trio.
- E. All the perianth lobes entire or very nearly so.
- F. Perianth lobes similar or subsimilar.
- G. Involucral tube, as well as the perianth, 2-4 mm. long.
- H. Plants procumbent to ascending.
- I. Involucral teeth uncinat.
- J. Plants gray-pubescent.
- K. Outer involucral teeth of slender spines. Plants of Santa Barbara County and northward.
- L. Perianth scarcely exceeding the involucre, lobes not apiculate. Plants of San Luis Obispo and Santa Barbara Counties.
- M. Flowers 2.5-3 mm. long, stamens 7-9.....
.....10a. *C. angustifolia* var. *Eastwoodae*
- MM. Flowers 2-2.5 mm. long, stamens 3.....
.....10. *C. angustifolia*
- LL. Perianth definitely exceeding the involucre, lobes apiculate. Plants from vicinity of San Francisco Bay.....9. *C. cuspidata*
- KK. Outer involucral teeth stout. Plants of Lower California.....40. *C. chaetophora*
- JJ. Plants greenish-yellow.
- N. Perianth lobes broadly elliptic-ovate to elliptic oblong.
- O. Outer involucral teeth stout, spinose portion very short.....39. *C. Jonesiana*
- OO. Outer involucral teeth of slender spines.....
.....38b. *C. procumbens* var. *mexicana*
- NN. Perianth lobes, at least the outer, oblong.
- P. Flowers yellow.....38. *C. procumbens*
- PP. Flowers white.....38a. *C. procumbens* var. *albiflora*
- II. Involucral teeth straight.....13. *C. villosa*
- HH. Plants erect.
- Q. Leaves oblanceolate.....1. *C. brevicornu*
- QQ. Leaves spatulate.....2. *C. spatulata*
- GG. Involucral tube 5 mm. long, flower 6-7 mm. long.

- R. Inner teeth evident.....35. *C. mutabilis*
- RR. Inner teeth obsolete.....36. *C. flava*
- FF. Perianth lobes dissimilar.
- S. Involucral teeth uncinatc, or at least down-curved.
- T. Plants without foliaceous bracts, or at least these not long persisting.
- U. Perianth 4 mm. or less long.
- V. Lobes oblong to narrowly elliptic.
- W. Plants 3 dm. or less tall, leaves 7 cm. or less long.
- X. At least 5 of the teeth consisting of scarcely more than a short uncinatc spine.....
.....18b. *C. staticoides* var. *brevispina*
- XX. Teeth longer, all tapering from a broadened base
.....18. *C. staticoides*
- WW. Plants over 3 dm. tall, leaves 8-10 cm. long.....
.....18c. *C. staticoides* var. *elata*
- VV. Lobes, at least the outer, obovate.
- Y. Involucral tube about 3 mm. long, teeth long and slender. Plants from vicinity of San Diego.....
.....22. *C. discolor*
- YY. Involucral tube more than 3 mm. long, teeth shorter than in the preceding species. Plants of Los Angeles County.....18d. *C. staticoides* var. *latiloba*
- UU. Perianth 4.5-5.5 mm. long.
- Z. Involucres in large, dense clusters, perianth 5-5.5 mm. long.
- a. Plants not densely branched.....19. *C. chrysacantha*
- aa. Plants densely branched.....
.....19a. *C. chrysacantha* var. *compacta*
- ZZ. Involucres very slender, disposed in small, loose clusters; perianth 4.5 mm. long.....21. *C. leptotheca*
- TT. Plants with foliaceous bracts.
- b. Perianths 4 mm. or less long. Plants coastal.
- c. Bracts lanceolate.
- d. Involucres closely aggregated in flat-topped cymes..
.....18a. *C. staticoides* f. *bracteata*
- dd. Involucres not closely aggregated in flat-topped cymes.
- e. Clusters of involucres dense, spherical, 1-1.5 cm. broad. Plants chiefly of Santa Barbara Islands
.....24. *C. Wheeleri*
- ee. Clusters of involucres less than 1 cm. broad. Plants of Los Angeles and southwestern San Bernardino Counties and southward.....33. *C. Parryi*
- cc. Bracts, at least some of them, ovate to orbicular.....
.....23. *C. Breweri*

- bb. Perianths 5–6 mm. long. Plants from east of the coast ranges.
- f. Involucres not white-tomentose.....20. *C. Xanti*
- ff. Involucres white-tomentose....20a. *C. Xanti* var. *leucotheca*
- SS. Involucral teeth straight.
- g. Outer teeth 4 mm. or more long. Plants from the region of northern Lower California.....34. *C. inequalis*
- gg. Outer teeth shorter. Plants of Los Angeles and Orange Counties.....33a. *C. Parryi* var. *fernandina*
- EE. All the perianth lobes not entire.
- h. Outer lobes of perianth entire or bilobed, the inner fimbriate.
- i. The outer lobes entire.
- j. Outer lobes obovate, inner oblong.
- k. Plants erect.....27. *C. obovata*
- kk. Plants prostrate.....27a. *C. obovata* f. *prostrata*
- jj. Outer lobes orbicular, inner retuse to emarginate.....
-30. *C. Palmeri*
- ii. The outer lobes bilobed.....29. *C. biloba*
- hh. Outer and inner lobes erose or fimbriate.
- l. All the lobes fimbriate.
- m. Inner teeth evident.
- n. Perianth 5.5–7 mm. long, terminal portion of lobes linear-oblong. Plants of west half of San Diego County and adjacent country to northward and southward.....
-25. *C. fimbriata*
- nn. Perianth 7–9 mm. long, terminal portion of lobe scarcely larger than the fimbriations. Plants of east half of San Diego County and adjacent country to north, east and south.....26. *C. laciniata*
- mm. Inner teeth almost obsolete.....37. *C. pulchella*
- ll. All the lobes more or less erose.
- o. Involucral teeth straight.....15. *C. valida*
- oo. Involucral teeth uncinata.....33. *C. Parryi*
- DD. Anterior involucral tooth as long as or longer than the tube, the other 5 teeth short.
- p. The long tooth straight.
- q. Flowers partly exserted, the outer lobes obovate, truncate, stamens 9.....28. *C. rectispina*
- qq. Flowers included or nearly so, stamens 3.....32. *C. uniaristata*
- pp. The long tooth uncinata.....31. *C. Clevelandii*
- CC. Involucral teeth scarious-margined.
- r. Margins parted or divided at the sinuses.
- s. Involucral teeth uncinata or recurved.
- t. Foliaceous bracts present.
- u. Involucres 4 mm. or less long, diffuse plants.
- v. Lobes obovate to oblong, erose.



- w. Margins of involucre light-colored. Plants of vicinity of Monterey Bay.....8. *C. pungens*
- ww. Margins of involucre purple. Plants chiefly of Santa Cruz County.....8a. *C. pungens* var. *Hartwegi*
- vv. Lobes not obovate to oblong, nor erose.
 - x. Perianth lobes oblong, entire, cuspidate.
 - y. Margins of involucre obsolete.....9. *C. cuspidata*
 - yy. Margins of involucre evident and purplish.....
 -9a. *C. cuspidata* var. *marginata*
 - xx. Perianth lobes oblong, lanceolate, entire.....11. *C. diffusa*
- uu. Involucres more than 4 mm. long, erect plants.
 - z. Involucres hispid, margins white and evident....17. *C. stellulata*
 - zz. Involucres hirsute, margins not white.....14. *C. robusta*
- tt. Foliaceous bracts mostly lacking.....11. *C. diffusa*
- ss. Involucral teeth straight.
 - 1. Plants erect; involucre, as well as the flowers, 5-6 mm. long...
 -15. *C. valida*
 - 1'. Plants diffuse, flowers 4 mm. long.....12. *C. Howellii*
- rr. Margins continuous through the sinuses.
 - 2. Margins scarcely lobed, never cleft, purple.....16. *C. Douglasii*
 - 2'. Margins cleft, white.....17. *C. stellulata*
- BB. Involucral teeth fewer than 6.
 - 3. Involucral teeth 3.
 - 4. Perianth 4 mm. or less long.
 - 5. Involucres triangular in cross-section.
 - 6. Bracts opposite. Plants from Pt. Loma, San Diego County..
 -4. *C. Orcuttiana*
 - 6'. Bracts verticillate. Plants from Lower California.....
 -6. *C. interposita*
 - 5'. Involucres cylindric.....5. *C. corrugata*
 - 4'. Perianth 6 mm. or more long.
 - 7. Lobes entire.....36. *C. flava*
 - 7'. Lobes fimbriate.....37. *C. pulchella*
 - 3'. Involucral teeth 5 (one larger than the others and frequently foliaceous).....3. *C. Watsoni*
- AA. Involucres lacking.....7. *C. Lastarriæa* var. *californica*

Section 1. SUFFRUTICES Benth. Perennials, or if annuals, with the characters as given under subsection 2. Chorizan-thella.

Subsection 1. PERENNES, new subsection. South American perennials, represented by such species as *C. virgata* Benth., *C. glabrescens* Benth. (pl. 1, figs. 1 and 2), and *C. frankenioides* Remy. The subsection not here treated. The morphology of the involucre and flowers is similar to that of *C. brevicornu* of the next subsection.

Subsection 2. *CHORIZANTHELLA* Parry, emend. Erect or less frequently prostrate plants; stems several from the base, leaves basal, and the lower bracts foliaceous. Involucral teeth 6 and short, or 3, or rarely 5. Flowers frequently pedicellate. Perianth 2–4 mm. long, the lobes similar, entire or nearly so. Stamens frequently inserted well up on the perianth tube. Cotyledons longer than the radicle. Species 1–7 incl.

Range: Idaho and Washington, south to Arizona and Lower California; also in South America.

C. commissuralis Remy, a South American annual species closely related to *C. brevicornu*, and also the South American representatives of the former genus *Lastarriaea* belong to this subsection. The species with the largest distribution of the North American group also belong here.

1. *Chorizanthe brevicornu* Torr. Bot. Mex. Bound. 2: 177. 1859; Torr. & Gray, Proc. Am. Acad. 8: 196. 1870, excluding Watson's collection; Wats. U. S. Geol. Surv. Fortieth Parallel (Bot. King's Exp.) 5: 312, 484. 1871, excluding plants with "leaves . . . spathulate-obovate," *Watson 1044*, and p. 484, "leaves . . . obovate-spathulate"; Wats. Proc. Am. Acad. 12: 272. 1877, excluding plants with "leaves . . . broadly spathulate"; Wats. Botany [of California] 2: 38, 481. 1880, excluding plants with "leaves broadly spathulate"; Hemsley, Biol. Cent.-Am. Bot. 3: 33. 1882, including citation of Parry plant from Arizona; Parry, Proc. Davenp. Acad. Sci. 4: 62. 1884; Jepson, Fl. Calif. 393, *fig. 68*. 1914; Rydb. Fl. Rocky Mts. 229. 1917, and ed. 2. 229. 1922; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 297, *fig. 319*. 1923; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 145. 1925, excluding synonymy.

Erect plants, 1–2 dm. tall, pubescent to pulverulent or glabrate, extremely fragile at the nodes when mature; branches ascending; leaves oblanceolate, frequently narrowly so, 3–6 cm. long; foliaceous bracts narrowly lanceolate to oblanceolate, apiculate, upper reduced, all opposite; involucre appearing singly in the axils of the branches of the cyme, narrowly subcylindric, curved, 4 mm. long, teeth 6, short, nearly equal, all

uncinate; flowers short-pedicellate, usually included, 3–4 mm. long, glabrous, perianth tubes cylindric, slender, lobes similar, linear-oblong to lanceolate, nearly 1 mm. long; stamens 3, inserted at base of perianth opposite the inner segments, anthers small and suborbicular; achenes sometimes a little exserted from perianth, somewhat curved, cotyledons very slightly incumbently curved at tips.

Type: on the Gila River, March, *Parry*.

Distribution: southern and western Arizona, southwestern Utah, western Nevada, and Mono County, California, southward to the Lower California boundary.

Specimens examined:

ARIZONA: valley of Gila, October, 1871, *Mohr* (US); 1880, *Lemmon* (M); 1881, *Lemmon* (M, Par); mesa near Tucson, April 28, 1883, *Pringle* (M, Ph, US); Ft. Mojave, April, 1884, *Lemmon & wife* (US); Tucson, May 24, 1892, *Toumey 469b* (US); gravel, Beaverdam, alt. 1800 ft., April 5, 1894, *Jones 5024av* (Pom, US); Tucson Mts., March 13–April 23, 1903, *Griffiths 3486* (M, US); Oracle to Redington, March 13–April 23, 1903, *Griffiths 3722* (M, US); Coyote to Santa Rosa, March 13–April 23, 1903, *Griffiths 3981* (M, US); Coyote to Santa Rosa, March 13–April 23, 1903, *Griffiths 3991* (US); Franconia, alt. 900 ft., April 17, 1903, *Jones* (Pom); Congress Junction, alt. 3000 ft., May 2, 1903, *Jones* (Pom); Wickenburg, alt. 2100 ft., May 5, 1903, *Jones* (Pom); Phoenix, alt. 1000 ft., May 6, 1903, *Jones* (Pom); Santa Rita Forest Reserve, May 20–22, 1903, *Griffiths 4395* (M, US); north end Tucson Mts., April 22, 1908, *Rose 11870* (US); Santa Rita Range Reserve, May 11, 1912, *Wootton* (US); Phoenix, April 18, 1917, *Eastwood 6165* (CAS); Tucson, March 21, 1919, *Eastwood 8071* (CAS); Roosevelt Dam, May 17, 1919, *Eastwood 8667* (CAS); Topock, May 24, 1919, *Eastwood 8910* (CAS); Mormon Flats, March 7, 1926, *Peebles & Loomis 1033* (US); near Dome, March 6, 1927, *Harrison 3619* (US); Buck Mts., south of Yucca, April, 1928, *Braem* (D); Sierra Ancha, May 7, 1929, *Eastwood 16988* (CAS); Sacaton Mts., March 27, 1930, *Peebles 6532* (US); Oatman, April 21, 1931, *Eastwood 18188* (CAS).

UTAH: rocky slopes near St. George, 1874, *Parry* (M, Ph); 1876, *Johnson* (US); red sand, St. George, alt. 3000 ft., April 26, 1894, *Jones 5110al* (Pom, US); volcanic hillsides, Diamond Valley, May 19, 1902, *Goodding 881* (M, Rmt, US).

NEVADA: Hawthorn, 1882, *Jones* (Par); near Hole in the Rock, alt. 1500 ft., April 13, 1894, *Jones 5036ap* (US); Mica Spring, alt. 4000 ft., April 13, 1894, *Jones 5045ao* (US); Amargosa Desert, alt. 3000 ft., April 26, 1907, *Jones* (Pom); Logan, May 5, 1909, *Kennedy 1851* (D, Ph); Indian Spring, May 5, 1909, *Kennedy 1851* (US); Rhyolite, alt. 3575 ft., May 17, 1909, *Heller 9680* (ISC).

CALIFORNIA: SANTA CRUZ COUNTY—Santa Cruz, June 29, 1881, *Jones* (Pom, US); MONO COUNTY—volcanic tableland, June 25, 1925, *Peirson 6037* (Pe); INYO COUNTY—Darwin, alt. 4600 ft., April 27, 1897, *Jones* (Pom); Panamint Cañon, alt. 2000 ft., May 3, 1897, *Jones* (D, Pom); rocky hills, Argus Mts., alt. 3000–4000 ft., April–September, 1897, *Purpus 5318* (M, US); Funeral Mts., Death Valley, alt. 2000 ft., April 9, 1907, *Jones* (Pom); Surprise Cañon, May 12, 1915, *Parish*

10102 (D); wash of Wild Rose Cañon, Panamint Mts., alt. 2000 ft., March 20, 1924, *Ferris* 3948 (D); between Shoshone and Silver Lake, June 14, 1930, *Ferris* 8007 (D, M); KERN COUNTY—on rocky hillside south of Mojave, May 5, 1920, *Johnston* (Pom); sandy flat, Muroc, May 20, 1929, *Hoffmann* (E); alluvial slopes, Red Rock Canyon, May 13, 1930, *Howell* 4969 (CAS); Red Rock Canyon, May 13, 1930, *Peirson* 8805 (Pe); SAN BERNARDINO COUNTY—Mojave River, May 23, 1876, *Palmer* 469 (M); Mojave River, June 1, 1876, *Palmer* 469 (M, US); Needles, May, 1884, *Jones* (US); Rabbit Spring, Mojave Desert, May–June, 1901, *Parish* 4864 (D); Palm Springs, April 30, 1913, *Eastwood* 3061 (CAS); Barstow, May 30, 1914, *Parish* 9274 (D); Baxter, May 23, 1915, *Parish* 9876 (D); dry, rocky hill, Barstow, April 13, 1919, *Munz* 2601 (D, Pom); sandy wash, near Needles, alt. 700 ft., March 31, 1920, *Munz & Harwood* 3618 (Pom); dry, sandy plain, near Warren's Well, alt. 3200 ft., May 6, 1922, *Munz & Johnston* 5175 (Pom); between Barstow and Victorville, May 14, 1922, *Hart* 78 (CAS); Salt Wells Canyon, March 20, 1924, *Ferris* 3922a (D); Barstow to Granite Wells, April 25, 1927, *Hart* (CAS); sandy soil, near Deadman's Point, alt. 3000 ft., July 9, 1927, *Howell* 2678 (CAS); 39 miles from Needles, April 24, 1928, *Ferris* 7222 (D); near Valley Wells, Trona, April 18, 1931, *Mathias* 806 (M); Needles, April 23, 1931, *Eastwood* 18246 (CAS); between Victorville and Lucerne Valley, April 30, 1932, *Eastwood* 18803 (CAS); RIVERSIDE COUNTY—near Palm Springs, March, 1903, *Saunders* (Ph); Palm Springs, alt. 200 ft., May 10, 1903, *Jones* (Pom); Whitewater, alt. 1000 ft., May 11, 1903, *Jones* (Pom); near Pinto Mts., May, 1905, *Hall* 6029 (D); Palm Springs, April 20, 1906, *Grant* 6715 (D); Indio, April 27, 1906, *Jones* (Pom); south of Palm Springs, April 24, 1911, *Schellenger* (D, US); sandy soil, near Palm Springs, April 4–6, 1917, *Johnston* (Pom); sandy soil, near Palm Springs, April 4–6, 1917, *Johnston* 1105 (D, Ph); Palm Springs, alt. 525 ft., April, 1920, *Jaeger* 214 (US); sandy desert, near Palm Springs, alt. 500 ft., April 4, 1920, *Munz & Harwood* 3517 (Pom); in desert sand, Mecca, 197 ft. below sea-level, March 16, 1921, *Spencer* (Pom); in sandy wash, Corn Springs, March 25, 1921, *Jaeger* (Pom); vicinity of Corn Springs, Chuckwalla Mts., alt. 1500 ft., April 9–12, 1922, *Munz & Keck* 4859 (Pom); Palm Springs, March 26, 1926, *Abrams* 11016 (D); Palm Springs to Palm Canyon, March 26, 1926, *Abrams* 11060 (D); Palm Springs, April 20, 1926, *Beller* (M); Indio, June 1926, *Clark* (CAS); sandy soil, near Palm Springs, March 25, 1928, *Howell* 3555 (CAS); stony east slope, Thousand Palms Canyon, March 13, 1932, *Fosberg* 8066 (B); SAN DIEGO COUNTY—Mountain Springs, June, 1880, *Vasey* 541 (US); near Agua Caliente, April, 1882, *Parish Bros.* 828 (D); Colorado Desert, April, 1889, *Orcutt* (M, US); Mountain Spring, alt. 2500 ft., May 12, 1894, *Schoenfeldt* 3076 (US); Mountain Spring, May 13, 1894, *Mearns* 3145 (US); Signal Mt., April 2, 1903, *Abrams* 3169 (D, M, Ph, Pom); San Felipe Creek, April 14, 1913, *Eastwood* 2708 (CAS, US); in desert sand, Mountain Springs, alt. 2260 ft., May 3, 1918, *Spencer* 802 (Pom); San Felipe Wash, near Banner, alt. 3000 ft., May 17, 1925, *Keck & McCully* 88 (Pom); near Palm Wash, March 24, 1928, *Howell* 3518 (CAS); IMPERIAL COUNTY—28 miles south of Coachella, April 12, 1922, *Peirson* 4213 (Pe); in wash, near Picacho, April 20, 1928, *Ferris* 7138 (D).

The slight arcuate curve mentioned in the description is manifest in many of the involucre. This character, together with the lax inflorescence and extreme brittleness of the nodes,

makes this and the next species readily recognizable from the rest of the genus.

C. brevicornu has next to the largest range of any of the *Chorizanthes* here considered. The species is prevailingly greenish, even in age.

2. *Chorizanthe spathulata* Small ex. Rydb. Bull. Torr. Bot. Club **39**: 309. 1912; Rydb. Fl. Rocky Mts. 229. 1917, and ed. 2. 229. 1922; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] **25**: 145. 1925, in synonymy.

Chorizanthe brevicornu Torr. & Gray, Proc. Am. Acad. **8**: 196. 1870, as to Watson's collection; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] **5**: 312, 484. 1871, as to "leaves . . . spathulate-obovate," and *Watson 1044*, and p. 484, as to plants with "leaves . . . obovate-spathulate"; Wats. Proc. Am. Acad. **12**: 272. 1877, as to plants with "leaves . . . broadly spathulate"; Wats. Botany [of California] **2**: 38. 1880, as to plants with "leaves broadly spathulate."

Erect plants, 1-1.5 dm. tall, pubescent, reddish at maturity; branches ascending; leaves broadly spathulate, tapered to a winged petiole, 2-5 cm. long; bracts opposite, lower subfoliaceous and small, upper acerose; involucre solitary in the axils of the cymes, subcylindric, curved, 4-5 mm. long; flowers as in *C. brevicornu*.

Type: Big Butte Station, Idaho, June 23, 1893, *Palmer 230* (CU).

Distribution: Idaho, western Nevada, and part of adjacent California.

Specimens examined:

IDAHO: Shoshone, June 10, 1893, *Palmer 129* (US); Big Butte Station, June 23, 1893, *Palmer 230* (CU TYPE, M photograph, US); Murphy, Owyhee County, alt. 4000 ft., July 4, 1911, *Macbride 1033* (D, M, Pom, RMt, US); on black lava overflows, Shoshone, Lincoln County, July 18, 1911, *Nelson & Macbride 1171* (D, M, RMt); crevices in lava rocks, Picabo, Blaine County, alt. 4900 ft., July 3, 1916, *Macbride & Payson 3024* (CAS, D, Pom, RMt, US); Bruneau, June 23, 1930, *Jones 25782* (Pom).

NEVADA: Big Bend of the Truckee, alt. 4000 ft., May, 1868, *Watson 1044* (CU, US); Hawthorn, June 23, 1882, *Jones* (D, Pom); probably Tonopah, 1907, *Shockley* (D).

CALIFORNIA: MONO COUNTY—Green Creek, August 16, 1906, *Eastwood* (CAS); in sagebrush . . . Walker Creek, June 27, 1923, *Ferris 3728* (D); Mono Lake,

August, 1923, *Michaels* (CAS); dry slopes about Whiskey Creek, Owens River, alt. 6700 ft., July 29, 1933, *Peirson 10739* (M, Pe); INYO COUNTY—Bishop Creek, alt. 5000 ft., June 1, 1906, *Hall & Chandler 7262* (Pom); Andrews Camp, Bishop Creek, July, 1911, *Davidson 2737* (D); sandy soil, Surprise Cañon, Panamint Mts., alt. 5000 ft., June 16, 1928, *Howell 3982* (CAS); Westegard Pass, alt. 5000 ft., July 10, 1930, *Hoffmann* (CAS, E); gravelly flat, Wild Rose Canyon, Panamint Mts., June 20, 1931, *Hoffmann 438* (CAS).

The spatulate leaves of this species separate it very well from its nearest relative, *C. brevicornu*. These leaves, however, in which such a good diagnostic character is to be found, are frequently lacking in the older specimens. Nevertheless, the species can still be recognized by the red color of the stems and involucre of the older plants, the broader involucre, as compared with *C. brevicornu*, and the geographic distribution.

3. *Chorizanthe Watsoni* Torr. & Gray, Proc. Am. Acad. 8: 199. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 313, *pl. 34, figs. 4-6*, and 485. 1871; Wats. Proc. Am. Acad. 12: 273. 1877; Wats. Botany [of California] 2: 39, 481. 1880; Parry, Proc. Davenport Acad. Sci. 4: 54. 1884; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 11. 1891; Howell, Fl. N. W. Am. 576. 1902; Piper, Contr. U. S. Nat. Herb. [Fl. Wash.] 11: 239. 1906; Jepson, Fl. Calif. 397. 1914; Rydb. Fl. Rocky Mts. 229. 1917, and ed. 2. 229. 1922; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 299. 1923; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 145. 1925.

Erect to ascending plants, about 1 dm. tall; stems considerably branched, canescent, green or reddish; leaves petiolate, oblanceolate, 2-3 cm. long, tomentose beneath, lanate above; bracts opposite, lower frequently similar to the leaves or narrower, upper acerose; involucre disposed singly or in small groups in the axils of the lax cyme, involucre tube cylindric, inconspicuously 5-ribbed, 3-4 mm. long, canescently ascending pubescent, 5-toothed, the teeth short and recurved to uncinatate, except the anterior one—this foliaceous, lanceolate, from but little longer than the short teeth to 15 mm. long, terminated by a recurved awn; flowers included or very slightly exserted, pedicellate, 3-4 mm. long, yellow, perianth tubes cylindric, scantily pubescent, segments oblong, acute, 0.5-1 mm. long,

equal; stamens 9, inserted on the perianth tube just below the lobes, filaments 0.5 mm. long, anthers oval; styles short.

Type: on borders of the desert, Reese River, Nevada, *Humboldt*.

Distribution: western Arizona, southwestern Utah, Nevada, southwestern Idaho, Washington, Oregon, and California.

Specimens examined:

ARIZONA: Chloride, alt. 4500 ft., April 14, 1903, *Jones* (Pom).

IDAHO: Shoshone, June 10, 1893, *Palmer 126* (US); Shoshone, June 10, 1893, *Palmer 128* (CAS, M, Ph, RMt, US); north of Big Camas Prairie, alt. 5000 ft., July 14, 1895, *Henderson 3129* (US); Weiser, alt. 2200 ft., July 7, 1899, *Jones* (Pom); dry sandy slopes, Big Willow, alt. 3000 ft., May 31, 1910, *Macbride 159* (M, RMt, US); Glenn's Ferry, alt. 3000 ft., June 17, 1911, *Jones* (Pom); dry stony slopes, Three Creek, Owyhee County, July 2, 1912, *Nelson & Macbride 1875* (RMt, US); stony hillsides, near Dixie, Elmore County, alt. 4000 ft., June 24, 1916, *Macbride & Payson 2848* (RMt, US).

UTAH: dry hillside, Diamond Valley, Washington County, alt. 4000 ft., June 2, 1929, *Cottam, Stanton & Harrison 4033* (Pom).

NEVADA: Unionville Valley, alt. 4800 ft., June, 1868, *Watson 1046* (US); Humboldt Lake, alt. 4500 ft., May, 1868, *Watson 1046* (US); Pyramid Lake, September, 1874, *Lemmon* (US); Shoshone, June 6, 1881, *Jones* (Pom); Elko, June 14, 1882, *Jones* (Pom); Empire City, June 19, 1882, *Jones 2995* (CAS, D, M, Ph, Pom, RMt, US); Dayton, June 21, 1882, *Jones* (Pom.); Hawthorn, June 23, 1882, *Jones* (Pom); 1883, *Curran* (M); Alum Creek, Reno, June 30, 1893, *Hillman* (M); Reno, June 22, 1895, *Hillman* (D); Peavine foothills, Reno, June 25, 1895, *Hillman* (Pom); foothills, Reno, alt. 5500 ft., June 14, 1897, *Jones* (M, Pom, US); dry hills, Reno, alt. 5000 ft., June 19, 1900, *Stokes* (D, US); Eagle Valley, Ormsby County, alt. 1446 m., June 15, 1902, *Baker 1092* (M, Pom, US); Palisade, alt. 5000 ft., June 17, 1903, *Stokes* (US); Truckee Pass, Washoe County, alt. 4500 ft., June 14, 1906, *Kennedy 1308* (M, US); Rhyolite, alt. 3600 ft., June 1, 1907, *Shockley 56* (D); Riverside Park, Reno, alt. 4500 ft., May 26, 1909, *Heller 9705* (D, Ph); near Austin, July 26, 1913, *Kennedy 4536* (D); dry hills, near Austin, alt. 1950 m., July 27, 1913, *Hitchcock 764* (US).

WASHINGTON: dry hillsides, Wilson Creek, June, 1893, *Sandberg* (M); Wilson Creek, alt. 2000-3000 ft., June, 1893, *Sandberg & Leiberg* (ISC, Pom); near Wilson Creek, Douglas County, alt. 470 m., June 21, 1893, *Sandberg & Leiberg 258* (US); Pasco, May 25, 1899, *Piper 2960* (US).

OREGON: Union County, 1879, *Cusick 771* (US); dry hills, near Willow Creek, Baker County, June 17, *Cusick 1974* (M, US); base of Stein's Mts., May 30, 1885, *Howell* (CAS, Ph, US); Malheur Valley, near Harper Ranch, alt. 900 m., June 8, 1896, *Leiberg 2225* (CAS); dry ground, near Redmond, June 19, 1925, *Peck 13817* (D); dry sandy ground, near Redmond, June 19, 1925, *Peck 13847* (Ph); dry sandy ground, near Riley, June 22, 1925, *Peck 13847a* (D); dry ground, near Riley, June 22, 1925, *Peck 13852* (D, Ph); dry ground, near Folly Farm, Harney County, June 26, 1925, *Peck 13393* (D); dry gravelly slopes, near Brogan, May 25, 1927, *Henderson 8987* (CAS); dry slopes of Pueblo Mts., July 2, 1927, *Henderson 8989*

(CAS); dry ground, Jordan Valley, Malheur County, July 9, 1927, *Henderson 8988* (CAS).

CALIFORNIA: LASSEN COUNTY—Chat, alt. 5000 ft., June 18, 1897, *Jones* (Pom); INYO COUNTY—Bishop Creek, alt. 4750 ft., May 31, 1906, *Hall & Chandler 7247* (Pom); Lone Pine, May 13, 1927, *Jones* (Pom); Westgard Pass, White Mts., alt. 7300 ft., June 27, 1930, *Duran 517* (CAS, D, M); KERN COUNTY—Mojave, May, 1882, *Pringle* (M, Par, US); Mojave, May 25, 1882, *Pringle* (Ph); Mojave Desert, alt. 950 m., June 26, 1891, *Coville & Funston 1135* (US); Mojave, alt. 3000 ft., May 20, 1903, *Jones* (Pom); Mojave, May 13, 1913, *Eastwood 3235* (CAS, US); rocky hillside, near Mojave, May 5, 1920, *Johnston* (Pom); rocky hills between Rosamund and Mojave, April 30, 1927, *Abrams 11754* (D); El Paso Range, May 1, 1927, *Abrams 11932a* (D); alluvial slopes, Red Rock Canyon, May 13, 1930, *Howell 4976* (CAS); SAN BERNARDINO COUNTY—Mojave River, June 1, 1876, *Palmer 470* (M, Ph, US); Cajon Pass, alt. 3800 ft., May 16, 1903, *Jones* (Pom); on shady bench, Cajon Pass, alt. 3500 ft., May 15, 1920, *Johnston* (Pom); open, sandy plain, Deadman's Point, May 16, 1920, *Johnston* (Pom); sandy plain, near Victorville, May 16, 1920, *Johnston* (Pom); near Hesperia, May 17, 1920, *Johnston* (Pom); Hesperia, alt. 3000 ft., May 27, 1922, *Jaeger* (D); Foxessee Creek, alt. 6000 ft., June 25, 1922, *Peirson 3131* (Pe); sandy soil, Deadman's Point, alt. 3000 ft., June 12, 1927, *Howell 2518* (CAS); between Deadman's Point and Rabbit Springs, May 24, 1931, *Mathias 874* (M, Ph); dry field, 7 miles south of Box "S" Ranch, Mohave Desert, alt. 3700 ft., June 9, 1932, *Munz & Hitchcock 12776* (M); LOS ANGELES COUNTY—near Acton, May 21, 1893, *Hasse* (D); Rock Creek, San Gabriel Mts., alt. 4750 ft., June 16, 1918, *Peirson 394* (E, Pe); sandy wash, Big Rock Creek, San Gabriel Mts., May 19, 1929, *Hoffmann* (E); SAN DIEGO COUNTY—Agua Caliente, April, 1882, *Parish Bros. 1201* (D, ISC, M, Par, US); COUNTY NOT KNOWN—1874, *Lemmon 204* (M, Ph).

This species is unique in the genus in possessing 5 involucre teeth. The foliaceous one is commonly quite as large as the involucre and sometimes much larger. All degrees of variation may occur on the same plant, however, and such plants may occur in any part of the range.

C. Watsoni has the largest area of distribution of any species in the group here treated, and this range is not greatly different from that of its widely distributed relative, *C. brevicornu*.

The faucial insertion of the stamens characterize the remainder of the subsection *Chorizanthella*.

4. *Chorizantho Orcuttiana* Parry, Proc. Davenp. Acad. Sci. 4: 54. 1884; Jepson, Fl. Calif. 396. 1914; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 299. 1923.

Pl. 1, fig. 3.

Spreading plants, about 1 dm. broad; stems appressed or spreading pubescent with rather straight hairs; leaves petiolate, narrowly oblanceolate, 1-2 cm. long, pubescent; bracts opposite, foliaceous and oblanceolate, or the upper short and acerose; involucre mostly solitary in the axils of the cymes, chartaceous, involucreal tube definitely triangular in cross-section, 2 mm. long, ascending long-pubescent, teeth 3, squarrose, as long as the tube, spines abruptly uncinat; flowers pedicellate, barely exserted, perianths cylindric, narrowed above, 2-2.5 mm. long, segments erect, linear-lanceolate, subentire, 0.5 mm. long, short-villous; stamens 9, attached in a ring at the base of the segments, anthers orbicular; achenes smooth, styles short and straight.

Type: "Exposed sandy soil on Point Loma, San Diego, March, 1884." *C. R. Orcutt* (Par.)

Distribution: known only from Point Loma, San Diego County, California.

Specimens examined:

CALIFORNIA: SAN DIEGO COUNTY—Point Loma, March 13, 1884, *Orcutt & Cleveland* (D); Point Loma, March, 1884, *Orcutt* (Par TYPE); San Diego, March, 1884, *Cleveland* (CAS, D); Point Loma, April 2, 1884, *Orcutt* (Par); Point Loma, April, 1884, *Orcutt* (CAS, M, Par, US); Point Loma, April 25, 1897, *Brandeggee* (Pom); Point Loma, April 28, 1905, *K. Brandeggee* (D, US); Point Loma, April 28, 1905, *T. S. Brandeggee* (Pom, US); Point Loma, April 10, 1906, *K. Brandeggee 218* (CAS, D, M, Pom, RMt, US); Point Loma, March 28, 1914, *Parish 9111* (D).

This is a remarkable species, exceedingly limited in its distribution, and with no very close relatives, its nearest ally probably being *C. corrugata*. Superficially, *C. Orcuttiana* resembles *C. procumbens*, or to an extent, the former *C. polygonoides*.

A specimen in the herbarium of the Missouri Botanical Garden is accompanied by a label which reads, "Parry, Tehachipi." It is thought that this piece of data has been confused with that of another species.

5. *Chorizanthe corrugata* (Torr.) Torr. & Gray, Proc. Am. Acad. 8: 198. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 485. 1871; Wats. Proc. Am. Acad. 12: 273. 1877; Wats. Botany [of California] 2: 39. 1880;

Parry, Proc. Davenp. Acad. Sci. 4: 53. 1884; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 11. 1891; Jepson, Fl. Calif. 397, fig. 69. 1914; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 299, fig. 320. 1923; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 145. 1925.

Pl. 1, figs. 4-5.

Acanthogonum corrugatum Torr. Pacif. R. R. Rept. 5: 364. 1856.

Erect plants, 0.5–1.5 dm. tall; stems silky spreading pubescent; leaves petiolate, mostly orbicular, 0.75–2 cm. in diameter, floccose-tomentose beneath, villous above; bracts opposite, lower spatulate, reduced and acerose above; lower involucre loosely disposed in the axils of the cymes, upper densely congested, involucral tube cylindric, transversely and obviously corrugated, shortly attenuated at base, 2–2.5 mm. long, glabrate, teeth 3, squarrose, as long as the tube or longer, occasionally foliose, the short spines down-curved, not uncinat; flowers included, pedicellate, subcylindric, 2–2.5 mm. long, segments oblong, obtuse, about 0.75 mm. long, subequal, pubescent; stamens 6, inserted at base of segments, anthers orbicular; achenes slightly exserted, papillose at top, styles short, straight.

Type: near Fort Yuma, Arizona, December, 1853, *General Thomas*.

Distribution: southern New Mexico, southern and western Arizona, and the inland parts of the southern half of California.

Specimens examined:

NEW MEXICO: Rincon, April 30, 1884, *Jones* (Pom).

ARIZONA: Colorado River Valley, March, 1876, *Palmer 642* (M, Par, US); near Fort Mojave, April, 1884, *Lemmon & wife* (US); Franconia, alt. 900 ft., April 17, 1903, *Jones* (Pom); near Yuma, April 27, 1905, *Goldman 1089* (US); Yuma, April 25, 1906, *Jones* (Pom); Yuma, 1911, *Beard* (M); Sentinel, March 22, 1924, *Orcutt 91* (US); near Dome, March 6, 1927, *Harrison 3615* (US); near Mohawk, March 8, 1928, *Peebles & Harrison 5014* (US).

CALIFORNIA: SANTA CRUZ COUNTY—Santa Cruz, June 29, 1881, *Jones* (Pom); INYO COUNTY—Salt Spring, Death Valley, May 24, 1915, *Parish 10016* (D); SAN BERNARDINO COUNTY—Needles, May, 1884, *Jones* (US); Kelso, alt. 3000 ft., May 2, 1906, *Jones* (Pom); Baxter, May 23, 1915, *Parish 9887* (D); near Cottonwood Springs, alt. 500 ft., April, 1920, *Jaeger 213* (US); 28 miles north of Baker, April 1,

1928, *Howell 3591* (CAS); on volcanic rock, 28 miles north of Baker, April 1, 1928, *Peirson 7762* (Pe); near Riggs, April 3, 1928, *Munz & Hitchcock 10952* (Pom); near Parker, April 22, 1928, *Ferris 7205* (D); RIVERSIDE COUNTY—Colorado Desert, March, 1881, *Parry 272* (M, Par, US); Colorado Desert, April, 1905, *Brandegge* (US); Indio, April 20, 1913, *Piemeisel 3520* (US); near Blythe Junction, alt. 1200 ft., April 2, 1920, *Munz & Harwood* (Pom); Thousand Palm Canyon, alt. 500 ft., February 22, 1926, *Peirson 6509* (Pe); near Dos Palmos, March 13, 1926, *Hill* (Pom); Salt Creek Wash, March 20, 1927, *Reed 5477* (Pom); Thousand Palms, March 27, 1927, *Epling* (M); Painted Canyon, April 12, 1927, *Peirson 7175* (Pe, Pom); Dos Palmos, April 27, 1930, *Gilman* (Pom); SAN DIEGO COUNTY—Colorado Desert, April, 1889, *Orcutt* (M, US); Signal Mt., April 2, 1903, *Abrams 3222* (D); Agua Caliente, February 26, 1914, *Carlson* (CAS); Yaqui Wells, January 21, 1926, *Jones* (Pom); near Palm Wash, March 24, 1928, *Howell 3497* (CAS); IMPERIAL COUNTY—Mesquite, March, 1881, *W. F. Parish* (D); near Picacho, April 20, 1928, *Ferris 7140* (D); Midway Well, March 22, 1932, *Peirson 9795* (Pe); near Potholes, April 13, 1932, *Johansen & Ewan 7139* (E).

An outstanding species, easily recognized by the corrugations on the cylindric tubes of the involucre.

6. *Chorizanthé interposita* Goodman, n. sp.²⁶

Ascending plants; stems 1–2 dm. long, short-villous with ascending or spreading hairs, reddish at maturity; leaves linear and very narrow; bracts verticillate, foliaceous and linear or reduced above, 4–8 mm. long; involucre solitary in the axils of the uniparous cymes, or in small clusters toward the ends of the branches, 5–6 mm. long, the involucre tube triangular in cross-section, 3 mm. long, pubescent, teeth 3, long and divergent, the short spines down-curved or uncinat; flowers nearly sessile, prismatic, 3–3.5 mm. long, submembranaceous, the 6 lobes lanceolate, recurved-apiculate, inner frequently a trifle narrower, 1–1.25 mm. long; stamens 7–9, inserted at the base of

²⁶ *Chorizanthé interposita* Goodman, sp. nov. Planta adscendens; caulibus 1–2 dm. longis, brevi-villosis, pilis adscendentibus vel diffusis; foliis linearibus et angustissimis; bracteis verticillatis, foliaceis et linearibus aut supra minutis, 4–8 mm. longis; involucris solitariis in axillis uniparitarum cymarum, vel ad terminos ramorum in glomerulis parvis, 5–6 mm. longis, involucri tubo prismatico, 3 mm. longo, pubescente, dentibus 3, longis et divergentibus, spinis brevibus, recurvatis vel uncinatis; floribus subsessilibus, prismaticis, 3–3.5 mm. longis, submembranaceis, 6 laciniis lanceolatis, recurvato-apiculatis, interioribus saepe angustioribus, 1–1.25 mm. longis; staminibus 7–9, ad basem laciniarum insertis, filamentis 0.5 mm. longis, singula glandula ad basem filamentarum, antheris orbicularibus; stylis brevibus.—San Quentin, Lower California, April 19, 1886, *C. R. Orcutt* (Mo. Bot. Gard. Herb. No. 128475 TYPE).

the lobes, filaments 0.5 mm. long, a gland at base of each on the perianth tube, anthers orbicular; styles short.

Type: San Quentin, Lower California, April 19, 1886, *C. R. Orcutt* (Mo. Bot. Gard. Herb. No. 128475).

Distribution: Lower California.

Specimens examined:

LOWER CALIFORNIA: San Quentin, April 19, 1886, *Orcutt* (M TYPE).

This intermediate species is an exceedingly interesting one. Superficially resembling the next (*C. Lastarriaea* var. *californica*) very closely, it can be differentiated from it by the narrower bracts, and, more especially, by the presence of a true, 3-toothed involucre containing a non-involucre-like perianth.

7. *Chorizanthé Lastarriaea* Parry var. *californica* (H. Gross) Goodman, n. comb.

Lastarriaea chilensis Remy subsp. *californica* H. Gross in Engl. Bot. Jahrb. **49**: 345. 1913.

Lastarriaea chilensis Remy in Torr. & Gray, Proc. Am. Acad. **8**: 199. 1870, as to North American specimens; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] **5**: 477. 1871, as to North American specimens; Wats. Botany [of California] **2**: 39. 1880, as to North American specimens; Parry, Proc. Davenp. Acad. Sci. **5**: 36. 1887, as to North American specimens; Behr, Fl. Vicinity San Francis. 278. 1888; Dammer in Engl. & Prantl, Nat. Pflanzenfam. **3**^{1a}: 10, fig. 4E. 1891, as to North American specimens; Greene, Fl. Francis. 159. 1891; Jepson, Fl. West. Mid. Calif. 149. 1901, and ed. 2. 128. 1911, both as to North American specimens; Abrams, Fl. Los Angeles & Vicinity, 112. 1904, and ed. 2. 103. 1917; Jepson, Fl. Calif. 389. 1914, as to North American specimens; Davidson & Moxley, Fl. So. Calif. 105. 1923; Jepson, Man. Fl. Pl. Calif. 295. 1923, as to North American specimens.

Chorizanthé Lastarriaea Parry, Proc. Davenp. Acad. Sci. **4**: 63. 1884, as to North American specimens; Parry, West. Am. Sci. **1**: 29. 1885.

Ascending to prostrate plants; stems about 1–1.5 dm. long, pubescent with spreading or ascending hairs; leaves narrowly linear, less than 1 mm. wide, 2–2.5 cm. long, ciliate; bracts in

verticils of 4 or 5, usually connate at base only, lanceolate to linear, 4–7 or 9 mm. long; involucre lacking; flowers solitary in the axils of the uniparous cymes, perianth 4 mm. long, coriaceous, ciliate, tube prismatic, 2 mm. long, lobes 5, two shorter than the others, long-spinose, divergent, uncinat; stamens 3 or more, inserted near the base of the perianth lobes, anthers small and orbicular; styles short.

Type: mesas, San Bernardino Valley, California, April, 1882, *Parish 819*.

Distribution: Monterey County, California, southward into Lower California.

Specimens examined:

CALIFORNIA: MONTEREY COUNTY—sandy fields, Monterey, July 18, 1882, *Pringle* (M); SANTA BARBARA COUNTY—sea bluffs at East Point, Santa Rosa Island, April 9, 1930, *Munz & Hoffmann 11734* (Pom); SAN BERNARDINO COUNTY—1876, *Parry & Lemmon 371* (M); mesas, San Bernardino Valley, April, 1884, *Parish Bros. 819* (M); Colton, April 29, 1889, *Parish* (M); dry mesas, near San Bernardino, alt. about 300 m., May 17, 1917, *Parish 11217* (Pom); sandy washes, Highland, alt. 1000 ft., May 9, 1919, *Spencer 1110* (Pom); RIVERSIDE COUNTY—Whitewater, alt. 1000 ft., May 11, 1903, *Jones* (M, Pom, US); near Murietta, alt. 1500 ft., May 19, 1922, *Munz & Johnston 5364* (Pom); LOS ANGELES COUNTY—Pasadena, May 3, 1882, *Jones* (Pom); dry ridges, Santa Monica, May, 1890, *Hasse* (M); dry hills, April, 1891, *Hasse* (M); Ballena Harbor, April 1, 1901, *Abrams 1218* (M, Pom); Santa Catalina Island, May 7, 1902, *Trask* (M); sandy soil, between Claremont and Upland, June 2, 1921, *Robinson 94* (Pom); dry soil, San Gabriel Wash, alt. 350 ft., May 26, 1932, *Wheeler 745* (M); SAN DIEGO COUNTY—Fallbrook, March 28, 1882, *Jones* (Pom); San Diego, April 3, 1882, *Jones* (Pom); Point Loma, May 7, 1902, *Brandege 1623* (M, Pom); San Diego, March–June, 1906, *K. Brandege* (M); mesa near San Diego, alt. 4000 ft., *Peirson 3360* (Pe); COUNTY NOT KNOWN—1868–1869, *Kellogg & Harford 865* (M, US); 1882, *Parry* (M).

LOWER CALIFORNIA: Todos Santos Bay, April 7, 1886, *Orcutt* (M); San Quentin Bay, February, 1889, *Palmer 722* (US).

The acceptance of Gross' subspecific name is made even though the writer possesses a lack of full knowledge of the South American representatives of the former *Lastarriaeas*. Certainly the North American species are distinguishable from the plant delineated in the plate accompanying the original description of *Lastarriaea chilensis*,²⁷ but whether or not one of

²⁷ Remy in Gay, *Fl. Chili* 5: 290. 1849; Gay, *Hist. Chili, Atlas Bot.* 1: *pl. 58, fig. 1.* 1854.

Philippi's species of *Lastarriaea* would not include var. *californica* is not known.

The absence of certain of the bracts which would normally form the involucre, the reduction of the perianth lobes to 5, and the faucial insertion of the stamens all indicate, it is thought, *C. Lastarriaea* to be the most highly evolved of this series of Chorizanthes.

Section 2. HERBACEAE Benth., in large part. North American annuals, differing chiefly from the annual Suffrutices in the prevailingly larger outer teeth of the involucre as compared with the tube, and the differentiation of the teeth into a long outer trio and a shorter alternating trio. Cotyledons longer than the radicle.

Subsection 1. PUNGENTES, new subsection. Erect or decumbent plants with spreading pubescence. Lower bracts foliaceous or rarely reduced, upper acerose and ciliate. Involucre 6-ribbed and 6-toothed, the teeth prevailingly margined, the alternating 3 shorter except in one species, the anterior tooth a little longer than any of the others. Perianth scantily pubescent on the outer surface, the lobes mostly equal or subequal. Stamens prevailingly 9, inserted at the base of the perianth. Species 8-17, incl.

Range: coastal or in the coast ranges of California from Monterey County to Sonoma County, with outlying species as far north as Mendocino County, and southward into Santa Barbara County; and one species inland in northern California.

8. *Chorizanthe pungens* Benth. Trans. Linn. Soc. Lond. 17: 419, *pl. 19, fig. 2*. 1836; Torr. Pacif. R. R. Rept. 4: 132. 1856; Benth. in DC. Prodr. 14: 26. 1857; Torr. and Gray, Proc. Am. Acad. 8: 194. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 270. 1877; Wats. Botany [of California] 2: 36, 481. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 60. 1884; Behr, Fl. Vicinity San Francis. 278. 1888; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 12. 1891; Greene, Fl. Francis. 155. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894; Jepson, Fl. West.

Mid. Calif. 151. 1901, and ed. 2. 130. 1911; Jepson, Fl. Calif. 392, *fig. 67c*. 1914; Jepson, Man. Fl. Pl. Calif. 296, *fig. 318*. 1923, excluding vars. Pl. 1, *figs. 10-11*.

Chorizanthe Douglasii Benth. var. *albens* Parry, Proc. Davenp. Acad. Sci. 5: 175. 1889; Greene, Fl. Francis. 154. 1891.

Diffuse plants; stems several from the base, 1-3 dm. long, grayish with widely spreading villous hairs; leaves basal, petiolate, oblanceolate, 3-5 cm. long, ascending villous; bracts opposite, the lower similar to the leaves, upper acerose; involucre in dense clusters in compound uniparous cymes, 3.5-4 mm. long, the involucre tube subcylindric, 2-3 mm. long, hispidulous on the ribs with widely spreading hairs, the teeth divergent, straight except for the prevailingly uncinat tip, the alternate 3 a little smaller, plainly margined with a light-colored membrane, this cleft or divided at the sinuses; flower partially exserted, narrowly obconic, 3-3.5 mm. long, perianth lobes subequal and erose, nearly half as long as the tube, the outer 3 obovate or oblong, rounded to truncate, sometimes mucronate, inner oblong, similar, often a little shorter; stamens 9, anthers small and oblong; achene 3 mm. long.

Type: "California, coll. of 1833," *Douglas* (K).

Distribution: northern Monterey County, California.

Specimens examined:

CALIFORNIA: MONTEREY COUNTY—1833, *Douglas* (K TYPE, M photograph); pastures near Monterey, 1848, *Hartweg 1936* (K); Monterey, 1850, *Parry* (US); sandy soil, Monterey, July 8, 1880, *Engelmann* (M); 1880, *M. E. Norton* (US); Monterey, 1881, *Lemmon* (Par); in sandy places, Monterey, July 19, 1882, *Pringle* (Ph); Salinas Valley, April 20, 1888, *Parry* (M, Par TYPE of *C. Douglasii* var. *albens*, US); Hotel del Monte grounds, May 1, 1888, *Hasse* (M); Seaside, April 13, 1894, *Dudley* (D); Pacific Grove, June-July, 1898, *Nott* (D); sandy beach, May 16, 1900, *Grant* (D); Del Monte, May 16, 1900, *Grant 2605* (Pom); Del Monte, April, 1902, *Elmer 3570* (CAS, D, M, US); near Seaside, May 19, 1903, *Heller 6749* (D, M, Ph, Pom, RMt, US); Moss Beach, June 10, 1906, *McGregor 42* (D); Pacific Grove, June 7, 1907, *Patterson & Wiltz* (D); Seaside, March 31, 1910, *Randall 221* (D); Seaside, May 29, 1912, *Eastwood 150* (US); near Monterey, June 27, 1923, *Peirson 3707* (Pe); Monterey Point, June 9, 1929, *Dearing* (E).

A specimen of Nuttall's which seems referable to *pungens* is labeled "St. Simeon" (San Luis Obispo County). Two

specimens from near Castroville, Monterey County (*K. Brandegee*, June 16, 1908, and *Dearing*, June 9, 1929) are doubtfully referred to this species.

C. pungens has been considered one of the most variable species in the genus, and while it is still to be regarded as variable, it is not unusually so as here delimited. The size of the plant and the character of the perianth lobes are the most variable characters; the pubescence and the character of the involucre teeth being, perhaps, the next.

Parry's *C. Douglasii* Benth. var. *albens* is here considered a white-pubescent phase of *C. pungens*. The reason that Parry referred this variety to *Douglasii* is apparently because even after having seen type material of *Douglasii* the outstanding character of the continuous involucre membrane was overlooked. Most or all of the plants which Parry referred to *C. Douglasii*, the present writer would designate as the purple-margined variety of *pungens*, namely, var. *Hartwegi*.

The figure of the involucre of *C. pungens* which accompanies Bentham's original description shows the involucre teeth as straight. It happens that on the type specimen the teeth are straight on many of the involucres, on the others they are uncinat. Though the latter condition prevails, straight teeth are sometimes met with.

8a. *Chorizanthe pungens* Benth. var. *Hartwegi* (Benth.) Goodman, n. comb.

Chorizanthe Douglasii Benth. var. *Hartwegi* Benth. in DC. Prodr. 14: 26. 1857; Torr. & Gray, Proc. Am. Acad. 8: 194. 1870, in synonymy.

Less decumbent than the species, spreading villous-pubescent, sometimes hoary; stems, leaves, bracts, and inflorescence similar to the species; involucres commonly purplish, especially the marginal membrane, the latter parted or divided at the sinuses, otherwise as in the species; flower partly exserted, narrowly obconic, 3–3.5 mm. long, often yellowish, outer lobes obovate to oblong, erose, very often mucronate, inner oblong, similar; stamens 9, anthers small, oblong.

Type: dry mountain pastures near Santa Cruz, California, coll. of 1848, *Hartweg* 1935 (K).

Distribution: Santa Cruz County, California, and occasionally adjacent counties to north and south.

Specimens examined:

CALIFORNIA: SAN FRANCISCO COUNTY—San Francisco, July 16, 1881, *Jones* (Pom); SANTA CRUZ COUNTY—dry mountain pastures near Santa Cruz, 1848, *Hartweg 1935* (K TYPE, M fragment and photograph); Santa Cruz, 1881, *Jones* (US); Santa Cruz, July 1, 1881, *Jones 2327* (Pom); Santa Cruz, June, 1882, *Parry* (M, Par); Santa Cruz Mts., July 13, 1882, *Pringle* (M, US) Santa Cruz Mts., July 15, 1882, *Pringle* (Ph); sandy fields, Santa Cruz Mts., July 26, 1882, *Pringle* (M, US); Santa Cruz Mts., 1883, *Parry* (US); Santa Cruz, 1888, *Parry* (M, Par, US); Ben Lomond, 1888, *Parry 13* (Par); Flat Rock, Big Basin, May 29, 1897, *Dudley* (D); near Eccles, Santa Cruz Mts., June 26, 1897, *Dudley* (D, M); Ben Lomond, May, 1903, *Elmer 4671* (CAS, D, M, US); Felton, July 11, 1903, *Mrs. B. H. Thompson* (M); Felton, July 11, 1903, *C. H. Thompson* (D); Santa Cruz, June 21, 1917, *Reed* (CAS); sandy hills near Mt. Hermon, May 18, 1926, *Bacigalupi 1491* (D); Santa Cruz Mts., June 16, 1929, *Rowntree* (Pom); sand hills, Ben Lomond, June 20, 1933, *Rose 33235* (CAS); MONTEREY COUNTY—sandy fields, July 16, 1882, *Pringle* (M, US); Pacific Grove, July 8, 1914, *Newell* (CAS, US).

This variety, ranging just to the north of the species, is usually readily distinguishable from *C. pungens* by the purplish involucrel margin. The flowers generally have more evidently obovate, erose and mucronate outer lobes, and in this respect the variety does approach *C. Douglasii*.

9. *Chorizanthe cuspidata* Wats. Proc. Am. Acad. 17: 379. 1882; Greene, Fl. Francis. 156. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894.

Chorizanthe pungens Benth. var. *cuspidata* (Wats.) Parry, Proc. Davenp. Acad. Sci. 4: 60. 1884; Jepson, Fl. Calif. 392. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Decumbent plants; stems 1–2.5 dm. long, spreading villous; leaves basal, petiolate, oblanceolate, 2–3.5 cm. long, clothed with short, ascending, villous hairs; bracts opposite, lower similar to the leaves, upper acerose; involucre 3.5–4 mm. long, in dense clusters on the compound, uniparous cymes, involucrel tube triangular in cross-section, campanulate to urceolate, about 2 mm. long, pubescent to glabrate, the teeth spreading and uncinat, marginal membrane lacking or vestigial; flower partly exserted, subcylindric, 2–2.5 mm. long, outer segments oblong, half as long as the perianth tube, inner a trifle shorter

and narrower, all entire and tipped with a short cusp; stamens 9, anthers oblong.

Type: San Francisco, California, July 16, 1881, *M. E. Jones* 2386 (G).

Distribution: chiefly in vicinity of San Francisco, California, and in adjacent counties to the northward and southward.

Specimens examined:

CALIFORNIA: SONOMA COUNTY—sand hills at north end of Bodega Bay, June 8, 1930, *Howell* 5271 (CAS); SAN FRANCISCO COUNTY—San Francisco, *Wilkes* 1522 (US); near San Francisco, 1865, *Torrey* 434 (US); sandy fields, San Francisco, May 1, 1865, *Bolander* 112 (M); San Francisco, May 16, 1868, *Kellogg & Harford* (RMt, US); San Francisco, June 16, 1868, *Kellogg & Harford* (D, M, US); San Francisco, June 16, 1868, *Kellogg & Harford* 6 (US); Lone Mountain, San Francisco, July 10, 1868, *Kellogg & Harford* (US); Merced Lake, August 22, 1868, *Kellogg & Harford* (US); San Francisco, July 16, 1878, *Moore* (CAS); near San Francisco, 1880, *Vasey* 539 (US); San Francisco, July 16, 1881, *Jones* (Ph); Golden Gate Park, July 16, 1881, *Jones* 186 (Pom); San Francisco, July 16, 1881, *Jones* 2386 (D, M, Pom, US ISOTYPES); San Francisco, 1882, *Parry* (M); San Francisco, May 12, 1882, *Jones* (CAS, Pom); San Francisco, May 19, 1882, *Jones* (Pom); Golden Gate Park, June, 1882, *Parry* (M); San Francisco, June, 1886, *Curran* (D); Lake Merced, June, 1892, *Michener & Bioletti* (US); Lone Mountain, San Francisco, June 3, 1894, *Dudley* (D); between Presidio and park, San Francisco, May 21, 1896, *Cannan* (US); between Presidio and park, San Francisco, May 21, 1896, *Eastwood* (CAS); Lake Merced, June 8, 1902, *Heller* 5666 (D, M, Ph, Pom, RMt, US); vicinity of Lake Merced, May, 1903, *Gardner* 548 (US); sand hills near San Francisco, May 3, 1903, *Baker* 2842 (M, Pom, RMt, US); near San Francisco, June, 1903, *Baker* 5072 (D, Pom); San Francisco, 1905, *K. Brandegee* (M, Pom, RMt, US); sand dunes, near Lake Merced, April 24, 1926, *Howell* 1956 (CAS); near Sutro Heights, San Francisco, June 21, 1930, *Howell* 5316 (CAS); sandy ground near Relief Home, San Francisco, June 1, 1933, *Eastwood* (CAS); Lake Merced, San Francisco, July 9, 1933, *Howell* 11430 (CAS); SAN MATEO COUNTY—Crystal Springs Lake, May, 1903, *Elmer* 4793 (M, US); San Pedro, May, 1903, *Elmer* 4793 (CAS, D, Pom); SANTA CRUZ COUNTY—Santa Cruz, June, 1881, *Jones* (US); COUNTY NOT KNOWN—1866, *Bolander* (US); *Bridges* 286 (US).

C. cuspidata has been considered as but a variety of *C. pungens* by some taxonomists, but the present comparative study indicates it as a good species. It is true that the involucreal membranes in *C. cuspidata* are not always completely lacking, and they are regularly present in the variety *marginata*, thus evidencing close relationship to *pungens*. However, important differentiating characters are to be found in a more fundamental organ, namely, the perianth. Here the smaller

flower, and the narrow, entire to subentire, apiculate lobes amply separate the species from *C. pungens*. Further, the range of *C. cuspidata* is quite distinct from that of *C. pungens*.

9a. *Chorizanthe cuspidata* Wats. var. *marginata* Goodman, n. var.²⁸

Ascending to decumbent plants; stems 2–4 dm. long, spreading villous; leaves basal, petiolate, oblanceolate to spatulate, 3.5–5 cm. long; lower bracts similar to the leaves, upper acerose; inflorescence as in the species; involucre ascending pubescent, the teeth margined with an evident membrane, this and the involucral tube often purplish; otherwise as in the species.

Type: San Pedro, San Mateo County, California, May, 1903, *Elmer 4828* (M).

Distribution: San Francisco and San Mateo Counties, California, and rarely southward.

Specimens examined:

CALIFORNIA: SAN FRANCISCO COUNTY—San Francisco, 1905, *K. Brandegee* (D); near Ocean View, June 8, 1906, *Heller 8383* (CAS, D, M, Ph, US); Laurel Hill Cemetery, June 6, 1912, *Eastwood 222* (CAS, US); Lake Merced, May 20, 1918, *Eastwood* (CAS); SAN MATEO COUNTY—Colma, May 11, 1901, *Abrams 1603* (D, Pom, Rmt); near Colma, May 11, 1901, *Dudley* (D); San Pedro, May, 1903, *Elmer 4828* (CAS, D, M TYPE, Pom, US); MONTEREY COUNTY—Seaside, May 29, 1912, *Eastwood 150a* (CAS); COUNTY NOT KNOWN—1875, *Vasey* (US).

This variety is intermediate between *C. cuspidata* and *C. pungens* var. *Hartwegi*, and probably gave rise to the former. The floral morphology serves definitely to ally the new variety to *C. cuspidata*, and the geographic distribution agrees with such a contention.

The specimens of *C. cuspidata* var. *marginata* thus far seen average larger, more erect, and possess larger bracts than do those of typical *cuspidata*.

²⁸ ***Chorizanthe cuspidata* Wats. var. *marginata* Goodman, var. nov.** Planta adscendens vel decumbens; caulibus 2–4 dm. longis, diffuse villosis; foliis basalibus, petiolatis, oblanceolatis vel spatulatis, 3.5–5 cm. longis; bracteis inferioribus foliis similibus, superioribus acerosis; inflorescentia speciei simile; involucris adscendente pubescentibus, margine dentium membrana purpurascente, tubo involucri saepe purpurascente. Cetera speciei similis.—San Pedro, San Mateo County, California, May, 1903, *Elmer 4828* (M TYPE).

10. *Chorizanthe angustifolia* Nutt. Jour. Acad. Phila. N. S. 1: 167. 1848; Benth. in DC. Prodr. 14: 26. 1857, excluding specimens from near San Francisco; Torr. & Gray, Proc. Am. Acad. 8: 194. 1870, in synonymy.

Decumbent plants; stems several from the base, 1–4 dm. long, canescent with ascending hairs; leaves basal, petiolate in the larger plants, oblanceolate, 2–5 cm. long, gray with villous hairs; bracts similar, reduced above; inflorescence of numerous medium-sized clusters of involucre, rather closely arranged on compound uniparous cymes; involucre about 3.5 mm. long, the tube cylindro-triangular in cross-section, 2 mm. long, with spreading, villous hairs, teeth slender, spreading, straight except for the uncinat tips, the larger as long as the tube, marginal membranes lacking; flower scarcely exerted, cylindric, 2–2.5 mm. long, lobes similar, oblong, acute to truncate and erose at apex, 0.75 mm. long; stamens 3, anthers suborbicular, minute.

Type: "Pueblo los Angeles, Upper California," *Gambel* (Ph).

Distribution: probably only Santa Barbara County, California.

Specimens examined:

CALIFORNIA: near Santa Maria, Santa Barbara County, June 13–July 3, 1906, *Eastwood 351* (CAS); sandy soil near Buellton, Santa Barbara County, May 30, 1929, *Hoffmann* (E); "Pueblo los Angeles," *Gambel* (M photograph, Ph TYPE).

This species, the most southern of the subsection *Pungentes*, is doubtless a derivative of *C. pungens* (or an ancestor similar to *C. pungens*). *C. angustifolia* has undergone some of the same evolution, in the loss of the marginal membrane of the involucre, that *C. cuspidata*, whose range lies to the north of that of *C. pungens*, has manifested.

Grayish plants in aspect, they are readily recognized as "*pungens*" relatives, despite the lack of the characteristic involucre margins, by the foliaceous, opposite, oblanceolate bracts, and the inflorescence.

The name *C. angustifolia* has not appeared in any treatments of *Chorizanthe* since Torrey and Gray put the species

in synonymy in 1870, and collections made during the past several years which were referable to this species or its variety have, of course, been troublesome.

In the light of subsequent collections, it seems unlikely that the type of *C. angustifolia* was collected as far south as Los Angeles.

10a. *Chorizanthe angustifolia* Nutt. var. *Eastwoodae* Goodman, n. var.²⁹

Flowers 2.5–3 mm. long, stamens 8–9. Otherwise as the species.

Type: sandy soil, Morro Bay, San Luis Obispo County, California, May 16, 1928, *Eastwood 15108* (CAS).

Distribution: San Luis Obispo and Santa Barbara Counties, California.

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—dry hills, near coast, 1884, *Summers* (US); Haynes ranch, July, 1912, *Ingalls* (CAS); sand hills near Pismo Beach, June 10, 1917, *Abrams 6516* (D); Morro, April 7, 1927, *Eastwood 14266* (CAS); Morro Bay, May 16, 1928, *Eastwood 15102* (CAS); Morro Bay, May 16, 1928, *Eastwood 15108* (CAS TYPE, D, M photograph); between Guadalupe and Callender, April 15, 1929, *Ferris 7613* (D); near San Luis Obispo, *Roadhouse 401* (US); SANTA BARBARA COUNTY—sand dunes, Surf, April 20, 1929, *Peirson 8310* (CAS, Pe); sandy field, Santa Maria, April 22, 1929, *Hoffmann* (E); near Buellton, May 31, 1931, *Hoffmann* (Pom).

Most of the “*angustifolia*” material is referable to this less reduced variety.

11. *Chorizanthe diffusa* Benth. Pl. Hartweg. 333. 1857; Benth. in DC. Prodr. 14: 26. 1857; Torr. & Gray, Proc. Am. Acad. 8: 193. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 270. 1877; Wats. Botany [of California] 2: 36, 481. 1880; Greene, Fl. Francis. 156. 1891.

Chorizanthe pungens Benth. var. *diffusa* (Benth.) Parry, Proc. Davenp. Acad. Sci. 4: 60. 1884; Jepson, Fl. Calif. 392. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

²⁹ *Chorizanthe angustifolia* Nutt. var. *Eastwoodae* Goodman, var. nov. Planta speciei similis sed floribus 2.5–3 mm. longis; staminibus 8–9.—Sandy soil, Morro Bay, San Luis Obispo County, California, May 16, 1928, *Eastwood 15108* (CAS TYPE).

Chorizanthe pungens Benth. var. *nivea* Curran, Bull. Cal. Acad. Sci. 1: 274. 1885; Jepson, Fl. Calif. 392. 1914.

Chorizanthe nivea (Curran) Jepson, Man. Fl. Pl. Calif. 297. 1923.

Chorizanthe Andersoni Parry, Proc. Davenp. Acad. Sci. 5: 175. 1889; Greene, Fl. Francis. 156. 1891; Jepson, Fl. Calif. 392. 1914, in synonymy.

Decumbent to ascending plants; stems several from the base, 1–2.5 dm. long, grayish with spreading or ascending pubescence; leaves basal, petiolate, oblanceolate, 2–4.5 cm. long, thickly short-villous beneath, at least when young, and sparsely villous above; bracts opposite, prevailingy acerose; involucre 3 mm. long, disposed in clusters in subequally branched cymes, the involucral tube triangular in cross-section, 2 mm. long, sparsely villous-hirsute with widely spreading hairs, the 6 teeth spreading and uncinat, the alternating 3 considerably shorter, all margined by a conspicuous, white membrane, this parted at the sinuses; flower partially exserted, subcylindric, about 2.5 mm. long, lobes similar, oblong, the apices acutish, entire or nearly so, 0.5 mm. long; stamens 9, anthers suborbicular to oval.

Type: in dry, sandy places near Monterey, California, 1848, *Hartweg* 1938 (K).

Distribution: San Mateo and Santa Clara Counties southward to Santa Barbara County, California.

Specimens examined:

CALIFORNIA: SAN MATEO COUNTY—Jasper Ridge, May 29, 1910, *Dudley* (D); SANTA CLARA COUNTY—Jasper Ridge, May, 1901, *Abrams* 1653 (D); SANTA CRUZ COUNTY—near Fulton, August, 1883, *Parry* (M); Ben Lomond, 1888, *Parry* 21² (Par TYPE of *C. Andersoni*, US); Ben Lomond, June 28, 1888, *Parry* (M); Big Basin, June 7, 1895, *Dudley* (D); Santa Cruz, June 22, 1903, *Thompson* (D, M); sandy hills near Mt. Hermon, May 18, 1926, *Bacigalupi* 1490 (D); Santa Cruz Mts., June 16, 1929, *Rowntree* (Pom); MONTEREY COUNTY—dry sandy places near Monterey, 1848, *Hartweg* 1938 (K TYPE, M photograph, US photograph); Monterey, *Parry* (M, Par); Monterey, May 12, 1889, *Parry* (Par); near Seaside, May 19, 1903, *Heller* 6750 (D, M, Ph, Pom, Rmt, US); Monterey, June, 1903, *Elmer* 5084a (US); Carmel-by-the-Sea, April 30, 1910, *Randall* 427 (D); Carmel River, August 15, 1910, *Clemens* (Pom); Seaside, May 29, 1912, *Eastwood* 151 (CAS); near Monterey, June 26, 1923, *Peirson* 8665 (Pe); near Del Monte, June 27, 1927, *Heller* 14404 (M, Ph); SAN LUIS OBISPO COUNTY—Arroya Grande hills, July, 1883,

Summers 1 (US); mountain near San Luis Obispo, July, 1885, *Curran* (D, Par, Pom isotypes of *C. pungens* var. *nivea*); Price Cañon, *Brandege* 85 (D, M, Pom, RMt, US); SANTA BARBARA COUNTY—dry ridge, head of Purissima Canyon, March 26, 1925, *Munz 9275* (Pom); near Buellton, May 30, 1929, *Hoffmann* (E).

Despite the confusion that has existed concerning this species, it is well marked both as to aspect and technical characters. Obviously a member of the *Pungentes* subsection because of the involucre margins, it is unique in the lack (except in very young specimens) of foliaceous bracts. The broad, white involucre membrane makes the clusters of involucres almost showy for the genus. The perianths, which when fresh frequently have yellow-tipped lobes and a white tube, are distinctive by the acutish, very nearly entire segments.

Dr. Jepson recognizes Mrs. Curran's *C. pungens* Benth. var. *nivea* as a species, and designates these specimens from the southern portion of the range as erect. In the original description of var. *nivea*, Mrs. Curran stated that it was "decumbent," and such a characterization certainly applies correctly to the type collection. Herbarium material would indicate that the plants which are "erect" are but young specimens of *diffusa*.

12. *Chorizanthe Howellii* Goodman, n. sp.³⁰

Pl. 3, fig. 1.

Spreading to decumbent plants; stems several from the base, thick, 1–2 dm. long, ascending villous; leaves basal, petiolate, spathulate to broadly obovate, 3–5 cm. long, gray villous-hirsute beneath, more sparsely villous above; bracts opposite, sim-

³⁰ *Chorizanthe Howellii* Goodman, sp. nov. Planta patula vel decumbens; caulibus pluribus e base, crassis, 1–2 dm. longis, adscendente villosis; foliis basilibus, petiolatis, spathulatis vel late obovatis, 3–5 cm. longis, subter cinereo-villoso-hirsutis, supra sparse villosis; bracteis oppositis, similibus foliis aut superioribus multum minoribus; involucris 5–6 mm. longis, in glomerulis densis 2–3 cm. latis dispositis, tubo involucri subcylindrico, 3 mm. longo, inter costas adscendente villoso, dentibus patulis, spinis rectis, 3 alternatis brevioribus, omnibus membrana marginatis, ad sinus divisis; floribus paulo exsertis, subcylindricis, 4 mm. longis, lobis exterioribus circiter 1 mm. longis, interioribus 0.25 mm. brevioribus, omnibus oblongis, ad apices truncatis et denticulatis; staminibus 9, antheris ovalibus; achaeniis 3.5 mm. longis.—Sand dunes on Mendocino coastal plain, Ft. Bragg, Mendocino County, California, alt. 50 ft., May 26, 1929, *J. T. Howell 4233* (CAS TYPE).

ilar to the leaves, or the upper much reduced; involucre 5–6 mm. long, disposed in dense clusters, these 2–3 cm. broad, the involucre tube subcylindric, 3 mm. long, ascending villous between the ribs, teeth spreading, the spines straight, the 3 alternate a little shorter, all margined with a membrane, this parted at the sinuses; flower slightly exserted, subcylindric, 4 mm. long, outer lobes a little over 1 mm. long, inner 0.25 mm. shorter, all oblong, truncate, and denticulate at apices; stamens 9, anthers oval; achene 3.5 mm. long.

Type: sand dunes on Mendocino coastal plain, Ft. Bragg, Mendocino County, California, alt. 50 ft., May 26, 1929, *J. T. Howell 4233* (CAS).

Distribution: Mendocino County, California.

Specimens examined:

CALIFORNIA: MENDOCINO COUNTY—sand dunes on Mendocino coastal plain, Fort Bragg, alt. 50 ft., May 26, 1929, *Howell 4233* (CAS TYPE, M photograph); on the beach, Fort Bragg, July, 1931, *Hutchinson* (M); Fort Bragg, July 12, 1931, *Jones 28863* (M).

C. Howellii is the most northern of the close relatives of *C. pungens*. Its nearest relative is *C. villosa*, from which it can be readily differentiated by the presence of marginal membranes on the involucre, and by the broadly spatulate leaves and bracts.

It is a pleasure to dedicate this species to John Thomas Howell, Assistant Curator of the Herbarium of the California Academy of Sciences, important collector of Pacific Coast plants, and friend who has conferred many favors upon the writer during the course of this study.

13. *Chorizanthe villosa* Eastwood, Bull. Torr. Bot. Club 30: 485. 1903; Jepson, Fl. Calif. 392. 1914, in synonymy.

Spreading plants; stems several from the base, slender, 2–4 dm. long, gray with spreading villous hairs; leaves basal or essentially so, petiolate, oblanceolate, 4 or 5 cm. long, villous; bracts opposite, similar to the leaves, reduced above; involucre 4 mm. long, in cymose clusters along the stems, the clusters about 1 cm. broad, the involucre tube more or less triangular in cross-section, 2.5 mm. long, shortly and rather densely and evenly villous with ascending hairs, the teeth divergent, the

spines straight, marginal membrane obsolete; flower barely included, narrowly obconic, 3 mm. long, lobes about 0.75 mm. long, oblong, obtuse, mucronate, pubescent with hairs which often exceed the lobes; stamens 9, anthers oblong; mature achene slightly exserted.

Type: Bodega Point, Sonoma County, California, July 4, 1900, *Eastwood* (CAS).

Distribution: Sonoma and Marin Counties, California.

Specimens examined:

CALIFORNIA: SONOMA COUNTY—Bodega Point, July 4, 1900, *Eastwood* (CAS TYPE, M photograph, US); sand dunes, Bodega Point, June, 1905, *K. Brandegee* (M, Ph, Pom, RMt, US); Bodega Point, June 29, 1915, *Eastwood 4832* (CAS, US); MARIN COUNTY—Dillon's Beach, June 6, 1890, *Congdon* (D).

Of the specimens thus far seen of this species, the teeth of the involucre are an amber-yellow.

14. *Chorizanthe robusta* Parry, Proc. Davenp. Acad. Sci. 5: 176. 1889; Greene, Fl. Francis. 154. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894; Jepson, Fl. West. Mid. Calif. 150. 1901, and ed. 2. 129. 1911.

Chorizanthe Douglasii Parry, Proc. Davenp. Acad. Sci. 4: 56. 1884, not Benth.

Chorizanthe pungens Benth. var. *robusta* (Parry) Jepson, Fl. Calif. 392. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Erect plants, 1.5–5 dm. tall; stem 1 or few from the base, thick, branched from the middle or near the bottom, spreading hirsute; leaves basal or nearly so, petiolate, the petiole frequently long and slender, oblanceolate, 4–8 cm. long, hirsute; bracts opposite or verticillate, similar to the leaves, the upper reduced; involucre long-campanulate, about 6 mm. long, arranged in large, dense, cymose clusters, these 2–4 cm. broad, the involucral tube subcylindric, 3.5–4 mm. long, evenly hirsute, teeth but slightly divergent, margined by an evident membrane, this parted at the sinuses, spines minute, straight or very shortly recurved to uncinat; flower included, shortly pedicellate, narrowly obconic, 3–4 mm. long, lobes oblong or slightly elliptic, rounded-erose, sometimes mucronate, 1–1.5 mm. long, subequal or the inner a little shorter; stamens 9, anthers linear-oblong, 0.5 mm. long.

Type: dry sandy soil, margins of Monterey Bay, north of Aptos, Santa Cruz County, California, June, 1883, *Parry* (Par.)

Distribution: Alameda and Santa Clara Counties, southward to Monterey County, California.

Specimens examined:

CALIFORNIA: ALAMEDA COUNTY—Alameda, July 4, 1866, *Bolander 1939* (M, US); Alameda, 1887, *Parry* (D); Alameda, 1888, *Parry 13²* (Par, US); Alameda, May, 1891, *Greene* (US); SANTA CLARA COUNTY—San Jose, 1882, *Parry* (M); SAN FRANCISCO COUNTY—Ocean View, June 11, 1889, *Congdon* (US); SAN MATEO COUNTY—Colma, June, 1905, *K. Brandegee* (D, Rmt, US); SANTA CRUZ COUNTY—Santa Cruz, June 24, 1881, *Jones 2253* (M, Ph, Pom); Santa Cruz, June, 1883, *Parry* (M, Par); Aptos, June, 1883, *Parry* (CAS, Par TYPE); Santa Cruz, June 22, 1903, *C. H. Thompson* (M); near Watsonville, July 8, 1907, *Smith* (D); Santa Cruz, June 21, 1917, *Read* (CAS); salt marsh, near Watsonville, July 5, 1929, *Hayward* (D); MONTEREY COUNTY—Monterey, 1850, *Andrews 13 & 14* (ISC); near Soledad, June, 1881, *Congdon* (D); Salinas Valley; near Monterey Bay, June–July, 1889, *Abbott* (CAS); Del Monte, September, 1902, *Elmer 4047* (D, Pom); near Moss Landing, September 27, 1903, *Abrams 4047* (D); Carmel, August 22, 1909, *Abrams 4283* (D).

In many of its characters, *C. robusta* is quite as variable as *C. pungens*. In poorly developed specimens, the involucre are apt to be somewhat shorter than in the species, and sometimes the involucral teeth are spreading instead of divergent. Not infrequently the apiculations of the perianth lobes are present only on certain flowers of a plant, or only on certain lobes of a flower.

15. *Chorizanthe valida* Wats. Proc. Am. Acad. 12: 271. 1877; Wats. Botany [of California] 2: 36. 1880; Parry, Proc. Davenport Acad. Sci. 4: 57. 1884; Greene, Fl. Francis. 155. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894; Jepson, Fl. West. Mid. Calif. 150. 1901, and ed. 2. 129. 1911; Jepson, Fl. Calif. 394. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Pl. 1, figs. 8–9.

Erect plants, 1–3 dm. tall; stem solitary, villous, only slightly branched; leaves basal or nearly so, petiolate, broadly oblanceolate, short-villous, or glabrate above; bracts foliaceous, similar to the leaves, upper acerose; inflorescence of large, dense, cymose, leafy bracted clusters of involucre, the clusters 2–3 cm. broad; involucre subcylindric, 5–6 mm. long, the tube 4

mm. long, finely cross-corrugated, scantily appressed-pubescent to glabrate, teeth erect or a little divergent, bordered by an inconspicuous membrane, spines straight, light-colored; flower cylindric, 5–6 mm. long, outer lobes oblong, truncate, erose to denticulate at apex, 1.75–2 mm. long, inner narrower and elliptic, 1–1.25 mm. shorter; stamens 9, the anthers linear-oblong, 1 mm. long.

Type: "Russian Colony" (G).

Distribution: Sonoma and Marin Counties, California.

Specimens examined:

CALIFORNIA: SONOMA COUNTY—*Samuels 194* (US); *Samuels 195* (US); MARIN COUNTY—Point Reyes, July, 1903, *Elmer 4756* (CAS, D, M, Pom, US).

Perhaps the most important morphologic modification to be found in this species is the greatly shortened inner perianth lobes. The erect, straight, light-colored involucral teeth are also unusual and serve well in making the species easily recognizable.

16. *Chorizanthe Douglasii* Benth. Trans. Linn. Soc. Lond. **17**: 418. 1836; Benth. in DC. Prodr. **14**: 25. 1857; Torr. & Gray, Proc. Am. Acad. **8**: 193. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] **5**: 484. 1871; Wats. Proc. Am. Acad. **12**: 270. 1877; Wats. Botany [of California] **2**: 35. 1880; Parry, Proc. Davenp. Acad. Sci. **4**: 56. 1884, as to name only; Behr, Fl. Vicinity San Francis. 278. 1888, as to name only; Dammer in Engl. & Prantl, Nat. Pflanzenfam. **3**^{1a}: 11. 1891; Greene, Fl. Francis. 154. 1891; Jepson, Fl. West. Mid. Calif. 150. 1901, and ed. 2. 129. 1911, as to name only; Jepson, Fl. Calif. 392. 1914, as to name only; Jepson, Man. Fl. Pl. Calif. 297. 1923, as to name only.

Chorizanthe Nortoni Greene, Pittonia **2**: 164. 1891; Jepson, Fl. Calif. 391, *fig. 67b*. 1914; Jepson, Man. Fl. Pl. Calif. 296, *fig. 317*. 1923.

Erect plants, 1–3 dm. tall; stem solitary, branched above, curly ascending pubescent with a few spreading villous hairs; leaves basal, oblanceolate, narrowed to a short petiole, 2–5 cm. long, villous-hispid; bracts similar to the leaves, verticillate, frequently a medial, cauline whorl present, those subtending

the involucre acerose; peduncles of the inflorescence umbellately arranged; involucre disposed terminally in dense, medium-sized, subspherical, cymose clusters, the involucral tube more or less triangular in cross-section, 2.5–3 mm. long, ascending hirsute, sometimes densely so, teeth shorter than the tube, bordered with a broad, purplish membrane, this continuous through the sinuses, not cleft or parted; flower obconic, about 3.5 mm. long, outer lobes obovate to oblong, cuneate, truncate to retuse, denticulate, apiculate by the excurrent midrib, about 1 mm. long, inner a little shorter, obovate, emarginate; stamens 9, anthers linear-oblong.

Type: California, coll. of 1833, *Douglas* (K).

Distribution: San Benito, Monterey, and San Luis Obispo Counties, California.

Specimens examined:

CALIFORNIA: SAN BENITO COUNTY—San Benito River, near Merrill Valley, alt. 1900 ft., May 24, 1915, *Hall 9922* (US); San Benito, May 16, 1918, *Eastwood 6948* (CAS, US); The Pinnacles, May 31, 1920, *Sutcliffe* (CAS); Pinnacles, May 15, 1929, *Dr. & Mrs. Linsdale* (CAS); MONTEREY COUNTY—1833, *Douglas* (K TYPE, M fragment and photograph, Par fragment, US photograph); Soledad, June, 1881, *Congdon* (D); Salinas River, June, 1889, *Brandeggee* (Pom); Palisades and Chalone Peaks near Gonzales, alt. 2000–4000 ft., May, 1891, *Norton* (CAS, D, M photograph of *C. Nortoni*); June, 1891, *Norton* (CAS, D, US); near Mission, May 11, 1895, *Dudley* (D); Stony Creek, San Migueleta Ranch, Santa Lucia Mts., May 1–12, 1897, *Eastwood* (US); Santa Lucia Mts., June, 1898, *Plaskett 157* (US); Tassajara Hot Springs, June, 1901, *Elmer 3253* (D, M, US); Carmel Valley, June 25, 1905, *Dudley* (D); Carmel River, July 1, 1906, *McMurphy* (D); Burro Trail, Santa Lucia Mts., June 9, 1909, *K. Brandeggee* (US); Carmel River, August 15, 1910, *Clemens* (Pom); Tassajara Springs, July, 1916, *Kelly* (CAS); "Big Pinnacles," April 27, 1919, *Ferris 1696* (D); Sur Ridge, Santa Lucia Mts., May 13, 1920, *Abrams 7443* (D); Rancho del Monte, Carmel River, May 7, 1921, *Mason* (D, US); cañon f Cachagua Creek, below Tassajara, May, 1926, *C. Dudley* (D); Tassajara Springs, May 30, 1926, *Durbrow* (CAS); pine woods, Santa Lucia Mts., alt. 4720 ft., June 27, 1929, *Rowntree* (E); Arroyo Seco Road, June 28, 1929, *Rowntree* (Pom); 20.5 miles west of King City, Santa Lucia Mts., May 23, 1931, *Howell 6516* (CAS, M); alt. 1900 ft., *Clemens* (US); SAN LUIS OBISPO COUNTY—Camp 27, Atascadero Ranch, May 1, 1861, *Brewer* (US); Camp 27, Atascadero Ranch, April 30, 1861, *Brewer 893* (US); Santa Margarita, May 11, 1933, *Wall* (CAS).

The identity of this species for the last several years has been essentially lost, and Greene's name, *Norton*, applied to it. *C. Douglasii* is very readily recognized by the funnel-like upper part of the involucre which is formed by the broad,

usually purple, marginal membrane. Unlike the other species, here this membrane is not cleft in the sinuses but extends almost directly from tooth to tooth.

The medial whorl of cauline bracts and the umbellate arrangement of the peduncles is remindful of the morphology of *Eriogonum heracleoides*.

17. *Chorizanthe stellulata* Benth. Pl. Hartweg. 333. 1857; Benth. in DC. Prodr. 14: 26. 1857; Torr. & Gray, Proc. Am. Acad. 8: 193. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 270. 1877; Wats. Botany [of California] 2: 35, 481. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 56. 1884; Greene, Fl. Francis. 154. 1891; Jepson, Fl. Calif. 391. 1914; Jepson, Man. Fl. Pl. Calif. 296. 1923.

Erect plants, 1–2.5 dm. tall; stem solitary, slender, spreading hirsute; leaves basal, sessile or short-petiolate, lanceolate to oblanceolate, 1–2 cm. long, spreading hispid-hirsute; bracts similar to the leaves, verticillate, very commonly a medial cauline whorl present, upper acerose and hispid; inflorescence of terminal, solitary or umbellately arranged, dense cymose clusters of involucres; the involucres 4.5–5 mm. long, tube prominently 6-ribbed, slightly contracted at the throat, cross-corrugated, about 4 mm. long, pubescence of spreading, hispid hairs, these chiefly on the ribs, the 6 teeth similar, short, recurved or uncinat, united by a white membrane, this lobed, but extended through the sinuses; flower shortly pedicellate, included, subcylindric, 4–4.5 mm. long, outer segments broadly obovate, obcordate to bilobed, 2–2.5 mm. long, inner similar but a little narrower and shorter; stamens 9, anthers oblong, 0.75 mm. long.

Type: "Valley of the Sacramento," Hartweg 1937 (K).

Distribution: inland in northern and central California.

Specimens examined:

CALIFORNIA: SHASTA COUNTY—near Redding, May 30, 1905, Heller 7910a (M, Ph, US); Anderson, May 27, 1915, Smith (CAS); BUTTE COUNTY—Dead Man's Grade, May, 1879, Austin (Pom); Chico, May, 1882, Parry (M, Par, US); Chico, 1887, Parry (M, Par); SUTTER COUNTY—Marysville Buttes, May 17, 1902, Heller & Brown 5568 (D, M, Ph, Pom, US); LAKE COUNTY—volcanic sand flats, Kelseyville,

June 8, 1929, *Blankinship* (M); ELDORADO COUNTY—1884, *Curran* (D); Simpson's Ranch, May 29, 1907, *K. Brandegee* (Pom); CALAVERAS COUNTY—Wallace, June 4, 1914, *McMurphy* (D); MADERA COUNTY—Raymond, May 8, 1900, *Congdon* (D); Raymond, May 8, 1925, *Eastwood 12558* (CAS, Pom); FRESNO COUNTY—June, 1881, *Parry 264* (Par); COUNTY NOT KNOWN—1853–1854, *Bigelow* (Ph, US); Sacramento Valley, 1882, *Parry* (US); Sweetwater Creek, May 29, 1907, *K. Brandegee* (Pom).

C. stellulata is the most aberrant member of the Pungentes, the bilobed perianth lobes and the hirsute pubescence being unusual. The inflorescence and continuous (though deeply lobed) margins of the involucre are suggestive of relationship with *C. Douglasii*. It is the only inland species of the subsection.

Subsection 2. STATICOIDEAE, new subsection. Erect or decumbent plants, the characteristic pubescence of the stems at first directed downward, and then abruptly appressed; leaves basal; bracts opposite or, rarely, some of the foliaceous ones verticillate. Involucres 6-ribbed, 6-toothed, the anterior a little longer, margins not membranous. Perianths scantily pubescent, lobes mostly entire, occasionally conspicuously fimbriate, outer longer than the inner. Stamens usually 9, inserted at the base of the perianth. Species 18–26, incl.

Range: Los Angeles County, California, and country immediately adjacent eastward, north through Kern and Monterey Counties, and south to Lower California.

18. *Chorizanthe staticoides* Benth. Trans. Linn. Soc. Lond. **17**: 418. 1836; Benth. in DC. Prodr. **14**: 25. 1857, excluding *C. discolor*; Torr. & Gray, Proc. Am. Acad. **8**: 195. 1870, in part, excluding *C. discolor* and Xantus collection; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] **5**: 484. 1871; Wats. Proc. Am. Acad. **12**: 271. 1877, excluding plants from San Diego; Wats. Botany [of California] **2**: 37. 1880, excluding plants from San Diego; Parry, Proc. Davenp. Acad. Sci. **4**: 59. 1884, as to description in part, and excluding synonymy and part of range; Dammer in Engl. & Prantl, Nat. Pflanzenfam. **3**^{1a}: 12. 1891; Greene, Fl. Francis. 157. 1891; Hall, Univ. Calif. Publ. Bot. [Botanical Survey San Jacinto Mountain] **1**: 72. 1902, as to name only; Abrams, Fl. Los Angeles & Vicinity, 113. 1904, and ed. 2. 104. 1917; Jepson, Fl. Calif. 393.

1914, in part, excluding synonymy except *C. nudicaulis*, and not as to plants of "upper San Joaquin valley"; Davidson & Moxley, Fl. So. Calif. 113. 1923, as to part of range; Jepson, Man. Fl. Pl. Calif. 297. 1923, as to coastal plants and including variety; Millspaugh & Nuttall, Publ. Field Mus. Nat. Hist. Bot. [Fl. Santa Catalina Island] 5: 83. 1923.

Pl. 1, figs. 6-7.

Chorizanthe staticoides Benth. var. *nudicaule* (Nutt.) Jepson, Fl. Calif. 394. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Chorizanthe nudicaulis Nutt. Jour. Acad. Phila. N. S. 1: 166. 1848; Benth. Pl. Hartweg. 332. 1849, as to name only; Benth. in DC. Prodr. 14: 25. 1857, in synonymy; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870, in synonymy; Davidson & Moxley, Fl. So. Calif. 113. 1923.

Erect plants, 1-3 dm. tall, reddish at maturity; stem 1 to several from the base, appressed pubescent, often trichotomously branched at the first node; leaves petiolate, oblanceolate, rounded and emarginate, 2-6 cm. long, tomentose beneath, curly pubescent above; bracts acerose; inflorescence a more or less flat-topped cyme, the involucre aggregated in dense clusters; involucre subcylindric or sometimes contracted above the middle, 3.5-4 mm. or more long, curly pubescent, the teeth spreading and the spines uncinat, the alternate 3 teeth much shorter; flower obconic, about 4 mm. long, outer lobes oblong to elliptic, obtuse, nearly as long as the tube, inner a half to two-thirds as long and narrower; stamens 9, anthers oblong-orbicular.

Type: "Nova California," coll. of 1833, *Douglas* (K).

Distribution: coastal from Monterey County southward to Orange County, California.

Specimens examined:

CALIFORNIA: MONTEREY COUNTY—mountains behind Monterey, September, 1877, *Hooker & Gray* (G); Monterey, 1877, *Hooker & Gray* (G); Tassajara Hot Springs, June, 1901, *Elmer 3251* (D, M, US); Burro Trail, Santa Lucia Mts., June 9, 1909, *K. Brandegee* (D, M, Rmt, US); Tassajara Springs, June 1, 1917, *Kelley* (CAS); SAN LUIS OBISPO COUNTY—dry hill, Arroyo Grande, 1860-1862, *Brewer 445* (G, US); Santa Barbara, *Gambel* (M photograph, Ph TYPE of *C. nudicaulis*); 1865, *Torrey 433* (G, US); Santa Barbara, 1874, *Monks 36* (Ph); Hot Springs, June 5, 1896, *Dudley* (D); Santa Barbara, August 21, 1904, *Abrams 4116* (D, Pom); Bloch-

man's Ranch, June 17, 1906, *Eastwood 459* (CAS, US); Zaca Lake Forest Reserve, June 19-30, 1906, *Eastwood 658* (CAS); Painted Cave Ranch, May 9, 1908, *Eastwood 107* (US); SAN BERNARDINO COUNTY—San Bernardino, 1876, *Parry* (G); 1876, *Parry & Lemmon 369* (CAS, M, Par); near San Bernardino, 1880, *Parish* (M); foothills of San Bernardino Mts., May 1, 1885, *Parish Bros. 667* (D, US); San Bernardino Mts., alt. 2500 ft., June 13, 1894, *Parish 3217* (US); dry mesas, alt. about 300 m., San Bernardino Valley, June 2, 1919, *Parish 19294* (CAS, D, G); RIVERSIDE COUNTY—Glen Ivy Trail to Santiago Peak, Santa Ana Mts., alt. 3700 ft., June 14, 1923, *Munz & Keck 7066* (Pom, RMt); LOS ANGELES COUNTY—North Fork San Gabriel, alt. 500 m., May 5, 1878, *Leiberg 3381a* (US); Los Angeles, 1884, *Nevin 18* (G); Santa Catalina Island, 1885, *Lyon* (G); June, 1887, *Parish 1999* (D, Par); June, 1888, *Hasse* (ISC); Newhall, June 3, 1893, *Hasse* (D); dry upland slopes, Avalon, Santa Catalina Island, June, 1897, *Trask* (M, US); hills near Inglewood, April, 1899, *Abrams 205* (D); Garvanza, April 8, 1900, *Grant* (D); Santa Monica Mts., alt. 800 ft., April 3, 1901, *Abrams 1274* (D, Pom); San Jose Hills, near Claremont, alt. 900 ft., April 5, 1901, *Parish 594* (D); Laurel Cañon, April 7, 1901, *Grant* (D); dry ground, May, 1901, *Grant* (ISC); Oak Knoll, May 5, 1901, *Braunton 15* (US); Glendora, May 5, 1902, *Braunton* (D); Glendora, May 5, 1902, *Braunton 306* (US); Glendora, May 14, 1902, *Grant* (D); Sherman, May 27, 1902, *Braunton 275* (US); Elysian Park, June 1, 1902, *Braunton 418* (US); Sepulveda Canyon, Santa Monica Mts., June 16, 1902, *Abrams 2554* (D, G, M, Ph, Pom, US); dry hillsides, Sierra Madre, July 2, 1902, *Abrams 2637* (D, G, M, Pom); Garvanza, May, 1903, *Sheldon* (E); hills near Claremont, May, 1904, *Baker 4706* (M, Pom, US); Altadena, June 17, 1904, *Grant* (D); Pasadena, June 17, 1904, *Grant 169* (CAS, D, M, Ph, Pom, RMt); Pasadena, May 18, *Grant 3887* (D); Tujunga Wash, July 6, 1905, *Grinnell 497* (US); Garvanza, May 27–June 10, 1906, *Eastwood 10* (CAS, US); Roscoe, June 5, 1906, *Eastwood 245* (CAS); Claremont Wash, May 25, 1910, *Davis 51* (M); San Fernando Wash, May 11, 1913, *Eastwood 3144* (CAS); dry roadside, Azusa, June 22, 1915, *Macbride & Payson 717* (G, RMt); rocky hillside, Griffith Park, July 12, 1915, *Macbride & Payson 815* (G, RMt); near Acton, June 12, 1918, *Ferris 953* (D); gravelly wash, near Claremont, May 14, 1919, *Munz 2791* (D, Pom); Sepulveda Canyon, Santa Monica Mts., alt. 800 ft., May 15, 1920, *Munz & Harwood 3924* (D, Ph, Pom, RMt), Mt. Wilson, June, 1921, *Blazie* (CAS); Griffith Park, May 15, 1925, *C. & M. Epling* (M); Sevaine Flats, San Antonio Mts., alt. 3000 ft., July 10, 1925, *Johnston* (Pom); mountains near Claremont, May 21, 1926, *Jones* (CAS, D, US); Mandeville Canyon, alt. 200–1000 ft., April 20, 1928, *Bryan 76* (Pom); dry ridge, Little Santa Anita Canyon, alt. 2100 ft., May 30, 1928, *Ewan 1526* (E); Little Santa Anita Canyon, alt. 1600 ft., May 30, 1928, *Ewan 1527* (E); Claremont, June 15, 1928, *Eastwood 15379* (CAS); Santa Monica Mts., alt. 1825 ft., May 25, 1929, *Ewan 1509* (E); hills along Ridge Route at Sandberg's, June, 1929, *Clark* (CAS); Tuna Canyon above Roscoe, alt. 1000 ft., June 7, 1929, *MacFadden 8* (E); Glendale, alt. 1000 ft., June 8, 1929, *Fisher 142* (US); trail to Barley Flats, San Gabriel Mts., alt. 5000 ft., July 10, 1929, *Ewan 1507* (E); gravelly slope, Mint Canyon, May 19, 1930, *Hoffmann* (CAS, E); gravelly slope, near Castaic, May 19, 1930, *Hoffmann* (CAS, E); between Coldbrook and Pine Flats, San Gabriel Mts., June 28, 1930, *Crow* (E); Santa Susana Pass, May 29, 1931, *Howell* (Pe); Santa Susana Pass, May 29, 1931, *Howell 6585* (CAS); San Gabriel Wash, May 31, 1931,

Howell 6621 (CAS); San Gabriel Wash, May 31, 1931, *Howell 6621a* (CAS); Thompson Creek Dam near Claremont, alt. 1600 ft., May 27, 1932, *Wheeler 764* (M); dry decomposed granite bank, upper Topango Canyon, Santa Monica Mts., July 7, 1933, *Epling & Ewan 7599* (M); dry grassy ridges, east end of Barley Flats, San Gabriel Mts., alt. 5300 ft., July 23, 1933, *Dunn & Ewan 7838* (M); ORANGE COUNTY—Santiago, June, 1899, *Bowman* (D); Mt. Santiago, June, 1901, *Abrams 1807* (D, Pom); hills near Santa Ana, Spring, 1902, *Geis 542* (D); bluffs along shore, Laguna Beach, May 5, 1916, *Crawford* (M, Pom, US); southern Puente Hills in the Santa Ana Cañon, alt. 1600 ft., June 8, 1927, *Howell 2455* (CAS); southern Puente Hills, Santa Ana Cañon, alt. 750 ft., June 8, 1927, *Howell 2461* (CAS); COUNTY NOT KNOWN—1833, *Douglas* (G, K TYPE, M photograph, US photograph); Cassitas Pass, alt. 550 ft., July, 1875, *Rothrock 168* (G, US); 1881, *Parry* (M, US).

C. staticoides has been a troublesome species, and even as delimited above it is a variable one. Of the several specific names which have at one time or another been placed in synonymy under *C. staticoides*, the author thinks that but one, *C. nudicaulis* Nutt., can remain there. *C. nudicaulis* has been recognized by some authors in recent years, either specifically or varietally, on the ground that it possesses green stems and white flowers. These characters frequently attend young specimens of *C. staticoides*. Indeed, on somewhat older specimens, both reddish and green involucres and stems and both red and white flowers may be found on the same plant. These characters accredited to *C. nudicaulis* can certainly not be detected in the type collection.

The variation in the perianth lobes from oblong to elliptic seems to be of no significance, nor is the slight variation in length and degree of divergence of the involucral teeth. Variations of importance have been detected, however, and these are described below as subspecific entities.

18a. *Chorizanthe staticoides* Benth. forma *bracteata* Goodman, n. form.³¹

Lower bracts foliaceous and persistent. Otherwise as the species.

Type: Red Reef Canyon, Topatopa Mts., Ventura County,

³¹ *Chorizanthe staticoides* Benth. forma *bracteata* Goodman, forma nov., bracteis inferioribus foliaceis et persistentibus. Cetera speciei similis.—Red Reef Canyon, Topatopa Mts., Ventura County, California, alt. 2800–3500 ft., June 8, 1908, *Abrams & McGregor 146* (D TYPE).

California, alt. 2800-3500 ft., June 8, 1908, *Abrams & McGregor* 146 (D).

Distribution: Ventura and Los Angeles Counties, California.

Specimens examined:

CALIFORNIA: VENTURA COUNTY—Santa Paula, 1887-1888, *Parry* (M, Par); Red Reef Canyon, Topatopa Mts., alt. 2800-3500 ft., June 8, 1908, *Abrams & McGregor* 146 (D TYPE, G, M photograph, US); Camarilla, April 27, 1926, *Jones* (Pom); LOS ANGELES COUNTY—Los Tunas Cañon, Santa Monica Mts., May, 1901, *Abrams* 1708 (D, Pom).

This form constitutes a minor entity, and gains recognition partly because it seems localized in the northwest portion of the center of distribution for the species.

18b. *Chorizanthe staticoides* Benth. var. *brevispina* Goodman, n. var.³²

Stem usually 1 to few from the base; teeth of the involucre very short, consisting of hardly more than the short, recurved or uncinat spines. Otherwise as the species.

Type: sandy soil near Deer Park, Monrovia Canyon, San Gabriel Mts., Los Angeles County, California, June 10, 1928, *J. T. Howell* 3876 (M).

Distribution: western San Bernardino County and Los Angeles County, California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—City Creek road to Big Bear Lake, alt. 6000 ft., July 28-30, 1930, *Goodman & Hitchcock* 1748 (M); LOS ANGELES COUNTY—north Fork San Gabriel, alt. 500 m., May 5, 1878, *Leiberg* 3381b (US); hills, Los Angeles, April 22, 1888, *Hasse* (M); May, 1901, *Grant* 3387 (US); Mt. Lowe, July 24, 1901, *Williamson* (Ph); Pasadena, June 28, 1902, *Jones* (Pom); San Gabriel Wash, alt. 500 ft., May 13, 1917, *Johnston* 27P (Pom); Altadena, alt. 1500 ft., June 30, 1917, *Grinnell* (D); Barley Flats, San Gabriel Mts., alt. 5600 ft., July 8, 1917, *Grinnell* (D, Pom); San Gabriel Canyon, May 29, 1919, *Eastwood* 8963 (CAS, G); Mt. Wilson, June 20, 1919, *Eastwood* 9045 (CAS); San Gabriel Mts., alt. 3000 ft., June 30, 1924, *Dobbs* (Pe); San Antonio Mts., alt. 4700 ft., July 8, 1925, *Johnston* (Pom); Deer Park, Monrovia Canyon, San Gabriel Mts., June 10, 1928, *Howell* 3876 (CAS, M TYPE); near Lake Hollywood, Santa Monica Mts., alt.

³² *Chorizanthe staticoides* Benth. var. *brevispina* Goodman, var. nov. caulibus solitariis aut paucis e base; involucri dentibus brevissimis, vix plus spinis brevibus recurvatis aut uncinatis. Cetera speciei similis.—Sandy soil near Deer Park, Monrovia Canyon, San Gabriel Mts., Los Angeles County, California, June 10, 1928, *J. T. Howell* 3876 (M TYPE).

1000 ft., May 30, 1930, *Ewan 2244* (E, Pe); gravelly ground, Tujunga Canyon, San Gabriel Mts., June 12, 1932, *Ewan 7365* (E); San Dimas Cañon, San Gabriel Mts., alt. 1800 ft., June 12, 1932, *Wheeler 821* (M); gravelly chaparral slope, Upper Millards Canyon, San Gabriel Mts., alt. 3700 ft., July 4, 1932, *Ewan 7586* (M).

18c. *Chorizanthe staticoides* Benth. var. *elata* Goodman, n. var.³³

Erect plants; stems few from the base, 3.5–5 dm. tall; leaves petiolate, oblong to oblanceolate, obtuse to emarginate, 8–10 cm. long, thinly tomentose beneath, sparsely villous above; lower bracts frequently foliaceous, oblanceolate to lanceolate, upper much reduced; involucre in small clusters at the ends of the branches of a loose cyme, similar to those of the species; mature flowers not seen; stamens 9.

Type: dry ridge in chaparral belt, Glen Ivy trail to Santiago Peak, Santa Ana Mountains, Riverside County, California, alt. 4800 ft., June 14, 1923, *Munz 7085* (Pom.)

Distribution: western San Bernardino and Riverside Counties and westward, California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—Arrowhead Hot Springs, alt. 1600 ft., May 7, 1919, *Spencer 1102* (CAS, Pom); RIVERSIDE COUNTY—dry ridge, Glen Ivy trail to Santiago Peak, Santa Ana Mts., alt. 4800 ft., June 14, 1923, *Munz 7085* (M photograph, Pom TYPE); LOS ANGELES COUNTY—dry hills, April 22, 1888, *Hasse* (US); San Dimas Canyon, alt. 1500 ft., April 21, 1920, *Munz & Harwood 3715* (Pom, RMT, US); San Dimas Canyon, alt. 1500 ft., May 2, 1920, *Munz & Harwood 3822* (Pom, US); Arroyo Seco, Pasadena, May, 1925, *C. & M. Epling* (M); Griffith Park, alt. 1050 ft., April 26, 1930, *Ewan 2252* (E).

No mature plants of this variety have been seen, and it may be found, upon the study of further collections, that this entity is a distinct species. However, in the lack of complete knowledge of the morphology of the plants, and because they do not have a separate range, nor, so far as collections now show, do

³³ *Chorizanthe staticoides* Benth. var. *elata* Goodman, var. nov. Planta erecta; caulibus paucis e base, 3.5–5 dm. altis; foliis petiolatis, oblongis vel oblanceolatis, obtusis vel emarginatis, 8–10 cm. longis, subter parce tomentosis, supra sparse villosis; bracteis inferioribus saepe foliaceis, oblanceolatis vel lanceolatis, superioribus multum minoribus; involucri in glomerulis parvis ad terminos ramorum cymae laxae, speciei similibus; floribus maturis non visis; staminibus 9.—Dry ridge in chaparral belt, Glen Ivy trail to Santiago Peak, Santa Ana Mountains, Riverside County, California, alt. 4800 ft., June 14, 1923, *Munz 7085* (Pom TYPE).

they form an aspect of the range of the parent species, they are considered as constituting a variety.

18d. *Chorizanthe staticoides* Benth. var. *latiloba* Goodman, n. var.³⁴

Diffuse ascending plants; outer lobes of the perianth obovate and truncate, 2 mm. long, inner oblanceolate and truncate, about two-thirds as long. Otherwise as in the species.

Type: Acton, Los Angeles County, California, June, 1902, *Elmer 3689* (M).

Distribution: probably only from Los Angeles County, California.

Specimens examined:

CALIFORNIA: LOS ANGELES COUNTY—Rock Creek, June, 1886, *Parish 1986* (D, Par); San Francisquito Cañon, June, 1887, *Parish Bros. 1988* (M); San Francisquito Cañon, June, 1887, *Parish 1988* (D, Par); Acton, June, 1902, *Elmer 3689* (D, G, M TYPE, Pom, US); Newhall, May 15, 1916, *Evermann* (CAS); Mint Cañon, alt. 1500 ft., June 15, 1918, *Peirson 26* (Pe); Little Rock Creek, San Gabriel Mts., alt. 3500 ft., May 20, 1921, *Peirson 5342* (E, Pe); COUNTY NOT KNOWN—hills bordering Mojave Desert, May 24, 1882, *Pringle* (Ph); hills bordering Mojave Desert, May 25, 1882, *Pringle* (Ph, US).

19. *Chorizanthe chrysacantha* Goodman, n. sp.³⁵

Pl. 3, fig. 2.

Plants erect, 1–2 dm. tall; stems trichotomously branched at first node, canescent with appressed pubescence; leaves petiolate, oblong, obtuse to emarginate, 3–4 cm. long, tomentose be-

³⁴ *Chorizanthe staticoides* Benth. var. *latiloba* Goodman, var. nov. Planta diffusa vel adscendens; perigonii laciniis exterioribus obovatis et truncatis, 2 mm. longis, $1\frac{1}{2}$ plo longioribus quam interioribus, interioribus oblanceolatis et truncatis. Cetera speciei similis.—Acton, Los Angeles County, California, June, 1902, *Elmer 3689* (M TYPE).

³⁵ *Chorizanthe chrysacantha* Goodman, sp. nov. Planta erecta, 1–2 dm. alta; caulibus ad primum nodum trichotome ramosis, canescentibus, appressa pubescentia; foliis petiolatis, oblongis, obtusis vel emarginatis, 3–4 cm. longis, subter tomentosis, supra pubescentibus vel glabris; bracteis parvis, subulatis; inflorescentia in glomerulis paucis magnis densis disposita; involueris subcylindricis, circiter 5 mm. longis, tubo 4 mm. longo, pubescente, interdum transverso-corrugato, dentibus divergentibus, spinis brevibus recurvatis vel uncinatis; floribus cylindricis, 5–5.5 mm. longis, lobis exterioribus late elliptico-ovatis, obtusissimis, plus 2 mm. longis, interioribus ellipticis vel oblongis, 0.5 mm. brevioribus; staminibus 9, antheris elliptico-oblongis.—Bluffs along coast, Laguna Beach, Orange County, California, alt. 50 ft., April 17, 1920, *Munz & Harwood 3775* (Pom TYPE).

neath, pubescent to glabrate above; bracts small, subulate; inflorescence of a few large, dense cymose clusters; involucre subcylindric, about 5 mm. long, the tube 4 mm. long, pubescent, sometimes cross-corrugated, the teeth divergent, the short spines down-curved to uncinat; flower cylindric, 5–5.5 mm. long, outer lobes broadly elliptic-ovate, very obtuse, over 2 mm. long, inner elliptic to oblong, 0.5 mm. shorter; stamens 9, anthers elliptic-oblong.

Type: bluffs along coast, Laguna Beach, Orange County, California, alt. 50 ft., April 17, 1920, *Munz & Harwood 3775* (Pom).

Distribution: known only from Orange County, California.

Specimens examined:

CALIFORNIA: ORANGE COUNTY—bluffs along coast, Laguna Beach, alt. 50 ft., April 17, 1920, *Munz & Harwood 3775* (M photograph, Pom TYPE); on sea bluffs, Laguna, May 31, 1924, *Peirson 4644* (Pe); COUNTY NOT KNOWN—"sea side form," April, 1881, *Parry 271* (G).

The range of this species, it will be noticed, lies just to the south of that of its relative, *C. staticoides*. The size of the involucre in the large dense clusters makes the species easily recognizable. Except at late maturity, the involucre teeth are golden or amber-yellow.

19a. *Chorizanthe chrysacantha* Goodman var. *compacta* Goodman, n. var.³⁶

Stems more numerously branched, densely pubescent; the dense clusters of involucre closely aggregated; involucre teeth very short. Otherwise similar to the species.

Type: Bench Bluff, between Laguna and Newport, Orange County, California, April 27, 1928, *Reed 5700* (Pom.)

Distribution: known only from Orange County, California.

Specimens examined:

CALIFORNIA: ORANGE COUNTY—Bench Bluff, between Laguna and Newport, April 27, 1928, *Reed 5700* (M photograph, Pom TYPE).

³⁶ *Chorizanthe chrysacantha* Goodman var. *compacta* Goodman, var. nov., caulibus numerosius ramosis quam in specie, dense pubescentibus; involucri in glomerulis densis aggregatis, involucri dentibus brevissimis. Cetera speciei similis.—Bench Bluff, between Laguna and Newport, Orange County, California, April 27, 1928, *Reed 5700* (Pom TYPE).

The compact habit, resulting from short internodes and the more frequently branched stems, gives the variety a very different appearance than the species.

20. *Chorizanthe Xanti* Wats. Proc. Am. Acad. **12**: 272. 1877; Wats. Botany [of California] **2**: 37, 481. 1880; Parry, Proc. Davenport Acad. Sci. **4**: 59. 1884; Greene, Fl. Francis. 157. 1891; Abrams, Fl. Los Angeles & Vicinity, 114. 1904, except as to stated range; Jepson, Fl. Calif. 394. 1914, in synonymy.

Ascending to spreading plants, branched at or near the base; stems 0.5–3 dm. long, gray-pubescent, sometimes sparsely so; leaves petiolate, broadly ovate to oblong, 2–5 cm. long, tomentose beneath, short-villous above; lower bracts foliaceous, similar to the leaves, or lanceolate, upper acerose; inflorescence of congested, more or less flat-topped cymes, the involucre appearing singly in the axils or in small clusters; involucre 4.5–6 mm. long, the tube cylindric, about 4 mm. long, densely pubescent, the teeth widely divergent, the anterior tooth not detectably longer, the spines recurved to uncinat; flower sub-cylindric, 5–6 mm. long, outer lobes oblong-linear to elliptic, 2 mm. or more long, inner linear-oblong, a little shorter; stamens 9, anthers short-oblong.

Type: near Fort Tejon, Kern County, California, "*C. L. Xantus*" (G).

Distribution: Kern County to Riverside County, California, and adjacent counties to the westward.

Specimens examined:

CALIFORNIA: KERN COUNTY—Fort Tejon and vicinity, 1857–1858, *Xantus de Vesey* (US isotype); in Owens Valley and at Fort Tejon, 1863, *Horn* (US); Tehachapi, May, 1883, *Parry* (M); Fort Tejon, June, 1887, *Parish 1989* (D, Par); near Caliente, alt. 800–1100 m., June 24, 1891, *Coville & Funston 1100* (D, US); Bakersfield, May 2, 1896, *Davy 1882* (Rmt); Tejon Pass, June 16, 1896, *Dudley & Lamb 4556* (US); Keene, alt. 1700 ft., May 22, 1903, *Jones* (Pom.); Bakersfield, May 23, 1903, *Jones* (Pom); east slope of Greenhorn Range, alt. 4000 ft., June 2–10, 1904, *Hall & Babcock 5081* (D); McKittrick, April 29, 1905, *Heller 7797* (D, M, Ph, US); Johnson Canyon, Walker Basin, June 5, 1905, *Grinnell 110* (US); near Havilah, June 11, 1905, *Grinnell 194* (US); near Havilah, June 15, 1905, *Grinnell 288* (US); vicinity of Fort Tejon, alt. 3200 ft., June 16–17, 1908, *Abrams & McGregor 305* (D); hills, Bakersfield, alt. 2000 ft., May 25, 1926, *Ford* (D); Tehachapi Mts., June 1, 1926, *Weston 164* (CAS); gravelly slope, Frazier Mountain Park,

May 25, 1928, *Hoffmann* (Pom); dry slopes, Tehachapi Grade, alt. 1000 ft., May 17, 1929, *Munz 11426* (Pom); dry hills, Caliente, April 28, 1930, *Hoffmann* (CAS); rocky slope, near Kernville, alt. 2770 ft., May 13, 1930, *Howell 5034* (CAS); SAN BERNARDINO COUNTY—San Bernardino, 1876, *Parry* (M); 1876, *Parry & Lemmon 368* (CAS, M, Ph, US); April, 1876, *Lemmon* (US); San Bernardino, May, 1885, *Parish 367* (US); mouth of Santa Ana Cañon, San Bernardino Mts., May 1, 1885, *Parish 601* (D); San Bernardino, May 1, 1885, *Parish 638* (US); Yucaipe, San Bernardino Mts., alt. 2500 ft., June 13, 1894, *Parish 3217a* (US); vicinity of San Bernardino, alt. 500 ft., May 11, 1901, *Parish 4771* (D, US); Palm Cañon, Palm Springs, April 30, 1913, *Eastwood 3100* (CAS); Lytle Creek, San Gabriel Mts., alt. 5000 ft., July 18, 1921, *Peirson 2501* (Pe); RIVERSIDE COUNTY—San Gorgonio, *Parry* (Par); SAN LUIS OBISPO COUNTY—on Cuyama Valley Road, about 62 miles east of the Coast Boulevard, May 18, 1929, *Peirson 8402* (Pe); SANTA BARBARA COUNTY—Carpinteria, April 6, 1929, *Jones* (Pom); VENTURA COUNTY—valley below Cuddys, Mt. Pinos region, June 15–16, 1896, *Dudley & Lamb 4556* (D, Pom); LOS ANGELES COUNTY—Los Angeles, 1881, *Parry* (M); Elizabeth Lake, July 2, 1905, *Grinnell 450* (US); Lone Pine Cañon, San Antonio Mts., alt. 3500 ft., May 30, 1921, *Peirson 2419* (Pe, Pom); Lone Pine Canyon, alt. 5000 ft., June 17, 1921, *Munz 4654* (Pom); sandy slope, Elizabeth Lake, May 22, 1929, *Hoffmann* (E); gravelly soil, trail to Barley Flats, San Gabriel Mts., alt. 4800 ft., July 10, 1929, *Ewan 1506* (E); COUNTY NOT KNOWN—hills bordering on the Mojave Desert, May 25, 1882, *Pringle* (US); 1883, *Parry* (M, US); North Fork of Kern River, alt. 750 m., June 22, 1931, *Coville & Funston 1033* (US); sunny slopes, Erskin Creek, alt. 4000–5000 ft., April–September, 1897, *Purpus 5027* (M, US.)

As will be noticed from the description, *C. Xanti* has several characters which separate it from related species. The ovate leaves constitute an excellent character, although these are sometimes lacking in herbarium specimens. The foliaceous bracts and the usually white-pubescent and long involucre are characteristic. Further, the inflorescence of *C. Xanti* does not consist of dense, spherical clusters of involucre, but rather of conglomerate cymes composed of groups of 1 to few, erect involucre.

20a. *Chorizanthe Xanti* Wats. var. *leucotheca* Goodman, n. var.³⁷

Smaller plants; the involucre white-tomentose. Otherwise as the species.

Type: Whitewater, Riverside County, California, May 11, 1903, *Jones* (Hb. Pom. College 122122).

³⁷ *Chorizanthe Xanti* Wats. var. *leucotheca* Goodman, var. nov. Planta speciei similis sed brevior; involueris albo-tomentosis.—Whitewater, Riverside County, California, May 11, 1903, *Jones* (Hb. Pom. College 122122 TYPE).

Distribution: western San Bernardino and Riverside Counties, California, and possibly adjacent counties to the westward.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—Lytle Creek, San Gabriel Mts., alt. 3500 ft., May 18, 1920, *Peirson 1772* (CAS, Pe); RIVERSIDE COUNTY—near Cabazon, April, 1891, *Orcutt* (M); Whitewater, May 11, 1903, *Jones* (M photograph, Pom 122122 TYPE); Palm Spring, alt. 2000 m., April 19, 1906, *Parish 6168* (D); Whitewater, April, 1914, *Peirson 1776* (Pe); Snow Creek, alt. 1000 ft., April 10, 1922, *Jaeger* (D); Mission Creek Wash, April 15, 1926, *Jaeger* (Pom); Whitewater Canyon, alt. 1500 ft., Spring, 1929, *Clary* (E); dry flat, near Cabazon, May 1, 1930, *Munz 11919* (Pom.)

The writer is particularly indebted to Mr. J. A. Ewan, of Los Angeles, for additional material of this variety. Mr. Ewan had also detected this new variety and was preparing to publish on it when he heard that the group was undergoing revisional treatment, whereupon he placed his entire collection of the genus in the hands of the writer.

21. *Chorizanthe leptotheca* Goodman, n. sp.³⁸

Chorizanthe staticoides Benth. acc. to Hall, Univ. Calif. Publ. Bot. [Botanical Survey San Jacinto Mountain] 1: 72. 1902, and of several other authors in part.

Erect to diffuse reddish plants, stem 1 to several from the base, slender, 1–2 dm. long, scantily pubescent; leaves slender-petiolate, obovate to oblong or oblanceolate, 2–4 cm. long, the blades sometimes but a few millimeters long, tomentose beneath, villous above; upper bracts acerose; inflorescence a rounded, loose cyme, the involucres in small, loose clusters; involucres slender, 4 mm. long, tube nearly as long, curly pu-

³⁸ *Chorizanthe leptotheca* Goodman, sp. nov. Planta erecta vel diffusa, rosea; caulibus solitariis vel pluribus e base, 1–2 dm. longis, sparse pubescentibus; foliis tenui-petiolatis, obovatis vel oblongis vel oblanceolatis, 2–4 cm. longis, laminis interdum modo paucis millimetribus longis, subter tomentosis, supra villosis; bracteis superioribus acerosis; inflorescentia cyma rotundata laxa; involucris tenuibus, 4 mm. longis, in glomerulis parvis laxis, tubum paulo superantibus, crispopubescentibus, dentibus patulis et uncinatis; floribus valde exsertis, cylindricis, 4.5–5 mm. longis, tubo circiter 3 mm. longo, lobis exterioribus linearibus, obtusis, interioribus lineari-lanceolatis, vix plus $\frac{1}{2}$ longitudine; staminibus 9, antheris oblongo-orbicularibus.—Dry hills between Ramona and Ballena, San Diego County California, June 19, 1903, *Abrams 3777* (M TYPE).

bescent, the teeth spreading and uncinat; flower well exserted, perianth cylindric, 4.5–5 mm. long, tube about 3 mm. long, outer lobes linear, obtuse, inner linear-lanceolate, scarcely more than half as long; stamens 9, anthers oblong-orbicular.

Type: dry hills between Ramona and Ballena, San Diego County, California, June 19, 1903, *Abrams 3777* (M).

Distribution: western Riverside County, California, southward into Lower California.

Specimens examined:

CALIFORNIA: RIVERSIDE COUNTY—San Jacinto Mt., alt. 5000 ft., July 29, 1897, *Hall 745* (US); Elsinore, May, 1901, *Mrs. J. D. Abrams* (D); San Jacinto, alt. 1800 ft., May 28, 1921, *Spencer 1716* (G); MacMullen Trail, San Jacinto Mts., June 14, 1921, *Spencer 1715* (G); MacMullen Trail, San Jacinto Mts., June 14, 1922, *Jaeger* (D, US); near Idyllwild, San Jacinto Mts., alt. 6000 ft., June 24, 1922, *Spencer 1975* (Pom); dry slopes, Aguanga Valley, May 20, 1925, *Munz 9843* (Pom); Aguanga, May 20, 1925, *Peirson 6012* (Pe); dry slope, near Coahuila, May 21, 1927, *Munz 10879* (Pom); dry sandy soil on road to Hemet, San Jacinto Mt., alt. about 4500 ft., August 2, 1927, *Howell 2926* (CAS); SAN DIEGO COUNTY—San Diego, May 1, 1862, *Cooper 523* (US); Valle de las Viejas, June, 1877, *Cleveland* (G); Campo, June, 1880, *Vasey 543* (US); Oak Grove, 1880, *Vasey 543a* (US); Witch Creek, June, 1894, *Alderson* (D, G); dry hills between Ramona and Ballena, June 19, 1903, *Abrams 3777* (D, G, M TYPE, Ph, Pom, US); Descanso, June, 1910, *K. Brandegees* (D, US); sandy hillsides, Descanso, alt. 3100 ft., July 22, 1918, *Spencer 1022* (G); sandy hills, Mesa Grande, alt. 3300 ft., May 24, 1919, *Spencer 1144* (CAS, Pom); near Santa Ysabel, June 29, 1923, *Munz & Harwood 7310* (Pom); Laguna Mt., May 22, 1927, *Sanford* (CAS).

LOWER CALIFORNIA: near U. S. Boundary Mts., July 2, 1884, *Orcutt* (M, Par, US); dry sandy slope, south of Tecate, May 12, 1925, *Munz 9481* (Pom).

It is probable that the lower bracts in this species are foliaceous but early caducous.

Specimens of *C. leptotheca* are recognizable by the loose inflorescence and the slender, red stems and involucre. Representatives of this species have heretofore passed as *C. statiocoides* but the nearest relative is *C. Xanti*.

Orcutt's 1371 from Rosario, Lower California (hbb. Missouri Botanical Garden and Parry) differs from typical *C. leptotheca* in having crenate perianth lobes.

22. *Chorizanthe discolor* Nutt. Jour. Acad. Phila. N. S. 1: 167. 1848; Benth. in DC. Prodr. 14: 25. 1857, in synonymy; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870, in synonymy.

Ascending to spreading plants; stems few from the base, 1–1.5 dm. long, gray-pubescent; leaves petiolate, the blades oblong, rounded to truncate, emarginate, 1.5–3.5 cm. long, tomentose beneath, lanate to sparsely pubescent above; bracts linear to acerose; inflorescence of medium-sized, dense, cymose clusters; the involucres triangular in cross-section, 4–5 mm. long, the tube short, less than 3 mm. long, curly pubescent, the outer teeth long and spreading, spines straight except for the down-curved to uncinat tips, inner similar but half as long; mature flowers not seen; stamens 9, anthers short-oblong.

Type: "St. Diego," California, *Gambel* (Ph.)

Distribution: San Diego County, California.

Specimens examined:

CALIFORNIA: SAN DIEGO COUNTY—"St. Diego," *Gambel* (G isotype, M photograph, Ph TYPE); San Diego, 1882, *Parry* (M, Par); between Jacumba and Mountain Springs, April 24, 1920, *Eastwood* (CAS).

Probably the nearest relative of *C. discolor* is *C. staticoides*, from which it is separated readily both morphologically and geographically. The round, smaller clusters of involucres and the short involueral tube separate it well, and manifest a closer morphologic resemblance to *C. Breweri*.

An immature flower of *C. discolor*, which was but 2.5 mm. long, had broadly obovate-oblong outer lobes, and ovate-lanceolate inner lobes which were half as long.

23. *Chorizanthe Breweri* Wats. Proc. Am. Acad. 12: 270. 1877; Wats. Botany [of California] 2: 36. 1880; Parry, Proc. Davenport Acad. Sci. 4: 57. 1884; Greene, Fl. Francis. 155. 1891; Jepson, Fl. Calif. 393. 1914, excluding part of description; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Ascending to decumbent plants; stems few from the base, 1–1.5 dm. long, gray-pubescent; leaves petiolate, blades spatulate to ovate and about 1 cm. long, short villous-pubescent; bracts similar to the leaves or the lamina orbicular, lanceolate or acerose; inflorescence of small, dense, rather remote cymose clusters; involucres subcylindric, 3–4 mm. long, tube nearly as long, pubescent, the teeth short and widely spreading, the short spines down-curved to uncinat; flower 3–3.5 mm. long, the

outer lobes elliptic to broadly obovate-oblong, as long as the tube, inner ovate to orbicular-ovate, 0.5 mm. shorter; stamens 9, anthers oblong.

Type: dry rocky hillsides, San Luis Obispo, California, April, 1861, *Brewer 456* (G).

Distribution: San Luis Obispo County, California.

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—dry, rocky hillsides, San Luis Obispo, April, 1861, *Brewer 456* (G TYPE, M photograph, US); San Margarita Valley, *Brewer 894* (G, Par); Atascadero Ranch, May 1, 1861, *Brewer 894* (M, US); San Luis Obispo, 1882, *Jones* (G, Par); San Luis Obispo, May, 1882, *Jones* (Ph); San Luis Obispo, May 6, 1882, *Jones 3234* (CAS, D, M, Pom, Rmt, US); Chorro, May, 1909, *K. Brandegees* (US); Chorro Creek, May 17, 1928, *Eastwood 15116* (CAS); serpentine hills, along Chorro Creek, May 17, 1928, *Eastwood 15127* (CAS); on stony hills, near San Luis Obispo, May 19, 1928, *Eastwood 15167* (CAS).

This infrequently collected species seems to constitute a northern offshoot of *C. staticoides*, much as *C. discolor* represents a southern offshoot of the same parent.

The broadly foliaceous, sometimes nearly orbicular bracts of *C. Breweri* are very distinctive. Fortunately, these are fairly persistent.

The occurrence of the involucre in small clusters (1 cm. or less broad), the short appearance of the involucre, caused by the shortness of the teeth, and the short flowers with broad lobes are good diagnostic characters.

In Watson's revision, where the species was originally described, *C. Breweri* is placed near *C. pungens* because the teeth were "united at base by an inconspicuous margin." Such an interdentate margin occurs in all members of the subsection *Staticoideae* and in many members of subsequent subsections. This membrane does not show a relationship to the characteristic margin on the teeth of the subsection *Pungentes*. In *C. Breweri* the margin is a little larger than usual.

Variation in the shape of the perianth lobes occurs here much as it does in *C. staticoides*.

24. *Chorizanthe Wheeleri* Wats. Proc. Am. Acad. **12**: 272. 1877; Wats. Botany [of California] **2**: 38. 1880; Parry, Proc.

Davenp. Acad. Sci. 4: 59. 1884, in synonymy; Greene, Fl. Francis. 157. 1891; Jepson, Fl. Calif. 394. 1914, in synonymy.

Chorizanthe staticoides Benth. acc. to Greene, Bull. Cal. Acad. Sci. [Bot. Santa Cruz Island] 2: 411. 1887; T. S. Brandegee, Proc. Cal. Acad. Sci. [Fl. Santa Barbara Islands] II. 1: 216. 1888.

Chorizanthe insularis Hoffmann, Bull. So. Cal. Acad. Sci. 31: 56. 1932.

Erect to spreading plants; stems frequently trichotomously branched at first node, 0.6–2 dm. long, gray-pubescent; leaves petiolate, ovate-spathulate to oblong, 2–3 cm. long, tomentose beneath, short-villous above; foliaceous bracts lanceolate and cuspidate, opposite or occasionally 3 or 4 in a verticil, upper acerose; inflorescence of closely congested terminal clusters, 1–1.5 cm. broad, red at maturity; involucre cylindric, 2.5–3 mm. long, tube the same length, sparsely pubescent to glabrate, and also beset with a few short, thick, upwardly curved, blunt and transparent hairs, teeth short, widely spreading, spines very short, down-curved to uncinat; flower partially exserted, cylindric, 3–3.5 mm. long, lobes entire to subentire, sometimes divergent, outer elliptic-oblong to lanceolate and obtuse, 1.25–1.5 mm. long, inner oval or narrower, a little shorter; stamens 6, anthers oblong.

Type: Santa Barbara, California, July, 1875, *J. T. Rothrock* 62 (G).

Distribution: Santa Barbara County, California—chiefly on the Santa Barbara Islands.

Specimens examined:

CALIFORNIA: SANTA BARBARA COUNTY—Santa Barbara, July, 1875, *Rothrock* 62 (F, G TYPE, M photograph, Par fragment, US); Santa Barbara, 1929, *Hoffmann* (CAS); SANTA CRUZ ISLAND—June 6, 1918, *Miller* (CAS); Summer, 1919, *Swain* (CAS); about Prisoner's Cove, April 14, 1927, *M. B. Peirson* (Pe); canyon at Lady's Harbor, April 10, 1930, *Munz & Norris* 11847 (Pom); near Pelican Bay, April 26, 1930, *Abrams & Wiggins* 66 (CAS); stream bed above Cochies Prietos, July 1, 1930, *Hoffmann* (Pom); Canada del Puerta Zuela, April 10, 1931, *Howell* 6220 (CAS); ½ mile northeast of Main Ranch, April 12, 1931, *Hoffmann* (M, US isotypes of *C. insularis*); Cochie Canyon, April 12, 1931, *Howell* 6300 (CAS, Pe); SANTA ROSA ISLAND—Elder Creek, *Hoffmann* (CAS); dry slope of Water Canyon, April 8, 1930, *Munz & Crow* 11679 (Pom).

The identity of *C. Wheeleri* has long been uncertain. The type, collected on the mainland of Santa Barbara County, is so scanty as likely to cause a botanist to consider its characters as aberrant rather than genetic. More ample collections from the Santa Barbara Islands revealed the distinctness of the island material and led to the publication of *C. insularis*. The present writer has been unable, after making careful comparison of the type of *Wheeleri* with the insular material, to separate them so much as varietally.

Chorizanthe Wheeleri furnishes another example of a flowering plant which is nearly extinct on the mainland, but is still plentiful on the neighboring islands.

Besides the macroscopic characters which make the species recognizable, there are two technical characters which can aid in identifying fragmentary material. One of these, mentioned in the description, are the short, thick hairs on the involucre. These hairs, which are crystal-clear, curved, and blunt, have never been observed elsewhere in the genus. The other character is found in the cells of the perianth lobes. These cells form a roughened surface which appears minutely scaly.

25. *Chorizanthe fimbriata* Nutt. Jour. Acad. Phila. N. S. **1**: 168. 1848; Benth. in DC. Prodr. **14**: 25. 1857; Torrey, Pacif. R. R. Rept. [Desc. of plants collected by W. P. Blake at mouth of Gila] **5**: 364, *pl.* 8. 1857; Torr. & Gray, Proc. Am. Acad. **8**: 195. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] **5**: 484. 1871; Wats. Proc. Am. Acad. **12**: 271. 1877; Wats. Botany [of California] **2**: 36. 1880; Parry, Proc. Davenp. Acad. Sci. **4**: 58. 1884; Dammer in Engl. & Prantl, Nat. Pflanzenfam. **3**^{1a}: 11. 1891; Greene, Fl. Francis. 157. 1891; Hall, Univ. Calif. Publ. Bot. [Bot. Surv. San Jacinto Mountain] **1**: 72. 1902; Jepson, Fl. Calif. 394. 1914; Armstrong, Field Book West. Flowers, 86. *fig.* on p. 87. 1915; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 298. 1923, excluding variety.

Erect plants, 1.5–3 or even 5 dm. tall; stem 1 to few from the base, trichotomously branched at the first node, branches spreading, pubescent; leaves petiolate, obovate-spathulate,

truncate to emarginate, tapered below the blade to petiolar wings, 3-5 cm. long, in mature specimens villous-hirsute beneath, pubescent above; bracts rarely foliaceous, acerose and spreading; inflorescence broadly cymose, the involucre in small, rather dense clusters at the ends of the branches; involucre 5-6 mm. long, the tube cylindric, about 4.5 mm. long, pubescent, sometimes densely so, teeth widely spreading, inner considerably shorter than the outer, all recurved or uncinate; flower conspicuously exserted, 5.5-7 mm. long, tube cylindric, segments ascending, about as long as the tube, all similar, the inner a little shorter, the margins fimbriate except for the linear and entire terminal lobe; stamens 9, anthers short-elliptic; styles 4 mm. long.

Type: "St. Diego, Upper California," 1836, *Nuttall* (Ph).

Distribution: western Riverside County and Los Angeles County, California, southward through the western half of San Diego County to Lower California.

Specimens examined:

CALIFORNIA: RIVERSIDE COUNTY—Dripping Springs, Temecula, alt. 1500 ft., June 22, 1920, *Peirson 2165* (Pe); dry hills, near Murietta, May 18, 1922, *Munz & Johnston 5318* (Pom); near Murietta, May 19, 1922, *Peirson 3024* (Pe); LOS ANGELES COUNTY—Pasadena, May, 1882, *Jones* (D, Pom); SAN DIEGO COUNTY—"St. Diego," 1836, *Nuttall* (G fragment, M photograph, Ph TYPE); San Diego, May, 1852, *Thurber 618* (G); San Diego, 1860-1861, *Cooper* (G); San Diego, 1868-69, *Kellogg & Harford* (US); San Diego, 1875, *Cleveland* (M); San Diego, June, 1875, *Palmer 353* (M); San Diego, 1876, *Cleveland* (Par); San Diego, 1880, *Cleveland* (M); Fallbrook, March 28, 1882, *Jones* (Pom); Soledad, March 28, 1882, *Jones* (Pom); San Diego, April 19, 1882, *Jones* (Pom); San Diego, May, 1882, *Parry* (M, US); hills, San Diego, April 29, 1882, *Pringle* (Ph, US); San Diego Falls, June 25, 1883, *Orcutt* (G); Potrero, June, 1889, *Orcutt* (US); San Diego, June, 1891, *Blaisdell 87* (CAS); Jamul Valley, July 2, 1894, *Schoenfeldt 3828* (US); Del Mar, March 22, 1895, *Angier 184* (M); Ocean Beach, May 16, 1897, *Minnie Reed* (Pom); near Pala, May 31, 1897, *Parish 4399* (G, M, US); June, 1897, *Redman* (G); San Diego, May 25, 1902, *Brandegge 1631* (CAS, G, M, Pom, RMt, US); San Diego, July 1, 1902, *Herre* (Pom); Mission Hills, San Diego, May 8, 1903, *Abrams 3426* (M, Ph, Pom, US); San Diego, April, 1905, *Brandegge* (US); San Diego, 1906, *K. Brandegge* (M, Pom, RMt, US); Point Loma, April 21, 1913, *Eastwood 2881* (CAS); Point Loma, April 21, 1913, *Eastwood 2886* (CAS); Tia Juana, April 24, 1913, *Eastwood 2916* (CAS); La Jolla, April 25, 1914, *Clements & Clements 52* (G, M, Ph); La Jolla, May 16, 1914, *Clements & Clements 50* (G, Ph); La Jolla, June 3, 1914, *Clements & Clements 51* (G, M, Ph); Point Loma, June 6, 1915, *Collins & Kempton 167* (US); Otay Mesa,

near San Diego, July 16, 1915, *Collins & Kempton 2* (US); near San Diego, May 12, 1916, *Spencer 32* (US); near Fallbrook, alt. 750 ft., May 15, 1920, *Munz & Harwood 3852* (Pom, R Mt, US); north of Pala, alt. 750 ft., June 21, 1924, *Peirson 4763* (Pe); near Bonsal, June 13, 1928, *Wiggins 3043* (D); near Rincon, Palomar Mts., June 14, 1928, *Wiggins 3108* (D); San Onofre Canyon, alt. 550 ft., May 16, 1929, *C. L. Hitchcock* (Pom); near San Diego, June 4, 1931, *Howell 6634* (CAS, M); near Dulzura, May 15, 1932, *Munz & Johnston 12618* (E, M).

LOWER CALIFORNIA: April 13, 1883, *Orcutt* (US); San Telmo, April 16, 1886, *Orcutt* (US); Vallecito, May 22, 1886, *Orcutt* (M); near Tecate, alt. 600 m., May 30, 1932, *Fosberg 8279* (E).

Considerable variation occurs in the height of these plants and in the shape and size of the leaves. The fimbriate perianths mark this and the next species conspicuously, however.

The specimen of *Orcutt* (hb. Gray) from San Diego Falls, has very large leaves, and is atypical. Another specimen of *Orcutt* (hb. U. S. National) from Potrero is in the range of *C. laciniata*. Specimens bearing this same data (hb. Missouri Botanical Garden) are referable to the latter species.

26. *Chorizanthe laciniata* Torr. Pacif. R. R. Rept. 7: 19. 1856; Torr. & Gray, Proc. Am. Acad. 8: 194. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 271. 1877; Wats. Botany [of California] 2: 37. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 58. 1884.

Chorizanthe fimbriata Nutt. var. *laciniata* (Torr.) Jepson, Fl. Calif. 394. 1914; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 298. 1923.

Erect plants, 1–2 dm. tall; stem 1 to few from the base, spreading, branched above, pubescent; leaves petiolate, partly winged, broadly spathulate, emarginate, about 2 cm. long, lanate to sparsely pubescent; involucre 4 mm. long, tube subcylindric, about the same length, usually canescent, teeth very widely spreading, spines down-curved to uncinatate, the inner 3 considerably shorter; flower conspicuously exserted, 7–9 mm. long, tube cylindric, perianth segments finely fimbriate, the terminal lobe very narrow; stamens 9, anthers short-elliptic; styles long.

Type: San Felipe, Imperial County, California, May, 1855, *Antisell*.

Distribution: western Riverside County, California, southward but inland to Lower California.

Specimens examined:

CALIFORNIA: RIVERSIDE COUNTY—Coahuila, San Jacinto Mts., June, 1882, *Parish Bros. 833* (Par); Aguanga, June, 1882, *Parish Bros. 1612* (M); Coahuila, San Jacinto Mts., June, 1882, *Parish Bros. 1612* (D); Aguanga, June, 1883, *Parish Bros. 1617* (US); SAN DIEGO COUNTY—San Diego, 1870, *Palmer* (Par); San Diego, 1876, *Palmer* (Par); Smith's Mt., June, 1880, *Vasey 535* (Par, US); Larkin's Station, 1880, *Vasey 543* (US); June, 1880, *Vasey 545* (Par); Potrero, July 24, 1883, *Orcutt 919* (Par); 1889, *Orcutt* (US); Potrero, June, 1889, *Orcutt* (M); Mountain Spring, May 10, 1894, *Mearns 3032* (US); Mountain Springs, May 12, 1894, *Schoenfeldt 3087* (US); summit of wagon pass, Coast Range, May 15, 1894, *Mearns 3199* (US); Jacumba Hot Springs, May 20, 1894, *Mearns 3243* (US); Jacumba Hot Springs, May 31, 1894, *Schoenfeldt 3359* (US); Cameron's Ranch, Laguna, June 22, 1894, *Schoenfeldt 3710* (US); Potrero, July, 1895, *Stokes* (D); Stonewall mine, Cuyamaca Mts., alt. 4600 ft., June 5-7, 1897, *Parish* (D); Oak Grove, July 13, 1900, *Jones* (Pom); dry sand hills, Jacumba, May 31, 1903, *Abrams 3661* (D, M, Pom); Viejas, June 16, 1906, *K. Brandegee* (D, US); Descanso, June, 1910, *K. Brandegee* (US); Warner's Springs, 1911, *Coombs* (CAS); Hot Spring Mountain, Warner's Hot Springs, 1913, *Buttle* (CAS); San Ysabel, July 29, 1915, *Collins & Kempton 253* (US); Julian, July 29-30, 1915, *A. S. Hitchcock* (US); Viejas, June 16, 1916, *K. Brandegee* (Pom); Live Oak Springs, Laguna Mts., August 6, 1916, *McGregor 62* (D); Jacumba, June 10, 1917, *McGregor 1015* (D); Cuyamaca, June 25, 1919, *Eastwood 9162* (CAS); between Jacumba and Mountain Springs, April 24, 1920, *Eastwood* (CAS); Alpine, June 27, 1923, *Munz & Harwood 7145* (Pom, RMt); dry slope, Jacumba, May 10, 1924, *Munz 8060* (Pom); Vallecito Cañon, Laguna Mts., June 26, 1924, *Peirson 4881* (Pe); sandy wash, near Jacumba, alt. 4000 ft., May 15, 1925, *Munz 9624* (Pom); San Felipe Valley, alt. 3000 ft., May 17, 1925, *Keck & McCully 67* (Pom); Henshaw Dam, alt. 3800 ft., May 26, 1926, *Jaeger* (Pom); between Jacumba and Mountain Springs, April 18, 1928, *Ferris 7049* (D); San Felipe Creek, near Sentenac Canyon, April 20, 1928, *Peirson 7847* (Pe); between El Centro and Jacumba, June 10, 1928, *Johnson* (CAS); San Felipe Ranch, alt. 2500 ft., May 6, 1929, *Munz & Hitchcock 11366* (Pom); near Warner Hot Springs, alt. 950 m., June 5, 1932, *Fosberg 8277* (E); IMPERIAL COUNTY—San Felipe, 1855, *Antisell* (Par isotype fragment); San Felipe, April, 1899, *K. Brandegee* (D); San Felipe Hill, alt. 2400 ft., April 19, 1906, *Jones* (Pom).

LOWER CALIFORNIA: near U. S. Boundary Mts., July 12, 1884, *Orcutt 919* (M, US).

Not only does *C. laciniata* have a geographic distribution which lies immediately to the east of the range of *C. fimbriata*, but also it is separable from the latter on several morphologic characters. The smaller leaves, the smaller average size of the plants, and more canescent involucres nearly always ac-

company *C. laciniata*, and the finely laciniate perianth segments, with the very narrow terminal lobes, form the best character.

Subsection 3. *UNIARISTATAE*, new subsection. Erect or decumbent plants. At least the lower bracts foliaceous. Involucres with the anterior tooth longer than the others. Perianth subcylindric; outer lobes entire, subentire, or rarely bilobed; inner lobes usually shorter, variously fimbriate, or only erose. Stamens attached at base of perianth tube. Species 27-32, incl.

Range: Mendocino County to Ventura County, California, chiefly in Monterey, and San Luis Obispo Counties.

In the species of this subsection where the inner perianth lobes are but erose, the long tooth of the involucre is conspicuously elongated.

27. *Chorizantho obovata* Goodman, n. sp.³⁹

Erect plants, 1-3 dm. tall; stem one, or few from the base, usually trichotomously branched below and dichotomously above, subappressed or spreading pubescent; leaves basal or nearly so, oblanceolate, long-petiolate, blade 1-2 cm. long, densely but rather softly hirsute beneath, sparsely so above; lower bracts foliar, strigose, mucronate to awn-pointed, upper bracts subulate; inflorescence glomerate or disposed in closely aggregated flat-topped cymes; involucres urceolate, 4.5-5 mm. (or rarely more) long, grayish with an ascending pubescence

³⁹ *Chorizantho obovata* Goodman, sp. nov. Planta erecta, 1-3 dm. alta; caulibus solitariis aut paucis e base, subappressis vel diffuse pubescentibus, plerumque infra trichotome ramosis et supra dichotome ramosis; foliis basalibus vel subbasalibus, oblanceolatis, longe-petiolatis, laminis 1-2 cm. longis, subter dense et molliuscule hirsutis, supra sparse hirsutis; bracteis inferioribus foliaceis, strigosis, mucronatis vel aristatis, bracteis superioribus subulatis; inflorescentia conferta aut in cymis planis aggregatis; involucris urceolatis, 4.5-5 (raro plus) mm. longis, cinereo-adscendente-pubescentibus aut raro hirsutulis, tubo 3-4 mm. longo, dentibus divergentibus, 5 uncinatis, dente anteriore conspicue longiore (2 mm.) et recto aut recurvato; floribus subsessilibus, paulo exsertis, 4-4.5 mm. longis, glabris, lobis exterioribus tubo parum brevioribus, obovatis, ad basem attenuatis, truncatis, lobis interioribus longitudini $\frac{2}{3}$ tubi adaequantibus, breve oblongis, ad latera et summum minute fimbriatis; staminibus 9, antheris linearibus, plus 1 mm. longis.—Price Cañon, near the coast of San Luis Obispo County, California, 1911, *K. Brandegee* 84 (M TYPE).

or rarely but slightly hairy, tube 3–4 mm. long, teeth divergent, the 3 inner and 2 of the slightly longer outer ones uncinatate, the anterior one noticeably longer (2 mm.) and straight or down-curved; flowers nearly sessile, slightly exserted, 4–4.5 mm. long, glabrous, tube slightly longer than the outer lobes, outer lobes obovate, narrowed at the base, truncate, inner lobes two-thirds as long as the tube, shortly oblong, finely fimbriate at sides and top; stamens 9, anthers linear and over 1 mm. long.

Type: Price Cañon, near the coast of San Luis Obispo County, California, 1911, *K. Brandegee* 84 (M).

Distribution: San Benito and Monterey Counties, southward into Santa Barbara County, California.

Specimens examined:

CALIFORNIA: SAN BENITO COUNTY—Hernandez, June 7, 1903, *Lathrop* (D); MONTEREY COUNTY—Priest Valley, alt. 2373 ft., August 15, 1929, *Rowntree* (E); SAN LUIS OBISPO COUNTY—San Luis Obispo, July, 1885, *Brandegee* (CAS); Santa Margarita, June, 1889, *Parry* (Par); Price Cañon, near the coast, 1911, *K. Brandegee* 84 (D, G, M TYPE, Pom, RMt, US); on road between Arroya Grande and Huasna, July 30, 1927, *Eastwood* 14981 (CAS); on new road to Pozo, May 17, 1928, *Eastwood* (CAS); along Chorro Creek, among rocks, May 17, 1928, *Eastwood* 15121 (CAS); on old road to Pozo, May 17, 1928, *Eastwood* 15137 (CAS); SANTA BARBARA COUNTY—near Mono Flat Ranger Station, alt. 1500 ft., July 3, 1923, *A. L. Grant* 1685 (M); sandy field, 7 miles west of Buellton, May 30, 1929, *Hoffmann* (E); rocky slope above ocean, 3 miles south of Point Sal, May 31, 1931, *Hoffmann* 371 (CAS).

Representatives of this species have for the most part been referred heretofore to *C. Palmeri*. The shapes of the perianth lobes differentiate the species with certainty.

27a. *Chorizanthe obovata* Goodman forma *prostrata* Goodman, n. form.⁴⁰

Plants prostrate; long tooth of the involucre straight or uncinatate. Otherwise like the species.

Type: hills near San Luis Obispo, California, June, 1878, *Lemmon* (M).

Distribution: San Luis Obispo and Santa Barbara Counties, California.

⁴⁰ *Chorizanthe obovata* Goodman forma *prostrata* Goodman, forma nov. Planta prostrata, involucri longo dente recto vel uncinato. Cetera speciei similis.—Hills near San Luis Obispo, California, June, 1878, *Lemmon* (M TYPE).

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—hills near San Luis Obispo, June, 1878, Lemmon (M TYPE, Ph); SANTA BARBARA COUNTY—San Marcos Pass, August 16, 1927, Hoffmann (Pom).

28. *Chorizantho rectispina* Goodman, n. sp.⁴¹

Chorizantho uniaristata of auths., in part.

Spreading to decumbent plants; stems several from the base, 1–2 dm. long, gray with an appressed pubescence; leaves basal, oblanceolate or spatulate, 1.5–3 cm. long, obtuse, villous-hirsute; bracts foliaceous, similar to the leaves in outline, 0.5–1 cm. long, tipped with a conspicuous awn; inflorescence of compound uniparous cymes; involucre, urceolate-cylindric, gray-pubescent, 6-ribbed, the tube 2–2.5 mm. long, 5 of the teeth short and uncinat, widely spreading, the anterior one as long as or much longer than the tube, straight and divergent; flowers partly exserted, about 3.5 mm. long, appressed-pubescent on the outer surface along the six veins, the segments very unequal, the outer 3 nearly as long as the perianth tube, broadly obovate to suborbicular and truncate, subentire, the inner 3 half as long, oblong, erose to finely fimbriate, mostly obtuse; stamens 9, anthers linear-oblong, a little over 0.5 mm. long; achene 2.5 mm. long.

Type: McGinness, 25 miles northeast of San Luis Obispo, California, July 10, 1876, *Palmer 466* (M).

Distribution: San Luis Obispo and Santa Barbara Counties, California.

⁴¹ *Chorizantho rectispina* Goodman, sp. nov. Planta diffusa vel decumbens; caulibus pluribus e base, 1–2 dm. longis, cinereo-appresse-pubescentibus; foliis basalibus oblanceolatis vel spatulatis, 1.5–3 cm. longis, obtusis, villosis-hirsutis; bracteis foliaceis, circumscriptione foliis similibus, 0.5–1 cm. longis, ad apicem conspicue aristatis; inflorescentia in cymis compositis uniparitis; involucri urceolato-cylindricis, cinereo-pubescentibus, 6-costatis, tubo 2–2.5 mm. longo, 5 dentibus brevibus uncinatisque, late divergentibus, anteriore dente tubi longitudinem adaequante vel superante, recto et divergente; floribus paulo exsertis, circiter 3.5 mm. longis, exteriore appresso-pubescentibus, laciniis inaequalissimis, exterioribus 3 tubo perigonii subadaequantibus, late obovatis vel suborbiculatis et truncatis, subintegris, bis longioribus quam 3 interioribus, interioribus oblongis, erosis vel fimbriatis, plerumque obtusis; staminibus 9, antheris lineari-oblongis, plus 0.5 mm. longis; achenio 2.5 mm. longo.—McGinness, 25 miles northeast of San Luis Obispo, California, July 10, 1876, *Palmer 466* (M TYPE).

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—McGinness, 25 miles northeast of San Luis Obispo, July 10, 1876, *Palmer 466* (CAS, M TYPE, Par, Ph, US); SANTA BARBARA COUNTY—Blochman's Ranch, June 15, 1906, *Eastwood 452* (CAS); sandy flat, San Marcos Pass, Santa Ynez Mts., May 31, 1929, *Hoffmann* (E).

The inflorescences in this species superficially resemble cylindric racemes. This appearance is attained through the relatively slight elongation (commonly less than 5 mm.) of the longer branches of the uniparous cymes.

The long, straight tooth of the involucre caused this species to be confused with *C. uniaristata*, the error having been initiated by Dr. Watson. However, the new species is abundantly distinct. The partially exserted perianths of *C. rectispina* enable one to distinguish it from *C. uniaristata*, even with the unaided eye. With a hand lens the broadly obovate outer lobes of the perianth are readily seen.

The presence of 3 stamens in *C. uniaristata* seems to be a constant character for that species, whereas 9 stamens, with large anthers, have always been found in *C. rectispina*. The nearest relative of *C. rectispina* is *C. obovata*.

29. *Chorizanthe biloba* Goodman, n. sp.⁴²

Chorizanthe Palmeri Wats. acc. to Parry, Proc. Davenp. Acad. Sci. 4: 57. 1884, at least as to part of description and specimens from Monterey County.

⁴² *Chorizanthe biloba* Goodman, sp. nov. Planta erecta, 1.5–3.5 dm. alta; caulibus solitariis vel paucibus e base, supra dichotome aut trichotome ramosis, saepe verticillium medium bractearum foliacearum ferentibus, appresse crispo-pubescentibus et plerumque ad inflorescentiam pilis longis et divergentibus; foliis basalibus ellipticis et sessilibus vel oblanceolatis et petiolatis, 1–5 cm. longis, appresse-pubescentibus, supra minus dense pubescentibus; bracteis inferioribus foliaceis, foliis similibus sed aristatis, bracteis superioribus minoribus, 8 mm. longis, in aristam longam rectam terminatis; inflorescentia in glomerulis crebris cymosis; involucris subcylindricis, 5–7 mm. longis, cinereo-pubescentibus et ad costas grosse hirsutis, tubo 4–4.5 mm. longo, dentibus brevibus, diffusis, uncinatis, dente anteriore longiore quam ceteris; floribus parte exsertis, 5–6 mm. longis, glabris aut sparse pubescentibus, lobis 2 mm. longis, exterioribus obovatis ad basem attenuatis, obcordatis vel bilobatis, interioribus oblongis, obtusis, superiore $\frac{1}{3}$ parte fimbriato; staminibus 9, antheris lineari-oblongis, 2 mm. longis.—Paso Robles, San Luis Obispo County, California, in the coast ranges, 1911, *K. Brandege* (M TYPE).

Erect plants, 1.5–3.5 dm. tall; stem one or few from the base, dichotomously or trichotomously branched above, frequently bearing a medial whorl of foliar bracts, appressed curly-pubescent and commonly with some long spreading hairs intermixed toward the inflorescence; leaves basal, elliptic and sessile to oblanceolate and petiolate, 1–5 cm. long, appressed-pubescent, less densely so above; bracts at the lower branches foliaceous, similar to the leaves but awn-pointed, upper bracts much reduced, 8 mm. long, tipped with a long, straight awn; inflorescence of close cymose clusters, involucre subcylindric, 5–7 mm. long, gray-pubescent and with coarser, spreading hairs on the ribs, tube 4–4.5 mm. long, teeth short, spreading, uncinat, anterior tooth longer than the others; flowers partly exserted, 5–6 mm. long, glabrous or slightly pubescent on the outer surface on the midveins, lobes 2 mm. long, outer obovate, narrowed at base, obcordate to bilobed, inner oblong, obtuse, upper third fimbriate; stamens 9, anthers linear-oblong, 2 mm. long.

Type: Paso Robles, San Luis Obispo County, California, in the coast ranges, 1911, *K. Brandegee* (M).

Distribution: San Benito and Monterey Counties, southward into Santa Barbara County, California.

Specimens examined:

CALIFORNIA: SAN BENITO COUNTY—near Hernandez, August 17, 1933, *Howell 11551* (CAS); MONTEREY COUNTY—*Abbott* (CAS); Jolon, July, 1880, *Vasey 534* (US); Reliz Cañon, near Santa Lucia Peak, July, 1891, *Norton* (D); Jolon, July 19, 1910, *K. Brandegee* (D, US); Jolon, July 5, 1929, *Rowntree* (Pom); SAN LUIS OBISPO COUNTY—Paso Robles, *Parry* (Par); in the coast ranges, Paso Robles, 1911, *K. Brandegee* (D, M TYPE, Pom, RMt, US); Paso Robles, June 18, 1914, *C. P. Smith 2849* (CAS, D); Paso Robles, May 4, 1926, *Eastwood 13812* (CAS); flats near Paso Robles, June, 1927, *C. Dudley* (CAS); Creston, alt. 1000 ft., June 29, 1927, *Feudge 1644* (Pom); SANTA BARBARA COUNTY—Santa Inez Mts., May 21, 1891, *Dunn* (US); gravelly slope, Figueroa Mt., San Rafael Range, May 30, 1929, *Hoffmann* (E).

For many years Pacific Coast botanists have realized, as indicated by notes and question marks on herbarium sheets, that the members of this species could not satisfactorily be referred to any known species. *Parry*,⁴³ under *C. Palmeri*, describes this species in large part, and certainly as to the perianth. Mate-

⁴³ *Parry*, Proc. Davenport Acad. Sci. 4: 57. 1884.

rial of *C. biloba*, as well as of *C. obovata*, have heretofore been referred chiefly to *C. Palmeri*.

30. *Chorizanthe Palmeri* Wats. Proc. Am. Acad. **12**: 271. 1877; Wats. Botany [of California] **2**: 36. 1880; Parry, Proc. Davenp. Acad. Sci. **4**: 57. 1884, in part; Dammer in Engl. & Prantl, Nat. Pflanzenfam. **3**^{1a}: 11. 1891; Greene, Fl. Francis. **155**. 1891; Jepson, Fl. Calif. **394**. 1914, in part; Jepson, Man. Fl. Pl. Calif. **298**. 1923, in part.

Erect plants, 1–2 dm. tall, the appressed-pubescent stems solitary, branching near or above the middle; leaves arranged along the lower portion of the stem, spatulate to oblanceolate, on slender petioles, blades 2–3 cm. long, weakly strigose below, more sparsely so above; cauline bracts verticillate and foliar, oblanceolate, bracts subtending the inflorescence smaller and awn-tipped, or subulate; inflorescence of dense cymose clusters; involucre subcylindric, about 4.5 mm. over all, tube commonly slightly gibbose at base of rib leading to the large anterior tooth, 3–4 mm. long, grayish-pubescent, teeth slightly divergent and uncinatate, very short except the anterior one, this noticeably longer and sometimes scarcely uncinatate; flower 3.5–5 mm. long, glabrous, outer lobes nearly 1 mm. long, orbicular, inner lobes a little shorter, shortly obovate, retuse to emarginate and finely fimbriate across the top; stamens 9, anthers versatile, oblong-linear, remarkably long (1.5 mm).

Type: San Luis Obispo, California, June 26, 1876, *Palmer 464* (G).

Distribution: San Luis Obispo County, California.

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—San Luis Obispo, June 26, 1876, *Palmer 464* (M, Par, Ph, isotypes); San Luis Mt., May–July, *Summers* (M, Pom, Rmt, US); Five Mile House, near San Luis Obispo, *K. Brandegee* (D, Pom); stony, dry, open hills, June, 1884, *Summers* (US); San Luis Obispo, 1885, *Summers* (US); from Atascadero to Beach, July 24, 1920, *Abrams 7655* (D); Polytechnic School grounds, San Luis Obispo, July 21, 1925, *McDonald* (CAS); Walter's Ranch, San Luis Obispo, August 31, 1925, *Sampson* (D); on serpentine near San Luis Obispo, July 31, 1927, *Eastwood 15015* (CAS).

A confusion has occurred in regard to Vasey's *534a* in the United States National Herbarium. The label reads, "Jolon, Monterey Co., California, 1880. Outer lobes of corolla deeply

bifid." The specimen originally referred to was doubtlessly *C. biloba*, which species includes Jolon in its range. The specimen on the sheet, however, is typical *Palmeri*.

31. *Chorizanthe Clevelandii* Parry, Proc. Davenp. Acad. Sci. 4: 62. 1884; Greene, Fl. Francis. 156. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894; Jepson, Fl. West. Mid. Calif. 151. 1901, and ed. 2. 130. 1911; Jepson, Fl. Calif. 395. 1914; Jepson, Man. Fl. Pl. Calif. 298. 1923.

More or less decumbent plants; stems several from the base, spreading pubescent; leaves basal, petioled, oblanceolate, 1–3 cm. long, obtuse, gray-pubescent; foliaceous bracts lanceolate to oblanceolate, conspicuously awned; bracts subtending the involucre acerose; inflorescence of compound uniparous cymes, the small clusters of involucre occurring at short intervals; involucre covered with spreading pubescence, the tube urceolate, triangular in cross-section, 3–3.5 mm. long, all of the 6 teeth uncinatate, the anterior one considerably longer than any of the others and frequently exceeding the length of the tube; flower on a very short pedicel, included, 3.5 mm. long, the upper portion of the veins very sparingly appressed-pubescent, the outer perianth lobes a little less than 1 mm. long, ovate, minutely erose, commonly emarginate, inner lobes a little less than half as long, broadly ovate, conspicuously erose; stamens 3, opposite the inner lobes, anthers elliptic.

Type: Allen Springs, Lake Co., California, June, 1882, *Cleveland* (Par).

Distribution: an intermittent distribution as judged from present collections, and known from the following counties in California: Mendocino, Lake, San Benito, Monterey, Tulare, and Ventura.

Specimens examined:

CALIFORNIA: MENDOCINO COUNTY—Ukiah, August, 1882, *Pringle* (Par); LAKE COUNTY—Allen Springs, June, 1882, *Cleveland* (M, Par TYPE); June, 1886, *K. Brandegee* (Ph, Pom); Allen Springs, June, 1888, *Simonds* (M); Rice Fork of Eel River, July 5, 1928, *M. S. Baker 3097b* (CAS); Bogg's Lake, Mt. Hannah, alt. 3000 ft., July 14, 1929, *Blankinship* (M); near Mirabel Mine, July 9, 1931, *M. S. Baker 5360* (CAS); between Cobb Mt. and Adams Spring, June 25, 1933, *Jussel 143* (CAS); Coleman Place, Cobb Mt., June 27, 1933, *Jussel 276* (CAS); SAN BENITO COUNTY—near Dominicks, San Benito River, June 3, 1899, *Dudley*

(D); near Hernandez, August 17, 1933, *Howell 11552* (CAS); MONTEREY COUNTY—Tassajara Hot Springs, June, 1901, *Elmer 3245* (D, M, Pom, US); TULARE COUNTY—vicinity of Second Dry Meadow Creek, Kern River, July 15, 1895, *Dudley 733* (D); VENTURA COUNTY—below Mission Pines, San Rafael Mts., alt. 4500 ft., July 26, 1930, *Hoffmann* (CAS, Pom).

32. *Chorizanthe uniaristata* Torr. & Gray, Proc. Am. Acad. 8: 195. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 272. 1877, in part; Wats. Botany [of California] 2: 38. 1880, in part; Parry, Proc. Davenp. Acad. Sci. 4: 61. 1884, in part; Greene, Fl. Francis. 156. 1891, in small part; Jepson, Fl. West. Mid. Calif. 151. 1901, in part, and ed. 2. 130. 1911, in part; Jepson, Fl. Calif. 395. 1914, in part; Jepson, Man. Fl. Pl. Calif. 298. 1923, in part.

Decumbent plants; stems usually several from the base, 1 dm. or more long, spreading pubescent; leaves basal and petiolate, oblanceolate, 2–3 cm. long, long-pubescent; bracts narrowly linear and acerose; inflorescence of uniparous cymes, or sometimes of nearly equally branched cymes, the involucre occurring in small clusters; involucre cylindric, urceolate, pubescent with ascending hairs, tube 2–2.75 mm. long, 5 of the teeth widely spreading, recurved or uncinatate, the anterior one divergent, straight, and equalling or twice the length of the tube; flower slender, included or but inconspicuously exerted, about 2.75 mm. long, sparsely pubescent on the veins, outer lobes linear-oblong to linear-oblanceolate, rounded and minutely erose at apex, 1 mm. long, inner scarcely half so long, and half as wide, linear, obtuse, slightly erose; stamens 3, opposite the inner lobes, anthers suborbicular.

Type: dry places, New Idria, California, *Brewer* (G).

Distribution: San Benito, Fresno, Monterey, and Kern Counties, California.

Specimens examined:

CALIFORNIA: SAN BENITO COUNTY—mountains near New Idria, July, 1861, *Brewer 2739* (US part of TYPE collection); FRESNO COUNTY—dry, sandy loam, near Kingsburg, June 27, 1901, *Kearney 72* (M, US); MONTEREY COUNTY—near Mt. Diablo, 1884, *Curran* (D); Palisades, June, 1891, *Norton* (CAS); near Gonzales, July, 1891, *Norton* (CAS, D); foot of Jolon grade, June 7, 1909, *K. Brandegee* (US); Jolon, June 8, 1909, *K. Brandegee* (D); on stony hilltops, Jolon, June,

1915, *Hall 10033* (US); KERN COUNTY—Walker Basin, alt. 1000 m., June 24, 1901, *Coville & Funston 1090* (D, US); plains east of Bakersfield on Tehachapi Road, June 12, 1921, *Ferris & Duncan 2205* (CAS, D); between Caliente and Bodfish, near Walker Basin, July 9, 1933, *Peirson 10684* (M, Pe).

That *C. Clevelandii* and *C. uniaristata* are closely related there can be no doubt, although there are several morphological differences between them as delineated in the descriptions. The two species can be readily separated by the character of the long tooth of the involucre. In *C. Clevelandii* this spine is uncinat, in *C. uniaristata*, straight.

Subsection 4. *PARRYANAE*, new subsection. Spreading, gray-pubescent plants with basal leaves and foliaceous bracts. Involucral tubes short (about 2 mm. long), the teeth widely spreading. Perianth partially exserted, slightly pubescent, outer surface white; tube cylindric; outer lobes longer than the inner. Stamens 9, inserted at the base of the perianth. Species 33–34.

Range: Los Angeles and western Riverside Counties south into northern Lower California.

33. *Chorizanthe Parryi* Wats. Proc. Am. Acad. **12**: 271. 1877; Wats. Botany [of California] **2**: 37. 1880; Parry, Proc. Davenp. Acad. Sci. **4**: 61. 1884; Dammer in Engl. & Prantl, Nat. Pflanzenfam. **3**^{1a}: 12, *fig. 5 N.* 1891; Abrams, Fl. Los Angeles & Vicinity, 114. 1904, and ed. 2. 105. 1917; Jepson, Fl. Calif. 395. 1914, excluding synonymy; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 298. 1923.

Diffuse or decumbent plants, a few cm. to as much as 3 dm. high; stems several from the base, ascending pubescent to canescent; leaves oblanceolate, frequently narrowly so, and tapered to a petiole, commonly mucronate, 2–7 cm. long, scantily pubescent to canescent beneath, glabrate to sparsely pubescent above; lower bracts similar to the leaves, the upper ones acerose; inflorescence chiefly a loose cyme, the involucre aggregated at the ends of the branches into small clusters; involucre 6-ribbed, urceolate, about 3 mm. long, appressed-pubescent, tube triangular in cross-section, 2 mm. long, the larger teeth squarrose, as long as the tube, shortly recurved or unci-

nate, inner teeth very short, uncinat; flower 2.5–3.25 mm. long, segments widely spreading, outer oblong-obovate to oblong, obtuse, commonly erose, about 1.25 mm. long, inner linear-lanceolate, subacute, entire, 0.5 mm. shorter; anthers oblong, achene 2.25 mm. long.

Type: gravelly mesas near Crofton, San Bernardino County, California, coll. of 1876, *Parry* (G).

Distribution: western San Bernardino and Riverside Counties, Los Angeles County and southward into San Diego County, California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—1876, *Parry & Lemmon 370* (M, Par); San Bernardino, 1880, *Parish* (M); San Bernardino, May, 1880, *Vasey 540* (US); San Bernardino, 1881, *Parry 269* (M, Par, US); San Bernardino, May, 1881, *Parish Bros. 827* (D, ISC, Ph, US); Colton, April 27, 1882, *Jones 3181* (CAS, D, M, Pom, US); sandy plains, Colton, May 29, 1882, *Pringle* (Ph, US); sandy plains, May, 1888, *Parish* (M); Rialto, May 29, 1889, *Parish* (M); Arrowhead Springs, May 11, 1891, *Fritchey 44* (M); Yucaipe, San Bernardino Mts., alt. 2500 ft., June 13, 1894, *Parish 3218* (US); vicinity of San Bernardino, April 10, 1900, *Parish* (D); Yucaipe, alt. 2500 ft., May, 1900, *Parish* (Pom); vicinity of San Bernardino, April 27, 1901, *Parish 4703* (D); Redlands, May, 1906, *Greata 455* (CAS); Arrowhead Hot Springs, May 22, 1906, *Grant* (Pom); Arrowhead Hot Springs, May 22, 1906, *Grant 6627* (D); Arrowhead Hot Springs, alt. 1750 ft., May 21–28, 1906, *Grant 6642* (D); East Highlands, April 16, 1915, *Cox* (Pom); dry mesas, San Bernardino Valley, alt. 300 m., May 17, 1917, *Parish 11219* (Pom); sandy wash, Lytle Creek, San Bernardino Valley, July 8, 1917, *Johnston* (Pom); sandy wash, Highland, alt. 1000 ft., May 7, 1919, *Spencer 1183* (CAS, Pom); Arrowhead Hot Springs, alt. 1000 ft., May 9, 1919, *Spencer 1103* (CAS, Pom); between Claremont and Upland, June 2, 1921, *Robinson 71* (Pom, RMt); near Arrowhead Hot Springs, alt. 1350 ft., April 28, 1923, *Feudge 240* (Pom); sandy soil, east of Upland, alt. about 1000 ft., June 11, 1927, *Howell 2482* (CAS); RIVERSIDE COUNTY—San Gorgonio, *Parry* (M, Par); Elsinore, May, 1901, *Mrs. J. D. Abrams* (D); Banning, alt. 2300 ft., May 11, 1903, *Jones* (CAS, D, Pom); Palm Springs, March 25, 1920, *Jaeger 1058* (Pom); near Murietta, alt. 1500 ft., May 19, 1922, *Munz & Johnston 5359* (Pom); near Murietta, May 19, 1922, *Peirson 3055* (Pe); San Gorgonio Pass at Cabazon, June 5, 1931, *Howell 6658* (CAS, M); LOS ANGELES COUNTY—Claremont, June 10, 1900, *Shaw* (Pom); Glendora, May 14, 1902, *Grant* (D); Mt. Lowe, alt. 4000 ft., June, 1902, *Grant 171* (D); Claremont, April, 1912, *Howery* (M); Claremont, June 15, 1912, *de Camp* (M); dry wash in chaparral, Claremont, May 13, 1919, *Munz 2790a* (Pom); San Gabriel Wash, San Gabriel Mts., alt. 600 ft., May 12, 1920, *Peirson 2131* (Pe); mountains near Claremont, May 21, 1926, *Jones* (D, Pom); Claremont, June 15, 1928, *Eastwood 15383* (CAS); San Gabriel Wash, alt. 350 ft., May 26, 1932, *Wheeler 744* (M); Thompson Creek Dam near Claremont, alt. 1600 ft., May 27,

1932, *Wheeler* 765 (M); SAN DIEGO COUNTY—Soledad, March 28, 1882, *Jones* (Pom); COUNTY NOT KNOWN—alt. 500 m., April 13, 1898, *Leiberg* 3300 (US).

33a. *Chorizanthe Parryi* Wats. var. *fernandina* (Wats.) Jepson, Man. Fl. Pl. Calif. 298. 1923.

Chorizanthe fernandina Wats. Botany [of California] 2: 481. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 61. 1884; Abrams, Fl. Los Angeles & Vicinity, 114. 1904, and ed. 2. 105. 1917; Jepson, Fl. Calif. 395. 1914, in synonymy; Davidson & Moxley, Fl. So. Calif. 113. 1923.

Involucral teeth straight or merely curved, divergent, sometimes widely so, outer commonly longer than the tube, inner very short. Otherwise as in the species.

Type: San Fernando Cañon, Los Angeles County, California, June, 1879, *Mrs. E. A. Bush* (G).

Distribution: Los Angeles and Orange Counties, California.

Specimens examined:

CALIFORNIA: LOS ANGELES COUNTY—San Fernando Valley, June, 1879, *Mrs. E. A. Bush* (CAS, US, isotypes); May, 1882, *Parry* (M, US); San Fernando, May 23, 1882, *Pringle* (M, Ph, US); Los Angeles River bed, April, 1884, *Lyon* (CAS); San Fernando Valley, June, 1887, *Parish* 1987 (Par); Newhall, June 3, 1893, *Hasse* (D); Chatsworth Park, April 4, 1901, *Abrams* 1337 (D, Pom, Rmt); San Fernando Wash, May 11, 1913, *Eastwood* 3139 (CAS, US); Little Tujunga Wash, San Fernando Valley, alt. 1100 ft., May 3, 1920, *Peirson* 2120 (Pe); ORANGE COUNTY—Spring, 1902, *Geis* (D, Pom); hills near Santa Ana, Spring, 1902, *Geis* 541 (D, Pom).

The geographic distribution of the variety, it will be noted, forms not merely an aspect of the species distribution, but an isolated area of its own. This area lies a little to the west of the north end of the range of the species. All specimens examined by the writer which possessed straight teeth were from the San Fernando region, whereas all the specimens from the geographic range of *C. Parryi* possessed the strongly down-curved or uncinat teeth.

34. *Chorizanthe inequalis* Stokes, Zoe 5: 60. 1900.

Diffuse plants; stems several from the base, slender, grayish ascending pubescent; leaves linear-oblongate, 2-4 cm. long, appressed-pubescent; lower bracts similar to the leaves, upper ones mostly acicular; inflorescence a loose cyme, the in-

volucres in small clusters at the ends of the branches or solitary and sessile in the lower axils; involucres urceolate, more or less triangular in cross-section, 3.5–6 mm. long, ascending pubescent, the teeth divergent, straight, outer as much as 4 mm. or more long, inner very short; flower 2.5–3 mm. long, outer lobes less than half as long as the perianth, outer segments obovate to oblong-obovate, erose, inner linear-oblong to oblong-obovate, a little shorter, minutely erose; anthers elliptic.

Type: San Telmo, Baja California, May 31, 1893, *T. S. Brandegee* (UC).

Distribution: Lower California.

Specimens examined:

LOWER CALIFORNIA: Salada, April-May, 1886, *Orcutt 1369* (CAS, M, Par, US); April 17, 1886, *Orcutt* (US); San Quentin Bay, January, 1889, *Palmer 651* (Ph, US); San Telmo, May 31, 1893, *Brandegee* (M photograph, UC TYPE).

The morphology of the flower of this Lower Californian species is very similar to that of *C. Parryi* and its variety, but the involucres and the general aspect of the plant differentiate it sharply. The long involucral teeth give the plant a spiny appearance, and an aspect of gracefulness is attained because of the slender stems and long internodes.

Subsection 5. FLAVAE, new subsection. Erect to procumbent plants with basal leaves and usually non-foliaceous bracts. Involucres solitary and remote or in small clusters at the ends of the branches, about 5 mm. long, the awns infrequently uncinatate, the inner teeth very short to obsolete. Flowers 5 mm. or more long, partially exserted. Perianth lobes similar or nearly so. Stamens 9. Species 35-37, incl.

Range: central Lower California.

The species included in this section have the most southern range of the North American representatives of the genus.

35. *Chorizanthe mutabilis* T. S. Brandegee, Proc. Cal. Acad. Sci. II. 2: 203. 1889.

Pl. 1, fig. 12.

Plants erect or procumbent, 1–3 dm. long; stem solitary or few from the base, sparingly long-pubescent to glabrate, pale reddish; leaves narrowly lanceolate and long-petiolate, 1–2 cm.

over all, loosely tomentose below, long-pubescent above; bracts linear-lanceolate to acicular, hirsutulose to glabrate; inflorescence a uniparous cyme, the involucre solitary and remote, or more crowded at the ends of the branches; involucre, including the cylindric tube, 5 mm. long, ribs not reaching the base, sparingly pubescent, the larger teeth widely divergent, short and sometimes uncinat, the smaller set of teeth minute, some of the lower involucre a little longer, the larger teeth 3–4 mm. long, the awns short, straight or curved, the smaller divergent, 1 mm. long, a thin membrane appearing in the sinuses and frequently extending along the upper margins; flower cylindric, 6–7 mm. long, long-pubescent on the midveins above the middle, lobes linear-oblong, obtuse, entire or crenulate, about 2.5 mm. long, inner segments a little narrower; stamens adnate for a short distance to the perianth-tube, anthers oblong.

Type: San Enrique, Lower California, May 2, 1889, *T. S. Brandege* (UC).

Distribution: near San Enrique, Lower California.

Specimens examined:

LOWER CALIFORNIA: San Enrique, May 2, 1889, *Brandegee* (CAS, M, Ph, Pom, US, isotypes).

This species, still so rare in herbaria, is well marked and easily recognized. Its nearest relative is *C. flava*. While it is probably unwise to designate one species as being more primitive than another in so small a subsection, nevertheless *C. mutabilis* is listed first, partly because its involucre are less modified than in *C. flava* and *C. pulchella*. These organs in the present species more nearly resemble the involucre of preceding subsections, and while the smaller trio of teeth are much reduced, they are not obsolete as they are in the other two species.

Brandegee states that the perianth tube in *C. mutabilis* is yellow and the segments white or rose color.

36. *Chorizanthe flava* T. S. Brandege, Proc. Cal. Acad. Sci. II. 2: 202. 1889.

Pl. 1, fig. 13.

Chorizanthe Vaseyi Parry & Rose, Bot. Gaz. 15: 64, pl. 10. 1890; Vasey & Rose, Contr. U. S. Nat. Herb. 1: 12. 1890.

Suberect or decumbent plants, a few cm. to 1.5 dm. or more high; stems several from the base, sparsely long appressed-pubescent; leaves spatulate, with a slender winged petiole, 1–5 cm. long, tomentose beneath, less densely so above, the midrib glabrate; bracts linear-lanceolate; inflorescence of elongated uniparous cymes, the involucre single and remote except at the ends of the branches; involucre subcylindric, ribs nearly lacking, 5 mm. long, tube 4 mm. long, curly-pubescent, the 3 larger teeth 3–5 mm. long, widely spreading, straight to falcate, one a little longer than the other two, inner teeth obsolete or nearly so, their positions taken instead by noticeable, hairy membranes; flower obconic, about 6 mm. long, minutely and sparsely pubescent, yellow, lobes 2 mm. long, linear-lanceolate, all similar; anthers short-oblong.

Type: Calmalli, Lower California, April 18, 1889, *T. S. Brandegee* (UC).

Distribution: region of Calmalli, Lower California.

Specimens examined:

LOWER CALIFORNIA: "40 miles from ocean, hilly country," Lagoon Head, March 6–15, 1889, *Palmer 775* (M, Par, US TYPE material of *C. Vaseyi*); Calmalli, April 18, 1889, *Brandegee* (M photograph, Ph isotype); plains, Calmalli, January–March, 1898, *Purpus 126* (D, US); plains, Calmalli, January–March, 1898, *Purpus* (D, US); margin of the Viscaino Desert, 39 miles north of San Ignacio, January 31, 1929, *Reed 6193* (Pom).

Brandegee's publication preceded that of Parry & Rose by four months. Ironically, the type of *C. Vaseyi* was collected a month before Brandegee collected his *C. flava*. A good illustration of the species accompanies the Parry & Rose publication.

In the original description of *C. Vaseyi*, the type is given as *Palmer 275* rather than *Palmer 775*. This is doubtless a typographic error.

37. *Chorizanthe pulchella* T. S. Brandegee, Proc. Cal. Acad. Sci. II. 2: 203. 1889.

Plants erect to spreading; stems several from the base, becoming reddish in age, only slightly branched, sparsely ascending pubescent; leaves ovate, acute, abruptly contracted at base to a long, winged petiole, blades less than 1 cm. long; bracts

acero-se, usually spreading; involucre disposed singly in loose, uniparous cymes, 5 mm. long, tube as long, cylindric, tomentose to glabrate, the 3 larger teeth widely spreading, falcate, longer than the tube, the inner erect, very short, scarcely exceeding the sinu-al membrane; flowers 9-12 mm. long, the tube yellow, lobes ovate-oblong in outline, deeply and numerous-ly lacini-ate, reddish; anthers oval.

Type: San Sebastian, Lower California, April 28, 1889, *T. S. Brandegee* (UC).

Distribution: near San Sebastian, Lower California.

Specimens examined:

LOWER CALIFORNIA: San Luis, April 27, 1889, *Brandegee* (CAS); San Sebastian, April 28, 1889, *Brandegee* (CAS, Ph, isotypes, M photograph).

The reduction in the number of involucre at the branches of the cymes from several to one, the markedly arrested development of the smaller teeth of the involucre, and the lacini-ate condition of the perianth lobes are characters found in this species which indicate a comparatively highly evolved condition.

Subsection 6. PROCUMBENTES, new subsection. Diffuse to decumbent plants, stems several from the base, dichotomously branched, the leaves basal, and the lower bracts usually folia-ceous. Inflorescence of compound, uniparous cymes. Involucre short (tube 2 or rarely 3 mm. long), with small, yellow membranes in the sinu-ses. Perianth lobes similar or nearly so, entire. The 9 stamens united by their filaments into a short, pilose-ciliate staminal tube. Species 38-40, incl.

Range: Los Angeles County, California, south into Lower California.

38. *Chorizanthe procumbens* Nutt. Jour. Acad. Phila. N. S. 1: 167. 1848; Benth. in DC. Prodr. 14: 26. 1857; Gray, Proc. Bost. Soc. Nat. Hist. 7: 148. 1859, as to name only; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 271. 1877; Wats. Botany [of California] 2: 37. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 60. 1884; Dammer in

Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 12. 1891; Abrams, Fl. Los Angeles & Vicinity, 114. 1904, and ed. 2. 104. 1917; Jepson, Fl. Calif. 395. 1914; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 298. 1923.

Chorizanthe uncinata Nutt. Jour. Acad. Phila. N. S. 1: 167. 1848; Benth. in DC. Prodr. 14: 26. 1857, in synonymy; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870, in synonymy.

Procumbent or diffuse plants, 3–15 cm. high; stems curly ascending pubescent; leaves spatulate-oblong to oblong, 2–7 cm. long including the slender petioles, long and densely pubescent beneath, at least when young, more sparsely pubescent to glabrate above; lower bracts frequently foliaceous and similar to the leaves, upper bracts acerose; the involucre aggregated into small clusters, short, 2–2.5 mm. long, pubescent to sparsely so, the tube cylindric, 6-ribbed, about 2 mm. long, the 6 teeth widely divergent, their tips down-curved or uncinately, the 3 larger as long as the tube, the inner a little shorter; flower partly exserted, cylindric, 1.5–2 mm. long, yellow, the lobes oblong (or the inner sometimes ovate), obtuse, a third to a half as long as the tube, the inner slightly smaller, an appressed, scanty pubescence along the midveins; stamens just included, anthers oblong, very small.

Type: "St. Diego, Upper California," coll. of 1836, *Nuttall* (Ph).

Distribution: western San Bernardino and Riverside Counties, Los Angeles County, California, and southward to Lower California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—Colton, 1881, *Parry* 270 (G, Par, US); Colton, May 8, 1881, *Parry* (G); mesas, San Bernardino Valley, April 29, 1888, *Parish Bros.* 826 (D, ISC, M, US); vicinity of San Bernardino, alt. 1000–1500 ft., May 20, 1895, *Parish* 3663 (G, US); east of Upland, alt. about 1000 ft., June 11, 1927, *Howell* 2481 (CAS); RIVERSIDE COUNTY—Cabazon, April, 1891, *Orcutt* (M); LOS ANGELES COUNTY—Pasadena, May 2, 1882, *Jones* (Pom); Roscoe, May 27–June 10, 1906, *Eastwood* 258 (CAS, G); San Fernando Wash, May 11, 1913, *Eastwood* (CAS); dry wash in chaparral, Claremont, May 13, 1919, *Munz* 2790 (D, Pom); Arroyo Seco, San Gabriel Mts., alt. 1250 ft., May 20, 1919, *Peirson* 446 (Pe); Santa Anita Wash, San Gabriel Mts., alt. 700 ft., April 26, 1920, *Peirson* 4212 (Pe); mountains near Claremont, May 21, 1926, *Jones* (US); Thompson

Creek Dam near Claremont, alt. 1600 ft., May 27, 1932, *Wheeler 766* (M); SAN DIEGO COUNTY—San Diego, 1836, *Nuttall* (G isotype, M photograph, Ph isotype, US photograph); San Diego, 1836, *Nuttall* (G fragment of TYPE of *C. uncinata*, Ph TYPE of *C. uncinata*, US photograph); San Diego, 1874, *Cleveland* (G); San Diego, 1875, *Palmer 135* (US); San Diego, June, 1875, *Palmer 354* (M); 1880, *Vasey 542* (G, US); San Diego, 1882, *Parry 270* (G, M, Par); Soledad, April 20, 1882, *Jones 3159* (CAS, D, M, Pom, US); San Diego, May, 1882, *Parry* (Par); San Diego, 1884, *Orcutt* (Par); Point Loma, March 28, 1884, *Parry* (Par); mesas, San Diego, May 8, 1884, *Orcutt* (M); San Diego, May 15, 1885, *Orcutt* (US); San Diego, April 24, 1891, *Dunn* (D); Coronado, May 5, 1891, *Dunn* (US); San Ysabel, April 28, 1893, *Henshaw* (US); Witch Creek, June, 1894, *Alderson* (D); San Diego, June, 1895, *Stokes* (D); Point Loma, April, 1896, *K. Brandegee* (D); San Diego, May, 1901, *K. Brandegee* (US); San Diego, May 25, 1902, *Brandegee 1638* (G, M, Pom, RMt, US); Coronado, *Grant 2607* (D); near Potrero, June 3, 1903, *Abrams 3737* (D, G, M, Ph, Pom); San Diego, April, 1905, *Brandegee* (US); San Diego, May 5, 1906, *Grant 6818* (D); sandy hills, Point Loma, June, 1906, *K. Brandegee 29* (D, G, M, Ph, Pom, RMt, US); Point Loma, April 21, 1913, *Eastwood 2874* (CAS, G, US); La Jolla, May 23, 1914, *Clements & Clements 49* (G, M, Ph); Otay Mesa, near San Diego, June 14, 1915, *Collins & Kempton 183* (US); sandy slopes, Granite, alt. 2000 ft., May 30, 1916, *Spencer 33* (G, US); Alpine, June 27, 1923, *Munz & Harwood 7146* (Pom, RMt); sandy soil, Cardiff, May 9, 1924, *Munz 7958* (Pom).

LOWER CALIFORNIA: Tecate River, June 23, 1894, *Schoenfeldt 3716* (US).

The yellow, triangular membrane in the sinuses between the teeth furnishes a ready means of distinguishing this species from its immediate allies. This character may be seen readily by the aid of a binocular dissecting microscope when the involucre has been pressed in such a way as to open the sinus and stretch the membrane. The yellowish-green color of all except the last member of this subsection is also characteristic.

The lower bracts of *C. procumbens* are sometimes bract-like rather than foliaceous, or are lacking in herbarium specimens. Foliaceous bracts are not mentioned in Nuttall's original description, and Watson⁴⁴ and Parry⁴⁵ state that the bracts are not foliaceous.

The inner teeth of the involucre are smaller than those of the outer 3, but there is not the disparity in size which occurs in many of the species.

Nuttall's *C. uncinata* is itself distinguishable from the type

⁴⁴ Wats. Proc. Am. Acad. 12: 271. 1877, and Botany [of California] 2: 33, 37. 1880.

⁴⁵ Parry, Proc. Davenp. Acad. Sci. 4: 60. 1884.

of *C. procumbens* in that the involucral teeth are longer and more uncinata, and the involucre are less pubescent. However, the series of specimens examined present so many intermediates between the two extremes that it seems impossible to give *uncinata* recognition.

38a. *Chorizanthé procumbens* Nutt. var. *albiflora* Goodman, n. var.⁴⁶

Similar to the species but the flowers white.

Type: dry slope 2 miles east of Pala, San Diego County, California, April 30, 1926, *Munz 10372* (Pom).

Distribution: northern San Diego County, California.

Specimens examined:

CALIFORNIA: SAN DIEGO COUNTY—Pala, June, 1880, *Vasey 542* (US); near Fallbrook, May 15, 1920, *Munz & Harwood 3897* (Ph, Pom); near Pala, June 21, 1922, *Munz 8192* (Pom); southeast of Pala, alt. 800 ft., June 21, 1924, *Peirson 4766* (Pe); dry slope, 2 miles east of Pala, April 30, 1926, *Munz 10372* (M photograph, Pom TYPE); near Pala, April 30, 1926, *Peirson 6692* (Pe); wash, south of Pala, April 20, 1928, *Reed 5827* (CAS); above Rincon, Palomar Mts., June 14, 1928, *Wiggins 3090* (D); sandy flats, east of Pala, May 11, 1930, *Howell 4856* (CAS).

38b. *Chorizanthé procumbens* Nutt. var. *mexicana* Goodman, n. var.⁴⁷

Small plants, 2 to few cm. tall, the foliaceous bracts seemingly early deciduous; involucral teeth very slender and uncinata; flowers 2 mm. long, yellowish to whitish, lobes equal, broadly ovate to broadly elliptic-oblong, about 0.75 mm. long; otherwise similar to the species.

Type: open spaces in chaparral, Tecate, Lower California, alt. 600 m., May 30, 1932, *F. R. Fosberg 8281* (M).

Distribution: northwestern Lower California.

⁴⁶ *Chorizanthé procumbens* Nutt. var. *albiflora* Goodman, var. nov., similis speciei, sed floribus albis.—Dry slope, 2 miles east of Pala, San Diego County, California, April 30, 1926, *Munz 10372* (Pom TYPE).

⁴⁷ *Chorizanthé procumbens* Nutt. var. *mexicana* Goodman, var. nov. Planta parva, 2 vel pauca cm. alta; involucri dentibus tenuissimis et uncinatis; floribus 2 mm. longis, flavescentibus vel albidis, laciniis aequalibus, late ovatis vel late elliptico-oblongis, circiter 0.75 mm. longis. Cetera speciei similis.—Open spaces in chaparral, Tecate, Lower California, alt. 600 m., May 30, 1932, *F. R. Fosberg 8281* (M TYPE).

Specimens examined:

LOWER CALIFORNIA: All Saints Bay, April, 1882, *Fish* (G); Tecate, alt. 600 m., May 30, 1932, *Fosberg* 8281 (M TYPE).

The broad lobes of this variety suggest *C. Jonesiana*, but the short branches of the inflorescence and the slender teeth of the involucre ally it more closely to *C. procumbens*.

39. *Chorizanthé Jonesiana* Goodman, n. sp.⁴⁸

Pl. 2, fig. 2.

Decumbent plants; stems several from the base, 1–2 dm. long, sparsely curly ascending pubescent; leaves petiolate, oblanceolate, 2–4.5 cm. long, sparsely pubescent; lower bracts similar to the leaves, upper lanceolate-acicular; the long branches of the uniparous cymes 2–3 cm. long, the involucre solitary or in scattered clusters, 6-ribbed, 3–4 mm. long, tube 2–3 mm. long, campanulate, sparsely spreading pubescent, the awned portion of the teeth short and uncinat, the larger set arcuate, widely divaricate, and as long as or longer than the tube; inner much smaller, the small yellow membrane in the sinuses apparent; flower partially exserted, obconic, about 3 mm. long, glabrate, white, lobes elliptic-obovate, a third as long as the tube, inner scarcely smaller; the 9 stamens united into a short, pilose-ciliate tube, anthers linear-oblong.

Type: ranch, 29 miles southwest of Tia Juana, Lower California, April 13, 1925, *M. E. Jones* (Pom.)

Distribution: northwestern Lower California.

Specimens examined:

LOWER CALIFORNIA: Ensenada, April 12, 1882, *Jones* (Pom); April 11, 1882,

⁴⁸ *Chorizanthé Jonesiana* Goodman, sp. nov. Planta decumbens; caulibus pluribus e base, 1–2 dm. longis, sparse adscendente pubescentibus; foliis petiolatis, oblanceolatis, 2–4.5 cm. longis, sparse pubescentibus; bracteis inferioribus foliis similibus, superioribus lanceolato-acicularibus; ramis cymarum uniparitarum 2–3 cm. longis; involucri solitariis vel in glomerulis laxis, 6-costatis, 3–4 mm. longis, tubo campanulato, 2–3 mm. longo, divergente pubescente, spinis dentium brevibus et uncinatis, majoribus 3 arcuatis, late divaricatis, tubum adaequantibus vel superantibus, alternatis multum parvioribus; floribus paulo exsertis, obconicis, circiter 3 mm. longis, glabratibus, albis, laciniis elliptico-obovatis, 0.75 mm. longis, interioribus vix parvioribus; staminibus 9, in tubum brevem pilosum conjunctis; antheris lineari-oblongis.—Ranch, 29 miles southwest of Tia Juana, Lower California, April 13, 1925, *M. E. Jones* (Pom TYPE).

Jones (Pom); May 29, 1883, *Orcutt 877* (G); ranch, 29 miles southwest of Tia Juana, April 13, 1925, *Jones* (D, M photograph, Pom TYPE).

The long internodes of the inflorescence, the thickened involucre teeth with short awns, and the white flowers serve to readily distinguish *C. Jonesiana* from its nearest relative, *C. procumbens*. The broader lobes of the perianth form a most important, though hidden, difference between the two species. In young flowers of *C. Jonesiana* the inner lobes have been observed to be orbicular-obovate.

40. *Chorizanthé chaetophora* Goodman, n. sp.⁴⁹

Pl. 2, fig. 1.

Plants spreading, only slightly branched, 1–1.5 dm. long, grayish with a loosely appressed pubescence; leaves petiolate, oblanceolate, obtuse to rounded, about 3 cm. long, shortly villous; lower bracts similar to the leaves, reduced above, the upper small and linear; involucres arranged in small clusters along a compound uniparous cyme, gray with appressed pubescence, tube campanulate, 2 mm. long, the 3 larger teeth widely spreading, arcuate, 2–3 mm. long, thickened toward the base, spines cuspidate, short, nearly straight, inner short and spreading, membranes of the sinuses yellow but inconspicuous; flowers narrowly obconic, 2.5 mm. long, slightly pubescent on the outer surface, the hairs surpassing the perianth lobes, these yellow, equal, short (0.5 mm. long), oblong; filaments united into a short, ciliate tube, anthers oblong.

Type: San Quentin Bay, Lower California, January, 1889, *Palmer 652* (Ph).

⁴⁹ *Chorizanthé chaetophora* Goodman, sp. nov. Planta diffusa, ramosiuscula, 1–1.5 dm. longa, cinerea, laxè appresso-pubescent; foliis petiolatis, oblanceolatis, obtusis vel rotundatis, circiter 3 cm. longis, brevè villosis; bracteis inferioribus foliis similibus, superioribus parvioribus, linearibus; involucris in glomerulis parvis in cyma composita uniparita dispositis, cinereo-appresso-pubescentibus, tubo campanulato, 2 mm. longo, 3 majoribus dentibus late divergentibus, arcuatis, 2–3 mm. longis, ad basem crassulatis, spinis dentium cuspidatis, brevibus, subrectis, inferioribus brevibus et divergentibus, sinorum membranis flavis sed inconspicuis; floribus anguste obconicis, 2.5 mm. longis, exteriore pubescentibus, pilis perigonii laciniis superantibus, flavis, laciniis aequalibus, brevibus (0.5 mm. longis), oblongis; filamentis in tubum brevem ciliatum conjunctis, antheris oblongis.—San Quentin, Lower California, January, 1889, *Palmer 652* (Ph TYPE).

Distribution: near San Quentin, Lower California.

Specimens examined:

LOWER CALIFORNIA: San Quentin Bay, January, 1889, *Palmer 652* (G, M photograph, Ph TYPE, US).

This species is most nearly related to *C. procumbens* var. *mexicana*, but differs chiefly in the large, thick teeth of the involucre, and in the gray pubescence of the stems and involucres. *Chorizanthe chaetophora* superficially simulates to a remarkable degree *C. inequalis* of the Parryanae subsection.

The specific appellation is in allusion to the pubescence of the perianth which, so far as present observation shows in this subsection, uniquely exceeds the perianth lobes.

DIAGNOSIS OF ERIOGONELLA, NEW GENUS

In the course of transferring to other genera several species heretofore usually considered as members of *Chorizanthe*, it was discovered that two of these species, *C. membranacea* and *C. spinosa*, could not correctly be referred to any known genus. Below, under "Species Excluded," they are properly referred to the following genus:

Eriogonella Goodman, n. gen. of the Polygonaceae.⁵⁰ Annual plants, softly pubescent to tomentose. Stems erect or prostrate, dichotomously branched. Leaves basal or nearly so, and entire. Inflorescence cymose. Bracts opposite or verticillate, entire. Involucres sessile, urceolate, 5-6-ribbed and -toothed, the teeth spine-tipped. Flowers 2 or 3 in an involucre, but only one developing, pedicellate, bractlets lacking; perianth 6-parted, the outer segments larger than the inner 3, all entire. Stamens 9, inserted at the base of the perianth.

⁵⁰ **Eriogonella** Goodman, gen. nov. Polygonacearum. Plantae annuae, molliter pubescentes vel tomentosae. Caules erecti aut prostrati, dichotome ramosi. Folia basalia vel subbasalia et integra. Inflorescentia cymosa. Bractae oppositae aut verticillatae, integrae. Involucra sessilia, urceolata, 5-6-costata dentataque, dentibus in spinis terminatis. Flores 2-3 in involuero (uno flore maturante), pedicellati; bracteoli nulli; perianthum 6-partitum, segmentis integris, exterioribus interioribus 3 majoribus. Stamina 9, ad basem perianthi inserta. Achaenium 3-carpellatum, 3-angulatum; styli 3; stigmatae capitatae; radícula curvata, cotyledones suborbiculati et accumbenti.

Achene 3-carpellate, 3-angled, styles 3, stigmas capitate; radicle curved, the cotyledons suborbicular and accumbent.

Type species: *Eriogonella membranacea* (Benth.) Goodman.

SPECIES EXCLUDED

C. californica (Benth.) Gray, Proc. Bost. Soc. Nat. Hist. 7: 149. 1859 = **Mucronea californica** Benth. Trans. Linn. Soc. Lond. 17: 419, pl. 20. 1836.

C. californica (Benth.) Gray var. *Suksdorfii* Macbride, Contr. Gray Herb. N. S. 53: 6. 1918 = **Mucronea californica** Benth. var. **Suksdorfii** (Macbr.) Goodman, n. comb.

C. floccosa Jones, Contr. West. Bot. 12: 74. 1908 = **Hollisteria lanata** Wats. Proc. Am. Acad. 14: 296. 1879.

C. insignis Curran, Bull. Cal. Acad. Sci. 1: 275. 1885 = **Oxytheca insignis** (Curran) Goodman, n. comb.

C. leptoceras (Gray) Wats. Proc. Am. Acad. 12: 269. 1877 = **Centrostegia leptoceras** Gray, Proc. Am. Acad. 8: 192. 1870.

C. membranacea Benth. Trans. Linn. Soc. Lond. 17: 419, pl. 17, fig. 11. 1836. = **Eriogonella membranacea** (Benth.) Goodman, n. comb.

C. perfoliata Gray, Proc. Bost. Soc. Nat. Hist. 7: 148. 1859 = **Mucronea perfoliata** (Gray) Heller, Muhlenbergia 2: 23. 1905.

C. polygonoides Torr. & Gray, Proc. Am. Acad. 8: 197. 1870 = **Acanthogonum polygonoides** (T. & G.) Goodman, n. comb.

C. rigida (Torr.) Torr. & Gray, l. c. 198. 1870 = **Acanthogonum rigidum** Torr. Pacif. R. R. Rept. 4: 133. 1856.

C. spinosa Wats. Botany [of California] 2: 481. 1880 = **Eriogonella spinosa** (Wats.) Goodman, n. comb.

C. Thurberi (Gray) Wats. Proc. Am. Acad. 12: 269. 1877 = **Centrostegia Thurberi** Gray ex Benth. in DC. Prodr. 14: 27. 1857.

C. Thurberi (Gray) Wats. var. *cryptantha* Curran, Bull. Cal. Acad. Sci. 1: 275. 1885 = **Centrostegia Thurberi** Gray ex Benth, l. c. 1857.

C. Vortriedei T. S. Brandege, Zoe 4: 158. 1893 = **Centrostegia Vortriedei** (T. S. Brandege) Goodman, n. comb.

LIST OF EXSICCATAE

The collectors' numbers are printed in *italics*, or, if the collection is unnumbered, it is indicated by a dash. The numbers in parentheses indicate the number assigned to the species in this revision.

- Abbott, E. K. — (14); — (29).
 Abrams, Mrs. J. D. — (21); — (33).
 Abrams, L. R. *3169*, *11016*, *11060* (1); *11754*, *11932a*, (3); *3222* (5); *1218* (7); *1603* (9a); *6516* (10a); *1653* (11); *4047*, *4283* (14); *7443* (16); *205*, *1274*, *1807*, *2554*, *2637*, *4116* (18); *1708* (18a); *3777* (21); *3426* (25); *3661* (26); *7655* (30); *1337* (33a); *3737* (38).
 Abrams, L. R. & E. A. McGregor. *146* (18a); *305* (20).
 Abrams, L. R. & I. L. Wiggins. *66* (24).
 Alderson, R. D. — (21); — (38).
 Andrews, T. L. *13*, *14* (14).
 Angier, B. S. *184* (25).
 Antisell, T. — (26).
 Austin, Mrs. R. M. — (17).
 Bacigalupi, R. *1491* (8a); *1490* (11).
 Baker, C. F. *1092* (3); *2842*, *5072* (9); *4706* (18).
 Baker, M. S. *3097b*, *5360* (31).
 Beard, A. — (5).
 Beller, S. — (1).
 Bigelow, J. M. — (17).
 Blaisdell, F. E. *87* (25).
 Blankinship, J. W. — (17); — (31).
 Blazie, A. — (18).
 Bolander, H. N. —, *112* (9); *1939* (14).
 Bowman, A. M. — (18).
 Braem, S. — (1).
 Brandegee, K. —, *218* (4); — (7); — (9); — (9a); *85* (11); — (13); — (14); — (16); — (17); — (18); — (21); — (23); — (25); — (26); —, *84* (27); — (29); — (30); — (31); — (32); —, *29* (38).
 Brandegee, T. S. — (4); — (5); *1623* (7); — (16); —, *1631* (25); — (34); — (35); — (36); — (37); —, *1638* (38).
 Braunton, E. —, *15*, *275*, *306*, *418* (18).
 Brewer, W. H. —, *893* (16); *445* (18); *456*, *894* (23); *2739* (32).
 Bridges, T. *286* (9).
 Bryan, M. L. *76* (18).
 Bush, Mrs. A. E. — (33a).
 Buttle, A. F. — (26).
 De Camp, I. — (18); — (33).
 Cannan, E. — (9).
 Carlson, J. I. — (5).
 Clark, H. W. — (1); — (18).
 Clary, M. — (20a).
 Clemens, Mrs. Jos. — (11); — (16).
 Clements, F. E. & E. S. *50*, *51*, *52* ((25); *49* (38).
 Cleveland, D. — (4); — (21); — (25); — (31); — (38).
 Collins, G. N. & J. H. Kempton. *2*, *167* (25); *253* (26); *183* (38).
 Congdon, J. W. — (13); — (14); — (16); — (17).
 Coombs, Mrs. A. L. — (26).
 Cooper, J. G. *523* (21); — (25).
 Cottam, Stanton & Harrison. *4033* (3).
 Coville, F. V. & F. Funston. *1135* (3); *1033*, *1100* (20); *1090* (32).
 Cox, F. — (33).
 Crawford, D. L. — (18).
 Crow, E. — (18).
 Curran, M. K. — (3); — (9); — (11); — (17); — (32).
 Cusick, W. C. *771*, *1974* (3).
 Davidson, A. *2737* (2).
 Davis, A. *51* (18).
 Davy, J. B. *1882* (20).
 Dearing, Mr. & Mrs. — (8).
 Dobbs, R. J. — (18b).
 Douglas, D. — (8); — (16); — (18).
 Dudley, C. — (16); — (29).
 Dudley, W. R. — (8); — (8a); — (9); — (9a); — (11); — (16); — (18); —, *733* (31).
 Dudley, W. R. & F. H. Lamb. *4556* (20).

- Dunn, A. N. & J. A. Ewan. 7838 (18).
 Dunn, G. W. — (25); — (29); — (38).
 Duran, V. 517 (3).
 Durbrow, P. — (16).
 Eastwood, A. 2708, 3061, 6165, 8071, 8667, 8910, 16988, 18188, 18246, 18803 (1); — (2); 3235 (3); 150 (8); — (9); —, 150a, 222 (9a); 351 (10); 14266, 15102, 15108 (10a); 151 (11); —, 4832 (13); —, 6948 (16); 12558 (17); 10, 107, 245, 459, 658, 3144, 15379 (18); 8963, 9045 (18b); 3100 (20); — (22); 15116, 15127, 15167 (23); 2881, 2886, 2916 (25); —, 9162 (26); —, 14981, 15121, 15137 (27); 452 (28); 13812 (29); 15015 (30); 15383 (33); 3139 (33a); —, 258, 2874 (38).
 Elmer, A. D. E. 3570 (8); 4671 (8a); 4793 (9); 4828 (9a); 5084a (11); 4047 (14); 4756 (15); 3253 (16); 3251 (18); 3689 (18d); 3245 (31).
 Engelmann, G. — (8).
 Epling, C. C. — (5).
 Epling, C. C. & M. — (18); — (18c).
 Epling, C. C. & J. A. Ewan. 7599 (18).
 Evermann, B. W. — (18d).
 Ewan, J. A. 1507, 1509, 1526, 1527 (18); 2244, 7365, 7586 (18b); 2252 (18c); 1506 (20).
 Ferris, R. S. 3922a, 3948, 7138, 7222, 8007 (1); 3728 (2); 7140, 7205 (5); 7613 (10a); 1696 (16); 953 (18); 7049 (26).
 Ferris, R. S. & C. D. Duncan. 2205 (32).
 Feudge, J. B. 1644 (29); 240 (33).
 Fish, F. E. — (38b).
 Fisher, G. L. 142 (18).
 Ford, B. — (20).
 Fosberg, F. R. 8066 (1); 8279 (25); 8277 (26); 8281 (38b).
 Fritchey, J. Q. A. 44 (33).
 Gambel, W. — (10); — (18); — (22).
 Gardner, N. L. 548 (9).
 Geis, H. D. 542 (18); —, 541 (33a).
 Gilman, M. F. — (5).
 Goldman, E. A. 1089 (5).
 Goodding, L. N. 881 (1).
 Goodman, G. J. & C. L. Hitchcock. 1748 (18b).
 Grant, A. L. 1685 (27).
 Grant, G. B. 6715 (1); —, 2605 (8); —, 169, 3887 (18); 3887 (18b); —, 171, 6627, 6642 (33); 2607, 6818 (38).
 Greata, L. A. 455 (33).
 Greene, E. L. — (14).
 Griffiths, D. 3486, 3722, 3981, 3991, 4395 (1).
 Grinnell, F. 497 (18); — (18b); 110, 194, 288, 450 (20).
 Hall, H. M. 6029 (1); 9922 (16); 745 (21); 10033 (32).
 Hall, H. M. & H. D. Babcock. 5081 (20).
 Hall, H. M. & H. P. Chandler. 7262 (2); 7247 (3).
 Harrison, G. J. 3619 (1); 3615 (5).
 Hart, C. —, 78 (1).
 Hartweg, T. 1936 (8); 1935 (8a); 1938 (11).
 Hasse, H. E. — (3); — (7); — (8); — (18); — (18b); — (18c); — (33a).
 Hayward, I. — (14).
 Heller, A. A. 9680 (1); 9705 (3); 6749 (8); 5666 (9); 8383 (9a); 6750, 14404 (11); 7910a (17); 7797 (20).
 Heller, A. A. & H. E. Brown. 5568 (17).
 Henderson, L. F. 3129, 8987, 8988, 8989 (3).
 Henshaw, H. W. — (38).
 Herre, A. C. — (25).
 Hill, M. — (5).
 Hillman, F. H. — (3).
 Hitchcock, A. E. 764 (3).
 Hitchcock, A. S. — (26).
 Hitchcock, C. L. — (25).
 Hoffmann, R. — (1); —, 438 (2); — (3); — (10); — (10a); — (11); — (18); — (20); — (24); —, 371 (27); — (27a); — (28); — (29); — (31).
 Hooker, J. D. & A. Gray. — (18).
 Horn, G. H. — (20).

- Howell, J. T. 2678, 3518, 3555, 4969 (1); 3982 (2); —, 2518, 4976 (3); 3497, 3591 (5); 1956, 5271, 5316, 11430 (9); 4233 (12); 6516 (16); —, 2455, 2461, 6585, 6621, 6621a (18); 3876 (18b); 5034 (20); 2926 (21); 6220, 6300 (24); 6634 (25); 11551 (29); 11552 (31); 2482, 6658 (33); 2481 (38); 4856 (38a).
- Howery, C. E. — (33).
- Hutchinson, S. — (12).
- Ingalls, M. P. — (10a).
- Jaeger, E. C. —, 214 (1); — (3); 213 (5); — (20a); — (21); — (26); 1058 (33).
- Johansen, D. A. & J. A. Ewan. 7139 (5).
- Johnson, E. R. — (26).
- Johnson, J. E. — (1).
- Johnston, I. M. — (1); — (3); — (18); —, 27P (18b); — (33).
- Jones, M. E.—, 5024av, 5036ap, 5045ao, 5110al (1); —, 25782 (2); —, 2995 (3); — (5); — (7); —, 2327 (8a); —, 186, 2386 (9); 28863 (12); 2253 (14); — (18); — (18a); — (18b); — (20); — (20a); —, 3234 (23); — (25); — (26); —, 3181 (33); —, 3159 (38); — (39).
- Jussel, M. S. 143, 276 (31).
- Kearney, T. H. 72 (32).
- Keck, D. & McCully. 88 (1); 67 (26).
- Kelley, E. — (18).
- Kellogg, A. & W. G. W. Harford. 865 (7); —, 6 (9); — (25).
- Kelly, J. — (16).
- Kennedy, P. B. 1851 (1); 1308, 4536 (3).
- Lathrop, L. M. — (27).
- Leiberg, J. B. 2225 (3); 3381a (18); 3381b (18b); 3300 (33).
- Lemmon, J. G. — (1); —, 204 (3); — (8); — (20); — (27a).
- Lemmon, J. G. & wife. — (1); — (5).
- Linsdale, Dr. and Mrs. — (16).
- Lyon, W. S. — (18); — (33a).
- Macbride, J. F. 1033 (2); 159 (3).
- Macbride, J. F. & E. B. Payson. 3024 (2); 2848 (3); 717, 815 (18).
- MacFadden, F. 8 (18).
- Mason, H. L. — (16).
- Mathias, M. E. 806 (1); 874 (3).
- McDonald, J. — (30).
- McGregor, E. A. 42 (8); 62, 1015 (26).
- McMurphy, J. — (16); — (17).
- Mearns, E. A. 3145 (1); 3032, 3199, 3243 (26).
- Michaels, E. — (2).
- Michener, C. A. & F. T. Bioletti. — (9).
- Miller, C. E. — (24).
- Mohr, P. F. — (1).
- Monks, S. P. 36 (18).
- Moore, J. P. — (9).
- Munz, P. A. 2601 (1); 9275 (11); 2791 (18); 7085 (18c); 4654, 11426 (20); 11919 (20a); 9481, 9843, 10879 (21); 8060, 9624 (26); 2790a (33); 2790, 7958 (38); 8192, 10372 (38a).
- Munz, P. A. & E. Crow. 11679 (24).
- Munz, P. A. & R. D. Harwood. 3517, 3618 (1); — (5); 3924 (18); 3715, 3822 (18c); 3775 (19); 7310 (21); 3852 (25); 7145 (26); 7146 (38); 3897 (38a).
- Munz, P. A. & C. L. Hitchcock. 12776 (3); 10952 (5); 11366 (26).
- Munz, P. A. & R. Hoffmann. 11734 (7).
- Munz, P. A. & I. M. Johnston. 5175 (1); 5364 (7); 5318, 12618 (25); 5359 (33).
- Munz, P. A. & D. Keck. 4859 (1); 7066 (18).
- Munz, P. A. & B. Norris. 11847 (24).
- Nelson, A. & J. F. Macbride. 1171 (2); 1875 (3).
- Nevin, J. C. 18 (18).
- Newell, G. — (8a).
- Norton, A. — (16); — (29); — (32).
- Norton, M. E. — (8).
- Nott, C. P. — (8).
- Nuttall, T. — (8); — (25); — (38).
- Oreutt, C. R. — (1); — (4); —, 91 (5); — (6); — (7); — (20a); — (21); — (25); —, 919 (26); —, 1369 (34); — (38); 877 (39).
- Oreutt, C. R. & D. Cleveland. — (4).

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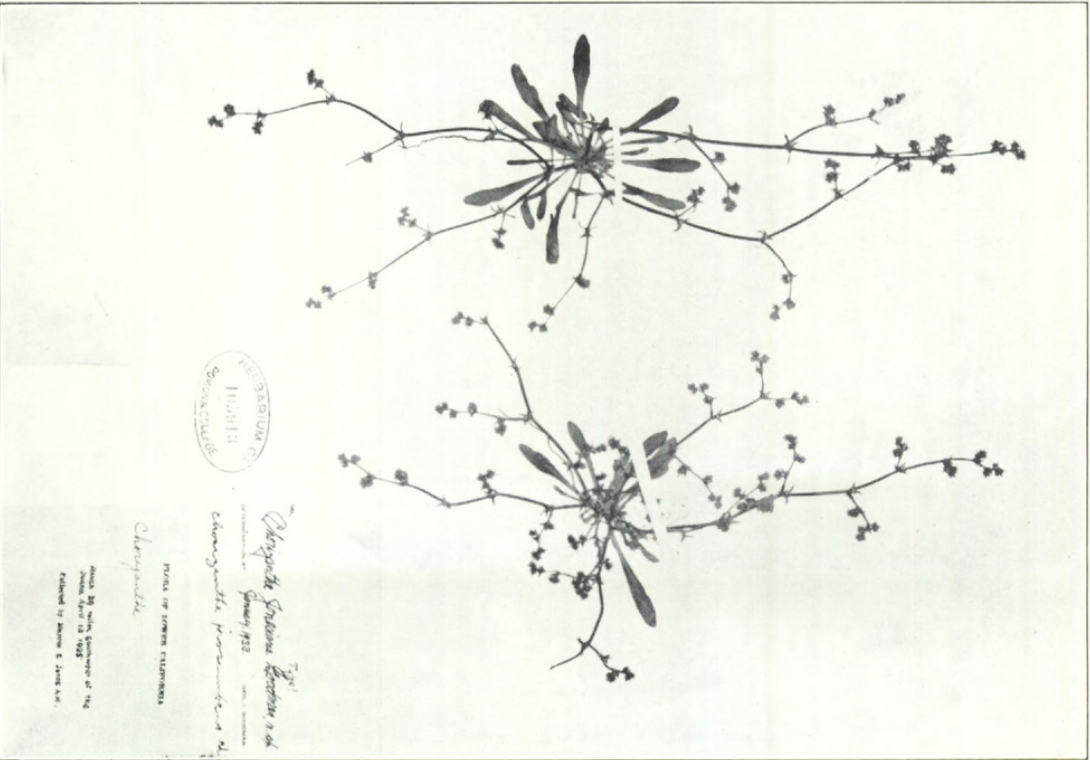
GOODMAN—NORTH AMERICAN SPECIES OF CHORIZANTHE

EXPLANATION OF PLATE

PLATE 2

Fig. 1. *Chorizanthë chaetophora* Goodman. From the type specimen, *Palmer 652*, in the Herbarium of the Academy of Natural Sciences of Philadelphia.

Fig. 2. *Chorizanthë Jonesiana* Goodman. From the type specimen, *M. E. Jones*, in the Herbarium of Pomona College.





Goodman, George J. 1934. "A Revision of the North American Species of the Genus *Chorizanthe*." *Annals of the Missouri Botanical Garden* 21, 1–102.

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