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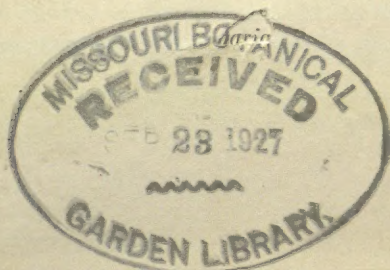
CONTRIBUTIONS
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OF
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NEW SERIES

VOL. III—Nos. 51-⁶⁴75

1917-1925

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lxxiv. " " "	3-114. 22 Apr., 1925.
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ERRATA

- li. 185, line 7 from bottom, for northern read southern
 " 189, " 22, for Swamp read Stump
 " 201, " 3 from bottom, for *Filix-temina* read *Filix-femina*
 " 210, " 7 " " for Betchouam Seignoiry read Betchouana Seignoiry
 " 215, " 29, for *cicutaria* read *cicutarium*
 lii. 4, lines 15, 16, and 32, for *Bailleria* read *Baillieria*
 " 9, line 5, for 1886 read 1882
 " 14, " 19, " B. BRASILIANUM read D. BRASILIANUM
 " 16, " 25, " *Oyedeia* read *Oyedaea*
 " 18, " 22, for *Bimilek* read *Bilimek*
 " 21, " 33, " *Eli-* read *Ely-*
 " 23, " 12, " 1905 read 1895
 " 24, " 16, " " " "
 " 50, lines 22, 23, and 29, for *angusta* read *augusta*
 " 62, line 29, for *altus* read *alta*
 " 69, " 7 from bottom, for 1-2 cm. longus read 1-2 cm. longa
 " " 6 " " " donatus read donata
 " 76, " 10 " " " ramosus read ramosa
 " 87, " 9 " " " Herbacea valde ramosa read Herbaceum valde ramosum
 " 95, " 9 " " " tectus read tecta
 " 100, " 5 " " for *chamaeranthermoideum* read *chameranthermoideum*
 " 102, " 6 " " for Syn. Fl. i. pt. 2, read Syn. Fl. ii, pt. 1
 liii. 6, " 13 " " " comb. nov. read Rydb. Fl. Rky. Mts. 170, 1061 (1917).
 " 21, " 3 " " " comb. nov. read Petrak, Beih. Bot. Centralbl. xxxv. Abt. 2, 552 (1917).
 " 22, " 3, for comb. nov. read Petrak, Beih. Bot. Centralbl. xxxv. Abt. 2, 551 (1917).
 liv. 44, " 12, for sterile read fertile
 " 97, " 4 from bottom, for COTYPE read TYPE
 " " 3 " " dele COTYPE
 " 194, 1st column line 26, dele 201
 " " " " 28, for 271 read 291
 lv. 263, line 7, for *Fleishmannia* read *Fleischmannia*
 " 295, " 3 from bottom, for *Sinclairii* read *Sinclairi*
 " 333-344, for MÉRIDA: . . . Tovar read ARAGUA: . . . Colonia Tovar
 " 333, line 3 from bottom, for Victoriana road of read road from La Victoria to Colonia
 " 333, " 4 from bottom, for MÉRIDA read ARAGUA
 " 334, " 20, for MIRANDA read FEDERAL DIST.
 " " " 22, " "Guajaca rumbo," read Guaracarumbo,
 " 335, lines 8-9 from bottom, for MÉRIDA: on stony hills near Incantados de read MIRANDA: on stony hills near La Encantado near
 " 338, line 6, for ARAGUA: Las Adjuntas read MIRANDA: Las Adjuntas
 " 339, " 25, and 340, line 11 from bottom, for BERMUDEZ read MON-AGAS

- lv. 340, line 17, for "Sanchorquig" read Sanchorquiz
 " 343, " 6 from bottom, for STATE NOT CLEAR: Quebrada de Anoico
 read ; Quebrada de Anaúco
 " 364, " 4 " " for *Conclinium* read *Conoclinium*
 " 367, " 4 " " for *pterophyllum* read *pteropodium*
- lvi. 3, " 16, for, comb. nov. read Gates, Journ. Linn. Soc. xlv. 167
 (1918)
 " 17, " 14, for *Krausianum* read *Krausianus*
 " 42, " 5, " *depressa* read *pygmaea*
 " 46, last line, for Hoffman read Hoffmann
 " 50, lines 4 and 5, for, comb. nov. read Petrak, Beih. Bot. Centralbl.
 xxxv. Abt. 2, 477 (1917).
 " 50, line 20, for *S. maritimum* read *S. maritima*
 " 55, " 8 for *Tsutsutsi* read *Tsutsusi*
- lvii. 7, " 7 from bottom, for Britton read Britten
 " 10, " 12 " " " HYDBOPHILA read HYDROPHILA
 " 21, " 10 " " " var. *pubescens* read var. **pubescens**
- lx. 15, " 5 " " " *Subimbricatum* read *Subimbricata*
 " 33, " 14 " " " *E. elata* read *E. elatum*
 " 71, " 26, for *E. cuzcoesne* read *E. cuzcoense*
 " 74, " 16 from bottom, for var. *lanceolatum* read var. *lanceolata*
 " 85, " 2, for Bog. read Bot.
- lxi. 4, " 22, for *longis* read *longo*
 " 25, " 2 from bottom, for *hepanthum* read *heptanthum* and for *eleu-*
theranthemum read *eleutherantherum*
- lxii. 103, " 1, for **Tache** read **Tache**
- lxiii. " " 25, " *A. oblongifolia* read *Amelanchier oblongifolia*
 " 130, " 22, " *A. stolonifera* read *Amelanchier stolonifera*
 " 132, " 23, for *palmata* read *palmatus*
 " 152, " 5, " *J.* read *Juncus*
 " 170, " 2 from bottom, for *Osmorrhiza* read *Osmorhiza*
 " 264, " 14 " " " SHREBERI read SCHREBERI
 " 265, " 15, for *Erysimum* read *Erysimum*
 " 300, last line, for *Tusketense* read *tusketense*
- lxiv. 75, line 28, for *moyabambensis* read *moyobambensis*
- lxv. 8, line 4, for *rectangularibus, ancipitibus* read *rectangularibus; stipti-*
tibus ancipitibus
 " 15, " 13 from bottom, for, comb. nov. read Standl. Contr. U. S.
 Nat. Herb. xxiii. 460 (1922).
 " 15, " 10 from bottom, for, comb. nov. read Standl. l. c.
 " 16, " 23, for, comb. nov. read Standl. l. c. 462 (1922).
 " 18, " 9, for *P. psoraleoides* (Moric.) Rose read *P. psoralioides*
 (Moric.) Rose
 " 42, " 11 from bottom, for *Mertensia maritimus, Carex maritimus*
 read *Mertensia maritima, Carex ma-*
ritima
 " 47, " 6 from bottom, or **fratri** read **fratris**
 " 52, " 4 " " *Cylindrocephalum* read *Cylindrocephala*
- lxvii. 163, " 14, for R SEA read ROSEA
 " " 12 from bottom, for CRYPT LEPIS read CRYPTOLEPIS
 " " 9 " " " *magaritense* read *margaritense*
- lxviii. 19, " 27, lines 22 and 32 for *Dasynaphia* read *Disynaphia*
 " 29, " 9 " 12 " *Cylindrocephalum* read *Cylindrocephala*
 " 30, line 14 from bottom, for *Dasynaphia* read *Disynaphia*
 " 35, lines 12, 15 and 20, for *triangularis* read *triangulare*
 " " line 11 from bottom for *punctatum* read *punctatam*
 " " " 7 " " " *punctati* read *punctatae*
 " 48, " 17, for *caerulescens* read *coerulescens*

- lxviii. 48, lines 18 and 19, for *caerulescens* read *coerulescens*
 " 49, " 7 " 10, " *mexicana* read *mexicanum*
 " " line 9, for Mociño read Mociño's
 " 59, " 8, for *funamental* read *fundamental*
 " 93, lines 13 and 14, for *Flouresia* read *Florestina*
 " 95, line 14 from bottom, for *marginata* read *marginatum*
 " 99, " 7, for *volcanicum* read *vulcanicum*
 " 101, " 15 from bottom, for *Heleniarum* read *Heleniearum*
 " 102, " 1 from bottom, for *Angianthineae*, read *Angianthinæ*
 " 103, lines 2 and 9, for *Angianthineae* read *Angianthinæ*
 lxix. 157, line 11, for *Nacissales* read *Narcissales*
 lxx. 10, " 15, " l. e. read l. c.
 " 18, " 11, " *cariolinianum* read *carolinianum*
 " 45, " 2 from bottom, for appear read appears
 " 49, " 10 " " *L. cupulatum* read *L. cupulata*
 " 50, " 28, for *L. cupulatum* read *L. cupulata*
 " 51, " 2 from bottom, for *rupestris* read *rupestre*
 " 55, " 22, for *virginiana*, read *virginica*
 " 58, " 5 " " " *Lithospermum dichotoma* read *Lithospermum dichotomum*
 " 61, " 13, for FRANKINIA read FRANKENIA
 " 61, " 16, for PHAENOCARPA read PHAENOCARPUM
 " 76, " 2 from bottom, for *capitata* read *capitatum*
 " 82, " 11 " " " (C. & S.) and for C. & S. read (Schlecht) and Schlecht.
 " 87, " 12 " " " A. NEGLECTED read A NEGLECTED
 lxxi. 70, " 4 " " " *Austineae* read *Austinae*
 " 71, " 12, for *canescens* read CANESCENS
 lxxiii. 25, lines 22 and 24, for *nigropuncticulata* read *nigropunctulata*
 " 46, line 23, for *Trichodesmia* read *Trichodesma*
 " 53, " 27, for *vernation* read *venation*
 lxxiv. 14, " 3, " *ryptanthes* read *cryptanthes*
 " 18, " 8, " *Or ocarya* read *Oreocarya*
 " 56, " 13 from bottom, for *texanae* read *texana*
 " 76, " 13 " " " *scabrida* read *scabrella*
 lxxv. 37, " 7, for *ovatis* read *ovalis*

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NEW SERIES.— No. LI.

TAXONOMIC AND GEOGRAPHIC STUDIES IN NORTH AMERICAN FERNS.

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F. K. BUTTERS.

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AMERICAN FERNS.

FREDERIC K. BUTTERS.

(Plate 123.)

INTRODUCTION.

WRITING about the ferns of China, Christ says, "It has been believed and is still believed, that the distribution of ferns differs essentially from that of Phanerogams, in that the former have more extended ranges, and that endemism among them is less marked. Nothing is more incorrect. In specialization of species and endemism, the class of Pteridophytes is on a level with the remainder of the flora. Wherever the flora has an original character, and endemic forms play a great part, wherever types vary, and give rise to a circle of derived forms, these peculiarities appear strongly also among the ferns."¹

¹ On a cru, et on croit encore, que la dispersion des Fougères diffère essentiellement de celle des Phanérogams dans ce sens que les premières auraient des aires plus vaste, et que l'endémisme serait moins accentué. Rien n'est plus inexact. La spécialisation des espèces et endémisme dans la classe des Ptéridophytes, vont de pair avec le reste de la flore. Partout où la flore a un caractère original et où les formes endémiques jouent un grand rôle, partout où les types varient et s'entourent d'un cercle de formes dérivées, ces particularités s'étendent tout aussi bien sur les Fougères. Christ, H., Les Collections de Fougères de la Chine au Muséum d'histoire naturelle de Paris. Bull. Soc. Bot. de France, lii. Mém. i. 9 (1905).

Nevertheless, the commonly accepted range of some of our most familiar ferns is much more extended than is usual in the case of Phanerogams, and not infrequently is quite at variance with the laws of distribution which have been worked out for the latter type of plants.

In a recent examination of the ferns of the Selkirk Mountains it occurred to the author to make a critical study of some of the forms which are supposed to have a very wide and somewhat anomalous range. It appeared that, in the treatment of closely related species of ferns, and of races within the species, too much reliance had been placed on such superficial characters as details in the form and cutting of the fronds, characters of a kind which botanists have found to be peculiarly unreliable in most groups of plants. It seemed that a study of such technical characters as the size, form and sculpture of the spores, and details of the structure of the sporangia, sori, indusia and scales, might reveal characters of a more stable nature than the purely vegetative ones usually employed. As will be seen in the following series of papers, this study has led, in the case of several of our common groups of ferns, to the separation of species and varieties, in other cases to the recombination of forms supposed to be distinct, and the races characterized by the same technical characters have been found in all cases to have geographical ranges quite in harmony with well-known laws of the distribution of flowering plants.

I. THE GENUS *ATHYRIUM* AND THE NORTH AMERICAN FERNS ALLIED TO *ATHYRIUM FILIX-FEMINA*.

1. THE GENUS *ATHYRIUM*.

Fern genera are traditionally unsatisfactory, and in no part of the group are they more so than in the alliance of which the lady fern is a member. These form a naturally compact group in which it is sometimes difficult to distinguish clearly between the species, yet in some treatments of the ferns the species described below have been relegated to as many as three different genera, while *Athyrium Filix-femina* itself has been placed by reputable authors in at least four of the larger fern genera. This is largely due to the attempt, current throughout the latter part of the eighteenth, and much of the nineteenth century,

to rely entirely upon the structure of the sorus and indusium for generic distinctions and delimitations. This attempt is now seen to have resulted in an artificial system entirely comparable to the Linnaean system of classification of flowering plants. In some cases, particularly in highly specialized groups, it resulted in bringing together related forms, but it often led to obvious absurdities both of aggregation and of separation. It naturally resulted in particularly illogical results in such a group as *Athyrium*, where the sorus is a peculiarly variable and unstable organ.

The genus *Athyrium* Roth ex Mertens¹ was originally founded entirely upon soral characters which further investigation has shown to be illusory. In view of this it is not strange that botanists like Mettenius and Hooker should have found it impossible to maintain the genus, and should have considered it merely as a section of *Asplenium*. In 1866 and 1870, Milde, however, in two notable papers² showed that the lady fern and its relatives differ in several respects from the true *Asplenium*, and refounded the genus *Athyrium* on a firmer basis. He laid particular stress on the structure of the scales in the two genera and on differences in the vascular structure of the frond. He also pointed out that *Phyllitis* (*Scolopendrium*) and *Camptosorus* agree with *Asplenium* in both of these respects, while *Diplazium*, several of the other genera of *Aspleniaceae*, and the more primitive genera of the *Aspidiaceae* agree with *Athyrium*. In his second paper he confirms his earlier results so far as the differences between *Athyrium* and *Asplenium* are concerned, but he confesses that he is unable to maintain any generic difference between *Athyrium* and *Diplazium*, and he accordingly transfers a long list of species from the latter genus to *Athyrium*.

In general, the distinctions pointed out by Milde hold very well,

¹ Auszug eines Briefes von Hrn. Prof. Mertens in Bremen an den Herausgeber, Römer's Archiv für die Botanik, ii, pt. 1, 105 (1799).

Roth, A. G., Tentamen Florae Germanicae, iii. 58 (1800).

Roth's diagnostic character was the recurved sorus. Though his description of the genus was evidently based almost wholly on *A. Filix-femina*, which has since been considered the type of the genus, and on its various European forms, which he treated as distinct species, he listed as the first species *A. fontanum*, a genuine *Asplenium* with no close affinity to the lady fern. This species often has some of its sori recurved, and rarely has a few of them hooked as in true *Athyrium*. Roth's reason for placing this fern first was evidently merely that he was arranging all of the species in order, with the least compound first. That he did not consider it typical is evident, as it differs in several respects, notably in its entire indusium, from his generic description.

² Milde, J., Das Genus *Athyrium*. Bot. Zeit. xxiv. 373 (1866).

Id., Ueber *Athyrium*, *Asplenium* und Verwandte, Bot. Zeit. xxviii. 329 et sqq. (1870).

though there are a very few species of *Diplazium* in which one or the other breaks down. Such partially intermediate species occur, however, throughout the ferns, and any attempt to unite the larger fern genera on such grounds would result in reducing such a family as the *Polypodiaceae* to a very few genera — possibly to a single genus.

The scales of *Asplenium* consist of oblong cells, apparently nearly square in cross section, and the vertical interior cell-walls are dark colored and much thickened, while the superficial and marginal walls are very thin and transparent. This gives the scale, under the microscope, a clathrate appearance. In *Athyrium*, on the other hand, the typical scales are composed of elongated, more or less fibrous cells which are somewhat rounded in cross section, and all parts of the cell-wall are equally thickened, sometimes slightly, sometimes very greatly.

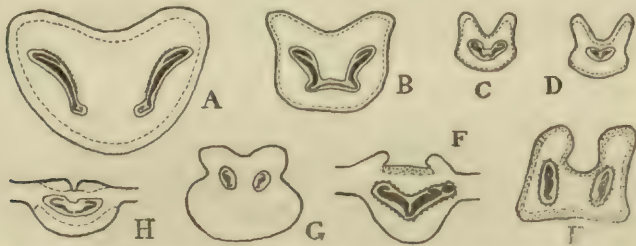


Fig. 1. Structure of the stipe in the genera *Athyrium* and *Diplazium*. A-D, *Athyrium angustum* (Willd.) Presl. A, lower part of the stipe, $\times 5$; B, upper end of the stipe, $\times 5$; C, rachis of the frond; D, midrib of a pinna, $\times 10$; E, F, *Diplazium plantaginifolium* (L.) (Brazilian material). E, stipe, $\times 10$; F, midrib of the blade, $\times 10$; G, H, *D. grandifolium* Sw. G, stipe, $\times 10$; H, midrib of the blade, $\times 10$.

The result is that, under the microscope, there is no such contrast between walls and lumina as is seen in the scales of *Asplenium*. Similar scales are found in *Cystopteris*, in *Dryopteris*, in *Diplazium* and in several other genera. In some species of *Athyrium* and in many species of *Diplazium*, the much reduced scales which occur along the rachis and veins of the frond, and especially in the axils of the pinnae, are somewhat clathrate, but the large basal scales, occurring on the rhizome and on the bases of the stipes are of the characteristic form just described.

In *Athyrium* and *Diplazium* the structure of the stipe and the rachis is rather uniform (see fig. 1). Two large bundles enter the base of the stipe. These may be nearly parallel, but more commonly they are somewhat inclined towards each other on the ab-axial

side of the stipe. They are usually well separated from each other and in a frond broken off at the base, they often project as two perfectly distinct fibrous cords. Taken as a whole, the xylem groups of the bundles are somewhat concave on their inner faces, though their central portion usually curves in the opposite direction. The tips of the xylem groups, and especially those facing the ad-axial side of the stipe are always sharply inflexed towards the middle of the stipe. These inflexed tips of the xylem may extend in at a sharp angle to the main mass of the xylem, in which case they are very conspicuous, or they may be completely inflexed, so as to lie closely applied to the inner face of the main xylem mass. Milde noted the existence of these inflexed parts of the bundle in those ferns in which they are conspicuous, but he seems to have overlooked the entirely parallel condition

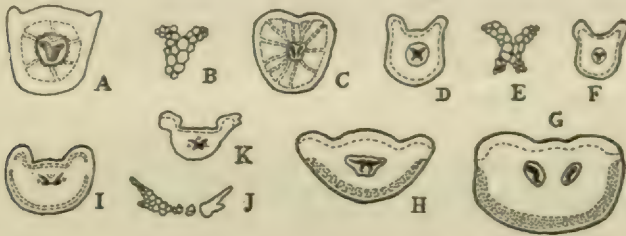


Fig. 2. Structure of the stipe in the genus *Asplenium*. A, B, *A. Trichomanes* L. A, stipe, $\times 10$; B, detail of the xylem of A. C-F, *A. viride* Huds. C, base of stipe, $\times 10$; D, upper part of the stipe, $\times 10$; E, detail of the xylem of D; F, rachis of the frond, $\times 10$; G, H, *A. bulbiferum* Forst. G, stipe, $\times 3\frac{1}{2}$; H, rachis of the frond, $\times 3\frac{1}{2}$. I-K, *A. fragrans* Sw. I, stipe, $\times 2\frac{1}{2}$; J, detail of the xylem of I; K, rachis of the frond, $\times 5$.

in such species as *Athyrium Filix-femina* in which the tips of the xylem are so much inflexed as to be almost hidden against the mass of the bundle. Sooner or later the two bundles unite by their dorsal extremities into a single U-shaped, or rarely V-shaped bundle. The structure of the stipe of *Dryopteris Thelypteris* (L.) A. Gray, *D. montana* (Vogler) Watt and other related species of *Dryopteris* is identical with that of *Athyrium*.

In *Asplenium* the vascular structure of the stipe is less uniform, and Milde recognizes four classes of structure in this genus, besides certain anomalous cases (see fig. 2). There are two small, centrally located bundles, which may be free throughout the length of the stipe and rachis, or may be united above, or even throughout.

When separate, they are more or less crescentic, with the convex side facing towards the middle of the stipe. The ad-axial tips of the bundles are never inflexed. When the two bundles are united, the compound bundle is usually X, Y, or T-shaped. Very rarely, as in *Asplenium fragrans* Sw. (*A. mexicanum* Mart. & Gal.) and *A. bipartitum* Bory (*A. auritum* Watt), the compound is V-shaped, but even then it is not entirely like that of *Athyrium*. Thus we find that in *Asplenium fragrans*, the compound bundle is formed, not by the union of the true ab-axial extremities of the component bundles, but by the junction of the points of narrowly V-shaped bundles (I and J, fig. 2).

There are certain minor points in which *Asplenium* nearly always differs from *Athyrium* and *Diplazium*. In the first mentioned genus, the walls of the sclerenchymatous cells of the stipe have a distinctly red color,—it is this which gives the characteristic red-black hue to the stipes of many species of *Asplenium*. In *Athyrium* and *Diplazium* on the other hand, the sclerenchymatous cells of the stipe have yellow or yellow-brown walls. A similar difference obtains in respect to the thickened walls of the cells of the scales.

In *Asplenium* the veins of the ultimate segments tend to be repeatedly dichotomous, while in *Athyrium* and *Diplazium* the veins are pinnate, and the veinlets are either simple or once forked. Very rarely indeed in these genera is a vein forked twice.

The distinctions between *Athyrium* and the genera *Diplazium* and *Dryopteris* are based entirely on the character of the sorus. As has already been stated, this organ in *Athyrium* is very variable and in many species two, or even three distinct types of sorus occur, even on the same frond. The simplest of these types from the descriptive stand-point, though almost certainly not the most primitive, is that which is characteristic of the genus *Asplenium* (see fig. 3). Here the sorus extends for a greater or less distance along the anterior side of a vein,¹ and is covered by an indusium, which grows out from the

¹ When the subtending vein is forked or otherwise branched, the primary sorus occurs on the anterior side of the anterior branch of the vein. Secondary sori may occur on the posterior side of the anterior branch, and the anterior side of the posterior branch, and in corresponding positions on the other branches if there are any. It is to be noted that the secondary sori are always on the anterior side of the veinlets, if we consider their orientation in regard to the group of veinlets, viewed as an ultimate segment of the frond, rather than in respect to the segment of the next lower order, which controls the position of the primary sorus. As has been pointed out by E. J. Winslow (Double Sori in *Athyrium*, *Am. Fern Journ.* iii. 88, 1913), it is at such points of confused and indeterminate orientation that diplazioid and athyrioid sori especially tend to develop.

subtending vein and lies upon the sporangia. In the genus *Athyrium* such sori seem always to be in close contact with the subtending vein throughout their entire length, and never, as in some species of *Asplenium*, to curve away from it at the ends. Asplenioid sori vary greatly in length, but are otherwise quite uniform in character. The indusium is raised and pushed back by the developing sporangia, and at maturity is often completely reflexed.

The sorus characteristic of the great tropical genus *Diplazium* and found also in some species of *Asplenium* and *Athyrium*, consists of two



Fig. 3.

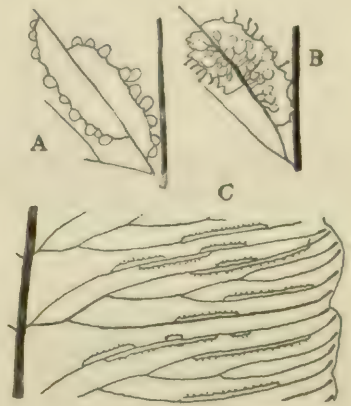


Fig. 4.

Fig. 3. Asplenioid sori. A, B, *Asplenium platyneuron* (L.) Oakes. A, pinna, $\times 24$; B, young sorus, $\times 10$, the sporangia indicated as if seen through the transparent indusium. C, sorus from the distal portion of the pinnule of *Athyrium Filix-femina* (L.) Roth., l-l, line measuring the length of the indusium, h-h, line measuring its height.

Fig. 4. Diplazioid sori. A, *Diplazium acrostichoides* (Sw.) Butters, $\times 124$; B, *Athyrium asplenioides* (Michx.) Desv., $\times 124$; C, portion of the frond of *Diplazium plantaginifolium* (L.) Urban, natural size.

asplenioid sori standing back to back along the same vein (see fig. 4). Such sori may vary not only in their absolute length (in some species of *Diplazium* reaching over 2 cm.) but also in the relative length of the component parts. In general, the anterior sorus is longer than that on the posterior side of the vein. In typical *Diplazium* the indusia wither at maturity.

The characteristic athyrioid sorus may be described as an asplenioid sorus which at the distal end crosses the subtending vein (see fig. 5). Athyrioid sori display great diversity of form. At the distal

end, the sorus may barely cross the veins so as to be slightly hooked, a "hamate" sorus, or it may develop a considerable posterior limb, becoming horse-shoe shaped, or "hippocrepiiform." In the latter

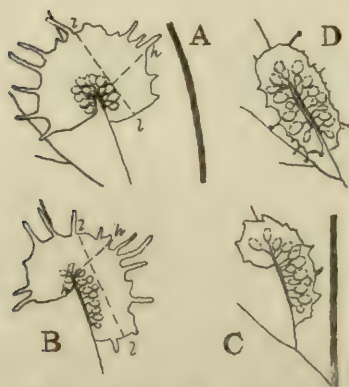


Fig. 5. Athyroid sori. A, B, *Athyrium Filix-femina* (L.) Roth, l-l, length, h-h, height of the indusium. C, *A. angustum* (Willd.) Presl. D, *A. asplenoides* (Michx.) Desv. A and D are hippocrepiiform, B and C, hamate.

case the two limbs may lie close together, or the posterior limb may lie at a visible distance from the subtending vein. Moreover, the entire sorus may be several millimeters long, or may be so short as to appear nearly round. In typical *Athyria*, the indusium of the mature sorus is reflexed wherever there is sufficient room, and at the curved distal end, it is crowded up into a vertical position in the midst of the sporangia. It is easy to see that the condition in a very short athyroid sorus is but a brief step from that which obtains in such a fern as *Dryopteris Thelypteris* (L.) A. Gray, in which an essentially round sorus is covered

by a centrally placed indusium shaped like an umbrella, but discontinuous on the proximal side. Finally, in a very short sorus, only that part may be present which crosses the vein, and the indusium may then also merely cross the vein, usually somewhat obliquely and just behind the sorus, a condition very like that found in the genus *Cystopteris*. Cystopterid sori are also fairly common in some of the more primitive species of *Dryopteris*, e. g. *D. Thelypteris* and its allies. In this connection it is interesting to note that Bower¹ considers *Cystopteris* as a relatively primitive type from which the *Aspidiaceae* have probably developed, and it seems equally probable that *Athyrium*, and through it the other genera of *Aspleniceae* have developed from a similar origin.

It is readily seen, that with such variability of the sorus, it is not easy to define the limits of the genus *Athyrium*. In this connection there are two major problems, the limit between *Athyrium* and *Dryopteris*, and the question of the genus *Diplazium*.

¹ Bower, F. O., *The Origin of a Land Flora*, 615 (1908).

As Copeland has well pointed out,¹ *Athyrium* and *Dryopteris* are both relatively primitive genera of *Polypodiaceae*, presumably with a common origin, and between the more undifferentiated species of the two genera there is really no definable difference. In both groups, species occur with small hippocrepiform, round and cystopterid sori mingled on the same frond, and it becomes necessary to judge such cases, each on its individual merits. Thus *Athyrium mongolicum* (Franch.) Diels, which has many cystopterid and dryopterid sori mingled with other athyrioid ones is more closely allied to the *Filix-femina* group of *Athyria*, than to any species of *Dryopteris*, while *Dryopteris Schaffneri* (Fée) C. Chr., with a similar assortment of sori, is obviously a member of the somewhat specialized section *Goniopteris* of the genus *Dryopteris*. Similarly, in one of the species discussed in this paper, *Athyrium alpestre* (Hoppe) Rylands, evidence from the sori is at best very slight, and in some of its forms, as, for example, that found in America, such evidence is entirely wanting, yet, so closely do some of its forms approach to certain forms of the common lady fern, that the two species can scarcely be kept separate, and there can be no question of the generic position of *Athyrium alpestre* in any natural classification of ferns.

In this connection, it is well to note that Christensen² has found the type of pubescence very useful in classifying ferns of the genus *Dryopteris*, and it bids fare to be equally useful in delimiting the groups of the genera *Athyrium* and *Diplazium*, and in indicating the true affinities of certain anomalous species.

In the direction of *Diplazium* the limits of the genus *Athyrium* are even harder to define. As stated above, Milde³ decided finally that this is an impossible task, and he then merged the two genera, while Copeland holds⁴ that the Asiatic *Diplazia* have had a multiple origin from the typical *Athyria*, and therefore cannot properly be regarded as constituting a genus. The Asiatic forms of *Diplazium*, and of *Athyrium* also, are certainly much more complex in their relationships than the American forms, and the final settlement of this question will depend on a careful working out of the lines of evolution of the

¹ Copeland, E. B., A Revision of the Philippine Species of *Athyrium*. Philip. Journ. of Sci. Bot. iii. 285 (1908).

² Christensen, C., On a natural Classification of the species of *Dryopteris*. Biol. Arb. filig. Eug. Warming (1911).

³ Milde J., Ueber Ath. etc., Bot. Zeit. xxviii. 329 (1870).

⁴ Copeland, E. B., loc. cit.

Asiatic groups. As both of the genera involved are already of considerable size,—according to Christensen's Index, *Athyrium* has 85 valid species, and *Diplazium*, 206,—a merging of them seems undesirable unless it is absolutely required by considerations of taxonomic honesty. So far as American ferns are concerned, the author finds that *Athyrium acrostichoides* (Sw.) Diels shows, in the thickened walls of the cells of its indusium, and in its pubescence, far closer kinship for the ordinary type of tropical American *Diplazium*, than for ferns of the lady fern group, and the same is true of *Athyrium angustifolium* (Michx.) Milde.¹ It seems that it may be possible eventually, to limit the genus *Athyrium* to the lady fern and its immediate allies, and possibly to form two or more genera out of the more remote groups of *Athyria* and *Diplazia*, but careful monographic work upon the whole complex is very much needed at the present time.

Finally it appears that the contact between these ferns and the true *Asplenium* is through once pinnate (or possibly entire leaved) tropical forms such as *Diplazium semihastatum* (Kze.) C. Chr. and *Asplenium bipartitum* Bory, as it is only among ferns of this general type, that any forms with intermediate vascular structure occur. While the larger, 2-3 times compound *Asplenium* sometimes closely simulate certain species of *Athyrium*, the structural differences are always perfectly sharp and clean cut.

The close resemblance of the western ferns commonly classified as *Athyrium cyclosorum* to certain European forms of *A. Filix-femina*, led to an examination of all the American and old world material of these species in the Gray Herbarium. From this examination certain conclusions were reached, which are discussed at length below. These conclusions are as follows:

1. That in the eastern United States and Canada there are two distinct species of lady ferns, neither of which is conspecific with *A. Filix-femina* (L.) Roth of Europe. One of these two species, *A. asplenioides* (Michx.) Desv. is prevailing southern in its distribution, the other, *A. angustum* (Willd.) Presl, is prevailing northern.

2. That the ferns of the northwest are conspecific with the Euro-

¹ In the opinion of the author these ferns should be known as ***Diplazium acrostichoides*** (Sw.), comb. nov. (*Asplenium acrostichoides* Sw. Schrader's Journal 1800, ii. 54 (1801), *Asplenium thelipteroides* Michx., Fl. Bor.-Am. ii, 265 (1803), *Diplazium thelipteroides* Presl, Tent. Pterid. 114, 1836) and ***Diplazium angustifolium*** (Michx.), comb. nov. (*Asplenium angustifolium* Michx., Fl. Bor.-Am. ii, 265, 1803).

pean plant, but, in some cases, differ from the common European forms of *A. Filix-femina* in certain minor points, and are then best regarded as a geographical variety of that species.

3. That the lady ferns of California, and the southern Rocky Mountains differ more markedly from the European plant, but are not clearly distinct from the more northern form, and therefore are best considered as a second, and much more aberrant geographical variety of *A. Filix-femina*.

4. That a boreal and high alpine fern found in eastern Quebec and in the alpine areas of western North America, is a clearly distinct geographical variety of the old world *A. alpestre*.

2. *ATHYRIUM FILIX-FEMINA* (L.) Roth.¹

Since the conception of this species among American botanists seems to have become considerably confused by the failure to distinguish it from the related forms of eastern America, a brief account of its chief characteristics seems desirable. The following description has been drawn up mainly from the specimens of the European plant in the Gray Herbarium (about twenty-five in number), together with a careful comparison with the standard works on British and continental ferns.

The rhizome is generally described as erect, sometimes as erect or ascending, rarely as decumbent. Even in cases where it is not entirely erect, there appears to be always, a distinct upright crown of fronds, with the young growth in their midst.²

¹ *Polpodium Filix femina* L. Sp. Pl. ii, 1090 (1753). *Athyrium Filix Foemina* Roth ex Mertens, Archiv für die Botanik, ii, pt. 1, 106 (1799). *Athyrium Filix femina* Roth, Tent. Flor. Germ. iii, 65 (1800).

² The character of the rhizome is in general poorly shown in herbarium material. In the Gray Herbarium only two European plants of this species show the crown of the rhizome. One of these from Holstein, has the rhizome ascending at an angle of about 70°, the other, from Saxony, at an angle of about 45°. An Algerian specimen has the rhizome ascending at an angle of about 60°, and curving upward. In all these specimens the young growth is surrounded by the bases of the older fronds.

In this connection the testimony of certain European writers is interesting. Thus Newman, Hist. of Brit. Ferns, ed. I, 62 (1840), says "The Rhizome is vertically elongate, sometimes rising several inches above the surface of the ground: in one instance I have seen it more than a foot in height, thus evincing a considerable proximity to the *Dixoniae*, and other tree ferns," and Moore, Popular History of British Ferns, ed. I, 87 (1851), states, "The habit of the plant is tufted, the caudex of the larger varieties often with age acquiring some length, and elevating the circle of fronds on a low, rude pedestal: this stem, however, never acquires more than a few inches in length. In winter, the summit of this stem, whether a tuft seated close to the ground, or elevated a few inches above the surface, is occupied by a mass of incipient fronds, each rolled up separately, and nestling in a bed of chaffy scales," while Milde, Die Gefäss-Crypt. Schles. 570 (1858), speaks of the "ganz aufrechten oder wenig aufsteigendem Rhizome."

The crown of the rhizome and the lower one-third of the stipes are covered rather densely, and the upper portions of the stipes more sparingly, with large rather persistent scales. These are sometimes over 1 cm. long, and up to 3 mm. wide, lanceolate, and contracted to a narrow base, so that in falling one leaves a very small scar which is almost round or like a minute inverted U. The scales are translucent and glossy, so that it is difficult to evaluate their true color. Seen against a white background, e. g. an herbarium sheet, they generally correspond to the "tawny" or "russet" shades of Ridgway's Color Standards, Plate 15. Very rarely they are darker, approaching Ridgway's "Mars Brown." The cells of which they are composed are large enough to show plainly with a hand-lens of moderate power, and under a compound microscope appear as elongated, but scarcely fibrous cells about six times as long as they are wide.

The stipes are commonly very short, one-fourth to one-third as long as the frond. The fronds themselves are lanceolate, widest in the middle, and tapering about equally in both directions. The lower pinnae are rather remote, in general strongly deflexed, and, though but little reduced in width, only one-fourth to one-half as long as the middle pinnae.

In the details of the arrangement, form and cutting of the pinnules, this species, like all of its close relatives, is very variable, and innumerable "varieties" have been named, sixty five of which are enumerated and described by Moore in his "Nature Printed British Ferns."¹

The sori differ considerably in different specimens, and different parts of the same specimen, but have certain general characters which distinguish them clearly from those of the east American plants of this group (see Plate 123, figs. 1 and 2, also text-fig. 3, p. 175 and text-fig. 5, p. 176). They are uniformly short, very rarely reaching the length of 1 mm. Strictly asplenioid sori are rare, and are usually found only at the distal extremity of the pinnules, where the sori are considerably reduced in size. A very common form is the sorus which runs along the anterior side of the subtending vein for about 0.75 mm., and then crosses it without extending at all down the posterior side of the vein. In many specimens, horse-shoe shaped sori, and even round sori are found. In sori of the latter types, the indusium is

¹ Good figures, showing the general aspect of this fern may be found in the work just mentioned, Folio ed. pl. 30-34, 8vo. ed. pl. 52-66, in Lowe, E. J., *Our Native Ferns*, pl. 35, also in his *Ferns British and Exotic*, v. pl. 29, and in Schkuhr, Ch., *Kryptogamische Gewächse*, pl. 58.

bent sharply back upon itself, with the two sides in contact, so that it stands in the midst of the sporangia of the distal half of the sorus.

The indusia are usually provided with an abundance of long multicellular cilia. These are occasionally rather few in number, and in old sori they often become so shrivelled that they are not easily seen, except with the compound microscope, and after careful dissection. In no specimen examined were they wanting. The average height of the indusia, not including the cilia, is 0.55 mm., and their average length in the larger sori is 0.8 mm.¹ In the case of the short asplenioid sori near the tips of the pinnules the indusium is often higher than it is long. At both extremities the indusium ends abruptly, so that its sides meet the line of attachment nearly perpendicularly, and sometimes it is even contracted towards the base.²

The stalks of the sporangia are short and very frequently proliferate, the branch usually bearing a secondary sporangium. Occasionally the secondary sporangium is abortive, and rarely it is replaced by a glandular structure. In no specimen seen are such glands freely and uniformly produced as they are in nearly all east American material.

The spores are yellowish, sparsely papillate, and average $39.1 \times 24.1 \mu$ in size.

3. THE LADY FERNS OF THE EASTERN UNITED STATES AND CANADA.

In the eastern parts of North America there are two species of the lady fern group which appear to be amply distinct from each other and from the true *Athyrium Filix-femina*. These are *A. asplenioides* (Michx.) Desv. and *A. angustum* (Willd.) Presl. The former is a southern species, ranging from Florida to Texas, and north to Missouri, Indiana, Ohio, and along the Atlantic coast to eastern Massa-

¹ All measurements of indusia in this paper were made upon indusia dissected off from the frond and flattened out under a cover glass. The length is always measured in a straight line, as nearly as possible parallel to the line of attachment of the indusium, the height in a straight line from the attached edge of the indusium to its free margin. See text-figure 3, p. 175, and text-figure 5, p. 176.

² The soral characters of the true *A. Filix-femina* are reflected in the treatment of it by European botanists. Thus Linnaeus, who defined *Polypodium*, "Fructificationes distributae in puncta rotunda, per paginam folii aversam (Gen. Pl. ed. 5, 485, 1754), placed the lady fern in that genus between *P. cristatum* and *P. Filix-mas*, and *P. aculeatum*, *P. rhaeticum* (a mixture of *Athyrium Filix-femina* and *A. alpestre*) and *P. noveboracense*. It has been placed in *Nephrodium* and *Aspidium* and by most recent European botanists in *Athyrium*. Those who, like Mettenius and Hooker placed it in *Asplenium* have held very broad views of the extent and characteristics of the latter genus.

chusetts, the latter is a northern species ranging from Labrador to Manitoba, and southward to southern New England, the mountains of Pennsylvania, the region of the Great Lakes, northern Missouri and the Black Hills. The two species meet chiefly in southern New England.

In both of these species the rootstock is horizontal or nearly so, and the young growth appears at the end, in advance of the bases of the older fronds, instead of surrounded by them as in *A. Filix-femina*. At the same time the two species differ considerably from one another in their underground parts. *A. asplenoides* has the rootstock distinctly creeping, and only partially and incompletely covered by the short persistent bases of the fronds, the whole structure being only 1-1.5 cm. in diameter. The fronds of each season's growth are loosely clustered, and the next season's growth projects conspicuously beyond the bases of the fronds of the current season. *A. angustum* has a much more condensed rootstock completely covered by the long overlapping fleshy persistent bases of the fronds, the whole structure being 2-5 cm. in diameter. The fronds are usually produced in considerable numbers, and as the rootstock grows but slowly, they are bunched together, but not truly tufted or forming a crown as in *A. Filix-femina*. The new growth stands in front of the fronds of the current season, but does not project conspicuously as in *A. asplenoides*.¹

The young growth of *A. asplenoides* is covered with scales which are smaller and proportionally narrower than those of *A. Filix-femina* but similar in color and structure. In the American fern, however, these scales are for the most part quickly deciduous after growth starts, and the stipes and bases of the mature fronds show very few scales, and these commonly of very small size (3-5 mm. long, by less than 1 mm. wide).

¹ I have laid particular emphasis on this point because D. C. Eaton, Ferns of the Southwest, U. S. Geog. Surveys West of the 100th Meridian, vi. 330 (1878), says, "Moore separates the greater part of the North American ferns specifically under the name of *Athyrium asplenoides*, Desv., making two varieties, one with broader and one with narrower pinnules, but the distinctive character which he relies mainly upon, the 'creeping caudex,' seems to be invalid, as our American plants grow in crowns no less decidedly than those of Europe." The context shows that Eaton was not confining these remarks to the western ferns, which are truly tufted, but that he entirely ignored the difference between the close crowding of leaves due to a very slow horizontal growth of the rootstock, and the true crown which arises when the growth is vertical or nearly so. Certainly the quotations in the footnote on p. 179 are very far from describing the condition of the rootstock in either of our east American species. It is noteworthy that all European botanists who have been dealing with living American plants in cultivation have noted the difference in the underground parts between these plants and *A. Filix-femina*.

The scales of *A. angustum* are quite different from those of either of the other species just mentioned. They are of moderate size (up to 1 cm. long and 1.5 mm. wide, usually considerably shorter than this). In shape they are narrowly linear-lanceolate with a fairly wide base, and in falling they leave larger and more conspicuous scars than do the wider scales of *A. Filix-femina*. They are much more opaque than those of the last mentioned species, and generally of darker color, varying from the "Mars Brown" of Ridgway's Color Standards, Pl. 15, to nearly black, with the middle often darker than the edges. Under a moderately strong hand-lens it is difficult to make out any structure, while under a compound microscope, they are seen to be composed of narrow fibrous cells about 15 times as long as they are wide.

In the form of the frond, the two American ferns are decidedly dissimilar. *A. angustum* closely resembles *A. Filix-femina*, but its stipes are commonly proportionally longer,— often one-half as long as the fronds,— and the lower pinnae are not quite so much reduced in size, and are less strongly deflexed than in that species.

A. asplenioides has still longer stipes, about equalling the narrowly deltoid lanceolate fronds. The second pair of pinnae are commonly the longest, and the basal pinnae are only very slightly reduced in length.

The details of the fronds of both American species are, as in *A. Filix-femina*, very variable, but the following points are worthy of note: the fronds of *A. angustum* are often markedly dimorphic, the segments of the fertile fronds being much narrower and more acute than those of the sterile fronds; the pinnules of the fertile fronds of *A. angustum* are commonly narrowly lanceolate and acute, those of *A. asplenioides*, oblong or linear-oblong and obtuse (in very large fronds, however, the pinnules may be deltoid-lanceolate and sub-acute, and the segments of the third order oblong and obtuse.¹

In the structure of the sori and indusia, the two east American species are markedly different from *A. Filix-femina* and from each other. The sori in both American species are prevailingly asplenioid and for the most part over 1 mm. in length, those of *A. asplenioides* being longer than those of *A. angustum*. Athyroid sori are generally

¹ For a discussion of the various forms and varieties of *A. asplenioides* and *A. angustum*, see below, p. 188 et seq. For illustrations of the pinnules of the various forms of these species see Plate 123, figures 3-18.

either long sori, rather sharply hooked at one end (hamate), or else long horse-shoe shaped, while the short and almost round type so commonly found in *A. Filix-femina* is very uncommon. Diplazioid sori are somewhat rare, but are more common than in *A. Filix-femina* (see Plate 123, figs. 4, 6, 11, 13 and 16, also text-figs. 3-5, pp. 175, 176).¹

The indusium of both American species is broadest at the base, and is often markedly decurrent along the subtending vein. The margin of the indusium of *A. angustum* is usually toothed, or furnished with a few short one-celled cilia (Plate 123, fig. 17). Rarely, especially in the later fronds of the season, it has a few longer, multicellular cilia similar to those found in *A. Filix-femina*. The indusium of *A. asplenioides* is ciliate with multicellular hairs which have swollen glandular tips of a yellow-brown color, a character which is conspicuous under the compound microscope in the recently matured indusium, but is sometimes difficult to demonstrate in over mature specimens, in which the cilia are often broken (Plate 123, fig. 8). The indusia of the largest sori in *A. angustum* measure on the average, 0.5 mm. high, by 1.1 mm. long, those of *A. asplenioides* 0.45 mm. high, by 1.3 mm. long. Even the small sori toward the tips of the pinnae never have indusia higher than they are long.

In *A. asplenioides* the stalk of the sporangium bears a yellowish, long-stalked, glandular body (Plate 123, fig. 9). In *A. angustum*, similar glands are common but by no means as uniformly present as in *A. asplenioides*, and sometimes the stalks of the sporangia proliferate and bear secondary sporangia as in *Filix-femina*.

The spores of *A. angustum* resemble those of *A. Filix-femina*; their average size is $38.6 \times 24.7 \mu$. The spores of *A. asplenioides*, on the other hand are furnished with a nigrescent, wrinkled or reticulate exospore, and resemble rather the spores of *A. alpestre* of arctic-alpine Europe and America. Their average size is $36.0 \times 25.5 \mu$ (Plate 123, figs. 10 and 18).

It will be seen, therefore, that the two species of lady ferns of the eastern states and Canada differ from each other and from *A. Filix-femina* in characters of rootstock, scales, fronds, sori, indusia and spores.

The history of the treatment of these ferns by botanists, American

¹ Asplenioid sori in the American species, particularly the rather long ones of *A. asplenioides*, are somewhat curved, or "lunate," with the convex side facing away from the subtending vein. The amount of this curve depends chiefly on the absolute length of the sorus. It is not to be confused with the sharp bend which occurs in athyroid sori.

and foreign, is interesting and somewhat illuminating. Prior to the work of Michaux, no mention is made of the American occurrence of any species of this group. Michaux assigns two species to eastern North America, describing one as "*Nephrodium Filix foemina*," with the habitat "Canada," and the other as "*Nephrodium asplenoides*," with the habitat "from New England to Carolina."¹

The following year, Sprengel² described *Asplenium Athyrium* apparently from slightly different material of the same species which Michaux had called *Nephrodium asplenoides*. He states that he gives it this name because it has the greatest similarity to *Athyrium Filix-femina*, and ends his description, "Ich vermuthe dass dies Michaux *Nephrodium asplenoides* ist." These two names have been treated as synonyms by all subsequent botanists. In 1809, Schkuhr,³ after publishing a description of *Asplenium Athyrium*, with an excellent plate, had a change of heart and added the statement "aber nach andern Beobachtungen an mehrern aus Amerika erhaltenen Exemplaren kann ich solchen jetzt von *Aspid. Filix fem.* nicht unterscheiden; selbst an unserer deutschen Pflanze dieses weiblichen Farn habe ich noch weit grössere Abänderungen gefunden, die von einigen als verschiedene Arten betrachtet werden."

In 1810 Willdenow⁴ adopted Michaux's species, treating it as *Aspidium asplenoides*, and citing as synonyms both the *Nephrodium asplenoides* of Michaux and the *Asplenium Athyrium* of Sprengel. He says of it, "A sequenti [*A. Filix-femina*] praeter formam frondis parum diversum, soris lunatis abunde distinctum." He introduces a change into the description, saying, "pinnulis lineari-lanceolatis inciso-dentatis," a change which is certainly not in the direction of greater accuracy, and which seems to have led to considerable confusion. Willdenow gives the habitat of "*Aspidium Filix femina*" as

¹ Michaux, Fl. Bor.-Am. ii. 268 (1803). The original description reads: [*Nephrodium*] ASPLENOIDES. N. majusculum, glabrum: stipite nudo: fronde bipinnata: pinnulis subovalibus, inciso-dentatis: dentibus inferioribus obtusis, supremis mucice-acutis: punctis utrinque juxta nervum lunatis.

Obs. Affine POLYP *Filici foem.* et forsari varietas. Puncta maturitatem quasi lineolae plerumque arcuatae: ita ut proximitatem ad ASPLENIUM indigent.

HAB. a Nova Anglia ad Carolinam.

This description and the range given apply distinctly to the more northern of our two eastern species. A fragment in the herbarium of the New York Botanical Garden, consisting of two pinnules labelled "from Herb. Michx. Poly. asplenoides a Nova Anglia ad Carolinam" confirms this application of Michaux's name.

² Sprengel, K., Anleit. zur Kent. der Gew. iii. 113 (1804).

³ Schkuhr, Ch., Kryptogamische Gewächse, 72 (1809).

⁴ Willdenow, C. L., Sp. Pl. v. 276 (1810).

"Europe," and describes a third species, *Aspidium angustum*, founding it upon the fern called by Michaux, "*Nephrodium Filix foemina.*"¹

Almost immediately after Willdenow had thus cleared up the status of the American lady ferns, Pursh² introduced an element of confusion. He lists *Aspidium asplenioides* and *A. angustum*, quoting Willdenow's short diagnosis of each, and between them inserting *A. Filix-femina* with Willdenow's diagnosis of that species and the statement, "In low shady grounds: Canada to Virginia. July 24. v.v." He also says of *A. asplenioides*, "A tall species much resembling the following in many respects," and of *A. angustum*, "Resembling the following."

The history of the treatment of these ferns by American botanists during the next twenty-five years, was largely a series of attempts to fit the existing plants into the three species as outlined by Pursh. In these attempts reliance seems to have been placed almost entirely on the form and details of the fronds, while the real distinctions were ignored. It is accordingly often difficult to ascertain what species or form any particular author had in mind when he used a certain name. This confusion is especially evident if one compares, for example, the various editions of Amos Eaton's Manual of botany.³

¹ Willdenow, loc. cit. 277. The original description reads:

129. ASPIDIUM *angustum* W.

A. frondibus bipinnatis, pinnulis lanceolatis inciso-serratis, serraturis subbidentatis, infima superiore elongata, soris oblongis sublunatis. W.

Nephrodium (Filix femina) majusculum ***** Mich. amer. 2. p. 268.

Schmallaubiger Wurmfarn. W.

Habitat in Canada. 24. (v. s.)

Stipes glaber. Frons oblonga bipinnata pedalis et altior. Pinnae sesqui- seu bipollicares lanceolatae valde acuminatae alternae. Pinnulae trilineares suboppositae lanceolatae acutae inciso-serratae. Serraturae breves obtusiusculae indivisae vel bidentatae, infima superior reliquis longior. Sori oblongi parum lunati. A. praecedente [A. Filix-femina] salis distincta, circumscriptione frondis oblonga multo angustiore, pinnis magis acuminatis, serratura infima superiore pinnulae majore, soris non rectis sed leviter lunatis. W.

It is evident that Willdenow was describing a very small sun-form of our northern species. Specimens in the Gray Herbarium collected by C. G. Pringle in the province of Quebec in 1879 and 1880 correspond entirely to this description, nearly all others are larger.

² Pursh, F., Flora Am. Sept. 664 (1814).

³ It may be noted that a few American botanists refused to follow Pursh's lead. Thus Jacob Bigelow, in his *Florulae Bostonensis* (p. 254, 1814) lists only "*Aspidium asplenioides* Muhl." [sic], though his description, evidently drawn from actual material, indicated that he was dealing with one of the larger forms of *A. angustum*, and he persisted in this treatment of the ferns about Boston throughout the three editions of his work. The Pennsylvania botanists, Barton and Darlington (Barton, W. P. C., *Compendium Florae Philadelphiae*, n. 209, 1818. Darlington, Wm., *Flora Coestriæ* ed. 2, 379, 1837.) listed only a single species, *Aspidium asplenioides*. Darlington gives a good original description which indicates that he had named the species correctly. Unfortunately, in his third edition (1853) evidently under the influence of Hooker and Gray, he changed the name to *Asplenium Filix-foemina* R. Br.

The next stage in the treatment of the North American lady ferns, is that represented by the work of W. J. Hooker, Asa Gray and D. C. Eaton. Hooker at first¹ reduced all the lady ferns of British North America, eastern and western, to *Athyrium Filix femina* with variety β (*Aspidium angustum* Willd.) and var. γ of the northwest coast. In both the typical species and his var. β he included western as well as eastern forms. He later² transferred the species to *Asplenium*, and discarded all varieties. In his *Species Filicum* he says, "I do not find any of the N. American forms to differ essentially from the European."

American authors since Hooker's time have generally followed him pretty closely. Thus in the first four editions of Gray's *Manual* (1848–1863) we find beneath the description of "*A[splenium] Filix-foemina*," the following explanation: "*(Aspidium Filix-foemina and asplenioides Swartz.)* — A narrow form is *Aspid. angustum*, Willd. Moist woods, common. July." In the fifth edition (1869) the concluding sentence is changed to "moist woods, common and very variable. July. (Eu.)", while in the sixth edition (1890, Watson and Coulter), the synonymy disappears entirely, and the description is followed merely by the statement, "Moist woods; common, and presenting many variable forms. July. (Eu.)" The only change in the seventh edition (1908, Robinson and Fernald) is the substitution of the word "cosmop." for "Eu."

Likewise in the earlier editions of Wood's *Class Book*, under "*A[splenium] Filix-foemina Bernh.*" are cited the synonyms, "*Aspidium Filix-foemina* and *asplenioides* [sic] Sw. *A. angustum* W.," but beginning in 1861, these names disappear even as synonyms. D. C. Eaton³ reduces all North American lady ferns to "*Asplenium Filix-foemina*." He says, "The so-called varieties of this fern are almost innumerable, but all pass into one another by various gradations. The chief forms occurring in North America are the following." He then enumerates and describes vars. *exile*, *angustum*, *latifolium*, *commune* and *cyclosorum*. His chief illustration (pl. 76, no. 1) is drawn from a specimen of *Athyrium asplenioides*.

European botanists have generally kept the east American ferns as species distinct from *Athyrium Filix-femina*, the most notable excep-

¹ Hooker, W. J., *Flor. Bor.-Am.* ii. 262 (1840).

² *Id.* *Species Fil.* iii. 219 (1860).

³ Eaton, D. C., *Ferns of N. A.* ii. 225 (1880).

tions being Mettenius¹, who reduced them to varieties, and Hooker, who as noted above finally discarded them entirely. Milde, in some of his earlier publications² identifies "*Asplenium Michauxii*" (*Athyrium angustum*) with the European *A. Filix-femina*, but in his *Filices*, he does not include the names of the American ferns in the synonymy, of *A. Filix-femina*, and under the treatment of that species, he makes the following enlightening statement:

"The American plant, very similar in habit to the European, produces several forms which seem to be wanting in Europe. a) I have found smooth yellowish spores, in others ridged and blackish. b) Indusia sometimes fimbriate, sometimes furnished with cilia ending in large hyacinthine glands. Generally I have found stalked glands also intermixed with the sori. c) The blade beneath is either glabrous, or covered with long, cylindrical, obtuse, 1-2 celled hairs. Here belong: *Athyrium asplenioides* Fée and Presl (*Aspidium* Sw.—*Asplenium Athyrium* Sprengel) and *Athyrium Michauxii* Fée (*Asplenium* Spr.—*Aspidium angustum* Willd.—*Asplenium elatius* Link). The American plant is worthy of more accurate examination from various regions."³

SYNOPTICAL TREATMENT OF THE LADY FERNS OF EASTERN NORTH AMERICA.⁴

- A. Rhizome creeping, not densely covered with persistent bases of the fronds; scales of stipes very few, seldom persistent, rarely over 4 mm. long, their cells relatively broad and with pale walls; frond widest near the base; indusia ciliate, the cilia ending in glands; spores nigrescent, reticulate or wrinkled.

¹ Mettenius, G., Über einige Farngat. vi. *Asplenium*, 199 (1859).

² Milde, J., Die Gefäss. Crypt. in Schles. 575 (1858).

³ *Planta Americana habitu Europaeae simillima formes complures procreat, quae in Europa deesse videntur.* a) Sporas flavas laeves, in aliis formas subnigras verrucosas inveni. b) Indusia nunc fimbriata, nunc ciliis in glandulas magnas hyacinthinas exeuntibus instructa. Glandulae stipitatas etiam soris immixtas interdum inveni. c) Lamina subtus aut glabra est, aut pilis longis cylindricis, obtusis, 1-2 cellularibus obsita est. Huc pertinent: *Athyrium asplenioides* Fée et Presl. (— *Aspidium* Sw.— *Asplenium Athyrium* Sprengel) et *Athyrium Michauxii* Fée (*Asplenium* Spr.— *Aspidium angustum* Willd.— *Asplenium elatius* Link). *Planta Americana digna est, quae ex diversissimis regionibus accuratius examinetur.* Milde, J., *Filices Europae et Atlantidis*, 52 (1867).

⁴ The variety of *Athyrium alpestre* which occurs in a few alpine situations in the Gaspé peninsula, is treated fully with the lady ferns of western America. It is readily distinguished from any other eastern species of *Athyrium* by the exceedingly narrow segments of the frond, and by its small round sori, entirely without indusium.

ATHYRIUM ASPLENIOIDES (Michx.) Desv.

Nephrodium asplenioides Michx. Flor. Bor.-Am. ii. 268 (1803).

Asplenium Athyrium Spreng. Anleit. iii. 113 (1804).

Athyrium asplenioides Desv. Prod. 266 (1827), (Mem. Soc. Lin. Paris, vi.).

Icones: Schkuhr, Krypt. Gew. plate 78; Eaton, D. C., Ferns of N. A. ii. plate 76, fig. 1-3; Lowe, Ferns Br. and Ex. v. plate 37.

The following two forms of this species may be recognized:

B. Pinnules under 15 mm. long, oblong to oblong-linear, obtuse.

A. asplenioides f. *typicum*.¹

In the Gray Herbarium all specimens of lady ferns from south of the Potomac and Ohio Rivers, and the state of Missouri are of this species, and all except those noted below under the forma *subtripinnatum* are of this, the typical form. The following are specimens of *A. asplenioides* f. *typicum* from more northern states:

MASSACHUSETTS: Waltham, July 27, 1901, *W. P. Rich* (N. E.²); Quaker Leonard Road, Brockton, September 8, 1907, *A. A. Eaton*; Sandwich, July 28, 1909, *E. W. Sinnott* (N. E.).

RHODE ISLAND: Cranston, July 14, 1884, *J. F. Collins*; near Harbor Pond, Block Island, September 13, 1913, *Fernald, Hunnewell* and *Long* no. 8339; Foster, September 11, 1910, *G. S.* and *K. A. Torrey* (N. E.); near Swamp Hill Reservoir, Lincoln, August 8, 1885, *J. F. Collins* (N. E.).

CONNECTICUT: Bridgeport, July 7, 1889, *C. K. Averil* (N. E.); woods north of Cave Brook, Guilford, August 4, 1882, *Wm. R. Dudley* (N. E.); Danbury, July 19-20, 1912, *E. J. Winslow* (N. E.); without locality, *D. C. Eaton*.

NEW YORK: Bedford Park, New York City, August 14, 1900, *Percy Wilson*; Staten Island, July 28, 1905, *Philip Dowell* no. 3962.

PENNSYLVANIA: Lily Lake, Lucerne Co., July 29, 1899, *A. A. Heller*; swamp two miles south of Refton, in Eozoic, September 23, 1901, *A. A. Heller*.

MARYLAND: Hyattsville, September 12, 1899, *W. R. Maxon* no. 310; near Bush River, two miles north of station, September 11, 1902, *G. H. Shull* no. 369; Cumberland, *Howard Shriver*.

DISTRICT OF COLUMBIA: near Hamilton Hill, Washington, September 22, 1899, *W. R. Maxon* no. 339.

OHIO: without locality, *I. H. Lea*.

MISSOURI: Montevallo, October 17, 1915, *B. F. Bush* nos. 7897 and 7897A.; Campbell, September 6, 1910, *B. F. Bush* nos. 6199 and 6199A.

BB. Pinnules about 2 cm. long, triangular lanceolate, pinnatifid with oblong obtuse segments. *A. asplenioides* f. *subtripinnatum*.

¹ See Plate 123, figures 3-4 and 7-10.

² (N. E.), in the herbarium of the New England Botanical Club.

ATHYRIUM ASPLENIODES forma **subtripinnatum**, forma nov., frondibus maximis subtripinnatis, pinnulis deltoideo-lanceolatis ad 2 cm. longis, 8-10 mm. latis subacutis pinnatifidis, segmentis ordinis tertii oblongis obtusis ad apicem dentatis pinnulis parvulis formae typicae similibus.

A rare and unusually large form in which the segments of the third order, rather than the pinnules show the characteristic blunt oblong form (Plate 123, figs. 5 and 6).

Specimens in the Gray Herbarium:

MASSACHUSETTS: rich wet situations in half shade, Coon Hollow Brook, Milton, September 19, 1901, *F. G. Floyd* no. 89 b (N. E.); West Tisbury, July 26, 1916, *F. C. Seymour*.

WEST VIRGINIA: Glady, Randolph Co., September 21, 1904, *J. M. Greenman* no. 32.

VIRGINIA: altitude 3500 ft. near Luray, August 15, 1901, *E. S. and Mrs. Steele* no. 233; altitude 3600 ft. near Luray, August 27, 1901, *E. S. and Mrs. Steele* no. 48 (TYPE).

AA. Rhizome horizontal or somewhat oblique, completely concealed by the thick fleshy bases of the old fronds; scales of the stipes usually dark brown, their cells very narrow, and with thick usually dark walls; frond widest near the middle; indusia usually toothed or short ciliate, or rarely long ciliate, never glandular; spores yellow brown, smooth or sparingly papillate.

ATHYRIUM ANGUSTUM (Willd.) Presl.¹

Aspidium angustum Willd. Sp. Pl. ed. 4, v. 277 (1810).

Asplenium Michauxii Spreng. Syst. iv. 88 (1827).

Asplenium elatius Link, Fil. sp. 94 (1841).

Athyrium angustum Presl, Rel. Haenk. i. 39 (1825) as to combination only, excluding description and specimens cited.

Asplenium Filix femina var. *Michauxii* Mett. Über einige Farngat. vi. Asplen. 199 (1859).²

Athyrium asplenioides var. *angustum* Moore, Index Fil. 179 (1860).

Athyrium Filix-femina var. *Michauxii* Burnham, Am. Fern Journ. vii. 54 (1917).

An exceedingly polymorphic species, varying but slightly in the characters of rootstock, scales, sori, indusia and spores, but very widely, in the form of the frond. On the basis of differences in the frond, the following varieties and forms may be recognized, though in every case they pass by imperceptible gradations into one another:

C. Fronds dimorphic, the fertile coriaceous, contracted, sori at maturity confluent and covering the lower side of the fertile pinnules. Sunforms, found only in regions of hot summers.

¹ See Plate 123, figures 11-18.

² The frequently cited reference of this combination to Mettenius, Fil. Hort. Lips., 1856 is not correct. Mettenius there described the variety, but gave it no name.

- D. Longest pinnae of the fertile frond 5–12 cm. long, pinnules 4–12 mm. long, simple, sori mainly asplenoid; pinnules of sterile fronds oblong obtuse, but slightly toothed or lobed. *A. angustum* f. *typicum*.¹

Willdenow described the pinnae as 1.5–2 inches long, the pinnules as 3 lines long. This is about the minimum size for a fruiting specimen. All sun-forms with simple pinnules may be considered as belonging to the typical form. These are the forms to which the varietal names *angustum* and *Michauxii* have commonly been given. As thus limited, the typical *A. angustum* ranges from Maine and southern Quebec to Massachusetts and Pennsylvania, being more common northwards. It does not occur in the region about the Gulf of St. Lawrence.

In the Gray Herbarium are the following specimens of this form:

QUEBEC: North Wakefield, July 4, 1911, *John Macoun*, Herb. Geol. Surv. Canada no. 83900; Rivière Ste. Marguerite, Lower Canada, August 14, 1879, *G. S. Pringle*; Lower Canada, August 3, 1880, *C. G. Pringle*.

MAINE: Hartford, August 29, 1907, *J. C. Parlin* no. 2271; very dry open woods, No. Berwick, August 31, 1894, *J. C. Parlin*.

NEW HAMPSHIRE: roadside in the sun, Randolph, July 30, 1896, *E. F. Williams*; North Conway, August 14, 1877, herb. of *W. C. Lane*; Kensington and Seabrook, many specimens collected by *A. A. Eaton*, including his numbers 90, 145, and 182; Hampton Falls, August 3, 1899, *A. A. Eaton*; Mt. Vernon, August 1891, *M. L. Stevens*.

VERMONT: without locality, 1855, herb. of *D. C. Eaton*; Dorset, 1915, *E. H. Terry* (N. E.).

MASSACHUSETTS: in sun, Salisbury, July 23, 1899, *A. A. Eaton*; in moist woods, Ipswich, *Wm. Oakes*; near Boston, *C. E.* and *W. Faxon*; Sharon, September, 1905, *S. F. Poole* no. 50.

NEW YORK: Gouverneur, August 1900, herb. of *E. C. Anthony*.

PENNSYLVANIA: Bald Eagle Valley, Blair Co., 1860, *H. V. Bocking*; Friendsville, September 1, 1906, *M. H. Grant*; Pocono Plateau, 1904, *J. W. Harshberger*.

ONTARIO: Port Colborne, July 12, 1901, *John Macoun*, herb. Geol. Surv. Canada, no. 66416.

- DD. Longest pinnae of fertile frond 1–2 dm. long, pinnules 12–25 mm. long, pinnatifid, sori several on each of the lower segments, often horse-shoe shaped; pinnules of sterile fronds oblong lanceolate, strongly toothed or pinnatifid, somewhat acute.

A. angustum var. *elatius*.

ATHYRIUM ANGUSTUM var. **elatius** (Link), new comb.

Asplenium elatius Link, Fil. Sp. 94 (1841).

Link describes the frond of his fern as sub-tripinnatifid, 3 feet long, pinnae 4–6 inches long, scarcely 1 line wide. The larger sub-forms

¹ See Plate 123, figures 11 and 12.

with a tendency to have compound pinnules may be placed here. This variety is not found quite so far north as the typical form, and is more abundant southward. In situations where both this and the typical forms occur, it is quite possible that this form may represent merely a more mature state of the plant than the typical form (Plate 123, figs. 14-16).

A. angustum var. *clatius* occurs from Maine to Minnesota, south to Rhode Island, New York and Missouri.

The following are the specimens of this variety in the Gray Herbarium:

MAINE: North Berwick, July 27, 1894, *J. C. Parlin*.

NEW HAMPSHIRE: Kensington, August 3, 1899, *A. A. Eaton* no. 149; Nottingham, September 15, 1899, *A. A. Eaton* no. 303.

VERMONT: open roadside, Repton, July 7, 1908, *E. F. Williams*.

MASSACHUSETTS: in moist woods, Ipswich, *Wm. Oakes*; roadside, in sun, Rockport, August 15, 1897, *E. F. Williams*; in shady woods, Hyde Park, August 24, 1902, *F. G. Floyd* no. 1119A; open woods, Rowley, August 9, 1899, *E. F. Williams*.

RHODE ISLAND: dry open soil between Pilot Hill and Southeast Point, Block Island, August 20, 1913, *Fernald, Hunnewell and Long*, no. 8337.

CONNECTICUT: trap soil, Bluff Mountain, No. Guilford, August 19, 1906, *G. H. Bartlett*.

NEW YORK: Lake Mahopac, August 1848, herb. *J. Carey*; Lawrence, September 23, 1914, *Orra P. Phelps* no. 14; moist woods, Clayville, August 5, 1899, *B. D. Gilbert*; Castle swamp, Oneida, August 12, 1906, *H. D. House* no. 2763, September 22, 1907, *Nellie Mirick*; Elmyra, September 22, 1907, *E. J. Winslow*.

MICHIGAN: damp sandy ground, Rush Lake, Huron Co., August 22, 1907, *C. K. Dodge* no. 2; Lansing, July 7, 1887, *D. A. Pelton*; Wallace, Menominee Co., August 22, 1884, *J. H. Schuette*.

MINNESOTA: springy mud, St. Anthony (part of Minneapolis), July 20, 1888, *J. H. Schuette*.

MISSOURI: shaded banks, Dumas, *B. F. Bush* no. 5889.

CC. Fronds not dimorphic, coriaceous nor contracted, sori discrete at maturity. Forms of regions with cool summers, found also in dense shade in warmer regions.

E. Pinnules diminishing in size regularly toward the tip of the pinna, oblong or linear-lanceolate, 3-5 times as long as wide, regularly and coarsely toothed or pinnatifid, the basal anterior segment usually largest, the others regularly diminishing in size toward the tip of the pinnule.

F. Pinnules standing at a wide angle to the rachis of the pinna, often connected by a membranous wing along the rachis of the pinna, teeth or segments of pinnules obtuse.

G. Pinnules lanceolate, subacute, strongly toothed or pinnatifid, the segments toothed, membranous wing along the rachis obscure or wanting. . . . *A. angustum* var. *rubellum*.

ATHYRIUM ANGUSTUM var. **rubellum** (Gilbert), new comb.¹

Athyrium filix-foemina rubellum Gilbert, List of N. A. Pterid. 35 (1901).

In the southern part of its range this variety appears to be merely the shade-form corresponding to the sun-forms discussed above, especially to the var. *clatius*, and its fronds are scarcely to be distinguished from the sterile fronds of that variety. The variety *rubellum*, however, ranges much farther to the north and east than either forma *typicum* or var. *clatius*, which appear never to occur in regions of cool summers.

The variety *rubellum* occurs throughout the range of the species, of which it appears to be the fundamental biological type, from which all the other varieties and forms have been derived. As here defined, it is not limited to forms with red stems, and hence it is unfortunate that we are obliged to adopt Gilbert's name. This is necessary, as authentic material of Gilbert's variety, collected by Gilbert himself, from his type locality, unquestionably belongs to the variety as here defined.

The following are the specimens of this variety in the Gray Herbarium:

NEWFOUNDLAND: barrens at the base of the serpentine tablelands, region of Bonne Bay; August 27, 1910, *Fernald* and *Wiegand* no. 2319; rocky border of hillside brook, Snook's Arm, Notre Dame Bay, August 19, 1911, *Fernald* and *Wiegand* no. 4284; Blow-me-down Mts., 1300 ft. altitude, August 4, 1908, *Eames* and *Godfrey* no. 5763; woods, Bay of Islands, August 9 and 10, 1901, *Howe* and *Lang* no. 1179; dry thicket, Bay St. George, August 5-7, 1901, *Howe* and *Lang* no. 989.

QUEBEC: low wet margin of Seal Cove River, Douglstown, Gaspé Co., August 22, 1904, *Collins*, *Fernald* and *Pease*; Bic, Rimouski Co., July 15, 1907, *Fernald* and *Collins* no. 817; Cap à l'Aigle, July 13, 1905, *John Macoun*, herb. Geol. Surv. Canada no. 69251; Little Metis, August 21, 1906, *James Fowler*.

PRINCE EDWARD ISLAND: roadsides thickets and borders of dry woods, August 29, 1912, *Fernald*, *Long* and *St. John* no. 6664.

NEW BRUNSWICK: in partial shade along a fence, Shediac Cape, August 2, 1914, *F. T. Hubbard*.

NOVA SCOTIA: Banter's Harbor, July 10, 1900, *F. G. Floyd* no. 680; rich soil, edge of woods, Pictou, July 12-18, 1901, *Howe* and *Lang* no. 547, dry woods, Pictou, July 12-18, 1901, *Howe* and *Lang* no. 546; rich moist bank, Yarmouth, June 22-29, 1901, *Howe* and *Lang* no. 111; Kentville, July 11, 1900, *F. G. Floyd* no. 686.

MAINE: rich woods, Canton, August 1, 1908, *J. C. Parlin*.

NEW HAMPSHIRE: woods, Randolph, July 7, 1894, *E. F. Williams*. Alton Bay, *A. A. Eaton*; low woods, Jaffrey, July 21, 1897, *B. L.*

¹ See Plate 123, figure 13.

Robinson no. 249; roadside, Kingston, August 3, 1899, *A. A. Eaton* no. 150; East Kingston, June 24, 1900, *A. A. Eaton*; Hampton Falls, August 5, 1899, *A. A. Eaton*.

VERMONT: woods, Hancock, July 5, 1905, *E. F. Williams*; Manchester, July 21, 1898, *M. A. Day* no. 233.

MASSACHUSETTS: great swamp, Amesbury, June 24, 1899, *A. A. Eaton* no. 49; Boston, *C. E. Faxon*; id. *W. Faxon*; rich shady woods, West Roxbury, July 13, 1902, *F. G. Floyd* no. 1044; wet rich shady woods, Hyde Park, July 6, 1902; *F. G. Floyd* no. 1032A; shady woods, Milton, July 5, 1902, *F. G. Floyd* no. 1028; sandy bank, Concord, August 10, 1908, *E. F. Williams*.

CONNECTICUT: low woods, Southington, July 18, 1899, *C. H. Bissell*.

NEW YORK: Trout Lake, Hermon, September 4, 1900 (two collections), *B. D. Gilbert*; Clayville, July 25, 1899, *B. D. Gilbert* (type material of *Gilbert's A. filix-foemina rubellum*); bottom woods, Gouverneur, July 1900, *E. C. Anthony*; river bank, Pine Grove, July 8, 1894, *Grace Gilbert*.

PENNSYLVANIA: Friendsville, September 1, 1906, *M. H. Grant*.

ONTARIO: Ottawa, August 21, 1915, *Fr. Rolland* no. 135; Plevna, August 11, 1902, *J. Fowler*.

OHIO: Newark, May 6, 1905, *H. A. Gleason*.

MICHIGAN: moist woods, Hamlin Lake, Ludington, Mason Co., July 7, 1910, *Ralph W. Chaney* no. 109; among rocks in low places, Keweenaw Co., August, 1889, *O. A. Farwell*.

ILLINOIS: Lincoln, July 4, 1899, herb. of *H. A. Gleason* no. 778.

WISCONSIN: Milwaukee, *I. A. Lapham*.

MINNESOTA: White Bear Lake, July 17, 1885, *J. H. Schuette*.

MISSOURI: Canton, May 30, 1906, *John Davis*; rich woods, Sibley, June 30, 1906, *B. F. Bush* no. 3999.

SOUTH DAKOTA: Sylvan Lake, Black Hills, altitude 6000-6500 ft., July 20, 1892, *P. A. Rydberg* no. 1195.

GG. Pinnae acute, pinnatifid pinnules oblong, obtuse, obscurely toothed, membranous wing along the rachis of the pinna strongly developed.

A. angustum var. *laurentianum*.

ATHYRIUM ANGUSTUM var. **laurentianum**, var. nov., frondibus ac fertilibus ac sterilibus consimilibus membranosis, pinnis pinnatifidis acutis, pinnulis oblongis obscure serratis ala membranosa conjunctis, soris haud confluentibus ex pinnae costa remotis.

A northeastern variety with fronds corresponding to those of young plants of the variety *rubellum*, but the ample fruiting, and the strongly developed rootstock indicate clearly that the plants are mature. The range of this plant is indicated by the following list of the specimens in the Gray Herbarium:

LABRADOR: Wabock Harbor, August 4, 1891, *Bowdoin College expedition to Labrador* no. 215.

NEWFOUNDLAND: boggy places on hill southwest of Tilt Cove,

Notre Dame Bay, August 22, 1911, *Fernald and Wiegand* no. 4285; rich shaded soil, Torbay, August 21–26, 1901, *Howe and Lang* no. 1433; woods, Virginia Water, August 5, 1894, *Robinson and Schrenk*; low damp clearings, Grand Falls, valley of Exploits River, July 20, 1911, *Fernald and Wiegand* no. 4283; Mc. Weils Cove, Bay of Islands, August 24, 1896, *A. C. Waghorne* no. 29; Birchy Cove, Bay of Islands, August 24, 1896, *A. C. Waghorne* no. 24; damp thickets, Bay St. George, August 5–7, 1901, *Howe and Lang* no. 1006a.

QUEBEC: eastern granite slopes, Table-Topped Mt., Gaspé Co., August 9 and 11, 1908, *Fernald and Collins* no. 275 (type); alpine bogs, Mt. Albert, Gaspé Co., July 21–23, 1906, *Fernald and Collins* no. 273.

MAINE: moist woods, Princeton, Washington Co., August 3, 1912, *S. N. F. Sanford* (N. E.).

EE. Adjacent pinnules varying irregularly from one another, irregularly lobed and toothed.

H. Pinnules 5–8 mm. broad, 10–18 mm. long, joined by a broad membraneous wing, lobes of the pinnules broad and overlapping.....*A. angustum* forma *confertum*.

ATHYRIUM ANGUSTUM forma **confertum**, forma nov., foliis ac fertilibus ac sterilibus consimilibus, pinnis pinnulisque imparibus, pinnis basin versus pinnatis, apicem versus pinnatifidis, pinnulis confertis ad 8 mm. latis, segmentis ordinis tertii imparibus confertis.

A form of *A. angustum* corresponding in the irregular cutting and overlapping of the broad pinnules to *A. Filix-femina* var. *latifolium* Babington, but with all the technical characters of *A. angustum*. Apparently this is a somewhat abnormal form without geographical significance as appears from the following list of specimens:

QUEBEC: boggy subalpine woods, altitude 1000 m., Table-topped Mt., Gaspé Co., August 13, 1906, *Fernald and Collins* no. 276 (type).

NEW HAMPSHIRE: Hampton Falls, August 5, 1899, *A. A. Eaton*.

MASSACHUSETTS: Brockton, September 8, 1907, *A. A. Eaton*.

The New England specimens are not so far removed from the ordinary var. *rubellum* as is the Gaspé specimen.

HH. Pinnules very irregular in size and shape, with many long acute teeth which project in various directions.

A. angustum forma *laciniatum*.

ATHYRIUM ANGUSTUM forma **laciniatum**, forma nov., frondibus ac sterilibus ac fertilibus consimilibus pinnulis erosis dentibus spinulosis incompositis instructis.

An abnormal form of fairly frequent occurrence, in which the frond looks as if it had been nibbled when young, some of the pinnules being wanting or greatly reduced, and all of them tending to show great irregularity of form. The teeth of the margins of the pinnules are unusually long and acute, and are inclined to stand out in a very irregular and disorderly fashion.

It corresponds exactly to the similarly named "variety" of *A. Filix-femina*. The following is a list of the specimens of this form in the Gray Herbarium:

MAINE: rocky bank of woodland stream, Buckfield, July 23, 1908, *J. C. Parlin* no. 2617.

VERMONT: in sun, edge of woods, Windham, August 30, 1902, *W. H. Blanchard* (type); Westmore, August 6, 1908, *E. J. Winslow* no. 21 (varying but slightly from the normal).

MASSACHUSETTS: low rich woods, West Roxbury, August 2, 1902, *F. G. Floyd* no. 1075.

NEW YORK: under tree in garden, Gouverneur, July 1900, *E. C. Anthony*.

FF. Pinnules oblique to the rachis of the pinna and prominently decurrent, though usually not connected by a membranous wing, teeth of pinnules acute. . . *A. angustum* forma *elegans*.

ATHYRIUM ANGUSTUM forma **elegans** (Gilbert), new comb.

Athyrium filix-femina elegans Gilbert, List of N. A. Pterid. 33 (1901).

A somewhat rare form with markedly oblique and decurrent widely spaced pinnules, the basal anterior pinnule usually much larger than the others. The following specimens in the Gray Herbarium are definitely of this form:

MAINE: Bar Harbor, herb. of *Francis H. Peabody*.

NEW HAMPSHIRE: Nottingham, July 17, 1900, *A. A. Eaton* no. 422.

RHODE ISLAND: Cranston, July 14, 1884, *J. F. Collins*.

NEW YORK: Trout Lake, Herman, September 4, 1900, herb. of *E. C. Anthony*.

ONTARIO: Owen Sound, *Mrs. Roy* (an exceedingly large specimen, nearly thrice pinnate, but showing the general character of this form).

It is notable that certain ferns of eastern Asia seem to be identical with certain of the American forms of *A. angustum*, having small dark scales similar in structure to those of the American plant, fronds moderately reduced downward, and sori with the characteristics of *A. angustum*. None of these specimens shows any part of the rhizome, so that it is impossible to say definitely whether *A. angustum* really reappears in eastern Asia like so many other east American plants, or whether it has there merely a representative species of very close affinity.

The specimens in question are: Northern China, 1910, *Wm. Purdom* no. 48, apparently *A. angustum* var. *typicum*; ad. fl. *Schilka, Dahuria, Turczaninow*, labelled "*Asplenium Filix Femina Bernh. var. tripinatum* Rupr.," evidently some of the material referred by Ruprecht

himself to that variety with the comment "forma rigida"¹; Mandshuria, ad. fl. Amur, 1855, *R. Maack*; the last two specimens appear to be var. *rubellum*; North China, 1886, *H. E. M. James* no. 192, close to var. *elatius*.

If these ferns should prove to be conspecific with the similar North American forms, an interesting nomenclatorial question would be raised concerning the status of Ruprecht's varietal name *tripinnatum*.

4. THE LADY FERNS OF ALASKA, WESTERN CANADA AND THE NORTHWESTERN STATES.

In 1901, Gilbert recognized clearly the points of difference between the lady ferns of the northwestern states, British Columbia and Alaska and those of the eastern states.² So traditional, however, had become the view that our eastern ferns were true *Athyrium Filix-femina*, that Gilbert seems never to have noticed that, in the various points of difference which he noted, it is always the western, rather than the eastern plant which approaches most closely to the European type. Thus he says of the western fern, which he called *Athyrium cyclosorum* Ruprecht, "Indusium short, fringed early in the season with long, jointed cilia which disappear with age, generally hippocrepiform, sometimes only hamate," and a little lower on the page he mentions the "rotund sorus and jointed cilia of the indusium," descriptions which correspond perfectly with much of the European material. In a later publication³ he mentions a color peculiarity (by no means general in western lady ferns) and then goes on to say, "the shape of the frond is very much like that of *Struthiopteris*. It tapers from the middle both ways, and the small lower pinnae come within four inches of the root. The farther down the stipe the pinnae are situated, the farther apart they stand. The pinnae themselves are quite different from those of *Asplenium filix-foemina*. Not only are they cut differently, but the enlargement of the anterior lower lobe, which is so distinct a feature of *A. f. f.* is entirely lacking here." It will be remembered that one of the diagnostic characters by which Willdenow distinguished his *Aspidium angustum* from the true *Filix-femina*, was

¹ Ruprecht, F. J., *Dist. Crypt. Vasc. in Imp. Ros.* 41 (1845).

² Gilbert, B. D., *Working List of N. A. Pterid.* 31 (1901).

³ *Id.* *Obs. on N. A. Pterid. Fern Bull.* xiii. 76 (1905).

that the *former* species has "serraturis subbidentibus, infima superiore elongata."

A comparison of the specimens in the Gray Herbarium of *Athyrium Filix-femina* from western North America, with those from Europe shows that in all important respects there is complete agreement. Rhizome, scales, general form of frond, sori, indusia, sporangia and spores all agree. The indusia of the larger sori, measured in over twenty-five specimens give an average height of 0.55 mm., and an average length of 0.8 mm., precisely the dimensions obtained from European material.

The stalks of the sporangia proliferate as they commonly do in European material of *A. Filix-femina*. No case has been seen in west American material in which a branch of the sporangial stalk bears a glandular structure such as is common in the east American species, and is occasionally found in European material of *A. Filix-femina*.

The spores are yellowish, and average $38.9 \times 24 \mu$ in size.

Like the European *A. Filix-femina*, the northwestern plant is very variable. Some forms are common to both continents, while others appear to be peculiar to one or the other. The coarser European forms may be matched exactly with American material, while some of the finer cut forms, particularly var. *multidentatum* (Döll) Milde, and the form commonly known in Europe as var. *rhaeticum*,¹ appear to be wanting in this continent. — A characteristically American variety is *A. Filix-femina* var. *sitchense* Ruprecht ex Moore,² a large and coarse

¹ This is the *Polypodium rhaeticum* of Linnaeus in part. As explained below on page 203 the Linnaean name is a nomen confusum, and should be rejected. The oldest tenable varietal name for this plant appears to be *Athyrium Filix-femina* var. *concerum* Newman, Hist. of Brit. Ferns, ed. 2, 245 (1844).

² Moore, Thomas, Index Fil. 183 (1860), where this combination appears in the synonymy, and is attributed to Ruprecht. Ruprecht's own publication in Dist. Crypt. Vasc. Imp. Ross., 41 (1845), was as follows:

65. *Athyrium Filix foemina* Roth. *****

65β. *Athyrium Filix foemina*: tripinnatum ***

65γ. *Athyrium cyclosorum* * Indusium brevius et sori plerumque rotundi. Petropawlowsk! (etiam pinnulis angustis) et Unalasehka!: Kadiak (Blaschke!). Ut videtur etiam pr. Kola in Lappon. ross. crescit. (Hb. Baer!).

65δ. *Athyrium sitchense* * Frons interdum 4 pedalis; indusia brevissima fere cystopteridis; pinnae primariae secundariae pl. min. spatio pollicis dimidiū disjunctae. Sitcha (Mertens!).

This publication of "γ *Athyrium cyclosorum*" and "δ *Athyrium sitchense*", has been cited by various authors, sometimes as the publication of species, and sometimes as that of varieties. Ruprecht, himself, in the preface to his paper (loc. cit., p. 6) speaks of them as "species secundi ordinis s. d. varietates characteres suos interdum constanter servantes."

Ruprecht's other subspecies, γ *Athyrium cyclosorum*, has been identified with the var. *sitchense* by many authors, and the name has been applied to some or all of our western lady ferns. As

variety sometimes 2 m. tall, pinnae 1–2 dm. long, remote, the lower ones with 5–10 cm. intervals; pinnules triangular-lanceolate, 1.5–3 cm. long, 0.5–1.5 cm. wide, remote, separated by about their own width, incised with numerous low, broad and blunt teeth, or in the largest fronds, pinnatifid, the segments of the third order oblong, obtuse, slightly 5–8 toothed, the largest 6 × 2.5 mm. in size.

This variety differs from *A. Filix-femina* var. *multidentatum* (Döll) Milde of Europe, chiefly in its relatively broad and short ultimate segments with almost suppressed marginal teeth, which are crowded towards the very obtuse apex of the segment. The immature form of this variety is the forma *Hillii*.² The pinnules at this stage are large (4–5 × 7–10 mm.), very blunt and rounded, crowded, and not at all pinnatifid, but with a somewhat crenate outline and numerous very small teeth borne chiefly at the summit of the pinnule. This type of foliage is retained until after fruiting commences, and until the fronds are 5–6 dm. tall. The transition to the mature form may sometimes

has already been pointed out, there is nothing about the sori of the American ferns of this species to distinguish them from many Scandinavian, German, and British specimens. Accordingly, Ruprecht's definition of γ *A. cyclosorum* becomes nearly meaningless, and his reference to Lapland in his statement of habitat indicates that he was including in his variety all those lady ferns which have unusually short and round sori. Some of his Alaskan material assigned to this variety is here considered as belonging to the var. *sitchense*, while the Asiatic (probably) and the European (certainly) is considered as typical *A. Filix-femina*. In this interpretation I am following Milde, who says (Fil. Eu. et At. p. 50, 1867.) "var. *cyclosorum* Rupr. ex insulis Kadjak et Unalashka mihi nomine varietatis non digna videtur; specimina unalashkensis paulum varietatis praecedentis [var. *sitchense*] nos component, and again, on p. 52 of the same work, "*Athyrium cyclosorum* Rupr. Beitr. III (1845) p. 41 nullo modo ab *A. Fil. fem.* differt."

Gilbert (List of N. A. Pterid. 31) says, "The only [specimens] in the U. S. which can be considered as something like type specimens are two in the Gray herbarium which were received from St. Petersburg: one of them came from the Amur region, the other from Unalaska which was the type locality." The first mentioned specimen cannot be identified, as there are in the Gray Herbarium three specimens of lady ferns from the Amur region, all received by way of Petrograd, and all labelled "*Aspidium Filix foemina*." None of these shows any especial resemblance to the west American forms of this species. The Unalaska specimen is labelled, apparently in Ruprecht's own hand-writing, "*Aspidium Filix foemina* var. *aspidioides* Ruprecht," and has the printed data "Herb. Acad. Petrop.—Unalashka.—Dr. Mertens." While this is probably some of the original material from which Ruprecht published his γ *A. cyclosorum*, it cannot be considered as type material, considering that it does not bear that name, nor any recognized synonym. It is a fairly well marked example of the var. *sitchense* as here defined. A specimen labelled in the same hand-writing, "*Athyrium Filix foemina* (L.) Roth. var.—Kamtschatka" is typical *A. Filix-femina*.

The synonymy of the var. *sitchense* is, therefore:

ATHYRIUM FILIX-FEMINA (L.) Roth. var. SITCHENSE Ruprecht ex Moore, Index Fil. 183 (1860).

δ *Athyrium sitchense* Rupr. Dist. Crypt. Vas. Ross., 41 (1845).

γ *Athyrium cyclosorum* Rupr. loc. cit. 41 (1845), in part.

² ATHYRIUM FILIX-FEMINA (L.) Roth. var. SITCHENSE Ruprecht ex Moore forma *Hillii* (Gilbert) comb. nov., *Athyrium cyclosorum* f. *Hillii* Gilbert, List of N. A. Pterid., 32 (1901).

be seen in a single frond, the lower pinnae showing the immature form, and the upper ones, the mature. As the immature type of foliage appears to be sub-permanent in some cases, it seems to be worthy of a formal name.

An extreme sun-form of the var. *sitchense* is the forma *strictum*,¹ which has narrowly lanceolate pinnules with revolute margins. It closely resembles the European var. *convexum* Newman, but may be distinguished from that variety by the lower pinnae, which in the European form are modified like the upper ones, whereas in the form now under consideration they are but slightly contracted, and resemble the basal pinnae of the typical var. *sitchense*.

Athyrium Filix-femina var. *sitchense* occurs from the Aleutian Islands to California,² chiefly near the coast, also at low altitudes in the Selkirk Mountains of British Columbia, and in northern Idaho.

American specimens of typical *Athyrium Filix-femina* in the Gray Herbarium:

IDAHO: near Lakeview, Kootenai Co., August 1-10, 1892, *A. A. Heller*; in damp forest at Mullan, Coeur d'Alene Mts., altitude 3000 ft., August 7, 1895, *J. B. Leiber* no. 1493.

OREGON: Calapooga, Douglass Co., 800 ft. altitude, July 26, 1899, *M. A. Barber*, no. 125.

WASHINGTON: Stevens Pass, Cascade Mts. August 17, 1893, *Sandberg* and *Leiber*, no. 771; deep canyon near springs, Blue Mts., Columbia Co., August 7, 1897, *R. M. Horner* no. B. 598; Tacoma, Sept. 17, 1898, *J. B. Flett*; Clark Springs, Spokane, June 26, 1902, *F. O. Kreager*, no. 34; without locality, *G. R. Vasey*, no. 45.

BRITISH COLUMBIA: Selkirk region: Upper Spillimacheen, altitude 6500 ft., August 3, 1904, *C. H. Shaw* no. 438; Spillimacheen valley, altitude 6000 ft., July 30, 1904, *L. R. Heacock*, in *Shaw's Selkirk Flora*, no. 421; near mouth of Downie Creek, altitude 1900 ft., August 9, 1905, *C. H. Shaw* no. 1127; Rogers Pass, altitude 4400 ft., August 9, 1904, *E. R. Heacock*, in *Shaw's Selkirk Flora*, no. 444; Goldstream, altitude 2200 ft., August 3, 1905, *C. H. Shaw* no. 1069.

Coast region: New Westminster, June 1899, *A. J. Hill*; on rocks in shady places, Pt. Renfrew, Vancouver Island, June-July 1901, *Rosendahl* and *Brand*, no. 106.

Specimens of *Athyrium Filix-femina* var. *sitchense* in the Gray Herbarium:

IDAHO: along creeks near Rathdrum, Kootenay Co., July 25, 1892, *McDougal* and *Heller*, no. 723.

¹ *ATHYRIUM FILIX-FEMINA* (L.) Roth var. *SITCHENSE* Ruprecht ex Moore forma *strictum* (Gilbert), comb. nov., *Athyrium cyclosoorum strictum* Gilbert, loc. cit., 32 (1901).

² I have seen a single specimen of this variety from California. It is in the collection of Mr. R. A. Ware of Boston, and was collected by R. J. Smith near Sur River, Monterey Co. It was distributed as *Dryopteris spinulosa dilatata*.

OREGON: without locality, *Elihu Hall* no. 682 (f. *Hillii*).

WASHINGTON: Columbia River, 1841, *Hinds*; without locality, *G. R. Vasey* no. 47 (f. *strictum*), and no. 46; Ewell's yard, Quinalt, June 25, 1902, *H. S. Conard* no. 154; Cheney, *Mrs. Susan Tucker*.

BRITISH COLUMBIA: Selkirk region: Revelstoke, altitude 1600 ft. July 22, 1890, *John Macoun* (f. *strictum*), and July 3, 1905, *C. H. Shaw* no. 793; Glacier, altitude 3900 ft., August 8, 1909, *Butters* and *Holway* no. 475.

Coast region: New Westminster, 1899, *A. J. Hill*, an extensive series of specimens illustrating different stages in the development of this fern, and including type material of Gilbert's two forms.

ALASKA: "Unalaska, Dr. Mertens," from Herb. Acad. Petrop., labelled in Ruprecht's writing, "Athyrium Filix foemina var. aspidioides Ruprecht"; White Pass, July 23, 1914, *Alice Eastwood* no. 874; Skagway, July 20, 1914, *Alice Eastwood* no. 796.

4. THE LADY FERN OF CALIFORNIA,¹ THE BASIN REGION, AND THE SOUTHERN ROCKY MOUNTAINS.

The lady fern of this region has been treated by all American authors as the true *Athyrium Filix-femina*. It is, however, found to differ from the typical form of that species in several minor respects, and in one important character. It should, therefore, be considered as a well marked geographical variety:

ATHYRIUM FILIX-FEMINA (L.) Roth. var. **californicum** var. nov.
differt a forma typica paleis atris, indusiis interdum dentatis
vel brevissime ciliatis, sporis majoribus reticulatis nigrescentibus.

The scales of this variety are usually considerably darker than in typical *A. Filix-femina*, but as in the case of similar dark scales found occasionally in European specimens, they have the same structure as the ordinary pale scales of *A. Filix-femina*, and not the fibrous structure characteristic of the dark scales of *A. angustum*. Short asplenoid sori are more frequent than in typical *A. Filix-femina*, and the indusia are seldom long ciliate, but rather short ciliate or merely toothed. In this respect they resemble those of *A. angustum*, but their dimensions are rather those of typical *A. Filix-femina*. They measure, on the average, 0.5 mm. high, and 0.8 mm. long. As in all American forms of *A. Filix-femina*, the sporangia are entirely without stalked glands. The most important peculiarity of this variety is the character of the spores, which are unusually large, averaging $43 \times 27.5 \mu$,

and which have a distinct nigrescent, wrinkled and reticulate exospore similar to that found in *A. alpestre* and in *A. asplenioides*.

In its underground parts, and in the form of the frond, this variety is in no way peculiar. The frond is rather variable but generally agrees closely with ordinary European forms. It is usually markedly puberulent on the rachis and the back of the pinnae.

It ranges from California eastward to southern Idaho, Colorado and New Mexico. It also extends southward into Mexico, at least as far as the state of Chihuahua.

All specimens of *A. Filix-femina* in the Gray Herbarium within this range belong to this variety except that in Idaho and Wyoming some specimens occur which are intermediate between this variety and typical *A. Filix-femina*. These transitional forms have intermediate types of spores, or spores which are variable in type even on the same frond.

The following list contains a portion of the material of this variety in the Gray Herbarium:

COLORADO: Tabeguache Basin, 8000 ft., August 20, 1913, *Edwin Payson* no. 195; Fish Creek Falls, Routt Co., July 21, 1903, *Leslie N. Goodding* no. 125.

IDAHO: Trinity, Elmore Co., August 23, 1910, *J. F. Macbride* no. 635, distributed as *Cystopteris languida* A. Nels. n. sp.

UTAH: City Creek Canyon, August 9, 1884, *F. E. Leonard*, ex herb. Oberlin College, no. 201.

NEW MEXICO: Mogollon Mts., 7500 ft., Socorro Co., July 23, 1903, *O. B. Metcalfe* no. 298.

NEVADA: Little Valley, Washoe Co., 2000-2155 M., August 14, 1902, *C. F. Baker* no. 1466; Snow Valley, Ormsby Co., August 8, 1902, *C. F. Baker* no. 1444.

CALIFORNIA: Dollar Lake Canyon, San Geronio Mts., altitude 9000-9500 ft., July 12, 1908, *Abrams and McGregor*, no. 768, Mt. Eddy, Siskiyou Co., August 26, 1915, *A. A. Heller* no. 12234; Mt. Rose, near Webber Lake, August 15, 1874, *J. G. Lemmon*; outlet of Lake Chequita, Madera Co., August 16, 1895, *J. W. Congdon* no. 79 (TYPE).

Specimen: intermediate between *A. Filix-femina* and *A. Filix-femina* var. *californicum*:

WYOMING: Piney Creek, Bighorn Mts., August 28, 1900, *J. B. Jack*.

5. ATHYRIUM ALPESTRE AND ITS AMERICAN VARIETY.

The typical form of *Athyrium alpestre* (Hoppe) Rylands ex Moore¹ is an arctic-alpine plant of Europe, ranging from Iceland to Asia Minor. In habit and foliage it greatly resembles *A. Filix-femina*, from which it differs in its spores, which are nigrescent and reticulate, and in its sori, which are smaller than those of *A. Filix-femina*, almost perfectly round, and seemingly without any indusium. Careful dissection shows, however, that the receptacle of the sorus is slightly elongated along the vein, and under a compound microscope it is almost always possible to find a vestigial indusium in the same position that the indusium holds in forms of *A. Filix-femina* with round sori. This indusium is about 0.3 mm. high, and may extend along the vein for as much as 0.25 mm., but often consists merely of two or three hairs joined together side by side at the base. Its cilia are always swollen and glandular at the tip.

The peculiarly reduced condition of the sorus and indusium in this species has often lead to its being placed in genera far removed from the group now under consideration. Its structural general resemblance to *A. Filix-femina* is, however, very great, and the latter species occasionally has semi-abortive sori with indusia almost as reduced as those of *A. alpestre*.

A common arctic-alpine plant of North America has been traditionally identified with this species, but it differs in having the ultimate segments of the frond conspicuously narrower, and more widely separated from one another, and the sori even smaller than in the type (0.5–0.7 mm. in diameter as against 0.75–1.0 mm. in the typical form), sub-marginal and protected by a reflexed tooth of the pinnule. Care-

¹ ATHYRIUM ALPESTRE (Hoppe) Rylands ex Moore.

Aspidium alpestre Hoppe. Neue Taschenbuch 216 (1805).

Phegopteris alpestris Mett. Fil. Hort. Lips. 83 (1856).

Athyrium alpestre Rylands according to Moore, Ferns of Gr. Br. and Ir. Nat. Print. Fol. ed. Pl. 7 (1857).

Polypodium rhaeticum L. Sp. Pl. ii. 1091 (1753), in part.

Polypodium Rhaeticum L. was made up of a mixture of this plant and certain forms of *A. Filix-femina* which resemble it in the form of the frond. The latter alone are represented in the Linnaean herbarium under this name, while to the former belongs probably the name-bringing synonym, Bauhin's *Filix rhaetica tenuissime dentata*. With sundry variations the Linnaean name has been employed extensively for both of these ferns. This seems to be a clear case of a nomen confusum, which should be rejected under the international rules. For a further discussion of this question, see P. Ascherson, Oesterreicher Bot. Zeit. 46: 44. 1896.

ful search has failed to disclose any vestige of indusium in the American material.

As certain intermediate forms occur, it is the opinion of the author that this plant should be considered a distinct geographical variety rather than a species.

ATHYRIUM ALPESTRE (Hoppe) Rylands ex Moore var. **americanum**, var. nov., omnibus frondium segmentis iisdem formae typicae angustioribus, inter se plus distantibus ultimis linearibus, soris minutis (0.5–0.7 mm. latis) rotundis submarginalibus, soris singulis dente marginali pinnulae everso tectis, velo nullo.

This variety is found in subarctic and high alpine situations from Alaska and British Columbia to California and Colorado, also in Gaspé Co., Quebec.

The following specimens of *Athyrium alpestre* var. *americanum* are in the Gray Herbarium:

QUEBEC: forming extensive areas in the alluvium of alpine brooks, easterly and northerly slopes, Table-top Mt. Gaspé Co., August 9, 1906, *Fernald* and *Collins* no. 151a; (specimens 9 dm. tall; crevices of granite rock, altitude 750–1050 m., easterly and northerly slopes Table-top Mt. Gaspé Co., August 9, 1906, *Fernald* and *Collins* no. 151.

MONTANA: altitude 5500–6000 ft., Glacier Basin below Sperry Glacier, August 5, 1901, *F. K. Vreeland* no. 1058.

IDAHO: moist places, Packsaddle Peak, Kootenai Co., August 6, 1892, *Sandberg*, *McDougal* and *Heller*, no. 858.

WYOMING: in glacial drift, Teton Mts., July 26, 1901, *Merrill* and *Wilcox* no. 1032.

COLORADO: rocky slopes and rock crevices, summit of North Park Range, Larimer Co., August 10, 1903, *L. N. Goodding* no. 1841.

CALIFORNIA: near summit of Mt. Rose, 8600 ft. altitude, 1877, *J. G. Lemmon* no. 1160; 7500 ft. altitude, Mt. Shasta, August 17, 1881, *C. G. Pringle*; 7800 ft. altitude, Mt. Shasta, August 16, 1903, *E. B. Copeland* (distributed by *C. F. Baker*) no. 3917; Mt. Shasta, 1877, *Hooker* and *Gray*; Mt. Shasta, 1897, *W. M. Canby* no. 414.

WASHINGTON: loose rock, 6000 ft. altitude, Mt. Rainier, August, 1895, *C. V. Piper* no. 2111; Mt. Rainier, August 1890, *E. C. Smith*.

BRITISH COLUMBIA: mountains near Ainsworth, Kootanie Lake, altitude 6000 ft., July 10, 1890, *John Macoun*; altitude 5500 ft., Fish Creek Valley, August 1906, *Butters* and *Holway*; on dry rocks, near top of Mt. Cheops [near Glacier], altitude 8200 ft., July 12, 1904, *E. R. Heacock* in *Shaw's Selkirk Flora* no. 453; altitude 4400 ft., Rogers Pass, August 23, 1904, *E. R. Heacock* in *Shaw's Selkirk Flora* no. 554; Selkirk Range, August 24, 1885, *John Macoun*; Cascade Mts. 49° N. lat., 1859, *Dr. Lyall*.

ALASKA: mountains, interior of Unalaska, October 10, 1871, *M. W. Harrington*.

The following specimens approach close to the European form in the cutting of the frond, but have no indusia:

CALIFORNIA: near summit of Sierra Nevada, Nevada Co., 1873, Miller; ridge south of Donner Pass at 7500 ft., Nevada Co., August 17, 1903; A. A. Heller no. 7186; 11500 ft. altitude, Saw Tooth Peak, Tulare Co., August 17, 1904, Culbertson.

OREGON: Union Co., 1878, W. C. Cusick.

WASHINGTON: Wenatchie region, altitude 7000 ft., August 1883, T. S. Brandegee no. 1222.

From this study of the *Filix-femina* group of *Athyrium*, it appears that these ferns follow certain laws of distribution, which have been noted often in the case of Phanerogams. Thus we find that the common woodland species of eastern North America (*A. angustum*) either reappears in eastern Asia, or is represented there by a very closely related species.¹ This plant, like many others of eastern North America ranges northeastward into the region of the Gulf of St. Lawrence, and there appears, often in a peculiar form, the variety *laurentianum*.² A very distinct species (*A. asplenioides*) occurs in the southeastern United States, and like so many plants of that region, extends northward along the Atlantic as far as southeastern New England.

The common fern of cool temperate Europe (*A. Filix-femina*) extends well across Asia, occurs in Kamchatka, and reappears in Alaska and British Columbia in precisely the same form. There are, however, in each of the chief areas occupied by this species, certain well marked minor forms peculiar to the respective regions,—in Europe the various finely cut forms, especially that commonly known as the variety *rhaeticum*, in the Pacific coast region from Alaska to Oregon the variety *sitchense*. Like a great number of plants of the wet western coast, this latter variety reappears at low altitudes on the climatically similar west slope of the Selkirk Range.³

¹ The close relations between the flora of the region of deciduous forests of eastern North America and the corresponding region of eastern Asia, was long ago pointed out by Asa Gray, in his classic essay, "Observations upon the Relation of the Japanese Flora to that of North America and other Parts of the northern Temperate Zone." Mem. of the Am. Acad. of Arts and Sciences, vi. 377 (1859).

² Professor Fernald, in studying the flora of the region about the Gulf of St. Lawrence, has found that a great many of the plants of that region are similarly peculiar. He informs me that it is never safe to assume that a plant of Newfoundland or Gaspé is identical with an apparently similar species of the eastern United States, until a detailed study has been made of all its technical characters.

³ Several years ago the author pointed out (The Vegetation of the Selkirk Mountains, Appendix A. to Howard Palmer's "Mountaineering and exploration in the Selkirks" 354. 1914)

The southern extension of *A. Filix-femina* into the western United States is marked by a peculiar technical variety, as seems often to be the case with northern plants which extend south into California and the southern Rocky Mountains.

The *Filix-femina* group of the genus *Athyrium* presents a typical case of boreal distribution. Apparently the center of this distribution is somewhere in Asia. Christ says of the genus *Athyrium* in China, "The variation of the genus *Athyrium* in southern China is only equalled by that of the same genus in Japan and the Indian Himalaya, other countries belonging to the same botanical region. It is a plastic mass which appears to be endlessly modified.¹

On the other hand the number of species of this genus in North America is limited to those just described and the two diplazioid species *A. acrostichoides* and *A. angustifolium*.

Moreover, as has been pointed out already, the *Diplazia* of tropical America, presumably descendents from the genus *Athyrium*, though very numerous as to species, appear to belong almost wholly to a section of the genus which is probably descended from *Athyrium acrostichoides* (Sw.) Diels or some very similar species, while the Asiatic *Diplazia* form a mass of species of almost endlessly complicated relationships.

Athyria of the true *Filix-femina* group extend south into the tropical mountains in Mexico (*A. Martensi* and *A. Dombeyi* Desv.), and

the strong relationship of the boreal flora of the Selkirk Range with that of Scandinavia. Evidence is accumulating, that this relationship extends to parts of the flora which cannot be considered as arctic-alpine, but rather cool temperate and subalpine.

The lady fern is only one of numerous cases in which plants of cool temperate Europe occur, in precisely the same form, in the cool and moist evergreen forests of British Columbia and Alaska.

The occurrence of *Athyrium alpestre* in the mountains of western America,— in this case in a somewhat modified form,— is another instance of the relationship of European and north-west American floras, though in this case the plant is distinctly alpine in character. The further extension of its range to the Gaspé region is entirely in keeping with the known facts concerning the flora of that interesting region. See Fernald, M. L., The Soil Preferences of Certain Alpine and Subalpine Plants. RHODORA, ix, 149 (1907).

The reappearance of the variety *sitchense* in the western part of the Selkirk Range, is also entirely normal. Piper, in his Flora of Washington, Contrib. from the U. S. National Herb. xi, 53 (1906) called attention to the large number of west coast plants, which do not occur in the interior of Washington, but which reappear in the more moist hill country of eastern Washington and northern Idaho. Evidence is accumulating that a much larger number of coastal forms occur farther north in the region around Revelstoke, the interior region, which, above all others, has the nearest approach to the coastal climate.

¹La variation du genre *Athyrium* en Chine mérid. n'a d'égale que celle du même genre au Japon et l'Himalaya indien, pays du reste qui appartient à la même région botanique. C'est une masse plastique qui semble se modifier sans cesse. Christ, H. Les collections de Fougères de la Chine au Muséum d'histoire naturelle de Paris. Bull. Soc. Bot. de France lii. Mém. i 50 (1905).

thence into the South American Andes, in India (*A. pectinatum* Pr.) and in Abyssinia (*A. Schimperii* Mong., apparently the closest relative of our *A. asplenioides*). With these exceptions they are entirely wanting from the tropical regions, and from the southern hemisphere.

II. BOTRYCHIUM VIRGINIANUM AND ITS AMERICAN VARIETIES.

In 1915 Fernald and St. John¹ called attention to the fact that *Botrychium virginianum* about the Gulf of St. Lawrence differs from the more southern typical plant in several respects. They identified this form with *Botrychium virginianum* var. *europaeum* Ångström, a rare fern of Scandinavia, Russia, and central Europe. A re-examination of all the North American and European material of this species in the Gray Herbarium indicates that the actual condition is somewhat more complex.

In this examination particular attention has been paid to the character of the sporangia and of the ultimate segments of the fertile frond which bear the sporangia.

Each of the varieties has, indeed, its own characteristic sterile frond, but the attempt to distinguish them on this ground is unsatisfactory in view of the slight and often scarcely describable differences between the fronds of the different varieties, and the very considerable individual variation within the same variety.

Typical *Botrychium virginianum* (L.) Sw. has a sterile frond of thin texture with the pinnules lanceolate, deeply pinnatifid or nearly pinnate, and the ultimate segments oblong or lanceolate and scarcely or not at all spatulate. The ultimate segments of the fertile shoot are narrow (0.25–0.5 mm.) and thick, and in dried specimens appear nearly opaque. The mature sporangia are dark in color, varying in different plants from a moderately dark yellow brown to almost black. As in all the species of *Botrychium*, they vary considerably in size, the largest measuring 0.5–0.8 mm. in length and somewhat less in width.²

¹ Fernald, M. L., and St. John, Harold. The Occurrence of *Botrychium virginianum* var. *europaeum* in America. RHODORA, xvii. 233 (1915).

² The measurements of sporangia given throughout this discussion of *Botrychium virginianum* and its varieties, are all taken from large fully developed sporangia. Smaller sporangia are always mingled with the large ones, and these vary in size in the respective species proportionally with the larger ones.

In dehiscence the valves of the sporangia open very widely and recurve so that the open sporangium is nearly flat with a depressed pit in the center at the point of attachment. When moist, the empty sporangia close again, and are then of a distinctly flattened or lenticular form (see fig. 6, A and B). The walls of the sporangia are nearly opaque as seen under a microscope, and the superficial layer of the wall is seen to consist of irregular cells with thick, sinuous walls (see fig. 6, C).

Typical *Botrychium virginianum* is a plant found usually in rich deciduous woods. It is most abundant in calcareous regions, and ranges from Prince Edward Island to Minnesota, and south to Florida and Texas,¹ reappearing in exactly the same form in eastern Asia.

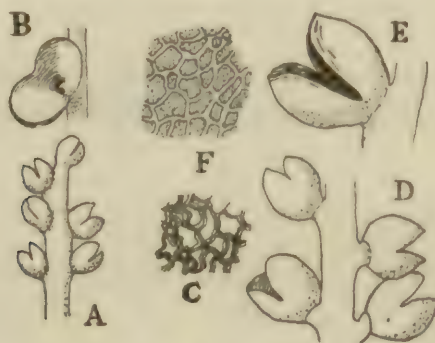


Fig. 6. A-C, *Botrychium virginianum* (L.) Sw. D-F, *B. virginianum* var. *laurentianum* Batters. A and D, group of sporangia, dehiscent, but moist, dorsal view, $\times 5$. B and E, dry, dehiscent sporangium, ventral view, $\times 10$. C and F, group of cells from the sporangial wall, $\times 75$.

In the Gray Herbarium there are two specimens of it from the latter region, one collected by *Dr. August Henry* (no. 5799) in the province of Hupeh, China, the other by *K. Watanabe* in the province of Tosa, Japan.²

The plant found about the Gulf of St. Lawrence is a hitherto undescribed variety, *BOTRYCHIUM VIRGINIANUM* (L.) Sw. var. *lauren-*

¹ As has been recently pointed out by *Ivar Tidestrom* (*Botrychium virginianum* and its forms. *Contrib. U. S. Nat. Herb.* xvi. 299. 1913.) *Botrychium gracile* Priesh (Flora Am. Sept. 656. 1814), described originally from Virginia, is only a young stage of the typical *Botrychium virginianum*.

² In Japan occurs also the closely related *Botrychium strictum* Undw., *Bull. Tor. Bot. Club.* xxx. 52 (1903), of which there is in the Gray Herbarium a single specimen collected by *Maximowicz* in Yokohama in 1862. This is quite distinct from any North American form known to the author.

tianum, var. nov., fronde sterili crassiore, segmentis ordinum omnium latoribus rebus formae typicae iisdem, segmentis confertis imbricatis ultimis spathulatis, fronde fertili crassa conferte paniculata segmentis ultimis herbaceis complanatis 0.5–1.0 mm. latis, sporangiis flavis 1–1.8 mm. longis (exsiccatis) anguste apertis.

This variety is characterized by its thick and heavy sterile frond, less finely divided than in the typical form, and with the segments so crowded that they overlap one another. Though it is generally smaller than the typical *Botrychium virginianum*, it occasionally reaches large size, the largest specimen seen, having the sterile frond 18 cm. long and 28 cm. wide. The pinnules are shorter than in typical *Botrychium virginianum*, and tend to be ovate in form and the ultimate segments are strongly spatulate. The fertile spike is relatively short and stout, and in well developed specimens is very strongly paniculate. Its ultimate segments are flat, foliaceous, and often 1 mm. wide.

It is, however, in the sporangia that this form differs most greatly from *Botrychium virginianum*. Indeed these organs resemble rather those of *Botrychium Lunaria* than those of typical *Botrychium virginianum*. They are 1–1.8 mm. long when dried, and sometimes exceed 2 mm. when fresh. When ripe, they are of a dark straw color like those of *Botrychium Lunaria*. Before dehiscence the line of fracture shows as a distinct paler band. In dehiscence they open but slightly, and the valves never become recurved. When moistened, they close again, regaining their almost spherical form (see fig. 6, p. 208 D and E). Under the microscope the walls of the sporangia appear very translucent, and the cells of the outer layer are seen to be of regular quadrilateral or polygonal form with nearly straight thickened walls (see fig. 6, p. 208, F).

So different is this fern from typical *Botrychium virginianum*, that, were it not for the intermediate varieties discussed below, it would certainly take rank as a distinct species. It grows typically in open, grassy places, occasionally on exposed rocks or talus. It is almost confined to the calcareous districts in the vicinity of the Gulf of St. Lawrence, as is shown by the following list of the specimens in the Gray Herbarium.

LABRADOR: limestone and calcareous sandstone terraces, Blanc Sablon, Straits of Belle Isle, August 6, 1910, *Fernald* and *Wiegand* no. 2356.

NEWFOUNDLAND: grassy strand, Ingornachoix Bay, August 2, 1910, *Fernald* and *Wiegand* no. 2354; damp talus of limestone sea-cliffs, Point Riche, Ingornachoix Bay, August 4, 1910, *Fernald* and *Wiegand* no. 2355; talus slopes of the marble region between Mt. Musgrave and Humber Mouth, July 18, 1910, *Fernald* and *Wiegand* no. 2353.

QUEBEC: cold calcareous walls of the Grand Coupe, Percé, Gaspé Co., August 5, 1907, *Fernald* and *Collins* no. 795 (a very small and immature plant); alluvial woods, Nouvelle, Bonaventure Co., July 19 and 20, 1908, *Collins* and *Fernald*; Grand Cascapedia River, Bonaventure Co., July 12-15, 1905, *Williams*, *Collins* and *Fernald* no. 1; meadows and swamps in the slaty region south of Bic, Rimouski Co., July 25, 1907, *Fernald* and *Collins* no. 794 (type); Rivière du Loup, July 24, 1908, *A. A. Eaton* no. 217; Little Metis, July 18, 1906, *James Fowler*; Georgeville, July 5, 1905, *J. R. Churchill*.

MAINE: rich upland meadows, Cutler, Washington Co., July 3, 1902, *Kennedy*, *Williams*, *Collins* and *Fernald*; larch and arbovitae swamps, Houlton, Aroostook Co., July 13, 1916, *Fernald* and *Long* no. 12302.

MICHIGAN: Isle Royale, Lake Superior, July 3, 1909, *W. S. Cooper* no. 23 (a large but very immature specimen, which appears to be of this variety, but cannot be identified with entire certainty).¹

South of the region occupied by *Botrychium virginianum* var. *laurentianum*, there is a second variety somewhat intermediate between this fern and typical *Botrychium virginianum*. The sterile frond has the somewhat ovate pinnules and the spatulate ultimate segments of the var. *laurentianum*, though without the close imbrication of the segments which is characteristic of that variety. The ultimate segments of the fertile frond are narrow (0.25-0.5 mm. wide) as in typical *Botrychium virginianum*, but are thin and flat and more translucent than in that plant. The sporangia resemble those of var. *laurentianum* except in their smaller size (0.5-0.8 mm. long when dried) and slightly wider dehiscence. This also is an undescribed variety,

BOTRYCHIUM VIRGINIANUM (L.) Sw. var. **intermedium**, var. nov.,

¹ This list includes all the material of the *Botrychium virginianum* group from the region of the Gulf of St. Lawrence with three exceptions, viz.: 1. Typical *Botrychium virginianum* occurs on Prince Edward Island as indicated by the following specimens: swampy *Larix* and *Thuja* woods, Tiginish, August 6, 1912, *Fernald*, *Long* and *St. John* no. 6679; springy larch swamp, Bloomfield, August 7, 1912, *Fernald*, *Long* and *St. John* no. 6681. 2. The following variety occurs on Cape Breton Island, as noted on p. 211. 3. Three plants collected by Mr. Harold St. John in September 1915, at Betchouam, Seignoiry of Mingan, on the south shore of the Labrador peninsula (Geological survey of Canada, no. 90028) appear to belong to an undescribed variety of *Botrychium virginianum*. They were, however, collected so late in the season, and in such an over-mature condition that it seems best to postpone a description of this form until better material can be obtained. As Mr. St. John hopes to visit the same region again, in the near future, I have hopes that additional material of this form may soon be available.

segmentis frondis sterilis ultimis spatulatis, penultimis ovatis haud confertis, segmentis frondis fertilis ultimis angustis complanatis, sporangiis flavis ad 0.8 mm. longis.

This variety occurs in Nova Scotia, New England and northern New York, and also in Illinois and Missouri. The following specimens, in the Gray Herbarium belong to this variety:

NOVA SCOTIA: hardwood forest, Indian Brook, valley of the Barrassis River, Cape Breton Island, July August 1915, *G. E. Nichols* no. 1562.

MAINE: open springy meadows, Brownville, July 18, 1905, *Knight and Parlin* no. 1913.

VERMONT: Arlington, July 5, 1913, *N. H. Blanchard* no. 57.

MASSACHUSETTS: dry rocky upland woods, North Adams, June 25, 1913, *Fernald and Long* no. 8374 (N. E.¹).

CONNECTICUT: rich woods, North Guilford, June 22, 1906, *G. H. Bartlett*.

NEW YORK: moist woods, Canton, June 25, 1914, *Orra P. Phelps* no. 47 (TYPE); Pierrepoint, July 10, 1914, *O. P. Phelps* no. 48; moist woods, Norfolk, July 7, 1914, *O. P. Phelps* no. 50 (all in St. Lawrence Co.).

ILLINOIS: rich woods, C. H. and D. bridge, Macon Co., May 21, 1915, *I. W. Clokey*, no. 2387.

MISSOURI: rich woods, Monteer, May 26, 1907, *B. F. Bush* no. 4724; Whiteside, June 13, 1910, *John Davis*.

BOTRYCHIUM VIRGINIANUM var. *EUROPAEUM* Ångström is also somewhat intermediate in character but quite unlike the variety just discussed. The fertile frond is less finely dissected than in typical *Botrychium virginianum*, and the ultimate segments are usually more obtuse than in that plant, but they show little of the spatulate form seen in var. *laurentianum* or var. *intermedium*. The pinnules are lanceolate, and tend to be strongly decurrent so that the pinnae are usually merely pinnatifid. The sporangia resemble those of *Botrychium virginianum* rather than those of either of the varieties just described. They are somewhat larger than in the typical form (0.7-1.2 mm. long), and slightly lighter colored, but with a distinct dark stripe along the edge of the valves. Their dehiscence is wider than that of either of the varieties just described, and nearly as wide as that of *Botrychium virginianum*, but usually without the strong recurving of the valves seen in that form. The microscopic structure of the sporangium wall is somewhat intermediate between that of true *Botrychium virginianum* and that seen in the two varieties just discussed. Some irregular cells with sinuous walls are always present in the outer layer of the wall, but much of this layer is made up of nearly regular quadrilateral cells.

Like the majority of lowland plants common to temperate Europe

¹ Herbarium of the New England Botanical Club.

and North America, this variety is essentially a plant of the evergreen coniferous forests. In America it is a plant of the Canadian zone, and is confined largely to calcareous regions. In Europe it appears to be very rare. There are specimens in the Gray Herbarium from the Baltic regions of Sweden (Ångermannland) and Russia (Petrograd and Novgorod). It is also reported from Bohemia. The European plant has conspicuously large sporangia, so also has the British Columbian plant, which is an exact match for the Russian plant in all respects. In the eastern United States the size of the sporangia is usually less and there is a complete intergradation between this variety and typical *Botrychium virginianum*.

The following American specimens of this variety are in the Gray Herbarium:

QUEBEC: Montmorenci Falls, July 1, 1905, *John Macoun*.

NEW BRUNSWICK: St. Francis parish, July 29, 1900, *E. F. Williams*.

NEW HAMPSHIRE: Randolph, July 15, 1894, *E. F. Williams*; *ib.*, July 18, 1894, *E. F. Williams* (N. E.).¹

VERMONT: rich woods, Westmore, July 24, 1903, *R. A. Ware* (N. E.).

NEW YORK: Pierrepont, St. Lawrence Co., July 10, 1914, *Orra P. Phelps* no. 48.

ONTARIO: sandy woods, Nepigon House, Lake Nepigon, July 15, 1884, *John Macoun*; clay soil, Ouaman River, Hunder Bay district, *H. E. Pulling*.

MONTANA: Swan Lake near Flathead Lake, August 25, 1908, *Mrs. John Clemens* (in part).

BRITISH COLUMBIA: rich soil, avalanche path, Emerald Lake, altitude 4400 ft. (Rocky Mts.), July 1, 1904, *C. H. Shaw* no. 83; flood plain of Columbia River, Beavermouth, altitude 2400 ft., August 18, 1905, *C. H. Shaw* no. 1157; woods, Carbonate (upper Columbia valley), altitude 3000 ft., July 8, 1904, *T. B. Snyder* in *Shaw's Selkirk Flora* no. 207; forest near mouth of Downie Creek (west slope of Selkirk Range), August 7, 1905, *C. H. Shaw* no. 1106; New Westminster, September 15, 1899, *A. J. Hill*.

Besides the varieties of *Botrychium virginianum* in eastern and northern North America yet another one occurs in the far western states. It appears to be a direct development from the var. *europaeum*, and occasionally grows with that form. The sterile frond is exactly like that of the var. *europaeum*, but the sporangia are peculiar. In the species and its other varieties the sporangia are narrow at the base, and when one of them is sufficiently wide open so that the inside is visible, the narrow base appears as a funnel-like hole leading down from near the middle of the expanded upper portion. In this western variety, on the other hand, the base of the sporangia is very nearly its widest part. This broad base is herbaceous, and appears like a

¹ This is a somewhat peculiar specimen, see below, p. 213.

lobe of the ultimate segment of the fertile frond. When the sporangium has opened, an inside view has something the appearance of the inside of a straw hat, the shallow crown of which is formed by the wide lower part of the sporangium. The herbaceous base then appears as a dark spot in the middle of the open sporangium, corresponding in its position to a lining in the top of the crown of the hat. The sporangia in this variety are as small as in typical *Botrychium virginianum*, rarely over 0.7 mm. long and their walls consist of irregular cells with flexuous walls, as in the typical form.

A single specimen of *Botrychium virginianum* var. *europaeum* from the eastern states, that from Randolph, N. H., previously noted as peculiar, shows a somewhat similar broadening of the base of the sporangium, though to a smaller degree. In the size and the microscopical structure of the sporangia it corresponds with the var. *europaeum*. Otherwise the specimens displaying the peculiarity here discussed are all western, and I am calling the variety

BOTRYCHIUM VIRGINIANUM (L.) Sw. var. **occidentale**, var. nov., varietati *europaeo* similis sed sporangiis 0.5–0.7 mm. longis, basin versus latioribus herbaceis late apertis.

The following specimens are in the Gray Herbarium:

MONTANA: Swan Lake, near Flat Head Lake, August 25, 1908, Mrs. Joseph Clemens (in part).

IDAHO: deep woods near the south end of Lake Pend d'Oreille, July 28, 1892, Sandberg, McDougal and Heller no. 762 (type).

OREGON: Hood River, April 1882, Mrs. P. G. Barrett.

CALIFORNIA: without locality, 1873, "Miller."

In Mexico there are two *Botrychia* belonging to the group now under discussion. One of these occurs also in Central America and the West Indies, and possibly also in the Andes. The other, apparently confined to Mexico, has usually been considered as *Botrychium virginianum*, but it differs so much from the typical form of that species in the form and cutting of the sterile frond, that it should be distinguished as a variety, *BOTRYCHIUM VIRGINIANUM* (L.) Sw. var. **meridionale**, var. nov., fronde sterili haud ternata, pinnis basalibus eas secundas parum superantibus, pinnulis ovatis ad basin cordatis vel truncatis vel brevissime cuneatis pinnatifidis, segmentis ordinis tertii approximatis obovatis seu spathulatis obtusissimis crenulato-serratis, fronde fertili atque sporangiis iisdem *Botrychii virginiani* typici similibus.

This plant is evidently closely allied to true *Botrychium virginianum* with which it agrees entirely in the character of the fertile spike and the details of the sporangia except that the valves of the latter are usually somewhat less recurved in dehiscence. It differs, however, in both the form and the cutting of the sterile frond. The basal pinnae are only slightly longer and wider than the second pair, so that the frond is distinctly pinnate rather than ternate. The pinnules are wider and shorter than in the typical form and are truncate or

cordate, rarely very slightly cuneate at the base. They are cut into obovate or spatulate very blunt segments, which lie so close to one another that, at a little distance, the pinnule appears as if it were nearly undivided.

In the Gray Herbarium are two excellent specimens of this plant: Chiapas, *Dr. Ghiesbreght*, filices austro-mexicanae no. 252 (type); in the San Migueleto Mountains, valley of San Luis Potosi, *J. G. Schaffner*, flora mexicana no. 943.

BOTRYCHIUM CICUTARIUM (Savigny) Sw. Syn. 171 (1806). (*Osunda cicutaria* Savigny in Lam. Encycl. iv. 650, 1797). Ivar Tidestrom has recently pointed out¹ the identity of the Mexican fern *Botrychium brachystachys* Kunze, and the West Indian fern *Botrychium dichronum* Undw. with the old species *Botrychium cicutarium*. As has been pointed out several times, this species has a very short fertile spike, but little exceeding the length of the sterile frond. It is also peculiar in having often a second sterile leaf present at the time of fruiting. It seems to be generally assumed that this second leaf is the remaining sterile part of the fruiting leaf of the previous year, but in a specimen in the Gray Herbarium which shows this second leaf, there is no indication that it ever bore a fertile spike. In this species the sterile frond has greatly enlarged basal pinnae as in ordinary *Botrychium virginianum*, the pinnules are lanceolate, acute, markedly decurrent at the base, and conspicuously cut about two thirds of the distance to the midrib. The ultimate segments of the fertile frond are flat and moderately broad. The sporangia are small (0.5–0.7 mm. long), and dark brown. Their dehiscence is narrow, with a slight recurving of the tips of the valves.

It is not quite clear to the author whether this plant should be considered as a species or as a variety of *Botrychium virginianum*. The differences between this form and typical *Botrychium virginianum* are no greater than the differences between some of the North American varieties of that species. On the other hand there is at present no evidence of any intergradation such as is found between the various North American varieties. It was long since given a varietal name, *Botrychium virginicum* β *mexicanum* Greville and Hooker, Bot. Misc. iii. 223 (1833).

Specimens in the Gray Herbarium:

SANTO DOMINGO: in woods near Constanze, 4000 ft. altitude, February 1910, *von Tuerckheim* no. 2963; in woods, Tal Mingo, Province of Barahona, 4400 ft. altitude, April 1912, *Padre Miguel Fuertes* no. 1540.

MEXICO: Jalapa, state of Vera Cruz, 4000–4500 ft. altitude, 1894, *C. L. Smith* no. 2141.

GUATEMALA: Volcan de Agua, *O. Salvin*.

This plant is also reported from Jamaica and Panama, and either this or a closely related form from Ecuador.

¹ Contrib. U. S. Nat. Herb. xvi. 307 (1913).

Key to the American species and varieties of the *BOTRYCHIUM VIRGINIANUM* group.

- A. Ripe sporangia straw colored, opening but slightly in dehiscence, their walls composed of regular cells; pinnules of the sterile frond ovate to lance-ovate, their ultimate segments spatulate.
 - B. Sporangia 1–1.8 mm. long, segments of sterile frond imbricated.
 - B. virginianum* var. *laurentianum*.
 - BB. Sporangia 0.5–0.8 mm. long, segments of sterile frond not imbricated.
 - B. virginianum* var. *intermedium*.
- AA. Ripe sporangia brown, opening rather widely in dehiscence, their walls composed, at least in part, of irregular cells with sinuous walls.
 - C. Fertile shoot much longer than the sterile frond, no additional sterile leaf present at the time of fruiting.
 - D. Sporangia with conspicuously broad herbaceous bases.
 - B. virginianum* var. *occidentale*.
 - DD. Sporangia narrow at the base.
 - E. Sporangia 0.7–0.8 mm. long, dark brown, concolorous, their valves recurved in dehiscence.
 - F. Pinnules of sterile frond but slightly dissected, cordate or truncate at base, valves of sporangia moderately recurved.
 - B. virginianum* var. *meridionale*.
 - FF. Pinnules of sterile frond much dissected, cuneate or decurrent at base, valves of sporangia strongly recurved.
 - B. virginianum*.
 - EE. Sporangia 0.7–1.2 mm. long, their valves light brown with a darker margin, valves usually not recurved in dehiscence.
 - B. virginianum* var. *europaeum*.
 - CC. Fertile shoot but little longer than the sterile frond, an additional sterile leaf present at time of fruiting. *B. cicutaria*.

Again, as in the case of *Athyrium Filix-femina* and its allies an examination of the close technical characters of *Botrychium virginianum* shows that it is readily divided into natural varieties, and these are found to have a distribution entirely in harmony with what is known concerning the laws of the distribution of Phanerogams and indeed, very similar to the distribution of the *Filix-femina* group.

Thus we find *Botrychium virginianum* occurring in the deciduous forests of eastern North America, and again, in this case entirely unchanged, in eastern Asia,—both in China and in Japan. Again we find the European plant reappearing unchanged in the Pacific northwest of America, and in this case occurring eastward across the continent in the evergreen coniferous forests.

In Japan there is one local variation from the typical form of the species (*B. strictum*), and in eastern North America there are at least

two, and probably three such variants. As in the case of *Athyrium angustum*, the lands about the Gulf of St. Lawrence are a region of maximum departure from the ordinary type of the species.

As in the case of *Athyrium Filix-femina*, *Botrychium virginianum* var. *europaeum* undergoes a marked change in passing southward into the Californian region and there develops the peculiar variety, *Botrychium virginianum* var. *occidentale*.

Like the *Filix-femina* group, *Botrychium virginianum* and its allies have a typical boreal distribution, and all tropical forms of this group have evidently come from the north. Thus in Mexico we find *Botrychium virginianum* var. and *Botrychium cicutarium*. The latter species is also in the West Indies, and this or a closely allied species occurs for some distance south in the Andes. In Asia, *Botrychium lanuginosum*, considerably more aberrant than any of the forms yet mentioned, occurs in the Himalayas, and in southern China, and thence south to the hill country of southern India, Ceylon, and the Philippine Islands.

There is a single species of *Botrychium* in Africa, and that is said to be a close relative of the last mentioned species, and hence a member of the *Botrychium virginianum* group. This is *Botrychium chamacconium*, and it occurs in the mountains of Cameroon. It is the only member of the group which is not either strictly boreal, or else in tropical mountains with easy access to the north.

In one respect the *Botrychium virginianum* group differs in its distribution from the *Filix-femina* group. They present their most complicated arrays of forms, not in Asia, but in eastern North America, and it seems probable that the latter region is the center of distribution of this group of plants.

EXPLANATION OF PLATE 123.

Figs. 1-2. European specimens of *Athyrium Filix-femina* (L.) Roth: fig. 1, pinnule of var. *multidentatum* (Döll) Milde, $\times 2\frac{1}{2}$; fig. 2, pinnule of var. *fissidens* (Döll) Milde, $\times 5$.

Figs. 3-10. *Athyrium asplenioides* (Michx.) Desv.: fig. 3, pinna of typical form, $\times \frac{1}{2}$; fig. 4, pinnule of the same frond, $\times 5$; fig. 5, mature pinnule of f. *subtripinnatum* Butters, $\times 2$; fig. 6, base of younger pinnule of the same form, $\times 5$; fig. 7, indusium of *A. asplenioides*, $\times 12\frac{1}{2}$; fig. 8, detail of the margin of a portion of the indusium, $\times 50$; fig. 9, sporangium, $\times 50$; fig. 10, spores, $\times 100$.

Figs. 11-18. *Athyrium angustum* (Willd.) Presl.: figs. 11 and 12, pinnules of fertile and sterile fronds, respectively of the same plant of f. *typicum*, $\times 5$; fig. 13, pinnule of var. *rubellum* (Gilbert) Butters, $\times 5$; fig. 14 and 15, pinnules of the fertile and nearly sterile fronds respectively of var. *elatus* (Link) Butters, $\times 2$; fig. 16, base of younger fertile pinnule of var. *elatus*, $\times 5$; fig. 17, margin of indusium, showing the ordinary type found in *A. angustum*, $\times 50$; fig. 18, spores, $\times 100$.



ATHYRIUM FILIX-FEMINA AND ITS ALLIES.

CONTRIBUTIONS FROM THE GRAY HERBARIUM
OF HARVARD UNIVERSITY

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- II. A Revision of the Genus *Dimerostemma* Cass.
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- IV. Descriptions of New Spermatophytes, chiefly from
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I. NOTES ON THE SYSTEMATIC POSITION OF
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BY S. F. BLAKE.

THE genus *Clibadium* L. of the helianthoid Compositae is placed by Bentham & Hooker and by Hoffmann at the end of the subtribe *Millerinae*, separated only by the not at all closely related *Sheareria* from the genus *Ichthyothere* Mart. of the *Melampodinae*. A recent investigation of the species of *Clibadium* has made the writer very doubtful of the propriety of this arrangement. When all the characters of the two genera are taken into consideration, there seems no room for doubt that *Clibadium* and *Ichthyothere* are much too closely related for reference to different subtribes, as was indeed long ago indicated by Bentham's hesitation (Gen. Pl. ii. 346) in fixing on the affinity of a still unpublished plant of Spruce's, finally referred by him to *Clibadium*, where there can be no doubt that it properly belongs (see *C. Sprucei* below).

The subtribe *Millerinae* differs from the *Melampodinae* in but two definite characters — the absence of pales on the disk, and the few (less than 10)-flowered heads — in both of which features *Clibadium* forms, at least as to some of its species, an exception to all the other genera of the *Millerinae*, and agrees with the *Melampodinae*. In the recent revision by O. E. Schulz (Bot. Jahrb. xlvi. 613–629 (1912)) *Clibadium* is divided into two sections — *Euclibadium* DC., with receptacle naked in the middle and sterile ovaries villous throughout, and *Trixidium* DC., with receptacle paleaceous throughout and sterile ovaries pilose only at apex. It might at first appear that the genus could be divided into two on these characters, the one genus (De Candolle's sect. *Euclibadium*) being referred to the *Millerinae*, where its many-flowered heads would still render it exceptional, the other (De Candolle's sect. *Trixidium*) referred to the *Melampodinae* next to *Ichthyothere*. But the very

close relationship existing between all the species now referred to *Clibadium*, as well as the gradations observable in these two features themselves, renders such a course as artificial as it would be unsatisfactory. In all the species the outer (female and fertile) florets, 3-37 in number, are subtended by chaff which may be considered either as receptacular pales (as they are taken by writers generally) or as inner scales of the 1-5-scaled genuine involucre, to which they are very similar in every character; the difference is after all one of words only and of no great consequence. In the five species of the section *Trixidium* now known the inner (hermaphrodite and sterile) florets of the disk are also subtended by pales, considerably reduced it is true but easily found; but in the twenty species of *Euclibadium* they vary greatly, being sometimes entirely absent, sometimes present only at the base of a few florets and as it were sporadically, and sometimes at the base of all but the innermost disk-florets. The gap between such species as *C. strigillosum*, with 16-flowered heads, only the five female florets provided with pales, and *C. Eggersii*, with 47-flowered heads paleaceous throughout, is bridged by such species as *C. polygynum* with 37-flowered heads of which only the innermost of the disk are without pales. The amount of pubescence on the sterile achenes of the disk is also not without variation in some of the species of each section and is of much less importance as a possible generic character.

Of the some twenty-five species of *Clibadium* now known (including six here first published) only three are in agreement with the other genera referred to the *Millerinae* in the possession of less than ten flowers in the head. Hoffmann's statement in 1890 (*Nat. Pfl.* iv. pt. 4, 214) of the number of female florets as "1-2" was very incorrect even for the species then known, no species having less than 3, while *C. erosum* has about 18 and *C. fragiferum* about 28. Hoffmann's error may have derived from Bentham's description of the female florets as "1-2-seriati," but surely never from dissection of a specimen.

From what has been written above it seems beyond dispute that *Clibadium* should be removed from the *Millerinae* and referred to the *Melampodinae* next to *Ichthyothere*, from which it differs chiefly in habit and in the more or less complete reduction of the receptacular pales. The typical or original group would seem to be *Trixidium*, with many-flowered heads and a receptacle paleaceous

throughout, from which by reduction of the receptacular chaff the species of *Euclibadium* have been derived.

In O. E. Schulz's monograph of 1912 nineteen species and two varieties were recognized of the thirty or more which have been described by authors. In the present paper five new species are described, one published by Hieronymus as a *Desmanthodium* is transferred to *Clibadium*, and the name of one species is changed as the result of an examination of two of Aublet's types in the British Museum. In this as in so many other cases I have to express my thanks to Dr. A. B. Rendle of the British Museum and Dr. Otto Stapf of the Kew Herbarium for the opportunity to study the collections under their charge, and to secure fragments of types for the Gray Herbarium. The order of Schulz's monograph is followed in the arrangement of the species.

CLIBADIUM SURINAMENSE L. To this species may be referred *Hayes* 401, from Paraiso Station, Panama Railway, August 1862, which has been included by Hemsley (*Biol. Centr.-Am. Bot. ii. 143*) under *C. leiocarpum* Steetz.

C. SYLVESTRE (Aubl.) Baill., referred by Schulz to *C. surinamense*, is identical with *C. Vargasii* DC. and should replace it (see beyond).

C. heterotrichum, sp. nov. Frutex sect. *Euclibadii*. Caulis subteres striatus purpurascens dense appresseque strigosus pilis deciduis basibus tuberculatis persistentibus. Folia ovata vel oblongo-ovata vel ovato-lanceolata acuminata basi cuneata vel cuneato-rotundata irregulariter serrata (dentibus 16-22-jugis acute mucronatis subpatentibus vel appressis) trinervia subtus reticulata supra viridia dense asperaque hispida et hispidula pilis basi tuberculatis aetate lepidota subtus pallidiora juventate canescentia ad venas densissime inter venas subdense et subaspere pilosulo-hispidula pilis adscendentibus et plus minusve glandulosa 6.5-10 cm. longa 2-4.6 cm. lata, in petioliis immarginatis tuberculato-hispido-strigosis et -strigillosis 5-14 mm. longis. Paniculae terminales et ex axillis supremis orientes densissime strigosae ca. 25-cephalae ad 2.5 cm. latae. Capitula ovoideo-subglobosa subdense aggregata 5 mm. alta 4 mm. diametro. Involucri phyllaria 3 ovata distincte acuta pallide lutescenti-albida 7-nervia subdense strigillosa et ciliolata submembranaceo-siccata 5 mm. longa 3.2 mm. lata. Receptaculum nudum, paleis flor. fem. subtendentibus

squamis similibus sed minoribus exceptis. Flor. fem. 5, hermaph. 19. Flor. fem.: corolla apice pilosa 2 mm. longa; ovarium apice pilosum. Flor. hermaph.: corolla 2 mm. longa sursum pilosa; ovarium (immaturum) oblongum dense pilosum 1 mm. longum. Achenia non visa. — BOLIVIA: Polo-Polo, near Coroico, Distr. La Paz, 1100 m., Oct.–Nov. 1912, *Buchtien* sine num. (TYPE in Brit. Mus.). — This species finds its closest relative in *C. peruvianum* Poeppig, which has a harsh spreading stem-pubescence and larger heads. The type collection was distributed as *C. asperum* DC. (= *C. surinamense* L.), an unrelated species.

C. SYLVESTRE (Aubl.) Baill. Hist. Pl. viii. 307 (1886). — In Schulz's monograph (p. 622) this species is called *C. Vargasii* DC., and *C. sylvestre* is synonymized with *C. surinamense* L. There are in the British Museum two sheets of *Clibadium* from Aublet, one of which has been marked by Dryander as *Bailleria aspera* Aubl. (Hist. ii. 804, t. 317 (1775)), the other being labelled *Bailleria sylvestris* Aubl. (l.c. 807) in an unidentified hand. The first of these is identical with *C. Vargasii* DC., the second with *C. surinamense* L. But when careful comparison is made with the descriptions and plate of Aublet, the conclusion seems unavoidable that the names written on the sheets have in some way been transposed, and that the type of *B. sylvestris* Aubl. is in reality the plant labelled *B. aspera* by Dryander. The leaves of the specimen labelled *B. sylvestris* agree much better with those shown in plate 317 (*B. aspera*) of the *Histoire* in shape and tothing, and are distinctly scabrous as contrasted with the nearly smooth leaves of the other specimens (i. e., those labelled *B. aspera*), which is one of the chief diagnostic features attributed to *B. aspera* by Aublet. It seems necessary to disregard the labels on the sheets, not written by Aublet himself, and follow the characters considered essential by him, which leads to the consideration of the sheet marked *Bailleria aspera* by Dryander as the type of *B. sylvestris*, and the adoption of the name *Clibadium sylvestre* (Aubl.) Baill. for the well-marked species called *C. Vargasii* DC. in Schulz's revision.

C. strigillosum, sp. nov. Frutex sect. *Euclibadii*. Caulis subquadrangularis dense canescente strigillosus. Folia ovata tenuiter acuminata basi cuneata irregulariter subrependo-dentata (dentibus 20–30-jugis plus minusve depressis mucronatis) trinervia utrinque non aspera supra obscure viridia subdense strigillosa

aetate sublepidota basibus pilorum persistentibus infra paullo pallidiora dense appresse hispidulo-strigillosa 10-11.8 cm. longa 4.8-5.3 cm. lata, in petiolis dense minuteque canescenterque strigillosis immarginatis 1.2-2 cm. longis. Paniculae axillares et terminales ca. 50-cephalae pyramidatae ad 3 cm. latae foliis multo breviores dense strigillosae. Capitula globosa 5 mm. alta 3.5-4.5 mm. diametro sessilia vel brevissime pedicellata irregulariter aggregata. Involuceri phyllaria 3 ovalia acutiusecula 8-13-nervia vix subherbacea supra dense strigillosa 3-3.8 mm. longa 2.1-2.8 mm. lata. Receptaculum nudum, paleis flor. fem. subtendentibus squamis similibus paullo angustioribus exceptis. Flor. fem. 5, hermaph. 11. Flor. fem.: corolla 2.5 mm. longa, dentibus 4 dorso sparse pilosis. Flor. hermaph.: corolla 3 mm. longa, dentibus 5 pilosis; ovarium sterile oblongum ad apicem villosum 1.3 mm. longum. Achenia suborbicularia nigrescentia vix marginata sparse pilosa 2.1 mm. longa 2 mm. lata. — PERU: *Mathews* 1360 (TYPES: Brit. Mus., Kew, fragm. in hb. Gray). — Rather closely related to *C. sylvestre* (Aubl.) Baill. (*C. Vargasii* DC.: see above), but that species, unknown in Peru, has smaller heads with a more decidedly herbaceous involucre.

C. Sprucei, sp. nov. Frutex sect. *Euclibadii* scandens (?) ramosus ramis latissime patentibus. Caulis obtusangulus ramique teretes densissime aspere strigosi pilis arcte appressis demum deciduis eorum basibus albidis tuberculatis persistentibus. Folia opposita ovato-lanceolata longissime acuminata paullum falcata basi truncato-rotundata vel superiora basi rotundata ca. 1 cm. supra basin valde trinervia mucronato-denticulata (dentibus ca. 20-jugis patentibus tenuibus) supra viridia impresso-venoso-reticulata asperrime scabra pilis densis incurvis basi valde tuberculatis subtus vix pallidiora dense submolliterque pilosa pilis incurvis basi subtuberculatis et glanduloso-adspersa 7-14 cm. longa 1.8-3.3 cm. lata, in petiolis immarginatis 4-10 mm. longis dense strigoso-hispidis pilis incurvis basi tuberculatis. Capitula in glomerulis densissimis axillaribus et terminalibus (in pedunculis 2-4 cm. longis) basi bifolioso-bracteatis rare nudis 1.1-2.1 cm. diametro 10-20-cephalis aggregata. Involuceri 6 mm. alti 4 mm. diametro ellipsoidei plus minusve compressi phyllaria 3 oblonga ad oblongo-ovalia obtusiusecula subherbaceo-submembranacea dense strigillosa et ciliolata 4-5-nervia apice paullum sicca 6-6.5 mm. longa 3-3.5 mm.

lata. Receptaculum convexum apice excepto paleaceum, paleis exterioribus (eis flor. fem.) squamis involucri similibus sed minoribus introrsum sensim reductis; intimis scariosis lanceolatis acuminatis ciliatis floribus multo brevioribus. Flor. fem. 10–11, hermaph. 10–11 (in capitulo altero flor. fem. 10, hermaph. 11, altero flor. fem. 11, hermaph. 10). Flor. fem.: ovarium ovale apice sparse pilosum 1.2 mm. longum; corolla tubulosa bilobata apice sparse pilosa nectario conspicuo annulari praedita 1.7 mm. longa. Flor. hermaph.: ovarium oblongo-obovoideum supra longe pilosum 0.7 mm. longum; corolla 5-dentata supra pilosa clavato-tubulosa 2.7 mm. longa basi nectario annulari praedita; antherae basi sagittatae apice appendice ovali-ovata obtusa munitae; stylus indivisus supra medium plus minusve hirtus. — ECUADOR: Tungaragua, 1857–1859, *Spruce* 5826 (TYPE COLL.: Brit. Mus., Kew, Gray Herb.). — Long ago referred to *Clibadium* by Bentham (Gen. Pl. ii. 346), who considered it transitional to *Ichthyothere*, as a new species of which genus it was originally distributed. It has however no special affinity with this genus. *Clibadium Sprucei* belongs to the section *Euclibadium*, where its nearest ally is the (from description) clearly distinct *C. subsessilifolium* Hieron. of Ecuador. Only the two or three innermost florets of the disk are without pales.

C. Trianae (Hieron.), comb. nov. — *Desmanthodium Trianae* Hieron.! Engl. Bot. Jahrb. xix. 52 (1894). — This species, the type of which, *Triana* 1317, from Colombia, is represented in both the British Museum and Kew Herbarium and by a fragment in the Gray Herbarium, is so clearly a *Clibadium* both in habit and technical characters that it is difficult to understand how it could have been referred to *Desmanthodium* by Hieronymus. The small heads densely aggregated in ternately arranged glomerules place it between *C. subsessilifolium* Hieron. and *C. glomeratum* Greenm., from both of which it is (from description) very distinct. The female florets seem to be always 5; the hermaphrodite may be either 6 or 7 in number.

C. polygynum, sp. nov. Frutex ramosus sect. *Euclibadii*. Caulis teres dense patenter hispidus et hispidulus pilis deorsum demum deciduis basibus tuberculatis persistentibus. Folia opposita ovata vel suprema ovato-lanceolata acuminata basi acute cuneate trinervia e basi serrata (dentibus acute mucronatis ca. 21–26-jugis sub-

appressis) utrinque scabra supra patenter vel adscendenter hispida et hispidula pilis basi tuberculatis subtus paullo pallidiora sparsius hispida et hispidula pilis basi non tuberculatis 7–9.5 cm. longa 2.3–4 cm. lata, in petiolis dense patenter hispidis et hispidulis immarginatis 1–3 cm. longis. Paniculae 3.5 cm. latae ca. 9–11-cephalae; pedicelli dense hispidi et hispiduli 3–7 mm. longi. Capitula globosa ca. 5 mm. alta 6 mm. diametro. Involucri phyllaria ca. 2 ovalia acutiuscula strigosa lineata ca. 3 mm. longa 1.5 mm. lata. Receptaculum paene ad apicem paleaceum; paleae exteriores ovals obtusae supra strigosae hispido-ciliatae ca. 5-nerviae 4 mm. longae 2 mm. latae; interiores sensim angustiores, intimae anguste oblongae 1-nerviae apice subherbaceae sursum hispido-ciliatae pilis incurvis 3 mm. longae. Flor. fem. 29, hermaph. 8. Flor. fem.: corolla glabra obtuse 3-denticulata 1.7 mm. longa. Flor. hermaph.: corolla clavato-tubulosa 1.8 mm. longa, dentibus 5 pilosis; ovarium sterile dense pilosum oblongum 1.2 mm. longum; stylus vix exsertus. Achenia nigrescentia obovoidea marginata apice dense pilosa 2 mm. longa 1.5 mm. lata. — NICARAGUA: Chontales, 1867–68, *R. Tate* 192 (Brit. Mus., Kew, fragm. in hb. Gray); without definite locality, *Seemann* 88 (TYPE COLL.: Brit. Mus., Kew). — Unique among the species of the section *Euclibadium* by reason of its very numerous female florets, in which it approaches the species of the section *Trixidium*.

C. divaricatum, sp. nov. Frutex ramosus sect. *Trixidii*. Caulis tenuis subteres striatus plus minusve flexuosus minute subsparse strigillosus viridescens. Folia opposita ovato-lanceolata longe acuminata basi acute cuneata paene e basi serrata (dentibus ca. 8–11-jugis appressis mucronatis) trinervia paullum reticulata supra obscure viridia minute subdense strigillosa subtus pallidiora subdense appresseque hispidulo-strigillosa 7–9.5 cm. longa 2.1–3.8 cm. lata, in petiolis tenuibus sparse strigillosis immarginatis 1–2.6 cm. longis. Paniculae ramos et ramulos terminantes breviter (ca. 1 cm.) pedunculatae divaricatissime ramosae strigillosae 20–27-cephalae 3–4 cm. latae. Capitula depresso-hemisphaerica plus minusve distantia sessilia 2.5 mm. alta 4 mm. diametro. Involucri phyllaria 5 latissime orbiculari-ovata obtusiuscula viridescencia minute et subsparse strigillosa ciliolata 3.3 mm. alta 3 mm. lata. Receptaculum omnino paleaceum; paleae extimae squamis consimiles; interiores oblongae obtusae subglabrae margine ciliato

excepto 3-nerviae. Flor. fem. 24; hermaph. 10. Corollae non visae. Achenia obovata marginata viridescenti-nigrescentia 1.5 mm. longa 0.9–1 mm. lata. Ovaria sterilia linearia ad apicem villosa pilis perpauca praedita ad 1.8 mm. longa. — PERU: near Tarapoto, 1855–56, *Spruce* 4522 (TYPE COLL.: Brit. Mus., Kew, Gray Herb.). — Very distinct from any published species.

II. A REVISION OF THE GENUS DIMEROSTEMMA CASS.

BY S. F. BLAKE.

In 1848 Gardner published from Brazil a new genus of the helianthoid Compositae which he named *Serpaea* in honor of Dr. Serpa, then professor of botany in the College of Olinda near Pernambuco. One of the two species on which the genus was based is a true *Aspilia* and was referred to that genus by Baker in 1884, having wrongly been remanded to *Viguiera* by Bentham & Hooker in 1873. The other, *S. ovata* Gardn., has since 1873 been retained in *Oyedaea*, to which it was first referred by Bentham & Hooker. With three new species it was taken by Baker in 1884 to constitute his subgenus *Serpaea* of *Oyedaea*.

Recent critical study of the genera *Viguiera* and *Oyedaea* has convinced me that Gardner's genus *Serpaea* is well worthy of generic rank. While all the some 20 species of *Oyedaea* have a thickened laterally rounded achene bearing a pappus of two awns with an intermediate corona of basally fused squamellae, the six species referable to *Serpaea* have a more or less quadrangular achene with a pappus of two awns only without intermediate corona, although in some cases the intermediate angles of the achene are prolonged into short teeth or occasionally into awns nearly or quite as long as those of the main angles. These species are likewise distinguished by the possession of a secondary involucre of 2–several herbaceous bracts outside the true more or less indurated phyllaries, these accessory bracts being similar to the stem leaves but very much reduced in size.

Cassini's genus *Dimerostemma*, described in 1817 from material in the herbaria of Jussieu and Desfontaines brought from the garden of Lisbon and originating from Brazil, has ever since remained an unverified genus to synantherologists. It was placed by Ben-

tham & Hooker next to *Helianthus* and said to differ from that genus, no true member of which is known from Brazil, chiefly in its discoid heads. Baker in 1884 in the *Flora Brasiliensis* gave a Latin description based on Cassini's original, but suggested no new disposition of the genus. Baillon in 1886 included under *Dimerostemma* (itself doubtfully retained) the genera *Oyedaea*, *Serpaea*, *Zexmenia*, and *Lipochaeta*. In the *Pflanzenfamilien* Hoffmann placed the genus between *Eleutheranthera* and *Perymenium*, a position for which it is hard to find reason in Cassini's published description, repeating Bentham & Hooker's statement that the genus chiefly differed from *Helianthus* in its discoid heads. Comparison of the published diagnosis of *Dimerostemma* with Gardner's *Serpaea* led me some time ago to believe that its true relationships were with this genus, and the recent acquisition for the Gray Herbarium, through the kindness of Dr. H. Lecomte and M. F. Gagnepain of the Paris Museum of Natural History, of a photograph of the type in the Jussieu Herbarium, has shown that such is the case. This type is in very poor condition, consisting at the present time merely of a stem bearing one stem leaf, three branch leaves, and several peduncles without heads, but it is clearly a *Serpaea* and apparently identical with *S. ovata* Gardn. The name *Dimerostemma* Cassini, freed from its long obscurity, must accordingly be adopted for this genus. Cassini's original description of the heads as discoid was undoubtedly due to the poor condition of his specimens, since *S. ovata* is a radiate species, and the one character by which for many years the genus has been distinguished proves, oddly enough, to have been a mistaken one. In one species, however, which must be referred to this genus, *Viguiera* ? *retifolia* Sch. Bip., the heads are apparently truly discoid, so far as may be judged from the single type specimen I have been able to examine, in the Kew Herbarium, but better specimens are required before this can be affirmed with certainty.

The present revision was prepared chiefly at the Kew Herbarium, where is to be found what is probably the best collection of this little-known genus. Through the kindness of Dr. Stapf fragments of all the species there have been acquired for the Gray Herbarium. The herbaria in which specimens are deposited are indicated by letters (B = British Museum of Natural History; G = Gray Herbarium; K = Kew Herbarium).

Although the generic name (from *διμερής*, two-parted, and *στέμμα*, crown) was, probably through oversight, treated by Cassini as feminine (*D. brasiliana*), it is properly a neuter noun and is so used in this revision.

DIMEROSTEMMA Cass. — Heads medium or rather large, many-flowered, radiate or sometimes apparently discoid, the rays neutral; flowers all yellow. Involucre subtended by an outer 1–2-seriate pseudo-involucre of leaf-like bracts, usually surpassing the disk; proper involucre 2–4-seriate, slightly graduated, about equalling disk, the phyllaries oblong, chartaceous-coriaceous or sub-coriaceous-scarious or the outer subherbaceous. Receptacle flattish or slightly convex; pales firm, keeled, enfolding the flowers. Rays small, oblong, neutral; disk-corollas with short tube and cylindric throat, 5-toothed. Anthers sagittate at base, with ovate acutish appendages. Style somewhat swollen at base, inserted in a nectary (?); style-branches oblong, bluntish, hispidulous, not appendaged. Achenes of ray sterile; of disk thickened, somewhat quadrangular, sometimes with more or less prominent intermediate ribs, narrowly winged on the two main angles, glabrous or ciliate on the angles, their pappus of two strong awns continuous with the wings, the lateral angles sometimes prolonged into teeth or awns; the awns in one species connected at base by their lacerate decurrent bases, but without the true corona of *Oyedaea*. — Erect simple or sparsely branched perennials, probably suffrutescent at base, bearing 1–12 heads; leaves opposite or alternate, ovate to orbicular, veiny; the stem and at least the under side of the leaves (except in one species) densely pubescent.

Dimerostemma Cass. Bull. Soc. Philom. 1817. 11 (1817); l. c. 1818. 58 (1818); Dict. Soc. Nat. xiii. 253 (1819); DC. Prod. vii. 255 (1838); B. & H. Gen. Pl. ii. 376 (1873); Baker in Mart. Fl. Bras. vi. pt. 3, 231 (1884); Baillon, Hist. Pl. viii. 202 (1886), in small part; O. Hoffm. in Engl. & Prantl, Nat. Pfl. iv. pt. 5, 236 (1890). *Serpaea* Gardn. Lond. Journ. Bot. vii. 296 (1848), excl. *S. oblonga*. *Oyedaea* DC. subg. *Serpaea* (Gardn.) Baker in Mart. l. c. 206 (1884).

- a. Plant green, merely strigillose or appressed-puberulous. 1. *D. retifolium*.
 a. Plant cinereous with usually longer more or less spreading hairs, b.
 b. Heads solitary at apex of stem and branches, c.
 c. Leaves suborbicular, softly pilose-tomentose above. 2. *D. vestitum*.

- c. Leaves oval to ovate or oblong-ovate, harshly hispid-pilose above 3. *D. asperatum*.
 b. Heads pedunculate, more or less cymose-panicled, d.
 d. Leaves densely and softly pilose-tomentose beneath; stems densely pilose-tomentose with spreading hairs, e.
 e. Leaves orbicular, softly densely pilose above. 4. *D. rotundifolium*.
 e. Leaves broadly ovate, roughish above with dense short tuberculate-based hairs 5. *D. brasilianum*.
 d. Leaves densely hispidulous-pilosulous beneath; stem strigose-pilose with ascending or subspreading flexuous tuberculate-based hairs 6. *D. lippioides*.

1. ***D. retifolium*** (Sch. Bip.), comb. nov. Apparently suffrutescens, erect, simple below the 5-headed cymose panicle. Stem brownish, striate, subdensely appressed-puberulous, slender. Leaves alternate, oval, obtusish, mucronate, broadly rounded to barely cordate at base, crenulate-serrulate with about 16 pairs of rounded depressed teeth, triplinerved, finely and conspicuously reticulate both sides, thickish, plane, densely strigillose and of the same grayish-green hue both sides, 2.8–5.3 cm. long, 1.4–3.6 cm. wide, on marginless flattened petioles 1–2 mm. long, densely and minutely strigillose. Heads axillary and terminal, discoid, on monocephalous densely minutely strigillose peduncles 2–24 mm. long. Disk 8 mm. high, 14 mm. wide. Involucre 7–8 mm. high, 3–4-seriate, scarcely graduated, the outermost phyllaries ovate or obovate, obtusish, herbaceous, reticulate, constricted near the middle, minutely and densely strigillose, unequal, some of them exceeding the other phyllaries, these oblong, acutish, strongly indurated, chartaceous-coriaceous, brownish, densely and finely strigillose except on margin, ciliate above. Rays apparently none; disk-corollas apparently yellow, tubular, glabrous except on teeth, 4 mm. long, the tube (0.8 mm. long) only slightly more slender than the throat. Pales narrow, indurate, finely strigillose toward the acutish apex, 7.5 mm. long. Achenes (immature) narrow-oblong, not thickened, glabrous, about 4 mm. long; the two stout awns subequal, finely spinulose on keel, 3.5 mm. long. — *Viguiera* ? *retifolia* Sch. Bip.! ex Baker in Mart. Fl. Bras. vi. pt. 3, 223 (1884). — BRAZIL: fields along the Rio Pardo, Matto Grosso, *Riedel* (TYPE COLL.: K, fragm. G).

2. ***D. vestitum*** (Baker), comb. nov. Erect, simple or sparsely branched, suffrutescens. Stem striatulate, stoutish, like the whole plant dull and cinereously pilose-tomentose with dense spreading

rather soft hairs. Leaves alternate, oval or orbicular-ovate, acutish to obtuse, at base truncate-rounded or cordate, triplinerved, crenate-serrulate with about 20 pairs of rounded appressed teeth, reticulate beneath, densely dully cinereous-pilose-tomentose both sides and densely glandular-dotted beneath the hairs, 2-4.4 cm. long, 2-4 cm. wide, on similarly pubescent petioles 3-4 mm. long. Heads (1-5) solitary and sessile at apices of stem and branches, leafy-bracted at base (the bracts nearly or quite as large as foliage leaves), 2.8 cm. wide; disk 1.1-1.5 cm. high, 1.6-2.2 cm. wide. Involucre (excluding the outermost foliaceous bracts) about 4-seriate, scarcely graduated, about 1 cm. high, the outermost 1-2 series of phyllaries foliaceous, like the outermost bracts but smaller, the two inner indurated, chartaceous-coriaceous, oblong, truncate to obtusish at apex, densely subsericeous-pilosulous on back (except on margin). Rays about 13, linear-oblong, pilose and gland-dotted dorsally, 1 cm. long, 1.8 mm. wide; disk-corollas sparsely pilose below and on teeth, 4.2-5.2 mm. long (tube 0.9 mm.). Pales indurate, strongly carinate, pilose on back above, 7-8 mm. long. Achenes at full maturity grayish, thickened, subquadrangular, rather deeply grooved on the lateral angles, sometimes also on the outer, the ridges all with pale narrow margins, more or less ciliate, prolonged above into ciliate teeth, the inner and sometimes also the outer into firm awns about 2 mm. long. — *Oyedaea vestita* Baker! in Mart. Fl. Bras. vi. pt. 3, 207 (1884); Pilger, Bot. Jahrb. xxx. 204 (1901). — BRAZIL: GOYAZ: fields near Goyaz, *Burchell* 6815 (COTYPE: K, fragm. G); San Antonio del Monte, 1818, *Sello* 1088 (tracing G, ex hb. Klatt); without locality, *Pohl* 572 (COTYPE: K, fragm. G). Recorded also by Pilger from Matto Grosso.

3. *D. asperatum*, sp. nov. Suffrutescens ? (basi invis) 1 m. altum. Caulis (vel ramus ?) erectus teres vel infra angulatus tenuis dense asperique tuberculato-hispidulus pilis brevibus late patentibus monocephalus. Folia opposita remota (internodiis 5-8.5 cm. longis) ovata vel ovalia vel suprema anguste oblongo-ovata acuta rare obtusa basi subcordata vel rotundata crenato-serrata (dentibus 15-18-jugis depressis obtuse calloso-mucronulatis) supra siccitate obscure canescenti-viridescencia densissime et scabre tuberculato-hispidula pilis adscendentibus subtus sicca obscure canescentia densissime et submolliter hispidulo-pilosula

pilis late patentibus basi plus minusve tuberculatis triplinervia 3.7–5.5 cm. longa 1.5–2.9 cm. lata, in petiolis densissime aspereque tuberculato-hispidulis et hispidis immarginatis 3 mm. longis; suprema minora. Capitulum in pedunculo nudo caulem terminante 4–6.3 cm. longo insidens; discus (fructu) 1–1.2 cm. altus 1.4–1.8 cm. crassus. Involuceri ca. 4-seriati ad 1.2 cm. alti phyllaria (vel bracteae) serierum duarum exteriorum herbacea ovata vel oblongo-ovata acuta ad basin plus minusve abrupte contracta ut folia pubescentia; ea serierum duarum interiorum breviora oblonga obtusa subindurata non herbacea plus minusve tuberculato-strigosa vel -strigillosa. Radii . . . ?; corollae disci 4.5 mm. longae (tubulo 0.7 mm.) ut videtur glabrae. Paleae acutae mucronatae carinatae in carina et ad apicem spinulosae 6.5 mm. longae. Achenia oblique oblongo-obovata paullum incrassata subquadrangularia nigrescentia fere glabra vel sparse tuberculato-strigosa 3.5 mm. longa. Aristae 2 subtriangulares in angulis ciliatae cum alis angustis spinuloso-ciliatis continuae ad 2 mm. longae inaequales basi plus minusve dilatatae et laceratae interdum lacerato-coniunctae. — BOLIVIA: East Velasco, 200 m., July 1892, *Otto Kuntze* (TYPE no. 702220, U. S. Nat. Herb.) — Of interest as the first extra-Brazilian species of the genus. The type specimens were recorded by Kuntze (Rev. iii. pt. 2, 184 (1898)) as *Viguiera macrorhiza* Baker, an unrelated species. In *D. asperatum* the two awns (trigonous and broad as in all the other species) are connected at base by their lacerate-decurrent bases — but there is no true corona (constricted at base) as in *Oyedaea*, and the habit is entirely that of *Dimerostemma*.

4. *D. rotundifolium* (Baker), comb. nov. Erect, suffrutescent, branched chiefly in the inflorescence, the branches strict, erect, bearing 1–3 heads. Stem striatulate, rather slender, cinereously pilose-tomentose. Leaves opposite to the inflorescence, orbicular, obtusish to rounded at apex, truncate to subcordate at base, crenate-serrulate with 13–19 pairs of more or less appressed teeth, triplinerved, reticulate beneath, above dull green, pilose with more or less matted soft hairs, beneath densely white-canescantly pilose-tomentose, 2–3.2 cm. long, 2.5–3.7 cm. wide, on canescantly pilose-tomentose petioles 3–5 mm. long. Heads about 4–11, in cymose panicles of 1–3 at ends of branches, 1.7–2 cm. wide, leafy-bracted at base, the bracts about 2, similar to the uppermost stem

leaves; disk 9–11 mm. high, 9–15 mm. wide. Involucre (excluding outermost leaf-like bracts, which are 1–1.2 cm. long) about 3-seriate, the outermost phyllaries herbaceous, obovate, acutish, crenulate, like much reduced stem leaves, the inner oblong, chartaceous-coriaceous, obtusish, pilosulous down middle of back, ciliate at tip. Rays yellow, oblong, rather deeply 2–3-fid, 6 mm. long, 1.5 mm. wide, pilosulous dorsally; disk-corollas sparsely pubescent on teeth, 5 mm. long (tube 1 mm.). Pales scarious-indurated, ciliolate on the narrowed keel, pilosulous at the acute apex, 8.5 mm. long. Achenes (immature) ciliate on margin, 1-nerved on sides, strongly 2-awned, the awns trigonous, ciliate on back, subequal, 3.5 mm. long, the lateral nerves of achene sometimes produced into a short tooth.—*Oyedaea rotundifolia* Baker! in Mart. Fl. Bras. vi. pt. 3, 208 (1884). *Serpaea rotundifolia* Sch. Bip. ex Baker l. c. as syn. — BRAZIL: MINAS GERAES: Sera de Caraça, R. Mendonça 68 (tracing G, ex hb. Klatt); SÃO PAULO: near San Carlos, Riedel 1852 (TYPE COLL.: GK); without definite locality, Glaziou 16162 (K).

5. B. BRASILIANUM Cass. "Herbaceous perennial," about 6 dm. high, erect, subsimple or branched. Stem densely sordidly subtomentose-villous and glandular, bearing 4–9 heads. Leaves opposite, broadly ovate, subacute, rounded at base, regularly serrulate with 20–25 pairs of depressed teeth, distinctly 3-nerved, dull green above, glandular and roughish with dense short tuberculate-based hairs, beneath densely gray-tomentose, 3–6 cm. long, 2.2–4.2 cm. wide; petioles sordidly villous-tomentose and glandular, 4–7 mm. long. Heads terminal and from the upper axils, 1.7 cm. wide, on mostly monocephalous peduncles 1.2–8 cm. long; disk 8.5–10 mm. high, 11–13 mm. wide. Involucre 3-seriate, the outer phyllaries 4, herbaceous, obovate to orbicular-obovate, denticulate, reticulate, sordidly glandular-tomentose, resembling reduced stem leaves, slightly exceeding the inner phyllaries, a little shorter than disk; inner phyllaries oblong, subacute, subcoriaceous-scarious, somewhat indurated, glandular-tomentulose, at length more or less glabrate. Rays about 8, oblong-ovate, 3 mm. long, 1 mm. wide; disk-corollas puberulous on the teeth, 4.1 mm. long (tube 0.5 mm.). Receptacle conical; pales scarious-margined, acute, glandular-puberulous at apex, 7 mm. long. Achenes slightly thickened, black, with a few hairs above, 3.4 mm. long,

1.4 mm. wide, the narrow ciliate wings continuous with the two strong lanceolate ciliolate flattened awns, these often lacerate-lobed on each side at base, and with one or two tiny attenuate squamelloid processes between them, unequal, up to 3.4 mm. long. — Cass. Bull. Soc. Philom. 1818. 58 (1818), as *brasiliana*; Baker in Mart. Fl. Bras. vi. pt. 3, 231 (1884). *Serpaea ovata* Gardn.! Lond. Journ. Bot. vii. 296 (1848). *Oyedaea ovata* (Gardn.) Benth. ex Baker in Mart. l. c. 207 (1884). — BRAZIL: GOYAZ: dry upland campos near Arrayas, 1840, Gardner 3852 (TYPE COLL. of *S. ovata*: BK, fragm. G). CULT.: Hort. Lisbon (photog. G, of type of *D. brasilianum* Cass. in hb. Juss.).

The date of collection of Gardner's no. 3852 is given by him (l. c.) as April; the Kew specimens however are labelled February, the one in the British Museum July.

Although the leaves of his *Dimerostemma brasiliana*(*anum*) are described by Cassini as alternate, they are shown by the photograph of the type to be opposite. The origin of Cassini's specimens is at present involved in some mystery. The only definitely known habitat for the species is Goyaz, where it was found by Gardner in 1840, and no collector is known to have entered that province before Martius in 1818 (see Urb. in Mart. Fl. Bras. i. pt. 1, 146). One species of *Dimerostemma*, *D. lippioides* of the provinces of Minas Geraes and São Paulo, was in cultivation at Lisbon as late as 1874 at least, as shown by a specimen in the Kew Herbarium, but this species, although growing in provinces which were visited by collectors in communication with Lisbon before the date of publication of Cassini's genus (1817), can by no means be identical with the plant in the herbarium of Jussieu on which Cassini's species was based, which can be identified only with *S. ovata* among the known species of the genus. It is probable that this species will later be found to have a much more extended range than is at present known.

6. *D. lippioides* (Baker), comb. nov. Suffrutescent, erect, branched in inflorescence, bearing 3–12 heads. Stem brownish, striate, strigose-pilose with ascending or somewhat spreading flexuous hairs with subtuberculate bases. Leaves opposite or those of inflorescence partly alternate, orbicular or orbicular-oval, obtuse or rounded at apex, truncate or truncate-rounded at base, crenulate-serrulate with 12–23 pairs of appressed teeth, triplinerved and reti-

culate below, above dull green, somewhat harshly and very densely tuberculate-hispidulous and strigose-pilose, beneath dully cinereous and densely hispidulous-pilosulous, gland-dotted between the hairs, 2.7–4.4 cm. long, 2–4 cm. wide, those of inflorescence smaller; petioles tuberculate-hispid-pilose, 2–5 mm. long. Heads 1.8–2.4 cm. wide, leafy-bracted at base (bracts 6–11 mm. long), on hispidulous and more or less hispid-pilose monocephalous peduncles 2–12.5 cm. long, naked or few-bracted; disk 7–(fruit) 12 mm. high, 9–(fruit) 17 mm. wide. Involucre (excluding the outermost foliaceous bracts) about 4-seriate, scarcely graduated, the outer 1–2 series herbaceous above the constricted base, obovate, obtusish, reticulate and pubescent like the leaves, the inner shorter, slightly graduated, oblong, obtuse, chartaceo-coriaceous, mucronulate, puberulous toward apex. Rays about 11, oblong, gland-dotted and sparsely pilose on back, 6–8 mm. long, 1.5 mm. wide; disk-corollas sparsely pubescent on the teeth, 3.5 mm. long (tube 1 mm.). Pales indurated, narrowly keeled, sparsely pubescent toward the acute apex, 6.5 mm. long. Achenes rather strongly compressed, blackish, glabrous, 4.5 mm. long, 3 mm. wide (including the broadish chartaceous-crustaceous sparsely ciliate wing), 1–2-nerved on the sides, the nerves sometimes produced into teeth and narrowly wing-margined, strongly 2-awned, the awns continuous with the wings, ciliate on edges and back, unequal, 1–2.5 mm. long, sometimes with a pair of ear-like ciliate lobes at base. — *Oyedeia lippoides* Baker! in Mart. Fl. Bras. vi. pt. 3, 208 (1884). — BRAZIL: MINAS GERAES: *Pohl* 571 (COTYPES: K); SÃO PAULO: near Jundiáhy, *Burchell* 4900 (COTYPE: K, fragm. G). CULT.: hb. Ferreira, ex Escola Polytechnica of Lisbon, 1874 (K).

III. NEW AND NOTEWORTHY COMPOSITAE, CHIEFLY MEXICAN.

BY S. F. BLAKE.

VERNONIA Schreb. sect. EREMOSIS (DC.) B. & H. Gen. Pl. ii. 231 (1873), ampl. — *Monosis* DC. sect. *Eremosis* DC. Prod. v. 77 (1836). *Vernonia* sect. *Trianthaea* DC. l. c. 23 (1836), in part. *Eremosis* (DC.) Gleason, Bull. N. Y. Bot. Gard. iv. 227 (1906). — In his revision of North American *Vernoniae* in 1906 Gleason raised DeCandolle's section *Eremosis* of *Monosis*, which has been

generally included in *Vernonia*, to generic rank, distinguishing the group from *Vernonia* by its inflorescence, the few (1-5)-flowered heads, and the frequently deciduous inner phyllaries. This separation, while possible if only the North American species of *Vernonia* are considered, breaks down completely if the whole range of variation in the genus is taken into view. Thus, there are several African species with deciduous inner phyllaries, constituting the section *Strobocalyx* as treated by Oliver & Hiern in the Flora of Tropical Africa, iii. 267 (1877). Some species of this section have 4-6-flowered, others many-flowered heads. In South America there are several species with 4-6-flowered heads, for instance *V. apiculata* Mart. and *V. hexantha* Sch. Bip., with persistent phyllaries and a habit and inflorescence utterly different from that of the species included by Gleason in *Eremosis*, which is said by him to be a strictly North American genus, although some of the African species are precisely similar in habit, inflorescence, involucre, and number of flowers. The lack of any definite concomitant characters by which *Eremosis* can be distinguished as a genus necessitates its inclusion as a section in *Vernonia*, and the following four species should be transferred to that genus. To comply with International Rules, Latin diagnoses are given of the new species described by Dr. Gleason.

VERNONIA Gleasoni, nom. nov. Fruticosa caule subsordide tomentuloso. Folia ovata vel elliptico-ovata acuta basi rotundata subintegra firma supra obscure viridia plus minusve praecipue ad venas tomentulosa et glanduloso-punctata subtus dense canescens centerque tomentosa, venis lateralibus ca. 10-jugis subrectis subtus prominentibus, 6.8-9 cm. longa 3.5-5 cm. lata, in petiolis 1-1.3 cm. longis insidentia; ea inflorescentiae minora. Capitula numerosa 4-flora in paniculis 5-8 cm. diametro ramulos terminantibus, inflorescentiam 2.3 dm. latam efficientibus. Involucri 5.5 mm. alti phyllaria exteriora ovata interiora oblonga vel elliptica decidua acuta ad apicem tomentulosa. Achenia breviter adscendenti-pilosa 3 mm. longa. Pappi albi biseriati series interior 8 mm. exterior ca. 1.3 mm. longa. — *Eremosis ovata* Gleason! Bull. Torr. Club xl. 331 (1913), without Lat. descr. — DURANGO: San Ramon, 21 April-18 May 1906, Palmer 139 (TYPE COLL.). — This very distinct species, whose name must be changed on account of the prior *V. ovata* Less. (1829), is renamed in honor of its original describer,

through whose efforts the North and Central American members of the tribe have been brought into a very satisfactory state of order.

VERNONIA leiophylla (Gleason), comb. nov. Frutex 3-5 m. altus. Caulis striatus glabratus glanduloso-adspersus. Folia alterna lanceolata vel elliptico-lanceolata utroque subacuminata vel acuta interdum obtusiuscula obscure serrulata supra viridia glabra (costa pilosula excepta) interdum glanduloso-adspersa subtus paullo pallidiora glabra (costa sparse pilosula excepta) vel sparse puberula dense glanduloso-adspersa 5-8.5 cm. longa 1.5-2.5 cm. lata, in petiolis pilosulis purpurascens nudis 5 mm. longis. Panicula pyramidalis 1.6 dm. diametro sparse appresseque puberula, capitulis numerosis ad 1.2 cm. altis 1-floris. Involueri ca. 5-seriati ad 6 mm. alti phyllaria albida (apice purpurascens excepto) margine sparse ciliata ceterum glabra submucronulata. Corolla immaturitate purpureo-suffusa maturitate ut videtur albida ca. 9 mm. longa. Achenium turbinatum dense vel subdense pilosum 1.3 mm. longum. Pappi albi series interior 6-7 mm. exterior 1 mm. longa. — *Eremosis leiophylla* Gleason! Bull. N. Y. Bot. Gard. iv. 231 (1906), without Lat. descr. — MORELOS: mountains above Cuernavaca, 2135 m., 5 Nov. 1895, *Pringle* 6188 (TYPE COLL.); Cuernavaca, 10 Jan. 1866, *Bimilek* 350; MICHOCAN or GUERRERO: abundant, Monte de la Pasa Cuareta, 24 Mar. 1898, *Langlassé* 72. — Local name "bara blanca," according to *Langlassé*.

VERNONIA melanocarpa (Gleason), comb. nov. Frutex. Caulis subflexuosus validus dense sordideque puberulus et glandulosus aetate subglabratus. Folia alterna ovalia vel elliptico-ovata basi cuneata leviter repando-denticulata dentibus mucronatis vel crenato-serrata supra obscure viridia subdense sordideque pilosula pilis demum deciduis eorum basibus glandulari-subtuberculatis persistentibus subtus dense sordido-canescensque pilosa et glanduloso-adspersa pilis laxis flexuosis 6-10.5 cm. longa 2.2-5 cm. lata in petiolis nudis 1.4-2.2 cm. longis. Panicula composita densa subovoidea 8-18 cm. longa 6-10 cm. diametro folioso-bracteata, capitulis aggregatis 3-floris 7-10 mm. altis. Involueri 5.5-7 mm. alti ca. 6-seriati phyllaria acuta pallida apice colorato excepto ad basin et apicem et in margine laxo sordideque pilosa ceterum subglabra. Corolla ut videtur albida ca. 6 mm. longa. Achenium maturitate brunneo-subpurpurascens vel brunneum glabrum subquadrangu-

lare 3 mm. longum. Pappi albi series interior 6 mm. longa, exterior ca. 1.5 mm. — *Eremosis melanocarpa* Gleason! Bull. N. Y. Bot. Gard. iv. 232 (1906), without Lat. descr. — VERA CRUZ: Mirador, *Liebmann* 1; l. c., 1853, *Sartorius*; CHIAPAS: limestone mountain slope above Huitzan, 10 Mar. 1896, *C. & E. Seler* 2127. GUATEMALA: Chupadera, Dept. Santa Rosa, 1525 m., May 1892, *Heyde & Lux* 3416 (TYPE COLL.).

VERNONIA mucronata, nom. nov. — *Monosis foliosa* Benth.! Pl. Hartw. 19 (1839). *Vernonia foliosa* (Benth.) Sch. Bip. Pollichia xviii.–xix. 161 (1861), not *V. foliosa* Gardn. Lond. Journ. Bot. v. 210 (1846). *Eremosis foliosa* (Benth.) Gleason, Bull. N. Y. Bot. Gard. iv. 228 (1906).

VERNONIA (Eremosis) chacalana, sp. nov. Frutex, caule subdense subsordideque appresso-puberulo et glanduloso-adsperso. Folia alterna elongato-lanceolata subacuminata basi acuta mucronato-serrata (dentibus 12–18-jugis parvis callosis) supra pallide viridia subsparse pubescentia pilis brevibus subpatentibus vel incurvatis eorum basibus glanduloso-subtuberculatis persistentibus subtus pallidiora prominulo-venosa (venis lateralibus majoribus ca. 15-jugis anastomosantibus) ad venas dense inter venas sparse pilosula pilis patentibus vel subpatentibus obscure pluriloculatis et dense glanduloso-adspersa ca. 15 cm. longa 3.3 cm. lata, in petiolis nudis dense puberulis pilis sordidis pluriloculatis 7–12 mm. longis. Panicula composita obtuse convexa sordide puberula ca. 9 cm. longa 12 cm. diametro, capitulis in pedicellis ultimis saepius 1.5–2.5 mm. longis insidentibus cylindrico-obconicis ca. 6 mm. longis 3-floris. Involucri 5 mm. alti ad 6-seriati phyllaria albida vel albido-brunnea in linea media et ad apicem viridescencia vel aetate purpurascencia obtusa vel subrotundata exteriora deltoideo-ovata interiora lanceolata margine minute glandulari-ciliolata et sparse piloso-ciliata prope apicem glanduloso-adspersa ceterum glabra subscarioso-coriacea. Corolla siccitate ut videtur pallide purpurascens parum glanduloso-adspersa ad 6 mm. longa. Achenium cylindrico-clavatum adscendenti-pilosum sparse glanduloso-adspersum 1.8 mm. longum. Pappi albi series interior ca. 4 mm. longa exterior ca. 1.4 mm. longa. — DURANGO: near Chacala, 23 Feb. 1899, *Goldman* 333 (TYPE in Gray Herb.). — Distributed as *V. salicifolia* (DC.) Sch. Bip., from which it is at once distinguishable by its 3-flowered heads. It is nearer *V. triflosculosa* HBK.,

but differs in the dense persistent spreading and subglandular pubescence of the veins of the under leaf-surface and in other features.

VERNONIA (*Eremosis*) **oolepis**, sp. nov. Frutex ramosus, caule fusco-brunneo-purpureo striato dense appresse sordideque pilosotomentoso demum subglabrato. Folia ovali-lanceolata vel subobovato-lanceolata utroque acuminata integra supra viridia glabra subtus dense sordideque pilosotomentosa venis subobscuris ca. 5-jugis omnino non reticulatis 6.5–7.3 cm. longa 2.6–3.2 cm. lata, in petiolis subtus tomentoso-pilosis 2–4 mm. longis. Paniculae polycephalae 6–8 cm. diametro, capitulis in pedunculis ultimis ca. 3–6-cephalis cymoso-paniculatis sessilibus vel brevissime pedicellatis 4-floris 10 mm. altis. Involuceri cylindrico-campanulati 6–7-seriati 5.2–5.5 mm. alti phyllaria coriacea pallida sub apice maculata et glandulosa subsordide piloso-ciliata ceterum subglabra apice rotundata extima deltoideo-ovata interiora gradatim longiora ovata intima anguste lanceolata decidua. Corollae glabrae 5.5–6 mm. longae. Achenia 6–sub-7-costata sparse pilosula brunneo-nigrescentia 3 mm. longa. Pappi aristae minute barbelatae albiae interiores 5.5 mm. longae exteriores 0.6–1 mm. longae. — YUCATAN: Izamal, 1886, *Gaumer* (TYPE in hb. Gray, being a fragm. ex hb. Field Museum).

From *V. Gleasoni* Blake (*Eremosis ovata* Gleason), the only other Mexican species with 4-flowered heads, the present plant may be quickly distinguished by its considerably smaller sessile or subsessile heads with obtuse phyllaries, and smaller differently shaped leaves with different pubescence and not venose beneath.

ELEPHANTOPUS hypomalacus, sp. nov. Perennis erectus 6 dm. altus et ultra. Caulis tenuis vel validus plus minusve tortuosus dense vel subdense subaspereque hispido-pilosus (pilis late patentibus vel adscendentibus rare subappressis basi paullum tuberculatis) foliosus, foliis caulinis 4–5. Folia late obovata vel oblongo-obovata acuta rare obtusa basi attentuata vel acuminata serrata (dentibus depresso-deltoideis mucronatis) subtus reticulato-venosa supra viridia incurvo-pilosa pilis longis et brevibus basi tuberculatis basibus persistentibus, subtus ad venas (praecipue ad costam) et venulas interdum inter venulas dense molliter subcanescenter patenti-pilosa et -pilosula et dense glanduloso-adspersa in basin am-

pliatam subscarioso-marginatam subamplectentem angustata vix petiolata dicenda, inferiora 17–21.7 cm. longa 6.5–9 cm. lata, media minora, superiora 5–8.5 cm. longa 1.5–3.8 cm. lata. Capitula in glomis 8–10 mm. altis 1.5–2.1 cm. diametro in pedunculis erectis vel divergentibus strigoso-pilosis vel dense patenterque hispido-pilosis 2.5–6.6 cm. longis aggregata. Bractee extimae 2–4 late ovatae acutae vel mucronatae herbaceae reticulatae 9–10 mm. longae; involucri proprii phyllaria 8, exteriora 4 lanceolata acuminata longiuscule mucronata scariosa 1-nervia nervo ad apicem viridi plus minusve hispido-piloso margine minute spinulosa ceterum glabra 3.5 mm. longa, interiora 4 lineari-oblonga acuminata supra subherbacea hispido-pilosa pilis basi glandulosis subtuberculatis ceterum exterioribus similia 8 mm. longa. Flores ca. 4; corolla glabra pallida 6 mm. longa (tubulo 4–4.3 mm.). Achenia submatura ca. 8-costata adscenderter pilosa 3.5 mm. longa virescentia. Aristae 5–6 margine denticulato-hispidulae 4–5 mm. longae in basin anguste subulato-lanceolatam 0.7–1 mm. longam basi ima 0.5 mm. latam sensim ampliatae. — TAMAULIPAS (?): on way to Tampico, 1878, *Palmer* 1120. JALISCO: rich copses near Magdalena, 12 Oct. 1893, *Pringle* 4588. GUATEMALA: San Felipe, Dept. Retalhuleu, 13 Jan. 1917, *Holway* 704. COSTA RICA: Orotina, ca. 180 m., 29 Dec. 1915, *Holway* 314 (TYPE in Gray Herb.). — This species has been confused with *E. mollis* HBK., from which it differs sharply in pappus characters, and with *E. carolinianus* Willd., under which species the first two collections above quoted were doubtfully included by Gleason in his revision of the genus. The large series of *E. carolinianus* at hand differs constantly in the pubescence of the leaves, these being sparsely spreading-pilose chiefly along the costa and major veins beneath. The West Indian plant, somewhat doubtfully referred to *E. carolinianus* by Gleason, is clearly that species and not the Mexican and Central American *E. hypomalacus*.

GNAPHALIUM lavandulaefolium (HBK.), comb. nov. — *Elichrysum lavandulaefolium* HBK.! Nov. Gen. iv. 86 (1820). *Gnaphalium lavandulaceum* DC. Prod. vi. 227 (1837). *Chionolaena lavandulaceum* B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 134 (1881). *C. lavandulifolium* B. & H. ex Hook. & Jacks. Ind. Kew. i. 516 (1893). — Not *Gnaphalium lavandulaefolium* Willd. Sp. iii. 1868 (1804), which is *Elichrysum lavandulaefolium* (Willd.) D. Don,

Mem. Wern. Soc. v. pt. 2, 550 (1826); DC. Prod. vi. 184 (1837), as *Helichrysum*. — *Gnaphalium lavandulaefolium* of Willdenow now being universally referred to *Elichrysum*, the name *Gnaphalium lavandulaefolium*, based on *Elichrysum lavandulaefolium* HBK., must according to the International Rules be taken up for the species which has been passing as *G. lavandulaceum*. It is now known from Mt. Orizaba (*Galeotti, Liebmann 307, Rose & Hay 5762*) and Costa Rica (*Oersted 278, Pittier & Durand 3430*). The two names the species has borne in the genus *Chionolaena*, while only of synonymic interest, serve to emphasize the uncertainty and undesirability of further burdening synonymy by publishing as of "Bentham & Hooker" combinations made only inferentially in their Genera Plantarum.

APLOPAPPUS PHYLLOCEPHALUS DC. Prod. v. 347 (1836). — *A. rubiginosus* T. & G. var. *phyllocephalus* (DC.) Gray, Syn. Fl. i. pt. 2, 130 (1884). *Aster phyllocephalus* (DC.) Ktze. Rev. i. 316 (1891). *Eriocarpum phyllocephalum* (DC.) Greene, Erythea iii. 15 (1895). *E. rubiginosum phyllocephalum* (DC.) Heller, Contr. Herb. Franklin & Marshall Coll. no. 1, 101 (1895.) *E. megacephalum* Nash! Bull. Torr. Club xxiii. 107 (1906).

Two varieties are recognizable, var. **genuinus** (*A. phyllocephalus* DC. l. c.), to which the above synonymy appertains, and

A. PHYLLOCEPHALUS DC. var. **rubiginosus** (T. & G.), comb. nov. — *A. rubiginosus* T. & G.! Fl. N. Am. ii. 240 (1842). *Eriocarpum rubiginosum* (T. & G.) Britton, Mem. Torr. Club v. 316 (1894); Greene, Erythea iii. 15 (1895). *Sideranthus rubiginosus* (T. & G.) Britton in Rydb. Bull. Torr. Club xxvii. 621 (1900). — The two varieties above named, although appearing very different in their extremes, seem so completely connected by intergradient specimens that they can not be specifically separated.

APLOPAPPUS SPINULOSUS (Pursh) DC. The problem of the interpretation of this polymorphous species would seem to be simplified by the recognition of several well-marked varieties of rather definite geographical range, as follows.

A. SPINULOSUS var. **genuinus**. Planta plus minusve tomentosolanata. Folia inferiora bi-subtripinnatifida, superiora pinnatifida segmentis linearibus latitudinem laminae multo superantibus. Involucrum plus minusve dense canescenterque lanato-tomentoso-pilosum, phyllariis haud vel non conspicuiter glandulosis. —

"*Sideranthus pinnatifidus* [Nutt. in] Fras. Cat. no. 81 (1813)," nomen, fide Greene, Pitt. ii. 118 (1890). *Amellus spinulosus* Pursh, Fl. Am. Sept. ii. 564 (1814). *Starkea ? pinnata* Nutt. Gen. ii. 169 (1818). *Sideranthus spinulosus* (Pursh) Sweet, Hort. Brit. ed. 1, 227 ("1827" = 1826). *Diplopappus pinnatifidus* Hook. Fl. Bor.-Am. ii. 22 (1834). *Aplopappus (?) spinulosus* (Pursh) DC. Prod. v. 347 (1836). *Dieteria spinulosa* (Pursh) Nutt. Trans. Am. Philos. Soc. N. S. vii. 301 (1841). *Aplopappus spinulosus* var. *canescens* Gray, Pl. Fendl. 75 (1849), nomen subnudum. — Minn. to Sask., south to Tex. and Ariz. — A few representative collections may be cited. — IOWA: *Pammel* 41. KANSAS: *Hitchcock* 222 in part (Ottawa Co., 9 Jul. 1905), 802. MONTANA: *Sandberg, MacDougal & Heller* 1000. COLORADO: *Clements* 61. WYOMING: *A. Nelson* 456, 8073; *Merrill & Wilcox* 1173. TEXAS: *Reverchon* (distr. *Curtiss* 1358*). NEW MEXICO: *Fendler* 394, 546 (toward var. *turbinellus*).

Gray's *A. spinulosus* var. *canescens*, which can only be considered a nomen subnudum, was based on *Fendler* 355, which I have not been able to find at the Gray Herbarium. It was referred to as "dwarf, more hoary than in the ordinary plant from which I cannot separate it. It is the same as the *A. (Blepharodon) Coulteri*, Harv. & Gray, ined., from Calif." *Coulter* 276 (manuscript type of *A. Coulteri*) is however var. *turbinellus*, while *Palmer* 606 (anno 1876), later labelled *A. Coulteri* by Gray, is *A. gracilis* (Nutt.) Gray. No sharp line can be drawn between this and the three following varieties.

✓ *A. SPINULOSUS* var. *turbinellus* (Rydb.), comb. nov. Tota planta minus pubescens interdum subglabra, plus minusve glandulosa. Folia ut apud var. *genuinum*. Involucrum non pubescens sed dense glandulosum. Ceterum ut apud var. *genuinum*. — *A. spinulosus* var. *glaber* Gray, Pl. Fendl. 75 (1849), nomen; Pl. Wright. i. 97 (1852), nomen subnudum. *Sideranthus puberulus* Rydb. Bull. Torr. Club xxvii. 622 (1900). *S. turbinellus* Rydb. ! l. c. (1900). — The following specimens illustrate this variety. — IDAHO: *Pocatello*, 31 Aug. 1892, *A. I. Mulford* (TYPE COLL. of *S. turbinellus*). CALIFORNIA: *Coulter* 276 (manuscript TYPE of *A. Coulteri*); *Mohawk Pass, Maricopa, Newberry*. ARIZONA: *Diamond River, Newberry*. NEW MEXICO: *Wright* 1189 p. p.; near *Silver City*, 2 June 1890, *Greene* 115. TEXAS: *Rio Grande*, July 1834, *Berlandier*

2390; Rio Grande, 1848, *Wright* 290. COAHUILA: hills near Diaz, 210 m., 1900, *Pringle* 8315.

Fendler 354, basis of Dr. Gray's scarcely defined name *glaber*, I have not been able to find in the Gray Herbarium. *Fendler* 394, also referred to this name by Dr. Gray, is an intermediate nearer var. *genuinus*. *Wright* 1190 is an intermediate connecting this variety with var. *scabrellus*.

✓ *A. SPINULOSUS* var. **glaberrimus** (Rydb.), comb. nov. Caulis ut folia glaber vel subglaber vel subglabratus (sed glandulosus). Involucri phyllaria glabra margine ciliato vel glanduloso vel glanduloso-ciliolato excepto. Ceterum ut apud var. *genuinum*. — *Sideranthus glaberrimus* Rydb. ! Bull. Torr. Club xxvii. 621 (1900). *S. spinulosus* var. *glaberrimus* (Rydb.) A. Nels in Coulter & Nelson, Man. Bot. Rocky Mts. 499 (1909). — S. D. to Wyo. and Tex. A few representative collections may be cited. — KANSAS: *Shear* 194; *Hitchcock* 222 in part (Hamilton Co., 2 Aug. 1905). NEBRASKA: *Clements* 2718; Middle Loup River near Theford, 19 Aug. 1893, *Rydberg* 1403 (TYPE COLL.). OKLAHOMA: *Huntsville*, 30 May 1896, *L. A. Blankinship*. TEXAS: *Heller* 1858; sandy soil on the Llano, Aug. 1848, *Lindheimer* (fasc. IV.). — *Lindheimer's* plant is noteworthy for its very narrow leaf-segments.

✓ *A. SPINULOSUS* var. **scabrellus** (Greene), comb. nov. Caulis ut folia glabratus vel subglabratus vel subcanescenter piloso-hispidus pilis patentibus brevibus et plus minusve glandulosus non lanato-pilosus. Folia inferiora pinnatifida segmentis oblongis integris vel pinnatifidis latitudinem laminae non superantibus, media et superiora lineari-oblonga dentata dentibus deltoideis brevissimis integris vel subdentatis. Involucrum dense glandulosum, phyllariis apice breviter herbaceis saepe patentibus vel reflexis. — *Eriocarpum scabrellum* Greene ! *Erythea* ii. 108 (1894). *E. serratum* Greene, Bull. Torr. Club xxv. 119, t. 331, f. 3-4 (1898). — Chiefly Mexican. — COLORADO: *Baker* 79. TEXAS: *Tracy & Earle* 35a. NEW MEXICO: *Metcalf* 83, 1373; *J. Skehan* 72; *Wooton* 32. LOWER CALIFORNIA: La Paz, 1890, *Palmer* 17; La Paz, *Brandegee*; foothills, Los Angeles Bay, Dec. 1887, *Palmer* 539 (TYPE COLL. of *E. scabrellum*). CHIHUAHUA: *Palmer* 49 (anno 1908); *E. Stearns* 83. COAHUILA: *Nelson* 3928; *Purpus* 4478; *Gregg* 5, 6; *Palmer* 62 (anno 1898). NUEVO LEON: *Palmer* 474 (anno 1880). DURANGO: *Palmer* 278 (anno 1896), 587 (anno

1898), 307 (anno 1906). ZACATECAS: *Kirkwood* 100; *Palmer* 373 (anno 1902). SAN LUIS POTOSI: *Parry & Palmer* 374. GUANAJUATO: *Duges* 9 (anno 1904). Mexico, without locality, *Schiede* 1527 (hb. Berol.); between San Pedro Tlalilpan and Huehuetoca, June 1831, *Schiede* 1522, 1523 (hb. Berol.). — At first sight seemingly very distinct, but too intimately connected with the typical form and var. *turbinellus* for specific separation. *Wright* 294 (valley of the Rio Grande, 60–70 miles below El Paso), referred to *A. gracilis* as a “more glabrate and less setigerous variety” by Gray (Pl. Wright. i. 98) shows a gradual passage to the form with nearly all leaves entire and not spinulose, and long small-leaved mostly one-headed flowering branches, exemplified by *Mexican Boundary Survey under Emory* 509a (hb. Berol.). The receptacle is often prominently chaffy-fimbriate.

According to Gregg, the plant is known as “Yerba de vibora” by the Mexicans and used for stomach and uterine disorders. Palmer says that it is sold in the markets of Coahuila as a blood purifier under the name “Yerba de la vivosa,” but the latter name is perhaps incorrectly transcribed.

Eriocarpum australe Greene, *Erythea* ii. 108 (1894) (*Sideranthus australis* (Greene) Rydb. Bull. Torr. Club xxvii. 621 (1900)), is as to distributed specimens so named by Greene himself a mixture of var. *scabrellus*, var. *turbinellus*, and various intermediate specimens. Some other described species of this affinity may be referable to the form-series of *A. spinulosus*, but material for their exact determination has not been available.

APLOPAPPUS STOLONIFERUS DC. Prod. v. 349 (1836).—*Inula stolonifera* C. Gay ex DC. l. c. as syn. *Aster stolonifer* (DC.) Ktze. Rev. Gen. i. 318 (1891). *Osbertia stolonifera* (DC.) Greene, *Erythea* iii. 14 (1895).—Three varieties of this plant may be distinguished, as follows:

Var. **genuinus**. — *A. stoloniferus* DC. l. c. — Caulis bracteatus sed vix foliatus.

Var. **Heleniastrum** (Greene), comb. nov. — *Erigeron Heleniastrum* Greene! *Erythea* i. 150 (1893). *Osbertia Heleniastrum* Greene, l. c. iii. 14 (1895). — Caulis foliis 3–9 plus minusve reductis donatus. — I am unable to follow Dr. Greene in referring this plant to *Erigeron*, still less in distinguishing it generically from both *Erigeron* and *Aplopappus*. The golden rays would not in themselves

be considered sufficient to prohibit the reference of the plant to *Erigeron*, but the form of the style-tips here enters in to confirm its reference to *Aplopappus*. The style-branches are provided with a conical acuminate hispid-ciliate appendage like that found in its near relative *Aplopappus Brandegei* Gray (*Erigeron aureus* Greene), which is not known in *Erigeron*.

Var. **GLABRATUS** Coult. ! Bot. Gaz. xvi. 98 (1891). — *Osbertia Heleniastrum* Greene var. *glabrata* (Coult.) Greene, Erythea iii. 14 (1895); var. ? *scabrella* Greene ! l. c. — Folia vix pubescentia sed glandulosa. Caulis abbreviatus bracteatus non foliatus dense glandulosus sparsissime pilosus. Involucrum parce pilosum et glandulosum.

ERICAMERIA Nelsonii (Fernald), comb. nov. — *Bigelowia Nelsonii* Fernald ! Proc. Am. Acad. xxxvi. 505 (1901). — A radiate species, referable to *Ericameria* as these genera are now taken. *E. Nelsonii*, which is still known only from Nelson 6494 from the Chihuahuan Sierra Madre, is nearest to *E. pinifolia* (Gray) Hall, but distinct in its narrower phyllaries and various other characters.

ERICAMERIA parrasana, sp. nov. Frutex ramosus caule tenui cortice griseo glabro donato, ramulis juventate viridibus dense papilloso-glandulosis viscosis non puberulis dense foliosis. Folia alterna creberrima omnino non fasciculata linearia mucronulata ut ramuli punctata et viscosa complanata supra subplana vel paullum concava subtus subconvexa sessilia 6–9 mm. longa 0.6–0.9 mm. lata. Capitula hemisphaerica ramulos foliosos breves 0.6–2.3 cm. longos terminantia 1.7 cm. lata; discus 6–8 mm. altus 8–(fructu) 11 mm. latus. Involucri 3-seriati paullulum gradati 3.5–4 mm. alti phyllaria anguste oblonga vel oblongo-lanceolata acuta non mucronata praecipue supra glandulari-viscosa ceterum subglabra infra valde indurata coriacea albida apice appendice appressa subherbacea lanceolata munita. Radii flavi (siccitate subalbescentes) ca. 10 fertiles ovaes 5 mm. longi 3 mm. lati apice tridenticulati; corollae disci flavae ca. 25 glabrae 4 mm. longae, tubulo in fauces campanulato-infundibuliformes sensim ampliato, dentibus 5 oblongo-ovatis acutiusculis ad 1.6 mm. longis. Receptaculum alveolatum. Achenia radii subtrigona disci turbinata paullum compressa densissime sericeo-pilosa ad 1.3 mm. longa. Pappi aristae ad 80 paullum inaequales non regulariter gradatae hirtellae ad 3.8 mm. longae. Styli rami elongato-lineares longe

exserti obtusi non appendiculati in dorso hispidulo-puberuli. — COAHUILA: rocky slopes, Sierra de Parras, Mar. 1905, *Purpus* 1005 (TYPE in Gray Herb.). — Distributed as *Aplopappus laricifolius* var., but that species has small more or less turbinate heads and different involucre. In shape of heads *E. parrasana* is more nearly related to *E. pinifolia* (Gray) Hall, but it is very distinct from that species and from *E. Nelsonii* (Fernald) Blake in involucre characters.

ERIGERON (*Caenotus*) BONARIENSIS L. This wide-ranging weed has by nearly all authors been maintained as distinct from *E. linifolius* Willd. As shown by abundant material in the Gray Herbarium, the introduced plant of the Old World and of the south-eastern United States has almost always been distributed as *Erigeron linifolius* or as *Conyza ambigua* DC., one of its accepted synonyms, while the plant of Mexico and Central and South America has quite as regularly been called *E. bonariensis* L. The origin of this treatment is doubtless to be sought in the habitats attributed to the two supposed species by their describers, *E. bonariensis* L. having been based on a plate of Dillenius (Hort. Elth. 344, t. 257) representing a plant grown from seed from Buenos Ayres, while *E. linifolius* Willd. was described as a garden weed of Europe of unknown nativity, and its synonym, *Conyza ambigua* DC., from artificial prairies about Nismes and Montpellier, growing with *E. canadensis*. Prolonged study of the large series representing both names in the Gray Herbarium has failed to show any conclusive differential characters. Neither in color of pappus, pubescence of stems, leaves, or involucre, shape or cutting of leaves, nor in number of florets can any concomitant characters be found. The number of hermaphrodite flowers in heads of *E. bonariensis* chosen at random varies from 7–18, that of the female florets from 90–280; in specimens typical of *E. linifolius* the same numbers run from 8–9 and 124–180 respectively. The shape of the leaves is extremely variable, but a specimen from Buenos Ayres, type locality of *E. bonariensis*, collected by Bacle and typifying the *E. bonariensis* of the Prodromus, is absolutely indistinguishable in foliar or other characters from *E. linifolius*.

Although there can be little doubt of the identity of *E. bonariensis* and *E. linifolius* when careful comparison is made of a full series of the two supposed species, there are certain variations

which call for recognition. All the Mexican and Central American material examined has a pale straw-colored pappus, while most of the material from other localities has a pappus distinctly tinged with buffy or reddish-brown. Several South American specimens, however, even from Brazil, show a pappus identical in color with that of the Central American plants, which for the rest does not differ in number or length of setae from that of specimens from other localities. Much of the Central American material has distinctly larger leaves than the other specimens, and slightly less hispid involucre, but these differences are by no means constant. These Central American specimens lead to a form, apparently most common in Central America but occurring also south to Brazil, and seemingly well worthy of recognition in nomenclature, in which the involucre is entirely glabrous, although in all other respects these specimens seem identical with the common Central American series. The identity and distribution of the forms here treated may be summarized thus.

ERIGERON BONARIENSIS L. Sp. ii. 863 (1753), as *bonariense* (typical form). — *E. linifolium* Willd. Sp. iii. 1955 (1804). *Conyza ambigua* DC. Fl. Fr. Suppl. vi. 468 (1815); Prod. v. 381 (1836). *Conyza albida* Willd. ex Spreng. Sys. iii. 514 (1826). *Erigeron ambiguus* (DC.) Sch. Bip. in Webb & Berth. Phyt. Canar. ii. 208 (1836–50). *E. albidum* (Willd.) Gray, Proc. Am. Acad. v. 319 (1861–62). *Conyzella linifolia* (Willd.) Greene, Fl. Francis. 386 (1897). *Leptilon linifolium* (Willd.) Small, Fl. S. E. U. S. ed. 1. 1231 (1903). *Leptilon bonariense* (L.) Small, l. c. (1903). — Other synonyms often cited are omitted as more or less doubtful. — A native of South America (Buenos Ayres), now spread over the Old World, Central America, the southeastern U. S. (N. J. to Fla.), and Calif. — Primarily distinguished from *E. canadense* by its larger heads, 4.5–6 mm. high.

E. BONARIENSIS L. var. *leiothecus*, var. nov. Involucrum glabrum ca. 3-seriatum 4–6 mm. altum. Caulis ut folia lanceolata vel oblanceolata quam in vulgari speciei forma multo glabrior. — GUATEMALA: San Rafael, Dept. Guatemala, 2135 m., 8 Jan. 1915, *E. W. D. Holway* 39 (TYPE in Gray Herb.); San Miguel Uspantán, 1830 m., Apr. 1892, *Heyde & Lux* 3371; Coban, 1310 m., May 1886, *Tuerckheim* 393. COSTA RICA: pastures near Alajuelito, 1894, *Tonduz* (distr. *Pitt. & Dur.* 8894).

ST. VINCENTS: top of the Lonfrère (?) Volcano, 610–915 m., June, *H. H. & W. G. Smith* 1931. VENEZUELA: Tovar, 1980 m., 1854–55, *Fendler* 669. BRAZIL: *N. W. Schroeder*. — Not to be sharply separated from the typical form of the species.

E. BONARIENSIS L. forma *FILIFOLIUS* Chod. ! Bull. Herb. Boiss. ser. 2, iii. 714 (1903), as *filifolia*. — A peculiar form, based on *Hassler* 7023 from Paraguay, in which the involucre is as in var. *leiothecus* but the leaves very numerous, linear (1.5 mm. wide or less) and sparsely hispid-ciliate, the stem sparsely hispid-pilose. A plant from Rio Negro, Northern Patagonia, collected by the Wilkes Expedition, and identical except for the undoubtedly purely individual feature that its lower leaves are slightly broader and bear 2–4 narrow lateral lobes, was labelled by Dr. Gray *E. spiculosus* H. & A. var. *minor* Hook. fil. (Fl. Antarc. ii. 307 (1847)). The plant is worthy of further study. *E. spiculosus* H. & A. var. *glabellus* H. & A. Comp. Bot. Mag. ii. 49 (1836), nomen, is referred by J. D. Hooker l. c. to *E. alpinus*.

ERIGERON GNAPHALIOIDES HBK. This species has become rather badly confused in herbaria not only with one or two near relatives, but also with the at least technically very distinct *Conyza gnaphalioides* HBK. The following citation of specimens and essential characters will it is hoped lead to a clearer understanding of this puzzling group.

ERIGERON GNAPHALIOIDES HBK. Nov. Gen. iv. 88, t. 331 (1820). — Female florets with distinct ligules; achene pale yellowish-white, nerved on the margins, sparsely appressed-pubescent; pappus subsimple, the outer setae few and short. — CHIHUAHUA: *Pringle* 560. DURANGO: *Palmer* 803 (anno 1896). JALISCO: *Palmer* 561 (anno 1886); *Pringle* 2449. SAN LUIS POTOSI: *Parry & Palmer* 402. MICHOACAN: *Pringle* 13549. CHIAPAS: *Ghiesbreght* 538 p. p.

CONYZA GNAPHALIOIDES HBK. Nov. Gen. iv. 73, t. 327 (1820) — *Laennecia gnaphalioides* (HBK.) Cass. Dict. Sci. Nat. xxv. 92 (1822); DC. Prod. v. 376 (1836). *Stenactis gnaphalioides* (HBK.) Cass. Dict. Sci. Nat. l. 484 (1827). *Heterochaeta ? gnaphalioides* (HBK.) DC. Prod. v. 282 (1836). *Heterochaeta stricta* Benth. ! Pl. Hartw. 206 (1845). *Erigeron (Eschenbachia) niveum* Sch. Bip. ! Bull. Soc. Bot. Fr. xii. 81 (1865), and Linn. xxxiv. 534 (1865–66), nomen, ex numero. *Conyza evacioides* Rusby ! Bull. N. Y. Bot.

Gard. iv. 385 (1907). — Female flowers all tubular, the corolla about $\frac{3}{5}$ as long as the style; achene yellowish-brown, ciliate on the unnerved edges, sparsely short-pubescent down the middle of the sides; pappus double, the inner bristles very easily deciduous, 3.5–4 mm. long, the outer very short (0.5 mm. long), persistent, not broader than the inner. — CHIHUAHUA: *Pringle* 1274; *Palmer* 404 (anno 1885). DURANGO: *Palmer* 953 (anno 1896), 157 (anno 1902). SAN LUIS POTOSI: *Schaffner* 218 (distr. *Vigener* 659). Mexico without locality: 1835, *Ehrenberg* (hb. Berol.). COLOMBIA: *André* 3162; *Holton*. ECUADOR: *Hartweg* 1145 (TYPE COLL. of *H. stricta*). BOLIVIA: *Mandon* 221 (TYPE COLL. of *E. niveum*); *Bang* 1875 (TYPE COLL. of *C. evacioides*).

CONYZA FILAGINOIDES (DC.) Hieron. Bot. Jahrb. xxviii. 588 (1901). — *Laennecia filaginoides* DC. ! Prod. v. 376 (1836). — Female flowers all tubular, corolla about half as long as style; achene silky-pilose; pappus double, persistent, the inner setae about 2.5 mm. long, the outer similar, rather numerous, 1 mm. long. — CHIHUAHUA: *Pringle* 634. DURANGO: *Palmer* 697, 954 (anno 1896). SAN LUIS POTOSI: *Schaffner* 216; *Parry & Palmer* 400. GUANAJUATO: *Dugès*. STATE OF MEXICO: *Berlandier* 820 (TYPE COLL.); *Purpus* 1830; *Pringle* 7186, 7976, 11505. PUEBLA: *Pringle* 9521. HIDALGO: Mineral del Monte, *Ehrenberg* 340 (hb. Berol.), 452 p. p. (hb. Berol.). CHIAPAS: *Ghiesbreght* 538 p. p. COLOMBIA: *Lehmann* 3684. ECUADOR: *Bonpland*, *Jameson* 647, *André* 3574 (all from Quito).

ERIGERON KARVINSKIANUS DC. Prod. v. 85 (1836), as *Karvinskianum*. — *E. mucronatum* DC. l. c. *E. trilobum* Sonder, Hamburger Gart.-Blum.-Zeit. xii. 78 (1856), as to plant, not syn. — No distinctive characters are mentioned by DeCandolle in his diagnosis of the above two species that are not shown by the large series of specimens at hand to be of no value, and their union seems necessary. Although the name *E. mucronatus* (*mucronatum*) has been most used by botanists, it seems desirable to adopt where possible in such cases the name having anteriority of position, which in this case is *E. Karvinskianus*. The error through which Sonder was led to adopt for this plant, then cultivated in European gardens, a name based on the Australian *Brachycome triloba* of Gaudichaud (Voy. Freyc. Bot. 467 (1830); *Vittadinia*

triloba DC. Prod. v. 281 (1836)) was long ago corrected by Dr. Gray (Proc. Am. Acad. v. 117 (1861-62)).

ERIGERON microglossus, sp. nov. Planta annua e basi sparse vel valde ramosa, caulibus vel ramis adscendentibus vel subprocumbentibus 6-21 cm. longis pallidis valde lanato-tomentosis. Folia alterna oblanceolata vel anguste oblonga apice obtusiuscula quoque latere dentibus 4-7 oblongis vel deltoideis obtusiusculis praedita lanato-tomentosa caulina basi paullum angustata sessilia paullum decurrentia 1.8-2.5 cm. longa 3.5-7 mm. lata, infima in petiolum 1.5-2 cm. longum sensim angustata 4.5 cm. longa (petiolo incluso). Capitula pauca (3-4) ad apicem caulis subaggregata vel numerosa et racemoso-paniculata subsessilia vel in pedicellis usque ad 1 cm. longis subhemisphaerica 4-4.5 mm. alta 5-7 mm. crassa. Involucri 3.5-4 mm. alti 3-seriati paullum gradati phyllaria lineari-lanceolata attenuata appressa apice plus minusve purpurascencia margine scariosa in costa viridi pilosa pilis laxis multiloculatis basi glandulosis ad apicem plus minusve purpureoglandulosa et ad basin plus minusve floccoso-tomentosa. Flor. fem. numerosi 3-4-seriati, corolla minute ligulata; tubus albidus tenuis ca. 2.3 mm. longus; ligula ovalis apice 2-lobata erecta ca. 0.3 mm. longa albida vel purpurascens; achenia ovalia compressa albescentia subdense appresse hispidula 1.2 mm. longa; pappus exiguus simplex 2.2 mm. longus. Flor. hermaph. pauca (ca. 10), corolla 2.5 mm. longa pappum paullo superante. — SAN LUIS POTOSI: mountains near San Miguelita, Aug. 1876, *Schaffner* 215 (TYPES in Gray Herb., hb. Berlin); without definite locality, 1878, *Parry & Palmer* 424 (Gray Herb.). — The specimen of Schaffner's in the Berlin Herbarium (included in a collection now at the Gray Herbarium on loan) is dated 1879 and numbered 656 of Vignier's distribution, but as the number 215 is also written on the label under Schaffner's name it is probably of the same collection as the plant in the Gray Herbarium. The species, although of conyzoid appearance, is technically a true *Erigeron* in the possession of a definite although minute ligule.

ERIGERON notobellidiastrum (Griseb.), comb. nov. — *Conyza* (*Coenotrophium*) *notobellidiastrum* Griseb. Abh. Ges. Wiss. Goett. (Symb. Fl. Arg.) xxiv. 177 (1879); Baker in Mart. Fl. Bras. vi. pt. 3, 34, t. 13 (1882). *Erigeron paucifolius* Less. ex Baker l. c. as syn.

— This species, having the outer flowers ligulate, must be transferred to *Erigeron*. *Conyza notobellidiastrum* var. *oblongifolia* Griseb., l. c. 178, I have not been able to examine, but from description it does not seem a form of much significance.

ERIGERON OBTUSUS (HBK.) Gomez, Anal. Hist. Nat. Madrid xix. 272 (1890), as *obtusum*. — *Conyza obtusa* HBK. Nov. Gen. iv. 71 (1820). — A true *Erigeron* of the conyzoid group, related to *E. variifolius* (see beyond).

ERIGERON SCHIEDEANUS Less. ! Linn. v. 145 (1830), as *Schiedeanum*. — *Conyza subdecurrens* DC. Prod. v. 379 (1836). *Erigeron subdecurrens* (DC.) Gray in Torr., Bot. Mex. Bound. 78 (1859), as to syn. only; Sch. Bip. ex Gray, Syn. Fl. i. pt. 2, 220 (1884). *Leptilon integrifolium* Woot. & Standl. Contr. U. S. Nat. Herb. xvi. 183 (1913). — Fragments and a tracing of the type of *E. Schiedeanus* (*Schiede* 314, Llanos de la Perote, Sept. 1828), brought by Dr. Greenman some years ago from the Berlin Herbarium, prove it to be identical with the plant which has been called *E. subdecurrens*.

ERIGERON variifolius, nom. nov. — *Conyza coronopifolia* HBK. Nov. Gen. iv. 70 (1820), not *E. coronopifolius* Schrank, Denkschr. Bot. Ges. Regensb. ii. 69 (1822). ? *C. hispida* HBK. l. c. 71, not *E. hispidus* Baker in Mart. Fl. Bras. vi. pt. 3, 29 (1882). — This common Mexican species, having ligulate outer female florets, must be referred to *Erigeron*, which has already been done by Schultz Bipontinus in herb., but under an untenable name. Forms with spatulate or spatulate-oblongate entire or subentire leaves, such as *Ehrenberg* 873, from near Hacienda del Carmen (hb. Berol.), have been distinguished by Schultz as a variety under an unpublished name, but the differences are at most only formal.

CONYZA mima, sp. nov. Annuæ erecta simplex vel sparse ramosa 8.5–21 cm. alta. Caulis tenuis purpurascens lanato-tomentosus pilis laxis albidis. Folia anguste oblonga vel sublinearia ad apicem pectinate 3–5-denticulata dentibus calloso-mucronulatis basi sessilia paullum decurrentia paullum revoluta utrinque viridia lanata pilis subdeciduis basi glandulosis 18 mm. longa 3 mm. lata vel minora. Capitula numerosa in racemis brevibus densis axillaribus et terminalibus paene e basi plantae orientibus 2.7 cm. longis vel brevioribus paniculam densam virgatam efficientibus, singula hemisphaerica 4 mm. alta 5 mm. crassa. Involucri 4 mm. alti 3-seriati paullum gradati phyllaria lineari-lanceolata attenuata

appressa in medio dorsi laxe hispido-pilosa sicca margine scariosa in costa viridia basi obscure rubescentia. Flor. fem. ca. 56 ca. 3-4-seriati; corolla albida tubulosa apice oblique 2-3-denticulata 2 mm. longa, stylo 3 mm. longo valde exserto; achenia brunnea valde compressa in margine nervosa sparse appresse pubescentia 1 mm. longa; pappus exiguus 1-seriatus 2.2 mm. longus. Flor. hermaph. ca. 6; corolla 3 mm. longa tubo tenui ad 2 mm. longo, faucibus lutescentibus infundibularibus 5-dentatis, dentibus oblongo-ovatis acutiusculis ad 0.7 mm. longis. — VENEZUELA: Paramo de Mucuchiee (Mucuchies), Oct., Moritz 1404 in part (TYPE: hb. Berol.) — Labelled as a *Gnaphalium* in the Berlin Herbarium. The species is named from its great resemblance to *Erigeron subspicatus* Benth., a resemblance so close that except in the technical characters of the head the two species can scarcely be distinguished.

CONYZA SOPHIAEFOLIA HBK. Nov. Gen. iv. 72, t. 326 (1820). — *C. Coulteri* Gray var. *tenuisecta* Gray! Syn. Fl. i. pt. 2, 221 (1884). *Eschenbachia tenuisecta* (Gray) Woot. & Standl. Contr. U. S. Nat. Herb. xvi. 186 (1913). — Gray's var. *tenuisecta* of *Conyza Coulteri* is, as Wooton & Standley have well pointed out, sufficiently distinct from *C. Coulteri*, but they have overlooked its identity with *C. sophiaefolia* HBK., a fact long ago suspected by Dr. Gray, who has marked on his type sheet "an *C. sophiaefolia*."

POLYMNIA MACULATA Cav. Icon. iii. 14, t. 227 ("1794" = 1795). The rather extensive material of this species in the Gray Herbarium can be divided by characters of pubescence into three groups, quite distinct in their extremes but connected by intergradient specimens in such a way that they are best ranked as varieties.

Var. **vulgaris**. Rami hispido-pilosi et sparse glandulosi. Folia subtus viridia subdense vel subsparse hispido-pilosula et -pilosa. — VERA CRUZ: Orizaba, *Botteri* 237; Cordoba, *Seaton* 420; Wartenberg, *Ervendberg* 286. MICHOACAN: Patzcuaro, *Pringle* 3326, *Holway* 3598. STATE OF MEXICO: Rio Hondo Cañon, *Holway* 3562. CHIAPAS: *Ghiesbreght* 106. GUATEMALA: *Tuerckheim* 1105, 8427, II. 1334; *J. D. Smith* 2384, 2863; *Holway* 62, 553; *Deam* 236; *Heyde & Lux* 6161. BRITISH HONDURAS: *Peck* 875. COSTA RICA: *Pittier* 4923.

Var. **hypomalaca**. Rami hispido-pilosi et plus minusve glandulosi. Folia subtus dense canescenterque vel subcanescenter pilosula pilis appressis. — VERA CRUZ: Boca del Monte, *Purpus* 3024.

MICHOACAN: Santa Maria near Morelia, 1910, *Arsène*. STATE OF MEXICO: Santa Fe, *Bourgeau* 596; barranca above Santa Fe, 2590 m., 1 Sept. 1905, *Pringle* 13564 (TYPE in Gray Herb.). Mexico without locality: *Schmitz* 250.

Var. *adenotricha*. Rami dense glandulosi glandulis pedicellatis et sparse hispido-pilosi. Folia subtus viridia glanduloso-adspersa et subsparse pubescentia. — SAN LUIS POTOSI: near Tancanhuitz, *Nelson* 4401. VERA CRUZ: Mirador, *Sartorius*; Zacuapan, *Purpus* 2853. CHIAPAS: near Ocuilapa, 1035–1160 m., *Nelson* 3040. GUATEMALA: Chupadero, Dept. Santa Rosa, 1525 m., Aug. 1892, *Heyde & Lux* 3807 (TYPE in Gray Herb.). COSTA RICA: Cartago, 1295 m., *J. J. Cooper* (distr. *J. D. Smith*) 5827; San Rafael de Cartago, 455 m., *Pittier* 6993.

The original plant of Cavanilles, judging from his description and figure, was referable to the var. *vulgaris* above named. *Holway* 3054, from Mexico City, and *Berlandier*, without number or habitat, are more or less intermediate between var. *hypomalaca* and var. *adenotricha*.

Schizoptera lyrata Klatt! Ann. Naturh. Hofmus. Wien ix. 360 (1894). The type collection of this species, *Schmitz* 609, now in the Gray Herbarium, is identical with *DUGESIA MEXICANA* Gray, Proc. Am. Acad. xvii. 216 (1882), with which it was identified some years ago by Drs. Robinson and Greenman, although no published record seems to have been made of the fact. The only true member of the genus is the original species, *Schizoptera peduncularis* (Benth.) Blake in Hook. Icon. xxxi. t. 3058 (June 1916), of which *S. trichotoma* Turcz. is a synonym.

GRYPOCARPHA Greenm. Trees & Shrubs i. 145, t. 73 (1903). — *Sanvitaliopsis* Sch. Bip. ex Benth. & Hook. Gen. Pl. ii. 357 (1873), as syn. (*Zinnia*); O. Hoffm. Nat. Pflanzenfam. iv. pt. 5, 225 (1890), as syn.; Greenm. Proc. Am. Acad. xli. 260 (1905). — According to the International Rules of Nomenclature, the name to be used for this genus is the one given above. *Sanvitaliopsis*, a manuscript name used by Schultz in the Liebmann *Compositae* (no. 552), was never published until given by Bentham & Hooker as a synonym of *Zinnia*, and again used in synonymy by Klatt and later by O. Hoffmann, always as a synonym of *Zinnia*. Such publication does not validate a genus, and the name must give way to that of *Grypocarpa*, properly published by Greenman in 1903. The adop-

tion of *Sanvitaliopsis* by Dr. Greenman in place of *Grypocarpa* in 1905, before the International Rules were in force, can not affect the validity of the name. The three known species are:

GRYPOCARPHA Liebmannii (Klatt), comb. nov. — *Zinnia Liebmannii* ["Benth. & Hook."] Klatt! Leopoldina xxiii. 89 (reprint 2) (1887). *Sanvitaliopsis Liebmannii* Sch. Bip. ex Klatt l. c., as syn.; Greenm. Proc. Am. Acad. xli. 261 (1905). — The proper authority for the specific name of this species would seem to be that of Klatt, who first described the plant. The authority for the name given by Klatt has of course no real existence, as is the case with so many others of the names currently ascribed to Benth. & Hooker; and since the manuscript name used by Schultz Bipontinus was published only in synonymy, a proper interpretation of the International Rules regarding synonyms leads to its neglect. The only known collection of this species has been the original, that by Liebmann (no. 552), at Rio Taba, in Oaxaca (?); but to it is clearly referable Heyde & Lux 3815, from Santa Rosa, Guatemala, which was distributed as *Viguiera dentata* Spreng., the latter a true *Viguiera* in no way related to this species.

GRYPOCARPHA NELSONII Greenm.! Trees & Shrubs i. 145, t. 73 (1903). — *Sanvitaliopsis Nelsonii* Greenm. Proc. Am. Acad. xli. 261 (1905). — Known only from the original collection of Nelson (no. 2892) from Tonala, Chiapas.

GRYPOCARPHA hebeclada, sp. nov. Fruticosa ramosa caule glabro cortice cano tecto, ramulis oppositis purpurascensibus et pedunculis dense glanduloso-pubescentibus. Folia opposita ovata basi rotundata vel truncata apice acuta serrulata supra strigosa pilis basi tuberculatis subtus subasperis et juventate dense pubescentia 4–6.5 cm. longa 2.5–5.3 cm. lata, in petioliis 1–1.2 cm. longis strigosis pilis basi glandulari-tuberculatis. Pedunculi monocephali solitarii axillares et terminales striati 1–5 cm. longi; capitula 7–8 mm. alta 1.5–2.9 cm. lata. Involucri discum subaequantis phyllaria subaequalia biseriata oblonga villosa 3–4-striata exterioribus apice reflexis. Clinium conicum. Radii ca. 8 fertiles sessiles flavi tridenticulati persistentes venas dorsi secundum pubescentes 5–15 mm. longi 3–5 mm. lati; corollae disci flavae glabrae 3.6 mm. longae. Paleae firmae concavae longe et argute acuminatae supra strigosae 6–7.5 mm. longae. Achenia radii (immatura) triangularia angulo interiore ciliato et uniaristato; ea disci (immatura)

pubescentia lateraliter subcompressa quadrangulata in angulis et apice ciliata, aristis 2 inaequalibus longioribus et 1-2 brevissimis. — OAXACA: hills near Tula, 1675 m., 20 May 1906, *Pringle* 13863 (TYPE in Gray Herb.); Cerro San Antonio de la Cal, 1600 m., 18 Aug. 1907, *Conzatti* 1952. — Distinguished from the two species previously known by the densely pubescent branches and more pubescent pales and involucre. *Conzatti's* collection has been recorded by *Greenman* (*Field Col. Mus. Bot.* ii. 345 (1912)) as *S. Liebmannii*.

Rhysolepis, genus nov. *Verbesininarum*. — Capitula heterogama radiata, floribus radii 1-seriatis neutris rare styliiferis sed sterilibus, disci hermaphroditis fertilibus. Involuceri 4-5-seriati gradati subcampanulati phyllaria lanceolata acuta vel acuminata basi valde indurata et subcoriacea ecostata vel costato-vittata apice subabrupte herbaceo subappresso vel elongato foliaceo squarroso praedita plus minusve strigoso-pilosa. Receptaculum acute convexum valde alveolatum, paleis flores ♀ basi amplexantibus maturitate firmis induratis subscarioso-marginatis latis plus minusve gibbosis transverse corrugatis mucronulatis valde compressis achenia arete foventibus et cum eisdem maturitate deciduis subglabris, interioribus angustioribus longioribus onustum. Corollae radii 10-14 ligulatae patentes 3-denticulatae neutrae rare styliiferae sed steriles aureae; eae disci numerosae tenuiter tubulosae 5-nerviae, tubo brevi basi paullum ampliato. Antherae elongatae basi sagittatae apice appendicibus lanceolato-ovatis obtusis praeditae. Styli flor. ♀ rami elongati tenues recurvi supra medium hispidulo-pilosi appendice brevi acuta hispidula praediti. Achenia nigra valde compressa paullulum obliqua substriata ciliolata et apice minute hispidula vel glabra. Pappi aristae 2 tenues ciliolatae, squamellas 6-8 minutas fimbriato-laceratas liberas vel subliberas multiplo superantes. — Suffrutices mexicani foliis alternis vel oppositis oblongis vel ovato-lanceolatis serratis plus minusve strigosis venosis, capitulis majusculis vel mediocribus apicibus ramorum paucis cymoso-paniculatis aureis vel aurantiacis. — Species typica *Viguiera Palmeri* Gray.

1. **RHYSOLEPIS morelensis** (Greenm.), comb. nov. — *Viguiera morelensis* Greenm. ! *Proc. Am. Acad.* xl. 40 (1904). — Leaves mostly alternate, oblong or ovate-oblong, acute to subacuminate, 4-6.8 cm. long, 0.8-2 cm. wide, subsessile or on petioles 1 mm.

long. Involucre 4-seriate, graduated, 7 mm. high, the two outer rows of phyllaries herbaceous, ovate-oblong, acute, slightly revolute, 1-nerved, hispid-strigose and tuberculate, strongly reflexed; the two inner series longer, oblong, acute, tuberculate-strigillose and hispid-ciliate, indurated but scarcely ribbed below, herbaceous above, only the apex reflexed. Awns of pappus 2, slender, 2 mm. long, rather easily deciduous; squamellae about 8, quadrate, free, lacerate, 0.2 mm. long. — MORELOS: near Cuernavaca, *Pringle* 10407, 10825, 11295 (TYPE COLL.); sandy volcanic mountains, 2000 m., Casa del Tepozteco, 26 Oct. 1904, *C. & E. Seler* 4332 (herb. Berol., fragm. hb. Gray.).

2. **RHYSOLEPIS Palmeri** (Gray), comb. nov. — *Viguiera Palmeri* Gray ! in *Wats. Proc. Am. Acad.* xxii. 427 (1887). — Leaves opposite, ovate-lanceolate, long-acuminate, 4–10.5 cm. long, 1.3–3.1 cm. wide, on petioles 0.3–1.3 cm. long. Involucre 3–4-seriate, the outer phyllaries usually longest and much exceeding disk, lance-linear, foliaceous, up to 2.5 cm. long, the inner gradually shorter, with thickened pale coriaceous vittate body and loose herbaceous tip, all hispidulous-ciliolate and more or less strigillose above, with squarrose tips. Awns as in the last; squamellae about 6, unequal, about 0.2 mm. long. — JALISCO: sides of ravines, Rio Blanco, Oct. 1886, *Palmer* 738 (TYPE COLL.); near Guadalajara, *Pringle* 2314, 8631, 11610; Chapala, 23 Sept. 1899, *Holway* 3488.

The genus *Rhysolepis* (from *ρυσός*, wrinkled, and *λεπίς*, scale) is related on the one hand to *Sclerocarpus* Jacq., next to which it may be inserted, and on the other to *Viguiera* HBK. From the former it differs essentially in the presence of a pappus and somewhat in habit, from the latter in the firm enclosure of the achenes and base of the corollas by the much larger transversely wrinkled pales. From its general characters and its pappus, which are essentially those of *Viguiera*, it seems to be a comparatively modern derivative of that genus, while *Sclerocarpus*, from its distribution, must be considered an ancient genus whose progenitor has long since disappeared.

MONTANOA **Liebmannii** (Sch. Bip.), comb. nov. — *Polymnia Liebmannii* Sch. Bip. ! ex Klatt, *Leopoldina* xxiii. 89 (reprint 2) (1887). *Montanoa macrolepis* Rob. & Greenm. ! *Proc. Am. Acad.* xxxii. 44 (1896); l. c. xxxiv. 512 (1899); *Greenm. l. c.* xxxix. 100 (1903). — The identity of these two species, first pointed out by

Dr. Greenman, necessitates the adoption of the earlier specific name.

CHROMOLEPIS HETEROPHYLLA Benth. ! Pl. Hartw. 40 (1840). — *Leptosyne pinnata* Rob. ! Proc. Am. Acad. xxvii. 176 (1892). *Stephanopholis pinnata* (Rob.) Blake, l. c. xlix. 346 (1913). — Bentham's *Chromolepis heterophylla* has not been recognized among distributed exsiccatae since its original collection by Hartweg (no. 311) in swampy places at Anganguio, State of Mexico, in 1836. Examination of specimens of the type collection at the British Museum and in the Kew Herbarium has shown its identity with Pringle 3668, collected at Del Rio, State of Mexico, in 1890, on which was based *Leptosyne pinnata* Robinson, subsequently raised to generic rank as *Stephanopholis* by the writer in 1913. Bentham's reference of the genus to the *Verbesininae* is confirmed by a careful reexamination of material collected by Pringle, in which the too immature achenes of the disk are thickened and distinctly compressed, and the pales slightly folded. Two formae are to be distinguished:

Forma **typica**: foliis pseudo-pinnatis. — See synonymy above.

Forma **integrifolia** (Greenm.): foliis integris. — *Leptosyne pinnata* Rob. var. *integrifolia* Greenm. ! Proc. Am. Acad. xl. 44 (1904). *Stephanopholis pinnata* (Rob.) Blake var. *integrifolia* (Greenm.) Blake, l. c. xlix. 346 (1913).

WEDELIA crassiuscula, sp. nov. Herbacea perennis simplex vel supra vix ramosa erecta 3-5.2 dm. alta. Caulis pallidus brunneus subtuberculato-strigillosus subcarnosus vix striatus 1-2-cephalus. Folia opposita inferiora et media oblongo-obovata obtusa mucronata basi cuneata serrulata (dentibus depressis mucronatis ca. 11-jugis) triplinervia utrinque pallide viridia dense non aspere strigillosa actate obscure lepidota chartaceo-coriacea 6.5-10 cm. longa 2.5-3.5 cm. lata, in petiolis submarginatis 1.2-1.8 cm. longis; superiora oblonga acuta minora. Capitula 1 vel 2 terminalia 2.6 cm. lata in pedunculis nudis dense strigillosis 3.8-7.4 cm. longis; discus 9-11 mm. altus 14-17 mm. diametro. Involucri 2-seriati 6-7 mm. alti phyllaria inaequalia (exterioribus longioribus) oblonga vel oblongo-lanceolata obtusiuscula crassiuscula coriaceo-indurata pallida vix striata dense strigillosa apice paullum herbacea mucronata appressa, interiora similia breviora costa subherbacea apice vix herbacea paleas simulantia. Radii ca. 16 aurei fertiles

ovales emarginati dorso parce puberuli 5–8 mm. longi 2.8 mm. lati; corollae disci flavae glabrae 3.6 mm. longae (tubo 1 mm.). Paleae firmae acutae multistriatae supra minute strigillosae 5.5 mm. longae. Achenia oblongo-obovata glabra vel apice sparse puberula 4 mm. longa. Pappus cupuliformis paleaceus fimbriatulus et paucidentatus in apice rotundato achenii sessilis ad 0.7 mm. longus. — PARAGUAY: Santa Elisa, lat. S. 23° 10', Gran Chaco, Jan. 1903, *Hassler* 2741 (TYPE in Brit. Mus.).

This new species finds its only close relative in *W. glauca* (see beyond), which has much narrower acuminate leaves, more herbaceous longer involucre, and acuminate pales, as well as (when young) a partly aristiform pappus.

WEDELIA glauca (Ort.), comb. nov. — *Pascalialia glauca* Ort. Dec. 39, t. 4 (1797). *Lorentzia pascaliioides* Griseb.! Goett. Abh. (Pl. Lorentz.) xix. 182 (separate 134) (1874), at least in great part. — Despite the very satisfactory figures of this plant given by Ortega, its identity and systematic position have been more or less in doubt. In the *Prodromus* (v. 549 (1836)) it was placed by De Candolle next to *Tilesia* Mey. (referred to *Wulffia* by Grisebach, Bonpl. vi. 9 (1858)), and was called in the generic description an "herba Mexicana," but in the specific notes, following Ortega's description, was said to come from "Chili non longe ab oppido Chillon." The plant has never since been collected in Chili, and since Hooker & Arnott, in Hooker's Journ. Bot. iii. 300 (1841), Remy, in C. Gay, Fl. Chil. iv. 280 (1849), and Reiche, Fl. Chil. iv. 90 (1905), are unanimous in considering its original record from Chili erroneous, it seems certain that Née's specimens came from Argentina, particularly since Née, who collected the seed from which the species was grown in the Royal Gardens at Madrid, is known to have collected along the coast of Argentina as well as in Chili. The plant seems common on the pampas of Argentina, from Tinogasta (Prov. Catamarca) and Mendoza to Buenos Ayres, and is apparently spreading widely if scatteringly to other regions, as there are specimens in the Kew Herbarium from waste ground, Pensacola, Florida (*Curtiss* 6492), and from near Melbourne, Australia (March 1909, *J. R. Tovey*).

Pascalialia is maintained as a monotypic genus by Bentham (Gen. Pl. ii. 369) on the strength of its "squameis in cyathum minime coalitis," its narrow more numerous rays, and somewhat peculiar

habit. Hoffmann, however, in the *Pflanzenfamilien* (iv. pt. 5, 235 (1890)) has reduced *Pascalina* Ort., with its later synonym *Lorentzia* Griseb., to *Wedelia* under the section *Cyathophora* DC., which seems much the better disposition of the plant. Its habitual peculiarities, slight at the best, as well as the suggested difference in ligules, are quite negligible if the variation among the species of *Wedelia* itself, as of any large helianthoid genus, is taken into consideration, while they are equally shown in *W. crassiuscula* above described, whose pappus is quite that of *Wedelia*. But *Pascalina* itself does not show pappus characters of any real diagnostic significance when compared with many undoubted *Wedelias*. In many species, certainly, the pappus consists of a strongly thickened cup; but in others, for instance *W. filipes* Hemsl. and some members of the section *Wollastonia* (DC.) O. Hoffm., the coalescence of the squamellae is not more pronounced than in *Pascalina*. The pappus of *Wedelia glauca* (*Pascalina glauca* Ort.), of short irregular squamellae united below on young achenes, becomes in age a low jagged cyathiform corona, or is sometimes split nearly to the base or in extreme maturity entirely lost.

Lorentzia pascaloides Grisebach, as represented at Kew by supposedly authentic material sent by Grisebach himself, is a mixture of *Wedelia glauca* and a *Viguiera* near *V. anchusaefolia* (DC.). Baker. On a loose leaf with the latter specimen Mr. Baker has the following note: "Grisebach has sent us two totally different plants under the name of *Lorentzia pascaloides*, viz., this and the true *Pascalina glauca* and it seems to me his description in *Plant. Lorentz.* p. 135 has been drawn up partly from one and partly from the other. JGB." It seemed to the writer, however, when studying the same specimens at the Kew Herbarium, that the description above cited referred wholly or almost wholly to the *Pascalina*, and had very little application to the *Viguiera*.

Stemodontia (*Wedelia*) *elongata* Rusby! Mem. Torr. Club iii. pt. 3, 58 (1893). — Rusby's *Stemodontia elongata* (not *Wedelia elongata* (Boj.) Vatke, Abh. Nat. Ver. Bremen ix. 121 (1885)), based on Bangs' number 685 from Yungas, Bolivia, is identical with the widely distributed *HELIOPSIS BUPHTHALMOIDES* (Jacq.) Dunal of Central and South America. I find that this identification was likewise recorded by Dr. J. M. Greenman on the sheet in the Gray Herbarium some years ago.

Aspilia callosa Chod. ! Bull. Herb. Boiss. ser. 2, iii. 720 (1903). — *A. silphioides* forma *parvifolia* Chod. l. c. as syn. — Hassler 3587, from Paraguay, type collection of this species, has the fertile rays of *Wedelia*, and is in fact identical with *WEDELIA BRACHYCARPA* Baker in Mart. Fl. Bras. vi. pt. 3, 181 (1884).

Aspilia potosina Brandegee ! Univ. Calif. Pub. Bot. iv. 280 (1912). — *Purpus* 5162, type collection of this species, has, at least as represented in the Gray Herbarium, fertile rays, and is identical with *ZEXMENIA HISPIDA* (HBK.) Gray.

✓ *TITHONIA rotundifolia* (Mill.), comb. nov. — *Tagetes rotundifolia* Mill. ! Gardn. Dict. ed. 8. no. 4 (1768); Rydb. in Britton, N. Am. Fl. xxxiv. 159 (1915). *Tithonia uniflora* J. F. Gmel. Syst. 1259 (1791), hyponym. *Tithonia tagetiflora* Desf. Ann. Mus. Par. i. 49, t. 4 (1802). *Helianthus speciosus* Hook. ! Bot. Mag. lxi. t. 3295 (1834). *Tithonia speciosa* Hook. ex Griseb. Cat. Pl. Cub. 155 (1866); Klatt in Dur. & Pitt. Bull. Soc. Bot. Belg. xxxi. pt. 1, 203 (1892), as to name-bringing syn. only. *Urbanisol tagetifolius* Ktze. Rev. i. 370 (1891), excl. syn. & var. in part. — The type of *Tagetes rotundifolia* Miller in the British Museum is identical with the handsome annual long known as *Tithonia tagetiflora* Desf., and his name must consequently be adopted. The original of plate 3295 of the Botanical Magazine (*Helianthus speciosus* Hook.), in the Kew Herbarium, is likewise indistinguishable in any essential characters.

SYNCRETOCARPUS sericeus (DC.), comb. nov. — *S. Weberbaueri* Blake ! Bot. Jahrb. liv. Beibl. no. 119, 49 (1916). *Harpalium ? sericeum* DC. ! Prod. v. 584 (1836). *Viguiera sericea* (DC.) Gray ! Proc. Am. Acad. xix. 6 (1883). — Study of the fragments and photograph of *Syncretocarpus Weberbaueri* in the Gray Herbarium, and the discovery that the specimen of *Viguiera sericea* also in the Gray Herbarium was of the same species, led me some time ago to believe that the type of *Harpalium ? sericeum* DC., on which Dr. Gray's name was based, would prove to be identical, a suspicion which has been confirmed through the kindness of Dr. Casimir de Candolle. De Candolle's name, on which his *Harpalium* sect. ? *Harpalizia* (Prod. v. 584 (1836)) was based, must be adopted for the species. Additional specimens may be cited as follows: PERU: dry broken ground, on road to Purruchuca, Mathews 1043 (hb. Kew); Chosica Canyon, 1065–1220 m., 4 April 1913 and 10 Jan.

1914, *C. H. T. Townsend* 1511 and 1518 (U.S. Nat. Herb.); without definite locality, *Née* (type of *H. sericeum* DC.: hb. Prod.), *U. S. Exploring expedition under Wilkes* (Gray Herb.). According to Dr. Weberbauer's label the plant is a shrub, but the specimens have rather the appearance of a barely suffrutescent perennial; Mathews describes it as a "perennial herb."

The name of this genus is derived from *συγκρητισμός*, a blending of unlike elements, and *καρπός*, fruit, in reference to the peculiar combination of characters presented by the ripe achene.

ALVORDIA angusta, sp. nov. Fruticosa ramosa, caule brunneo strigoso aetate glabro, ramulis alternis vel oppositis teretibus strigosis. Folia opposita vel alterna integra anguste lanceolata acuminata basi cuneata 3-nervia ubique asperrime strigosa 3.5-5.5 cm. longa 5-10 mm. lata, in petiolis strigillosis 3-5 mm. longis. Capitula in apicibus ramorum dense glomerata glomerulis subternatis, capitulis in axibus brevissimis racemose aggregatis, squama infima capituli cuiusque persistente late patente. Involucri compressi 5-6 mm. alti phyllaria ca. 7 imbricata 2 extima subaequalia 3 mm. longa naviculata interiora longiora planiora intima tenuiora achenia subamplectentia, omnia lutescentia dorso glabra margine et apice incrassato ciliolata. Radii nulli; corollae disci 1-2 flavae glabrae 4 mm. longae oblongo-cylindricae sursum vix ampliatae 5-dentatae dentibus intus glandulosi. Achenia incrassata lateraliter subcompressa plerumque plano-convexa truncata atra supra appresse pubescentia 2.5 mm. longa. Pappi aristae ca. 20 laciniatae inaequalissimae paleaceae, longiores 1.5 mm. longae. — LOWER CALIFORNIA: Todos Santos, 29 Jan. 1889, *Brandegee* (COTYPES in Gray Herb. and U. S. Nat. Herb. no. 342433); Cape Region, Nov. 1902, *Brandegee* p.p. (U. S. Nat. Herb. no. 397921).

The first collection above cited was distributed as *A. glomerata* Brandegee, the second includes *A. fruticosa* Brandegee. Both *A. fruticosa* and *A. angusta* are easily distinguished from *A. glomerata*, the type species of the genus, by the smaller involucre with bracts merely marginally ciliolate (densely strigillose on back as well in *A. glomerata*), the smaller achene with shorter pappus, and the absence of rays. *A. fruticosa* as originally described (*Erythea* vii. 5 (1899)) included the species here separated as *A. angusta*, the description of the leaves and achenes referring better to the former, of the solitary disk-floret to the latter. No type is cited, but its

publication in a list of new species chiefly collected by Anthony in 1897 leads me to consider that *Anthony* 339, from San José del Cabo, may be taken as typifying the form to which the name *A. fruticosa* should be applied. The latter differs from *A. angusta* chiefly in its ovate leaves 1.3–3 cm. broad, its 2–3-flowered heads, and the longer more nearly equal pappus-awns.

ENCELIA pilosiflora, sp. nov. "Suffruticosa," radice et parte caulis inferiore invis. Caulis validus ramosus procumbentia-dscendens dense longe submolliterque tomentoso-pilosus pilis laxis albis. Folia alterna late ovata basi truncata vel rotundata rare cuneata apice subacuta integra vel rare irregulariter subdentata utrinque dense mollissime incano-tomentoso-pilosa trinervata 5.5–8 cm. longa 3.5–7 cm. lata, in petiolis dense pilosis 2–2.5 cm. longis insidentia. Pedunculi terminales 1–2-cephali pilosi 1–1.7 dm. longi; capitula 3–4.5 cm. lata; discus purpureus 12 mm. altus 16–25 mm. diametro. Involucri phyllaria 2–3-seriata subaequalia lanceolata vel oblongo-lanceolata acuta dense mollissimeque tomentoso-pilosa laxe patentia margine plerumque repando-involuta 1–1.5 cm. longa 3–3.5 mm. lata. Radii flavi ca. 12 oblongi vel late cuneati 1–1.5 cm. longi dorso pubescentes apice leviter 3-lobati vel 1-dentati; corollae disci apice purpureae infra puberulae in dentibus pilosae 5 mm. longae. Paleae dorso pilosae 6.8 mm. longae. Achenia margine et in medio latere villosa 5.5 mm. longa 2.5 mm. lata. — PERU: Tablada de Lurin, August, *Mathews* 1014 (TYPES: hb. Kew, hb. Univ. Cambridge, fragm. & photographs in Gray Herb.); same locality, *McLean* (hb. Kew); sandy ground in the Loma-formation, 300 m., mountains of Barranco near Lima, 23 Oct. 1902, *Weberbauer* 1658 (hb. Berlin). HORT.: 20 Apr. 1825, *Barclay* (hb. Univ. Cambridge). — This new species is nearly related to the variable *E. canescens* Lam., but unlike the various plants of that relationship already described seems not to intergrade with that species. Its larger size and peculiarly soft pubescence distinguish it from all its near relatives. I am indebted to Dr. C. E. Moss of the Cambridge Botanical School for fragments and photographs of the material at Cambridge.

SIMSIA annectens, sp. nov. Herbacea elata. Caulis validus usque ad 1.1 cm. diametro multistriatulus dense minute glanduloso-puberulus et tuberculato-hispido-pilosus. Folia inferiora opposita

orbiculari-ovata 3-sub-5-lobata (lobis acuminatis crenato-dentatis) basi late cordata utrinque densissime tuberculato-hispidula et subtus hispido-setosa 13-16 cm. longa 12-15 cm. lata, in petiolis superne marginatis glanduloso-puberulis pilis basi incrassatis in margine foliaceo tuberculato-hispidulis 8-10.5 cm. longis basi in discum foliaceum repande et mucronate subdentatum venosum 2 cm. altum 3 cm. latum dense tuberculato-hispidulum connatis; folia superiora alterna multo minora petiolis basi auriculatis; suprema ovato-lanceolata acuminata vix lobata basi cuneata. Capitula numerosa cymoso-paniculata, paniculis folioso-bracteatis glanduloso-puberulis et hispido-pilosis 1.9-2.8 dm. latis; pedunculi 0.5-3 cm. longi; capitula 1.5 cm. lata; discus 1-(fructu) 1.3 cm. altus 7.5-(fructu) 13 mm. diametro. Involucri 3-seriati gradati 7-8 mm. alti phyllaria lanceolata acuminata apice laxa herbacea glanduloso-puberula et praecipue in juventate hispido-pilosa. Radii ca. 8 flavi oblongi 5.5 mm. longi 1.7 mm. lati; corollae disci flavae in dentibus et tubulo glanduloso-puberulae 5.5 mm. longae (tubulo 1 mm.). Paleae acutae vel acuminatae in dorso et apice glanduloso-puberulae plus minusve hispidae 7-8 mm. longae 2.2-3 mm. latae. Achenia maculata ovalia appresse pubescentia 4.5 mm. longa 3 mm. lata. Aristae 2 ciliolatae basi paullum ampliatae et laciniatae 2.5 mm. longae. — STATE OF MEXICO: in bushes along edge of road, Almoloya de las Alguisiras, District of Zuatepec, 23 Dec. 1904, C. & E. Seler 4472 (TYPES: hb. Berlin, Gray Herb.).— A species connecting the *S. setosa* group with that of *S. amplexicaulis* (see beyond).

SIMSIA DOMBEYANA DC.! Prod. v. 578 (1836). — *Encelia hirsuta* Ktze.! Rev. Gen. iii. pt. 2, 145 (1898). *E. hirsuta* Ktze. forma *radiata* Ktze.! l.c. *Simsia hirsuta* (Ktze.) Blake, Proc. Am. Acad. xlix. 389 (1913). — After examining the type material of *Simsia Dombeyana* DC. (*Dombey*, Peru (?)) in the Paris and Prodromus Herbaria, and that of *Encelia hirsuta* Ktze. (*Billberg* 183, Carthagena, Colombia, 1826; *Lorentz* 237, Sierra de Asdochinga, Argentina, April 1878; *Dombey*, without locality (ex Mus. Par. 1829); *Kuntze*, Dique near Cordoba, Argentina, 1891) in the Berlin Herbarium, I have been unable to discern any differences to justify their separation. Indeed, the *Dombey* specimen in the Berlin Herbarium on which Kuntze's forma *radiata* was based was probably from the same collection as the specimens on

which DeCandolle's earlier name was established. A recent collection of *S. Dombeyana* is the following, in the Berlin Herbarium: between Piura and Hacienda Ñomala, Peru, 23 Mar. 1912, *Weberbauer* 5934.

SIMSIA EXARISTATA Gray, Pl. Wright. ii. 87 (1853); Blake, Proc. Am. Acad. xlix. 380 (1913). This species, like several other members of the genus, proves to have two varieties differing only in achenial characters. The typical plant, which may be called var. **epapposa** (*S. exaristata* Gray, l.c.), has awnless and strictly glabrous achenes. To *S. exaristata* must also be referred the following variety:

Var. **perplexa**: acheniis biaristatis pubescentibus. — TEXAS: valleys in the mountains east of El Paso, May–Oct. 1849, *Wright* 331 p.p. (TYPE in hb. Kew, fragments and tracing in Gray Herb.). All other specimens of this number examined (Gray Herb., Brit. Mus., U. S. Nat. Herb.) have the glabrous calvous achene of var. *epapposa*. Although by the key given in my revision this new variety would be referred to *S. lagascaeformis* DC., yet it differs from that species and agrees with *S. exaristata* in the few small characters — longer narrower phyllaries, narrower pales, longer disk-florets, fewer larger heads, and leaves not at all glandular beneath — which in addition to the usual achenial differences serve to distinguish the latter species from its close ally *S. lagascaeformis*. Were it not for the rather striking gap in their ranges — which however *Botteri* 804 (Gray Herb.) from Orizaba, which is *S. exaristata*, and *Bourgeau* 3320 (hb. Kew) from Orizaba, Nov. 1866, with *Gouin* (hb. Paris) from the state of Vera Cruz, 8 Nov. 1866, both of which are *S. lagascaeformis*, show is not an absolute one — *S. exaristata* might require reduction as a variety to *S. lagascaeformis*.

SIMSIA FOETIDA (Cav.) Blake, Proc. Am. Acad. xlix. 385 (1913). — An authentic specimen from Pavon (in the Prodrômus Herbarium at Geneva) of Cavanilles's *Coreopsis foetida*, on which the name *Simsia foetida* was based, is not that species as interpreted in my revision but is identical with *S. adenophora* (Greenm.) Blake, l. c. 388. The name *SIMSIA FOETIDA* must accordingly be used for the latter species, and to it should be referred the synonyms *Coreopsis foetida* Cav., *Ximenesia foetida* Spreng., *Encelia foetida* Hemsl., and *Simsia ficifolia* Pers. quoted on page 386 of my treat-

ment. The name to be adopted for the very common species there called *Simsia foetida*, which has generally passed as *Simsia auriculata* or *Encelia mexicana*, is *SIMSIA AMPLEXICAULIS* (Cav.) Pers. Syn. ii. 478 (1807), based on *Coreopsis amplexicaulis* Cav. Descript. 226 (1802). To its synonymy should be added *Helianthus trilobatus* Link ! Enum. ii. 352 (1822), the types of which I have examined at Berlin. The typical form, with pubescent 2-awned achene, may be called *S. AMPLEXICAULIS* (Cav.) Pers. var. **genuina**: achenio appresso-pubescente, pappo biaristato. The form with glabrous epappose achene becomes *S. AMPLEXICAULIS* var. **decipiens** (*S. foetida* var. *decipiens* Blake, Proc. Am. Acad. xlix. 387 (1913)). The specimen of *Palmer* 440 (anno 1885), the type collection, in the Kew Herbarium, belongs to this form.

SIMSIA Holwayi, sp. nov. Herbacea 0.5–1 m. alta (basi invisā), opposita (supra alterne) ramosa, caule tenui leviter striato subdense hispidulo-puberulo et breviter hispido-piloso pilis patentibus vel subretrorsis basi saepe glandulari-tuberculatis. Folia media opposita triangulari-ovata acuta basi late cordata (sinu subhexagono ad 8 mm. alto infra 1.1–1.7 supra 1–1.8 cm. lato) ad basin subhastate dilatata crenato-serrata (dentibus obtusis depresso-deltaideis mucronatis ad 17-jugis) supra obscure viridia dense submolliterque hispido-pilosula pilis brevibus basi glandulari-tuberculatis subtus dense molliter canescenterque pilosa pilis subpatentibus basi subtuberculatis trinervia parum venosa 4.7–6.3 cm. longa ad basin 3.5–5 cm. ad medium 2.7–3.3 cm. lata, in petiolis nudis praecipue infra dense breviterque pilosula pilis patentibus basi glandulari-tuberculatis, basi in discum foliaceum rotundatum integrum ad 8 mm. latum ampliatis et connatis; folia superiora similia alterna gradatim minora saepius integra vel subintegra lobis basilaribus nunc conspicuis nunc nullis, petiolis vix marginatis basi auriculatis. Capitula numerosa laxe paniculata ad 1.3 cm. lata in pedicellis 0.4–4.4 cm. longis nudis vel 1-bracteolatis; discus subhemisphaericus 7–(fructu)11 mm. altus 6–9 mm. diametro. Involucri 4-seriati gradati 8–9 mm. alti phyllaria ovato-lanceolata (vel interiora lanceolata) acuminata mucronulata sicco-subherbacea lineata dense hispidulo-pilosula (pilis basi glandulari-tuberculatis) et interdum sparse hispidopilosa margine hispido-piloso-ciliata (pilis basi glandulari-tuberculatis) plus minusve purpurascencia appressa. Radii 10 aurei

minimi ovales bidentati 3-nervii 3–3.5 mm. longi 1–1.6 mm. lati; corollae disci aureae aetate apice purpurascens tenues in tubo et ad basin faucium stipitato-glandulosae in dentibus puberulae 5–6 mm. longae (tubo 0.8–1 mm., dentibus 0.7–1 mm. longis). Paleae persistentes apice abrupte et acute mucronatae ad carinam angustam et apicem erosum pilosae 8.5 mm. longae. Achenia plane compressa nigrescentia in marginibus et in medio latere appresse pilosa 4–5.5 mm. longa 2.5–3 mm. lata. Aristae 2 tenues sursum ciliolatae basi in utroque latere squamelliformiter ampliatas laceratas ad 3.2 mm. longae. Styli rami longi tenues recurvi hispidi acuminati. — GUATEMALA: Agua Caliente, on Barrios — Guatemala City Railway, 4 Feb. 1917, *E. W. D. Holway* 854 (TYPE in Gray Herb.).

This interesting new species comes between *Simsia setosa* Blake and *S. tenuis* (Fernald) Blake in the writer's revision of the genus. From the former it differs in its smaller heads, entire foliaceous petiolar disks, and bluntly lobed leaves with a different pubescence; from the latter, to which it is more closely allied, it may at once be distinguished by the dense short pubescence of its under leaf-surface.

SIMSIA SERICEA (Hemsl.) Blake, Proc. Am. Acad. xlix. 393 (1913). The type of this species in the Kew Herbarium (*Salvin & Godman* 133) has scattered long hairs with enlarged bases interspersed among the dense short puberulence of the inflorescence-branches quite as in the type of *S. Ghiesbreghtii* (Gray) Blake, from which I can separate it only by its pubescent biaristate achenes. As at least five cases of such variation within the limits of a species are already known in this genus (in *S. calva*, *S. setosa*, *S. exaristata*, *S. amplexicaulis*, and *S. sanguinea*), it is not improbable that with further knowledge *S. sericea*, at present known from but two collections, may require reference as a variety to *S. Ghiesbreghtii*, which has been collected but once.

SIMSIA TRILOBA Blake, Proc. Am. Acad. xlix. 393 (1913). Specimens of this species collected by *C. & E. Seler* (no. 5398) on sunny heights, Hochicalco, Morelos, 29 Sept. 1910, show it to be an annual.

PERYMENIUM PURPUSII Brandegee! Univ. Calif. Pub. Bot. vi. 74 (1914). — *P. leptopodium* Blake! Proc. Am. Acad. li. 523 (1916). — I am unable to distinguish between the type collections

of these two species. Further collections are: GUATEMALA: heights between Tactic and Coban, 1800 m., Oct. 1907, *von Tuerckheim* II. 1983; Coban, 1350 m., Dec. 1907, *von Tuerckheim* II. 1504.

STEIRACTINIA glandulosa, sp. nov. Planta sine dubitatione fruticosa. Caulis validus subteres cortice brunneo tectus dense subaspere hispido-pilosus pilis patenti-adscendentibus basi tuberculatis aetate deciduis et inter pilos densissime glandulosus glandulis sessilibus. Folia opposita ovata longe acuminata plus minusve falcata basi truncato-rotundata deinde in petiolum abrupte angustata appresso-serrulata (dentibus ca. 21-jugis) supra viridia dense subaspereque hispido-pilosa pilis subincurvis basi tuberculatis et dense glandulosa aetate pilorum basibus persistentibus sublepidota, subtus ubique densius molliusque pilosa pilis longis subpatenti-incurvis et dense glandulosa non canescentia triplinervia 7.5–12 cm. longa 2.5–5.5 cm. lata, in petiolis supra marginatis ut apud caulem pubescentibus et glandulosis 1–2 cm. longis. Capitula pauca (4 in specimine suppetente) terminalia et axillaria in pedicellis ut caule pubescentibus 4–5 cm. longis saepius nudis; discus 1.3–1.5 cm. alta 1.9–2.2 cm. crassus. Involucri 3-seriati vix gradati ad 1.7 cm. alti phyllaria extima 4 late ovata vel suborbiculari-ovata acutiuscula infra medium paulum angustata et plus minusve indurata ceterum herbacea subappressa vel subpatentia (haud reflexa) 5-nervia subsparse tuberculato-hispido-pilosa et densissime glandulosa 13 mm. longa 8.5–11 mm. lata; interiora 2-seriata subaequalia late elliptica apice late rotundata similiter pubescentia et glandulosa subscarioso-membranacea quam exteriora paullo longiora et angustiora. Discus convexus; receptaculum plano-convexum. Radii neutrales flavi oblongo-ovales (nervis validioribus ca. 16) dorso subglabri 25 mm. longi 11 mm. lati; corollae disci flavae glabrae 8 mm. longae (tubo 2.3 mm., dentibus 0.7 mm.). Paleae subscariosae 1-costatae apice angustato ad 2 mm. longo donatae subglabrae vel ad apicem minute glanduloso-puberulae 10.5–11 mm. longae. Achenia matura incrassata sed distincte compressa 4-angulata non alata olivaceo-brunnea et purpurascenti-brunneo-maculata sparse strigillosa 3.8 mm. longa 2 mm. lata, apice abrupte truncato et patelliformi. Pappi aristae ca. 50 subaequales deciduae sursum strigillosae ad 2.3 mm. longae. — COLOMBIA: El Chorro, along the Tuluà River, Prov. Cauca, 14 Sept. 1853, *Lieut. I. F. Holton* (TYPE in Gray

Herb.). — Very distinct from any other species of this genus in its dense glandularity, which gives to the dried plant a somewhat yellowish hue.

STEIRACTINIA **Klattii** (Rob. & Greenm.), comb. nov. — *Perymenium Klattii* Rob. & Greenm. ! Proc. Am. Acad. xxxiv. 528 (1899). — The neutral rays of this species necessitate its transfer to *Steiractinia*. It is nearest *S. oyedaeoides* Blake, Journ. Bot. liii. 156 (1915), but differs among other features in its lance-ovate leaves long-cuneate at base. *Lehmann* 3282, the type, now in the Gray Herbarium, was originally recorded by Klatt (Bot. Jahrb. viii. 43) as *Perymenium grande* Hemsl., and it is of interest in this connection that fragments of a young *Perymenium* almost certainly of that species are mounted on the same sheet with the large specimen from which *P. Klattii* was described. It is perhaps doubtful, however, whether they were really collected by Lehmann under his number 3282, for *P. grande* Hemsl. is not as yet definitely known from Colombia.

PAPPOBOLUS **mollicomus**, sp. nov. Verisimiliter frutex ramosus. Caulis subvalidus dense canescenter submolliterque pilosus pilis laxe patentibus vel subadscendentibus basi tuberculatis. Folia alterna ovata acuminata basi cuneata paullulum falcata 3-nervia obscure appresso-serrulata supra obscure viridia dense appresse submolliterque hispido-pilosa aetate pilorum basibus deciduorum tuberculatis persistentibus scabra subtus dense molliterque canescenti-piloso-tomentosa pilis appressis sublucentibus 7.5–8 cm. longa 3–3.7 cm. lata, suprema minora lancolata vel lanceolato-ovata; petioli ut caulis pubescentes nudi 1–1.8 cm. longi. Capitula pauca ramos et ramulos terminantia 3.5–3.8 cm. lata in pedunculis 9 cm. longis vel brevioribus saepissime nudis; discus ad 1.2 cm. altus 1.8–2.2 cm. diametro. Involucri 3-seriati subaequalis vel paullum gradati ca. 1.8 cm. alti phyllaria anguste oblongo-lanceolata margine plus minusve revoluto-sinuata extus dense molliter canescenterque tomentoso-pilosa intus obscure viridia subscabre hispido-pilosa pilis basi tuberculatis sub-3-nervia herbacea basi intus indurata supra medium patentia 2.5–3.5 mm. lata. Radii ca. 25 neutrales flavi oblongi ca. 9-nervii dorso in nervis breviter pilosi 12–23 mm. longi 5–5.2 mm. lati; corollae disci flavae apice obscurae (ut videtur nigrescenti-brunneae) infra glabrae supra in nervis et dentibus breviter pubescentes 6 mm.

longae (tubo 0.8 mm. longo glabro). Paleae angustae breviter acutae mucronulatae leviter carinatae glabrae vel in dorso incurvo-hispidae 6-7 mm. longae. Achenia nigra glabra valde compressa subquadrangularia 3.2 mm. longa 1.7 mm. lata. Pappi deciduissimi subaristiformis aristae sursum hispidulae 1.5-2.2 mm. longae verisim. ca. 15. — PERU: Province of Chachapoyas, *Mathews* (TYPE in Gray Herb.). — From the only other known species, *Pappobolus macranthus* Blake, of Bolivia (Hook. Ic. xxxi. t. 3057 (1916)), *P. mollicomus* differs widely in size of leaves and heads, shape of phyllaries, and various minor characters, while agreeing entirely in all the essential generic features.

PODACHAENIUM EMINENS (Lag.) Sch. Bip. Flora xlv. 557 (1861). — *Ferdinanda eminens* Lag. Gen. et Spec. Nov. 31 (1816). *Podachaenium paniculatum* Benth. in Oerst. Vidensk. Medd. Kjobenh. 1852. 99 (1852). “*Dicalymma fragrans* Lemaire, Illus. Hort. ii. Misc. 37 (1855).” *Cosmophyllum cacaliaefolium* C. Koch & Bouché, “Ind. Sem. Hort. Berol. 1854,” ex Walp. Ann. v. 219 (1858). — In Dalla Torre & Harms’s Genera Siphonogamarum, p. 550 (1905), the name *Podachaenium* Benth. has been replaced by *Ferdinanda* Lag., presumably through the application of the “theory of residues.” This course is incorrect. Lagasca included two species in his genus, the first, *F. angusta*, being *Zaluzania angusta* (Lag.) Sch. Bip., the second, *F. eminens*, identical with the later *Podachaenium paniculatum* Benth. The essential feature of the generic diagnosis (“*Pappus* in seminibus radii paleaceus, paleis 2-5, brevibus; *disci* nullus . . .”) is drawn from *F. angusta* alone, and has no reference to *Podachaenium*, and the same is true of other less important characters mentioned. Lagasca was acquainted with his *F. angusta* in the growing state in the Royal Garden at Madrid, but knew *F. eminens* only from dried specimens (“Vidi Siccam,” he says of it), and obviously included the latter species merely because of its similarity of habit. The name *Ferdinanda* Lag. must therefore be referred to the synonymy of *Zaluzania* Pers., to which the generic diagnosis applies, and the name to be used for the *Podachaenium* is the one given above. The whole subject has been very clearly discussed by Schultz Bipontinus (Flora l. c. 553-557).

ZEXMENIA frutescens (Mill.), comb. nov. — *Bidens fruticosa* L. Sp. ii. 833 (1753); not *Z. fruticosa* Rose, Contr. U. S. Nat. Herb.

i. 103 (1891). *Verbesina fruticosa* L. Sp. ed. 2, ii. 1271 (1763), in part (excl. syn. Plum., which = *Narvalina domingensis* (Cass.) Less. Syn. 234 (1832)). *Bidens frutescens* Mill. Gardn. Dict. ed. 8. no. 4 (1768). *Zexmenia costaricensis* Benth. in Oerst. Vidensk. Meddel. 1852. 95 (1852); Blake, Journ. Bot. liii. 14 (1915). *Z. nicaraguensis* C. Muell. in Walp. Ann. v. 226 (1858), sphalm. *Narvalina fruticosa* (L.) Urban, Symb. Antill. v. 265 (1907), as to name-bringing synonym only, in part. — When discussing this species two years ago (Journ. Bot. liii. 13–14 (1915)) I was led to adopt for it the name *Z. costaricensis* Benth., in the belief that Miller's earlier name was to be treated as a still-born name incapable of adoption. Further consideration of the matter, however, has convinced me that Miller's name, although based on nearly the same material as Linnaeus's, is not properly to be treated as still-born inasmuch as the Linnaean name was not cited by Miller, and hence must be taken up as the oldest available designation for the species. The typical smoothish form, to which the above synonymy applies, may be called var. **genuina**. The more pubescent variety becomes *Z. FRUTESCENS* var. **villosa** (Polak.), comb. nov. (*Z. villosa* Polak. Linnaea xli. 579 (1877); *Z. costaricensis* Benth. var. *villosa* (Polak.) Blake, Journ. Bot. liii. 14 (1915)).

It is unfortunate that the class of names designated, in the paper above cited, *nomina abortiva*, should have suffered the further indignity of a vicarious baptism — for the Latin equivalent of the “*totgeborenen Namen*” of Schintz & Thellung, as it now seems, had not previously appeared in print. Nevertheless, the term may find a measure of use as a designation for those mere renamings devoid of any basis but caprice which it is the intent of the International Rules to consign to eternal desuetude. It must be confessed, however, that names of this sort are as a class very close to that other group of name-changes, based on mistaken identification and usually involving a generic transfer, which have no more moral validity but which it has become customary to adopt, and which it might be convenient to designate as *nomina legitimata*. The latter class is well exemplified by *Gerardia quercifolia* Pursh (shortly to be discussed in Rhodora); the former by *Erysimum lyratum* Gilib. (see Fernald, Rhodora xi. 139, footnote 1 (1909), where references will be found to the earlier writings on the subject).

ZEXMENIA guaranítica (Chod.), comb. nov. — *Verbesina guaranítica* Chod. ! Bull. Herb. Boiss. ser. 2, iii. 722 (1903). — Careful study of the type numbers (*Hassler* 5647 and 8132, in the British Museum) of this Paraguayan species has led me to make this transfer. The achene, narrowly winged on both edges with the wing expanded above on one edge somewhat in the manner of an *Otopappus*, bears a pappus of two awns connected by a distinct although short corona of basally fused squamellae. For this reason the species can not be included in *Verbesina*. Its inclusion with the two following species in *Zexmenia* necessitates a slight change in the generally accepted character of that genus, since the leaves in all three species are at least in part alternate. In none of the three has the base of the stem been seen, but in *Z. guaranítica* and *Z. myrtifolia* all the leaves on the upper foot or two of the stem, at least, are alternate; in *Z. paraguariensis* the lower leaves of the incomplete specimen examined are opposite, the upper alternate. Although the possession of opposite leaves has generally been more or less emphasized as a characteristic feature of *Zexmenia*, there is at least one other species whose place in the genus has never been questioned, *Z. brevifolia* Gray, in which also alternate leaves are found, at least on the branches — a fact long ago noted by Dr. Gray.

ZEXMENIA myrtifolia (Chod.), comb. nov. — *Verbesina myrtifolia* Chod. ! Bull. Herb. Boiss. ser. 2, ii. 393 (1902). — A good *Zexmenia*, but like the last somewhat anomalous in its alternate leaves. The rather young achene is narrowly winged on both edges, the wings continuous with the stout awns, and one awn is obliquely decurrent by a broad denticulate base into the other, this broad base representing a somewhat peculiarly developed squamellaceous crown. When dissecting flowers of *Hassler* 4991, the type collection, at the British Museum, I found that the style-branches of the ray bore a distinct subulate-acicular appendage, about as long as that of the disk-flowers, from which they differed only in being nearly glabrous throughout. The occurrence on the style-arms of the ray-florets of this appendage, so commonly found on those of the disk in genera of this group of the *Compositae*, is decidedly unusual.

ZEXMENIA paraguariensis (Chod.), comb. nov. — *Verbesina paraguariensis* Chod. ! Bull. Herb. Boiss. ser. 2, iii. 722 (1903). —

Hassler 7017, type collection of this species (in the British Museum), is in young fruit only but shows the generic characters of *Zexmenia*. In this species only the upper leaves are alternate, the lower being opposite.

ZEXMENIA LEUCTACTIS Blake, Journ. Bot. liii. 307 (2 Oct. 1915). — *Zexmenia chiapensis* Brandegee ! Univ. Calif. Pub. Bot. vi. 197 (30 Oct. 1915). — Additional specimens of this species are: GUATEMALA: Colomba, Quezaltenango, 3 Feb. 1917, *Holway* 823; Esquintla, 335 m., 19 Feb. 1916, *Holway* 505; San Felipe, Retalhuleu, 12 Jan. 1917, *Holway* 693 ("wet places, 8 ft. high"); Rio Samala, Retalhuleu, 520 m., April 1894, *J. D. Smith* 2854. The slightly later *Z. chiapensis* Brandegee, based on *Purpus* 7192, from Finca Irlanda, Chiapas, is identical with my *Z. leuctactis*. This name proves to have been unfortunately chosen, for the fresh color of the rays is shown by *Holway's* plant to be bright yellow. The whiteness of the ligules in the type was evidently due to fading. The species is related to *Z. virgulta* Klatt, but distinct in the dense fine soft pubescence of the under leaf-surface.

NOTOPTERA BREVIPES (Rob.) Blake, Journ. Bot. liii. 227 (1915). Good specimens collected by Prof. E. W. D. *Holway* (no. 493) at Guatemala City, Guatemala, at an elevation of 1465 meters, on 15 Feb. 1916, afford the following data regarding the habit of the species: "a big climber, with woody stems $1\frac{1}{2}$ inch in diameter, climbing over trees and sending out very slender branches 10 feet long or more." Other specimens, from Guatemala City, 21 Dec. 1916 (*Holway* 615) were taken from a "shrub, 15 feet high, with long slender branches."

VERBESINA apleura, sp. nov. Frutex 5 m. altus sect. *Verbesinariae*, caule valido brunneo medullosa subappresse piloso omnino non alato. Folia alterna (infima invis) media ovata vel subovali-ovata acuminata mucronata basi late cuneata irregulariter serrata (dentibus ca. 20-jugis depresso-triangularibus obtuse callosa-mucronulatis) submembranacea penninervia venulis translucens supra scabriuscula pilis brevibus incurvis basi glandulari-tuberculatis subtus similiter pubescentia pilis longioribus et mollibus 14–20 cm. longa 5.5–8.3 cm. lata, in petiolis nudis sordide pilosis 2.5–3.7 cm. longis et ultra; superiora (ramealia) similia basi longius cuneata minora 5.5–10 cm. longa 1.7–3.8 cm.

lata, in petiolis 7–15 mm. longis. Paniculae ramos terminantes 1–1.3 dm. diametro 20–30-cephalae convexae; pedunculi axillares 1–5 cm. longi, pedicelli 0.8–3.3 cm. longi; bracteae inflorescentiae 1–2.2 cm. longae. Capitula 2.5–2.8 cm. lata; discus subhemisphaericus 1–1.2 cm. altus 1–1.1 cm. diametro. Involucri 3-seriati irregulariter gradati 6 mm. alti phyllaria serierum duarum exteriorum obovata apice obtusa callosomucronulata herbacea viridia subsparse vel subdense pilosa pilis adscendentibus 1.5–2 mm. lata appressa vel sublaxa, intima (radios subtendentia) lanceolata sparse pilosa subherbacea acuminata. Radii 12 aurei neutrales oblongo-ovales dorso ad venas pilosi 12 mm. longi 3.5 mm. lati; corollae disci aureae in tubo pilosae ceterum glabrae 5.7 mm. longae (tubo 2 mm. longo, dentibus 0.8 mm.). Receptaculum vix convexum; paleae acuminatae mucronulatae in dorso et apice nigrescenti-virides et subsordide subappresso-pilosae 7.5 mm. longae. Achenia nigrescentia ad apicem sparse pubescentia 3.7 mm. longa 2.4 mm. lata (alis apice ciliatis ad 0.6 mm. latis inclusis). Aristae 2 inaequales sursum ciliolatae 2.5–3.2 mm. longae. — GUATEMALA: shrub 15 feet high, Quezaltenango, 2440 m., 17 Jan. 1917, *E. W. D. Holway* 739 (TYPE in Gray Herb.). — Nearest to *V. Liebmannii* Sch. Bip., which has narrow corky wings decurrent from the leaf-bases, and more finely toothed leaves more sparsely and somewhat harshly pubescent beneath.

VERBESINA *scabriuscula*, sp. nov. Frutex (?) 3.3 m. altus sect. *Ochractiniae*, caule valido medullosa dense sordideque piloso pilis brevibus laxis multiloculatis. Folia (saltem superiora) alterna inferiora ovata vel ovali-ovata plus minusve falcata acuminata infra abrupte in petiolum cuneate marginatum contracta irregulariter leviterque repando-denticulata (dentibus ca. 40-jugis ad mucrones obtusos callosos reductis) penninervia et subreticulatovenulosa supra subdense hispidula pilis incurvis basi tuberculatis aetate scabriuscula basibus pilorum persistentibus, infra non pallidiora ubique densius hispidula pilis incurvis persistentibus basi glandulari-subtuberculatis ad costam longioribus sordidis subappressis, 28–29 cm. longa 10–13 cm. lata (basi cuneata in petiolum decurrente inclusa), in petiolis infra dense supra sparse sordidopuberulis immarginatis 3–4 cm. longis insidentia; suprema lanceolata vel oblanceolata bracteiformia 2.5–9 cm. longa 0.8–2.1 cm. lata. Paniculae ramos terminantes 2–2.8 dm. diametro ca. 200-

cephalae subnudae, ramulis (vel pedunculis) divaricatis 5-8 cm. longis, pedicellis ultimis saepius 8-12 mm. longis incurvo-pilosulis pilis brevibus et longioribus; bracteae ultimae lineares 1.5 mm. longae. Capitula 1.3-1.5 cm. lata; discus 4.5-(fructu) 5.5 mm. alta 3.5 mm. diametro. Involucri ca. 2-seriati ad 3 mm. alti irregularis phyllaria linearia vel spathulata acuta vel acuminata exteriora subherbacea interiora subherbaceo-subsicca mucronulata plus minusve pilosula. Radii 8 albi ovales 2-3-denticulati 5-nervii fertiles 5.5-6 mm. longi 2-2.5 mm. lati; corollae disci ca. 33 albae in tubo pilosae 2.6-3 mm. longae (tubo 1.2-1.5 mm., dentibus 0.6 mm.), faucibus infundibularibus. Paleae spathulato-obovatae acutae mucronulatae ciliatae dorso pilosae 4 mm. longae. Achenia nigrescentia paullum incrassata tuberculato-hispidula 2.8 mm. longa 1.6 mm. lata (alis 0.3-0.5 mm. latis ciliolatis apice aristis adnatis inclusis). Aristae 2 ciliolatae inaequales ad 1.9 mm. longae. — GUATEMALA: San Felipe, Retalhuleu, 14 Jan. 1917, E. W. D. Holway 723 (TYPE in Gray Herb.).

COREOPSIS MUTICA DC. Prod. v. 571 (1836). Examination of the type of this species by the writer in 1914 showed it to be identical with *C. mexicana* (DC.) Hemsl. (*Electra mexicana* DC. Prod. v. 630 (1836), which must be referred to its synonymy. The varieties of *C. mutica* will stand as follows:

Var. **genuina**: subglabra, foliis glabris vel glabris. — *C. mutica* DC. ! *Electra mexicana* DC. ! *Coreopsis mexicana* (DC.) Hemsl. Biol. Centr.-Am. Bot. ii. 196 (1881); Blake, Proc. Am. Acad. xlix. 337 (1913). *Electra Galeottii* Gray ! Pl. Wright. i. 110, footnote (1852). *Coreopsis Galeottii* (Gray) Hemsl. Biol. Centr.-Am. Bot. ii. 195 (1881). — The better specimens of *Galeotti* 2086 and 2087, types of *E. Galeottii*, in the Kew Herbarium, afford the following data for these collections: *Galeotti* 2086: woods, 1370-1675 m., cordillera, Oaxaca, Sept. 1840; *Galeotti* 2087; same locality, mountains at 2285 m., 1840.

Var. **SUBVILLOSA** DC. ! Prod. v. 571 (1836). — *C. mexicana* (DC.) Hemsl. var. *hyperdasya* Blake ! Proc. Am. Acad. xlix. 338 (1913). — Ehrenberg's no. 354, which as represented in the Gray Herbarium is of this variety, is of var. *genuina* as to the specimen in the British Museum.

Var. **holotricha** (Blake), comb. nov. — *C. mexicana* (DC.) Hemsl. var. *hyperdasya* Blake forma *holotricha* Blake ! Proc. Am. Acad. xlix. 338 (1913).

COREOPSIS STILLMANII (Gray) Blake, Proc. Am. Acad. xlix. 342 (1913). A considerable range extension for this species is afforded by specimens in the British Museum collected by M. E. Jones at Pasadena, California, 2 May 1882.

COREOCARPUS DISSECTUS (Benth.) Blake, Proc. Am. Acad. xlix. 344 (1913). This species (*Acoma dissecta* Benth. ! Bot. Sulph. 29, t. 17 (1844)) was originally described as collected at Cape San Lucas, at the southernmost extremity of Lower California. Of the two type sheets in the Kew Herbarium one is marked Bay of Magdalena, *Hinds*, 1841, the other Magdalena Bay, so that the record of locality in the original description seems to be based on an error. The other specimens I have examined, collected by Brandegee in 1889 (Gray Herb.) and by Anthony in 1897 (hb. Kew) are all from Magdalena Island. The species has a distinct and fairly tall stem, which is not well indicated in Bentham's plate.

Tonalanthus aurantiacus Brandeg. ! Univ. Calif. Pub. Bot. vi. 75 (1914); Cockerell, *Torreya* xv. 70-71, fig. 1 (1915). — *Purpus* 7002, type of the only species of this proposed new genus, from Sierra de Tonalá, Chiapas, is identical with *CALEA MEGACEPHALA* Rob. & Greenm. Proc. Am. Acad. xxxii. 21 (1896). There seem to be no characters to justify the generic separation of the species.

CALEA insignis, sp. nov. Frutex 5 m. altus, caule tenui tereti striato glabro (pilis sparsissimis exceptis) ramoso apice polycephalo. Folia opposita ovata tenuiter acuminata plus minusve falcata basi rotundato-cuneata regulariter serrata (dentibus ca. 15-jugis depressis obtuse callosio-mucronulatis) tenuia membranacea 3-nervia plus minusve venosa (venulis translucens) supra hispido-pilosa pilis adscendentibus basi subtuberculatis infra vix pallidiora pilosa pilis basi vix tuberculatis 7-11.5 cm. longa 3.3-6.5 cm. lata, in petiolis tenuibus nudis margine pilosis 0.9-3.3 cm. longis. Panicula 6-13 cm. diametro ca. 22-capitata; pedunculi 2-4 cm. longi; pedicelli nudi 2-18 mm. longi; bracteae inflorescentiae lineares herbaceae apice nigro-brunneo scarioso ciliato excepto 2.5-9 mm. longae. Capitula 2.5 cm. lata; discus subcampanulatus 9-10 mm. altus 6-7 mm. diametro. Involucri 4-seriati valde gradati 5-6 mm. alti phyllaria oblonga vel ovali-oblonga apice rotundata subherbaceo-membranacea lineata margine angusto scarioso brunneo donata apice latius scariose fusco-marginata et lacerato-ciliata appressa. Radii 8 albi fertiles ovales 3-denticu-

lati dorso glabri 12 mm. longi 3.5–4.5 mm. lati; corollae disci flavae glabrae 5.6 mm. longae (tubo 2–2.5 mm., dentibus 0.8 mm.). Receptaculum convexum; paleae angustae lineatae apice subfuscatae lacerato-ciliatae 5 mm. longae. Achenia incrassata infra angustata subquadrangularia glabra purpureo-nigrescentia 1.8 mm. longa. Aristae pappi ca. 20 inaequales deciduae sursum ciliatae 1.5–2 mm. longae, in annulo persistente insidentes. — GUATEMALA: a slender shrub up to 5 meters high, in ravines, Quezaltenango, 31 Jan. 1917, *E. W. D. Holway* 817 (TYPE in Gray Herb.). — Remarkable in its broad thin long-petioled leaves.

CALEA URTICIFOLIA (Mill.) DC. Prod. v. 674 (1836), as *urticaefolia*. — *Solidago urticifolia* Mill. Gardn. Dict. ed. 8. no. 30 (1768). *Caleacte urticifolia* (Mill.) R. Br. Trans. Linn. Soc. xii. 109 (1817). *Calea axillaris* DC. var. *urticaefolia* (Mill.) Rob. & Greenm. Proc. Am. Acad. xxxii. 27 (1896). — Miller's *Solidago urticifolia*, based on specimens from Vera Cruz collected by Houstoun, is by far the oldest name for this species. The narrow-leaved form, treated as the species by Robinson & Greenman in their revision, becomes

C. URTICIFOLIA (Mill.) DC. var. **axillaris** (DC.), comb. nov. — *Mocinna serrata* Lag. Nov. Gen. 31 (1816). *Galinsogea serrata* (Lag.) Spreng. Sys. iii. 579 (1826). *Calea axillaris* DC. Prod. v. 673 (1836).

STENOCARPHA filiformis (Hemsl.), comb. nov. — *Galinsoga filiformis* Hemsl. ! Diagn. Pl. Nov. ii. 34 (1879); Biol. Centr.-Am. Bot. ii. 204, t. 50 (1881). *Galinsoga filipes* "Hemsl." et *Stenocarpha filipes* Blake, Kew Bull. 1915. 348 (Sept. 1915). — When establishing the genus *Stenocarpha* I unfortunately cited its unique species, through some error, as *Galinsoga filipes* Hemsl. The name as used by Hemsley was however *G. filiformis*, and the species is properly designated by the name used above. Two varieties are known: var. **genuina** (*G. filiformis* Hemsl. l. c.) and var. **epapposa** (Rob.), comb. nov. (*Galinsoga filiformis* Hemsl. var. *epapposa* Rob. ! Proc. Am. Acad. xliii. 42 (1907)). As in many similar cases, the epappose form differs not only in the lack of pappus but in the glabrous achene. As the type collection (*Palmer* 127 of 1906, from Durango) includes both forms, it is probable that they grow together, as is likewise true of similar forms in *Simsia*, at least in some cases.

POROPHYLLUM punctatum (Mill.), comb. nov. — *Eupatorium punctatum* Mill. ! Gardn. Dict. ed. 8. no. 11 (1768). *E. Milleri* Steud. Nom. ed. 2. i. 608 (1840). *P. nummularium* DC. Prod. v. 649 (1836). — The type of *Eupatorium punctatum* Miller in the British Museum, Houstoun's "*Chrysanthemum americanum frutescens; Balsamino luteo foliis, nigris maculis punctatis. Pluk. G. 161. f. 1.*," quoted as "*Eupatorium americanum &c.*" by Miller, is the same as *Porophyllum nummularium* DC., and his name must replace it as being much the oldest name for the species. The type, a tracing of which is now in the Gray Herbarium, is erect, herbaceous, sparsely branched; the involucre in bud 10–12 mm., in fruit 12–13 mm. high; achenes brownish-black, puberulous with ascending hairs, 6.3 mm. long; pappus 8.5 mm. long; corollas in fruit 9–10 mm. long; leaves with glands on surface as well as on the margin; and peduncles not at all clavate upwardly.

CACALIA brachycoma, sp. nov. Herbacea erecta glabra radice invisā. Folia inferiora late ovata circa 9-lobata marginibus et venis ciliolatis exceptis glabra utrinque obscure viridia lobis mucronulatis subobtusis sinuate paucilobatis 21–22 cm. longa 23–28 cm. lata, in petiolis marginatis 12–16 cm. longis; superiora oblongo-ovata irregulariter et acute sinuata basi vaginata multo minora. Panicula polycephala composita sparse puberula parvibracteata 10 cm. diametro. Capitula maturitate 1.3 cm. alta 4–5 mm. diametro, in pedicellis 3–13 mm. longis. Involucri glabri 5.5–7.5 mm. alti achenia cum pappo subaequantis basi bracteolis paucis linearibus calyculati phyllaria oblonga. Corollae albiae 8–8.5 mm. longae (tubulo 4.5 mm. basi ampliato, dentibus oblongo-linearibus 3.5 mm. longis). Achenia badia glabra 10-costata 5.5 mm. longa. Setae ca. 40 brevissimae setulosae 1.6 mm. longae. — MICHOCAN: wet ravines near Uruapan, 1525 m., 13 Nov. 1905, Pringle 10126 (TYPES in Gray Herb. and U. S. Nat. Herb.). — Distributed as *C. amplifolia* DC., from which it differs in being glabrous, in its broader more deeply lobed leaves, and particularly in its greatly abbreviated pappus, which leaves the corolla tubes almost naked.

CACALIA calotricha, sp. nov. Erecta ramosa basi invisā, caule frutescente vel subarborescente cortice brunneo glabro tecto, supra glabro herbaceo folioso in inflorescentia subdense patentipiloso pilis multiloculatis subglandulosis subsordidis. Folia radicalia (?) peltata heptagonali-suborbicularia tertiam partem ad

basin repando-7-lobata lobis deltoideis saepe plus minusve trilobatis subremote calloso-mucronata chartaceo-herbacea subtenuia 3-nervia tenuiter reticulata utrinque ad venas et venulas et sparse inter venulas laxe pilosa pilis ut videtur purpureis ca. 12-loculatis patentibus et ciliata ca. 16 cm. longa 21 cm. lata, petiolo immarginato striato ut lamina subdense piloso; media sessilia ovalia vel ovali-obovata sinuatim ca. 4-8-lobata lobis depresso-deltoideis late rotundatis in basin brevem marginatam subabrupte angustata 12-16 cm. longa 8.5-10 cm. lata; superiora oblonga minora 3.5-7 cm. longa subintegra in bracteas minutas inflorescentiae sensim reducta. Panicula laxe divaricato-adscendens ad 2.7 dm. diam. polycephala dense pilosa pilis patentibus multiloculatis ut videtur purpureis; pedicelli 6-17 mm. longi 1-3-bracteolati. Capitula turbinato-hemisphaerica discoidea 21-flora 10.5-12 mm. alta et crassa. Involucri 8.5-9.5 mm. alti bracteae exteriores ca. 4 lineares ad 4 mm. longae, phyllaria 10 viridia scarioso-marginata linearia apice obtusa ciliata ut exteriores in dorso pilosa pilis laxis sordido-purpureis multiloculatis. Corolla ut videtur albida glabra maturitate 8 mm. longa (tubulo basi dilatato 4 mm. longo, denticibus 1.2 mm. longis). Achenia submatura ca. 7-costata glabra 3 mm. longa. Pappi aristae numerosae ca. 35 ciliolatae pilis crectis 5 mm. longae. — GUATEMALA: Volcan de Agua, above Santa Maria de Jesus, 2285 m., 4 March 1916, *Holway* 570 (TYPE in Gray Herb.). — *Cacalia calotricha* is somewhat nearly related to *C. Holwayana* Rob., but differs in nature of inflorescence, size of head, and many details of structure.

IV. DESCRIPTIONS OF NEW SPERMATOPHYTES, CHIEFLY FROM THE COLLECTIONS OF PROF. M. E. PECK IN BRITISH HONDURAS.

BY S. F. BLAKE.

The new species here described, belonging for the most part to sympetalous orders, are based mainly on the extensive collections made by Prof. M. E. Peck in British Honduras from 1905 to 1907. A few other species are described from hitherto undetermined collections made in Mexico, Costa Rica, and Nicaragua by C. F. Baker, Langlassé, Palmer, Pringle, Rose, and Tonduz. A new species of *Danthonia* from Mexico, described at the Gray Herbarium by

Mr. F. Tracy Hubbard, is included at the request of the author, as is a combination under *Setaria* relating to a species from tropical America, recently found needful by Mr. Hubbard.

GRAMINEAE

DANTHONIA filifolia Hubbard, spec. nov. Perennis caespitosa; culmi infra glabri, supra folium supremum puberuli, paullo tenuiores sed rigidi erecti circa 7.5 dm. alti purpurascens; folia plerumque radicalia; vaginae radicales glabrae (ore excepto), 3-6 mm. longae paullo validius nervatae, saepe ad laminam abrupte contractae et ad junctionem pilosae; laminae arcute involuto-filiformes, usque ad 3.6 dm. longae (explanatae circa 1 mm. latae), cum lamina supra ad basin veram pilosa et in parte superiore intra nervos prominulos puberula; folia culmorum 1 vel 2, cum vaginis glabris aliquanto ad orem auriculatis; ligula annulum ciliatum circa 0.2 mm. longum formans, laminae 3-4 cm. longis basin versus circa 2 mm. latis apicem versus valde involutis; panicula compacta infra cum ramis 1-2 adpressis instructa, in parte superiore spicata, ramo infimo usque ad 4.5 cm. longo, rachi puberulo ad axillas infimas breviter piloso; spiculae 10-12 mm. longae 5-8-florae; glumae glabrae purpureae ad marginem et ad apicem acutum scariosae subaequales 10-12 mm. longae flosculis multo longiores; pili calli numerosi circa 3.5 mm. longi; lemma albidum margine longe pilosum aliter glabrum 4.5-5.5 mm. (arista exclusa) longum, cum dentibus 3 mm. longis instructum; arista basin versus pallide brunnea plana et spiraliter torta in parte superiore albida teres recta geniculato-patens 4-6 mm. longa; palea circa 2.5 mm. longa ad marginem et apicem obtusiusculum ciliolata. — MEXICO: Puebla, Honey, June 17 ?, 1908, *C. G. Pringle*, no. 10,818 (TYPE in Gray Herb.). Noticeably different from other species of *Danthonia* in the long filiform leaves, in the very long glumes as compared with the small florets, and in the very hairy appearance of the florets caused by the long callus-hairs in connection with the long marginal hairs of the lemmas.

SETARIA sphaerocarpa (Salzm.) Hubbard, comb. nov. *Panicum sphaerocarpum* Salzm. ex Steud. Syn. Pl. Glum. i. 51 (1854). It has recently been found necessary to form this new combination in order to give correct labeling to a grass which forms no. 230 of

a considerable collection of the plants of Surinam gathered by Dr. J. A. Samuels in 1916 and recently determined at the Gray Herbarium. The specimen in question was collected in the Forest of Zandery, May 31, 1916.

URTICACEAE

MYRIOCARPA paniculata, sp. nov. Arbor 6-10-metralis dioica. Rami novelli sparsim lepidoto-hispidi fusco-brunnei vetustiores subglabrati, internodiis 0.8-3.6 cm. longis. Folia alterna obovata vel ovali-obovata apice subabrupte acuminata (acumine 6-15 mm. longo) basi cuneata obscurissime repando-denticulata glabra (pilis paucissimis in costa et venis majoribus exceptis) dense cystolithigera (cystolithis lineari-ellipticis circa bases pilorum deciduorum obscure stellatis) 3-nervia et parum venosa 7-15 cm. longa 2.2-5.2 cm. lata, in petiolis nudis 8-16 mm. longis insidentia; stipulae obscurae. Paniculae (♀ solum visae) axillares solitariae usque ad 4.5 cm. longae 4 cm. diam. (pedunculo 7-12 mm. longo incluso), ramis primariis ca. 6-8 patentibus vel divergentibus, secundariis paucis, floribus fasciculatis, fasciculis sparsis. Perianthium ♀ paene ad basin 4-partitum ad 0.4 mm. longum subaequale, segmentis duobus in angulis stipitis ovatis subacutis duobus inter angulas lanceolatis. Achenium (immaturum) complanatum 2.7 mm. longum (stigmatibus obliquo villosopapilloso 0.8 mm. longo incluso) in margine hispidum, stipite 1 mm. longo complanato, corpore ovato in stylum 0.7 mm. longum desinente. Ovulum erectum. — NICARAGUA: slender tree, 20-30 feet high, with very openly branched top, occasional in deep forests, Volcan Mombacho, 20 Feb. 1903, C. F. Baker 2489 (TYPE in Gray Herb.). — The present species, although a good *Myriocarpa* in all other characters, is unique in the genus by reason of its short truly paniculate inflorescence. The 4-parted perigonium, more distinct here than is general in the genus, seems to fairly merit the name of perianth. In these two features *M. paniculata* differs so strongly from its congeners that it may properly be taken as the type of a distinct group, to be called, in allusion to the strikingly developed although not absolutely characteristic stipe of the achene,

MYRIOCARPA Benth. sect. **Podocnide**. — Inflorescentia vere paniculata. Perianthium definitum 4-partitum. — Species unica

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33400459
M. paniculata Blake. The other species of the genus will form the sect. **Eumyriocarpa**. — Flores filiformiter cymoso-spicati innumerabiles. Perianthium minus definitum saepius 2-partitum. — Species typica *M. stipitata* Benth.

POLYGONACEAE

MILLSPAUGHIA **leiophylla**, sp. nov. Frutex valde intricateque ramosus. Caulis flexuosus, ramis late patentibus junioribus brunneis senioribus canescentibus demum cortice cano fibrilloso-decorticato fuscis. Folia 1-3 in fasciculis obovata apice late rotundata interdum minute mucronulata basi angustata obscure inaequaliterque cordata integerrima chartaceo-subcoriacea supra obscure viridia subtus vix pallidiora utrinque glaberrima et reticulata, nervis lateralibus ca. 5-jugis nervulis anastomosantibus, 1.6-3.3 cm. longa 0.8-1.6 cm. lata, in petiolis glabris 2-3 mm. longis. Racemi solitarii vel bini axillares puberuli 5-5.5 cm. longi, floribus 2-6 in fasciculis; pedicelli demum 5-6 mm. longi tenues. Perianthium frugiferum 6.5-7 mm. longum; valvae exteriores 3 suborbiculari-ovatae obtusae basi late rotundatae vel subcordatae puberulae 3-nerviae et valde reticulatae; interiores 3 lanceolatae acuminatae 1-nerviae reticulatae 5 mm. longae. Achenium lanceolatum 3-gonum lateribus concavis in angulis ciliolatum pallide brunneum 4.5 mm. longum 1.5 mm. latum, stylis 3 ad 1 mm. longis. — BRITISH HONDURAS: a shrub with hard light-brown wood, in swampy saline ground, Manatee Lagoon, 30 Jan. 1905, *M. E. Peck* 320 (TYPE in Gray Herb.). — An interesting addition to a genus hitherto known only from Yucatan. From the two published species *M. leiophylla* is at once distinguished by its glabrous leaves.

LAURACEAE

PERSEA (*Eupersea*) **podadenia**, sp. nov. Frutex vel arbor. Rami vetustiores glabri cortice canescente tecti, juniores fusci minute strigilloso-tomentelli, hornotini valde striati dense strigilloso-tomentelli et glanduloso-adsersi. Folia alterna lanceolata vel anguste lanceolato-elliptica utroque acuta vel subacuminata obscure mucronata integra coriacea supra sicc. sublaete viridia in costa subdense alibi sparsissime appresso-pilosula dense foveolata subtus glaucescentia in costa et venis subdense alibi subsparse

appresso-pilosa foveolata pennivenia (venis ca. 14-jugis prominulis venulis obscure reticulatis non prominulis) 6–11 cm. longa 2–3 cm. lata, in petiolis nudis dense appresseque pilosis supra canaliculatis 1–2 cm. longis insidentia. Paniculae axillares subpyramidales saepius 4.2–6.5 cm. longae 1.4–2.1 cm. diam. (pedunculo 1.8–3.6 cm. longo incluso) subsericeo-tomentoso-pilosulae; flores per 2–3 in apicibus pedunculorum secundi ordinis aggregati, pedicellis 1 mm. longis vel subnullis. Perianthium 3.5–4 mm. longum extus sericeum, segmentis exterioribus ovatis vel deltoideo-ovatis acutiusculis intus glabris 2 mm. longis, interioribus ovatis obtusis intus subappresso-pilosis duplo longioribus. Stamina I. ser. 2.4 mm. longa, filamentis 1.5 mm. longis adscendenti-pilosis, antheris ellipticis apice truncato-rotundatis, locellis inferioribus eos superiores lateraliter tangentibus; ea II. ser. similia; ea III. ser. 2.6 mm. longa, filamentis dense pilosis 1.3 mm. longis basi 2-glandulosis (glandulis magnis $\frac{2}{3}$ longit. filamentorum aequantibus subcullato-involutis distincte stipitatis, stipite piloso ad 0.4 mm. longo), antheris 1.3 mm. longis ellipticis extus ad medium pilosis lateraliter dehiscentibus. Staminodia IV. ser. 1.2 mm. longa dense pilosa, capite triangulari 0.6 mm. longo in stipitem 0.6 mm. longum cuneato-rotundato. Ovarium glaberrimum $\frac{2}{3}$ longit. styli aequans, stigmatibus magno. Bacca sicc. purpurea glauca ellipsoideo-subglobosa 11–12 mm. longa 8–10 mm. diametro, in calyce persistente vix accrescente sessilis. — DURANGO: San Ramón, 21 April–18 May 1906, *Palmer* 119 (TYPE in Gray Herb.). — A species superficially similar to *P. Borbonia* (L.) Spreng., but with different staminodia, floral glands, &c.

PHOEBE (*Euphoebe*) **angustata**, sp. nov. Frutex vel arbor 7–10 m. altus. Rami vetustiores griseo-viridescetes glabrati, hornotini sicc. nigrescentes subsparse appresso-puberuli. Folia anguste lanceolata longe acuminata basi acuta vel breviter acuminata integra subcoriacea supra viridia juventate sparse vel subdense appresso-pilosula maturitate glaberrima subnitida subtus pallidiora sed distincte viridia omnino non glaucescentia juventate appresso-sericea submaturitate in axillis barbata maturitate glaberrima pennivenia prominulo-reticulata (venis 12–16-jugis) 5–13.5 cm. longa 0.8–2.3 cm. lata, in petiolis nudis sparse et obscure appresso-puberulis supra paullum complanatis 8–15 mm. longis insidentia. Paniculae axillares 3–6.8 cm. longae 2–4.2 cm. diam.

(pedunculo 8-12 mm. longo incluso) infra sparse supra subdense appresso-puberulae multiflorae; pedicelli 3-5 mm. longi. Perianthium 2.5 mm. longum 7 mm. latum, segmentis subaequalibus anguste oblongis vel oblongo-ellipticis obtusis extus sparse appresso-puberulis ciliolatis intus appresso-pilosulis, tubo brevissimo. Stamina I. ser. glaberrima 1.5 mm. longa, filamentis tenuibus antheras quadrato-ellipticas aequantibus, locellis inferioribus eos superiores basi (et usque ad medium) tangentibus; ea II. ser. similia; ea III. ser. similia locellis sublateralibus, filamentis ad basin glandulis 2 subsessilibus magnis filamenta paene aequantibus donatis. Staminodia IV. ser. magna 1.2 mm. longa glaberrima, stipite 0.6 mm. longo, capite triangulari-cucullato basi cuneato-rotundato non cordato. Ovarium globosum stylo subdimidio longius. Pedicelli frugiferi sursum incrassati 6 mm. longi apice patelliformiter ampliati; baccæ (matura ?) ellipsoidea olivacea laevis sicc. 1.8 cm. longa 1.3 cm. diametro. — TAMAUlipas: vicinity of Victoria, 320 m., 1 Feb. - 9 April 1907, *Palmer* 80 (TYPE in Gray Herb.); limestone hills near Tampico, 1 Mar. 1899, *Pringle* 8006. SAN LUIS POTOSI: near Los Canos, 15-21 Oct. 1902, *Palmer* 249; limestone hills, Las Palmas, 24 July 1891, *Pringle* 3794. — All these specimens, with the exception of the type, have been distributed or determined as *Persea salicifolia* (Nees) Hemsl. which is properly *Phoebe salicifolia* Nees. That species, however, as described by Mez from the type collection (*Ehrenberg* 875), differs in many characters — subtriplinerved broader leaves, glabrous inflorescence and flowers, pilose filaments, &c. The closest affinity of *P. angustata* seems to be with *P. Ehrenbergii* Mez, which has much larger and broader leaves, glabrous flowers, acute perianth-segments, &c. Of the specimens here referred to *P. angustata*, the two collections from Tamaulipas are in flower, those from San Luis Potosi in fruit.

PHOEBE (*Euphoebe*) **mollicella**, sp. nov. Arbor. Rami vetustiores fusco-purpurei brunneo-flavide tomentoso-pilosuli, hornotini densissime tomentoso-pilosuli. Folia alterna lanceolata vel anguste elliptico-lanceolata apice acuminata plus minusve falcata basi acute vel subacute cuneata firme chartacea integra supra obscure viridia juventate dense maturitate sparse pilosula (venis et costis dense pilosulis exceptis) pilis laxis subappressis et venosa subtus multo pallidiora dense molliterque tomentoso-pilosula pilis

laxe subappressis vel adscendentibus pennivenia (venis ca. 6-jugis distincte prominulo-reticulatis) 5–7 cm. longa 1.3–2.3 cm. lata, in petiolis nudis similiter pubescentibus 7–11 mm. longis insidentia. Paniculae axillares subpyramidales foliis breviores 3–4.5 cm. longae 1–1.8 cm. diam. (pedunculo 1.1–2.5 cm. longo incluso) dense subrufescenterque tomentosopilosulae pauciflorae (floribus ca. 6–8); pedicelli 3–4 mm. longi. Perianthium 2.5 mm. longum 6.5 mm. latum, extus in tubo brevissimo sparse pubescens in segmentis 6 anguste ellipticis obtusis extus sparsissime pubescens vel subglabrum intus puberulum in apice tubi pilosum. Stamina I. ser. 1.2 mm. longa, filamentis basi sparse pilosis 0.5 mm. longis, antheris quadrato-suborbicularibus truncatis, locellis inferioribus eos superiores basi (et paene ad medium) tangentibus; ea II. ser. similia, filamentis brevioribus; ea III. ser. 1.5 mm. longa, filamentis basi pilosis et 2-glandulosis (glandulis sessilibus 1/2 longit. filamenti aequantibus vel paullo longioribus), quam antherae paullo longioribus, locellis extrorsis. Staminodia IV. ser. trigono-clavata obscure stipitata, capite in stipitem subobscurum brevioris pilosum cuneato-rotundato, apice brunnescente triangulari subeucullato. Ovarium glaberrimum stylo subdimidio longius. — COSTA RICA: tree with rounded top, forests of Copey, 1800 m., Feb. 1898, *Tenduz* 11676: also distr. by J. D. Smith under the no. 7353 (TYPES in Gray Herb.). — Vern. name “Quizarrá amarillo.” Distributed (no. 7353) under the name *P. helicterifolia* Mez. That species (*Phoebe helicterifolia* (Meisn.) Mez), however, as described by Mez from the original, *Linden* 1641, has much larger leaves somewhat shining above, acutish perianth-segments, glabrous very short outer filaments, &c. The present plant is perhaps nearest to *P. mollis* Mez.

OCOTEA (*Mespilodaphne*) **Bakeri**, sp. nov. Arbor 6–10-metralis. Ramuli subangulati juventate dense appresseque subsordidopuberuli aetate glabrati cortice canescente tecti. Folia alterna ovalia apice obtusa vel subrotundata interdum obscure breviterque acutata (sed apice supremo obtuso) basi cuneata integerrima chartaceo-subcoriacea utrinque subobscuris reticulato-venulosa (venis lateralibus ca. 9-jugis, venulis interdum prominentibus) supra viridia glaberrima subtus paullo pallidiora et juventate sparsissime strigosa aetate in costa sparsissime strigosa ceterum glabra 6.5–11 cm. longa 2.7–4.3 cm. lata, in petiolis nudis subglabris supra canal-

iculatis 7-8 mm. longis insidentia. Paniculae 13-25-florae axillares subpyramidales foliis breviores 2-6.5 cm. diam. 2-4 cm. longae, in pedunculis 3.5-6 cm. longis subdense puberulis pilis laxe curvatis subpatentibus; pedicelli ultimi dense subsordideque puberuli ca. 4 mm. longi. Flores perfecti ca. 7.5 mm. lati fragrantis: perianthium extus subcanescenti-puberulum, tubo campanulato 1.5 mm. alto, segmentis 6 ovalibus obtusis intus dense glandulosis 4 mm. longis 2-2.5 mm. latis. Stamina 9: ea I. ser. papilloso-puberula 1.5 longa brevissime sed distincte stipitata, antheris ellipticis apice rotundatis, loculis per paria superpositis; ea II. ser. consimilia, stipite longiore papilloso-pilosa; ea III. ser. extrorsa sessilia oblonga papilloso-puberula basi biglandulosa, glandulis sessilibus. Pistillum obovoideum 2 mm. longum glabrum; ovarium stylo subduplo longius. — NICARAGUA: occasional in high forests, Volcan Mombacho, 20 Feb. 1903, C. F. Baker 2493 (TYPE in Gray Herb.). — Mr. Baker's label bears the following notes: "Small tree, 20-30 ft. high, with rather thick top. New foliage light-green, old dark green, much contrasted. Flowers with strong and pleasant odor. Used by natives as tonic medicine."

ROSACEAE

LICANIA *licaniaeflora* (Sagot), comb. nov. — *Moquilea licaniaeflora* Sagot, Ann. Sci. Nat. VI. xv. 308 (1883). *Licania bracteosa* Fritsch, Ann. Naturh. Hofmus. Wien iv. 54 (1889). — This combination, avoided by Dr. Fritsch, is required by the International Rules.

LICANIA (*Moquilea*) *retifolia*, sp. nov. Arbor 5-8 m. alta. Rami vetustiores cortice griseo-brunneo tecti, hornotini subteretes subrecti purpureo-brunnei glabri. Folia alterna lanceolata vel obovata (in specimine saepius inaequilateralia) apice acuta obtusa truncata vel rotundata basi saepius oblique cuneata obscure repanda coriacea glaberrima supra lucenter viridia subtus plus minusve rufescentia lucentia utrinque conspicuiter prominuloreticulata (venis ca. 10-jugis, venulis eleganter reticulatis) 4.3-10 cm. longa 1.7-2.5 cm. lata, in petiolis supra parum complanatis glabris nudis 5-7 mm. longis insidentia; stipulae scariosae intrapetiolares. Flores numerosi ad apices ramorum hornotinorum subdense paniculati in panicula sessili pyramidales 3-3.5 cm. longa

4–4.8 cm. diam.; axis et ramuli paniculae patenti-puberuli, pedicellis ultimis canescenti-puberulis 1.5 mm. longis vel brevioribus; flores in ramulis secundi ordinis racemosi; bracteae primariae lanceolato-subulatae basi ampliatae laceratae subglabrae ad 2.5 mm. longae, ultimae deltoideae canescenti-puberulae minimae. Calycis tubus turbinato-hemisphaericus canescenter densissimeque patenti-puberulus intus pilosus 2 mm. longus, lobis 5 triangularibus acutiusculis extus et intus canescenti-puberulis ad 1.5 mm. longis erectis vel patentibus. Petala 5 ovalia utrinque dense pilosa cito decidua “viridescenti-albida” 1.5 mm. longa 1 mm. lata. Stamina 15 valde exserta, filamentis (per 2 mm. longit. liberis) basi in anulum completum pilosum connatis. Ovarium glabrum. Stylus 3.5–4.5 mm. longus stamina saepius superans. — MICHOCAN or GUERRERO: granitic soil, Cerro de los Cajones, 1000 m., 14 April 1899, *Langlassé* 992 (TYPE in Gray Herb.)

LICANIA (Moquilea) sparsipilis, sp. nov. Arbor ramosa. Rami vetustiores cortice cano vel purpureo-brunneo glabro vel sparse pubescente tecti, hornotini fusco-brunnei sulcati subsparse piloso-strigosi pilis appressis vel laxis sordide flavescentibus. Folia alterna ovalia vel oblongo-elliptica vel ovata apice breviter acuminata basi cuneata vel rotundato-cuneata chartaceo-coriacea integra supra sicc. pallida lucentia glaberrima (juventate ad costam sparsissime piloso-strigosa) subtus paullo pallidiora venosa (venis ca. 10-jugis conspicuis) inter venas prominule venuloso-reticulata juventate in costa strigoso-pilosa (pilis flavicantibus) maturitate glabra vel pilis sparsissimis praedita 8–12 cm. longa 3.3–3.9 cm. lata, suprema minora angustiora; petioli supra complanati nudi sparse strigoso-pilosi vel subglabrati 2–4 mm. longi. Paniculae axillares dense flavicanti-pilosae pilis adscendentibus 1–1.2 dm. longae 5–6 cm. diam., pedunculo subnullo; rami primarii alterni ca. 8 recte patentes vel divergentes vel interdum parum recurvati usque ad 3.3 cm. longi dense florigeri, floribus sessilibus, bracteolis ovatis acutis vel breviter acuminatis in dorso pilosis subpersistentibus 0.6–1.3 mm. longis. Calycistubus hemisphaerico-campanulatus densissime canescenti-puberulus et subdense subappresso-pilosus pilis flavicantibus intus pilosulus 2 mm. altus, lobis 5 deltoideis obtusiusculis utrinque canescenti-puberulis extus pilosis erectis 0.8–1 mm. altis. Petala nulla. Stamina 10 longe exserta 3.5 mm. longa, filamentis basi in anulum completum sparse pilo-

sum brevissime connatis. Ovarium pilosum. Stylus stamina paullo superans basi pilosus. Fructus immaturus tubum calycis implens. — BRITISH HONDURAS: a tree with hard red wood, in forest, Sittee River, 15 April 1907, *M. E. Peck* 858 (TYPE in Gray Herb.)

I have followed Fritsch in including *Moquilea*, to which belong the two new species here described, in *Licania*, as the differences between them seem too weak and inconstant to be of generic value.

PRUNUS apodantha, sp. nov. Frutex 6 dm. altus ut videtur procumbens ramis sursum curvatis. Caulis griseo-brunneus subglabratus, ramis angulatis subdense retrorso-hispidulis pilis paucis longioribus subpatentibus intermixtis. Folia alterna internodia superantia ovalia vel ovali-subovata obtusa vel rotundata mucronulata basi cuneata crenato-serrata (dentibus ca. 12-jugis rotundatis glandulari-mucronulatis nigrescentibus) supra obscure viridia sparsissime hispidula vel glabrata subtus pallidiora ad costam et venas dense inter venas sparse pilosa pilis laxe patentibus vel subincurvis, venis 5-6-jugis prominulis anastomosantibus, 1.6-2.8 cm. longa 0.9-1.5 cm. lata, in petiolis nudis vel anguste marginatis puberulis 2-3 mm. longis insidentia; stipulae subulatae erectae sursum recurvatae puberulae persistentes 2-3 mm. longae. Flores in axillis solitarii vel bini sessiles ad 6 mm. lati; bractee siccae rubescentes ovaes rotundatae ciliatae ad apicem glandulari-puberulae ceterum glabrae ad 1 mm. longae. Calyx turbinato-hemisphaericus basi ima contractus intus breviter pilosus 10-nervis (nervis supra parum anastomosantibus) 3 mm. altus 3.5 mm. diametro, lobis 5 deltoideis apice subtruncatis vel retusis vel obtusis in lateribus dentibus 2-3 glanduliferis praeditis reflexis vel subpatentibus ad 1.2 mm. longis. Petala 5 albida obovata apice rotundata basi cuneata non unguiculata glabra decidua 3.3 mm. longa 1.8 mm. lata. Stamina 15: 10 (antisepala et antipetala) in tubi calycini apice inserta, 5 (antisepala) ca. 0.7 mm. infra apicem tubi inserta; filamenta ad 2 mm. longa glabra. Ovarium (immaturissimum) glaberrimum. — STATE OF MEXICO: hillsides, Rio Hondo, 3 Nov. 1895, *Pringle* 7055 (TYPE in Gray Herb.). — A characteristic species, differing from *P. microphylla* (HBK.) Hemsl., its nearest ally, in its glabrous ovary, larger and broader leaves, and calyx-tube much less hairy inside.

CONNARACEAE

CONNARUS lonchotus, sp. nov. Frutex alte scandens. Caulis glaber obscure brunneus lentiginosus. Folia 3-foliolata; petiolus tenuis glaber 3.8–7.2 cm. longus basi incrassatus; petioluli laterales incrassati ca. 4 mm. longi, terminalis apice incrassatus 0.9–2.9 cm. longus; foliola ovalia integerrima apice abrupte breviterque (1–2 cm.) acuminata apice supremo rotundata firma chartaceo-coriacea glaberrima subconcoloria, venis majoribus 7–12-jugis venulis anastomosantibus vix reticulatis, (7)11–17.5 cm. longa (2.3)4.1–6.3 cm. lata. Paniculae axillares foliis breviores tenues 8–15 cm. longae pilis brevibus subappressis rufescentibus pubescentes; pedicelli brevissimi vel subnulli ut gemmae dense rufescenti-puberuli. Calyx rufescenti-puberulus et glanduloso-punctatus 3 mm. longus segmentis ovalibus obtusis. Petala calycem 1 mm. superantia ciliolata et sparse glanduloso-punctata infra medium connata. Stamina 10 basi connata alternis longioribus. Ovarium solitarium rufescenti-pilosum. — BRITISH HONDURAS: a high climber in forests, Moho River, 16 March 1907, *M. E. Peck* 727 (TYPE in Gray Herb.). — Nearest to *C. lentiginosus* Brandegee, which has five less acuminate leaflets, larger and more branched panicles, slightly shorter and more ovate sepals, longer and much more punctate petals, shorter stamens, and more shortly pubescent ovary.

LEGUMINOSAE

PITHECOLOBIUM graciliflorum, sp. nov. Frutex vel arbor ramosa inermis. Rami juventate subteretes densissime molliterque rufescenti-pilosuli pilis patentibus et subincurvis aetate glabrati subangulati cortice cano tecti. Folia 2-pinnata; stipulae herbaceae minimae subulatae rufescentes 2 mm. longae; petiolus (ut raches primariae et secundariae) dense rufescenter patenti-pilosulus supra sulcatus eglandulosus 7–10 mm. longus; rachis 1–2 cm. longus glandulis jugalibus donatus; pinnae 2–3-jugae 3–5 cm. longae, petiolulis 3–7 mm. longis infra medium glandula donatis; foliola 6–8-juga oblongo-ovata vel ovali-ovata obtusa interdum apiculata basi oblique rotundata paullum inaequilateralia subchartaceo-membranacea infra parum venosa supra siccitate obscure viridia glabra subtus pallidiora ad costam et marginem sparse rufescenti-

pilosula 1–2.8 cm. longa 3–16 mm. lata (ad apices pinnarum gradatim majora). Capitula globosa 1.8–2 cm. diametro (staminibus inclusis) axillaria solitaria vel gemina, in pedunculis rufescenti-pilosulis 1.8–2.7 cm. longis; bracteae lineari-setaceae rufescenti-pilosulae ad 5 mm. longae; flores numerosi sessiles. Calyx tubulosus apice paullum dilatatus 5-dentatus superne rufescenti-pilosulus 3.4 mm. longus (dentibus triangularibus obtusis 0.6 mm. longis). Corolla longe tenuiterque tubuloso-infundibuliformis 5-dentata in dentibus rufescenti-pilosa ceterum glabra 10 mm. longa (dentibus 1.8 mm. longis ovatis obtusiusculis). Stamina ca. 34 usque ad apicem corollae in tubum connata maturitate ad 1.8 cm. longa. Ovarium glabrum sed ut videtur papillosum ca. 15-ovulatum. Fructus deest. — BRITISH HONDURAS: open ground, Toledo, 2 June 1907, *M. E. Peck* 921 (TYPE in Gray Herb.).

PITHECOLOBIUM idiopodum, sp. nov. Arbor inermis. Ramus subrectus paullum striatus juventate densissime rufescenti-puberulus aetate subglabratus vel sparse pubescens cortice fusco tectus. Folia bipinnata; stipulae deciduae; petiolus plus minusve puberulus pilis incurvis vel glabratus teres non sulcatus prope apicem glandula unica donatus 3–3.5 cm. longus; rachis subsparse rufescenter vel sordide pilosula 3–7.8 cm. longa glandulis ca. 3 subjugalibus donata; pinnae 3–4-jugae 7–11 cm. longae, earum rachibus apice 1-glanduliferis; foliola 12–21-juga oblique oblonga apice rotundata obtuse subapiculata basi oblique cuneata in latere uno late subauriculata firma supra obscure viridia ad basin in costa puberula ceterum glabra parum venosa subtus multo pallidiora sparse breviterque strigosa 9–18 mm. longa 2.5–5 mm. lata. Capitula subglobosa vel turbinato-subglobosa ad 3.5 cm. diametro (staminibus inclusis) in pedunculis axillaribus geminis rufescenti-puberulis 7 cm. longis; bracteae rufescenti-pilosulae ad 1.5 mm. longae; pedicelli sparse appresseque rufescenti-pubescentes 5–6 mm. longi. Calyx obovatus sparse appresseque rufescenti-pubescenti breviter 5-dentatus 2.6 mm. longus, dentibus acutis deltoideis 0.4 mm. longis. Corolla obovata siccitate lutescenti-brunnea in dentibus appresse rufescenti-pubescenti 6.5 mm. longa 5-dentata, dentibus lanceolatis subacuminatis 3 mm. longis. Stamina ad 24–27 usque ad apicem tubi corollae in tubum pentagonum connata maturitate usque ad 2.2 cm. longa. Ovarium subsessile appresse pilosum ad 16-ovulatum. Fructus deest. —

BRITISH HONDURAS: a medium-sized tree, on pine ridges near Manatee Lagoon, 12 May 1906, *M. E. Peck* 437 (TYPE in Gray Herb.) — Rather closely related to *P. corymbosum* Benth. but with larger calyx, larger more deeply toothed corolla, and less venose more numerous leaflets.

PITHECOLOBIUM *Peckii*, sp. nov. Arbor armata. Rami subrecti costati glabri cortice griseo pustulato tecti, spinis stipularibus rectis subulatis 2–3 mm. longis armati. Folia bipinnata; petiolus valde canaliculatus basi sparse puberulus eglandulosus immarginatus 2–2.4 cm. longus; rachis 1.2–2.4 cm. longa, glandulis jugalibus clavato-poculiformibus donata; pinnae 2–3-jugae 5–7.5 cm. longae, earum rachillis basi puberulis; foliola 5–11-juga subsessilia oblique ovalia vel oblonga apice truncata vel rotundata rare retusa mucronulata basi oblique rotundata supra in costa parum puberula et glandulosa infra ad basin in latere antico comata ceterum glabra subcoriacea utroque venoso-reticulata 1.1–2.6 cm. longa 4–7.5 mm. lata. Spicae oblongae axillares 3-nae 2.3–3.5 cm. longae sessiles; rachis puberula; bractee deltoideae acutae persistentes ad 0.8 mm. longae; flores sessiles ca. 25–33. Calyx subhemisphaericus vel turbinato-subhemisphaericus ad apicem sparse strigillosus lutescenti-viridis brevissime 5-dentatus 1.2 mm. longus. Corolla lutescens infundibuliformis in dentibus strigillosa ceterum glabra 6.5 mm. longa (tubo 3 mm., faucibus ad 2 mm., dentibus 1–1.5 mm. longis). Stamina 31 vel ultra, filamentis longe connatis, tubo demum 1.5 cm. longo. Ovarium stipitatum dense puberulum. Legumen circinatum ca. 1.2 dm. longum sublignosum glabrum intus rubescens ca. 11-spermum, valvis margine contortis (0.6) 1.2–1.7 cm. latis. Semina magna brunneo-nigrescentia 7.5–15 mm. longa 6–12 mm. lata (2–5) mm. crassa glabra, arillo magno ad medium vestita. — BRITISH HONDURAS: in wet ground, without definite locality, 1905–07, *M. E. Peck* 738 (TYPE in Gray Herb.), 829 (Gray Herb.). — Described as a small gnarly tree with hard wood. A member of the sect. *Unguis-cati*, but quite distinct from any species yet described. Full data for these two collections are unfortunately lacking.

MALPIGHIACEAE

THRYALLIS *Langlassei*, sp. nov. Frutex 3 m. altus. Caulis tenuis teres glaber rufescenti-brunneus; rami erecti olivacei prope

inflorescentiam subsparse pubescentes pilis fusco-brunneis medio adfixis non verrucosi. Folia opposita lanceolata vel ovata obtusa basi longe cuneata integra parum revoluta supra viridia glabra subtus pallidiora glabra vel in costa sparsissime pilosa (pilis eis caulis similibus) 4.5–5.5 cm. longa 0.8–1.5 cm. lata, in petiolis nudis glabris vel sparsissime pilosis ad apicem 2-glandulosis 6–9 mm. longis; ea basi inflorescentiae multo minora. Racemi terminales 1–1.3 dm. longi 3.5 cm. diametro sessiles vel breviter pedunculati, floribus 25–38; pedicelli 1.2–1.6 cm. longi ut axis angulatus inflorescentiae pilosus pilis fusco-brunneis medio adfixis patentibus vel appressis non verrucosi; bracteae lanceolatae acuminatae 1–1.5 mm. longae similiter pubescentes. Sepala 5 oblongo-ovalia apice rotundata omnia eglandulosa ciliolata (pilis fusco-brunneis) 2 mm. longa. Corolla 1.7 cm. lata “flava,” petalis 5: 4 subaequalia, lamina ovali-ovata apice rotundata basi truncato-cordata parum undulata 5.5 mm. longa 3.8 mm. lata, ungue 1.5 mm. longo; 1 majus, lamina 6 mm. longa 5 mm. lata, ungue (sicc.) rubescente 3.2 mm. longo. Stamina 10, alterna breviora: filamenta purpurea 2.5 et 4 mm. longa; antherae flavidae 2.7 mm. longae. Styli 3 purpurascens aequales sursum subulato-filiformes 6 mm. longi. Capsula ut ovarium breviter patenti-pilosa 3-gona ad 3.5 mm. longa et lata. —MICHOCAN or GUERRERO: sandy soil, San Andres, 700 m., 22 Mar. 1899, *Langlassé* 955 (TYPE in Gray Herb.). — A species intermediate between *T. dasycarpa* Small and *T. tuberculata* Rose, but quite distinct from either. I have followed Rose and Small in displacing *Galphimia* Cav. by *Thryallis* L., as the original species of Linnaeus belonged to the present genus.

HIPPOCRATEACEAE

HIPPOCRATEA (*Barbatae* Peyr.) **meizantha**, sp. nov. Frutex scandens. Rami vetustiores subteretes recte patentes cortice albido-brunneo tecti, hornotini viridescens glabri. Folia opposita ovalia vel ovali-ovata obtusa vel acutiusecula basi rotundato-cuneata coriacea obscure crenato-serrata glaberrima supra viridia subtus paullo pallidiora vix conspicuiter prominulo-reticulata (venis prominentibus 6-jugis) 5–9.1 cm. longa 2.4–3.9 cm. lata, in petiolis supra sulcatis glaberrimis nudis 5–9 mm. longis insidentia; stipulae subulatae firmas basi sparse laciniatae 1.5 mm. longae. Flores in paniculis axillaribus saepius bifurcatis (ramis divergenti-

bus vel adscendentibus) multifloris dense glanduloso-puberulis 4-5 cm. longis (pedunculo subglabrato 1.5 cm. longo incluso), pedicellis ultimis 1.5-2 mm. longis; bracteae triangulares acuminatae basi parum laciniatae ca. 1.4 mm. longae. Alabastrum pyramidali-hemisphaericum 2.4 mm. longum 2.8 mm. diametro. Sepala 5 (rare 4) depresso-rotundata glanduloso-puberula et ciliolata ad 0.8 mm. longa 1.5 mm. lata. Corolla 7.5-8 mm. diametro: petala 5 (rare 4) ovalia vel elliptica apice rotundata sicc. albida extus densissime glanduloso-puberula intus infra apicem barbatula 3-3.5 mm. longa 2.2-3 mm. lata. Discus pulvinaris elevatus carnosus densissime glandulari-adspersus. Stamina 3 (in flore 4-mero 2), filamentis complanatis extus ad basin dense glandulari-adsperis. Stigma integrum. Carpida desunt. — MORELOS: barranca near Cuernavaca, 1525 m., 10 May 1898, *Pringle* 7671 (TYPE in Gray Herb.). — A species nearly related to *H. ovata* Lam. (which should probably be called *H. volubilis* L.), but with noticeably larger flowers than those of any of the numerous specimens of that species which have been examined. In this feature it suggests the Brazilian *H. affinis* Cambess., but it differs in several particulars from the description of that plant, of which no material has been seen by the writer.

HIPPOCRATEA (*Micranthae* Peyr.) **subintegra**, sp. nov. Arbor patens ramosa. Rami vetustiores teretes cortice cano glabrato tecti, hornotini purpureo-brunnei verrucosi minute et subsparse patenti-puberuli. Folia opposita obovata apice saepius apiculata basi cuneata coriacea obscure crenata supra pallide viridia glabra prominulo-reticulata subtus concoloria glabra prominulo-reticulata (venis 5-jugis venulis anastomosantibus) 5-7.5 cm. longa 2.1-3.2 cm. lata, in petiolis supra complanatis patenti-puberulis nudis 4-8 mm. longis. Paniculae axillares in ramis hornotinis patenti-puberulae erectae vel divergentes 1.7-2.4 cm. longae (pedunculo 1-1.6 cm. longo incluso) pauciflorae, pedicellis ultimis 1 mm. longis vel subnullis; bracteae ovato-lanceolatae acuminatae 0.5-1 mm. longae. Flores ad 5 mm. lati, alabastrum subhemisphaericum 1.7 mm. longum et latum. Sepala 5 patenti-puberula 0.7 mm. longa depresso-deltaoidea obtusa. Petala 5 imbricata suborbiculari-ovalia latissime rotundata obscurissime erosula glabra 3 mm. longa 2.4 mm. lata. Discus cupularis carnosus parum elevatus ad 0.5 mm. altus. Stigma integrum. Carpida (immatura) 3 plane complanata

oblique obovato-orbicularia obovata coriacea ad 1.3 cm. longa et lata. — BRITISH HONDURAS: a small spreading tree in pine ridge thickets, near Manatee Lagoon, 8 July 1906, *M. E. Peck* 456 (TYPE in Gray Herb.).

RHAMNACEAE

COLUBRINA lanulosa, sp. nov. Frutex 3 m. altus. Caulis fusco-brunneus glabratus sed parum papillosus (basibus pilorum persistentibus); rami hornotini densissime lanuloso-pilosi pilis pallide rufescentibus intertextis. Folia alterna ovalia vel ovata apice rotundata vel obtusa basi rotundata obscurissime serrulata firma supra obscure viridia densissime molliterque pilosa pilis subapressis modice venosa subtus dense mollissimeque rufescenti-canescenterque lanuloso-pilosa venosa (venis ca. 6-jugis) 2.5–4.6 cm. longa 1.4–2.1 cm. lata, in petiolis dense lanuloso-pilosis 3–5 mm. longis. Flores “virides” in paniculis axillaribus 1.3–2.5 cm. longis 1.7–3.2 cm. latis (pedunculo 6–10 mm. longo incluso) ut ramulis pubescentibus densissime multifloris aggregati; pedicelli 1.5 mm. longi vel subnulli. Calycis rotati 5.2 mm. lati extus lanuloso-pilosi intus glabri tubus disco 5-gono impletus, segmenta 5 patentia deltoidea acutiuscula intus 1-alato-nervia. Petala 5 elliptico-obovata subsaccata stamina foventia 1.5 mm. longa (ungue 0.5 mm. longo incluso). Stamina 5 petalis subaequalia, filamentis subulatis glabris. Ovarium aestivatione per discum omnino occultum. — MICHOCAN or GUERRERO: volcanic soil, Tlacotepec, 1600 m., 10 June 1899, *Langlassé* 1053 (TYPE in Gray Herb.). — A species finding its only close ally in *C. megacarpa* Rose, which has somewhat looser fewer-flowered inflorescences, thinner more distinctly toothed leaves, and much less pubescent young branches and under leaf-surfaces.

DILLENIAACEAE

SAURAUIA Buscalioniana, sp. nov. Arbor 5–6 m. alta. Ramus validus sordide (novellus rufescens) densissimeque sed non aspere piloso-setosus (setis patenti-incurvis per totam longitudinem spinulosus) et stellato-pilosus. Folia alterna obovata breviter acuminata basi cuneata subsimpliciter serrulata (dentibus setoso-mucronatis) supra sicc. obscure brunneo-viridia subdense incurvo-setosa et -setulosa (pilis basi ampliatis glabris vel sparse

spinulosis) et sparsissime stellato-pubescentia pennivenia (venis ca. 16-jugis venulis obscurissimis) subtus vix pallidiora subdense in axillis densissime stellato-pilosa in costa subsparse setosa venulis inconspicuis 18–22 cm. longa 5.8–7.8 cm. lata, in petiolis nudis ut ramo rufescenter piloso-setosis ad 2 cm. longis insidentia. Paniculae pyramidales ut ramus piloso-setosae et stellato-pilosae 9–10 cm. longae 5–6 cm. diam. (pedunculo nudo 5–5.8 cm. longo incluso); bracteae subulato-lanceolatae attenuatae 1–4.5 mm. longae; pedicelli 3–6 mm. longi. Calycis 4.5 mm. longi paene ad basin 5-partiti intus in basi tubi conspicuiter barbato-setosi pilis rufescentibus segmenta 5: 2 exteriora ovato-orbicularia rotundata subherbacea regulariter sed sparse piloso-setosa setis basi saepius stellato-pilosis interdum supra spinulosis; tertium simile sed in uno latere subchartaceum ibidem glabrum margine stellato-setulosum; 2 interiora subchartacea margine stellato-setulosa in linea media paene ad apicem piloso-setosa setis basi stellato-pilosis ceterum glabra. Corolla 13 mm. lata: petala 5 albida basi connata et barbato-pilosa obovato-orbicularia apice rotundata vel retusa 6 mm. longa 4.3–6.5 mm. lata. Stamina ca. 31: filamenta basi connata ampliata et pilosa 2.7 mm. longa; antherae albiae 1.6 mm. longae. Ovarium glabrum. Styli 5 glabri. — MICHOCAN or GUERRERO: clayey soil, Sierra Madre, 1800 m., 21 April 1899, *Langlassé* 1004 (TYPE in Gray Herb.). — Closely related to *S. Pringlei* Rose, to which the present collection was referred by Dr. Buscalioni (*Malpighia* xxvi. 131 (1913)) in his revision of the genus. From the type collection of that species, *Pringle* 4668, it differs in a number of significant features. The leaves are more densely setose above, particularly on the costa and veins, with long and short setae, and the panicles more densely setose with longer hairs. The sepals are broader and more overlapping at base and more densely covered with setose hairs which are spinulose or at base stellate-setulose, while in *S. Pringlei* the broadly obovate sepals, somewhat disjunct at base, are sparsely stellate-pilose but without true setae. Its affinities with *S. subalpina* J. D. Sm. and *S. latipetala* Hemsl., while clearly marked, are not so close. The species is dedicated to Dr. L. Buscalioni, editor of *Malpighia*, whose revision of *Saurauia* has been in course of publication in that journal for some years, and who, it is greatly to be desired, will present us at the close of his work with a key to all the American species of this exceedingly difficult genus.

SAURAUIA PSEUDOCOSTARICENSIS Busc.! *Malpighia* xxvii. 25 (1915). To this species I would refer *Tonduz* 11690, from Copey, Costa Rica, which was included by Dr. Buscalioni first among the specimens upon which his *S. costaricensis* J. D. Sm. var. *dolicotricha* was based (*Malpighia* xxvii. 15). The same number was also referred by him (l.c 12) to his var. *brachitricha* of the same species. *Saurauia costaricensis*, as originally described by Capt. Smith (*Bot. Gaz.* xxiii. 236 (1897)), was a complex, based upon the following collections: *Cooper* 5714, *Tonduz* 1744 & 7685, *J. D. Smith* 4745 & 4746, and *Pittier & Tonduz* 8589. On one of these collections, *J. D. Smith* 4746, the very distinct *S. ovalifolia* J. D. Sm. *Bot. Gaz.* xlii. 292 (1906) was based; from another, *J. D. Smith* 4745, the equally distinct *S. pseudocostaricensis* Busc. was described. As no type for *S. costaricensis* has ever been designated, the first-cited collection, *J. J. Cooper* 5714, which agrees well with the original description, is here selected as type. From *S. costaricensis* as thus typified the collection under consideration, *Tonduz* 11690, is too different to permit its union as a variety, while it agrees perfectly with the type collection of *S. pseudocostaricensis*, except for the fact that there are a few stellate hairs on the midrib beneath, a feature too insignificant to be considered of any importance, in the absence of other differences.

SAPOTACEAE

BUMELIA Brandegei, nom. nov. — *B. fragrans* Brandegee ! *Zoe* v. 106 (1901), not *B. fragrans* Ridley ! *Journ. Linn. Soc. Bot.* xxvii. 43 (1890). — The existence of an earlier *B. fragrans* Ridley, from Brazil, makes it necessary to provide a new name for the quite different species of the same name from Lower California.

BUMELIA megaphylla, sp. nov. Arbor ramosus. Rami teretes brunnescentes glabrati plus minusve lenticellati. Folia alterna elliptica apice brevissime acutata apice supremo rotundata basi rotundato-cuneata vel cuneata integra parum repanda supra saturate viridia lucentia glaberrima subtus vix pallidiora parum lucentia glaberrima pallido-marginata, costa prominente venis subobscuris ca. 17-jugis venulis obscure reticulatis, 8.7–12.5 cm. longa 3.5–4.7 cm. lata, in petiolis supra sulcatis glabris subtus rufescenter appresso-puberulis 9–13 mm. longis insidentia. Flores per 8–17 in fasciculis axillaribus aggregati, in pedicellis rufescenter

puberulis 6–7 mm. longis. Calycis 3 mm. longi segmenta 5 valde imbricata erecta elliptica apice rotundata appresse rufescenti-pubescentia 2 exteriora breviora et angustius scarioso-marginata. Corolla 5.6 mm. longa: petala 5 basi connata tripartita, lacinia media obovata obtusa saepius integra lateralibus paullo interioribus anguste lanceolatis acuminatis vel attenuatis parum obliquis in latere exteriori serratis. Stamina 5 petala paullulo superantia; staminodia 5 petaloidea obovata subobtusa fimbriato-lacerata longit. petala aequantia latitud. inter petalorum segmenta media et lateralia intermedia. Fructus (immaturus) ellipsoideo-ovoideus apice concavus stylo terminatus 7 mm. longus. Semen (immaturum) exalbuminosum. — BRITISH HONDURAS: a small or medium-sized tree with hard light-colored wood, in forest, Rio Grande, 25 March 1907, *M. E. Peck* 756 (TYPE in Gray Herb.). — A species apparently most nearly related to *B. arborescens* Rose, but with much larger leaves, longer pedicels, larger corolla, and more nearly equal less toothed staminodia and lateral petal-segments.

EBENACEAE

DIOSPYROS sinaloensis, sp. nov. Frutex dioicus pluricaulis 3.3 m. altus 1.5 dm. diametro. Rami vetustiores cani glabri vel rare unifariam pubescentes, hornotini sicc. nigrescentes sparse strigosi. Folia alterna elliptica vel parum obovato-elliptica apice rotundata vel retusa basi rotundata vel truncato-subcordata integra interdum parum repando-crenata vetustiores sicc. pallida infra paullo obscuriora utrinque glabra et prominulo-reticulata (venis majoribus 8–9-jugis, nervis anastomosantibus) chartaceo-subcoriacea 7.7–12 cm. longa 3.3–5.2 cm. lata, in petiolis validis nudissubglabris 3 mm. longis; folia hornotina sicc. nigrescentia infra ad costam sparsissime strigosa. Flores ♂ per 2–4 in axillis paniculati nutantes, in pedicellis curvatis hispidulis 3–4 mm. longis. Calyx 4.5 mm. longus, lobis ovatis obtusis mucronulatis ciliolatis sparse puberulis plus minusve venosis. Corolla urceolata (alabastro rostrato-conico) extus canescenter appresso-puberula; tubus ad 8 mm. longus, in medio 4 mm. in apice 3 mm. diametro; limbus patens ad 8 mm. latus, lobis 5 obovato-suborbicularibus rotundatis 3.5 mm. longis 3 mm. latis. Stamina 20: 10 inferiora breviora, filamentis ad 0.3 mm. longis, antheris ovato-lanceolatis acuminatis 3 mm. longis; 10 superiora longiora, filamentis ad 1 mm. longis,

antheris lanceolatis acuminatis 3.2 mm. longis. Ovarii rudimentum puberulum. Fl. ♀ non vidi. — SINALOA: shrub 3.3 m. high, with seven stems, and trunk 1.5 dm. in diameter, Altata, 15 June 1897, *Rose* 1339 (TYPE COLL.: U. S. Nat. Herb. no. 300162, Gray Herb.).

APOCYNACEAE

BELANDRA, genus nov. *Echitidearum*. Calyx majusculus 5-partitus, segmentis subacuminatis quoque basi squama deltoidea denticulata donato. Corolla hypocraterimorpha, tubo limbum superante isodiametrico esquamato; lobi 5 oblongi dextrorsum obtegentes sinistrorsum torti. Stamina infra apicem tubi affixa apicem tubi attingentia sed non exserta, filamentis brevissimis; antherae sagittatae acuminatae circa stigma conniventes et ei adhaerentes, loculis basi in appendiculas rigidas productis. Discus ampulliformis ad apicem angustatus apice denticulatus ovarium superans et omnino occultans. Ovarii carpella 2 distincta multiovulata; stigma crassum pulvinare 5-angulatum basi cingulo brevissimo patente 5-lobato donatum. Fructus ignotus. — Herba (?) scandens minute hispidula. Folia opposita penninervia eleganter reticulata. Flores siccitate pallidi (flavi vel albidi?) in racemo simplici multifloro axi spiraliter torto per paria dispositi.

The genus *Belandra* (βέλος, *arrow*, and ἀνήρ, *for stamen*), finds its nearest relative in *Echites* P. Br., but differs in the excessively developed disk. From *Odontadenia* Benth., which has a similar disk, *Belandra* is sharply distinguished by its strictly salver-form corolla and simple spiralled raceme.

BELANDRA concolor, sp. nov. Planta sine dubitatione scandens verisim. volubilis. Caulis herbaceus tenuis subteres pallide viridis minute hispidulus pilis basi valde incrassatis retrorsis. Folia opposita ovalia vel oblongo-ovalia abrupte breviterque (3-6 mm.) acutata basi rotundata vel obscure cordata integerrima sicc. utrinque lutescenti-viridia concoloria glaberrima supra laevia subtus granuloso-papillosa, nervis lateralibus 6-8-jugis et venulis supra impressis subtus valde prominentibus reticulatis, 8.6-12.6 cm. longa 3.2-4.7 cm. lata, in petiolis minute tuberculato-hispidulis immarginatis 5-7 mm. longis basi connatis. Racemus (an normaliter?) collateralis multiflorus ad 7 cm. longus, pedunculo 2.5 cm. longo, axi spiraliter torto; bractee minutae vix bene visae;

pedicelli 8–13 mm. longi tenues sparse minuteque hispiduli. Calycis 7 mm. longi segmenta aequalia oblongo-ovata ad 2.7 mm. lata, quoque basi squama deltoidea apice ca. 4-denticulata ad 1 mm. longa donato. Corollae tubus 1.5 cm. longus 3 mm. diametro ad insertionem staminum vix ampliatus; limbi lobi 5 aequales obliqui oblongi parum crispatis apice rotundati 1.3 cm. longi 7 mm. lati. Discus ad 3 mm. longus ovarium omnino occultans. Stamina in annulo retrorse comoso angusto ca. 1.2 cm. supra basin corollae inserta; antherae 5 mm. longae, appendiculis basilaribus acutis subcurvatis 0.8 mm. longis; filamenta hirtella ad 0.8 mm. longa. Fructus deest. — BRITISH HONDURAS: low bank of Rio Grande, 25 March 1907, *M. E. Peck* 953 (TYPE in Gray Herb.). — The single raceme of the type specimen is, perhaps abnormally, inserted laterally between the bases of the paired leaves. Prof. Peck's field notes unfortunately fail to indicate the color of the corolla, but in the dried flower it is pale, and in life probably whitish or yellowish.

ECHITES cuspidifera, sp. nov. Planta volubilis 3–7-metralis. Caulis tenuis teres fusco-brunneus minute hispidulo-puberulus pilis patenti-retrorsis acetate subglabratus. Folia opposita elliptica vel obovato-ovalia apice vel breviter acuta vel rotundata vel truncata cuspidifera (cuspidate 0.8–2 mm. longa) basi cordata (sinu 1.5–3.5 mm. alto angustissimo) supra viridia ad costam et marginem rare in facie minute hispidula infra glancescenti-canescencia ad nervos sparse hispidula, nervis lateralibus 6–7-jugis nervulis anastomosantibus, 3.2–5.1 cm. longa 1.7–2.9 cm. lata, in petiolis minute granuloso-hispidulis 3–4 mm. longis. Racemi axillares simplices 5–34-flori 1–4.8 cm. longi, pedunculo 5–10 mm. longo et axi minutissime granuloso-hispidulis; pedicelli 7–8 mm. longi apice in-crassati maturitate patentes vel paulum recurvati. Calycis segmenta 5 deltoideo-ovata acuminata subcuspidata paene ad basin sejuncta ad 1.8 mm. longa, quoque basi squama deltoidea ca. 4-dentata praedito. Corollae hypocraterimorphae tubus 2.6 cm. longus e basi 2 mm. diametro sensim ampliatus, 9 mm. supra basin 4 mm. diametro, deinde angustatus 1.5 cm. supra basin 1.6 mm. diametro, deinde ampliatus 4 mm. diametro, apice paulo angustior 3.5 mm. diametro; limbi lobi 5 patentes aequales oblongi crispato-erosi apice rotundati ca. 10 mm. longi 4.5 mm. lati. Discus cupularis breviter 5-lobatus ad 0.8 mm. altus ovario

paullo brevior. Stamina 1.7 cm. supra basin corollae in annulo retrorse comoso inserta, filamentis breviter comosis. Folliculi moniliformes 1.3–2.1 dm. longi glabri. Semina 5.5 mm. longa, coma rufescente 1.5 cm. longa donata. — BRITISH HONDURAS: a vine climbing 3–7 m. over shrubs, pine ridge near Manatee Lagoon, 11 June 1905, *M. E. Peck* 35 (TYPE in Gray Herb.).

FORSTERONIA viridescens, sp. nov. Frutex alte scandens. Ramus subvalidus teres brunneus glaber lenticellatus. Folia elliptica vel ovalia vel parum obovato-elliptica breviter acuminata (apice supremo obtusiusculo mucronulato) basi cuneata vel cuneato-rotundata integra vix revoluta chartaceo-coriacea glaberrima supra obscure viridia subtus vix pallidiora fusco-viridia pennivenia, venis 6–8-jugis subconspicuis venulis obscure reticulatis, 1–1.4 dm. longa 3.3–4.6 cm. lata, in petiolis nudis glaberrimis supra sulcatis 2–4 mm. longis insidentia. Flores ad apices rami et ramulorum axillarum dense cymoso-paniculati (paniculis 1.5–2.8 cm. latis), pedunculis ad 1.2 cm. longis cum axi paniculae sordido-rufescenter glandulari-puberulis; bractee triangulari-ovatae acuminatae plus minusve glandulari-puberulae 0.8–1.7 mm. longae; pedicelli ultimi 1.5 mm. longi vel breviores. Calycis 1.2 mm. longi intus eglandulosi segmenta 5 triangulari-ovata acutiusecula utrinque plus minusve glandulari-puberula. Corollae “viridescenti-albidae” 3.5 mm. longae per $\frac{2}{5}$ longit. sympetalae segmenta 5 oblongo-ovalia obtusa utrinque rufescenter glandulari-puberula in alabastro valde convoluta dextrorsim obtegentia, tubo intus supra insertionem staminum barbato-annulato pilis albidis valde clavatis. Stamina 5 prope basin tubi inserta apicem tubi paullum superantia circa stigma conniventia lineari-oblonga (corpore 1 mm. longo), appendicibus hyalinis lanceolato-subulatis attenuatis 0.7 mm. longis praedita; filamenta ad 0.25 mm. longa. Stigma crasso-cylindricum circa medium parum constrictum, rostro valde bifido 0.8 mm. longo donatum. Glandulae disci 5 subquadratae subtruncatae ad medium connatae ovario puberulo duplo breviores. — BRITISH HONDURAS: a climber reaching the tops of large forest trees, with greenish-white flowers, in forest near Manatee Lagoon, 7 July 1906, *M. E. Peck* 450 (TYPE in Gray Herb.). — A species apparently most closely allied to *F. brasiliensis* A. DC., which is described as with corolla glabrous outside and calyx-segments glandular-appendaged within.

MANDEVILLA denticulata, sp. nov. Planta volubilis. Caulis aspere granuloso-hispidulus pilis nonnullis longioribus interspersis ad 1.5 mm. diametro, internodiis 1 dm. longis et ultra. Folia opposita oblongo-ovalia apice subabrupte breviterque attenuata basi cordata (sinu ad 3.5 mm. alto 2.5 mm. lato) integerrima supra viridia hispida pilis albidis basi paullum incrassatis subtus multo pallidiora sed haud glaucescentia subdense hispida et granulosa, nervis lateralibus ca. 12-jugis venulis anastomosantibus, 7.5–9.5 cm. longa 3–3.7 cm. lata, in petiolis ca. 1.3 cm. longis. Racemi axillares ut videtur ca. 10-flori ca. 2.5 cm. longi; pedunculus validus supra incrassatus sordide incurvo-pubescentis 1.5–2.3 cm. longus; bracteae ovatae acuminatae hispido-pilosulae 1.5 cm. longae vel minores ut videtur rubescentes; pedicelli maturitate crassi 6 mm. longi. Calycis segmenta 5 subaequalia paene ad basin sejuncta lineari-lanceolata attenuata extus dense subsordide pilosula 9–10.5 mm. longa, quoque basi squama deltoidea apice 5–6-denticulata discum subaequante praedito. Corolla anguste infundibuliformis extus supra basin subglabram dense appresse albescenti-pilosa lactea in faucibus rubro-venosa; tubus ad 1.5 cm. longus 2.5 mm. diametro, in fauces infundibuliformes 2.5 cm. longas apice ad 9 mm. diametro sensim ampliatus; limbi lobi aequales oblique flabellato-cuneati in latere 1-dentata apice late rotundati ad 1.3 cm. longi 1.1 cm. lati. Discus annularis obscure 5-lobatus ovario brevior. Stamina 2.4 cm. supra basin corollae in annulo retrorse comoso inserta, filamentis brevissimis comosis. Folliculi obscure torulosi dense molliterque sordido-pilosi 13.5 cm. longi 4–4.5 mm. diametro. — **BRITISH HONDURAS**: climbing over thickets in saline soil, New Haven, 8 March 1907, *M. E. Peck* 696 (TYPE in Gray Herb.). — Related to *M. hispida* (R. & S.) Hemsl., but with a different pubescence.

TABERNAEMONTANA chrysocarpa, sp. nov. Arbuseculus undique glaberrimus. Caulis juventate viridis plus minusve compressus aetate pallidus teres sicc. striatus bifurcate ramosus, internodiis superioribus 1–3 cm. longis. Folia opposita obovata apice subabrupte breviterque (5–8 mm.) acutata apice supremo obtusa basi longe acuminata integerrima subconcoloria subcoriacea nervis lateralibus 10–13-jugis supra impressis subtus prominentibus venulis supra impressis subtus obscuris, sicc. paullum revoluta 8–12.7 cm. longa 3–4.3 cm. lata, in petiolis vix marginatis basi

connatis 1-1.7 cm. longis. Paniculae terminales et laterales multiflorae saepius bifidae, ramis sparse ramosis, 1-1.5 dm. longae, in pedunculis ca. 2.5 cm. longis; bracteae subscariosae rotundatae ad 0.7 mm. longae; pedicelli 9-10 mm. longi. Calycis 1.7 mm. longi segmenta 5 ovata obtusa paene ad basin distincta, quoque basi glandulis 5-6 linearibus donato. Corollae (albidae ?) hypocraterimorphae tubus 7.5 mm. longus basi ad 1.7 mm. diametro deinde paullum angustatus ad insertionem staminum paullum ampliatus deinde ad limbum isodiametricus; limbi lobi 5 aequales oblique cuneati apice rotundati parum crispatis 6 mm. longi 3.5 mm. lati. Discus obscurus. Stamina 5 inclusa glabra. Fructus ut dicitur flavus juventate 1.7 cm. latus. — BRITISH HONDURAS: a small tree with yellow fruit, in deep forests near Manatee Lagoon, 10 Aug. 1905, *M. E. Peck* 118 (TYPE in Gray Herb.).

ASCLEPIADACEAE

PATTALIAS Wats. Proc. Am. Acad. xxiv. 60 (1889). — This genus was based by Dr. Watson on his *Pattalias Palmeri*, described from a Sonoran collection of Palmer's (no. 424 of 1887), with which he associated a second species, *P. angustifolius* (Torr.) Wats., another Sonoran species originally published as a *Metastelma* and later transferred to *Melinia* by Dr. Gray. In the Pflanzenfamilien (iv. pt. 2, 246, 255) Schumann has placed *Pattalias* next *Mellichampia* and marked it in his key (p. 246) as of uncertain position. His description is so exact a translation of Watson's original (except that Watson's "petiolate" for the leaves of *P. angustifolius* is mistranslated "sitzende") that it seems probable that he was unable to examine material and drew his description entirely from the printed diagnosis of the genus. More recently Bartlett (Proc. Am. Acad. xlv. 631 (1909)) has based a new genus, *Basistelma*, on *Pattalias angustifolius* (Torr.) Wats. and *Melinia mexicana* Brandegee, leaving *Pattalias Palmeri* the sole representative of this genus.

After careful dissections and comparisons of *Pattalias Palmeri* and related species, and various species of *Cynanchum* (including *Vincetoxicum* of Bentham & Hooker's Genera), I have been unable to find any characters to justify the maintenance of *Pattalias* as a distinct genus. In Schumann's key to the *Cynanchinae* (p. 246) *Cynanchum* (which with him includes *Vincetoxicum* Moench, kept

distinct by Bentham & Hooker) is mentioned only in the group with "Coronazipfel glocken- oder krugförmig, mit kurzen Zipfeln," while *Pattalias* is placed in the group with "Corona tiefer geteilt; Zipfel zuweilen nur am Grunde ringförmig verbunden." But in the text, the first section of *Cynanchum* (§ *Vincetoxicum* (Moench) K. Sch.) is described as with "Corona sehr tief geteilt oder in fast ganz freie, selten völlig getrennte Zipfel gelöst." In this regard, then, there is no difference between *Pattalias* and *Cynanchum*. Furthermore, *Pattalias* agrees in all essential features — 5-parted eglandular calyx, shape and twisting of corolla-lobes, and insertion of corona upon the column — with *Cynanchum* § *Vincetoxicum* of Schumann. The stigma-rostrum from which Dr. Watson's name was derived is in *P. Palmeri* merely depressed-conic, in the excluded *P. angustifolius* (= *Basistelma angustifolium* (Torr.) Bartlett) slenderly columnar and subterete. It was described (in *P. Palmeri*) as entire by Watson, and as distinctly bifid by Bartlett. To me it appears very faintly and obscurely bifid. In the related species described below as *Cynanchum peninsulare* it is longer than in *P. Palmeri*, more acutely conic, and distinctly bifid, but neither species can be sharply separated by this feature from *Cynanchum*, which is described by Bentham & Hooker as with stigma "medio vertice convexiusculum v. breviter conicum" (*Cynanchum*) or "apiculo crasso conico breviter 2-fido instructum (rarius rostratum?)" (*Vincetoxicum*), and by Schumann as with "Narbenkopf gewöhnlich gebuckelt, selten plump keulenförmig oder cylindrisch über die Stb. hinaus verlängert und dann 2lappig."

In the absence of any distinguishing features of habit or structure, it becomes necessary to sink the genus *Pattalias* in *Cynanchum*. The only described species becomes

CYNANCHUM Palmeri (Wats.), comb. nov. — *Pattalias Palmeri* Wats. ! Proc. Am. Acad. xxiv. 60 (1889). — The species has never been found since it was collected by Palmer in 1887.

CYNANCHUM peninsulare, sp. nov. Planta scandens? verisim. pluricaulis. Caulis canescenti-viridis tenuis subteres ad nodos sparse pubescens ceterum subglaber ramosus. Folia opposita linearia mucronata margine sparse appresse pubescentia basi vix angustata sessilia subplana 3–8.3 cm. longa 1–1.8 mm. lata. Flores in axillis foliorum 2–7 subumbellati; pedunculus pubescens ad 1 mm. longus; pedicelli ad 2 mm. longi. Calyx ad basin 5-partitus

1.3–1.5 mm. longus, segmentis anguste lanceolatis acuminatis sub-appresse pubescentibus. Corolla viridis 5-partita glabra vel subglabra; tubus calycem aequans; lobi erecti lineari-lanceolati obtusiusculi paullum torti 8 mm. longi. Coronae segmenta 5 oblongo-elliptica integra late rotundata erecta basi (per 0.3 mm. longitudinis) conjuncta ca. 2 mm. longa 1.3 mm. lata, basi conjuncta gynostegio adnata. Antherarum appendiculæ ad rostrum stigmatis appressæ. Stigmatis rostrum conico-lanceolatum acutum apice minute bifidum coronam vix superans. Folliculi fusiformes basi breviter apice longissime attenuati glabri glaucescentes 9.8 cm. longi. Semina subovata apice angustata 5.5 mm. longa; coma lucide alba 15 mm. longa. — LOWER CALIFORNIA: west coast of Cape Region, Nov. 1902, *Brandege* (TYPE in Gray Herb.). — Related to *C. Palmeri* (see above), with which the material in the Gray Herbarium was identified by Dr. Greenman, but with much larger flowers and various other differences.

VINCETOXICUM cteniophorum, sp. nov. Herba scandens. Caulis modice validus fusco-brunneus ad nodos sparse appresso-pilosus ceterum glaber. Folia opposita oblongo-ovata breviter acuminata basi vix angustata cordata (sinu 1–2 cm. alto 3.5–7 mm. lato) membranacea subconcoloria glaberrima, nervis lateralibus 3–5-jugis, 5–9 cm. longa 2.3–4.1 cm. lata, in petiolis immarginatis glabris 1.8–4.6 cm. longis. Pedunculi axillares 2–3 cm. longi glabri; axis florifer subaequilongus multiflorus floribus irregulariter racemosis; pedicelli glabri 1–2.5 cm. longi. Calycis segmenta 5 ovata acuminata sparse et minute ciliolata ceterum glabra 3 mm. longa 1.4 mm. lata. Corolla rotata 3.5–3.8 cm. lata paene ad basin 5-lobata, lobis angustissime lanceolatis paene e basi attenuatis tortis extus glabris sicc. in latere dextro viridescentibus in latere sinistro pallide flavicantibus et lineatis in medio linea pilosociliata pilis erectis 4 mm. longa praeditis. Corona duplex: exterior brevis dense ciliata; interior brevis carnosa glabra patens 5-lobata lobis semicircularibus. Fructus deest. — BRITISH HONDURAS: a low climber in thicket, Toledo, 5 April 1907, *M. E. Peck* 821 (TYPE in Gray Herb.).

VINCETOXICUM dasystephanum, sp. nov. Planta scandens. Caulis tenuis teres hispidus et hispidulus pilis subretrorsis basi paullum tuberculatis. Folia opposita oblongo-ovalia apice breviter acuminata basi obtusa vel rotundata integerrima supra viridia

subtus paullo pallidiora utrinque subdense hispido-pilosa pilis rufescentibus adscendentibus basi tuberculatis, nervis lateralibus majoribus 5-7-jugis, 3.3-5 cm. longa 1.2-2 cm. lata, in petiolis immarginatis rufescenter hispido-pilosis pilis subpatentibus 6.5-8.5 mm. longis. Pedunculi incurvo-hispiduli pilis paucis longioribus intermixtis 7-10 mm. longi; flores 6-9 subumbellati; pedicelli ca. 1.5 cm. longi. Calycis segmenta 5 ovata obtusa hispidula 2 mm. longa. Corolla sicc. viridis rotata paene ad basin 5-lobata 12 mm. diametro, lobis ovali-ovatis apice obtusis extus hispidulis intus glabris ca. 9-nerviis 5 mm. longis 2.8 mm. latis. Corona duplex: exterior annularis erecta obscure 5-lobata apice dense piloso-ciliata ad 1.5 mm. alta (pilis exclusis); interior brevior glabra carnosa medio exterioris adnata pauci-crenulata. Fructus deest. — BRITISH HONDURAS: a rather high climber in forests and thickets, near Manatee Lagoon, 30 Jan. 1905, *M. E. Peck* 323 (TYPE in Gray Herb.). — This species like the last belongs in the old genus *Gonolobus*, for which the name *Vincetoxicum* of Walter is now used by all American botanists.

SOLANACEAE

MERINTHOPODIUM internexum, sp. nov. Frutex sine dubitatione epiphyticus, caule valde ruguloso juventate sparse hispidulo-strigilloso. Folia obovata apice abrupte acutissime breviterque (ad 1 cm.) acuminata basi acuta integerrima subconcoloria subchartacea glaberrima, nervis lateralibus ca. 7-jugis, (8.5) 10.8-15.2 cm. longa 3.3-6.8 cm. lata, petiolis 1-1.5 cm. longis. Pedunculus ca. 18 cm. longus valde rugulosus; flores pauci ad apicem axis dense cicatricosi 18 cm. longi hispiduli, in pedicellis glandulari-granulosis 3-3.7 cm. longis apice incrassatis. Sepala 5 lanceolata longissime attenuata granulata 2.6-2.9 cm. longa. Corolla e basi tubulosa campanulata ca. 5 cm. longa extus granulati-puberula; tubus 1.8 cm. longus apice ca. 7.5 mm. diametro in fauces campanulatas ca. 2.8 cm. longas (sicc.) 2.8 cm. latis abrupte ampliatus; limbi lobi triangulares ad 1 cm. longi ut videtur patentibus vel reflexi. Antherae 11 mm. longae exsertae. Stylus exsertus stamina aequans. — GUATEMALA: Cobilquitz, Dept. Alta Verapaz, 350 m., July 1903, *von Tuerckheim* 8435 (TYPE in Gray Herb.). — Distributed as *M. neuranthum*, but quite distinct in its very attenuate sepals and campanulate corolla, in respect to which

characters it is intermediate between *M. neuranthum* (Hemsl.) J. D. Sm. and *M. campanulatum* J. D. Sm. I am indebted to Capt. Smith for the loan of the unique type of *M. campanulatum* for purposes of comparison.

MERINTHOPODIUM leptesthemum, sp. nov. Frutex in palmis epiphyticus. Caulis glaber pallide brunneus rugulosus. Folia alterna obovata vel ovali-obovata breviter acuminata basi longe acuminata integerrima chartaceo-coriacea glaberrima obscure viridia subtus paullo pallidiora, nervis lateralibus 6-7-jugis supra impressis subtus prominentibus venulis nullis, 12.5-20.5 cm. longa 3.5-6 cm. lata, in petiolis 1-1.7 cm. longis supra canaliculatis. Pedunculi 7-9 cm. longi; flores pauci ad apicem axis perennis 5-15 cm. longi dense cicatricosi in pedicellis 3-3.5 cm. longis ad apicem incrassatis et granuloso-puberulis. Sepala 5 oblongo-ovata acuta paene ad basin libera (interdum per 2 et 3 connata) 1-nervia venulis anastomosantibus granulosa 1.3-2 cm. longa 0.8 cm. lata. Corolla tubulosa supra paullum ampliata textura tenuis 4.8 cm. longa extus granularis multinervosa, lobis 5 porrectis ovato-triangularibus obtusiusculis 1.3 cm. longis. Filamenta tenuissima 3.7 cm. longa ad basin corollae brevissime adnata fere ad medium patenti-pilosula; antherae 8 mm. longae. Stylus 3.8 cm. longus; stigma saltem senectute conicus 1 mm. longus. Capsula ellipsoidea obtusa 1.3 cm. longa polysperma. Semina compressa 2 mm. longa, albumine exiguo donata. — BRITISH HONDURAS: an epiphytic shrub on palms, Toledo, 12 Sept. 1906, *M. E. Peck* 508 (TYPE in Gray Herb.). — From *M. neuranthum* (Hemsl.) J. D. Sm., its nearest relative, *M. leptesthemum* differs primarily in the thin texture and different nervation of the corolla. In *M. leptesthemum* there are on each side of the main nerve of the lobes, between this and the strong nerve on the margin of the sinus, three weaker but distinct nerves; and in the sinus itself two similar weak veins between the two strong marginal ones. In *M. neuranthum*, on the other hand, the much thicker corolla bears only one or two weak nerves laterally on each side of each main nerve, between the latter and the nerves bordering the sinus, the latter being two-nerved much as in *M. leptesthemum*.

In describing these two new species I have with some little hesitation followed Capt. John Donnell Smith in his separation of *Merinthopodium* from *Markea*. The distinctions between the

two genera appear somewhat vague. *Merinthopodium*, as originally based by Capt. Smith (Bot. Gaz. xxiii. 11, t. 1 (1897)) on *Markea neurantha* Hemsl., was distinguished by the peculiar inflorescence of few umbellate-racemose flowers terminating a very scarred and evidently perennial rachis or leafless flowering branch, the tubular-campanulate corolla, and the seeds described as exalbuminous. The last feature is, however, apparently based on a misconception, for in fig. 9 of Faxon's plate above cited the embryo is represented as surrounded by what is apparently a thin layer of albumen, and in *M. leptesthemum*, certainly a very close ally of *M. neuranthum*, the seeds are clearly albuminous. In this respect, then, *Merinthopodium* does not differ from the original species of *Markea* (*M. coccinea*) as figured by Vauthier (Dict. Class. Hist. Nat. xvii. t. [9]) and by Miers (Ill. ii. t. 45). In Vauthier's plate the flowers are represented as scattered in a sparsely branched panicle, in Miers' as racemose along an axis which, except for its scattered and not crowded scars, is very similar to that of *Merinthopodium*. *Merinthopodium*, if it is to be distinguished as a genus, must accordingly rest on its peculiar inflorescence and tubular-campanulate or more openly campanulate (not salver-form) corolla. In these features, however, a plant from Costa Rica (*Cooper* (distr. J. D. Smith) 5887) described by Capt. Smith as *Markea leucantha* (Bot. Gaz. xxxi. 116 (1901)) is a good *Merinthopodium* and should be called **MERINTHOPODIUM leucanthum** (J. D. Sm.), comb. nov.

There is no material of the true genus *Markea* in the Gray Herbarium, and I have been forced to depend for the characters of the genus on Miers' and Vauthier's plates and on the description in the Genera Plantarum. A final determination of the relationships of the two genera must be deferred until authentic specimens of the two can be compared.

SOLANUM (§ *Morella*) **Peckii**, sp. nov. Herbacea valde ramosa. Caulis tenuis obtuse subangulatus supra lineatim puberulus ceterum glaber, internodiis 5.5–6.5 cm. longis. Folia bina valde inaequalia collateralia tenuia ovalia vel ovato-lanceolata ad apicem et basin acuminata obtusiuscula viridia sicc. plus minusve nigrescentia supra granularia subtus non pallidiora ad venas et venulas plus minusve hispidulo-puberula ceterum glabra subintegra, nervis validioribus ca. 4-jugis venulis anastomosantibus, majora 9–9.5 cm. longa 3.5–4.5 cm. lata, in petiolis 1.3–2 cm. longis vix

marginatis subglabris, minora 3-4 cm. longa. Umbellae inter petiolos binos sessiles 9-12-florae; pedicelli glabri maturitate recti sursum paullulum incrassati 1 cm. longi. Calyx sub-8-angulatus obscurissime 4-dentatus sparsissime ciliolatus 1 mm. longus. Corolla alba rotata 4-partita, tubo 1.5 mm. longo ad 2.3 mm. diametro, segmentis lanceolatis acuminatis apice acutiusculis 1-nerviis extus granuloso-puberulis 4 mm. longis. Stamina 4 aequalia; antherae ovatae 2.6-2.9 mm. longae; filamenta ad 1.3 mm. longa infra glabra supra incrassata dense pilosa. Stylus ad 5 mm. longus. Bacca globosa polysperma 4-4.5 mm. diametro. — BRITISH HONDURAS: cultivated ground in clearing, Monkey River, 26 Dec. 1906, *M. E. Peck* 585 (TYPE in Gray Herb.). — Apparently quite distinct in its 4-parted flowers and sessile umbels inserted between the petioles of the paired leaves, not extra-axillary as in so many of this group.

LENTIBULARIACEAE

UTRICULARIA aureola, sp. nov. Herba erecta glabra biflora 5.5-7.5 cm. alta, radiculis parvis albidis fibrosis ut videtur ampullis destitutis, foliis nullis. Scapus tenuissimus rectus squamis 2-4 minutis lancolatis vel ovatis acuminatis integerrimis basi adfixis praeditus. Bractee ternatae integrae; media ovata subacuta 0.7 mm. longa; laterales angustiores paullo breviores; pedicelli ad 1 mm. longi erecti. Flores duo 0.3-1 cm. distantes aurei parviuseculi. Sepala integra: superius ovatum acutiusculum 2.3 longum; inferius angustius 2 mm. longum. Labium corollae superius ellipticum planum adscendens 4 mm. longum 2.6 mm. latum; inferius integrum horizontale late orbiculare marginibus recte descendentibus 4.3 mm. longum 3 mm. altum, palato non prominente; calcar recte pendens regulariter subulatum acutum rectum 4 mm. longum. — BRITISH HONDURAS: wet sand, beach of Manatee Lagoon, 6 Dec. 1905, *M. E. Peck* 235 (TYPE in Gray Herb.). — This pretty little addition to the section *Oligocista* has no close relative among Mexican Bladderworts, nor do I find any South American species with which it can be identified. Its affinities, as shown by the ternate bractlets and general habit, are with the *U. juncea* group, the so-called genus *Stomoisia* Raf., which is included by Kamienski (in Engl. & Prantl, Pflanzenfam. iv. pt. 3b, 120 (1893)) in the section *Oligocista* A. DC.

UTRICULARIA JUNCEA Vahl. This species, not hitherto reported from Central America, was collected by Prof. Peck in mud near Manatee Lagoon, 10 Oct. 1905 (no. 165). Only a single specimen bearing a single flower was secured.

UTRICULARIA JUNCEA Vahl forma *minima*, forma nov. Planta 1-flora 3–7.5 cm. alta; corolla paullo minor (calcare 5–6 mm. longo); ceterum ut in forma typica. — BRITISH HONDURAS: Toledo, 12 Sept. 1906, *M. E. Peck* 502a (TYPE in Gray Herb.). — From all other examples of *U. juncea* examined the present plant is distinguished by its tiny size; the flowers, however, identical in every observed character with those of the typical form, are only very slightly smaller than in the latter. Unfortunately it is impossible to give full data for this collection, as the reference in Prof. Peck's notes under the number 502 relates to a species of *Ficus*.

UTRICULARIA macerrima, sp. nov. Herba ad 5 dm. longa glabra, radiculis paucis fibrosis ut videtur ampullis destitutis, foliis nullis. Caulis 2–3-florus tenuissimus ut videtur laxis simplex vel infra medium ramo longo donatus, squamis ca. 8 lanceolatis acuminatis plus minusve serrulatis basi adfixis ad 1 mm. longis praeditus. Bracteae ternatae: media lanceolato-ovata acuminata lacerato-denticulata (dentibus ca. 3–4-jugis inferioribus longis curvatis superioribus brevioribus) ad 1.5 mm. longa; laterales lineari-subulatae parce dentato-laceratae ad 0.8 mm. longae; pedicelli adscendentes tenues nudi 4.5 mm. longi. Flores 2–3 verisim. flavi. Sepalum superius orbiculari-ovatum obtusum distincte obtusissimeque crenatum ca. 13-nerve 2.5 mm. longum 3 mm. latum; inferius simile ca. 9-nerve 2 mm. longum 2.5 mm. latum. Labium corollae superius ovali-oblongum integrum apice rotundatum 3.5 mm. longum 1.8 mm. latum; inferius (imperfectum) ut videtur eo *U. juncea* simile (integrum marginibus recte descendibus palato non prominente) ad 4 mm. longum 4.5 mm. altum; calcar recte pendens anguste subulatum acutum 6 mm. longum. — BRITISH HONDURAS: in open swampy ground near Manatee Lagoon, 25 Nov. 1905, *M. E. Peck* 222 (TYPE in Gray Herb.). — Likewise a member of the *U. juncea* group, but very distinct among North American species in its lacerate bracteas and distinct pedicels, and apparently not identical with any of the numerous species described from South America, very few of which are in the Gray

Herbarium. The species is represented by two stems and a single imperfect flower, from which when boiled out the above description was drawn up. Prof. Peck's notes do not specify the color of the flowers, but they were probably yellow.

UTRICULARIA Peckii, sp. nov. Herba erecta 1-1.2 dm. alta glabra, radiculis interdum ampullis paucis parvis praeditis, foliis nullis. Caulis tenuis purpurascens paullulum flexuosus simplex vel infra ramo erecto donatus 6-8-florus supra paullum marginatus, squamis ca. 8 ovatis integris apice rotundatis basi lata adfixis ad 0.6 mm. longis praeditis. Bractee ternatae integrae: media ovata apice rotundata 1 mm. longa; laterales multo angustiores paullo breviores; pedicelli erecti supra paullum incrassati 1.3-1.4 mm. longi. Sepalum superius apice late rotundatum integrum ad 1.5 mm. longum; inferius subtruncatum integrum ad 1.2 mm. longum. Corolla ut videtur flavida 4 mm. longa adscendens: labium superius ellipticum apice rotundato-truncatum 3 mm. longum porrectum marginibus ut videtur paullum reflexis; labium inferius 4 mm. longum ad 1.3 mm. altum integrum, juventate carinatiforme concavum, maturitate ut videtur ut apud *U. juncea* medio horizontale marginibus descendentibus valde crenato-crispatis (sed integris); calcar gibboso-triangulari late rotundatum recte pendens sepalo brevius ad 1 mm. longum. Capsula ellipsoidea ad 1.2 mm. longum in sepalis inclusa stylo rostrata, in pedicello erecto. — BRITISH HONDURAS: in mud near Manatee Lagoon, 8 Mar. 1906, *M. E. Peck* 371 (TYPE in Gray Herb.). — A most distinct species of the *U. juncea* alliance, more strongly suggestive of *U. subulata* in general appearance but with shorter pedicels and only slightly flexuose stem.

BIGNONIACEAE

ADENOCALYMNA ciliolatum, sp. nov. Frutex scandens. Caulis tenuis teres canus glaber sparsim lepidotus. Folia opposita conjugata verisim. cirrho (in specim. ad manum semper manco) clausa: phylla stipulas simulantia coriacea anguste ovata obtusa margine puberula ca. 2 mm. longa; petiolus subteres supra paullulum complanatus ad apicem sparse puberulus 7-18 mm. longus; foliola late ovata breviter acutata apice supremo obtuso basi truncato-rotundata integra subtenuia chartacea angustissime pallido-marginata utrinque glaberrima et impresso-lepidota 4.5-8

cm. longa 2.3–5.7 cm. lata, in petiolulis 8–21 mm. longis insidentia. Flores in pedunculis 2–3-floris axillaribus et terminalibus folia saepe superantibus gesti; pedicelli erecti ad apicem glandulari-lepidoti 7–12 mm. longi. Calyx campanulatus subcoriaceus subtruncatus obscurissime 5-denticulatus ad apicem conspicuiter lepidotus apice ciliolatus ceterum glaber 5 mm. longus. Corolla ut videtur flava submembranacea ad apicem faucium et in limbo sordido-puberula intus ad insertionem staminum pilosa ceterum glabra 5–5.5 cm. longa; tubus ca. 7 mm. longus; fauces tubulosae sursum parum ampliatae ad 3 cm. longae; limbi lobi 5 subaequales oblongo-ovales integri apice obtusi vel rotundati 1–1.3 cm. longi. Stamina fertilia 4, staminodio ad 5 mm. longo adjuncto, filamentis 1.5 et 2.1 cm. longis. Discus elevatus hemisphaericus in ovarium transiens. Ovarium subteres densissime lepidotum 2-loculare, seminibus in quoque loculo 2-seriatis. Fructus deest. — NICARAGUA: a vine running over bushes and low trees, La Paz, 31 Jan. 1903, C. F. Baker 2424 (TYPE in Gray Herb.). — Although the specimen is without fruit and its generic position is therefore not absolutely certain, its alliance with the species of *Adenocalymna* in all comparable characters is so close that I have little hesitation in referring it to that genus. *A. macrocarpum* J. D. Sm., of Guatemala, is a near ally of *A. ciliolatum*, but differs sufficiently in the shape and texture of the leaves and in other features. In the belief that permanence of nomenclature can only be secured by adherence to the original form of a published name, even when etymologically incorrect, I have followed the original spelling of the generic name rather than the corrected form used by various writers, and particularly by Schumann.

ANEMOPAEGMA (*Climacopaegma*) **balizeanum**, sp. nov. Frutex scandens, ramis florentibus teretibus valde striatis tenuibus albidis subsparse hispidulo-puberulis pilis incurvis aetate subglabris ad nodos modice complanatis et ampliatis ad 2 mm. diametro. Folia conjugata cirrho terminali simplici filiformi terminata; petioli subteres supra paullum complanati subdense hispidulo-puberuli pilis incurvis 1.5–2.7 cm. longi; petioluli incurvo-puberuli 5–8 mm. longi; foliola ovalia vel ovato-oblonga breviter acutata apice supremo obtusa mucronulata basi rotundato-cuneata basi ima saepius breviter truncata integra firme subcoriacea utrinque laete viridia impresso-lepidota infra ad basin costae pilis paucis brevissi-

mis incurvis donata ceterum glabra 5.5–11.2 cm. longa 1.9–5.1 cm. lata, nervis lateralibus validioribus 5–6-jugis anastomosantibus; phylla stipulas simulantia orbicularia vel elliptica 9–9.5 mm. longa 6.5–8.5 mm. lata. Racemi ca. 3-flori axillares, rhache uti pedicellis incurvo-puberula ad 9 mm. longa. Calyx campanulatus basi latus apice truncatus obscure sinuatus vix lobatus coriaceus plus minusve glanduloso-adsersus et sparse ciliolatus 8 mm. longus basi 4 mm. apice 6 mm. diam. Corolla submatura verisim. aurantiaca subcoriacea 5.7 cm. longa extus glabra, intus in tubulo breviter pilosa; tubus 1.5 cm. longus supra basin paullum ampliatu deinde contractus in fauces ad basin paullum saccato-inflatus ad 3.2 cm. longas ca. 8–10 mm. diametro ampliatu; limbi lobi 5 subaequales suborbiculares ad 1 cm. diametro ciliolati (vix maturi). Stamina perfecta 4 didynama inclusa; loculi glabri late divergentes; filamenta basi ima pubescentia ca. 1.7 et 2.4 cm. longa; staminodium ad 2.5 mm. longum. Ovarium subquadrangulum paullum cum septo parallelo compressum paullum obtuse marginatum 2-loculare; semina in quoque loculo 2-seriata ad margines septi adfixa. Discus pulvinaris paullum crenulatus parum elevatus ad 1.8 mm. altus. — BRITISH HONDURAS: low bank of Rio Grande, 25 March 1907, *M. E. Peck* 957 (TYPE in Gray Herb.).

So far as I am aware, the only previous record of a member of this genus in Central America is that by J. D. Smith (Pl. Guat. iv. 117 (1895)) of *A. Vargasianum* DC. from Honduras (*Thieme* (distr. J. D. Smith) 5392). This number, represented in the Gray Herbarium by flowering material only, seems correctly assigned generically. If DeCandolle's description of the calyx and corolla in his species as glabriusculus is correct, however, it can hardly be identical with *A. Vargasianum*.

ARRABIDAEA mollicoma, sp. nov. Frutex scandens. Caulis teres subvalidus multistriatulus densissime molliterque subrufo-pilosulus pilis longioribus et brevioribus apice saepius glanduliferis subpatentibus, demum subglabratus canescens. Folia opposita conjugata cirrho terminali clausa: phylla stipulas simulantia aciculari-subulata ca. 6 mm. longa; petiolus et petioluli ut caulis densissime pilosuli, his ca. 1 cm. illo 3–4 cm. longis; foliola ovata subabrupte breviterque acutata basi truncato-rotundata vel -subcordata integra subcoriacea venuloso-reticulata (venis

lateralibus ca. 6-jugis) subtus paullulo pallidiora supra dense subtus densissime molliter subrufescenterque patenti-pilosula (pilis rare glanduliferis) et glanduloso-adspersa 4-5 cm. longa 2.3-3.3 cm. lata; cirrhus ut caulis pilosulus adhaerens ad 1.5 dm. longus. Paniculae ramulos terminantes geminae angustae subracemiformes 1.7-3 dm. longae ca. 5-6 cm. latae floribundae ut caulis pilosulae. Calyx campanulatus obscure 5-denticulatus densissime puberulus pilis patentibus paucilocularibus vix glanduliferis et parum glanduloso-adspersus 6 mm. longus. Corolla subcampanulato-infundibuliformis 5-5.4 cm. longa extus undique et intus in limbo et ad apicem faucium dense pilosula paullum lepidota intus ad insertionem staminum pilosa pilis apice glandulari-capitatis: tubus 6-8 mm. longus; fauces ca. 3 cm. longae; lobi limbi 5 suborbiculares obscure repandi apice emarginati ca. 1.5 cm. longi et lati. Stamina fertilia 4, staminodio ad 2 mm. longo adjuncto, filamentis 1.3 et 1.6 cm. longis. Discus pulvinaris sulcatus ca. 0.7 mm. altus. Ovarium dense patenti-puberulum septo parallele compressum 2-loculare, seminibus in quoque loculo 2-seriatis. Fructus planus lineari-ligulatus rufescenti-brunneus dense patenti-pilosulus pilis non glanduliferis et sparsim glanduloso-adspersus 2.3 dm. longus 1.5 cm. latus. Semina late alata 3 cm. lata. — NICARAGUA: woody vine, running over low trees and border growths, La Paz, 31 Jan. 1903, C. F. Baker 2268 (TYPE in Gray Herb.). — A member of the sect. *Macrocarpaea* subser. *Discolores*, apparently most nearly related to *A. cinerea* Bur.

BIGNONIA dasyonyx, sp. nov. Frutex alte scandens. Caulis obtuse subquadrangulatus cortice caeno-brunneo tectus dense patenterque puberulus, ramis floriferis ad 3 mm. diametro. Folia conjugata cirrho trifido dense puberulo pilis patentibus paucis longioribus adjunctis, axi 1 cm. longo, segmentis lateralibus compressis firmis unguiculato-incurvis cuspidatis ad 1 cm. longis (cirrho ut videtur interdum deficiente) terminata; pedunculus dense patenti-puberulus 1.7-2 cm. longus; foliola ovata basi minute cordata apice subacuminata mucronata molliterque hispidulo-pilosula pilis basi subtuberculatis, infra paullo pallidiora dense molliterque hispidulo-pilosula pilis patentibus basi non incrassatis et sparse glanduloso-punctata 5.5-6.5 cm. longa 3-3.3 cm. lata; folia juventate dense molliterque canescenti-pubescentia; phylla

stipulas simulantia cucullato-ovata firma subcoriacea sicca puberula 3 mm. longa. Flores solitarii vel bini e axillis cum foliis orientes; pedicelli puberuli ad 1 cm. longi; corolla flava sicca nigrescens 5.5 cm. longa extus glabra intus in faucibus subdense glandulosa; tubus basi ampliatus abrupte constrictus ad 5 mm. longus in fauces conico-infundibuliformes ad 3.2 cm. longas oblique desinens; limbi lobi inaequales cuneato-flabellati apice late rotundati crispato-crenulati margine sparse ciliati superiores (2) ad 1.3 cm. longi et lati, inferiores (3) ad 1.6 cm. longi. Calycis glabri ad 1.2 cm. longi campanulati basi ad 6 mm. apice ad 12 mm. lati lobi 5 obtusi ad 3.5 mm. longi late depresso-deltoidei valde crispati. Stamina 5, postico sterili 8 mm. longo; altera didynama, loculis glabris 2.4 mm. longis, filamentis basi stipitato-glandulosis ca. 12 et 17 mm. longis. Pistillum 3.2 cm. longum inclusum; discus annularis crassus obscure 5-lobatus ad 1.3 mm. altus; ovarium dense patenti-puberulum 4.5 mm. longum; stylus 2.5 cm. longus, stigmatis lamina 3 mm. longa. — BRITISH HONDURAS: a yellow-flowered rather high climber in forest, Toledo, 27 May 1907, *M. E. Peck* 919 (TYPE in Gray Herb.). — A true congener of *B. unguis-cati* L., to which, with *B. exoleta* Vell., the genus *Bignonia* is restricted by Schumann. It agrees with *B. exoleta*, as described by Bureau & Schumann, in its crispate calyx but differs in the pubescence, entire leaflets, and solitary or twin flowers. From *B. unguis-cati*, a more variable plant than has generally been realized, it differs essentially in the crisped calyx margin and leaves permanently pubescent beneath. The West Indian and South American material of *B. unguis-cati* examined is mostly glabrous, the Mexican and Central American finely puberulous on petioles, etc., at least when young, and good characters for varietal separation will doubtless be found when the species is carefully studied. Certain specimens, such as *H. H. Smith* 1134 from Colombia, simulate *B. dasyonyx* in pubescence, but have the entire calyx of *B. unguis-cati*. The former may prove to be only a variety of the latter species, but no real evidence of this is afforded by the material at hand.

LUNDIA diceilocalyx, sp. nov. Frutex alte scandens. Caulis subteres ad nodos ampliatus et complanatus obscure purpurascens molliter densissimeque griseo-puberulus pilis minimis. Folia conjugata, cirrho tenui firmo apice verisim. simplice ad 11 cm. longo

terminata; petioli 3 cm. longi, petiolulis 1.5-2.3 cm. longis, ut caule puberulis; foliola 2 ovata paullum inaequilateralia abrupte breviterque acuminata basi oblique leviterque cordata integerrima supra sicc. purpurascens sparse glanduloso-lepidota sparsissime pubescentia vel subglabra subtus paullo pallidiora ad costam et nervos (ca. 4-jugos) puberula ceterum glabra margine minute denseque ciliolata 6.5-8 cm. longa 3.8-5.5 cm. lata; phylla stipulas simulantia ut videtur nulla. Paniculae axillares et terminales multi(30-50)-florae ut caulis puberulae 13-15 cm. longae; pedicelli ultimi 3.5-6 mm. longi. Calyx etiam juventate valde bilabiatum 6.5 mm. longum puberulum et ciliolatum, labiis subaequalibus 2-2.5 mm. longis obtusis apice minute emarginatis vel subintegris. Corolla purpurascens (?) recta 4.5 cm. longa extus dense breviterque pilosa pilis subglandulosis; tubus tenuis intus valde glandulosus 1 cm. longus ad basin 1 mm. ad apicem 3 mm. diametro, in fauces rectas intus glabras cylindrico-infundibuliformes ad 2.5 cm. longas 1 cm. latas ampliatas; limbi lobi subaequales cuneato-suborbiculares 1-1.3 cm. longi ad 1.3 cm. lati extus et intus breviter pilosi. Stamina 5, postico abortivo apice piloso ad 1 mm. longo; altera didynama, loculis divergentibus barbatissimis ad 3 mm. longis, filamentis glabris 10 et 15 mm. longis. Pistillum 2.5 cm. longum; discus vix ullus; ovarium extus puberulum 2-loculare, loculis polyspermis, placentis in quoque loculo 2 in dissepimento submarginalibus. — BRITISH HONDURAS: a high climber in forests, Toledo, 9 Sept. 1906, *M. E. Peck* 495 (TYPE in Gray Herb.). — Of special interest as the first member of the genus discovered outside of South America. *Lundia diceilocalyx* belongs to the sect. *Eulundia* K. Sch. and most approaches *L. obliqua* Sonder (ex char.), but is very different from any described species of the genus.

TABEBUIA nicaraguensis, sp. nov. Arbor 10-13-metralis cortice cano fisso tectus, ramulis canis glabratibus. Folia opposita digitatim 5-foliolata: petiolus et petioluli teretes supra canaliculati patentipuberuli, his 1-4.4 cm. illo 11 cm. longis; foliola ovalia vel ovali-obovata subabrupte tenuiterque acuminata (acumine 1-2 cm. longo 2 mm. lato) basi cuneata vel cuneato-rotundata integra supra obscure viridia in costa et venis majoribus patentipuberula ceterum sparse pubescentia vel subglabrata prominulo-reticulata subtus paullo pallidiora undique breviter pilosa in costa et venis (9-14-jugis) et earum in axillis densius puberula inter pilos lepidota

8.8–17.5 cm. longa 4.2–6.3 cm. lata. Flores in panicula brevi sessili ca. 20-flora terminali dense rufescenterque farinoso-tomentula aggregati, pedicellis ultimis ca. 2 mm. longis. Calyx campanulatus subtruncatus vel obscure 5-dentatus ut panicula pubescens 7 mm. longus. Corolla extus et intus sordide puberula 7 cm. longa; tubus 7 mm. longus; fauces tubuloso-infundibuliformes ad 4 cm. longae; limbi lobi 5 ovaes vel obovato-ovales margine plus minusve crenato-plicati ad 2.2 cm. longi. Stamina fertilia 4, staminodio 6 mm. longo adjuncto, filamentis 1.5 et 2.2 cm. longis. Discus subduplex obscure 5-lobatus. Ovarium glabrum septo parallele compressum 2-loculare, placentis 2 in quoque loculo. Fructus deest. — NICARAGUA: Hacienda Campuscus, 30 Jan. 1903, *C. F. Baker* 2258 (TYPE in Gray Herb.). — Described by the collector as a tree 30–40 feet high, with widely spreading irregular top and gray broken bark, growing in open woods. The species is closely related to *T. Palmeri* Rose of Mexico, but in that species, represented in the Gray Herbarium by several collections, the leaves, while pilosulous beneath along the costa and the chief lateral veins and in their axils, are otherwise without hairs, while the whole under surface is densely lepidote.

ACANTHACEAE

BRAVAISIA proxima, sp. nov. Frutex vel arbusculus ramosus. Rami juventate olivaceo-virides acute quadrangulares glabri densissime cystolithigeri aetate cortice canescente donati subteretes. Folia elliptico-obovata vel obovata apice acuta subabrupte breviterque acuminata basi longe acuminata integra paullulum sinuata glabra utrinque cystolithigera infra vix pallidiora 5.5–12 cm. longa 2.4–3.8 cm. lata, in petiolis tenuibus 4–9 mm. longis, ea inflorescentiae multo minima supra ad bracteas reducta. Flores in panicula trichotoma multiflora ramum terminante glabra ad 2 dm. lata dispositi. Bracteolae laterales 2 ovatae vel oblongo-ovatae ut sepala dense cystolithigerae margine ciliolatae ceterum glabrae abrupte vel subabrupte mucronatae, lamina 4–4.5 mm. longa 1.6–1.8 mm. lata, mucrone 1–2.2 mm. longo. Sepala 5 oblonga lineata plus minusve minute puberula margine pallido angusto ciliata 8 mm. longa 2.3 mm. lata, apice obtusa mucrone 0.8 mm. longo donata. Corolla pallide lavendulacea supra medium subdense breviterque pilosa pilis subincurvis 3.5–3.7 cm. longa; tubus

tenuis 6 mm. longus in fauces anguste campanulatas 1.7 cm. longas abrupte ampliatas; limbi lobi 5 subaequales euneato-suborbiculares ad 1.1 cm. longi 1.3 cm. lati. Stamina 4: filamenta basi disjuncta et apice pilosa 7 et 13.5 mm. longa; antherarum loculi aequales oppositi 3 mm. longi margine subsparse pilosi basi mucrone ad 0.8 mm. longo muniti. Stylus 2.5 cm. longus; stigma liguliforme ad 0.8 mm. longum. — BRITISH HONDURAS: shrub or small tree with showy pale lavender flowers, in forest, upper Moho River, 16 March 1907, *M. E. Peck* 730 (TYPE in Gray Herb.). — From *B. grandiflora* J. D. Smith (*Bot. Gaz.* xxxiii. 255 (1902)), the only other species with mucronate calyx-lobes, the present plant differs in a number of small but significant features. The flowers are smaller, and the sepals merely minutely puberulous, entirely lacking the long hairs found along the midline of at least the inner sepals in *B. grandiflora*. The filaments are shorter, less hairy at base and apex than in *B. grandiflora* and entirely separate at base, while in *B. grandiflora* the members of each lateral pair are much more hairy at base and united by a narrow membrane forming a little pocket. Furthermore the anther-cells of *B. proxima* are distinctly smaller and less hairy, and the anther-appendages shorter.

DIANTHERA **Peckii**, sp. nov. "Basi fruticulosa 0.6–1.3 m. alta," supra herbacea. Caulis subteres ad nodos paullum incrassatus cystolithiger bifariam hispido-pilosus pilis laxis. Folia lanceolata longissime attenuata plus minusve falcata basi longe attenuata crenato-sinuata vel subintegra utrinque viridia supra ad costam appresse hispida ceterum glabra cystolithigera 9.5–13.5 cm. longa 2.3–2.6 cm. lata, in petiolis hispido-piloso-ciliatis 8–15 mm. longis. Spicae solitariae vel binae terminales vel subterminales 9.5–11.3 cm. longae bifariam pubescentes, in pedunculo 2–2.4 cm. longo; internodia 5.5–7.5 mm. longa; flores solitarii oppositi sessiles. Bracteolae laterales 2 lineari-subulatae subpungentes ad basin anguste ovatas et apicem sparse ciliolatae 3 mm. longae. Calycis segmenta 4 basi ima unita aequalia lineari-subulata subpungentia sparse incurvo-hispidula ad 5 mm. longa. Corolla extus glabra 10–12.5 mm. longa; tubus 6 mm. longus anguste infundibuliformi-campanulatus, intus facie superiore praecipue ad basin et filamenta adnata secundum pilosulus; labium superius porrectum apice paullum cucullatum emarginatum ad 7 mm. longum ad 2.3 mm. latum; inferius longius ad 5 mm. latum decurvatum palato con-

spicuo per tertiam partem longitudinis 3-lobum, lobis lateralibus ovalibus medio latiore brevioribus. Stamina 2: loculi subaequales (1-1.2 mm. longi) sed valde dissiti plus minusve obliqui mutici, superiore in latere uno barbato inferiore glabro; filamenta glabra ad apicem tubi adfixa 4.3 mm. longa. — BRITISH HONDURAS: "shrubby at base, 2-4 feet high," high banks of the upper Moho River, 16 March 1907, *M. E. Peck* 722 (TYPE in Gray Herb.). — Prof. Peck's notes do not indicate the color of the flowers.

DICLYPTERA magniflora, sp. nov. Verisim. frutex. Caulis subteres viridi-nigrescens cystolithiger bifariam hirtus pilis brevibus recurvatis. Folia elliptica vel elliptico-obovata utroque (apice interdum subabrupte) acuminata crenato-sinuata margine sparse ciliolata subtus ad basin costae sparse pubescentia ceterum glabra cystolithigera infra paullo pallidiora 12-17.5 cm. longa 4.3-7.1 cm. lata, in petiolis hispido-ciliatis 8-14 mm. longis. Spica terminalis densa ad 9 cm. longa 4.5 cm. crassa parum composita, in pedunculo 9 mm. longo; bracteae 0.6-1.2 cm. longae infra ad venas hirtopilosae. Bracteolae laterales 2 herbaceae oblongo-ovatae infra non angustatae calycem vix aequantes 5.5 mm. longae, florem singulam includentes; pedicelli ad 1.8 mm. longi. Calycis segmenta 5 basi unita lanceolato-ovata acuminata hispido-pilosa aequalia 5.7 mm. longa ad 1.3 mm. lata. Corolla extus pilosa 6.4 cm. longa; tubus ad 7 mm. longus 1.5 mm. diametro in fauces subcylindricas ad 3.5 cm. longas sensim ampliatus; labia subaequalia ad 2.1 cm. longa lanceolata integra subacuta paullum ringentia superius 2-nerviium inferius 3-nerviium. Stamina 2 e faucibus exserta: loculi antherarum valde dissiti altero erecto altero obliquo mutici inaequales 1.4-1.8 mm. longi; filamenta basi sparse pilosula 2 cm. longa. Stylus corollam paullo superans. Ovarium 4-ovulatum. — BRITISH HONDURAS: 1905-07, *M. E. Peck* 622a (TYPE in Gray Herb.). — Very distinct in the large corollas and the small bracteoles barely equalling the calyx, although in all other characters the plant seems to agree perfectly with other species of the genus. The data for this collection have unfortunately become confused. The plant is probably from Toledo.

ERANTHEMUM adenocarpum, sp. nov. Herbaceum perenne erectum simplex vel pauciramosum 3.5 dm. altum, radice tenui furcato-ramosa. Caulis tenuis obscure viridis dense cystolithiger subteres

bifariam hispido-pilosus pilis patentibus persistentibus, aetate infra cortice albido suberoso donatus. Folia lanceolata vel inferiora ovalia utroque acuminata vel inferiora abrupte breviterque acuta plus minusve falcata integra plus minusve sinuata paullum coriacea utrinque glabra concoloria cystolithigera media 4.8–6.7 cm. longa 8.5–19 mm. lata, inferiora 3.3–5.5 cm. longa 1.6–2.7 cm. lata; petioli 3 mm. longi glabri, basibus connatis hispido-pilosus pilis subrufescentibus. Spicae simplices vel basi ramosae terminales et e axillis supremis 5–9 cm. longae minute patenterque hispidulae nudae, nodis 5–16 mm. distantibus; flores solitarii oppositi. Bracteolae laterales 2 subulatae ad 12 mm. longae; pedicelli ad 1.5 mm. longi. Calycis segmenta 5 basi ina unita anguste subulata attenuata subaequalia hispidula plus minusve stipitato-glandulosa ad 2.3 mm. longa. Corolla lavendulacea subsparse patenti-puberula ad 2.7 cm. longa; tubus tenuis ad 1.3 cm. longus 0.6 mm. diametro in fauces ad 7 mm. longas 1.5 mm. diametro subsensim ampliatus; limbi lobi 5 elliptici apice rotundati, 2 superiores 9 mm. longi 5.5 mm. lati, 3 inferiores 8 mm. longi 4 mm. lati. Stamina 2 ad basin faucium affixa longe inclusa; loculi antherarum fere aequales mutici oppositi glabri 1.5 mm. longi; filamenta glabra ad 1 mm. longa; staminodia 2 paullo alterius inserta 1 mm. longa glabra e staminibus omnino libera. Stylus 18 mm. longus vix exsertus; stigma minute inaequaliterque bifidum. Capsula 1.4 cm. longa clavata stipitato-glandulosa compressa tetrasperma. Semina laevia. — BRITISH HONDURAS: in damp low forest, Toledo, 10 April 1907, *M. E. Peck* 830 (TYPE in Gray Herb.). — Seemingly more closely related to some Philippine species, for example *E. minutiflorum* Elmer, than to any of the Mexican or South American species.

ERANTHEMUM tetrasepalum, sp. nov. Planta 1–1.6 m. alta ut videtur herbacea. Caulis ramosus dense cystolithiger subteres bifariam hispido-pilosus pilis recurvatis, ramulis paullum ancipitibus. Folia ovata vel ovali-ovata acuminata plus minusve falcata basi late rotundata vel rotundato-cuneata margine crenato-sinuata utrinque glabra cystolithigera infra paullo pallidiora 7.5–10.5 cm. longa 3.3–4.7 cm. lata, in petiolis 5–6 mm. longis margine incurvopubescentibus. Spicae simplices vel ternatae terminales et exaxillis supremis 8.7–12.5 cm. longae, rache breviter bifariamque hispido-pilosa, pedunculo 0.9–2.1 cm. longo, nodis 5–7 mm. distantibus;

flores solitarii oppositi. Bracteolae laterales 2 lineari-subulatae attenuatae subpungentes ad 2.5 mm. longae; pedicelli vix ulli. Calycis segmenta 4 basi ima unita lineari-subulata attenuata subpungentia paullum hispidula subaequalia ad 5 mm. longa 0.7 mm. lata. Corolla ad 2.4 cm. longa sparse patenti-pilosa; tubus tenuis ad 1 cm. longus 0.6 mm. diametro in fauces cylindricas 6 mm. longas 1.6 mm. latas subsensim ampliatus; limbi lobi 5 oblongi apice rotundati, 2 superiores 8 mm. longi 3 mm. lati, 3 inferiores 7 mm. longi 3 mm. lati. Stamina 2 glabra ad basin faucium adfixa valde inclusa; loculi subaequales oppositi mutici 1.4 mm. longi; filamenta ad 0.7 mm. longa. Staminodia 2 linearia ad 0.8 mm. longa, basi ima ad filamenta staminum brevissime adnata. Capsula tetrasperma basi sterili 2.5–3.5 mm. longa stipitata acuta glabra paullum compressa 8.5–10 mm. longa. Semina papilloso-rugosa 1.6 mm. longa. — BRITISH HONDURAS: in deep shade in forest, Moho River, 16 Oct. 1906, *M. E. Peck* 552 (TYPE in Gray Herb.). — Unique, apparently, in its 4-parted calyx, but in all other features in close agreement with other species of this genus.

The generic name *Gerardia* L. (Sp. ii. 610 (1753); Gen. ed. 5, 266, no. 665 (1754)) has recently been referred by Dr. F. W. Pennell (Bull. Torr. Club xl. 119 (1913)) to the Acanthaceous genus *Stenandrium* Nees (in Lindl. Introd. Nat. Sys. Bot. ed. 2, 444 (1836); in DC. Prod. xi. 281 (1847)). An independent investigation of the matter has convinced me of the justice of this treatment, which, in its bearing on the nomenclature of the North American forms that have been passing as *Gerardia*, will soon be discussed by the writer in *Rhodora*. The Mexican, Central American, and West Indian members of the genus *Stenandrium* to be transferred to *Gerardia* are as follows:

GERARDIA acuminata (Urb.), comb. nov. — *Stenandrium acuminatum* Urb. Symb. Ant. vii. 382 (1912).

✓ *GERARDIA barbata* (Torr. & Gray), comb. nov. — *Stenandrium barbatum* Torr. & Gray, Pacif. Rail. Rep. ii. 168, t. 4 (1855).

GERARDIA chamaeranthemoidea (Oerst.), comb. nov. — *Stenandrium chamaeranthemoideum* Oerst. Vidensk. Meddel. 1854. 139 (1854).

GERARDIA consobrina, nom. nov. — *Stenandrium Wrightii* Lindau in Urb. Symb. Ant. ii. 208 (1900). Not *G. Wrightii* Gray in Torr. Bot. Mex. Bound. 118 (1858).

GERARDIA dulcis (Cav.), comb. nov. — *Ruellia dulcis* Cav. Ic. vi. 62, t. 585, f. 2 (1801). *Stenandrium dulce* (Cav.) Nees in DC. Prod. xi. 282 (1847).

✓ *GERARDIA DULCIS* (Cav.) Blake var. **floridana** (Gray), comb. nov. — *Stenandrium dulce* (Cav.) Nees var. *floridanum* Gray, Syn. Fl. ii. pt. 1, 327 (1878). *S. floridanum* (Gray) Small, Fl. S. E. U. S. ed. 1. 1085, 1338 (1903).

GERARDIA TUBEROSA L. Sp. ii. 610 (1753). — *Ruellia ? rupestris* Sw. Prod. 93 (1788); Fl. Ind. Occ. ii. 1071 (1800). *Stenandrium rupestre* (Sw.) Nees in DC. Prod. xi. 283 (1847). *S. tuberosum* (L.) Urb. Symb. Ant. iv. 576 (1911).

GERARDIA verticillata (Brandegee), comb. nov. — *Stenandrium verticillatum* Brandegee, Zoe v. 237 (1906).

GERARDIA pilosula, sp. nov. Planta scaposa 4.5–5.7 cm. alta e rhizomate brevissimo horizontale, radiculis crasso-filiformibus, scapis 1–2 erectis. Folia (vix bene evoluta) pauca ovalia obtusa basi cuneata crassiuscula punctata glabra vel subglabra ad 1.2 cm. longa 4 mm. lata, in petiolos ad marginem pilosulos folia subaequantur angustata, petiolorum basibus persistentibus. Scapus infra spicam glaber nudus 1.5–4 cm. altus; spica densa vel basi interrupta ovoidea 1–2.5 cm. alta 0.8–2.5 cm. diametro (corollis exclusis), rache cum bracteis bracteolis calycibusque dense submolliterque patienti-pilosulis. Bractee lanceolatae vel oblongo-lanceolatae obtusiusculae nervosae ca. 1 cm. longae 2.5–3 mm. latae; bracteolae lineares vel lineari-lanceolatae obtusiusculae nervosae nervis ca. 3 validioribus 8 mm. longae 1.3 mm. latae. Sepala 5 aequalia lineari-lanceolata obtusiuscula capsulam aequantia 11 mm. longa 1.2 mm. lata. Corolla tubaeformis ad 1.8 cm. longa ut videtur lilacina, tubo et faucibus intus antice flavis; tubus proprius 5 mm. longus, fauces parum ampliatae 7 mm. longae, lobi limbi 5 subaequales (antico paullo majore excepto) ovali-obovata late rotundati ad 5 mm. longi 3.5–4.3 mm. lati. Stamina 4 ad apicem tubi inserta: filamenta 1–1.5 mm. longa patienti-pilosa; antherae omnes 1-loculares patienti-pilosae plus minusve cohaerentes oblique oblongae 1.5 mm. longae. Stylus 6.5 mm. longus. Capsula oblique ellipsoideo-ovoidea obtusa ad 10 mm. longa 3.8 mm. crassa, seminibus 2 in quoque loculo glochidiatis. — CHIHUAHUA: vicinity of Madera, 2250 m., 27 May–3 June 1908, Palmer 317 (TYPE in Gray Herb.). — Readily distin-

guished from all its Mexican congeners by the fine dense spreading pubescence.

JACOBINIA scarlatina, sp. nov. Frutex tenuis vagans. Caulis saturate brunneus ramosus striatus paullulum quadrangulatus ad nodos paullum incrassatus bifariam hirtus pilis brevibus recurvis. Folia inaequaliter ovata acuminata apice supremo obtusa basi cuneata vel rotundato-cuneata obscure viridia infra vix pallidiora margine hirto-ciliata pilis incurvis supra in costa incurvo-hirta subtus glabra vel in costa pilis paucissimis donata cystolithigera 7.5–11.8 cm. longa 3.5–5.5 cm. lata, in petiolis dense hirto-ciliatis pilis incurvis 6–10 mm. longis. Paniculae terminales et ex axillis superioribus trichotomae vel duplo trichotomae ut caulis pubescentes folia subaequantur vel paullo superantes; flores in ramulis ultimis 1.5–4.5 cm. longis secundi ad nodos approximatos solitarii; bracteae ovatae acutae ad 1.3 mm. longae; bracteolae laterales 2 minores; pedicelli ad 0.5 mm. longi. Calycis tubus subglobofus ad 0.8 mm. longus; segmenta 5 aequalia lanceolato-ovata acuminata margine obscure stipitato-glandulosa 1.8–2.2 mm. longa. Corolla bilabiata coccinea ca. 3.6 cm. longa extus glabra intus ad basin dense pubescens pilis appressis retrorsis; tubus basi ima paullum ampliatus deinde constrictus supra sensim ampliatus anguste cylindrico-infundibuliformis ad 2.4 cm. longus; labium superius lanceolatum integrum apice paullum cucullatum porrectum 1.2 cm. longum basi ad 7 mm. latum; inferius aequale liguliforme ad 4 mm. latum apice 3-lobum (lobis aequalibus ovalibus rotundatis 1.5 mm. longis). Stamina 2 corollam subaequantia: antherarum loculi subaequales glabri oppositi regulares mutici 2.5 mm. longi; filamenta glabra 12 mm. longa. Staminodium nullum. Stylus 4 cm. longus. — BRITISH HONDURAS: a slender straggling shrub with scarlet flowers, in forests near Manatee Lagoon, 12 May 1906, *M. E. Peck* 430 (TYPE in Gray Herb.). — Closely related to the three following species, whose synonymy and characters have become somewhat confused.

JACOBINIA NEGLECTA (Oerst.) Gray, Syn. Fl. i. pt. 2, 395 (1878); l. c. ed. 2, 457 (1886). — *Sericographis neglecta* Oerst. ! Vidensk. Meddel. 1854. 151, t.5, f.12–14 (1854). — Leaves lanceolate, falcate-acuminate, incurved-hirtous on costa and sparsely on lateral nerves above, more sparsely so beneath, glabrous between the veins, 6–9.5 cm. long, 1.7–2.1 cm. wide. Branches equally and rather densely

incurved-hirtous. — VERA CRUZ: Calipa and Papantla, 1841, *Liebmann* (COTYPE COLL. in Gray Herb.).

JACOBINIA SPICIGERA (Schlecht.) Bailey, Stand. Cyc. Hort. iii. 1715 (1915). — *Justicia spicigera* Schlecht. ! *Linnaea* vii. 395 (1832). — Leaves lanceolate, acute, above incurved-hirtous along costa and lateral nerves and with sparse longer hairs between them, beneath softly and at least in youth uniformly short-pilose with incurved hairs, even in age distinctly pubescent between the veins, 6-8.5 cm. long, 1.8-2.3 cm. wide. Branches densely softly pilose with incurved hairs. — VERA CRUZ: Jalapa, *Schiede* (TYPE COLL. in Gray Herb.).

JACOBINIA atramentaria (Benth.), comb. nov. — *Justicia (Beloperone?* v. *Gendarussa?*) *atramentaria* Benth. Pl. Hartw. 69 (1840). *Sericographis moctli* Nees in Nees & Schauer, *Linnaea* xx. 715 (1847). *Justicia moctli* Moc. & Sess. ex Nees l. c. as syn. *Drejera Willdenowiana* Nees in DC. Prod. xi. 334 (1847), fide Hemsl. *Sericographis mohintli* Nees in DC. l. c. 361 (1847). *Justicia mohintli* Moc. & Sess. ex Nees l. c. as syn. *Jacobinia mohintli* (Nees) Hemsl. Biol. Centr.-Am. Bot. ii. 521 (1882). — Leaves ovate, obtusish to acuminate, above incurved-hirtous only along costa or also sparsely along lateral nerves or rarely even between them, beneath incurved-pubescent along costa or sometimes also sparsely so along lateral nerves, 3-14 cm. long, 1.6-6 cm. wide. Branches equally and rather densely incurved-pubescent. — SAN LUIS POTOSI: 1876, *Shaffner* 112. TEPIC: 1892, *Palmer* 1987. GUANAJUATO: 1880, *Dugès*. VERA CRUZ: *Botteri*, *Purpus* 2393, *Bourgeau* 2239. OAXACA: *Conzatti* 2 & 102, *L. C. Smith* 354. GUATEMALA: *J. D. Smith* 1883 & 2700.

JACOBINIA umbrosa (Benth.), comb. nov. — *Justicia aurea* Schlecht. *Linnaea* vii. 393 (1832). *Justicia (Beloperone?) umbrosa* Benth. Pl. Hartw. 79 (1841). *Cyrtanthera aurea* (Schlecht.) Nees in DC. Prod. xi. 329 (1847). *C. umbrosa* (Benth.) Nees l. c. *C. catalpaefolia* Hook. Bot. Mag. lxxv.t. 4444 (1849). *Cyclanthera catalpaefolia* Nees ex Hook. l. c. as syn. *Cyrtanthera densiflora* Oerst. Vidensk. Meddel. 1854. 147 (1854). *Jacobinia aurea* (Schlecht.) Hemsl. Diag. Pl. Nov. ii. 35 (1879); Biol. Centr.-Am. Bot. ii. 520, t. 68 (1882). — A change of name in this species is required because of the prior *Jacobinia aurea* Hiern, Vidensk. Meddel. 1877-78. 85(1877-78), from Brazil.

ODONTONEMA paniculiferum, sp. nov. Frutex laxis tenuis. Caulis brunneus subteres ad nodos paullum incrassatus et anceps obscure cystolithiger glaber, internodiis superioribus ca. 5 cm. longis. Folia elliptica apice acuta breviter (ad 8 mm.) acuminata basi cuneata integra vix sinuata obscure cystolithigera subtus ad costam sparsissime strigosa ceterum glabra, nervis lateralibus ca. 8-9-jugis validis, 12-14.3 cm. longa 4.3-4.9 cm. lata, in petiolis glabris 5-6 mm. longis. Panicula terminalis trichotome divisa ad 2.3 dm. longa 1.4 dm. lata multiflora subglabra vel sparse minutissimeque puberula, bracteis (saltem mediis et superioribus) minimis ad 1.5 mm. longis subulatis, internodiis 0.8-2.4 cm. longis; flores oppositi solitarii vel rare fasciculati in pedicellis plus minusve patentibus glabris 5-7 mm. longis. Bracteolae laterales 2 minutae lanceolato-subulatae ad 0.6 mm. longae. Calycis tubus subglobosus glaber ad 0.6 mm. longus; segmenta 5 lineari-subulata aequalia attenuata sparse ciliolata ad 2 mm. longa. Corolla plus minusve puberula 1.9 cm. longa obscure bilabiata; tubus ad basin ampliatus deinde constrictus in fauces infundibuliformes sensim ampliatus; labium superius 4 mm. longum usque ad basin bilobatum lobis deltoideo-ovalibus obtusis ciliolatis; inferius aequale ad basin 3-lobum lobis inter se aequalibus eis labii superioris similibus paullo angustioribus ciliolatis. Stamina 2; antherarum loculi aequales 2 mm. longi oppositi glabri basi mutici, connectivo apice adunco; filamenta glabra 4 mm. longa. Staminodia 2 oblique obovata subobtusa subsessilia 0.5 mm. longa e filamentis staminum omnino libera. Stylus integer. Ovarium 4-ovulatum. Capsula sensim clavata glabra 2.1 cm. longa 2.5 mm. lata saepius 2-sperma. Semina dense reticulato-scrbiculata. — BRITISH HONDURAS: a slender drooping shrub in deep shade, forest near Manatee Lagoon, 8 Jan. 1906, *M. E. Peck* 278 (TYPE in Gray Herb.). — From **ODONTONEMA geminatum** (J. D. Sm.), comb. nov. (*Thyrsacanthus geminatus* J. D. Sm. ! Bot. Gaz. xiii. 75 (1888)), of Guatemala, this new species differs *inter alia* in its glabrous or subglabrous pedicels and panicle, smaller corolla, and especially in its androecium. In *O. geminatum* the staminodia are linear and attached laterally to the decurrent bases of the filaments of the perfect stamens. The upper lip of the corolla in *O. geminatum* is merely notched, while in *O. paniculiferum* it is divided to the base, but the two seem strictly congeneric. With other published species of *Odontonema* (*Thyrsacanthus*), *O. paniculiferum* requires no special comparison.

RUELLIA (§ *Dipteracanthus*) **obtusata**, sp. nov. Caulis infra suffruticosus teres cano-albidus striatus cystolithiger praecipue ad nodos pilosus et pilosulus pilis patentibus basi paullum incrassatis aetate subglabratus 6 dm. longus et ultra. Folia opposita remota (paribus 4.5–12.5 cm. distantibus) ovalia vel oblongo-ovalia apice obtusa vel rotundata basi acute cuneata integra (margine paullum sinuata) concoloria utrinque subdense (infra juventate dense canescenterque) pilosa pilis late patentibus vel paullum incurvis et supra conspicuiter lineolata 4.5–6 cm. longa 1.8–2.5 cm. lata, in petiolis tenuibus hispido-pilosis et puberulis 5–8 mm. longis. Flores in axillis foliorum solitarii; bractee ca. 4 foliis similes minores ad 1.5 cm. longae; pedicelli ad 1 mm. longi. Calycis segmenta 5 basi ima unita hispido-pilosa (pilis late patentibus) et albo-punctatis; posticum lanceolatum acutum 12 mm. longum 3 mm. latum; cetera lineari-subulata attenuata apice supremo obtusa ad 9 mm. longa 0.7 mm. lata. Corollae extus praecipue supra medium pilosae tubus ad 2 cm. longus infra tenuis supra medium subabrupte ampliatus; limbi lobi 5 subaequales suborbiculares margine sinuati ad 9 mm. longi 8 mm. lati. Stamina 4: filamenta per paria lateralia basi connata glabra, partibus liberis 4.5 et 6.5 mm. longis; antherarum loculi aequales oppositi mutici 2.5 mm. longi. Stylus ad 2 cm. longus; stigmati lamina 2 mm. longa. Capsula clavata brevissime (ad 0.7 mm.) rostrata glabra 14 mm. longa ad 3.5 mm. lata ca. 10-sperma. — BRITISH HONDURAS: in damp open cultivated ground, Toledo, 21 April 1907, *M. E. Peck* 871 (TYPE in Gray Herb.).

RUBIACEAE

HAMELIA purpurascens, sp. nov. Frutex subscandens 3–13 m. altus. Caulis teres dense sordido-pilosus pilis laxis patentibus crispatis multiloculatis. Folia 3-verticillata ovalia vel ovali-ovata utroque acuta vel subacuminata integra supra viridia pilis sparsissimis adpersa subtus ut caulis ubique sordide pilosula pilis ad venas longioribus, nervis lateralibus ca. 11-jugis, caulina 8–11 cm. longa 2.8–4.2 cm. lata, ramealia minora; stipulae subulato-filiiformes ad 5 mm. longae. Paniculae caulem et ramos terminantes 3–4-fidae, pedunculo ut caule pubescente 1.5–2.5 cm. longo, ramis ca. 7-floris 1.5–4 cm. longis, floribus sessilibus. Calycis lobi liberi 5 maturitate lanceolati acutiusculi sub-3-nervii ciliati et pilosi 5

mm. longi 1.5 mm. lati. Corolla saturate rubra 2.2–2.4 cm. longa extus dense sordido-pilosa, basi 2.3 mm. diametro, 8 mm. supra basin 1.3 mm. diametro, deinde tubuloso-clavatus ad apicem 3 mm. diametro; limbi lobi deltoidei ad 1.2 mm. longi. Antherae exsertae 9 mm. longae; filamenta glabra basi dilatata 5 mm. longa. Stylus 2 cm. longus. Fructus rubro-purpurascens dense sordide pilosus 5-loculus polyspermus ad 8 mm. longus 3 mm. crassus. — BRITISH HONDURAS: a partly climbing shrub 10–40 feet high, with dark red flowers and reddish-purple fruit, on pine ridge near Manatee Lagoon, 6 Aug. 1905, *M. E. Peck* 104 (TYPE in Gray Herb.). — From its nearest relative, *H. Rovirosae* Wernham, the present plant differs strongly in its very dense sordid pubescence, longer more slender fruit, and various other characters.

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I. NEW OR OTHERWISE INTERESTING PLANTS,
MOSTLY NORTH AMERICAN LILIACEAE
AND CHENOPODIACEAE

BY J. FRANCIS MACBRIDE

DURING the past year I have had the pleasure of studying various collections, mostly from western North America, which have been sent to the Gray Herbarium for determination. In the course of work of this nature one invariably discovers instances where species have been known under names no longer tenable in accord with those principles of nomenclature expressed in the International Rules. Also, especially in the case of collections from portions of the western United States where the flora is even yet imperfectly known, species apparently undescribed have from time to time come to light. Two collections have been particularly noteworthy in this respect. One was made by Mrs. Mary F. Spencer of San Diego and consists of some three hundred species largely from the Mohave and Colorado Deserts, regions long known as possessing a unique and interesting flora. Mrs. Spencer secured, in most instances, four duplicates of each species collected. The other collection was made by Mr. J. C. Nelson, principal of the high school at Salem, Oregon. Mr. Nelson, accompanied by Professor Peck of Willamette University, was able in late June to make a hurried trip to Curry Co., Oregon, a region which apparently has never been botanized. He found a number of species which are rare, at least in southwestern Oregon, several representing range extensions from California. Notable in this last respect was the discovery of *Zauschneria californica*.

The following pages, therefore, have resulted partly from determinative work as outlined above but the notes on the *Liliaceae* and the *Chenopodiaceae* have arisen from an attempt to order up, in accord with recent literature on the groups, certain material already in the herbarium. My observations on the *Chenopodiaceae*

are largely in the nature of criticism of the revision by Mr. Paul C. Standley of the North American representatives of this family (North American Flora xxi. 1916). I would say that, except for the tendency to assign specific rank to plants representing mere variants of earlier described forms, or, more especially, to maintain such variants as "species," Mr. Standley's work seems excellent, especially as he has succeeded, both in *Chenopodium* and *Atriplex*, in indicating the natural relationships of the specific units in so far as is possible in a lineal arrangement. This is a decided improvement over Watson's treatment (which was somewhat artificial) and is evidence of sincere work and inherent ability on the part of the monographer.

In thus calling attention in some detail to the *raison d'être* of this paper I have had in mind the miscellaneous character of the contents, — a condition which I have felt needed some prefatory remarks by way of explanation.

ZIGADENUS. In 1903 Dr. Rydberg, Bull. Torr. Club xxx. 271, wrote "It matters little how broad or narrow concepts we have of a genus, if only we are consistent and in the same family or tribe designate as genera equivalent natural groups of related species; i. e., not making in one case the limits of a genus too large and in another too narrow.

"I. An inconsistency of this kind exists, I think, in the usual treatments of the family Melanthaceae. *Chrosperma* and *Stenanthium*, *Melanthium* and *Veratrum*, are separated by rather trifling characters, while in *Zygadenus* are included species of no closer relationship. If we keep as distinct all of the first four genera, we must, if consistent, divide *Zygadenus* into at least three genera." Mr. M. E. Jones, Contrib. W. Bot. xiv. 22-23 (1912), has criticised this segregation of *Zygadenus* but his arguments, which in form too nearly approach a sarcastic tirade, fail to convince. The substance of Mr. Jones's objection would appear to be that Rydberg has divided the genus along unnatural lines since it consists of "two rather well defined groups (shading into each other), the large and white-flowered (often with a tinge of blue) forms with twin or V-shaped single gland which is morphologically a union of two glands at the lower edges, and the small yellow-flowered forms with a single obovate to oblong gland." By the indication of

further points of difference in the groups Jones shows clearly the fallacy of creating the genus *Toxicoscordion* Rydb. as distinct from *Anticlea* Kunth, a course which results in the placing of *Z. Fremontii*, because it has a free ovary, in a genus containing species to which it obviously is not very closely related. But Jones in thus disposing of *Toxicoscordion* as a segregate of *Anticlea* (with which it should be merged) has failed to show why the latter should not be maintained distinct from true *Zigadenus*, i. e. *Z. glaberrimus*, nor has he answered Rydberg's statement (quoted above) in regard to the relationship of other genera in the *Veratreae*. Obviously the status of *Zigadenus* as a genus rests upon the value for purposes of generic distinction of the differences existing between the original species (*Z. glaberrimus*) and those referable to *Anticlea*. Rydberg's statement of these points of difference may be repeated here.

Plant with a rootstock; each petal and sepal with two glands.....	<i>Zigadenus</i> .
Plant with a bulb; each petal and sepal with a single gland.....	<i>Anticlea</i> .

In spite of the fact that Jones would dispose of these differences as but modifications in each case of a single structural phenomenon their existence as distinct and stable characters must be acknowledged and therefore they must be dealt with solely from the standpoint of their value as generic characters. Since, according to Rydberg, *Amianthium* and *Stenanthium*, *Melanthium* and *Veratrum*, genera universally maintained, are no more distinct from each other than are *Zigadenus* and *Anticlea* it becomes necessary either to show that Rydberg is wrong in this assertion or to accept *Anticlea* as a valid generic segregate. Upon first acquaintance with the above genera their differences appear, as Rydberg says "rather trifling," but further study soon discloses the fact that, in reality, they are strong. *Amianthium* and *Stenanthium*, for instance, are ordinarily distinguished simply by the perfect (in the case of the former) and the polygamous flowers. But in addition they differ widely in the arrangement of foliage and in the type of inflorescence, differences which render them quite distinct in aspect. In like manner, investigation of the characters of *Melanthium* and *Veratrum* leaves no doubt in one's mind of the distinctness of these genera which, though somewhat similar in aspect, possess at least three very distinctive characters. It appears, then, that

we do not need to "divide *Zygadenus* into at least three genera" in order to be consistent in our treatment of the *Veratreae* since the other genera of the tribe are distinguishable by much stronger characters than exist between typical *Zygadenus* and the segregate genus *Anticlea*. Finally it may be remarked that nearly, if not all, modern botanists whose work is to be taken seriously have failed to see any offence to "consistency," much less to truth, in maintaining the genus *Zygadenus* in the larger sense.

✓ *Zygadenus vaginatus* (Rydb.), comb. nov. *Anticlea vaginata* Rydb. Bull. Torr. Club xxxix. 108 (1912).

This Utah species is closely related to *Z. porrifolius* Greene. Besides the differences noted by Rydberg, mention should be made of the nearly white flowers. The statement, "This differs from the other species of *Anticlea* in its habit of growing in big clumps" is of no value if it is meant that many bulbs grow together in clusters, since I have often observed this in Idaho in the case of *Z. elegans*. A specimen from Quebec of *Z. chloranthus* (Collins, Fernald, and Pease) illustrates well this habit.

✓ *Zygadenus virescens* (HBK.), comb. nov. *Helonias virescens* HBK. Nov. Gen. & Sp. i. 267 (1816). *Z. mexicanus* (Kunth) Hemsl. Biol. Cent.-Am. Bot. iii. 382 (1885). *Anticlea virescens* (HBK.) Rydb. Bull. Torr. Club xxx. 273 (1903).

ZIGADENUS VENENOSUS Wats. *Toxicoscordion arenicola* Heller, Muhl. ii. 182 (1906), I do not believe can be distinguished from Watson's plant. *Z. micranthus* Eastw. Bull. Torr. Club xxx. 483 (1905), however, which Jones, Contrib. W. Bot. xiv. 23 (1912), considers the same as *Z. Fremontii*, var. *brevibracteatus* Jones (which he regards as "an extreme form of *elegans*") is, on the contrary, most nearly related to the entirely different *Z. venenosus* from which it is amply distinct. And Dr. Hall, in raising Jones's variety of *Z. Fremontii* to specific rank, Univ. Cal. Publ. Bot. vi. 165 (1915), has shown that its true relationship is rather with *Z. paniculatus*.

✓ *Zygadenus texensis* (Rydb.), comb. nov. *Toxicoscordion texense* Rydb. in Small, Fl. S.E.U.S. 252 (1903).

This species is closely related to *Z. venenosus* of the Pacific coast. The floral parts are different, however, in shape and size. The claws of the perianth segments are unusually fleshy.

ZIGADENUS LEIMANTHOIDES (Gray) Wats. The most cursory examination of *Tracyanthus texanus* (Bush) Small, Fl. S.E.U.S. ed. 2. 1329 (1913) would have shown, since the perianth-segments bear well-developed glands, that it is a *Zigadenus* and that it cannot be distinguished from the above species. *Z. leimanthoides* has heretofore been known only from as far west as Louisiana. Small regards this species as meriting generic rank and has proposed for it the name *Oceanoros*, basing it on two characters, the polygamous flowers and the "fibrous-coated rootstocks." Unfortunately some specimens apparently have only perfect flowers and certainly the "rootstocks" of other *Zigadeni* are more or less fibrous-coated, the degree to which this attains being purely a relative matter. The genus *Tracyanthus* Small is separated from *Amianthium* on characters which likewise are merely relative, of slight extent, and therefore by no means to be considered as of generic value.

Oakesia floridana (Chapm.), comb. nov. *Urularia floridana* Chapm. Fl. S.U.S. 487 (1860). *Oakesiella floridana* (Chapm.) Small, Fl. S.E.U.S. 272 (1903).

One of the salient features of this species does not appear to have been indicated, namely, the well-developed beak at the summit of the capsule. Harper has collected *O. floridana* in Georgia and Alabama.

Androcymbium gramineum (Cav.), comb. nov. *Melanthium gramineum* Cav. Anal. Cienc. Nat. iii. 49 (1801) & Icones Pl. Rar. vi. 64. t. 587 (1801). *A. punctatum* Baker, Journ. Linn. Soc. xvii. 445 (1879), not *Melanthium punctatum* L. Pl. Afr. Rar. 10 (1760); *A. punctatum* Baker, Gard. Chron. n. ser. i. 786 (1874), a name which must be revived to replace the more generally used but (as to specific name) later synonym *A. leucanthum* Willd. Ges. nat. Fr. Berl. Mag. ii. 22 (1808).

Tricyrtis maculata (D. Don), comb. nov. *Compsoa maculata* D. Don, Prod. Fl. Nepal. 51 (1825). *T. pilosa* Wall. Tent. Fl. Nepal. ii. 62 (1826).

In spite of the fact that Hooker, Baker and others have agreed on the identity of the plant of D. Don and that of Wallich they have failed to take up the former's name which has priority.

Tricyrtis clinata, spec. nov., erecta circa 6 dm. alta ubique mediocriter villosa; caulibus basi ad apicem plus minusve flexuosis et aequabiliter foliosissimis; foliis caulinis ovato-lanceolatis caudato-acuminatis, basi cordato-amplexicaulibus 5(-6)-nerviis

circa 15 cm. longis; floribus ut apud *T. hirtam*; ovario glabro; capsula circa 2 cm. longa 4 mm. diametro. — JAPAN: Nanokawa, Tosa, Oct. 9, 1889, *K. Watanabe* (TYPE, Gray Herb.).

This plant was distributed as *T. hirta* (Thunb.) Hook. and other collections have probably been taken for that species which is its nearest relative and to which it bears superficial resemblance. The very caudate-acuminate leaves, the nodding strictly solitary axillary flowers and the long narrow glabrous pods are the chief distinguishing features of *T. clinata*. Since Baker's revision of this genus appeared in Journ. Linn. Soc. xvii. 463-5 (1879) several species of the Orient have been proposed as new. It is noteworthy that two of these, *T. macrantha* Maxim. and *T. affinis* Makino (and its var. *albida* Makino) have come from Tosa, the type locality of *T. clinata*.

ORNITHOGLOSSUM VIRIDE (L.) Dryand., var. **undulatum** (Willd.), comb. nov. *Lichtensteinia undulata* Willd. Ges. nat. Fr. Berl. Mag. ii. 20 (1808). *O. undulatum* (Willd.) Spreng. Syst. Veg. iv. pt. 2, 143 (1827). *O. glaucum* Salisb., var. *undulatum* (Willd.) Baker, Journ. Linn. Soc. xvii. 449 (1879).

Durand and Schinz, Consp. Fl. Afr. v. 416 (1895) would maintain this plant as a distinct species. But it is connected directly with the typical form of *O. viride* by the var. *grandiflorum* Baker ex Durand & Schinz, l. c. Accordingly I think Baker's treatment of it as a variety is the correct one; but the proper specific name is not *glaucum* but *viride*, necessitating the above new varietal combination.

Clistoyucca brevifolia (Engelm.), comb. nov. *Yucca brevifolia* Engelm. Bot. King Exp. 496 (1871). *Y. Draconis*, var. *arborescens* Torr. Pacific Rail. Rep. iv. 147 (1857). *C. arborescens* (Torr.) Trelease, Rep. Mo. Bot. Gard. xiii. 41 (1902).

Ever since I first saw this species, the so-called Joshua tree, in its native habitat I have felt averse to calling it a *Yucca*. Some specimens sent by Mrs. Spencer have been the means of calling to my attention the fact that Dr. Trelease, l. c., has shown that good technical characters as well as aspect distinguish this curious plant from the true *Yuccas*. He failed, however, to take up the first specific name so I am making this necessary transfer.

CHORIZANTHE CALIFORNICA (Benth.) Gray, var. **Suksdorffii**, var. nov., foliis radicalibus obovatis vel late ovatis; internodiis valde

reductis; involucri tubo plus minusve angulato. — CALIFORNIA: among the dunes at Surf, Santa Barbara Co., June 12, 1913. *Suksdorf*, no. 146 (TYPE, Gray Herb.).

This plant is doubtless the same as one collected at Surf by Mrs. Brandegee to which Jepson, Fl. Calif. iv. 398 (1914) refers as "a singular form with somewhat angular and urceolate involueral tubes and very large bracts." The ample specimen secured by Mr. Suksdorf exhibiting the characters indicated shows the plant to be worthy at least varietal rank. Jepson, l.c., describes the involucre-tube of *C. californica* as "smooth." It is always more or less villous as in cotype material collected by Douglas.

CHENOPODIUM GLAUCUM L. *C. salinum* Standley, N. A. Fl. xxi. 29 (1916), cannot be distinguished satisfactorily. Examination of much material shows that at least two of the three characters Standley separates his species on, viz. the "dense short axillary spikes" and the "finely tuberculate seed" are, to greater or less degree, statements applicable to many specimens not only from North America but from the Old World. The other distinguishing feature Standley gives, the "sparsely villous inflorescence" is not discernable in some of the specimens in the Gray Herbarium referred to *C. salinum* by its author. In some cases the "villous hairs" can be made out but are far from obvious and furthermore a specimen from India possesses them. In fact the latter, so far as I can see, is good *C. salinum*. Standley's name, it would appear therefore, should pass into synonymy.

CHENOPODIUM FREMONTI Wats. Standley, N. A. Fl. xxi. 18 (1916), recognizes seven species in this group (*Fremontiana*), five of which are proposed by him. Two of these, *C. flabellifolium* Standley and *C. arizonicum* Standley, l. c. 19, are not represented in the Gray Herbarium. *C. incanum* (Wats.) Heller, described by Watson as a variety of *C. Fremonti*, is as well-marked as most species of this genus. Its low, much branched habit and dense inflorescence generally furnish good contrast with the tall loosely branched *C. Fremonti*. The inflorescence of the latter, however, is not always lax, as given by Standley, but is generally so. *C. Pringlei* Standley, l. c. 18, is not to be distinguished from this species. In the key to the group, l. c. 10, it is contrasted as follows:

- "Leaf-blades coarsely sinuate-dentate 20. *C. Pringlei*
 Leaf-blades entire except for the hastate, usually spreading lobes at the base 21. *C. Fremonti*."

But in the description of *C. Pringlei* we read the following modified statement of the degree of leaf-dentation: "leaf-blades . . . coarsely and irregularly sinuate-dentate or shallowly repand-dentate." This description applies nicely to Rydberg and Carleton's no. 6928 from Utah, but according to Standley, his *C. Pringlei* is confined to "hillsides, Hidalgo." Moreover, of two specimens in the Gray Herbarium labeled by Standley as *C. Pringlei* only one has "coarsely . . . sinuate-dentate" leaves and care must be taken to interpret liberally the descriptive term "coarsely." The leaves of the other specimen, also from Hidalgo, are scarcely as shallowly repand-dentate as are those of the Utah specimen of *C. Fremonti*. The next species in Standley's treatment is *C. neomexicanum* Standley, l. c. 19, which is not distinguishable from *C. paniculatum* Hook. This latter species is very closely related to *C. Fremonti* but appears to be distinct by reason of the adherent pericarp. *C. Palmeri* Standley, as its author states, has the pericarp more or less adherent to the seed and this character together with the open ample inflorescence marks the plant as probably a good species although it is known from but a single collection.

CHENOPODIUM LEPTOPHYLLUM Nutt. Three of the seven species recognized by Standley in this group are proposed as new. Only one of these, *C. pallescens* is represented at the Gray Herbarium. This is apparently a good species much resembling *C. subglabrum* but distinguished by the adherent pericarp. The latter species is well-marked by the open inflorescence and large seeds. Standley refers *C. leptophyllum* Nutt., var. *oblongifolium* Wats. Proc. Am. Acad. ix. 95 (1874) to *C. desiccatum* A. Nels. This is correct as regards the original of Watson's variety (Fendler's no. 717) but Wright's 1732 & 1733, referred by Watson to his variety, represent the broad-leaved form described by Rydberg, Bull. Torr. Club xxxix. 310 (1912), as *C. pratericola*. *C. desiccatum* is only a starved condition of the typical form of *C. leptophyllum* and should be treated, as by Watson, as a variety, or according to the ideals of the N. A. Fl. reduced to synonymy. *C. pratericola* is purely an herbarium species, the result of sorting into one pile specimens exhibiting oblong-elliptic leaves in which the three nerves near the base are more or less evident and the placing in another pile specimens with narrower leaves (rarely even linear) in which case, of

course, the lateral veins are apparently wanting or obscure. It is not surprising, I suppose, that exponents of the system should disagree as to the pile to which certain collections should be referred. For instance, Standley, in sorting the material in the Gray Herbarium has placed Bush's no. 367 and Nelson's no. 483 in the species cover of *C. leptophyllum*, although both these collections are referred to *C. pratericola* by Rydberg, i. e. Bush's plant was secured at Courtney, Mo., and he has collected a series of half a dozen specimens showing the degree of variation. Standley has labeled part of these as representing Rydberg's species and part as representing *C. leptophyllum*. With these specimens before one, the truth of the matter appears to be that all of them represent one slightly variable species.

BLITUM HASTATUM Rydb. Bull. Torr. Club xxviii. 273 (1901) is another species which Standley has maintained. But this name (*B. hastatum*) represents merely a leaf-form of *Chenopodium capitatum* (L.) Asch. (*B. capitatum*). Reference to a series of specimens will show that this plant, although usually having sinuate-dentate leaves frequently exhibits great variation in this respect, some of the leaves on a given plant being quite entire except for the hastately lobed base. When a plant has all or most of the leaves nearly entire it is *B. hastatum*. But strangely enough no European botanist has deemed this condition worthy even a varietal name although reference to almost any manual of central and southern Europe will give a description of *C. capitatum* which accounts for this variation by the statement "entire or weakly sinuate-dentate," "mostly slightly toothed" or similar phrase.

ATRIPLEX EXPANSA Wats., var. *trinervata* (Jepson), comb. nov. *A. trinervata* Jepson, Pitt. ii. 305 (1892).

Jepson, Fl. Cal. 437 (1914), reduces his species to *A. expansa*. He also gives *A. expansa*, var. *mohavensis* Jones, Contrib. W. Bot. xi. 20 (1903), as a synonym. Standley, N. A. Fl. xxi. 46-47 (1916), on the other hand, maintains Jepson's plant as a species and raises Jones's variety to specific rank. Neither of these treatments is quite satisfactory. *A. trinervata* Jepson differs from typical *A. expansa* in the repand-dentate leaves and the less united mostly sessile bracts; furthermore it replaces the typical form in central and northern California. *A. mohavensis* (Jones) Standley has the

sessile bracts of *A. trinervata* but they are united to above the middle and the leaves are entire as in true *A. expansa*. This form is most common in southern California but extends north where it meets the range of *A. trinervata*. Since these variations merge with and largely but not entirely replace *A. expansa* in California they are best treated as varieties of the latter.

ATRIPLEX CORONATA Wats. The meager but well-fruited co-type material in the Gray Herbarium of *A. sordida* Standley, N. A. Fl. xxi. 47 (1916) does not suggest that it is specifically distinct from Watson's plant.

ATRIPLEX MURICATA Humb. & Bonpl. *A. glomerata* Wats. ex Standley, l. c. 54, is not to be distinguished. It represents the form with reduced tubercles on the bracts, or these even obsolete, a variation occurring in many other species. *A. pueblensis* Standley, l. c. 56 is related to *A. muricata* but is apparently quite distinct by reason of the spicate staminate inflorescence. Standley describes the leaves as entire. Our specimen, a co-type and labeled by Standley as representing his species has some of the upper leaves distinctly denticulate.

ATRIPLEX OBOVATA Moq. Chenop. Enum. 61 (1840); DC. Prod. xiii. pt. 2, 99 (1849). *A. Greggii* Wats. Proc. Am. Acad. ix. 118. (1874). *A. sabulosa* Jones, Contrib. W. Bot. xi. 21 (1903). *A. Jonesii* Standley, N. A. Fl. xxi. 65 (1916).

Standley, l. c., distinguishes *A. Jonesii* from *A. obovata* by the "usually smooth bracts," the latter species (according to Standley) having the sides of the bracts "sparsely tuberculate or crested near the base or rarely smooth." In as much as most species exhibit this sort of variation, viz. in having the bracts either quite smooth or more or less tuberculate, one is not greatly impressed by the strength of *A. Jonesii* as a species. Furthermore *A. obovata* was originally described as having smooth bracts! As a matter of fact the species may have quite smooth and sparsely tubercled bracts on the same plant as is shown by a specimen from El Sauz, Arizona (*Hayes*) and also by one from Sonora, Mexico (*Thurber*). Standley has labeled the former as representing *A. Jonesii* and the latter as *A. obovata* although each shows approximately the same number of tubercled bracts. There is, however, a Texan specimen of this species collected by Havard the bracts of which are so copiously covered with elongate tubercles that it was determined as "*A.*

acanthocarpa Wats. ?" This extreme is so marked (none of the bracts being smooth or even approaching the short-tubercled condition of *A. obovata*) that it may be known as

ATRIPLEX OBOVATA Moq., var. **tuberala**, var. nov. Fructus utrinque copiose tuberculatus. — TEXAS: Fornillo Creek, Aug., 1883, *Harvard*, no. 103 (TYPE, Gray Herb.).

ATRIPLEX GARDNERI (Moq.) D. Dietr., var. **tridentata** (Kuntze), comb. nov. *A. tridentata* Kuntze, Rev. Gen. ii. 546 (1891). *A. pabularis* A. Nels. Bull. Torr. Club xv. 203 (1898).

This variety is often well marked, differing from the typical form in the nearly oblong leaves and triangular-cuneate usually irregularly dentate bracts. Since intermediate forms are not infrequent, however, as for instance Aven Nelson's no. 3667 from Sweetwater Co., Wyo., I am inclined to treat the plant as representing only a variety of *A. Gardneri*.

Atriplex dioica (Nutt.), comb. nov. *Kochia dioica* Nutt. Gen. i. 200 (1818). *Endolepis dioica* (Nutt.) Standley, N. A. Fl. xxi. 73 (1916).

Atriplex Covillei (Standley), comb. nov. *Endolepis Covillei* Standley, N.A. Fl. xxi. 73 (1916).

The genus *Endolepis* differs from the type species of the genus *Atriplex* only by the presence of a perianth in *all* of the pistillate flowers, this being absent in some of the pistillate flowers of true *Atriplices*. If this character is of generic value how can Standley, maintaining *Endolepis*, consistently regard species of *Atriplex* having *all* the pistillate flowers *without* a perianth as belonging to the genus *Atriplex*? Yet he follows this obviously illogical reasoning in his interpretation of the genus *Atriplex*, l. c. 33. By all means let us have another genus to care for the 101 species in North America (according to Standley's treatment) referable to neither true *Atriplex* nor *Endolepis* for exactly the same reason, as indicated above.

Atriplex spinifera, spec. nov., fruticosa ramosa; ramis valde spinescentibus; foliis superioribus (inferioribus ignotis) alternis fere sessilibus oblongo-lanceolatis obtusis circa 7 mm. longis, 3-4 mm. latis lepidoto-farinosis; floribus ignotis; bractearum theca subsessili circa 3.5 mm. lata, circa 9 mm. longa subacuta margine integra. — CALIFORNIA: Maricopa hills, Kern Co., May 15, 1913, *Eastwood*, no. 3269 (TYPE, Gray Herb.).

This plant is evidently most closely related to *A. confertifolia* (Torr.) Wats. from which it is at once distinguishable by the narrow fruiting bracts. The bracts of *A. confertifolia* are usually suborbicular. The specimen is very mature, nearly all the leaves having fallen, but apparently these are not crowded as in Torrey's plant. The branches, too, are much more spiny.

Atriplex fera (L.), comb. nov. *Spinacia fera* L. Sp. Pl. ed. 2. ii. 1456 (1763). *Obione fera* (L.) Moq. in DC. Prod. xiii. pt. 2, 107 (1849).

KOCHIA CALIFORNICA Wats. Proc. Am. Acad. xvii. 378 (1882). In the N. A. Fl. xxi. 77 (1916) the place of publication of this species is given as "Proc. Am. Acad. 9: 93. 1874." This may be disposed of as a clerical error. But another error on the same page cannot be passed over so easily. This is the maintenance of *K. vestita* (Wats.) Rydb. as a species distinct from *K. americana* Wats. Even as reference to the volumes nine and seventeen of the "Proceedings" will verify the citations listed above so reference to material of *K. americana* will show that Watson knew what he was about when he treated the more pilose specimens as representing only a variety. Doubtless, too, Watson was aware of the analogous variability displayed by the Old World species, *K. prostrata*. This plant varies from essentially glabrous to inordinately long-villous and though the extremes are much more pronounced than in the case of *K. americana* and the variety *vestita*, no one has considered them other than as constituting one variable specific unit.

Enchylaena tamariscina (Lindley), comb. nov. *Suaeda tamariscina* Lindley in Mitchel Journ. Trop. Austr. 239 (1848). *E. microphylla* Moq. DC. Prod. xiii. pt. 2, 128 (1849). *Kochia microphylla* (Moq.) F. v. Muell. Fragm. Austr. viii. 148 (1874).

Apparently this unusual plant has never been properly christened. I follow Bentham, Moquin, and Volkens in maintaining the genus *Enchylaena* distinct from *Kochia*. It is true, as noticed by Bentham and also by Volkens, that it is not very sharply defined but on the other hand its reduction to *Kochia* would necessitate, in the interests of consistency, the abandoning as well of the long-established genera *Bassia* and *Chenolea*. But in general these four genera are satisfactorily distinct and surely should be maintained.

CORISPERMUM ORIENTALE Lam. *Coriospermum villosum* Rydb. Bull. Torr. Club xxiv. 191 (1897). A sometimes well-marked

variant of this species occurs in North America. This has been described as *C. emarginatum* Rydb., the author distinguishing it from *C. villosum* by the somewhat shorter bracts and entire lack of pubescence. Since it merges with the typical form, however, and since these are characters which are known to be inconstant in most if not all Old World species it may be regarded properly as

CORISPERMUM ORIENTALE Lam., var. **emarginatum** (Rydb.), comb. nov. *Coriospermum emarginatum* Rydb. Bull. Torr. Club xxxi. 404 (1904).

Halogeton souda (Loefl.), comb. nov. *Salsola souda* Loefl. It. 132 (1758). *S. sativa* L. Sp. Pl. ed. 2. 323 (1762). *Halogeton sativus* (L.) Moq. Chenop. Monog. 158 (1840).

This plant, a native of northern Africa and, according to some authorities sometimes cultivated in Middle Europe as a *Gemüsepflanze*, apparently has never been properly christened.

Oligomeris linifolia (Vahl), comb. nov. *Reseda linifolia* Vahl in Hornem. Hort. Hafn. 501 (1815). *O. subulata* Webb, Fragm. Aethiop. 26 (1854). *Reseda subulata* Delile, Fl. Aegypt. Ill. 15 (1813), nomen nudum.

For the complete synonymy of this much named plant see Durand and Schinz, Consp. Fl. Afr. i. pt. 2, 187 (1898). They overlooked the fact, however, that *R. subulata* is a name only and that the first name accompanied by description is *R. linifolia* Vahl. The distribution of this plant is rather remarkable. Nelson and Kennedy, Muhl. viii. 138 (1908) framed the combination *Oligomeris ruderalis* (*Ellimia ruderalis* Nutt.) for a specimen from Nevada, the capsule of which "is distinctly bilobed as to each of the main lobes." I have not seen this material but specimens sent by Mrs. Spencer from the Colorado Desert, California, do not show this double lobing. Indeed I have not been able to distinguish any of the American specimens from authentic material from the Canary Islands.

Lotus Spencerae, spec. nov., perennis adpresse hirsutulus; caulibus suberectis flexuosis pumilis (circa 1 dm. longis) mediocriter divaricato-ramosissimis; foliis trifoliolatis; foliolis ovato-ellipticis minimis circa 3 mm. longis et 2.5 mm. latis; pedunculis axillaribus unifloris folio brevioribus; calycis circa 2 mm. longi dentibus linearibus tubo multo brevioribus; corolla flavo-aurantiaca circa 5 mm. longa; leguminibus junioribus arcuato-incurvis

paullo pubescentibus. — CALIFORNIA: stony slopes, Mountain Springs, Colorado Desert, March 18, 1917, *Mary F. Spencer*, no. 561 (TYPE, Gray Herb.).

This species is most nearly related to *L. Haydoni* (Orcutt) Greene which is essentially glabrous and has subequal corolla and calyx and smaller leaves. In Pitt. ii. 133–137 (1890) Greene showed the naturalness of the genus *Lotus* when considered as embracing the groups sometimes segregated as distinct genera, in *Hosackia*, *Syrmatium*, etc. When viewed in its entirety the group must be treated (if considered logically) in one of two ways. Either Greene's interpretation of the genus must be accepted or the numerous segregate genera must all be adopted, for to recognize one (as some have done in the case of *Hosackia*, for instance) will necessitate the acceptance of the others which have quite as good claim to generic recognition. It is not conceivable that any "conservative" botanist will endorse this segregation of a group which, when considered in the largest sense, forms a very natural entity.

ERODIUM CYGNORUM Nees. So far as I have been able to discover, Mrs. Spencer's specimens from San Diego (to be distributed under her number 227) furnish the first record of the introduction into the United States of this Australian species. According to Bailey this plant exhibits, in its native land, the same weedy propensity displayed by *E. cicutarium*. The question may be raised whether it will become as completely established in this country as the latter which has spread so rapidly in the last decade.

* *Fremontia mexicana* (Davidson), comb. nov. *Fremontodendron mexicanum* Davidson, Bull. So. Calif. Acad. Sci. xvi. 50 (1917).

Despite the presence in botanical literature of the name *Fremontia* for more than one group of plants, its valid use, according to Art. 50 of the International Rules, is restricted to the sterculiaceous group of which the above species is a member; for where the name elsewhere occurs it is universally regarded as a synonym. Besides co-type material (Dr. Davidson's no. 3234) there is a specimen in the Gray Herbarium bearing no data except "San Diego, Cleveland" which is to be referred to this species. As indicated by Dr. Davidson, l. c., the species is an excellent one readily distinguished from *F. californica* by the glabrous pit at the base of the sepals. In the latter species the pit is densely hairy.

LOMATIUM Raf. According to Art. 57 of the International Rules of Botanical Nomenclature, Coulter and Rose, Contrib. U.S. Nat. Herb. xii. 448 (1909), erred in following Jones's rejection of this name because of the earlier *Lomatia* R.Br. This article reads, "When the difference between two names, especially between two generic names, lies in the termination, these names are to be regarded as distinct even though differing by one letter only." *Peponia* and *Peponium* are then cited as examples and these names are obviously analogous to those we are considering. It will become necessary, therefore, to transfer a number of species referred to *Cogswellia* Spreng. (revived by Jones to replace *Lomatium*) and in the course of determinative work the following have come to my notice.

• **Lomatium millefolium** (Wats.), comb. nov. *Peucedanum millefolium* Wats. Bot. King Surv. 129 (1871). *P. Grayi* Coult. & Rose, Bot. Gaz. xiii. 209 (1888). *Cogswellia millefolia* (Wats.) Jones, Contrib. W. Bot. xii. 35 (1903).

Lomatium Chandleri (Jones), comb. nov. *Cogswellia Chandleri* Jones, Contrib. W. Bot. xiii. 11 (1910).

✓ **Lomatium Nelsonianum**, spec. nov., mediocriter robustum circa 3.5 dm. altum; foliis subradicalibus late ovatis 2.5-3 dm. longis circa 1.5 dm. latis pinnatim vel subternatim decompositis, foliolis pinnatifidis, segmentis cuneatis versus apicem argute dentatis incisisque, supra fere glabris subtus minute hispidis imprimis in nervis; foliis caulinis inferioribus similibus sed brevioribus (circa 1 dm. longis); umbellis multiradiatis; involucelli bracteis lineari-subulatis; pedicellis fructiferis minute pubescentibus; fructu fere apud *L. Donnellii* sed alis disco suboblongo paullo angustioribus; vittis in valleculis semper 3. — OREGON: dry rocky hillside near Mule Creek, Curry Co., June 21, 1917, *J. C. Nelson*, no. 1419 (TYPE, Gray Herb.).

No described species of *Lomatium* is more closely related to this one than is *L. Donnellii* Coult. & Rose which may be distinguished by its complete lack of pubescence, more narrowly winged fruits and more numerous (4-6) oil-tubes in the intervals. Moreover it seems to be confined to eastern Oregon and adjacent Idaho — a region noted for the very restricted ranges of the components of its flora. Furthermore the flora of southwestern Oregon — the region from which *L. Nelsonianum* comes — is likewise known for its endemism. Accordingly there is little doubt but that the differences that exist between these two plants are to be considered

as indicating specific values. *L. Plummerae* Coult. & Rose of northeastern California and adjacent Nevada resembles *L. Nelsonianum* in the number of oil-tubes (2-3) in the intervals but otherwise it is widely different, notably in characters of foliage. Mr. Nelson is an enthusiastic student of the flora of his state and finds time apart from his work as principal of the Salem High School to do much collecting. It is a pleasure, therefore, to have the opportunity to connect his name with this flora in which he takes so great an interest.

✓*Arctostaphylos drupacea* (Parry), comb. nov. *A. Pringlei* Parry, var. ? *drupacea* Parry, Bull. Calif. Acad. Sci. ii. 495 (1885). *Uva-ursi drupacea* (Parry) Abrams, Bull. N.Y. Bot. Gard. vi. 434 (1910).

Mrs. Spencer has secured, as her no. 500, some excellent specimens of this conspicuous shrub from the region of the type, — near Cuyamaca Lake. This Californian species is genuinely distinct from *A. Pringlei*, which is confined to Arizona, by the character of the completely consolidated stone. Indeed this is so hard that it is not breakable by any ordinary means. The fruit of *A. Pringlei* however (as shown nicely in recent specimens by Goodding) is easily separable into four nutlets by pressure between the fingers. Since recent collections substantiate the constancy of this striking character (pointed out by Parry, l. c.) and since the ranges of the shrubs with coalescent and readily separable nutlets do not meet, it seems proper to consider, as Abrams has done, N. A. Fl. xxix. 99 (1914), the two forms as distinct species. The attempt to use the words "Uva Ursi" as a generic name to replace *Arctostaphylos* is a procedure which Professor Fernald has shown clearly, Rhodora, xvi. 25-26 (1914), to be in accord with neither the International Rules nor the "American" Code.

Madhuca Hamilton ex J. F. Gmel. Syst. ii. 799 (1891). *Bassia* Koenig ex L. Mant. ii. App. 555 (1771) not *Bassia* All. Misc. Taur. iii. 177, t. 4 (1766). *Illipe* Koenig ex F. v. Muell. Select Extra-trop. Pl. Am. Ed. 181 (1884); Engler, Bot. Jahrb. xii. 509 (1890). *Vidoricum* Rumpf. ex Kuntze, Gen. Pl. ii. 407 (1891).

Engler, l. c., showed the necessity of replacing the name *Bassia* Koenig because of the earlier valid *Bassia* Allioni. He erred, however, in taking up the name *Illipe*, first published by F. von Mueller, l. c. The situation is well explained by Cooke in his Flora

of Bombay ii. 92 (1904). " In his description of *Bassia longifolia*, Linnaeus (Mantiss. p. 563) mentions that Koenig (MS.) had given *Illipe* as a name of the plant. This name (*Illipe*) is the Tamil name of the tree and Koenig evidently intended to explain that it was the *Illipe* of the inhabitants of the Malabar coast (*Illipe malabarorum*). F. von Mueller (Select Extra-Trop. pl. ed. 5, p. 181) under the mistaken notion that Koenig, notwithstanding his having already established the genus *Bassia*, had changed the name of that genus to *Illipe*, called *Bassia latifolia* by the name *Illipe latifolia*. Engler (Engl. & Prantl, Pflanzenf. v. 4, part 1, p. 133) follows Mueller in his mistake and gives the name *Illipe*, Koenig, to the genus. Koenig has nowhere published the genus as *Illipe*, and the only name possible to recognize for it is *Bassia*." Trimen in his Flora of Ceylon iii. 79 (1895) also calls attention to Engler's mistake. " This [*Illipe malabarorum*] has been recently published by Engler as if a generic and specific appellation, to which it has no sort of claim." Kuntze, l. c., makes the same point as do also King and Gamble, Flora Malayan Pen. xvii. 176 (1905). But we do not need to depend upon recent authors to explain the significance of the phrase "*Illipe malabarorum*" for Gras in 1864, Bull. Soc. Bot. France, xi. 71-85 showed its meaning in his highly interesting paper " L'histoire du genre *Bassia*." Engler makes no reference to Mueller's publication, l. c., of *Illipe latifolia* which he probably overlooked since he makes the combination as his own, Bot. Jahrb. xii. 509 (1890). He is correct, however, in his statement that *Bassia* Koenig must be replaced because of the presence of the earlier and valid *Bassia* Allioni, l. c. This is in accord with the International Rules, Art. 51.2. And there is no question as to the validity of the publication (accord. to Int. Rules, Art. 37, 38) of Allioni's genus since there is not only an excellent description but also a good plate showing the plant and the floral parts. Since, as shown above, *Illipe* was not published until by F. von Mueller, l. c., the first available name for the group of plants known as *Bassia* Koenig is *Madhuca* Hamilton ex J. F. Gmel., l. c. About thirty species are known, the following being represented in the Gray Herbarium or in the herbarium of the Arnold Arboretum.

Madhuca longifolia (L.), comb. nov. *Bassia longifolia* L. Mant. 563 (1771). *M. indica* J. F. Gmel. Syst. 799 (1791). *Illipe Malabarorum* Koenig ex Engler, Bot. Jahrb. xii. 509 (1890).

Madhuca obovata (Forst. f.), comb. nov. *Bassia obovata* Forst. f. Prod. 35 (1786).

Madhuca latifolia (Roxb.), comb. nov. *Bassia latifolia* Roxb. Pl. Cor. 20, pl. 19 (1795). *Illipe latifolia* F. von Muell. Select Extra-trop. Pl. Am. Ed. 181 (1884).

Madhuca butyracea (Roxb.), comb. nov. *Bassia butyracea* Roxb. As. Res. viii. 477 (1805). *Illipe butyracea* Engler, l. c.

Madhuca cuneata (Blume), comb. nov. *Bassia cuneata* Blume, Bijdr. 675 (1825). *Illipe cuneata* Engler, l. c.

Madhuca fulva (Thwaites), comb. nov. *Dasyaulus fulvus* Thwaites, Enum. Pl. Zeyl. 176 (1860). *Bassia fulva* Thwaites ex Bedd. Forest. Man. Bot. 140 (1873). *Illipe fulva* Engler, l. c.

Madhuca Motleyana (de Vriese), comb. nov. *Isonandra Motleyana* de Vriese, Natumk. Tijdschr. Neerl. Ind. xxi. 308. 1860, & Miq. Journ. Bot. Neerl. i. 257 (1861). *Bassia Mottleyana* Clarke, Hook. f. Fl. Br. Ind. iii. 546 (1882). *Illipe Mottleyana* Engler, l. c.

Madhuca amicorum (Gray), comb. nov. *Bassia amicorum* Gray, Proc. Am. Acad. v. 327 (1862).

Madhuca betis (Blanco), comb. nov. *Azaola betis* Blanco, Fl. Filip. ed. 1. 402 (1837). *Illipe betis* Merrill, Forest. Bureau Philipp. Bull. i. 46 (1903).

Madhuca multiflora (Merrill), comb. nov. *Illipe multiflora* Merrill, Philipp. Gov. Lab. Bur. Bull. xvii. 41 (1904).

✓ **MERTENSIA OBLONGIFOLIA** (Nutt.) G. Don, var. **nimbata**, var. nov., foliis utrinque pubescentibus. — MONTANA: Bozeman, May 18, 1893, *Camilla Gottschalck* (TYPE, Gray Herb.).

The discovery of a plant of this species which has the leaves pubescent on both sides instead of only on the upper surface makes eleven species, or approximately one-third of the known species of North America, which exhibit this sort of variation. The character, though trifling, is always obvious and may be noted in classification as a variety.

✓ **PHACELIA CALIFORNICA** Cham., f. **immunda**, f. nov., f. *egenae* peraffinis sed plus minusve glandulosa. — OREGON: dry rocky ridge, Agness, Curry Co., June 23, 1917, *J. C. Nelson*, no. 1470 (TYPE, Gray Herb.).

Except for the glandulosity this plant might be referred to forma *egena* which has been secured by Heller (no. 7993) in adjacent California.

Lycium Spencerae, spec. nov., frutex mediocriter ramosus fere inermis; ramis gracilibus in spinos terminantibus; foliis lineari-oblongatis circa 15 mm. longis 2.5 mm. latis minute pubescenti-

bus; floribus sessilibus; calyce glabro campanulato circa 4 mm. longo lobis brevibus ovatis acutis; corolla late campanulata circa 5 mm. longa lobis latis erectis; staminibus styloque inclusis, filamentis glabris; baecca ignota. — CALIFORNIA: summit El Cajon Pass, San Bernardino Co., May 12, 1917, Mrs. Mary F. Spencer, no. 366 (TYPE, Gray Herb.).

The short campanulate calyx and corolla are characters which definitely ally this species to *L. californicum*. The latter plant, however, has small thick glabrous leaves and is of totally different habit, being a very spinescent much branched shrub. *L. Spencerae*, on the other hand, produces simple elongate flowering branches spinescent only at the tip and thickly clothed with long narrow leaves.

Terracciano's revision of *Lycium* in *Malpighia* iv. 472-540 (1891) is scarcely to be taken seriously. His conception of "species" and "variety" is so extreme that his work is of little value except as indicating the grouping of the described forms. The species in the genus are numerous and certainly closely related but apparently they do not often intergrade and may be distinguished rather easily by Dr. Gray's treatment in the *Flora of California* and in the *Proc. Am. Acad.* vi. 45. Therefore, in following Dr. Gray's interpretation of specific limitations here I have been compelled to consider the above plant as a species amply distinct from its nearest relative, *L. californicum*, and in assigning to it the name *L. Spencerae* I have accorded well-merited recognition to an enthusiastic and discriminating collector.

* *Cirsium praeteriens*, spec. nov., ut videtur validum et 1 m. altum; caulibus superne foliosissimis parce arachnoideis: foliis valde spinescentibus caulinis oblongo-lanceolatis 1.5-2 dm. longis supra viridibus et fere glabris subtus lanuginoso-tomentosis subpinnatifidis, laciniis brevibus saepius trilobis lobis triangulari-lanceolatis spina circa 5 mm. longa terminatis: foliis superioribus similibus sed brevioribus; capitulis sessilibus folioso-bracteatis 3-5 aggregatis vel rare solitariis circa 5 cm. altis; involuero campanulato circa 3 cm. alto; squamis subimbricatis exterioribus arachnoideis erectis spinescentibus margine minute et parce ciliatis, interioribus similibus sed vix rigidis et margine dense papilloso-ciliatis; corolla albida fere 3.5 cm. longa lobis circa 7 mm. longis quam limbus paulum brevioribus; pappo paulo sordido. — CALIFORNIA: Palo Alto, July 19, 1897, Congdon, no. 6 (TYPE, Gray Herb.); also July 7, 1901.

It seems remarkable that this splendid thistle should have escaped notice so long since it grows at the very door, so to speak, of one of the principal herbaria of the Pacific coast. An explanation may be had, however, from the fact that the identity of two species in the *C. edule* group (to which *C. praeteriens* belongs) has been obscure. *C. Andrewsii* (Gray) Jepson was described from a meager specimen showing only an upper branch. When Professor Jepson included it in his *Flora of W. Middle Cal.* ed. 1, 506, (1901) he referred to it a specimen collected by Miss Eastwood from Tennessee Bay with the note "(apparently also at Lake Merced) and distributed by her as *Carduus amplifolius* Greene." In the second edition, p. 423 (1911), Tennessee Bay is still given as the only known locality and no mention is made of Greene's *amplifolius*. I have compared Miss Eastwood's specimens with the type of *C. Andrewsii* and there is no doubt that they are referable to that species; and since they agree precisely with the description of *Carduus amplifolius* Greene, Bot. San F. Bay Reg. 217 (1894) I have no hesitancy in regarding this name as a synonym. It may be noted that Miss Eastwood's material is fine, consisting of several sheets which show the entire plant. A distinctive character of *C. Andrewsii* is the great reduction of the upper leaves. These are broadly ovate in outline and, as described by Dr. Gray, lacinate-pinnatifid. The lower cauline leaves are well-described by Greene, l. c. *C. praeteriens* is nearest this species but is at once distinguished by reason of its comparatively narrow inordinately spinose leaves which are scarcely reduced upward and retain to the heads their oblong outline. The narrow rigid lobes of the leaves are very different from the broad soft overlapping lobes that characterize *C. Andrewsii*. The flowers of the latter are not "whitish" but roseate (as is still evident even in the type) and the heads are smaller (3-4 cm.) than those of *C. praeteriens*. Only two other species of this group, characterized by leafy-bracted heads, are known from the vicinity of San Francisco, viz. *C. edule* and *C. crassicaule* and these are obviously very different from our plant. *C. crassicaule* was first collected by Dr. Kellogg in April, 1868 or 1869 and was cited by Dr. Gray, Proc. Am. Acad. x. 41 (1875) as representing his new species *Cnicus quercetorum*. He based this species, however, upon an Oakland specimen collected by Bolander and this is to be taken as the type since his description was evidently drawn from that material rather

than Kellogg's. He also cites the Bolander specimen first. Moreover, in the Fl. of Cal. i. 418 (1876), having noticed the leafy-bracted heads of Kellogg's plant he appended a note to that effect and suggested ecological conditions as a probable cause. Of course it is now well-known that the character of leafy bracts beneath the heads is constant and of specific value. Professor Jepson, Fl. W. Middle Cal. ed. 2, 423 (1911) has indicated the glabrous (in age) involucre as a means of distinguishing this species (*C. crassicaule*) from *C. Andrewsii* but the elongate upper leaves also furnish a means of separation. The former character distinguishes it also from *C. praeteriens*, which it resembles in its elongate upper leaves but these have the broad ample lobes of the leaves of *C. Andrewsii*. The broadly ovate proper bracts resemble most those of *C. quercetorum*, so it is not very surprising that Dr. Gray referred (although doubtfully) Kellogg's rather meager specimen to that species.

In recognizing the genus *Cirsium* as distinct from *Carduus* I am following Bentham, Gray, Hoffmann, Petrak and many others. It is rather singular that the recognition of this genus has not come more readily in this country. It was accepted in Gray's New Manual, however, and I feel it will be taken up generally as soon as it is realized that the weight of authority in the botanical world is for its recognition. I am taking this opportunity to transfer two beautiful species with which I am very familiar in the field. The first forms an important component of the midsummer flora of the Laramie Plains and the second is characteristic of wet saline flats at low altitudes in central and western southern Idaho. It is truly a magnificent plant growing often as high as five feet and coloring gorgeously, both as to stem and bracts, toward maturity. The cobwebby pubescence of the bracts glistening in the sun accentuates their beauty. In emphasizing the attractiveness of this species I have had in mind *Cirsium foliosum* (Hook.) DC. which it resembles too closely in the herbarium and from which it is mainly distinct by characters of habit and habitat. *C. foliosum*, however, is a comparatively low plant, smaller in all its parts and an inhabitant of non-saline grasslands. It is not uncommon, either, in Idaho but the collector would never confuse it with *C. magnificum*.

Cirsium Nelsoni (Pammel), comb. nov. *Cnicus Nelsoni* Pammel, Proc. Iowa Acad. Sci. viii. 235 (1901). *Carduus Nelsonii*

Pammel acc. to A. Nels. in Coulter & Nelson, Man. Bot. Rocky Mts. 586 (1909).

Cirsium magnificum (A. Nels.), comb. nov. *Carduus magnificus* A. Nels. Bot. Gaz. liii. 228 (1912).

CIRSIUM DRUMMONDII T. & G., var. *acaulescens* (Gray), comb. nov. *Cnicus Drummondii* T. & G., var. *acaulescens* Gray, Proc. Am. Acad. x. 40 (1874). *Carduus Drummondii acaulescens* (Gray) Cov. Contrib. U. S. Nat. Herb. iv. 142 (1893).

This curious form of the species, well represented by Mrs. Spencer's no. 474 from San Diego County, not infrequently grows with the typical state in Idaho, and, according to Hall, Univ. Cal. Publ. Bot. iii. 238 (1907) also in California.

CIRSIUM OCCIDENTALE (Nutt.) Jepson, var. *candidissimum* (Greene), comb. nov. *Carduus candidissimus* Greene, Proc. Phil. Acad. 1892. 359 (1893). *C. occidentalis* Nutt., var. *candidissimus* (Greene) Hall, Univ. Cal. Publ. Bot. iii. 240 (1907).

This handsome variant of the typical form of the species has been secured in Curry County, Oregon, by Professor J. C. Nelson (his number 1518). Dr. Hall, l. c., has shown that the plant is to be considered only as a variety of true *C. occidentale* since intermediate forms are frequently met with.

STEPHANOMERIA EXIGUA Nutt., var. *Deanei*, var. nov., ramis intricato-ramosissimis plus minusve glandulosis. — CALIFORNIA: Sweetwater Valley, San Diego Co., July 23, 1888, *Geo. C. Deane* (TYPE, Gray Herb.); sandy valley-bottoms, San Diego, Oct. 20, 1916, *Mary F. Spencer*, no. 293.

This is the plant to which Hall refers, Univ. Cal. Publ. Bot. iii. 260 (1907), as follows: "The common form [of *S. exigua*] in southwestern San Diego Co. is intricately branched, the twigs very slender, the herbage conspicuously glandular, and the pappus that of the *S. coronaria* form. It apparently grades into *S. exigua* as regards all of these characters." Nevertheless it would seem to merit recognition as a variety since its glandulosity is so striking a character and since it so largely if not quite replaces in San Diego County the typical form. It is a pleasure to connect the name *Deane* with the flora of the region, the collector of this plant having secured many specimens for his brother, the enthusiastic New England botanist, Walter Deane, whose long interest in taxonomy has been so appropriately remembered by Coulter and Rose in the genus *Deanea*.

II. FURTHER NEW OR NOTEWORTHY COMPOSITAE

BY S. F. BLAKE

APHANOSTEPHUS **Kidderi** Blake, sp. nov. Herbaceus ramosus ut videtur adscendens 1.5 dm. longus et ultra, basi invisus. Caulis angulatus obscure viridis dense breviterque hispido-pilosus. Folia alterna obovata vel ovata obtusa vel acutiusecula in petiolum marginatum angustata saepius supra medium serrata (dentibus 1-2-jugis triangularibus acutis) vel suprema integra obscure pennivenia (venis ca. 3-jugis) utrinque obscure viridia et subdense hispido-pilosa (pilis incurvis basi obscure tuberculatis) 1.2-1.5 cm. longa (petiolo marginato 3-5 mm. longo incluso) 5-6.5 mm. lata. Capitula ca. 1.4 cm. lata, in pedunculis subdense hispido-pilosis nudis usque ad 3.5 cm. longis insidentia; discus ca. 4.5 mm. altus. Involucri 4.5 mm. alti phyllaria 3-seriata gradata lanceolata acuminata subherbacea anguste scarioso-marginata hispido-pilosa 1-vittata. Radii ca. 24 (albi ?), lamina subglabra 5-nervia ca. 6 mm. longa 2 mm. lata, tubo deorsum ampliato apice sparsissime subglochidiato-piloso deorsum demum indurato-incrassato ca. 1.2 mm. longo; corollae disci flavidae ad medium sparse pubescentes pilis subcapitatis, tubo demum indurato-incrassato, faucibus paene ad medium vasiculari-cellulosis, venis conspicuis, dentibus in dorso apicali papilloso-cristatis 2.5 mm. longae (tubo 0.8 mm., dentibus 0.4 mm. longis). Achenia utroque subtruncata pilis glochidiatis munita 1.2 mm. longa ca. 0.7 mm. diametro. Pappus persistens paleaceus, paleis ca. 10 liberis sub-2-seriatis lineari-lanceolatis acuminatis paullum inaequalibus infra medium paullum ampliatis spinulosis, in flor. ♀ 1.3 mm. longus, in flor. ♂ 1.7 mm. — TEXAS: San Antonio to Laredo, 26 Mar. 1885, N. T. Kidder (TYPE in Gray Herb.). — TAB. 1. FIG. 1-7.

The present plant furnishes yet another illustration of the exceedingly artificial character of the subtribes of the *Astereae*. Technically it would fall at once into the *Asterinae* (*Heterochromaeae*) because of its well developed pappus and heterochromous rays. In that group it keys down to *Townsendia*, from which it is abundantly distinct in its toothed leaves, thick achenes, fewer broader pappus-scales, and short style-tips. It shows no likeness to any other member of that subtribe. In every feature except that of

pappus, however, the plant agrees perfectly with *Aphanostephus* of the *Bellidinae*. In this genus the pappus is reduced, in all the hitherto known forms except one, to a more or less obscure ring or cup ciliolate or fimbriate on the margin. From these normal members of the genus *A. Kidderi* presents such a strong technical difference in its well-developed pappus that its recognition as a distinct genus in another subtribe from *Aphanostephus* (*Asterinae*) might be plausibly supported, in view of the somewhat artificial nature of the distinctive characters now current for generic and higher groups in the *Astereae*. However, in the plant above referred to, *A. skirrhobasis* var. *Hallii*,¹ a pappus occurs precisely intermediate in character between the ciliolate or fimbriate cup of typical *Aphanostephus* and the well-developed sub-2-seriate circle of 10 paleae found in *A. Kidderi*. In *A. skirrhobasis* var. *Hallii* the cup which crowns the achene is continued upward into some 10 triangular to lanceolate spinulose-ciliolate scales which may be as much as 0.5 mm. long, in a single series and connate only for a short distance at base. The existence of this rare variety makes it clear that the recognition of *Aphanostephus Kidderi* as of independent generic rank is not advisable. It may, however, be taken to typify a subgenus **Pappophanus**: acheniis et radii et disci pappo e aristas 10 paleaceis sistente praeditis. The other species of *Aphanostephus*, with *A. ramosissimus* DC. as type, will form the subgenus **Euaphanostephus**: acheniis cupula ciliolata vel fimbriolata rare in aristas 10 breves lanceolatas producta praeditis.

I have much pleasure in dedicating the species to Mr. Nathaniel T. Kidder, who discovered the plant many years ago while on a collecting trip in the Western States in company with Mr. C. S. Sargent and Mr. C. E. Faxon. As the data accompanying the specimens in the Gray Herbarium reads only "San Antonio to Laredo, 26 Mch. 1885," Mr. Kidder has supplied the following extracts from his journal which serve to determine somewhat more closely the habitat of the plant. "Thurs: 26 Mch. '85. San Antonio, Texas. Warm and cloudy. S(argent) and I up at 8 A.M. for Laredo, while F. (C. E. Faxon) stays here to collect a few more things.

¹ APHANOSTEPHUS SKIRRHOBASIS (DC.) Trel. var. *Hallii* (Gray) Blake, comb. nov. — *A. arkansanus* (DC.) Gray var. *Hallii* Gray! Syn. Fl. i. pt. 2. 164 (1884).

"The engine broke down about 9.30 and we had a fair chance to prowl about the country in a rather fine place; along the river bottom. . . . (Arrived at) Cotula 2.30 . . . Reached Laredo about 6. . . . Took a stroll before sunset and got a few things of one sort and another."

Mr. Kidder adds: "I should say that, without much doubt, the particular specimen was collected while the engine was out of commission. Of course I cannot be certain." This would indicate that the plant was probably collected in Frio County, and perhaps along the Frio River. Collectors in that region should endeavor to rediscover the species.

Hinterhubera ericoides Klatt ! Bot. Jahrb. viii. 37 (1886), not Wedd. — *Lehmann* 401, from Colombia, recorded as *Hinterhubera ericoides* by Klatt, is *ALCHEMILLA NIVALIS* HBK. !

Hinterhubera Laseguei Klatt ! Bull. Soc. Bot. Belg. xxxi. pt. 1. 197 (1892), not Wedd. — *Pittier* 3431, from Costa Rica, recorded as *Hinterhubera Laseguei* by Klatt, is likewise an *Alchemilla*, and is in fact the type number of *ALCHEMILLA OCREATA* J. D. Sm. Bot. Gaz. xxiii. 7 (1897).

DIPLOSTEPHIUM denticulatum Blake, sp. nov. Frutex caule crassiusculo striato cortice fusco-griseo sordide tomentuloso tardatim glabrato tecto, ramis hornotinis dense sordideque tomentulosis. Folia alterna ad apices ramorum subconferta elliptico-oblonga vel -obovata apice obtusa vel acutiusecula mucronulata basi acute et saepius oblique cuneata pergamentacea (non coriacea) supra medium denticulata (dentibus ca. 4-jugis brevibus calloso-mucronulatis) supra pallide (vel sicc. obscuranter) viridia glabra obscure reticulata subtus ochraceo- vel actate canescenti-tomentulosa reticulata (venis lateralibus 7-9-jugis) 3.5-6 cm. longa 1.4-2.5 cm. lata; petioli dense tomentulosi 6-10 mm. longi. Paniculae terminales ad 25-capitatae deltoideo-pyramidales vel ovoideo-pyramidales 2.3-3.5 cm. longae lataeque (pedunculo 5-7 mm. longo incluso); pedicelli ultimi 4 mm. longi vel breviores tomentulosi; bractee (eis infimis usque ad 2.5 cm. longis exceptis) parvae vel minimae. Capitula radiata ca. 12 mm. lata; discus 6 mm. altus ad 8 mm. diametro. Involucri 5-seriati gradati 5 mm. alti plus minusve tomentulosi deinde subglabrati phyllaria extima ovata media ovato-lanceolata intima lanceolata omnia ad apicem plus minusve acuminata subcoriacea, apice supremo obtusiuscula.

Receptaculum nudum alveolatum. Radii ♀ ca. 13 lineares saepius inaequaliter 3-denticulati vel -dentati, lamina 2 mm. longa 0.5 mm. lata; corollae disci ♂ infra sparse glandulari-pubescentes 4 mm. longae (tubo ca. 1 mm. longo). Achenia (valde immatura) prismatica in angulis pubescentia pilis brevibus clavatis subglandularibus 1.8 mm. longa. Pappi 3.8 mm. longi sordide brunnei setae longiores ca. 20 antrorsum spinulosae ad apicem saepius parum dilatatae, breviores ca. 10 ca. 2 mm. longae. — COLOMBIA: Guadalupe, 3000 m., July 1911, *Bros. Apollinaire & Arthur* 11 (TYPE in Gray Herb.). — Distinguished by its comparatively large and finely denticulate not coriaceous leaves.

STEIRACTINIA KLATTII (Rob. & Greenm.) Blake, Contr. Gray Herb. N. S. no. 52. 49 (1917). — *Perymenium Klattii* Rob. & Greenm. ! Proc. Am. Acad. xxxiv. 528 (1899). *Aspilia Lehmannii* Hieron. ! Bot. Jahrb. xxviii. 605 (1901), in part. — Hieronymus's *Aspilia Lehmannii* was based on *Lehmann* 3282 and *Triana* 1363 & 1365, the first of which is here selected as type. *Lehmann* 3282 is also the type of *Perymenium Klattii* Rob. & Greenm. Hieronymus noted the neutral rays of the species, but referred it to *Aspilia* with which it has no special relationship. Of the other two numbers cited by Hieronymus, *Triana* 1363 is type of *Steiractinia Trianae* Blake, Journ. Bot. liii. 156 (1915), and *Triana* 1365 the type of *S. oyedaeoides* Blake l. c. Both are quite distinct specifically from *S. Klattii*.

STEIRACTINIA **Sodiroi** (Hieron.) Blake, comb. nov. — *Aspilia Sodiroi* Hieron. in Sodiro, Bot. Jahrb. xxix. 38 (1900); l. c. xxviii. 607 (1901). *Steiractinia grandiceps* Blake ! Journ. Bot. liii. 157. t. 539. f. 9 (1915). — *Aspilia Sodiroi* Hieron., of which I have not seen the type, is from character identical with my *Steiractinia grandiceps*; moreover *Triana* 1364, type of the latter species, has been referred to *A. Sodiroi* by Hieronymus (l. c. 1901).

VERBESINA (*Saubinetia*) **Arthurii** Blake, sp. nov. Frutex. Rami seniores striatuli glabrati cortice ochraceo-griseo tecti, hornotini fusco-grisei striati dense hispido-pilosi pilis retrorsis vel laxe patentibus sordidis pluriloculatis basi ampliatis et subglandulosis. Folia alterna oblonga vel ovali-obovata apice obtusa vel acutiuscula mucronulata basi acute cuneata subintegra vel obscure serrulata sicc. chartacea supra parum scabra pilis basi tuberculatis incurvis vel subpatentibus aetate deciduis lepidota subtus paullum

pallidius viridia subsparse hispido-pilosa pilis patentibus basi tuberculatis 3.3–5.5 cm. longa 1.5–2.7 cm. lata; petioli immarginati basi non auriculati hispido-pilosi 2–4 mm. longi. Capitula per 4–8 in apicibus ramorum irregulariter paniculata; bractee anguste lanceolatae saepius 8–10 mm. longae; pedicelli ut pedunculus brevis dense sordideque hispido-pilosi 0.8–2 cm. longi ad apicem saepius parum clavati. Capitula radiata ca. 1.8 cm. lata; discus 7–(fructu)10 mm. altus 7–(fructu)12 mm. diametro. Involucri 2-seriati parum gradati 5–6 mm. alti phyllaria oblongo-lanceolata apice calloso-mucronulato obtusiuscula subherbacea nigrescenti-viridia subdense patenterque hispido-pilosa. Radii 6–8 late elliptici leviter emarginati fertiles ut videtur albidus (?), lamina 7.5 mm. longa 4.5 mm. lata, tubo piloso 2 mm. longo; corollae disci ca. 40 albae (?) 4.5 mm. longae, tubulo 1 mm. longo supra basin ampliata contracto piloso, faucibus anguste infundibuliformibus 2.5 mm. longis in nervis sparse pilosis, dentibus triangulari-ovatis 1 mm. longis. Paleae acutiuseulae supra nigrescenti-virides in dorso hispido-pilosae 7 mm. longae. Achenia plane compressa nigrescentia in latere sparse strigillosa 4.2 mm. longa 1.5 mm. lata angustissime alata, alis ciliolatis basibus aristarum 2 inaequalium ca. 2 mm. longarum adnatis. — COLOMBIA: Guadalupe, 3000 m., Nov. 1911, *Bros. Apollinaire & Arthur* 60 (TYPE in Gray Herb.). — To be inserted next to *V. sordescens* DC.

LIABUM HASTIFOLIUM Poepp. & Endl. Nov. Gen. iii. 43 (1845). — To the synonymy of this well-known species may be added *Heterotheca deltoidea* Klatt ! Ann. Naturh. Hofmus. Wien ix. 358 (1894). Fragments of the type of this species (*D'Orbigny* 466, Yungas, "Peru") are now in the Gray Herbarium and differ in no respect from specimens of *Liabum hastifolium*.

LIABUM hypochlorum Blake, sp. nov. Frutex 2 m. altus infra inflorescentiam vix ramosus. Caulis validus juventate fusco-brunneus dense glanduloso-adpersus et sparse sublanateque sordido-pilosus aetate glabratus vel subglabratus olivaceo-brunneus. Folia opposita triangulari-ovata breviter acuminata basi latissime rotundata et abrupte breviterque in petiolum angustata obscurissime denticulata (dentibus minutis mucronulatis interdum intramarginalibus!) subchartaceo-membranacea supra viridia glabra (costa venisque obscure glandulari-puberulis exceptis) subtus vix

pallidius viridia dense glanduloso-adspersa in costa et venulis sparse sordideque appresso-pilosa et -puberula triplinervia et infra parum reticulato-venosa 11–13 cm. longa 8–11.6 cm. lata, in petiolis immarginatis (apice excepto) supra canaliculatis glandulari-puberulis et parum sublanato-pilosis pilis subdeciduis 2.5–3.5 cm. longis; ea inflorescentiae minora. Panicula composita pyramidalis obtusa 1.5 dm. longa 1.8 dm. diametro folioso-bracteata, ramis patentibus; pedicelli ultimi 2–8 mm. longi dense sordideque glandulari-puberuli saepius nudi. Capitula numerosa turbinato-campanulata 1 cm. alta 8 mm. diametro radiata 15-flora. Involucri sub-4-seriati gradati 4.5 mm. alti phyllaria lanceolata acuminata (intimis apice obtusiusculis) herbaceo-membranacea nigrescenti-viridia ad apicem pallidiora appressa basi parum costata subdense sordideque glandulari-puberula et -pilosa. Receptaculum fimbriato-alveolatum. Corollae radii 5 ligulatae angustae aurantiaco-flavae fertiles apice tridenticulatae discum subaequantes (immaturae); eae disci 10 aurantiaco-flavae glabrae 8 mm. longae, tubulo vix e faucibus distincto. Achenium (immaturum) crasse subturbinatum 5-angulatum sparse puberulum 1.2 mm. longum. Pappus sordidus irregularis 7 mm. longus (immaturus), setis breviter barbellatis, exterioribus brevissimis. Stylus flor. ♂ basi nectario conspicuo cinctus; rami elongati obtusi dorso hispiduli. Stamina basi obtuse cordato-sagittata, apice appendicibus ovali-ovatis truncato-rotundatis praedita. — GUATEMALA: wet places, San Felipe, Retalhuleu, 13 Jan. 1917, *Holway* 703 (TYPE in Gray Herb.). — Perhaps nearest to *L. discolor* (H. & A.) Hemsl., which has leaves whitened beneath and a different involucre. The very imperfectly known *L. Liebmannii* Klatt, represented in the Gray Herbarium by a fragment of the inflorescence from the type, seems also to be nearly allied.

GYNOXYS boliviana (Klatt) Blake, comb. nov. — *Liabum bolivianum* Klatt ! Ann. Naturh. Hofmus. Wien ix. 362 (1894). — Fragments of the type of *Liabum bolivianum* Klatt, collected by *Cuming* in Bolivia, are now in the Gray Herbarium, accompanied by a good sketch, and show the plant to have the 1-seriate involucre and distinctive style-tips of *Gynoxys*. The species is close to *G. psilophylla* Klatt, but apparently distinct in involucre characters.

✓ **CIRSIIUM acanthodontum** Blake, sp. nov. Planta ut videtur elata, basi invisā; caulis tenuis sparse foliosus supra erecte ramosus

valde angulatus pallide viridis vix dense floccoso-lanatus et infra patenti-pilosus pilis pluriloculatis. Folia inferiora (vel ima ?) lanceolato-ovata acuta paene ad basin petioli longissime acuminata per $\frac{3}{4}$ latit. lobata lobis 3-4-jugis acute ca. 3-lobis vel bifurcatis, ad apicem integriuscula, tenuia membranacea supra viridia in costa sparse pilosa pilis pluriloculatis ceterum subglabra infra incane tenuiterque lanato-pilosa in margine spinis patentibus debilibus armata 15 cm. longa 8 cm. lata, petiolo usque ad basin marginato 12 cm. longo; media similia petiolo latius foliaceo-marginato (usque ad 4.5 cm. lato) valde amplectentia; superiora integra lanceolata vel oblongo-lanceolata sessilia valde amplectentia 10-16.5 cm. longa 2.5-4.5 cm. lata. Capitula pauca axillaria et terminalia campanulata 2.5-2.7 cm. alta 2.2-2.7 cm. diametro (stylis exclusis), in pedunculis 1-5-bracteatis usque ad 2.3 dm. longis solitaria. Involucri 1.8-2 cm. alti basi paullum lanati phyllaria distincte biformia: exteriora ca. 6-seriata subaequalis 1.2-1.5 cm. longa lineari-lanceolata herbacea saturate viridia spinoso-mucronata (mucrone 1.5-2 mm. longo) in margine angustissime crustaceo-marginato spinoso-dentata (dentibus ca. 15-jugis 0.4-1.2 mm. longis, inferioribus sensim brevioribus, patentibus vel adscendentibus rare retrorsis) in medio dorso linea angusta non glandulifera praedita; interiora ca. 4-seriata paullum gradata linear-lanceolata acuta laete viridia herbacea apice lanceolato scarioiso nigrescente praedita; intima breviter spinoso-mucronata, linea nigrescenti-viridi media excepta dense sessili-glandularia et glandulari-spinuloso-ciliata. Receptaculum dense setosum. Corollae purpureae glabrae 2.2 cm. longae (tubo 9.5 mm., dentibus 5 mm. longis). Achenia (immatura) glabra compressa 2.5 mm. longa. Pappi 1.6 cm. longi albidi pluriseriati setae longe plumosae. Filamenta libera papilloso-pilosa. — OREGON: dry rocky soil, 6.4 km. north of Agness, Curry Co., 25 June 1917, *J. C. Nelson* 1503 (TYPE in Gray Herb.). — Among American species this plant finds its nearest ally in *C. Parryi* (Gray) Petrak, which has, at least in some specimens, the same type of involucre but differs entirely in shape and pubescence of the leaves, color of flowers, etc. Although so many European plants have become introduced on the Northwest Coast, it seems improbable that the present plant is one of these since the county in which it was collected is, as I am informed by Mr. J. F. Macbride, entirely without railroads or factories, and

the chance of its belonging to one of the many species or hybrids recently described from the Old World and not represented in the Gray Herbarium would seem to be reduced to a minimum.

III. NEW SPERMATOPHYTES COLLECTED IN VENEZUELA AND CURAÇAO BY MESSRS. CURRAN & HAMAN

BY S. F. BLAKE

THE new species described in this paper form part of a collection made for the Gray Herbarium in the spring and summer of 1917 by Mr. H. M. Curran, tropical forester, and his assistant, Mr. Miles Haman of Cornell University, on the Island of Curaçao and in the coastal region of Venezuela. Mr. Curran has supplied the following notes on the area of his explorations. "My collections cover the coast region of Venezuela from Lake Maracaibo to the Pedernales mouth of the Orinoco. Mr. Haman made a short trip to the south of the Lake in the vicinity of the railroad which goes to Cucuta. We also collected about Caracas. With these exceptions our collections were in the arid scrubby cactus and thorn forests of the coast." It may be added that Mr. Curran's collecting was confined almost entirely to woody plants, very few herbaceous species being represented.

RUPRECHTIA (*Euruprechtia*) **Curranii** Blake, sp. nov. Arbor dioica valde ramosa. Ramuli crassi teretes lenticellati rugosi glabri cortice canescente tecti, novelli pallidi glabri. Folia alterna obovata vel ovali-obovata subobtusa vel breviter acutata basi cuneata integra parum repanda crasso-chartacea obscure viridia pennivenia (venis majoribus 9-10-jugis conspicuis, ceteris obscuris) supra tenuiter reticulata venis et venulis etiam minimis paullum prominentibus subtus vix pallidiora reticulata venis parum curvatis apice inter se anastomosantibus parum prominentibus venulis vix vel omnino non prominentibus utrinque glabra saepius 4.5-7.7 cm. longa 1.8-3.9 cm. lata; petioli glabri pallidi 2-5 mm. longi; ochreae strigosae persistentes ad 0.6 mm. longae. Spicae (♂ tantum visae) axillares 2-4 in fasciculis dense breviterque strigosae 3-3.5 cm. longae; pedicelli ad 3 mm. longi hispiduli prope medium articulati. Flor. ♂: perianthium 1.8-2 mm. longum sparse pubescens paene

ad basin 6-partitum, segmentis ovatis vel oblongo-ovatis obtusis; stamina 8, filamentis ad 2.5 mm. longis; ovarii rudimentum hispido-pilosum. — CURAÇAO: Hofje Abau, near Mt. Christoffelberg, 26–27 Feb. 1917, *H. M. Curran* 189 (TYPE in Gray Herb.). — Although only the staminate flowers of this plant are known, it seems sufficiently distinct in foliar characters to justify its description as a new species. It is perhaps nearest to *R. Cruegerii* Griseb. ex Lindau, Notizbl. Berl. i. 214 (1896), which is known to me only from description. No species of the genus is recorded in Boldingh's *Flora of Curaçao* (1914).

RUPRECHTIA (*Euruprechtia*) **Hamanii** Blake, sp. nov. Arbor 7 m. alta ramosa. Rami tenues parum flexuosi striati subsordide puberuli pilis patentibus vel adscendentibus cortice cano tecti, vetustiores glabrati lenticellati, internodiis saepe 2–5.5 cm. longis. Folia alterna ovalia vel late et breviter ovata vel (an normaliter?) suborbiculari-ovata acuta interdum obtusa basi cordata interdum subamplectentia firme chartacea valde repanda (dentibus paucis late rotundatis) ceterum integra supra ad costae basin et subtus in costa interdum etiam paullum in venis sordide patenti-puberula pennivenia (venis majoribus 9–11-jugis) supra obscure tenuiterque reticulata venis et venulis vix prominentibus subtus valde aperteque reticulata venis et venulis albidis valde prominentibus venis curvatis apice anastomosantibus 6–11.5 cm. longa 3.5–8 cm. lata; petioli validi dense subsordide puberuli pilis longis intermixtis 1.5–5 mm. longi; ochreae strigosae persistentes ad 2.5 mm. longae. Spicae (♀ tantum visae) axillares et terminales breves (axi 1.5 cm. longo vel brevioribus breviter hispido-piloso) maturitate paniculas 6.5–10 cm. longas latasque efficientes; pedicelli frugiferi patentipilosuli ad 5 mm. longi prope medium articulati. Flor. ♀: perianthium frugiferum 2.8–3 cm. longum demum obscure rubescens in tubo turbinato 5 mm. longo dense breviterque pilosum; segmenta 3 exteriora anguste ligulari-spathulata ad 2.5 cm. longa 4–6 mm. lata 3-nervia et reticulata, 3 interiora lineari-subulata acutiuscula sparsissime ciliata in apice tubi adfixa 3 mm. longa. Achenium obtuse trigonum acuminatum valde trisulcum, angulis rotundatis medio leviter sulcatis, supra hispido-pilosum 8 mm. longum 3.3 mm. diametro; stigmata 3 subsessilia penicillato-fimbriata 1.8 mm. longa. — VENEZUELA: Estacadita, 25 April 1917, *Curran & Haman* 766 (TYPE in Gray Herb.). — Rather closely related to

R. colorata J. D. Sm. (! Bot. Gaz. xlvii. 260 (1909)), which has smaller less pubescent fruiting calyx and leaves glabrous on both sides and with the ultimate veinlets much more prominent beneath.

ATRIPLEX oestophora Blake, sp. nov. Frutex monoicus 0.6 m. altus adscendens ramosus, caule albido glabro cum lineis e foliis decurrentibus costato. Folia alterna obovata supra medium latissima apice retusa obscure obtuseque mucronulata basi cuneata integerrima albida vel canescenter densissimeque lepidoto-furfuracea utrinque concoloria costa subprominente venis lateralibus 2-5-jugis obscurissimis 1.5-3.1 cm. longa 7-13 mm. lata, in petiolos 1.5-3 mm. longos obscure marginatos angustata. Spicae ramos et caules terminantes infra foliaceae supra nudae interruptae demum 11 cm. longae 7-10 mm. diametro (foliis exclusis), floribus ♂ et ♀ intermixtis saepius 4-6 in fasciculis. Flor. ♂: perianthium depressum 1.7 mm. latum infra medium 5-lobum, lobis deltoideis obtusis incurvatis; stamina 5 breviora glabra, filamentis basi in anulum connatis. Flor. ♀: bractearum subcanescenter lepidoto-furfuracearum theca sessilis crasso-cylindrica demum infra coriacea apice umbonata ad 3 mm. longa, disco bilobo lobis (partibus liberis bractearum) deltoideis obtusis integris 3-nerviis et reticulato-venosis erectis basi subcordatis ad 2.5 mm. altis 5 mm. latis demum plane patentibus discum 5-6 mm. diam. efficientibus. Semen verticale 1.8 mm. altum pallidum lucens, radícula adscendente. — VENEZUELA: "shrub 2 ft. high," Vela de Coro, 1 April 1917, Curran & Haman 451 (TYPE in Gray Herb.). — Named from the resemblance of the submature fruits with erect bract-margins to arrow-heads.

BAUHINIA (*Pauletia*) **mollicella** Blake, sp. nov. Arbor armata 5 m. alta 1.3 dm. diametro. Rami vetustiores crassi paullum flexuosi patenti-puberuli cortice brunnescenti-canescente tecti, spinis stipularibus saepius solitariis firmis acuminatis basi paululum decurrentibus recurvatis rare antrorsum curvatis 5-6 mm. longis; rami novelli dense molliterque sordido-puberuli pilis subpatentibus aliis paucis longioribus intermixtis, spinis binis saepius subaequalibus puberulis. Folia alterna simplicia quadrato-suborbicularia apice leviter (per 1/10-1/5 longitudinis) bilobata lobis late rotundatis, basi truncata vel leviter cordata apice mucrone 1.5-3 mm. longo donata margine integra 9-nervia et subtus parum reticulato-venosa, supra obscure viridia molliter sed

non dense patenti-pilosula aetate pilis paucioribus praedita sed non glabrata, subtus multo pallidiora dense molliterque subpatenti-pilosula et glandulari-adspersa venis interdum subrufescentibus 4–5.8 cm. longa 3.1–5.8 cm. lata; petioli dense puberuli 8–11 mm. longi. Flores numerosi in cymis suboppositifoliis vel extra-axillaribus 4–6-floris speciosi sicc. 9.5 cm. lati; pedunculus brevis; pedicelli patenti-puberuli ad 1.5 cm. longi. Calycis tubus discifer clavatus ad 0.9 cm. longus, limbus 4.3 cm. longus subelavato-tubulosus sordide molliterque puberulus et glandularis apice minute 5-denticulatus spathaceus varie fissus. Petala 5 “alba” subaequalia anguste ovali-obovata apice rotundata extus in costa glandulari-adspersa ceterum glabra 4.8–6 cm. longa 1.3–1.7 cm. lata (ungue 1–1.3 cm. longo incluso). Stamina 10 omnia antherifera alterna breviora, filamentis basi breviter connatis et pilosis ca. 3.5 et 4.8 cm. longis, antheris 4.5–7 mm. longis. Pistillum 4.8 cm. longum; ovarium dense puberulum 10-ovulatum; stylus glandularis; stigma magnum 3 mm. diametro. Fructus deest. — VENEZUELA: vicinity of Las Cumbres, 17 May 1917, *Curran & Haman* 1024 (TYPE in Gray Herb.). — Local name “Dibrito.” — The species is apparently nearest the very imperfectly characterized and still obscure *B. emarginata* Mill., but that is described as with 2–3-seeded pod; furthermore the inflorescence appears to differ.

CROTON (*Eucroton* ser. II. Prod.) *Curranii* Blake, sp. nov. Frutex vel arbor ramosa. Caulis crassiusculus juventate densissime sordideque stellato-pilosus aetate lenticellatus sparsius pubescens vel subglabratus cortice brunneo-canescente tectus. Folia alterna ovata (superiora interdum ovalia) acuminata basi obscure cordata vel rotundata obscure crenato-serrulata vel paene subintegra chartaceo-membranacea 3(-sub-5)-nervia et subtus paullum venosa (venis lateralibus 3–4-jugis, basalibus exclusis) supra saturate viridia subsparse stellato-pilosa (pilis partialibus diametro clavulae abbreviatae centralis multoties longioribus, haud appressis) subtus parum pallidiora (juventate flavescentia) densius stellato-pilosa 4.2–8.5 cm. longa 2–5.2 cm. lata; petioli densissime sordideque stellato-pilosi 0.7–2.5 cm. longi; stipulae subulato-filiformes integrae stellato-pilosae 3–4.5 mm. longae ad 0.2 mm. latae. Racemi terminales 8–11 cm. longi infra foeminei supra masculi haud interrupto-denudati dense stellato-pilosi. Flores ♀ sublaxe racemosi, infimi folioso-bracteati, alteri bracteis

subulatis 2-5 mm. longis suffulti; pedicelli 1.5-5 mm. longi; calyx 5-6 mm. altus 7.5-11 mm. diametro ad medium 5-lobatus dense stellato-pilosus, tubo subhemisphaerico, lobis late deltoideis obtusissimis valde reduplicatis quoque linea brunnea mediana praedito, rudimentis petalorum 3 subulatis apice bilobatis vel saepissime nullis; ovarium late trigonum depresso-subglobosum stellato-pilosum, capsula submatura 5.5 mm. crassa; styli ad medium connati, partibus liberis infra medium 4-partitis, lobis 2-lobatis. Flores ♂ subdense racemosi, in pedicellis 2.5-3 mm. longis, aperti ad 5.5 mm. lati; sepala 5 paene ad basin disjuncta extus stellato-pilosa ovata acutiuscula; petala ovata basi parum angustata obtusa intus infra apicem dense pilosa extus glabra sepala paullo superantia ca. 3 mm. longa; stamina 15, filamentis pilosis 3-3.5 mm. longis; glandulae 5 petalis alternantes; receptaculum pilosum. — VENEZUELA: between La Guaira and Rio Grande, 12 June 1917, Curran & Haman 974 (TYPE in Gray Herb.). — Local name "Sala-sala."

CROTON (*Eleuteria*) **heliaster** Blake, sp. nov. Frutex vel arbor ramosa. Rami novelli dense canescenter vel brunnescenter depresso-stellato-pilosi, vetustiores subglabrati cortice fusco fisso tecti. Folia alterna rarius subopposita ovalia apice rotundata rarius obtusa obscure mucronulata basi rotundata integerrima subtus pennivenia (venis 6-7-jugis subprominulis angulam 45-75° cum costa formantibus, venulis nullis) supra obscure viridia dense subdepresso-stellato-pilosi (pilis partialibus numerosis diametro clavulae abbreviatae centralis aequalibus) subtus densissime subargenteo-canescenterque subdepresso-stellato-pilosa (pilis paucis brunneis adjectis) 1.5-2 cm. longa 8-13.5 mm. lata; petioli supra sulcati densissime subdepresso-stellato-pilosi 2-3.5 mm. longi; stipulae filiformi-subulatae stellato-pilosae ad 1.5 mm. longae deciduae. Racemi ramos et ramulos terminantes 4-5 cm. longi sublaxiflori basi paullum ramosi foeminei ceterum masculi haud interrupti. Flor. ♀ pauci ad 6 mm. lati: pedicelli 3 mm. longi; sepala 5 imbricata ovalia vel ovata acutiuscula 1-costata dense subdepresso-stellato-pilosa; petala 5 lanceolato-ovata acutiuscula sepala paullo superantia; glandulae subulatae; ovarium stellato-pilosum; styli 3 pilosi ad basin distincti paene usque ad basin 2-partiti, lobis iterum paene ad medium bilobatis. Flor. ♂ ad 4 mm. lati: sepala 5 late ovate acuta dense subdepresso-stellato-

pilosa 3-nervia et paullum venosa; petala ovato-lanceolata venosa intus densissime longeque pilosa sepala subaequantia; stamina ca. 13, filamentis pilosis; glandulae 5 orbiculares. — VENEZUELA: between Coro and Alta Gracia, 1 May 1917, *Curran & Haman* 739 (TYPE in Gray Herb.).

MAYTENUS Curranii Blake, sp. nov. Arbor 3-5 m. alta valde ramosa, ramis novellis 4-costato-angulatis pallide viridibus glabris subpapillosis, hornotinis obscure viridibus, vetustioribus teretibus lenticellatis cortice fusco-cinereo tectis. Folia alterna disticha oblongo-ovalia vel ovalia utroque rotundata apice saepe retusa vel emarginata irregulariter obtuseque crenulata coriacea glaberrima utrinque reticulato-venosa venis (majoribus 9-10-jugis ad angulam ca. 40° abeuntibus apice curvato-anastomosantibus, intermediis brevioribus) et venulis utrinque prominulis supra lucentia subtus paullum obscuriora 3.8-7.5 cm. longa 1.8-3.7 cm. lata, in petiolis supra subcomplanatis anguste marginatis 2-4 mm. longis. Flores in cymis brevissimis 2-5-floris petiolos subaequantibus dispositi, expansi 2.5 mm. lati. Sepala 5 depresso-suborbicularia. Petala 5 deltoideo-ovata obtusa sepala quadruplo superantia. Stamina 5, filamentis glabris crasse subulatis. Discus 10-undulatus ovarium breve basi cingens. Ovarium 2-loculare, loculis 2-ovulatis, ovulis erectis. Stylus brevissimus. Fructus glaber ellipsoideo-ovoideus stipitatus 14 mm. longus ad 7 mm. latus (stipite 2-3 mm. longo incluso) demum ad medium dehiscens 1-loculare, 2-3-spermus, in pedicello demum 3 mm. longo. Semen olivaceo-nigrescens lucidum ad 7.5 mm. longum, arillo chartaceo-carnoso verisim. roseo paene omnino occultum. — VENEZUELA: common, Cerro Santa Ana, Paraguana Peninsula, 7 and 13 April 1917, *Curran & Haman* 529 & 529A (TYPE no. 529A, in Gray Herb.). — Apparently well distinguished by the shape and nervation of the coriaceous leaves.

ZIZYPHUS cyclocardia Blake, sp. nov. Arbor armata 8 m. alta 2.5 dm. diam. intricate ramosa. Ramuli novelli valde flexuosi quadrangulares virides subsparsae subappresseque pubescentes pilis basi fusco-glandularibus, hornotini incani glabri, vetustiores cortice fusco-canescente tecti; spini bini axillares tenuiter subulati patentes 2.2-3.5 cm. longi demum decidui. Folia alterna orbicularia vel ovato-orbicularia apice rotundata vel retusa basi cordata 3-sub-5-nervia venulis obscuris utrinque in venis pilis paucis praedita ceterum glabra subchartacea supra parum lucentia subtus

vix pallidiora 2.8–3.5 cm. longa 2.2–3.7 cm. lata; petioli supra sulcati sparse pubescentes 2.5–4 mm. longi; stipulae lanceolato-subulatae brunneae scariosae persistentes 1–2 mm. longae. Flores in cymis axillaribus ca. 8-floris dispositi 5 mm. lati; pedunculus sparse pubescens ad 6 mm. longus, pedicellis paullo brevioribus; bracteae scariosae lanceolatae pubescentes 0.7 mm. longae vel breviores. Calycis tubus brevissimus subplanus disco late 5-lobato impletus, segmenta 5 triangulato-ovata acutiuscula 3-nervia et dense venuloso-reticulata 1-costata 2.3 mm. longa 2 mm. lata. Petala cochleato-saccata longe unguiculata stamina foventia sepalis breviora. Stamina 5, filamentis glabris subulatis, antheris didymis. Ovarium disco immersum parum exsertum glabrum 2-loculare, loculis 1-ovulatis. Styli 2 paene vel usque ad basin liberi. Fructus immaturus 2-spermus basi disco cinctus. — VENEZUELA: between Santa Ana and Morui, Paraguana, 8 April 1917, *Curran & Haman* 560 (TYPE in Gray Herb.). — A species well characterized by its round cordate leaves.

WIKSTROEMIA Schrad. Goett. Gel. Anz. 1821. pt. 1. 710 (5 May 1821). — *Haemocharis* Salisb. Paradis. Lond. i. sub t. 56 (1806), nomen. *Lindleya* Nees, Flora iv. pt. 1. 299 (21 May 1821). *Laplacea* HBK. Nov. Gen. v. 207. t. 461 ("1821" = 23 Feb. 1822¹). *Cloaschima* Korth. Verh. Nat. Gesch. Bot. 139. t. 28 (1842). — It is somewhat singular that Otto Kuntze's displacement of *Laplacea*, long the accepted designation of this genus, by *Haemocharis* has been accepted by practically all subsequent authors without a word of comment. Kuntze's reason for this change is given as follows (Rev. Gen. i. 62 (1891): "**Haemocharis** Salisb. (1806) par. lond. sub No. 56 ex typo *Gordonia Haematoxyton* Sw. = *Wickstroemia* Schrad. 5. Mai 1821 = *Lindleya* Nees 21. Mai 1821 = *Laplacea* HBK. . . . 1821. BHgp. geben unrichtig 'n.n.' für *Haemocharis* Salisb. an; da eine bekannte Pflanzenart dazu citirt wird, ist es nur ein nomen seminudum und mit recht hat ihn Choisy (Mém. Ternstr.) verwendet; nur muss noch *Laplacea*, welches Choisy getrennt aufführt, damit vereinigt werden." That Bentham and Hooker's rejection of the name *Haemocharis* as a nomen nudum was justified is shown by the following quotation from Salisbury, which embraces his only use of the name: "I have given this genus [*Lacathea* Salisb.] a name from its wide receptacle,

¹ See Barnhart, Bull. Torr. Club xxix. 595 (1902).

as there is not a shadow of a pretence to call it *Franklinia*; it differs from *Gordonia* in the filaments not being inserted in 5 solid bodies; from *Haemocharis* (G. *Haematoxylon* Swartz) in its monopetalous corolla; from *Stuartia*. . . ." According to Art. 38 of the International Rules, "the mere indication of species as belonging to a new genus . . . does not allow us to accept the genus in question as characterized and effectively published." It is impossible, surely, to argue that *Haemocharis* is characterized by inference in the statement that *Lacathea* differs from it "in its monopetalous corolla," since there is more than one possible alternative to this. *Haemocharis* was not adopted by any subsequent author or effectively published until 1826¹ (Mart. & Zucc. Nov. Gen. et Sp. i. 106), and in the meantime three other names for the group had received valid publication. The one in almost universal use until Kuntze's ill-advised action, *Laplacea* HBK., must unfortunately lapse, since the fascicle in which it was published, although forming part of a volume bearing the date 1821 on its title page, was not issued until February 1822.² Of the other two names the earlier, both by printed date and by contemporary evidence,³ is *Wikstroemia* Schrad., and since it is the earliest valid name given to the genus and had not before been used in nomenclature, it must be taken up for the group. The later combination of the two names, *Wikstroemia* and *Lindleya*, under *Lindleya*, by Sprengel (Vet. Akad. Handl. Stockh. 1821. 168, footnote (1821)), when publishing his own genus *Wikstroemia* (= *Eupatorium*), is of no consequence, since he was not dealing with two names of the same date.

Unfortunately another and later use of the same name has become so firmly engrained in nomenclature as to have been placed on the list of *nomina conservanda* by the International Congress in 1905. This is *Wickstroemia* Endl. Prod. Fl. Norf. 47 (1833), to

¹ See Woodward, Journ. Bot. xlv. 198 (1908).

² See Barnhart, Bull. Torr. Club xxix. 595 (1902).

³ Both Schrader and Nees had received sets of the plants collected by Prince Maximilian of Neuwied in Brazil and had published nearly simultaneously their determinations, with descriptions of the new species and genera, in the magazines above indicated. Nees himself (Flora iv. pt. 1. 326-330 (7 June 1821)), in a letter dated from Bonn, 9 May 1821, has noted the earlier appearance of Schrader's publication and has equated the two sets of names. Under no. 15 (p. 328) he says: "Wickstroemia fruticosa Schr. ist Lindleya semiserrata m."

which *Capura* L. Mant. ii. 149 (1771) has been subordinated as a *nomen rejiciendum*. Although, by a strict interpretation of Art. 57 of the International Code, it might be possible to conserve the later *Wickstroemia* Endl., since it differs by a single letter from *Wikstroemia* Schrad. (commonly but not originally spelled *Wickstroemia*), such action is very unlikely to meet with favor among botanists, and is certainly opposed to the spirit if not the letter of the Code, since it could not fail to lead to uncertainty and confusion. Furthermore both genera were named after the same botanist, whose name as written by himself was *Wikström*, and it seems best to consider *Wikstroemia* and *Wickstroemia* as mere variant spellings of the same name.

Although the name to be used for the large genus of the *Thymelaeaceae* now known as *Wickstroemia* Endl. is not directly at issue here, it may be noticed in passing. The obvious intent of the International Congress was to forestall unnecessary changes by making *Wickstroemia* Endl. a *nomen conservandum* over *Capura* L.,¹ in the belief that the earlier *Wikstroemia* of Schrader had been definitely disposed of in synonymy; that is, to do away with the necessity of replacing *Wickstroemia* by *Capura* merely because of the priority of the latter. The necessary recognition of an earlier *Wikstroemia* essentially alters the circumstances of the case, and should certainly lead to the adoption of the earliest name, *Capura* L., rather than to the use of the third and latest name (*Diplomorpha* Meisn. Denkschr. Regensb. Ges. iii. 289 (1841)), which a too strict interpretation of the letter of the Rules might seem to indicate. In any case, it is clear that by the International Rules the name to be adopted for the Theaceous genus generally called *Laplacea* or *Haemocharis* is *Wikstroemia* Schrader. The valid species of this genus, material for the revision of which is chiefly to be sought in European herbaria, are the following:

WIKSTROEMIA alpestris (Krug & Urb.) Blake, comb. nov. — *Haemocharis alpestris* Krug & Urb. Bot. Jahrb. xxi. 547 (1896). *Laplacea alpestris* (Krug & Urb.) Dyer, Ind. Kew. Suppl. 2. 86 (1904).

W. barbinervis (Moric.) Blake, comb. nov. — *L. barbinervis* Moric. "Mém. Soc. Phys. Genève vii. 256. t. 11 (1830)"; Pl.

¹ As to the identity of *Capura* L., consult Benth. & Hook. Gen. Pl. iii. 193 (1883), obs. under *Wikstroemia*.

Nouv. Am. 16. t. 11 (1836). *H. barbinervis* (Moric.) Chois. Mém. Soc. Phys. Genève xiv. 144 (reprint 56) (1855).

W. camelliaefolia (Tr. & Pl.) Blake, comb. nov. — *L. camelliaefolia* Tr. & Pl. Ann. Sci. Nat. IV. xviii. 270 (1862). — *L. camelliaefolia* Hook. & Jacks. Ind. Kew. ii. 30 (1894), sphalm.

W. Curtyana (A. Rich.) Blake, comb. nov. — *L. Curtyana* A. Rich. Ess. Fl. Cub. 225 (1845). *H. Curtyana* (A. Rich.) Gomez, Anal. Hist. Nat. Madrid xix. 222 (1890); Millsp. Field Columb. Mus. Bot. i. 430 (1900). *H. Courtyana* (A. Rich.) Ktze. Rev. Gen. i. 62 (1891).

W. FRUTICOSA Schrad. Goett. Gel. Anz. 1821. pt. 1. 711 (5 May 1821). — *Lindleya semiserrata* Nees, Flora iv. pt. 1. 328 (7 June 1821), as syn. *H. semiserrata* Mart. & Zucc. Nov. Gen. et Sp. i. 107. t. 66 (1826).¹ *Laplacea semiserrata* (Mart. & Zucc.) Cambess. in St. Hil. Fl. Bras. Mer. i. 300 (1825-7). *L. inaequilatera* Schott ex Spreng. Syst. iv. pt. 2. App. 408 (1827). *L. praemorsa* Splitg. "in Hoev. & De Vriese, Tijdschr. ix. 100 (1842)"; ex Mohl. Bot. Zeit. i. 95 (1843). *L. camellioides* Sond. Linnaea xxii. 549 (1849). *H. camellioides* (Sond.) Ktze. Rev. Gen. i. 62 (1891). *H. praemorsa* (Splitg.) Ktze. l. c. (1891). *L. inaequalilatera* Hook. & Jacks. Ind. Kew. ii. 30 (1894), sphalm. *Lindleya fruticosa* Hook. & Jacks. Ind. Kew. ii. 89 (1894), lapsu.

W. FRUTICOSA Schrad. var. **acutifolia** (Wawra) Blake, comb. nov. — *L. semiserrata* var. *acutifolia* Wawra in Mart. Fl. Bras. xii. pt. 1. 290 (1886). *H. acutifolia* Mart. ex Wawra l. c., as syn. *H. semiserrata* var. *acutifolia* (Wawra) Dusén, Archiv. Mus. Nac. Rio Janeiro xiii. 52 (1903).

W. FRUTICOSA Schrad. var. **communis** (Wawra) Blake, comb. nov. — *L. semiserrata* var. *communis* Wawra l. c. 289 (1886).

W. FRUTICOSA Schrad. var. **microphylla** (Wawra) Blake, comb. nov. — *L. semiserrata* var. *microphylla* Wawra in Mart. Fl. Bras. xii. pt. 1. 289. t. 57. f. 1 (1886).

W. FRUTICOSA Schrad. var. **obovata** (Wawra) Blake, comb. nov. — *L. semiserrata* var. *obovata* Wawra in Mart. Fl. Bras. xii. pt. 1. 290 (1886). *H. obovata* Mart. ex Chois. l. c. 144 (repr. 56) (1856), as syn. of *H. semiserrata*; ex Wawra l. c., as syn. *H. obovata* var. *acutifolia* Mart. ex Wawra l. c., as syn.

¹ Date according to Woodward, Journ. Bot. xlv. 198 (1906).

W. FRUTICOSA Schrad. var. *sericea* (Wawra) Blake, comb. nov. — *L. semiserrata* var. *sericea* Wawra in Mart. Fl. Bras. xii. pt. 1. 290 (1886).

W. FRUTICOSA Schrad. var. *typica* (Wawra) Blake, comb. nov. — *L. semiserrata typica* Wawra in Mart. Fl. Bras. xii. pt. 1. 289 (1886).

W. grandis (Brandegge) Blake, comb. nov. — *L. grandis* Brandegge, Univ. Calif. Pub. Bot. vi. 186 (1915).

W. haematoxylon (Sw.) Blake, comb. nov. — *Gordonia haematoxylon* Sw. Fl. Ind. Occ. ii. 1199 (1800). *L. haematoxylon* (Sw.) G. Don, Gen. Syst. i. 569 (1831). *H. haematoxylon* (Sw.) Choisy. Mém. Soc. Phys. Genève xiv. 144 (repr. 56) (1855).

W. intermedia (Benth.) Blake, comb. nov. — *L. intermedia* Benth. Pl. Hartw. 126 (1843). *H. intermedia* (Benth.) Choisy. Mém. Soc. Phys. Genève xiv. 144 (repr. 56) (1855).

W. Macfadyenii Blake, nom. nov. — *Gordonia villosa* Macfad. Fl. Jam. i. 117 (1837). *H. villosa* (Macfad.) Choisy. Mém. Soc. Phys. Genève xiv. 144 (repr. 56) (1855). *L. villosa* (Macfad.) Griseb. Fl. Brit. W. Ind. 104 (1859). *L. viscosa* Hook. & Jacks. Ind. Kew. ii. 30 (1894), lapsu. — The name of this species is changed on account of *Wikstroemia villosa* Hillebr. Fl. Haw. Isl. 386 (1888).

W. parviflora (Choisy.) Blake, comb. nov. — ? *L. parviflora* [Mart. in] Spix & Mart. Reise Bras. i. 207 (1823), nomen. *H. parviflora* Choisy. Mém. Soc. Phys. Genève xiv. 144 (repr. 56) (1855). — This species was described as new by Choisy, without reference to Martius's earlier but invalid use of the name.

W. portoricensis (Krug & Urb.) Blake, comb. nov. — *H. portoricensis* Krug & Urb. Bot. Jahrb. xxi. 548 (1896). *L. portoricensis* (Krug & Urb.) Dyer, Ind. Kew. Suppl. 2. 86 (1904).

W. pubescens (Planch. & Lind.) Blake, comb. nov. — *L. pubescens* Planch. & Lind. in Tr. & Pl. Ann. Sci. Nat. IV. xviii. 269 (1862). *H. pubescens* (Planch. & Lind.) Hieron. Bot. Jahrb. xx. Beibl. no. 49. 48 (1895).

W. quinoderma (Wedd.) Blake, comb. nov. — *L. quinoderma* Wedd. Hist. Nat. Quin. 33, footnote (1849). *H. quinoderma* (Wedd.) Choisy. Mém. Soc. Phys. Genève xiv. 145 (repr. 57) (1855).

W. speciosa (HBK.) Blake, comb. nov. — *L. speciosa* HBK. Nov. Gen. v. 209. t. 461 ("1821" = 1822). *L. insignis* Benth. Pl.

Hartw. 126 (1843), lapsu. *H. speciosa* (HBK.) Chois. Mém. Soc. Phys. Genève xiv. 144 (repr. 56) (1855).

W. symplocoides (Tr. & Pl.) Blake, comb. nov. — *L. symplocoides* Tr. & Pl. Ann. Sci. Nat. IV. xviii. 269 (1862). *H. symplocodes* (Tr. & Pl.) Ktze. Rev. Gen. i. 62 (1891).

W. tomentosa (Mart. & Zucc.) Blake, comb. nov. — *H. tomentosa* Mart. & Zucc. Nov. Gen. et Sp. i. 108. t. 67 (1826). *L. tomentosa* (Mart. & Zucc.) G. Don, Gen. Syst. i. 569 (1831).

W. TOMENTOSA (Mart. & Zucc.) Blake var. *glabrata* (Wawra) Blake, comb. nov. — *L. tomentosa* var. *glabrata* Wawra in Mart. Fl. Bras. xii. pt. 1. 291 (1886).

W. TOMENTOSA (Mart. & Zucc.) Blake var. *typica* (Wawra) Blake, comb. nov. — *L. tomentosa typica* Wawra in Mart. Fl. Bras. xii. pt. 1. 291 (1886).

W. Wrightii (Griseb.) Blake, comb. nov. — *L. Wrightii* Griseb. Mem. Am. Acad. N. S. viii. (Pl. Wright.) 166 (1860). *H. Wrightii* (Griseb.) Gomez, Anal. Hist. Nat. Madrid xix. 222 (1890).

VISMIA cordata (Rusby) Blake, comb. nov. — *Caopia cordata* Rusby, Bull. N. Y. Bot. Gard. viii. 105 (1912).

VISMIA crassa (Rusby) Blake, comb. nov. — *Caopia crassa* Rusby! Mem. Torr. Club iv. 204 (1895). — *Vismia* was placed on the list of *nomina conservanda* by the International Congress at Vienna in 1905.

VISMIA Hamanii Blake, sp. nov. Arbor 5-10 m. alta 1.3 dm. diametro. Ramuli tenues obtusi quadrangulares leviter sulcati ad nodos paullum complanati juventate dense sordide canescenterque tomentuli pilis longioribus fusco-brunneis sat numerosis intermixtis demum glabrati. Folia opposita ovata vel ovali-ovata subabrupte acuminata basi late rotundata subchartacea integerrima pennivenia (venis 13-17-jugis supra planiusculis infra prominulis, venulis utrinque subconspicuis infra prominulis) supra obscure viridia glabra subtus densissime albescenterque stellato-pilosula, pilis rufescentibus paucissimis intermixtis 1.4-2.1 dm. longa 7-8.8 cm. lata, ea inflorescentiae minora; petioli anguste sulcati nudi canescenter stellato-pilosuli et praecipue supra pilis brunneis donati 1.7-2.2 cm. longi. Paniculae multiflorae pyramidales 1-2 dm. diametro basi folioso-bracteatae supra nudae canescenter stellato-pilosulae pilis brunneis stellatis longioribus numerosis adjectis, ramis et ramulis late patentibus vel divergen-

tibus; pedicelli ultimi brunneo-pubescentes ad 2 mm. longi. Calyx (clausus) subglobosus extus dense rufescens stellato-pilosulus ad 4.5 mm. diametro; calycis expansi segmenta 5 ovata obtusa imbricata ad 6 mm. longa; 2 extima crasso-herbacea 5-nervia extus ubique rufescens stellato-pilosula, tertium anguste scarioso-marginatum in uno margine dense ciliolatum, 2 intima margine lato scarioso lineato donata apice breviter comosa marginibus dense ciliolata. Petala 5 flava obovata parum obliqua apice rotundata in unguem cuneate angustata lineata intus densissime longeque comosa pilis albis laxis 8 mm. longa 4 mm. lata (ungue 1.5 mm. longo incluso). Glandulae suborbiculares e apice subtruncato abrupte apiculatae extus flavido-comosae ad 1.8 mm. longae. Stamina pentadelphia: podium basi excepta dense pilosum pilis inferioribus flavis superioribus albis 2.8 mm. longum; antheris in fasciculo ca. 65; filamenta partialia basi sparse pilosa. Ovarium glabrum 5-loculare. Styli basi liberi glabri. — VENEZUELA: very common tree, San Felipe to Tachira, 16 May 1917, *Curran & Haman* 1010 (TYPE in Gray Herb.); between La Guaira and Rio Grande, 12 June 1917, *Curran & Haman* 985. — Vern. name "Onotillo." — The short dense ciliolation of the inner sepals appears to characterize this species. The genus as a whole, however, is rather badly in need of a thorough revision.

HECATOSTEMON Blake, gen. nov. *Flacourtiacearum Caseariae* affine, a qua staminibus ca. 100 sub-3-seriatis valde imbricatis distinguitur. Calycis tubus nullus, segmenta 5 ovalia subherbaceo-subpetaloidea valde imbricata persistentia. Petala nulla. Stamina ca. 100 valde imbricata 3-seriata basi calycis extra discum inserta stylum parum superantia basi non connata, filamentis tenuibus, antheris oblongo-ovalibus apice rotundatis prope basin adfixis, connectivo non producto; segmenta disci ("staminodia") numerosa 1-seriata libera glanduliformia apice pilosa. Ovarium liberum ovoideum dense pilosum basi paullum contractum in stylum parum longiorem glabrum attenuatum 1-loculare, stigmatibus parvo capitato; placentae 3 parietales, ovulis numerosis. Fructus maturus deest. — Arbor parva plus minusve puberula, foliis alternis ovalibus pellucido-punctatis appresse serrulatis subchartaceis reticulatis, stipulis parvis, floribus mediocribus in axillis cymoso-fasciculatis, fasciculis breviter pedunculatis ca. 4-floris.

HECATOSTEMON dasygynus Blake, sp. nov. "Arbor parva." Rami vetustiores subtenues patenti-puberuli lenticellati cortice canescente tecti, ramuli novelli patenti-puberuli pilis aliis brevissimis aliis longiusculis flavicantibus lucentibus et glandular-adpersi. Folia alterna ovalia vel oblongo-ovalia basi inaequilateraliter rotundata vel vix semicordata apice obtusa rotundata retusa vel brevissime acutata subchartacea appresse serrulata (dentibus ca. 57-jugis glandulari-mucronulatis) pennivenia reticulato-venosa (venis majoribus 8-11-jugis) supra juventate in costa et venis patenti-pubescentia maturitate glabra (costa excepta) subtus paullo pallidiora in costa venis et venulis majoribus patenti-pubescentia ceterum glabra dense pellucido-punctata 5-11 cm. longa 2.5-5 cm. lata; petioli nudi dense patenti-puberuli 4-6 mm. longi; stipulae ovato-lanceolatae acuminatae dense puberulae deciduae 2 mm. longae. Flores axillares cymoso-fasciculati, fasciculis saepius 4-floris dense sordide patenti-puberulis; pedunculus 4-6 mm. longus, pedicellis 1.1-2 cm. longis basi articulatis; bracteolae triangulari-ovatae pilosulae ad 1 mm. longae deciduae. Calycis 6 mm. longi segmenta 5 ovalia apice rotundata subcanescenti-pilosa pilis subappressis subsordidis pellucido-punctata et -lineolata. Stamina 90-100, filamentis liberis glabris filiformibus ad 5 mm. longis, in alabastro inflexis. Segmenta disci ("staminodia") pallida ad apicem parum colorata et pilosa subclavata ad 0.5 mm. longa. Pistillum ad 4.5 mm. longum. Fructus immaturus ovoideo-subglobosus dense vestitus, stylo basi excepta deciduo, sepalis reflexis et staminibus basi donatus. — VENEZUELA: dry land south of river, Rio Limón, 10 May 1917, Curran & Haman 807 (TYPE in Gray Herb.).

The affinity of this genus is clearly with *Casearia* Jacq. and *Zulania* A. Rich. The latter, sunk in *Casearia* by Bentham & Hooker but readopted with reason by Warburg in the Pflanzenfamilien, differs in its large sessile stigma and fewer (about 30) 1-seriate anthers on short filaments; the former in its few (6-25) 1-seriate stamens alternating with the glands of the disk. In *Casearia spiralis* Johnston, also from Venezuela, which possesses nearly the maximum number of stamens (22-23) in the genus, they are still strictly 1-seriate and in alternation with the glands of the disk. I am unable to see the pertinence of Johnston's

remarks (Proc. Am. Acad. xl. 691 (1905)) on the significance of the arrangement of the sepals in his species. These are certainly quite distinctly imbricated, but no more to be called spiral than those of various other species of the genus.

PASSIFLORA (§ *Granadilla*) **physocalymma** Blake, sp. nov.
 Planta scandens. Ramus tenuis teres luteo-viridescens striatulus subnitidus molliter pilosus pilis brevibus subcurvatis lucentibus. Cirri e axillis sterilibus et fertilibus orientes tenues pilosuli 3 cm. longi (contracti) et ultra. Folia alterna ad medium trilobata (eis *Mori* forma similia) lobis acuminatis vel integra, ovata vel late ovata dense subirregulariterque serrulata (dentibus acute mucronulatis) base latissime leviterque cordata vel subtruncata membranacea tripli- vel 3-nervia et praecipue supra eleganter reticulato-venulosa venulis prominentibus, supra subnitido-viridia venis majoribus pilosulis exceptis glabra subtus vix pallidiora in venis majoribus pilosa pilis laxis ceterum glabra 6.5–10 cm. longa 4.8–10 cm. lata; petioli patenti-pilosuli medio 2-glandulosi glandulis magnis sessilibus nudi 2.7–3.8 cm. longi; stipulae lineari-subulatae subcoriaceae prope medium paullum ampliatae uno latere obtuse 3-dentatae dentibus glanduliformibus sparse ciliatae ad 2 cm. longae 1.5 mm. latae. Flores solitarii axillares expansi ad 4.8 cm. lati; pedunculi dense patenti-puberuli 2.8–4 cm. longi. Bractee 3 magnae ovatae subabrupte acuminatae (acumine ad 1 cm. longo) integerrimae ciliolatae eglandulosae per 1 cm. longitudinis connatae 5-nerves et pinnato-veniae 6.6 cm. longae 3 cm. latae ovario approximatae anthesi reflexae. Calycis tubus campanulato-subglobosus ad 8 mm. altus; segmenta 5 lanceolata obtusa sub apice cirro 7 mm. longo donata crassiuscula extus carinata albidovirescentia intus basi excepta dense purpureo-maculata ca. 2.8 cm. longa (cirro excluso). Petala 5 tenuiter membranacea obtusa lanceolato-oblonga purpureo-maculata 2.5 cm. longa ca. 5 mm. lata. Corona faucialis ca. 2-seriata, filis supra contortis purpureo-maculatis exterioribus ad 1.3 cm. longis, interioribus 2–2.7 cm. longis apice attenuatis, intra tubum filis brevissimis dentiformibus multiserialibus deorsum decrescentibus adjectis. Corona mediana e medio tubi erecta submembranacea annularis brevis apice multidenticulata dentibus extrorsum patentibus. Corona basalis brevissime annularis. Gynandrophorum petalis multo brevius virescens processibus 2 subremotis parum lobulatis vel subintegris

crassiusculis instructum. Filamenta plana. Ovarium elliptico-obovoideum. Stylus clavatus. Stigma bilobato-capitatum. — VENEZUELA: between La Guaira and Rio Grande, 12 June 1917, Curran & Haman 1035 (TYPE in Gray Herb.).

JACQUINIA mucronulata Blake, sp. nov. Arbor 5 m. alta trichotome ramosa. Ramuli novelli pallidi sulcato-angulati dense lepidoto-furfuracei glabri, vetustiores cortice griseo tecti. Folia alterna plerumque apicibus ramulorum conferta obovata apice rotundata breviter mucronata (mucrone triangulari acuto 0.5–0.8 mm. longo) basi cuneata triplinervia costa et venis basalibus praecipue supra prominentibus, venis lateralibus 3–5-jugis anastomosantibus supra conspicuis subtus obscuris coriacea glaberrima punctulosa pallide viridia integerrima 3.7–4.7 cm. longa 1.2–1.9 cm. lata, in petiolos 1–2 mm. longos cuneate angustata. Flores distincte racemosi, racemo 7–10-floro glaberrimo (axillis pedicellorum obscure puberulis exceptis) 2.5–3.8 cm. longo (pedunculo 8 mm. longo vel paullo longiore incluso), pedicellis sursum clavatis 8–12 mm. longis, bracteis ovalibus obtusis 1.3 mm. longis margine angustissimo scarioso introrsum anguste colorato donatis. Sepala 5 depresso-orbicularia in margine parum colorato aut scarioso irregulariter breviterque glandulari-ciliata et paullum erosula ceterum glaberrima punctulosa ad 2.5 mm. longa 3.5 mm. lata. Flores nimis immaturi. Fructus immaturus obovoideus aurantiacus apice umbonato-apiculatus ad 7 mm. longus 5.5 mm. diametro. — VENEZUELA: near Cumarato, 4 April 1917, Curran & Haman 488 (TYPE in Gray Herb.). — Local name "Barbasco." — Nearest *J. brasiliensis* Mez, which seems distinct in having its sepals much more densely ciliate with longer hairs. Unfortunately the flowers of *J. mucronulata* are altogether too young to show their real characters.

BUMELIA affinis Blake, sp. nov. Frutex ramosissimus ramis spinosis armatus 1.3–3.3 m. altus. Rami patentes juniores vinacei glabri apice spiniformes, vetusti crassi cortice cano tecti. Folia in ramis junioribus alterna in vetustioribus fasciculata obovata interdum ovalia apice rotundata basi cuneata rare rotundata integra glabra chartaceo-subcoriacea utrinque venulosa (venis lateralibus ca. 5-jugalibus anastomosantibus) 1.5–2.5 cm. longa 5–11 mm. lata, in petiolis supra complanatis 1–2.5 mm. longis. Fructus in fasciulis axillaribus pauci, pedicellis glabris 5–6 mm.

longis. Sepala 5 inaequalia imbricata orbicularia vel ovato-orbicularia rotundata irregulariter erosula glabra rufescentia ca. 1.5 mm. longa. Fructus immaturus ellipsoideo-obovoideus viridis glaber apice subtruncatus stylo usque ad 4 mm. longo persistente apiculatus 1-ocularis 1-spermus. — VENEZUELA: Mt. Santa Ana, Paraguana Peninsula, 7 April 1917, *Curran & Haman* 534 (TYPE in Gray Herb.). — A species nearly resembling in all comparable characters *B. reclinata* Vent., but with much less venose leaves and of very different range.

ASPIDOSPERMA lucentivenium Blake, sp. nov. Arbor 5–7 m. alta 1.3 dm. diametro ramosa. Rami conspicuiter lentiginosi hornotini griseo-olivacei subsparse appresseque puberuli vetustiores glabri cortice canescente tecti. Folia alterna ovalia (ea ad apices ramulorum interdum anguste oblongo-ovata vel lanceolata) interdum paullum obovata apice rotundata interdum retusa rare obtusa basi rotundata rare cuneata integerrima pro genere tenuia parum coriacea vel subchartaceo-coriacea supra lucida pennivenia conspicuiter venosa (venis majoribus ca. 15-jugis angulam saepius 45–70° cum costa formantibus cum intermediis et venulis reticulato-anastomosantibus paullum prominulis), infra pallida vel glaucescentia similiter reticulata venulis minus prominulis in costa minutissime appresso-puberula vel glaberrima, venis et venulis translucens (3.5–)6–10 cm. longa (1.8–)3–4.2 cm. lata; petioli minutissime puberuli nudi supra parum excavati 4–8 mm. longi. Paniculae axillares subpyramidales minute appresso-puberulae 1.5–3 cm. longae 1.5–4.3 cm. latae (pedunculo saepius 1–1.5 cm. longo incluso), ramis late patentibus, floribus sessilibus fasciculatis, fasciculis sparsis; bracteae deltoideae acutiusculae ciliatae ad 1 mm. longae. Calycis 2 mm. longi tubus brevis, segmenta 5 ovata vel triangulari-ovata imbricata obtusa dorso plus minusve appresso-puberula margine ciliolata intus eglandulosa. Corolla 5-dentata dentibus ovatis obtusiusculis (in alabastro) tubulosa extus glaberrima intus ad insertionem staminum annulo pilosulo cincta. Antherae ovatae acuminatae. Ovaria (conjunctim visa) globosa supra pubescentia. Discus vix ullus. Stylus ovarium subaequans. Stigma ellipsoideum, apiculo piloso vix bifido donatum. Carpella dua patentia compressa in latere 1-costata punctis albidis notata 4-sperma 3 cm. longa ad 1.4 cm. lata. Semina 2.5–3 cm. longa; embryo viridis 1.2–1.5 cm. longus 8.5

mm. latus; cotyledones aequales ovales basi inaequaliter cordatae radiculam multiplo superantes. — VENEZUELA: Cabo Blanco. 11 June 1917, *Curran & Haman* 938, 940, 954, 955; Camburi Chiquito, alt. 150 m., 9 June 1917, *Curran & Haman* 840, 923; between La Guaira and Rio Grande, common on lower slopes, 12 June 1917, *Curran & Haman* 970 (TYPE in Gray Herb.); Paraguana Peninsula, 12 April 1917, *Curran & Haman* 586. — Vern. name "Amaroso." — Apparently nearest *A. Vargasii* A.DC., of Venezuela, which is described as with corolla "utrinque pilosa," etc.

PLUMERIA cochleata Blake, sp. nov. Arbor parva erecta. Rami ad apicem crassi (ad 1 cm. diametro) novelli breviter patenterque hispido-pilosi pilis albidis vetustiores glabrati cortice griseo tecti. Folia (nondum matura) ad apicem ramorum conferta cochleiformia vel obovato-spathulata apice acuta integra, lamina orbiculari vel orbiculari-ovata 3-4 cm. longa 3-3.8 cm. lata, in basem anguste cuneatam 4-5 cm. longam abrupte vel sensim contracta, supra saturate viridia glabra vel in costa sparse pilosa subtus pallidiora in costa et venis majoribus densissime breviter patenterque sordido-pilosa in venulis sparse pilosis, pennivenia venis 23-24-jugis angulam 65-80° cum costa formantibus ut venulis distinctis non prominentibus apice arcuato-anastomosantibus, 5-9 cm. longa 3-3.8 cm. lata, juventate duplicata, maturitate verisim. explanata; petioli dense patenter pilosuli 3-4 mm. longi, basi glandulis 2 parvis donati. Flores albidissimi numerosi in apice pedunculati sparse hispido-pilosi vel glabrati nudi 3.8-5.2 cm. longi aggregati; pedicelli sparse pilosi 1-1.3 cm. longi; bracteolae depresso-triangulares 1.3 mm. longae. Calycis 1.2 mm. longi late campanulati segmenta 5 late quadrata truncata sparse ciliolata ceterum glabra intus eglandulosa. Corolla 5.5 cm. longa 6.5 cm. lata extus glaberrima intus e statione staminum usque ad apicem faucium dense pilosa, infra stamina puberula; tubus (cum faucibus vix distinctis) ad 2 cm. longus prope basi parum ampliatus deinde contractus supra angustissime infundibularis; limbi lobi 5 rhombico-obovati apice obtusi 3.5 cm. longi 2 cm. lati. Discus annularis brevis. Anthera oblongo-ovata minute apiculata 2.2 mm. longa; filamenta ca. 1 mm. longa, 2.5 mm. supra basin corollae inserta. Pistillum 2.5 mm. longum. — VENEZUELA: between Coro and Alta Gracia, 1 May 1917, *Curran & Haman* 742 (TYPE in Gray Herb.). — Distinguished especially by its characteristic leaves. —

Apparently of the same species is *Curran & Haman* 742A from vicinity of La Boca, 1 May 1917, represented only by loose flowers with corolla-lobes as much as 4.5 cm. long. There is no valid reason for changing the original spelling of the generic name used by both Tournefort and Linnaeus to *Plumiera* as is done by many writers, including K. Schumann in the *Pflanzenfamilien*.

MARSDENIA (§ *Verlotia*) **condensiflora** Blake, sp. nov. Frutex volubilis. Caulis lentiginosus subtenuis (ad 3 mm. diametro) pallide brunneus; rami hornotini glabri pallide virides cortice suberoso-carnoso tecti. Folia opposita anguste elliptica utroque acuta obscure mucronulata integerrima tenuiter coriacea glaberrima supra obscure viridia subtus pallidiora pennivenia venis lateralibus 5-6-jugis apice anastomosantibus inconspicuis 4.3-6.3 cm. longa 1.6-2.3 cm. lata, in petiolis nudis glaberrimis 4-5 mm. longis insidentia. Flores in racemis axillaribus et interaxillaribus brevissimis (axi crasso cicatricoso 4-12 mm. longo) densissime aggregati viridescentes; pedicelli clavati crassi costato-angulati 3 mm. longi glabri; bracteolae minimae. Calycis 5-partiti 1.5 mm. longi segmenta inaequalia suborbicularia late rotundata dorso obscure subglandulari-puberula margine ciliolata; glandulae 5 parviusculae intersepalae. Corolla rotata 7.5 mm. lata; lobi 5 triangulari-ovata obtusa margine parum revoluta glaberrima 2.6 mm. longa, tubum brevem late campanulatum subduplo superantia. Coronae simplicis segmenta 5 stigmatibus et appendicibus antherarum breviora late oblonga apice deltoidea acutiuscula basi ima inter se connata usque ad medium gynostegio adnata in medio abrupte contracta deinde ampliata et libera appressa apice inflexa. Antherarum appendices scariosae erectiusculae stigma paullulo superantes; pollinia erecta. Stigma apice late rotundatum. — **VENEZUELA**: Camburi Chiquito, 9 June 1917, *Curran & Haman* 836 (TYPE in Gray Herb.). — Vern. name "Lechero" (i. e. milky). Almost unique in the genus in its very contracted inflorescence.¹

¹ A new species of *Marsdenia* from Mexico may be described here, as follows.

MARSDENIA **peraffinis** Blake, sp. nov. Frutex volubilis. Caulis tenuissimus cortice canescente glabrato vel retrorse hispidulo tectus. Folia opposita internodiis saepius breviora ovata vel ovali-ovata acuminata vel solum acuta basi acute cuneata integerrima supra viridia sparse (ad costam subdense) incurvo-hispidula vel subglabrata subtus vix pallidiora subdense pubescentia pilis subpatentibus subglandulosis (ope microscopiae visis pluriloculatis) 3.2-5.3 cm. longa 1.2-2.4 cm. lata, in petiolis anguste marginatis hispidulis supra

LYCIUM (*Mesocope* Miers) *Johnstonii* Blake, sp. nov. "Frutex scandens" vel interdum "arbor 3-5 m. alta," ramulis spiniformibus armata. Caulis tenuis glaber cortice incano tectus; ramuli spinosi usque ad 6 cm. longi foliati novelli puberuli vetustiores glabri. Folia fasciculata euncato-spathulata apice rotundata basi acuminata integerrima glabra crassiuscula pallide viridia sicc. paullum ruguloso-foveolata sed venulis veris obscurissimis vix petiolata 8-16 mm. longa 2-3.5 mm. lata, in ramulis reductis brevissimis (ca. 1 mm. longis) dense breviterque ochraceo-pilosulis insidentia. Flores "purpurei" sparsi axillares solitarii 4(rarius 5)-meri; pedicelli glabri tenues 4-6 mm. longi. Calyx anthesi 2-3 mm. longus per tertiam partem longit. 4(rarius 5)-lobatus, nervis 4(-5) majoribus intermediis aequinumeris reticulato-venulosis, dentibus deltoideis acutiusculis praecipue ad apicem dense ciliolatis, in fructu vix accrescens demum bacca fissus. Corolla ca. 9.5 mm. longa extus glabra; tubus 3.5 mm. longus; fauces infundibulari-campanulatae 3.5 mm. longae intus supra insertionem staminum et sub apice annulo pilosulo donatae; limbi lobi 4(-5) oblongo-ovales patentes eciliolati 3.5 mm. longi 2 mm. lati. Stamina 4(-5) exserta (sed quam lobi corollae paullulo breviora) 4-5 mm. supra basin corollae exserta; filamenta 4.5 mm. longa basi dense (praecipue antice) pilosula pilis pluriloculatis; antherae connectivo breviter producto apiculatae 1.4 mm. longae. Ovarium ellipsoideum glabrum; stylus 8 mm. longus exsertus staminibus paullo longior. Bacca (submatura?) subglobosa ad 5 mm. diametro. Semina reticulata. — VENEZUELA: Vela de Coro, 1 April

suleatis 4-7.5 mm. longis. Flores per 8-15 in axillis aggregati petiolum subaequantes, pedicellis hispidulis ad 3 mm. longis. Calycis 5-partiti 1.5 mm. longi segmenta ovata vel ovali-ovata apice rotundata viridescencia scarioso-marginata breviter ciliata dorso sparse hispidula vel subglabra. Corollae late apertae 10 mm. diametro "rubrae flavo-striatae" tubus ad apicem in sinibus conspicue 5-pulvinatus, segmenta 5 lanceolata apice oblique emarginata recurvata glabra vel apice pilis 2-3 brevissimis donata, nervis 5 centrali multo validiore percursa 4.5 mm. longa basi 1.3 mm. apice 0.7 mm. lata. Corona ad gynostegium basi adnata, lobis in margine conspicuis rotundatis. Stigmatos rostrum conicum bifidum 0.7 mm. longum. Fructus dest. — MICHOACAN or GUERRERO: clayey soil, Baqueta, 150 m., 22 Oct. 1898, *Langlasse* 489 TYPE in Gray Herb. 1. — A species remarkably similar in nearly every feature to *M. trivirgata* Bartlett, which, however, has less prominent lateral margins to the lobes of the corona, a more slender much longer stigma-rostrum (about 1.5 mm. long), and flowers in which the stripes rather than the ground-color are reddish.

1917, *Curran & Haman* 447; "tree 10-15 ft. high," between Coro and Alta Gracia, 1 May 1917, *Curran & Haman* 750 (TYPE in Gray Herb.); Cabo Blanco, 11 June 1917, *Curran & Haman* 939; Island of Coche, 5 August 1903, *J. R. Johnston* 8; El Valle, Island of Margarita, 31 July 1901, *O. O. Miller & J. R. Johnston* 153, 3 August 1903, *J. R. Johnston* 61. — Mr. Johnston's collections of this species were recorded by him (*Proc. Bost. Soc. Nat. Hist.* xxxiv. 243 (1909)) as *L. salsum* R. & P. That species, however, is referred by Miers (*Ill.* ii. 131) to the sect. *Macrocope*, with the lobes longer than the tubular portion of the corolla. I have adopted Miers' interpretation of this species, since the original description is decidedly defective. The very inadequately described *L. obtusum* Willd. ex R. & S. *Syst.* iv. 698, from Cumana, is somewhat suggestive of *L. Johnstonii*, but is too poorly defined to be recognized (see HBK. *Nov. Gen.* iii. 452).

TABEBUIA chrysea Blake, sp. nov. Arbor 7 m. alta 1.5-2.5 dm. diametro. Caulis subquadratus angulis rotundatis juventate sordide tomentulo-furfuraceus aetate glabratus cortice griseo tectus. Folia opposita digitatim 5-foliolata (in speciminibus ad manum ut videtur vix matura): petiolus dense sordideque tomentulosus 9.5 cm. longus, petiolulis 1-2.2 cm. longis; foliola oblonga vel ovali-ovata acuta repando-crenulata (dentibus ca. 22-jugis deltoideis obtusissimis) membranacea pennivenia (venis lateralibus ca. 11-jugis subtus prominentibus, venulis subobscuris) supra juventate canescenter tomentula submaturitate saturate viridia ubique minute patenterque puberula in costa breviter pilosula subtus juventate canescenter tomentula submaturitate obscure viridia ubique subsparse patenti-puberula in costa et venis sordide puberula 6-9 cm. longa 3-4.1 cm. lata. Flores aurei speciosi in axi sordide tomentulo multifloro 6-10 cm. longo fasciculato-racemosi, fasciculis oppositis 3-4-floris; racemus ca. 12 cm. diametro; bractee ovatae flavidae membranaceae deciduae 1.8 cm. longae; pedicelli 6-10 mm. longi sordide tomentelli. Calyx campanulatus tenuiter membranaceus flavus nervosus tomentellus maturitate subglabratus 2.2 cm. longus, dentibus 5 deltoideis acutis 4-5 mm. longis. Corolla 6.5-7 cm. longa extus plus minusve tomentella tenuiter membranacea; tubus ca. 8 mm. longus; fauces anguste campanulato-infundibulares ca. 4 cm. longae; limbi lobi 5 quadrato-suborbiculares margine crispatis ca. 2.5 cm. longi 2.2 cm. lati.

Discus crassus annularis brevis. Stamina 4 perfecta apice tubi inserta, staminodio 4 mm. longo subulato adjecto; filamenta glabra 1.2 et 1.9 cm. longa; antherae glabrae, locellis 2.5 mm. longis. Pistillum 3 cm. longum; ovarium sulcatum minute tomentellum; ovula in quoque loculo 2-seriata. Fructus (valde imperfectus) ligulatus brunneus costatus lucens obscure puberulus ca. 2.5 dm. longus 1.4 cm. latus. — VENEZUELA: between La Boca and Alta Gracia, 1 May 1917, *Curran & Haman 737* (TYPE in Gray Herb.); vicinity of Alta Gracia, 1 May 1917, *Curran & Haman 737 A, 737 B*. — A beautiful and distinct species. According to Mr. Curran, the tree is covered before the leaves appear with great masses of yellow flowers, soon falling and succeeded by the leaves.

DIANTHERA pleurolarynx Blake, sp. nov. Herbacea (basi invisā) ramosa, caule aetate tereti glabro cortice canescente tecto, ramis viridibus bilineatim incurvo-pilosulis dense cystolithigeris, internodiis folia multo superantibus. Folia opposita lanceolata vel ovato-lanceolata plus minusve curvata longe acuminata basi rotundata integerrima pennivenia (venis conspicuoribus 3-6-jugis) supra saturate viridia cystolithigera in costa incurvo-hispidula ceterum glabra subtus pallidius viridia dense cystolithigera in venis sparse hispido-pilosa ceterum glabra majora 4-7 cm. longa 1-2 cm. lata; petioli incurvo-hispiduli vix marginati 3-4 mm. longi. Spicae caulem et ramos terminantes solitariae vel binae demum interdum pseudo-axillares simplices tenues 6-12.5 cm. longae, in pedunculis bifariam et sparse hispidulis 1.5-3.2 cm. longis; flores per paria dissiti vel subapproximati sessiles. Bractea et bracteolae e basi ovata subulato-acuminatae supra sparse patenti-hispidulae ca. 4.5 mm. longae. Calyx 4-partitus 6 mm. longus, laciniis aequalibus lineari-subulatis attenuatis sparse hispidulis. Corolla valde bilabiata 9 mm. longa extus subsparse patenti-pilosula, parte tubulosa 3.5 mm. longa; labium superius ovatum obtusum integrum intus ad apicem 2-lamellatum, intus ad basin staminum pilosum; labium inferius multo majus et longius 3-lobum, lobis lateralibus deltoideo-rotundatis, medio quadrato-rotundato vix longiore, palato plicato-lamellato papilloso. Stamina 2: filamenta glabra 3 mm. longa; antherarum loculi mutici aequales 1 mm. longi in connectivo dilatato valde dissiti, altero suberecto in dorso pubescente altero valde obliquo glabro. Capsula clavata acutiuscula glaberrima 10 mm. longa tetrasperma. Semina dense papilloso-

tuberculata ad 1.7 mm. longa. — VENEZUELA: common herb, alt. 60 m., Puerto Cabello, 14 June 1917, *Curran & Haman* 1145 (TYPE in Gray Herb.).

OXYCARPHA Blake, genus nov. *Helianth.-Verbesin.* Capitula homogama discoidea, floribus omnibus hermaphroditis fertilibus. Involucrum breve campanulatum, phyllariis coriaceis induratis in mucronem subulatum recurvatum attenuatis sub-2-seriatis inter se basi connatis achenia foveatis, bracteolis paucis subulatis in mucronem erectum attenuatis apice pedunculi fistulosi adjectis. Receptaculum acute conicum, paleis coriaceis in mucronem recurvatum vel erectum spiniformem attenuatis firmis persistentibus phyllariis similibus onustum. Corollae regulares glabrae, tubo brevi, faucibus cylindraceutis paullo longioribus, limbo 5-dentato dentibus oblongo-lanceolatis curvato-patentibus fauces subaequantibus. Antherae basi sagittatae, apice appendice lanceolato-ovata donatae. Styli rami breves oblongi apice appendice brevi triangulari obtusa breviter hispidula muniti. Achenia obovato-oblonga lateraliter compressa sed incrassata sub-10-costata truncata nigra minutissime rugulosa basi pilis paucis praedita ceterum glabra. Pappus coroniformis crassus crustaceus albidus subinteger in angulo interiore in aristam attenuatus. — Herba halophila perennis pluricaulis glaberrima caulibus procumbentibus interdum ad nodos radicanibus, foliis oppositis linearibus integerrimis crassis utrinque complanatis basi connatis, capitulis terminalibus et axillaribus solitariis, pedunculis nudis fistulosis, floribus albis. — TAB. I. FIG. 8-14.

OXYCARPHA suaedaefolia Blake, sp. nov. Glaberrima pluricaulis e basi brevi lignosa, radicibus subulato-filiformibus, caulibus brunneis, internodiis 1-2.4 cm. longis. Folia linearia 1-nervia apice obtuse subulata 1.8-3.8 cm. longa 0.7-1.2 mm. lata. Pedunculi 2-2.5 cm. longi striatuli supra fistulosi. Capitula ca. 1 cm. alta 1 cm. diametro conico-subhemisphaerica, in alabastro cum paleis valde echinata. Involucrum ca. 4-5 mm. altum; bracteolae exteriores ca. 6 subulatae subherbaceo-coriaceae in mucronem attenuatae 3.5 mm. longae. Corollae ca. 3 mm. longae; tubus ca. 0.5 mm. longus; fauces 2 mm. longus; dentes 1.5 mm. longi plus minusve recurvati. Paleae carinatae lanceolatae coriaceae in mucronem attenuatae 5-6 mm. longae, extimae phyllariis similes

interiores paullo tenuiores mucronibus saepissime rectis. Achenia 2 mm. longa. Pappi corona 0.4 mm., cum aristo 1 mm. longa. — VENEZUELA: in sand dune valleys, Vela de Coro, 1 April 1917, *Curran & Haman* 440 (TYPE in Gray Herb.) and 440A.

Notwithstanding the remarkable character of the involucre, which is made up of coriaceous phyllaries somewhat united among themselves and to the receptacle so as almost to enclose the outer achenes, I believe that this very distinct new genus should be placed in the subtribe *Verbesininae* immediately before *Spilanthes*, with which it shows many marks of affinity.

SPILANTHES URENS Jacq. var. **megalophylla** Blake, var. nov. Robusta 3 dm. alta paucifoliata, caule sparsissime pubescente; folia ovali-lanceolata utroque acuminata integra quintuplinervia in basi petioliformi ciliata ceterum glabra vel subtus in costa pilis paucissimis praedita media et superiora 7.8–11.3 cm. longa (basi inclusa) 1.6–2.8 cm. lata, inferiora minora ovalia obtusa; pedunculus 2–2.3 dm. longus; capitulum discoideum conico-hemisphaericum obtusum 1.1–1.3 cm. altum 1.1–1.4 cm. diametro; phyllaria ca. 14; corollae albae; achenium ciliatum biaristatum. — VENEZUELA: Pedernales, 16 July 1917, *Curran & Haman* 1311 (TYPE in Gray Herb.). — Local name "Escorbuto" (i. e., "Scurvy"-plant). Rather distinct in appearance from typical *S. urens* Jacq., but without any difference which I can discover in essential characters.

SIMSIA grisea Blake, sp. nov. Frutex ramosus. Caulis subtennis aetate glabratus cortice cano tectus; ramuli dense hispidulo-pilosuli et hispido-pilosi pilis patentibus vel retrorso-patientibus basi saepius glandulari-tuberculatis etiam stipitato-vel sessiliglandulosi. Folia omnia opposita triangulari-ovata integra (supremis prope basin profunde trilobatis exceptis) acuminata basi breviter cuneata dentato-serrata (dentibus ca. 17-jugis deltoideis acutiusculis) 3-nervia supra obscure viridia aspere hispidula (pilis incurvis basi glandulari-tuberculatis) subtus juventate subcanescentia maturitate griseo-viridia dense submolliterque hispidopilosa (pilis curvato-patientibus basi parum glandulari-tuberculatis) et stipitato-glandulosa demum parum aspera 4.5–7 cm. longa 2.5–4.8 cm. lata; petioli sicut caulis pubescentes et glandulosi immarginati 1–1.7 cm. longi basi connati et saepius in discum foliaceum ca. 2 mm. latum dilatati. Panicula valde immatura ca.

10-capitata ca. 1.4 cm. alta 2.4 cm. lata. Capitulum valde immaturum oblongo-subhemisphaericum 7 mm. altum 4.5 mm. diametro. Involucrum immaturum ca. 4-seriatum valde gradatum 7 mm. altum; phyllaria extima ovali-ovata interiora oblongo-ovata omnia sicca pallida ad apicem virescentia 3-5-nervia breviter acuta dense glanduloso-hispidula (sed omnino non canescentia) in costa plus minusve hispido-pilosa ad apicem hispido-piloso-ciliata 2-2.5 mm. lata. Radii 5 ovales flavi; corollae disci flavae basi et apice hispidulae. Achenia immaturissima ciliata biaristata. — VENEZUELA: shrub growing in dense patches, Guanta, 1 July 1917, *Curran & Haman* 1226 (TYPE in Gray Herb.). — Of particular interest as affording the first Venezuelan record for this genus. *Simsia grisea* belongs to the closely related group consisting of *S. Sodiroi* (Hieron.) Blake, *S. pastoensis* Triana, *S. pubescens* Triana, and *S. fruticulosa* (Spreng.) Blake. The first two differ from *S. grisea* in their canescent-pilose involucre, *S. pubescens* in its narrower lance-ovate leaves and subcylindric heads, and *S. fruticulosa* in its appressed stem-pubesence and unlobed leaves.

VERBESINA (§ *Saubinetia*) **phlebodes** Blake, sp. nov. Frutex ramosus. Caulis crassus parum lentiginosus cortice griseo tectus; rami crassi lignosi juventate strigilloso aetate glabrati subteretes cicatricibus trilobatis 3-porosis conspicuiter notati. Folia alterna conferta ovata vel ovalia apice acuta basi in petiolum marginatum basi breviter biauriculatum cuneato-rotundata crasse chartacea crenato-serrata (dentibus 13-17-jugis depressis obtusis et obtuse calloso-mucronulatis) pennivenia supra venis (ca. 15-jugis, eis petioli inclusis) vix prominentibus venulis obscuris subtus valde reticulato-venosis et -venulosis venis et venulis valde prominentibus, utrinque lutescenti-viridia vel aetate supra obscure subtus pallide viridia supra aspere strigillosa pilis basi glandulari-tuberculatis subtus densius incurvo-hispidula pilis basi glandulari-tuberculatis, lamina 5-7.5 cm. longa 3-4.2 cm. lata petiolo foliaceo-marginato 2-4 cm. longo 4-10 mm. lato basi vix dilatato parum biauriculato. Capitula ca. 12 mm. lata in paniculas cymosas ca. 5-cephalas terminales folia aequantes vel paullo superantes disposita; pedicelli dense incurvo-hispiduli 8-25 mm. longi nudi vel 1-2-bracteolati; discus hemisphaericus 6-7 mm. altus 6.5- (fructu) 14 mm. diametro. Involucri biseriati inaequalis 4-5 mm. alti phyllaria appressa herbacea anguste oblonga vel oblongo-

lanceolata obtusa vel acutiuscula apice obscure callosa strigilosa vel hispidula. Corollae radii 5 flavae fertiles, lamina deltoideo-cuneata ad medium trilobata 5 mm. longa lataque dorso glabra; eae disci ca. 30 ut videtur albidae infra hispidulae 4.2 mm. longae (tubo indistincto 1.2 mm., dentibus 1 mm. longis). Paleae subscariosae acutae hispidulo-strigillosae 6.5 mm. longae. Achenia radii trigona obscure alata; ea disci nigra sparse minuteque strigilosa 5.5 mm. longa 4 mm. lata (alis albidis ciliolatis ad 0.7 mm. latis inclusis). Aristae ciliolatae ca. 2.7 mm. longae. — VENEZUELA: Cerro Santa Ana, Paraguana Peninsula, 7 April 1917, Curran & Haman 517 (TYPE in Gray Herb.). — The closest ally of this species is probably *V. densifolia* Blake of Colombia.

IV. NEW PLANTS FROM OAXACA

BY S. F. BLAKE

THE new species here described were included in a small collection of plants made in extreme southern Oaxaca, Mexico, in the spring of 1917 by Professor C. Conzatti and his assistants, Messrs. Reko and Makrinius, which was recently forwarded by Professor Conzatti to the Gray Herbarium for identification.

IREFINE *Herrerae* Conzatti & Blake, sp. nov. "Frutex 3 m. altus" dioicus. Folia (inferiora vel media) elliptico-lanceolata utroque acuta vel subacuminata prope apicem subabrupte breviterque contracta acuminata parum sinuata integra pergamentacea utrinque glaberrima viridia sicc. saepius obscurantia pennivenia (venis lateralibus majoribus 12-jugis apice curvato-anastomosantibus utrinque prominulis) 2.5–3.3 dm. longa 7.5–9.7 cm. lata, in petiolis nudis glaberrimis 2.5 cm. longis; suprema (eis in basi paniculae solum visis) similia sed multo minora (9–13 cm. longa 3–4.5 cm. lata, in petiolis 1–1.5 cm. longis). Panicula ovoideo-pyramidalis 2.7 dm. longa 2.6 dm. lata, axi et ramis recte patentibus nigrescentibus glaberrimis, ramulis 5 cm. longis vel minoribus, spicis 3–6 mm. longis 2–3 mm. crassis. Bracteae suborbiculares obtusae vel late rotundatae scariosae alidae 0.5 mm. longae lataeque basi breviter pilosae pilis albis intricate intertextis; bracteolae similes 1 mm. longae lataeque. Flores 1.5 mm. longae; sepala ovata obtusa obscure 1-venia scariosa ca. 1 mm. longa, glabra vel basi piloso-lanata, stipite lanato-piloso pilis albis flores

triplo superantibus flexuoso-intricatis; ovarium subglobosum parum compressum ca. 0.5 mm. longum; stylus brevissimus, stigmata ad 0.4 mm. longa. Fl. ♂ desunt. — OAXACA: Rio Concordia, Dept. Pochutla, 600 m., 23 April 1917, *Conzatti, Reko, & Makrinius* 3194 (TYPE in Gray Herb.). — The species, which is very distinct in characters of foliage and inflorescence, is dedicated to the well-known Mexican naturalist, Professor Alfonso L. Herrera, Director of Biological Studies in Mexico. Only the panicle and apex of the stem and two of the stem leaves have been examined.

IREFINE laxissima Blake, sp. nov. Caulis herbaceus tenuis hexagonus viridis papillosus glaber, ramulis novellis canescenti-pilosis. Folia saepius opposita ovata vel lanceolata acuminata basi cuneata vel rotundata integra tenuia supra juventate appresse pilosa maturitate sparse (in costa et margine subdense) appresse puberula subtus in costa sparse puberula margine ciliolata ceterum subglabra pennivenia (venis ca. 7-jugis subtus prominentibus) 4–6.5 cm. longa 1.5–2.4 cm. lata, in petiolis subnudis pilosis 4–6 mm. longis. Rami floriferi axillares laxe patentes vel curvati usque ad 2 dm. longi glabri angulati nudi basi ramosi, ramulis 1.3 dm. longis vel brevioribus, spicis 3–7 mm. longis 2–3 mm. diametro. Bractee suborbiculari-ovatae breviter (ca. 0.05 mm.) acutatumucronulatae scariosae basi ima pilosae 0.8 mm. longae; bracteolae similes ad apicem 1-nerviae longius mucronatae (mucrone ca. 0.15 mm. longo) basi pilosae 1.4 mm. longae. Flores perfecti 1.7 mm. longi; sepala oblongo-ovalia apice obtusa vel rotundata et parum cucullata 3-nervia viridescenti-scariosa basi pilosa, pilis sepala aequantibus vel dimidio longioribus; stamina 5, filamentis basi in anulum connatis, staminodiis nullis; ovarium turbinato-subglobosum; stigmata stylum duplo superantia. Semen brunescens 0.7 mm. diametro. — OAXACA: Rio Concordia, Dept. Pochutla, 600 m., 23 April 1917, *Conzatti, Reko, & Makrinius* 3166 (TYPE in Gray Herb.). — Related to *I. angustifolia* Euphrasén (see Standley, N. Am. Fl. xxi. 157), but with obsolete staminodia, much shorter acumina to the bracts, and obtuse sepals.

AMYRIS Reko Blake, sp. nov. Arbor vel frutex glaberrimus; rami tenues glabri cortice canescenti-brunneo lenticellato tecti, novelli obscure virides glabri. Folia alterna unifoliolata, foliolo lanceolato-ovato acuminato basi cuneato vel cuneato-rotundato

integro utrinque glabro dense pellucido-punctato firme sed non crasse subcoriaceo pennivenio (venis majoribus ca. 11-jugis subtus prominulis apice curvato-anastomosantibus) 6.7–11.5 cm. longo 2.4–4 cm. lato, in petiolo 1.4–2.3 cm. longo (petiolulo incluso) nudo glabro. Paniculae terminales pyramidatae 2.5–4.3 cm. longae 1.5–4.3 cm. latae glabrae, in pedunculis 1 cm. longis vel brevioribus; bracteae subulatae 1 mm. longae vel breviores; pedicelli usque ad 1–2 mm. longi. Calyx ca. 0.7 mm. longus, segmentis 5 ovalibus vel deltoideo-ovalibus obtusis vel rotundatis. Petala 5 cuneato-obovata apice rotundata 1-nervia reflexa albida 1.5 mm. longa 0.7 mm. lata. Stamina 10 alterna longiora, filamentis 1 et 2.2 mm. longis. Ovarium subglobosum glabrum, stigmatate subsessili, gynophorio conspicuo. Drupa cyaneo-nigra subglobosa 5 mm. diametro. — OAXACA: Cafetal Nueva Esperanza, Dept. Pochutla, 700 m., 17 April 1917, *Conzatti, Reko, & Makrinus* 3102 (TYPE in Gray Herb.). — Most nearly related to *A. simplicifolia* Karst., but with much longer and comparatively narrower leaflet. *E. W. Nelson* 4237, from the Tres Marias Islands, 1897, is closely related to *A. Rekoii* and perhaps identical.

GUAREA **Makrinii** Blake, sp. nov. Frutex vel arbor, ramo ad manum apice fusco-olivaceo striato obscure strigilloso. Folia alterna foliolis 2–3-jugis, petiolo supra parum sulcato appresse sordideque puberulo subtus rotundato subglabro 1.8–4.3 cm. longo, rachi 5–7.5 cm. longa plumula abortiva terminata; foliola ovalia vel obovato-ovalia apice obtusa basi inaequaliter cuneata integra supra ad basin costae sparsissime hispido-pilosa ceterum glabra reticulata venis (8–11-jugis) et venulis prominulis subtus vix pallidiora similiter reticulata in axillis venarum barbata ceterum glabra, terminalia 9–10.5 cm. longa 3.5–4.5 cm. lata, inferiora minora, infima 5.7–7.2 cm. longa 2.8–4.2 cm. lata, in petiolulis 2 mm. longis. Paniculae axillares dupliciter ramosae strigillosae 2.5–3.5 cm. longae lataeque (pedunculo 1 cm. longo vel brevior); bracteae triangulares 1 mm. longae vel breviores; pedicelli 1–2 mm. longi. Calyx ca. 1 mm. longus obscurissime 4-dentatus sparse hirtellus. Petala 4 oblongo-ovalia obtusa margine papillosa et sparse ciliolata 4 mm. longa 2.5 mm. lata. Tubus staminum glaber 3 mm. longus 8-andrus, antheris intra tubum ad apicem inter denticula gemina sessilibus glabris. Ovarium glabrum subglobosum; stylus brevis; stigma subcapitatum. — OAXACA: Cafetal Concordia,

Dept. Pochutla, 600 m., 6 May 1917, *Conzatti, Reko, & Makrinius* 3244 (TYPE in Gray Herb.). — Local name "Ocotillo blanco." — The genus is represented by so few authentic specimens in the Gray Herbarium that it is difficult to determine the alliance of this species, but it seems distinct from any described form.

TRICHILIA (*Eutrichilia*) ***oaxacana*** Blake, sp. nov. Arbor vel frutex. Folium ad manum abrupte pinnatum foliolis 4-jugis, petiolo supra parum complanato obscure puberulo subtus rotundato subglabro 7.5 cm. longo, rachi 13.5 cm. longa; foliola parum inaequaliter ovalia vel obovato-ovalia subabrupte acuminata (acumine 1.3 cm. longo vel brevior apice obtuso) basi rotundata vel cuneato-rotundata integra supra maturitate glabra subtus vix pallidiora pennivenia (venis 12–16-jugis ut costa flavescens prominentibus sparsissime puberulis), terminalia opposita 13.5–14.5 cm. longa 5.6–5.9 cm. lata, inferiora sensim minora plus minusve alterna, in petiolulis 2–4 mm. longis. Panicula pyramidata obscurissime fusco-strigillosa 1.6 dm. longa 1 dm. lata, ramis adscendentibus, pedunculo 11.5 cm. longo; bractee minimae lanceolatae; pedicelli ca. 2 mm. longi. Calyx 5-dentatus strigillosus et ciliolatus 1 mm. longus, dentibus triangularibus acutis. Petala 5 oblongo-ovalia vel -subobovata apice oblique obtusa sparse puberula et ciliolata erecta 3.5 mm. longa 1.5 mm. lata. Stamina 10, filamentis intus et in margine pilosis per $\frac{2}{5}$ longit. connatis, antheris ovato-lanceolatis obtusis margine pilosis 0.5 mm. longis. Pistillum stamina aequans; discus depressus carnosus glaber; ovarium dense hirsutum subglobosum 2-loculum; stylus brevis sparse pilosus; stigma capitatum; ovula in loculis 2 collateralia. — OAXACA: Cafetal Concordia, Dept. Pochutla, 600 m., 12 May 1917, *Conzatti, Reko, & Makrinius* 3221 (TYPE in Gray Herb.).

COMOCLADIA ***repanda*** Blake, sp. nov. Frutex vel arbor. Folia pinnata 4 dm. longa, foliolis 9 (2–6 minimis infimis plus minusve deciduis adjectis); petiolus ca. 4 cm. longus, rachi 3 dm. longa striata subtereti striatula ad bases foliolorum sparse breviterque pilosa ceterum subglabra; foliolum terminale cuneato-obovatum basi acuminatum in petiolulo nudo 1.8 cm. longo insidens, lateralia elliptica vel elliptico-oblonga vel -subobovata basi inaequaliter cuneata vel rotundata in petiolulis 1–2 mm. longis, omnia leviter obtusissimeque repanda apice subtruncata pergamentacea supra saturate viridia subtus vix pallidiora parum reticulata (venis

majoribus ca. 11-jugis complanatis, venulis anastomosantibus non prominulis) utrinque glabra (costa sparse pilosa excepta) 5–11 cm. longa 3.7–6.7 cm. lata. Panicula ovoideo-pyramidata 3.4 dm. longa ca. 2 dm. lata (pedunculo 4 cm. longo incluso) subsparse sordido-pilosula, ramis patentibus vel adscendentibus, ramulis 4 cm. longis vel brevioribus, floribus in spicis subglobosis saepius 2–3 mm. longis latisque aggregatis. Flores 4-meri rarius (abnormaliter?) 5-meri. Sepala suborbiculari-ovata obtusa puberula viridia 0.8 mm. longa. Petala late ovata apice rotundata glabra purpurea saturatius purpureo-pennivenia 1.5 mm. longa 1.3 mm. lata. Stamina 4 glabra petalis multo breviora. Discus patens valde 4-lobus. Ovarium glabrum, stylo brevissimo. Fructus ellipsoideus subteres vel compressus 1.2–1.9 cm. longus. — OAXACA: Cafetal Concordia, Dept. Pochutla, 600 m., 11–14 April 1917, *Conzatti, Reko, & Makrinius* 3026, 3095 (TYPE in Gray Herb.). — Local name “Palo fatatían or Fatatil.” — Most nearly related to *C. platyphylla* A. Rich. of Cuba, which has leaves of similar shape and texture but with mucronate teeth.

ASTRONIUM Conzattii Blake, sp. nov. Frutex vel arbor dioica, cauli (vel ramo) apice fusco glabro. Folia alterna pinnata ca. 1.7 dm. longa, foliolis 9–11; petiolus teres patenti-pilosulus vel subglabratus 3.5–4.5 cm. longus, rachi 7–8 cm. longa molliter patenti-pilosula, petiolulis similiter pilosulis 3–5 mm. longis; foliola 4–5-juga opposita vel parum alterna ovata inaequalilatera breviter acuminata (apice supremo obtuso) basi oblique rotundata vel obscure subcordata obscure serrulata supra subsparse subtus praecipue in costa et venis (ca. 11-jugis prominentibus) subdense pilosula 3.5–5.3 cm. longa 1.5–2.5 cm. lata. Panicula glabra pyramidata ca. 1 dm. longa lataque (pedunculo 7 mm. longo incluso); bracteae deciduae; pedicelli 1.5–2 mm. longi. Flor. ♂: sepala 5 orbicularia apice late rotundata imbricata glabra 1.3 mm. longa; petala 5 patentia flava oblongo-elliptica apice rotundata subintegra 2.5 mm. longa 1.5 mm. lata; discus 5-lobatus, staminibus 5 inter lobos insertis petala aequantibus; filamenta albida subulata prope apicem angustata antheris longiora; antherae in medio dorsi affixae ellipticae flavidae 1.3 mm. longae. Flor. ♀ desunt. — OAXACA: Cafetal Concordia, Dept. Pochutla, 600 m., 10 April 1917, *Conzatti, Reko, & Makrinius* 3051 (TYPE in Gray Herb.). — Local name “Zangolica-sangolico.” — No species of

the genus has hitherto been recorded from north of the Isthmus of Panama. Nevertheless, the species here described is so closely in agreement with the South American species, particularly *A. Planchonianum* Engl., in leaves, pubescence, and details of the staminate inflorescence, that I have no hesitation in considering them congeneric. From the previously described species *A. Conzattii* is distinguished by the shape, size, and pubescence of its leaflets.

MYGINDA oxyphylla Blake, sp. nov. Frutex vel arbor ramosa. Rami seniores subteretes cortice laete brunneo glabro lenticellato tecti, novelli olivaceo-virides quadrangulares glabri. Folia opposita vel interdum alterna lanceolata vel ovato- vel elliptico-lanceolata acuminata basi acute inaequaliterque cuneata obscure crenulato-serrata dentibus mucronulatis appressis supra saturate viridia subtus paullo laetius viridia utrinque glabra infra paullum venosa (venis 5-6-jugis paullum prominulis curvato-anastomosantibus) 4.5-7.5 cm. longa 1.2-2.5 cm. lata, in petiolis supra subcomplanatis submarginatis 3-5 mm. longis. Paniculae axillares saepius pseudo-terminales dichotome divaricateque ramosae usque ad 7.5 cm. longae 8.5 cm. latae (pedunculo 1.2-3 cm. longo incluso), ramis et ramulis filiformibus purpurascensibus sparse puberulis, pilis patentibus basi purpureis; bractee lanceolatae acutae puberulae 2-3-glanduloso-denticulatae dentibus purpurascensibus ca. 0.5 mm. longae; pedicelli bibracteolati 1.5-4 mm. longi. Sepala 4 depresso-orbicularia late rotundata erosula glabra 0.5 mm. longa 1 mm. lata. Petala 4 late obovata apice rotundata erosula praecipue basi purpurascens glabra 1.6 mm. longa 1.2 mm. lata. Stamina 4 antise-pala, filamentis ca. 0.8 mm. longis. Discus valde 4-lobus, staminibus lobis alternis. Ovarium glabrum. Fructus asymmetricus viridis glaber verrucosus 11 mm. longus. — OAXACA: Cafetal Nueva Esperanza, Dept. Pochutla, 800 m., 17 April 1917, *Conzatti, Reko, & Makrinus* 3107 (TYPE in Gray Herb.). — Nearest to *M. macrocarpa* Brandege, which has larger leaves puberulous along the midvein beneath, smaller stricter more pubescent panicles of larger flowers, and larger fruits.

HOMALIUM trichostemon Blake, sp. nov. Frutex vel arbor. Rami tenues seniores cortice griseo glabro tecti, novelli fusci pallidolenticellati glabri. Folia alterna ovalia vel obovato-ovalia acuminata basi acute cuneata grosse crenato-serrata (dentibus 11-16-

jugis obtusis) supra obscure viridia basi sparse pilosa ceterum subglabra subtus pallidius viridia in axillis venarum (7-8-jugarum) barbatula ceterum glabra costa et venis interdum obscure puberulis exceptis reticulata venis et venulis subprominulis 8.7-11.5 cm. longa 3.3-4.5 cm. lata, in petiolis supra complanatis sordide pubescentibus subtus subglabris nudis 5-7 mm. longis. Racemi simplices axillares 6.5-7 cm. longi 1.5-2 cm. diametro, pedunculo subglabro 1.5-3.5 cm. longo, rachi griseo-puberula pilis patentibus aliis longioribus intermixtis, floribus subproximis, pedicellis 1.3 mm. longis vel brevioribus. Flores 11-13 mm. lati. Calycis tubus turbinatus dense sordideque tomentulo-puberulus pilis aliis longioribus intermixtis 4 mm. longus, segmenta 7 ovato-lanceolata acuta utrinque tomentulo-puberula et pilosa 4.5 mm. longa. Petala 7 non colorata ovalia obtusa ut calyx pubescentia 5.5 mm. longa. Glandulae antisepalae conspicuae intus concavae. Stamina 6-7 in quoque fasciculo, filamentis 4-4.5 mm. longis filiformibus e basi usque ad medium pilosis. Ovarium conicum dense hispidopilosum, stylis 3 hispidopilosis patentidivergentibus. — OAXACA: Cafetal Montecristo, Dept. Pochutla, 800 m., 11-12 April 1917, *Conzatti, Reko, & Makrinus* 3027 (TYPE in Gray Herb.). — Local name "Palo de piedra."

Of the three other species known from Mexico and Central America, *H. racemosum* Jacq. is quickly distinguished by its glabrous stamens in fascicles of 3-4, and its round-based leaves. *H. hondurensis* J. D. Sm. likewise has the stamens in fascicles of 3. The only other species, *H. senarium* DC., based on t. 293 of the Calques des Dessins of Mociño & Sessé, is described as having pedicelled flowers and stamens in fascicles of 6, and of the previously known species makes the nearest approach to *H. trichostemon*. It is represented in t. 293, however, as with very coarsely toothed leaves with truncate-rounded base and suborbicular petals. In view of these important discrepancies, and of its very imperfect description, it seems unwise to assume its identity with *H. trichostemon* merely because of the similar composition of their fascicles of stamens.

SCHISMOCARPUS Blake, gen. nov. *Loasacearum-Mentzeliearum*. — Flores 5-meri. Calycis tubus late turbinatus 10-costatus; lobi (in aestivatione vix bene visi) in fructu erecti aperti

herbacei lanceolati. Petala flava in aestivatione valde imbricata, elliptica basi brevissime connata ad basin paullulum contracta omnino non unguiculata dicenda apice rotundata. Stamina 10 basi cum petalis breviter connata 1-seriata inter se libera valde inaequalia (alterna longiora) omnia normalia, staminodiis nullis; filamenta glabra filiformia, alterna inaequalia; antherae biloculares lateraliter dehiscentes basi affixae lineari-lanceolatae obtusae. Discus subnulus. Ovarium 1-loculare paene ad medium inferum, parte libera conica acuta; placentae 5 parietales antisepalae latiusculae planiusculae sursum angustatae et steriles; ovula innumerabilia multiseriata horizontalia, funiculo lato brevi stipitata. Stylus filiformis glaber ovario longior; stigma subclavatum obscure bilobulatum. Capsula conico-ovoidea acuta stylo persistente terminata per 2/5 longit. tubo calycis adnata supra libera glabra submembranacea, e basi styli per partem liberam per fissuras 5 antisepalas dehiscens (itaque partibus superioribus sterilibus placentarum solutis apice excepto intra capsulam liberis). Semina innumerabilia minuta, in placentis multiseriata subfusiformia; testa submembranacea translucida longitudinaliter ca. 12-costata; endospermium copiosum. Embryo rectus; radícula cylindrica obtusa, cotyledones sibi aequilatas duplo superans.—Herba simplex alternifolia plus minusve carnosa scabrida e radice crassissima tuberosa, foliis alternis ovatis petiolatis duplici serrato-dentatis subtus canescentibus, panicula terminali cymosa composita, floribus flavis majuseulis.

SCHISMOCARPUS pachypus Blake, sp. nov. Radix crassissima tuberosa ca. 7 cm. diametro (e sectionibus solum mihi nota). Caulis curvatus 5 dm. altus crassus ut videtur carnosus sic nigrescens striatulus scabridus pilis densis recte patentibus apice glochidiatis ceterum laevibus. Folia alterna, inferiora decidua non visa, superiora ovata acuminata basi acute inaequaliterque cuneata dupliciter irregulariterque dentato-serrata (dentibus patentibus vel incurvis) membranacea juventate utrinque (sed praecipue subtus) canescenter submolliterque hispido-setosa et ciliata pilis attenuatis deorsum incrassatis apice non glochidiatis subtus in costa pilis glochidiatis donata demum (saltem in pagina superiore) viridia usque ad 5.7 cm. longa 2 cm. lata (sed nondum bene evoluta); petioli nudi scabridi pilis apice glochidiatis usque ad 9 mm. longi. Panicula terminalis multiflora (floribus ca. 40;

flore solitario e axilla foliorum superiorum orto in specimine ad manum etiam praesente — an normaliter?) 1 dm. alta 1.5 dm. lata nuda scabrida pilis patentibus apice glochidiatis aliis eglochidiatis admixtis, in pedunculo nudo 5.5 cm. longo; bracteae filiformes 2–3 mm. longae setosae pilis non glochidiatis; pedicelli 1.5 cm. longi vel breviores. Calycis tubus anthesi turbinatus setosus pilis aliis apice glochidiatis aliis longioribus eglochidiatis 2 mm. longus, segmenta lanceolata acuminata herbacea erecta similiter pubescentia 3 mm. longa; tubus maturitate ampliatus 10-costatus 3–4 mm. longus, segmenta 3-costata usque ad 6 mm. longa. Petala 5 flava ovalia apice obtusa basi vix contracta 8 mm. longa 4.5 mm. lata patentia basi paullum connata. Discus vix ullus. Stamina 10 omnia antherifera glabra, antisejala longiora; filamenta 3.5 et 4.5 mm. longa; antherae albae 3 et 5.6 mm. longae. Capsulae pars infera ca. 4 mm. longa, pars supera conica acuta glabra 5–7 mm. longa; stylus persistens erectus glaber 9–10 mm. longus; stigma 0.5 mm. longum. Semen 0.7–0.8 mm. longum, uno fini funiculo latiusculo brevi, altero appendice brevissima donatum. — OAXACA: Cafetal Nueva Esperanza, Dept. Pochutla, 600 m., 9 April 1917, *Conzatti, Reko, & Makrinus* 3010 (TYPE in Gray Herb.). — Local name "Camote de llama" (*camote* is a name for the Sweet Potato, and evidently refers to the thick tuberous root of the plant).

The genus *Schismocarpus* (from *σχισμή*, a cleft, and *καρπός*, fruit, in allusion to the 5-cleft free portion of the capsule) evidently belongs in the tribe *Mentzelieae* as the family is arranged by Urban & Gilg in their monograph. From *Mentzelia*, the only genus recognized in that tribe by Urban & Gilg, it differs primarily in the more than half superior ovary and the innumerable multiseriate seeds. The few stamens, unequal in size but otherwise similar, and the lack of staminodia are features less characteristic of the genus. The many-flowered pedunculate and essentially naked sympodial cymose panicle of *Schismocarpus* is moreover quite unknown in *Mentzelia*, although suggested by some species of *Klaprothia*.

CUPHEA (*Leptocalyx*) *megalophylla* Blake, sp. nov. Herbacea (basi invisae) 4 dm. alta et ultra infra inflorescentiam simplex. Caulis viridis infra subteres supra leviter 4-sulcatus subdense hispidulus pilis brevissimis retrorsis vel appressis et subdense setosus pilis longis patentibus albidis glandulosis. Folia opposita subinae-

qualiter ovalia acuminata basi cuneata in petiolum acuminata leviter crenato-sinuata chartacea utrinque scabra supra saturate viridia subdense strigillosa subsparse setosa pilis vix incrassatis demum deciduis tum lepidota subtus pallidius viridia in costa et venis patenter hispida alibi minute tuberculato-hispidula pennivenia (venis albidis conspicuis 19–21-jugis curvatis parallelis apice intra marginem laminae connexis venam intramarginalem efficientibus) 1–1.4 dm. longa 4.8–8 cm. lata, in petiolis 1 cm. longis insidentia. Panicula terminalis sessilis submultiflora 7 cm. longa 3.5 cm. lata dense canescenterque tomentulo-hispidula etiam dense setosa pilis purpureis eglandulosis 3 mm. longis; bracteae lanceolatae duae inferiores ca. 1.8 cm. longae, superiores minimae 6 mm. longae vel breviores; internodia 2 cm. longa vel breviora; pedicelli 2.5 mm. longi vel breviores. Calyx vix maturus 2.7 cm. longus basi purpurascens sursum viridescens tubulosus ad apicem paulum ampliatus intus glaber extus dense hispidulus pilis brevibus albicantibus et subdense setosus pilis longis purpureis patentibus; lobus dorsalis calycis obscurus obtusus ca. 1.5 mm. longus; dentes 6 ovati acuti ad 2 mm. longi; appendices oblongi obtusi hispiduli et apice setis 3–4 donati ca. 0.6 mm. longi; glandulae 6 magnae. Petala 2 dorsalia lanceolata acuminata glabra pallida (an matura?) ca. 1 mm. longa. Stamina 11, filamenta glabra. Discus lunulatus sulcatus. Ovarium glabrum. Ovula 9. — OAXACA: Cafetal Concordia, Dept. Pochutla, 500 m., 27 April 1917, *Conzatti, Reko, & Makrinius* 3209 (TYPE in Gray Herb.). — From *C. cristata* Rose, its only near relative, *Cuphea megalophylla* is distinguished chiefly by the rather densely setose stem, leaves, inflorescence, and calyx.

ARDISIA (Icacorea) Conzattii Blake, sp. nov. Frutex vel arbor. Ramus glaber cortice griseo tectus. Folia alterna anguste elliptico-lanceolata acuminata basi acute inaequaliterque cuneata crenulata pergamentacea supra saturate viridia subtus pallidiora pellucido-punctata et -lineolata utrinque glabra pennivenia (venis ca. 22-jugis parum prominulis prope marginem ramosis et anastomosantibus, venulis obscuris) 9–16 cm. longa 2.6–4.4 cm. lata, in petiolis glabris supra subcomplanatis immarginatis 4–13 mm. longis. Paniculae axillares pyramidatae multiflorae nudaе vel ramo imo basi bractea 13 mm. longa suffulto sordide subsparseque pubescentes pilis brevibus glandularibus 6–15 cm. longae 7–15 cm.

latae, petiolo 5–6.5 cm. longo, ramis et ramulis subpatentibus, floribus versus apices ramulorum subcorymbose dispositis; pedicelli 12 mm. longi vel breviores. Calyx 2 mm. longus paene ad basin 5-partitus, segmentis lanceolatis acuminatis nigro-lineolatis dorso sparse glandulari-puberulis margine papilloso-ciliolatis. Petala 5 lanceolata paene e basi acuminata basi brevissime connata nigro-lineata anthesi recurva utrinque subglandulari-papillosa margine papilloso-ciliolata 7 mm. longa. Stamina 5 in basibus petalorum inserta; filamenta crasse subulata glabra praecipue apice nigro-lineolata 1.6 mm. longa; antherae ovatae obtusae basi cordatae flavae 2 mm. longae. Pistillum 6 mm. longum; ovarium glabrum ad 1 mm. longum. — OAXACA: Los Naranjos, Cercanías de San Pedro el Alto, Dept. Miahuatlán, 2200 m., 16 May 1917, *Conzatti & Reko* 3285 (TYPE in Gray Herb.).

BOUVARDIA macilenta Blake, sp. nov. Fruticulus ramosus, basi invisus. Caulis tenuis cortice griseo puberulo vel glabrato tectus; rami novelli fusci dense subcanescentesque hispiduli pilis brevissimis patentibus. Folia opposita lanceolata vel ovato-lanceolata acuminata cuspidulata basi rotundata vel leviter subcordata integra supra saturate viridia sparse minuteque strigillosa vel subglabra subtus multo pallidiora flavescenti-viridia basi costae et in margine minutissime hispidula ceterum glabra pennivenia (venis lateralibus 2-jugis supra conspicuoribus) 8–11 mm. longa 2–3.5 mm. lata, in petiolis minute hispidulis ca. 0.5 mm. longis insidentia. Flores per 3–5 in apicibus caulium ramorumque corymbose disposita, in pedicellis 1–2 mm. longis. Calyx glaber 4-dentatus 2.5–3 mm. longus, dentibus (2 mm. longis) lineari-subulatis acuminatis. Corolla 2 cm. longa coccinea tubulosa sursum parum ampliata 4-dentata extus intusque glaberrima, dentibus late ovatis obtusiusculis 2.7 mm. longis. Stamina 4 anguste oblonga 3 mm. longa apicem tubi paene attingentia. Fructus subglobosus didymus glaber polyspermus ca. 4 mm. altus 4 mm. diametro. — OAXACA: Cerro El Zopilote, Dept. Miahuatlán, 2100 m., 18 May 1917, *Conzatti & Reko* 3288 (TYPE in Gray Herb.). — A species easily recognized by its glabrous scarlet flowers and minute leaves.

EXPLANATION OF TAB. 1

FIGS. 1-7. *Aphanostephus (Pappophanus) Kidderi* Blake.

Fig. 1. Portion of plant, $\frac{1}{2}$ nat. size. Fig. 2. Head, the rays mostly removed, $\times 2$. Fig. 3. Ray-flower, $\times 5$. Fig. 4. Disk-corolla, $\times 5$; a, enlarged apex of tooth to show papillose crest. Fig. 5. Disk-achene, $\times 10$; a, cross-section; b, awn of pappus; c, hairs of achene, enlarged. Fig. 6. Style-tip, $\times 10$; a, apex of style-branch, enlarged. Fig. 7. Androecium, $\times 10$.

FIGS. 8-14. *Oxycarpha suaedaefolia* Blake.

Fig. 8. Plant, $\frac{1}{2}$ nat. size. Fig. 9. Vertical section of head, $\times 2$. Fig. 10. Disk-corolla, $\times 5$. Fig. 11. Pale, $\times 5$. Fig. 12. Achene, $\times 5$; a, cross-section. Fig. 13. Style-tip, $\times 10$; a, apex of style-branch, enlarged. Fig. 14. Androecium, $\times 10$.



FIGS. 1-7. *APHANOSTEPHUS (PAPPOPHANUS) KIDDERI* Blake.
 FIGS. 8-14. *OXYCARPHA SUAEDAEOFOLIA* Blake.

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A REVISION OF THE GENUS VIGUIERA

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A REVISION OF THE GENUS VIGUIERA.

BY S. F. BLAKE.

I. HISTORY

THE genus *Viguiera* of the helianthoid *Compositae*, named in honor of L. G. A. Viguier, a physician of Montpellier and author of a monograph of *Papaver*, was established by Kunth ¹ in 1820 on the single species *V. helianthoides* of Cuba, and was distinguished from *Helianthus* by its conic receptacle, "simple involucre," and pappus of two awns with several intermediate squamellae. Its affinities with *Spilanthes*, with which it was also compared by its author, are too remote to require notice in this connection. Two years later Cassini ² proposed to establish under the name *Leighia* a new "sous-genre . . . dans le genre *Helianthus*," to include the three species now known as *Viguiera linearis* (Cav.) Sch. Bip., *Helianthus angustifolius* L., and *H. microphyllus* HBK., only the first of which was autoptically known to him, and must consequently stand as the type of the name. At the same time he added ³ to his "sous-genre" *Harpalium*, founded ⁴ in 1818 on *H. rigidum*, the species *Harpalium truxillense* (*Helianthus truxillensis* HBK.) and *H. aureum* (*Helianthus aureus* HBK.). In his article on *Leighia* Cassini incidentally drew attention to the character now generally considered critical in the separation of *Viguiera* and *Helianthus* — the persistent pappus of the former, always with squamellae between the awns, and the deciduous pappus of the latter, with squamellae none or rarely present and few.

DeCandolle ⁵ in 1836 recognized the three genera, although suggesting that they might require union: "Forte *Viguiera*, *Leighia*,

¹ HBK. Nov. Gen. iv. 224. t. 379 (1820).
² Cass. Dict. Sci. Nat. xxv. 435 (1822).
³ Cass. l. c. 438 (1822).
⁴ Cass. Bull. Soc. Philom. 1818. 141 (1818).
⁵ DC. Prod. v. 578-583 (1836).

et *Harpalium* in unicum genus congreganda, sed certe inter se potius quam *Heliantho* affinia." *Viguiera*, with 13 species, was divided into two groups separated by the nature of the receptacle. All six species of his first section and three of his second are, however, identical, as long ago suggested by Dr. Gray, with the species generally known as *Viguiera helianthoides* HBK., the proper name for which as a species is *V. dentata* (Cav.) Spreng., the Cuban form (true *V. helianthoides*) being only varietally separable. Of *Leighia* 18 species were recognized. Of these only six (one of which was described under four names) are really referable to *Viguiera*, the others belonging to *Aspilia*, *Helianthus*, and *Tithonia*. *Harpalium* was divided into two sections, the only species additional to the three recognized by Cassini being *H. ? sericeum*, a Peruvian plant which proves to be identical with the species on which I have recently based the new genus *Syncretocarpus*.¹ Two species now universally referred to *Viguiera* were also given under the closely allied genus *Tithonia*.

In 1848 Gardner,² uniting *Harpalium*, *Leighia*, and *Viguiera* under the last name, distinguished the genus so formed from *Helianthus* "only . . . by the squamellae which exist between the awns of the pappus." Four sections, *Ewiguiera*, *Leighia*, *Harpalizia*, and *Harpalium*, were distinguished by features of involucre and pappus. The three latter names were misapplied by Gardner, however, and all the true *Viguiers* he describes belong to a single section (*Paradosa*) of the subgenus *Calanticaria* as here taken, being distinguished by characters of only minor importance. Of the 17 new species from Brazil described by Gardner only 7 are good species of *Viguiera*, the others being referable to *Aspilia* and *Oyedaea*. Between this date and 1873 various new species were described by Gray, Schultz Bipontinus, and Bentham, but no notes of broader scope were published on the genus.

In the *Genera Plantarum* of Bentham and Hooker³ the genus *Viguiera*, including *Leighia* Cass., *Harpalium* DC. not Cass., and *Bahiopsis* Kellogg, was placed between *Tithonia* and *Helianthus*, and distinguished from the former chiefly by features of habit and fruiting peduncle, from the latter by the presence of squamellae in

¹ Blake, Bot. Jahrb. liv. Beibl. No. 119. 49 (1916). See under *V. sericea*, p. 188.

² Gardn. Lond. Journ. Bot. vii. 395-404 (1848).

³ Benth. & Hook. Gen. Pl. ii. 375 (1873).

the persistent pappus, characters which, although leaving much to be desired, have not been improved upon or strengthened by any later worker on the genus. The species were said to be about 60 in number.

In 1881 Hemsley¹ listed 20 species of the genus, two being unnamed, from Mexico and Central America, and two years later Gray² published important notes on several species. Baker's treatment³ of 1884, in the *Flora Brasiliensis*, enumerating 29 species, is the latest general conspectus of any considerable portion of the genus to be published. Its arrangement, however, is purely artificial. Baillon⁴ in 1886, in his *Histoire des Plantes*, following out his general practice of reduction of genera in the family, united *Tithonia*, *Viguiera*, and the more distantly related *Flourensia* and *Wyethia* under *Helianthus* L. Hoffmann⁵ in 1890, in the *Pflanzenfamilien*, gave the number of species as 60-70, but contributed nothing to our knowledge of the group. More recently a considerable number of new species have been described from Mexico, chiefly by Robinson, Greenman, Brandege, and Rose, and from South America, chiefly by Hieronymus and Chodat, and in 1913 some rectification of the generic lines in this group, which had become somewhat confused, was attempted by the present writer⁶ in connection with a revision of the genus *Encelia*. The latest attempt at a redefinition of the generic line to be drawn between *Viguiera* and *Helianthus*, made by Prof. T. D. A. Cockerell,⁷ cannot be considered a very successful one. Prof. Cockerell proposes as a possible solution of our difficulties in this regard a study of the varying color-changes induced in the rays by treatment with a solution of potassium hydrate. Prof. Cockerell's observations were based on some half-dozen species of *Helianthus* and on a single species of *Viguiera* out of its total of some hundred and forty, and can scarcely be considered to promise much for a more natural classification, since he found that not even all the perennial species of *Helianthus* agreed in their response to KOH, while the annual species agreed with the single *Viguiera* (itself a perennial) and with a miscellaneous collec-

¹ Hensl. Biol. Centr.-Am. Bot. ii. 177-179 (1881).

² Gray, Proc. Am. Acad. xix. 5 (1883).

³ Baker in Mart. Fl. Bras. vi. pt. 3. 217-229. t. 66 (f. 2)-68 (1884).

⁴ Baill. Hist. Pl. viii. 46, 201 (1886).

⁵ O. Hoffm. in Engl. & Prantl, Nat. Pflanzenfam. iv. pt. 5. 235 (1890).

⁶ Blake, Proc. Am. Acad. xlix. 346-349, 374-376 (1913).

⁷ Cockerell, Torreya xv. 11-16 (1915).

tion of species from other unrelated genera—*Taraxacum* and *Tragopogon*, among others — in their reaction. The chemical reactions of plant protoplasm are undoubtedly of value in the discrimination of species of lichens, as Prof. Cockerell observes, but their use as a touchstone of critical generic values in the highest family of flowering plants is not likely to commend itself to taxonomists.

II. MATERIAL EXAMINED

The present revision owes its inception and whatever it may possess of completeness to the opportunities afforded by two years spent in study in Europe as a Sheldon Travelling Fellow of Harvard University, for which my most grateful thanks are due to the authorities having the administration of the Frederick Sheldon Fund. It is a pleasure to acknowledge the uniform courtesy shown and kindly assistance rendered by Dr. Otto Stapf and Mr. J. Hutchinson of the Kew Herbarium, Dr. A. B. Rendle of the British Museum, Dr. C. E. Moss of the Cambridge University Herbarium, Dr. H. Lecomte and Dr. F. Gagnepain of the Paris Museum of Natural History, Profs. Engler, Diels, and Volkens of the Royal Herbarium at Dahlem, Dr. C. de Candolle of Geneva, Prof. J. Briquet of the Delessert Herbarium, and M. G. Beauverd of the Barbey-Boissier Herbarium — to many of whom I am further indebted for the gift of fragments and photographs of authentic material for the Gray Herbarium. Through the kindness of Dr. J. M. Greenman and Mr. W. R. Maxon I have also been enabled to examine the material in the herbaria of the Missouri Botanical Garden and the United States National Herbarium, including many important types. To Mr. T. S. Brandegee I am under obligations for the loan of the type of *Viguiera similis*, to Dr. N. L. Britton for the loan of the type of *V. lanceolata*, and to Dr. C. A. Lindman for the transmission of fragments or tracings from the types of three species in the Riksmuseum at Stockholm. To Mr. F. Schuyler Mathews my thanks are due for his care in the preparation of the plates, and to Miss Mary A. Day for bibliographical assistance. Especial thanks are due Dr. B. L. Robinson, under whose guidance this revision has been completed at the Gray Herbarium, for his aid and advice in various critical questions, where his extensive knowledge of the Compositae has been of great service to me, and to Dr. E. C.

Jeffrey for his assistance and the use of his laboratory, in connection with some investigations in the anatomy of *Viguiera* and related genera.

III. RELATIONSHIPS AND SUBDIVISIONS

The very close relationship between *Viguiera* HBK., *Helianthus* L., and *Tithonia* Desf. has been recognized by nearly all authors, and their differences have been well summarized by Bentham. As additional species of other genera of this group have been made known, their alliance with *Viguiera* has become more evident, while other related but distinct genera have been described, until the genus *Viguiera* now stands as the focus and probable point of origin of a closely related group of seven genera. These are, in order of publication: *Helianthus* L. (1753), of about 80 species, ranging from Canada to Peru; *Tithonia* Desf. (1789), of Mexico and Central America, with about 8 valid species; *Viguiera* HBK. (1820), of some 120 species, from Nevada to Argentina; *Heliomeris* Nutt. (1848), the *Gymnolomia* of authors in great part but not of HBK., of some 36 species, ranging from Montana to Ecuador, with one species in Georgia and one in Brazil; *Hymenostephium* Benth. (1873), of 4 species, from Mexico to Colombia; *Haplocalymma* Blake (1916), a Mexican monotype; and *Syncretocarpus* Blake (1916), of two closely related Peruvian species. All of these are confined to the American continent or immediately adjacent islands, the only at all outlying forms being a variety of a Lower Californian *Viguiera* on Socorro Island, and another variety of a *Viguiera* found in Cuba, where perhaps introduced in early times from Yucatan. All these genera are so nearly related that in a broad treatment of Composite genera their union would be necessary, with the exception of *Syncretocarpus*; nevertheless they show, with the exception of *Heliomeris* (" *Gymnolomia* " of auth.), of which more will be said in the sequel, sufficiently important and constant technical characters to be retained as distinct groups whatever the scheme of classification adopted. The really intermediate species are very few, and but little advantage could follow from their union. Discussion of their relationships will be facilitated by the introduction at this point of a synoptical table of the essential characters, on the basis of which these groups are now generally separated.

PRELIMINARY KEY TO VIGUIERA AND IMMEDIATELY RELATED GENERA

- a. Achene not corky-margined, b.
 b. Pappus present, c.
 c. Involucre 2-7-seriate, of more than 5 phyllaries, d.
 d. Pappus quickly deciduous; squamellae very rarely present HELIANTHUS L.
 d. Pappus persistent; squamellae always present, e.
 e. Large herbs or shrubs, with large heads on strongly fistulose peduncles; pales stiff, abruptly acuminate, forming a prickly head in fruit TITHONIA Desf.
 e. Peduncles not swollen, or only slightly so; pales not stiff and prickly in fruit, f.
 f. Pappus of two awns and several short distinctly thinner and more scarious squamellae VIGUIERA HBK.
 f. Pappus of several rather short subequal membranous-scarious scales .. HYMENOSTEPHIUM Benth.
 c. Involucre 1-seriate, of 5 phyllaries; pappus of *Hymenostephium* HAPLOCALYMMMA Blake.
 b. Pappus none HELIOMERIS Nutt.
 a. Achene corky-margined SYNCRETOCARPUS Blake.

The most distinct of these genera is unquestionably *Syncretocarpus*, whose corky-margined fruit is something of an anomaly in the *Viguiera* group, nor is it quite the same as that of the *Verbesina* series, the genus being indeed in some degree a link between the two groups, but presumably more nearly related genetically to *Viguiera*.

The genera *Hymenostephium* and *Haplocalymma*, with the section *Diplostichis* of *Viguiera* and four species of the genus hitherto treated as *Gymnolomia* form a group so closely related in all features but the technical one of pappus-character that it seems impossible to doubt their common origin. In habit, foliage, most details of involucre, shape and pubescence of achenes, and the technical points of their androecia and gynoecia they are closely and often confusingly similar, and with the exception of *Haplocalymma*, technically distinct enough in its uniseriate 5-leaved involucre, offer no differences of more than specific value in any of these features. Between *Hymenostephium cordatum* and some forms of *Gymnolomia costaricensis*, for instance, no one has yet been able to discover the slightest difference aside from the presence or absence of pappus and, what seems here as elsewhere a character in some way linked with this, the concomitant presence or absence of hairs on the achene. All occupy portions of the same general

range — from San Luis Potosi to Colombia and western Venezuela — a fact of considerable significance in any conjectures as to their relationships. In such a case as is presented by the plants under discussion — the occurrence in a common area of several closely related groups — it is natural to suppose that the one most closely allied to some group of much wider range represents most nearly the ancestral stock, especially when as in this case the distinctive features of the other more localized groups can be considered in the light of reductions. The group of *Gymnolomia* above referred to presents this most clearly in its total lack of pappus, a feature of common occurrence in the *Verbesininae* among varieties, species, and genera which show the most certain evidence of derivation from pappus-bearing forms. The relation of three species of *Gymnolomia* (*G. microcephala* Less., *G. guatemalensis* (Rob. & Greenm.) Greenm., and *G. costaricensis* Benth.) to the Mexican and Central American species of *Hymenostephium* is so intimate that they can only be considered as derivatives of the latter or of a very closely allied ancestral stock.

The genus *Hymenostephium* Benth., as at present interpreted, is composed of three herbaceous species ranging from Mexico to Colombia, all closely related, with a single much more distinct frutescent representative in Colombia. They are distinguished from the section *Diplostichis* of *Viguiera*, which they closely resemble in all other features, solely by their pappus, which is made up of several subequal membranaceous-scarious scales of about equal length, with no distinction into awns and squamellae of different form such as is found in *Viguiera*. This type of pappus is of rather uncommon occurrence in the *Verbesininae*, and is certainly not to be looked upon as primitive. As an approach to the same condition is shown by various species of *Viguiera* — notably by the subgenus *Yerbalesia* of South America, and by *V. brevifolia* and *V. Brandegei* of Mexico, the latter a member of the section *Diplostichis* itself — it is evident that a tendency to it is of somewhat wide distribution in the genus *Viguiera*, and its occurrence in *V. Brandegei* is sufficient to make the suggested origin of *Hymenostephium* from some past or present members of the section *Diplostichis* a matter of the greatest probability. Obviously related to the fruticose *Hymenostephium angustifolium* Benth. of Colombia is *Gymnolomia Goebelii* Klatt of Venezuela, an apparently frutescent

species with much the same narrow leaves as those which distinguish *H. angustifolium*, a somewhat similar involucre, and the same prominent crustaceous carpopod (see p. 31, footnote) to the achene.¹

The monotypic genus *Haplocalymma* Blake, known at present only by two collections from Morelos, with its pappus like that of *Hymenostephium* and its uniseriate involucre, is clearly a lateral offshoot of the *Diplostichis-Hymenostephium* line, its prominent character of involucre being one shared by only a very few of the *Verbesininae*, those which have it being genera of comparatively remote relationship, while the nature of the phyllaries is rather more suggestive of some species of the section *Diplostichis* of *Viguiera* than of *Hymenostephium*.

There remain for consideration the relationships of *Helianthus* and *Tithonia* to *Viguiera*, as well as those of the species of *Gymnolomia* to the other groups here considered. *Tithonia* Desf., as now generally accepted, includes about eight species of Mexico and Central America, one or two of which have become somewhat widely naturalized. All are apparently annuals, with the exception of a single strongly woody species, and are chiefly distinguished from *Viguiera*, of which they have the persistent pappus of awns and squamellae, by the strongly swollen and fistulose fruiting peduncle. Additional characters of some significance are the broad normally three-lobed leaves, unknown in *Viguiera* or *Helianthus*, and the stiff abruptly acuminate pales of the receptacle, which in fruit

¹ The following species of *Gymnolomia* require transfer to *Hymenostephium*:

HYMENOSTEPHIUM microcephalum (Less.), comb. nov. — *Gymnolomia microcephala* Less. *Linnaea* v. 153 (1830); Greenm. Proc. Am. Acad. xxxix. 100 (1903), in part. — *Montanoa Thomasii* Klatt (1882), *Gymnolomia patens* var. *abbreviata* Rob. & Greenm. (1894), *G. patens* var. *macrophylla* Rob. & Greenm. (1899), and *Hymenostephium mexicanum* Benth. (1873) are all conspecific with *H. microcephalum*.

H. guatemalense (Rob. & Greenm.), comb. nov. — *Gymnolomia patens* var. *guatemalensis* Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 95 (1899); var. *brachypoda* Rob. & Greenm. l. c. 95. *G. guatemalensis* (Rob. & Greenm.) Greenm. Field Col. Mus. Bot. ii. 347 (1912). — *H. pilosulum* Blake (1915) is only varietally separable.

H. cordatum (H. & A.) Blake, Journ. Bot. liii. 268 (1915). — *Gymnolomia costaricensis* Benth. (1852), of which *G. patens* Gray (1861-62) is the most important synonym, is not specifically separable. — The departures from current usage indicated by the synonymy given under the three above species will receive due elaboration and explanation elsewhere.

H. Goebelii (Klatt), comb. nov. — *Gymnolomia Goebelii* Klatt in Goebel, Pflanzenbiol. Schilderung. ii. 49 (1891); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 98 (1899).

form a somewhat prickly head, least conspicuous in *T. fruticosa* Canby & Rose, which is likewise somewhat abnormal in its shrubby habit, entire leaves, and in the great reduction of the awns of the pappus. The involucre of *Tithonia*, too, of broad phyllaries subequal or distinctly graduated and either uniformly subherbaceous-submembranaceous in texture or with indurated ribbed base and herbaceous tip, is not precisely matched by any species of *Viguiera*. In all these features except the lobed leaves, however, *Tithonia* finds a close ally in four related species of *Gymnolomia* — *G. scaberrima* (Benth.) Greenm., *G. Pittieri* Greenm., *G. calva* (Sch. Bip.) Gray, and *G. auriculata* Brandegee — upon the first and third of which Schultz's genus *Mirasolia*, upheld by Bentham but now long discredited, was founded. These four species are of course technically distinguished by the complete absence of pappus, but in no other feature do they offer a distinction of more than specific worth. There is moreover a single species of *Tithonia*, *T. brachypappa* Robinson, in which different heads of the same plant, indeed different flowers of the same head, may possess the pappus typical of *Tithonia* (except for the obsolescence of the awns) or lack it entirely as in the genus *Gymnolomia*. The derivation of this group of *Gymnolomia*, which by Hoffmann in 1890 was included in *Tithonia*, from a recent Tithonioid ancestry seems accordingly very well established, and the species should be transferred to that genus.¹ Among the groups of *Viguiera*, *Tithonia* finds its nearest allies in the subgenus *Amphilepis* and the section *Hypargyrea*, both of which occur in the same region as *Tithonia*, although of considerably more restricted range. Of the two groups, all of which are perennial herbs or rarely frutescent, the closely related *Viguiera*

¹ *TITHONIA auriculata* (Brandegee), comb. nov. — *Gymnolomia auriculata* Brandeg. Zoe v. 223 (1905).

T. CALVA Sch. Bip. in Seem. Bot. Herald 305 (1856-57). — *Mirasolia calva* (Sch. Bip.) B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 168 (1881). *Gymnolomia calva* (Sch. Bip.) Gray ex Hook. & Jackson, Ind. Kew. i. pt. 2. 1076 (1893); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 103 (1899).

T. Pittieri (Greenm.), comb. nov. — *Gymnolomia Pittieri* Greenm. Proc. Am. Acad. xxxix. 101 (1903).

T. SCABERRIMA Benth. in Oerst. Vidensk. Meddel. 1852. 91 (1852). — *T. platylepis* Sch. Bip. ex B. & H. Gen. Pl. ii. 368 (1873), as syn. *Mirasolia scaberrima* (Benth.) B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 168 (1881). *Gymnolomia platylepis* Gray, Proc. Am. Acad. xix. 5 (1883); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 102 (1899). *Gymnolomia decurrens* Klatt, Leopoldina xxiii. 90 (1887). *Perimeniopsis perfoliata* Sch. Bip. ex Klatt, l. c., as syn. *Tithonia glaberrima* Ktze. Rev. Gen. i. 371 (1891), sphalm.

excelsa and *V. pachycephala* of *Amphilepis*, with *V. decurrens* of *Hypargyrea*, mark the closest approach to *Tithonia*; all three in fact have been included in that genus by such good authorities as DeCandolle and Gray. The fruiting peduncle in these two groups of *Viguiera* is however only very slightly or not at all thickened, while the leaves and pales, as well as the involucre, are of a different character, so that their separation from *Tithonia* is by no means difficult. In view of the general distribution of the two genera, the origin of *Tithonia* as a Central American offshoot of some lost Viguieroid stock related to *Amphilepis* is more than probable.

The alliance of *Helianthus* and *Viguiera* has always been recognized as a close one. As was natural, the first species of *Viguiera* which were discovered (*V. dentata*, *V. linearis*, *V. quinqueradiata*) were published as species of *Helianthus* by Cavanilles, and some later ones have been described under the same name. In general, the pappus of *Helianthus* is composed of two paleaceous and very caducous awns, while that of *Viguiera*, of two awns and several intermediate squamellae, is strongly persistent, but dubious and more or less intermediate species are not wanting. Some four species of *Helianthus* are mentioned by Gray in the Synoptical Flora in which the awns of the pappus are at least occasionally accompanied by squamellae, and two or three more have recently been added to this list by Cockerell. Most prominent of these species is *Helianthus rigidus* (Cass.) Desf., which on this account was at first elevated into a genus (*Harpalium*) by the over-analytic Cassini.¹ In this species, however, as in the others which possess squamellae, the entire pappus is quickly deciduous, and as they also have the typical habit of *Helianthus* they must be considered somewhat abnormal examples of that genus still retaining traces of their Viguieroid ancestry. There are also in Lower California and adjacent California and Mexico two species more distinctly intermediate between the two genera, being those originally described as *Encelia nivea* Benth. and *Viguiera similis* Brandegee. The former, which was twice redescribed by Gray under *Helianthus* and once under *Gymnolomia*, and has recently been again described and well figured by Rose and Standley as *Viguiera sonorae*, has

¹ *Harpalium rigidum* Cass. Bull. Soc. Philom. 1818. 141 (1818). *Helianthus scaberrimus* Ell. Sk. ii. 423 (1823). *H. rigidus* (Cass.) Desf. Cat. Hort. Par. ed. 3. 184 (1829). *Viguiera rigida* Hort. ex Gardn. Chron. N. S. xvi. 396, fig. 75 (1881). For full syn. see Gray, Syn. Fl. i. pt. 2. 274 (1884).

generally passed as *H. dealbatus* Gray. With the general habit of a *Viguiera*, but the involucre more nearly of a *Helianthus*, it has a pappus of several (3-8) variously unequal paleaceous scales, which at maturity are strongly deciduous, so that its reference to *Helianthus* seems the best disposition that can be made of it. A full account of its synonymy will be found in the list of excluded species under *V. nivea*. The other plant, *V. similis* Brandegee, has the habit and nearly the involucre of the series *Dentatae* of *Viguiera*, with a Viguieroid pappus of two awns and several short squamellae. The whole pappus, however, is absolutely deciduous from the thick and almost glabrous mature achene, and the species, although presumably a late derivative and still retaining strong evidence of its Viguieroid progeniture, seems to be more at home in *Helianthus*.

The distribution of the two genera is of considerable significance in connection with their probable evolutionary history. That of *Viguiera*¹ may be summarized as follows. With extreme northern limits in Inyo County, California, and Lincoln County, Nevada, where two species are found, the genus is represented by eight species in Lower California and adjacent California and Arizona. From western Texas, New Mexico, and Arizona, where two species are found, it extends south through all the elevated regions of Mexico, reaching its greatest diversity in the area from Durango to Oaxaca, wherein occur members of all the groups found north of the Isthmus, forming by far the richest display of diversified forms in the genus, although as many species are found in Brazil. A few scattering species of the section *Diplostichis* continue the genus to Colombia and Venezuela, where an apparent break in distribution occurs. From the mountains of Ecuador southward to Bolivia occur an increasing number of species, all belonging to one section (*Paradosa*); only three or four are known from Chile, and but few more from northern Argentina. In the mountainous areas of Goyaz, Matto Grosso, and Minas Geraes and southward to Uruguay and Paraguay occur some 47 species, representing the subgenus *Yerbalesia* and the sections *Paradosa* and *Trichophylla* of *Calanticaria*. The genus is then chiefly one of Lower California, central and southern Mexico, the mountains of Ecuador to Bolivia

¹ The statement of the range of the genus here presented is based only on its typical pappus-bearing members, which are those most closely related to *Helianthus*.

and northern Argentina, and the uplands of Brazil, Paraguay, and Uruguay.

The distribution of *Helianthus* as a genus is quite different. Of the species now known, approximately 80 in number, some 65 are found in the United States, about equally divided between east and west, a few ranging north to Canada. In Mexico and Lower California occur about eight species (excluding *H. parviflorus* HBK. and *H. mexicanus* (Walp.) Hemsl., whose status as members of the genus can scarcely be considered as sufficiently made out as yet), all of which, with the exception of *H. similis* already discussed, are represented by identical or allied species in the adjacent United States, and are therefore perhaps to be considered as immigrants from that region. None extends further south than the elevated regions of San Luis Potosi; in southern and central Mexico, where *Viguiera* displays its greatest luxuriance in species and groups, the genus is entirely absent, — the plant described by Greenman as *Helianthus oaxacanus* being a good *Viguiera* of the series *Maculatae*, — nor is it found again until the mountains of Ecuador and Peru are reached. These, the only South American species of *Helianthus*, — Philippi's Chilean species, most and perhaps all of which belong to *Viguiera*, and a few described by the older authors being disregarded as too uncertain, — are about ten in number. Although in general features for the most part very close to the *Viguiers* (subseries *Euaureae*) of the same region, they possess the typical pappus of *Helianthus*, of two quickly deciduous paleaceous awns, and are undoubtedly as truly members of the latter genus as its United States representatives. A small group of *Viguiera* from the same region (*V. lanceolata*, *V. pazensis*, and *V. Pflanzii*), closely similar in habit, has the normal pappus of *Viguiera*, but the awns and sometimes some of the squamellae tend to be more or less deciduous. These species, however, are best retained in *Viguiera*, since the deciduous character even of the awns is by no means a fixed one. At this point, however, as in the case of *Helianthus similis* of Lower California, the two genera approach one another very closely, and it is to these two groups of *Viguiera* — the subseries *Euaureae* of South America, and the series *Dentatae* (with the *Grammatoglossae*?) of Mexico and Lower California — that I am disposed to look for the points of origin of the genus *Helianthus* as we know it today. It is also possible that the series *Maculatae* of

Viguiera, most of whose species have strongly paleaceous awns in the pappus, may be related to *Helianthus*, but such a connection is scarcely indicated by any existing species.

Of all the problems connected with the genera here discussed, none is more puzzling than that presented by the genus *Gymnolomia*. The perplexing interrelationships shown by several of the species of this genus and species of *Viguiera* have already been brought to attention by Robinson and Greenman¹ in their revision of *Gymnolomia* in 1899. Before discussing the relationships of the two groups, a note as to the nomenclature of *Gymnolomia* is in order. The true genus *Gymnolomia* HBK.² (1820) was founded on four species of Colombia and Peru, all of which (with the possible exception of *G. triplinervia*, in which the pappus is unknown) have a thickened obovoid achene narrowed at both ends and bearing a short coroniform lacerate pappus. They form, in fact, a genus very closely related to *Aspilia* and perhaps identical, but of no close affinity to the *Viguiera* group. With them are apparently congeneric *G. hirsuta* Klatt and *G. Jelskii* Hieron. of the same region. *G. ? subflexuosa* (Benth.) B. & H. has proved to be referable to *Hymenostephium*; *G. cruciata* Klatt is a synonym of *Wulffia baccata* (L. f.) Ktze.; *G. serrata* Rob. & Greenm. proves to be a *Verbesina*; and a comparison of type specimens has shown that *G. decumbens* Robinson is a synonym of *G. flava* Hemsl., while the collection (*Ghiesbreght* 383) which was treated by Robinson and Greenman, following Gray, as *G. flava*, represents an allied but undescribed species. The remaining species of Robinson and Greenman's revision, with the five or six good species since published,³ form a group of some 36 species very variable in habit but all characterized by an absolute lack of pappus. On this basis, were it not for the evidence to be drawn from all their other characters, they might be retained as an

¹ Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 87-88, 101 (1899).

² HBK. Nov. Gen. iv. 217 (1820).

³ The two following species, lately published under *Gymnolomia*, are synonymous with species of other genera. — One, *G. acuminata* Blake in Rob. Proc. Am. Acad. xlix. 505 (1913), is identical with *Scleroocarpus Schiedeanus* (DC.) B. & H. var. *elongatus* Greenm. Proc. Am. Acad. xxxii. 309 (1897). The recent elevation of this variety to specific rank, as *S. elongatus* (Greenm.) Greenm. & Thompson, Ann. Mo. Bot. Gard. i. 412 (1915), is not supported by the rather extensive material in the Gray Herbarium. It may be doubted whether *S. Schiedeanus* is distinct from the earlier *S. dentatus* (Llav. & Lex.) B. & H. — The other is *G. scaposus* Brandegees, Univ. Calif. Pub. Bot. iv. 93 (1910), which, as has been indicated by Dr. Robinson, Proc. Am. Acad. xlvii. 211 (1911), is synonymous with *Iostephane trilobata* Hemsl. Biol. Centr.-Am. Bot. ii. 169 (1881).

easily definable but confessedly artificial group, to which as a generic unit the name *Heliomeris* of Nuttall (1848), based on *H. multiflora*, should be applied. The aim of generic limitations, however, is not merely to provide an easy index to our real units the species, but to indicate their true genetic relationships so far as this can be done without too great a sacrifice of clearness and precision. After long and careful study of all these groups and repeated comparisons of the related genera, I have come to believe that there are lines along which all the species of *Heliomeris* can be distributed into the genera to which they are most closely related — *Viguiera*, *Tithonia*, and *Hymenostephium* — without thereby destroying the integrity of these groups, and with a distinct gain in the expression of the natural relationships of the species concerned. Evidence that such a treatment is in accord with the natural affinities of the plants concerned is shown by the fact that the species of *Gymnolomia*, with the exceptions already noted, can be divided nearly in the order in which they stand in Robinson and Greenman's revision into groups which fall easily, and without requiring more than a very slight change in the statement of essential characters, into very natural subgenera, sections, and series already recognized among the species of *Viguiera*, *Tithonia*, and *Hymenostephium*. The significance of this fact will become apparent in the following discussion of the species in the order in which they appear in Robinson and Greenman's revision.

Gymnolomia Greggii Gray is in habit, foliage, and involucre almost the precise counterpart of *Viguiera bicolor* Blake of the series *Brevifoliae* of § *Chloracra*. The identity of involucre is especially noteworthy, inasmuch as the *Brevifoliae* are somewhat aberrant in their section in this regard. Aside from the lack of pappus and concomitant glabry of the achene in the *Gymnolomia*, there is no distinctive character of more than specific consequence to be found between the species, unless it be the dilation of the corolla-base in the *Gymnolomia*, a feature of doubtful taxonomic importance. *G. cinerascens* (Sch. Bip.) B. & H. I have never seen, and the combination of characters presented in its description is such as to leave its affinities in doubt.

G. pinnatilobata (Sch. Bip.) B. & H., *G. tripartita* Rob. & Greenm., and *G. tenuifolia* (Gray) B. & H. form a small group of low shrubby plants with more or less pinnately lobed or divided leaves, without

counterpart in this respect among the known species of *Viguiera*, and but slightly approached by *V. laciniata* Gray. The alliance of these species is indicated primarily by their involucre, of 3-4-seriate graduated lance-subulate phyllaries with slightly broadened indurated ribbed and vittate base and long loose linear herbaceous apex, which are thus identical in all essentials with those of the series *Dentatae* of Mexico and Lower California, to which *V. laciniata* above mentioned belongs. The three species of *Gymnolomia* just mentioned are found from Texas to Oaxaca, where the only species of the *Dentatae* occurring is *V. dentata* itself, an herb with entire or merely toothed leaves. It seems probable, therefore, that these species of *Gymnolomia* have been derived from some group of *Viguiera* now extinct. The next five species of *Gymnolomia* in Robinson & Greenman's enumeration, including the curiously isolated *G. Porteri* of Stone Mountain and vicinity, Georgia, with the later described *G. brevifolia* Greene, *G. nevadensis* A. Nelson, and *G. obscura* Blake, form a section which may be called, from its oldest known species, the *G. multiflora* group. They have no precise analogues in *Viguiera*, but their relationships are made clear by their receptacular pales, which have the peculiarly stiff strongly ribbed base and rather abrupt firm mucro of the series *Dentatae* of *Viguiera*. Their involucre also are of the same general type found in that series, except that the indurated and ribbed base of the phyllaries is practically wanting. It is probable that the *G. multiflora* group, like the *G. tenuifolia* group, has been derived from a group of *Viguiera* most nearly related to the *Dentatae* but now extinct.

The relationship of *Gymnolomia microcephala* Less., *G. guatemalensis* (Rob. & Greenm.) Greenm., and *G. costaricensis* Benth. to species of the genus *Hymenostephium* has already been discussed, and it must suffice to repeat here that not the slightest difference can be found between *G. costaricensis* and *H. cordatum* aside from the presence or absence of pappus and the concomitant presence or absence of hairs on the achene, while the differences in other characters between the other pairs of species are only of varietal value. *G. ? subflexuosa* (H. & A.) B. & H. of Robinson and Greenman's revision is, as I have elsewhere shown,¹ a true *Hymenostephium* (= *H. cordatum* (H. & A.) Blake) with the characteristic pappus of that genus.

¹ Blake, Journ. Bot. liii. 268 (1915).

G. canescens Robinson has the involucre and habit of the series *Dentatae* of *Viguiera*, from which it differs, aside from specific characters of foliage and pubescence, solely in the lack of pappus. *G. ovata* Gray, with *G. Liebmannii* Klatt, which I cannot distinguish specifically, is very nearly related in habit, inflorescence, foliage, and involucre to *V. sessilifolia* of the series *Grammatoglossae*, but differs in its lack of pappus. Nos. 18–20 (*G. tenella*, *G. hondensis*, and *G. triplinervia* HBK.) are three of the original species of *Gymnolomia* and as already noted form a genus remotely allied to the other species of *Gymnolomia* as heretofore taken, but closely related to *Aspilia*. *G. cruciata* Klatt proves, on examination of the good sketch and fragments of the type in the Gray Herbarium, to be identical with *Wulffia baccata* (L. f.) Ktze. (*W. stenoglossa* (Cass.) DC.). *G. quitensis* (Benth.) B. & H. is in habit and involucre a close analogue of the section *Diplostichis* of *Viguiera*, no pappus-bearing member of which is known south of Colombia. *G. Kunthiana* (Gardn.) Baker, the only Brazilian species of the genus, is unfortunately not now available for examination, but my recollection of the specimens seen at Kew and the British Museum is one of great likeness, aside from the difference in pappus, to some species of *Oyedaea* from the same region. *G. Goebelii* Klatt is as previously indicated a close relative of the somewhat isolated *Hymenostephium angustifolium* Benth. of Colombia. *G. hirsuta* Klatt, the type of which is in a very young state, possesses a coroniform lacerate pappus and belongs either to true *Gymnolomia* or to the closely related genus *Aspilia*, which it suggests in habit, but is best left in *Gymnolomia* until the fruit becomes known. *G. Parkinsonii* Hemsl. of Mexico, somewhat suggesting the remote series *Bracteatae* (*Viguiera*) of Brazil in general appearance, is easily homologized with the series *Grammatoglossae* of *Viguiera*, which occur in the same region. *G. serrata* Rob. & Greenm. is known only from a single collection with immature achenes, but these prove, when closely examined, to have a distinctly winged margin. The species must accordingly be referred to *Verbesina*, where it finds a very close ally in *V. longifolia* Gray, likewise an epappose species. There being already a valid *V. serrata* Cav., the species may be called **VERBESINA scotiodonta**, from the dark glandular teeth of the leaves.

Nos. 28 to 35 (excepting no. 31) of Robinson and Greenman's revision form a related group of mostly large-headed species with the habit, foliage, and very distinct involucre of the subgenus *Amphilepis* of *Viguiera*. At the same time they provide the most cogent argument that could possibly be adduced for the proposed amalgamation of most of the species of *Gymnolomia* with *Viguiera*, in the fact, already brought to attention by Robinson and Greenman, that two of their species (*G. decumbens* and *G. megacephala* var. *simulans*) are, omitting the achenes, absolutely identical in every detail with two species of *Viguiera* (*V. Ghiesbreghtii* and *V. pachycephala*: the latter was included by Robinson & Greenman in *V. excelsa*). Most of the other species show similar but less extreme resemblances to species of the same subgenus of *Viguiera*. Thus *G. ensifolia* is very close to *V. angustifolia* (H. & A.) Blake; *G. Ghiesbreghtii* Hemsl. and *G. hypochlora* Blake are very close to *V. buddleiaeformis*; while *G. squarrosa* and *G. latibracteata* have no very close analogues in *Viguiera*, but are clearly of the same group as the other species mentioned. The case of *G. decumbens* is especially noteworthy. This species, which proves to be identical with the type of *G. flava* Hemsl. (not of Robinson and Greenman's revision) was described from a collection (no. 3263) made by Pringle at Tultenango in the State of Mexico. The specimen of this number in the Klatt Herbarium, although so precisely similar in every feature that it might well have been cut originally from the many-stemmed root of the type in the Gray Herbarium, proved when later examined by Robinson and Greenman to have the pappus and achene-pubescence of *Viguiera*. The dissimilarities in the shape of the achenes indicated by Robinson and Greenman, however, are not borne out by the comparison of mature fruit, and the differences in their pappus and pubescence, which as has before been noted are so closely linked as to be capable of consideration as a single character, are the only ones which can be found between the two specimens. Of importance, also, as further proving that in the case of *Gymnolomia flava* (*G. decumbens*) and *Viguiera Ghiesbreghtii* we have to do not with two wonderfully mimetic or convergent species of two different genera but with individuals of the same species whose sole significant difference is due to the presence or absence of a single or two closely linked unit-characters, is the occurrence in both *G. flava* and *V. Ghiesbreghtii* of long-and-

narrow and short-and-broad leaf-forms, and of forms with longer-and-spreading and short-and-appressed pubescence of leaf and stem. The type sheet of *Viguiera Ghiesbreghtii* in the Gray Herbarium, *Ghiesbreght* 381, labelled (in Dr. Gray's hand) as from Morelia, Michoacan, bears two specimens, one with the hairs of stem and leaves longer and spreading or ascending, and a pubescent achene with the normal pappus of *Viguiera*, the other with the hairs more appressed and a glabrous epappose achene. The two specimens in the Kew Herbarium on which Hemsley's *Gymnolomia flava* was founded, although both with the glabrous epappose achene of *Heliomeris* (" *Gymnolomia* "), differ in much the same way as regards the pubescence, and although they bear a printed label signifying that they were collected by Ghiesbreght in Oaxaca, their resemblance to the types of *V. Ghiesbreghtii* is so great as strongly to suggest the suspicion that they were taken from the same colony.

The likeness between *Viguiera pachycephala* and *Gymnolomia megacephala* var. *simulans* is of quite the same nature, amounting to identity in every part but the achene. These two cases of absolute specific identity in species of the two related genera, reinforced by the fact that the nearly related species of *Gymnolomia* are (omitting achenial features) clearly identical subgenerically with the correspondingly related species of *Viguiera*, are capable of but one interpretation, viz. — that all these plants are members of the same genus, and that the presence or absence of pappus is here as elsewhere a character of no more than varietal value when unsupported by other differences. Here also is the explanation of the somewhat remarkable fact that no epappose species of *Viguiera* has ever been described, while the occasional absence of pappus in normally pappiferous species has long been recognized as of common occurrence in many closely related genera. Those who adhere to the theory on which the late Prof. E. D. Cope was wont to insist — that generic differentiation often precedes specific — will of course find no difficulty in the cases of *Gymnolomia flava* and *G. megacephala* var. *simulans*; but there seems no occasion here for such a dubious explanation of the observed facts when a much simpler one, supported by a large number of analogous cases in allied genera, will suffice.

G. sericca Klatt (no. 31) corresponds to the series *Grammatoglossae* of *Viguiera* in all its essential characters, and is in fact so closely similar to *V. grammatoglossa* DC. that the only known collection (*Purpus* 5615) beside the type was distributed under a name which is synonymous with *V. grammatoglossa*. The last two species of Robinson and Greenman's revision (*G. scaberrima* (Benth.) Greenm. (*G. platylepis* Gray) and *G. calva* (Sch. Bip.) Gray), with the later *G. Pittieri* Greenm. and *G. auriculata* Brandegee, go naturally into the genus *Tithonia*, of which they have the characteristic fruiting peduncle and the other important features.¹ The first two were in fact originally described as species of *Tithonia*, and were included in that genus by no less an authority than O. Hoffmann, as is evident from the synonymy in the *Pflanzenfamilien*.

It thus appears that the group to which the name *Heliomeris* of Nuttall applies contains, after the exclusion of extraneous forms from Robinson & Greenman's revision, some 33 species (*G. cinerascens* and *G. Kunthiana*, not available for study, being omitted), which fall readily into three main groups whose direct affinities are with the genera *Viguiera* (25 species), *Hymenostephium* (4 species), and *Tithonia* (4 species), from which they differ only in the absence of a pair of linked characters (pappus and pubescence of achene) which are shown by numerous species of not remotely related genera to be of no more than varietal or specific worth, and the artificiality of which is shown conclusively by the fact that as now applied they separate into different genera plants growing side by side and distinguished in other features literally not by the difference of a hair. It seems impossible on any grounds to defend the reference of *Gymnolomia flava* and *Viguiera Ghiesbreghtii*, *G. megacephala* var. *simulans* and *V. pachycephala*, and *G. costaricensis* and *Hymenostephium cordatum* to different genera when no specific difference can be shown between them, while the relationships of the other species of *Heliomeris* (*Gymnolomia* auct.) to other groups of *Viguiera*, *Tithonia*, and *Hymenostephium* are so close that any loss in ease of definition caused by their union should be more than compensated by the increased approach to a natural classification thereby secured.

As regards the evolution of the typical pappus-bearing species of *Viguiera*, it is difficult to speak with much assurance. The most

¹ See footnote, p. 9.

generalized and by far the largest group of species, the subseries *Euaureae*, occurs from Ecuador to Chile, Argentina, and Brazil, covering practically the whole South American range of the genus (except Colombia and Venezuela, where the two known species, both endemic, belong to the typically Mexican and Central American section *Diplostichis*), and shows in various species indications of the features which, carried to a greater extreme in certain other groups of species in various parts of its range, are taken as the basis for their separation into series, sections, and subgenera. It seems probable therefore that all these other groups confined to South America (sect. *Paradosa* and *Trichophylla* of *Calanticaria*, and subgenus *Yerbalesia*) have been derived from the *Euaureae* or a group like them. Although the pappose species of Mexico and Central America (including also the single endemic species of the United States, *V. reticulata*, and the two related species of Colombia and Venezuela) are much fewer in number (46 as opposed to 74) than those of South America, they offer a far wider range of forms; nor is there any species or group of species which shows very close connections with the South American types. Of them all only the series *Grammatoglossae* and *Dentatae* of the section *Chloracra* afford in habit and involucre any evidence of close affinity with the South American *Euaureae* and so with the probable parent stock of the genus.

On the basis of the reduction of the species of *Heliomeris* (*Gymnolomia* auct.) to the related genera, the following key to *Viguiera* and related groups is put forward as being more in accord with the true genetic affinities of the plants concerned than the one given on page 6. It will be noted that the only point of real ambiguity is in the distinction between *Viguiera* (section *Diplostichis*) and *Hymenostephium*, and that this is due to the inclusion in each group of species with calvous achenes. It is believed, nevertheless, that in this as in other similar cases in *Compositae* the apparent obliteration of generic lines by epappose species, which on other characters, scarcely capable of sufficiently precise statement for use in a key, can be definitely referred to one or other of the genera concerned, should not prevent the recognition as independent genera of groups which in their pappus-bearing forms are perfectly distinct.

REVISED KEY TO VIGUIERA AND RELATED GENERA

- a. Achene not corky-margined, b.
 - b. Involucre 2-7-seriate, of more than 5 phyllaries, c.
 - c. Pappus always occurring but quickly deciduous, of two usually paleaceous awns and very rarely short intermediate squamellae HELIANTHUS L.
 - c. Pappus persistent or none, when present always including squamellae, d.
 - d. Large herbs or very rarely shrubs, with large heads on swollen peduncles TITHONIA Desf.
 - d. Peduncles not swollen, e.
 - e. Pappus present, f.
 - f. Pappus of awns and squamellae, the former of different shape and texture from the latter and almost invariably much longer VIGUIERA HBK.
 - f. Pappus of several subequal membranous-scarious scales HYMENOSTEPHIUM Benth.
 - e. Pappus none, g.
 - g. Herbaceous perennials, or rarely annuals (then with the phyllaries strictly herbaceous); one species shrubby, with broadly ovate leaves VIGUIERA HBK.
 - g. Annuals, with the phyllaries 2-seriate, more or less indurated and ribbed at base; one species shrubby and with narrowly lanceolate leaves HYMENOSTEPHIUM Benth.
 - b. Involucre 1-seriate, of 5 phyllaries; pappus of *Hymenostephium* HAPLOCALYMMA Blake.
- a. Achene corky-margined SYNCRETOCARPUS Blake.

IV. GENERAL MORPHOLOGY

Habit (and Habitat). The species of *Viguiera* seem to be practically without exception plants of dry and usually elevated habitats. The data at hand are unfortunately too scanty to permit any significant correlation between habitat and general structure, but it may be stated in general terms that the majority of the species are mesophytic in character, a few pronouncedly xerophytic, and none hydrophytic. Most species are branched perennial herbs, a few annual, and some shrubs as much as 5-7 m. high. Occasionally the stem is simple, and rarely it is decumbent.

Roots and Rootstocks. As is the case with many other genera of *Compositae*, the underground portions of the species of *Viguiera* have generally been neglected by collectors, and are known with definiteness in not more than a third of the species. A presumably common type is that of *V. dentata* (supposed by Dr. Gray to be an annual or biennial, but shown by the abundant material now available to be clearly perennial), which has a thick or sometimes

thin and elongated root from which branch a number of tough rather slender rootlets. In other species (*V. cordifolia*, for example) the root becomes very thick, vertical, and subfusiform or napiform, being sometimes as much as 3 dm. long by 3 cm. thick. In others, as in *V. Kunthiana*, it is slender and vertical. In some South American species, such as *V. fusiformis* and *V. tuberosa*, the root is thick, woody, and tuberous, bearing a cluster of slenderly fusiform rootlets. In *V. squalida*, and probably in all its near relatives of the series *Grandiflorae*, there is a thick, short root, about 2 cm. long, bearing a cluster of slender rootlets. *V. decurrens* and some other species of Mexico have a horizontal very woody rootstock, at least 13 cm. long, bearing on the upper side the bases of old stems and on the under several thickened tuberlike roots, some of which nearly equal in size the main rootstock itself.

Stems and Branches. The stem of all *Viguieras* is normally terete in section, obscurely or distinctly striate, and usually pubescent with harsh hairs. In internal structure the stems show all gradations in various species between the very herbaceous type found in the annuals of the section *Diplostichis* and the very woody extreme found in *V. brevifolia*, in which the woody cylinder makes up nearly the whole substance of the stem and the pith is very greatly reduced.

Leaves. As in most of the large genera of *Heliantheae*, the species of *Viguiera* show great variation in the form, texture, and tothing of their leaves, when the genus is considered as a whole, while the variations in a single species may be slight or so great as to have given ground in the past for the description of several species now shown by full series of specimens to be too completely intergradient for independent recognition (see especially *V. dentata* (no. 36) and *V. deltoidea* (no. 39)). The typical or synthetic leaf of the genus may be described in general terms as ovate, acute or acutish, trip-linerved and more or less toothed. This type of leaf is shown by many of the large series *Aureae* of South America, which there is reason to believe represent most nearly the ancestral stock of the genus, as well as by many other species of various groups. Extremes of variation are found in *V. decurrens*, with sessile strongly decurrent ovate leaves, the largest in the genus, on the one hand, and on the other in the section *Trichophylla*, with strongly revolute very narrowly linear or linear-filiform leaves.

One special modification of leaf-form, frequent in the genus, deserves special mention. *V. trachyphylla* may be selected to illustrate this (see t. 3. f. 19). In this species the large opposite leaves are ovate, abruptly contracted below into a broad sessile or subsessile base about 2 cm. long and nearly as wide, and the two prominent lateral veins arise 2-3 cm. above the apparent base of the leaf-blade. This peculiar venation, in connection with the very weak submarginal nerves in the portion below the contraction, shows that the morphological blade of the leaf is the portion above it, and the part below it a broadly winged petiole only the lowest part of which is naked. A somewhat similar condition is shown by several species of this and other groups (t. 3. f. 21) and in a very marked degree by *V. rhombifolia* (t. 3. f. 20) of the related series *Grammatoglossae*. Of special interest in this connection, as furnishing a complete series of leaf-forms showing the evolution of this character, is the not very distantly related *Simsia amplexicaulis* (Cav.) Pers., a member of the same subtribe (*Verbesininae*). In this species the thin ovate leaf is in young or poorly developed forms subtruncate or cuneate at base, the two lateral veins arising from the midrib approximately at the base of the lamina, which continues as a narrow wing on the upper portion of the slender petiole, and in well developed leaves to the base of the petiole where it expands into a prominent herbaceous auricle. On the upper leaves of nearly all specimens, and on the lower leaves of some, this herbaceous margin of the petiole becomes so broad that the leaf appears to be sessile with an abrupt contraction below the middle. In the related *Simsia megacephala* Sch. Bip. this condition is a fixed one for even the middle leaves, the two prominent lateral veins arising 2-4 cm. above the apparent base of the leaf, the deltoid lamina being abruptly contracted near the level of these lateral veins into a broadly margined base (petiole) about 1.5 cm. wide above and as much as 3.7 cm. wide at base.

Inflorescence. The inflorescence of *Viguiera* is uniformly determinate, in its simplest form confined to solitary heads terminating the stem, and branches if present, by the production of axillary heads becoming obraceose, and by multiplication of heads and reduction of pedicels developing a distinctly cymose panicle. With few exceptions, which are noted in the systematic portion of this revision, the form of the inflorescence is of very little value in the genus for the recognition of groups above the species.

Involucre. Although the importance of involucre characters for systematic purposes has long been recognized, very little attention is usually paid to them in descriptions of new species, while the minuteness and relativity of the differential characters involved often render their intelligible description a difficult matter for even the most painstaking. The variations in the phyllaries¹ fall into six chief categories: (1) in absolute number; (2) in arrangement horizontally (i. e., in one, two, or more series, without reference to height); (3) in arrangement vertically (i. e., in series of equal or unequal lengths); (4) in shape; (5) in texture; and (6) in character and amount of pubescence and glandularity. The first of these, the absolute number of the phyllaries, is in *Compositae* at large a character of relatively slight importance, except in some groups with but a single main row of phyllaries, where it is often of much significance for the distinction of species. In general, however, because of the usual difficulty of obtaining precise information on this point from the mounted specimen this matter is passed over lightly in work on *Compositae*, and rightly so. It is otherwise with regard to the arrangement of the phyllaries, when as is usually the case they are in more than one row. In most cases the phyllaries are successively longer centripetally, giving what has been called an "imbricate" or "seriate" arrangement, the former term perhaps having been reserved for those cases in which the inequality was very pronounced. For the sake of definiteness, it seems advisable to use the expression "*n*-seriate" to describe an involucre whose phyllaries are in *n* rows, without prejudice to their height; to be qualified, in the normal case of centripetal increase in length, by the word graduated (Latin *gradatus*), the rarer case of centrifugal increase in height being called obgraduated, in conformity with the

¹ This term is here consistently employed for the involucre leaves, as being the best of those now in use. The often used "scale" or "bract" is not sufficiently exact in application to permit its use without some qualifying phrase, and the term "phyllary" (Latin *phyllarium*, from *φυλλάριον*, a little leaf) has the advantage over the word "tegule," recently introduced by Mr. Steele and Mr. Piper, of being already in wide use among English synanthemologists, while its definition can be found in any good dictionary. From the point of view of etymology, too, the word phyllary, suggesting at once the fundamental unity underlying the diverse manifestations of foliage and involucre leaves, seems to the writer preferable to tegule, which signifies merely a tile or covering-piece, and might better refer to the pales of the receptacle — particularly since the same term, as used in entomology, is applied to various membranous sheathing scales, such as pales always are, in contrast with the often foliaceous segments of the involucre.

terms compressed and obcompressed used for achenes. For these conditions the word graduated seems preferable to imbricated, since the latter term is commonly used in botany to refer to laterally overlapping organs of the same length. Some degree of lateral overlapping is of course so common in *Compositae* that not its presence but its absence requires comment.

The terms employed in describing the texture, shape, and pubescence of the phyllaries are those in common use for leaves and require no special notice here. It may be well to note, however, that the term ribbed is here used to denote the presence of thickened, indurated, and usually pale costae in the lower portion of the phyllary, while vittate is used to denote the presence of thin linear glands.

As the result of long-continued attempts at a natural classification of the species of *Viguiera*, I have been compelled to depend on involueral characters for the distinctions of nearly all the major subdivisions. Unfortunately it is very nearly impossible to convey in words a clear conception of differences in form and texture very noticeable when specimens are compared, and it has accordingly seemed best to give, in addition to the key to sections based largely on involueral characters, an artificial key to all the species based chiefly on more easily recognized but less fundamental differences in leaf-form, pubescence, and so forth. The underlying principle of involueral variation in the genus — that of greater or less differentiation in the phyllary between a more or less indurated and ribbed base and an herbaceous or submembranaceous or sub-chartaceous apex — will become evident in the following descriptions of the chief groups.

The subgenus *Amphilepis* (t. 2. f. 1-2) is characterized by its several-seriate involucre with the outer phyllaries herbaceous at least at apex (in two species dry and scarcely subherbaceous), and the inner especially in fruit with amplified, somewhat elongated, and membranaceous or membranaceous-chartaceous rounded tip. The common *V. excelsa* well illustrates this type of involucre, which is peculiar to this subgenus.

In the section *Hypargyrea* of *Calanticaria* the phyllaries of the slightly graduated involucre are firmly herbaceous with little evident differentiation of base and apex, except for the slight ribbing below. The section *Chloracra* (t. 2. f. 3-10), aside from some ap-

preciable but scarcely definable habitual features, is characterized mainly by its involucre. The 2-5-seriate phyllaries are, except in a few non-typical forms, distinctly divided into an ovate or oblong more or less ribbed and indurated pale base and a narrower herbaceous apex, such as is well seen in *V. dentata* (*V. helianthoides*) (t. 2. f. 8); the five series into which the section is divided are based largely on secondary modifications of this type. In the series *Maculatae* (t. 2. f. 3-4), the phyllaries are oblong or rarely lanceolate, and the strongly indurated and vittate lower portion is distinctly pallid and thinner on the margin, and (except in *V. adenophylla*) considerably longer than the herbaceous apex. *V. adenophylla*, although of this series, shows both in habit and involucre some approach to the series *Dentatae*. Through var. *latisquama* of *V. cordifolia* the otherwise distinct series *Grammatoglossae* is closely connected with the *Maculatae*. The typical involucre of the *Grammatoglossae* is few-seriate, the phyllaries lanceolate, acuminate, and subherbaceous throughout, with almost no differentiation into upper and lower regions of different texture. So it is in *V. cordifolia* var. *genuina* (t. 2. f. 6); but in var. *latisquama* (t. 2. f. 7), which differs in no other feature and is closely connected with the type by a series of intermediates, the phyllaries are in no way to be distinguished from the type just described for the *Maculatae*. A slight approach to the same condition is also observable in *V. Purpusii* and *V. grammatoglossa*.

The typical series *Dentatae* is distinguished by its peculiar phyllaries with pale, indurated, and ribbed ovate base and abruptly narrowed herbaceous tip, a form running with only minor variations throughout the whole series, although sometimes, as in *V. lanata*, somewhat obscured by a dense pubescence. Very similar, except for its narrower phyllaries, is the series *Pinnatilobatae*. The three species comprising the *Brevifoliae* (t. 2. f. 9-10), which for the rest are very distinct in habit, have a 3-4-seriate graduated involucre of mostly ovate phyllaries more or less callous-mucronulate at tip and nearly homogeneous in texture, with only slight traces of ribbing below and very obscure herbaceous apex; but in occasional specimens of *V. brevifolia* the characteristic ovate phyllary with abruptly narrowed more herbaceous tip is evident, and confirms the reference of the series to the section *Chloracra*.

In the section *Diplostichis* (t. 2. f. 11–13) the involueral characters are much as in the *Dentatae*, although the ovate tendency of the base of the phyllary is less pronounced. In *Heliomeris* (t. 2. f. 14) the 2-seriate scarcely graduated involuere is composed of strictly herbaceous mostly lanceolate phyllaries, sometimes vittate but never ribbed.

Unlike the groups so far discussed, which are represented south of Panama only by three species of sect. *Diplostichis* in Colombia, Venezuela, and Ecuador, the section *Paradosa* (t. 2. f. 15–26), including nearly half the species of the genus, is exclusively South American, with its great centers in Brazil and in the Andes from Ecuador to Bolivia. Its subdivisions, based chiefly on involueral characters almost continuously intergradient, are in some sort parallel to those of the Mexican species without ever exactly matching them, and all its species are undoubtedly of one common origin without any but a distant connection with the Mexican forms. Beginning with the series showing the simplest involueral features, the *Tenuifoliae*, we find a 2-seriate subequal involuere of lanceolate to oblong phyllaries which are subherbaceous throughout or only very slightly indurated at base in age. In the *Revolutae* (t. 2. f. 15) the 3–5-seriate involuere is distinctly graduated, and its phyllaries are more or less distinctly ribbed below, although any differentiation into base and apex of diverse texture is very obscure. A similar involuere is shown by the *Grandiflorae* (t. 2. f. 16–17). The large series *Aureae* (t. 2. f. 18–26), however, shows a gradual accentuation of the differentiation between the proximal and distal portions of the phyllaries, until in some of its species one finds a condition scarcely distinguishable from that found in the *Bracteatae*. In the group of species centering about *V. aurea* (t. 2. f. 18–19) the strongly graduated phyllaries are distinctly drier in texture at the base but not prominently indurated, and the ribbing when present is inconspicuous. In the *V. pazensis* group the situation is nearly the same, although in *V. Pflanzii* (t. 2. f. 20) and *V. lanceolata* the indurated base becomes prominent in some specimens, as it is to a greater or less degree in the *V. fusiformis* group (t. 2. f. 22). In *V. Szyszylowiczii* (t. 2. f. 21) there is very little differentiation in the phyllaries, and the general appearance is that of the Mexican series *Grammatoglossae*. *V. acutifolia* and *V. australis* (t. 2. f. 24) have lanceolate phyllaries with distinctly indurated

base and short or long slender herbaceous tip, the whole so strongly suggestive of the Mexican series *Dentatae* that for a time I was inclined to place at least *V. australis* in that group. A more careful comparative study of the species, however, has shown that its resemblance to the *Dentatae* is more apparent than real. Finally, in *V. tucumanensis*, *V. discoidea*, and *V. atacamensis* (t. 2. f. 25) there is a distinct differentiation of the phyllary into indurated base and herbaceous apex which differs only in degree from that met with in the *Bracteatae*.

In the species among the *Bracteatae* (t. 2. f. 27-31) which appear to be the most primitive, such as *V. arenaria* and *V. radula*, there is evident a strong differentiation in the phyllary into a very strongly indurated and ribbed base and an abruptly delimited herbaceous apex. In such species as *V. bracteata* (t. 2. f. 31), *V. imbricata*, and *V. oblongifolia* (t. 2. f. 28) the herbaceous tip becomes less distinct and the whole phyllary broadens, until in *V. robusta* (t. 2. f. 29) and *V. macrocalyx* the broad and blunt phyllaries are more or less indurated and vittate nearly or quite to the apex, and the herbaceous tip is obscure or almost wanting.

Closely simulating the *Bracteatae* in involueral characters, the Mexican section *Leighia* (t. 2. f. 33) exhibits the most highly differentiated phyllaries of the genus, as well as a progressive variation closely analogous to that just described for the *Bracteatae*. In *V. linearis* (t. 2. f. 33) the only common and wide-spread species, the phyllaries of the strongly graduated involucre are sharply divided into an indurated pallid base and a short herbaceous tip, the latter varying from lanceolate and acute to deltoid and obtusish. Through a reduction in height and thickness of the terminal herbaceous appendage, and extension through it to its tip of the vittae of the main body of the phyllary, particularly noticeable in the forma *lteriorifolia*, an easy passage is afforded to *V. purissimae*, in which the herbaceous apex of *V. linearis* is represented merely by a darker coloration and somewhat thinner texture; to *V. montana*, in which the extreme tip is thin, subscarious, and scarcely nerved; and to *V. Goldmanii*, in which it is thin and scarious and nearly or quite veinless, the whole involucre in fact, in the last species, being very similar to that of the genus *Calea*.

The section *Trichophylla* (t. 2. f. 32) of Paraguay and Brazil has a several-seriate graduated involucre of lanceolate attenuate more

or less callous-mucronulate phyllaries with rather strongly ribbed base and loose herbaceous apex. In the subgenus *Yerbalesia* (t. 2. f. 34), finally, the involucreal characters are much as in some species of the series *Aureae* already described.

This summary of involucreal conditions in the genus has, it is hoped, served to bring out the fact that in two distinct areas — Mexico, with Central America and the United States, on the one hand, and extra-tropical South America on the other — two groups of species, certainly separated for a long period, have developed in the evolution of their involucres very similar and often parallel sets of tendencies, although the genetic relationship between any pair of assimilated groups of the two areas is, so far as all the other characters of the plants indicate, no closer than that between much more widely different groups of the two regions. Examples of this parallelism are shown by the *V. cordifolia* group of Mexico and *V. Szyzylowiczii* of Peru, the series *Dentatae* of Mexico and *V. australis* of Peru, and particularly by the series *Bracteatae* of Brazil and Paraguay and the section *Leighia* of Mexico and Lower California.

Receptacle and Pales. The receptacle of *Viguiera* varies from flattish or slightly convex to low-conical without distinct line of demarcation, reaching its highest degree of convexity in *V. Parteri*. The importance of the form of the receptacle was exaggerated by the early botanists, especially by DeCandolle, whose conclusions often based on imperfect or unripe material have required much correction. Thus his primary division of *Viguiera* in 1836 was into "§ 1. Receptaculo acute vel obtuse conico," including six species, and "§ 2. Receptaculo planiusculo," with seven. Three of the species of his second group, however (*V. brevipes*, *V. laxa*, *V. oppositipes*), with all six of his first, are reducible to one species, *V. dentata* (Cav.) Spreng.; nor is the conical character of the receptacle in this plant really very pronounced, as compared with average species of the genus. On the whole, the apparently slight significance of variations in the shape of the receptacles in this genus, the difficulty of describing intelligibly their often slight comparative differences, and the impossibility of discovering the character of the receptacle, in many cases, without serious injury to the specimen, have led me to neglect this feature almost entirely.

The pales of *Viguiera* are normal for the *Verbesininae*, being firm, subindurated or subscariosus, nerved, usually acute and entire, sometimes 3-toothed at apex, and apparently always persist on the receptacle after the achenes have fallen.

Corollas. With a single apparent exception, *V. discoidea*, all the species of *Viguiera* have heterogamous flower-heads, with neutral ligulate ray-florets and fertile tubular disk-florets. With the exception of a form of *V. tenuis*, in which they are white, and of *V. Parkinsonii*, in which they are sometimes brownish-purple, the rays are invariably yellow, as are the disk-corollas except in *V. simsoides*, *V. Parkinsonii*, and a few other species, in which they are either purplish from the start or become so in age by a change from the normal yellow of the genus. The ligules are oval or oblong, 2-3-denticulate or subentire, and almost invariably neutral; in a very few cases I have found infertile styles on the rays, but this condition is due entirely to individual variation, is never constant in any species, and is evidently reversionary. The disk-corollas have a usually short proper tube, sometimes obscure and amplified downward so as to cap the achene, a longer usually cylindrical throat, and a 5-toothed limb; the throat has the normal nervation, of five nerves lying in the sinus and joined at apex by a submarginal nerve bordering the teeth of the limb. Both the disk-corollas and the dorsal surface of the rays are almost invariably pubescent. Where not otherwise specified in the descriptions, the color of the flowers is yellow.

Androecium. The androecium of *Viguiera*, of the usual five connate anthers with blackish pollen-sacs, mostly ovate terminal appendages, and sagittate or cordate-sagittate bases, differs in no way from that of various related genera.

Gynoecium. The style of the disk-florets bears two usually long and slender more or less recurved arms, the stigmatic lines extending to the base of the shorter or longer hispidulous and triangular terminal appendage, which is hispid dorsally like the upper portion of the back of the stigmatiferous area. There seems to be no variation of significance in the genus in this regard.

Achenes and Pappus. (See t. 3. f. 1-1-18.) The achene of *Viguiera* is ordinarily obovate-oblong, distinctly thickened with rounded or medially somewhat angled sides, and is more or less appressed-pubescent. In about twenty species formerly included

in *Gymnolomia*, however, it is almost always glabrous and more or less striatulate. In some species, particularly of the sect. *Diplostichis*, there is a prominent crustaceous basal margin or carpopod¹ to the achene, although this never reaches sufficient dimensions to be called a foot. Variations in the achenes are very slight in most cases, however, and of no more than specific importance. As is usual, the pappus presents characters of much greater significance and value than the achenes.

In the great majority of species a pappus is present, consisting normally of two slender awns at the angles of the achene and several (2-6) short usually distinct rounded and denticulate or lacerate squamellae on each side between them, the whole being very persistent. Frequently the squamellae of each side are united at base, and in some species of nearly all the groups this connation may extend to the middle or nearly to the apex of the squamellae; but in such cases there is never formed the distinct corona of proximally fused scales with more or less contracted base found in such genera as *Zexmenia* and *Oyedaca*. In one species (*V. flava* var. *papposa*) the awns are sometimes as many as six, some of the squamellae being produced into awns quite like those of the angles of the achene. In about twenty species (formerly included in *Gymnolomia*) the pappus is always lacking, the lack of pappus being almost invariably accompanied by the loss of hairs on the body of the achene. In three species of the subg. *Amphilepis* the pappus may be either present or absent.

In only one group is there a distinct departure from the typical pappus above described. In the subg. *Yerbalesia* the awns are broadened and membranous-scarious, and about equal the squamellae, which are united on each side of the achene into a many-nerved membranous scale. Were it not for the intermediate character of the pappus in *V. nudicaulis* and *V. macrorhiza*, the subg. *Yerbalesia* might well claim generic rank.

V. ECONOMIC USES AND LOCAL NAMES

Like most other genera of the *Heliantheae*, the genus *Viguiera* is of very slight economic importance. The few uses which I have

¹ This term, introduced by Beauverd in 1912 (Bull. Soc. Bot. Genève ser. 2. iv. 15) in the French form "carpopode," seems to be a convenient designation for a structure, usually obscure, which in *Podachaenium* and a few other groups becomes of generic significance.

been able to ascertain, from a study of the literature and from collectors' labels, are the following. *Viguiera decurrens* Gray is, according to Hartman, employed for the purpose of poisoning fish by the Indians of Chihuahua, who know it as "nakarori." The Mexican *V. quinqueradiata* (Cav.) Gray, according to Dugès, is called "vara blanca" (white-rod) and used for removing oil-spots, in what way is not specified. *V. hypargyrea* Greenm. is known in Durango, according to Endlich's label, as "plateada" (silvery), and its thick rootstock finds a medicinal application in disorders of the stomach. But few local names are recorded for the South American species of the genus, and no very definite uses, although some of them are presumably employed in native medicine. *V. revoluta* (Meyen) Blake is called "yerba buena" (healing herb), and also, according to Reiche, "boton de oro del monte" (gold-bud of the mountain); *V. Gilliesii* (H. & A.) Griseb., according to Hieronymus, is known as "maravilla"; *V. Weberbaueri* Blake, of Peru, is known as "suncho"; and *V. Pflanzii* Perkins, also of Peru, as "ss-akka."

VI. KEYS TO SUBGENERA, SECTIONS, AND SPECIES

The following synopsis of the subgenera and lower groups of *Viguiera* will it is hoped lead to the ready reference of the great majority of specimens to their appropriate groups, and serve as a supplement to the artificial key to species. The involucrel differences upon which it is for the most part based are in some cases minute and scarcely to be appreciated without the comparison of specimens, yet by them alone does it seem possible to divide the genus into minor groups in an approximately natural way.

SYNOPSIS OF SUBGENERA, SECTIONS, AND SERIES

Subg. I. AMPHILEPIS. Herbs or shrubs; heads medium or large; involucre 3-5-seriate, the *outer phyllaries usually subherbaceous, the inner at least in fruit with amplified and more or less elongated submembranaceous or membranaceous-chartaceous rounded apex*; pappus of 2 awns and several squamellae, or wanting. Mexico; species 1-12. Page 45.

Subg. II. CALANTICARIA. Herbs or shrubs of very diverse habit; *phyllaries in fruit not amplified into a membranous or membranous-*

chartaceous apex; pappus of 2 awns and several free or united nearly always much shorter scarious (not submembranous) squamellae, or sometimes wanting. United States to Argentina and Brazil; species 13-136. P. 59.

Sect. 1. *HYPARGYREA*. *Stout simple or subsimple perennials, with one to few large heads, and large or very large sessile lanceolate or ovate leaves sericeous or tomentose beneath; involucre 2-3-seriate, slightly graduated, the phyllaries oblong or oblong-ovate, slightly indurated below; pappus always present. Mexico; species 13-15. P. 59.*

Sect. 2. *CHLORACRA*. *Perennial herbs or shrubs; involucre 2-5-seriate, graduated or rarely subequal, the phyllaries with ovate to oblong usually strongly indurated base and narrower abruptly herbaceous apex (the latter obscure in some species), or sometimes subherbaceous throughout; pappus present or absent. United States to Guatemala; species 16-49. P. 62.*

Ser. A. *MACULATAE*. *Shrubs or rarely herbs, with paniced heads and usually scabrous ovate leaves; involucre 2-3-seriate, the phyllaries with oblong or oblong-lanceolate indurated costate and vittate pale-margined base and usually short and triangular herbaceous apex; pappus always present, the awns usually paleaceous. Mexico; species 16-22. P. 62.*

Ser. B. *GRAMMATOGLOSSAE*. *Herbs or shrubs, with mostly ovate leaves and few to many medium to large heads; involucre 2-5-seriate, the phyllaries graduated or subequal, obtuse to acute, at base obscurely indurated or merely costate and subherbaceous, the herbaceous or subherbaceous apex usually not distinctly different in texture from the base; pappus present or sometimes none. Texas to Guatemala; species 23-33. P. 68.*

Ser. C. *DENTATAE*. *Herbs or shrubs, with usually ovate entire to dentate or laciniate-toothed leaves; heads paniced; involucre 2-3-seriate, the phyllaries with strongly indurated and ribbed usually ovate or ovate-oblong base and abruptly narrowed linear or linear-lanceolate herbaceous apex; pappus rarely absent. Nevada to Honduras; species 34-42. P. 79.*

Ser. D. *PINNATILOBATAE*. *Shrubs or rarely herbs (?), with deeply pinnate-lobed leaves; involucre 2-3-seriate, the phyllaries lanceolate or lance-subulate, with strongly indurated costate and vittate base and abrupt narrow herbaceous apex; corollas ampli-*

ated downward, capping the apex of the achene; pappus none. Texas to Mexico; species 43-46. P. 95.

Ser. E. BREVIFOLIAE. *Low much-branched shrubs, canescent with a fine appressed pubescence; leaves small, ovate, canescent at least beneath; heads solitary at tips of stem and branches; involucre 3-4-seriate, the phyllaries ovate or oblong-ovate, acute, strigillose, obscurely costate, the herbaceous apex very short and obscure; pappus present or absent. Mexico; species 47-49. P. 99.*

Sect. 3. DIPLOSTICHIS. *Annuals or rarely shrubs, of slender habit; leaves ovate or lanceolate; heads small, few or paniced; involucre 2-seriate, the phyllaries with more or less indurated and ribbed base and short subherbaceous apex, or rarely subherbaceous nearly throughout; achene usually with distinct carpopod; pappus rarely wanting. Mexico to Venezuela and Ecuador; species 50-57. P. 101.*

Sect. 4. HELIOMERIS. *Slender annuals or perennials, with mostly lanceolate or linear leaves and small paniced heads; involucre 2-seriate, scarcely graduated, the lanceolate or linear-lanceolate (in one species ovate) phyllaries herbaceous throughout, sometimes vittate but not ribbed; pappus none. Montana to Chiapas; a single species also in Georgia; species 58-64. P. 108.*

Sect. 5. PARADOSA. *Herbs or shrubs of exceedingly varied habit; involucre 2-5-seriate, the phyllaries usually lanceolate or lance-oblong, below more or less indurated and costate, above herbaceous; pappus always present. Ecuador to Argentina and Brazil; species 65-127. P. 116.*

Ser. A. TENUIFOLIAE. *Slender simple perennials, with rather few linear or linear-filiform leaves and solitary heads; involucre 2-seriate, the phyllaries subequal, lanceolate or oblong, herbaceous, scarcely indurated at base. Brazil; species 65-68. P. 116.*

Ser. B. REVOLUTAE. *Shrubs or herbaceous perennials, with alternate entire lanceolate or lance-oblong leaves and rather large heads solitary at apex of stem and branches; involucre 3-5-seriate, graduated, the phyllaries lanceolate, slightly indurated at base. Chile and adjacent Argentina; species 69-71. P. 119.*

Ser. C. GRANDIFLORAE. *Herbaceous perennials, with one to few large or medium-sized heads on mostly long peduncles; leaves few, subremote, oval to oblong-oval or suborbicular, the lower much reduced (sometimes scale-like), opposite, the upper much larger and alternate; involucre 2-4-seriate, scarcely graduated, the phyllaries lanceolate*

to lance-oblong, slightly indurated at base. Paraguay and Brazil, with two species in Peru; species 72-82. P. 122.

Ser. D. AUREAE. Herbaceous or frutescent perennials, rarely annuals, of varied habit; heads mostly medium-sized; involucre (2-)3-5-seriate, subequal or usually graduated, the phyllaries mostly lanceolate, with weakly or rather strongly indurated base usually not sharply delimited from the herbaceous apex. Ecuador to Argentina and Brazil; species 83-113. P. 132.

Subser. α . ECAUREAE. Herbaceous or frutescent perennials. Range of the series; species 83-111. P. 132.

Subser. β . PUSILLAE. Annuals. Peru; species 112-113. P. 159.

Ser. E. BRACTEATAE. Herbaceous perennials; leaves mostly sessile or subsessile; involucre 3-5-seriate, strongly graduated, the phyllaries very strongly indurated and ribbed nearly or quite to apex, with short abrupt herbaceous tip or this obsolete. Brazil and Paraguay; species 114-127. P. 161.

Sect. 6. LEIGHIA. Herbaceous perennials; involucre 4-7-seriate, strongly graduated, the phyllaries usually oblong, strongly indurated, costate, and vittate, with abrupt herbaceous or narrow and subscarious terminal appendage or this obsolescent. Mexico and Lower California; species 128-131. P. 172.

Sect. 7. TRICHOPHYLLA. Slender virgate perennials, the simple or subsimple stem very leafy; leaves linear or linear-filiform, revolute; involucre 3-5-seriate, the phyllaries lanceolate or linear-lanceolate, strongly ribbed below, herbaceous above. Paraguay and adjacent Brazil; species 132-136. P. 176.

Subg. III. YERBALESIA. Perennial simple or subsimple herbs; heads solitary at apex of stem and branches, long-peduncled; leaves lanceolate or oblong, rarely ovate; involucre 2-4-seriate, the phyllaries lanceolate, more or less indurated at base, above herbaceous; pappus of 2 membranaceous-paleaceous awns about equalled by the squamellae, which are united on each side of the achene into a many-nerved membranaceous-scarious scale. Paraguay, Uruguay, and adjacent Argentina; species 137-141. P. 180.

SPECIES OF DOUBTFUL AFFINITY. Species 142-143. P. 184.

KEY TO SPECIES

- A. Inner phyllaries with amplified and elongated membranaceous or membranaceous-chartaceous rounded tips. Subg. *Amphilepis*, p. 45.
- A. Inner phyllaries not amplified into membranaceous or membranaceous-chartaceous rounded tips, B.
- B. Low much-branched shrubs, with small ovate entire leaves canescent at least beneath, and small heads solitary at tips of stems and branches.
Ser. *Brevifoliae*, p. 99.
- B. Herbaceous, or if shrubby and with small ovate entire leaves, then with heads not solitary, C.
- C. Leaves deeply pinnate-lobed; pappus none.
Ser. *Pinnatilobatae*, p. 79.
- C. Leaves never more than dentate or lacinate-toothed, D.
- D. Involucre 2-seriate, the phyllaries strictly herbaceous; pappus none. Sect. *Heliomeris*, p. 108.
- D. Involucre 2-7-seriate, the phyllaries more or less indurated or ribbed at base; pappus usually present, E.
- E. Simple perennial herbs, very densely leafy; leaves strongly revolute, linear or linear-filiform; Paraguay and Brazil.
Sect. *Trichophylla*, p. 176.
- E. Leaves lanceolate or broader, or if linear, then stem not very leafy (except in *V. linearis* of Mexico, which has blunt or merely acute phyllaries), F.
- F. Simple or subsimple perennials, with one to few large heads; leaves sessile, lanceolate or lance-ovate, entire, canescent or sericeous beneath. Sect. *Hypargyrea*, p. 59.
- F. Leaves not at once sessile, entire, lanceolate or lance-ovate, and canescent or sericeous beneath, or else heads several, G.
- G. Leaves ovate, obovate, or oval, H. (See p. 40.)
- H. Leaves silky or densely pilose-tomentose or lanate beneath, I.
- I. Leaves subsessile, J.
- J. Leaves very broadly rounded. 79. *V. obtusifolia*.
- J. Leaves acute or acutish.
Leaves silky-canescens beneath. 29. *V. sessilifolia*.
Leaves pilose-tomentose beneath. 80. *V. discolor*.
- I. Leaves slender-petioled, K.
- K. Pappus none.
Disk 12-13 mm. high. 26. *V. bombycina*.
Disk 6-8 mm. high. 42. *V. potosina*.
- K. Pappus present, L.
- L. Plant densely pannose-tomentose. . . . 41. *V. lanata*.
- L. Plant not pannose-tomentose, M.
- M. Herbaceous.
Phyllaries ovate-based, with narrow herbaceous apex. 36. *V. dentata*.
Phyllaries oblong. 89. *V. Sodiroi*.
- M. Frutescent.
Leaves silky beneath; phyllaries scarcely indurated at base. . . . 25. *V. grammatoglossa*.
Leaves pilose-tomentose beneath; phyllaries strongly indurated at base.
38. *V. tomentosa*.
- H. Leaves not silky or densely pilose-tomentose or lanate beneath, N.
- N. Leaves distinctly petioled (petiole 6 mm. long or more),
O. (See p. 38.)

- O. Involucre 3-5-seriate, P.
 - P. Pales with stiff abrupt recurved cusps.
 - Leaves hispidulous-pilosulous beneath; branches sordid-tomentose 16. *V. sphacrocephala*.
 - Leaves glabrate beneath; branches appressed-puberulous 17. *V. oaxacana*.
 - P. Pales without stiff recurved cusps, Q.
 - Q. Leaves laciniate-toothed 34. *V. laciniata*.
 - Q. Leaves merely dentate or entire, R.
 - R. Involucre 4-5-seriate, S.
 - S. Leaves obovate, strigillose beneath. 129. *V. purissima*.
 - S. Leaves ovate, T.
 - T. Petioles mostly 1-2.8 cm. long; Mexico. 20. *V. eriophara*.
 - T. Petioles 7 mm. long or less; South America.
 - Involucre 12-14 mm. high 85. *V. aurea*.
 - Involucre 8 mm. high 116. *V. radula*.
 - R. Involucre 3-seriate, U.
 - U. Phyllaries with indurated ovate base and abruptly narrowed linear herbaceous apex. 36. *V. dentata*.
 - U. Phyllaries not with abruptly narrowed linear herbaceous apex, V.
 - V. Shrubby. 19. *V. maculata*.
 - V. Herbaceous, W.
 - W. Involucre subcanescently hispid-pilose. 28. *V. rhombifolia*.
 - W. Involucre not subcanescently hispid-pilose, X.
 - X. Rays 6-12; Mexico and United States.
 - Petioles 1-3 cm. long. 23. *V. Purpusii*.
 - Petioles 8 mm. long or less. 27. *V. cordifolia*.
 - X. Rays 14-20; South America.
 - Leaves longer (7.5-11 cm.), strongly venose beneath. 92. *V. pazensis*.
 - Leaves shorter (3.5-6.5 cm.), not venose beneath. 93. *V. Pflanzii*.
- O. Involucre 2-seriate, Y.
 - Y. Involucre 6.5-10.5 mm. high, Z.
 - Z. Pappus none 57. *V. quitensis*.
 - Z. Pappus present, AA.
 - AA. Frutescent. 39. *V. deltoidea*.
 - AA. Herbaceous, BB.
 - BB. Leaves finely canescent-puberulous beneath 24. *V. mimia*.
 - BB. Leaves not finely canescent-puberulous beneath, CC.
 - CC. Disk purple 112. *V. simsioides*.
 - CC. Disk yellow, DD.
 - DD. Leaves abruptly contracted below the middle, very rough above. 18. *V. trachyphylla*.

- DD. Leaves not abruptly contracted below the middle, scarcely rough above.
 Rays about 8; disk 8-12 mm. thick. 50. *V. sylvatica*.
 Rays 14-20; disk 1.5-2 cm. thick. 92. *V. patens*.
- Y. Involucre 3.5-6.5 mm. high, EE.
 EE. Leaves 8-12 mm. long 40. *V. microphylla*.
 EE. Leaves larger, FF.
 FF. Leaves deeply jagged-serrate 35. *V. subincisa*.
 FF. Leaves very finely and strongly reticulate beneath, entire 37. *V. reticulata*.
 FF. Leaves merely serrate or subserrate, not finely reticulate beneath, GG.
 GG. Leaves abruptly narrowed below the middle into a very broadly margined petiole, very rough above 18. *V. trachyphylla*.
 GG. Leaves not abruptly narrowed below the middle into a broadly margined petiole, III.
 III. Frutescent
 Heads subcylindric; achenes densely silky 21. *V. quinquepartita*.
 Heads subglobose; achenes sparsely appressed-pilose 39. *V. deltoidea*.
 III. Herbaceous
 Stem glandular-puberulous 22. *V. adenophylla*.
 Stem not glandular-puberulous
 Sect. *Diplastichis*, p. 101.
- N. Leaves sessile or subsessile (petioles 4 mm. long or less), II.
 II. Involucre 4-5-seriate, JJ. (See p. 39.)
 JJ. Pappus none 35. *V. Parkinsonii*.
 JJ. Pappus present, KK.
 KK. Leaves obovate 129. *V. purissima*.
 KK. Leaves ovate or oval, LL.
 LL. Phyllaries very strongly indurated for more than half their length.
 Leaves mostly opposite, deltoid-ovate; Mexico and United States 27. *V. cordifolia*.
 Leaves not deltoid-ovate, mostly alternate; Paraguay and Brazil
 Ser. *Bracteatae*, p. 161.
- LL. Phyllaries indurated only at extreme base or below the middle, MM.
 MM. Involucre 12-23 mm. high, NN.
 NN. Leaves green both sides.
 Involucre 12 mm. high at most 81. *V. Bakeriana*.
 Involucre 15-23 mm. high 141. *V. macrohiza*.
 NN. Leaves distinctly paler below.
 Leaves ovate-oblong (or oblong); achene appressed-pilose 85. *V. aenea*.

- Leaves distinctly ovate; achene subglabrous. 86. *V. Lehmannii*.
- MM.* Involucre 5–9 mm. high, *OO*.
- OO.* Leaves cordate and somewhat amplexicaul at base. 111. *V. breviflosculosa*.
- OO.* Leaves narrowed at base, not clasping, *PP*.
- PP.* Phyllaries ridged on back by the thickened costa; Mexico.
Leaves ovate or oval-oblong, usually obtuse. 31. *V. Pringlei*.
Leaves ovate-lanceolate, usually long-acuminate.
32. *V. Seemannii*.
- PP.* Phyllaries not ridged on back; South America, *QQ*.
- QQ.* Leaves strongly venulose above.
81. *V. Bakeriana*.
- QQ.* Leaves not venulose above.
Phyllaries strongly spreading or reflexed; squamellae lanceolate, deeply lacerate.
87. *V. media*.
Phyllaries scarcely spreading; squamellae narrowly oblong, finely fimbriate.
88. *V. Brittonii*.
- II.* Involucre 2–3-seriate, *RR*.
- RR.* Squamellae united into a membranous scale, about equalling the awns.
Leaves hispid-pilose . . . 138. *V. Hassleriana*.
Leaves sparsely strigillose. 139. *V. guaranitica*.
- RR.* Squamellae not united into a membranous scale, usually quite free, *SS*.
- SS.* Pappus none. 30. *V. ovata*.
- SS.* Pappus present; leaves laciniate.
34. *V. laciniata*.
- SS.* Pappus present; leaves entire or dentate, *TT*.
- TT.* Leaves 8–12 mm. long. . . 40. *V. microphylla*.
- TT.* Leaves larger, *UU*.
- UU.* Heads 9 mm. wide; involucre 3.5 mm. high 55. *V. Brandegei*.
- UU.* Heads larger (1.4–10 cm. wide); involucre 5 mm. high or more, *VV*.
- VV.* Slender annual. 53. *V. tenuis*.
- VV.* Perennials, *WW*.
- WW.* Phyllaries strongly indurated to above the middle, *XX*.
- XX.* Leaves abruptly contracted below the middle. 18. *V. trachyphylla*.
- XX.* Leaves not abruptly contracted below the middle.
Herbaceous. . . 27. *V. cordifolia*.
Frutescent. . . 39. *V. deltoidea*.
- WW.* Phyllaries not strongly indurated above the middle, *YY*.
- YY.* Involucre subcanescently hispid-pilose; Mexico.
28. *V. rhombifolia*.

- YY. Involucre not canescently hispid-pilose, ZZ.
- ZZ. Stem decumbent; phyllaries strigillose, not distinctly ciliate; heads 1-2.
95. *V. fusiformis*.
- ZZ. Stems mostly erect; phyllaries usually ciliate; heads usually several, AAA.
- AAA. Leaves very strongly venose beneath; heads very numerous (about 30).
94. *V. Szyszylowiczii*.
- AAA. Leaves rarely venose beneath; heads 1-10, BBB.
- BBB. Leaves ovate, the lower not reduced; involucre 6-12 mm. high; Peru and Bolivia, CCC.
- CCC. Leaves distinctly paler beneath.
88. *V. Brittonii*.
- CCC. Leaves green beneath.
Leaves 7.5-11 cm. long, somewhat veiny beneath.
92. *V. pazensis*.
Leaves 3.3-6.5 cm. long, not venose beneath.
93. *V. Pflanzii*.
- BBB. Leaves oval or oval-oblong, the lower much reduced; Brazil and Paraguay (two species in Peru, with involucre 13-21 mm. high).
Ser. *Grandiflorae*, p. 122.
- G. Leaves linear to lanceolate or oblong, a.
- a. Leaves linear; heads 1-4; involucre 2-seriate, subequal.
Ser. *Tenuifoliae*, p. 116.
- a. Leaves lanceolate to oblong, or when linear not accompanied by a 2-seriate involucre, b.
- b. Pappus none 33. *V. Parkinsonii*.
- b. Pappus present; leaves lacinate..... 34. *V. laciniata*.
- b. Pappus present; leaves entire to merely dentate, c.
- c. Leaves linear to very narrowly lanceolate, d.
- d. Leaves densely canescent-strigillose beneath.
Heads discoid..... 109. *V. discoidea*.
Heads radiate..... 137. *V. tuberosa*.
- d. Leaves green beneath, e.
- e. Phyllaries appressed or slightly loose at apex, f.
- f. Phyllaries strongly ciliate 130. *V. montana*.
- f. Phyllaries not strongly ciliate, g.
- g. Leaves harshly tuberculate-hispid or strigillose above, h.
- h. Leaves very strongly venulose.
124. *V. nervosa*.

- h. Leaves not venulose.
 Leaves hispid and hispidulous beneath,
 not lepidote above. . . 107. *V. hispida*.
 Leaves lepidote above, tuberculate-strigillose
 beneath. . . 108. *V. anchusaefolia*.
- g. Leaves merely strigillose and not harsh
 above.
 Involucre 4-seriate, 6–8.5 mm. high; stem
 glabrous below. . . 119. *V. amphichlora*.
 Involucre 5-seriate, 9–10 mm. high; stem
 tuberculate-strigillose below.
 120. *V. imbricata*.
- e. Phyllaries squarrose, *i*.
- i*. Involucre 3-seriate, 6–6.5 mm. high.
 110. *V. atacamensis*.
- i*. Involucre 4–5-seriate, generally higher, *j*.
- j*. Leaves 1-nerved; Argentina.
 106. *V. tucumanensis*.
- j*. Leaves 3-nerved (sometimes apparently 1-
 nerved through revolution of the mar-
 gin), *k*.
- k*. Heads usually very numerous; leaves pale
 beneath; Mexico. . . 128. *V. linearis*.
- k*. Heads few (4–12); leaves green beneath;
 South America.
 Involucre 4-seriate; phyllaries slightly
 strigillose and ciliolate at apex.
 121. *V. bracteata*.
 Involucre 5-seriate; phyllaries densely
 hispidulous at apex.
 122. *V. quinquereinis*.
- c. Leaves lanceolate or broader, *m*.
- m*. Leaves densely and canescently strigillose, tomen-
 tose, or puberulous beneath, *n*.
- n*. Leaves densely canescent-puberulous beneath;
 Guatemala 24. *V. mima*.
- n*. Leaves densely canescent-strigillose beneath;
 Argentina and Paraguay. . . 137. *V. tuberosa*.
- n*. Leaves pilose-tomentose beneath, *o*.
- o*. Phyllaries ciliolate, otherwise glabrous.
 118. *V. hypoleuca*.
- o*. Phyllaries pilose or tomentose.
 Leaves permanently pilose-tomentose be-
 neath; involucre 10–12 mm. high.
 90. *V. mollis*.
 Leaves becoming green beneath; involucre
 7–10 mm. high. 91. *V. lanceolata*.
- m*. Leaves not densely and canescently pubescent
 beneath, *p*.
- p*. Leaves distinctly lanceolate, *q*.
- q*. Involucre 4–7-seriate, *r*.
- r*. Phyllaries strongly indurated to above the
 middle, *s*.
- s*. Phyllaries with distinctly herbaceous apex.
 Heads few (3–6); Brazil.
 120. *V. imbricata*.
 Heads numerous; Mexico.
 128. *V. linearis*.

- s. Phyllaries not herbaceous at apex.
Phyllaries densely pilose-ciliate.
130. *V. montana*.
Phyllaries minutely ciliate.
131. *V. Goldmannii*.
- r. Phyllaries not indurated above the middle, t.
t. Peduncles 3-10 mm. long; Mexico.
32. *V. Seemannii*.
- t. Peduncles 3.5-34 cm. long; South America, u.
u. Heads large; involucre 12-16 mm. high.
71. *V. revoluta*.
u. Heads medium; involucre 7-10 mm. high, v.
v. Phyllaries not ciliate with spreading hairs . . . 108. *V. anchusaeifolia*.
- v. Phyllaries ciliate with spreading hairs.
Leaves 6.5-10 mm. wide; achenes rather sparsely pilose.
96. *V. oligodonta*.
Leaves 1.7-3.1 cm. wide; achenes densely silky . . . 105. *V. Hilairei*.
- g. Involucre 2-3-seriate, w.
w. Involucre 11-16 mm. high or more, x.
x. Leaves slender-petioled; Mexico.
36. *V. dentata*.
x. Leaves sessile or subsessile; South America, y.
y. Leaves acuminate at base.
107. *V. hispida*.
y. Leaves cuneate or rounded at base.
Leaves opposite; Brazil.
140. *V. nudicaulis*.
Leaves alternate; Chile and Argentina. Ser. *Revolutae*, p. 119.
- w. Involucre 5-10 mm. high, z.
z. Phyllaries strongly indurated to above the middle, aa.
aa. Shrub 19. *V. maculata*.
aa. Herbs, bb.
bb. Involucre 3-seriate . . . 36. *V. dentata*.
bb. Involucre 2-seriate.
Phyllaries nearly glabrous except on margin; rays 5.
51. *V. strigosa*.
Phyllaries pubescent on back; rays about 10. 52. *V. mucronata*.
- z. Phyllaries not indurated above the middle, cc.
cc. Annuals.
Phyllaries attenuate; Mexico and Central America . . . 53. *V. tenuis*.
Phyllaries obtuse to acutish; Peru.
113. *V. pusilla*.
- cc. Perennials, dd.
dd. Phyllaries with strongly indurated ovate base and abrupt linear herbaceous apex; Mexico and Central America. 36. *V. dentata*.

- dd.* Phyllaries not with ovate indurated base and abruptly narrowed herbaceous apex; South America.
 Phyllaries lanceolate, attenuate from near the base, densely hispidulous; Chile and adjacent Argentina . . . 69. *V. Gilliesii*.
 Phyllaries broadest above the base, usually strigillose.
 Ser. *Aureae*, p. 132.
- p.* Leaves oblong or lance-oblong, *ee.*
- ee.* Phyllaries strongly indurated to above the middle, *ff.*
- ff.* Phyllaries with conspicuous squarrose herbaceous tips; Mexico. 128. *V. linearis*.
- ff.* Phyllaries with inconspicuous appressed herbaceous or subherbaceous tips; South America, *gg.*
- gg.* Leaves green beneath.
 Leaves strongly venulose, tuberculate-hispid and strigillose; peduncles 1.3-3.2 dm. long. 123. *V. oblongifolia*.
 Leaves not venulose, merely strigillose; peduncles 3.5-14.5 cm. long.
 125. *V. Gardneri*.
- gg.* Leaves pale or canescent beneath.
 Leaves subentire . . 115. *V. ovatifolia*.
 Leaves strongly crenate-serrate.
 126. *V. robusta*.
- ee.* Phyllaries indurated only at base, *hh.*
- hh.* Squamellae united on each side of achene into a many-nerved membranous scale about equalling the awns.
 Subg. *Yerbalesia*, p. 180.
- hh.* Squamellae free or somewhat united, but not membranous, *ii.*
- ii.* Involucre 4-5-seriate, 6-8 mm. high; Mexico 31. *V. Pringlei*.
- ii.* Involucre 2-3-seriate, or, if 4-seriate, mostly much higher; South America, *jj.*
- jj.* Involucre 12-20 mm. high, *kk.*
- kk.* Leaves pale or subcanescent beneath.
 Involucre 4-seriate, 14-16 mm. high 83. *V. chimboensis*.
 Involucre 5-seriate, 12-14 mm. high 86. *V. aurea*.
- kk.* Leaves green beneath.
 Involucre 15-20 mm. high.
 76. *V. grandiflora*.
 Involucre 12 mm. high or less.
 93. *V. Pfanzii*.
- jj.* Involucre 6-11 mm. high, *ll.*
- ll.* Lower leaves much reduced.
 Involucre 3-4-seriate.
 81. *V. Bakeriana*.
 Involucre 2-seriate.
 82. *V. subdentata*.

- ll. Lower leaves not reduced, *mm.*
mm. Leaves entire. .84. *V. truxillensis.*
mm. Leaves dentate or serrate.
 Leaves 7.5–11 cm. long, venose
 beneath . . . 92. *V. pazensis.*
 Leaves 3.3–6.5 cm. long, not
 veiny beneath.
 93. *V. Pflanzii.*

VII. SYSTEMATIC DESCRIPTIONS

VIGUIERA HBK.¹

Heads heterogamous (in one species homogamous and discoid), the rays neutral, the disk-flowers sterile. Involucre subcampanulate to subcylindric, 2–7-seriate, graduated or subequal, the phyllaries usually lanceolate or ovate-lanceolate, sometimes linear to oval or oblong, with usually indurated and ribbed base and herbaceous apex, sometimes herbaceous or indurated throughout, or the inner sometimes membranaceous or membranaceous-chartaceous at apex. Receptacle flattish to low-conical, usually convex; pales firm, scarious or at apex subherbaceous, carinate, embracing the achenes and persistent after the fall of the latter. Corollas of ray 5–32, ligulate, usually 2–3-denticulate at apex; of disk with short tube, longer throat, and 5-toothed limb. Anthers sagittate or cordate-sagittate at base, with ovate appendages. Style-branches rather long and more or less recurved, hispid above, with acutish to acuminate sterile appendages. Achenes of the ray sterile; of disk fertile, more or less thickened, often subquad-rangular, usually appressed-pubescent, unmarginated except for the obscure carpoid at base, truncate or rounded at apex. Pappus of ray-achenes of 2–3 paleaceous awns or squamellae, or none; of disk-achenes of two awns and several shorter free or united squamellae, or sometimes entirely wanting. — Perennial herbs or shrubs, sometimes annuals; leaves opposite at least below, usually ovate or lanceolate and merely dentate, but varying from linear to oval or suborbicular, and from entire to pinnate-lobed; heads small to large, almost always yellow, rarely with purple (or white) rays, or purple disk. — Type species *V. helianthoides* HBK. (= *V. dentata* (Cav.) Spreng; var. *helianthoides* (HBK.) Blake).

¹ In the citation of specimens, the following abbreviations are used: B. M. = British Museum; Ber. = Royal Herbarium, Berlin; G. = Gray Herbarium; K. = Kew Herbarium; Mo. = Herb. Missouri Botanical Garden; Par. = Museum d'Histoire Naturelle, Paris; Prod. = Prodromus Herbarium, Geneva; U. S. = United States National Herbarium.

Viguiera HBK. Nov. Gen. et Sp. iv. 224. t. 379 (1820); Spreng. Syst. iii. 615 (1826), excl. *V. foliacea*; DC. Prod. v. 578 (1836), excl. *V. foliacea*; Gardn. Lond. Journ. Bot. vii. 395 (1848), excl. spp.; Benth. & Hook. Gen. Pl. ii. 375 (1873); Hemsl. Biol. Centr.-Am. Bot. ii. 177 (1881); Gray, Proc. Am. Acad. xix. 5 (1883); Baker in Mart. Fl. Bras. vi. pt. 3. 217 (1884); Gray in Wats. Proc. Am. Acad. xxii. 426 (1887); Brandegee, Proc. Calif. Acad. ser. 2. ii. 173 (1889); O. Hoffm. Nat. Pflanzenfam. iv. pt. 5. 235. f. 116 D (1890); Britton, Bull. Torr. Club xix. 149 (1892); Chod. Bull. Herb. Boiss. ser. 2. ii. 724 (1903); Greenm. Proc. Am. Acad. xxxix. 103 (1903); Glaziou, Bull. Soc. Bot. Fr. lvii. Mém. 3. 412 (1910); Blake, Proc. Am. Acad. xlix. 348, 374 (1913); Cockerell, Torreya xv. 11 (1915); Blake, Proc. Am. Acad. li. 518 (1916).

Viguiera Durand & Jackson, Ind. Kew. Suppl. i. 454 (1906), sphalm.

Leighia Cass. Dict. Sci. Nat. xxv. 435 (1822), as to type species; DC. Prod. v. 580 (1836), in part.

Harpalium Cass. Dict. Sci. Nat. xxv. 437 (1822), excl. type species (*H. rigidum* Cass.); DC. Prod. v. 583 (1836), in part.

Helioomeris Nutt. Journ. Acad. Nat. Sci. Philad. N.S. i. 171 (Aug. 1848); Gray, Pl. Fendl. 84 (1848); Pl. Wright. i. 107 (1852), ii. 87 (1853).

Bahiopsis Kellogg, Proc. Calif. Acad. ii. 35 (1863).

Gymnolomia of most authors in great part, not HBK. Nov. Gen. et Sp. iv. 217 (1820).

Microcephalum Sch. Bip. ex Klatt, Leopoldina xxiii., 90 (1887), as syn. (*Gymnolomia*).

Subgenus I. **Amphilepis**, subg. nov. Herbae perennes vel rare suffrutices, capitulis saepe magnis vel majusculis, foliis saepe ovatis vel oblongo-lanceolatis, involucri 3-5-seriati plus minusve gradati phyllariis saepe lanceolatis vel oblongo-lanceolatis interdum oblongis exterioribus saepius herbaceis acutis involutis rare oblongis planis, interioribus oblongis vel oblongo-spathulatis vel -obovatis apice ampliato rotundato membranaceo vel chartaceo-membranaceo et subsiccio, pappo ex aristis et squamellis liberis composito vel interdum nullo. — Species typica *V. excelsa* (Willd.) B. & H. — Twelve species of Mexico, with medium or large heads, the inner phyllaries especially in fruit submembranaceous or subchartaceous at the rounded amplified apex. Species 1-12.

- a. Leaves canescent or whitened beneath, b.
 b. Phyllaries whitish-green, obtuse, appressed, c.
 c. Phyllaries hispid-pilose-ciliate; pappus present . . . 11. *V. angustifolia*.
 c. Phyllaries merely ciliolate; pappus none . . . 12. *V. ensifolia*.
 b. Phyllaries blackish-green, mostly acute and loose at apex, d.
 d. Phyllaries strongly ciliate, e.
 e. Achene more or less pubescent; pappus present. 8. *V. buddleiaeformis*.
 e. Achene glabrous; pappus none . . . 9. *V. Hemsleyana*.
 d. Phyllaries not conspicuously ciliate, f.
 f. Leaves hispidulous-pilosulous beneath; heads few, solitary at apex of stem and peduncles. . . 4. *V. subcanescens*.
 f. Leaves hispid-pilose beneath; heads rather numerous, in close clusters of 1-4 at apex of stem and peduncles. . . 5. *V. Schultzii*.
 a. Leaves green or paler but not canescent beneath, g.
 g. Heads very large (disk 15-25 mm. high, 17-35 mm. thick), h.
 h. Leaves pubescent beneath on all the veins, even the smallest, and usually also between them. . . 6. *V. excelsa*.
 h. Leaves pubescent beneath chiefly on the larger nerves and veins . . . 7. *V. pachycephala*.
 g. Heads medium-sized (disk 7-15 mm. high, 9-19 mm. thick), i.
 i. Leaves ovate, j.
 j. Involucre 3-seriate, 15-20 mm. high . . . 3. *V. urticiformis*.
 j. Involucre 5-seriate, 9-14 mm. high . . . 5. *V. Schultzii*.
 i. Leaves lanceolate or oblong-lanceolate to oval, k.
 k. Leaves strigillose beneath, l.
 l. Phyllaries obscurely strigillose and ciliate. . . 1. *V. latibracteata*.
 l. Phyllaries conspicuously strigillose and ciliate . . . 2. *V. flava*.
 k. Leaves hispidulous or hispid beneath, m.
 m. Heads about 11; outer phyllaries strongly ciliate, otherwise not conspicuously pubescent; leaves 8-13.5 cm. long . . . 10. *V. hypochlora*.
 m. Heads 1-4; outer phyllaries rather strongly pubescent; leaves 3-7.3 cm. long, n.
 n. Involucre 9-12 mm. high . . . 2. *V. flava*.
 n. Involucre 15-20 mm. high . . . 3. *V. urticiformis*.

1. *V. latibracteata* (Hemsl.), comb. nov. Branching herb, in habit like *Sclerocarpus Schiedeanus*; stem slender, purplish, striate, very sparsely strigose or practically glabrous. Leaves remote, alternate (only the upper seen), lanceolate, attenuate, at base acuminate into the margined petiole, obscurely appressed-serrulate, triplinerved, dull green both sides, above lepidote-tuberculate-strigillose, beneath sparsely strigillose chiefly along veins and gland-dotted, 6-7.5 ("13") cm. long, 1-2.5 cm. wide; petioles margined, 1-2 cm. long. Heads loosely paniced, on subglabrous strongly striate pedicels 1 dm. long or less; disk in fruit convex, 7-8 mm. high, 12-13 mm. wide. Involucre about 4-seriate, 8 mm.

high, the phyllaries loose or spreading at apex, the two to three outer series narrowly obovate or oblong-obovate, with indurated ribbed base and herbaceous or subherbaceous subacute apex, the innermost broader, with amplified venulose submembranaceous obtuse tip; all subdensely but inconspicuously strigillose with minute hairs, and ciliolate. Rays "few," scarcely seen, "1.2-1.4 cm. long"; disk-corollas puberulous below, 3 mm. long (tube 0.8 mm., amplified at base). Pales subglabrous or sparsely puberulous along the obscure keel and toward the abruptly pointed sometimes 3-toothed tip, 3.4-4.8 mm. long, the outermost somewhat firmly embracing the achenes. Achenes striatulate, glabrous, 1.8 mm. long. Pappus none. — *Gymnolomia latibracteata* Hemsl.! Biol. Centr.-Am. Bot. ii. 162 (1881); Rob. & Greenm.! Proc. Bost. Soc. Nat. Hist. xxix. 100 (1899). — MEXICO: SINALOA: Cerro de Pinal, *Seemann* 1485 (TYPE COLL.: G.).

2. *V. flava* (Hemsl.), comb. nov. Stems several, decumbent from a thick woody root, simple or sparsely branched, bearing 1-4 heads, strigose or strigillose or sometimes tuberculate-hispid-pilose with subspreading or ascending hairs. Leaves mostly opposite, oval or oval-oblong to lanceolate or even linear-lanceolate, acute to acuminate at each end, entire or obscurely serrulate, lepidote-strigose or -hispid-pilose and nearly equally green both sides, 3-nerved, 3-7.3 cm. long, 0.6-2.5 cm. wide; petioles scarcely margined, 1-6 mm. long. Peduncles monocephalous, 2-9.5 cm. long, pubescent with mostly appressed hairs; heads 3 cm. wide; disk 8-11 mm. high, 9-12 mm. thick. Involucre 4-seriate, graduated, 9-12 mm. high, the outermost phyllaries lanceolate, acute, herbaceous, 6-7.5 mm. long, 1.2-1.8 mm. wide, more or less spreading; the next series longer and slightly broader, the third still broader, longer, and less acute, the innermost especially in fruit still longer, often exceeding disk, with siccate subchartaceous-membranaceous rounded apex; all blackish-green, strigillose on their exposed surfaces, ciliate elsewhere. Rays 8-10, black-veined, 1-1.4 cm. long, 2.5-4 mm. wide; disk-corollas sparsely strigillose below, 5.3 mm. long (tube 1.1 mm.). Pales acutish and tridentate at apex, strigillose above, 7 mm. long. Achenes blackish or mottled, appressed-pubescent or glabrous, 4 mm. long. Pappus present or absent; when present of 2 (rarely 3-6) awns, slender, widened at base, 3 mm. long, and about 4 squamellae, free, irregularly lacerate-

fimbriate, 0.8 mm. long. — *Gymnolomia flava* Hemsl. ! Biol. Centr.-Am. Bot. ii. 161 (1881); not Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 101 (1899). *Viguiera Ghiesbreghtii* Gray ! Proc. Am. Acad. xix. 6 (1883); Rob. & Greenm. l. c. 88, 101 (1899). *Gymnolomia decumbens* Rob. ! Proc. Am. Acad. xxvi. 165 (1891); Rob. & Greenm. l. c. 101 (1899). — Divisible into two varieties distinguished by the presence or absence of pappus and of pubescence on the achene, sometimes growing together and not separable by any other character. Each has a long-leaved and a short-leaved form, and each a form with short-and-appressed and with long-and-spreading pubescence.

Var. **genuina**: achenio glabro, pappo nullo. — *Gymnolomia flava* Hemsl. l. c. V. *Ghiesbreghtii* Gray, l. c. as to specim. in part. *G. decumbens* Rob. l. c. — MEXICO: STATE OF MEXICO: rocky hills, Tultenango, 3 Sept. 1890, *Pringle* 3263 in part (TYPE COLL. of *G. decumbens*: G.); grassy slopes, Tultenango Station, 2530 m., 7 Oct. 1902, *Pringle* 9918 (G.); MICHOACAN: pine forests near Morelia, Sept., *Ghiesbreght* 381 in part (TYPE COLL. of *V. Ghiesbreghtii*: G.); OAXACA: *Ghiesbreght* 216 (TYPE of *G. flava*: K., tracing G.). — T. 3. FIG. 3.

Var. **papposa**, nom. nov.: achenio pubescente, cum pappo *Viguierae* normali praedito. — *Viguiera Ghiesbreghtii* Gray, l. c. in part. — MEXICO: DURANGO: near City of Durango, 1896, *Palmer* 824 (G., U. S.); STATE OF MEXICO: rocky hills, Tultenango, 3 Sept. 1890, *Pringle* 3263 in part (TYPE COLL. of *G. decumbens*: B. M., G.); MICHOACAN: pine forests near Morelia, Sept., *Ghiesbreght* 381 in part (TYPE COLL. of *V. Ghiesbreghtii*: G.). — The pappus is said by Gray to be deciduous in the type, but it is strongly persistent in the ripe achenes of Palmer's and Pringle's plants. Dr. Gray's statement is undoubtedly due to the fact that his type sheet has one specimen of var. *genuina*, with glabrous epappose achene, and one of var. *papposa* with the normal pappus of *Viguiera*. — T. 3. FIG. 2.

3. V. URTICIFORMIS (DC.) Hemsl. Herbaceous, the stem terete, purplish, densely tuberculate-hispid with spreading or reflexed hairs, 1-2-headed. Leaves except the uppermost opposite or sometimes nearly all alternate, oblong-lanceolate to lance-ovate, acute to acuminate, cuneate to rounded at base, obscurely serrate, 3-nerved, dull green above, scabrous with tuberculate-based hairs,

beneath venose and somewhat paler but not canescent, densely hispidulous or hispid-pilose along the veins and gland-dotted between them, 5–7 cm. long, 1.1–2.6 cm. wide; petioles scarcely margined, flattish above, densely tuberculate-hispid, 4–7 mm. long. Peduncles 1–3 cm. long, densely hispid-pilose like the stem; disk 1.1–1.5 cm. high, 1.4–1.8 cm. thick. Involucre 3-seriate, 1.5–2 cm. high, the outer phyllaries a little shorter or sometimes longer than the inner, lanceolate to ovate-oblong, subacute to acuminate, more or less involute, reflexed, densely tuberculate-hispid, the middle oblong-lanceolate, acuminate, the innermost in fruit amplified and elongated, oblong, rounded and membranaceous-chartaceous at tip, densely tuberculate-hispid or strigillose below the apex, 1.5 cm. long, 5 mm. wide. Rays 10–14, 1.2–2.2 cm. long, 4–7 mm. wide; disk-corollas puberulous below, 6–7 mm. long (tube 1–1.1 mm.). Pales narrow, abruptly acuminate, sparsely strigillose on back, 1 cm. long. Achenes densely appressed-pubescent, 3.5–4.5 mm. long. Awns 3.6–4 mm. long; squamellae two pairs, lacerate, acute, 0.6–0.8 mm. long. — Hemsl. Biol. Centr.-Am. Bot. ii. 179 (1881). *Leighia urticiformis* DC.! Prod. v. 582 (1836). — MEXICO: GUANAJUATO: near Villalpando, Mendez (TYPE COLL.: Par., Prod., G.); STATE OF MEXICO (?): near City of Mexico (?), Ehrenberg 1575 (Ber., photog. and fragm. G.)

4. *V. subcanescens*, sp. nov. Herbacea erecta parce ramosa, caule subvalido densissime tuberculato-hispido-piloso, foliis alternis ovatis acuminatis obscure serrulatis supra dense et aspere tuberculato-hispidis et -hispidulis subtus dense canescenterque hispidulo-pilosulis pilis subpatentibus ad venas et venulas tuberculato-hispidulis et -hispidis 7–9.5 cm. longis 1.8–3 cm. latis, capitulis paucis 4.5 cm. latis, involucri 5-seriati gradati 1.3 cm. alti phyllariis exterioribus lanceolatis vel oblongo-lanceolatis herbaceis vel subherbaceis tuberculato-hispido-strigosis et -strigillosis apice longe reflexis et involutis intimis apice ampliatis subchartaceis, achenio glabro, pappo nullo.

Erect, herbaceous, sparsely branched, the stem purplish, rather stout, very densely tuberculate-hispid-pilose, the spreading or retrorse hairs with strongly persistent bases. Leaves alternate, surpassing the internodes, ovate or the upper ovate-lanceolate, acuminate, callose-mucronate, cuneately contracted into the petiole,

obscurely serrulate (teeth about 8 pairs, appressed, scarcely mucronulate), 3-nerved and somewhat venose, above densely and harshly tuberculate-hispid and -hispidulous, the incurved at length deciduous hairs with strongly persistent bases, beneath densely and canescently hispidulous-pilosulous between the veins with subspreading hairs and gland-dotted, along the veins tuberculate-hispid and -hispidulous with subincurved hairs, 7–9.5 cm. long, 1.8–3 cm. wide; petioles unmarginated, very densely tuberculate-hispid-pilose, 3–8 mm. long. Heads 5 in specimen, terminal and on axillary naked or bracted peduncles 6–15.5 cm. long, hemispheric, about 4.5 cm. wide; disk 1.3 cm. high, 1.7 cm. thick. Involucre 5-seriate, graduated, 1.3 cm. high, the outer phyllaries lanceolate, acute, strongly involute, herbaceous (or slightly indurated and subglabrous but scarcely costate at base), densely tuberculate-hispid-strigose and -strigillose, within densely and minutely hispidulous-pilosulous, the apex strongly reflexed; next series similar, broader, at base indurated and subglabrous, the triangular herbaceous apex more or less reflexed; the innermost series oblong, thinner, the somewhat amplified subchartaceous-submembranous apex reflexed, strigillose and ciliolate. Rays about 22, linear-oblong, yellow, more or less puberulous on back, 18 mm. long, 4 mm. wide; disk-corollas yellow, below and on teeth puberulous, at base amplified, 6–7 mm. long (tube 1 mm.). Pales narrow, acuminate, mucronate, subglabrous, 9.5–10.5 mm. long. Achenes (immature) brownish-black, substrate, subtruncate, glabrous, 3 mm. long. — MEXICO: MICHOACAN (?): pine forests, *Ghiesbreght* 383 (TYPE: G.). — This specimen was referred to *Gymnolomia flava* Hemsl. by Dr. Gray, and the description under that name (no. 34) in Robinson & Greenman's revision of *Gymnolomia* is based on it. Hemsley's type, however, proves to be identical with *G. decumbens* Rob. (see no. 2 of this revision).

✓ 5. *V. Schultzii*, nom. nov. Herbaceous erect perennial, densely leafy, the stem stoutish, striatulate, very densely and sordidly pilose with spreading hairs, simple below the inflorescence. Leaves opposite, the uppermost alternate, ovate or broadly ovate, acute to acuminate, rounded to subcordate and clasping at the sessile base, serrate with usually appressed teeth, triplinerved and reticulate below, above green, tuberculate-hispid-pilose with appressed or incurved hairs, and gland-dotted, beneath similarly pubescent with

more spreading and often denser hairs, and paler or subcanescent, 5–8.7 cm. long, 2.5–5.2 cm. wide. Heads numerous in close clusters of 1–4 on axillary and terminal mostly naked peduncles 1.5 cm. long or less; pedicels mostly less than 1 cm. long; head 3 cm. wide; disk 9–13 mm. high, 10–15 mm. wide. Involucre 5-seriate, graduated, 9–14 mm. high, the 2–3 outer series of phyllaries with indurated and ribbed vittate base and squarrose acute herbaceous apex, more or less densely hispid-pilose; the 1–2 inner series longer, obtuse, with somewhat elongated submembranaceous apex, merely strigillose and ciliolate. Rays 12, 10–13 mm. long, 2.5–3.5 mm. wide; disk-corollas yellow, becoming purplish above in age, hispidulous at least below, 5.8 mm. long (tube 1.8 mm., very slender, strongly amplified at base). Pales stiffly acuminate, narrow, subglabrous, purplish above in age, 7 mm. long, the outer rather firmly embracing their achenes. Achene glabrous, 2.5 mm. long. Pappus none. — *Zaluzania squarrosa* Sch. Bip. Flora xlvii. 217 (1864). *Gymnolomia squarrosa* (Sch. Bip.) B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 163 (1881); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 99 (1899). Not *V. squarrosa* (Greenm.) Blake (1913), which is a synonym of *V. sphaerocephala* (DC.) Hemsl. — MEXICO: JALISCO: Rio Blanco, Oct. 1886, *Palmer* 741 (G.); Guadalajara, Sept. 1886, *Palmer* 486 (G.); l. c., ravines, Nov. 1888, *Pringle* 2194 (G.); do., 15 Oct. 1889, *Pringle* 2474 (G.); do., alt. 1370 m., 14 Oct. 1903, *Pringle* 11540 (G.). — The name of this species has been changed to prevent confusion with *Viguiera squarrosa* (Greenm.) Blake, Proc. Am. Acad. xlix. 376 (1913), here reduced to *V. sphaerocephala* (DC.) Hemsl. (see p. 63).

6. *V. EXCELSA* (Willd.) B. & H. Erect herbaceous perennial, about 2 m. high, simple or rather sparsely branched, the stout stem tuberculate-strigillose, -strigose, or -hispid, and often densely hispid-pilose in lines. Leaves opposite at least below, oblong-ovate or oblong to broad-ovate, rarely lanceolate, acute to acuminate, mucronate, cuneate or rarely rounded at base, distantly appressed-serrulate, 3-nerved, the veins reticulate, very harshly tuberculate-strigose above, beneath slightly but distinctly paler, strongly venose, hispidulous to hispid along all the veins, even the finest, and glandular-dotted, 5.5–13.5 cm. long, 2–5.5 cm. wide, on petioles 4–12 mm. long. Heads solitary, 4–8 cm. wide, at tips of the 1–11 tuberculate-hispid peduncles, these naked or 1–2-bracteate, (3)

5.5–25 cm. long, rarely somewhat thickened upwardly in age (*Tithonia*-like); disk 1.5–(fruit)2.5 cm. high, 1.7–2.7 cm. thick. Involucre equalling or slightly surpassing disk, 4–5-seriate, the 3 outer rows herbaceous, more or less indurated and ribbed at base, oblong or ovate, with acutish to obtusish more or less involute spreading apex, hispid-strigillose on back, hispid-ciliate on margin, the two inner rows membranaceous-chartaceous, minutely tuberculate-strigillose and -ciliolate, round-tipped, enlarged and siccate in fruit. Receptacle convex. Rays about 18, oblong to oval, 1.5–3 cm. long, 2.5–10 mm. wide; disk-corollas yellow, sparsely puberulous below and on veins and teeth, 7–8.5 mm. long (tube 2–2.3 mm.). Pales stiff, ovate-acuminate, more or less purplish-tinged, 9.5–11 mm. long. Achenes appressed-pubescent or glabrous, 5 mm. long. Pappus present or absent; when present of 2 awns, unequal, ciliate, 3–4.3 mm. long, and 2–3 pairs of squamellae, these quadrate, fimbriate, 0.9 mm. long; the awns somewhat deciduous. — *Helianthus giganteus* Cav. Icon. iii. 10. t. 219 (“1794” = 1795), not L. (err. iden.). *H. excelsus* Willd. Sp. iii. pt. 3. 2243 (1804). *Tithonia excelsa* (Willd.) DC. Prod. I v. 585 (1836). *Viguiera excelsa* (Willd.) B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 177 (1881); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 88, 102 (1899). *Helianthus trinervis* Hort. ex DC. Prod. v. 585 (1836), as syn. *Gymnolomia megacephala* Rob. & Greenm.! Proc. Bost. Soc. Nat. Hist. xxix. 102 (1899), excl. var. — Divisible into three varieties.

→ Var. **genuina**: caule tuberculato-strigoso vel -strigiloso vel dense bifariamque hispido-piloso; foliis anguste oblongis vel lanceolatis 5.5–11.7 cm. longis 1.5–3.1 cm. latis, ut videtur semper alternis (inferioribus non visis). — *Helianthus giganteus* Cav. l. c. *H. excelsus* Willd. l. c. *H. trinervis* Hort. ex DC. l. c. *Tithonia excelsa* (Willd.) DC. l. c. *Viguiera excelsa* (Willd.) B. & H. l. c. — MEXICO: STATE OF MEXICO: San Angelo, *Berlandier* 940 (authentic for *T. excelsa* DC.: B. M., G., Prod.); l. c., Aug. 1855, *Schaffner* 74 (G.); l. c., 1 Aug. 1865, *Bourgeau* 599 (K.); hills near Santa Fe, 8 Sept. 1865, *Bourgeau* 843 (G., K.); Cuantitlan, 12 Nov. 1827, *Berlandier* 1265 (K.); Valley of Mexico, 187–, *Schaffner* 296 (K.); PUEBLA: grassy hills, Esperanza, Sept. 1907, *Purpus* 2794 (B. M., G., Mo., U. S.). CULTIVATED: Hanover Garden (Mo., ex hb. Bernhardt.).

Var. *dilatatifolia*: caule saepius densissime bifariamque tuberculato-hispido-piloso; foliis ovatis vel late ovatis 5–14 cm. longis 2.5–5.5 cm. latis, saepius oppositis. — MEXICO: SAN LUIS POTOSI: 1830–2440 m., 1878, *Parry & Palmer 458* (TYPE COLL.: G., K., Mo., U. S.); Alvarez, 28 Sept.–3 Oct. 1902, *Palmer 145* (G., Mo., U. S.), 152 (G., Mo., U. S.).

Var. *megacephala* (Rob. & Greenm.), comb. nov.: pappo nullo, achenio glabro, caule bifariam hispido-piloso, foliis oblongo-ovatis vel oblongo-lanceolatis 7.5–11 cm. longis 2.2–4.3 cm. latis infra venulosioribus, ad et inter venas et venulas etiam minimas hispidulis. — *Gymnolomia megacephala* Rob. & Greenm. l. c. — MEXICO: GUERRERO: Between Tlapa and Ayusinapa, 1370–1740 m., 13 Dec. 1894, *E. W. Nelson 2105* (TYPE: G.). — Distinguished from the other forms of the species chiefly by its lack of pappus.

7. V. PACHYCEPHALA (DC.) Hemsl. Stout, herbaceous, about 2 m. high, the stem scatteringly sometimes densely villous-hispid in two lines, or densely tuberculate-hispid or -strigose, 1–4-headed. Leaves opposite below or sometimes nearly throughout, ovate-oblong to ovate or elongated-lanceolate, acute to obtuse at apex, rounded or cuneate into a short petioliform base, appressed-serrate or -serrulate, strongly venose below, densely tuberculate-hispid above with spreading or incurved hairs, beneath rather sparsely hispid mostly along the chief veins and gland-dotted between them, equally green both sides, 9.5–19 cm. long, (2–)3–4.7 cm. broad. Peduncles scarcely thickened below the head, stout, 4 cm. long or more; heads 3.5–11.5 cm. wide; disk 1.5–2.5 cm. high, 2.5–3.5 cm. thick, convex in age. Involucre equalling the disk, 4-seriate, the inner phyllaries with chartaceous-membranaceous amplified obtuse tip, densely and minutely tuberculate and more or less hispid; the two outer series subequal, herbaceous, indurated and ribbed at base, oblong, acute, densely hispid, trinerved, usually strongly involute. Rays about 18, oblong, 2.5–5 cm. long, 1–1.2 cm. wide; disk-corollas puberulous below, 8 mm. long. Pales acute to acuminate, subglabrous, 8–13 mm. long. Achenes sparsely pubescent or glabrous, about 6 mm. long. Pappus present or absent; when present of 2 awns, widened below, 4.5–5 mm. long, and about 10 squamellae, a pair of oblong larger ones (1 mm. long) at base of each awn, about 3 minute deltoid ones on each side of achene between them; whole pappus persistent. — Hemsl. Biol. Centr.-

Am. Bot. ii. 178 (1881). *Tithonia pachycephala* DC.! Prod. v. 585 (1836). *Gymnolomia megacephala* Rob. & Greenm. var. *simulans* Rob. & Greenm.! Proc. Bost. Soc. Nat. Hist. xxix. 102 (1899). — Two varieties may be recognized.

Var. **genuina**: achenio pubescente, cum pappo normali *Viguierae* praedito. — *Tithonia pachycephala* DC. l. c. *Viguiera pachycephala* (DC.) Hemsl. l. c. *V. excelsa* Gray in Wats. Proc. Am. Acad. xxii. 426 (1887), not B. & H. — MEXICO: SAN LUIS POTOSI: shady places near Morales, Sept. 1876, *Schaffner* 267 (G.); JALISCO: Rio Blanco, Sept. 1886, *Palmer* 532 (B. M., G., K., U. S.); Guadalajara, Sept. 1886, *Palmer* 443 (B. M., G., K., Mo., U. S.); barranca, Guadalajara, 10 Nov. 1888, *Pringle* 2175 (G.); hillsides near Guadalajara, 9 Oct. 1889, *Pringle* 2484 (B. M., G., K., Mo., U. S.); barranca near Guadalajara, 1370 m., 20 Oct. 1903, *Pringle* 11609 (G., K., U. S.); Huejotitan, 1700 m., Oct. 1912, *L. Diguet* (Par.); road between Plateado and Colotlan, 5 Sept. 1897, *Rose* 3653 (U. S.); Chapala, 5 Oct. 1903, *Rose & Painter* 7633 (U. S.); GUANAJUATO: Guanajuato City, *Mendez* (TYPE: Prod.). — Nearly all the above specimens, excepting the type, were distributed as *V. excelsa*. The two species are very intimately related, but the present plant seems consistently different in its greener leaves pubescent beneath almost entirely on the main nerves alone, and not between them.

Var. **simulans** (Rob. & Greenm.), comb. nov.: achenio glabro, pappo nullo, capitulis paullo minoribus (3.5 cm. latis). — *Gymnolomia megacephala* Rob. & Greenm. var. *simulans* Rob. & Greenm. l. c. — MEXICO: ZACATECAS: Sierra de los Morones, near Plateado, 2315 m., 1 Sept. 1897, *Rose* 2740 (TYPE: G.).

7 8. *V. BUDDLEIAEFORMIS* (DC.) B. & H. Herbaceous perennial, up to 2.6 m. high. Stem brown or purplish-tinged, densely tuberculate-strigillose, rarely somewhat hispid-pilose in lines, paniculately branched above, bearing 8–90 heads in a panicle sometimes 2.5 dm. wide. Leaves usually opposite to near the inflorescence-branches, narrow-oblong to oblong-ovate or lanceolate, the lowest ovate, acute, mucronate, cuneate to rounded at base, more or less distinctly serrulate to subentire, 3-nerved and reticulate-veined, above green, harshly tuberculate-hispidulous, beneath densely canescent-hispidulous, 6–15 cm. long, 1.3–2.8 cm. wide (the lower up to 6 cm. wide), on petioles 1–1.6 cm. long. Heads cymosely

panicked, 3.5–4 cm. wide; disk 9–(fruit)16 mm. high, 8–14 mm. thick, convex in fruit. Involucre 9–11 mm. high, 4–5-seriate, the phyllaries blackish-green, the two or three outer series oblong or obovate-oblong, herbaceous at the acute reflexed apex, indurated and ribbed below, tuberculate-strigillose and hispid-ciliate, the inner two series somewhat indurated below, subherbaceous at length chartaceous at the enlarged apex, tuberculate-strigillose, more or less glandular-dotted, ciliolate, enlarged and looser in fruit. Rays about 10, oblong to lance-oblong, 1.2–2 cm. long, 3–4 mm. wide, sometimes deeply 2-lobed; disk-corollas sometimes purplish-tinged in age, puberulous, 6 mm. long (tube 1.8–2 mm.). Pales mucronately pointed, glabrous, 6.5 mm. long. Achenes sparsely hairy or subglabrate, 4 mm. long, 1 mm. wide. Awns 2 mm. long, rather easily deciduous at maturity; squamellae quadrate, laciniate-fimbriate, 0.2–0.8 mm. long, a pair at base of each awn, easily deciduous. — B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 177 (1881); Gray, Proc. Am. Acad. xix. 5 (1883); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 88 (1899). *Helianthus buddleiaeformis* DC.! Prod. v. 588 (1836). *Verbesina mollis*? Alam. ex DC. l. c. as syn. (1836), not HBK. *Helianthus rugosus* Schauer! Linnaea xix. 728 (1847), not Meyen, Reise ii. 45 (1835). *Viguiera rugosus* (a) (Schauer) B. & H. ex Hemsl. l. c. ii. 178 (1881). — MEXICO: GUANAJUATO: Villalpando, 1829, Mendez (COTYPE of *H. buddleiaeformis*: Prod.); MICHOACAN: Patzcuaro, 20 Oct. 1898, Holway 3217 (G.); Quinceo, near Morelia, 11 Nov. 1909, Arsène (U. S.); STATE OF MEXICO: Valley of Mexico, 1855, Schaffner 7 (G.); l. c., Schmitz 59 (G.); San Nicolas, 26 Sept. 1865, Bourgeau 965 (B. M., G., K., U. S.); hills near Santa Fe, 3 Oct. 1865, Bourgeau 965 bis (G., K., U. S.); Sante Fe, 18 Oct. 1903, Rose & Painter 8002 (U. S.); near Tacubaja, Sept. 1854, Schaffner 159 (K.); Tultenango Canyon, 17 Oct. 1890, Pringle 3314 (B. M., G., K., Mo., U. S.); hills, Valley of Mexico, 29 Oct. 1896, Pringle 7348 (G.); Rio Hondo Canyon, 22 Oct. 1900, Pringle 9055 (G., K., Mo., U. S.); thickets near Eslaba, 2440 m., 13 Oct. 1903, Pringle 11608 (G., K., U. S.); near City of Mexico, 18 Oct. 1903, Holway 5173 (G.); PUEBLA: Yavesia, Liebmann 610 (G.). Mexico without locality: *Alaman* (COTYPE of *H. buddleiaeformis*: G., Prod.); *Tate* 117 (K.); *Mackenzie* (K.); *Baites* 16 (K., Prod.); *Hahn* (K.); *Aschenborn* (TYPE COLL. of *H. rugosus*: K.). — T. 2. FIG. 2.

9. *V. Hemsleyana*, nom. nov. Herbaceous perennial, 1.6 m. high or less, the stems few, simple or branched in inflorescence, somewhat harshly tuberculate-strigillose or strigose. Leaves opposite below or nearly throughout, oblong-lanceolate or ovate, acuminate at both ends, serrate, 3-nerved and reticulate beneath, above green, tuberculate-strigillose and strigose, beneath very densely and canescently hispidulous-puberulous, along the veins hispid-pilose or strigose, 4.5–9.7 cm. long, 1.3–3.5 cm. wide; petioles 2–4 mm. long. Heads few (1–5), 3–6 cm. wide, on often very long axillary and terminal peduncles; disk 11–17 mm. high, 12–20 mm. wide. Involucre 4–5-seriate, 12–16 mm. high, the phyllaries blackish-green, the three outermost series oblong or oblong-obovate or -spatulate, more or less indurated, ribbed, and nearly glabrous below, above strongly hispid-pilose-ciliate, with herbaceous obtuse or acutish mucronulate usually strigose apex; inner two series much longer, obovate or obovate-spatulate, ciliate and subsparingly strigillose, with amplified rounded submembranous often purplish apex; all tending to be rather loose at tip. Rays 14–16, 1.2–2.9 cm. long, 5–7 mm. wide; disk-corollas hispidulous especially below, 4.8–(fruit)7.5 mm. long (tube 0.9–2 mm.). Pales stiffly short-pointed or acuminate, hispidulous along back, often with two teeth below apex, 6–8 mm. long. Achenes glabrous, 3.5 mm. long. Pappus none. — *Gymnolomia Ghiesbreghtii* Hemsl. Biol. Centr.-Am. Bot. ii. 162 (1881); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 101 (1899). Not *V. Ghiesbreghtii* Gray (1883), which is a variety of *V. flava* (Hemsl.) Blake (see no. 2). — MEXICO: MICHOACAN: mountains near Morelia, *Ghiesbreght* 382 (G.); wooded hills near Patzcuaro, 10 Nov. 1890, *Pringle* 3339 (G.); OAXACA: hills near Oaxaca City, 1830–2135 m., Aug.–Sept. 1894, *Pringle* 4963 (G.); Valley of Oaxaca, 1675–2285 m., 20 Sept. 1894, *E. W. Nelson* 1464 (G.); 30 km. S. W. of City of Oaxaca, 2285–2900 m., 10–20 Sept. 1894, *E. W. Nelson* 1371 (G.); La Carbonera, 2135 m., 20 Sept. 1895, *L. C. Smith* 799 (G.); Cerro de San Felipe, 1900 m., 26 Sept. 1897, *Conzatti & González* 553 (G.); without definite locality, July–Aug. 1900, *Conzatti & González* 53 (G.). — It has seemed best to change the name of this species to prevent confusion with *V. Ghiesbreghtii* Gray (1883), a name which has been in use for more than a generation for a species here reduced to *V. flava* (Hemsl.) Blake (see p. 47). — T. 2. FIG. 1.

10. *V. hypochlora* (Blake), comb. nov. Herbaceous, erect, somewhat branched above, the stem slender, hispidulous-strigillose. Leaves alternate (the lower not seen), lanceolate or narrowly oblong-lanceolate, acuminate, at base cuneate, obscurely serrulate, strongly 3-nerved above the base, reticulate beneath, above green, tuberculate-strigose, in age lepidote, beneath equally green, hispidulous along the veins, gland-dotted between them, 8–13.5 cm. long, 1.7–2.7 cm. wide; unmarginated portion of petiole 3 mm. long. Heads about 11, 3.5 cm. wide, loosely cymose-panicled, the peduncles 5–13 cm. long; disk 1–(fruit)1.4 cm. high, 1.4–(fruit)1.9 cm. thick. Involucre 5-seriate, graduated, surpassing disk, the phyllaries of the three outer series herbaceous, lanceolate or oblong-lanceolate, acuminate, more or less involute, blackish-green, hispid-pilose-ciliate, strigillose within, indurated at base, strongly reflexed at apex; the inner ones oblong, obtuse or obtusish, at apex submembranaceous, elongated, ciliolate, below slightly indurated and more or less strigillose. Rays 12, oblong, 15 mm. long, 4 mm. wide; disk-corollas yellow, puberulous at base, 5.5 mm. long (tube 1.2 mm., amplified below). Pales purplish and strigillose above, abruptly acuminate, 6.8 mm. long. Achenes glabrous, substriate, oblong, 3 mm. long, 1 mm. wide. Pappus none. — *Gymnolomia hypochlora* Blake! Proc. Am. Acad. li. 516 (1916). — MEXICO: JALISCO: mountains above Etzatlan, 2 Oct. 1903, *Pringle* 11537 (TYPE COLL.: G., K.).

11. *V. ANGUSTIFOLIA* (H. & A.) Blake. Apparently suffrutescent (?), branched or simple (?), the stem slender, densely and canescently subtuberculate-strigose or -strigillose, at length subglabrate and grayish. Leaves opposite (except usually the uppermost), narrowly oblong to linear-oblong or broadly linear, acute or rarely obtusish, cuneate to rounded at base, subentire or faintly and remotely denticulate, 3-nerved, above pale green, tuberculate-strigillose, beneath densely canescent-hispidulous, 3–9.5 cm. long, 4–13 mm. wide, on petioles 3–4 mm. long. Heads solitary at apex of stem and branches, 3–5 cm. wide, on few-bracted peduncles 1–13 cm. long; disk 1–(fruit)1.8 cm. high, 1–(fruit)1.7 cm. thick. Involucre 11–(fruit)19 mm. high, 4–5-seriate, the phyllaries all densely and canescently tuberculate-strigillose and hispid-ciliate, the outermost oval or oblong to oval-ovate, acutish, callous-mucronate, the next two series longer and more oval-oblong, the inner two

series oblong, chartaceous, round-tipped, enlarged in fruit; all appressed. Rays 12, 1–2 cm. long, 2.8–7.5 mm. wide; disk-corollas densely puberulous, 6–7 mm. long (tube 1.5 mm. long). Pales acute, spinulose-crose on margin and keel, 8–11 mm. long. Achenes somewhat appressed-silky-pubescent, 6.5 mm. long. Awns linear-lanceolate, 4.5–6 mm. long; squamellae about 6–8, subequal or the inner minute, free or more or less united below, 1.5 mm. long or less; pappus persistent. — Blake, Proc. Am. Acad. li. 518 (1916). *Tithonia pachycephala* H. & A.! Bot. Beech. Voy. 299 (1840), not DC. (err. iden.). *T. angustifolia* H. & A.! l. c. 435 (1841). *Viguiera blepharolepis* Gray! Proc. Am. Acad. xix. 5 (1883). — MEXICO: SINALOA: Cerro de Pinal, Dec. 1848, *Seemann* 1481 (TYPE COLL. of *V. blepharolepis*: G., K.); TEPIC: Tepic, *Sinclair* (TYPE of *T. angustifolia*: K.), *Barclay* (B. M.), Jan.–Feb. 1892, *Palmer* 1859 (G., U. S.); JALISCO: rocky hills near Tequila, 12 Oct. 1893, *Pringle* 4546 (B. M., G., K., Mo., U. S.). Mexico without definite locality (Tepic?): *Beechey* (K.).

12. *V. ensifolia* (Sch. Bip.), comb. nov. Apparently herbaceous, slender, sparsely branched above, the stem subsparingly tuberculate-strigillose. Leaves opposite, linear-lanceolate, long-attenuate and somewhat falcate, 3-nerved and reticulate beneath, very obscurely serrulate, above dull green, harshly tuberculate-strigillose, the tubercles persistent, beneath finely and evenly canescent-strigillose and gland-dotted, 11–12 cm. long, 0.9–1.3 cm. wide, the upper much reduced; petioles about 4 mm. long. Heads 2 cm. wide, rather numerous (25 in specimen), on axillary and terminal peduncles 2.5–5.5 cm. long; disk 9 mm. high, 11 mm. wide. Involucre 5-seriate, about 9 mm. high, the phyllaries oval (outer) to oblong or oblong-obovate, densely and canescently strigillose and ciliate, the outer strigose toward apex and mucronate, with indurated base and siccate-subherbaceous tip, the inner broadly rounded, with somewhat amplified submembranaceous apex, all whitish-green, appressed or the inner with somewhat loose tips. Rays about 8 (?), about 9 mm. long, 5 mm. wide; disk-corollas puberulous especially below, 4.2 mm. long (tube 1 mm.). Pales narrow, acutish, minutely puberulent especially above, 5.6 mm. long. Achenes (immature) brownish, glabrous. Pappus none. — *Montagnea ensifolia* Sch. Bip.! in Seem. Bot. Herald 304 (1856–57). *Zaluzania ensifolia* Sch. Bip. Flora xlvi. 216 (1864). *Gymnolomia ensifolia* (Sch. Bip.)

B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 161 (1881); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 100 (1899). — MEXICO: Sierra Madre of northern Mexico, *Seemann* 2007 in part (TYPE COLL.: G.). — According to Bentham & Hooker (Gen. Pl. ii. 364 (1873)) this number of *Seemann's* includes also *Viguiera angustifolia* (H. & A.) Blake (*Tithonia angustifolia* H. & A.).

Subgenus II. *Calanticaria* (Rob. & Greenm.), comb. nov.

Herbae perennes vel frutices rare annuae, capitulis saepe majusculis, foliis variis, involucri 2-7-seriati phyllariis saepius basi induratis apice herbaceis, appendice ampliata membranaceo-chartacea numquam praeditis, pappo ex aristis et squamellis liberis vel plus minusve connatis numquam membranaceo-scariosis composito interdum nullo. — Species typica *Gymnolomia Greggii* Gray (= *V. Greggii* (Gray) Blake). — A large and varied group, distinguished from *Amphilepis* by the fact that the inner phyllaries are never membranaceo-chartaceous and amplified at apex, from *Yerbalesia* by the fact that the squamellae when united are stiff and scarious, not forming a membranaceous many-nerved scale. Species 13-136. For synopsis of sections, see p. 33.

It has seemed necessary to adopt for this, the typical and largest subgenus of *Viguiera*, the first subgeneric name used for any species now included in it. This is *Gymnolomia* subg. *Calanticaria* Rob. & Greenm., Proc. Bost. Soc. Nat. Hist. xxix. 89 (1899), which included *G. Greggii* Gray, *G. cinerascens* (Sch. Bip.) B. & H., *G. pinatilobata* (Sch. Bip.) B. & H., *G. tripartita* Rob. & Greenm. and *G. tenuifolia* (Gray) B. & H., of which *G. Greggii* is here selected as the type. The subgeneric diagnosis there given applies of course to only a very few of the species now included in *Calanticaria*. The name *Ewiguiera*, which would have been the preferable designation for the group, had long before been used by Gardner (Lond. Journ. Bot. vii. 397 (1848)), but only as the name of a section (which included two species of *Viguiera*, two of *Oyedaea*, and three of *Aspilia*), and is accordingly not available in the present connection.

Section 1. ***Hypargyrea***, sect. nov. Herbae perennes robustae, foliis lanceolatis vel ovato-lanceolatis integris sessilibus infra sericeis vel tomentosis, capitulis majusculis vel magnis solitariis vel paucis, involucri phyllariis infra paullum induratis. — Species

typica *V. hypargyrea* Greenm. — Three species of northern Mexico, with few or solitary large heads and sessile alternate lanceolate or lance-ovate leaves which are silky or tomentose beneath.

a. Leaves strongly decurrent13. *V. decurrens*.

a. Leaves merely sessile, b.

b. Stem densely silky-lanate; leaves 9–22 cm. long.....14. *V. Rosei*.

b. Stem merely pilose-strigose; leaves 4–7.4 cm. long....15. *V. hypargyrea*.

13. *V. DECURRENS* Gray. Stout erect herb, 0.6–1 m. high, very leafy. Stem simple, 1–4-headed, pilose-tomentose, angulate. Leaves alternate, ovate to oblong-ovate, acuminate, narrowed to the base and very strongly decurrent on the stem, green and rather softly tuberculate-hispidulous above, pale, glandular, and canescent-pilose beneath with appressed hairs, 1-nerved and feather-veined (the veins uniting to form a submarginal nerve), 11–19 cm. long, 2.4–6 cm. wide. Heads 5–6 cm. wide, on pilose often winged peduncles, these 1–10.5 cm. long, not at all or only slightly thickened at apex; disk 1.6–(fruit)2.7 cm. high, 3–4 cm. thick. Involucre 2(–3)-seriate, subequal or with the outer phyllaries longer and exceeding the disk, 11–22.5 mm. high, the phyllaries oblong or broadly oblong-ovate, subacute, at first canescent-pilose, in fruit thickened, ribbed, and subglabrate below, the triangular subherbaceous apex loosely spreading or reflexed. Rays about 14, 1.4–2 cm. long, 3.5–4.5 mm. wide; disk-corollas glandular and appressed-pilose, 6–(fruit)8.5 mm. long (tube 1–1.7 mm.). Pales truncate, 1.2 cm. long or more. Achenes 7 mm. long, densely appressed-pubescent. Awns 4.5 mm. long; squamellae united at very base, about 6–10, lacerate, unequal, up to 1.6 mm. long. — Gray! Proc. Am. Acad. xix. 5 (1883). *Tithonia decurrens* Gray! Pl. Fendl. 85 (1849). *T. recurrens* Hemsl. Biol. Centr.-Am. Bot. ii. 176 (1881), sphalm. — MEXICO: CHIHUAHUA: common on mountains around Cosiquiriachi, Oct. 1846, *Wislizenus* 193 (TYPE: G.); grassy slopes, Santa Eulalia Mts., 9 Sept. 1885, *Pringle* 676 (B. M., G., K., U. S.); mountains near Chihuahua, 29 Sept. 1886, *Pringle* 1063 (Mo.); Sierra Madre near Colonia Garcia, 2385 m., 25 Aug. 1899, *Townsend & Barber* 279 (B. M., G., K., Mo., U. S.); Marsh Lake, Sierra Madre, 2135 m., 19 Sept. 1903, *M. E. Jones* (U. S.); Sierra Madre, 25 Aug. 1899, *E. W. Nelson* 6287 (G., U. S.); Guajochoic, 8 Sept. 1892, *Hartman* 562 (G.); Colonia Juarez, 1585 m., Sept. 1903, *M. E. Jones* (Mo.); DURANGO: rocky

hills, Sandia Station, 2385 m., 12 Oct. 1905, *Pringle* 13579 (G., U. S.); along road between Cerro Prieto and La Providencia, 11 Sept. 1898, *E. W. Nelson* 4981 (U. S.).

According to Hartman, the plant is known to the natives of Chihuahua as "nakaróri," and used for poisoning fish.

14. *V. ROSEI* Greenm. Stem stout, densely white-silky-lanate like the ascending branches. Leaves ovate-lanceolate, long-attenuate, falcate, rounded and subclasping at the base, 1-nerved, reticulate-veined (the veins closed near the margin), somewhat crisped on border, above pale green, tuberculate-hispid-pilose with incurved or subspreading hairs and gland-dotted, beneath canescently pilose-tomentose, gland-dotted, and venose; those of main stem 1.6–2.2 dm. long, 3–4.7 cm. wide, those of branches much smaller. Heads solitary at apex of stem and branches, 4.5 cm. wide, on short peduncles pubescent like the stem, much overtopped by the leaves; disk 3.5 cm. thick, 1.8 cm. high. Involucre 3-seriate, the phyllaries slightly graduated, with oblong to oval indurated-herbaceous base and strongly squarrose lanceolate acuminate herbaceous tip, densely tuberculate-strigose-pilose on their free surfaces, exceeding disk. Rays about 18, 10–12 mm. long, 4 mm. wide; disk-corollas appressed-puberulous on nerves and teeth, yellow, the teeth apparently turning purplish with age, 7 mm. long (tube 1 mm.). Pales slender, mucronulate, pilosulous toward apex, 1–1.3 cm. long. Achenes silky-pilose, 6 mm. long. Awns 2 mm. long; squamellae about 4–7 pairs, unequal, 1 mm. or less long, deeply lacerate, united only at extreme base. — Greenm.! *Proc. Am. Acad.* xxxix. 105 (1903). — MEXICO: ZACATECAS: near Plateado, on the road from Colotlan, 31 Aug. 1897, *Rose* 2710 (TYPE COLL.: G., K.).

15. *V. HYPARGYREA* Greenm. Stems erect, subcanescently pilose-strigose, at length subglabrate, simple or sparsely branched. Leaves longer than the internodes, lanceolate, acuminate, rounded at base, 3-nerved, above light green, roughly tuberculate-strigose and finely reticulate, beneath rather softly subsericeous-pilose with appressed hairs, 4–7.4 cm. long, 1–2.4 cm. wide. Heads solitary on stem and branches, on very slightly thickened strigose peduncles 3–3.5 cm. long; disk (in fruit) 1.8 cm. high, 2.5 cm. wide, convex. Involucre about 1 cm. high, 3-seriate, slightly graduated, the phyllaries firm, oblong, more or less pilose, slightly indurated at

base, narrowed to a callous-mucronate tip. Rays 6–12 mm. long, 1.6–5 mm. broad; disk-corollas hispidulous, 6 mm. long (tube 1.8 mm.). Pales canescent-strigillose near the obtusish apex, 10.5 mm. long. Achenes subsilky-pubescent, 5.5 mm. long. Awns somewhat flattened, 4 mm. long; squamellae 6–8, nearly free or firmly coherent to above the middle, laciniate-fimbriate, 1.5 mm. long; pappus strongly persistent. — Greenm.! Proc. Am. Acad. xxxix. 105 (1903). — MEXICO: DURANGO: city of Durango and vicinity, Apr.–Nov. 1896, *Palmer* 816 (TYPE COLL.: G., K., Mo.); Otinapa, 25 July–5 Aug. 1906, *Palmer* 448 (G., U. S.); Santa Catalina, 2200 m., 2 Sept. 1903, *Endlich* 89 (Ber.). — The thick woody root is used for disorders of the stomach, according to Endlich, and the plant is called “Plateada” (silvery).

Section 2. **Chloracra**, sect. nov. Herbae vel suffrutices vel frutices, foliis sursum saepe alternis saepius ovatis vel lanceolatis interdum pinnatilobatis, capitulis mediocribus vel majusculis, involucri 2–5-seriati phyllariis basi saepe valde induratis ovatis vel oblongis vel lanceolatis pallidis costatis et vittatis apice abrupte angustatis herbaceis, interdum prorsus subherbaceis basi costatis vel subcostatis sed vix induratis, pappo interdum nullo. — Species typica *V. dentata* (Cav.) Spreng. — A group of some 34 species, ranging from Nevada and Texas to Guatemala and Honduras, divisible into five very natural series. Species 16–49. For key to series, see p. 33.

Series A. **Maculatae**, ser. nov. Frutices vel herbae perennes, foliis saepe ovatis scabris, capitulis paniculatis mediocribus vel majusculis, involucri phyllariis saepe oblongis vel lanceolato-oblongis basi induratis costatis vittatis pallido-marginatis appendice herbacea saepius brevi triangulari praeditis. — Species typica *V. maculata* (Brandege) Blake (*Encelia maculata* Brandege). — Shrubs or perennial herbs of central and southern Mexico, with mostly ovate and scabrous leaves and paniced heads; involucre 2–3-seriate, the phyllaries with indurated mostly oblong costate and vittate pale-margined base and usually much shorter and triangular herbaceous tip, or the latter rarely linear-lanceolate; awns of pappus usually strongly paleaceous. Species 16–22.

- a. Pales with a stiff abrupt more or less recurved cusp, b.
- b. Petioles and under leaf-surface rather densely hispidulous or puberulous; branches sordid-tomentose
 - 16. *V. sphaerocephala*.
 - b. Petioles and under leaf-surface nearly glabrous; branches appressed-puberulous17. *V. oaxacana*.
- a. Pales without stiff recurved cusp, c.
- c. Heads very numerous, subcylindric, 1 cm. thick or usually much less.....21. *V. quinquerediata*.
- c. Heads fewer, hemispheric or turbinate-hemispheric, 1 cm. thick or usually more, d.
- d. Phyllaries with reflexed herbaceous apex.....22. *V. adenophylla*.
- d. Phyllaries appressed, e.
- e. Pales very blunt18. *V. trachyphylla*.
- e. Pales acute or cuspidate, f.
- f. Phyllaries and petioles sparsely ciliate; involucre 3-seriate19. *V. maculata*.
- f. Phyllaries and petioles very strongly ciliate; involucre 4-seriate.....20. *V. eriophora*.

16. *V. SPHAEROCEPHALA* (DC.) Hemsl. Shrubby, 5-7 m. high, the branches sordid-tomentose, bearing rather numerous heads in a cymose panicle about equalled by the leaves. Leaves opposite, ovate or triangular-ovate, acuminate from near the unequally subcordate base, crenate-dentate, densely tuberculate-hispidulous above, scarcely paler, hispidulous-pilosulous and gland-dotted beneath, 3(-5)-nerved, 9-10 cm. long, 4.8-5 cm. wide, on unmargined sordid-puberulous petioles 1.1-2.2 cm. long. Ultimate pedicels 1-1.9 cm. long; heads 4.5-5 cm. wide; disk 1-1.2 cm. high, 1.4-2 cm. wide. Involucre 3-4-seriate, the scales oblong, acute, ciliolate and sordid-puberulous, somewhat indurated and vittate below, with lanceolate herbaceous spreading tip about as long as the body. Rays about 20, 1.7-2 cm. long, 6 mm. wide; disk-corollas puberulous on teeth, 5-5.5 mm. long (tube 1.4-1.6 mm.). Pales puberulous, 7-9 mm. long, with an abrupt pungent widely spreading mucro at apex. Achenes more or less villous-silky, 4 mm. long. Awns 2.3 mm. long; squamellae 4, quadrate, free, sublacerate, 1.3 mm. long. — Hemsl. Biol. Centr.-Am. Bot. ii. 179 (1881). *Leighia sphaerocephala* DC.! Prod. v. 582 (1836). *Encelia squarrosa* Greenm.! Proc. Am. Acad. xxxix. 112 (1903). *V. squarrosa* (Greenm.) Blake, l. c. xlix. 376 (1913). — MEXICO: GUERRERO: mountains above Iguala, 1220 m., 11 Oct. 1900, Pringle 8390 (TYPE COLL. of *E. squarrosa*: B. M., G., K.); mountain slope near Taxmalac, Portizuelo del Picacho Alto, Dist. Hidalgo, 18 Oct. 1904, C. & E. Seler 4251 (Ber., G.). Mexico without locality: *Alaman* (TYPE of *L. sphaerocephala*: Prod.).

17. *V. oaxacana* (Greenm.), comb. nov. Herbaceous, the stem brownish, striatulate, glabrous below, strongly striate and appressed-puberulous above, especially in the inflorescence. Leaves alternate, broadly ovate or subrhombic-ovate, subacuminate, at base cuneate, unequally crenate-serrate or serrate (the teeth about 25 pairs, appressed or subspreading), 3-nerved, deep green both sides, finely tuberculate above, very sparsely strigose or glabrate beneath, those of stem 13 cm. long, 8 cm. wide, the others much smaller; petioles unmarginated, 0.7–3.4 cm. long, subglabrous. Heads chiefly in axillary and doubtless terminal few (about 3)-headed cymes, about 4 cm. wide, on peduncles 1–2.8 cm. long; disk 1.3–1.5 cm. high, 2.1–2.5 cm. wide, broadly campanulate. Involucre 3–sub-4-seriate, graduated, 6–8 mm. high, the phyllaries lanceolate, narrowed to the callous-mucronate apex, with coriaceous pale-margined vittate body and more herbaceous appressed or rather loose tip about as long as body, more or less puberulous along margin and rarely on back, otherwise subglabrous. Rays “12–16,” oblong-oval, 15 mm. long, 6 mm. wide; disk-corollas sparsely puberulous at base of throat, otherwise glabrous, 7.5 mm. long (tube 2 mm.). Pales firm, sparsely puberulous along keel, with a strong spreading barely subulate mucro, 11–12 mm. long. Achenes (submature) densely appressed-pilose, 4.5 mm. long. Awns 2, broadly paleaceous (up to 1.5 mm. broad), acutish, erose-fimbriatulate above, unequal, 5.5 mm. long or less; squamellae about 6, free, unequal, lacerate, 1.3 mm. long or less. — *Helianthus oaxacanus* Greenm.! Proc. Am. Acad. xxxix. 107 (1903). — MEXICO: between Huajuapam, Oaxaca, and Retlatzingo, Puebla, 1465–1980 m., 19 Nov. 1894, *E. W. Nelson* 1985 (TYPE COLL.: G.).

18. *V. TRACHYPHYLLA* Blake. Herbaceous (?); stem tuberculate-hispidulous above, subglabrate below, bearing a narrow (1.5 dm. wide) many-headed cymose panicle. Leaves opposite (except in inflorescence), ovate, acuminate, abruptly narrowed about 2 cm. above the base into a subamplexicaul lower portion (petiole), appressed-serrulate, very harshly tuberculate-hispidulous above, dark green, below scarcely paler, rather softly hispidulous along the veins and gland-dotted, 3-nerved, pinnate-veined, 8.3–12.3 cm. long, 3.5–6.3 cm. wide, the narrowed basal portion 1.4–2 cm. wide; naked portion of petioles broad, hispidulous, 2.5–5 mm. long, the bases connate. Pedicels hispidulous, 4–10 mm. long, the bracts of

inflorescence lanceolate; heads 4.5 cm. wide; disk 1-(fruit)1.5 cm. high, 9-(fruit)15 mm. wide. Involucre 2-seriate, 6-9 mm. high, the phyllaries oblong-lanceolate, subacute, graduated, hispidulous-pilosulous, with dark center and narrow pale margin, scarcely indurated, the lanceolate apex herbaceous, subappressed. Rays about 8, 1.7 cm. long, 7 mm. wide; disk-corollas hispidulous below, 6.5 mm. long (tube 1.3 mm.). Pales narrow, truncate and minutely erose at apex, the keel greenish, 10-11.5 mm. long. Achenes (immature) silky-villous, 5-6 mm. long. Awns linear-oblong, rather easily deciduous, 4.5 mm. long; squamellae 4-8, unequal, slightly united at base, 1.5 mm. long. — Blake, Proc. Am. Acad. xlix. 375 (1913). *Encelia Pringlei* Fernald! *ibid.* xxxv. 573 (1900). Not *V. Pringlei* Rob. & Greenm. (1894). — MEXICO: HIDALGO: hill-sides above Pachuca, 2745 m., 14 Sept. 1899, *Pringle* 8248 (TYPE COLL.: B. M., G., K.); Pachuca, 5 Sept. 1910, *Orcutt* 3912 (U. S.). Mexico without definite locality: *C. Ehrenberg* 352 (Ber.); 20 Nov. 1885, *Schumann* 138 (Ber.). — T. 2. FIG. 4, T. 3. FIGS. 4, 19.

19. *V. MACULATA* (Brandege) Blake. Much branched shrub, with opposite branches, the bark gray, the young branches purplish-brown, more or less sordid-pubescent with appressed hairs. Leaves opposite, ovate to ovate-lanceolate, acuminate, truncate to rounded at base, then attenuate into the petiole, obscurely serrulate, lepidote-strigillose and very scabrous above, hispidulous and glandular-dotted beneath, concolorous, 3-nerved, venose beneath, 5-6.5(-"12") cm. long, 1.7-3.5(-"5") cm. wide; petioles scarcely margined, puberulous above, 5-7 mm. long. Heads in cymose panicles of 5-8 at tips of branches, 2.7-3.5 cm. wide; peduncles 1-3 cm. long; disk 9-11 mm. high, 9-12 mm. wide. Involucre 3-seriate, graduated, 6-7 mm. high, the phyllaries oblong, acute, loosely pilosulous especially on margin, with slightly thickened subcoriaceous vittate broadly pale-margined body and abrupt subherbaceous mucronate triangular tip. Rays 6, 9-15 mm. long, 4.5-5 mm. wide, sometimes styliiferous but sterile; disk-corollas sparsely hirtellous on tube and teeth, 5.5 mm. long (tube 1.7-2 mm.). Pales acute, pilosulous and slightly glandular above, 7 mm. long. Achenes (immature) silky-villous on margin and above, 3 mm. long. Awns acute, one often deciduous, 2.5 mm. long, 1 mm. wide; squamellae about 4, roundish, fimbriate, 1 mm. long. — Blake! Proc. Am. Acad. xlix. 374 (1913). *Encelia maculata*

Brandege, Zoe v. 259 (1908). — MEXICO: **OAXACA**: Los Naranjos, Aug. 1908, *Purpus* 2520a (B. M., G.); PUEBLA: Coxcatlan, 1830–2135 m., Sept. 1909, *Purpus* 4127 (B. M., G., U. S.). — Brandege's type (*Purpus* 2520) came from San Luis Tultitlanapa, Puebla. — T. 2. FIG. 3, T. 3. FIG. 21.

20. V. ERIOPHORA Greenm. Evidently shrubby, the stem branched, grayish and glabrate below, purplish-brown, striate, and densely canescent-tomentose with curly hairs above. Leaves opposite (uppermost sometimes alternate), ovate, acute to acuminate, rounded to cordate above the cuneate base, rather sharply dentate-serrate with deltoid mucronate teeth, above tuberculate-hispidulous with subspreading finally deciduous hairs, beneath slightly paler, hispidulous-pilosulous and gland-dotted, 3-nerved and rather venose, 7–13.5 cm. long, 2.3–6 cm. wide, those of the inflorescence smaller; petioles flattened above, densely pilose-tomentose on margin, 0.7–2.8 cm. long. Heads numerous in trichotomous panicles 5 cm. wide; disk 1–1.4 cm. high, 0.9–1.9 cm. wide. Involucre 4-seriate, graduated, 8–10 mm. high, its phyllaries oblong, shortly acute, callous-mucronate, with pale-margined indurated vittate body and shorter appressed herbaceous tip, densely pilose-ciliate, on back pilose or often glabrous. Rays about 6, 1.6–2 cm. long, 6.5–9 mm. wide; disk-corollas sparsely pubescent at base of throat and on nerves, 6 mm. long (tube 2 mm.). Pales subglabrous or pubescent toward the yellowish denticulate acute apex, 8–10 mm. long. Achenes (immature) densely silky-pilose, 4 mm. long. Awns 5 mm. long; squamellae about 6, free, lanceolate, fimbriate, about 1.5 mm. long. — Greenm.! Proc. Am. Acad. xxxix. 104 (1903). — MEXICO: **OAXACA**: hills of Telixtlahuaca, 1980 m., 18 Oct. 1895, *L. C. Smith* 971 (COTYPE: G.); without definite locality, 21 Oct. 1899, *Holway* 3689 (COTYPE: G.), 25 Oct. 1899, *Holway* 3744 (U. S.), alt. 1750 m., July–Aug. 1900, *Conzatti & González* 987 (COTYPE: G.).

21. V. QUINQUERADIATA (Cav.) Gray. Branching shrub, 3–7 m. high, the branches puberulous, at length glabrate, bearing many-headed panicles 7–19 cm. wide. Leaves nearly all opposite, ovate or triangular-ovate, acuminate, truncate or subcordate at the usually oblique base, cuneately narrowed into the petiole, appressed-serrulate to sharply crenate-serrate, the upper entire, scabrous with minute tuberculate-strigillose glandular-based hairs above,

beneath slightly paler, hispidulous-pilosulous with loose hairs and glandular-dotted, 3-nerved, 3–15 cm. long, 3.2–9 cm. wide; petioles puberulous, 1.3–4.5 cm. long. Inflorescence puberulous-strigillose, the ultimate pedicels 0.5–2.6 cm. long; heads 2–2.3 cm. wide; disk subcylindric, 1–(fruit)1.3 cm. high, 3.5–(fruit)10 mm. thick. Involucre 2-seriate, graduated, 5–6 mm. high, the phyllaries few (about 14), linear-lanceolate, more or less pilose, scarcely indurated, vittate, pale-margined, with short loose mucronate herbaceous apex. Rays 5–6, oval, 9–11 mm. long, 4–5.5 mm. wide; disk-corollas about 14, very densely puberulous below, 4.5–5 mm. long (tube 1.3 mm.). Pales pilosulous, abruptly pungent-mucronate, 7.5–9.5 mm. long. Achenes densely silky-villous, 6 mm. long. Awns slender or slightly broadened and paleaceous, 2–2.5 mm. long; squamellae about 6, free or united nearly to apex, acuminate, deeply lacerate, 1.2 mm. long. — Gray! in Wats. Proc. Am. Acad. xxii. 426 (1887). *Helianthus quinque-radiatus* Cav. Icon. iii. 36. t. 272 (“1794” = 1795); DC. Prod. v. 590 (1836). *Leighia? leptocephala* DC.! Prod. v. 582 (1836). — MEXICO: JALISCO: ravines and hillsides, Chapala, Oct.–Nov. 1886, *Palmer* 718 (B. M., G., K., Mo., U. S.); hills near Guadalajara, 9 Nov. 1888, *Pringle* 1794 (B. M., G., K., Mo., U. S.); mountains above Etzatlan, 23 Oct. 1903, *Pringle* 11611 (G., K., U. S.); Huejotitan, Oct. 1912, *L. Diguet* (G., Par.); Sierra Madre west of Bolaños, 17 Sept. 1897, *Rose* 3729 (U. S.). Mexico without definite locality: *Alaman* (TYPE of *L. leptocephala*: Prod.); “Barranca,” 26 May 1848–49, *Gregg* 901 (G., Mo.); “Pastita,” Sept. 1898, *Dugès* (U. S.).

Dugès's plant, collected “dans un jardin à Pastita,” is said to be known as “vara blanca” and used to remove oil-spots.

22. V. ADENOPHYLLA Blake. Herbaceous, the branches erect, the stem subflexuous, more or less glandular-puberulous, above appressed-pilosulous. Leaves alternate, broadly ovate, acuminate, at base cunate or abruptly truncate, then narrowed into a margined petiole, crenate-dentate, 3-nerved, above pilosulous, the hairs subappressed, glandular but scarcely tuberculate at base, beneath pilosulous, glandular, 8.5–10.5 cm. long, 4.6–8 cm. wide; petioles glandular-pubescent, 1.8–2 cm. long. Heads numerous, cymose-panicled, 2.8 cm. wide; disk 8–13 mm. high, 7–12 mm. wide. Involucre 2-seriate, 6 mm. high, subgraduated, the phyllaries lanceolate to ovate-lanceolate, acute, subherbaceous, reflexed at

apex, at base somewhat indurated and costate, on margin and back more or less sordid-pilosulous and glandular. Rays 8, oval, 10–14 mm. long, 5.5–7 mm. wide; disk-corollas subappressed-pilosulous, 6 mm. long (tube 1.3 mm.). Pales oblong, mucronate-acute, erose at apex, yellowish on margin, sordidly pilosulous and glandular on back, 8–9 mm. long. Achenes sparsely appressed-pilose, 5 mm. long. Awns fimbriate, sometimes trifid, 2.8–3.5 mm. long, rather easily deciduous; larger squamellae 4, free, oblong, lacerate-fimbriate, about 1.2 mm. long, with about 4 smaller intermediate ones. — Blake! Proc. Am. Acad. li. 518 (1916). — MEXICO: SAN LUIS POTOSI: 1830–2440 m., 1878, *Parry & Palmer* 467 (TYPE COLL.: B. M., G., K., Mo., U. S.); Alvarez, 29 Sept.–3 Oct. 1902, *Palmer* 172 (G., Mo., U. S.).

Series B. **Grammatoglossae**, ser. nov. Herbae perennes vel suffrutescentes, foliis oppositis vel alternis, capitulis saepe majusculis, involucri phyllariis 2–5-seriatis gradatis vel subaequalibus lanceolatis vel oblongis acutis vel obtusis subherbaceis basi rarius leviter vel valde costatis et induratis, pappo interdum nullo. — Species typica *V. grammatoglossa* DC. — Eleven species of Mexico and Guatemala, one species extending into the southwestern United States. Chiefly distinguished from the other series of this section by the phyllaries, which are only slightly or not at all indurated and ribbed below, but through the var. *latisquama* of *V. cordifolia* the group is closely connected with the *Maculatae*. Species 23–33.

a. Phyllaries 2–3-seriate, b.

b. Phyllaries obtuse to acute, c.

c. Leaves densely silky-canescens beneath, d.

d. Pappus present; achenes pubescent 25. *V. grammatoglossa*.

d. Pappus none; achenes glabrous 26. *V. bombycina*.

c. Leaves not silky beneath, e.

e. Leaves densely and softly pilosulous beneath 24. *V. mima*.

e. Leaves not softly pilosulous beneath, f.

f. Petioles 1–3 cm. long 23. *V. Purpusii*.

f. Petioles mostly 5 mm. long or less 27. *V. cordifolia*.

b. Phyllaries acuminate or attenuate, g.

g. Leaves densely silky-canescens beneath 29. *V. sessilifolia*.

g. Leaves sometimes densely pilose but not silky beneath, h.

h. Pappus none; achene glabrous 30. *V. ovata*.

h. Pappus present; achene pubescent, i.

i. Leaves short-petioled or sessile, not abruptly contracted into a margined base 27. *V. cordifolia*.

i. Leaves abruptly contracted into a broadly margined petiole, thereby appearing sessile 28. *V. rhombifolia*.

- a. Phyllaries 4-5-seriate, *j.*
j. Pappus none; phyllaries obtusish to acutish.....33. *V. Parkinsonii.*
j. Pappus present; phyllaries acute to acuminate, *k.*
k. Leaves ovate to oval.31. *V. Pringlei.*
k. Leaves lanceolate to ovate-oblong.....32. *V. Seemannii.*

23. *V. PURPUSII* Brandege. Herbaceous (?), 2.5 m. high, the stem greenish-fuscous, retrorsely hispid-pilose, tuberculate-strigillose and somewhat glandular-granulose, the stem and branches bearing mostly solitary heads. Leaves opposite below, alternate above, ovate or deltoid-ovate, acute to subobtusate at apex, from rounded to subcordate at base, shallowly repand-serrate with about 5-10 pairs of depressed teeth, 3-nerved, dark green above, scabrous, tuberculate-hispidulous and gland-dotted, beneath paler or nearly equally green, hispid-pilose along the veins and glandular-dotted between them, sometimes subcanescent, 2-7.3 cm. long, 1.5-6.5 cm. wide; petioles more or less densely hispid-pilose, (0.6) 1-3 cm. long. Peduncles 2.7-14 cm. long; heads 1.8-2.5 cm. wide; disk 7.5-12 mm. high, 13 mm. wide. Involucre 3-seriate, 6-8.5 mm. high, slightly graduated, the phyllaries oblong. obtuse to subacute, hispid-pilose especially on margin, densely tuberculate and gland-dotted, somewhat indurated and ribbed below the middle, herbaceous above. Rays about 12, prominulous on veins of back, 1 cm. long, 3 mm. wide; disk-corollas glandular-hispidulous, 5-6 mm. long (tube 0.8-1.1 mm.). Pales acute, granular-hispidulous above, 7 mm. long. Achenes (immature) appressed-villous, 3.3 mm. long. Awns subpaleaceous, 2.5 mm. long; squamellae 6-8, free, lacerate-fimbriate, 0.5 mm. long. — Brandege! Univ. Calif. Publ. Bot. iii. 393 (1909). — MEXICO: PUEBLA: San Luis Tultitlanapa, Aug. 1908, *Purpus* 3089 (TYPE COLL.: B. M., G., Mo.). — Brandege describes the ray-florets as styliiferous, but this is evidently not a constant feature, for they are neutral in the specimens I have examined.

24. *V. mima*, sp. nov. Herbacea caule piloso, foliis alternis ovato-lanceolatis acuminatis crenato-serratis supra molliter appresso-pilosulis subtus pallidioribus densissime pilosulis pilis brevissimis patentibus, involucri subequalis 2-seriati 10.5 mm. alti phyllariis anguste oblongis pilosulis, paleis 1.2 cm. longis.

Herbaceous, branched, the stem purplish, striatulate, pilose. Leaves alternate, ovate-lanceolate, acuminate, at base subtruncate to rounded or cuneate, crenate-serrate (teeth 24-36 pairs, de-

pressed-triangular, obtuse), 3-nerved, above dull green, softly appressed-pilose and gland-dotted, beneath paler, densely pilosulous with very short spreading hairs and gland-dotted, 4–9.3 cm. long, 1.3–3 cm. wide; petioles scarcely margined, pubescent like the leaves, 6–13 mm. long. Heads few, about 5 cm. wide, on moncephalous rather densely pilose peduncles 3–11 cm. long, terminal and axillary; disk 1.3–(fruit)1.8 cm. high, 2–(fruit)2.8 cm. thick. Involucre 2-seriate, subequal, 10.5 mm. high, the phyllaries narrowly oblong, subobtuse to subacute, pilosulous, subindurated and costate to middle, herbaceous above and slightly broader, appressed or loose at apex. Rays about 16, yellow, oblong, emarginate or bidenticulate, minutely puberulous on back, 1.6–2.3 cm. long, 7–8.5 mm. wide; disk-corollas yellowish, puberulous below and on veins and teeth, the tube scarcely distinct, the throat amplified at its base, 6.5 mm. long (tube about 0.4 mm. long). Pales narrowed above, subacute, tuberculate-strigillose at apex, 1.2 cm. long. Achenes black, subsparingly appressed-pubescent, thickened, 4 mm. long, 1.8 mm. wide. Awns 2, ciliolate, subequal, slightly widened below, 3 mm. long; squamellae about 8, fimbriate, connate below, the marginal longer, 1 mm. long. — GUATEMALA: Retalhuleu, Dec. 1875, *Bernoulli & Cario* 1520 (TYPE: K., fragm. G.). — Strongly suggesting *Simsia grandiflora* Benth. in appearance.

25. V. GRAMMATOGLOSSA DC. Plant 1.6–5 m. high, with herbaceous branches, densely often canescently hispid-pilose with slightly tuberculate-based hairs. Leaves opposite throughout or alternate above, ovate, acute to acuminate, at base cordate to rounded or the uppermost cuneate, rather obscurely appressed-serrate, above green or greenish, densely pilosulous with incurved somewhat tuberculate-based hairs, beneath densely appressed-sericeous, glandular between the scarcely enlarged bases of the hairs, 4.4–8 cm. long, 2.2–5 cm. wide; petioles hispid-pilose, 1–2.2 cm. long. Heads in cymose panicles of 2–8 on axillary and terminal branches, 2.8–5 cm. wide, on peduncles 1.8–21 cm. long; disk 1–1.4 cm. high, 1.5–2.1 cm. thick. Involucre 3-seriate, graduated, 8–10.5 mm. high, the phyllaries linear-oblong to narrowly lance-oblong, the outer sometimes narrowly ovate-oblong, obtuse (outer) to acute, somewhat indurated and ribbed below, with mostly longer herbaceous tip, somewhat 3-nerved above, densely

or rather sparsely hispid-pilose especially on margin and midnerve or subsericeous, sometimes also finely tuberculate-hispidulous and glandular. Rays 10–12, oval, 11–19 mm. long, 4.5–10 mm. wide, the veins often prominent in drying; disk-corollas puberulous below and on the teeth, 5.5–6 mm. long (tube 0.7–1 mm.). Pales obtuse to acuminate, mucronate, tuberculate-hispidulous toward tip and along keel, 8–10 mm. long. Achenes appressed-silky, 4.8 mm. long. Awns slender, 4 mm. long; squamellae about 8, linear-oblong, 1.2 mm. long. — DC.! *Prod.* v. 580 (1836). *Encelia hypargyrea* Rob. & Greenm.! *Am. Journ. Sci.* ser. 3. l. 155 (1895). (Not *V. hypargyrea* Greenm. (1903).) *V. argyrophylla* Blake, *Proc. Am. Acad.* xlix. 374 (1913). — MEXICO: MICHOACAN: Tlapujahua, *F. W. Keerl* (TYPE of *V. grammatoglossa*: *Prod.*); PUEBLA: Santa Lucia, near San Luis Tultitlanapa, July 1908, *Purpus* 2528 (B. M., G., U. S.); Tehuacan, Sept. 1911, *Purpus* 5415 (G.); OAXACA: limestone ledges, La Hoya Canyon, 1525 m., 2 Nov. 1894, *Pringle* 6142 (TYPE COLL. of *E. hypargyrea*: B. M., G., K.); Santa Catarina Canyon, 1000 m., 4 July 1897, *Pringle & Conzatti* 405 (G.).

26. *V. bombycina*, nom. nov. Shrubby, the stem in youth rather densely subcanescent-pilose with long ascending tuberculate-based subsericeous hairs and more or less granular, in age becoming subglabrate and covered with a grayish bark. Leaves opposite or the upper alternate, ovate or ovate-lanceolate, acute or sub-acuminate, at base cuneate, entire, strongly triplinerved, above dull green or subcanescent with incurved tuberculate-based rather long hairs, beneath densely softly silky-pilose with appressed hairs, 2.5–5.3 cm. long, 1–2.2 cm. wide; petioles silky-pilose, nearly naked, 5–10 mm. long. Heads 1–3 at apex of stem and branches, 4.5 cm. wide, on mostly naked peduncles 6.5 cm. long or less; disk in fruit 12–13 mm. high, 20–23 mm. thick. Involucre 3-seriate, scarcely graduated, 7–8 mm. high, the phyllaries narrowly oblong, obtusish, silky-pilose, below subindurated and ribbed, the loose or spreading apex slightly more herbaceous. Rays about 16, 13–15 mm. long, 3–5 mm. wide; disk-corollas puberulous below and on teeth, 6.8 mm. long (tube 1.2 mm., strongly swollen at base). Pales mucronulate, hispidulous on keel, 7 mm. long. Achenes glabrous, 3 mm. long. Pappus none. — *Gymnolomia sericea* Klatt! *Leopoldina* xxiii. 90 (1887); Rob. & Greenm. *Proc. Bost.*

Soc. Nat. Hist. xxix. 100 (1899). *Microcephalum sericeum* Sch. Bip. ex Klatt, l. c., as syn. — MEXICO: PUEBLA: Esperanza, Oct. 1911, *Purpus* 5615 (G.). Mexico without definite locality: *Liebmann* 609 (TYPE COLL.: drawing and fragm. G.). — The name has been changed to obviate confusion with *V. sericea* (DC.) Gray, a name long valid for a species now to be referred to *Syncretocarpus*. Purpus's plant was distributed as *Encelia hypargyrea* Rob. & Greenm. (= *V. grammatoglossa* DC.).

- ↗ 27. *V. CORDIFOLIA* Gray. Stems usually several, herbaceous and erect from a deep and thick napiform root (as much as 3 dm. long by 3 cm. in diameter), tuberculate-hispid with persistent-based hairs and finely granular, about 1 m. high. Leaves mostly opposite or sometimes mostly alternate, ovate to deltoid-ovate, or the upper lanceolate, acute to acuminate, mucronate, from rounded or cuneate-rounded to shallowly cordate at base, obscurely or rather sharply serrate or the upper entire, green and very rough both sides, above tuberculate-hispidulous with incurved hairs and glandular-granular, beneath more or less hispid or hispidulous (the hairs often tuberculate-based) and glandular-granular, 3-nerved, rather veiny, 2–10 cm. long, 1.3–6.8 cm. wide, on petioles 1–8 mm. long. Heads usually numerous, paniced at ends of stem and branches, 2.5–4.5 cm. wide, on peduncles 1.3–14.3 cm. long; disk 11–15 mm. high, 11–18 mm. thick. Involucre 3–4-seriate, graduated, 7.5–15 mm. high, the phyllaries varying in shape from lance-subulate and attenuate to narrowly oblong or subspatulate-oblong and obtuse, usually mucronate, in texture from herbaceous or subherbaceous throughout to strongly indurated (except the herbaceous apex) and costate-vittate, tuberculate-hispid on margin and midline, sometimes also on back, and densely tuberculate-granulose. Rays 6–8, oblong to oval, 9–19 mm. long, 3.5–9 mm. wide; disk-corollas minutely puberulous below and on the teeth, gland-dotted, 6 mm. long (tube 1–1.5 mm.). Pales acuminate, cuspidate, 8–10.5 mm. long. Achenes appressed-pilose, 6.5 mm. long. Awns 5.5 mm. long; squamellae 4–6, united below or distinct, 0.8–2 mm. long. — Gray! Pl. Wright. i. 107 (1852), ii. 88 (1853); Syn. Fl. i. pt. 2. 270 (1884). — Divisible on characters of involucre into two varieties, appearing in their extremes like members of two different series, but completely connected by a number of intergradient specimens.

Var. **genuina**: involucri phyllariis lanceolatis vel subulato-lanceolatis attenuatis vel acuminatis subherbaceis vel infra valde induratis et vittatis. — *V. cordifolia* Gray ll. cc. — TEXAS: plains near base of the Guadalupe Mts., Oct. 1849, *Wright* 332 (TYPE COLL.: B. M., G., K., U. S.); Guadalupe Mts., *Havard* 77 (B. M.); foot of Guadalupe Mts., *Reverchon* (?) 1760 (Mo.). NEW MEXICO: White Mts., 1892, *Mearns* 351 (U. S.); 1950 m., White Mts., Lincoln Co., 1897, *Wooton* 365 (K., Mo., U. S.); Gray, 1830–1980 m., 1900, *Earle & Earle* 470 (Mo., U. S.); Filmare Canyon, Organ Mts., 23 Sept. 1906, *Standley* (Mo.); Organ Mts., 28 Sept. 1902, *Wooton* (U. S.); Organ Mts., 1980 m., 23 Sept. 1906, *Wooton & Standley* (U. S.); Hillsboro Peak, 2590 m., 1904, *Metcalfe* 1326 (Mo.); Lake Valley, 1914, *Mrs. Ida M. Beals* (U. S.); Mogollon Mts., 1881, *Rusby* 170 (Mo., U. S.); l. c., 5 Aug. 1900, *Wooton* (U. S.); Middle Fork of the Gila, Socorro Co., 5 Aug. 1900, *Wooton* (U. S.); Fairview, 1909, *Goldman* 1777 (U. S.); Mangas Springs, Grant Co., 1365 m., 1903, *Metcalfe* 130 (B. M., G., K., Mo., U. S.) & 812 (U. S.); Coppermine Creek, Oct. 1851, *Wright* 1225 (G., K., Mo., U. S.); on the Mimbres, *Dr. Henry* (G.); Dog Spring, Dog Mt., 1893, *Mearns* 2364 (U. S.); White Water, 1892, *Mearns* 351 (U. S.); l. c., 1893, *Mearns* 2275 (U. S.); Chiz, 1904, *Wooton* 2581 (U. S.). ARIZONA: Barfoot Park, Chiricahua Mts., 2440 m., 1906, *Blumer* 1412 (G., K., Mo., U. S.); Cochise Co., 2100–2480 m., 1914, *Eggleston* 10772, 10889 (U. S.); Ft. Huachuca, 1894, *Wilcox* 437 (U. S.); south of Bisbee, 1892, *Mearns* 1025 (U. S.), 1030 (G., Mo., U. S.), 1032 (U. S.), 1040 (U. S.); Cajon Bonita Creek, 1893, *Mearns* 2470 (U. S.); Santa Rita Mts., 1902, *Griffiths & Thornber* 34 (U. S.); Fort Apache, 1890, *Palmer* 593 (G., K., U. S.); Bowie, 1881, *Lemmon* 205 (G.); l. c., 1884, *Jones* 592 (G.) & 4292 (U. S.); Apache Pass, 1881, *Lemmon* (B. M.); Blue River, 1902, *Davidson* 1450 (U. S.); Rincon Mts., 2285 m., 1891, *Nealley* 209 (U. S.); near Silver City, 8 Sept. 1880, *Greene* (K.); without definite locality, *Wright* 272 (K.), *Mexican Boundary Survey under Emory* 562 (U. S.). MEXICO: SONORA: Santa Cruz, 1851, *Wright* 1226 (G., K., U. S.); without definite locality, 1855, *Schott* (G.); CHIHUAHUA: near Chihuahua City, 1885, *Pringle* 114 (G.), 603 (B. M., G., K., U. S.); l. c., 1886, *Pringle* 1030 (Mo.); near Balleza, 1898, *Goldman* 135 (G., U. S.); Sierra en Media, 1899, *E. W. Nelson* 6470 (G., U. S.); near Colonia Garcia, 1899, *Townsend & Barber* 299

(B. M., G., K., Mo., U. S.) & 300 (B. M., G., K., Mo., U. S.); SAN LUIS POTOSI: 1878, Parry & Palmer 452 (B. M., G., K., U. S.); sandy places near San Luis Potosi, Sept. 1876, *Schaffner* 260 (G.), 261 in part (G.); shady swampy places, 1880, *Schaffner* 386 (G., K.); without definite locality, 1891, *L. F. Ward* (U. S.). — T. 2. FIG. 6.

The following are more or less intermediate between var. *genuina* and var. *latisquama*. COAHUILA: Sierra de la Paila, Oct. 1910, *Purpus* 4693 (B. M., Mo.); Sierra de Parras, July 1910, *Purpus* 4566 (B. M., G., Mo., U. S.); l. c., Oct. 1910, *Purpus* 4641 (B. M., G., Mo., U. S.); SAN LUIS POTOSI: sandy places near San Luis Potosi, Sept. 1876, *Schaffner* 261 in part (G.).

Var. LATISQUAMA Greenm. Phyllaries oblong, strongly graduated, mucronate at the obtuse apex, with more or less strongly indurated base and much shorter subherbaceous tip. — Greenm.! Proc. Am. Acad. xxxix. 103 (1903). — MEXICO: DURANGO: near City of Durango, Sept. 1896, *Palmer* 667 (COTYPE COLL.: B. M., G., K., Mo., U. S.), 747 (COTYPE COLL.: B. M., G., K., Mo., U. S.); ZACATECAS: near Concepcion del Oro, 22 Nov. 1902, *Palmer* 379 (G., Mo., U. S.). — In involueral characters this variety makes a strong approach to the series *Maculatae*. — T. 2. FIG. 7.

28. V. RHOMBIFOLIA (Rob. & Greenm.) Blake. Herbaceous perennial, several-stemmed from a thick woody root, decumbent, 1–1.3 m. long; stems hispid and granulose, rather few-leaved, paniculately branched above, the internodes very long. Leaves opposite except in inflorescence, rhombic-ovate, acute, rather abruptly narrowed below the middle to a broadly margined subamplexicaul base (broadly margined petiole) 1–1.4 cm. wide, the lower shortly naked-petioled, very scabrous above, rough with a tuberculate hispidity beneath, serrate above the middle or the uppermost entire, 3-nerved, 5.5–9 cm. long, 1.8–4.2 cm. wide; those of inflorescence lance-oblong, acute, entire, 1.8–3.5 cm. long. Heads numerous in a long loose paniculate inflorescence, about 2.3 cm. wide; ultimate pedicels 2–12 cm. long; disk 11 mm. high, 9–11 mm. thick. Involucre 3-seriate, 10.5–12.5 mm. high, the outermost phyllaries much the shortest, the two inner series subequal or the innermost longer, all lanceolate, acuminate, subcanescently hispid-pilose and granular, subherbaceous, appressed. Rays 8, 9 mm. long, 3 mm. wide; disk-corollas yellow, purpurascant

above in age, hispidulous on tube and veins of throat, pilose-hispid at apex, 6 mm. long (tube 0.8 mm.). Pales long-acuminate, 10–11 mm. long. Achenes hispid-villous above, 3.5 mm. long. Awns 2 or rarely 3, slender, 3 mm. long; squamellae about 6, free, lacinate, 0.4 mm. long. — Blake, Proc. Am. Acad. xlix. 375 (1913). *Encelia* (§ *Geraea*) *rhombofolia* Rob. & Greenm.! Am. Journ. Sci. ser. 3. l. 155 (1895). — MEXICO: OAXACA: 1842, *Ghiesbreght* (Par.); dry calcareous hills, Las Sedas, 1830 m., Aug. 1894, *Pringle* 4813 (TYPE COLL.: B. M., G., K.); near Cuicatlan, Valley of Oaxaca, 2075–2380 m., 3 Oct. 1894, *E. W. Nelson* 1530 (G., U. S.); Valley of Oaxaca, 1585–2380 m., 2–3 Oct. 1894, *E. W. Nelson* 1495, 1496, 1535 (U. S.); hills near Tamazulapam, 2380 m., 13 Nov. 1894, *E. W. Nelson* 1951 (G., U. S.); La Carbonera, 2045 m., 19 Sept. 1895, *L. C. Smith* 821 (G.). — T. 3. FIG. 20.

29. *V. SESSILIFOLIA* DC. Herbaceous, leafy, simple or slightly branched; stem slender, hispid-pilose, bearing 1–6 heads, terminal and from the upper axils. Leaves mostly alternate, ovate to ovate-lanceolate, acuminate, rounded at base, mostly sessile, only the lower short-petioled, serrate, densely tuberculate-strigose above, beneath subsericeous-canescens with a rather soft hispid pilosity, 3-nerved, gradually reduced to bracts above, 2.5–4 cm. long, 1–2.3 cm. wide; petioles of lower leaves 3 mm. long. Peduncles 3–13 cm. long; heads 2–3.5 cm. wide; disk 11–15 mm. high, 11–16 mm. thick. Involucre 3-seriate, graduated, 8–12 mm. high, the phyllaries narrowly lanceolate, acuminate, granular-tuberculate and canescently hispid-pilose, subherbaceous throughout. Rays 6–8, oblong, 6–15 mm. long, 2.5–5 mm. wide; disk-corollas yellow, purplish-tinged in age, hirtellous and more or less granulose, 6.5 mm. long (tube 1.5 mm.). Pales very acuminate, 11 mm. long. Achenes silky-pubescent, 6 mm. long. Awns slightly broadened below, 5 mm. long; squamellae 6–12, slender, deeply lacerate, united at extreme base, 1.2 mm. long. — DC.! Prod. v. 579 (1836); Gray, Proc. Am. Acad. xix. 6 (1883). *Ximenesia hispida* HBK.! Nov. Gen. iv. 227 (1820). (Not *V. hispida* Baker (1884).) *Simsia hispida* (HBK.) Cass. Dict. Sci. Nat. lix. 137 (1829); DC. Prod. v. 578 (1836); Blake, Proc. Am. Acad. xlix. 395 (1913). *Encelia hispida* (HBK.) Hemsl. Biol. Centr.-Am. Bot. ii. 184 (1881). — MEXICO: ZACATECAS: Sierra de los Morones, near Plateado, 1 Sept. 1897, *Rose* 2736 (U. S.); SAN LUIS POTOSI: 1878, *Parry* &

Palmer 453 (B. M., G., K., Mo., U. S.); Alvarez, 1902, *Palmer* 142 (G., Mo., U. S.); GUANAJUATO: Villalpando, *Mendez* (TYPE of *V. sessilifolia*: Prod.); STATE OF MEXICO: ledges, Tultenango Canyon, 7 Oct. 1902, *Pringle* 8677 (B. M., G., K., Mo., U. S.). Mexico without definite locality: 1830, *Graham* 78 (K.); *Parkinson* (K.); between Santa Rosa (Queretaro) and Valladolid (Michoacan), 1000–1400 m., *Bonpland* (TYPE of *X. hispida*: Par.).

30. *V. ovata* (Gray), comb. nov. Herbaceous, 6–8 dm. long or more, the stem simple or sparsely branched, rather densely but not canescently spreading- or retrorse-pubescent with short and long hairs, and more or less granular, the long hairs deciduous in age. Leaves opposite below or nearly throughout, ovate or triangular-ovate, acute or obtusish, at base truncate-rounded or subcordate, regularly serrate with usually spreading deltoid teeth, 3-nerved and rather veiny beneath, above green, hispid with incurved tuberculate-based hairs, beneath green or barely subcanescent with a mostly softer hispid pilosity, 3–5.3 cm. long, 1.5–3.5 cm. wide; petioles hispid-pilose, 3 mm. long or less; upper leaves sometimes oblong-lanceolate. Heads few (4–8) in a usually loose panicle, 2.5 cm. wide, on hispid-pilose and densely glandular mostly naked peduncles 7.3 cm. long or less; disk 0.9–1.1 cm. high, 1–1.7 cm. thick. Involucre 3-seriate, graduated, 7–8 mm. high, the phyllaries lanceolate-acuminate, densely tuberculate-glandular, hispid-pilose chiefly on margin and midline, subappressed or loose above, subherbaceous, blackish-green, with 1–3 indistinct ribs. Rays 8–14, "pale yellow," in the dry state appearing white, the nerves blackish and prominent when dry, 6–8 mm. long, 2–4 mm. wide; disk-corollas finely and densely puberulous at least below, yellow becoming purplish above in age, 4.5 mm. long (tube 0.8 mm. long). Pales acuminate, with a tooth each side above middle, sparsely hispid toward apex, 7 mm. long. Achenes striatulate, 3 mm. long, 1.6 mm. wide. Pappus none. — *Gymnolomia ovata* Gray! Proc. Am. Acad. xix. 4 (1883); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 96 (1899). *G. Liebmannii* Klatt! Leopoldina xxiii. 90 (1887); Rob. & Greenm. l. c. *Microcephalum Liebmannii* Sch. Bip. ex Klatt, l. c., as syn. — MEXICO: (OAXACA) Cerro de San Felipe, 2440 m., 13 Oct. 1894, *Pringle* 5674 (G.); l. c., 1800 m., 26 Sept. 1897, *Conzatti & González* 551 (G.); without definite locality, 1750 m., July–Aug. 1900, *Conzatti & González* 1005 (G.); San

Andres, Mecatlan (Oaxaca ?), *Liebmann* 588 (TYPE COLL. of *G. Liebmannii*: drawing and fragm. G.) (CHIAPAS (?)) in forests on slopes of mountains, "terre froide," Nov., *Ghesbreght* 554 (TYPE of *G. ovata*: G.). — After careful comparison of the sketch and fragments of the type of *G. Liebmannii* in the Gray Herbarium with material of *G. ovata*, I have been unable to discover any differences between them which appear to substantiate the claim of the former to specific rank. Klatt's species seems to have been based on a small and weak specimen of *G. ovata*.

31. *V. PRINGLEI* Rob. & Greenm. Frutescent, 1-3.3 m. high, the stem tuberculate-hispid and glandular-granulose. Leaves mostly opposite, oval or oblong- or ovate-oval, obtusish to acutish, mucronate, rounded at base, pale green both sides, entire, very harshly lepidote-tuberculate both sides, 3-nerved above the base, strongly reticulate beneath, slightly revolute, 4-7.3 cm. long, 1.5-3 cm. wide; petioles granular-hispidulous, 1-1.5 mm. long. Heads 3-15 in contracted cymose panicles at end of stem and branches, 2.5 cm. wide; peduncles 1-2.5 cm. long; disk 8-12 mm. high, 1-(fruit)1.8 cm. thick. Involucre 5-seriate, graduated, 6-8 mm. high, strongly radiating in fruit, the phyllaries stiffish, lanceolate to linear-lanceolate, narrow, mucronulate, slightly pale-margined, with thickened midrib, densely granular-tuberculate, hispidulous-ciliolate. Rays 10-12, oval-oblong, 12 mm. long, 6 mm. wide; disk-corollas minutely granular-tuberculate, 4.6 mm. long (tube 1 mm.). Pales somewhat wing-keeled, granular-tuberculate at the colorate apex, 6.5-7 mm. long. Achenes silky-villous on margin, slightly so on sides above, 4 mm. long, 1.5 mm. wide. Awns very slender, 2.5-3 mm. long; squamellae 4, lacerate, sometimes united below, 1.5 mm. long. — Rob. & Greenm.! Proc. Am. Acad. xxix. 387 (1894). — MEXICO: TEPIC: Tepic, 5 Jan.-6 Feb. 1892, *Palmer* 1979 (G., U. S.); JALISCO: hills near Zapotlan, 12 May 1893, *Pringle* 4365 (TYPE COLL.: B. M., G., K., Mo.); rocky ravines near Guadalajara, 1525 m., 13 May 1901, *Pringle* 8496 (B. M., G., K., Mo., U. S.).

32. *V. SEEMANNII* Sch. Bip. Erect, frutescent; stem terete above, densely tuberculate-setose with short thick upcurved bristles, the stem between their persistent bases very densely and minutely tuberculate-hispidulous. Leaves opposite usually even to tips of branches, lanceolate to ovate-lanceolate or ovate-oblong,

acute to acuminate or rarely obtusish, at base cuneate to rounded-cuneate, barely petioled, 3-nerved, beneath reticulate, above green, somewhat lucid, densely and very harshly tuberculate-setose with short curved ascending bristles, beneath slightly paler, rather densely hispid-pilosulous with spreading scarcely rough hairs without tuberculate bases, entire or with about 6 pairs of distant sub-spreading teeth, 4–10 cm. long, 1–2.5 cm. wide; petioles tuberculate-setulose, 1.5–3 mm. long. Heads in subsessile cymes of 3–5 at ends of branches, 1.7 cm. wide; peduncle 3–10 mm. long, the pedicels equalling it or shorter; disk 10–11 mm. high, 12–13 mm. thick. Involucre 4–5-seriate, graduated, 8–9 mm. high, the phyllaries appressed, lanceolate, acuminate, somewhat thickened, densely and finely tuberculate, along margin and elevated midrib setose-hispidulous. Rays about 8, 6–7 mm. long, 3–5.5 mm. wide; disk-corollas hispidulous below, 5 mm. long (tube 1 mm.). Pales acuminate, mucronulate, tuberculate-hispidulous above, 8.5–9 mm. long. Achenes (immature) of disk sericeous, 4 mm. long; of ray 3-gonous, ciliate-edged, sterile. Pappus of disk-achenes of 2 awns (3 mm. long) and about 8 linear-lanceolate free ciliate squamellae (1 mm. long); of ray-achenes of 3 very unequal paleaceous aristae. — Sch. Bip.! in Seem. Bot. Herald 305 (1856–57). *Oyedaea Seemannii* (Sch. Bip.) Gray! Proc. Am. Acad. xix. 10 (1883). — MEXICO: Sierra Madre of northwestern Mexico, *Seemann* 2005 (TYPE COLL.: G., K.). — Gray's reference of this species to *Oyedaea* was evidently based on achenes belonging to a species of that genus which had in some manner found their way into the pocket mounted with the specimen of *Seemann* 2005 in the Gray Herbarium, where they may still be seen. The species, however, is a true *Viguiera*, closely related to *V. Pringlei*, and in no way connected with *Oyedaea*.

33. *V. Parkinsonii* (Hemsl.), comb. nov. Stoutish herbaceous perennial from a thick woody root bearing many fibrous rootlets, the stem simple, bearing 3–5 axillary and terminal heads above, below densely and harshly spreading-hispid-pilose and tuberculate-puberulous, above more sparsely strigose and strigillose. Leaves mostly alternate, crowded or rarely subremote, oblong to oval or oblong-lanceolate, sessile, strongly 3-nerved and venose, appressed-serrulate to subentire, dull green both sides and harshly tuberculate-hispid-pilose with subspreading hairs, 4.5–12 cm. long, 1.5–3.3

cm. wide, the upper gradually reduced. Heads 1.8–2.7 cm. wide, on peduncles 1.6 dm. long or less; disk 8–13 mm. high, 13–20 mm. thick. Involucre 4–5-seriate, graduated, 5–7 mm. high, the phyllaries oblong, obtuse to acutish and mucronulate, harshly and subdensely tuberculate-strigillose and -strigose, thick, with about 2 pale ribs below, the short subspreading apex subherbaceous. Rays 12–16 or more, yellow or deep brownish-purple, 4–7 mm. long, 2.5–3.6 mm. wide; disk-corollas purplish or when rays yellow, sometimes (always, at least in youth?) yellow, rather sparsely puberulous, 4.3 mm. long (tube 0.8 mm.). Pales short-acuminate, strigillose at the usually purplish apex, 7 mm. long. Achenes glabrous, 3.5 mm. long. Pappus none. — *Gymnolomia Parkinsonii* Hemsl. Biol. Centr.-Am. Bot. ii. 163 (1881); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 98 (1899). *G. rudis* Gray! in Wats. Proc. Am. Acad. xxii. 424 (1887). *G. rudis* Gray var. *minor* Rob. & Greenm.! Proc. Am. Acad. xxix. 387 (1894). *G. Parkinsonii* Hemsl. forma *flaviflora* Rob. & Greenm.! Proc. Bost. Soc. Nat. Hist. xxix. 99 (1899). — Two color forms may be recognized.

➤ Forma **typica**: radiis et corollis disci brunneo-purpureis. — *G. Parkinsonii* Hemsl. l. c. *G. rudis* Gray l. c. in part. *G. rudis* Gray var. *minor* Rob. & Greenm. l. c. in part. — MEXICO: JALISCO: Rio Blanco, Sept. 1886, *Palmer* 531 (COTYPE of *G. rudis*: G.); rocky hills near Tequila, 7 Oct. 1893, *Pringle* 4584 in part (TYPE of *G. rudis* var. *minor*: G.); bluffs of ravines near Guadalajara, 1525 m., 6 Oct. 1903, *Pringle* 11538 in part (G).

➤ Forma **flaviflora** (Rob. & Greenm.), comb. nov.: radiis et saepius corollis disci flavis. — *G. rudis* Gray l. c. in part. *G. rudis* Gray var. *minor* Rob. & Greenm. l. c. in part. *G. Parkinsonii* Hemsl. forma *flaviflora* Rob. & Greenm. l. c. — MEXICO: JALISCO: Rio Blanco, Sept. 1886, *Palmer* 533 (COTYPE of *G. rudis*: G.); hillsides near Guadalajara, 2 Oct. 1889, *Pringle* 2460 (G.); near Tequila, *Pringle* 4584 in part (TYPE of *G. rudis* var. *minor*: G.); near Guadalajara, *Pringle* 11538 in part (G.); road between Colotlan and Bolaños, 7–9 Sept. 1897, *Rose* 2827 (G.). — *Palmer* 533 is somewhat intermediate, the generally yellow rays having more or less purplish nervation.

Series C. **Dentatae**, ser. nov. Herbae vel frutices, foliis saepe alternis ovatis rare lanceolatis vel ovalibus, capitulis paniculatis

saepe medioeribus, involucri 2-3-seriati phyllariis infra ovatis vel oblongo-ovatis valde induratis costatis et vittatis supra abrupte angustatis herbaceis, pappo interdum nullo. — Species typica *V. dentata* (Cav.) Spreng. — Nine species ranging from Texas and Nevada to Honduras, but mostly of Lower California. The group is chiefly distinguished by the normally ovate-based and strongly indurated pale phyllaries with abruptly narrowed herbaceous apex. From the somewhat similar series *Pinnatilobatae* it differs in the never more than lacinate-toothed leaves and the disk-corollas not calyprate at base, as well as in the broader bases of the phyllaries. Species 34-42.

- a. Leaves lacinate or deeply jagged-toothed, *b*:
b. Plant resinous; stem pubescent throughout 34. *V. laciniata*.
b. Plant not resinous; stem glabrous below 35. *V. subincisa*.
- a. Leaves entire or merely serrate, *c*:
c. Leaves roundish-ovate or oval; plant densely pannose-tomentose 41. *V. lanata*.
c. Leaves ovate to lanceolate, rarely roundish-ovate; plant not pannose-tomentose, *d*:
d. Leaves very strongly and finely reticulated beneath; plant of Inyo Co., California 37. *V. reticulata*.
d. Leaves not strongly and finely reticulated beneath; range mostly more southern, *e*:
e. Leaves ovate, 8-12 mm. long; involucre 3-4 mm. high 40. *V. microphylla*.
e. Leaves and involucre larger, *f*:
f. Pappus none; achene glabrous 42. *V. potosina*.
f. Pappus present; achene pubescent, *g*:
g. Frutescent; plants of Lower California and adjacent United States and Sonora, *h*:
h. Leaves ovate or triangular-ovate, large or medium-sized, densely and softly tomentose beneath 38. *V. tomentosa*.
h. Leaves not densely tomentose beneath 39. *V. deltoidea*.
g. Herbaceous; plant ranging from Texas to Honduras 36. *V. dentata*.

34. *V. LACINIATA* Gray. Frutescent, up to 1.3 m. high, more or less resinous, the stem in age covered with a grayish bark; younger branches scabrous with a very short dense hispid pubescence, bearing 3-13 cymosely paniced heads. Leaves alternate, often in axillary fascicles, lanceolate to lance-ovate, acute to acuminate, cuneate to truncate-subcordate at base, laciniately repand-lobate (the lobes often again toothed, the lowest pair hastate), rarely subentire, above tuberculate-hispid, beneath glutinous and lucid, venose, tuberculate-hispid, slightly 3-nerved, 1.5-3 cm. long, 7-16 mm. wide; petioles 4-6 mm. long. Peduncles 1-5 cm. long;

heads 1.7–2.7 cm. wide; disk 8–10 mm. high, 8–11 mm. wide. Involucre 3-seriate, slightly graduated, 5.5–6 mm. high, the glutinous phyllaries oblong to ovate-oblong, the inner with broadly ovate costate indurated body abruptly narrowed into an herbaceous linear tip, all hispidulous and callous-mucronulate. Rays about 8, 8–11 mm. long, 3–5.5 mm. wide; disk-corollas sparsely hispidulous on tube, 3.8 mm. long (tube 1 mm.). Pales glutinous, stiff, mucronate, acute, puberulous at apex, 5.5 mm. long. Achenes ciliolate on edges and at apex, 3.5 mm. long. Awns broad, paleaceous, somewhat deciduous, 2.5 mm. long; squamellae about 6, lacerate-fimbriate, united at base, 0.5 mm. long. — Gray! in Torr. Bot. Mex. Bound. 89 (1859); Bot. Calif. i. 354 (1876); Syn. Fl. i. pt. 2. 270 (1884); Hall, Univ. Calif. Publ. Bot. iii. 128 (1907). — CALIFORNIA: San Diego, *Ives Expedition* (U. S.), *Cleveland* (G., K.), *Newberry* (G.), 1880, *Vasey* 289 (K., U. S.), 1901, *Brandegee* (distr. *C. F. Baker*) 1614 (G., K., Mo., U. S.), 1903, *Hall* 3855 (K., Mo., U. S.); Mission Hills, San Diego, 1903, *Abrams* 3450 (B. M., G., K., Mo., U. S.); Rancho Gamacha, east of San Diego, Sept. 1855, *Schott* (TYPE: G.); Sweetwater Valley, 1876, *Cleveland* (G.), 1878, *Cleveland* (Mo.); Cottonwood Grade near Potrero, 1903, *Abrams* 3901 (G., Mo.); Las Paderes Ranch, 8 April 1888, *G. C. Deane* (G.); Jamuel Valley, 1875, *Palmer* 173 (B. M., Mo.); l. c., 1894, *L. Schoenfeldt* 3818 (U. S.); San Diego Co., 1880, *Parish* 299 (G.); l. c., 1882, *Pringle* (Mo.). LOWER CALIFORNIA: near the Tia Juana, 1882, *Jones* 3704 (B. M., U. S.); Ensenada, 1897, *Anthony* 181 (G., K., Mo., U. S.); San Telmo, 12 May 1886, *Orcutt* (K., Mo.); San Quentin Bay, Jan. 1889, *Palmer* 664 (K., U. S.); Lagoon Head, 1889, *Palmer* 793 (G., K., U. S.); arroyos, Calmalli, 365 m., 1898, *Purpus* 218 (K., U. S.); mountain sides, Los Angeles Bay, Nov. 1887, *Palmer* 529 (B. M., G., K., U. S.). — Flowering throughout the year.

35. *V. SUBINCISA* Benth. Herbaceous, or perhaps suffrutescent at base, branched, 0.6 m. high; stem minutely and sparsely strigillose in the inflorescence, glabrous below. Leaves opposite below, alternate above, ovate, obtuse to acute or subacuminate, cuneate or subtruncate at base, incisely jagged-serrate with 5–10 pairs of coarse triangular often dentate teeth, sparsely and minutely strigillose both sides, 3-nerved, slightly fleshy, 4.8–6.3 cm. long, 2.8–4.5 cm. wide; petioles 1.4–4.7 cm. long. Heads 12–26 in a

terminal narrow long-peduncled tiny-bracted cymose panicle, 1.4–3.5 cm. wide; pedicels strigillose, 1–5.7 cm. long; disk 7–9 mm. high, 10–12 mm. thick. Involucre 2-seriate, subequal, 3.5 mm. high, the phyllaries few (about 12), ovate-oblong, constricted near the middle, callose-mucronulate, densely strigillose, slightly striate, indurated and ribbed at the ovate base, the narrowed apex herbaceous. Rays about 6, 6–15.5 mm. long, 3–6 mm. wide; disk-corollas puberulous, 3.6 mm. long (tube 0.8 mm.). Pales mucronulate, puberulous at apex, 4.5–5.5 mm. long. Achenes silky-villous, 2.8 mm. long. Awns slightly broadened below, 2.7 mm. long; squamellae 4, quadrate, united below or nearly to apex, 1 mm. long. — Benth.! Bot. Voy. Sulph. 27 (1844). — LOWER CALIFORNIA: hills, Bay of Magdalena, *Barclay* 3155 (COTYPE COLL.: B. M., K.); Magdalena Bay, 1841, *Hinds* (COTYPE: K.); Magdalena Island, 16 Jan. 1889, *Brandegee* (G., U. S.), 4 March 1892, *Brandegee* (U. S.), 1897, *Anthony* (K.).

36. *V. DENTATA* (Cav.) Spreng. Herbaceous perennial, paniculately branched, 1–2 m. high or more; stem slender, usually sparsely strigillose or subglabrate, sometimes densely canescent-pilose, sometimes hispid. Leaves opposite below, alternate above, ovate to rhombic-ovate or rarely narrowly lanceolate, long-acuminate, from cuneate to truncate at base, tapering into the petiole, entire or more often serrulate or serrate, the teeth usually appressed but sometimes longer and spreading, green above, from lepidote-strigillose (sparsely or densely) to densely rather softly pilose with incurved or subspreading hairs with glandular-tuberculate bases, beneath varying from green and very sparsely strigillose or hispidulous to subcanescent with fine appressed hairs or densely and softly pilose, 3.5–12.5 cm. long, 0.9–8 cm. wide; petioles narrowly margined, tuberculate-hispid or pilose, 0.6–5.5 cm. long. Heads usually very numerous, cymosely paniced, on naked or minutely bracteolate often sharply angled peduncles 3–14 cm. long; heads 2.2–3.7 cm. wide; disk 7–(fruit)10 mm. high, 1–(fruit) 1.4 cm. thick. Involucre 3-seriate, 5–10 mm. high, or sometimes longer by the elongated herbaceous tips of the phyllaries, graduated or subequal, the phyllaries with ovate to ovate-oblong indurated costate and vittate body and shorter or often much elongated linear or linear-oblong herbaceous apex, loose or appressed, from hispidulous to subcanescently appressed-pilose. Rays 10–12,

rarely styliiferous but sterile, oval to oblong-oval, 7–15 mm. long, 3–7.5 mm. wide; disk-corollas hirtellous, 3–4 mm. long (tube 0.6–0.7 mm.). Pales scarious-margined, hispidulous on back, with ovate-oblong body abruptly narrowed into an acuminate stiff pungent tip, 6.5 mm. long. Achenes obovate-oblong, black or mottled, appressed-pubescent, 3.5–3.8 mm. long, 2 mm. wide. Awns slender, 2.2–2.8 mm. long; squamellae 4, quadrate, free, fimbriate, 0.7 mm. long. Stamens with pubescent filaments. — Spreng. Syst. iii. 615 (1826). *Helianthus dentatus* Cav. Icon. iii. 10. t. 220 (“1794” = 1795). *H. triqueter* Ort. Dec. 76 (1798). *Viguiera helianthoides* HBK.! Nov. Gen. iv. 226. t. 379 (1820); DC. Prod. v. 578 (1836); Gray, Proc. Am. Acad. xix. 6 (1883), Syn. Fl. i. pt. 2. 270 (1884), & in Wats. Proc. Am. Acad. xxii. 426 (1887); Millsp. & Chase, Field Col. Mus. Bot. Ser. iii. 119, fig. (1904); Cockerell, Torreya xv. 12 (1915). *V. Sagraeana* DC.! Prod. v. 579 (1836). *V. microcline* DC.! l. c. (1836). *V. canescens* DC.! l. c. (1836); Gray, Proc. Am. Acad. xix. 6 (1883), in part, & Syn. Fl. l. c. (but not of DC.). *V. triquetra* (Ort.) DC.! Prod. v. 579 (1836). *V. brevipes* DC.! l. c. (1836). *V. laxa* DC.! Prod. v. 580 (1836); Gray, Pl. Wright. i. 108 (1852), ii. 89 (1853). *V. oppositipes* DC.! l. c. (1836). *V. texana* T. & G.! Fl. N. A. ii. 318 (1842); Woot. & Standl. Contr. U. S. Nat. Herb. xix. 709 (1916). *Helianthella latifolia* Scheele! Linnaea xxii. 160 (1849). *V. laxa* DC. var. *brevipes* (DC.) Gray, Pl. Wright. i. 108 (1852). *Helianthus microclinus* (DC.) Gomez, Ann. Hist. Nat. Madrid xix. 273 (1890). *H. Baillonianus* Gomez, l. c. (1890). *Viguiera pedunculata* Seaton! Proc. Am. Acad. xxviii. 119 (1893). *Viguiera Nelsonii* Rob. & Greenm.! Proc. Am. Acad. xxxii. 45 (1896). *Encelia montana* Brandegees! Univ. Calif. Publ. Bot. iii. 394 (1909); Blake, Proc. Am. Acad. xlix. 374 (1913) (where reduced to *V. helianthoides*). — A variable and wide-spread species, of which four fairly marked varieties can be recognized.

Var. **brevipes** (DC.), comb. nov. (typical form): caule glabro vel subglabro, foliis ovatis utrinque viridibus et sparse pubescentibus, saepius dentatis. — *H. dentatus* Cav. l. c. *H. triqueter* Ort. l. c. *V. dentata* (Cav.) Spreng. l. c. *V. triquetra* (Ort.) DC., *V. brevipes* DC., *V. laxa* DC., *V. oppositipes* DC. l. c. *V. texana* T. & G. l. c. *Helianthella latifolia* Scheele, l. c. *V. laxa* DC. var. *brevipes* (DC.) Gray, l. c. *V. pedunculata* Seaton, l. c. *Encelia montana* Brandegees, l. c. —

TEXAS: Waco, *L. Pace* (Mo.); Gillespie Co., *Jermy* 861 (Mo.); New Braunfels, Oct. 1846, *Lindheimer* III. 434 (TYPE COLL. of *Helianthella latifolia*: B. M., G., K., Mo., U. S.); l. c., 1850, *Lindheimer* 974 (B. M., G., K., Mo., U. S.); Dappan, Travis Co., 1891, *J. E. Bodin* 190 (U. S.); San Antonio, 1900-02, *E. H. Wilkinson* 11 (Mo.); San Antonio, 1900, *Bush* 1208 (Mo., U. S.); Bejar (Bexar), 1828, *Berlandier* 525 (G.), 1879 (B. M., G., K.), 1905 (TYPE COLL. of *V. brevipes*: B. M., G., K., Prod.); Comanche Spring, 1847, *Lindheimer* 184 (G.); l. c., 1849, *Lindheimer* 973 (B. M., G., K., Mo., U. S.); hills of the San Pedro River, east of El Paso, 1849, *Wright* 333 (B. M., G., K., U. S.); Uvalde, 1880, *Palmer* 603 (G., K., Mo., U. S.); Georgetown, 1880, *Palmer* 604 (K., U. S.); without definite locality, *Drummond* III. 194 (TYPE COLL. of *V. texana*: B. M., G.). NEW MEXICO: Coppermine Creek, 1851, *Wright* 1227 (B. M., G., U. S.); White Mts., Lincoln Co., 1645 m., 1897, *Wooton* 190 (G., K., Mo., U. S.); Van Patten's, Organ Mts., 1899, *Wooton* (Mo., U. S.); Kingston, 2015 m., 1904, *Metcalfe* 1301 (Mo.); Silver City, 7 Sept. 1880, *Greene* (Mo.); Bear Mt., near Silver City, 1525 m., 1903, *Metcalfe* 883 (K., Mo., U. S.); Fort Bayard Watershed, Grant Co., 1905, *Blumer* 52 (G., U. S.); Canyon Media, Sandia Mts., *Miss C. C. Ellis* 389 (U. S.); on the Mimbres, 1854, *Dr. Henry* (G.); Dog Spring, Dog Mts., 1893, *Mearns* 2360 (U. S.). ARIZONA: Blue River, Clifton, 1902, *Davidson* 710 (G.); limestone soil, Paradise, Chiricahua Mts., 1675 m., 1907, *Blumer* 1662 (G., K., Mo., U. S.); Apache Pass, 1881, *Lemmon* (B. M.); Wilgus Ranch, Chiricahua Mts., 1675 m., 1907, *Blumer* 2227 (G.); Camp Bowie, 1874, *Rothrock* 501 (G., U. S.); Bowie, 1884, *Jones* 7 (G.); Mustang Mts., 11 Sept. 1884, *Pringle* (G., K., Mo., U. S.); Santa Rita Forest Reserve, 1903, *Griffiths* 6085 (Mo.); Fort Whipple, 1865, *Coues & Palmer* 437 (Mo.); Santa Rita Mts., 1902, *Griffiths & Thornber* 150 (U. S.); vicinity of Bisbee, 1892, *Mearns* 899, 936, 1016 (U. S.). MEXICO: SONORA: between San Pedro and Fronteras, Sept. 1890, *Hartman* 937 (G.); CHIHUAHUA: Bachimba Canyon, 1885, *Pringle* 27 (G.); between Colonia Garcia and Pratt's Ranch, below Pacheco, 1899, *E. W. Nelson* 6251 (G., U. S.); Santa Eulalia plains, 25 Sept. 1885, *Wilkinson* (U. S.); near Chihuahua, 1886, *Pringle* 1036 (B. M.); COAHUILA: Jimulco, 1885, *Pringle* 126 (G.); Saltillo, 1898, *Palmer* 331 (G., K., Mo., U. S.); Parras, 1898, *Palmer* 429 (G.,

Mo., U. S.), 431 (G., Mo., U. S.), 789 (G., U. S.); Torreon, 1898, *Palmer* 456 (G., Mo., U. S.), 472 (G., Mo., U. S.); Sierra de Parras, 1910, *Purpus* 4643 (B. M., G., Mo., U. S.); without definite locality, 1880, *Palmer* 614 (G., K., U. S.); NUEVO LEON: El Carrizo, near Monterey, 1903, *Lozano* (U. S.); TAMAULIPAS: San Miguel, Oct. 1827, *Berlandier* 1313 (G.); San Fernando to Santander, Oct. 1830, *Berlandier* 838 (G.); l. c., *Berlandier* 2258 (TYPE COLL. of *V. laxa*: G., K., Prod.); SINALOA: Agiabampo, 1890, *Palmer* 811 (B. M., Mo., U. S.); Culiacan, 1891, *Palmer* 1772 (G., U. S.); l. c., 11 Oct. 1904, *Brandege* (G., U. S.); Villa Union, 1895, *Lamb* 398 (G., Mo., U. S.); l. c., 1910, *Rose, Standley, & Russell* 13883 (U. S.); Mazatlan, 1910, *Rose, Standley, & Russell* 14036 (U. S.); DURANGO: near City of Durango, 1895 m., 1896, *Palmer* 359 (G., K., U. S.), 398 (U. S.), 656 (B. M., G., K., Mo., U. S.), 692 (B. M., G., K., Mo., U. S.); SAN LUIS POTOSI: 1878, *Parry & Palmer* 471½ (G., K., Mo., U. S.); Morales Mts., 1880, *Schaffner* 387 (G., K.); Rio Verde, 1910, *Orcutt* 5434 (Mo.); Venado, 1895, *C. & E. Seler* 1128 (G.); AGUAS CALIENTES: near City of Aguas Calientes, 1903, *Rose & Painter* 7770 (G., U. S.); HIDALGO: near Tula, 2075 m., 1899, *Pringle* 7961 (G., Mo.); VERA CRUZ: near Orizaba, 1888, *C. & E. Seler* 828 (G.); near Esperanza, Mt. Orizaba, 2440 m., 15 Aug. 1891, *Seaton* 368 (TYPE of *V. pedunculata*: G.); COLIMA: Colima, 1891, *Palmer* 1131 (G., U. S.); STATE OF MEXICO: San Angelo, 28 Sept. 1827, *Berlandier* 937 (*V. triquetra* DC.!: Prod.); l. c., Sept. 1855, *Schaffner* (G.); San Nicolas, 1865, *Bourgeau* 960 (G., K., U. S.); Chapultepec, 1865, *Bourgeau* 365 (G., K.) & 513 (K.); Cuantepec, *Bourgeau* 1076 (K.); near Mixcoac, 1865, *Bourgeau* 1222 (G., K., U. S.); near City of Mexico, 14 Aug. 1827, *Berlandier* 827 (*V. triquetra* DC.!: B. M., Prod.); l. c., 1898, *Holway* 3055 (G.); Valley of Mexico, *Schaffner* (G.); l. c., 1855, *Schmitz* 47 (B. M.); Churubusco, 1910, *Orcutt* 4326 (Mo.); PUEBLA: Tehuacan, *Liebmann* 243 (K.); without definite locality, 1903, *Holway* 5358 (G.), 1905, *Trelease* (Mo.), 1911, *Purpus* 5617 (B. M., G., Mo., U. S.); Cerro de Coatepe, San Luis, 1908, *Purpus* 3093 (B. M., G., Mo., U. S.); Chalchicomula, 1901, *Rose & Hay* 5651 (G., U. S.); Cerro de Paxtle, near San Luis Tultitlanapa, 1905, *Purpus* 3013 (TYPE COLL. of *Encelia montana*: B. M., G.); OAXACA: Cuicatlan, 610 m., 1895, *L. C. Smith* 382 (G.); Hacienda de Caenero, 1830 m., 1895, *L. C. Smith* 913 (G.); CHIAPAS:

Hacienda Petapan, Tuxtla, 1896, *C. & E. Seler* 1922 (G.). Mexico without locality: 1826, — (TYPE of *V. oppositipes*: Prod.); *ex herb. Pavon* (authentic for *Helianthus dentatus*: Prod.).

Var. **lancifolia**: foliis anguste lanceolatis paene e basi acuminatis basi acute cuneatis vel acuminatis utrinque viridibus sparse vel subdense strigoso-pilosis (pilis basi glandulosis) 4–8 cm. longis 9–17 mm. latis. — ARIZONA: Stone Cabin Canyon, Santa Rita Mts., 1525 m., 14 Oct. 1903, *Thornber* 117 (Mo., U. S.); Santa Rita Mts., 1903, *Griffiths* 6007 (Mo.); Santa Rita Mts., 11 June 1884, *Pringle* 24 (G., U. S.). MEXICO: SONORA: 1851, *Wright* 1228 (TYPE COLL.: G., U. S.).

→ Var. **helianthoides** (HBK.), comb. nov. Leaves acuminate, as large as in var. *brevipes*, entire or subentire, beneath paler and usually subcanescently but not very densely appressed-pilose, above green. — *V. helianthoides* HBK. l. c. (1820); Millsp. & Chase, l. c. (1904); Cockerell, l. c. (1915); the *V. helianthoides* of other authors is usually var. *brevipes*. *V. Sagraeana* DC. l. c. (1836). *V. microcline* DC. l. c. *Helianthus microclinus* (DC.). Gomez, l. c. (1890). *H. Baillonianus* Gomez, l. c. — MEXICO: CAMPECHE: Campeche, 1901, *Goldman* 525 (U. S.); YUCATAN: Merida, 1865, *Schott* 192 (B. M.), 195 (B. M.); l. c., 1896, *Valdez* 71 (B. M., G., K., Mo., U. S.); Hacienda Chuca, 1866, *Schott* 833 in part (B. M.); Izamal and Xcholac, *Gaumer* 502 (B. M., G., K., Mo., U. S.); Colonia San Cosme, 1906, *Greenman* 363 (G.); QUINTANA ROO: Cozumel Island, 20 Jan. 1886, *Gaumer* (B. M., K.). CUBA: Havana, 1731, *Houstoun* (B. M.); l. c., *Bonpland* 1360 (TYPE of *V. helianthoides*: Par.); l. c., *De la Sagra* (TYPE COLL. of *V. Sagraeana*: G., Prod.); l. c., 1828–31, *De la Sagra* (TYPES of *V. microcline*: Prod., fragm. G.); vicinity of Vento, Prov. Havana, 1904, *Baker & Wilson* 566 (U. S.); l. c., 1905, *Baker & Van Hermann* 4382 (U. S.); introduced, roadside near San Diego de Buinos, 14 Jan., *Wright* 2853 (B. M., G., K., Mo.); Matanzas, 1848–49, *Rugel* 2 (B. M., G., K.); l. c., *Pringle* 42 (G.); Columbia, 1905, *Curtiss* 595 (B. M., G., K., Mo., U. S.); waste places, Guanajay, Pinar del Rio, 1900, *Wm. Palmer & Riley* 662, 672 (U. S.); Mariel, 1900, *Wm. Palmer & Riley* 741 (U. S.); open places, Sierra de Anafe, 1911, *P. Wilson* 11557 (U. S.); Santiago de las Vegas, 1905, *C. F. Baker* 4490 (U. S.); Nuevitas, Camaguey, 1909, *Shafer* 1133 (U. S.). — T. 2. FIG. 8, T. 3. FIG. 1A–I.

Var. *canescens* (DC.), comb. nov. Stem, branches, and peduncles more or less densely pilose with loose spreading hairs, sometimes canescent. Leaves ovate, entire or toothed, green above and densely rather softly pilose with incurved or subspreading hairs with glandular-tuberculate bases, beneath paler or canescent with dense rather soft appressed or subspreading hairs. Phyllaries generally subcanescent at least on margin. — *V. canescens* DC. l. c. (1836); not of most other authors. *V. Nelsonii* Rob. & Greenm. l. c. (1896). — MEXICO: JALISCO: Rio Blanco, Oct. 1886, *Palmer* 674 (B. M., G., Mo., U. S.); Huejotitan, 1912, *L. Diguet* (G., Par.); ZACATECAS; *Coulter* 359 (G., K.); GUANAJUATO: Prov. Leon, 1829, *Mendez* (TYPE of *V. canescens*: Prod., fragm. G.); Ravin de la Presa del Encino, near Guanajuato, 1900, *Dugès* (G.); without definite locality, 1897, 1904, *Dugès* (G.); MORELOS: near Hochicalco, Distr. Cuernavaca, 1887, *C. & E. Seler* 377 (G.); GUERRERO: between Chilapa and Tixtla, 1585–2135 m., 17 Dec. 1894, *E. W. Nelson* 2169 (COTYPE of *V. Nelsonii*: G.); OAXACA: mountains of Huitzo, 1980 m., 16 Nov. 1895, *L. C. Smith* 899 (COTYPE of *V. Nelsonii*: G.); CHIAPAS: between San Cristobal and Teopisca, 2040–2590 m., 1895, *E. W. Nelson* 3477 (G., U. S.: approaching var. *helianthoides*). GUATEMALA: lightly wooded mountain slopes, heights by Samalá, 24 Dec. 1896, *C. & E. Seler* 3402 (Ber.). HONDURAS: between Llano de la Puerta and El Salto-Copan, 900 m., 1907, *Pittier* 1853 (U. S.: toward var. *helianthoides*).

The following specimens are intermediate between various varieties. *Palmer* 218 (1885), from southwest Chihuahua (G., K., U. S.), *Palmer* 618 (1880), from San Lorenzo, Coahuila (G., U. S.), and a plant from Arizona (?) collected by *Pringle* in 1881 (G.) are more or less intermediate between var. *brevipes* and var. *helianthoides*. The two last were considered *V. canescens* DC. by Dr. Gray. In stem- and leaf-pubescent *Palmer* 218 is suggestive of var. *canescens*. In the appressed but dense hairs of the stem *Palmer* 674, quoted above under var. *canescens*, is somewhat intermediate between that variety and var. *helianthoides*; in *Nelson* 3477, also referred to var. *canescens*, the stem is nearly glabrate. *Palmer* 199 (1906), from San Ramón, Durango (U. S.), is like var. *canescens* in stem-pubescent, but is otherwise nearly normal for var. *brevipes*.

37. *V. RETICULATA* Wats. Suffrutescent, branched, about 8 dm. high; stem whitish, striatulate, finely appressed-pilose and gland-

dotted or nearly glabrous. Leaves opposite or alternate, broadly ovate, acuminate, truncate or cordate at base, entire but somewhat wavy-margined, above softly canescent-pilose with appressed hairs, beneath very strongly reticulate and slightly rough-pilose with spreading hairs, pale, gland-dotted, 2.8–6 cm. long, 2.3–4.5 cm. wide; petioles 3.5–13 mm. long. Flowering branches long and with few minute bracts, bearing about 14 cymose-panicled heads clustered at the summit of long naked peduncles, on pedicels 6–27 mm. long; heads 2 cm. wide; disk 8–9 mm. high, 11–13 mm. wide. Involucre 2-seriate, 4–4.5 mm. high, its phyllaries subequal, pilosulous, above tuberculate, callose-mucronulate, the ovate indurated ribbed base longer than the oval or oblong-ovate herbaceous apex. Rays about 8, 8 mm. long, 2.5 mm. wide; disk-corollas appressed-pilose, 4.5 mm. long. Pales abruptly acute, pilose on back above, 4.5 mm. long. Achenes appressed-pilose, 2.5 mm. long. Awns rather stout, 1.6 mm. long; squamellae about 10, coherent at base, 1 mm. long. — Wats.! *Am. Nat.* vii. 301 (1873); *Rothr. in Bot. Wheeler Exp. (Rep. U. S. Geog. Surv. West of 100th Merid. vi.)* 161. t. 4. f. 6–10 (1878); Coville, *Contr. U. S. Nat. Herb.* iv. 130 (1893). — CALIFORNIA: basalt rocks, Argus Mts., 610–915 m., 1897, *Purpus* 5321 (G., K., Mo., U. S.); Telescope Mts., 1871, *Wheeler* (TYPE: G.); south slope of Brown's Peak, Inyo Co., 750 m., 16 Jan. 1891, *Coville & Funston* 183 (U. S.); Inyo Co., 610–915 m., 1896, *Purpus* 3018 (U. S.).

38. *V. TOMENTOSA* Gray. Frutescent, erect, 3–4 m. high, the stem pilosulous, often pilose at the nodes, the branches loosely hanging. Leaves opposite to the inflorescence, ovate or triangular-ovate, acuminate at apex, truncate to shallowly cordate at base, serrulate with irregular depressed-triangular teeth or the upper subentire, above canescent or greenish-canescens with dense subappressed pilosity, the hairs slightly tuberculate at base, beneath densely and softly canescent-pilose-tomentose, 4–10 cm. long, 2–8 cm. wide, those of inflorescence reduced; petioles 6–16 mm. long. Heads 3.3–4 cm. wide, in 3–16-headed panicles at ends of branches; peduncles 1–5 cm. long; disk 9–13 mm. high, 1–1.6 cm. thick. Involucre 2-seriate, 6–10 mm. high, graduated, the phyllaries densely pilose-tomentose, with ovate or ovate-oblong body and longer loose linear-lanceolate callose-mucronate apex. Rays 8, 8–20 mm. long, 5–10 mm. wide; disk-corollas slender, ascending-

pilose on tube, nerves, and teeth, 5.6 mm. long (tube 1 mm.). Pales mucronate, nearly glabrous, 7–9.5 mm. long. Achenes appressed-silky-pilose, 4.8 mm. long. Awns slender, 3.8 mm. long; squamellae 4–6, lacerate, distinct, 0.8 mm. long. — Gray! Proc. Am. Acad. v. 161 (1861–62); Vasey & Rose, Contr. U. S. Nat. Herb. i. 72 (1890). — LOWER CALIFORNIA: Cape San Lucas, 1859–60, *Xantus* 61 (TYPE COLL.: G., K.), 1911, *Rose* 16341, 16344, 16356 (U. S.); common on arroyos and mesas, La Paz, 1890, *Palmer* 83 (G., K., U. S.); San José del Cabo, 1890, *Brandege* 313 (G.), 1897, *Anthony* 325 (G., K., Mo., U. S.), 1901, *Purpus* 491 (K., Mo., U. S.), 1911, *Rose* 16452 (U. S.); from El Cajan to El Saccatan, 60–150 m., 1905, *Nelson & Goldman* 7368 (U. S.).

39. *V. DELTOIDEA* Gray. Erect branched shrub, the branches often elongated and drooping; stem up to 3 m. high, from tuberculate-strigillose to densely white-tuberculate-hispidulous, in age often glabrate and grayish-white, bearing few to many cymose-panicled heads. Leaves mostly opposite, ovate to deltoid- or triangular-ovate, acute to rounded at apex, rounded to cordate at base, sinuate-dentate to entire, 3-nerved and slightly venose below, above dark green to canescent, impressed-veined, from harshly tuberculate-hispidulous to densely strigillose, beneath green or canescent, from sparsely to densely tuberculate-hispidulous, sub-pilosulous, or pilose, or sometimes densely appressed-strigillose, often gland-dotted, the hairs sometimes with strongly tubercular bases, 1.4–10 cm. long, 0.7–6.7 cm. wide; petioles narrowly margined or marginless, canescently tuberculate-strigillose or hispidulous, 2–20 mm. long. Heads 1.6–5 cm. wide, on peduncles very variable in length and strigillose or densely tuberculate-hispidulous and -hispid; disk 7–13 mm. high, 7–20 mm. thick. Involucre 2-seriate, graduated, 5–8 mm. high, the phyllaries with ovate indurated base and herbaceous lance-oblong loose often reflexed apex, canescently strigillose and often strigose or hispid. Rays 5–8, oval, 7–16 mm. long, 4–8 mm. wide; disk-corollas appressed-puberulous, 4–5.3 mm. long (tube 0.6–0.9 mm.). Pales broadly scarious-margined, rather abruptly acute, hispidulous on back and keel, 7–9 mm. long. Achenes corky on sides in age, more or less appressed-pilose, 2.3–5.5 mm. long, 1–1.8 mm. wide. Awns 2–3 mm. long; squamellae 4–6, fimbriate, usually united to middle or beyond on each side of achene, 0.3–1.8 mm. long. — Gray! Proc.

Am. Acad. v. 161 (1861-62); Vasey & Rose, Proc. U. S. Nat. Mus. xi. 535 (1889); Contr. U. S. Nat. Herb. i. 71 (1890). *V. Parishii* Greene! Bull. Torr. Club ix. 15 (1882); Gray, Syn. Fl. i. pt. 2. 271 (1884). *V. deltoidea* Gray var. *Parishii* (Greene) Vasey & Rose, Contr. U. S. Nat. Herb. i. 72 (1890); Hall, Univ. Calif. Publ. Bot. iii. 129 (1907). *V. deltoidea* Gray var. *Townsendii* Vasey & Rose! Proc. U. S. Nat. Mus. xiii. 148 (1890). *V. deltoidea* Gray var. *tastensis* Brandegee! Zoe v. 161 (1903). *V. chenopodina* Greene! Leaf. Bot. Obs. ii. 154 (1911). — The most variable species of the genus. The following varieties, though ill-defined, may in most cases be recognized.

Var. **genuina**: caule pedunculisque plerumque strigilloso rare aspere hispidis; foliis triangulari- vel deltoideo-ovatis dentatis rarius subintegris subtus densius pubescentibus pilis asperis vel submollibus interdum pilosulis 2.5-6.5 cm. longis 1.7-4.7 cm. latis; capitulis interdum majoribus 3.2-3.5 cm. latis. — *V. deltoidea* Gray, l. c. — LOWER CALIFORNIA: San Quentin, 1886, *Orcutt* 1356 (G., K., Mo., U. S.); Rosarito, 1905, *Nelson & Goldman* 7168 (U. S.); San Andres, 1905, *Nelson & Goldman* 7155 (U. S.); Lagoon Head, 1889, *Palmer* 807 (K., U. S.), 887 (G.); Playa Maria, 1896, *Anthony* 65 (Mo.); arroyos, Calmalli, 365 m., 1898, *Purpus* 219 (K., U. S.); Todos Santos, 1890, *Brandegee* 312 (G.); San José del Cabo, 1901, *Purpus* (K., Mo., U. S.); La Paz, 1890, *Palmer* 30 (G., K., U. S.); Cape San Lucas, 1859-60, *Xantus* 60 (TYPE COLL.: G., K., U. S.). — T. 1. FIG. 3.

Var. **TOWNSENDII** Vasey & Rose. Pubescence of stem strigillose, of branches hispidulous; leaves ovate to oblong-ovate, obtuse or rounded at apex, rounded at base or subtruncate, entire, scabrously tuberculate-strigillose above, beneath rather softly pilose or hispid-pilose or sometimes hispidulous-strigillose, 2.5-5.7 cm. long, 1.1-3.3 cm. wide; heads 1.7-3.8 cm. wide. — Vasey & Rose, l. c. (1890). — LOWER CALIFORNIA: Socorro Island, March 1889, *C. H. Townsend* (TYPE: U. S.), 1897, *Anthony* 389 (G., K., Mo., U. S.), 1903, *Barkelew* 181 (G., Mo., U. S.). — *Palmer* 828 (1890), from Carmen Island, is intermediate between this and var. *chenopodina*, but nearer the latter. — T. 1. FIG. 5.

Var. **TASTENSIS** Brandegee. Leaves large, very harshly tuberculate-strigillose above, the tubercles persistent, beneath rather softly and densely more or less canescently hispidulous-pilosulous,

crenate-dentate with depressed teeth, the larger 6–10 cm. long, 3.5–6.7 cm. wide; petioles 1.4–2 cm. long; heads 4.5–5 cm. broad; disk 1–1.2 cm. high, 1.4–2 cm. thick. — Brandegee, l. c. (1903). — LOWER CALIFORNIA: Sierra El Taste, Nov. 1902, *Brandegee* (TYPE COLL.: G.). — T. 1. FIG. 6.

Var. *PARISHII* (Greene) Vasey & Rose. Stem usually densely and harshly tuberculate-hispidulous; peduncles similar, more or less hispid below the head, usually longer than in var. *genuina*; leaves usually smaller, deltoid, strongly toothed and reticulate, more sparsely pubescent beneath, the hairs harsher and with more conspicuous tuberculate bases; heads mostly solitary at apices of stem and branches, often smaller. — Vasey & Rose, l. c. (1890); Hall, l. c. (1907). *V. Parishii* Greene, l. c. (1882); Gray, l. c. (1884). — NEVADA: Lincoln Co., 1880, *P. W. Davis* (Mo.). CALIFORNIA: Palm Springs (Agua Caliente), 150–210 m., 1896, *Parish* 4126 (B. M., G., K., Mo., U. S.); Coyote Canyon, Colorado Desert, 1902, *Hall* 2783 (K., Mo., U. S.); Colorado Desert, 1881, *W. G. Wright* 197 (G.); near San Felipe, 9 Oct. 1858, *S. Hayes* 448 (G., U. S.); Mountain Spring, San Diego Co., 1894, *Mearns* 3114 (U. S.); Coyote Wells, Colorado Desert, April 1905, *Brandegee* (U. S.); Colorado River, *Newberry* (G.); San Luis Rey, 1881, *Parish Bros.* 963 (TYPE COLL.: G.); San Diego Co., 1885, *Cleveland* (G.). ARIZONA: Grand Canyon, *Moseley* (K.); l. c., 1885, *Asa Gray* (G.); Yuma, 1881, *Parry* 112 (G.); Wickenburg, 1876, *Palmer* 607 (G., U. S.); Quitovaquito, Pima Co., 1894, *Mearns* 2749 (U. S.); Jacumba Hot Springs, near Monument No. 233, 1894, *L. Schoenfeldt* 3221 (U. S.). MEXICO: SONORA: Papago Tanks, Pinacate Mts., 1907, *MacDougal* 50 (U. S.). LOWER CALIFORNIA: Canyon Castillas, 1884, *Orcutt* 1110 (G.); Los Angeles Bay, 1887, *Palmer* 530 (B. M., G., K., U. S.); Santa Agueda, 1890, *Palmer* 250 (G., U. S.). — The Lower California specimens approach the type form. — T. 1. FIG. 2.

Var. *chenopodina* (Greene), comb. nov. Foliis parvulis deltoideovel rhombico-ovatis integris obtusissimis vel rotundatis utrinque vel solum infra canescens strigillosis 1.5–2.5 cm. longis 0.7–2.4 cm. latis. — *V. chenopodina* Greene, l. c. (1911). — LOWER CALIFORNIA: between Santo Domingo and Matancita, 15–30 m., 14–15 Nov. 1905, *Nelson & Goldman* 7277 (TYPE no. 565363, U. S. Nat. Herb.); San Bertólome Bay, 1911, *Rose* 16200

(U. S.); Carmen Island, 1890, *Palmer* 828 (G., K., U. S.). — T. 1. FIG. 4.

The variations in this species are so great as to deserve detailed mention (see t. 1). The megaphyllous extreme, var. *tastensis* (fig. 6), is a stoutish shrub with triangular-ovate toothed leaves (10 by 6.7 cm.) tapering almost from the truncate base to apex, above light green and shagreen-like with a tuberculate pubescence, beneath venose, rather softly and in youth subcanescently pubescent with rather short hairs. This passes into a form (fig. 3) with darker olive-green leaves (averaging about 6 by 4.5 cm.) with fewer teeth, even harsher and denser pubescence above (of finer hairs) and somewhat soft or rather harsh pubescence beneath, which is nomenclatorially the typical form of the species. On the one hand, as it goes northward into California and Arizona, and thence into adjacent Sonora, this passes by a reduction in size of the leaves accompanied by an increase in their dentation and harshness, associated with increased scabrosity of stems and peduncles and elongation of the herbaceous tips of the phyllaries, into the var. *Parishii* (fig. 2), through gradations so measured that it is difficult to draw any definite line of demarcation; on the other, variations in the direction of reduced and entire leaves and appressed and somewhat softer pubescence, with reduction in size of the tubercles on the upper surface of the leaves and increased development of the hairs, lead through such specimens as *Purpus* 219, *Nelson & Goldman* 7155, and *Palmer* 30 (1890) to var. *Townsendii* (fig. 5) of Socorro Island. In this variety the leaves beneath are either densely and rather softly pubescent with spreading hairs or in the thinner-leaved individuals less densely pubescent with appressed hairs. Intermediate between this and var. *chenopodina* is *Palmer* 828 (1890) from Carmen Island, with thicker leaves dark green above and canescently strigillose beneath. On the whole this is nearer to var. *chenopodina*, to which it is here referred. Through *Rose* 16200 it connects directly with the type of *V. chenopodina* (fig. 4), a plant which in aspect, aside from the paniced heads, is very close to *V. brevifolia*. In Greene's type the leaves are small (1.5–2.3 by 1–1.7 cm.), entire, thick, and blunt, and densely canescent-strigillose on both sides, and the whole character of the plant is so unlike that of var. *tastensis* that when the two sheets are laid side by side their specific identity seems

almost unbelievable. Yet through the whole series just discussed the chief features of involucre, inflorescence, and what may be termed the ground plan of the leaves remain essentially the same.

The following species, *V. microphylla* (fig. 1) is so close to *V. deltoidea* var. *chenopodina* that it is possible that further collections will succeed in bridging the gap between them.

40. *V. MICROPHYLLA* Vasey & Rose. Frutescent, about 0.6 m. high, the stem apparently ascending, clothed with a grayish glabrate bark, slender; branches canescently strigillose, bearing 2-4 heads at the end of long nearly naked peduncles. Leaves alternate, ovate, obtuse to acute, cuneate to truncate at base, entire, 3-nerved, canescently strigillose both sides, 8-12 mm. long, 5-8 mm. wide, the upper smaller; petioles canescently strigillose, 2.5-3 mm. long. Pedicels 0.7-6 cm. long; heads 1.5 cm. wide; disk 7-10.5 mm. high, 8-12 mm. thick. Involucre 2-seriate, scarcely graduated, 3-4 mm. high, the phyllaries canescently strigillose, with ovate or oblong base and narrowed callose-mucronulate herbaceous apex. Rays about 10, oval, 5 mm. long, 3 mm. wide; disk-corollas slightly pubescent, 4 mm. long (tube 0.9 mm.). Pales blackish above, yellowish-margined, the inner with abruptly acute erose more or less spreading or reflexed tip, pubescent and gland-dotted, 6.5 mm. long. Achenes silky-pilose, 4 mm. long. Awns somewhat easily deciduous, 2 mm. long; squamellae about 4, fimbriate-denticulate, united, 1.3 mm. long. — Vasey & Rose, Proc. U. S. Nat. Mus. xi, 535 (1890). — LOWER CALIFORNIA: 64 km. back from coast, Lagoon Head, 6-15 March 1889, *Palmer* 802 and 882 (G., K., U. S.); arroyos, Calmali, 270-315 m., Jan.-March 1898, *Purpus* 47 (K.). — Vasey & Rose's type (*Palmer* 270) came from the same locality as *Palmer* 802 (or 882). — T. 1. FIG. 1.

41. *V. LANATA* (Kellogg) Gray. Stems solitary or few, erect, about 3.5-5.5 dm. high, from a frutescent base, branched only in the inflorescence, purplish-brown beneath the pannose-lanate tomentum, in age glabrate above. Leaves opposite, rather few, somewhat crowded at base of the stem of the year, oval or orbicular-ovate, broadly rounded at apex, at base truncate or abruptly contracted into a short cuneate base, crenate-dentate with few teeth or subentire, densely white- or grayish-lanate-pannose both sides, somewhat venose-reticulated, 2.5-5.5 cm. long, 2.3-4.5 cm.

wide, on petioles 0.9–2.5 cm. long; stem-leaves few (3–6), much smaller, distant, usually alternate, passing into the lance-linear bracts of inflorescence. Heads 3–4, 4.5–6 cm. wide, on peduncles 3–11 cm. long; disk 9–15 mm. high, 17 mm. thick. Involucre 2-seriate, 6–9 mm. high, the phyllaries very densely lanate-tomentose, linear-lanceolate, with slightly broadened and ribbed base, the longer apex herbaceous. Rays about 18, sometimes styliiferous but sterile, 17–25 mm. long, 3.5–6 mm. wide; disk-corollas pilose, 5.5 mm. long (tube 1.5 mm.). Pales abruptly acute, pilose on back above, 7 mm. long. Achenes (immature) silky-pilose. Awns slightly broadened below, 2.7 mm. long; squamellae about 6, free, 1 mm. long. — Gray! Proc. Am. Acad. xvii. 218 (1882). *Bahiopsis lanata* Kellogg, Proc. Calif. Acad. ii. 35 (1863). — LOWER CALIFORNIA: Cedros Island: 1875, *Streets* (G., U. S.), May 1881, *Belding* (G.), Dec. 1888–Feb. 1889, *Lieut. C. F. Pond* (U. S.), Mar. 1889, *Palmer* 743 (G., K., U. S.), 1897, *Anthony* 279 (G., K., Mo., U. S.), 10 March 1911, *Rose* 16115 (U. S.).

42. *V. potosina*, nom. nov. Herbaceous, decumbent or ascending, 5–6 dm. high or more, sparsely branched or subsimple, the stem in youth canescently pubescent with incurved, retrorse, or spreading hairs mixed with few long widely spreading hairs, in age becoming subglabrate, naked above. Leaves opposite throughout, ovate, acute or acutish, at base truncate-rounded or slightly cordate, entire, triplinerved, above dull green or subcanescent, rather densely tuberculate-strigillose but not scabrous, beneath densely and rather softly canescent-pilose with appressed hairs, 3.5–9 cm. long, 1.5–5.3 cm. wide, the upper gradually smaller; petioles naked, canescent-pubescent and long-pilose, 1–2.5 cm. long. Heads 1.7 cm. wide or less, in close panicles of 3–14 at apex of long (2 dm. or less) naked axillary and terminal peduncles of unequal length; pedicels 4 cm. long or usually much less; disk 6–8 mm. high, 6–10 mm. thick. Involucre 2-seriate, scarcely graduated, 5 mm. high, the phyllaries lanceolate, canescently hispidulous and subciliolate, with ovate-lanceolate indurated about 3-vittate pale base and shorter narrow subappressed or spreading acuminate herbaceous apex. Rays about 8, 5 mm. long, 1 mm. wide; disk-corollas rather densely puberulous, 5.5 mm. long (tube 1 mm.). Pales somewhat trifid toward the hispidulous apex, subcuspidate, 5–6 mm. long. Achenes in age rather strongly thickened, sub-

marginate, mottled, sparsely and minutely puberulous, truncate at apex, 2.7 mm. long. Pappus none. — *Gymnolomia canescens* Rob.! Proc. Am. Acad. xxvii. 174 (1892); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 96 (1899). — MEXICO: SAN LUIS POTOSI: brackish marsh, Las Tablas, 27 June 1890, *Pringle* 3611 (COTYPE COLL.: G.); alkaline plains, Hacienda de Angostura, 27 June 1891, *Pringle* 3763 (COTYPE COLL.: G.); Media Luna, near Rio Verde, 2-8 June 1904, *Palmer* 74 (G.). — It has seemed advisable to change the name of this species to avoid confusion with *V. canescens* DC., a species here reduced to *V. dentata* (Cav.) Spreng.

Series D. **Pinnatilobatae**, ser. nov. Frutices vel rare herbaeae (?) valde ramosae, foliis saepe alternis valde pinnatilobatis, capitulis mediocribus, involucri 2-3-seriati phyllariis lanceolatis vel subulato-lanceolatis basi valde induratis costatis et vittatis apice abrupte angustatis herbaceis, corollis disci basi apicem achenii calvi glabri calyptratim tegentibus. — Species typica *Zaluzania pinnatilobata* Sch. Bip. (= *V. pinnatilobata* (Sch. Bip.) Blake). — Four species ranging from Texas to Oaxaca, unique in their pinnately lobed leaves. Species 43-46.

- a. Leaf-lobes attenuate46. *V. stenoloba*.
- a. Leaf-lobes blunt (the terminal sometimes acute), b.
- b. Leaves densely and softly tomentose beneath ... 44. *V. zaluzanioides*.
- b. Leaves not densely and softly tomentose beneath, c.
- c. Leaves several-lobed, subcanescent beneath... 43. *V. pinnatilobata*.
- c. Leaves hastately 3-lobed, scarcely subcanescent beneath45. *V. tripartita*.

43. ***V. pinnatilobata*** (Sch. Bip.), comb. nov. Frutescent, about 1 m. high, the stem slender, more or less puberulous with incurved or somewhat spreading hairs or substrigillose, in age subglabrate; bark grayish. Leaves alternate or sometimes opposite, ovate or deltoid-ovate in outline, obtuse to acutish at apex, cuneately or usually abruptly contracted into an often long margined petiole, deeply pinnately lobed (the lobes 1-3 pairs, short, broad, blunt, entire or slightly lobed or dentate), weakly subtriplinerved and subreticulate below, above green, closely strigillose, the hairs with prominent persistent glandular bases, beneath subcanescent with a fine incurved or somewhat spreading pubescence and gland-dotted, 2-4 cm. long, 1.3-3 cm. wide across the basal pair of lobes, the upper leaves sometimes subentire; petioles margined,

0.5–3.5 cm. long. Heads in cymose panicles of 3–5 or more at ends of branches, 3.5 cm. wide, on pedicels 6 cm. long or less; disk conic, 7–13 mm. high, 9–12 mm. thick. Involucre 2-seriate, 4–7 mm. high, the phyllaries lanceolate or lance-ovate, with indurated pale vittate and ribbed body and shorter narrower loose or spreading herbaceous apex, sparsely strigose and strigillose. Rays about 12, oval, 5–10 mm. long, 2–5 mm. wide; disk-corollas puberulous especially below, 3 mm. long. Pales stiffly short-acuminate, more or less puberulous and gland-dotted, 4–5 mm. long. Achenes glabrous, 2 mm. long. Pappus none. — *Zaluzania pinnatilobata* Sch. Bip.! Flora xlvii. 219 (1864). *Gymnolomia pinnatilobata* (Sch. Bip.) B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 163 (1881); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 90 (1899). — MEXICO: PUEBLA: Tehuacan, May 1842, *Liebmann* 384 (TYPE COLL.: drawing and fragm. G.); dry limestone hills, Tehuacan, 1675 m., 20 Dec. 1895, *Pringle* 6252 (G.); San Luis Tultitlanapa, July 1908, *Purpus* 2515 (G.); OAXACA: 9.6 km. above Dominiquillo, 1370–1675 m., 30 Oct. 1894, *E. W. Nelson* 1638 (G.).

44. *V. zaluzanioides*, sp. nov. Fruticosa ramosa, caule et ramis canescenter pilosulo-tomentosis, foliis saepe alternis figura triangulari-ovatis obtusis vel acutis pinnatim ca. 5–7-lobatis, lobis deltoideis vel quadratis obtusis integris vel denticulatis, supra obscure viridibus subtus dense canescenterque pilosulo-tomentosis in petiolum marginatum abrupte contractis, capitulis cymosopaniculatis.

Frutescent, branched, the stem and branches densely and canescently pilosulous-tomentose, in age subglabrate. Leaves chiefly alternate, ovate or triangular-ovate in outline, blunt to subacute, at base subtruncate, passing into the margined petiole, pinnately about 5–7-lobed (the lobes quadrate or deltoid, blunt, entire or with 1–3 rounded teeth, the lowest pair hastately spreading), above dull green, densely and rather softly incurved-puberulous with gland-based hairs, beneath densely and softly canescent-pilosulous-tomentose, triplinerved and finely reticulate, 2–4.5 cm. long, 1.5–3 cm. wide across the basal lobes, the lamina 6–10 mm. broad between the lobes; petioles margined, 7–15 mm. long; upper leaves gradually reduced but retaining the same shape. Heads in cymose panicles of 3–6 at ends of branches, about 14 mm. wide; pedicels mostly naked, pubescent like stem, 3 cm. long or less;

disk 8 mm. high, 7–8 mm. wide, convex. Involucre 2-seriate, slightly graduated, 3–4 mm. high, the phyllaries lanceolate, somewhat densely and loosely pilose and gland-dotted, with indurated ribbed and vittate base and slightly narrower and shorter or subequal reflexed herbaceous apex. Rays about 10, oval, yellow, puberulous and gland-dotted on back, 4.5–6 mm. long, 2.5–3.5 mm. wide; disk-corollas puberulous below, with erect teeth, 3 mm. long, the short and very obscure tube calyprate over the apex of achene. Pales stiffly short-acuminate, sparsely puberulous, 4.5 mm. long. Achenes blackish, glabrous. Pappus none. — MEXICO: OAXACA limestone mesa, San Antonio, 790 m., 2 Sept. 1894, *Pringle* 5731 (TYPE: G.). — Named from its remarkable likeness to some species of *Zaluzania*.

45. *V. tripartita* (Rob. & Greenm.), comb. nov. Apparently herbaceous, the stem slender, striate, glabrous except for a few scattered incurved hairs, paniculately branched above. Leaves alternate or rarely opposite, lanceolate or deltoid-lanceolate in outline, hastately 3-lobed (the basal lobes short, deltoid, blunt, and entire, or nearly equalling the terminal lobe and like it bearing a few secondary lobes), weakly triplinerved, above dull green, lepidote-tuberculate-strigillose, beneath barely subcanescent with short rather soft incurved hairs and gland-dotted, slightly revolute, acuminate or obtusish, cuneate and narrowed into the petiole, 4–6 cm. long, 1.8–5 cm. wide across the basal lobes, the upper leaves smaller and entire or subentire; petioles margined, 6–15 mm. long. Heads rather numerous, in cymose panicles of 3–5 at ends of branches, 2 cm. wide; ultimate pedicels 3 cm. long or less; disk convex, 8–10 mm. high, 8–11 mm. thick. Involucre 2–3-seriate, 5 mm. high, the phyllaries narrowly oblong-lanceolate, with indurated sparsely strigose base and shorter loose herbaceous tip. Rays 10–16, oval, 5–9 mm. long; disk-corollas puberulous chiefly below, 3 mm. long. Pales subglabrous, 4 mm. long. Achenes glabrous, 1.8 mm. long. Pappus none. — *Gymnolomia tripartita* Rob. & Greenm.! *Am. Journ. Sci. ser. 3. l. 154* (1895); *Proc. Bost. Soc. Nat. Hist.* xxix. 90 (1899). — MEXICO: OAXACA Cuicatlan, 550 m., 22 Oct. 1894, *L. C. Smith* 239 (COTYPE: G.); below Jaya-catlan, 1065 m., 9 Feb. 1895, *L. C. Smith* 386 (COTYPE: G.).

46. *V. stenoloba*, nom. nov. Much-branched shrub, about 1 m. high, the stem slender, glabrous or strigillose, sometimes subcanes-

cently so. Leaves alternate or rarely opposite, ovate in outline or linear, divided nearly to midrib into 3-7 linear or linear-lanceolate entire or few-lobed or -toothed lobes, or the upper linear and entire or subentire (the lobes attenuate, 1-5 mm. wide, equalling the lamina in breadth), above dull green, tuberculate-strigillose, beneath canescently strigillose, 2.5-6 cm. long, 4 cm. or less wide across the basal pair of lobes. Heads solitary at ends of branches, 1.8-3 cm. wide, on peduncles 2 dm. long or less; disk 6-8 mm. high, 8-12 mm. thick. Involucre 3-seriate, 6-9 mm. high, the phyllaries with ovate-lanceolate pale strongly indurated and ribbed base abruptly narrowed into a linear loose or spreading herbaceous tip, more or less strigose and strigillose, or the hairs somewhat looser. Rays about 12, 7-14 mm. long, 2-4 mm. wide; disk-corollas puberulous, with recurved teeth, 3.8 cm. long. Pales abruptly acute, 5 mm. long. Achenes glabrous, substriate, rather strongly compressed but subquadrangular, 3.5 mm. long. Pappus none. — *Heliomeris tenuifolia* Gray! Pl. Fendl. 84 (1848); Pl. Wright. i. 107 (1852), ii. 87 (1853). *Gymnolomia tenuifolia* (Gray) B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 163 (1881); Gray, Syn. Fl. i. pt. 2. 269 (1884); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 90 (1899). (Not *V. tenuifolia* Gardn. (1848).) — TEXAS: rocky cliffs of Turkey Creek and beyond the Pecos, *Wright* 329 (G.); rocky cliffs near Eagle Springs, *Wright* 1223 (G.); Presidio, *Havard* (G.); Rio Hondo, Cameron Co., 1913, *Chandler* 7041 (G.); El Paso, *A. Gray* (G.). NEW MEXICO: Organ Mts., 1465 m., Dona Ana Co., 1897, *Wooton* 442 (G.). MEXICO: CHIHUAHUA: Quincumé, 1852, *Thurber* 834 (G.); river bluffs, 1130 m., Ciudad Juarez, 1902, *Pringle* 9922 (G.); Lake Santa Maria, 1899, *E. W. Nelson* 6400 (G.); COAHUILA: near Saltillo and Rinconada, *Gregg* (COTYPE: G.); west of Mapimi, 9 May 1847, *Gregg* 21 (COTYPE: G.); Jimulco, 1885, *Pringle* 148 (G.); Saltillo, 1898, *Palmer* 174 (G.); Parras, 1898, *Palmer* 437 (G.), 443 (G.); Vileca, 1905, *Purpus* 1002 (G.); Sierra de Barbacon, 1910, *Purpus* 4460 (G.); without definite locality, 1880, *Palmer* 620, 621, 622, 623 (G.), *Gregg* 125 (G.); NUEVO LEON: calcareous mesas, El Carrizo, 1904, *Pringle* 13059 (G.); Monterey to Matamoras, April 1866, *A. Weber* (G.); TAMAULIPAS: San Fernando, Oct. 1830, *Berlandier* 814 (G.), 2234 (G.); DURANGO: barren hills above Tlahualilo, 1000 m., 1905, *Pittier* 462 (U. S.). — T. 2. FIG. 5.

Series E. **Brevifoliae**, ser. nov. Frutices parvi valde ramosi canescentes, foliis parvis ovatis infra canescentibus, capitulis mediocribus solitariis caulem et ramos terminantibus, involucri 3-4-seriati gradati phyllariis ovatis vel oblongo-ovatis acutis subherbaceis obscurissime costatis strigillosis, pappo interdum nullo. — Species typica *V. brevifolia* Greenm. — Three species of northern Mexico. Species 47-49.

- a. Pappus none; achene glabrous 49. *V. Greggii*.
- a. Pappus present; achene more or less pubescent, b.
 - b. Leaves ovate or triangular-ovate, acute or sometimes obtuse, on petioles 2-4 mm. long; awns equalling the squamellae (up to 1.7 mm. long) or slightly shorter; achene glabrous except at apex 47. *V. brevifolia*.
 - b. Leaves rotund or roundish-ovate, obtuse to rounded or retuse at apex, on petioles 5-7 mm. long; awns distinctly exceeding the squamellae; achene appressed-pubescent 48. *V. bicolor*.

47. *V. BREVIFOLIA* Greenm. Much-branched shrub, 1 m. or less high. Stem strigillose, at length glabrate, the bark grayish. Leaves alternate or opposite, ovate or triangular-ovate, acute to obtuse, submucronulate, cuneate to truncate or rounded at base, entire, slightly revolute, 3-nerved, greenish or canescent above and strigillose, beneath canescent or whitish with dense strigilosity, somewhat gland-dotted, 1-2.1 cm. long, 3.5-18 mm. wide; petioles densely canescent-strigillose, 2-4 mm. long. Heads solitary, 1.4 cm. wide, terminating slender naked or bracteolate peduncles (4.5-8.7 cm. long) at ends of branches; disk 7-8 mm. high, 8-9 mm. thick. Involucre 3-seriate, slightly graduated, 4 mm. high, the phyllaries densely canescent-strigillose, ovate to oblong-ovate, acute, callous-mucronate, thickened, subherbaceous-indurated, slightly ribbed below. Rays 8-10, 5 mm. long, 1.8 mm. wide; disk-corollas slightly pubescent above, 3.5 mm. long (tube 0.7 mm.). Pales yellowish, pilose above, with abruptly acute glabrous more or less spreading apex, 4 mm. long. Achenes sparsely pubescent near apex, 2.6 mm. long. Squamellae about 6, lacerate, slightly coherent at base, 1-1.7 mm. long, equalling the awns. — Greenm.! Proc. Am. Acad. xxxix. 103 (1903). — MEXICO: COAHUILA: shrubby desert in Rincon del Jabalé, southern Sierra de la Paila, Hacienda Nuevo Yucatán, 1160 m., 5 Aug. 1905, *Endlich* 916 (Ber.); Sierra de la Paila, Oct. 1910, *Purpus* 4697 (B. M., G., Mo., U. S.); DURANGO: Mapimi, 21-23 Oct. 1898, *Palmer* 527 (TYPE

COLL.: G., K., Mo., U.S.); chaparral near the Ojuelo Mine, 1640 m., 13 Sept. 1903, *Endlich* 259 (Ber., fragm. G.). — T. 2. FIG. 9.

48. *V. BICOLOR* Blake. Branching shrub, the younger branches canescent-strigillose, the older gray-brown, subglabrate. Leaves subopposite or the upper alternate, roundish or rotund-ovate, retuse, rounded, or obtuse at apex, truncate-rounded at base, above (in dried specimen) blackish-green, harshly strigillose, beneath very densely grayish-strigillose, rather venose, 1.2–1.8 cm. long, 8–18 mm. wide, on petioles 5–7 mm. long, canescent-strigillose. Heads solitary, 1.8 cm. wide, terminating the branches, on peduncles 2.8–4.3 cm. long; disk 6–7 mm. high, 11–12.5 mm. wide. Involucre 3-seriate, 3–4 mm. high, graduated, the phyllaries acute, densely strigillose, the outer oblong, 0.8 mm. broad, the inner oblong-ovate, 2 mm. broad. Rays about 12, oblong-oval, 6.5 mm. long, 3 mm. broad; disk-corollas puberulous, 3 mm. long (tube 0.5 mm.). Pales subobtusate, puberulous on back and apex, 5 mm. long. Achenes (immature) subsericeous, 2.5 mm. long. Awns 2, unequal, about 1.2 mm. long; squamellae about 6–8, acute, lacinate, 0.8 mm. long. — Blake! Proc. Am. Acad. li. 519 (1916). — MEXICO: HIDALGO (?): between Rio Grande and Jamaltepec (?), Dec. 1829, *C. Ehrenberg* 1227 (TYPES: Ber., G.).

> 49. *V. Greggii* (Gray), comb. nov. Much branched undershrub, 3–4 dm. high or less, the stem ascending or suberect, in youth canescent with a dense fine pubescence, in age subglabrate, clothed with a grayish bark; branches opposite. Leaves opposite, broadly ovate or oval, rounded to obtusish at apex, at base cuneate or rounded-cuneate, entire, above dull green, finely and densely strigillose and gland-dotted, beneath densely canescent-strigillose, 7–25 mm. long, 5–18 mm. wide, gradually reduced above; petioles 2–4 mm. long. Heads solitary at apex of stem and branches, 1.8–4 cm. wide, on canescent-strigillose peduncles 6 cm. long or less; disk 7–9 mm. high, 5–8 mm. wide. Involucre 3–4-seriate, graduated, 4 mm. high, the phyllaries ovate to oblong-ovate or the outermost narrowly oblong, acute, canescent-strigillose, somewhat blackish-green, below somewhat indurated and ribbed, with shorter subherbaceous apex. Rays 8–10, oblong, 8–13 mm. long, 3–6 mm. wide, rarely (according to Gray) styliiferous but sterile; disk-corollas subglabrous, the tube very obscure, capping the achene, 3 mm. long. Pales somewhat yellowish on sides, with

acutish blackish apex, vittate, densely pilosulous above, 5–6 mm. long. Achenes lucid, substriate, rather strongly compressed, glabrous, 2.5 mm. long. Pappus none. — *Gymnolomia Greggii* Gray! Proc. Am. Acad. xv. 36 (1879); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 89 (1899). — MEXICO: COAHUILA: limestone hills, Carneros Pass, 1889, *Pringle* 2387 (G.); Saltillo, 1902, *Palmer* 312 (G.); Chojo Grande, 43 km. S. E. of Saltillo, 1904, *Palmer* 357 (G.); San Lorenzo Canyon, 9.6 km. S. E. of Saltillo, 1904, *Palmer* 421 (G.); hills near Saltillo, 1675 m., 1904, *Pringle* 8800 (G.); Sierra de la Paila, 1910, *Purpus* 4698 (G.). Northern Mexico without definite locality, 1848–49, *Gregg* 382 (TYPE: G.). — Flowering Aug.–Nov. — T. 2. FIG. 10, T. 3. FIG. 5.

Section 3. **Diplostichis**, sect. nov. Herbae annuae vel rarissime frutices, foliis saltem inferioribus oppositis lanceolatis vel ovatis, capitulis parvis (disco 4–(fructu)12 mm. diametro), involucri 2-seriati phyllariis infra subinduratis vittatis supra subherbaceis, pappo rarissime nullo. — Species typica *V. tenuis* Gray. — Eight species ranging from Sinaloa to Colombia, Venezuela, and Ecuador. The section is most nearly related to the *Dentatae*, but differs in the slender and usually more delicate habit of the plants, the small heads, and the more obscure differentiation of the individual phyllaries into indurated base and abruptly narrowed herbaceous apex. Species 50–57.

- a. Phyllaries linear-lanceolate, long-attenuate; leaves subsessile 53. *V. tenuis*.
- a. Phyllaries lanceolate or ovate-lanceolate; leaves slender-petioled, b.
 - b. Branches of the inflorescence and pedicels rufous-pilosulous or sordid-pilose; South American, c.
 - c. Pappus present; heads very numerous 56. *V. anomala*.
 - c. Pappus none; heads 2–3. 57. *V. quitensis*.
 - b. Branches of the inflorescence and pedicels not rufous-pilosulous or sordid-pilose, d.
 - d. Phyllaries densely canescent-strigillose 54. *V. gracillima*.
 - d. Phyllaries not densely canescent-strigillose, e.
 - e. Heads in flower slenderly short-cylindric, 3–4 mm. thick, crowded at tips of branches 55. *V. Brandegei*.
 - e. Heads in flower more or less subglobose, 5 mm. thick or more, f.
 - f. Phyllaries nearly glabrous except on margin... 51. *V. strigosa*.
 - f. Phyllaries distinctly pubescent on back, g.
 - g. Involucre and leaves beneath gland-dotted; Costa Rica 50. *V. sylvatica*.
 - g. Involucre and leaves beneath not gland-dotted; Colombia and Venezuela ... 52. *V. mucronata*.

50. *V. SYLVATICA* Klatt. Herbaceous, the base not seen; stem slender, rather densely hispid-pilose with loose many-celled whitish hairs, in age glabrate, the bases of the hairs mostly deciduous. Leaves alternate, ovate, acuminate, at base cuneate or rounded, cuneately narrowed into the petiole, serrate nearly to the pointed tip (teeth deltoid, depressed, mucronate), above dark green, tuberculate-strigillose and short-hispid, the hair-bases persistent, beneath paler, subdensely hispidulous-pilosulous and hispid with ascending hairs, especially along the veins, and gland-dotted, 5.5–18 cm. long, 2.8–12.5 cm. wide, on tuberculate-hispid-pilose petioles 8–20 mm. long or more. Heads rather numerous, 1.6–2.6 cm. wide, in irregular cymose panicles; ultimate pedicels densely hispid-pilose with erectish hairs, gland-dotted, 3 cm. long or less; disk 8.5–9 mm. high, 8–(fruit)12 mm. thick. Involucre 2-seriate, 5–7 mm. high; phyllaries oblong-lanceolate, shortly acuminate, subdensely hispid-pilose with appressed subsordid hairs chiefly on margin and apex and slightly gland-dotted, with subindurated vittate base and shorter lanceolate loose herbaceous tip. Rays about 8, oval, 8–9 mm. long; disk-corollas puberulous on teeth, 5.4 mm. long (tube 1 mm.). Pales sparsely strigillose toward the abruptly mucronate apex, 6.8 mm. long. Achenes mottled black and white, appressed-pilose, with crustaceous base, 2.6 mm. long. Awns paleaceous, 2 mm. long or less; squamellae 6, united below, lacerate, 0.7 mm. long. — Klatt! in Dur. & Pitt. Bull. Soc. Bot. Belg. xxxi. pt. 1. 204 (1892). — COSTA RICA: wood, "massif du Barba," foot of Carrizal, 1900 m., Jan. 1889, *Pittier* 779 (TYPE: G.); San Ramon, Prov. Alajuela, 1525 m., 13 Jan. 1916, *Holway* 424 (G.); without definite locality, April 1910, *G. C. Worthen* (Mo.). PANAMA: between Hato del Jobo and Cerro Vaca, eastern Chiriquí, 700–1000 m., Dec. 1911, *Pittier* 5295 (U. S.).

51. *V. STRIGOSA* Klatt. Herbaceous, the stem slender, branched, sparsely pilose with loose several-celled mostly deciduous hairs and slightly puberulous. Leaves alternate (those of branches sometimes opposite), somewhat rhombic-ovate or lance-ovate with acuminate entire tip, at base sharply cuneate, crenate-serrate, thin, above green, subsparingly hispid-strigose, the hairs with conspicuous persistent tuberculate bases, occasionally sparsely strigillose, beneath pale green, sparsely strigillose and somewhat gland-dotted, 3.5–10 cm. long, 1.5–2.5 cm. wide, on slender petioles 3 cm.

long or less. Heads terminating the erect ultimate branches in 1's-3's, on mostly naked pedicels 1.7-5.7 cm. long and densely pilose with loose erectish hairs; disk in youth thick-cylindric, 6 mm. high, 6 mm. thick, in age depressed-globose, 7-8 mm. high, 9-11 mm. thick. Involucre 2-seriate, 5-6 mm. high; phyllaries somewhat obovate-oblong, very sparsely strigillose and along margin sparsely pilose, with ribbed and vittate base and much shorter abruptly acute or subacuminate green tip, the inner narrower. Rays 5, oval, 6 mm. long; disk-corollas 4.5 mm. long (tube 0.5 mm.), appressed-puberulous above. Pales nearly glabrous, abruptly cuspidate-mucronate, 7 mm. long. Achene mottled, appressed-rusty-pilose, 3 mm. long. Awns very unequal, abruptly scarious-margined near middle and appearing trifid, 2-3 mm. long; squamellae about 6, unequal, irregularly united below and to the awns, deeply lacerate, 1 mm. long. — Klatt! in Dur. & Pitt. Bull. Soc. Bot. Belg. xxxi. pt. 1. 204 (1892). — COSTA RICA: El Rodeo, along the Rio Tirribi, 700 m., 28 Dec. 1889, *Pittier* 1604 (TYPE: G.). — T. 2. FIG. 11.

52. *V. mucronata*, sp. nov. Annu tenuis caule strigoso apice divaricate ramoso capitulis laxo paniculatis, foliis alternis late ovatis vel anguste lanceolatis acuminatis vel attenuatis sparse strigillosis in petiolis 6-13 mm. longis insidentibus, disco subglobose 6-(fructu)11 mm. diametro, involucri biseriati 3.5-5 mm. alti phyllariis lineari- vel oblongo-lanceolatis strigillosis, radiis ca. 10, acheniis rufo-sericeis.

Slender annual, the stem striate, whitish, strigose, at apex (when well developed) divaricately branched, about 20-headed (in reduced forms fewer-headed), the heads loosely panicked. Leaves alternate, broadly ovate to narrowly lanceolate, acuminate or attenuate, truncate-rounded at base, cuspidate-dentate (teeth about 20 pairs, depressed), thin, sparsely strigillose, 3-nerved, 6.5-10.5 cm. long, 1.8-6.3 cm. wide, the uppermost reduced to linear-filiform bracts; petioles strigillose, unmarginated, 6-13 mm. long. Peduncles slender, densely strigillose, 0.8-3.2 cm. long; heads subglobose, 1.5 cm. wide; disk 7.5 mm. high, 6-(fruit)11 mm. wide. Involucre 2-seriate, slightly graduated, 3.5-5 mm. high, the phyllaries linear- or oblong-lanceolate, acute to acuminate, below indurated, ribbed, and vittate, at apex herbaceous, subdensely strigillose. Rays about 10, yellow, oblong, 8 mm. long, 2.5 mm.

wide; disk-corollas yellow, puberulous below, 3 mm. long (tube 0.6 mm.). Pales glabrous, mucronate, 5–5.5 mm. long. Achenes black, rufous-silky, with crustaceous carpodium, 2.5 mm. long. Awns 2, slender, 1.7 mm. long; squamellae 4, laciniate-fimbriate, 1 mm. long. — COLOMBIA: Cartagena, 1826, *Billberg* 188 (TYPE: Ber., photog. and fragm. G.); Santa Marta, 1898–1901, *Herbert H. Smith* 517, 1976, 2619 (Mo.). VENEZUELA: near Tovar, 610 m., 1856–57, *Fendler* 1962 (G., K.).

53. *V. tenuis* Gray. Slender annual, simple or branched, 1.5–5 dm. high, bearing 1–7 long-peduncled heads. Stem strigose or strigose-hispid below. Leaves opposite to the inflorescence, remote, lanceolate to lance-ovate, acuminate, mucronate, rounded or cuneate at base, entire or obscurely appressed-serrulate, strigose-pilose both sides with somewhat tuberculate-based hairs, 2.2–6 cm. long, 4–20 mm. wide, the lower somewhat reduced; petioles almost none. Peduncles strigose, naked or bracteolate, 2.3–16 cm. long; heads 1.4–1.7 cm. wide; disk 8–9 mm. high, 5.5–(fruit)12 mm. wide. Involucre 2-seriate, 5–8.5 mm. high, the phyllaries narrowly linear-lanceolate, attenuate almost from the base, canescently strigillose, the outer shorter, slightly striate and indurated below. Rays 8, pale yellow or white, oval to oblong-oval, 4.5–6 mm. long; disk-corollas yellow, hispidulous, 5.5 mm. long (tube 0.3 mm.), very slender. Pales scarious-membranaceous, strigillose on keel and at the purplish acute apex, 7.5 mm. long. Achenes subsericeous, slightly turbinate, 2.5 mm. long. Awns slender, occasionally bifid, 5.5 mm. long; squamellae about 6, free, oblong, laciniate, purple-maculate, 1 mm. long. — Gray! in *Wats. Proc. Am. Acad.* xxii. 426 (1887). — Two color forms are distinguishable.

Forma **typica**: radiis flavis. — *V. tenuis* Gray, l. c. *Melanthera lanceolata* Klatt (non Benth.), *Bull. Soc. Bot. Belg.* xxxi. pt. 1. 205 (1892), at least as to *Pittier* 4675. — MEXICO: SINALOA: Cofradia, Oct. 1904, *Brandege* (G., U. S.); JALISCO: Rio Blanco, Oct. 1886, *Palmer* 657 (TYPE COLL.: B. M., G., K., Mo.); dry slopes of barranca near Guadalajara, 6 Nov. 1888, *Pringle* 1725 (B. M., G., K., Mo., U. S.); hillsides near Guadalajara, 1525 m., 6 Oct. 1903, *Pringle* 11612 (G., K., U. S.); Guadalajara, 30 Sept. 1903, *Holway* 5079 (G.); OAXACA: Cerro de Fortin, 1615 m., 29 Sept. 1895, *Conzatti* 843 (G.); Fortin, 1600 m., 25 Oct. 1896, *Conzatti & González* 384 (G.); hills above Oaxaca, 1830 m., Oct.

1894, *Pringle* 5610 (G., Mo.); Sierra de Reyes, 2135 m., 10 Nov. 1894, *Pringle* 5635 (G.). Mexico without definite locality: near Rancho del Lorno, *C. Ehrenberg* 1558 (Ber.). COSTA RICA: savannas, Boruca, Dec. 1891, *Pittier* 4675 (B. M., G.); dry rocks, Quebrada de Tapshi, near Boruca, Jan. 1893, *Pittier* 7344 (G.). PANAMA: vicinity of Olá, Coelé, 100–350 m., Dec. 1911, *Pittier* 5033 (U. S.). — T. 2. FIG. 12, T. 3. FIG. 6.

Forma *alba* (Rose), comb. nov.: radii albis. — *Viguiera tenuis* Gray var. *alba* Rose! Contr. U. S. Nat. Herb. i. 336 (1895). — MEXICO: COLIMA: grassy hillsides, Colima, 9 Jan.–6 Feb. 1891, *Palmer* 1151 (TYPE COLL.: B. M., G., K., Mo.); MICHOACAN: granitic soil, El Ocote, Cerro Pedregoso, 450 m., 28 Oct. 1898, *Langlassé* 535 (G.). — Of the characters mentioned by Dr. Rose as distinctive (smaller heads and leaves, pales and phyllaries more or less purplish, and rays white), only the color of the rays is at all peculiar to this form as distinguished from ordinary plants of the species.

54. V. GRACILLIMA Brandege. Much branched annual, the stem rather sparsely strigose, slender. Leaves opposite below, alternate above, subrhombic-ovate, acuminate or obtusely short-pointed, broadly cuneate at base, serrate (teeth about 9 pairs, deltoid, mucronate), above dark green, subdensely and finely strigillose and sparsely hispid-strigose, the hairs all with persistent bases, beneath paler green, tuberculate-strigose, 1.8–3.5 cm. long, 1–1.8 cm. wide (the lowest not seen), on petioles 4–13 mm. long. Heads numerous in a loose irregular panicle, about 11 mm. wide, the ultimate pedicels 4 cm. long or less, mostly naked, rather densely strigose; disk at first thick-cylindric-campanulate, 7 mm. high, 5 mm. thick, in age broadly campanulate, 7–8 mm. wide and thick. Involucre 2-seriate, 4.5–5 mm. high, the phyllaries about 9, lanceolate, acuminate to attenuate, subdensely canescent-strigose, herbaceous, slightly indurated below. Rays about 5, oval, 2.5 mm. long, 1.8 mm. wide; disk-corollas about 21, puberulous below, 4.2 mm. long (tube 1.2 mm.). Pales strigillose on keel, abruptly short-pointed, 7–7.5 mm. long. Achenes appressed-pilose, 3 mm. long. Awns 3.5–4 mm. long; squamellae about 6, lacerate, slightly united at extreme base, 1.5 mm. long. — Brandege! Univ. Calif. Publ. Bot. vi. 74 (1914). — MEXICO: OAXACA: Picacho to San Geronimo, Oct. 1913, *Purpus* 6675 (TYPE COLL.: B. M., G., Mo.).

55. *V. BRANDEGEI* Blake. Herbaceous, erect, cymose-paniculately branched at apex of stem and of the few branches into 6–10-headed panicles. Stem slender, purplish, hispidulous. Leaves opposite (alternate in inflorescence), ovate, acuminate, rounded or subcordate at base, regularly serrulate, dull green above, slightly paler beneath, above tuberculate-hispid and slightly glandular, beneath hispid-pilose, 2.3–2.8 cm. long, 1.1–1.4 cm. wide, on hispidulous scarcely margined petioles 3.5 mm. long. Pedicels 1–12 mm. long, hispidulous; heads only 9 mm. wide; disk 5.5–6 mm. high, 3–4 mm. wide. Involucre 2-seriate, 3.5 mm. high, graduated, the phyllaries lanceolate, subacute, callous-unguiculate, strigillose, 3-ribbed and vittate, pale below; the short apex subherbaceous, lance-deltoid, the inner series subtending the rays. Rays 5, oval, 3–3.5 mm. long, 1.8 mm. wide, hardly surpassing the disk; disk-corollas about 12, strigillose especially below and on the teeth, 4 mm. long (tube 0.7 mm.). Pales acute, black-lineate, hispidulous on back, 4.5 mm. long. Achenes silky-villous, 1.5 mm. long. Awns 2, lanceolate, scarious, about 2 mm. long; squamellae about 4, oblong-lanceolate or lanceolate, irregularly lacerate, about 1 mm. long; whole pappus somewhat deciduous. — Blake, Proc. Am. Acad. li. 519 (1916). *Aspilia hispida* Brandegee! Univ. Calif. Publ. Bot. iv. 94 (1910). Not *V. hispida* Baker (1884). — MEXICO: PUEBLA: Coxcatlan, 2440–2745 m., Sept. 1909, *Purpus* 4126 (TYPE COLL.: B. M., G.). — T. 3. FIG. 7.

56. *V. anomala*, sp. nov. Herbacea? ramis et caule juventate sordide pilosis pilis laxe patentibus, foliis oppositis ovatis basi late rotundatis, in petiolis 1.3–2.6 cm. longis insidentibus, capitulis in paniculis 20–40-cephalis trichotomis laxis terminalibus dispositis, involucre sordide rufescenti-piloso, acheniis glabris papposis.

Herbaceous?, the stem and branches slender, in age grayish, subglabrate, in youth purplish-brown, like the inflorescence sordidly pilose with lax hairs. Leaves mostly opposite, ovate, acuminate, broadly rounded at base, regularly crenate-serrulate (teeth about 18 pairs, cuspidate), 5-nerved, somewhat harshly strigose, the hairs tuberculate at base, 6–8.5 cm. long, 2.5–5 cm. wide; petioles slender, unmarginated, sordidly pubescent, 1.3–2.6 cm. long. Heads 20–40, in trichotomous terminal lax panicles, about 1.5 cm. broad; peduncles very slender, 2–4 cm. long; disk 8 mm. high, 4–6.5 mm. thick. Involucre 2-seriate, 3.5 mm. high, the

phyllaries about 8, unequal, the inner linear-lanceolate, the outer ovate-lanceolate, sordidly rufous-pilose. Rays 5, oblong, 7 mm. long, 1.8 mm. wide; disk-corollas about 10, very minutely and sparsely strigillose, 4.5 mm. long (tube 0.7 mm.). Pales narrow, colorate on back, sparsely pubescent, the outer obtuse, 4.5 mm. long, the inner abruptly long-acuminate, 5.5 mm. long. Achenes black, glabrous, 2.9 mm. long, 1.2 mm. wide. Awns 2, slender, 2.6 mm. long; squamellae about 6, unequal, laciniate, about 1 mm. long. — COLOMBIA: without definite locality, *Triana* 1378 (TYPE: Ber., photog. and fragm. G. Also in B. M. ex hb. Triana, and apparently of the same collection, but marked *Linden* 95). — T. 2. FIG. 13.

57. *V. quitensis* (Benth.), comb. nov. "Shrub," the stem (only upper part seen) slender, subsimple or bearing short axillary branches, densely and sordidly pilose and pilosulous with spreading or subappressed hairs, in age subglabrate, striate or angled. Leaves opposite to apex of stem, ovate, acute to acuminate, at base rounded or slightly subcordate, serrulate with appressed or subascending teeth, 3-nerved and somewhat veiny. above rather harshly tuberculate-hispid-pilose with incurved or subspreading hairs, beneath slightly paler green, rather densely and subsordidly pilose or hispid-pilose especially along the veins, 4.3–9 cm. long, 2.3–5.3 cm. wide; petioles unmarginated, sordid-pilose, 8–25 mm. long. Heads few (2–3), 2.8 cm. wide, terminal and from the upper axils, on sordid-pilose pedicels 2.8 cm. long or less; disk 8–10 mm. high, 6–8 mm. thick. Involucre 6.5–7 mm. high, 2-seriate, the phyllaries short-pilose with appressed or somewhat spreading sordid hairs, with somewhat indurated and ribbed base and loose lanceolate acuminate callous-mucronate subherbaceous apex. Rays 8, narrow-oblong, 8–14 mm. long; disk-corollas 5.5 mm. long, puberulous especially below and on teeth. Pales acuminate, tricuspidate toward apex, pubescent above, 6.5 mm. long. Achenes glabrous, striatulate, 3 mm. long. Pappus none. — *Andrieuxia?* *quitensis* Benth.! Pl. Hartw. 206 (1845). *Gymnolomia quitensis* (Benth.) B. & H. ex Hook. & Jacks. Ind. Kew. i. pt. 2. 1076 (1893); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 98 (1899). — ECUADOR: vicinity of Quito, 1855, *Couthouy* (G.), *Hall* 20 (G.), *Bushnell* (G.); Rumibamba near Quito, *Hartweg* 1142 (TYPE COLL.: fragm. G.).

Wedelia Stuebelii Hieron., Bot. Jahrb. xxi. 348 (1895), has been referred by Hieronymus (l. c. xxix. 35 (1900)) to *Gymnolomia quitensis*, but, if the pappus is described correctly, cannot be this species, nor even referable to the genus *Viguiera* as here circumscribed.

Section 4. **Heliomeris** (Nutt.), comb. nov. Herbae tenues annuae vel perennes, foliis saepe lanceolatis vel linearibus integris vel dentatis 1-nerviis vel obscure triplinerviis, capitulis parvis cymoso-paniculatis, involucri 2-seriati vix gradati phyllariis herbaceis basi non induratis interdum 1-3-vittatis saepissime lanceolatis, pappo nullo, achenio saepissime glabro. — Species typica *Heliomeris multiflora* Nutt. (= *V. multiflora* (Nutt.) Blake). — Six species ranging from Montana to Chiapas, with a seventh isolated species in Georgia. A compact group of closely related species, well distinguished by habit and involucre, and corresponding to the original *Heliomeris* of Nuttall (Journ. Acad. Nat. Sci. Philad. ser. 2. i. 171 (1848)), which has long been wrongly synonymized with the very distinct genus *Gymnolomia* HBK. Species 58-64.

a. Perennials, b.

b. Leaves lanceolate to lance-ovate or linear-lanceolate. 58. *V. multiflora*.

b. Leaves oval. 59. *V. ovalis*.

a. Annuals, c.

c. Phyllaries merely ciliate; rays about 8; Georgia. 63. *V. Porteri*.

c. Phyllaries usually rather densely canescent-strigose; rays (6) 10-16; Montana to Mexico, d.

d. Phyllaries (at least in part) ovate-based with abruptly narrowed apex; rays about 6. 64. *V. obscura*.

d. Phyllaries lanceolate or linear-lanceolate, not abruptly contracted above; rays 10-14, e.

e. Phyllaries green, rather sparsely pubescent or merely ciliate. 62. *V. ciliata*.

e. Phyllaries densely and more or less canescently pubescent, f.

f. Leaves lanceolate to linear-lanceolate, 4-14 mm. wide; heads larger (disk 6-14 mm. thick) 60. *V. longifolia*.

f. Leaves linear or linear-lanceolate, 1.5-3 mm. wide; heads smaller (disk 6-8 mm. thick) 61. *V. annua*.

58. *V. multiflora* (Nutt.), comb. nov. Rather slender several-stemmed branched perennial, 1.2 m. high or less, from a usually thick woody rootstock, the stem finely pubescent with mostly incurved or appressed hairs, at length subglabrous. Leaves opposite below, alternate above, lanceolate or lance-ovate or rarely linear-

lanceolate, acuminate to obtuse at apex, cuneate at base, from entire to rather sharply serrate (teeth few, about 5 pairs), rather weakly triplinerved, green both sides or very slightly paler beneath, tuberculate-strigillose above, strigillose and gland-dotted beneath, 2.5–8 cm. long, 0.2–3 cm. wide; petioles strigose and strigillose, 2–7 mm. long. Heads numerous in irregular loose panicles, 2.5–3.5 cm. wide; disk 6–10 mm. high, 6–14 mm. thick. Involucre 2-seriate, 6–10 mm. high, the phyllaries linear-lanceolate, subacuminate, strigose below, tuberculate-strigillose toward tip, herbaceous throughout, loose and more or less reflexed at apex. Rays 10–14, oval to oblong, 7–17 mm. long; disk-corollas nearly glabrous, 4 mm. long (tube 0.8 mm.). Pales firmly short-pointed, hispid-pilose above, 6 mm. long. Achenes mottled in age, glabrous, 2.8 mm. long. Pappus none. — *Heliomeris multiflora* Nutt.! Journ. Acad. Nat. Sci. Philad. ser. 2. i. 171 (1848); Gray, Pl. Fendl. 84 (1848); Wats. Bot. King's Exp. 170 (1871), at least in part. *H. simplex* E. Dur. Journ. Acad. Nat. Sci. Philad. ser. 2. iii. 91 (1855), ex char. *Gymnolomia multiflora* (Nutt.) B. & H. ex Rothr. in Wheeler's Rep. vi. 160 (1878), as to syn.; Gray, Syn. Fl. i. pt. 2. 269 (1884), in part; Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 91 (1899); Woot. & Standl. Contr. U. S. Nat. Herb. xix. 708 (1915). *G. nevadensis* A. Nels.! Bot. Gaz. xxxvii. 271 (1904). *G. linearis* Rydb.! Bull. Torr. Club xxxvii. 327 (1910). — Two varieties may be recognized.

Var. **genuina**: foliis lanceolatis vel ovato-lanceolatis rare lineari-lanceolatis 2.5–8 cm. longis 0.6–3 cm. latis, radice saepius crassa. — *Heliomeris multiflora* Nutt. l. c. *Gymnolomia multiflora* (Nutt.) B. & H. l. c. — MONTANA: forks of the Madison, 2135 m., 1897, *Rydberg & Bessey* 5180 (G.). IDAHO: loose dry soil on exposed mountain sides, road to Island Park, Fremont Co., 1899, *Henderson* 4822 (G.). WYOMING: East Branch, East Fork, Yellowstone River, near Yellowstone Lake, 1871, *Hayden* 34 (G.); Mammoth Hot Springs, Yellowstone National Park, 1914, *F. W. Hunnewell 2nd* (G.); l. c., 1920 m., 1884, *Tweedy* 168 (G.); Teton Mts., 1894, *A. Nelson* 1064 (G.); Teton Pass, 1901, *Merrill & Wilcox* 1182 (G.); Bridger Peak, Carbon Co., 1903, *Goodding* 2031 (G.); Centennial Valley, 1891, *A. Nelson* 39 (G.); l. c., 1896, *A. Nelson* 2663 (G.); Centennial, 1900, *A. Nelson* 7988 (G.); l. c., 1902, *A. Nelson* 8772 (G.); Snake River, Uinta Co., 1899, *A. & E.*

Nelson 6455 (G.). COLORADO: Steamboat Springs, Routt Co., 1903, *Goodding* 1618 (G.); North Elk Canyon, Rio Blanco Co., 1902, *W. C. Sturgis* (G.); Manitou, 2100 m., 1901, *F. E. & E. S. Clements* 59 (G.); Cerro Summit, Gunnison Watershed, 2440 m., 1901, *C. F. Baker* 700 (G.); Marshall Pass, Gunnison Watershed, 3050 m., 1901, *C. F. Baker* 944 (G.); Norwood Hill, San Miguel Co., 2135 m., 1912, *E. P. Walker* 471 (G.); dry hillsides, Tabe-guache Basin, 2440 m., 1913, *E. Payson* 161 (G.); La Veta, 2135 m., 1897, *C. S. Crandall* 2917 (G.); near Pagosa Peak, 2900 m., 1899, *C. F. Baker* 685 (G.); Leroux, 1892, *J. H. Cowen* (G.); without definite locality, 1862, *Parry* 420 (G.), 1862, *Hall & Harbour* 271 (G.), 18 Aug. 1870, *Greene* 194 (G.); "Rocky Mts.," *Burke* (G.), *Gambell* (TYPE COLL. of *H. multiflora*: G.), 1845, *Frémont* 121 (G.). UTAH: Big Cottonwood Canyon, Salt Lake Co., 2775 m., 1905, *Garrett* 1581a (G.); Aquarius Plateau, head of Poison Creek, 1905, *Rydberg & Carleton* 7394 (G.). NEVADA: Goose Greek and Uinta Mts., 1980–2285 m., Oct. 1868 and Aug. 1869, *S. Watson* 606 (G.). NEW MEXICO: Mogollon Mts., Socorro Co., 2285 m., 1903, *Metcalf* 436 (G.); Chama, 1899, *C. F. Baker* 684 (G.). — Flowering July–Oct. — T. 2. FIG. 14, T. 3. FIG. 8.

Var. *nevadensis* (A. Nels.), comb. nov.: foliis anguste lineari-lanceolatis valde revolutis 4–4.5 cm. longis 2–3(–5) mm. latis, radice saepe tenuiore. — *Gymnolomia nevadensis* A. Nels. l. c. *G. linearis* Rydb. l. c. — COLORADO: dry hillside, Iron Springs Mesa, San Miguel Co., 2285 m., 1912, *E. P. Walker* 533 (G.); without definite locality, 1878, *M. E. Jones* (G.). UTAH: St. George, 1877, *Palmer* 241 (TYPE COLL. of *G. linearis*: G.). NEVADA: among the rocks, mountain slides, Meadow Valley Wash, 27 May 1902, *Goodding* 968 (TYPE COLL. of *G. nevadensis*: G.). ARIZONA: Barfoot Park, 2440–2515 m., Chiricahua Mts., 1906, *Blumer* 1361 (G.). CALIFORNIA: mesas, Argus Mts., 1525–1830 m., 1897, *Purpus* 5025 (G.). — This plant does not seem specifically separable from true *V. multiflora*. Its only distinctive feature of consequence seems to be its very narrow revolute leaves, and since these are not accompanied by other diagnostic characters, as they are in the case of the annual species of this section, the plant is best treated as a variety of *V. multiflora*.

59. *V. ovalis*, nom. nov. Perennis caule parce ramoso subsparse strigilloso et strigoso, foliis ovalibus acutis vel obtusis supra

glandulari-tuberculato-strigillosis subtus strigillosis et glandulari-adsersis non pallidioribus obscure dentatis 2.4–5 cm. longis 1.4–2.3 cm. latis, involucri phyllariis subsparse strigosis.

“Perennial,” the stem moderately stout, erectish, 3–8 dm. high, subsimple or branched above, subsparingly strigillose and strigose. Leaves opposite below, alternate above, the main ones oval, obtuse to acute at apex, cuneate at base, obscurely and irregularly serrate above, subtriplinerved, scarcely revolute, green both sides, above glandular-tuberculate-strigillose, beneath strigillose or hispidulous and gland-dotted, 2.4–5 cm. long, 1.4–2.3 cm. wide, those of branches smaller, narrow-oblong or oblong-lanceolate, obtusish; petioles 2–3 mm. long, narrowly margined. Heads 5–11, on axillary and terminal peduncles, 2.2–3 cm. wide; disk 6–7 mm. high, 9–11 mm. thick. Involucre 2-seriate, subequal, 4–5 mm. high, the phyllaries narrow-oblong or lance-oblong, subacuminate or merely acutish, scarcely mucronate, herbaceous, somewhat loose, blackish-green, somewhat sparsely and scarcely canescently strigose. Rays about 12, oblong-oval, puberulous on veins of back and gland-dotted, 6–12 mm. long, 1.8–3.8 mm. wide; disk-corollas with a few glandular hairs on tube, 3 mm. long (tube 0.6 mm.). Pales with a few glandular hairs along keel, sparsely hispid-pilose on margin above and toward the blackish-green acuminate submucronate apex, 3 mm. long. Achenes (immature) glabrous. Pappus none. — *Gymnolomia brevifolia* Greene! ex Woot. & Standl. Contr. U. S. Nat. Herb. xvi. 190 (1913); Woot. & Standl. l. c. xix. 708 (1915). Not *V. brevifolia* Greenm. (1903). — NEW MEXICO: Mogollon Mts., west fork of the Gila River, Socorro Co., 3355 m., 15 Aug. 1903, *Metcalf* 511 (TYPE COLL.: G.). ARIZONA: southern part, 1881, *Lemmon* (G.).

60. *V. longifolia* (Rob. & Greenm.), comb. nov. Annual, erect, subsimple or branched, about 8 dm. high, the stem strigillose with appressed or incurved hairs, sometimes subglabrate in age. Leaves opposite below or nearly throughout, narrowly lanceolate to linear-lanceolate, acuminate to attenuate at each end, 1-nerved and feather-veined, glandular-tuberculate-strigillose above, tuberculate-strigillose and scarcely paler beneath, entire or obscurely repand-toothed, only slightly revolute, 4.5–11 cm. long, 4–11 (–14) mm. wide; petioles 5 mm. long or less. Involucre 2-seriate, 4–7 mm. high, the phyllaries lanceolate or linear-lanceolate, acuminate,

herbaceous, strigose-hispid below, strigillose above. Rays about 12, as in *V. multiflora*; disk-corollas puberulous below, 2.5–3 mm. long (tube 0.7 mm.). Pales firmly short-pointed, hispid-pilose above, 4 mm. long. Achenes lucid, blackish, glabrous, 1.8 mm. long. Pappus none. — *Gymnolomia longifolia* Rob. & Greenm.! Proc. Bost. Soc. Nat. Hist. xxix. 92 (1899); Woot. & Standl. Contr. U. S. Nat. Herb. xix. 708 (1915). *G. multiflora* of earlier authors, in part. — TEXAS: western part, *Wright* 328 (TYPE¹: G.). NEW MEXICO: on pine hills between the copper mines and the Mimbres, *Wright* 1221 (G.); common, Kingston, 2010 m., 1904, *Metcalf* 1408 (G.); Forest Nursery, Fort Bayard Watershed, 1980 m., Grant Co., 1905, *Blumer* 54 (G.). ARIZONA: Manning Trail, Rincon Mts., 2440 m., 1909, *Blumer* 3487 (G.); southern part, 1881, *Lemmon* (G.); Rucker's Valley, 1881, *Lemmon* 383 (G.: "flore pleno" form). MEXICO: CHIHUAHUA: Strawberry Valley, Pilares, 1891, *Hartman* 777 (G.); hills and plains, near Chihuahua City, 1885, *Pringle* 615 (G.), 1900, *Pringle* 9153 (G.); near Colonia Garcia, 2440 m., 1899, *Townsend & Barber* 342 (G.); southwest part, 1885, *Palmer* 392 (G.); DURANGO: near City of Durango, 1896, *Palmer* 754 (G.); SAN LUIS POTOSI: from San Luis Potosi to Tampico, 1878–1879, *Parry & Palmer* 1102 (G.); CHIAPAS: *Ghiesbreght* 63 (G.). — Flowering Aug.–Oct.

61. *V. annua* (Jones), comb. nov. Erect paniculately branched or sometimes subsimple slender annual, about 7 dm. high, the stem subtuberculate-strigillose or strigose. Leaves opposite below, alternate above, linear or very narrowly linear-lanceolate, attenuate at each end, strongly revolute, tuberculate-strigillose both sides and gland-dotted beneath, equally green both sides, 1-nerved and feather-veined, very strongly revolute, 3–7 cm. long, 1.5–3 mm. wide, the upper smaller; petioles 4 mm. long or less. Heads mostly small, 1–1.5(–3.5) cm. wide; disk 5–7 mm. high, 6–8 mm. thick. Involucre 3–4(–5) mm. high, 2-seriate, the lanceolate acuminate bluntish-tipped callous-mucronulate phyllaries herbaceous, below strigose, above strigillose or subglabrous, appressed or loose. Rays about 12, oval, 5–12(–15) mm. long; disk-corollas with a few glandular hairs below, 2.5–2.8 mm. long (tube 0.6 mm.). Pales and achenes as in *V. longifolia*. Pappus none. — *Gymnolomia multiflora* (Nutt.) B. & H. var. *annua* Jones, Proc. Calif. Acad.

¹ Here first designated as type.

Sci. ser. 2. v. 698 (1895). *G. annua* (Jones) Rob. & Greenm.! Proc. Bost. Soc. Nat. Hist. xxix. 93 (1899); Woot. & Standl. Contr. U. S. Nat. Herb. xix. 708 (1915). *G. multiflora* of earlier authors, in part. — TEXAS: western part, *Wright* 334 (G.), *Pope* (G.). NEW MEXICO: *Wright* 1220 part (G.), *Palmer* (G.). ARIZONA: sandy river bottoms, Rio Verde, 1865, *Coues & Palmer* 559 (G.); San Carlos, 760 m., 1874, *Rothrock* 779 (G.); on limestone, Bernoudy's Mine, Maxon's Peak, 1705 m., 1907, *Blumer* 1755 (G.); Mexican Boundary Line, south of Bisbee, 1892, *Mearns* 1090 (G.); Pantano, 1884, *Pringle* 23 (G.). MEXICO: SONORA: Sal si Puede, 1890, *F. E. Lloyd* 410 (G.); hillsides, Badachuache, 1890, *F. E. Lloyd* 411 (G.); without definite locality, *Wright* 1220 part (G.); CHIHUAHUA: Sierra en Media, 1899, *E. W. Nelson* 6481 (G.); without definite locality, plains, 1902, *Pringle* 9921 (G.); Llanos, *Wislizenus* (G.). — Flowering Sept.-Dec.

62. *V. ciliata* (Rob. & Greenm.), comb. nov. Slender annual (at least as to the typical form), subsimple or branched from the base, the branches usually simple or subsimple; stem pale, sparsely strigose or rather densely spreading-hispid-pilose, or even subglabrous. Leaves mostly alternate, linear or linear-lanceolate, attenuate or acuminate at each end, rather strongly or slightly revolute, entire, above subsparingly (chiefly on margin) lepidote-tuberculate-strigillose, or sparsely or densely tuberculate-hispid-pilose with ascending or subspreading hairs, and usually hispid-pilose-ciliate with tuberculate-based hairs, beneath scarcely paler, from merely strigose along costa to densely hispid-strigose with ascending glandular-tuberculate-based hairs, 1-nerved, 3-8.3 cm. long, 1.5-3(-5) mm. wide; petioles hispid-pilose-ciliate, 2 mm. long or less. Heads few or numerous, 1.7-4 cm. wide, on axillary and terminal strigose or strigillose and spreading-hispid-pilose peduncles 6.5 cm. long or less, mostly naked; disk 6-7 mm. high, 9-14 mm. thick. Involucre 2-seriate, 6-12 mm. high, the phyllaries lanceolate or linear-lanceolate, acuminate or attenuate, callous-mucronate, distinctly green, 1-3-vittate, rather sparsely tuberculate-hispid and ciliate below, the hairs often confined to the margin, above tuberculate-strigillose. Rays 12-14, oval, 6-12 mm. long; disk-corollas sparsely hairy below, 3 mm. long (tube 1 mm.). Pales hispid-pilose above, with abrupt cusp (1 mm. long) formed by the excurrent vittate midrib, 5 mm. long. Achenes

blackish, lucid, glabrous, 2 mm. long. Pappus none. — *Heliomeris multiflora* Nutt. var. *hispida* Gray! Pl. Wright. ii. 87 (1853). *Gymnolomia hispida* (Gray) Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 93 (1899). *G. hispida* (Gray) Rob. & Greenm. var. *ciliata* Rob. & Greenm.! l. c. (1899). *G. ciliata* (Rob. & Greenm.) Rydb. Bull. Torr. Club xxxvii. 328 (1910); Woot. & Standl. Contr. U. S. Nat. Herb. xix. 708 (1915). — The name *hispida* is not available for this plant as a species because of the earlier and valid *V. hispida* Baker. Two varieties may be distinguished.

Var. **ciliata** (Rob. & Greenm.), comb. nov.: annua tenuis, basi saepe ramosa, caule sparse strigoso vel hispido-piloso vel subglabro, foliis viridibus hispido-piloso-ciliatis supra sparse hispido-pilosis subtus in costa et margine hispido-pilosis ceterum subglabris, pedunculis saepius strigosis, involucri phyllariis margine hispido-piloso-ciliatis apice attenuato tuberculato-hispidulis ceterum subglabris. — *G. hispida* (Gray) Rob. & Greenm. var. *ciliata* Rob. & Greenm. l. c. *G. ciliata* (Rob. & Greenm.) Rydb. l. c. — UTAH: Beaver, 1877, *Palmer* 245 (TYPE¹: G.). NEW MEXICO: Zuni Mts., Sept. 1851, *Sitgreaves Expedition* (G.). MEXICO: SONORA: *Wright* 1222 part (G.). — This variety makes the nearest approach of any of the western forms of the section to the isolated *V. Porteri* of Georgia.

Var. **hispida** (Gray), comb. nov.: basi invisā, caule subdense patenterque hispido-piloso, foliis utrinque dense pubescentibus (supra tuberculato-hispido-pilosis subtus dense hispido-strigosis pilis basi glandulari-tuberculatis), involucri phyllariis subdense hispido-pilosis. — *H. multiflora* Nutt. var. *hispida* Gray l. c. in part. *G. hispida* (Gray) Rob. & Greenm. l. c. — MEXICO: SONORA: low damp soil, near Santa Cruz and San Bernadino, *Wright* 1222 part (TYPE: G.).

63. **V. Porteri** (Gray), comb. nov. Erect paniculately branched or rarely subsimple annual, 5–9 dm. high, the stem usually purplish, slender, strigillose, below subglabrate. Leaves opposite below, alternate above, narrowly lanceolate to linear, attenuate, at base acuminate, entire, above subsparingly tuberculate-hispid and -hispidulous with incurved hairs, beneath sparsely hispid-pilose along costa or subglabrous, gland-dotted, tuberculate-hispid-ciliate, subtriplinerved above the base, 5–11.5 cm. long, 1.5–8.5 mm.

¹ As here first designated.

wide; petioles 2 mm. long or less. Heads 1.8–4 cm. wide, rather numerous, cymosely paniced; disk in fruit very strongly conic, 7–13 mm. high, 6–9 mm. thick. Involucre 2-seriate, 4–18 mm. high, the phyllaries erect or spreading, linear or linear-lanceolate, attenuate, callous-mucronulate, 3-vittate, herbaceous and green throughout, sparsely hispid-pilose-ciliate with several-celled spreading hairs, otherwise glabrous or practically so. Rays about 8, oblong to broadly oval, 12–18 mm. long, nearly glabrous; disk-corollas puberulous below, 2.8 mm. long (tube 0.6 mm.), the lanceolate recurved teeth longer than the throat. Pales cuspidate-acuminate, somewhat boat-shaped, sparsely strigillose along keel, 4.5 mm. long. Achenes blackish, very plump, striatulate, above and at base minutely puberulous, provided at the nearly truncate apex with a circle of papillae enlarged on the obscure inner and outer angles into a slight tooth or almost a narrow wing, the latter sometimes also observable toward the base of the achene, 2.3 mm. long, 1.3 mm. wide, 1 mm. thick. Pappus none. — *Rudbeckia* ? *Porteri* Gray! Pl. Fendl. 83, footnote (1848); Chapm. Fl. S. U. S. ed. 1. 228 (1860). *Gymnolomia Porteri* Gray, Proc. Am. Acad. xii. 59 (1876), & Syn. Fl. i. pt. 2. 269 (1884); Meehan, Nat. Flowers, ser. 1. ii. 137. t. 35 (1879); Chapm. l. c. ed. 3. 251 (1897); Rob. & Greenm. Proc. Bost. Soc. Nat. Hist. xxix. 91 (1899); Small, Fl. S. E. U. S. ed. 1. 1252 (1903), ed. 2. 1252 (1913). — GEORGIA: Stone Mt., De Kalb Co.: Aug. 1846, *T. C. Porter* (TYPE: G.), 1848, *Ravenel* (G.), 1851, *H. Hendee* (G.), 1876, *Canby* (G.), 1881, *R. B. Watson* (G.), 1883, *J. Donnell Smith* (G.), 335 m., 1893, *Small* (G.), 1897, *Biltmore Herbarium 3916* (G.), 1899, *A. Ruth* 42 (G.), 1900, *Pollard & Maxon* 459 (G.), Oct., *Curtiss* 1434 (G.); also in a meadow near Loganville, Walton Co., 11 Sept. 1894, 305 m., *Small* (G.). — Capt. Smith's label bears the following notes: "Juices somewhat resinous. Growing in dense patches on summit and slopes wherever vegetable mould has accumulated on the granite rock; and a few plants occurring even in the swamp at the base of the mountain." — Flowering July–Oct.

64. *V. obscura* (Blake), comb. nov. Slender erect annual, sparsely branched above, 1.9–3.5 dm. high, the stem hispidulous and strigose. Lower leaves (3–7 pairs) opposite, the others alternate, oblong-ovate or oblong-lanceolate or lanceolate, acute to subacuminate, cuneate at base, crenate-dentate or the upper en-

tire, above green, subdensely tuberculate-strigose, beneath distinctly paler, subsparingly strigose-hispid, the hairs longer along the veins, and sparsely gland-dotted, triplinerved, 2.7–4.7 cm. long, 9–13 mm. wide; petioles scarcely margined, spreading-hispid-pilose, 3–5 mm. long; upper leaves reduced to bracts. Heads 6–9, 2 cm. wide, on axillary and terminal naked or bracteate peduncles 2.3–8.5 cm. long, sometimes abnormally arising from the lower axils; disk 6.5 mm. high, 7 mm. thick, strongly convex at maturity. Involucre 2-seriate, 3.5–5 mm. high, the phyllaries lanceolate or ovate-lanceolate and abruptly narrowed above the middle to a linear apex, acute or rarely obtuse, mucronulate, herbaceous, blackish-green, hispid-pilose especially above. Rays about 6, oblong, 7 mm. long; disk-corollas 1.6–2.5 mm. long (tube gland-dotted, not ampliate at base, 0.5 mm. long). Pales subhyaline-scarious, blackish-green at apex, above sparsely pilose and ciliate, mucronulate, 3.3 mm. long. Achenes glabrous, striate, mottled, 2 mm. long, 1 mm. wide. Pappus none. — *Gymnolomia obscura* Blake! Proc. Am. Acad. li. 515 (1916). — MEXICO: VERA CRUZ: Maltrata, Jan. 1883, Kerber 211 (TYPE COLL.: B. M., K., fragm. G.). Local name “acaquale,” according to Kerber.

Section 5. **Paradosa**, sect. nov. Herbae vel frutices vel suffrutices, foliis saepe ovatis vel lanceolatis, involucri 2–5-seriati phyllariis saepe lanceolatis vel lanceolato-oblongis infra plus minusve induratis et costatis supra herbaceis; plantae austro-americanae. — Species typica *V. aurea* (HBK.) Hieron. — A very variable section, scarcely separable by definition from Sect. *Chloracra*, but on the whole a more generalized group, especially in involucre characters; the species, all of which are South American (from Ecuador southward), sometimes approximating in involucre characters members of the sections *Leighia* and *Chloracra*. Sp. 65–127. For key to series, see p. 34.

Series A. **Tenuifoliae**, ser. nov. Herbae perennes simplices, foliis paucis anguste linearibus vel lineari-filiformibus, capitulis solitariis, involucri 2-seriati subaequalis phyllariis lanceolatis vel oblongis herbaceis basi paullum induratis. — Species typica *V. tenuifolia* Gardn. — Slender simple perennials of Brazil, with few very narrow leaves and solitary heads, the involucre 2-seriate, the phyllaries only very slightly indurated at base. Sp. 65–68.

- a. Leaves 1-nerved, 1.2-1.5 mm. wide, canescent-strigillose beneath.....68. *V. angustissima*.
- a. Leaves 3-nerved, 1.5-7.5 mm. wide, green beneath, b.
 - b. Leaves 1.5-3.5 mm. wide, c.
 - c. Involucre 11 mm. high; phyllaries acuminate 65. *V. tenuifolia*.
 - c. Involucre 7-9 mm. high; phyllaries acute 66. *V. Kunthiana*.
- b. Leaves 5-7.5 mm. wide 67. *V. aspilioides*.

65. *V. TENUIFOLIA* Gardn. Stem slender, subflexuous, rather densely strigose, monocephalous. Leaves alternate, linear, entire or very remotely toothed, long-acuminate, sessile, strigose both sides, hispid along the slightly revolute margin, strongly 3-nerved, 9-13.5 cm. long, 1.6-3.5 mm. wide, sometimes with a few leafy branches in the axils. Peduncle densely strigose, 11.5 cm. long; head about 3 cm. wide; disk 9 mm. high, 1.3 cm. wide. Involucre 2-seriate, the phyllaries lanceolate, acuminate, densely hispid-strigillose, scarcely indurated below, subherbaceous, 11 mm. long. Rays linear, 14-17.5 mm. long, 2-2.5 mm. wide; disk-corollas sparsely hirtellous, 4.8 mm. long (tube 0.8 mm.), the throat funnel-form. Pales acute, cuspidate, minutely strigillose on back, 6 mm. long. Achenes (very immature) sparsely pubescent, 2.5 mm. long. Awns slender, 2.5 mm. long; squamellae about 6, lacerate, united at base, 1.1 mm. long. — Gardn.! Lond. Journ. Bot. vii. 400 (1848). — BRAZIL: MINAS GERAES: Sierra de Curral del Rey, Sept. 1840, *Gardner* 4927 bis (TYPE COLL.: B. M., tracing G.). — In the original description the length of the leaves is given as "4-5½ lin.," an obvious lapsus for "4-5½ poll." This species is omitted from the *Flora Brasiliensis*.

66. *V. KUNTHIANA* Gardn. Erect, 2.3-10 dm. high, the stems solitary or few, slender, rather few-leaved, sparsely pilose below, strigose-pilose above, bearing 1-4 long-peduncled heads. Leaves linear, alternate (only the lowest pair opposite, very much reduced and almost scalelike), attenuate, sessile, entire, slightly revolute, 3-nerved, tuberculate-strigillose above, scarcely paler, strigillose, and gland-dotted beneath, 5.3-11 cm. long, 1.5-3.5 mm. wide. Peduncles axillary and terminal, strigillose, mostly 1.1-3.1 dm. long; heads 3.2-5.6 cm. wide; disk 6- (fruit)10 mm. high, 11- (fruit)15 mm. wide. Involucre 2-seriate, 7-9 mm. high, the phyllaries oblong to oblong-ovate or -lanceolate, acute, tuberculate-strigillose, herbaceous, at base slightly thickened and ribbed. Rays 16-24, oblong to oblong-lanceolate, 1.2-2.5 cm. long, 3-7 mm. wide, puberulent and gland-dotted on back; disk-corollas glandu-

lar-puberulous, 3.2 mm. long (tube 0.7 mm.). Pales acute, mucronate, strigillose on back, 5.8 mm. long. Achenes brownish-black, thickened, very minutely puberulous above, 4 mm. long, 1.9 mm. wide. Awns somewhat amplified below, 2.8 mm. long; squamellae about 8, distinct, lacerate-fimbriate, 1.2 mm. long. — Gardn.! Lond. Journ. Bot. vii. 399 (1848); Baker in Mart. Fl. Bras. vi. pt. 3. 218 (1884). *Tridens longifolius* Pohl ex Baker, l. c. 219, as syn. — BRAZIL: GOYAZ: Sierra de Natividade, Dec. 1839, Gardner 3284 (K.); dry upland campos, Mission of Duro, Oct. 1839, Gardner 3285 (TYPE COLL.: B. M., K., tracing and fragm. G.); between Meiaponte and Caisara, Burchell 6311 (K.); MINAS GERAES: 1840, Claussen (K.); Pohl 576 (K.). — The leaves are wrongly described by Gardner as opposite, and by Baker as 1-nerved.

67. *V. ASPILIOIDES* Baker. Erect herbaceous perennial, simple, 0.6–1 m. high, the stem slender, appressed-pubescent above, glabrous below, monocephalous. Leaves about 10–12 pairs, a few upper alternate, linear, long-acuminate, narrowed to the base, entire, 3-nerved, green both sides, thinly appressed-hispidulous, 8.5–13.5 cm. long, 5–7.5 mm. wide. Head long-peduncled. Involucre campanulate, 1.2 cm. wide, 2–3-seriate, the phyllaries lanceolate, acute, subequal, appressed, subfoliaceous, pilose, 8–10 mm. long. Rays 2.5 cm. long. Achenes (immature) pilose. Awns lanceolate, 2 mm. long, thrice as long as the squamellae. — Baker in Mart. Fl. Bras. vi. pt. 3. 228 (1884). — BRAZIL: MATTO GROSSO: Fazenda de Santa Anna, Sello 669 (drawing of TYPE: K.). — No specimens examined.

68. *V. angustissima*, sp. nov. Herbacea perennis erecta, foliis lineari-filiformibus valde revolutis supra dense lepidoto-strigosis subtus densissime canescenterque strigillosis 1.2–1.5 mm. latis, squamellis paene ad apicem connatis.

Erect herbaceous perennial, slightly branched above, the stem slender, striate, pale or brownish, subglabrous below, above sparsely strigose, in the inflorescence tuberculate-strigillose, sparsely leafy, 8–10 dm. high. Leaves alternate or a few lower opposite (the lowest pair very small), linear-filiform, acuminate, at apex subobtuse, callose-mucronate, entire, sessile, strongly revolute, above green, densely lepidote-strigose, beneath strigose along costa, elsewhere very densely and canescently strigillose,

1-nerved, sometimes subtending leafy branchlets, the middle ones longer, 4–10 cm. long, 1.2–1.5 mm. wide. Heads 2–3, about 2.5 cm. broad, on naked or bracteolate peduncles 2–3.5 dm. long, these striate, rather densely strigose beneath the head; disk 7–11 mm. high, 1–(fruit)1.5 cm. thick. Involucre 2-seriate, slightly graduated, 5–6 mm. high, the phyllaries densely subtuberculate-strigillose, the outer narrowly lanceolate, the inner oblong-lanceolate, longer, all narrowed to an obtuse callous-mucronate apex, herbaceous, the inner slightly indurated at base and ribbed. Rays 10, oblong, yellow, minutely puberulous on veins of back, 9 mm. long, 3 mm. broad; disk-corollas yellow, strigillose below, 3–3.8 mm. long (tube 0.3–0.6 mm. long). Pales subacute, appressed-puberulous above, 5–5.8 mm. long. Achenes black, thickened, below very sparsely at apex densely strigillose, 3.8 mm. long, 1.2 mm. broad. Awns 2, broad, paleaceous, abruptly acuminate, fimbriate, 2.2–2.9 mm. long; squamellae connate nearly to apex, fimbriate, 1.5 mm. long. — *Ichthyothere dubia* Glaziou! Bull. Soc. Bot. Fr. lvii. Mém. 3. 409 (1910), nomen, ex numero. — BRAZIL: GOYAZ: “campo, between Rajadinha and Paranauna,” Glaziou 21561 (TYPE: K., fragm. G.). — T. 3. FIG. 9.

Series B. **Revolutae**, ser. nov. Suffrutescentes vel herbae perennes, foliis alternis lanceolatis integris, capitulis majusculis vel magnis solitariis caulem et ramos terminantibus, phyllariis involucri 3–5-seriati gradati lanceolatis basi paullum induratis. — Species typica *Helianthus revolutus* Meyen (= *V. revoluta* (Meyen) Blake). — Three species of Chile and adjacent Argentina.

- a. Stem spreading-hispid; leaves tuberculate-hispid above with spreading hairs 69. *V. Gilliesii*.
- a. Stem and leaves not spreading-hispid, b.
 - b. Stem loosely spreading-pilose; leaves densely glandular-tuberculate and rather softly spreading-pilosulous; involucre 3-seriate, densely spreading-pilosulous and glandular-tuberculate 70. *V. adenotricha*.
 - b. Stem not spreading-pilose; leaves strigose, rarely spreading-hispidulous; involucre 3–5-seriate, tuberculate-strigillose or hispidulous 71. *V. revoluta*.

69. *V. GILLIESII* (H. & A.) Hieron. Herbaceous?, branched, the stem slender, tuberculate-strigillose- and -hispid with spreading hairs. Leaves often with short leafy branches in their axils, narrowly lanceolate, broadest near the base, long-acuminate, entire,

above dull green, rather sparsely tuberculate-hispid with spreading hairs, the bases persistent and conspicuous, beneath scarcely paler, tuberculate-hispidulous with spreading hairs, longer along the veins, and gland-dotted, 4.5–7 cm. long, 7–12 mm. wide, the upper gradually reduced; petioles tuberculate-hispid, 2–4 mm. long. Peduncles 1–3, solitary at apex of stem and branches, hispid-strigose and tuberculate-hispid, more or less tuberculate-strigillose, monocephalous, 10.5–24 cm. long; heads 3.5 cm. wide; disk 10–(fruit)17 mm. high, 12–(fruit)18 mm. thick. Involucre 3-seriate, 10–13 mm. high, its phyllaries densely tuberculate-hispidulous, on the margins hispidulous-ciliate, lance-attenuate to lance-oblong, erect or with somewhat loose tips, herbaceous, not obviously indurated or ribbed outside. Rays about 14, oblong to oval, 1–1.2 cm. long; disk-corollas puberulous, 7 mm. long (tube 1.6 mm.). Pales obtuse to acute, puberulous near apex, 8.5 mm. long. Achenes (very immature) appressed-pilose. Awns 2.5 mm. long; squamellae about 8, lacerate, scarcely united, 1 mm. long. — Hieron. Bol. Acad. Nac. Cienc. Cordoba iv. 39 (1882); Pl. Diaphor. Fl. Arg. 153 (1882). *Leighia Gilliesii* H. & A.! Hook. Journ. Bot. iii. 313 (1841). *Helianthus heteropappus* Gill. ex H. & A. l. c. 314, as syn. *Flourensia hispida* Phil.! Anal. Univ. Chil. xxxvi. 186 (1870). — CHILE: La Sepultura, Andes of Chile, *Gillies* 81 in part (K.). ARGENTINA: San Pedro Mendoza, *Gillies* 68 (TYPE: K., fragm. G.); Prov. Mendoza, *Gillies* 67 (B. M.), 80 (B. M., tracing G.); Iter Mendocinum, 1868–69, *Philippi* (COTYPE of *F. hispida*: Ber.); without definite locality, *E. C. Reed* (K.). — Local name “maravilla,” according to Hieronymus.

70. *V. adenotricha*, sp. nov. Herbacea? supra ramosa, caule piloso pilis patentibus laxis, foliis lanceolatis acuminatis basi cuneato-rotundatis utrinque densissime glanduloso-tuberculatis submolliterque pilosulis pilis patentibus, involucri 3-seriati gradati 1.6 cm. alti phyllariis lanceolatis acuminatis densissime patentipilosulis et glanduloso-tuberculatis herbaceis vix induratis infra obscure costatis, radiis ca. 20.

Herbaceous?, branched above, the stem whitish, striatulate, pilose with loose spreading hairs. Leaves lanceolate, acuminate, at base rounded-cuneate, entire, 3-nerved, dull green, on both sides very densely glandular-tuberculate and rather softly pilosulous with spreading hairs, subsessile, 5–6.5 cm. long, 9–16 mm. wide,

the upper smaller. Heads 5.5 cm. wide, few (about 4), solitary on terminal and axillary peduncles; disk in fruit 13 mm. high, 2.8 cm. thick. Involucre 3-seriate, graduated, 16 mm. high, the phyllaries lanceolate, acuminate, very acutely mucronate, very densely spreading-pilosulous and glandular-tuberculate, herbaceous, scarcely indurated, below obscurely costate. Rays about 20, narrowly oblong-linear, on back puberulous and gland-dotted, yellow, 3-denticulate, 18 mm. long, 3 mm. wide; disk-corollas yellow, below and on veins and teeth appressed-puberulous, 6.7 mm. long (tube 1.8 mm.). Pales subacute, puberulous at apex, narrow, about 11 mm. long. Ray-achenes sterile, trigonous, very sparsely hispidulous, the pappus of 4 unequal awns (1 or 2 of them paleaceous); disk-achenes (immature) sericeous; awns 2, slender, ciliate, 3 mm. long; squamellae about 8, narrowly oblong, lacinate, united at base, 1.5 mm. long. — CHILE: Coquimbo, 1825, *Macrae* (TYPE: K., fragm. G.). — Distributed (ex herb. Soc. Hort. Lond.) as *Flourensia corymbosa* DC.

71. *V. revoluta* (Meyen), comb. nov. Suffrutescent at base, stoutish, branched, bearing several long-peduncled heads, the stem glabrate below, sparsely strigillose above. Leaves alternate, oblong- to narrow-lanceolate, acuminate, entire or obscurely serrulate, lepidote-strigillose above, strigillose and gland-dotted below but scarcely paler, rarely spreading-hispidulous, 5–10 cm. long, 1–2.1 cm. wide; petioles unmarginated, 2–6 mm. long. Peduncles monocephalous, angulate-striate, hispidulous, 0.7–3.4 dm. long; heads 3.5–7 cm. wide; disk 1.1–1.8 cm. high, 1.7–3 cm. thick. Involucre (3–)5-seriate, 12–16 mm. high, the phyllaries lanceolate to oblong-lanceolate, acute to acuminate, callous-mucronate, densely tuberculate-strigillose and more or less hispidulous-ciliate, subherbaceous, below slightly thickened and ribbed, the tip loose or reflexed. Rays 14–28, oblong, (8–)17–22 mm. long, sometimes styliferous but sterile; disk-corollas puberulous below, 7.5 mm. long (tube 1.5–2.2 mm.). Pales usually acute to acuminate, 8–11 mm. long. Achenes sparsely sericeous, 5 mm. long. Awns 4.5–4.8 mm. long; squamellae 6–10, narrowly oblong or lanceolate, lacerate, free or united at base, 1.5–2 mm. long. — *Helianthus lanceolatus* Meyen! Reise i. 311 (1834). (Not *V. lanceolata* Britton (1892).) *H. revolutus* Meyen! l. c. (1834). *Flourensia corymbosa* DC.! Prod. v. 592 (1836); H. & A. Hook. Journ. Bot. iii. 315 (1841); Remy in C.

Gay, Fl. Chil. iv. 290 (1849); Reiche, Fl. Chil. iv. 93 (1905). *Helianthus corymbosus* Poepp.! ex DC. l. c., as syn. (1836). *H. Cumingii* H. & A.! Hook. Journ. Bot. iii. 315 (1841), as syn. *Viguiera Poeppigii* Gray! Proc. Am. Acad. xix. 6 (1883). *Helianthus araucanus* Phil. Anal. Univ. Chil. xc. 39 (1895), fide Reiche, l. c. *Flourensia corymbosa* var. *lanceolata* (Meyen) Reiche, l. c. 93 (1905); var. *araucana* (Phil.) Reiche, l. c. 94 (1905). *Viguiera corymbosa* (DC.) Blake, Proc. Am. Acad. xlix. 349, footnote (1913). — CHILE: Cordillera de Santiago, *R. A. Philippi* (drawing, G.); Rio Claro Inferior, Feb. 1896, *F. Philippi* (B. M.); Colchagua, *Bridges* (K.); Talcareque, 1870, *E. C. Reed* (K.); Valle de Yeso, *E. C. Reed* (K.); Cordillères de Maule, 1855, *Germain* (B. M., G., K.); Maule Province, 1831, *Cuming* 849 (TYPE of *H. Cumingii*: K.); Baños de Cauquenes, Dec. 1901, *Elwes* (K.); Cordillera de Linares, *Philippi* (Ber.); stony fields near Antuco, Jan., *Poeppig* III. 222 (TYPE COLL. of *F. corymbosa*: Ber., Prod.); without definite locality, *Meyen* (TYPES of *H. lanceolatus* and *H. revolutus*: Ber.), *C. Gay* (G., K.), *Bridges* 1165 (K.), Oct. 1871, *E. C. Reed* 15 (G.). ARGENTINA: Mendoza, *Gillies* 72 (B. M.), 81 in part (B. M.). — Local name “yerba buena”; also, according to Reiche, “boton de oro del monte.” — T. 2. FIG. 15.

Series C. **Grandiflorae**, ser. nov. Herbae perennes, capitulis solitariis vel paucis magnis vel majusculis saepissime longe pedunculatis ramos et caulem terminantibus, involucri 2–4-seriati subaequalis phyllariis lanceolatis vel oblongo-lanceolatis parum induratis, foliis paucis saepe ovalibus vel oblongis inferioribus oppositis minoribus infimis valde reductis superioribus magnis alternis. — Species typica *V. grandiflora* Gardn. — Herbaceous perennials of Brazil and Paraguay, with two outlying species in Peru; heads medium or large, long-peduncled; lower leaves opposite, the lowest reduced and often scalelike, subremote, thickened and strongly venose, 5–7-nerved, the middle and upper thinner, much larger, and alternate. Species 72–82.

- a. Leaves densely canescent-pubescent beneath, b.
 b. Leaves broadly rounded at apex 79. *V. obtusifolia*.
 b. Leaves acutish at apex 80. *V. discolor*.
 a. Leaves green beneath, c.
 c. Leaves lepidote above in age; plants of Peru, d.
 d. Pales glabrous 72. *V. peruviana*.
 d. Pales ciliate on keel, glandular-tuberculate above.
 73. *V. Weberbaueri*.

- c. Leaves not lepidote above; plants of Brazil and Paraguay, e.
 - e. Involucre 9–12 mm. high; disk-corollas 4–4.5 mm. long, f.
 - f. Involucre 3–4-seriate 81. *V. Bakeriana*.
 - f. Involucre 2-seriate, g.
 - g. Middle leaves 1.6–2.6 cm. broad 82. *V. subdentata*.
 - g. Middle leaves 3–4.5 cm. broad, h.
 - h. Stem glabrate below, tuberculate-strigillose above; lower leaves tuberculate-hispidulous; phyllaries tuberculate-hispid and ciliate 74. *V. squalida*.
 - h. Stem sparsely hispid; lower leaves hispid; phyllaries tuberculate on margin and midline 75. *V. Weddellii*.
 - e. Involucre 1.5–2.3 cm. high; disk-corollas 5.5–6.3 mm. long, i.
 - i. Phyllaries tuberculate-strigillose, more or less hispidulous-ciliate; leaves strigose-pilose both sides; stem loosely pilose with slightly stiff spreading or retrorse hairs, more or less strigillose; squamellae free, 0.6 mm. long; Brazilian 76. *V. grandiflora*.
 - i. Phyllaries densely and minutely tuberculate, scarcely ciliate; leaves tuberculate-hispidulous, tuberculate-hispid along veins beneath; squamellae united to apex, 1.6 mm. long; Paraguayan 77. *V. simulans*.
 - i. Phyllaries puberulous on back, densely pilose-ciliate on sides; leaves above puberulous and pilose, beneath loosely pilose along veins; stem glabrescent or sparsely pubescent; Brazilian 78. *V. macropoda*.

72. *V. PERUVIANA* Gray. Herbaceous (only upper portion seen), branched, the stem tuberculate-hispid-pilose with spreading hairs, in age dull fuscous and glabrate except for the persistent bases of the hairs. Leaves alternate, subremote, oval, acutish at each end or obtusish at the mucronulate apex, crenate-serrate with 5–8 pairs of rather depressed submucronulate teeth, 3-nerved, slightly veined beneath, above dark green, tuberculate-strigillose, in age lepidote and somewhat scabrous, beneath slightly paler green, rather sparsely hispidulous with subappressed hairs chiefly along the veins, the upper 3–5 cm. long, 1.5–2.5 cm. wide, on petioles about 1.5 mm. long. Heads terminating stem and branches, about 8 cm. wide, solitary on short or rather long naked peduncles densely spreading-hispid-pilose with tuberculate-based hairs; disk 1.3 cm. high, 2 cm. thick. Involucre 3-seriate, scarcely graduated, 1.3–1.5 cm. high, the phyllaries oblong-lanceolate, acute or acuminate, herbaceous with only slightly indurated base, blackish-

green, loosely spreading, hispid-ciliate with tuberculate-based hairs, otherwise subglabrous or sparsely tuberculate-strigillose toward apex and on inside, about 3.5 mm. wide above the slightly narrowed base. Rays 12-14, elongated-oblong, hispidulous along nerves of back, 3 cm. long, 7 mm. wide; disk-corollas appressed-hispidulous, 6 mm. long (tube 1.3 mm.). Pales obtusish, glabrous, dark at apex, 7.5 mm. long. Achenes blackish, rather compressed, sparsely appressed-pilose, 3.5 mm. long. Awns 2, slender, strigillose, 2.8 mm. long; squamellae a pair at base of each awn, finely fimbriate, 0.6 mm. long. — Gray! Proc. Am. Acad. v. 124 (1861-62); l. c. xix. 6 (1883). — PERU: in the Andes, between Culluay and Obrajillo, *U. S. Exploring Expedition under Wilkes* in part (TYPES: G., U. S. no. 48974 in part). — The sheet in the National Herbarium bears a specimen of this species and one of *V. Pflanzii*; the sheet in the Gray Herbarium bears the present species only. Gray's description included both species, but I have been led to restrict the name to the present plant because the character "ligulis elongatis," which could refer only to this species, is almost the only feature of the original description which does not apply equally well to either of the two plants included under it. Moreover, the material in the Gray Herbarium is of this species only, and at a later date Gray (Proc. Am. Acad. xix. 6) referred to *V. peruviana* as apparently only "a glabrate state of *Helianthus aureus*, HBK., the *Harpalium aureum*, DC.," which he could have done only if the material in the Gray Herbarium (*i. e.*, the present plant) typified the species to his mind.

73. *V. WEBERBAUERI* Blake. Erect leafy herb, the stem stout, striatulate, pilose-hirsute and more or less glandular especially above, sparsely branched above the middle, 1-3-headed. Lower leaves opposite, broadly oval, acute, subsessile, rounded at base, acutely or obtusely serrulate with depressed cuspidate teeth, above the base 3-nerved, hirsutulous-scabrous, the hairs of the upper surface with tuberculate-lepidote bases, 9-11 cm. long, 4-7.2 cm. wide; the upper alternate, oblong or oblong-lanceolate, smaller. Peduncles hispid-pilose and glandular, naked or 1-bracted, 1.2-1.6 dm. long; heads 8-9 cm. broad; disk 1.5 cm. high, 2.5-2.7 cm. thick. Involucre 3-seriate, 1.6-2 cm. high, slightly graduated, the phyllaries linear-lanceolate, acuminate, tuberculate-hispidulous, loose, about 2.5 mm. broad. Rays about 30, yellow, narrowly

oblong, 3-3.5 cm. long, 6 mm. broad, very sparsely puberulous on tube and back; disk-corollas yellow, puberulous below, 5.8 mm. long (tube 2.1 mm. long, gradually widened into the narrow throat). Pales narrow, subacute, colorate on back, ciliate on keel, at apex glandular-tuberculate and puberulous, 7.5 mm. long. Achenes (very immature) sparsely silky, 3.5 mm. long. Awns 2, slightly flattened, fimbriate-ciliate, 1.1-2.2 mm. long; squamellae 4-6, short, free, lacerate-fimbriate. — Blake! Bot. Jahrb. liv. Beibl. No. 119. 49 (1916). — PERU: in the Loma formation, forming almost pure colonies, 300-600 m., Tambo, near Mollendo, 11 Oct. 1902, *Weberbauer* 1571 (TYPE: Ber., photog. and fragm. G.). — Local name "suncho." Type locality wrongly given as near "Nollendo" in the original description. — T. 2. FIG. 16.

74. *V. SQUALIDA* S. MOORE. Stout, leafy, about 1 m. high, sparsely branched above, from a short thick woody root, the stem glabrate below, tuberculate-strigillose and glandular-granulose above, bearing 1-3 long-peduncled heads. Leaves opposite below (about 7 pairs), alternate above, the 3 lowest pairs much reduced, remote, oval, somewhat thickish, rounded at apex, mucronate, sessile, at base subcordate-rounded, scarcely clasping, 5-7-nerved, reticulate-veiny, pale green both sides, lucid above, entire, scabrously tuberculate-hispidulous, 2.5-5 cm. long, 1.6-2.7 cm. wide; the middle and upper similar but thinner and larger, oblong-oval, remotely and obscurely serrulate, acutish, sessile, 7.5-10 cm. long, 3.6-4.5 cm. wide; the uppermost oblong-ovate, sometimes hispid. Peduncles strigillose and granulose, hispid below the head, 18-24 cm. long; head 6.5 cm. wide; disk 1 cm. high, 1.8 cm. thick. Involucre 2-seriate, 11-12 mm. high, lanceolate, acuminate, tuberculate-hispid and -ciliolate, indurated and vittate below, with a longer herbaceous mucronate apex. Rays 13, linear-oblong, 2.5 cm. long, 4.5-5 mm. wide; disk-corollas hispidulous on throat and teeth, 4.5 mm. long (tube 1 mm.). Pales obtuse to subacute, puberulous above, 7.5-8 mm. long. Achenes (immature) sparsely pubescent, 4.5 mm. long. Awns lanceolate, subpaleaceous, 2.5 mm. long; squamellae 4-6, lacerate, united at base, 0.8 mm. long. — S. Moore! Journ. Bot. xlii. 37 (1904). — BRAZIL: MATTO GROSSO: Santa Anna da Chapada, 20 Oct. 1902, *A. Robert* 640 (TYPE COLL.: B. M., K., tracing and fragm. G.).

75. *V. Weddellii* Sch. Bip. in herb. Mus. Par., sp. nov. Her-
bacea perennis sparse foliata, caule sparse hispido simplice vel
subsimpliice 1-5 capitato, foliis inferioribus oppositis reductis ovali-
ovatis integris 5-nerviis supra lucidis subtus reticulato-venosis
utrinque hispidis, mediis ovatis subserratis multo majoribus, invo-
luceri 2-seriati 1 cm. alti phyllariis anguste lanceolatis acutis mar-
gine et in medio dorso tuberculatis, radiis ca. 8, corollis disci 4.5 mm.
longis, acheniis fere glabris.

Perennial herb, 7-8 dm. high, the stem sparsely hispid, simple
or sparsely branched above, bearing 1-5 heads. Leaves few,
subremote, the lower opposite, reduced, oval-ovate, entire, 5-
nerved, mucronate, sessile, rounded at base, above lucid, beneath
reticulate-venose, everywhere hispid, 6.5 cm. long, 3.5 cm. wide;
the middle ones ovate, subserrate, 8-11 cm. long, 3-4.5 cm. wide.
Peduncles 7-19 cm. long; disk 1 cm. high, 1.2 cm. thick. Involucre
2-seriate, equalling the disk, the phyllaries narrowly lanceolate,
acute, tuberculate on margin and down the middle of the back.
Rays about 8, yellow, narrowly oblong, 1.8 cm. long, 3 mm. wide;
disk-corollas yellow, sparsely puberulous especially on teeth, 4.5
mm. long. Pales tuberculate-puberulous on back and apex, 6 mm.
long. Achenes black, nearly glabrous. Awns 2, paleiform, 2.5 mm.
long; squamellae 6, about half as long. — BRAZIL: between
Goyaz and Cujaba, Nov.-Dec. 1844, *Weddell* 2911 (TYPE: Par.).

76. *V. GRANDIFLORA* Gardn. Plant 5-7 dm. high, the stem
loosely pilose with slightly stiff spreading or retrorse hairs and
somewhat glandular, bearing 1-4 long-peduncled heads. Leaves
alternate, the middle and upper usually oblong or oblong-ovate or
-obovate, rarely orbiculate-oval or oval-oblong, acute to obtuse at
apex, from cuneate to rounded and slightly amplexicaul at the ses-
sile or subsessile base, subentire or usually irregularly dentate with
acute or rounded teeth above the middle or for nearly their whole
length, 3(-5)-nerved, equally green and strigose-pilose both sides,
beneath sometimes slightly gland-dotted, 5-12.5 cm. long, 2.2-8
cm. wide, the lowest 4-7 leaves abruptly reduced, oval or oblong to
lanceolate, thickened, venose, the lowest almost scalelike. Heads
7-10 cm. wide, on sordidly hispid-pilose naked peduncles 7-30 cm.
long; disk 1.5-(fruit)2.2 cm. high, 1.8-(fruit)2.8 cm. wide. In-
volucre 2-3-seriate, subequal or slightly graduated, 1.5-2 cm. high,
the phyllaries lanceolate to lance-oblong, linear-attenuate, her-

baccous, below slightly indurate-ribbed, tuberculate-strigillose, more or less hispidulous-ciliolate, the outer 1.8–2.8 mm. broad. Rays about 16, narrow-oblong, sometimes styliiferous but sterile, 2.2–4.2 cm. long, 5.5–10 mm. wide; disk-corollas somewhat puberulous below, 5.5 mm. long (tube 1.2–1.5 mm.). Pales acuminate, tuberculate, 9–13.5 mm. long. Achenes thickened and angular, subglabrous or sparsely puberulous above, 5–7.5 mm. long, 1.8 mm. wide. Awns somewhat paleaceous, 1.5 mm. long; squamellae about 10, distinct, unequal, lacerate-fimbriate, 0.6 mm. long. — This somewhat variable plant may be divided into two forms on the basis of leaf-characters.

Forma **typica**: foliis oblongis vel ovalibus 2–5 cm. latis. — *Leighia grandiflora* Gardn.! in Field. & Gardn. Sert. Pl. t. 54–55 (1844). *Viguiera grandiflora* Gardn. Lond. Journ. Bot. vii. 404 (1848); Baker in Mart. Fl. Bras. vi. pt. 3. 224 (1884). — BRAZIL: GOYAZ: dry wooded campos, Mission of Duro, Oct. 1839, *Gardner* 3288 p. p. (TYPE COLL.: B. M., K., fragm. G.); campos, Arrayas, April 1840, *Gardner* 3858 (B. M., K.). Brazil without definite locality: between Rio Bagagem and Rio da Serra, *Burchell* 7714 (K.); between Bau and Campo Aberto, *Burchell* 6083 (K.); between Capo Alegre and Uru, *Burchell* 6418 (K.). — T. 3. FIG. 10.

Forma **latifolia** (Baker), comb. nov.: foliis orbiculari-ovalibus abruptissime acutis 8.5–12.5 cm. longis 6–8 cm. latis. — *Viguiera grandiflora* Gardn. var. *latifolia* Baker! in Mart. Fl. Bras. vi. pt. 3. 224 (1884). *V. macrantha* Glaziou! Bull. Soc. Bot. Fr. lvii. Mém. 3. 413 (1910), nomen, ex num. — BRAZIL: GOYAZ: dry wooded campos, near Mission of Duro, Oct. 1839, *Gardner* 3288 (bis) (TYPE: K.); without definite locality, *Glaziou* 21556 (K.: TYPE COLL. of *V. macrantha*).

77. *V. simulans*, sp. nov. Planta alta simplex monocephala, caule valido tuberculato-hispidulo, foliis (infimis invis) magnis alternis ovatis vel ovali-ovatis tuberculato-hispidulis et glanduloso-adspersis venas secundum sparse tuberculato-hispidis crenato-serratis, involucri 3-seriati 2.3 cm. alti phyllariis oblongo-lanceolatis acuminatis dense et minute tuberculatis, radiis ca. 24, corollis disci 6.3 mm. longis, aristis pappi 2 paleaceis, squamellis 1.6 mm. longis in utroque latere achenii ad apicem connatis.

“Suffruticose [?], 1–1.5 m. high,” the stem erect, whitish, striate, tuberculate-hispidulous. Leaves (the lowest not seen)

alternate, ovate or oval-ovate, sessile, acute, at base broadly rounded, crenate-serrate (teeth about 13 pairs, deltoid, depressed, scarcely mucronate), green both sides, 5-nerved, tuberculate-hispidulous with incurved hairs and gland-dotted, along veins sparsely tuberculate-hispid, the lower 6.5–10 cm. long, 2.2–5 cm. wide, the uppermost smaller. Peduncle 2.1 dm. long, densely tuberculate-glandular-hispidulous below the head and sparsely hispid; head 8.2 cm. wide; disk 1.8 cm. high, 3.5 cm. wide. Involucre 3-seriate, slightly graduated, 2.3 cm. high, the phyllaries oblong-lanceolate, acuminate, appressed, herbaceous, at base slightly costate, 3–5-nerved, densely and minutely tuberculate. Rays about 24, yellow, oblong, bidenticulate, glandular on back, 3.3 cm. long, 5.5–7 mm. wide; disk-corollas yellow, glandular-tuberculate, 6.3 mm. long (tube 1.3 mm.). Pales narrow, acuminate, subdensely tuberculate, striate-lineate, 1–1.2 cm. long. Achenes (immature) oblong, appressed-pilose, 8 mm. long. Awns 2, paleaceous, lanceolate, acuminate, serrate, unequal, 2–2.8 mm. long; squamellae 1.6 mm. long, denticulate-fimbriate, united to apex on each side of achene, but free from the awns. — *V. grandiflora* Chod.! Bull. Herb. Boiss. ser. 2. ii. 392 (1902), not Gardn. (err. iden.). — PARAGUAY: Campo Apépu, near the River Tapiraguay, Sierra de Maracayú, Aug. 1898–99, Hassler 4367 (TYPE COLL.: B. M., G., K.). — T. 3. FIG. 11.

78. *V. macropoda*, sp. nov. Herbacea simplex vel parce ramosa monocephala, caule glabriusculo vel sparse pubescente, foliis paucis remotis inferioribus oppositis late ovatis saepe reductis integris vel subdentatis supra crispe pilosis et puberulis subtus in margine et ad venas laxe pilosis, superioribus alternis oblongo-ovatis vel lanceolatis, involucri 3-seriati 1.5 cm. lati phyllariis oblongo-lanceolatis dorso puberulis margine dense piloso-ciliatis, radiis ca. 20, corollis disci 5.5 mm. longis.

Plant probably about 0.6–1 m. high, the stem subglabrous or sparsely pubescent. Leaves few and remote, the lower opposite, often reduced, broadly ovate, 3–5-nerved, acute, sessile, with broad subamplexicaul base, entire or subdentate, above puberulous and crisply pilose, beneath on margin and along veins loosely pilose, 4–8 cm. long, 2–3.2 cm. wide; the upper often alternate, oblong-ovate or lanceolate. Peduncle more or less pubescent, 1.7–3.3 dm. long; disk 1.5–2 cm. high, 2.5–3.5 cm. thick. In-

volucre 3-seriate, 1.5 cm. high, the phyllaries equal, oblong-lanceolate, acute or acuminate, slightly thickened and ribbed at base, above herbaceous, appressed, puberulous on back, on the margin densely pilose-ciliate. Rays about 20, yellow, oblong, 2.5–3 cm. long, 6 mm. broad; disk-corollas yellow, slightly pilose at apex, 5.5 mm. long. Pales acute, pilose. Achenes (immature) pubescent. Awns (sometimes solitary ?) twice as long as the lanceolate fimbriate squamellae. — BRAZIL: MINAS GERAES: without definite locality, 1816–21, *A. St. Hilaire* 1157 (TYPE: Par.), 1159 (Par.).

79. *V. OBTUSIFOLIA* Baker. Plant 6.5 dm. high, simple, bearing 2–3 long-peduncled heads, the stem pale or purplish-brown, sparsely pilose with long jointed slightly harsh hairs and somewhat tuberculate-hispidulous and glandular. Leaves opposite below (about 7 pairs), alternate above (about 6–8), the middle and upper oval or orbicular-oval, broadly rounded at both ends, 3–5-nerved, subsessile, somewhat reticulate beneath, slightly coriaceous (the lower strongly so), above green, sparsely strigillose or subglabrate, beneath softly and densely canescent-pilosulous, glandular-dotted, 5–7 cm. long, 3–4 cm. wide, the 3–4 lower pairs very much reduced, the 2 lowermost almost scalelike. Heads 3.5–4.5 cm. wide, on somewhat hispid-pilose peduncles 13.5–19 cm. long; disk 9–12 mm. high, 13–16 mm. thick, the receptacle strongly convex. Involucre 3-seriate, graduated, 7.5–11 mm. high, the phyllaries lanceolate, obtusish, dull-pilose, herbaceous, slightly ribbed below. Rays 14, narrow-oblong, 1.8–2.2 cm. long; disk-corollas pilose below and on nerves and teeth, 3.5–3.8 mm. long (tube 0.5–0.7 mm.). Pales mucronate, somewhat cucullate, hispidulous above, 6.5–7 mm. long. Achenes very sparsely short-hairy near apex or subglabrate, striate, 4.5 mm. long, 1.8 mm. wide. Awns subpaleaceous, 2.8 mm. long; squamellae 6–8, free or united below, lacerate-fimbriate, 0.7–1 mm. long. — Baker! in *Mart. Fl. Bras. vi. pt. 3. 226* (1884). — BRAZIL: without locality, *Pohl* 581 (TYPE: K., fragm. G.).

80. *V. DISCOLOR* Baker. Erect perennial, 0.6–1 m. high, the stem pilose, branched above. Leaves few, remote, about 5 pairs, the upper alternate, ovate to oval, acutish, rounded or subcordate at the subsessile base, 3-nerved, above green, shortly pilose, beneath persistently white-tomentose, 5–7.5 cm. long, 4–5 cm. wide.

Heads 5–6, terminal and from the upper axils, about 6 cm. wide, on peduncles 1.5–3 dm. long. Involucre campanulate, 1.8–2 cm. wide, 2–3-seriate, the phyllaries slightly graduated, lanceolate, acute, appressed, densely pilose, 8 mm. long. Rays about 10, oval-oblong, pilose on back, about 2.5 cm. long, 8 mm. wide. Achenes glabrous except for the ciliate margins, compressed, 4–5 mm. long. Awns 2, acuminate, 2 mm. long; squamellae about 4 pairs, united at base, about 1 mm. long. — Baker in Mart. Fl. Bras. vi. pt. 3. 228. t. 68 (1884). — BRAZIL: MINAS GERAES: fields near Caldas, Sept. 1864, *Regnell* III. 771 in part (TYPE COLL.: tracing, G. [ex hb. Stockholm]); Uberava, Sept. 1848, *Regnell* III. 771 in part (TYPE COLL.: tracing, G. [ex hb. Stockholm]). — Not seen; description compiled from Baker, with the assistance of some tracings kindly sent by Dr. C. A. Lindman from the originals in the Royal Herbarium at Stockholm.

81. *V. Bakeriana*, sp. nov. Perennis erecta pluricaulis, caulibus simplicibus vel ramosis tuberculato-hispido-pilosis interdum solum strigosis, foliis paucis subremotis infimis oppositis valde reductis mediis oppositis vel alternis superioribus alternis oblongis ad lanceolato-oblongis saepe serratis valde reticulato-venulosis strigillosis vel strigosis rare pilosis, capitulis paucis 3–5.5 cm. latis, involucri 3–sub-4-seriati 9–11 mm. alti phyllariis dense tuberculato-strigillosis, radiis ca. 14, corollis disci 4.5 mm. longis.

Plant 4–6 dm. high, from a thick woody root; stems several, simple below the inflorescence or branched even from the base, striate, generally rather densely tuberculate-hispid-pilose with mostly spreading hairs, occasionally merely strigose. Leaves few, subremote, the 2–4 lowest pairs very much reduced, the middle opposite or alternate, the upper alternate, oblong to ovate- or lance-oblong or oblong-oval, acute to acuminate, rarely obtusish, at base rounded or rounded-cuneate, subsessile or barely petioled, subentire or generally crenate-serrate or sharply serrate (mostly above the middle), about equally green both sides, above strongly reticulate-venulose, from harshly strigillose to strigose or rarely rather softly pilose, beneath venulose-reticulate, 3(–5)-nerved, rather softly hispid-pilose, the hairs longer along the veins, and more or less gland-dotted, 5–8.5 cm. long, 1.5–3.2 cm. wide; petioles tuberculate-hispid-pilose, 1 mm. long or less. Heads 1–4, terminal and axillary, 3–5.5 cm. wide, on naked or bracteate

monocephalous peduncles 6–35 cm. long, densely strigose below the heads; disk 7–10 mm. high, 1.2–1.8 cm. thick. Involucre 3(–4)-seriate, slightly or inconspicuously graduated, 9–11 mm. high, the phyllaries lanceolate to lance-oblong, acutish to acuminate, callous-mucronate, densely tuberculate-strigillose and tuberculate-hispid-ciliate, herbaceous, not or only slightly indurated and ribbed at extreme base, appressed or slightly loose. Rays about 14, yellow, oblong, sparsely pubescent on back, 1.4–2.2 cm. long, 4–6 mm. wide; disk-corollas yellow, hirtellous chiefly below, 4.5 mm. long (tube 0.5 mm.). Pales acutish to subacuminate, more or less strigillose above, often purplish-tinged in age, 7 mm. long. Achenes black, thickened, striate, strigillose at apex, 4.2 mm. long. Awns unequal, broadened and spinulose-ciliate below, 2.5 mm. long; squamellae about 8, lacerate-fimbriate, united to above the middle, 1.7 mm. long. — *V. dissitifolia* Baker! in Mart. Fl. Bras. vi. pt. 3. 225. t. 66. f. 2 (1884); not *Leighia dissitifolia* DC. Prod. v. 581 (1836). — BRAZIL: MINAS GERAES: 1840, *Claussen* (K.); vicinity of Rio Janeiro and Ouro Preto, 1883–84, *Glaziou* 15077 (TYPE: K., fragm. G.); l. c., *Glaziou* 12806 (K.), 14006 (K.). Brazil without definite locality: *Sello* 998 (K.); *Herb. Imp. Brés.* 575 (K.), 577 (K.). — As the type of *Leighia dissitifolia* DC. (*Herb. Imp. Brés.* 881) proves to be identical with *Viguiera anchusaefolia*, the present very distinct plant is left without a name, which it is a pleasure to supply by dedicating the species to Mr. J. G. Baker, F. R. S., whose treatment of the *Compositae* of Brazil in the *Flora Brasiliensis* is of the greatest value to all workers on the flora of that region. — T. 2. FIG. 17.

82. *V. subdentata*, sp. nov. Perennis herbacea simplex vel parce ramosa, caule glandulari-strigoso vel piloso 1–3-capitato, foliis infimis oppositis ceteris alternis oblongis vel oblongo-ovalibus integris vel dentatis 3-nerviis supra lucidis utrinque tuberculato-hispidulis venosis 1.6–2.6 cm. latis, involucri 2-seriati discum subaequantis phyllariis lanceolatis dense tuberculato-strigillosis, radiis 12–16, corollis disci 4 mm. longis.

Herbaceous perennial, simple or sparsely branched, 2.5–6 dm. high, the stem glandular-strigose or pilose, 1–3-capitate, from a woody root. Lowest leaves opposite, the others alternate, oblong or oblong-oval, entire or dentate, acute, at base rounded, subsessile, 3-nerved, veiny, above lucid, tuberculate-hispidulous both

sides, 5.5–9 cm. long, 1.6–2.6 cm. wide. Peduncles strigillose below, densely hispidulous above, 5.5–29 cm. long; disk 8–10 mm. high, 1.3–1.6 cm. thick. Involucre 2-seriate, equalling or slightly exceeding the disk, its phyllaries lanceolate, acute, densely tuberculate-strigillose. Rays yellow, 12–16, oblong, 1.1–2.2 cm. long, 3–4.5 mm. wide; disk-corollas yellow, strigillose, 4 mm. long. Pales acute, puberulous on back, 8 mm. long. Achenes sparsely pubescent. Awns paleaceous (sometimes solitary?); squamellae about 4, irregular, about half as long as the awns. — BRAZIL: MINAS GERAES: 1816–21, *A. St. Hilaire* 1160 (TYPE: Par., photog. G.); 1838, *Claussen* (Par.); 1844, *Weddell* (Par.); SANTA CATHERINA: 1816–21, *A. St. Hilaire* 1136 (Par.). — Confused in the Paris Herbarium with *V. oblongifolia* Gardn., which it resembles in foliage but not in involucre.

Series D. **Aureae**, ser. nov. Herbae perennes vel rarissime annuae vel suffrutices rare frutices, foliis saepe ovatis vel lanceolatis rare linearibus, involucri (2–)3–5-seriati phyllariis basi plus minusve induratis apice herbaceo saepissime e basi non abrupte distincto. — Species typica *V. aurea* (HBK.) Hieron. — A large and variable group, chiefly to be distinguished from the other series of *Paradosa* by negative characters. It has not the habit or involucre of the *Tenuifoliae*, although both *V. anchusaefolia* and *V. hispida* somewhat approach that group, nor the habit or heads of the *Revolutae*, nor the foliage or quite the involucre of the *Grandiflorae*. Through *V. tucumanensis*, *V. atacamensis*, and *V. breviflosculosa* it grades into the *Bracteatae*, which as a group are ordinarily easily recognized by their more prominently indurated phyllaries. The species range from Ecuador to Argentina, Uruguay, and Brazil, each region having its own more or less distinct groups of species. Two very unequal subseries based on duration may be distinguished. Species 83–113.

- a. Perennial herbs or shrubs Subser. *a. Euaureae*.
 a. Annuals Subser. *β. Pusillae*, p. 159.

Subseries *a. Euaureae*, subser. nov. Perennes herbaceae vel suffrutescentes rare frutices. — Species typica *V. aurea* (HBK.) Hieron. — Species 83–111.

KEY TO EUAUREAE

- a. Leaves linear or linear-lanceolate, 9 mm. wide or less, *b*.
 - b. Heads discoid109. *V. discoidea*.
 - b. Heads radiate, *c*.
 - c. Phyllaries very strongly indurated, with short narrow herbaceous tip; Chile110. *V. atacamensis*.
 - c. Phyllaries less indurated, the herbaceous tip usually exceeding the indurated base, *d*.
 - d. Leaves lepidote above; Uruguay and adjacent regions108. *V. anchusaefolia*.
 - d. Leaves not lepidote above; northern Argentina and Brazil, *e*.
 - e. Involucre 4-5-seriate; leaves neither densely nor harshly strigillose, 1-nerved 106. *V. tucumanensis*.
 - e. Involucre 2-3-seriate; leaves densely and harshly tuberculate-strigillose and hispid, strongly 3-nerved107. *V. hispida*.
- a. Leaves lanceolate to ovate or oval, *f*.
 - f. Leaves densely canescent-tomentose beneath, *g*.
 - g. Involucre 1.6 cm. high, tomentose-pilose; Ecuador.... 89. *V. Sodiroi*.
 - g. Involucre 1-1.2 cm. high, canescent-tomentulose; Argentina 90. *V. mollis*.
 - f. Leaves not densely canescent-tomentose beneath, *h*.
 - h. Leaves narrowly lanceolate, four times as long as wide or more, *i*.
 - i. Phyllaries not distinctly ciliate with spreading hairs, *j*.
 - j. Leaves subcanescent beneath 98. *V. acutifolia*.
 - j. Leaves green beneath, *k*.
 - k. Squamellae 1.5-2.8 mm. long; Uruguay and adjacent regions108. *V. anchusaefolia*.
 - k. Squamellae 0.3-0.6 mm. long; Bolivia, *l*.
 - l. Stems decumbent; heads 1-2..... 95. *V. fusiformis*.
 - l. Stems erect; heads several to many, cymose-panicked, *m*.
 - m. Stem rather densely strigose-pilose.... 97. *V. retroflexa*.
 - m. Stem very smooth below the inflorescence. 99. *V. australis*.
 - i. Phyllaries distinctly ciliate with more or less spreading hairs, *n*.
 - n. Leaves rather pale and rather densely hispidulous or pilose beneath, *o*.
 - o. Phyllaries with oblong or oblong-obovate body and rather abruptly narrowed herbaceous tip; Bolivia and Peru..... 91. *V. lanceolata*.
 - o. Phyllaries gradually acute or acuminate; Brazil and Paraguay, *p*.
 - p. Squamellae 1.2 mm. long103. *V. Malmei*.
 - p. Squamellae minute, 0.5 mm. long, *q*.
 - q. Leaves lepidote above in age; phyllaries densely tuberculate-hispid-strigillose all over back 101. *V. pilosa*.
 - q. Leaves not lepidote above; phyllaries glabrous or glabrate below except on costa and margin 104. *V. villaricensis*.
 - n. Leaves green and sparsely pubescent beneath, *r*.
 - r. Involucre 4-seriate, *s*.

- s. Leaves 6.5-10 mm. wide; achene rather sparsely pilose96. *V. oligodonta*.
- s. Leaves 1.7-3.1 cm. wide; achene densely silky105. *V. Hilairei*.
- r. Involucre 2-3-seriate, *t*.
- t. Leaves shortly cuneate or rounded-cuneate at base; Bolivia and Chile92. *V. pazensis*.
- t. Leaves acuminate at base; Brazil, *u*.
- u. Stem densely strigillose; leaves strigillose. 105. *V. Hilairei*.
- u. Stem not densely strigillose; leaves lepidote above, *v*.
- v. Phyllaries strigose and hispid-ciliate; disk-corollas 5.2 mm. long, puberulous; awns 1.2 mm. long.100. *V. nudibasilaris*.
- v. Phyllaries densely hispidulous; disk-corollas 4 mm. long, glabrous; awns 0.6 mm. long102. *V. tuberculata*.
- h. Leaves lanceolate to ovate or ovate-oval, less than four times as long as wide, *w*.
- w. Leaves green and sparsely pubescent beneath, *x*.
- x. Leaves sessile, cordate and amplexicaul at base. 111. *V. breviflosculosa*.
- x. Leaves narrowed at base, not clasping, *y*.
- y. Stems decumbent; phyllaries strigillose, not distinctly ciliate; heads 1-2.95. *V. fusiformis*.
- y. Stems erect, rarely decumbent; phyllaries hispid-pilose-ciliate and more or less hispid-pilose, *z*.
- z. Leaves strongly venose and venulose beneath, *aa*.
- aa. Phyllaries lanceolate to oblong; involucre 7-10 mm. high92. *V. pazensis*.
- aa. Phyllaries linear-lanceolate; involucre 14-17 mm. high94. *V. Szyzylowiczii*.
- z. Leaves not strongly venose and venulose beneath, *bb*.
- bb. Involucre 12-13 mm. high; leaves ovate, entire86. *V. Lehmannii*.
- bb. Involucre 6-10 (12) mm. high; leaves when ovate usually distinctly serrate, *cc*.
- cc. Leaves oblong or lance-oblong, entire. 84. *V. truxillensis*.
- cc. Leaves lance-ovate to ovate or oblong-lanceolate, almost always toothed, *dd*.
- dd. Leaves larger (7.5-11 cm. long, 2.5-4 cm. wide), lanceolate or lance-ovate, acuminate, with rather prominent venation beneath92. *V. pazensis*.
- dd. Leaves smaller (3.3-6.5 cm. long, 1.7-3.2 cm. wide), ovate, merely acute, scarcely veiny beneath93. *V. Pflanzii*.
- w. Leaves distinctly paler and usually rather densely pubescent beneath, *ee*.
- ee. Leaves sessile, cordate and amplexicaul at base. 111. *V. breviflosculosa*.

- ee. Leaves narrowed to base, not clasping, ff.
 ff. Leaves lanceolate or ovate-lanceolate, long-acuminate 91. *V. lanceolata*.
 ff. Leaves oblong or oblong-ovate or lanceolate, merely acute, gg.
 gg. Involucre 8-9 mm. high, 3-4-seriate; phyllaries lanceolate; Peru 84. *V. truxillensis*.
 gg. Involucre 12-16 mm. high, 4-5-seriate; phyllaries oblong or oblong-lanceolate; Ecuador, hh.
 hh. Involucre 4-seriate, 14-16 mm. high. 83. *V. chimboensis*.
 hh. Involucre 5-seriate, 12-14 mm. high. 85. *V. aurea*.
 ff. Leaves distinctly ovate, merely acute or short-acuminate, ii.
 ii. Involucre 12-13 mm. high; achenes nearly or quite glabrous 86. *V. Lehmannii*.
 ii. Involucre 6-9 mm. high; achenes sparsely but distinctly pubescent, jj.
 jj. Leaves not venose-reticulate; phyllaries strongly spreading or reflexed; squamellae lanceolate, deeply lacerate, free or slightly united. 87. *V. media*.
 jj. Leaves more or less venose-reticulate beneath; phyllaries only slightly spreading; squamellae narrow-oblong, finely fimbriate, often united to apex. 88. *V. Brittonii*.

83. *V. CHIMBOENSIS* Hieron. Frutescent, 1-2 m. high, bearing 3-4 heads, branched, the stem leafy, pilose, at length subglabrate, the thickened bases of the hairs persistent. Leaves alternate, oblong-lanceolate, acute, mucronate, cuneate at base, entire, 3-nerved, venose, tuberculate-strigillose and scabrous above, beneath pale, subcanescent, somewhat harshly pilose and more or less glandular, 5-6.5 cm. long, 1.5-1.8 cm. wide, on petioles 2 mm. long. Peduncles 7-20 cm. long, terminating branchlets, monocephalous; heads 3.5 cm. wide; disk 1-(fruit) 1.8 cm. high, 1.2-(fruit) 2.2 cm. in diameter. Involucre 4-seriate, graduated, 1.4-1.6 cm. high, the phyllaries oblong to oblong-lanceolate, acute, loose at apex, indurated and 3-5-nerved, herbaceous above, densely appressed-tuberculate-pilose especially above, the innermost thinner in texture. Rays about 12, narrowly oblong, 1.5-“ 2.5 ” cm. long; disk-corollas appressed-puberulous below, 5.5 mm. long (tube 1 mm.). Pales subacuminate, sparsely puberulous near tip, 8 mm. long. Achenes sparsely appressed-pubescent, 4-4.5 mm. long. Awns very unequal, 2-3.2 mm. long; squamellae about 8, free, lacerate, 0.5-0.7 mm. long. — Hieron.! Bot. Jahrb. xxix. 38 (1900). — ECUADOR: dry hills near San Miguel de Chimbo, *Sodiro* 33/1 (TYPE: Ber., photog. and fragm. G.).

84. *V. truxillensis* (HBK.), comb. nov. Herbaceous, branched, erect, the stem sparsely ascending-hispid. Leaves alternate, narrow-oblong or lance-oblong, acute, rounded at base, entire, reticulate-venose, 3-nerved, above densely beneath sparsely tuberculate-strigillose, scarcely paler beneath, 4.5 cm. long, 1.3–1.5 cm. wide, on petioles 1.5 mm. long. Heads terminating branchlets, the monocephalous peduncles 7.5–12.5 cm. long, sulcate, densely hispid below the head; disk 0.8–1.2 cm. high. Involucre 3–4-seriate, 8–9 mm. high, slightly graduated, the phyllaries lanceolate, acute, the outer greenish, densely tuberculate-hispidulous, not ribbed, the inner subscarious, subglabrate, mucronate, vittate. Rays “12–15,” linear-oblong, 15 mm. long, 3 mm. wide; disk-corollas pubescent below, 5 mm. long. Pales acuminate, sparsely hispidulous on back. Achenes not seen; ovary “glabrous.” Awns persistent like the small lacerate squamellae. — *Helianthus truxillensis* HBK.! Nov. Gen. iv. 223 (1820). *Harpalium truxillense* (HBK.) Cass. Dict. Sci. Nat. xxv. 438 (1822). — PERU: near the sea, Truxillo, *Humboldt & Bonpland* (TYPE: Par., drawing G.). — I am unable to identify any recent collections with this species, the type of which I examined at the Paris Herbarium in 1914.

85. *V. AUREA* (HBK.) Hieron. Herbaceous perennial, 1–1.3 m. high, spreading-branched, the stem rather densely tuberculate-hispid-pilose (the hairs spreading and with persistent bases), sometimes sparsely strigillose. Middle and upper leaves alternate, oblong, sometimes ovate-oblong or even oval-oblong, rather abruptly acute and mucronate at apex, rounded or rounded-cuneate at base, very obscurely crenate-serrulate with about 6–10 pairs of very depressed teeth, 3-nerved and somewhat venose-reticulate beneath, above green, somewhat harshly tuberculate-strigose-pilose (the hairs without greatly enlarged bases), beneath much paler (subcanescent when very young), glandular-dotted and rather densely and softly pilose with more or less appressed hairs (longer along the veins), 4.5–10 cm. long, 1.4–4.2 cm. wide; petioles tuberculate-pilose, unmarginated, 2–7 mm. long. Heads rather few (1–4 at ends of branches), 4–7 cm. wide, on peduncles 9–26 cm. long; disk 1.1–1.5 cm. high, 1.4–2.5 cm. wide. Involucre 5-seriate, graduated, 12–14 mm. high, the phyllaries oblong or the outermost oblong-lanceolate, acutish or the inner obtuse, callous-

mucronulate, blackish-green and subherbaceous except for the somewhat thickened and ribbed but not pale base (which is nearly glabrous), densely tuberculate-strigose, less so near apex. Rays 14–25, oblong, 1.2–3.5 cm. long; disk-corollas appressed-puberulous on veins, teeth, and below, 5.5 mm. long (tube 1.2 mm.). Pales acutish, glabrous or practically so, 8 mm. long. Achenes (submature) appressed-silky-pilose, 3.5 mm. long. Awns slender, 1.8–2.8 mm. long; squamellae about 8, truncate, equal, fimbriate, connate toward base, 0.8 mm. long. — Hieron. Bot. Jahrb. xxviii. 608 (1901). *Helianthus aureus* HBK.! Nov. Gen. iv. 224 (1820). *Harpalium aureum* (HBK.) Cass. Dict. Sci. Nat. xxv. 438 (1822); DC. Prod. v. 584 (1836). — ECUADOR: in shrubby growth, Huataxi, Aug. 1859, *Spruce* 5974 (B. M., G., K.); Prov. Alausi, *Jameson* 15 (K.); Alausi, *Bonpland* 3225 (TYPE: Par.); near Guaranda, May 1844, *Jameson* (K.); along streams, Guaranda, western slopes of Mt. Chimborazo, 2670 m., 8 July 1876, *Ed. André* (G.). — T. 2. FIG. 18.

86. V. *LEHMANNII* Hieron. Suffrutescent, up to 3 m. high, the branches weak and hanging. Stem pilose-hirsute and strigillose, the lepidote bases of the hairs persistent. Leaves alternate, ovate, acute, mucronate, rounded at base, entire, somewhat venose beneath, above dull green, from glandular and tuberculate-strigillose to incurved-hispid-pilose, beneath paler, pilose and subglandular, 3–7 cm. long, 1.5–3 cm. wide; petioles hispid-pilose, 2–4 mm. long. Heads about 4, terminating strigose few-bracted peduncles (up to 1.5 dm. long), 4 cm. wide; disk in fruit 1.5–1.7 cm. high, 1.8–2 cm. thick. Involucre 4(–5)-seriate, graduated, 12–13 mm. high, the phyllaries lanceolate, acutish to subacuminate, mucronulate, with indurated blackish-brown 3-nerved glabrous (but marginally ciliate) base and longer rather loose herbaceous blackish-green densely tuberculate-hispid-pilose apex. Rays 20, narrowly elliptic-oblong, 23 mm. long; disk-corollas appressed-puberulous on throat and limb, 6.5 mm. long (tube 1 mm.). Pales acute, blackish-green at the denticulate tuberculate-hispidulous apex, 9 mm. long. Achenes (immature) subglabrous, 4 mm. long. Awns rather easily deciduous, slender, 3–3.7 mm. long; squamellae about 6, disjunct, subelliptic, deeply lacerate, 0.3–0.5 mm. long. — Hieron.! Bot. Jahrb. xxviii. 607 (1901). — ECUADOR: thick shrubbery near Banos, base of Mt. Tunguragua, 1500–2000 m., June, *Lehmann* 7965 (TYPE: Ber., photog. and fragm. G.).

87. *V. media*, sp. nov. Herbacea (?) erecta infra inflorescentiam vix ramosa, caule dense tuberculato-hispido pilis patentibus, foliis alternis ovatis acutis vel subacuminatis basi cuneatis obscure serratis supra obscure viridibus tuberculato-strigillosis subtus multo pallidioribus subcanescentibus dense et subaspere pilosis pilis patentibus, capitulis paucis, involucri 4(-5)-seriati 6-9 mm. alti gradati phyllariis oblongo-lanceolatis acutis ad subacuminatis nigro-viridibus basi nudiusculis supra dense albido-hispido-pilosis apice reflexis vel patentibus, radiis ca. 20, acheniis sparse pilosis, pappi squamellis ca. 8 profunde laceratis liberis vel basi breviter connatis.

Stem purplish, densely tuberculate-hispid with several-celled spreading hairs with conspicuous persistent bases. Leaves alternate, or very rarely opposite, ovate or ovate-lanceolate, acute to subacuminate, callose-mucronate, cuneate at base, obscurely serrate (teeth subappressed, 4-9 pairs), 3-nerved, above dull green, tuberculate-strigillose, the hairs along the veins longer and somewhat spreading, beneath much paler or subcanescent, densely and rather harshly pilose with spreading white hairs, and gland-dotted, 3.5-5.5 cm. long, 1.3-2.1 cm. broad; petioles tuberculate-hispid-pilose, scarcely margined, 2 mm. long. Heads few (about 4), 4 cm. broad, terminal and axillary, on peduncles 2.5-12.5 cm. long and bracteate; disk 12-(fruit)16 mm. high, 17-(fruit)22 mm. thick. Involucre 4(-5)-seriate, slightly graduated, (6-)9 mm. high, the phyllaries oblong-lanceolate, subacuminate to acute, callose-mucronulate, blackish-green, subherbaceous, the base indurated, costate, nearly naked, elsewhere densely hispid-pilose with patent whitish hairs, reflexed or spreading at apex. Rays about 20, oblong, emarginate, 15 mm. long, 4.5-5 mm. wide; disk-corollas strigillose below and on veins and teeth, 5 mm. long (tube 1 mm.). Pales firm, carinate, strigillose at apex, 7.5 mm. long. Achenes black, sparsely appressed-pilose, somewhat thickened, 3.2 mm. long, 1.1 mm. wide. Awns unequal, rather slender, ciliate, 2-3 mm. long; squamellae about 8, very unequal (two of them sometimes equaling the shorter awn), deeply lacerate, free or united at extreme base, 0.7-1 mm. long. — ECUADOR: village of Navon, August 1849, *Seemann* 710 (TYPE: K., fragm. G.). — T. 2. FIG. 19.

88. *V. BRITTONII* Hochr. Erect, herbaceous, with few mostly monocephalous branches from the upper axils, the stem purplish,

tuberculate-hispid-pilose with spreading hairs, their whitish bases persistent. Leaves alternate, sometimes opposite on the flowering branches, ovate, subacuminate, the mucronate apex generally decurved, rounded to rounded-cuneate at base, entire or obsoletely serrulate, scarcely revolute, 3-nerved, above dark green, densely lepidote-strigillose, beneath decidedly paler, somewhat densely hispid-pilose with rather soft hairs and more or less venose-reticulated, 4.5–5.5 cm. long, 1.5–2.2 cm. wide; petioles tuberculate-hispid-pilose, about 1.5 mm. long. Peduncles 4.7–14.5 cm. long, naked or bracteate, bearing one or rarely two heads; heads about 5, 3.7 cm. wide; disk 11 mm. high, 14–16 mm. thick. Involucre 3–4-seriate, distinctly but slightly graduated, 7 mm. high, the phyllaries lanceolate to lance-oblong (the inner broader and longer), acute to subacuminate, callose-mucronulate, slightly spreading, blackish-green, slightly indurated, ribbed, and glabrate at least in age near base, elsewhere densely strigose-hispid and -tuberculate except often at apex. Rays 16–18, oval, subentire to tridenticulate, 14 mm. long; disk-corollas somewhat strigillose, 4.2 mm. long (tube 1 mm.). Pales stiff, acute, carinate, sparsely strigillose or almost glabrous, 7 mm. long. Achenes (immature) rather sparsely strigose-pilose. Awns slender, very unequal, 1.2–2.2 mm. long; squamellae fimbriate, united at base or nearly to apex, 0.7 mm. long. — Hochr.! Bull. N. Y. Bot. Gard. vi. 294 (1910). — PERU: Chachapoyas, *Mathews* (COTYPE COLL.: B. M., K., fragm. and tracing G.).

89. *V. Sodiroi* (Hieron.), comb. nov. Erect branched herbaceous perennial; root with a cluster of thickened fleshy rootlets; stem pilose, at length subglabrate, the somewhat thickened bases of the hairs persistent. Lower leaves opposite (about 6 pairs), the others alternate, ovate, acute, cuneate to rounded at base, dentate-serrate above the middle with about 10 pairs of fine subremote teeth, the uppermost entire, greenish and pilose above, beneath densely canescent-tomentose-pilose, 5.2–9.5 cm. long, 2–4.2 cm. wide; petioles densely pilose, 5–11 mm. long. Heads about 5, terminal and on axillary leafy branchlets or peduncles, 7.5 cm. wide; disk 2–2.6 cm. high, 2.8–3.3 cm. thick. Involucre about 3-seriate, graduated, 1.6 cm. high, the phyllaries oblong, mucronate, densely tomentose-pilose except at apex and on midline of back, scarcely thickened at base. Rays about 32, oblong, 2.6–

3 cm. long, 5–9 mm. wide; disk-corollas sparsely pubescent below, 5 mm. long (tube 1 mm.). Pales carinate, subobtusate, subglabrate, 7–9 mm. long. Achenes (submature) subsericeous, 3.5 mm. long. Awns 2, ciliate, 3 mm. long; squamellae about 10, very unequal, lacinate, up to 0.5 mm. long. — *Helianthus Sodiroi* Hieron.! Bot. Jahrb. xxix. 41 (1900). — ECUADOR: dry hills near Piso, *Sodiro* 34/3 (TYPE: Ber., photog. and fragm. G.). — A good *Viguiera* in its technical characters.

90. V. MOLLIS Griseb. Suffrutescent (?), branched, erect, 2–2.5 m. high, the stem somewhat harshly and canescently short-villous, at length subglabrate, the thickened bases of the hairs persistent. Leaves alternate, oblong to oblong-lanceolate, acute to acuminate, cuneate to rounded at base, with a few serrations toward the apex, green and tuberculate-hispidulous above, beneath densely and softly canescent-tomentose, 6–8.5 cm. long, 1.5–3 cm. wide; petioles tomentose, mostly 1.5–3 mm. long. Heads terminating softly tomentose-pilose branchlets and axillary peduncles, 5–5.5 cm. wide; disk 12–13 mm. high, 16–18 mm. thick. Involucre 4-seriate, graduated, 10–12 mm. high, the phyllaries oval-oblong (outer) to oblong, subobtusate to acute, subherbaceous, densely canescent-tomentulose or the inner merely appressed-canescant-pubescent, squarrose at apex. Rays about 16, oblong, (1.2)2–2.3 cm. long, 4–8 mm. wide; disk-corollas strigillose particularly below, 5 mm. long (tube 0.8 mm.). Pales subobtusate, mucronulate, minutely hispidulous at apex, 8 mm. long. Achenes sparsely hairy on margin, minutely strigillose at apex, 3.8 mm. long. Awns 2.8 mm. long; squamellae about 6, lacinate, free, 0.4 mm. long. — Griseb.! Goett. Abh. xix. 183 (1874). — ARGENTINA: Cuesta del Garabatal, between Siambon and Juntas, in the Sierra de Tucuman, 18 March 1872, *Lorentz* 502 (TYPE COLL.: Ber., photog. and fragm. G.); Yacone near Salta, 27–28 March 1873, *Lorentz & Hieronymus* (Ber.).

91. V. LANCEOLATA Britton. Perennial, perhaps suffrutescent at base, branched, the stem stoutish or somewhat slender, rather densely tuberculate-hispid-pilose with rather spreading or incurved-ascending hairs and somewhat granular, the hair-bases persistent. Leaves alternate or rarely opposite, lanceolate, long-acuminate, cuspidulate, at base cuneate, crenate-serrate with about 6–16 pairs of obscure appressed teeth or subentire, above green, subdensely

tuberculate-hispid-pilose with rather short slightly harsh incurved hairs, their bases persistent, beneath paler, in youth subanescent with rather dense loose curly hairs intermixed along the veins with longer straighter ones, less pubescent in age, gland-dotted, 3-nerved slightly above the base, 8-10.5 cm. long, 1.8-3.5 cm. wide; petioles densely tuberculate-hispid-pilose, 3-6 mm. long. Heads in 1's-3's at ends of branches and on axillary peduncles, 5-6 cm. wide, on peduncles 8 cm. long or less and pubescent like the stem; disk 9-12 mm. high, 15-18 mm. thick. Involucre 3-seriate, graduated, 7-10 mm. high; phyllaries rather densely and more or less canescently pilose with appressed soft hairs (scarcely or not at all enlarged at base), with oblong or oblong-ovovate body, indurated, pale, and about 4-vittate, sometimes subglabrate below, and rather abruptly narrowed spreading or reflexed shorter lanceolate herbaceous apex (distinctly green but shortly appressed-pilose within). Rays about 12, linear-oblong, 2.5 cm. long, 6 mm. wide; disk-corollas puberulous below and on the teeth, 5 mm. long (tube 1 mm.). Pales puberulous at the shortly acute apex, otherwise glabrous, 7 mm. long. Achenes (submature) ciliate, otherwise practically glabrous, slightly thickened, 2.5 mm. long. Awns amplified below, 2 mm. long, somewhat deciduous; squamellae subequal, subquadrate, fimbriate, 0.5 mm. long, persistent. — Britton! Bull. Torr. Club xix. 149 (1892). *V. Mandonii* Sch. Bip.! Bull. Soc. Bot. Fr. xii. 79 (1865), nomen; *Linnaea* xxxiv. 528 (1865-66), nomen; ex Rusby, Mem. Torr. Club iii. pt. 3. 60 (1893); ex Klatt, Ann. Naturh. Hofmus. Wien ix. 361 (1894). *Helianthus Szyszyłowiczii* Hieron.! Bot. Jahrb. xxxvi. 491 (1905). — PERU: near Callacate, May 1879, *Jelski* 732 (TYPE of *H. Szyszyłowiczii*: Ber.). BOLIVIA: rocky and hilly fields, 2600-3000 m., near Sorata, 18 July 1858, *Mandon* 35 (TYPE COLL. of *V. Mandonii*: G.); La Paz, 3050 m., 1890, *Bang* 382 (G., U. S.); near Yungas, 1220 m., 1885, *Rusby* 2140 (TYPE of *V. lanceolata*: herb. N. Y. Bot. Gard.). — This species like the two following approaches *Helianthus* in its somewhat deciduous pappus, but from the presence and greater or less persistence of the squamellae is better referred to *Viguiera*.

92. *V. PAZENSIS* Rusby. Erect, herbaceous, branched, the stem and branches terminated by 2-4 pedunculate heads. Stem stout, tuberculate-strigillose or -strigose-hispid. Leaves alternate, lanceo-

late to ovate-lanceolate, acuminate, cuspidate, cuneate into the subsessile or shortly petioled base or rounded, subremotely serrate (teeth 3-9 pairs, appressed) or subentire, green and scabrously tuberculate-strigillose both sides, sparsely gland-dotted beneath and more or less hispid along the veins, 3-nerved and usually rather strongly venose beneath, 7.5-11 cm. long, 2.5-4 cm. wide; petioles tuberculate-hispidulous, 2-6 mm. long or shorter. Peduncles naked or 1-2-bracteate, 1-14 cm. long; heads 4 cm. wide; disk 1-1.4 cm. high, 1.5-2 cm. thick. Involucre 2-3-seriate, subequal or distinctly but slightly graduated, 7-10 mm. high, the phyllaries oblong to lanceolate, acute to acuminate, the innermost somewhat oblong-obovate, subherbaceous, below somewhat indurated and ribbed (rarely strongly so), hispid-ciliate and densely tuberculate-strigillose. Rays 14-20, 1.5-2 cm. long, 4.5-6 mm. broad; disk-corollas tuberculate-strigillose below, yellow, 5-5.2 mm. long (tube 0.9-1 mm.). Pales obtuse to subacute, greenish or blackish at apex, strigillose on back above, 7 mm. long. Achenes flattish, more or less appressed-sericeous, 3.5 mm. long. Awns slightly broadened below, 3 mm. long; squamellae 4-6, free, deeply lacerate, 0.6 mm. long. — Rusby! Mem. Torr. Club iii. pt. 3. 59 (1893). *Helianthus atacamensis* Phil. Anal. Mus. Nac. Chil. 1891. 48 (1891). *Flourensia atacamensis* (Phil.) Reiche, Fl. Chil. iv. 95 (1905). — BOLIVIA: La Paz, 3050 m., 1890, *Bang* 44 (TYPE COLL. of *V. pazensis*: B. M., Ber., G., K., Mo., U. S.); La Paz, 3500 m., May 1911, *Buchtien* 3302 (B. M., U. S.); cotana at Illimani, 2450 m., Nov. 1911, *Buchtien* 3300 (U. S.). CHILE: Tarapaca, *Philippi* (Ber., photog. and fragm. G.). — Philippi's species was described from a specimen collected near Atacama. The specimen in the Berlin Herbarium, which I am unable to distinguish by any significant character from *V. pazensis* Rusby, may be taken as authentic for his species, agreeing as it does fairly well with his very unsatisfactory description. Philippi's name, although the older, cannot be adopted for the species because of the valid *V. atacamensis* Phil. (no. 110).

93. *V. PFLANZII* Perkins. Herbaceous, erect or ascending, much branched or subsimple, about 1 m. high. Stem stoutish, greenish or fuscous-green, rather densely and usually harshly tuberculate-hispid-pilose with more or less spreading hairs, the hair-bases persistent, and more or less hispidulous and granular, subterete,

scarcely striate. Leaves usually opposite below, alternate above, ovate or rarely lance-ovate or somewhat oval-oblong, acute to subacuminate, at base cuneate to rounded and usually slightly oblique, irregularly serrate to subentire, triplinerved, rather thin or thickish, above dark green, rather densely and harshly tuberculate-hispidulous or -hispid with ascending or subappressed hairs, the tuberculate bases conspicuous in age, beneath slightly paler green, rather densely hispid-pilose with subascending more or less tuberculate-based hairs along the veins, sparsely hispid-pilose with shorter hairs between them and more or less gland-dotted, slightly veiny, 3.3–6.5 cm. long, 1.7–3.2 cm. wide; petioles tuberculate-hispid and hispidulous, 3–6 mm. long or shorter; the upper leaves reduced, sometimes subtending sterile branches. Heads about 3–10, 3–6 cm. wide, on terminal and axillary peduncles, these rather densely tuberculate-hispid-pilose and -hispidulous with spreading hairs and more or less glandular, naked or bracted, 19 cm. long or usually much less; disk 9–13 mm. high, 14–19 mm. thick. Involucre 3-seriate, slightly graduated, 6–9(-12) mm. high, the phyllaries oblong to lance-oblong, acutish to obtuse, mostly callose-mucronulate, appressed or with the tips somewhat loose but scarcely reflexed, blackish-green, with slightly indurated and costate base (mostly subglabrous except for marginal pubescence) and densely appressed-hispid-pilose and hispidulous-pilosulous herbaceous apex, the outer sometimes densely tuberculate-hispid-pilose throughout. Rays 14–18, oval to narrow-oblong, 16–20 mm. long, 3.5–6 mm. wide; disk-corollas puberulous below and on teeth or subglabrous, 4.5–5.5 mm. long (tube 1 mm.). Pales strigillose toward the dark apex, shortly acute, submucronulate, 6.5 mm. long. Achenes more or less appressed-pilose on margin and down sides, 3.3 mm. long. Awns slender, 2–3 mm. long; squamellae 4–8, fimbriate-lacerate or lobed, unequal, free, 0.5 mm. long or less, apparently sometimes lacking. — Perkins! Bot. Jahrb. xlix. 226 (1913). *Helianthus calvus* Sch. Bip. ! Bull. Soc. Bot. Fr. xii. 79 (1865), nomen; Linnaea xxxiv. 528 (1865–66), nomen. *H. Mandonii* Sch. Bip. var. [innom.] Sch. Bip. ! ll. cc., sine descr. *Viguiera calva* (Sch. Bip.) Britton, Bull. Torr. Club xix. 149 (1892), nomen. *V. punensis* Blake! Bot. Jahrb. liv. Beibl. No. 119. 48 (1916). — PERU: Pachacayo, 27 March 1913, C. H. T. Townsend 1506 (U. S.); rocky limestone meadows, Azangaro, Dept. Puno, 4000 m.,

28 Feb. 1902, *Weberbauer* 464 (TYPE of *V. punensis*: Ber., photog. and fragm. G.); between Culluay and Obrajillo, in the Andes, *U.S. Expl. Expedition under Wilkes* in part (U.S. no. 48974, in part). BOLIVIA: Sorata, 2600–3000 m., March–April 1859, *Mandon* 34 (TYPE COLL. of *H. calvus*: G., K.); Achacache, Prov. Omasuyos, foot of Mt. Avichaca, 4000 m., June 1859, *Mandon* 36 (*H. Mandonii* var. Sch. Bip. !: G.); La Paz, 3050 m., April 1885, *Rusby* 1683 (G., U. S.); l. c., 3700–3750 m., 1906–07, *Buchtien* 1510 (G.); l. c., March 1910, *Buchtien* 198 (G.); l. c., 3650 m., March 1913, *Buchtien* (Mo.); Palca to La Paz, 3700 m., 5 June 1909, *Pflanz* 48 (COTYPE of *V. Pflanzii*: Ber., photog. and fragm. G.); Huanca-pampa, 3650–3800 m., April 1910, *Pflanz* 372 (COTYPE of *V. Pflanzii*: Ber., fragm. G.). — Closely related to the last, from which it is distinguished chiefly by the smaller and relatively broader ovate rather than lanceolate or lance-ovate leaves which are merely acute at apex. Local name “ss-akka,” according to *Pflanz*. — T. 2. FIG. 20, T. 3. FIG. 12.

94. *V. Szyszyłowiczii* Hieron. Herbaceous (?), erect, much branched, the branches erect; stem stout, leafy, densely and minutely glandular and tuberculate-hispid, bearing about 30 cymose-panicked heads. Leaves alternate, ovate to ovate-lanceolate, acuminate, rounded at base, entire, 3-nerved and very strongly venose beneath, green both sides, glandular-dotted and sparsely tuberculate-strigose and -strigillose, 4.5–6.8 cm. long, 1.7–3.5 cm. wide, subsessile. Heads rather long-peduncled, about 4 cm. broad; disk 13–16 mm. high, 15–19 mm. broad. Involucre 3-seriate, scarcely graduated, 14–17 mm. high, the phyllaries linear-lanceolate, acuminate, mucronate, blackish-green, scarcely indurated, somewhat glandulose, densely hispid-strigose. Rays about 12, oblong, 15 mm. long, 2.8 mm. wide; disk-corollas strigillose below and on teeth, 5 mm. long (tube 1.1 mm.). Pales very narrow, subacute, slightly strigillose at the colorate apex, 9 mm. long. Achenes sparsely strigose, 4.2 mm. long. Awns 2 or 3, slender, unequal, up to 2.8 mm. long; squamellae about 6, lacinate, united to the middle, 0.8 mm. long. — Hieron. ! Bot. Jahrb. xxxvi. 489 (1905). — PERU: between Chota and Cutervo, June 1879, *Jelski* (distr. *Szyszyłowicz*) 797 (TYPE: Ber., photog. and fragm. G.). — T. 2. FIG. 21.

95. *V. fusiformis*, sp. nov. Herbacea perennis caulibus paucis decumbentibus subsimplicibus 1-2-cephalis, e radice lignosa tuberosa radicularibus tuberoso-fusiformibus, foliis usque ad medium caulem oppositis superioribus alternis lanceolato-ovatis vel oblongo-ovatis utroque acutis strigosis et strigillosis supra obscure viridibus infra vix pallidioribus, involucri 2-3-seriati paullum gradati phyllariis lanceolatis acutis vel subacuminatis infra paullum incrassatis costatis strigillosis vel substrigosis apice herbaceis vix patentibus.

Stems several, decumbent, herbaceous, 2.5-4.8 dm. long, subsimple, bearing 1-2 heads, whitish, striatulate, tuberculate-hispid, at length subglabrate, from a woody tuberlike root with tuberous-fusiform rootlets. Leaves opposite about to middle, alternate above, lance-ovate or narrowly oblong-ovate, acute at each end, irregularly serrulate (teeth about 5 pairs, appressed), subtrinnerved, strigose and strigillose both sides, scarcely paler beneath, 2.3-5.1 cm. long, 6-16 mm. wide; petioles hispid, 2-3 mm. long or shorter. Peduncles 3-10 cm. long, strigillose, naked or with one or two small bracts; heads 2.7 cm. wide; disk 9 mm. high, 10.5-13.5 mm. thick. Involucre 2-3-seriate, slightly graduated, 6.5-8 mm. high, the phyllaries lanceolate or lance-oblong, acute or obtusish to subacuminate, rather densely strigillose or substrigose, scarcely ciliate, somewhat indurated and ribbed at base, the herbaceous apex subappressed. Rays about 12, yellow, oblong-linear, glandular and pubescent on back, 11 mm. long, 2.5 mm. wide; disk-corollas yellow, sparsely strigillose, 4-4.5 mm. long (tube 0.7 mm.). Pales subacute, mucronulate, lineate, sparsely hispidulous at apex, 5 mm. long. Achenes black, oblong, sparsely pubescent, 2.5 mm. long. Awns 2, slender, ciliolate, 1.8 mm. long; squamellae 4-6, sublacerate, 0.5 mm. long. — *Viguiera prostrata* DC. ! Prod. v. 579 (1836), excl. the name-bringing syn. *Helianthus prostratus* Willd. *Bidens tuberosa* Sch. Bip. ! Bull. Soc. Bot. Fr. xii. 79 (1865), nomen; *Linnaea* xxxiv. 528 (1865-66), nomen; B. & H. Gen. Pl. ii. 388 (1873), where referred to *Viguiera* but comb. not definitely made. *Viguiera tuberosa* B. & H. ex Hook. & Jacks. Ind. Kew. ii. pt. 2. 1201 (1895), nomen; not *V. tuberosa* Griseb. (1879). — BOLIVIA: fields, neighborhood of Sorata, near Munaypata, Prov. Larecaja, 2650 m., Jan.-March 1859, *Mandon* 49 (TYPE COLL.: B. M., G., K.). Also in the Prodrum Herbarium ex Balbis, without locality (*V. prostrata* DC.!). — T. 2. FIG. 22.

96. *V. oligodonta*, sp. nov. Herbacea infra inflorescentiam simplex, caule tuberculato-hispido-piloso pilis patentibus demum deciduis, foliis anguste lanceolatis acuminatis basi acutis subintegris vel remote serratis supra tuberculate-strigosis subtus vix pallidioribus sparse subhispidulo-pilosulis 5.8–8.9 cm. longis 6.5–10 mm. latis, capitulis 2–3, 3–4 cm. latis, involucri 4-seriati gradati 8–9.5 mm. alti phyllariis lanceolatis vel oblongo-lanceolatis acutis vel acuminatis basi firme induratis costatis supra abrupte herbaceis tuberculato-strigillosis et hispido-ciliatis appressis vel exterioribus sublaxis, acheniis subsparse pilosis, pappi squamellis liberis.

Erect, herbaceous, simple below the inflorescence, 1.3–2 m. high, the stem purplish or pale, slender, striatulate, tuberculate-hispid-pilose with spreading at length deciduous hairs. Leaves alternate, narrowly lanceolate, acuminate, callose-mucronate, acute at base, subentire or distantly serrate (teeth 4–8 pairs, depressed), triplinerved and featherveined, very slightly revolute, above green, tuberculate-strigose, beneath scarcely paler, sparsely subhispidulous-pilosulous and gland-dotted, along the midrib rather softly pilose, the hairs scarcely tuberculate-based, 5.8–8.9 cm. long, 6.5–10 mm. wide; petioles tuberculate-hispid-pilose, 2 mm. long. Heads 2–3, on terminal and axillary naked or bracteate tuberculate-hispid-pilose peduncles 3.5–6.5 cm. long; disk 1 cm. high, 1.2–1.4 cm. thick. Involucre 4-seriate, graduated, 8–9.5 mm. high, the phyllaries lanceolate to oblong-lanceolate, acute to acuminate, callous-mucronate, at base firmly indurated and broadly ribbed, above abruptly herbaceous, 1–3-nerved, tuberculate-strigillose and hispid-ciliate, appressed or the outer rather loose. Rays about 16, narrow-oblong, yellow, puberulous and gland-dotted on back, 12–14 mm. long, 3.5 mm. wide; disk-corollas yellow, puberulous below, 4.5–5.2 mm. long (tube 0.8–1.1 mm.). Pales obtuse, minutely pubescent above, 7 mm. long. Achenes (very immature) subsparingly pilose. Awns 2, unequal, slender, ciliate, 2.8 mm. long; squamellae about 6, free, lacinate, 0.6 mm. long. — ARGENTINA: in woods, St. Xavier, Tucuman, *Tweedie* 1202 (TYPE: K., fragm. G.).

97. *V. retroflexa*, sp. nov. Herbacea infra inflorescentiam vix ramosa, caule infra sparse supra densius tuberculato-strigoso-piloso, foliis lanceolatis vel anguste oblongo-lanceolatis acuminatis

basi cuneatis vel rotundato-cuneatis serrulatis vel subintegriss supra tuberculato-strigillosis subtus vix pallidioribus subsparse hispidulis 6–9.2 cm. longis 1–1.9 cm. latis, capitulis 6–9 irregulariter cymoso-paniculatis 4–4.5 cm. latis, involucri 3-seriati gradati ca. 6 mm. alti phyllariis oblongo-lanceolatis acutis vel subacuminatis plus minusve tuberculato-strigillosis et strigiosis basi induratis costatis supra herbaceis reflexis vel patentibus, acheniis sericeis, pappi squamellis liberis fimbriatis.

Herbaceous, erect, scarcely branched below the inflorescence, 0.6–2 m. high, the stem purplish, striatulate, below sparsely above more densely tuberculate-strigose-pilose. Leaves alternate, lanceolate to oblong-lanceolate, acuminate, mucronate, at base cuneate or rounded-cuneate, regularly serrulate (teeth 5–10 pairs, depressed, subremote) or subentire, above green, tuberculate-strigillose, beneath scarcely paler, subsparingly hispidulous, along the veins tuberculate-hispidulous, and gland-dotted, 6–9.2 cm. long, 1–1.9 cm. wide; petioles tuberculate-strigose and hispid-ciliate, 1.5–2.5 mm. long. Heads about 6–9, irregularly cymose-panicled, 4–4.5 cm. wide, on peduncles 0.5–4 cm. long and densely tuberculate-strigose; disk 11–(fruit)12 mm. high, 12–(fruit)15 mm. thick. Involucre 3-seriate, graduated, about 6 mm. high, the phyllaries oblong-lanceolate, acute to subacuminate, mucronulate, more or less tuberculate-strigillose and strigose, not hispid-ciliate, at base indurated, costate, and subglabrate, above herbaceous, patent or strongly reflexed. Rays 12, yellow, puberulous and gland-dotted on back, 1.6–2 cm. long, 4–6 mm. wide; disk-corollas yellow, strigillose below and on the teeth, 4.2 mm. long (tube 0.7 mm.). Pales subobtusely mucronulate, strigillose at extreme apex, 6.5 mm. long. Achenes black, sericeous, 3 mm. long, 1.1 mm. wide. Awns 2, slender, ciliate, unequal, 2–2.8 mm. long; squamellae about 6, fimbriate, free, 0.3 mm. long. — BOLIVIA: Tarija, 1220 m., March 1864, *Pearce* (TYPE COLL.: B. M., K., tracing and fragm. G.); without definite locality, *Bridges* (K.).

98. *V. ACUTIFOLIA* Blake. Frutescent (?), 1 m. high, apparently simple, the stem purplish-brown, strigillose and glandular, at apex bearing 4–5 heads in a close cymose panicle. Leaves alternate, narrowly lanceolate, long-acuminate, at base cuneately contracted into a narrowly margined petiole, entire, above puberulous, beneath subcanescent-puberulous, gland-dotted, 5.5–7 cm. long,

1.5–1.8 cm. wide; petioles 5–8 mm. long. Peduncles glandular-pubescent, 0.5–4.5 cm. long; heads 2.3–2.8 cm. wide; disk 8–9 mm. high, 12–13 mm. thick. Involucre 3-seriate, slightly graduated or subequal, 6 mm. high, the phyllaries lanceolate, acute, striate, ribbed, strigillose, gland-dotted, at apex shortly subherbaceous. Rays about 12, yellow, oblong, 10 mm. long, 4.5 mm. wide; disk-corollas yellow, sparsely puberulous, 5 mm. long (tube 0.9 mm.). Pales subglabrous, acute to acuminate, 5.5–7 mm. long. Achenes (submature) black, sericeous, 3 mm. long. Awns 2, ciliate, 2.7 mm. long; squamellae about 4, oblong, 1 mm. long, laciniate. — Blake! Bot. Jahrb. liv. Beibl. No. 119. 48 (1916). — PERU: open formation, 2200–2500 m., Caraz, Dept. Ancacho, 19 May 1903, *Weberbauer* 3008 (TYPE: Ber., photog. and fragm. G.).

99. *V. australis*, sp. nov. Herbacea ramosior, caule purpureo glaberrimo (apice excepto) apice paniculate ramoso polycephalo, foliis inferioribus oppositis superioribus alternis anguste lanceolatis longe acuminatis basi anguste cuneatis subintegris supra lepidoto-strigillosis infra minute strigillosis et glandulari-adspersis utrinque viridibus 4.5–7 cm. longis 7–11.5 mm. latis, petiolis 3–6 mm. longis, capitulis 2.3–3 cm. latis, involucri 3-seriati gradati 6.5–7 mm. alti phyllariis anguste lanceolatis strigillosis basi induratis costatis apice subabrupte herbaceis angustioribus laxis vel reflexis, radiis ca. 8, acheniis subsparse pilosis, squamellis ca. 12 lacerato-fimbriatis liberis.

Herbaceous, rather strongly branched, the stem slender, purplish, very smooth below, in inflorescence strigillose, many-headed. Leaves opposite below, alternate above, narrowly lanceolate, long-acuminate, cuneate at base, entire or the largest obscurely serrulate, green both sides, above lepidote-strigillose, beneath sparsely strigillose and minutely gland-dotted, 3-nerved, 4.5–7 cm. long, 7–11.5 mm. wide; petioles narrowly margined, strigillose, 3–6 mm. long. Peduncles naked or 1-bracted, 3.7–7.7 cm. long, monocephalous; heads 2.3–3 cm. wide; disk 9–10 mm. high, 7–8.5 mm. thick. Involucre 3-seriate, graduated, 6.5–7 mm. high, the phyllaries narrowly lanceolate, strigillose, below thickened, ribbed and vittate, above with short or long linear-lanceolate loose or reflexed herbaceous apex. Rays about 8, golden-yellow, sparsely pubescent on back, 1 cm. long, 3.5 mm. wide; disk-corollas yellow, strigillose below and on the teeth, 4.2 mm. long

(tube 0.8 mm.). Pales narrow, pale, scarcely striate, mucronate, greenish at apex, minutely puberulous, 6 mm. long. Achenes black, subsparingly pilose, 3 mm. long, 1 mm. wide. Awns 2, spinulose, 2.5 mm. long; squamellae about 12, oblong, lacerate-fimbriate, free, 0.6 mm. long, or 1-2 sometimes elongated and about equalling the awns. — “*Viguiera*, a narrow-leaved species apparently undescribed,” Britton, Bull. Torr. Club xix. 150 (1892). — BOLIVIA: cotana at Illimani, 2450 m., Nov. 1911, *Buchtien* 297 (TYPE COLL.: B. M., G., Mo.); do., *Buchtien* 3292 (U. S.); Isla Titicaca, Lake Titicaca, 3840 m., March 1910, *Buchtien* 3064 (U. S.); near La Paz, 3050 m., *Rusby* 1689 (G., U. S.); without definite locality, *Bridges* (K.). — This species has been distributed several times under a manuscript name of Dr. Britton's which has already been used in the genus. The name here used for it was selected at a time when I considered it a southern representative of the § *Chloracra* and may be retained as serving to indicate its position as a southern analogue of that group. — T. 2. FIG. 24.

100. *V. nudibasilaris*, sp. nov. Herbacea ramosa, caule infra glabrato supra tuberculato-hispido-piloso pilis patentibus persistentibus, foliis anguste lanceolatis acuminatis basi cuneato-acuminatis supra lepidoto-tuberculato-strigosis basibus pilorum persistentibus subtus paullulum pallidioribus ad venas et venulas submolliter hispido-pilosis inter venulas subglabris vel sparsissime hispidulo-pilosulis 5-12 cm. longis 1-2 cm. latis, capitulis cymosopaniculatis, involucri 2(-3)-seriati gradati 9-10 mm. alti phyllariis lanceolatis vel lineari-lanceolatis basi induratis costatis glabris supra herbaceis strigosis tuberculato-hispido-ciliatis, corollis disci 5.2 mm. longis infra et in dentibus puberulis, squamellis pappi 4-6 liberis minimis (0.2-0.3 mm. longis).

Erect, branched, herbaceous, the stem stoutish, purplish, striatulate, sparsely tuberculate-pilose, below glabrate (the hair-bases persistent), above and in inflorescence tuberculate-hispid-pilose with spreading persistent hairs. Leaves alternate, narrowly lanceolate, acuminate, callose-mucronate, at base cuneately acuminate, serrate (teeth 8-12 pairs, appressed, obtuse or acute), or the uppermost entire, above dull green, lepidote-tuberculate-strigose, the bases of the hairs persistent, beneath slightly paler, along the veins and veinlets rather softly hispid-pilose, between them subglabrous or very sparsely hispidulous-pilosulous, 5-12 cm. long,

1-2 cm. wide; petioles tuberculate-hispid-pilose, 2-3 mm. long. Heads about 3-16, cymose-panicled, 2.5-4 cm. wide, on axillary and terminal peduncles 1.5-9 cm. long, tuberculate-hispid-pilose, naked or bracteolate; disk 9-11 mm. high, 9-(fruit)19 mm. thick. Involucre 2(-3)-seriate, graduated, 9-10 mm. high, the phyllaries lanceolate to linear-lanceolate, callose-mucronate, at base indurated, costate, glabrous or subglabrous, above herbaceous, strigose, tuberculate-hispid-ciliate. Rays about 14, yellow, sparsely pubescent on back, oblong, 10 mm. long, 4.5-6 mm. wide; disk-corollas yellow, puberulous below and on the teeth, 5.2 mm. long (tube 1.2 mm.). Pales obtuse to subacute, minutely strigillose above, in age purplish, 6 mm. long. Achenes black, very sparsely strigillose, 2.8 mm. long, 1.2 mm. wide. Awns 2, lanceolate, more or less deciduous, 1.2 mm. long; squamellae 4-6, erose, free, minute, 0.2-0.3 mm. long. — BRAZIL: MINAS GERAES: Caldas, 27 March 1846, *Widgren* (TYPE: K.); Caldas, Mar. 1865, *Regnell* III. 772 (K.); vicinity of Rio de Janeiro and Ouro Preto, 1883-84, *Glaziou* 15080 (K.); without definite locality, 1845, *Widgren* (G.). Brazil without locality, *Glaziou* 16165 (K.). — The specimens in the Kew Herbarium collected by *Widgren* and *Regnell* were labelled *V. pilosa* by Mr. Baker. From that species *V. nudibasilaris* differs in pubescence of leaves, peduncles, and phyllaries, and in pappus characters. — T. 2. FIG. 23.

101. *V. PILOSA* Baker. Erect, herbaceous, branched, the stem stoutish, sparsely strigose-pilose, glabrate below except for the tuberculate hair-bases, above tuberculate-hispid-pilose, the hairs ascending, persistent. Leaves alternate, lanceolate, acuminate, callose-mucronate, acute at base, widest below the middle, serrate (teeth 7-12 pairs, appressed or spreading, acute or obtuse), or the uppermost subentire, 3-nerved, faintly revolute, above dark green, harshly lepidote-tuberculate-strigose or -strigillose, the hair-bases persistent, beneath pale or subcanescent, gland-dotted and rather sparsely appressed-pilose all over with slightly roughish hairs, thickened below but scarcely tuberculate, 5-12 cm. long, 1-2.3 cm. wide, narrowed into scarcely margined tuberculate-hispid-pilose petioles 2.5-3 mm. long. Heads about 5-8, cymose-panicled, 3.5 cm. wide, on canescently strigose-pilose naked or bracteate peduncles 2-7 cm. long; disk 9-11 mm. high, 12-14 mm. thick. Involucre 2(-3)-seriate, 8-9 mm. high, the phyllaries unequal, loose,

lanceolate to lance-oblong (the outer narrower), acuminate, densely tuberculate-hispid-strigillose on their exposed portions, hispid-pilose-ciliate, callose-mucronate, indurated and ribbed below, herbaceous above. Rays about 12, oblong, sparsely pilosulous and gland-dotted on back, 1.5–2 cm. long, 4–5.6 mm. wide; disk-corollas hispidulous below and on teeth and veins, 5 mm. long (tube 1 mm.). Pales mucronate, acute, strigillose above, 6 mm. long. Achenes (immature) sericeous. Awns broadened, fimbriate, acuminate, 2.2–3 mm. long; squamellae about 4, free, unequal, lacerate, minute (0.5 mm. long). — Baker! in Mart. Fl. Bras. vi. pt. 3. 223 (1884). — BRAZIL: without locality, *Sello* 1028 (CO-TYPE: K., fragm. G.).

102. *V. tuberculata*, sp. nov. Herbacea caule purpurascente pubescente demum subglabrato, foliis anguste lanceolatis utroque acuminatis obscure dentatis supra dense asperrimeque albotuberculatis infra hispidulis et venas secundum hispidis 7–8.5 cm. longis 1.3–2.1 cm. latis, disco 8 mm. alto, involucri 3-seriati paululum gradati phyllariis lanceolatis acutis dense hispidulis sublaxis, radiis ca. 10, corollis disci glabris 4 mm. longis, aristis 0.6 mm. longis squamellas triplo superantibus.

Herbaceous, about 2 m. high, the stem purplish, pubescent and gland-dotted, at length subglabrate, branched above. Leaves alternate, lanceolate, acuminate at each end, obscurely dentate, above densely and very harshly white-tuberculate, beneath hispidulous, hispid along the veins, triplinerved, 7–8.5 cm. long, 1.3–2.1 cm. wide; petioles 3–4 mm. long or less. Peduncles axillary and terminal, monocephalous, 2.5–6.5 cm. long; disk 8 mm. high. Involucre 3-seriate, slightly graduated, the phyllaries lanceolate, acute, densely hispidulous, rather loose. Rays about 10, yellow, oblong-linear, 13 mm. long, 3 mm. wide; disk-corollas yellow, glabrous, 4 mm. long (tube 0.5 mm.). Pales purplish above, subacute, glandulose and puberulous, 6 mm. long. Achenes black, sparsely puberulous above, 2.3 mm. long. Awns 2, about 0.6 mm. long, the squamellae about a third as long. — BRAZIL: MINAS GERAES: 1816–21, *A. St. Hilaire* 1212 (TYPE: Par.).

103. *V. Malmei*, sp. nov. Herbacea simplex, caule tuberculato-strigilloso 2-cephalo infra glabrato, foliis inferioribus oppositis superioribus alternis anguste lanceolatis longe acuminatis basi acuminatis obscure serrulatis supra lepidoto-strigillosis infra

pallidioribus subdense appresseque hispidulis et glandulari-adsperis 9–14.5 cm. longis 1–2.6 cm. latis, petiolis 4–7 mm. longis, involucri 3-seriati 8–9 mm. alti phyllariis lanceolatis acutis hispidulis et hispidulo-ciliatis infra incrassatis pallidis 3-vittatis supra herbaceis laxis, pappi squamellis ca. 6 basi conjunctis fimbriatis usque ad 1.2 mm. longis.

Herbaceous, erect, simple, 2-headed, the stem slender, striatulate, tuberculate-strigillose, below glabrate. Leaves opposite below, alternate above, lanceolate, long-acuminate, acuminate at base, obscurely and subremotely serrulate (teeth 7–15 pairs, appressed), above green, lepidote-strigillose, below paler, subdensely appressed-hispidulous, gland-dotted, triplinerved, 9–14.5 cm. long, 1–2.6 cm. wide; petioles of the lower leaves unmarginated, 4–7 mm. long, of the upper obsolescent. Heads 3.5 cm. broad, on strigose naked peduncles 4 cm. long; disk 1 cm. high, 1.3 cm. thick. Involucre 3-seriate, 8–9 mm. high, graduated, the phyllaries lanceolate, acute, hispidulous and gland-dotted, hispidulous-ciliate on margin, below thickened, pale, and 3-vittate, above herbaceous, lax, 1-vittate. Rays about 10, yellow, gland-dotted on back but scarcely pubescent, oblong-linear, 1 cm. long, 2.8 mm. wide; disk-corollas yellow, sparsely hirtellous, 4.7–5.5 mm. long (tube 1.3–1.5 mm.). Pales acute, mucronulate, sparsely pubescent above, 6–7 mm. long. Achenes (immature) subsericeous, 3.7 mm. long. Awns 2, slender, ciliate, unequal, 2.7 mm. long; squamellae about 6, unequal, united at base, fimbriate, up to 1.2 mm. long. — BRAZIL: RIO GRANDE DO SUL: rather moist pasture, near a wood, Rincão dos Valles near Cruz Alta, 20 April 1893, *Malme* 794 (TYPE: B. M., photog., tracing, and fragm. G.).

104. *V. villaricensis*, sp. nov. Herbacea ramosa, caule piloso-strigoso, foliis anguste lanceolatis longissime acuminatis basi acutis vel acuminatis obscure serrulatis supra subaspere strigillosis pilis basi vix incrassatis subtus pallidis ad venas submolliter strigoso-pilosis inter venas strigilloso-pilosulis 3-nerviis et penniveniis 6.5–13 cm. longis 9–22 mm. latis, capitulis paucis 3 cm. latis, involucri 3-seriati 9 mm. alti paullulum gradati phyllariis lanceolatis acuminatis exterioribus plus minusve falcatis basi induratis costatis glabris vel glabratibus (margine strigoso-ciliato et costa strigosa exceptis) supra herbaceis canescenter strigosis, squamellis pappi 6–8 fragilibus basi conjunctis 0.5 mm. longis.

Herbaceous, erect, branched, the branches divergent-ascending, the stem purplish, obscurely striatulate, strigose-pilose with appressed hairs scarcely tuberculate at base. Leaves lanceolate, very long-acuminate, acuminate or acute at base, callose-mucronate at apex, more or less falcate, obscurely serrulate (teeth minute, subremote, mucronulate, 7-14 pairs), above green, rather harshly strigillose, the hairs scarcely thickened at base, beneath paler, along the veins rather softly strigose-pilose (the hairs more or less thickened at base), between the veins strigillose-pilosulous, gland-dotted, 3-nerved and feather-veined, 6.5-13 cm. long, 9-22 mm. wide; petioles unmarginated, tuberculate-strigose and strigillose-pilose, 2-6 mm. long. Heads few, 3 cm. wide, on terminal and axillary naked or bracteolate peduncles 1.2-11.4 cm. long, ascending-strigose-pilose below the heads; disk 1 cm. high, 1.4 (fruit) 1.6 cm. thick. Involucre 3-seriate, slightly graduated or subequal, 9 mm. high, the phyllaries lanceolate, acuminate, the outer (sometimes also the inner) more or less falcate, acutely callose-mucronate, at base indurated, costate, glabrate or glabrous (the strigose-ciliate margin and strigose costa excepted), above herbaceous, canescently strigose, 1-nerved. Rays about 12, oblong-oval, emarginate, sparsely puberulous on back and gland-dotted, 10-11 mm. long, 4-4.5 mm. broad; disk-corollas yellow, below and on veins and teeth very sparsely strigillose, 3.6 mm. long (tube 0.7 mm.). Pales obtuse to subtruncate, at apex erose, sparsely strigillose above, 5.5 mm. long. Achenes black, more or less striate, sparsely strigillose above, 3 mm. long, 1 mm. broad. Awns 2, lanceolate, acuminate, paleaceous, fragile, denticulate, 2.2 mm. long; squamellae about 6-8, united at base, quadrate, lacerate, like the awns fragile, 0.5 mm. long. — PARAGUAY: Cordillera de Villa-Rica, Jan. 1905, *Hassler* 8627 (TYPE: B. M.).

105. *V. Hilairei*, sp. nov. *Herbacea foliosa sursum parce ramosa, caule dense strigilloso, foliis alternis sessilibus inferioribus anguste lanceolatis acuminatis basi cuneate acuminatis obscure serrulatis utrinque strigillosis vix scabris 9-13.5 cm. longis 1.7-3.1 cm. latis, superioribus oblongo-lanceolatis 4-7 cm. longis 8-10 mm. latis, disco 12 mm. alto, involucri 3-4-seriati gradati phyllariis lanceolatis acutis infra induratis costatis supra herbaceis dense hispidulis et ciliatis vel interdum subglabratibus margine ciliato excepto, radiis ca. 16, acheniis dense sericeis.*

Herbaceous, leafy, sparingly branched above, about 2 m. high, the stem densely strigillose. Leaves alternate, gradually reduced above, sessile, the lower lanceolate, acuminate, narrowed to the base, obscurely serrulate, 3-nerved, strigillose but scarcely scabrous both sides, 9–13.5 cm. long, 1.7–3.1 cm. wide, the upper oblong-lanceolate, 4–7 cm. long, 8–10 mm. broad. Peduncles bracteate, 8–15 cm. long; disk 1.2 cm. high, 1.7 cm. thick. Involucre 3–4-seriate, graduated, the phyllaries lanceolate, acute, below indurated and costate, at apex herbaceous, loose, densely hispidulous and ciliate, or sometimes glabrate except for the ciliolate margin. Rays about 16, yellow, 1.2 cm. long, 3 mm. wide; disk-corollas yellow, puberulous at base and apex, 4.8 mm. long. Pales somewhat widened at apex, erose, puberulous. Achenes densely sericeous. Awns 2, twice as long as the 4 fimbriate squamellae. — BRAZIL: MINAS GERAES: 1816–21, A. *St. Hilaire* 1208 (TYPES: Par.).

106. V. TUCUMANENSIS (H. & A.) Griseb. Herbaceous?, more or less branched above, bearing 2–11 heads in a narrow cymose panicle; stem pale, somewhat sparsely tuberculate-strigillose, glabrate below except for the persistent bases of the hairs. Leaves alternate, linear-lanceolate, acuminate at each end, mucronate, entire or very indistinctly serrulate, very slightly revolute, above dark green, subtuberculate-strigillose, beneath distinctly paler and evenly but not densely strigillose-pilosulous, the hairs longer along the veins (which are more or less translucent), and gland-dotted, 8–18 cm. long, 2–9 mm. wide, 1-nerved and feather-veined, often with short leafy branches in their axils; petioles 1–2 mm. long. Heads 1.8–3.5 cm. wide, on striate strigillose peduncles slightly thickened below the head, 1.6–7 cm. long; disk 9–(fruit)14 mm. thick, 8–10 mm. high, cylindrical-campanulate. Involucre 4–5-seriate, strongly graduated, 8–10.5 mm. high, with one or two bractlets at base similar to the phyllaries; outermost phyllaries lance-oblong, 4 mm. long, 1.4 mm. wide, the next series similar but longer, the 2–3 inner series gradually much longer and broader (up to 3.5 mm. wide), all mucronulate, very strongly indurated below, pale and ribbed, with shorter abruptly herbaceous more or less spreading triangular tip, ciliolate on margin, otherwise nearly glabrous. Rays about 12, oblong, 3–4-dentate, 9 mm. long, 2.5 mm. wide; disk-corollas minutely strigillose chiefly below, 5 mm. long (tube 0.8 mm.). Pales mucronulate, sparsely hirtellous above,

7.5 mm. long. Achenes (immature) sericeous. Awns 2, or with a third shorter one, slender, 3–3.8 mm. long; squamellae about 6, oblong, acuminate, lacerate-fimbriate, unequal, about 1.2 mm. long. — Griseb. ! Goett. Abh. xix. 183 (1874). *Leighia tucumanensis* H. & A. ! Hook. Journ. Bot. iii. 314 (1841). — ARGENTINA: in woods near Tucuman, *Tweedie* 1203 (TYPE: K.); Alto de las Salinas, Tucuman, 25 April 1872, *Lorentz* 309 (Ber., fragm. G.); l. c., *Lorentz* 477 (Ber.); La Cruz, *Lorentz* 268 (Ber.).

107. V. *HISPIDA* Baker. Erect herbaceous perennial, 1 m. high, simple below the inflorescence, the stem strigose-pilose or -pilosulous with sometimes spreading hairs, more densely so above, sometimes glabrate below, leafy. Leaves alternate, very narrowly lanceolate, acuminate at both ends, barely acute at the mucronulate apex, entire, strongly revolute, 3-nerved, dull green both sides, above harshly and densely tuberculate-strigillose, beneath hispid along the midvein, elsewhere hispidulous and gland-dotted, sessile, 5.5–8.5 cm. long (the middle longest), 3.5–6 mm. wide. Heads about 6–8, 3.5–5 cm. wide, on canescent-strigose peduncles 5–9 cm. long; disk 7–11 mm. high, 12–18 mm. wide. Involucre 2(–3)-seriate, graduated, 9–12.5 mm. high, its phyllaries lanceolate or lanceolate-oblong, attenuate, callose-mucronate, densely tuberculate-hispidulous, somewhat indurated and ribbed below, herbaceous above, the tips appressed or rather loose. Rays about 16, oblong-linear, 18 mm. long, 3–6.2 mm. wide; disk-corollas puberulous below and on the teeth, 4.6 mm. long (tube 1.1 mm.). Pales obtuse to subtruncate, mucronate, tuberculate-strigillose above, 7.5 mm. long. Achenes (very immature) hispidulous at apex. Awns stoutish, 1.2 mm. long; squamellae about 6, unequal, lacerate, united to above the middle, 1 mm. long. — Baker ! in Mart. Fl. Bras. vi. pt. 3. 220 (1884). — BRAZIL: GOYAZ: *Pohl* 578 (TYPE: K., fragm. G.).

108. V. *ANCHUSAEFOLIA* (DC.) Baker. Erect herbaceous perennial, 0.8 m. high or more, the stems simple or branched above, bearing 1–9 heads, tuberculate-strigose and -strigillose. Leaves numerous, alternate, or rarely opposite below, from narrowly oblong or lance-oblong to linear, acute or acutish, callose-mucronate, rounded or rounded-cuneate at the barely petioled base, slightly revolute, obscurely and distantly serrulate (teeth 4–5 pairs, very appressed) or subentire, equally green both sides, tuberculate- or

usually lepidote-strigillose on both faces, the swollen hair-bases persistent and conspicuous especially above, 2.5–8 cm. long, 2.5–13 mm. wide; petioles strigillose, unmarginated, 1–3 mm. long. Peduncles axillary and terminal, normally monocephalous, 3–20 cm. long, naked or bracteate, tuberculate-strigillose and -strigose; heads 3–5.5 cm. wide; disk 8–(fruit)17 mm. high, 1.4–(fruit)2.3 cm. thick. Involucre 3(–4)-seriate, distinctly graduated, 7–10 mm. high, its phyllaries lance-attenuate or the inner merely oblong-lanceolate and acute, callose-mucronulate, densely and subcanescently tuberculate-strigillose, slightly indurated and ribbed at base, herbaceous above, the tips loose and herbaceous or sometimes appressed. Rays 10–14, oblong to oblong-oval, 1.1–2.2 cm. long, 3.8–7.2 mm. wide; disk-corollas puberulous chiefly below, 6 mm. long (tube 1.3–1.5 mm.). Pales subobtusate, mucronulate, strigillose on back, 8 mm. long. Achenes blackish or mottled, appressed-pilose, the hairs sometimes rufous, 5–5.5 mm. long, 1.8 mm. wide. Awns 3–4 mm. long or less; squamellae 6–10, united to middle or nearly to apex, lacerate-fimbriate, 1.5–2.8 mm. long. — Baker ! in Mart. Fl. Bras. vi. pt. 3. 222 (1884); Arechav. Ann. Mus. Nac. Montevid. vi. pt. 3. 333. t. 70 (1908). *Rudbeckia densifolia* Sm. in Rees, Ency. xxx. no. 10 (1819), ex parte, fide Baker, l. c.; not *Viguiera densifolia* Baker (1884). *Leighia anchusaefolia* DC. ! Prod. v. 580 (1836). *L. dissitifolia* DC. ! l. c. 581 (1836); not *Viguiera dissitifolia* Baker, l. c. 225 (1884). *L. lomatoneura* DC. ! l. c. 581 (1836). *L. immarginata* DC. ! l. c. 581 (1836). *L. stenophylla* H. & A. ! Hook. Journ. Bot. iii. 313 (1841). *L. Baldwiniana* Nutt. ! Trans. Am. Philos. Soc. ser. 2. vii. 365, footnote (1841). *Viguiera stenophylla* (H. & A.) Griseb. Goett. Abh. xxiv. 193 (1879); Baker, l. c. 221 (1884); Arechav. l. c. 332 (1908). *Helianthus angustifolius* Spreng. (not L.) ex Baker, l. c. 221 (1884), as syn. *H. montevidensis* Spreng. ex Baker, l. c. 221 (1884), as syn. — Divisible on leaf-form into two entirely intergradient varieties, corresponding to *V. anchusaefolia* and *V. stenophylla* as maintained by Baker.

Var. **genuina**: foliis anguste oblongis vel lanceolato-oblongis 2.6–6.7 cm. longis (2.5–)5–13 mm. latis. — *Rudbeckia densifolia* Sm. l. c. *Leighia anchusaefolia*, *L. dissitifolia*, & *L. lomatoneura* DC. l. c. *L. Baldwiniana* Nutt. l. c. — URUGUAY: near the top of Montevideo Hill, Gillies 868 in part (K.); Montevideo, March

1858, *Gibert* 1428 (K.); stony ground, Montevideo, Jan. 1877, *Arechavelata* 4121 (K., fragm. G.). BRAZIL: without definite locality, *Sello* (G., U. S.); RIO GRANDE DO SUL: *Herb. Imp. Brésil* 875 (TYPE of *L. anchusaefolia*: Par., Prod.), 878 (TYPE of *L. lomatonaura*: Par., Prod.), 881 (TYPE of *L. dissitifolia*: Par., Prod., photog. G.). South America without definite locality (Montevideo?), *Baldwin* (TYPE of *L. Baldwiniana*: B. M., tracing G.).

Var. **immarginata** (DC.), comb. nov.: foliis linearibus vel lineari-oblongis 2.5–8 cm. longis 2.5–8 mm. latis. — *Leighia immarginata* DC. l. c. *L. stenophylla* H. & A. l. c. *V. stenophylla* (H. & A.) Griseb. l. c. *Helianthus angustifolius* Spreng. (not L.) and *H. montevidensis* Spreng. ex Baker, l. c. — URUGUAY: Montevideo, *Capt. King* 203, 204 (B. M.), fields, Feb. 1867, *Gibert* 118 (K.), *Gillies* 70 (K.), *Tweedie* 875 (COTYPE of *L. stenophylla*: K.), March 1875, *Arechavelata* 4115 (K.); near the top of Montevideo Hill, *Gillies* 868 in part (K.); near the Santa Lucia River, March 1869, *Gibert* 984 (K.); west of Rio Grande, 1837, *Tweedie* (K.); Fray Bentos, Feb. 1877, *Arechavelata* (K.). BRAZIL: without definite locality, *Sello* 2509 (K.); RIO GRANDE DO SUL: *Herb. Imp. Brésil* 1052 (TYPE of *L. immarginata*: Par., Prod.). ARGENTINA: Buenos Aires, *Tweedie* (COTYPE of *L. stenophylla*: K.).

109. V. **discoidea** (Griseb.), comb. nov. Herbaceous, erect, the stem strigillose, often gland-dotted, leafy, at apex cymosely branched, bearing 5–9 heads. Leaves alternate above, those of the branchlets opposite, linear or linear-filiform, acuminate, sessile, more or less revolute, above tuberculate-strigillose, beneath densely canescent-strigillose and gland-dotted, 1-nerved, 3.5–8 cm. long, 1.2–6.8 mm. wide. Peduncles linear-bracted, monocephalous, 2.5–10.5 cm. long; heads discoid, 1–1.3 cm. high, 1–1.5 cm. thick. Involucre 4–5-seriate, graduated, 6–7.5 mm. high, the phyllaries oblong, acutish, densely strigillose and strigose, more or less gland-dotted, or in age subglabrate, rather strongly indurated and ribbed below, with short herbaceous apex, the outer reflexed at tip. Disk-corollas yellow, sparsely puberulous, 5.2 mm. long (tube 1 mm.). Pales truncate, erose at tip, sparsely hispidulous on back, 7.5 mm. long. Achenes sparsely sericeous, 3.5 mm. long. Awns 2.5 mm. long; squamellae about 8, unequal, lacinate, 1–1.5 mm. long. — *V. stenophylla* (H. & A.) Griseb. var. *discoidea* Griseb. ! Goett. Abh.

xxiv. 193 (1879). — ARGENTINA: Laguna del Volcan, Prov. Jujuy, 12–13 May 1873, *Lorentz & Hieronymus* 727 (COTYPE: Ber., photog. and fragm. G.); Maimara, Prov. Jujuy, 14 May 1873, *Lorentz & Hieronymus* 775 (COTYPE: Ber., photog. and fragm. G.).

110. V. ATACAMENSIS Phil. Herbaceous (?), the branches erectish; stem rather sparsely tuberculate-strigillose, the hair-bases persistent. Leaves alternate, linear, acute to subacuminate at each end, mucronate, 1-nerved, feather-veined, above green, densely tuberculate-strigillose, beneath somewhat paler, densely gland-dotted and evenly tuberculate-strigillose (the hairs longer along the costa), often with short leafy branches in their axils, slightly revolute, 3.5–7.5 cm. long, 2–4 mm. wide; petioles 1–2 mm. long. Heads rather numerous, narrowly cymose-panicked, 1.4–2 cm. wide, on striate tuberculate-strigillose peduncles about 4 cm. long; disk 9–(fruit)12 mm. high, 9–(fruit)15 mm. thick, campanulate. Involucre 3-seriate, graduated, 6–6.5 mm. high, the phyllaries lanceolate or long-oblong, acute to subacuminate, callous-mucronate, below strongly indurated, pale, and somewhat ribbed, there nearly glabrous except for the tuberculate-strigillose margin, with much shorter densely tuberculate-strigillose reflexed or spreading herbaceous apex. Rays 10–12, 7–9.5 mm. long, 2.5 mm. wide; disk-corollas strigillose chiefly below and on the teeth, 5.5 mm. long (tube 1 mm.). Pales mucronulate, scarious, few-ribbed, hirtellous on keel, 7.5 mm. long. Achenes (submature) rather sparsely strigose-pilose, 4.5 mm. long. Awns 3.8–4.5 mm. long; squamellae about 4, oblong-lanceolate, acuminate, united at base, lacerate, 2 mm. long. — *Viguiera* ? *atacamensis* Phil. ! Anal. Mus. Nac. Chil. Bot. 1891. 48 (1891). *Viguiera linearis* Reiche, Fl. Chil. iv. 90 (1905), not Sch. Bip. (err. iden.). — CHILI: Atacama, R. A. *Philippi* (COTYPE OR TOPOTYPE: Ber., K., photog. and fragm. G.). — T. 2. FIG. 25, T. 3. FIG. 14.

111. V. **breviflosculosa**, sp. nov. Herbacea supra sparse ramosa foliosa, caule valido densissime piloso pilis submollibus patentibus vel retrorsis, foliis alternis ovatis vel ovali-ovatis apice obtusis vel rotundatis vel subtruncatis basi leviter cordatis amplectentibus supra aspere tuberculato-strigillosis subtus paullo pallidioribus subdense tuberculato-hispido-pilosis subreticulato-venosis 1.8–3.7 cm. longis 1.2–2.2 cm. latis, capitulis paucis, involucri sub-4-seriati 6–7 mm. alti phyllariis lanceolatis vel oblongo-lanceolatis

acutis dense canescenterque tuberculato-strigosis et -strigillosis basi induratis pallidis subcostatis apice longiore herbaceo plus minusve patente.

Herbaceous, erect, about 1 m. high, above very sparsely branched, leafy; stem stout (5 mm. thick below), substriatulate, very densely pilose, the hairs rather soft, spreading or retrorse, at base slightly tuberculate. Leaves alternate, ovate or oval-ovate, sessile, at apex obtuse or rounded to subtruncate, at base slightly cordate, amplexant, above the middle obscurely crenate-denticulate or subentire, 3(-5)-nerved, dull green above, harshly tuberculate-strigillose, beneath slightly paler, rather densely tuberculate-hispid-pilose and -pilosulous, subreticulate-venose, 1.8-3.7 cm. broad, 1.2-2.2 cm. wide, the upper gradually reduced. Heads about 7, 2.2 cm. wide, on terminal and axillary naked or 1-bracteolate rather softly spreading-hispid-pilose peduncles 4.5-7.5 cm. long; disk 8-11 mm. high, 10-14 mm. thick. Involucre sub-4-seriate, slightly graduated, 6-7 mm. high, the phyllaries lanceolate or oblong-lanceolate, acute, callose-mucronate, densely and canescently tuberculate-strigose and above -strigillose, at base indurated, pale, subcostate, the longer herbaceous apex more or less spreading. Rays about 10, oval-oblong, yellow, puberulous on veins of back, 9.5 mm. long, 3.5 mm. wide; disk-corollas yellow, minutely puberulous below and on veins and teeth, 3.8 mm. long (tube 0.8 mm., teeth 1 mm.), the tube amplified at base, the throat campanulate, the teeth recurved. Pales acute, mucronate, minutely strigillose on keel and apex, 6.2 mm. long. Achenes black, short-pubescent, somewhat ribbed, more or less thickened, 4 mm. long, 2 mm. wide. Awns 2, slender, unequal, ciliate, 2-3 mm. long; squamellae about 6, unequal, lacerate, connate to middle, 1.3 mm. long. — URUGUAY: campos, Tacuarembo, Feb. 1897, *Arechavelata* 49 (TYPE: K., fragm. G.). — In habitual features most closely allied to the *Bracteatae*, but with the involucre more nearly of the *Euaureae*.

Subseries B. **Pusillae**, subser. nov. Annuae ramosae vel simplices, foliis infra oppositis supra alternis scabre tuberculato-hispidulis vel -hispidis, involucri 2-3-seriati phyllariis linearibus vel oblongo-lanceolatis infra induratis apice subherbaceis dense hispido-pilosis apice plus minusve reflexis vel laxis, acheniis plus

minusve sericeo-pilosis, pappi squamellis 4 laciniatis vel fimbriatis. Species typica *Tithonia pusilla* Gray (= *V. pusilla* (Gray) Blake).

— Two species of Peru.

- a. Disk-corollas purplish at apex; achene black, pubescent only on margin and down middle of sides 112. *V. simsioides*.
 a. Disk-corollas yellow throughout; achene mottled black-and-white, pubescent all over 113. *V. pusilla*.

112. *V. simsioides* Blake. Paniculately branched annual, 5.5 dm. high, the stem glabrate below, striatulate, above especially in inflorescence glandular-pubescent, the hairs spreading, thickened at base. Lowest leaves (about 4 pairs) opposite, obovate to ovate, acute, cuneate at base, dentate (teeth triangular, depressed), scabrously tuberculate-hispidulous, thin, 3-nerved, 4–7 cm. long, 2–2.7 cm. wide, on submargined petioles 1–1.5 cm. long; the upper ovate to lanceolate, acuminate, gradually reduced. Peduncles naked or bracteolate, monocephalous, 4.5–8 cm. long; heads 2.8–3.5 cm. wide; disk 8–11 mm. high, 12–15 mm. thick. Involucre 2-seriate, graduated, 7–9 mm. high, the phyllaries linear, 1 mm. wide, obtusish, densely hispid-pilose, reflexed, with indurated base and subherbaceous apex. Rays 10–12, yellow, oblong-oval, 11–12 mm. long, 4.5–6 mm. wide; disk-corollas yellow below, purplish above, puberulous on the tube, 5 mm. long (tube 1.2 mm.). Pales obtuse, sparsely glandular, 7 mm. long. Achenes black, silky-pilose on margins and down middle of sides, crustaceous at base, 3.5–4 mm. long. Awns dilated at base, 1.3–2 mm. long; squamellae 4, quadrate, free, lacinate, 1 mm. long. — Blake! Bot. Jahrb. liv. Beibl. no. 119. 48 (1916). — PERU: mountains north of Chosica, 1500–1600 m., 17 April 1910, *Weberbauer* 5355 (TYPE: Ber., photog. and fragm. G.); *Purruchuca*, *Mathews* 1042 (K., fragm. G.). — Named from its resemblance, particularly in involucre features, to *Simsia amplexicaulis* (Cav.) Pers.

113. *V. pusilla* (Gray), comb. nov. Slender erect annual, simple or sparsely branched, 11–14 cm. high, the stem slender, striate, rather sparsely hispid-pilose with ascending hairs with slightly tuberculate bases, and somewhat granular. Leaves few, opposite below (about 3 pairs), alternate above, narrowly lanceolate, narrowed to an obtuse apex, acuminate at base, subentire, triplinerved, rather densely and harshly tuberculate-hispid or tuberculate-hispid-pilose with ascending or subappressed hairs, slightly

paler beneath, 1.5–2.5 cm. long, 4–6 mm. wide, on petioles 1–2 mm. long. Heads 1–4, terminating stem and branches, about 2 cm. wide; disk 9–10 mm. high, 6–(fruit)15 mm. thick; peduncles short, densely tuberculate-hispid-pilose with spreading hairs. Involucre 2–3-seriate, subequal, 5–6 mm. high, the phyllaries narrowly oblong to oblong-lanceolate, obtuse to acutish, with short somewhat indurated and ribbed base and more herbaceous subappressed or slightly loose apex, in youth densely spreading-hispid-pilose and hispidulous-pilosulous with dull hairs, in age becoming glabrate below. Rays about 8, oblong, yellow, 6 mm. long, 2 mm. wide; disk-corollas yellow throughout, hispidulous chiefly at base of throat and on teeth, 4.5 mm. long (tube 1 mm.). Pales acute to shortly acuminate from a 3-toothed apex, hispidulous-pilosulous above on back, with dark midrib, 6–7.5 mm. long. Achene in age somewhat thickened, mottled, rather densely appressed-pilose, 5 mm. long. Awns slender, strigose, 3.5 mm. long; squamellae 4, fimbriate, united at extremest base, 1.5 mm. long. — *Tithonia pusilla* Gray ! Proc. Am. Acad. v. 124 (1861–62); not *Viguiera pusilla* Less. ex Baker in Mart. Fl. Bras. vi. pt. 3. 194 (1884), as syn. of *Aspilia pusilla* Baker. — PERU: Obrajillo, 1838–42, *U. S. Exploring Expedition under Wilkes* (TYPES: G., U. S.). — Undoubtedly a dwarfed state of a larger plant, but clearly distinct from its nearest relative, *V. simsioides* Blake. — T. 2. FIG. 26, T. 3. FIG. 13.

Series E. **Bracteatae**, ser. nov. Herbae perennes, foliis ovalibus ad linearibus sessilibus vel subsessilibus, capitulis 1–∞ saepe majusculis, involucri 3–5-seriati valde gradati phyllariis valde induratis costatis et vittatis apice saepe abrupte herbaceis. — Species typica *V. bracteata* Gardn. — Erect perennials of Brazil and Paraguay, with mostly sessile alternate or opposite leaves and rather large or medium heads; involucre strongly graduated, 3–5-seriate, the phyllaries very strongly indurated, ribbed, and vittate almost to apex, or with abrupt herbaceous tip. Sp. 114–127.

- a. Leaves linear to linear-oblong or -lanceolate, b.
- b. Leaves harshly tuberculate-hispid 124. *V. nervosa*.
- b. Leaves merely strigillose, c.
- c. Phyllaries appressed, d.
- d. Stem glabrous below; involucre 4-seriate, 6–8.5 mm. high 119. *V. amphichlora*.
- d. Stem tuberculate-strigillose below; involucre 5-seriate, 9–10 mm. high 120. *V. imbricata*.

- c. Phyllaries squarrose, e.
 e. Involucre 4-seriate; phyllaries slightly strigillose and ciliolate at apex.....121. *V. bracteata*.
 e. Involucre 5-seriate; phyllaries densely hispidulous at apex.....122. *V. quinqueremis*.
- a. Leaves ovate or oval to oblong, f.
 f. Leaves green beneath, g.
 g. Phyllaries with conspicuous spreading herbaceous tips; squamellae only 4, or apparently none.....114. *V. arenaria*.
 g. Phyllaries with inconspicuous appressed scarcely herbaceous tips; squamellae 6-10, normal, h.
 h. Heads numerous; lower leaves up to 8.5 cm. broad.....117. *V. pilicaulis*.
 h. Heads 1-5; lower leaves 1.5-3 cm. wide, i.
 i. Leaves strongly venulose, tuberculate-hispid and strigillose; peduncles 1.3-3.2 dm. long.....123. *V. oblongifolia*.
 i. Leaves not venulose, merely strigillose; peduncles 3.5-14.5 cm. long.....125. *V. Gardneri*.
- f. Leaves pale or canescent beneath, j.
 j. Phyllaries very bluntly rounded at tip, k.
 k. Involucre 7-10 mm. high.....126. *V. robusta*.
 k. Involucre 1.2-1.4 cm. high.....127. *V. macrocalyx*.
- j. Phyllaries acute or acutish, l.
 l. Leaves oblong to lanceolate, acute, entire, crowded.....118. *V. hypoleuca*.
 l. Leaves oval to ovate, crenate, serrulate, or subentire, m.
 m. Leaves ovate to oval, strongly crenate-serrate.....126. *V. robusta*.
 m. Leaves ovate or oval, not strongly crenate, n.
 n. Leaves oval-oblong; heads few (1-2).....115. *V. ovatifolia*.
 n. Leaves ovate; heads numerous.....116. *V. radula*.

114. *V. ARENARIA* Baker. Freely branched, about 1 m. high, the stem and branches leafy, densely hispid-pilose and hispidulous-pilosulous with somewhat tuberculate-based mostly spreading hairs, and more or less glandular. Leaves mostly alternate, ovate to ovate-oblong or the upper oblong, sessile by a rounded scarcely clasping base, acutish at the mucronulate apex, crenate-serrate, 3-nerved and strongly reticulate beneath, above dark green, tuberculate-hispidulous with subappressed hairs, beneath paler green, equally but subsparingly hispidulous-pilosulous with loosely spreading tuberculate-based hairs, the larger 6-7 cm. long, 2.7-3.3 cm. wide, the upper much smaller. Heads corymbose-panicled at apices of branches, about 3 cm. wide, on peduncles 1.5-5.5 cm. long, naked or bracteolate; disk 8.5-10 mm. high, 11-13 mm. wide. Involucre 4-5-seriate, 1-1.2 cm. high, graduated, the phyllaries ovate to oblong-ovate, with firm pale indurated glabrous or more or less tuberculate-hispid-pilose base and loosely ascending or spreading hispid-pilose and gland-dotted 3-nerved herbaceous acute apex, that of the inner phyllaries much longer than the in-

durated base. Rays rather narrowly oblong, 1.5-“2.4” cm. long; disk-corollas sparsely hispidulous at base of throat and on teeth, 5 mm. long (tube 1 mm.). Pales subglabrous, subacute, about 7 mm. long. Achenes ciliate, glabrous on sides, about 3 mm. long. Awns 2-2.8 cm. long, persistent, one of them sometimes reduced to a squamella; squamellae only a pair at base of each awn, or sometimes apparently wanting. — Baker ! in Mart. Fl. Bras. vi. pt. 3. 226 (1884). — BRAZIL: SAO PAULO: sandy places near Arraial de Cajuru, Mar. 1857, *Regnell* III. 771* (TYPE: fragm. G. [ex hb. Stockholm.]). — Description in part from Baker, l. c.

115. *V. OVATIFOLIA* (DC.) Baker. Herbaceous erect perennial, the stem slender, terete, subglabrous. Leaves alternate, or subopposite below, remote, oval-oblong, acute or acutish, subsessile by a truncate or truncate-rounded base, subentire, 3-nerved, above dark green, sparsely strigillose, beneath pale, velvety-hirsute-pilose. Heads few (2 in specimen), terminal and axillary, about 2 cm. wide, on naked or 1-bracteolate peduncles 8.8-10 cm. long, puberulous at apex; disk 1 cm. high, 1.8 cm. thick. Involucre about 4-seriate, graduated, the phyllaries oblong, acute or acutish, with coriaceous vittate base and short deltoid herbaceous tip, ciliate. Rays about 10, elliptic, rather small. Achenes with 1-2 awns and several small squamellae, the latter united nearly to apex. — Baker in Mart. Fl. Bras. vi. pt. 3. 226 (1884). *V. ovalifolia* Baker, l. c. 218, in key (sphalm.). *Leighia* ? *ovatifolia* DC. ! Prod. v. 583 (1836). — BRAZIL: SAO PAULO: in fields, 1833, *Herb. Imp. Brésil* 410 (TYPE: Par., photog. and sketch G.). — Description chiefly compiled from DeCandolle, l. c.

116. *V. RADULA* Baker. Freely branched above, about 1 m. high, the stem moderately stout, rather sparsely hispid-pilose with tubercular-based hairs. Leaves alternate, ovate to (upper) oblong-lanceolate, acute to acuminate, rounded at base, slightly veiny beneath, obscurely serrulate, above green, rather densely tuberculate-strigillose with shorter and longer hairs, beneath pale, somewhat obscurely pustulate, rather densely and subcanescently hispid-pilose with more or less spreading or subincurved hairs with tuberculate bases, and somewhat gland-dotted, 6 cm. long, 2.8 cm. wide, on flattish naked petioles 4 mm. long; the upper much smaller. Heads numerous, loosely corymbed, about 2.8 cm. wide; peduncles naked or bracteolate, 6-9 cm. long, densely

hispid-pilose and glandular below the head; disk 12.5 mm. high, 18 mm. thick. Involucre 4-seriate, graduated, 8 mm. high, the phyllaries oblong or oblong-ovate, acute or acutish, with pale indurated body, glabrous, or hispid-pilose on margin and midline, and shorter loose or spreading densely tuberculate-hispid-pilose deltoid herbaceous tip. Rays about 12 mm. long, 3 mm. wide; disk-corollas glabrous except on teeth, 5.5 mm. long (tube 1 mm.). Pales firm, with slightly cucullate sparsely pubescent apex, 7-8 mm. long. Achenes more or less appressed-pilose, about 4 mm. long. Awns about 2.5 mm. long; squamellae about 3 pairs, irregularly lacerate, united at base or to middle, 1.5 mm. long or less. — Baker ! in Mart. Fl. Bras. vi. pt. 3. 223 (1884). — BRAZIL: MINAS GERAES: less elevated pastures of Caldas, Apr. 1865 and Apr. 1867, *Regnell* I. 190* (TYPES: fragm. G. [ex herb. Stockholm.]). — Description in part from Baker, l. c. — T. 2. FIG. 27.

117. *V. pilicaulis*, sp. nov. Herbacea foliosa infra inflorescentiam simplex, caule valido densissime hispidopiloso apice ca. 18-capitato, foliis alternis inferioribus rotundato-ovalibus 8.5 cm. latis mediis et superioribus ovatis reticulato-venosis serratis vel crenato-serratis supra scaberrime tuberculato-hispidis subtus piloso-hispidis, involucri 5-seriati 8-9 mm. alti phyllariis oblongis induratis vittatis subcoriaceis hispidulo-ciliolatis apice abrupte breviterque herbaceis.

Erect herbaceous perennial, leafy, simple below the inflorescence, the stem stout (1.3 cm. thick), very densely hispid-pilose, striatulate, at apex cymosely paniculate-branched, bearing 17-18 heads. Leaves alternate, the lower rotund-oval, obtuse, 10 cm. long, 8.5 cm. wide, the middle and upper ovate, acute, mucronulate, truncate-rounded at base, 3-nerved and reticulate-venose, serrate with appressed mucronulate teeth (the lower crenate-serrate), above very harshly tuberculate-hispid, beneath hispid-pilose, more or less glandular, 5-7 cm. long, 2-3.5 cm. wide, the petioles tuberculate-hispid, 2-3 mm. long. Peduncles tuberculate-hispid, 1-9 cm. long; heads 2.5 cm. broad; disk 1-1.2 cm. high, 1-1.2 cm. thick. Involucre 5-seriate, 8-9 mm. high, graduated, the phyllaries oblong, thickened, vittate, subcoriaceous, pale, hispidulous-ciliolate (the outer also tuberculate-hispidulous), at apex with a deltoid subobtusate mucronulate more or less tuberculate abrupt herbaceous tip. Rays 10-11, yellow, oblong-oval, pubescent on back, 1-1.2 cm.

long, 3-4.5 mm. wide; disk-corollas yellow, puberulous below, 5 mm. long (tube 1 mm.). Pales glabrous, mucronulate, subtridenticulate, 8 mm. long. Achenes (very immature) sparsely appressed-villous, 3.5 mm. long. Awns 2, ciliolate, 2.2 mm. long; squamellae about 6, free, lanceolate, lacerate, 1 mm. long. — PARAGUAY: plateau and declivities of the Sierra de Amambay, Feb. 1907-08, *Rojas* (distr. *Hassler*) 10757 (TYPE COLL.: B. M., Ber., photog. and fragm. G.). — T. 2. FIG. 30.

118. *V. hypoleuca*, sp. nov. Herbacea infra inflorescentiam simplex, caule folioso hispido-piloso apice ca. 7-capitato, foliis oblongis vel lanceolatis integris acutis 5-nerviis supra viridibus lucidis subtus canescenter piloso-tomentosis, involucri 3-4-seriati 6-7 mm. alti phyllariis oblongis vel oblongo-ovatis appressis valde induratis hispidulo-ciliolatis apice breviter herbaceis saepe mucronulatis.

Herbaceous, erect, 1 m. high, simple below the inflorescence, the stem terete, striatulate, very leafy, whitish-brown, hispid-pilose, above hispidulous and more or less glandular, bearing about 7 heads. Leaves alternate, oblong to oblong-lanceolate or lanceolate, acute, entire, rounded at base, 5-nerved, above green and lucid, harshly strigillose at length subglabrous, beneath veiny, canescently pilose-tomentose, glandular, the lower 6-7 cm. long, 2.2-2.5 cm. wide, gradually smaller above. Bracts of inflorescence ovate-oblong, 1.4-3 cm. long; peduncles 0.4-10.7 cm. long, naked or 1-bracteate; heads 1.7 cm. wide; disk 8.5-10 mm. high, 9-14 mm. thick. Involucre 3-4-seriate, 6-7 mm. high, graduated, the phyllaries oblong, subacute, centripetally becoming broader and blunter, the innermost oblong-ovate, roundish at apex, all strongly indurated, subcoriaceous, costate, hispidulous-ciliolate, otherwise glabrous, with a short triangular herbaceous apex, often mucronulate. Rays about 8, yellow, oblong, 3.5-4 mm. long, 1.3 mm. wide; disk-corollas yellow, glabrous or with a few hairs, 4.5 mm. long (tube 0.8 mm. long). Pales truncate, hispidulous, 3-4-denticulate, 5-5.5 mm. long. Achenes black, hispidulous above, subquadrangular, 4 mm. long. Awns 2, spinulose-ciliolate, subtrigonus, strongly unequal, about 2.5 mm. long; squamellae lacerate-fimbriate, united at base, 0.7 mm. long. — BRAZIL: MATTO GROSSO: sandy rather grassy open place, Buriti, near Santa Anna da Chapada, 3 June 1894, *Malme* 1658 (TYPE: B. M., photog. and

fragm. G.). — Distributed as *V. robusta* Gardn., a very different species.

119. *V. amphichlora*, sp. nov. Herbacea elata, caule tenui infra glaberrimo supra sparse strigilloso 5-capitato, foliis alternis lineari-lanceolatis utroque acutis vel acuminatis integris scabre lepidoto-strigillosis prominenter trinerviis et penniveniis in faciebus ambabus pallide viridibus 6–8 mm. latis, involucri 4-seriati 6–8.5 mm. alti phyllariis oblongo-ovatis acutis costatis lepidoto-strigillosis et ciliolatis apice lanceolate herbaceo.

Tall herbaceous perennial, the stem slender, striatulate, grayish, very glabrous below, above sparsely strigillose, bearing 5 heads. Leaves alternate, narrowly linear-lanceolate, acute to acuminate at both ends, entire, scabrously strigillose, prominently trinerved and penniveined, of the same pale green hue on both sides, 5.6–6.7 cm. long, 6–8 mm. wide; petioles 1–1.5 mm. long. Bracts of inflorescence linear-lanceolate, 8–20 mm. long; peduncles moncephalous, 2.5–13.5 cm. long; heads 3 cm. broad; disk 8–(fruit) 12 mm. high, 13–(fruit) 17 mm. thick. Involucre 4-seriate, graduated, 6–8.5 mm. high, the phyllaries oblong-ovate, acute, costate-striate, callose-unguiculate, lepidote-strigillose and ciliate, appressed, with lanceolate herbaceous apex. Rays about 14, golden-yellow, oval, 6.5 mm. long, 2.5 mm. wide, sparsely pubescent on veins of back; disk-corollas yellow, strigillose below and on teeth, 4.5 mm. long (tube 0.7 mm.). Pales truncate, callose-mucronulate, striate, strigillose, 5.5–6.5 mm. long. Achenes blackish, oblong, puberulous on margin and apex, 4 mm. long, 2 mm. wide. Awns 2, lanceolate, acuminate, unequal, the longer 2.5 mm. long; squamellae about 6, acuminate, dentate-fimbriate, united nearly to apex, about half as long as awns. — PARAGUAY: region of the Yerbales of Maracayú, 1898–99, Hassler 5160 (TYPE: B. M., photog. and fragm. G.).

120. *V. IMBRICATA* Baker. Stem slender, tuberculate-strigillose especially below, very leafy, sparsely branched or simple below the inflorescence, the leaves sometimes with short leafy branches in their axils. Leaves narrowly lanceolate to linear, mostly opposite, the upper alternate, subacuminate at apex, acute at base, very obscurely crenate-serrulate or subentire, slightly revolute, 3-nerved and rather strongly feather-veined, above dull green, very sparsely tuberculate-strigillose, beneath concolored, sparsely

tuberculate-strigillose, 5–9 cm. long, 2–10 mm. wide, the upper passing gradually into the bracts of inflorescence; petioles scarcely any. Heads few (3–6), cymose-panicled, 2.5 cm. wide, on peduncles 5–15.5 cm. long; disk 1–1.4 cm. high, 9–15 mm. wide, campanulate. Involucre 5-seriate, strongly graduated, 9–10 mm. high, the outermost phyllaries lanceolate (4 mm. long, 1 mm. wide at base), the innermost oblong, acuminate, all strongly indurated and ribbed, with short lanceolate appressed herbaceous apex, callose-mucronate, hispidulous-ciliolate on margin below apex, the herbaceous tip slightly tuberculate-strigillose, the phyllaries otherwise nearly glabrous (only the outermost more or less strigillose). Rays 12, 8–10 mm. long, 2 mm. wide; disk-corollas strigillose below, 5.5 mm. long (tube 1.1 mm.). Pales obtusish, mucronate, sparsely strigillose above, 8.5 mm. long. Achenes (submature) sericeous with appressed hairs, 4 mm. long. Awns broadened, equalling the squamellae or barely shorter, 2 mm. long; squamellae 6, lacerate-fimbriate, united to middle. — Baker ! in Mart. Fl. Bras. vi. pt. 3. 220 (1884). — BRAZIL: without locality, *Pohl* 584 (TYPES: K., fragm. G.).

121. V. BRACTEATA Gardn. Leafy, 1–1.6 m. high, the stem greenish, finely and very sparsely strigillose, bearing 4–12 heads. Leaves (upper) linear-lanceolate or linear, alternate, acuminate, sessile, entire, tuberculate-strigillose but scarcely scabrous, 5–15 cm. long, 3.5–12 mm. wide. Peduncles monocephalous, 3–6-bracted, 9.4–14.6 cm. long; heads about 3.5 cm. wide; disk 14–15 mm. high, 14–19 mm. thick. Involucre 4-seriate, distinctly but slightly graduated, 10–12 mm. high, the phyllaries oblong-lanceolate, acute, strongly indurated below, loose and spreading or strongly reflexed at the abruptly herbaceous apex, there slightly strigillose and ciliolate, otherwise glabrous. Rays narrowly oblong-linear, 17 mm. long, 2.5 mm. wide; disk-corollas sparsely strigillose chiefly at base of throat, 4.5 mm. long (tube 1.3 mm.). Pales subacute, rather sharply keeled, glandular-strigillose above, 8 mm. long. Achenes strongly thickened, pubescent, 3.5 mm. long, 1.5 mm. wide. Awns very unequal, the longer 1.5 mm. long; squamellae about 8, lacerate-fimbriate, free, 0.8 mm. long, one or two sometimes longer and equal to the shorter awn. — Gardn. ! Lond. Journ. Bot. vii. 404 (1848); Baker in Mart. Fl. Bras. vi. pt. 3. 221 (1884). — BRAZIL: GOYAZ: dry grassy upland campos,

between Arrayas and San Domingos, May 1840, *Gardner* 4234 (TYPE COLL.: B. M., G., K.). — T. 2. FIG. 31.

122. *V. quinqueremis*, sp. nov. Herbacea foliosa, caule 4-6-cephalo strigilloso, foliis infimis oppositis ceteris alternis lineari-oblongis utroque acutis ubique strigosis et subtus granulari-strigillosis, involucri 5-seriati gradati phyllariis lanceolato-ovatis ciliolatis basi incrassatis costatis apice herbaceis dense hispidulis squarrosis, radiis 16-20.

Herbaceous, divaricately branched in the inflorescence, the stem strigillose, bearing 4-6 heads. Lowest leaves opposite, the others alternate, linear-oblong, acute at each end, sessile, entire, or very obscurely dentate, strigose both sides and granular-strigillose beneath, 3-nerved, 8-11 cm. long, 9-11 mm. wide, the uppermost reduced to bracts. Heads terminating the branches; disk 1 cm. high, 1.8 cm. thick. Involucre 5-seriate, graduated, the phyllaries lanceolate-ovate, ciliolate, thickened and costate at base, the apex herbaceous, squarrose, densely hispidulous. Rays 16-20, yellow, bidentate, 1.3 cm. long, 2 mm. wide; disk-corollas yellow, puberulous below, tubular-funnelform, 4.2 mm. long (tube 0.7 mm.). Pales slightly ampliate at apex, fimbriate, subcolorate, puberulous, 8 mm. long. Achenes (immature) densely sericeous. Awns . . . ; squamellae subequal, lacerate, 1.2 mm. long. — BRAZIL: MINAS GERAES: 1816-21, *A. St. Hilaire* 1216 (Par.), 1218 (TYPE: Par.).

123. *V. OBLONGIFOLIA* Gardn. Simple, about 5 dm. high, bearing 1-4 heads, the stem densely tuberculate-hispid, strigillose, and glandular. Leaves opposite to middle of stem, alternate above, oblong to ovate, subobtusate to acute, mucronulate, rounded at the barely petioled base, entire or subdenticulate, strongly venulose both sides, very slightly revolute, rough both sides with dense tubercular hispidity, glandular-dotted beneath, 4.8-6.5 cm. long, 1.2-3 cm. wide; petioles hispidulous, 1-1.5 mm. long. Peduncles strigillose-hispid especially above, 1.3-3.2 dm. long; heads 3-3.5 cm. wide. Involucre 4-seriate, strongly graduated, 9-10 mm. high, the phyllaries oblong, acute, lepidote-strigillose above, hispidulous-ciliolate on margin, coriaceous, glabrous, and vittate below, with rather abrupt triangular mucronate subherbaceous apex. Rays about 10, oblong, 12-14 mm. long, 4 mm. wide; disk-corollas hispidulous chiefly below, 4-5 mm. long (tube 1-1.2 mm.), the throat campanulate. Pales acute, densely tuberculate-hispidu-

lous or glabrous and merely ciliolate at the triangular apex, 8.5 mm. long. Achenes (submature) 5.5 mm. long, striate, hispidulous at apex. Awns much broadened below, 2 mm. long; squamellae about half as long, about 8–10, lanceolate, acuminate, lacinate, united below. — Gardn. ! Lond. Journ. Bot. vii. 402 (1848); Baker in Mart. Fl. Bras. vi. pt. 3. 225 (1884). — BRAZIL: GOYAZ: dry upland campos or in marsh, Mission of Duro, Oct. 1839, *Gardner* 3291 (TYPE COLL.: B. M., K., fragm. G.). Brazil without definite locality: *Burchell* 6535 (G., K.), 8294–2 (K.). — T. 2. FIG. 28.

124. *V. NERVOSA* Gardn. Simple or slightly branched above, 5–6 dm. high, bearing 3–4 heads terminal and from the upper axils. Stem tuberculate-hispid, the hair-bases persistent. Leaves opposite below, alternate above, linear-lanceolate, somewhat scythe-shaped, subacuminate, acute at base, subsessile or short-petioled, entire, slightly revolute, strongly 3-nerved and very strongly venose-reticulate, very rough both sides with tuberculate-based hairs, apparently somewhat glutinous, 6–12 cm. long, 6–13 mm. wide; petioles hispidulous, 1.5–3.5 mm. long. Peduncles 2–3 dm. long, monocephalous, tuberculate-strigillose, just beneath the head puberulous, naked or 2-bracteate; heads 3.5–4 cm. wide; disk 1–1.2 cm. high, 8–12 mm. thick. Involucre 4-seriate, strongly graduated, 1–1.2 cm. high, the outermost phyllaries ovate, the next oval-ovate, the others oblong, all acute, indurated and vittate below, ciliolate, lepidote-hispidulous, with abrupt deltoid to lanceolate-deltoid subherbaceous rather loose tip. Rays about 8, oblong, 13–14 mm. long, 3–3.6 mm. wide; disk-corollas puberulous chiefly below, 5 mm. long (tube 0.9 mm.). Pales acuminate, hispidulous, 11 mm. long. Achenes (immature) sparsely hispidulous, 4 mm. long. Awns 2.5 mm. long; squamellae about 8, lanceolate, acute, fimbriate, free, 0.5 mm. long. — Gardn. ! Lond. Journ. Bot. vii. 403 (1848); Baker in Mart. Fl. Bras. vi. pt. 3. 228 (1884). — BRAZIL: GOYAZ: very common, bushy places in upland campos near Villa de Natividade, Dec. 1839, *Gardner* 3290 (TYPE COLL.: B. M., K., fragm. G.). — The date of collection, given as "Jan. 1840" in Gardner's published account, is given as "Dec. 1839" on all the labels I have examined.

125. *V. GARDNERI* Baker. Leafy, erect, bearing 3–5 heads from the upper axils, 1.3–1.6 m. high, the stem more or less densely

lepidote-tuberculate-strigillose. Leaves alternate, oblong, acutish, rounded-cuneate at base or subtruncate, obscurely serrulate with 6–10 pairs of appressed teeth or subentire, lepidote-strigillose above, tuberculate-strigillose beneath, equally green both sides, 3-nerved, 4.3–7.3 cm. long, 1.4–2 cm. wide; petioles flattened, scarcely margined, 1.5–2.5 mm. long. Peduncles 3.5–14.5 cm. long, strigillose, few-bracteate, the bracts oblong, 1–3 cm. long; heads 2.5–3.5 cm. wide; disk 9–15 mm. high, 1.7–2.3 cm. wide. Involucre 4–5-seriate, distinctly graduated, 8–12 mm. high, the phyllaries broadly oblong, acutish to obtuse or rounded at tip, subsparingly tuberculate-strigillose, below thickened and ribbed, the short subherbaceous apex appressed. Rays about 12–14, narrow-oblong, 1 cm. long, 2 mm. wide; disk-corollas strigillose below, 5.5 mm. long (tube 1.4 mm.). Pales subobtusate, mucronate, strigillose at apex, 9 mm. long. Achenes densely sericeous, 4.8 mm. long, 2 mm. wide. Awns broadened, 3 mm. long; squamellae about 8, subequal, lacerate-fimbriate, united nearly to apex, firm, stiff, 2.5 mm. long; whole pappus at maturity somewhat purplish-tinged.—Baker ! in Mart. Fl. Bras. vi. pt. 3. 224 (1884).—BRAZIL: GOYAZ: dry upland campos between Arrayas and San Domingos, May 1840, *Gardner* 4233 bis (TYPE COLL.: B. M., K., fragm. G.).

126. V. ROBUSTA Gardn. Branched or simple below the inflorescence, 0.6–1 m. high, the stem often stout, strigillose and more or less densely tuberculate-hispidulous, leafy, bearing at apex 1–13 heads on terminal and axillary peduncles. Leaves alternate or rarely partly opposite, oblong or ovate-oblong to oval, gradually reduced to small bracts above, blunt or acutish, rounded to subcordate and subamplexicaul at base, sessile or on short hispid-pilose petioles 1.5 mm. long, green and rugose above, densely scabrous-strigillose, beneath much paler, subcanescent, rather densely hispidulous and gland-dotted, strongly reticulate beneath, irregularly crenate-serrate, 1.5–4 cm. long, 0.7–2.3 cm. wide. Ultimate peduncles 1–15 cm. long, somewhat thickened upwardly; heads 2.2–2.5 cm. wide; disk 1–1.3 cm. high, 1.3–2 cm. wide. Involucre 4–5-seriate, graduated, 7–10.5 mm. high, the phyllaries narrowly to broadly oblong or oval, obtuse to rounded or rarely acute to (innermost) subacuminate at apex, mucronulate, ciliolate, more or less hispidulous, indurated and vittate below, with short deltoid barely subherbaceous appressed apex. Rays

about 16, oval, 6 mm. long, 3 mm. wide; disk corollas sparsely hispidulous below, 4.7 mm. long (tube 1.2 mm.). Pales minutely tridenticulate, puberulous at extreme apex, 9 mm. long. Achenes appressed-sericeous, 3.5 mm. long. Awns slender, one about equalling the squamellae, the other 2.5 mm. long; squamellae about 6, lacerate above, those on each side united nearly to apex, 2 mm. long. — *Gardn. ! Lond. Journ. Bot.* vii. 403 (1848); *Baker in Mart. Fl. Bras.* vi. pt. 3. 227. t. 67. f. 1 (1884). *V. scabra* Pohl ex Baker, l. c., as syn. — Divisible on involueral characters into two varieties.

Var. **genuina**: phyllariis apice obtusis vel rotundatis vel intimis subacutis. — *V. robusta* Gardn. l. c. *V. scabra* Pohl, l. c. — BRAZIL: GOYAZ: dry upland campos near San Domingos, May 1840, *Gardner* 4233 (TYPE COLL.: B. M., K.); MINAS GERAES: 1839, *Claussen* (G.), 1840, *Claussen* 276 (B. M., K.), 27 April 1865, *Regnell* I. 190 (K.); Sierra de San José del Rei, 21 April 1888, *Glaziou* 17084 (K., U. S.); RIO DE JANEIRO: near Rio de Janeiro, *Glaziou* 9490 (K.), 11027 (G., K.). Brazil without definite locality: *Pohl* 585 (K.), *Martius* 826 (K.), *Sello* (G.). — T. 2. FIG. 29. — Through *Glaziou* 12880, from Rio de Janeiro (K.), this passes into

Var. **oxylepis**: phyllariis involucri 5-seriati 9–10.5 mm. alti angustius oblongis exterioribus acutis intimis subacuminatis calloso-mucronatis; ceterum ut apud var. *genuinam*. — BRAZIL: without locality, *Riedel* (TYPE COLL.: G., K.).

127. *V. macrocalyx*, sp. nov. Herbacea erecta supra ramosa, caule valido folioso, foliis alternis ovatis vel ovali-ovatis sursum crenato-serratis supra viridibus tuberculato-hispidulis sublucidis subtus subcanescentibus subdense hispidulis venoso-reticulatis, capitulis paucis, disco 16–18 mm. alto, involucri 4-seriati gradati 12–14 mm. alti phyllariis ovalibus vel ovali-oblongis apice rotundatis dense tuberculato-strigillosis induratis apice brevissime subherbaceis appressis, corollis disci 7 mm. longis.

Erect, herbaceous, branched above, the stem stout, striatulate, leafy, 1 m. high or more, densely tuberculate-strigillose and -strigose. Leaves alternate, ovate to oval-ovate, acute to subobtuse, rounded at base or truncate-rounded, scarcely amplexicaul, crenate-serrate above (teeth 7–13 pairs, obtuse, appressed), above green, sublucid, tuberculate-hispidulous, beneath subcanescent, subdensely hispidulous and along the veins hispid-strigose, gland-

dotted, 3(-5)-nerved, venose-reticulate, the lower 5.5-6.5 cm. long, 2.5-3.5 cm. wide, the upper gradually reduced; petioles 1 mm. long or less. Heads about 8, 3.3 cm. wide, on naked or bracteate tuberculate-hispidulous peduncles 4.5-13 cm. long; disk 16-18 mm. high, 2-2.5 cm. thick. Involucre 4-seriate, strongly graduated, 12-14 mm. high, the phyllaries oval (outer) to oval-oblong (inner), rounded at apex, densely tuberculate-strigillose, costate-vittate, indurated, the very short appressed subherbaceous apex ciliolate, subscariosus on margin. Rays about 12, oblong, yellow, very sparsely puberulous on back, 8 mm. long, 2 mm. wide; disk-corollas yellow, strigillose especially below, 7 mm. long (tube 1.8 mm.). Pales truncate or rounded, very sparsely strigillose above, 10 mm. long. Achenes (immature) sericeous, 4.7 mm. long. Awns 2, unequal, more or less amplified below, 1.8-2.6 mm. long; squamellae about 6, united on each side nearly to apex, fimbriate, firm, 1.8 mm. long.—BRAZIL: without locality, *Pohl* 582 (TYPE: K., fragm. G.).

Section 6. LEIGHIA (Cass.) Gardn. (as to syn. only). *Herbae perennes plus minusve ramosae, foliis alternis vel oppositis linearibus vel lanceolatis rare obovatis, capitulis paucis vel numerosis paniculatis majusculis vel mediocribus, involucri 4-7-seriati valde gradati phyllariis saepe oblongis valde induratis costatis vittatis, apice abrupte herbaceis vel subscariosis vel induratis.* — *Viguiera* sect. *Leighia* Gardn. Lond. Journ. Bot. vii. 400 (1848), as to name-bringing synonym only. *Leighia* Cass. Dict. Sci. Nat. xxv. 435 (1822), as to type species (*L. elegans* Cass. = *V. linearis*). — Herbaceous perennials of Mexico and Lower California, with a strongly graduated 4-7-seriate involucre, the phyllaries with very strongly indurated base and short abrupt herbaceous or subscariosus apex, or this obsolescent. Gardner's section *Leighia*, although resting on *Leighia* Cass., was composed of five species belonging to the genus *Aspilia*.

- a. Phyllaries with distinct herbaceous apex. 128. *V. linearis*.
 a. Phyllaries not herbaceous at apex, b.
 b. Leaves broadly obovate, distinctly petioled. 129. *V. purissima*.
 b. Leaves lanceolate or linear-lanceolate, subsessile, c.
 c. Phyllaries densely pilose-ciliate 130. *V. montana*.
 c. Phyllaries minutely ciliolate 131. *V. Goldmanii*.

128. *V. LINEARIS* (Cav.) Sch. Bip. Branched, about 1 m. high, the stem slender, pale, striatulate, subglabrate below, densely

strigillose above, very leafy. Leaves mostly alternate, only the very lowest opposite, crowded, linear to oblong-oval or oblong, entire, acute to obtusish, cuneate to rounded at base, barely petiolate, usually strongly revolute, 3-nerved, above densely tuberculate-strigillose, beneath somewhat paler, hispidulous on midrib, densely gland-dotted and somewhat minutely hispidulous, often subtending small leafy branches, 2.5–8.5 cm. long, 1.5–12 mm. wide; petioles hispidulous, 0.5–1 mm. long. Heads usually numerous, cymosely paniced at end of stem and upper branches on peduncles 1–15.5 cm. long; heads 1.7–3 cm. wide; disk 8–12 mm. high, 7–(fruit) 16 mm. thick. Involucre 5-seriate, strongly graduated, 6–11 mm. high, the phyllaries oblong or obovate-oblong, with thick coriaceous pale somewhat glutinous 1–3-vittate ciliate otherwise glabrous body and shorter lanceolate to deltoid abruptly herbaceous tuberculate-strigillose acuminate to obtuse or rounded spreading apex. Rays 12–20, oblong to oval, 5.5–10 mm. long, 2.5–4.3 mm. wide; disk-corollas glandular and minutely hispidulous below, 4.5–5 mm. long (tube 0.7–0.9 mm.). Pales strongly nerved, truncate or mucronate, minutely strigillose above, 6.5–7 mm. long. Achenes appressed-pubescent, 4 mm. long. Awns 2.7 mm. long; squamellae 8–10, oblong, acuminate, lacerate, up to 1 mm. long. — Sch. Bip. ex Hemsl. Biol. Centr-Am. Bot. ii. 178 (1881). *Helianthus linearis* Cav. Icon. iii. 9. t. 218 ("1794" = 1795); Ker, Bot. Reg. t. 523 (1821). *H. squarrosus* HBK. ! Nov. Gen. iv. 222. t. 377 (1820). *Leighia elegans* Cass. Dict. Sci. Nat. xxv. 435 (1822). *L. linearis* (Cav.) DC. Prod. v. 581 (1836). — Divisible on foliar and involucreal characters into the following varieties and forms.

Var. **genuina**: involucri phyllariis apice appendicibus herbaceis deltoideis vel deltoideo-ovatis vel ovatis obtusis vel rotundatis rare subacutis praeditis. — Two forms may be distinguished by foliar characters.

Forma **typica**: foliis linearibus vel caulinis lineari-lanceolatis 2.5–8.5 cm. longis 1.5–3(–7) mm. latis. — All the above cited synonyms belong here. — MEXICO: CHIHUAHUA: plains near Chihuahua, 1885, *Pringle* 645 (B. M., G., K., U. S.); do., 1886, *Pringle* 898 (G., Mo.); near Balleza, 1898, *Goldman* 142 (G., U. S.); Santa Eulalia Plains, 1885, *Wilkinson* (U. S.); COAHUILA AND NUEVO LEON: 1880, *Palmer* 626 (G., K., U. S.); DURANGO:

near city of Durango, 1890 m., 1896, *Palmer* 664 (B. M., G., Mo., U. S.: in some specimens approaching f. *latiorifolia*), 665 (B. M., G., K., Mo., U. S.), 748 (B. M., G., K., Mo., U. S.), 917 (B. M., G., K., Mo., U. S.); between Cerro Prieto and La Providencia, 1898, *E. W. Nelson* 4980 (U. S.); ZACATECAS: Plateado, 1897, *Rose* 2768 (U. S.: toward var. *acutior*); SAN LUIS POTOSI: 1830-2440 m., 1878, *Parry & Palmer* 454 (G., K., Mo.), 455 (B. M., G., Mo., U. S.); sandy mountains near Morales, 1876, *Schaffner* 339 (G., U. S.); Bagre, Minas de San Rafael, 1911, *Purpus* 5154 (B. M., Mo., U. S.); HIDALGO: rocky soil near Pachuca, 1905, *Purpus* 1540 (B. M., G., Mo., U. S.); mesas near Metepec Station, 2530 m., 1904, *Pringle* 13090 (G., U. S.); MICHOACAN: Patzcuaro, 1895, *C. & E. Seler* 1213 (G.); Morelia, 1909 and 1910, *Arsène* (G., U. S.); STATE OF MEXICO: San Angelo, *Berlandier* 924 (B. M., Mo.); near Tacubaja, 1854, *Schaffner* (G., K.); Chapultepec, 1865, *Bilimek* 535 (G., K., U. S.); Pedregal, 1865-66, *Bourgeau* 849 (K.); Valley of Toluca, *Berlandier* 1203 (B. M.); hills of Santa Fe, 1865, *Bourgeau* 847 (G., U. S.); Valley of Mexico, *Schaffner* 187 (K.), 291 (G.); Guadalupe, 1903, *Rose & Painter* 7294 (U. S.); GUANAJUATO: *Alaman* (Prod.), *Bonpland* (TYPE of *H. squarrosus*: Par.); QUERETARO: *Née* (Prod.); PUEBLA: near San Luis Tultitlanapa, 1908, *Purpus* 2592 (B. M., G., Mo., U. S.). Mexico without definite locality: Regla, *C. Ehrenberg* 461 (G.); plains near Hacienda d'Ysapia, *Ghiesbreght* 370 (G.); 1846, *Baites* (G.); *Schiede* 1565 (U. S.). — Flowering July-Nov. — T. 2. FIG. 33.

Forma *latiorifolia*: foliis anguste oblongis vel ovali-oblongis vix revolutis manifeste 3-nerviis 2.5-5.7 cm. longis 6-12 mm. latis; ceterum ut apud formam *typicam*. — MEXICO: CHIHUAHUA: hills and plains near Chihuahua, 25 Sept. 1886, *Pringle* 756 (TYPE COLL.: B. M., G., K., Mo., U. S.); DURANGO: near Durango, 1896, *Palmer* 480 (B. M., G., K., Mo., U. S.), 666 (B. M., G., K., Mo., U. S.).

Var. *acutior*: involucri phyllariis apice appendicibus herbaceis lanceolatis vel oblongo-lanceolatis acutis vel acuminatis praeditis; ceterum ut apud formam *typicam*. — MEXICO: QUERETARO: stony hillside, near San Juan del Rio, 1905, *Rose, Painter, & Rose* 9545 (G.); Hacienda Ciervo, near Cadereyta, 1905, *Rose, Painter, & Rose* 9657 (G.); STATE OF MEXICO: Rio Hondo Canyon, 1900, *Pringle* 9086 (G., Mo., U. S.; toward f. *typica*); Guadalupe, 1865,

Bourgeau 708 (G., K., U. S.); hills near El Salto, 2135 m., 18 Sept. 1902, *Pringle* 9995 (TYPE COLL.: G., K., Mo., U. S.). Mexico without definite locality: *Mackenzie* (K.). Cultivated: Jardin des Plantes, Paris, 1816 (K.); l. c., 1824, ex herb. J. Gay (G.).

129. *V. PURISIMAE* Brandege. "Stems branching from a perennial root, about 0.6 m. high," slender, whitish, strongly strigillose. Leaves few, opposite, obovate, shortly pointed, cuneate at base, entire, densely but not harshly glandular-tuberculate-strigillose both sides, somewhat blackish-green (at least when dried), 1.9–4 cm. long, 1–2.9 cm. wide; petioles 3–4 mm. long, connate at base; the uppermost leaves reduced to bracts. Heads about 2 cm. wide, about three at ends of branches on axillary and terminal peduncles 3–5 cm. long; disk 9–13 mm. high, 14–16 mm. thick. Involucre 5-seriate, 8–8.5 mm. high, graduated, the phyllaries oblong, obtusish, callous-mucronate or the innermost blunt, indurated, pale below, blackish-green above, 3–5-nerved and slightly reticulate, shortly and densely ciliate, glabrous on back, appressed. Rays 12, oval, 7–8 mm. long, 5 mm. wide, rarely styloferous but sterile; disk-corollas slender, puberulous below and on nerves and teeth, 6.3 mm. long (tube 1.1 mm.). Pales acuminate, sparsely glandular toward apex, about 6 mm. long. Achenes ciliate, puberulous at apex, glabrous on the sides, 3.3 mm. long. Awns 2.5–4.3 mm. long; squamellae about 6, lacerate, more or less united, 1 mm. long. — *Viguiera* ? *purisimae* Brandege, Proc. Calif. Acad. ser. 2. ii. 173 (1889). — LOWER CALIFORNIA: Lagoon Head, 6–15 March 1889, *Palmer* 773 (G., K., U. S.); arroyos, Calmalli, 365 m., 1898, *Purpus* 220 (K., U. S.).

130. *V. MONTANA* Rose. Slender, the stems erect, branched, 0.6–1 m. high, somewhat densely tuberculate-strigillose. Leaves opposite, equalling or shorter than the internodes, narrowly lanceolate, attenuate, rather abruptly narrowed at base or rounded into short connate-based petioles, pale green both sides, strongly 3-nerved, the connecting veins few but prominent, above densely tuberculate-strigillose and -strigose, beneath sparsely strigose chiefly along the veins, elsewhere gland-dotted, 5.7–12.2 cm. long, 3.5–12.5 mm. wide, on petioles 1–1.5 mm. long; the upper reduced and bractlike. Peduncles 8–13 cm. long, terminal and axillary, monocephalous; disk 13–14 mm. high, 9–10 mm. wide. Involucre campanulate, 6–7-seriate, graduated, with 1 or 2 small bracts at

base, 9.5–11 mm. high, the phyllaries oblong, obtusish, mucronate, strongly ciliate, glabrous on back, firmly coriaceous, with short dark apex, 1–3-nerved, appressed. Rays “5–6,” narrowly oblong, 7.5 mm. long, 2.5 mm. wide; disk-corollas puberulous especially below and on the nerves, 5.5 mm. long. Pales strigillose toward the sometimes mucronate obtuse tip, 7 mm. long. Achenes plump, pilose, 5 mm. long. Awns 3 mm. long; squamellae about 8, lacerate, 1.5 mm. long. — Rose! *Contr. U. S. Nat. Herb.* i. 103 (1891). — MEXICO: SONORA: Sierra de los Alamos, near the summit of the mountain, under shade of oaks, 25 March–8 April 1890, *Palmer* 340 (TYPE COLL.: G., K.); Sierra de los Alamos, 15 March 1910, *Rose, Standley, & Russell* 12867 (U. S.).

131. V. GOLDMANII Greenm. Stem slender, branched in the inflorescence, pale, sparsely tuberculate-strigillose. Leaves opposite, lanceolate, gradually acuminate from near the base, rounded into the short petiole, entire, above tuberculate-strigillose, beneath strigillose along the veins and more or less minutely hispidulous-puberulous between them, slightly gland-dotted, very strongly 3(–5)-nerved, the connecting veins rather numerous and prominent, 4.7–8.2 cm. long, 1.1–2.3 cm. wide, the petioles 1 mm. long, connate at base. Panicle loose, about 13-headed, sparsely bracted; heads 2.8 cm. wide, on peduncles 1.2–4 cm. long; disk 10–12 mm. high, 7 mm. thick. Involucre 5-seriate, graduated, 7–8 mm. high, the phyllaries oblong or slightly spatulate-oblong, rounded at apex, not mucronate, vittate, strongly indurated, with short deltoid subherbaceous at length scarious tip, sparsely ciliolate, glabrous on back. Rays about 9, narrowly oblong, 12–14 mm. long, 4 mm. wide; disk-corollas pubescent below and on the teeth, 4.5–5 mm. long (tube 1 mm.). Pales acuminate, sparsely puberulous above, 7 mm. long. Achenes (immature) silky-pilose, 4 mm. long. Awns 2.7 mm. long; squamellae about 6, lacerate-fimbriate, 1.1 mm. long. — Greenm. ! *Proc. Am. Acad.* xxxix. 104 (1903). — MEXICO: DURANGO: Chacala, 915 m., 7 March 1899, *Goldman* 359 (TYPES: G.). — The type locality is wrongly given as “Chalco” in the original description.

Section 7. **Trichophylla**, sect. nov. Herbae perennes infra inflorescentiam simplices, capitulis 1–21 simpliciter cymoso-paniculatis, caule dense folioso, foliis alternis lineari-filiformibus vel

angustissime linearibus valde revolutis, involucri 3-5-seriati gradati phyllariis lanceolatis vel lineari-lanceolatis acuminatis infra valde costatis vittatis et plus minusve induratis supra herbaceis. — Species typica *V. filifolia* Sch. Bip. — Erect virgate herbaceous perennials, with very leafy simple stems and linear or linear-filiform leaves, of Paraguay and adjacent Brazil.

- a. Involucre 1-1.5 cm. high; leaves 1-3 mm. wide, b.
- b. Leaves 2-3 mm. wide; involucre 5-seriate 133. *V. densifolia*.
- b. Leaves 1-1.5 mm. wide; involucre 3-4-seriate, c.
- c. Phyllaries densely canescent-strigillose between mid-nerve and margin 132. *V. filifolia*.
- c. Phyllaries green, sparsely strigillose 134. *V. linearifolia*.
- a. Involucre 7-9 mm. high; leaves 0.4-0.8 mm. wide, d.
- d. Leaves 5.5-7 cm. long, 0.8 mm. wide 135. *V. Rojasii*.
- d. Leaves 7-12 cm. long, 0.4-5 mm. wide 136. *V. trichophylla*.

132. *V. FILIFOLIA* Sch. Bip. "Perennial herb, 0.6-1 m. high," simple or (abnormally) branched near the middle, the branches erect. Stem very slender, leafy (the leaves mostly 6-9 mm. apart), rather sparsely tuberculate-strigillose. Leaves linear-filiform, falcate-recurved, callous-mucronate, strongly revolute, above green, densely lepidote-tuberculate-strigillose, the midnerve pale and rather prominent, beneath whitened with a dense cottony tomentum between the costa and margin, the lower 8.5-19 cm. long, 1-1.5 mm. wide, the upper gradually smaller, the uppermost bractlike and grading into the involucre. Heads 1-21 or more, on erect leafy pedicels, subumbellately cymose-panicled, about 2.5 cm. broad; disk 1.1 cm. high, 1.5 cm. wide. Involucre 3-4-seriate, considerably exceeding disk, the phyllaries with ovate or lanceolate body (1-nerved, tuberculate-strigillose on the nerve, densely canescent-strigillose between midnerve and margin) and attenuate to an ascending loose or at length reflexed more herbaceous tip. Rays (about 12?) narrowly oblong, 8 mm. long; disk-corollas subglabrous, 5 mm. long (tube 1 mm.). Pales firm, narrow, striate, slightly keeled, abruptly narrowed into a firm slightly recurved cusp (1.5 mm. long), puberulent above, 8 mm. long. Achenes 4-angular, subglabrous, 3 mm. long. Awns linear-lanceolate, 1-1.5 mm. long; squamellae about 3 pairs, subequal, lacerate, more or less united below, 0.7 mm. long; whole pappus sometimes purple-tinged. — Sch. Bip. ! ex Baker in Mart. Fl. Bras. vi. pt. 3. 219 (1884). — BRAZIL: grassy mountain fields near Cinza and on the shores of the Rio Pardo, Riedel (TYPE COLL.: G., K.).

PARAGUAY: Sierra de Amambay, Dec. 1907-08, *Rojas* (distr. *Hassler*) 9889 (Ber., photog. and fragm. G.).

133. *V. DENSIFOLIA* Baker. Erect, over 1 m. high; stem stout (0.7 cm. thick below), striate-angulate, tuberculate-strigillose especially below and in the inflorescence. Leaves crowded especially below, linear, acutish, callose-mucronate, thick, entire, strongly revolute, 1-nerved and strongly feather-veined, the edges often revolute to midrib, above pale green, densely lepidote-tuberculate-strigillose, beneath strigose on midrib, densely and canescently puberulous and more or less gland-dotted between midrib and margin, the lower 11-11.5 cm. long, 2-3 mm. wide, the upper shorter and less revolute, those just below the inflorescence 2.5 cm. long, 2.5 mm. wide. Heads 10-15, 3-4 cm. wide, on strigillose-tuberculate peduncles 3-16.5 cm. long; disk 1.1-1.2 cm. high, 1.6-1.8 cm. wide. Involucre 5-seriate, 1-1.1 cm. high, the phyllaries tuberculate-strigillose on their exposed faces, callose-mucronate, strongly indurated and ribbed below, the mostly shorter acuminate herbaceous apex loose or subappressed, the outermost linear-lanceolate (6 mm. long, 1 mm. wide), the innermost oblong-lanceolate, acuminate from above the middle. Rays 16, 1.5-1.8 cm. long, 2.5-4 mm. wide; disk-corollas puberulous and gland-dotted below, 3.5 mm. long (tube 0.6 mm.). Pales abruptly acute, somewhat erose near the slightly strigillose apex, 7.5 mm. long. Achenes very sparsely strigose, 3.1 mm. long, 1.3 mm. wide. Awns paleaceous, 2.6 mm. long, united with the ca. 6 squamellae (about 2 mm. long) nearly to the apex of the latter, the whole forming a paleaceous toothed cup, purplish-tinged at apex. — Baker ! in *Mart. Fl. Bras. vi. pt. 3. 219* (1884). — PARAGUAY: campos, Caaguazú, 24 March 1876, *Balansa* 858 (TYPE: K., fragm. G.); Caaguazú, March 1905, *Hassler* 9075 (B. M.). — T. 3. FIG. 16.

134. *V. LINEARIFOLIA* Chod. Erect, 1-1.5 m. high, the stem slender, somewhat flexuous, whitish, finely lepidote-strigillose, bearing about 10 long-peduncled heads from the upper axils. Leaves linear-filiform, flexuous or scythe-shaped, 1-nerved, green and slightly lepidote-strigillose above, strongly revolute, only the midrib visible beneath, 14-18.5 cm. long, 1-1.5 mm. wide. Peduncles 7.5-14 cm. long; heads 3.7-5.2 cm. wide; disk 1.1-1.4 cm. high, 1.5-2 cm. thick. Involucre 3-4-seriate, subequal or the outer

phyllaries generally shorter, 10.5–13 mm. high, the phyllaries linear-lanceolate, attenuate, with indurated ribbed body and long loose herbaceous tip, finely and sparsely strigillose, the inner gradually broader and with shorter herbaceous tips. Rays lemon-yellow, about 12, oblong, 1.5–2 cm. long, 5 mm. wide; disk-corollas puberulous on tube and teeth, 5 mm. long (tube 0.8 mm.). Pales narrow, acutish, hooded, densely strigillose at apex, striate, 8 mm. long. Achenes (submature) silky-villous, 4.5 mm. long. Awns paleaceous, up to 3.5 mm. long; squamellae on each side of achene united into fimbriate membranes 2 mm. high. — Chod. ! Bull. Herb. Boiss. ser. 2. ii. 392 (1902). — PARAGUAY: field near Ipe-hú, region of the Yerbales of Maracayú, Oct. 1898–99, Hassler 4959 (TYPE COLL.: B. M., Ber., G., K.). — T. 2. FIG. 32, T. 3. FIG. 15.

135. *V. Rojasii*, sp. nov. Herbacea elata, caule foliosissimo, foliis innumeris lineari-filiformibus mediis 5.5–7 cm. longis 0.8 mm. latis, involucri 4-seriati 7–8 mm. alti gradati phyllariis glabris vel in margine sparse strigillosis, acheniis sericeis, aristis 3 mm. longis quam squamellae duplo longioribus cum eisdem basi conjunctis.

Tall, erect, the stem tuberculate-strigillose, very leafy, bearing about 15 heads. Leaves very crowded, linear-filiform, acute, callose-mucronate, strongly revolute, above glabrous or very sparsely strigillose, beneath densely white-tomentulous between costa and margin, the middle ones 5.5–7 cm. long, 0.8 mm. broad, the upper smaller. Peduncles erect, bracteate, angulate-striate, monocephalous, 5–13.5 cm. long; heads 3 cm. broad; disk 1–1.1 cm high, 1.1–1.6 cm. wide. Involucre 4-seriate, graduated, 7–8 mm. high, the phyllaries glabrous or sparsely strigillose on margin, indurated and ribbed at base, those of the two outer series linear, the others ovate-lanceolate, all callous-mucronate, with herbaceous apex. Rays 12, narrowly oblong, 11 mm. long, 2.4 mm. wide; disk-corollas sparsely puberulous, 3.5 mm. long (tube 0.8 mm.). Pales acute, somewhat pubescent at apex, 7 mm. long. Achenes silky, 4.5 mm. long. Awns 2, paleaceous, unequal, 3 mm. long, twice as long as the ca. 6 lacinate squamellae and united with them at base. — PARAGUAY: plateau and declivities of the Sierra de Amambay, April 1907–08, *Rojas* (distr. Hassler) 10367 (TYPE COLL.: B. M., Ber., photog. and fragm. G.).

136. *V. TRICHOPHYLLA* Dusén. Herbaceous, erect, "1.5-2 m. high, 7 mm. thick at base." Stem whitish, sparsely strigillose above, glabrate below, bearing 8-13 heads. Leaves filiform, above the flattish base so strongly revolute as to hide the single nerve, green, glabrous above, mucronate, the lower "12 cm. long," the median 7-8.5 cm. long, 0.4-0.5 mm. wide, the upper gradually shorter. Peduncles 4-20.5 cm. long, minutely strigillose, striate-angled; heads 3.5-4 cm. wide; disk 8-11 mm. high, 1.1-(fruit) 1.6 cm. wide. Involucre 4-seriate, 7-9 mm. high, graduated, the outer phyllaries linear or linear-lanceolate, the inner gradually broader, the innermost ovate-lanceolate, all attenuate, mucronate, hispidly white-ciliolate on margin, otherwise glabrous, somewhat indurated and vittate below, herbaceous and rather loose above, the inner somewhat falcate. Rays 12-16, 1.1-1.4 cm. long, 1.7-4.5 mm. wide; disk-corollas minutely hirtellous below, 3.8-4.3 mm. long (tube 0.5-0.7 mm.), yellow, the throat becoming purplish in age. Pales obtuse to subacute, mucronulate, minutely hispidulous above, 5.5-7 mm. long, 1.2-1.4 mm. broad. Achenes hispidulous, 3-3.5 mm. long. Awns slender, very unequal, amplified at base, purple-tinged, up to 2.5 mm. long; squamellae about 8, oblong, purple-tinged, dentate-laciniate, united at base, 0.4-0.6 mm. long.—Dusén! Ark. Bot. Stockh. ix. No. 15. 30. f. 12 & t. 7. f. 4 (1910).—BRAZIL: SAO PAULO: 1816-21, *A. St. Hilaire* 1144 (Par.); PARANÁ: rather swampy field, Ponta Grossa, 7 Jan. 1904, *Dusén* 3488 (TYPE COLL.: B. M., K., fragm. G.).

Subgenus III. **Yerbalesia**, subg. nov. Herbae perennes simplices vel subsimplices, capitulis solitariis caulem et ramos terminantibus longepedunculatis majusculis, foliis lanceolatis vel oblongis rare ovatis, involucri 2-4-seriati gradati vel subaequalis phyllariis lanceolatis basi plus minusve induratis et vittatis supra herbaceis, pappo e aristas 2 paleaceo-membranaceis et squamellis (ca. 8) in utroque latere achenii in squamam apice denticulatam scarioso-membranaceam aristas saepe subaequantem conjunctis composito.—Species typica *V. tuberosa* Griseb.—Erectish perennials, probably several-stemmed, simple or subsimple, with solitary long-peduncled heads; pappus of two mostly membranaceous-paleaceous awns shorter than or somewhat exceeding the squamellae, which are united on each side of achene into a denticulate mem-

branaceous-scarious scale; plants of Paraguay, Uruguay, and Argentina. Sp. 137-141.

- a. Leaves canescent-strigillose beneath 137. *V. tuberosa*.
- a. Leaves green beneath, b.
- b. Leaves rather sparsely strigillose 139. *V. guaranitica*.
- b. Leaves pilose or hispid-pilose, c.
- c. Involucre 2-3-seriate, 1-1.5 cm. high, d.
- d. Leaves entire; involucre 2-seriate, the phyllaries loose at apex; disk-corollas 4-4.5 mm. long. 138. *V. Hassleriana*.
- d. Leaves serrulate; involucre 3-seriate, the phyllaries appressed; disk-corollas 6.5 mm. long 140. *V. nudicaulis*.
- c. Involucre 4-seriate, 1.5-2.3 cm. high 141. *V. macrorhiza*.

137. *V. TUBEROSA* Griseb. Procumbent or ascending from a thick woody tuber-like root, the stem pale or fuscous-tinged, rather sparsely tuberculate-strigillose, rather leafy below, 0.6-1 m. high, bearing a single very long-peduncled head. Leaves opposite or the upper often alternate, narrowly lanceolate to linear-lanceolate, long-acuminate at both ends, entire, above light green, finely tuberculate-strigillose, beneath canescent with a dense minute appressed pubescence and somewhat strigose, 1-nerved, the two lateral veins weak or evanescent, slightly revolute, short-petioled or subsessile, somewhat falcate, 5.5-10 cm. long, 4-13.5 mm. broad; petioles narrowly margined, 2.5 mm. long or less. Peduncle densely strigillose below the head, naked, 2-3.8 dm. long; head 3.5-5.5 cm. wide; disk 1-1.2 cm. high. Involucre 3-seriate, strongly graduated, 1-1.1 cm. high, the phyllaries callose-mucronate, hispidulous-ciliolate and more or less tuberculate-hispidulous, with indurated vittate base and herbaceous or subherbaceous tip, the outer narrowly lanceolate, acuminate, the inner oblong-lanceolate. Rays 12-16, oblong to oval, 1.2-2.4 cm. long; disk-corollas rather sparsely hirtellous, 4.3-5.5 mm. long (tube 0.7-0.9 mm.). Pales obtuse, hirtellous on keel and colorate apex, mucronulate, 8.5 mm. long. Achenes (submature) hispidulous, 5.6 mm. long. Awns paleaceous-membranaceous, 1.6-2.3 mm. long; squamellae on each side of achene united into an irregularly denticulate many-ribbed membranaceous scale nearly or quite equalling the awns. — Griseb. Goett. Abh. xxiv. 192 (1879); Baker in Mart. Fl. Bras. vi. pt. 3. 220 (1884). — PARAGUAY: region of the Yerbales of Maracayú, Sierra de Maracayú, 1898-99, Hassler 4295 (B. M.), 5459 (B. M.). ARGENTINA: Concepcion del Uruguay, Oct. 1878, Lorentz 581 (B. M., Ber., fragm. and

drawing G.); l. c., June 1877, *Lorentz* 1027 (Ber.); Ceres, O. Kuntze (U. S.); Puerto de Brete, 9 Feb. 1878, *Lorentz* 1454 (Ber.); Rio Cupalén, Entre Rios, 3 May 1880, *Niederlein* 127 (Ber.).— T. 2. FIG. 34, T. 3. FIG. 17.

138. V. *HASSLERIANA* Chod. Stem "woody at base," erect, 3–8 dm. high, slender, pilose with spreading hairs with slightly enlarged bases. Leaves opposite below, alternate above, rather few, oval-oblong to ovate and oblong-lanceolate, acute, cuneate or cuneate-rounded at base, entire, mucronate, 3-nerved, green and pilose-hispid above with somewhat tuberculate-based hairs, beneath slightly paler, pilose and somewhat gland-dotted, densely pilose-hispid below at the sessile base, 3.4–5.3 cm. long, 1–1.8 cm. wide. Head solitary; peduncle usually naked, densely pilose below the head, 1.8–2.5 dm. long; head 4.5–5.3 cm. wide; disk 1.2–1.5 cm. high, 1.6–2.3 cm. wide. Involucre biseriate, subequal or slightly graduated, 1.5 cm. high, the phyllaries oblong or oblong-lanceolate, acute to attenuate, 2.5–5 mm. broad, more or less densely hispid-pilose and somewhat glandular-dotted, in age subglabrate, subherbaceous except for the indurated and ribbed extreme base, the tips loose. Rays about 11, oblong to oblong-oval, 1.5–1.9 cm. long; disk-corollas puberulous on teeth, 4–4.5 mm. long (tube 0.8–1 mm.). Pales membranaceous, mucronulate, denticulate, 8 mm. long. Achenes (immature) sericeous, broadly truncate at apex, 5–5.5 mm. long. Awns paleaceous-membranaceous, abruptly pointed, 2.5 mm. long; squamellae on each side of achene united nearly or quite to apex into a broad membranous many-nerved lacerate-fimbriate scale 2 mm. long. — Chod. ! Bull. Herb. Boiss. ser. 2. iii. 724 (1903). — PARAGUAY: field near the Tapiraguay River, Aug. 1901–02, *Hassler* 4306 (COTYPE COLL.: B. M.); field near the Carimbatay River, Sept. 1901–02, *Hassler* 4578 (COTYPE COLL.: B. M., fragm. G.). — T. 3. FIG. 18.

139. V. *GUARANITICA* Chod. Stems several, erect from a woody base, 4.5–15 dm. high, very sparsely strigose. Leaves opposite below, alternate above, rather few, oblong or oblong-ovate or -lanceolate, acute, cuneate at base, entire, green and subsparingly strigillose both sides, 3-nerved above the base, 5.5–12.5 cm. long, 0.7–4 cm. wide; petioles unmarginated, 1.2 mm. long. Peduncle densely strigose below the head, naked or with a minute bract, 3–4.5 dm. long; head 4.5 cm. wide; disk 1.2 cm. high, 2.2 cm.

thick. Involucre 2-seriate, graduated, 1.4–1.6 cm. high, the phyllaries lanceolate, long-acuminate, callous-mucronulate, tuberculate-strigillose, subherbaceous, with about 4 pale ribs below. Rays 14, oblong, 1.6–1.9 cm. long; disk-corollas puberulous on teeth, 4 mm. long (tube 1 mm.). Pales subacute, narrow, hispidulous above, scarios-margined, 1 cm. long. Achenes (immature) villous on edges, sparsely appressed-pubescent on sides, 3.5–6 mm. long. Awns paleaceous-membranaceous, 2.5 mm. long; squamellae of each side united to apex into a broad many-nerved dentate membranaceous scale, 2 mm. long. — Chod. ! Bull. Herb. Boiss. ser. 2. iii. 724 (1903). — PARAGUAY: edge of woods along the upper Apa River, 1901–02, *Hassler* 7667 (COTYPE COLL.: B. M., fragm. G.); do., Jan. 1902, *Hassler* 8349 (COTYPE COLL.: B. M.); Santa Elisa, Gran Chaco, Dec. 1903, *Hassler* 2652 (B. M.).

140. V. *NUDICAULIS* Baker. Herbaceous, erect or ascending, the lower part of stem not known. Stem simple, purplish, terete, striatulate, hispid-pilose with longer ascending and shorter appressed white hairs with subtuberculate persistent bases, 3 dm. high and more. Leaves opposite, few, narrowly oblong or oblong-lanceolate, acutish, at base slightly cuneate, serrulate chiefly above the middle (teeth 5–7 pairs, appressed), 3-nerved, green both sides and hispid-pilose with long spreading or divaricate tuberculate-based hairs, apparently somewhat glutinous, 4.5–5.9 cm. long, 7–9.5 mm. wide; petioles 1 mm. long, hispid-pilose. Head solitary, 5 cm. wide; peduncle pubescent like stem, naked, 2.4 dm. long; disk 1.2 cm. high, 1.6 cm. thick. Involucre 3-seriate, 1.1 cm. high, graduated, the phyllaries lanceolate to lance-oblong, acuminate, tuberculate-hispid-pilose, strigose, callous-mucronulate, herbaceous, the inner indurated and costate at base, all appressed. Rays about 16, oblong, sparsely strigillose on back, 2.4 cm. long, 5 mm. wide; disk-corollas puberulous below, 6.5 mm. long (tube 1.4 mm., teeth 1 mm.). Pales narrow, glabrous, slightly keeled, cuspidate-acuminate, 8.5 mm. long. Achenes (immature) subsericeous-appressed-pilose, truncate at apex, 3.5 mm. long. Awns membranous-paleaceous, lanceolate, acutish, fimbriatulate, 2.5 mm. long; squamellae of each side (ca. 4) united almost to apex into a broad scale equalling or slightly shorter than the awns. — Baker! in Mart. Fl. Bras. vi. pt. 3. 228 (1884). — URUGUAY: Maldonado, *Capt. King* 40 (Voyage of H. M. S. Adventure and Beagle, 1826–30) (TYPE: K.).

141. *V. MACRORHIZA* Baker. Stems few, simple or branched from the base, 3–7 dm. high, from a very thick woody root (5 by 2 cm.) bearing fibrous rootlets with strongly tuberous thickenings. Stems sparsely leafy, pale, subangular, spreading-hispid-pilose and strigillose, the hairs with persistent tuberculate bases. Leaves opposite below, alternate above, oblong or oblong-ovate or lanceolate, obtuse to acute, cuneate to rounded at base, subentire or very obscurely serrate above the middle (teeth about 5 pairs, appressed), strongly 3-nerved, green both sides and somewhat harshly pilose-hispid all over with scarcely tuberculate-based more or less spreading hairs, 4–8 cm. long, 1–2.6 cm. wide, sessile or subsessile. Heads solitary at apex of stems and branches, 4–5 cm. wide, on striate peduncles about 3 dm. long; disk 1.2–1.6 cm. high, 2.2–(fruit) 2.6 cm. thick. Involucre 4-seriate, 1.5–2.3 cm. high, slightly graduated, the phyllaries oblong-lanceolate, acuminate, herbaceous except at the ribbed pale base, minutely tuberculate, hispidly pilose especially along margin and midline, loose at apex, 4–6 mm. wide. Rays 12 or more, oblong, 2.2 cm. long, 5 mm. wide; disk-corollas subglabrous, 5 mm. long (tube 1.2 mm.). Pales merely acute, finely puberulous at apex, 1 cm. long. Achenes subsericeous-appressed-pilose, 6 mm. long. Awns paleaceous, lanceolate, acuminate, 3 mm. long; squamellae of each side of achene united to apex into a firm scarious scale 2 mm. long, fimbriate at apex. — Baker ! in Mart. Fl. Bras. vi. pt. 3. 225 (1884). — PARAGUAY: campos, Caaguazú, 16 Nov. 1874, *Balansa* 1139 (COTYPE: K.); do., 1 April 1874, *Balansa* 848 (COTYPE: K., fragm. G.). — In its stiffer firmer pappus and longer awns approaching the subgenus *Calanticaria*.

SPECIES OF DOUBTFUL AFFINITY

142. *V. cornifolia* (HBK.), comb. nov. Herbaceous, somewhat branched, the stem pilose-hispid, stoutish. Leaves mostly opposite, the uppermost alternate, elliptic, acute, acutish to rounded at base, obscurely serrulate, above dull green, paler beneath, tuberculate-hispidulous above, beneath hispid along the veins and gland-dotted between them, three-nerved, 6.5–8 cm. long, 3–3.7 cm. wide; petioles margined above, tuberculate-hispid, 6 mm. long. Heads about 2, rather large, on terminal and axillary peduncles 1 dm. long and densely granulose-hispid above. Involucre about 2(?)—seriate, the outer phyllaries ovate, acute,

densely hispidulous, 1 cm. long, squarrose, the inner subglabrate above and scarious-membranous. Rays 11 mm. long; disk-corollas puberulent below and on the teeth, 4.8 mm. long. Pales acuminate, subcarinate, glabrous, 7 mm. long. Achenes more or less compressed, appressed-pubescent, 3.5 mm. long. Awns persistent, 4 mm. long; squamellae small, very much shorter. — *Helianthus cornifolius* HBK. ! Nov. Gen. iv. 223 (1820). — MEXICO: QUERETARO: Santa Rosa, 1450 m., *Bonpland* 4237 (TYPE: Par., drawing G.). — Apparently a member of the subgenus *Amphilepis*, but I have been unable to identify it with any other species.

143. *V. VERNONIOIDES* Baker. Erect herbaceous perennial, about 1 m. high, the stem brown, obscurely pilose, branching above, the branches arcuate-ascending. Leaves alternate, oblong, subremote, sessile, acute, at base rounded, rigid, entire, 3-nerved, above green, scaberulous, beneath more pilose and venose-reticulate, 4–5 cm. long. Heads 10–12, loosely cymose, the terminal head sometimes exceeded by the lateral. Involucre campanulate, 10–12 mm. wide, 6 mm. high, 3-seriate, the phyllaries subequal, oblong, acute, rigid, appressed, sparsely pilose. Rays twice as long as involucre. Pales rigid, obtuse, 6 mm. long. Achenes oblanceolate, 4 mm. long. Awns triangular, lanceolate, 2 mm. long; squamellae a half to a third as long. — Baker in Mart. Fl. Bras. vi. pt. 3. 223 (1884). — Based by Baker on *Manso* 216, from near Pouzo Alto, on the road to Cuyabá, Matto Grosso, Brazil. Not seen; apparently a member of the *Bracteatae*.

VIII. DOUBTFUL AND EXCLUDED SPECIES

V. acuminata Benth. ! in Oerst. Vidensk. Meddel. 1852. 91 (1852) = *OYEDAEA ACUMINATA* (Benth.) B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 176 (1881).

V. angustifolia Glaziou, Bull. Soc. Bot. Fr. lvii. Mém. 3. 412 (1910), nomen. Type *Glaziou* 21603, not seen. Brazil. Glaziou's note that the flowers are rose-color makes it almost certain that the plant is not a member of this genus.

V. asperrima Gardn. ! Lond. Journ. Bot. vii. 401 (1848) = *ASPILIA ASPERRIMA* (Gardn.) Baker in Mart. Fl. Bras. vi. pt. 3. 200 (1884), where name-bringing synonym is cited by error as *V. attenuata*.

V. attenuata Gardn. ! l. c. 400 (1848) = *ASPILIA ATTENUATA* (Gardn.) Baker in Mart. Fl. Bras. vi. pt. 3. 199 (1884).

V. Bonplandiana Gardn. ! l. c. 399 (1848) = *OYEDAEA BONPLANDIANA* (Gardn.) Benth. ex Baker in Mart. Fl. Bras. vi. pt. 3. 207 (1884).

V. drymonia Klatt ! Leopoldina, Bot. Beibl. 1895. 5 (1895); Bull. Soc. Bot. Belg. xxxv. pt. 1. 287 (1896) = *OYEDAEA ACUMINATA* (Benth.) B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 176 (1881). Type in Gray Herbarium.

V. elegans Gardn. ! Lond. Journ. Bot. vii. 297 (1848) = *ASPILIA FOLIACEA* (Spreng.) Baker in Mart. Fl. Bras. vi. pt. 3. 193 (1884).

V. elliptica Sch. Bip. ! ex Baker in Mart. Fl. Bras. vi. pt. 3. 194 (1884), as syn. = *ASPILIA BURCHELLII* Baker, l. c.

V. floribunda Gardn. ! Lond. Journ. Bot. vii. 401 (1848) = *ASPILIA FLORIBUNDA* (Gardn.) Baker in Mart. Fl. Bras. vi. pt. 3. 198 (1884).

V. foliacea Spreng. Syst. iii. 616 (1826) = *ASPILIA FOLIACEA* (Spreng.) Baker in Mart. Fl. Bras. vi. pt. 3. 193 (1884).

V. glabra Gardn. ! Lond. Journ. Bot. vii. 398 (1848) = *ASPILIA GLABRA* (Gardn.) Baker in Mart. Fl. Bras. vi. pt. 3. 191 (1884).

V. glandulosa Bertol. Misc. Bot. vii. 45 (1848) = *BALDUINA UNIFLORA* Nutt. (1818). See Gray, Syn. Fl. i. pt. 2. ed. 2. Suppl. 450 (1886), under *Baldwinia*.

V. glaucescens Glaziou, Bull. Soc. Bot. Fr. lvii. Mém. 3. 412 (1910), nomen. Not seen; type *Glaziou* 21562. Brazil.

V. ? glutinosa Rusby ! Mem. Torr. Club iv. 211 (1895) = *FLOURENSIA heterolepis*, nom. nov. (not *F. glutinosa* (Rob. & Greenm.) Blake (1913)). A good *Flourensia*, the relationships of which will be discussed elsewhere.

V. gracilis Gardn. ! Lond. Journ. Bot. vii. 402 (1848) = *ASPILIA GRACILIS* (Gardn.) Baker in Mart. Fl. Bras. vi. pt. 3. 198 (1884).

V. hirsuta Gardn. ! l. c. 397 (1848) = *ASPILIA FOLIACEA* (Spreng.) Baker in Mart. Fl. Bras. vi. pt. 3. 193 (1884).

V. Humboldtiana Gardn. ! l. c. 398 (1848) = *OYEDAEA HUMBOLDTIANA* (Gardn.) Benth. ex Baker in Mart. Fl. Bras. vi. pt. 3. 206 (1884).

V. laxa (DC.) Baker in Mart. Fl. Bras. vi. pt. 3. 222 (1884). — *Leighia laxa* DC. ! Prod. v. 580 (1836). — The type, *Herb. Imp. de Brésil* (coll. by Gaudichaud) 880, from the Province of Rio Grande

do Sul, in the Paris Herbarium, is in ripe fruit and is a good *Aspilia*. It becomes *ASPILIA laxa* (DC.), comb. nov.

V. leptocaulis Wats.! Proc. Am. Acad. xxvi. 140 (1891) = *HELIANTHUS LEPTOCAULIS* (Wats.) Blake, l. c. li. 519 (1916).

V. longipes Coult.! Contr. U. S. Nat. Herb. i. 41 (1890) = *ZEXMENIA HISPIDA* (HBK.) Gray, Proc. Am. Acad. xix. 10 (1883), as noted by Coulter, Contr. U. S. Nat. Herb. ii. 220 (1892).

V. macrophylla Benth.! in Oerst. Vidensk. Meddel. 1852. 92 (1852) = *OYEDAEA MACROPHYLLA* (Benth.) B. & H. ex Hemsl. Biol. Centr.-Am. Bot. ii. 176 (1881).

V. microcephala Greenm.! Proc. Am. Acad. xxxix. 105 (1903) = *HAPLOCALYMA MICROCEPHALUM* (Greenm.) Blake, l. c. li. 517 (1916).

V. microphylla (HBK.) Hieron. Bot. Jahrb. xxxvi. 490 (1905) (not Vasey & Rose) = *HELIANTHUS MICROPHYLLUS* HBK. Nov. Gen. iv. 220. t. 375 (1820).

V. morelensis Greenm.! Proc. Am. Acad. xl. 40 (1904) = *RHYSOLEPIS MORELENSIS* (Greenm.) Blake, Contr. Gray Herb. N. S. no. 52. 36 (1917).

V. nivea (Benth.) Gray in Brew. & Wats. Bot. Calif. i. 354 (1876), excl. syn. in part. — *Encelia nivea* Benth.! Bot. Voy. Sulph. 27 (1844); Blake, Proc. Am. Acad. xlix. 375 (1913). *Helianthus* (*Harpalium*) *tephrodes* Gray! in Torr. Bot. Mex. Bound. 90 (1859). *Viguiera tephrodes* Gray, Proc. Am. Acad. xvii. 218 (1882); Syn. Fl. i. pt. 2. 271 (1884). *Gymnolomia encelioides* Gray! Proc. Am. Acad. xix. 4 (1883); Syn. Fl. l. c. 269 (1884). *Helianthus dealbatus* Gray! Syn. Fl. l. c. 280 (1884). *Helianthus niveus* (Benth.) Brandegee, Proc. Calif. Acad. ser. 2. ii. 173 (1889). *Viguiera sonorae* Rose & Standley! Contr. U. S. Nat. Herb. xvi. 20. t. 16 (1912). — All the above synonymy appertains to a single species of *Helianthus*, ranging from extreme southeastern California to Sonora and Lower California, and characterized beneath a certain diversity of aspect by the ovate to oblong or oval leaves canescent like the stem with a strigose or strigillose usually dense and sub-sericeous pubescence, the very slender puberulous purple-tipped disk-corollas, and the pappus of several unequal paleaceous deciduous scales. The species should be known as *HELIANTHUS NIVEUS* (Benth.) Brandegee. See discussion, p. 10.

V. noneaefolia (DC.) Baker in Mart. Fl. Bras. vi. pt. 3. 222 (1884), as *V. nonneaefolia*. — *Leighia noneaefolia* DC. ! Prod. v. 581 (1836). — The type, *Herb. Imp. de Brésil* (coll. by Gaudichaud) 877, from the Province of Rio Grande do Sul, in the herbarium of the Paris Museum, is an *Aspilia* and should be known as *ASPILIA noneaefolia* (DC.), comb. nov. I have not been able to examine any of the other specimens referred to this species by Baker, which may represent an undescribed *Viguiera*.

V. oblonga (Gardn.) B. & H. ex Hook. & Jacks. Ind. Kew. ii. 1201 (1895), as syn. (*Serpaea oblonga* Gardn. ! Lond. Journ. Bot. vii. 395 (1848)) = *ASPILIA OBLONGA* (Gardn.) Baker in Mart. Fl. Bras. vi. pt. 3. 198 (1884).

V. Palmeri Gray! in Wats. Proc. Am. Acad. xxii. 427 (1887) = *RHYSOLEPIS PALMERI* (Gray) Blake, Contr. Gray Herb. N. S. no. 52. 37 (1917).

V. platyphylla Baker! in Mart. Fl. Bras. vi. pt. 3. 227 (1884) = *ASPILIA platyphylla* (Baker), comb. nov. A good *Aspilia* in habit and technical characters.

V. Pohliana Sch. Bip. ! ex Baker in Mart. l. c. 202 (1884), as syn. = *ASPILIA LAEVISSIMA* Baker, l. c.

V. pusilla Less. ex Baker in Mart. l. c. 194 (1884), as syn. = *ASPILIA PUSILLA* Baker, l. c.

V. ramosissima Gardn. ! Lond. Journ. Bot. vii. 402 (1848) = *ASPILIA FLORIBUNDA* (Gardn.) Baker in Mart. Fl. Bras. vi. pt. 3. 198 (1884).

V. reflexa Sch. Bip. (ex parte) ex Baker in Mart. Fl. Bras. vi. pt. 3. 196 (1884), as syn. = *ASPILIA RIEDELI* Baker, l. c.

V. ? retifolia Sch. Bip. ! ex Baker, l. c. 223 (1884) = *DIMEROSTEMMA RETIFOLIUM* (Sch. Bip.) Blake, Contr. Gray Herb. N. S. no. 52. 11 (1917).

V. rigida Hort. ex Gardn. Chron. N. S. xvi. 396. fig. 75 (1881) = *HELIANTHUS RIGIDUS* (Cass.) Desf. Cat. Hort. Par. ed. 3. 184 (1829). *Harpalium rigidum* Cass. Bull. Soc. Philom. 1818. 141 (1818). *Helianthus scaberrimus* Ell. Sk. ii. 423 (1823). See footnote 1, p. 10.

V. sericea (DC.) Gray! Proc. Am. Acad. xix. 6 (1883), based on *Harpalium ? sericeum* DC. ! Prod. v. 584 (1836) = *SYNCRETOCARPUS SERICEUS* (DC.) Blake, Contr. Gray Herb. N. S. no. 52. 41 (1917). *Syncretocarpus Weberbaueri* Blake! Bot. Jahrb. liv. Beibl. no. 119. 50 (1916).

V. similis Brandegee! Zoe v. 260 (1908) = **HELIANTHUS similis** (Brandegee), comb. nov. For a discussion of this species see introduction, p. 11. I am indebted to Mr. T. S. Brandegee for the loan of the type sheet, a photograph of which is now in the Gray Herbarium.

V. sonorae Rose & Standley! Contr. U. S. Nat. Herb. xvi. 20. t. 16 (1912) = **HELIANTHUS NIVEUS** (Benth.) Brandegee. See under *V. nivea*, p. 187.

V. tephrodes Gray! Proc. Am. Acad. xvii. 218 (1882) = **HELIANTHUS NIVEUS** (Benth.) Brandegee. See under *V. nivea*, p. 187.

V. triplinervis Less. ex Baker in Mart. Fl. Bras. vi. pt. 3. 191 (1884), as syn. = **ASPILIA GLABRA** (Gardn.) Baker, l. c.

V. wedelioides Baker! Journ. Bot. xx. 226 (1882) = **CALEA wedelioides** (Baker), comb. nov. This Brazilian species, the habitat of which is incorrectly given as Madagascar in the Index Kewensis, is a typical *Calea* in pappus and other features.

IX. LIST OF EXSICCATAE CITED

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Distribution-numbers are in bold type. The numbers in parentheses are those of the species in the present revision. Collections distributed without number are indicated by a dash. Specimens intermediate between two varieties are indicated by a - connecting the Greek letters representing the varieties, thus (36 α - β).

—

- Abrams 3450, 3901** (34).
Alaman — (8); — (16); — (21); — (128a a).
André — (85).
Anthony 65 (39a); **181** (34); **279** (41); **325** (38); **389** (39 β); — (35).
Archavelata 49 (111); **4115** (108 β); **4121** (108a); — (108 β).
Arsène — (8); — (128a a).
Aschenborn — (8).
- Baites 16** (8).
Baker (C. F.) 684, 685, 700, 944 (58a); **1614** (34); **4490** (36 γ).
Baker (C. F.) & Van Hermann 4382 (36 γ).
Baker (C. F.) & Wilson 566 (36 γ).
Balansa 848 (141); **858** (133); **1139** (141).
Balbis — (95).
Baldwin — (108a).
Bang 44 (92); **382** (91).
Barclay 3155 (35); — (11).
Barkelew 181 (39 β).
Beals (Mrs. I. M.) — (27a).
Beechey — (11).
Belding — (41).
Berlandier 504, 535 (36a); **814** (46); **827, 838** (36a); **924** (128a a); **937** (36a); **940** (6a); **1203** (128a a); **1265** (6a); **1303, 1879, 1905** (36a); **2234** (46); **2258** (36a).
Bernoulli & Cario 1520 (24).
Bilimek 535 (128a a).
Billberg 188 (52).
Biltmore Herbarium 3916 (63).
- Blumer 52** (36a); **54** (60); **1361** (58a); **1412** (27a); **1662** (36a); **1755** (61); **2227** (36a); **3487** (60).
Bodin (J. E.) 190 (36a).
Bonpland 1360 (36 γ); **3225** (85); **4237** (142); — (128a a). See also Humboldt & Bonpland.
Bourgeau 365, 513 (36a); **599** (6a); **708** (128 β); **843** (6a); **847, 849** (128a a); **960, 961** (36a); **965, 965 bis** (8); **1076, 1222** (36a).
Brandegge 312 (39a); **313** (38); **1614** (34); — (35); — (36a); — (39 γ); — (39 δ); — (53a).
Bridges 1165 (71); — (71); — (97); — (99).
Buchtien 198 (93); **297** (99); **1510** (93); **3064, 3292** (99); **3300, 3302** (92); — (93); — (99).
Burchell 6083 (76a); **6311** (66); **6418** (76a); **6535** (123); **7714** (76a); **8294-2** (123).
Burke — (58a).
Bush 1208 (36a).
Bushnell — (57).
- Canby** — (63).
Chandler 7041 (46).
Claussen 276 (126a); — (66); — (81); — (82); — (126a).
Clements (F. E. & E. S.) 59 (58a).
Cleveland — (34); — (39a).
Conzatti 843 (53a).
Conzatti & González 53 (9); **384** (53a); **551** (30); **553** (9); **987** (20); **1005** (30).

- Coues & Palmer 437** (36a); — (61).
Coulter 359 (36δ).
Couthouy — (57).
Coville & Funston 183 (37).
Cowen (J. H.) — (58a).
Crandall (C. S.) 2917 (58a).
Cuming 849 (71).
Curtiss 595 (36γ); **1434** (63).
- Davidson 710** (36a); **1450** (27a).
Davis (P. W.) — (39δ).
Deane (G. C.) — (34).
Diguet (L.) — (7a); — (21); — (36δ).
Drummond III. 194 (36a).
Dugès — (21); — (36δ).
Dusén 3488 (136).
- Earle & Earle 470** (27a).
Eggleston 10772, 10889 (27a).
Ehrenberg (C.) 352 (18); **461** (128a a); **1227** (48); **1558** (53a); **1575** (3).
Ellis (Miss C. C.) 389 (36a).
Elwes — (71).
Endlich 89 (13); **259; 916** (47).
- Fendler 1962** (52).
Frémont 121 (58a).
- Gambell** — (58a).
Gardner 3284, 3285 (66); **3288** p. p. (76a), p. p. (76β); **3290** (124); **3291** (123); **3358** (76a); **4233** (126a); **4233 bis** (125); **4234** (121); **4927 bis** (65).
Garrett (A. O.) 1581a (58a).
Gaumer 502 (36γ); — (36γ).
Gay (C.) — (71).
Germain — (71).
Ghiesbreght 63 (60); **216** (2a); **370** (128a a); **381** p. p. (2a), p. p. (2β); **382** (9); **383** (4); **554** (30); — (28).
Gibert 118, 984 (108β); **1428** (108a).
Gillies 67, 68 (69); **70** (108β); **72** (71); **80, 81** p. p. (69); **81** p. p. (71); **868** p. p. (108a), p. p. (108β).
- Glaziou 9490, 11027** (126a); **12806** (81); **12880** (126a-β); **14006, 15077** (81); **15080, 16165** (100); **17084** (126a); **21556** (76β); **21561** (68).
Goldman 135 (27a); **142** (128a a); **359** (131); **525** (36γ); **1777** (27a).
Goodding 968 (58β); **1618, 2031** (58a).
Graham 78 (29).
Gray — (36δ); — (46).
Greene 194 (58); — (27a); — (36a).
Greenman 363 (36γ).
Gregg 21, 125 (46); **382** (49); **901** (21); — (46).
Griffiths 6007 (36β); **6035** (36a).
Griffiths & Thornber 34 (27a); **150** (36a).
- Hahn** — (8).
Hall (E.) & Harbour 271 (58a).
Hall (H. M.) 2783 (39δ); **3855** (35).
Hall (—) — (57).
Hartman (C. V.) 562 (13); **777** (60); **937** (36a).
Hartweg 1142 (57).
Hassler 2652 (139); **4295** (137); **4306** (138); **4367** (77); **4578** (138); **4959** (134); **5160** (119); **5459** (137); **7677, 8349** (139); **8627** (104); **9075** (133); **9889** (132); **10367** (135); **10757** (117).
Havard 77 (27a); — (46).
Hayden 34 (58a).
Hayes (S.) 448 (39δ).
Hendee (H.) — (63).
Henderson 4822 (58a).
Henry — (27a); — (36a).
Herb. Imp. Brésil 410 (115); **575, 577** (81); **875, 878, 881** (108a); **1052** (108β).
Hinds — (35).
Holway 424 (50); **3055** (36a); **3217** (8); **3689, 3744** (20); **5079** (53a); **5173** (8); **5358** (36a).
Hort. Cantab. (U. S. A.) — (36a).
Hort. Hannov. — (6a).

- Hort. Monspel. — (128a a).
 Hort. Par. — (128β).
 Houstoun — (36γ).
 Humboldt & Bonpland — (84).
 Hunnewell — (58a).
 Ives Expedition — (34).
 Jameson 15 (85); — (85).
 Jelski 732 (91); 797 (94).
 Jermy 861 (36a).
 Jones (M. E.) 7 (36a); 592 (27a);
 3704 (34); 4292 (27a); — (13); —
 (58β).
 Keerl (F. W.) — (25).
 Kerber 211 (64).
 King 40 (140); 203, 224 (108β).
 Kuntze (O.) — (137).
 Lamb 398 (36a).
 Langlassé 535 (53β).
 Lehmann 7965 (86).
 Lemmon 205 (27a); 383 (60); —
 (27a); — (36a); — (59); — (60).
 Liebmann 243 (36a); 384 (43); 588
 (30); 609 (26); 610 (8).
 Linden 95 (56).
 Lindheimer 184, 973, 974, III. 434
 (36a).
 Lloyd (F. E.) 410, 411 (61).
 Lorentz 268, 309, 477 (106); 502
 (90); 581, 1027, 1454 (137).
 Lorentz & Hieronymus 727, 775
 (109); — (90).
 Lozano — (36a).
 MacDougal 50 (396).
 Mackenzie — (8); — (128β).
 Macrae — (70).
 Mairet — (8).
 Malme 794 (103); 1658 (118).
 Mandon 34 (93); 35 (91); 36 (93);
 49 (95).
 Manso 216 (143).
 Martius 826 (126a).
 Mathews 1042 (112); — (88).
 Mearns 351 (27a); 899, 936, 1016
 (36a); 1025, 1030, 1040 (27a);
 1090 (61); 2275 (27a); 2360 (36a);
 2364, 2470 (27a); 2749, 3114 (39δ).
 Mendez — (3); — (7a); — (8); —
 (29); — (36δ).
 Merrill & Wilcox 1182 (58a).
 Metcalfe 130 (27a); 436 (58a); 511
 (59); 812 (27a); 883, 1301 (36a);
 1326 (27a); 1408 (60).
 Mexican Boundary Survey under
 Emory 562 (27a).
 Meyen — (71).
 Moseley — (39γ).
 Neally 209 (27a).
 Née — (128a a).
 Nelson (A.) 39, 1064, 2663, 7988,
 8772 (58a).
 Nelson (A. & E.) 6455 (58a).
 Nelson (E. W.) 1371, 1464 (9); 1495,
 1496, 1530, 1535 (28); 1638 (43);
 1951 (28); 1985 (17); 2105 (6γ);
 2169, 3477 (36δ); 4980 (128a a);
 4981 (13); 6251 (36a); 6287 (13);
 6400 (46); 6470 (27a); 6481 (61).
 Nelson (E. W.) & Goldman 7156,
 7168 (39a); 7277 (39a); 7368 (38).
 Newberry — (34); — (39δ).
 Niederlein 127 (137).
 Orcutt 1110 (39δ); 1356 (39a); 3912
 (18); 4326, 5434 (36a); — (34).
 Pace (L.) — (36a).
 Palmer (E.). 1875: 173 (34). 1876:
 607 (39δ). 1877: 241 (58a); 245
 (62a). 1880: 603, 604, 614 (36a);
 618 (36a-γ); 620, 621, 622, 623
 (46); 626 (128a a). 1885: 218
 (36a-γ); 392 (60). 1886: 443
 (7a); 486 (5); 531 (33a); 532
 (7a); 533 (33β); 657 (53a); 674
 (36δ); 718 (21); 741 (5). 1887:
 529 (34); 530 (39δ); 887 (39a).
 1889: 270 (40); 664 (34); 743
 (41); 773 (129); 793 (34); 802

- (40); **807** (39a); **882** (40). **1890**: **30** (39a); **83** (38); **250** (39δ); **340** (130); **593** (27a); **811** (36a); **828** (39ε). **1891**: **1131** (36a); **1151** (53β); **1772** (36a). **1892**: **1859** (11); **1979** (31). **1896**: **359** (36a); **480** (128a b); **656** (36a); **664**, **665** (128a a); **666** (128a b); **667** (27β); **692** (36a); **747** (27β); **748** (128a a); **754** (60); **816** (15); **824** (2β); **917** (128a a). **1898**: **174** (46); **331** (36a); **429**, **431** (36a); **437**, **443** (46); **456**, **472** (36a); **527** (47); **789** (36a). **1902**: **142** (29); **145**, **152** (6β); **172** (22); **312** (49); **379** (27β). **1904**: **74** (42); **357**, **421** (49). **1906**: **199** (36a-δ); **448** (15). — (61).
- Palmer (Wm.) & Riley** **662**, **672**, **741** (36γ).
- Parish (S. B.)** **299** (34); **4126** (39δ).
- Parish Bros.** **963** (39δ).
- Parkinson** — (29).
- Parry** **112** (39δ); **420** (58a).
- Parry & Palmer** **452** (27a); **453** (29); **454**, **455** (128a a); **458** (6β); **467** (22); **471 1/2** (36a); **555** (128a a); **1102** (60).
- Pavon** — (36a); — (128a a).
- Payson** **161** (58a).
- Pearce (R.)** — (97).
- Pflanz** **48**, **372** (93).
- Philippi (F.)** — (71).
- Philippi (R. A.)** — (69); — (71); — (92); — (110).
- Pittier** **462** (46); **779** (50); **1604** (51); **1853** (36δ); **4675**, **5033** (53a); **5295** (50); **7344** (53a).
- Poeppig III.** **222** (71).
- Pohl** **576** (66); **578** (107); **581** (79); **582** (127); **584** (120); **585** (126a).
- Pollard & Maxon** **459** (63).
- Pond (C. F.)** — (41).
- Pope** — (61).
- Porter** — (63).
- Pringle** **23** (61); **24** (36β); **27** (36a); **42** (36γ); **114** (27a); **126** (36a); **148** (46); **603** (27a); **615** (60); **645** (128a a); **676** (13); **756** (128a b); **898** (128a a); **1030** (27a); **1036** (36a); **1063** (13); **1725** (53a); **1794** (21); **2175** (7a); **2194** (5); **2387** (49); **2460** (33β); **2474** (5); **2484** (7a); **3263** p. p. (2a), p. p. (2β); **3314** (8); **3339** (9); **3611**, **3753** (42); **4365** (31); **4546** (11); **4584** p. p. (33a), p. p. (33β); **4813** (28); **4963** (9); **5610**, **5635** (53a); **5674** (30); **5731** (44); **6142** (25); **6252** (43); **7348** (8); **7961** (36a); **8248** (18); **8390** (16); **8496** (31); **8677** (29); **8800** (49); **9055** (8); **9086** (128β); **9153** (60); **9918** (2a); **9921** (61); **9922** (46); **9995** (128β); **11537** (10); **11538** p. p. (33a), p. p. (33β); **11540** (5); **11608** (8); **11609** (7a); **11611** (21); **11612** (53a); **13059** (46); **13090** (128a a); **13579** (13); — (34); — (36a).
- Pringle & Conzatti** **405** (25).
- Purpus** **47** (40); **218** (34); **219** (39a); **220** (129); **491** (38); **1002** (46); **1540** (128a a); **2515** (43); **2520**, **2520a** (19); **2592** (128a a); **2794** (6a); **3018** (37); **3089** (23); **3093**, **3103** (36a); **4126** (55); **4127** (19); **4460** (46); **4528** (25); **4566**, **4641** (27a-β); **4643** (36a); **4693** (27a-β); **4697** (47); **4698** (49); **5025** (58β); **5154** (128a a); **5321** (37); **5415** (25); **5615** (26); **5617** (36a); **6675** (54); — (39a).
- Ravenel** — (63).
- Reed (E. C.)** **15** (71); — (69); — (71).
- Regnell I.** **190** (126a); **I. 190*** (116); **III. 771** (80); **III. 771*** (114); **III. 772** (100).
- Reverchon** **1760** (27a).
- Riedel** — (126β); — (132).
- Robert (A.)** **640** (74).
- Rojas** **9889** (132); **10367** (135); **10757** (117).

- Rose 2710 (14); 2736 (29); 2740 (7 β); 2768 (128a a); 2827 (33 β); 3653 (7a); 3729 (21); 16115 (41); 16200 (39 ϵ); 16341, 16344, 16356, 16452 (38).
 Rose & Hay 5651 (36a).
 Rose & Painter 7294 (128a a); 7633 (7a); 7770 (36a); 8002 (8).
 Rose, Painter, & Rose 9545, 9757 (128 β).
 Rose, Standley, & Russell 12867 (130); 13883, 14036 (36a).
 Rothrock 501 (36a); 779 (61).
 Rugel 2 (36 γ).
 Rusby 170 (27a); 1683 (93); 1689 (99); 2140 (91).
 Ruth (A.) 42 (63).
 Rydberg & Bessey 5180 (58a).
 Rydberg & Carleton 7394 (59a).
 Sagra, De la — (36 γ).
 St. Hilaire (A.) 1136 (82); 1144 (136); 1157, 1159 (78); 1160 (82); 1208 (105); 1212 (102); 1216, 1218 (122).
 Schaffner 7 (8); 74 (6a); 159 (8); 187, 201 (128a a); 260 (27a); 261 p. p. (27a), p. p. (27 β); 267 (7a); 271 (128a a); 296 (6a); 339 (128a a); 386 (27a); 387 (36a); — (36a); — (128a a).
 Schiede 1565 (128a a).
 Schmitz 44 (128 β); 47 (36a); 58 (6a); 59 (8).
 Schoenfeldt 3221 (39 δ); 3818 (34).
 Schott 192, 195, 833 p. p. (36 γ); — (27a); — (34).
 Schumann 138 (18).
 Seaton 368 (36a).
 Seemann 710 (87); 1405 (1); 1481 (11); 2005 (32); 2007 p. p. (12).
 Seler (C. & E.) 377 (36 δ); 828, 1128 (36a); 1213 (128a a); 1922 (36a); 3402 (36 δ); 4251 (16).
 Sello 669 (67); 998 (81); 1028 (101); 2509 (108 β); — (108a); — (126a).
 Shafer 1133 (36 γ).
 Sinclair — (11).
 Sitgreaves Expedition — (61).
 Small — (63).
 Smith (Herbert H.) 517, 1917, 2619 (52).
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 Smith (L. C.) 239 (45); 382 (36a); 386 (45); 799 (9); 821 (28); 899 (36 δ); 913 (36a); 971 (20).
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X. EXPLANATION OF PLATES

TAB. 1

All the figures are one-half life-size.

- Fig. 1. *Viguiera microphylla* Vasey & Rose (drawn from Palmer 802).
2. *V. deltaidea* Gray var. *Parishii* (Greene) Vasey & Rose (Parry 112).
3. *V. deltaidea* Gray var. *genuina* Blake (Purpus, anno 1901).
4. *V. deltaidea* Gray var. *chenopodiina* (Greene) Blake (Nelson & Goldman 7277).
5. *V. deltaidea* Gray var. *Townsendii* Vasey & Rose (C. H. Townsend).
6. *V. deltaidea* Gray var. *tastensis* Brandegee (Brandegee).

TAB. 2

Heads, natural size. The rays are not shown.

- Fig. 1. *V. Hemsleyana* Blake (Comzatti & González 553).
2. *V. buddleriaeformis* (DC.) B. & H. (Rose & Painter 8002).
3. *V. maculata* (Brandegee) Blake (Purpus 4127).
4. *V. trachyphylla* Blake (Pringle 8248).
5. *V. stenoloba* Blake (Pringle 148).
6. *V. cordifolia* Gray var. *genuina* Blake (Townsend & Barber 300).
7. *V. cordifolia* Gray var. *latisquama* Greenm. (Palmer 667).
8. *V. dentata* (Cav.) Spreng. var. *helianthoides* (HBK.) Blake (Curtiss 595).
9. *V. brevifolia* Greenm. (Purpus 4697).
10. *V. Greggii* (Gray) Blake (Pringle 2387).
11. *V. strigosa* Klatt (Pillier & Durand 1604).
12. *V. tenuis* Gray forma *typica* Blake (Pringle 11612).
13. *V. anomala* Blake (Triana).
14. *V. multiflora* (Nutt.) Blake var. *genuina* Blake (Baker 684).
15. *V. revoluta* (Meyen) Blake (Reed 15).
16. *V. Weberbaueri* Blake (Weberbauer 1591).
17. *V. Bakeriana* Blake (Glaziou 15077).
18. *V. aurea* (HBK.) Hieron. (Spruce 5974).
19. *V. media* Blake (Seemann 710).
20. *V. Pflanzii* Perkins (C. H. T. Townsend 1506).
21. *V. Szyszylowiczii* Hieron. (Szyszylowicz 797).
22. *V. fusiformis* Blake (Mandon 49).
23. *V. nudibasilaris* Blake (Widgren).
24. *V. australis* Blake (Buchtien 297).
25. *V. atacamensis* Phil. (Philippi).
26. *V. pusilla* (Gray) Blake (Wilkes Expl. Exp.).
27. *V. radula* Baker (Regnell I. 100).

28. *V. oblongifolia* Gardn. (*Gardner* 3291).
29. *V. robusta* Gardn. var. *genuina* Blake (*Sello* "853").
30. *V. pilicaulis* Blake (*Hassler* 10757).
31. *V. bracteata* Gardn. (*Gardner* 4234).
32. *V. linearifolia* Chod. (*Hassler* 4959).
33. *V. linearis* (Cav.) Sch. Bip. var. *genuina* Blake forma *typica* Blake (*Palmer* 664).
34. *V. tuberosa* Griseb. (*Kuntze*).

TAB. 3

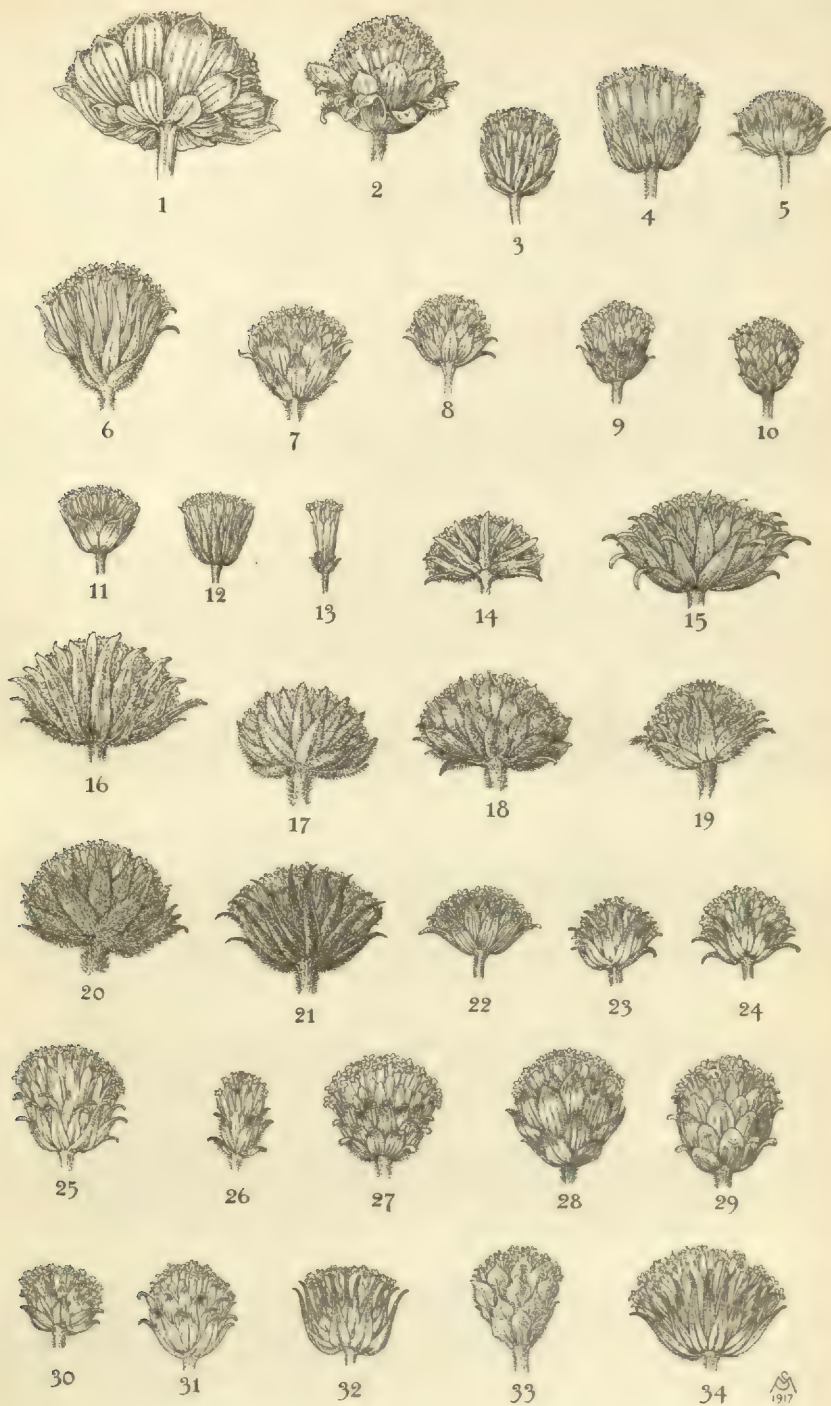
The figures of achenes are enlarged $\times 5$, the others to various scales.

Fig. 1. *V. dentata* (Cav.) Spreng. var. *helianthoides* (HBK.) Blake (*Curtiss* 595). A. head, $\times 1$; B. ray, $\times 2$; C. vertical section of head, $\times 1$; D. pale, $\times 5$; E. achene and floret, $\times 5$; F. style, $\times 10$; G. apex of style, much enlarged; H. stamens, $\times 10$; I. achene, $\times 5$.

2. *V. flava* (Hemsl.) Blake var. *papposa* Blake (*Pringle* 3263 p. p.).
3. *V. flava* (Hemsl.) Blake var. *genuina* Blake (*Pringle* 3263 p. p.).
4. *V. trachyphylla* Blake (*Pringle* 8248).
5. *V. Greggii* (Gray) Blake (*Pringle* 2387).
6. *V. tenuis* Gray forma *typica* Blake (*Conzatti & González* 384).
7. *V. Brandegei* Blake (*Purpus* 4126).
8. *V. multiflora* (Nutt.) Blake var. *genuina* Blake (*Parry* 420).
9. *V. angustissima* Blake (*Glaziou* 21561).
10. *V. grandiflora* Gardn. forma *typica* Blake (*Gardner* 3288).
11. *V. simulans* Blake (*Hassler* 4367).
12. *V. Pflanzii* Perkins (*C. H. T. Townsend* 1506).
13. *V. pusilla* (Gray) Blake (*Wilkes Expl. Exp.*).
14. *V. atacamensis* Phil. (*Philippi*).
15. *V. linearifolia* Chod. (*Hassler* 4959).
16. *V. densifolia* Baker (*Balansa* 858).
17. *V. tuberosa* Griseb. (*Kuntze*).
18. *V. Hassleriana* Chod. (*Hassler* 4578).
19. *V. trachyphylla* Blake (*Pringle* 8248). Leaf, one-half life-size.
20. *V. rhombifolia* (Rob. & Greenm.) Blake.
21. *V. maculata* (Brandege) Blake (*Purpus* 4127).



FIG. 1. *VIGUIERA MICROPHYLLA* Vasey & Rose.
FIGS. 2-6. *VIGUIERA DELTOIDEA* Gray, vars.



VIGUIERA — types of involucre.

1917



FIG. 1. *VIGUIERA DENTATA* VAR. *HELIANTHOIDES* (HBK.) Blake.
 FIGS. 2-18. *VIGUIERA* — types of achene.
 FIGS. 19-21. *VIGUIERA* — types of leaf-base.

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BY B. L. ROBINSON.

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I. DIAGNOSES AND NOTES RELATING TO TROPICAL
AMERICAN EUPATORIEAE.

DURING the past year, in the course of further work toward a comprehensive treatment of the *Eupatorium* tribe, the following plants have been encountered, which appear to need description as novelties, readjustment of rank, or further record as to standing or synonymy.

Several types of new species and varieties here proposed are hitherto unclassified specimens (notably those of Triana, of Lobb, and of Kalbreyer) kindly lent to the writer some time ago from the Royal Gardens at Kew for investigation as opportunity permitted. These are indicated by the abbreviation (K.). For the privilege of examining and publishing upon others the writer is similarly indebted to the botanists of the New York Botanical Garden (N. Y.), the United States National Herbarium (U. S.), Missouri Botanical Garden (Mo.), Field Museum (Field Mus.), and University of California (Calif.). Plants in the Gray Herbarium are indicated by (Gr.). During the preparation of this paper much aid has been derived from photographs which the writer was permitted to take of types in European herbaria during his journeys in 1900, 1905, and 1910. In some cases fragments of types or authenticated specimens have been supplied to the Gray Herbarium in return for similar bits from types in this or other groups. Occasionally tracings or sketches have also been made. The nature of such reference material is briefly indicated by abbreviations which will be self-explanatory (phot., fragm., trac., sk., &c.).

The writer is specially indebted to Drs. H. H. Rusby & F. W. Pennell for the privilege of studying the Eupatoriums of their recent and extensive collection from Colombia. Dr. Rusby has also permitted the inclusion here of his *E. Squiresii*, a hitherto unpublished novelty discovered on an earlier expedition to Venezuela. Prof. N. L. Britton has aided the writer by the loan of valuable material and by information, from time to time as solicited, regarding specimens in

the extensive herbarium of the New York Botanical Garden. He has furthermore brought to the attention of the writer a well marked and highly interesting novelty from Jamaica, *E. hammatocladum*, and has consented to join in its publication. Mr. W. R. Maxon of the United States National Museum has sent to the Gray Herbarium for study many *Eupatoriceae* collected by himself in Panama, by Prof. H. Pittier in Costa Rica, Panama, Colombia, and Venezuela, and by Bros. Apollinaire & Arthur in the neighborhood of Bogotá. Mr. T. S. Brandegee has sent many Eupatoriums collected by Dr. C. A. Purpus, chiefly from Vera Cruz and vicinity. Prof. C. F. Millspaugh of the Field Museum has brought to the writer's attention and lent for study a small but interesting collection made by Dr. Arthur Schott in Colombia just south of the Panama boundary. Miss Mary A. Day, librarian of the Gray Herbarium, has assisted in the bibliography and proof-reading, and in tracing many minor geographic localities of which the correct placing has involved much discriminating search in maps, atlases, and works of travel of very different periods. Mr. Percy Wilson has most kindly contributed a detailed transcription of the field data accompanying the Eupatoriums and Mikanias of the H. H. Smith collection from the region of Santa Marta. To all these persons the writer wishes here to express his thanks and cordial appreciation of their valued aid.

Eupatorium (§ **Eximbricata**) **Apollinairei**, spec. nov., ut videtur herbaceum vel mollissime lignescens sordideque glanduloso-tomentosum; caule tereti medullosa valde flexuoso fortasse plus minusve scandente; ramis oppositis patentibus; foliis oppositis late ovatis obtuse acuminatis crenatis basi sinu angusto profundo cordatis a basi 5-9-nervatis supra subglabris subtus pallidioribus praecipue in nervis venisque glanduloso-tomentosis 7-13 cm. longis aequilatis; petioli subteretibus densissime glanduloso-tomentosis 3.5-7 cm. longis; corymbis terminalibus planiusculis pluricapitulatis; capitulis 7 mm. altis ca. 58-floris graciliter pedicellatis; involucri campanulati squamis ca. 24 subaequalibus lineari-lanceolatis longissime attenuatis dorso pubescentibus 3-nerviis subherbaceis viridibus; corollis albis 5 mm. longis, faucibus cylindricis 2.5 mm. longis, tubo proprio gracillimo 2.5 mm. longo, limbi dentibus 5 patentibus dorso longiuscule hispidis; achaeniis nigris 5-angulatis deorsum decrescentibus basi callosis in costis patenter hispidulis (pilis non glandulosis); pappi setis ca. 16 albis tenuiter capillaribus vix scabratis corollam subaequantibus basi in cupulam coroniformem connatis; styli ramis filiformibus; antheris

apice cum appendice ovato-oblongo munitis basi distincte subsagittatis: receptaculo plano glabro.— COLOMBIA: near Bogotá, alt. 2700 m., *Bros. Apollinaire & Arthur*, no. 94 (TYPE Gr., dupl. U. S.).

This species in many respects closely approaches *E. viscosissimum* Rolfe, Gard. Chron. ser. 3, xxxix. 274 (1906), a plant of Lower California. It shows, however, a variety of minor differences which together with its very different habitat and widely separated range indicate clearly that it is to be regarded, at least for the present, as a distinct species. In *E. viscosissimum* the style-branches are strongly clavate, and the corolla has a throat distinctly exceeding the proper tube into which it passes very gradually, while in the present species throat and tube are the same length and the demarcation between them is rather sharp and definite. The achenes in *E. viscosissimum* have the ribs provided with ascending short bristles while in the present species the bristles are divaricate. Furthermore, the involueral scales in *E. viscosissimum* have the 3 nerves more or less branched in many instances, which does not appear to be the case in the Colombian plant. Somewhat nearly related is the Mexican *E. cardiophyllum* Robinson, but notwithstanding many points of resemblance it is clearly distinct, having fewer-flowered heads, leaves of firmer texture, and a glabrous corolla.

E. § Subimbricata) arcuans, spec. nov., fruticosum; ramis teretibus valde flexuosis glabratis, ramulis arcuatis angulatis ferrugineo-tomentosis; foliis parvis (1.5–3 cm. longis 1–1.5 cm. latis) oppositis petiolatis ovatis subacuminatis basi rotundatis supra mediam partem utroque 2–3-dentatis paullo crassiusculis vix membranaceis a basi conspicue 3-costatis supra subglabris cum nervis depressis, subtus olivaceis in nervis prominulentibus sparse pubescentibus; petiolo gracile ca. 5 mm. longo; capitulis 7 mm. altis; ca. 10-floris; involucri subcylindrici squamis ca. 16 sub-3-seriatis valde inaequalibus oblongis obtusis vel apice rotundatis 3–5-costatis obscure ciliolatis aliter glabris; corollis glabris 4 mm. longis, tubo proprio 2.4 mm. longo gracili, faucibus 1.3 mm. longis primo sensim ampliatis deinde paullo contractis; achaeniis glabris gracilibus 2.5 mm. altis.—“NEW GRENADA” without more exact locality, *Triana*, no. 1191 (TYPE K., phot. Gr.).

E. BALLOTAEFOLIUM HBK., Nov. Gen. et Spec. iv. 121 (1820). Study of the available Colombian material of this species discloses two pretty readily distinguishable varieties, which may be characterized as follows:

Var. **typicum**, involucri squamis lanceolatis modice firmis fere ad

apicem costatis, exterioribus gradatim brevioribus et angustioribus.— COLOMBIA: without precise locality, *Humboldt & Bonpland* (Par., phot. Gr.); also later collected by many others; see p. 321.

Var. **caucense**, var. nov., involucri squamis subaequalibus plerisque oblanceolatis apicem versus tenuioribus et magis herbaceis vix costatis dorsaliter magis pubescentibus; aliter var. *typico* simillimum.— *E. ballotaefolium* Hieron. in Engl. Bot. Jahrb. xxviii. 575 (1901), not exactly of HBK.— COLOMBIA: in the upper Cauca Valley, under low isolated thickets on savannahs near Anserma Nueva, alt. 1000 m., *Lehmann*, no. 3279 (TYPE Gr.); common in scattered bushy places on savannahs along the Rio Paez, *Lehmann*, no. 5675 (U. S.).

E. CELTIDIFOLIUM Lam., var. **hirtellum**, var. nov., arborescens 3–6 m. altum; inflorescentiae ramis et ramulis et pedicellis crispe hirtellis, pilis brevibus flexuosis; achaeniis non solum in costis sed etiam in faciebus hirtellis; aliter omnino ut apud var. *typicum* Antillum.— COLOMBIA: Dept. Magdalena, locally common in dry forest near Bonda, below alt. 150 m., May, 1852, *L. Schlim*, no. 909 (K., phot. Gr.).

In the typical variety, as it grows in Martinique and Dominica, the subdivisions of the inflorescence are glabrous and the achenes are hairy almost exclusively on the ribs and very slightly if at all on the faces.

E. (§ **Eximbricata**) **chiriquense**, spec. nov., fruticulosum 2.5–3 dm. altum; caule fusco paullo decumbente vel suberecto fastigiatim dichotome vel trichotome ramoso; ramis erectis foliosissimis atropurpleis strigillosis infra post foliorum delapsum nudis fuscis nodulosis lignescentibus; internodiis 3–9 mm. longis; foliis oppositis subsessilibus ovatis 1–2.5 cm. longis 6–15 mm. latis acutatis vel acuminatis ad apicem verum obtusiusculum crenato-serratis subcoriaceis supra viridibus glabris rugulosis subtus vix pallidioribus in nervis venisque pubentibus a basi 3-nerviis; petiolo vix 1 mm. longo; corymbis ramos terminantibus multicapitulatis densiusculis 3–5(–8) cm. diametro convexis; pedicellis filiformibus longiusculis glandulari-pubescentibus; capitulis ca. 26-floris 9 mm. altis 8 mm. diametro; involucri campanulati squamis ca. 14 linearibus obtusis subaequalibus (1–2 extimis brevioribus exceptis) dorso glandulis minutis stipitatis praeditis; corollis ut videtur albis vel forsitan roseis 5 mm. longis, tubo proprio 1.7 mm. longo, faucibus campanulatis distincte ampliatis 2.5 mm. longis, dentibus limbi 5 deltoideis 0.8 mm. longis; achaeniis atrobrunneis 2 mm. longis in costis hispidulis; pappi setis ca. 19 capillaribus vix scabratis 3.5 mm. longis roseis.— PANAMA: among rocks,

summit of Chiriqui Volcano, alt. 3374 m., *William R. Maxon*, no. 5360 (TYPE U. S.); dry sunny places, upper belt of Chiriqui Volcano, northern slope, alt. 3374 m., *Pittier*, no. 3089 (U. S.); on the same mountain but without number or indication of locality or altitude, April, 1899, *C. Sapper* (U. S.).

A characteristic and probably local species.

E. (§ Eximbricata) choricephalum, spec. nov., herbaceum perenne erectum 3-7 dm. altum; radice e fibris longis numerosis subsimplicibus nigrescentibus composita; caule pubescente gracili basin versus simplici superne laxe paniculatum ramoso; foliis suborbiculari-ovatis acuminatis grosse crenatis (dentibus 1.5-4 mm. altis 3-8 mm. basi latis) basi late cordatis ad insertionem petioli acuminatis membranaceis utrinque viridibus supra subglabris vel sparse hirtellis (pilis saepius adpressis) subtus vix pallidioribus in nervis venisque hirtellis ima a basi 3-nerviis 3-7.5 cm. longis 2.5-6 cm. latis; petiolo 1.5-3 cm. longo; panicula laxissima 4-6 dm. longa 2-3 dm. diametro foliaceo-bracteata; bracteolis lanceolatis parvis vel minimis; pedicellis filiformibus pubescentibus 8-18 mm. longis; capitulis dissitis ca. 34-floris 6.5 mm. altis 6 mm. diametro cymoso-dispositis; involucri campanulati squamis subaequalibus (una vel duabus multo minoribus) oblongo- vel lanceolato-linearibus acutis 4.5 mm. longis, exterioribus dorso villosulis, interioribus longiuscule ciliatis aliter subglabris saepius 2-costatis et 3-nerviis; corollis albis 3-4 mm. longis, tubo proprio gracili glabro 1.6-2 mm. longo, faucibus turbinato-subcylindricis 1.2-1.8 mm. longis extus sparse hirtis, dentibus limbi 5 (vel rariter 4) 0.3 mm. longis deltoideis obtusiusculis intus papillois extus hirsutulis; antheris brevibus basi distincte sagittatis apice cum appendice ovato-oblonga munitis; achaeniis nigris 1.5-2 mm. longis in costis et etiam in faciebus hispidulis basi callosis apice cum disco cupulato coronatis; pappi setis ca. 28 albis 4 mm. longis paullo scabratis.— *E. grandidentatum*, var. *laxiflorum* Gray in Pringle, Pl. Mex. [list of 1886] on first (unnumbered) page, as a name only. *E. guadalupense* Gray ex Wats. Proc. Am. Acad. xxii. 421 (1887), not Spreng.— CHIHUAHUA: southwestern part, Aug.-Nov., 1885, *Palmer*, no. 276; shaded ravines, Mapula Mts., 30 Oct., 1886, *Pringle*, no. 747. DURANGO: *Palmer*, no. 857. JALISCO: shaded hillsides, Chapala, 1886, *Palmer*, no. 712; ravines near Guadalajara, 14 Oct. 1903, *Pringle*, no. 11,924 (TYPE Gr.). MICHOACAN: oak woods near Uruapan, alt. 1464 m., *Pringle*, no. 10,099. MORELOS: barranca near Cuernavaca, alt. 1982 m., 23 Nov. 1902, *Pringle*, no. 11342. VERA CRUZ: Orizaba, *Botteri*, no. 494.

This is the plant which has in recent years been passing as *E. Muellerei* Sch. Bip., the identity of which is discussed below.

The plant here described as *E. choricephalum*, although for many years well represented in herbaria, appears never to have been characterized. Dr. Gray evidently glimpsed the plant as a separable entity and gave it a manuscript name as a variety of *E. grandidentatum* DC., but he may have lost confidence in it or altered his conception of *E. grandidentatum* (which has subsequently proved a synonym of the older *E. pazcuarensis* HBK.), for he never published a description of this variety.

Dr. Gray's varietal name, *laxiflorum*, notwithstanding its morphological inaccuracy, as well as its lack of characterization and consequently negligible nature, would have been here taken up in the specific rank, except for the circumstance that it would have necessitated making Pringle's no. 747 the type of the species, since it would have been the type of the name-bringing synonym. It happens, however, that this particular number, while pretty clearly conspecific with the others here referred to the new species, is by no means central or typical among them, being in fact a little firmer in general texture and having slightly more rigid pedicels. It therefore seems ill-fitted to function as the type of the group (otherwise pretty uniform) in which it seems a trifle exceptional.

E. (§ *Cylindrocephala*) **chrysostictum**, spec. nov., scandens vel in frutices vicinos incumbens 3-3.6 m. altum perenne vel fruticosum subglabrum, caule tereti laevi; internodiis 8 cm. vel ultra longis; foliis oppositis petiolatis ovatis caudato-acuminatis basi rotundatis margine revolutis subintegris (denticulis minimis obscuris callosis ca. 5-7 mm. distantibus instructis) usque ad 10 cm. longis 5 cm. latis a basi 3-nerviis et cum nervulis intramarginalibus undulatis munitis supra laevissimis lucentibus laete viridibus subtus vix pallidioribus glabris cum punctis aureis numerosis translucens instructis, venis inter costas subregulariter transientibus; petiolo gracili 1-1.5 cm. longo glabro; panicula 3-4 dm. longa 1.5-2 dm. diametro foliaceo-bracteata oppositiramea; ramis divaricatis ca. 8-10-capitulatis, pedicellis plerisque 1 cm. longis patentibus paullo sulcatis minutissime papillois; capitulis ca. 12 mm. altis ca. 26-floris 7 mm. diametro; involucri cylindrici 9 mm. alti squamis ca. 37 oblongis 3-5-nerviis obscure ciliolatis apice rotundatis mucronulatis stramineis apicem versus viridescens; corollis albis vel pallide purpureis glabris 6 mm. longis graciliter tubulosis a basi ad limbum plerumque 4-dentatum sensim ampliatis sine faucibus distinctis; achaeniis 3.5 mm. longis gracilibus deorsum

paullo decrescentibus in costis obscure subremoteque papillois; pappi setis ca. 40 stramineo-albidis 5.5 mm. longis.—COLOMBIA: Las Nubes near Santa Marta, alt. 1372 m., 7 Feb., expedition of 1898-'99, *H. H. Smith*, no. 660 (TYPE Gr.).

A species which appears very clearly distinct in habit and many technical characters from any previously attributed to Colombia. Said to be common in thickets near streams, alt. 1220-1830 m.

E. CONYZOIDES Mill. Dict. ed. 8, no. 14 (1768). Although this species is by Hooker f. & Jackson, Ind. Kew. i. 916 (1893), referred to *Vernonia arborescens* (L.) Sw., it is entirely clear from Miller's description stating that the leaves were 3-nerved and hastate in form, as well as by his reference to the "*Conyza fruticosa, folio hastato, flore pallide purpureo*" of Sloane's Cat. Jam. 124, that the plant he had in mind was certainly not *Vernonia arborescens* (L.) Sw., which has lance-oblong essentially entire pinnately veined leaves. Both from Miller's description and from his direct reference to Sloane, who in his turn cites Plukenet's plate 177, fig. 3, which forms the primary basis of the Linnaean *E. odoratum*, there is no reason to suppose that Miller's *E. conyzoides* was other than *E. odoratum* L., as was the later *E. conyzoides* of Vahl.

E. (§ Eximbricata) cuencanum, spec. nov., herbaceum perenne decumbens gracile usque ad inflorescentiam glaberrimum; caule tereti purpureo-brunneo laevissimo flexuoso ca. 3 dm. alto apice trichotomo-cymoso; foliis oppositis ovatis cordatis ad apicem obtusiusculum angustatis serrulatis firmiuscule membranaceis 2-2.5 cm. longis 1.2-1.6 cm. latis a basi 3(-5)-nerviis in siccatione fusciscentibus; petiolo gracillimo 8-10 mm. longo; inflorescentiae ramis pedunculisque cum glandulis atropurpureis stipitatis munitis aliter glabris; capitulis paucis laxissime cymosis ca. 7 mm. altis 3-4 mm. diametro 16-19-floris; involucri anguste campanulati squamis lanceolato-linearibus ca. 18 ca. 5 mm. longis acutis vel paullo erosis non ciliatis dorso 2-costatis 3-nerviis cum glandulis paucis stipitatis munitis; receptaculo parvo plano glabro; corollis ut videtur albis 3.5 mm. longis in limbo 5-dentato extrorsum paullo villosulis, tubo proprio 1.7 mm. longo fauces cylindricas mediocriter ampliatas aequante; achaeniis pallide brunneis glaberrimis 3 mm. longis basi callosis apice cum disco coronatis; pappi setis ca. 14, 3.5 mm. longis fragilibus caducis basi brevissime connatis.—ECUADOR: Cuenca, *Sallé*, communicated to the herbarium at the Kew Gardens by Mr. W. W. Saunders, Oct. 1874 (TYPE K., trac. Gr.).

A species with the habit of *E. gracile* HBK., *E. caducisetum* DC., and

E. epilobioides HBK. but differing from all these in its more cordate leaves and particularly in the presence of numerous tack-like glands on the inflorescence, the plant being otherwise entirely glabrous.

E. (§ *Cylindrocephala*) **diaphanophlebium**, spec. nov., *E. chrysostictum* habitu glabritate simillimum; caule gracili tereti 2.5 m. alto; foliis oppositis ovatis apice caudato-acuminatis basi rotundatis 5-7 cm. longis 2.8-3.5 cm. latis paullo supra basin 3-nervatis margine paullo undulatis obscure subremoteque calloso-denticulatis utrinque viridibus subtus paullulo pallidioribus impunctatis sed pulcherrime pellucido-reticulatis; panicula ca. 2.5 dm. longa 1.5 dm. diametro foliaceo-bracteata oppositiramea, ramis trichotomis multicapituliferis; capitulis ca. 8 mm. altis 4 mm. diametro; pedicellis 1-5 mm. longis sulcato-angulatis; involucri graciliter cylindrici ca. 6 mm. alti squamis ca. 25 oblongis 3-5-nerviis 4-5-seriatim imbricatis ciliolatis apice rotundatis; corollis 4 mm. longis glabris cum tubo proprio ca. 1 mm. longo et faucibus vix ampliatis cylindraceis; achaeniis 2.5 mm. longis glabris et etiam in costis laevibus; pappi setis ca. 35 albidis capillaribus vix scabratis.—COLOMBIA: in thicket, Las Nubes near Santa Marta, alt. 1372 m., expedition of 1898-'99, *H. H. Smith*, no. 1990 (TYPE Gr.).

A species at first sight suggesting a possible small-headed form of *E. chrysostictum*, but clearly distinct through a variety of characters not likely to be intergradient, as, for instance, the impunctate leaves with pellucid veins, the much more extensive branching (attaining to the third and fourth order) of the panicle, etc.

E. (§ *Conoclinium*) **diplodictyon**, spec. nov., verisimiliter herbaceum; caule tereti flexili ca. 4 mm. crasso fusco-tomentoso, pilis patentibus articulatis; foliis oppositis graciliter (1.5-3.3 cm. longe) petiolatis deltoideo-ovatis longiuscule acuminatis dentatis (dentibus ca. 3 mm. altis ca. 5 mm. latis saepe plus minusve denticulatis) basi profunde sinu angusto sed non clauso cordatis 7-10 cm. longis 4-6.5 cm. latis a basi 3-5(-7)-nerviis utrinque prominenter reticulatis lucidulis laete viridibus supra glabriusculis vix in venis hirtellis subtus in venis venulisque laxius pilosis; corymbo terminali densiusculo valde convexo ca. 7 cm. diametro ad 1 dm. longe pedunculato, ramulis pedicellisque fusco-tomentellis, pilis et articulatis et glanduloso-capitatis; capitulis ca. 30-floris 13 mm. altis; pedicellis ca. 7 mm. longis; involucri campanulati squamis ca. 13 lanceolatis herbaceis striatulis acute acuminatis 7 mm. longis dorso patenter pilosis; receptaculo distincte conico apicem versus rudimenta flosculorum aliquorum abortivorum gerente; corollis 5.5 mm. longis glaber-

rimis, tubo proprio 3 mm. longo sensim in fauces 2.5 mm. longas ampliato, dentibus limbi 5 ovato-lanceolatis patentibus 0.7 mm. longis; achaeniis stramineo-olivaceis 2.8 mm. longis lucidulis deorsum decrescentibus angulis praesertim apicem versus sparse hispidulis, faciebus nigro-punctatis; pappi setis ca. 40 stramineo-albidis 5.5 mm. longis vix scabratis.—COLOMBIA: *Lobb* (TYPE K., phot. Gr.).

A species obviously related to *E. lamiifolium* HBK. of middle altitudes on the Ecuadorian Andes, which, however, has considerably smaller heads with more numerous and very unequal involucre scales of much smaller size. Its leaves are, furthermore, rugose above and very shallowly cordate instead of being penetrated by a deep narrow sinus as in the species here described. Unfortunately the specimen is accompanied by no data in regard to the precise locality, habitat, habit, or flower-color.

E. (§ *Eximbricata*) *droserolepis*, spec. nov., herbaceum vel paullo lignescens subglabrum exsiccatione fuscescens; caule subtereti gracili leviter costato-angulato superne oppositirameo primo purpureo-fusco maturitate griseo-brunneo; foliis oppositis graciliter petiolatis ovato-lanceolatis caudato-acuminatis basi rotundatis vel subcordatis grosse serratis vel undulato-dentatis utrinque glabris viridibus obscuris opacis subtus paullo pallidioribus nigro-punctatis 5-7 cm. longis 2-4 cm. latis a basi vel vix supra basin 3(-5)-nerviis apicem versus saepe falcatis; petiolo 4-12 mm. longo; bracteis foliaceis gradatim reductis lanceolatis petiolatis, supremis linearibus minutis sessilibus; panicula ampla 1-3 dm. alta et crassa laxa ramosa; pedicellis filiformibus sub lente obscure puberulis 5-25 mm. longis; capitulis ca. 11-floris 8 mm. altis; involucri squamis ca. 10 lineari-oblongis laxa imbricatis obtusis 1-costatis subcarinatis ad 5 mm. longis margine sub lente obscure eroso-fimbriatis dorso cum glandulis lucidis globosis sessilibus dense obsitis, extimis paucis brevioribus; corollis 3.5 mm. longis sursum a media parte gradatim ampliatis, dentibus limbi brevissimis recurvatis; styli ramis longis filiformibus recurvatis fuscis apice brevissime incrassatis; achaeniis 3 mm. longis primo sursum in angulis hispidulis sed maturitate glabratis non glanduliferis nigrescentibus; pappi setis ca. 37 sordidis inaequalibus basi subconnatis sursum scabratis.—PORTO RICO: summit of Monte Torrecilla, alt. 1100 m., 19-20 March, 1915, *N. L. Britton, J. F. Cowell, & S. Brown*, no. 5608 (TYPE N. Y., phot. Gr.); Utuado, 8 November, 1913, *F. L. Stevens & W. E. Hess*, no. 4575 (N. Y., phot. Gr.).

E. (§ *Hebeclinium*) *eriodinium*, spec. nov., ut videtur herbaceum

elatum; caule tereti fulvido-tomentello meduloso; foliis oppositis suborbiculari-ovatis magnis acuminatis crenato-dentatis basi rotundato-truncatis vel subcordatis integriusculis 14–16 cm. longis 10–12 cm. latis membranaceis utrinque glabriusculis in nervis venisque fulvo-tomentellis prope basin cum 2 jugis nervorum munitis supra basin palmatim 3-nervatis; petiolo 3.5–5.5 cm. longo; paniculis amplis terminalibus et lateralibus ovato-pyramidalibus trifidis laxiusculis usque ad 2 dm. altis et crassis multicapitulatis; capitulis ca. 20-floris subsessilibus in glomerulos subsphaericos collectis; involucri campanulati 2 mm. longi squamis ca. 16 ovato-oblongis valde inaequalibus obtusis vel apice rotundatis 3–4-costatis ciliatis; receptaculo valde convexo densissime niveo-villoso, pilis 0.6–0.8 mm. longis erectis; corollis graciliter cylindraceutis sine faucibus distinctis breviter 5-dentatis 3 mm. longis limbum versus paullo hispidulis ut videtur albis; styli ramis longissimis gracillimis filiformibus; achaeniis nigris glabris 5-costatis deorsum decrescentibus 1.3 mm. longis basi callosis; pappi setis 30–35 albis tenuiter capillaribus.—COLOMBIA: occasional in thickets near water at Las Nubes, near Santa Marta, alt. 1373 m., 15–20 Dec., *H. H. Smith*, no. 625 (TYPE Gr.).

A species with the habit of *E. guapulense* Klatt, to which it is very close in many of its characters. In that species, however, the stem is described as notably tetragonal, the leaves are more distinctly cordate at base and are 3-nerved from the very base instead of being provided with two pairs of pinnately disposed nerves before the palmate divergence of the three principle nerves which occurs no less than 1.5–2 cm. above the actual base of the leaf. If one may judge from description as well as from an excellent photograph of the type of *E. guapulense* in the Gray Herbarium, the leaves in that species are somewhat thicker and are covered with more copious pubescence.

E. (§ *Eximbricata*) **flavisetum**, spec. nov., fruticosum; caule tereti firme lignoso cum cortice griseo-brunnescente tecto; ramis suberectis flexuosis conspicuiter nodosis; ramulis foliosissimis cum pilis setiformibus patentibus fulvo-flavidulis densissime instructis; foliis oppositis brevissime petiolatis ellipticis subcoriaceis utroque obtusis vel rotundatis crenato-serratis 3–3.5 cm. longis 1.3–2 cm. latis utrinque crebre reticulatis (venulis prominulentibus non sulcatis supra sparse subtus copiose setosis; petiolo 1–3 mm. longo dense setoso; corymbis terminalibus folia subtendentia vix superantibus parvis (2–3 cm. diametro) paucicapitulatis; pedicellis brevibus tomentoso-setosis; capitulis ca. 7 mm. altis et 5 mm. diametro ca. 14-floris; involucri campanulati paullo imbricati 1–2(–3)-seriati

squamis lanceolatis dorso pubescentibus; corollis verisimiliter purpurascentibus glabris 5 mm. longis; tubo proprio 2 mm. longo leviter gradatimque in fauces 3 mm. longas ampliato; antheris apice cum appendice brevi obtusa vel retusa munitis; achaeniis 3.5 mm. longis deorsum decrescentibus in faciebus et praesertim in angulis hispidulis; pappi setis ca. 31 inaequalibus plerisque ca. 5 mm. longis paullulo rigidiusculis flavidulo-albidis.—“VENEZUELA &c.,” coll. of 1842-3, *Funcke*, no. 520 (TYPE K., phot. Gr.).

E. (§ *Eximbricata*) *glischrum*, spec. nov., fruticosum ramosum; ramis teretibus oppositis flexuosis nodosis atrogriseis; ramulis papilloso-scabridulis atropurpureis; foliis oppositis oblongo-lanceolatis breviter petiolatis obtusis leviter cuspidatis basi cuneatis integerrimis trinerviis (nervis lateralibus anastomosantibus) utrinque glabris et vernicosis 2-3.5 cm. longis 5-10 mm. latis, levissime reticulatis subtus paullo pallidioribus, petiolis 2-6 mm. longis; inflorescentiis dense cymosis 2-3 cm. diametro terminalibus vernicoso-viscosis oppositirameis; capitulis 4-6-floris sessilibus vel brevissime pedicellatis 1 cm. altis; involucri subcylindrici squamis ca. 7 subaequalibus anguste oblongis obtusis 4.8 mm. longis apicem versus eroso-ciliolatis dorsaliter convexis 2-3-striato-nervatis marginibus valde involutis; corollis purpurascentibus glabris 5.5 mm. longis, tubo proprio ca. 1.5-2 mm. longo in fauces cylindricas ca. 4 mm. longas leviter expanso, dentibus limbi 5 ovato-triangularibus; styli ramis vix clavellatis; achaeniis 5-angularibus stramineo-olivaceis deorsum decrescentibus 3 mm. longis in faciebus et praesertim in costis hirtellis; pappi setis 27-34 substramineo-albidis et saepissime purpureo-tinctis valde inaequalibus sursum scabridulis.—MEXICO: on summit of Sierra de Parras, Coahuila, October, 1910, alt. 2745-3050 m., *Dr. C. A. Purpus*, no. 4655 (TYPE Gr., authenticated duplicate Calif.).

E. (§ *Eximbricata*) *glyptophlebium*, spec. nov., fruticosum; ramis teretibus flexuosis striatulis fulvo-tomentellis; internodiis 5-7 cm. longis; foliis oppositis petiolatis oblanceolato-oblongis grosse crenato-vel serrato-dentatis basi (quarta parte longitudinis) integerrimis paullulo angustatis imam ad basin rotundatis vel subcuneatis 1.5 dm. longis 5 cm. latis coriaceis penniveniis utrinque viridibus et reticulatis in costa venisque principibus pilosulis aliter glabris, venulis subtus (sub lente) sulcatis; petiolo 1.5 cm. longo; corymbis terminalibus compositis usque ad 12-14 cm. diametro convexis multicapitulatis fulvo-tomentellis; capitulis pedicellatis ca. 14-floris 10-11 mm. altis; involucri subcylindrici 5 mm. alti squamis 10-12 anguste oblongis subaequalibus molliter pilosis; corollis ut videtur albis vel roseis

5 mm. longis glabris, tubo proprio 2 mm. longo gradatim in fauces 3 mm. longas ampliato, dentibus limbi 5 lanceolatis patentibus; achaeniis 3.8–5 mm. longis atrobrunneis in costis cum granulis sparsis scabratis in faciebus glabris; pappi setis ca. 28 roseis 5.5 mm. longis.—COLOMBIA: hillside near Tequendama, alt. 2500–2700 m., *Pennell*, no. 2641 (TYPE Gr.).

E. (§ Eximbricata) hammatocladum Britton & Robinson, spec. nov., fruticosum 2–3 m. altum; ramis teretibus flexuosis foliosis fusco- vel fulvo-tomentellis post foliorum delapsum cum cicatricibus majusculis prominentibus conspicue nodosis; internodiis 1–2 cm. longis; foliis oppositis vel ternis vel quaternis petiolatis obovatis obtusis supra mediam partem repando-dentatis basi integerrimis rotundatis supra laete viridibus minute sparseque punctatis glabriusculis subtus paullo pallidioribus densius punctatis in costa venisque plus minusve fulvo-tomentellis 4–6.5 cm. longis 3–4.5 cm. latis coriaceis penniveniis; petiolo 1 cm. longo; corymbis terminalibus compositis planiusculis fulvo-tomentellis; capitulis ca. 7-floris pedicellatis ca. 7 mm. altis; involucri campanulati squamis ca. 9, interioribus subaequalibus oblongis apice rotundatis ciliolatis 1–3-nerviis, 1–3 extimis brevioribus lanceolatis dorso puberulis; corollis albidis 4 mm. longis sparse papillois, tubo proprio 1.5 mm. longo gradatim in fauces 2.5 mm. longas paullo ampliato; achaeniis 2.5 mm. longis cum granulis in faciebus sparse asperatis; pappi setis ca. 21 lutescenti-albidis firmiusculi-capillaribus ca. 4 mm. longis.—JAMAICA: Peckham Woods, Upper Clarendon, alt. 762 m., 28 December, 1917, *William Harris*, no. 12,795 (TYPE Gr., N. Y.).

An attractive and clear-cut species with bright-green thickish repand-dentate leaves in texture, contour, and toothing recalling those of *Hamamelis*.

E. (§ Eximbricata) hylibates, spec. nov., fruticosum 1.2–2.4 m. altum; caule robusto tereti medullosulo fulvo-tomentoso (pilis crispis cum glandulis sessilibus globosis numerosis intermixtis); foliis oppositis longe petiolatis oblongo-ovatis acutiusculis vel breviter acuminatis basi rotundatis vel leviter cordatis margine crenato-serratis (crenaturis ca. 1 mm. altis et 4 mm. latis) supra viridibus et in costa et venis principibus paullo fulvido-puberulis subtus multo pallidioribus et crisper fulvo-pubescentibus penniveniis 1.1–1.8 dm. longis 7–12 cm. latis; petiolo robusto fulvo-tomentello subtereti 5 cm. vel ultra longo; corymbo composito trichotomo multicapitulato leviter convexo denso 1.5–2 dm. diametro foliaceo-bracteato; capitulis ca. 7 mm. altis ca. 14-floris; involucri squamis ca. 12 lanceolato-linearibus

acutiusculis subaequalibus (1-2 extimis brevioribus exceptis) ca. 4.5-5 mm. longis vix nervatis dorso paullo granulatis; corollis albis 4.7 mm. longis; tubo proprio gracili 2 mm. longo cum glandulis paucis globosis sessilibus instructis; faucibus campanulato-cylindricis 2.7 mm. longis glabris; dentibus limbi 5 recurvatis; styli ramis sub-filiformibus; achaeniis brunneo-nigrescentibus in faciebus glabris in costis (pallidioribus) paullo hispidulis apice cum annulo flavidulo pappifero coronatis et cum nectario cupuliforme crenatulo instructis; pappi setis ca. 25 flavido-albis paullo scabridis.— COLOMBIA: in open places in the border of the forest, Rio Frio, Dept. Magdalena, alt. 2300-2750 m., *Kalbreyer*, no. 1956 (TYPE K., phot. Gr.).

E. (§ Eximbricata) intercostulatum, spec. nov., fruticosum puberulum; ramis teretibus post exsiccationem angulato-costatum adscendentibus; foliis oppositis petiolatis deltoideis acutis basi sub-truncatis sed ad insertionem breviter acuminatis, ima e basi 3-nerviis, crenato-dentatis basi integerrima excepta, membranaceis parce granulati-puberulis subtus paullo pallidioribus 3-3.5 cm. longis sub-aequilatis, dentibus 1.5-2 mm. altis 3-4 mm. latis; corymbis parvis densiusculis multicapitulatis terminalibus et ex axillis superioribus oriuntibus; capitulis ca. 15-floris 6.5 mm. altis 6 mm. diametro; involucri campanulati squamis ca. 13 plerisque subaequalibus lanceolatis attenuatis ca. 3 mm. longis dorso griseo-puberulis; corollis albis 3.5 mm. longis glabris, tubo proprio faucibus subcylindricis bis brevioribus; styli ramis filiformibus; achaeniis sub-10-costulatis (costulis secundariis 5 vel saltem 3-4 inter primarias singulatim distributis, omnibus sursum hispidulis) 2.3 mm. longis; pappi setis ca. 40 albidis sursum sub lente scabratis ca. 2.5 mm. longis.— COLOMBIA: Truandó, in the northern part of the Intendencia del Chocó, February, 1858, *Dr. Arthur Schott*, no. 3 (TYPE Field Mus., phot. Gr.).

In the secondary ribs of the achenes this species recalls the case of *Brickellia Fendleri* Gray, for a discussion of which see Robinson, Mem. Gray Herb. i. 12 (1917). Here also, as in that case, the chief technical distinction between *Eupatorium* and *Brickellia* breaks down and it becomes necessary to infer the affinities of the species concerned from habit and traits of minor weight. In the present case it appears to the writer that there can be no doubt that the plant is a true *Eupatorium*, although somewhat anomalous in its achenes.

E. (§ Cylindrocephala) iridolepis, spec. nov., fruticosum 12-15 dm. altum; caule tereti purpureo-brunneo crispe griseo-tomentello flexuoso; internodiis 3-6 cm. longis; foliis oppositis ovatis petiolatis in axillis proliferis longe acuminatis basi breviter rotundato-cuneatis

6-7 cm. longis 2.4-3 cm. latis basi apiceque exceptis crenato-serratis (dentibus 4-7 mm. latis vix usque ad 1 mm. altis) supra basin 3-nerviis supra minute hirtellis subtus in nervis venisque molliter pubescentibus crebre aureo-punctatis; corymbis terminalibus densiusculis convexis multicapitulatis ca. 1 dm. diametro; capitulis ca. 10-floris 9.5 mm. longis 3-4 mm. crassis sessilibus ad apices ramulorum ternis et quaternis fasciculatis; involucri gracile cylindrici 7 mm. alti squamis ca. 18 ca. 4-5-seriatim imbricatis plerisque anguste oblongis basi laete albis glabris apicem versus breviter subherbaceis viridibus vel (intimis) pulchriter roseo-purpureis, apice subherbaceo squamarum intermediarum plus minusve squaroso subpatente acutiusculo tomentello; corollis ut videtur roseis 4.5 mm. longis, tubo proprio 1 mm. longo, faucibus vix distinctis sensim sursum ampliatis extus 5-nerviis inter nervos cum glandulis stipitatis paucis munitis; achaeniis gracilibus 3.3 mm. longis in costis et in faciebus breviter hispidulis; nectario conspicuo depresso; pappi setis ca. 28 capillaribus laete albis 4 mm. longis.—COLOMBIA: open hillside, edge of forest, Las Nubes near Santa Marta, alt. 1370 m., December, *H. H. Smith*, no. 615 (TYPE Gr.).

A highly attractive species distributed under the name of *Eupatorium pulchellum* HBK., a Mexican plant with alternate shorter-petioled leaves and obtuse unappendaged involucreal scales. The name *iridolepis* alludes to the parti-colored involucreal scales which under low magnification have unusual beauty of form and color.

E. (§ **Eximbricata**) **Jahnii**, spec. nov., fruticosum; caulibus (vel ramis) teretibus 5 mm. diametro purpureo-brunneis juventate viscidulis molliter villosis maturitate glabris plus minusve vernicosis; internodiis ca. 3 cm. longis; foliis oppositis breviter petiolatis oblongis coriaceis acutis vel saltim acutiusculis margine (basi cuneata excepta) serrato-dentatis (dentibus 0.5-0.8 mm. altis 4-5 mm. latis) penniveniis (venis ca. 10-jugis) supra subglabris (costa et venis juventate paullo villosio-lanulatis) subtus in costa venisque sordido-vel fulvo-villosis vel -lanatis 6-9.5 cm. longis 2.3-4 cm. latis; petiolo ca. 8 mm. longo supra sulcato basi paullo dilatato; corymbo terminali sessili composito trichotomo multicapitulato planiusculo vel leviter convexo 8-10 cm. diametro; capitulis 6-floris ca. 11 mm. altis 4 mm. diametro; involucri anguste campanulati squamis ca. 11 lanceolatis inaequalibus laxe (ca. 2-seriatim) imbricatis viscidis ciliatis; corollis 6 mm. longis glabris; tubo proprio ca. 1.8 mm. longo; faucibus ca. 4.2 mm. longis gradatim leviterque sursum dilatatis; dentibus limbi 5 lanceolato-deltaideis recurvatis; antheris apice cum appendice longiuscula

oblonga instructis; achaeniis 3.5 mm. longis in costis sursum hispidulis; pappi setis ca. 37 flavidulo-albidis plerisque ca. 6 mm. longis (paucis multo brevioribus).—VENEZUELA: Sierra de Nevada de Mérida, Rio Nuestro Señora, alt. 3000–4000 m., *Dr. Alfredo Jahn*, no. 80 (TYPE U. S., phot. Gr.).

E. (§ *Conoclinium*) **lanulatum**, spec. nov., herbaceum vel paullulo lignescens decumbens 3–4 dm. altum; radice fibrosa quasi annua; caulibus 1–3 teretibus foliosis paullo flexuosis griseo-lanulatis; foliis oppositis breviter petiolatis lanceolatis crenulatis apicem versus gradatim angustatis (sed apice vero obtuso vel rotundato) supra viridibus vix cum vestigiis indumenti arachnoidei-puberuli tectis subtus albido-lanulatis penniveniis basi integris cuneatis 1–1.5(–3) cm. longis 2–4(–10) mm. latis; crenaturis utroque ca. 7; venis utroque ca. 9; petiolo 3–4 mm. longo; corymbis parvis terminalibus densiusculis 12–20-capitulatis 2–6 cm. diametro plerumque longe pedunculatis; capitulis ca. 20-floris ca. 7 mm. altis; involucri campanulati squamis 12–14 lanceolatis subtriseriatim imbricatis firmiusculis peracutis pilosulis vel glabrescentibus viridibus plerumque 3-nerviis 2–4-costulatis apicem versus purpurascens; corollis purpureis 4 mm. longis limbum versus granulati-pilosiusculis aliter glabris; tubo proprio 1.2 mm. longo tenui; faucibus anguste obconicis 2.2 mm. longis; achaeniis brunneo-fuscis 1.7 mm. longis glaberrimis basi calcaratis; pappi setis ca. 30 basi in anulum angustissimum connatis.—COLOMBIA: Guadalupe near Bogotá, alt. 2000 m., *Bros. Apollinaire & Arthur*, no. 33 (TYPE U. S., phot. Gr.); without precise locality, *Triana*, no. 1169 (K.).

This species clearly belongs to the small group of Colombian Eupatoriums of § *Conoclinium* of which *E. microphyllum* L. f. is probably the best known and most characteristic species. It differs from *E. microphyllum* in being a somewhat larger plant with lanceolate leaves cuneate at the base instead of roundish-ovate and cordate. The indument of the stem is also quite different being a very fine sub-appressed woolliness, while in *E. microphyllum*, at least on the peduncle, the hairs tend to spread widely and are somewhat stiffer in character.

E. (§ *Subimbricata*) **macrophyloides**, spec. nov., fruticosum elatum 3–4 m. altum; ramis teretibus costato-subangulatis dense fulvescenteque lanatis molliter lignescensibus medullosis; internodiis 3–8 cm. longis; foliis oppositis longe petiolatis deltoideo-ovatis 1 dm. longis 8 cm. latis acutis vel acuminatis basi subtruncatis ad insertionem brevissime cordatis usque ad basin crenulatis (dentibus numerosis 0.5–0.8 mm. altis 1–2 mm. latis) a basi 3-nerviis (nervis lateralibus

extrorsum fere ab incepto denuo ramosis) supra pulverulo-puberulis subtus multo pallidioribus griseis molliter tomentellis et atomiferis; petiolo usque ad 6 dm. longo; corymbis compositis trichotomis, partialibus convexis 6-10 cm. diametro densis multicapitulatis; capitulis breviter pedicellatis ca. 11-floris 7 mm. altis 3.2-3.5 mm. diametro; involucri subcylindrici squamis ca. 18 valde inaequalibus ca. 4-seriatim laxius imbricatis tenuibus stramineis, interioribus oblongo-linearibus apice rotundatis, exterioribus gradatim brevioribus obtusis ciliolatis, extimis ovatis acutiusculis dorso villosulis; receptaculo minimo planiusculo glabro; corollis ut videtur albidis 4 mm. longis, tubo proprio gracili fauces sensim paullo ampliatis subaequante, dentibus limbi 5 recurvatis; styli ramis filiformibus; achaeniis 2 mm. longis in faciebus et in angulis hispidulis; pappi setis albis capillaribus ca. 36 inaequalibus, aliis ca. 3.5 mm. longis, aliis quartem vel tertiam partem brevioribus.— VENEZUELA: at Sanchorquig (a name written with fair clearness upon the original label but not found on any available map), *Eggers*, no. 13,413 (TYPE U. S., phot. Gr.).

Although this species in foliage and general form of the inflorescence slightly suggests *E. macrophyllum* L., it differs in many important details (fewer florets, cylindrical rather than campanulate involucre, glabrous receptacle, etc.) and is clearly of § *Subimbricata*. Although cylindrical in form the involucre does not have the texture or close imbrication which characterize § *Cylindrocephala*.

E. (§ *Subimbricata*) **magdalenense**, spec. nov., perenne herbaceum erectum vel inclinatum 3-9 dm. altum; ramis brunneis obscure hexagonis mox glabratis laevissimis; ramulis inflorescentiae aliquid cum pilis minutis incurvis instructis; foliis oppositis (vel rameis alternis) anguste ovatis attenuato-acuminatis basi rotundatis argute serratis crassiuscule membranaceis paullulo succulentis utrinque viridibus et glabris 4-4.5 cm. longis 2-2.5 cm. latis a basi 3(-7)-costatis; venulis reticulatis translucetibus; petiolo 8-14 mm. longo; ramis primariis inflorescentiae late patentibus curvato-ascendingibus cum ramulis 3-7 brevibus subaequalibus (1-3 cm. longis) instructis; his 2-3-foliatis apicem versus floriferis 5-20-capitulatis; capitulis ca. 25-floris 6.5 mm. altis 5 mm. diametro; involucri campanulati 5 mm. alti et crassi squamis lanceolatis acutis minute ciliolatis ca. 3-seriatis subherbaceis persistentibus et denique brunnescentibus; corollis albis 4 mm. longis, tubo proprio ca. 7 mm. longo gradatim in fauces cylindricas ampliato; achaeniis 1.7 mm. longis nigris minute in costis pallidioribus hispidulis.— COLOMBIA: common on open ridges, Sierra del Libano, alt. 1680-1980 m., near Santa Marta, *H. H. Smith*, no. 1993 (TYPE Gr.).

. A species in many characters near *E. pycnocephalum*, but quite different in its inflorescence.

E. (§ Subimbricata) Maxonii, spec. nov., frutescens molliter lignescens 3-4 m. altum; caule tereti fistuloso fulvide puberulo ramoso; ramis oppositis modice patentibus; foliis oppositis ovato-suborbicularibus tenuiter membranaceis utrinque viridibus apice breviter acuminatis basi subtruncatis vel brevissime acuminatis simplice vel plus minusve duplici dentatis lateraliter saepe uni-lobatis vel -angulatis basi pinnatinerviis supra basin trinerviatis delicatule reticulatis 10-12 cm. longis 8-10 cm. latis; petiolis 3-5 cm. longis sordide puberulis supra planis vel leviter canaliculatis; capitulis ca. 26-floris subaxe corymboso-paniculatis graciliter pedicellatis 1 cm. longis; involucri anguste campanulati squamis ca. 23 valde inaequalibus dorsaliter minutissime puberulis 3-6-nerviis, exterioribus ovato-lanceolatis acutis brevioribus (extimis 1-3 lineari-lanceolatis subpatentibus), mediis lanceolatis, interioribus anguste oblongo-lanceolatis acutis, intimis linearibus subacutis apicem versus ciliolatis; corollis graciliter tubulosis 7 mm. longis apicem versus patenter hispidulis aliter glabris verisimiliter albis, faucibus brevissimis obscuris, limbi dentibus 5 breviter deltoideis patentibus vel recurvatis; antheris subliberis apice longiuscule appendiculatis basi subsagittatis; achaeniis glabris nigris lucidis 5-costulato-angulatis 1.5 mm. longis basi callosis et concavis; pappi setis ca. 40 laete albis delicatule capillaribus plerisque subaequalibus (2 vel 3 brevioribus) minute scabratis basi in cupulam connatis; styli ramis longissimis filiformibus.—PANAMA: in humid forests in the vicinity of El Boquete, Chiriquí, alt. 1000-1300 m., 2-8 March, 1911, *William R. Maxon*, no. 4942 (TYPE U. S., dupl. Gr.).

From *E. conspicuum* Kunth & Bouché, a species somewhat similar in its long-petioled, thin, and broadly ovate leaves, *E. Maxonii* differs much in its involucre which is clearly that of § *Subimbricata*. From *E. hylobium* Robinson it differs in the more spreading dentation of the leaves, its longer corollas (7 mm. instead of 4.5 mm.), and considerably more numerous florets and pappus-bristles, as well as its slightly firmer and more acute scales. In *E. oresbium* Robinson, another species of somewhat similar foliage and habit, the heads are smaller and less numerous flowered and the corolla has a more enlarged throat. *E. proratum* Klatt of Vera Cruz, likewise somewhat similar in habit, has the receptacle hairy and the achenes somewhat hispid, while *E. prionophyllum* Robinson of Costa Rica, which is arboreous, has more ovate, more gradually acuminate leaves, and glabrous corollas about 4.5 mm. long.

E. (§ *Cylindrocephala*) meridense, spec. nov., perenne herbaceum vel fruticosum erectum; caule teretiusculo paullulo costato-angulato dense breviterque fulvo-lanato; foliis oppositis lanceolatis utroque attenuato-acuminatis crenulatis vel subintegris 4-6 cm. longis 1-1.5 cm. latis basi in petiolum breve cuneato-alatum gradatim angustatis supra bullatis scabridis puberulis subtus 3-nerviis conspicue exserto-venosis et reticulatis in venis venulisque sordido-vel fulvo-tomentosis; corymbis terminalibus compositis valde rotundatis 1 dm. diametro multicapitulatis; capitulis pedicellatis ca. 10-floris ca. 9 mm. altis ca. 3.5 mm. diametro; involucri cylindrici 4-5-seriatim imbricati squamis ca. 22 regulariter gradatis obscure ciliolatis apice rotundatis vel subtruncatis apicem versus brunnescentibus; corollis graciliter tubulosis verisimiliter purpurascens; achaeniis gracilimimis 3.2 mm. longis (vix maturis) in costis cum pilis brevissimis subsphaericis ornatis; pappi setis ca. 30 sordide albidis vix scabratis corollam subaequantibus.—*E. scabrum* Sch. Bip. ex Hieron. in Engl. Bot. Jahrb. xxviii. 569 (1901), not L. f.—VENEZUELA: at Mérida, Moritz, no. 1365 (TYPE Gr.).

This species differs from *E. scabrum* L. f. in having smaller heads, considerably narrower subtire or finely crenulate leaves much more attenuate at each end. The pubescence is also very different, that of the stem being a close matted wool of tawny color instead of the long spreading articulated hairs composing the much harsher and more scattered indument of *E. scabrum*.

E. (§ *Subimbricata*) microdon, spec. nov., fruticosum; ramis teretibus curvatis nodosis griseis laevibus; ramulis obscure strigilloso-puberulis; foliis oppositis petiolatis lanceolato-oblongis longiuscule acuminatis basi acutis in margine subrevoluto remote obscureque cuspidato-denticulatis penninerviis (nervis lateralibus ca. 10-jugis prorsus curvatis) utrinque glaberrimis delicatule prominenter reticulatis subcoriaceis 9-13 cm. longis 2.5-4.8 cm. latis; petiolis 1-1.5 cm. longis; paniculis terminalibus hemisphaericis 6-10 cm. diametro; bracteis parvis anguste oblanceolatis; capitulis in glomerulos sphaericos ca. 5-capitulatos dispositis sessilibus ca. 3-floris 8 mm. longis; involucri subcylindrici squamis valde inaequalibus ca. 9, exterioribus lanceolato-ovatis acutiusculis vel obtusis dorso brevissime pilosulis brevibus persistentibus, intermediis et interioribus gradatim longioribus minute eroso-ciliolatis aliter glabrescentibus substramineis caducis; corollis graciliter tubulosis 4.8 mm. longis sine faucibus ullis distinctis, dentibus limbi ovato-deltaeideis patentibus subacutis; achaeniis atro-olivaceis 2 mm. longis 5-angulatis glaber-

rimis; pappi setis 41-50 minute subscabratis corollam subaequantibus; styli ramis clavellatis.—GUATEMALA: in tall woods, Coban, Alta Vera Paz, alt. 1550 m., April, 1908, *H. von Türckheim*, no. II, 2261 (TYPE Gr.).

This species with many of the characters of *E. dulcoides* (DC.) Hemsley differs markedly in having its leaves finely and remotely cuspidate-denticulate instead of serrate and very obscurely, if at all, punctate, and in the distinct though fine reticulation on their upper surface.

E. (§ *Subimbricata*) **miserum**, spec. nov., herbaceum gracillimum perenne 2-2.5 dm. altum; radice e fibris duris gracilibus composita; caulibus 1-3 teretibus ca. 1 mm. diametro obscure fulvotomentellis simplicibus usque ad inflorescentiam paniculatim ramosam; foliis oppositis lanceolatis attenuatis ad apicem obtusiusculum crenatis (basi anguste cuneata integerrima excepta) membranaceis utrinque viridibus et paullo puberulis a basi 3-nerviis 1-2 cm. longis 2-5 mm. latis; petiolo 2-3 mm. longo; paniculae diffusae ramis inferioribus oppositis superioribus plerumque alternis gracilibus; pedicellis filiformibus 1-9 mm. longis; capitulis 4.5 mm. altis ca. 25-floris 3.5 mm. diametro; involucri turbinato-campanulati persistentis squamis lanceolatis vel lanceolato-linearibus tenuibus viridibus, interioribus subaequalibus glabris, exterioribus paucis gradatis plus minusve dorso puberulis; receptaculo parvo plano calvo glabro; corollis lilaceis vel roseis 2 mm. longis, tubo proprio 5 mm. longo, faucibus subcylindricis distincte ampliatis 1.3 mm. longis, limbi dentibus 5 deltoideis dorso paullulo hispidulis; achaeniis immaturis saltem in angulis pubescentibus.—COLOMBIA: at the Falls of the Truandó, just south of the border of Panama, *Dr. Arthur Schott*, nos. 2 (TYPE Field Mus., phot. Gr.), 1 (Field Mus., phot. Gr.).

An inconspicuous plant clearly of a small group of annuals and slender perennials, represented by *E. sideritidis* Benth., *E. Sinclairi* Benth., *E. capillipes* Benth., and *E. lloense* Hieron.

EUPATORIUM MUELLERI Sch. Bip. ex Klatt, *Leopoldina*, xx. 90 (1884), as *Mülleri*. Although this name has in recent years been rather frequently employed in identifications of Mexican specimens, it now becomes clear that it has not been rightly applied. Fragments and an excellent sketch of the type of *E. Muelleri* which came to the Gray Herbarium with the Klatt *Compositae* prove it to have been precisely the plant later described and well figured by Coulter, *Bot. Gaz.* xx. 47, t. 5 (1895), as his proposed monotypic genus *Mallinoa corymbosa*. The writer, *Proc. Am. Acad.* xlix. 433 (1913), has already

discussed the generic position of *Mallinoa* and shown that it is of the genus *Eupatorium*, where it approaches very closely the species *E. bellidifolium* Benth. At that time it seemed unwise to rename *Mallinoa corymbosa* under *Eupatorium*, from a suspicion that the plant might already have been somewhere so treated, which now proves to have been the case. Klatt misleadingly described the species as shrubby. This is certainly not the case. It is an herbaceous perennial, leafy chiefly at or near the base and with consequent subscapose habit. The more leafy plant, long passing in herbaria as *E. Muelleri*, is described above as *E. choricepalum* and may be readily separated by its broadly ovate distinctly cordate leaves, distributed well into the open inflorescence, as well as by many other characters.

E. (§ Subimbricata) ornithophorum, spec. nov., herbaceum perenne griseo-viride tomentellum; caule striato-angulato griseo-brunneo, internodiis 6-12 cm. longis; foliis lanceolatis caudato-acuminatis penniveniis obtuse et irregulariter dentatis supra bullatis et scabridis subtus multo pallidioribus griseo-tomentosis 1 dm. longis 2.5-3.5 cm. latis basin versus primo paullo contractis deinde in discum suborbiculare dentatum perfoliatum ca. 2.4-4 cm. diametro dilatatis; foliis supremis bracteiformibus multo reductis angustatis attenuatis subintegris; panicula griseo-tomentella ca. 2 dm. alta et crassa; ramulis late patentibus, lateralibus terminales saepius longe superantibus; capitulis ca. 22-floris 7 mm. altis 4 mm. diametro subsessilibus glomeratis; involucri campanulati ca. 4-seriati griseo-tomentelli squamis lanceolatis vel intimis linearibus acutis; receptaculo plano calvo glabro; corollis 3 mm. longis purpureis vel violaceis tubulatis a basi ad apicem paullulo dilatatis sed sine faucibus distinctis; styli rami filiformibus elongatis papillois attenuatis non glabratis; acheniis 1.2 mm. longis in faciebus granulatis.— COLOMBIA: in the Cordillera Oriental east of Neiva, August 7, 1917, *Rusby & Pennell*, no. 1034 (TYPE N. Y., fragm. and phot. Gr.); foot of Cordillera, near Neiva, *Rusby & Pennell*, no. 479 (N. Y., fragm. Gr.).

E. (§ Subimbricata) Pennellii, spec. nov., herbaceum erectum 10-14 dm. altum exsiccatione fuscescens; caule tereti atropurpureo maturitate glabrato laevissimo sed obscuro infra simplici supra paniculatim ramoso; foliis oppositis petiolatis ovatis caudato-attenuatis basi rotundatis argute serratis (dentibus 14-18 utroque latere 0.7 mm. altis 1.5-2.5 mm. latis) membranaceis plerisque a basi 5-nervatis ca. 5 cm. longis 3.5 cm. latis supra in nervis sparse pubentibus infra subglabris; petiolo 1-1.5 cm. longo; panicula elongata ovoidea ca. 5 dm. longa 2 dm. diametro; ramis oppositis divaricatis saepe flexuosis

puberulis, pilis incurvis; cymis ca. 4-7-capitulatis 2-3 cm. diametro convexis laxiusculis, pedicellis 3-6 mm. longis; capitulis 7 mm. altis ca. 25-floris; involucri glabriusculi campanulati squamis stramineo-scariosis 3-4-seriatis plerisque 2-costatis (costis e callo conspicuo basilari oriuntibus), interioribus elliptico-oblongis apice erosis obtusis vel rotundatis, exterioribus gradatim brevioribus ovatis ciliatis dorso paullo pubescentibus; corollis albis 3.5 mm. longis glabris, tubo proprio 1 mm. longo, faucibus vix ampliatis cylindricis 2 mm. longis, limbi dentibus 5 ovato-deltoides 0.5 mm. longis; achaeniis 2 mm. longis nigrescentibus in costis pallidioribus patenter hispidulis. — COLOMBIA: at the foot of the Cordillera Oriental near Neiva, *Rusby & Pennell*, no. 626 (TYPE Gr., dupl. N. Y.).

E. (§ *Subimbricata*) *perezoides*, spec. nov., gracile perenne erectum 4-5 dm. altum; caule tereti ad inflorescentiam simplicem fusco-tomentoso et glandulari, internodiis inferioribus 2-12 mm. longis, superioribus 2-3 cm. longis; foliis oppositis ovato-ellipticis obtusis cordatis crenato-serratis firmis subcoriaceis supra atroviridibus et cum glandulis sessilibus vel breviter stipitatis conspersis infra multo pallidioribus griseo-tomentosis glandularibus 4-7 cm. longis 2.5-4 cm. latis basi ima penniveniis paullo supra basin tamen 3-nerviatis venulis utrinque prominulis reticulatis; petiolis 2-3 mm. longis fusco-tomentosis; panicula diffusa 12-30-capitata, ramis oppositis divaricatis longis flexuosis subfiliformibus; pedicellis 1-2.5 cm. longis; capitulis ca. 36-floris ca. 8 mm. altis 5 mm. diametro; involucri campanulati 3-4-seriati squamis purpureo-brunneis ca. 3-nerviis, exterioribus brevibus late ovatis obtusis, interioribus gradatim longioribus angustioribus acutioribus; corollis viridi-albis limbum versus purpureo-tinctis, tubo proprio gracili 2.3 mm. longo, faucibus campanulatis distincte ampliatis 1.2 mm. longis, limbi dentibus 5 breviter deltoideis patentibus vel recurvis; styli ramis filiformibus perlongis; achaeniis 2 mm. longis rubro-brunneis in costis hispidulis; pappi setis 27-36 vix scabratis 3.7 mm. longis. — COLOMBIA: "Buenavista," west of Villavicencio, Dept. Meta, alt. 1000-1200 m., *Pennell*, no. 1678 (TYPE Gr.).

Not very closely related to any hitherto described species, and to be readily recognized by its diffuse inflorescence and *Perezia*-like habit.

E. (§ *Eximbricata*) *rorulentum*, spec. nov., fruticosum vel arboreum fulvo-tomentellum; ramis teretibus; ligno albo duro, cortice fusco brunneo; ramulis adscendentibus subfastigiatis foliosis fulvo-tomentellis teretibus vel obscure hexagonis; foliis oppositis petiolatis

late ovatis obtusis serratis (basi leviter cordata integra) 2-2.8 cm. longis 1.5-2 cm. latis coriaceis basin versus penniveniis supra basin 3-nervatis utrinque reticulatis supra dense cum glandulis sessilibus praeditis aliter glabris subtus fulvo-pubescentibus et sparsius glanduliferis; petiolo 1-3 mm. longo fulvo-tomentello; corymbis numerosis parvis in ramis terminalibus; ramulis pedicellisque griseo-hirsutis; capitulis ca. 10-floris ca. 6 mm. altis; involucri campanulati squamis 7-10 subaequalibus vix imbricatis lanceolato-oblongis acutiusculis dorso fulvo- vel griseo-tomentosis; receptaculo parvo plano calvo glabro; corollis (valde immaturis) verisimiliter albidis 5 mm. longis glabris; tubo proprio ca. 1 mm. longo; faucibus distincte ampliatis subcylindricis ca. 3 mm. longis; achaeniis deorsum attenuatis in angulis cum glandulis sessilibus vel brevissime stipitatis praeditis.— COLOMBIA: Guadalupe, Dept., Cundinamarca, alt. 2900 m., *Bros. Apollinaire & Arthur*, no. 27 (TYPE Gr.).

EUPATORIUM ROTHROCKII Gray. This species seems to be capable of subdivision into the following varieties.

Var. **typicum**, foliis firmiuscule membranaceis ovatis vel lanceolatis basi obtusis vel rotundatis serratis (dentibus acutis) laeti- vel flavescenti-viridibus.— *E. Rothrockii* Gray, Syn. Fl. i. pt. 2, 102 (1884). *Kyrstenia Rothrockii* (Gray) Greene, Leaflet i. 9 (1903).— ARIZONA: Mt. Graham, alt. 2745 m., September, 1874, *Dr. J. T. Rothrock*, nos. 740, 741; Pine Cañon, alt. 2440 m., 1 Oct., 1909, *Blumer*, no. 3434. CHIHUAHUA: southwestern part of state, Aug.-Nov. 1885, *Palmer*, no. 375; shaded ledges of the Sierra Madre, 8 Oct. 1887, *Pringle*, no. 1265 (mixed with *E. Lemmoni* Robinson); mountain near Pilares, Strawberry Valley, 22 Sept. 1891, *Hartman*, no. 752; near Colonia Garcia, alt. 2250 m., 12 Sept. 1899, *Townsend & Barber*, no. 325.

Var. **Shrevei**, var. nov., foliis tenuioribus deltoideo-ovatis cordatis vel basi truncatis majoribus usque ad 1 dm. longis et 7 cm. latis grosse crenatis fuscescente viridibus; inflorescentia, involucri, flosculis ut apud var. *typicum*.— ARIZONA: Ramsey Cañon, Huachuca Mountains, alt. 1680 m., 25 Sept. 1916, *Dr. Forrest Shreve*, no. 5017 (TYPE Gr.). Seemingly something more than a mere shade form, although without any as yet detected floral differences.

E. (§ **Subimbricata**) **sciaphilum**, spec. nov., fruticosum vagum 2-4 m. longum molliter lignosum; ramis teretibus glabris purpurascenti-griseis ramulis fulvescenti-puberulis, pilis crispis; foliis oppositis spatulato-obovatis vel -oblanceolatis integerrimis utrinque glabris molliter coriaceis sessilibus vel brevissime petiolatis obtusis basi cuneatis 5-8 cm. longis 1.8-3.2 cm. latis, nervo medio supra

impresso subtus prominulo, nervulis lateralibus pinnatis obscurissimis ca. 5-jugis; capitulis ca. 10-floris in corymbum laxum valde convexum 1-1.5 dm. diametro dispositis graciliter pedicellatis; bracteis lineari-subulatis; involucri subcylindrici squamis ca. 9, interioribus linearibus oblanceolatis uninerviis ciliolatis aliter glabris ut videtur purpureis acutis subaequalibus, extimis 2-3 multo brevioribus ovatis acutiusculis medio plus minusve incrassatis; flosculis valde exsertis; corollis glaberrimis graciliter tubulosis 7 mm. longis deorsum decrescentibus sine faucibus distinctis, limbi dentibus ovato-deltoides suberectis; achaeniis gracilibus 4 mm. longis 5-angulatis basi attenuatis in costis basin et apicem versus paullulo patenter hispidulis; pappi setis ca. 48 albidis capillaribus vix scabratis corollam subaequantibus; styli ramis filiformibus.— COLOMBIA: Dept. Antioquia, alt. 2292-2350 m., in light shade of forest, 25 July, 1880, *Kalbreyer*, no. 1445 (TYPE K.).

This species, communicated to the Kew Herbarium by Messrs. Veitch, Nov. 1880, is said to have glossy foliage and dark purplish-violet handsome flowers. It seems promising for horticulture, but appears never to have received a name or scientific description. In its thick coriaceous foliage and the somewhat calyculate nature of the involucre it shows similarity to the Mexican *E. araliaefolium* Lessing, which, however, has lance-oblong acuminate leaves, more numerous flowered heads, and achenes hispid on the angles from the summit to the base.

E. (§ Eximbricata) sciatraphes, spec. nov., fruticosum primo aspectu laevissimum sed inflorescentia puberulum (pilis minutis attenuatis curvatis articulatis purpurascensibus); caule subtereti costulato juventate purpureo-brunneo maturitate griseo; internodiis 2-5 cm. longis; foliis oppositis petiolatis ovatis acuminatis apicem versus integris saepe falcatis lateraliter grosse crenatis (crenaturis ca. 2 mm. altis ca. 8 mm. latis) basi obtusis vel rotundatis subcoriaceis vel chartaceis supra in costa paullo puberulis aliter glaberrimis lucidulis viridibus subtus glaberrimis paullo pallidioribus 7-9 cm. longis 3-4 cm. latis supra basin 3-nervatis; nervis inter se a venis transversis connexis; corymbo terminali amplo leviter convexo laxiusecule ramoso ca. 18 cm. diametro basi foliaceo-bracteato supra bracteolis minimis integris spatulatis instructo; pedicellis rectis subfastigiatis apice plerisque capitula 2 vel 3 sessilia gerentibus; capitulis 8-13-floris ca. 6.5 mm. altis; involucri turbinato-campanulati squamis 10-12 lanceolatis vix imbricatis modice inaequalibus subacutis dorso paullo granulatis; corollis subcylindricis 2.5 mm. longis sensim dilatatis in

tubo extus sparse papillois aliter laevibus; achaeniis deorsum de-crescentibus 2 mm. longis in costis paullo hispidulis apice cum nectario purpurascenti breviter cylindrico instructis; pappi setis flavidulo-albidis vix scabratis.—SANTO DOMINGO: shady places at Altamira, alt. 420 m., *Eggers*, no. 2423 (TYPE N. Y., fragm. Gr.).

E. (§ *Subimbricata*) **Squiresii** Rusby, spec. nov., perenne elatum herbaceum vel verisimiliter fruticosum; caule tereti viridi glabro laevissimo meduloso; foliis oppositis breviter petiolatis oblongis acuminatis (apice vero saepe obtusiusculo) basi angustatis deinde rotundatis vel paullulo in petiolum decurrentibus penniveniis (venis utraque ca. 10 prorsus curvatis inter sese anastomosantibus) repando-dentatis membranaceis utrinque viridibus glabris vel praecipue subtus in costa venisque sordide puberulis 9–22 cm. longis 4.5–10 cm. latis; panicula terminali ampla ad 3 dm. longa 1–2 dm. diametro laxa patenter ramosa inferne folioso-bracteata, ramis denuo ramosis puberulis apicem versus cymoso-furcatis; capitulis breviter pedicellatis glomerulatis ca. 6 mm. altis ca. 3.5 mm. diametro ca. 22-floris; involucri campanulato-subcylindrici squamis ca. 21 tenuibus stramineis valde inaequalibus 3–4-seriatim imbricatis regulariter gradatis apice rotundatis et dorso villosulis 1–3-nerviis 2–4-costulatis; corollis flavescente albidis 3.5 mm. longis ad limbum extus granulosis aliter glabris; styli ramis filiformibus papillois; achaeniis nigris 1.3 mm. longis hispidulis; pappi setis ca. 30 capillaribus 3 mm. longis laete albis.—VENEZUELA: at Paloma, Delta Amacuro (in the region of the lower Orinoco), April, 1896, *Rusby & Squires*, no. 2 (TYPE N. Y., dupl. Gr., Mo., etc.).

Described by permission of Dr. H. H. Rusby, who long ago recognized the novelty of the plant but through pressure of professional duties has been unable to study it in detail and give it published record. The species is dedicated to his associate Mr. Roy W. Squires, who accompanied him on the arduous trip of exploration during which this plant, together with many others, was discovered.

EUPATORIUM TACOTANUM Klatt. This species, secured by several collectors at different points in Colombia, exhibits some variations worthy of note, the nature of which may be stated thus:

Var. **typicum**, involucri squamis plerisque 1-nerviis, extimis exceptis subglabris, intermediis lanceolato-linearibus acutiusculis, intimis linearibus acutis apice purpureis.—*E. tacotanum* Klatt in Engl. Bot. Jahrb. viii. 35 (1887).—A variety exhibiting two forms:

Forma **normale**, capitulis, ut dixit cl. Klatt, l. c., longe pedicellatis; pedicellis 3–10 mm. longitudine.—COLOMBIA: in bushy places of the savannahs around Tocotá, alt. 1600 m., *Lehmann*, n. 3424 (TYPE Gr.).

Forma **apodum**, forma nov., capitulis plerisque sessilibus in glomerulos 2-4-capitulatos dispositis; pedicellis paucissimis usque ad 2.8 mm. longis evolutis.— Same locality, habitat, and altitude, *Lehmann*, n. 3438 (TYPE Gr.).

Var. **trineurolepis**, var. nov., ut dicitur herbaceum 6 dm. altum habitu, inflorescentia, pubescentia, etc. vere in partibus omnibus involucri excepto ut apud var. *typicum* sed differt involucri squamis distincte 3-nerviis paulo magis oblongis obtusis vel apice rotundatis extus apicem versus tomentellis.— COLOMBIA: Papagayeros, Dept. El Valle, in clayey soil, alt. 800 m., 3 Nov. 1899, *E. Langlassé*, no. 9 (TYPE Gr.). The differences in the scales, which in the typical variety are as to the intermediate ones lance-linear, acutish, and 1-nerved, while here they are oblong-linear, obtusish, more copiously pubescent, and 3-nerved, are striking and might possibly justify separate specific rank. However, the plants appear to be otherwise identical throughout, and some slight variation has been observed in the scales of the typical variety of which several collections are now at hand, some of the intermediate scales being occasionally 3-nerved. It is therefore probable that a more extended series will bridge the gap between the two varieties. It may be remarked that, although Klatt, following a manuscript note of Lehmann, described his plant as a shrub reaching 3 m. in height and Langlassé notes his plant as an herb 60 cm. in height, the specimens themselves (showing in each case about 2.5-3 dm. of stem) exhibit no significant difference in the degree of lignescence, which if any distinction can be made is more pronounced in Langlassé's plant.

E. (§ *Subimbricata*) **tovarense**, spec. nov., herbaceum et perenne vel fortasse fruticosum (basi ignota); caulibus vel ramis teretibus gracilibus virgatis 2 mm. diametro sordide puberulis; foliis oppositis petiolatis lanceolato-oblongis attenuato-acuminatis basi cuneatis penniveniis 7-11 cm. longis 2.8-3.3 cm. latis primo aspectu integris sed remote obscureque cuspidato-denticulatis membranaceis utrinque viridibus supra glabris subtus puncticulatis atomiferis in costa venisque puberulis; venis utroque ca. 6 prorsus curvatis et inter sese anastomosantibus; petiolo ca. 1 cm. longo; paniculis terminalibus oppositifloris foliaceo-bracteatis 1-3 dm. longis 1-2 dm. diametro, ramis divaricatis basin versus nudis; ramulis brevibus etiam divaricatis; pedicellis plerisque 1-3 mm. longis; capitulis ca. 13-floris ca. 6 mm. altis 3.5 mm. diametro; involucri campanulati squamis ca. 21 stramineo-scariosis apice rotundatis regulariter 3-4-seriatim gradatis dorso praecipue apicem versus puberulis, extimis ovatis brevissimis, ceteris

oblongis vel lineari-oblongis plerisque 3-veniis 2-4-costatis; corollis 3 mm. longis in limbo brevissime 5-dentato extus granulosus aliter glabris, tubo proprio fauces vix ampliatus subaequante; acheniis nigris 1.5 mm. longis in faciebus paullo papillosis in angulis papilloso-hispidulis; pappi setis ca. 36 albis vix scabratis capillaribus 2.4 mm. longis; styli ramis filiformibus papillosis.— VENEZUELA: near Tovar, State of Mérida, alt. 1220 m., *Fendler*, no. 1947 (TYPE Gr.).

E. (§ *Eximbricata*) **Trianae**, spec. nov., herbaceum perenne crisper tomentellum; caulibus teretibus striatis indumento brevissimo brunescente tectis sursum alterni-ramosis foliosis; foliis caulinis alternis lanceolato-linearibus 6-10 cm. longis 5-10 mm. latis remote obscureque denticulatis vel integerrimis utroque attenuatis uninnerviis pinnativeniis supra reticulato-rugulosis et puberulis subtus pallidioribus reticulatis sordide griseo-tomentosis, foliis rameis saepissime oppositis minoribus; petiolis vix 2-3 mm. longis tomentosis; capitulis ca. 28-floris subsessilibus in glomerulos globosos subsessiles vel breviter pedunculatos paniculatim dispositos aggregatis 5 mm. altis 5 mm. diametro; involucri squamis ca. 16 anguste oblanceolato-oblongis subaequalibus acutis 3-nerviis ciliatis dorso hirsutulis et cum glandulis numerosis sessilibus globularibus munitis; receptaculo glabro modice convexo; corollis 2.2 mm. longis colore incertis a basi ad apicem gradatim ampliatis 5-nervatis inter nervos apicem versus cum glandulis sessilibus globosis sparsis, dentibus limbi 5 recurvatis; acheniis 5-costatis 5-angulatis nigris 1.2 mm. longis inter costas cum glandulis paucis instructis; pappi setis 21 sordide albis 1.8 mm. longis sursum minute scabratis; antheris oblongis basi rotundatis apice cum appendice oblongo-deltaoidea munitis; styli ramis filiformibus.— COLOMBIA: without precise locality, *Dr. J. Triana*, no. 1196 (TYPE K.).

Unfortunately, no detailed data accompany this interesting plant which, like many others of Dr. Triana's Colombian material, was purchased by the Royal Gardens in February, 1892, but is unaccompanied by any original ticket. The species is exceedingly distinct from any other *Eupatorium* known to the writer, yet there can be little doubt that it is correctly referred to the genus.

E. (§ *Cylindrocephala*) **uromeres**, spec. nov., fruticosum gracile 12 dm. altum; caule tereti tomentello glabrescente flexuoso verisimiliter scandente ramoso; ramis longis patentibus saepe patenter dichotomis; foliis oppositis petiolatis 4-6 cm. longis 2-3 cm. latis ovatis acutis basi rotundatis deinde brevissime cuneatis membranaceis supra minute papillosis subtus reticulatis molliter tomentellis a basi trinerviis obscure remoteque serratis dentibus 5-6 mm. latis vix 0.5 mm. altis; petiolo gracili tomentello 5-8 mm. longo; cymis axillaribus

oppositis plerisque 3-5-capitulatis; pedicellis lateralibus late patentibus subfiliformibus canescenti-tomentellis; capitulis campanulato-cylindricis ca. 45-floris 7 mm. altis 4 mm. diametro; involucri squamis ca. 50 albis uninerviis ca. 5-seriatim imbricatis apice cum appendice subulata herbacea patente vel deflexa ca. 0.7 mm. longa munitis; corollis 3 mm. longis purpurascensibus, tubo proprio 1.7 mm. longo sparse papilloso sursum in fauces 1 mm. longas paullo ampliato dentibus limbi 5 anguste ovatis 0.3 mm. longis; achaeniis 2.8 mm. longis gracilibus 5-costatis faciebus nigris glabris lucidulis, costis stramineis eroso-serratis; pappi setis ca. 28 albis breviter hispidulo-scabratis 3 mm. longis.—COLOMBIA: occasional in thickets and dry forests below 915 m., fl. May-Dec., near Santa Marta, expedition of 1898-'99, *H. H. Smith*, no. 505 (TYPE Gr.).

A species readily distinguished by its caudate involucreal scales.

E. (§ *Cylindrocephala*) **xestolepis**, spec. nov., ut videtur fruticosum (basi ignota); caulibus teretibus 3-4 mm. diametro lanatis maturitate glabrescentibus fuscescentibus medullosis; ramis divaricatis curvatis sordide lanato-villosissimis; foliis oppositis petiolatis ovatis acute acuminatis basi cordatis crenato-serratis 3-5 cm. longis 2-3 cm. latis supra bullatis puberulis subtus griseo-tomentosis prominenter reticulatis a basi 3(-7)-nerviis; nervis a venis transversis connexis; corymbis laxiusculis paucicapitulatis; pedicellis patentibus saepe curvatis gracilibus pubescentibus 2-12 mm. longis; capitulis ca. 9 mm. altis 6 mm. diametro ca. 28-floris; involucri campanulato-subcylindrici squamis ca. 27 rigidiusculis pallidis eburneis lucidis 1(-3)-nerviis vel -striatis 4-5-seriatis regulariter gradatis caducis, extimis ovatis acutis, intermediis oblongis obtusis, intimis linearibus; summa parte axis post delapsam squarum breviter cylindrica pedicello paullulo crassiore; corollis 4 mm. longis glabris; tubo proprio gracile 2.7 mm. longo; faucibus campanulatis 1.3 mm. altis; dentibus limbi brevibus recurvatis; pappi setis ca. 26 albidis 3.5 mm. longis apicem versus paullulo clavellatis stramineis hispidulo-scabratis; achaeniis nigris gracilibus 4-5-angulatis in angulis sursum minute scabratis apice cum nectario late breviterque cylindrico coronatis.—VENEZUELA: near Tovar, State of Mérida, *Fendler*, no. 638 (TYPE Gr.); Caracas, *Birschel* (Gr.); on the old road from Caracas to La Guaira, alt. 1100-1700 m., *Pittier*, no. 5880 (U. S., N. Y.).

E. (§ *Campyloclinium*) **zinniifolium**, spec. nov., fruticosum densissime fusco-tomentosum pilis glandulosis; foliis oppositis arete sessilibus 5-7-nerviis elliptico-lanceolatis 7 cm. longis 3.5 cm. latis serratis (dentibus 0.5-1 mm. altis 3-4 mm. latis) apice angustatis obtusiusculis utrinque sordido-tomentellis; corymbis terminalibus vix

pedunculatis ca. 10-capitulatis; capitulis ca. 100-floris 12-13 mm. altis; involucri campanulati squamis 22-25 subaequalibus lanceolato-oblongis basin versus 2-4-costatis (extimis 1-3 brevioribus) dorso pubescentibus et cum glandulis paucis sessilibus instructis margine erosis et glandulari-ciliatis; receptaculo valde convexo fere hemisphaerico glabro; corollis 6.3 mm. longis; tubo proprio 2.6 mm. longo gracillimo; faucibus 3.7 mm. longis campanulato-ampliatas; limbi dentibus 5 lanceolato-deltaideis acutis dorso villosis; achaeniis 2.7 mm. longis 5-costato-angulatis brunneis in costis sursum hispidulis in faciebus glabris basi callosis ad apicem cum disco parvo coronatis; pappi setis 20-25 albidis 5.5 mm. longis paullulo firmissimis apicem versus sensim incrassatis scabridulis.—COLOMBIA: on the Sierra Nevada, alt. 2745-3050 m., Prov. of Rio Hacha, Dept. Magdalena, 1852, *L. Schlim*, no. 1812 (TYPE K., phot. Gr.).

This noteworthy species clearly belongs to the § *Campylocinium* having the large heads and exceedingly convex receptacle of the group, but otherwise possessing many marked differences from previously described species. It was one of many plants obtained for horticultural purposes by J. Linden from northern South America in the 50's, but it has been impossible to find any horticultural records of the plant, which presumably failed to succeed in cultivation. The only field notes to be derived from the label are that the plant was shrubby and had roseate flowers. Whether the color was derived from the corollas or a composite impression of corollas and suffused involucreal scales cannot now be told.

Fleischmannia repens, spec. nov., herbacea repens; caulibus pluribus teretibus a rhizomate horizontali curvato-adscendentibus 1.5-4 dm. longis usque ad inflorescentiam foliosis longiuscule sordideque pilosis, pilis patentibus moniliformibus; foliis oppositis lanceolatis petiolatis 7-9 cm. longis 1.2-1.9 cm. latis argute serratis apice attenuato-acuminatis basi integerrimis anguste cuneatis supra basin 3-nervatis utrinque laxe in nervis venisque pilosis subtus paullo pallidioribus; corymbis terminalibus compositis planiusculis multicapitulatis puberulis; pedicellis gracillimis; bracteis lineari-filiformibus minimis; capitulis parvis vix 5 mm. altis ca. 4 mm. diametro 17-floris; involucri campanulati squamis ca. 11 lineari-lanceolatis vel anguste oblongis acutiusculis ciliolatis 2-3-costato-nervatis una vel duabus extimis brevioribus caeteris subaequalibus ca. 3 mm. longis; corollis 2.8 mm. longis ut videtur albis vel pallide roseis glabris, tubo proprio gracillimo 1.5 mm. longo, faucibus abrupte campanulato-dilatatis, dentibus limbi 5 ovato-deltaideis acutiusculis patentibus; styli ramis filiformibus; antheris brevibus apice cum appendice oblongo-ovata

obtusa munitis; achaeniis 5-angulatis 1.2 mm. longis deorsum de-
 crescentibus in costis hispidulis; pappi setis 5 delicatule capillaribus
 minute scabratis corollam aequantibus.— MEXICO: on wet rocks,
 Barranca de Tenampa, Zacuapan, Vera Cruz, March, 1910, *Dr. C. A.*
Purpus, no. 4925 (TYPE Gr.).

This species, very naturally sent out as a *Eupatorium*, is clearly
 from its definite pappus-bristles of the genus *Fleishmannia*. It is,
 however, certainly distinct from any hitherto described species of the
 genus. While it approaches most nearly in its general habit and
 foliar characters *F. arguta* (HBK.) Robinson, it differs in many im-
 portant characters. The heads are much more numerous, more
 definitely aggregated into flat-topped corymbs, and are much smaller.
 The florets are very much less numerous. The pubescence of the
 stem is of long conspicuous jointed hairs, while in *F. arguta* the stems
 are merely puberulent.

Kuhnia oreithales, spec. nov., herbacea erecta; caule tereti
 pluricostulato brevissime crispeque puberulo foliaceo 4-6 dm. vel
 ultra alto virgato vel supra mediam partem ramoso; ramis adscendente
 patentibus; foliis lineari-lanceolatis plerisque adscendentibus integer-
 rimis minute puberulis utrinque viridibus subtus paullo pallidioribus
 crebre punctatis 5-8 cm. longis 2-6 mm. latis tenuibus 1-nerviis
 margine paullo revolutis; capitulis ca. 18-floris thyrsoideo-corymbosis
 graciliter pedicellatis nutantibus 11-12 mm. altis; involucri squamis
 interioribus anguste oblongis acutis tenuibus striatis viridibus vel
 partim purpureis subglabris sed apicem versus atomiferis et plus
 minusve ciliolatis, squamis extimis multo brevioribus subsquarroso-
 recurvatis; corollis ca. 6 mm. longis albidis vel purpureo-tinctis
 glabris sed in limbo extus atomiferis; achaeniis maturitate 6 mm.
 longis fusco-brunneis glabriusculis.— MEXICO: Chihuahua: near
 Colonia Garcia, 16 August, 1899, *Townsend & Barber*, no. 260 (TYPE
 Gr., U. S., Mo., etc.), distributed as *Coleosanthus corymbosus*, with
 which it has no close resemblance even of general habit, not to men-
 tion its plumose pappus. *K. oreithales*, in its thin smoothish leaves
 and in habit, resembles the northeastern *K. eupatorioides* L., but it
 differs from that species in its entire leaves and nodding heads, as
 well as its more acute inner involucreal scales; and, of course, it is
 geographically remote. To *K. oreithales* may be referred the follow-
 ing specimens: near Colonia Garcia, 1-20 August, 1899, *E. W.*
Nelson, nos. 6208 (Gr.), 6216 (Gr.); near Parral, 28 September, 1898,
E. H. Goldman, no. 124 (Gr.); Sierra Madre and Sierra Santa Barbara,
 near La Providencia, alt. 1980-2440 m., *E. W. Nelson*, no. 5016 (Gr.).

II. A DESCRIPTIVE REVISION OF THE COLOMBIAN EUPATORIUMS.

IN assembling data for a revision of the Eupatoriums of Mexico and Central America the writer was some months ago led to scrutinize the existing evidence as to their possible range-extensions into the northern portions of South America. The questions which arose were briefly, in how far is the Isthmus of Panama a path of plant-migration, or conversely, to what extent has this narrow neck of relatively low land, in recent geologic times, or the pre-existing marine channel, at a more remote epoch, acted as an effective barrier to plant-distribution?

Correlated with this somewhat abstract inquiry, arises a more concrete one when it is borne in mind that most of the larger South American collections have been studied in Europe, while nearly all recent work upon the Mexican and Central American floras has been done in the United States. Thus it becomes pertinent to inquire whether to any serious extent there has been unconscious duplication in the results — whether, for instance, of the many species and varieties described as new from Mexico and Central America, some portion may not precisely duplicate plants present in and perhaps already described from South American collections, which are sparingly if at all represented even in the larger herbaria on this side of the Atlantic.

At all events, to put classification of the very numerous Eupatoriums north of the Isthmus on a more secure footing, it seemed desirable, if not actually necessary, to give systematic attention at the same time to those of the adjacent portions of South America. For this purpose a provisional revision of the Colombian Eupatoriums was begun in October, 1917. To the usual difficulties incident to tropical work — deplorably inadequate material, scattered types, fragmentary literature, uncontrasted descriptions, faulty and inconsistent records — there has in the present instance been added the impossibility of communicating with several important European herbaria. However, by piecing together all available bits of fragmentary data, a treatment is here presented, which includes more than three times as many Colombian Eupatoriums as have been heretofore recorded in any single paper.

It has long been customary in most minor works dealing with tropical

plants to confine the presentation to a bibliographic and synonymic enumeration of such previously described species, together with diagnoses of such novelties, as may have been found in a particular collection. Remarks on habit, habitat, dates of flowering, collectors' numbers, altitudinal ranges, etc., are usually added. Such papers are highly useful in large botanical establishments where numbered exsiccatae and copious literature are available, but apart from these aids they are exceedingly sterile. They fail signally to give assistance or encouragement to botanists resident in the tropics and to those collectors who are so situated as to be able to carry forward the all important field-work in the area treated. On this account it has seemed worth while to incorporate in the present paper not merely keys to sections and species, but at least brief descriptions of each species and variety enumerated.

As to the plants included, Colombian specimens of nearly all have been seen by the writer. A very few, however, have been included on the basis of past published records of their occurrence in Colombia or as it was formerly called New Grenada. Happily these reports rest in all cases upon work of such well known writers on the *Compositae* as the eldest DeCandolle, J. G. Baker, Weddell, Hieronymus, and Heering. In every instance in which no material has been personally seen, the authority for the occurrence in Colombia is duly cited. It is unfortunate that many specimens of marked character and considerable scientific interest, such as those of Triana in the herbarium of the Royal Gardens at Kew, are quite unaccompanied by data other than that they came from Colombia (New Grenada). It is possible that such specimens of Triana, Lobb, Moritz, and others, here recorded as lacking data of collection, may be present under corresponding numbers and with more complete labels in other herbaria. In case any such are found, the writer would welcome further information regarding them.

As the genus *Eupatorium* is of large size and extends from temperate North America to temperate South America; as it includes species of much diversity of habit from delicate annuals to small trees; and as it ranges from the seashore and tropical lowlands to alpine regions and areas of considerable aridity, it may be fairly regarded as an average sample from which to infer the relative endemism of particular regions. On this account it is believed that the following statistical memoranda will have a certain interest.

Of the 93 species of the genus, here presented as occurring within the limits of Colombia, no less than 53 or about 57 per cent are, so

far as our present knowledge of the species goes, endemic, being unknown elsewhere. Of these 21 are new to science.

While some of these species will doubtless be found later in the very similar climatic conditions of adjacent portions of western Venezuela and of Ecuador, the number of local novelties found in recent collections from Colombia is such as to suggest that the proportion of endemism is likely to be increased rather than diminished by further exploration.

After deducting the endemic members of the genus there remain 40 species which occur both in Colombia and in other countries. These fall into several categories, as follows:

1). A group of 12 common species, of wide north and south distribution in tropical and subtropical America, extending in all instances from Mexico or Central America through Colombia, at least to Venezuela or Ecuador, and in most cases to Brazil, Peru, or Bolivia. These are *E. laevigatum*, *iraefolium*, *odoratum*, *morifolium*, *microstemon*, *pycnocepalum*, *vitalbae*, *amygdalinum*, *solidaginooides*, *macrocephalum*, *nemorosum*, and *macrophyllum*. Among them, two or three (*E. microstemon*, *iraefolium*, and perhaps *macrophyllum*) are so frequent about roadsides and cultivated grounds as to suggest that they have been more or less diffused as weeds, yet all are probably natural (that is to say native) components in the flora of Colombia.

2). The following 6 species extend from Colombia merely into Venezuela: *E. pellium*, *Moritzianum*, *Vargasianum*, *theaefolium*, *iba-guense*, and *stoechadifolium*.

3). In similar manner 13 species extend from Colombia merely southward into Ecuador along the Cordilleras, some of them reaching Peru or Bolivia: *E. leptocepalum*, *subscandens*, *origanooides*, *niveum*, *salicinum*, *Stuebelii*, *pseudoglomeratum*, *obscurifolium*, *fastigiatum*, *gracile* (doubtfully in its smoothish var. *epilobioides*), *Dombeyanum*, *azangaroense*, and *pichinchense*.

4). Only 5 species of *Eupatorium* occurring in Colombia are also found on any of the Greater Antilles, namely: *E. iraefolium*, *odoratum*, *microstemon*, *ballotaefolium*, and *macrophyllum*. It will be observed that these are all common species of wide range. All except *E. ballotaefolium* (which in these larger islands of the West Indies occurs merely on Haiti) are found also in Mexico and Central America.

5). A very few species of Colombian *Eupatoriums* extend along the region of the "Spanish Main" and are also found on Margarita, Trinidad, or upon some of the Lesser Antilles. These are *E. corymbosum*, *iresinoides* (and its var. *glabrescens*), *inulaefolium*, and *ballotaefolium*. An analogous case is presented by *E. celtidifolium*, an

arborescent species, of which the typical form is confined to the Lesser Antilles, while a perceptibly different pubescence-variety is found in Colombia.

6). Finally a few species, reaching their northwestern limit in Colombia, are somewhat widely distributed in tropical South America without passing north of the Isthmus of Panama or occurring (with the exception of *E. inulaefolium*) on any of the West Indian Islands. These are *E. articulatum* extending from Colombia both into Venezuela and southward into Peru; *E. scabrum*, a species often erroneously interpreted in the past, said by Baker to reach Guiana and Peru; *E. inulaefolium*; *E. punctulatum*, a species first collected presumably in eastern Brazil but said by Baker to occur also in Colombia; finally two species of weedlike character and belonging to the little Sect. *Praxelis*, namely *E. pauciflorum*, which ranges from Colombia to Brazil, and *E. kleinoides*, which extends from Colombia to Brazil and also in somewhat varying form to Peru.

When the Colombian Eupatoriums are thus analyzed, the following generalizations become possible.

a). The common element between the species of Colombia (93 in number) and those of the Mexicano-Central-American region (estimated at about 250) is surprisingly slight, amounting to only 12 species, that is to say about 13 per cent of the Colombian and only 4.8 per cent of the Mexicano-Central-American representation of the genus. Furthermore, these 12 species are all common and abundant plants also in other regions. All of them have been known for some decades and most of them from the earliest period in the botanical exploration of tropical America. It is also worthy of mention that no one of these species which extend into Colombia from north of the Isthmus finds its limit in Colombia. All pass entirely through the country and are found at least in Venezuela or Ecuador, and most of them in Brazil, Peru, and Bolivia as well.

b). The common element between Colombia and the Greater Antilles is considerably less, amounting only to 5 species. These also are plants which are abundant and widely distributed. All of them but one are identical with those common to Colombia and the Mexicano-Central-American region.

c). The common element between Colombia and the Lesser Antilles amounts to only 5 species. Of these, four are more or less abundant in coastal South America from the Isthmus to the mouth of the Orinoco, and the fifth (*E. corymbosum*) has been stated by Aublet to occur in French Guiana.

d). The element common to Venezuela (21 species when all are

included even those of wide distribution and in some cases of weedy character) somewhat exceeds the element common to Ecuador (19 species). On the other hand the actual affinities of the Colombian Eupatoriums, when determined by the more characteristic and more certainly native species of limited range, are more strongly Ecuadorian than Venezuelan.

There seems no reason to suppose that the statistical relations here presented on the basis of this large and diversified genus will not be found to hold their approximate ratio in many other groups. Unfortunately the present state of knowledge regarding the details of plant-distribution in Colombia, as well as of the geological, meteorological, and physiographic conditions, is still much too slight to permit generalization regarding ecological relations or soil-influence in determining the present flora.

EUPATORIUM [Tourn.] L. Heads homogamous, (1-4)5- ∞ -flowered. Involucre cylindrical to campanulate; the scales of indefinite number, usually numerous, commonly graduated and appearing to be arranged in 2-8 series, the inner progressively longer, more rarely almost all subequal and with only a few (1-3) of the outermost considerably shorter. Receptacle flat or in varying degree convex to conical, glabrous or in one section pubescent, calvous. Corolla tubular, with or without a perceptibly enlarged campanulate, turbinate, or cylindrical throat; the limb (4-)5-toothed, regular. Anthers mostly connate but sometimes nearly or quite free, rounded (to rarely and obscurely cordate or subsagittate) at the base, provided at the summit with an ovate or oblong mostly obtuse rarely retuse membranaceous appendage. Style-branches much exserted, the appendage elongate, filiform or more commonly somewhat clavate, smooth or microscopically papillose. Achenes 5-angled, the angles usually rib-thickened and of modified texture, color, or pubescence, the intervals flat or often concave, occasionally provided with lesser ribs intermediate between the main ones. Pappus of 10- ∞ bristles, for the most part nearly or quite equalling the corolla; the bristles truly capillary or slightly firmer, white or sordid, sometimes tinged with rose or purple, rarely tawny, usually (at least when examined with a compound microscope) hispidulous, never strongly plumose.—Sp. Pl. ii. 836 (1753); L. f. Suppl. 354 (1781); HBK. Nov. Gen. et Spec. iv. 105-134 (1820), excl. certain species; DC. Prod. v. 141-186 (1836); Benth. & Hook. f. Gen. ii. 245 (1873); Bak. in Mart. Fl. Bras. vi. pt. 2, 274-365, t. 76-96 (1876); Klatt in Engl. Bot. Jahrb. viii. 33-36 (1887); Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Abt. 5, 138 (1890); Hieron.

in Engl. Bot. Jahrb. xix. 45 (1894), xxi. 329-333 (1895), xxix. 5-15 (1900), xxviii. 564-576 (1901), xl. 369-389 (1908); Heering in Fuhrmann & Mayor, Mém. Soc. neuchât. Sci. Nat. v. 418-421 (1913). For extended synonymy, see Dalla Torre & Harms, Gen. Siphonog. 527 (1905).—Mostly perennial herbs or erect shrubs, a few annuals, a few arborescent or even arboreous, a few shrubby climbers (leaning rather than twining). Leaves chiefly opposite, rarely alternate, sometimes scattered, in a few species verticillate or perfoliate, in contour ranging from filiform to orbicular, in texture from delicately membranaceous to coriaceous or rarely to fleshy. Florets clear white, pink, purple, or blue, rarely greenish- or yellowish-white.

A huge genus, most copiously distributed, both as to individuals and species in the warmer parts of America, from Mexico to Brazil, also well represented in temperate North America and extra-tropical South America, and sparingly so in Eurasia, but nearly absent from Africa and lacking in Australia.

KEY TO SECTIONS.

- a. Receptacle glabrous *b*.
- b*. Receptacle flat or nearly so *c*.
- c*. Involucre cylindrical (2-)3-5 times as long as thick; scales closely imbricate in several regularly graduated series, at maturity readily deciduous or sometimes caducous, firm in texture, somewhat scarios except toward the usually obtuse or rounded and commonly subherbaceous tip. Sect. I. *CYLINDROCEPHALA* (p. 270).
- c*. Involucre campanulate or turbinate (rarely cylindrical but then with scales in fewer series and less closely imbricated than in the preceding section), seldom more than twice as high as thick; scales persisting until after the fall of the achenes *d*.
- d*. Scales very unequal, the outer gradually shorter in 3-several series. Sect. II. *SUBIMBRICATA* (p. 281).
- d*. Scales subequal in 1-2 scarcely imbricated series, but often 1-3 of the outermost scales considerably smaller. Sect. III. *EXIMBRICATA* (p. 303).
- b*. Receptacle strongly convex, hemispherical or conical *e*.
- e*. Scales imbricated in several series, readily deciduous or caducous at maturity, commonly falling away before the achenes. Heads few, separate, long-peduncled. Annual herbs. Sect. IV. *PRAXELIS* (p. 318).
- e*. Scales persistent, at least until after the fall of the achenes. Chiefly perennial herbs or shrubs *f*.
- f*. Heads small (usually 4-7 mm. high), mostly 15-30-flowered. Scales 2-5-ribbed, usually graduated in 3-4 series, mostly attenuate to a subulate or at least acute tip. Sect. V. *CONOCLINIUM* (p. 320).
- f*. Heads large (1 cm. or more in height), 40-120-flowered. Scales subequal in length, finely nerved or many-striate rather than strongly ribbed. Sect. VI. *CAMPULOCLINIUM* (p. 325).
- a*. Receptacle hairy, convex. Sect. VII. *HEBECLINIUM* (p. 327).

Sect. I. CYLINDROCEPHALA DC. Heads cylindrical (2-)3-5 times as long as thick, 5-75-flowered; scales many-seried, regularly graduated, closely imbricated, concave, firmish in texture, often promptly deciduous, usually pale or stramineous except at the mostly darker often subherbaceous generally obtuse or rounded tip. Receptacle small, flat or nearly so, glabrous.—Prod. v. 141 (1836). *Eupatorium* ser. *Imbricata* DC. l. c. in part. *Eupatorium* sect. *Imbricata* (DC.) Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Abt. 5, 139 (1890). *Osmia* Sch. Bip. Pollichia, xxii.-xxiv. 250 (1866). *Eupatorium* sect. *Osmia* (Sch. Bip.) Benth. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 275 (1876).—Chiefly shrubby plants of warm climates.

KEY TO SPECIES.

- a. Leaves cordate, sessile or nearly so, deflexed, somewhat rigid, bullate above 1. *E. bullatum*.
- a. Leaves petiolate or cuneately narrowed to a subsessile base b.
- b. Pedicels sulcate-angulate, glabrous c.
- c. Heads in dense flattish or moderately convex corymbs d.
- d. Scales of the involucre oblong, rounded or subtruncate or even slightly retuse at the thinnish-margined apex; their nerves straight or even slightly diverging at the tip; leaves lanceolate, long-acuminate e.
- e. Heads thickish-cylindric to subcampanulate-cylindric, 45-75-flowered 2. *E. pellium*.
- e. Heads slender-cylindric, about 20-flowered 3. *E. Moritzianum*.
- d. Scales ovate-oblong, slightly thickened and with nerves somewhat convergent toward the tip; leaves ovate, never long-acuminate 4. *E. laevigatum*.
- c. Heads in an elongated loose opposite-branched leafy-bracted panicle f.
- f. Leaves coarsely pellucid-punctate; veinlets scarcely at all translucent; heads about 26-flowered 5. *E. chrysostictum*.
- f. Leaves not punctate; veinlets forming a translucent network; heads about 12-flowered 6. *E. diaphanophlebium*.
- b. Pedicels pubescent or puberulent (smoothish and essentially terete in *E. subscandens*) g.
- g. Scales (pale in color) provided at tip with a small but conspicuous lance-linear subherbaceous spreading or reflexed appendage 7. *E. uromeres*.
- g. Scales sometimes changed in texture toward the tip but in no case bearing a narrow appendage h.
- h. Leaves (ovate, never at all rhombic or hastate) rounded at base, petiolate (sometimes in *E. columbianum* abruptly short-acuminate on one or both sides of the insertion from an otherwise rounded base) i.
- i. Involucral scales dorsally woolly near the tip 8. *E. columbianum*.
- i. Scales glabrous j.
- j. Leaves merely acute or acutish, tomentose beneath, about 2 cm. long; petioles about 3 mm. long 9. *E. hypericifolium*.

- j. Leaves caudate-acuminate, 5-10 cm. long; petioles about 1 cm. long *k*.
- k. Pedicels mostly curved-ascending; leaves pubescent on the nerves and veins beneath, dull above
18. *E. subscandens*.
- k. Pedicels straight; leaves smooth and shining above, nearly glabrous beneath *l*.
- l. Leaves coarsely pellucid-punctate; veinlets scarcely translucent; heads about 26-flowered
5. *E. chrysostictum*.
- l. Leaves not punctate; veinlets forming a translucent network; heads about 12-flowered
6. *E. diaphanophlebium*.
- h. Leaves narrowed to an acute or at least obtusely pointed (not rounded) base *m*.
- m. Scales much changed in texture toward the tip, being there subherbaceous, pubescent, and often somewhat squarrose *n*.
- n. Scales, at least the middle and inner, acute; heads more than 3 times as long as thick; leaves ovate-lanceolate. 10. *E. iridolepis*.
- n. Scales subtruncate or rounded; heads about twice as long as thick; leaves linear- to oblong-lanceolate. 11. *E. waefolium*.
- m. Scales little changed in texture (although often somewhat darker) toward the closely appressed tip *o*.
- o. Leaves thickish but not rigid, small (2-4 or rarely -6 cm. long, including the short petiole), tomentelous above, canescent-tomentose beneath *p*.
- p. Leaves entire; achenes 3 mm. long, pubescent on the faces as well as the ribs. 12. *E. leivense*.
- p. Leaves crenate-serrate; achenes 2.2-2.5 mm. long, slightly hispidulous on the ribs only
13. *E. tacotanum*.
- o. Leaves somewhat firm in texture, lanceolate to ovate, 4-6 cm. long, conspicuously bullate-rugose and scabrid above, coarsely villous on prominently exerted ribs and veins beneath, the hairs long, dark, and articulated. 14. *E. scabrum*.
- o. Leaves rhombic-ovate to lanceolate, often with a slight hastate tendency, never strongly bullate-rugose above, nor with conspicuously exerted veins beneath *q*.
- q. Heads sessile in pedicellate glomerules together forming dense corymbs. 15. *E. punctulatum*.
- q. Heads, at least most of them, pedicelled *r*.
- r. Heads very slender, 6-8-flowered, acute in bud *s*.
- s. Petiole relatively short, about one sixteenth as long as the blade. 16. *E. leptcephalum*.
- s. Petiole (1-2 cm. long) about one fourth as long as the blade. 17. *E. barranguillense*.
- r. Heads thicker, obtuse or obtusish in bud, 10-35-flowered; petiole one fifth to one third as long as the blade *t*.

- t.* Leaves subchartaceous, subglabrous, ovate to ovate-lanceolate, attenuate, rather obscurely serrate (none in the least hastate); pedicels usually 1-1.5 cm. long, mostly curved or hooked.....18. *E. subscandens.*
- t.* Leaves membranaceous, rhombic- to deltoïd-ovate, rather coarsely and often somewhat hastately crenate-toothed, densely and softly villous or even subtomentose beneath; pedicels usually 2-8 mm. long, mostly straight.....19. *E. odoratum.*
- h.* Leaves deltoïd-ovate, the wide base of the blade subtruncate or shallowly and broadly cordate (sometimes with a slight acumination at the insertion.) .20. *E. corymbosum.*

1. ***E. bullatum*** Klatt. Grayish-green shrub 4 dm. or more in height, with erect or ascending leafy branches; leaves opposite, small (1-2 cm. long), ovate, subsessile by a cordate base, nearly or quite entire, thick, furrowed, warty, finely puberulent to glabrate and lucid above, gray-velvety beneath, commonly deflexed at maturity, their margins revolute; heads cylindric, erect, in small crowded compound cymes; scales closely appressed, obtuse, mucronulate, often brown-tipped; corollas white (Rusby & Pennell).—Klatt in Engl. Bot. Jahrb. viii. 34 (1887). *E. scabrum* HBK. Nov. Gen. et Spec. iv. 119 (1820), not. L. f. *E. Kunthianum* Sch. Bip. ex Hieron. in Engl. Bot. Jahrb. xxviii. 568 (1901).—A highly characteristic species of restricted range.

CUNDINAMARCA: in small open woods near Facatativá, alt. 2600 m., *Lehmann*, no. 2544 (fragm. and sk. Gr.); on high plains of Bogotá near Santa Fé, *Humboldt & Bonpland*, acc. to Hieronymus, l. c. (as *E. Kunthianum*); Montserrate near Bogotá, *Holton*, no. 315 (K., N. Y.); dry shrubby slope above Bogotá, *Pennell*, no. 2093 (Gr.); dry cañon above Bogotá, alt. 2600-2700 m., *Pennell*, no. 2137 (Gr.); dry open hillsides southwest of Sibate, alt. 2700-2800 m., *Pennell*, no. 2393 (Gr.).

2. ***E. pellium*** Klatt. Glabrous and somewhat sticky shrub 9-15 dm. high with round smooth grayish-brown ascending very leafy branches; leaves (often nigrescent in drying) opposite, lanceolate, serrate, attenuate, often conduplicate and falcate, cuneate at base to a short petiole, paler beneath, usually 3-nerved from somewhat above the base after 1-3 pairs of more obscure lateral veins have left the midrib; involucre ovoid in bud, at maturity campanulate, 5-7 mm. thick; florets 45-75.—Ann. k. k. Naturh. Hofmus. Wien, ix. 357 (1894).

MAGDALENA. Santa Marta, *Purdie* (K., Gr.); Onaca, alt. 762 m., *H. H. Smith*, no. 616 (Gr., N. Y., Mo.).

[Western Venezuela.]

3. **E. Moritzianum** Sch. Bip. Glabrous and slightly viscid leafy-branched shrub, turning dark in drying and in all respects very like the preceding species; heads smaller, about 20-flowered; involucre about 3 mm. thick, cylindric, with a shortly pointed base.— Sch. Bip. ex Hieron. in Engl. Bot. Jahrb. xxviii. 565 (1901).

HUILA: Eastern Cordillera near Neiva, *Rusby & Pennell*, no. 1056 (N. Y.).

DEPARTMENT (EL VALLE OR CALDAS?) NOT INDICATED: in Altamira above Tolima, alt. 800-1500 m., *Lehmann*, no. 8725 (N. Y.).

[Western Venezuela.]

Likely to prove a mere variety of the preceding, but convincing intermediates not as yet discovered.

4. **E. laevigatum** Lam. Viscid shrub, 1-3 m. high, glabrous throughout; branches and pedicels angled; leaves light green, opposite, rhombic-ovate to ovate-oblong, thickish, serrate, 3-ribbed from the entire mostly cuneate base, transversely veined between the ribs; heads (sessile to rather long-pedicelled) numerous, in dense moderately convex corymbs; flowers dull white.— Encyc. ii. 408 (1786); HBK. Nov. Gen. et Spec. iv. 117 (1820); Hieron. in Engl. Bot. Jahrb. xxviii. 567 (1901). *E. conyzoides* Klatt in Engl. Bot. Jahrb. viii. 34 (1887), not Mill. nor Vahl.

CAUCA: in bushy places on mountain meadows about La Teta and Buenos Aires, *Lehmann*, no. 5188, acc. to Hieron. l. c.; among shrubs on savannahs, alt. 1600 m., Tocotá, *Lehmann*, no. 3440 (Gr.); Cordillera Occidental, in clayey soil, alt. 1600 m., *Langlassé*, no. 70 (Gr.).

HUILA: about La Plata, alt. 1000-1400 m., *Lehmann*, no. 8447, acc. to Hieron. l. c.

TOLIMA: in coffee-plantation, "La Trinidad," Libano, alt. 1000-1200 m., *Pennell*, no. 3309 (Gr.).

Widely distributed from Mexico to Argentina, characteristic in habit and fairly constant.

5. **E. chrysostictum** Robinson. Subglabrous, erect perennial herb or very likely shrub; branches smooth, terete; leaves opposite, ovate, caudate-acuminate, rounded at base, obscurely and remotely mucronulate-denticulate on the revolute margin, 1 dm. long, half as broad, green and glabrous on both surfaces, shining above, dull and densely punctate beneath, the dots being orange and translucent; petiole 1-1.5 cm. long; heads cylindric, about 26-flowered, 7 mm. in diameter; scales stramineous, rounded and mucronulate at the closely appressed tip; flowers inferred to be white.— Proc. Am. Acad. liv. 240 (1918).

MAGDALENA: Santa Marta, *H. H. Smith*, no. 660 (Gr., Mo.).

6. **E. diaphanophlebium** Robinson. Similar in habit and in most features to the preceding, more slender; leaves also ovate, caudate-acuminate, rounded at base, opposite, on short petioles, but smaller, 5-7 cm. long, half as wide, not translucent-punctate but with a distinctly pellucid network of small veins; heads smaller, 4 mm. in diameter; branches of the panicle dividing three or more times, many-headed.—Proc. Am. Acad. liv. 242 (1918).

MAGDALENA: Santa Marta, *H. H. Smith*, no. 1990 (Gr., N. Y.).

7. **E. uromeres** Robinson. Slender shrub with grayish-green foliage and terete flexuous presumably reclining stems; leaves opposite, ovate, acute, rounded or shortly cuneate at base, undulate-serrulate, 4-6 cm. long, 2-3 cm. wide, thin, dull green and finely papillose above, paler, softly and rather copiously pubescent on the nerves and netted veins beneath; cymes 3-5-headed, opposite, widely spreading, their branches and diverging pedicels very slender, crisped-pubescent; heads campanulate, 7 mm. high, 4 mm. thick, about 45-flowered; scales ivory-white, with a dark mid-vein becoming broader upward and terminating in a narrow spreading or deflexed caudate herbaceous appendage.—Proc. Am. Acad. liv. 260 (1918).

MAGDALENA: Occasional in thickets and dry forest below 915 m., Santa Marta, *H. H. Smith*, no. 505 (Gr., N. Y., Mo.); dry forest near Bonda, Aug., *H. H. Smith*, no. 659 (N. Y.); near Onaca, alt. 770 m., Dec., *H. H. Smith*, no. 658 (N. Y.).

8. **E. columbianum** Heering. Sordid-pubescent shrub; branches 6-ribbed and deeply channeled between the ribs; leaves opposite, petiolate, large, ovate, 1-1.6 dm. long, about half as wide, acuminate, coarsely serrate, pubescent on nerves and veins but otherwise subglabrous and in age somewhat rugose or bullate above, sordid- or rusty-tomentose beneath, rounded at base or sometimes shortly cuneate-decurrent on one or both sides of the petiole; heads very numerous, sessile or nearly so in dense compound round-topped corymbs; scales many-seried, 3-nerved, darkened toward the obtusely pointed more or less hairy tip; florets about 12; corollas pale violet or white.—Mém. Soc. neuchât. Sci. Nat. v. 421 (1913).

ANTIOQUIA and TOLIMA: common everywhere to 2000 m., *Mayor*, no. 629 (acc. to Heering, l. c.).

CUNDINAMARCA: Guadalupe, alt. 3000 m., *Bros. Apollinaire & Arthur*, no. 88 (Gr., U. S.).

WITHOUT LOCALITY: *Triana*, no. 1238 (K., N. Y.).

9. **E. hypericifolium** HBK. Shrub, becoming 4 m. in height (Lehmann), with ascending terete slightly furrowed sordid-tomentelous at length glabrate branches; leaves opposite, short-petioled, ovate, acute, entire, 2-2.5 cm. long, 9-15 mm. wide, rounded at base, sordid-pubescent and at maturity more or less glabrate above, rusty-velvety beneath, 3-nerved from the base; petiole slender 2-3(-6) mm. long; heads cylindric, erect, 14 mm. high, 4-5 mm. thick, pedicelled, in small corymbs terminal on the branches; scales stramineous 3(-5)-nerved, brownish toward the tip, the outer obtusely and the inner acutely pointed; corollas lilac (Lehmann) or blue (Rusby & Pennell); achenes black, 5-6 mm. long, upwardly hispid on the sharp angles.—Nov. Gen. et Spec. iv. 118 (1820); Hieron in Engl. Bot. Jahrb. xxviii. 567 (1901). *E. conyzoides*, var. *incanum* Hieron. l. c. xix. 45 (1894), acc. to Hieron. l. c. xxviii. 567 (1901).

CUNDINAMARCA: among shrubs on savannahs near Pacho, alt. 1700-2200 m., Lehmann, no. 7494 (N. Y.).

HUILA: on the Cordillera Oriental, near Neiva, Rusby & Pennell, no. 431 (N. Y.).

WITHOUT LOCALITY: *Humboldt & Bonpland* (Par., phot. Gr.).

10. **E. iridolepis** Robinson. Shrub 12-15 dm. high; stem flexuous, gray-tomentulose (the hairs curved); leaves opposite, ovate, petiolate, crenate-serrate except at the long-acuminate apex and rounded or abruptly cuneate base where entire, 3-nerved above the base, 6-7 cm. long, 2.4-3 cm. wide, minutely hirtellous above, softly pubescent and orange-punctate beneath; corymbs terminal, rather dense, convex, many-headed; heads about 10-flowered, 9.5 mm. high, 3-4 mm. in diameter, sessile by 3's and 4's at the tips of the branchlets of the inflorescence; scales of the slender-cylindric involucre 4-5-seriate, narrowly oblong, white and shining toward the base, subherbaceous and green or (the innermost) rose-purple at the tip, the intermediate often more or less squarrose at the subherbaceous acutish and somewhat tomentelous apex; corollas roseate; achenes 3.3 mm. long, hispidulous on and between the ribs.—Proc. Am. Acad. liv. 247 (1918).

MAGDALENA: in one place only, on open hillside, edge of forest, Las Nubes, alt. 1370 m., December, *H. H. Smith*, no. 615 (Gr.).

11. **E. ivaefolium** L. Erect, subherbaceous or distinctly shrubby, 4-12 dm. high, harshly pubescent, the hairs jointed and curved; leaves opposite, lance-linear, 3-nerved, often proliferous in the axils,

3-7 cm. long, 5-22 mm. wide, the upper subentire, the lower coarsely toothed; heads in trichotomous open flattish-topped compound cymes; involucre shortly cylindric 5-8 mm. long, half as thick; outer and intermediate scales provided with subherbaceous and often slightly squarrose subtruncate erose tip, the innermost commonly somewhat petaloid and lilac at the apex; florets lilac-purple; achenes black, 2.4 mm. long, with light-colored smooth or somewhat roughened angles.—Syst. ed. 10, 1205 (1759) [as *E. iuacfolium*]; Amoen. Acad. v. 405 (28 Nov. 1759) [as *E. ivifolium*]; Sp. Pl. ed. 2, ii. 1174 (1763).

MAGDALENA: locally common, generally in ravines, edge of forest or on open campo, alt. 305-915 m., Onaca, *H. H. Smith*, nos. 533 (Gr., U. S.) and 617 (Gr., U. S.).

[Miss. to Tex., Cub., Jam., Lesser Antil., Mex. to Boliv. and Braz.]

12. ***E. leivense*** Hieron. Erect shrub, gray-tomentulose, with ascending branches; leaves opposite, lanceolate to ovate, entire, acute or obtuse at apex, cuneate at base, softly though shortly grayish-velvety especially beneath, 2-5 cm. long, 1-2.4 cm. wide; heads mostly sessile disposed by 3's to 5's in a broad flattish leafy-bracted compound terminal cyme; involucres about 6 mm. long, 2 mm. in thickness, 8-11-flowered; scales stramineous, slightly 3-nerved, ciliolate, somewhat darkened and dorsally hairy toward the bluntish tip.—Hieron. in Eng. Bot. Jahrb. xxi. 329 (1895).

BOYACÁ: near Leiva, *Stübel*, no. 152a (Berl., fragm. and phot. Gr.).

CUNDINAMARCA: near Bogotá, alt. 2600 m., *Bros. Apollinaire & Arthur*, no. 45 (U. S., fragm. Gr.).

13. ***E. tacotanum*** Klatt. Erect, often flowering at 6 dm. and essentially herbaceous (*Langlassé*, *Pennell*), but under favorable conditions becoming a shrub 2 m. or more in height (*Lehmann*), dark grayish-puberulent above, paler, velvety, and obviously reticulate-veiny beneath, 3-nerved from above the base; heads pedicelled in flattish-topped compound corymbs; pedicels 3-10 mm. long; involucre 7 mm. high, 2-3 mm. in diameter; scales oblong-lanceolate, mostly 1-nerved, all but the outermost smooth or nearly so, the intermediate lanceolate-linear, acutish, the innermost acute and purplish at the tip; corollas pale lilac.—Klatt in Eng. Bot. Jahrb. viii. 35 (1887); Hieron. in Eng. Bot. Jahrb. xxviii. 567 (1901); *Heering*, *Mém. Soc. neuchât. Sci. Nat.* v. 420 (1913).

CUNDINAMARCA: open slopes, Melgar, alt. 1300–1500 m., *Pennell*, no. 2843 (Gr.), herbaceous, flowers "blue."

HUILA: on dry hills around Huila, in the valley of the Rio Paez, alt. 1600–1900 m., *Pittier*, no. 1297 (U. S.), flowers "pink."

EL VALLE: La Paila, *Holton*, no. 316 (N. Y.); in bushy places on savannahs, alt. 1600 m., around Tocotá, *Lehmann*, no. 3424 (Gr.); around Cali, western side of Cauca Valley, alt. 1000–1200 m., *Pittier*, no. 654 (U. S.), flowers "azure-blue."

CAUCA: around Tacueyo, Rio Palo Valley, Central Cordillera, alt. 1800 m., *Pittier*, no. 1051 (U. S.), flowers "purple."

WITHOUT LOCALITY: *Linden*, no. 985 (K.) in part; *Triana*, no. 1204 (N. Y.) in part.

Forma **apodum** Robinson. Heads nearly all closely sessile in 2–4-headed glomerules, these disposed in more or less open flat-topped cymose panicles; a few pedicels developed to 2.8 mm. in length.—*Proc. Am. Acad. liv.* 259 (1918). *E. tacotanum* Klatt, l. c. in part.

EL VALLE: in bushy places on savannahs, alt. 1600 m., about Tocotá, *Lehmann*, no. 3438 (Gr.).

A shrub, attaining 3 m. in height; flowers lilac-red and very fragrant (*Lehmann*).

Var. **trineurolepis** Robinson. Scales of the involucre chiefly 3-nerved, somewhat more oblong and obtuse than in the typical variety, tomentulose near the tip; corollas mauve-violet (*Langlassé*), blue or white (*Pennell*).—*Proc. Am. Acad. liv.* 259 (1918).

CUNDINAMARCA: dry open hill, Ieononzo, alt. 1000–1200 m., *Pennell*, no. 2801 (Gr.), herbaceous.

TOLIMA: open rocky hill, Honda, alt. 300–500 m., *Pennell*, no. 3564 (Gr.), herbaceous.

EL VALLE: in clayey soil, alt. 800 m., Papagayeros, *Langlassé*, no. 9 (Gr.); El Saladito above Cali, Cordillera Occidental, alt. 1600 m., *Pittier*, no. 757 (U. S.).

WITHOUT LOCALITY: *Triana*, no. 1204 (K., N. Y.) in part; *Lehmann*, no. 5680 (N. Y.); *Linden*, no. 985 (K.) in part.

14. **E. scabrum** L. f. Shrubby, sordid-villous with long dark jointed spreading hairs; branches ribbed and furrowed, leafy; leaves opposite, short-petioled, ovate to ovate-lanceolate, acute to acuminate at both ends, 3-ribbed from the base, bullate-rugose and hirtellous above, coarsely reticulate-veiny and spreading sordid-villous beneath, 6–7 cm. long, 2.3–3 cm. wide, sparingly and rather finely serrate in the middle of each side, nearly or quite entire toward each end; heads

very numerous in dense round-topped compound corymbs; involucre 7-8 mm. long, 2-3 mm. thick; scales appressed in 4-5 series, 3-5-nerved, dark and slightly tomentulose at the rounded tip, the margin often purple; florets violet-blue (Pennell).— Suppl. 354 (1781); J. E. Sm. Ic. iii. t. 67 (1791). *Osmia scabra* (L. f.) Sch. Bip. Pollichia, xxii-xxiv. 253 (1866).

CUNDINAMARCA: on mountains east of Bogotá, *Holton*, no. 314 (Gr.); Guadalupe, alt. 3000 m., *Bros. Apollinaire & Arthur*, no. 95 (Gr., U. S.); cañon, Chapinero, alt. 2700-2800 m., *Pennell*, no. 2042 (Gr.).

WITHOUT LOCALITY: *Mutis* (Linnean Soc. Herb., phot. Gr.).

[By Baker in Mart. Fl. Bras. vi. pt. 2, 299 (1876) this species is said to range to British Guiana and Peru.]

For a species of such early date this was accurately described in considerable detail, but it has been much misinterpreted by continental writers; thus Kunth mistook for it the very different plant later described first as *E. bullatum* by Klatt and later as *E. Kunthianum* by Hieronymus, who took up a manuscript name of Schultz-Bipontinus. Both Klatt and Hieronymus appear to have been misled by an earlier determination of Schultz into supposing *E. scabrum* to have been represented by Moritz's no. 1365 from Venezuela (*E. meridense* Robinson), a plant very different from the fortunately preserved type of *E. scabrum* which fully confirms the diagnosis of Linnaeus filius.

15. ***E. punctulatum*** DC. Shrubby; stem round and nearly smooth; leaves opposite, ovate-elliptic or -oblong, acute or acuminate at both ends, rather finely serrate with somewhat distant teeth, 3-nerved, subglabrous, punctate beneath, 1 dm. long, 2.5 cm. wide; heads cylindric, 8-9-flowered, 8 mm. long, sessile in fascicles of 3-5 at the ends of the branchlets of ample flattish terminal corymbs; scales striate, closely appressed in about 4 series, finely 3(-5)-nerved, darkened toward the obtuse or rounded tip; achenes glabrous.— Prod. v. 147 (1836); Bak. in Mart. Fl. Bras. vi. pt. 2, 299 (1876).

NEW GRENADA: *Linden*, no. 823, acc. to Bak. l. c.

[Eastern Brazil, acc. to Bak. l. c.]

No Colombian material of this species has been seen by the writer, but the original character, here summarized, has been subject to control from a clear photograph (in the Gray Herbarium) of the fragmentary type in the DeCandolleian Herbarium in Geneva.

16. ***E. leptocephalum*** DC. Shrubby, with reddish or purplish branches sparingly puberulent with short curved subappressed non-

glandular hairs; leaves opposite, narrowly ovate-lanceolate to lanceolate, serrate, caudate-attenuate to a very narrow usually falcate tip and gradually cuneate to a shortly petioled base, thin, deep green above, scarcely paler beneath; heads very slender, acute in bud, 7-8-flowered, some sessile but most of them slender-pedicelled, in leafy-bracted panicles composed of small corymbosely disposed cymes; involucre about 7 mm. long; scales (1-)3-nerved, white, with acutish greenish tips, essentially glabrous.—Prod. v. 148 (1836). *Osmia leptcephala* (DC.) Sch. Bip. Pollichia, xxii.-xxiv. 253 (1866).

EL VALLE: Cuesta de Tocotá, Cordillera Occidental, alt. 1500-1900 m., Pittier, no. 735 (Gr.).

[Ecuador and Peru.]

17. **E. barranguillense** Hieron. Shrub, 3 m. high, with subscandent stems and glabrate divaricate slightly furrowed branches; leaves opposite, rhombic-ovate, acuminate at the apex, usually cuneate at base, 6-7 cm. long, about half as wide, 3-nerved, very slightly pubescent on both surfaces, scarcely paler and punctate beneath; petiole 0.8-1.8 cm. long; heads 6-8-flowered, very slender, in flattish-topped corymbs; involucre-scales pale, greenish-white, 5-7-nerved, (for the §) loosely imbricated, not much darkened toward the acutish somewhat ciliated tip, slightly puberulent on the back; florets whitish.—Hieron. in Engl. Bot. Jahrb. xxviii. 564 (1901).

ATLANTICO: in open bushy places around Barranguilla, flowering Nov.-Dec., Lehmann, no. 7953 (Berl., fragm. and phot. Gr.).

18. **E. subscandens** Hieron. Closely branched, subherbaceous to somewhat woody, at length reclining or weakly climbing, 2.5 m. high, with terete soon almost glabrate stem and sap-green foliage; leaves lance-ovate, opposite, petiolate, entire or very sparingly and remotely small-toothed, caudate-acuminate, often falcate, 3-nerved, rounded or shortly pointed at base, sparingly hirtellous above, more or less pubescent on the veins beneath; branches divaricate; heads cylindric, 1 cm. long, 4-5 mm., in diameter; involucre scales in about 4 ranks, 3-nerved, rounded at the closely appressed and darkened tip; pedicels mostly curved or hooked, 1-1.5 cm. long; corollas lilac-blue (Lehmann).—Hieron. in Engl. Bot. Jahrb. xxii. 742 (1897). *E. conyzoides*, var. *pauciflorum* Hieron. l. c. xix. 45 (1894), not Bak. *E. pulchellum* Klatt in Engl. Bot. Jahrb. viii. 35 (1887), not HBK. *E. tequendamense* Hieron. l. c. xxix. 6 (1900). *E. elongatum* Willd.

ex Hieron. l. c. (a name of no possible validity and in its late publication a needless increase to synonymy).

CUNDINAMARCA: in clearings near Tequendama, alt. 2300 m., *Lehmann*, no. 2491 (Gr.); near Pacho, alt. 1500-2000 m., *Lehmann*, no. 7475 (Berl., phot. Gr.).

[Bolivia.]

19. **E. odoratum** L. Much branched shrub 1-2 m. high, suberect or slightly scandent or reclining on neighboring vegetation; stems terete, spreading-villous; internodes often 1 dm. or more in length; branches divaricate, often curved upward; leaves deltoid- or rhombic-ovate, 7-10 cm. long, 3-4 cm. wide, long-acuminate, subentire to coarsely and often somewhat hastately few-toothed chiefly where broadest, entire at the abruptly narrowed though mostly acute base, sparingly villous above, moderately pubescent to velvety beneath; 3-nerved from the base; heads 20-35-flowered, in trichotomous convex corymbs; florets pale lilac to bright purplish-blue, varying (rarely) to pink or (frequently) to white, usually fragrant.—*Syst. ed.* 10, 1205 (1759), *Amoen. Acad.* v. 405 (1759), & *Spec. Pl.* ed. 2, ii. 1174 (1763); *Benth. Pl. Hartw.* 198 (1845); *Urb. Symb. Ant.* iv. 623 (1911). *E. conyzoides* Mill. *Dict.* ed. 8, no. 14 (1768), both as to descript. and ref. to Sloane, which in its turn goes back to same fig. of Plukenet. *E. conyzoides* Vahl, *Symb.* iii. 96 (1794); *Schrank, Pl. Rar. Hort. Monac.* t. 85 (1819); *Bak. in Mart. Fl. Bras.* vi. pt. 2, 277 (1876), where several not very satisfactory varieties are indicated; *Heering, Mém. Soc. neuchât. Sci. Nat.* v. 420 (1913).

MAGDALENA: Quemadito, *André*, no. 220 (Gr.); in a clearing at Las Nubes, alt. 1372 m., *H. H. Smith*, no. 636 (Gr.); campo near Onaca, alt. 762 m., *H. H. Smith*, no. 637 (N. Y.); common in thickets, Bonda, alt. 75 m., *H. H. Smith*, no. 506 (Gr., U. S.).

CUNDINAMARCA: in woods near Villeta, *Hartweg*, acc. to *Benth.* l. c.

ANTIOQUIA: river-flat, alt. 150 m., Brazuela de Perales, Rio Magdalena, *Pennell*, no. 3690 (Gr.), fl. violet.

TOLIMA: in loam on slope along river, Honda, alt. 200-250 m., *Pennell*, no. 3593 (Gr.), fl. light-blue; open loam slope, "La Trinidad," Libano, *Pennell*, no. 3339 (Gr.), fl. bluish-white.

ANTIOQUIA, TOLIMA, and CUNDINAMARCA: common up to 2000 m., *Mayor*, no. 544, acc. to *Heering*, l. c.

EL VALLE: La Manuelita near Palmira, alt. 1100-1302 m., *Pittier*, no. 504 (Gr.).

WITHOUT LOCALITY: *Otto*, no. 448 (Gr.); *Karsten* (Gr.); *Wagener* (U. S.).
[Southern U. S. to Argent.]

Widely distributed in the warmer parts of America, common and variable. The numerous varieties founded on leaf-contour, pubescence, flower-color, odor, etc., appear to have no more than formal value, since they rest upon arbitrarily selected combinations of characters subject to independent variation. The only variety definitely reported from Colombia is the following, which to a considerable extent bridges the gap between this species and *E. barranquillense*.

Var. **pauciflorum** Hieron. Heads more slender, 10-16-flowered; involucre 1 cm. long, the scales pale, the intermediate and inner ones tending to be acute; corollas pale violet or lilac.—Hieron. in Engl. Bot. Jahrb. xxviii. 564 (1901), as *pauciflora*.

BOLIVAR: Cartagena, *Billberg*, acc. to Hieron. l. c.

MAGDALENA: near Santa Marta, *H. H. Smith*, alt. 153 m., no. 1991 (Gr., U. S.).

[Venezuela, acc. to Hieron. l. c.]

20. **E. corymbosum** Aubl. Erect much branched shrub, 1-3 m. high; stems terete, finely tomentellous, the hairs curved, some of them gland-tipped; leaves opposite, petiolate, deltoid, 1.7-6 cm. long, nearly or quite as broad, obtuse or acute, coarsely crenate-toothed except at the widely and shallowly cordate or subtruncate base, yellow-green, puberulent or smooth above, paler and finely pubescent on the nerves and veins beneath; petiole 1-2 cm. long; heads in dense flattish compound corymbs; scales many-ranked, closely appressed, their 3-5 nerves tending to spread slightly as they reach the green rounded tips.—Guian. ii. 799 (1775). *E. atriplicifolium* Lam. Encyc. ii. 407 (1786); Vahl, Symb. iii. 96 (1794); Hieron. in Engl. Bot. Jahrb. xxviii. 567 (1901); Urb. Symb. Ant. iv. 623 (1911). *E. repandum* Willd. Spec. iii. 1767 (1804); Griseb. Fl. Brit. W. Ind. 358 (1861). *Osmia repanda* (Willd.) Sch. Bip. Pollichia, xxii.-xxiv. 252 (1866).

ANTIOQUIA: near the city so named, alt. 500 m., *Lehmann*, no. 7996, acc. to Hieron. l. c.

[West Indies, from the Bahamas to Guadaloupe; French Guiana, acc. to Aubl.]

No specimens of this species have been seen from the continent, but it is here included on the basis of the Colombian report by Hieronymus, l. c.

Sect. II. SUBIMBRICATA (DC.) Hoffm. Involucre campanulate or turbinate, rarely cylindric, seldom more than twice as long as thick;

scales very unequal, imbricated in 3—several graduated series, persisting until after the fall of the achenes.— Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Abt. 5, 140 (1890). *Eupatorium* ser. *Subimbricata* DC. Prod. v. 152 (1836). *Eupatorium* sect. *Heterolepis* Bak. in Mart. Fl. Bras. vi. pt. 2, 301 (1876). *Batschia* Moench, Meth. 567 (1794). *Wikströmia* Spreng. Syst. iii. 434 (1826). *Critonia* DC. Prod. v. 140 (1836). *Disynaphia* DC. Prod. vii. 267 (1838). *Heterolaena* Sch. Bip. ex Benth. & Hook. f. Gen. ii. 245 (1873).—Species very numerous, chiefly perennial herbs or shrubs.

KEY TO SPECIES.

- a. Leaves entire, rusty-woolly beneath 21. *E. gynoxoides*.
 a. Leaves toothed, undulate, or in a few cases (when not rusty-woolly) entire b.
 b. Heads few (mostly 5–13)-flowered c.
 c. Leaves strongly discolorous, white-lanulate beneath d.
 d. Leaf-blade ovate-oblong, obtuse, rounded at base 22. *E. origanoides*.
 d. Leaf-blade deltoid-ovate, acutish, cordate 23. *E. niveum*.
 c. Leaves (when mature) never whitened beneath e.
 e. Leaves spatulate-obovate, very fleshy, 1-nerved; lateral veins (pinnate) very obscure or invisible 24. *E. sciaphilum*.
 e. Leaves never obovate; lateral veins or nerves clearly evident f
 f. Heads separate or in small glomerules loosely disposed in open forking cymose panicles 25. *E. iresinoides*.
 f. Heads crowded in flattish or moderately convex corymbs or in corymbosely disposed subglobose glomerules g.
 g. Leaves pinnately veined, sessile or very shortly petioled h.
 h. Leaves oblong or lanceolate, coriaceous i.
 i. Leaves tomentose beneath 26. *E. salicinum*.
 i. Leaves subglabrous beneath j.
 j. Branches of the inflorescence and pedicels subglabrous, often vernicose 27. *E. baccharoides*.
 j. Branches of the inflorescence and pedicels rusty-pubescent 28. *E. arbutifolium*.
 h. Leaves ovate, membranaceous 47. *E. turbacense*, v. *ovatifolium*.
 g. Leaves palmately 3(–5)-nerved from or somewhat above the base k.
 k. Leaves slender-petioled; lamina suborbicular-to lance-ovate, rounded at base l.
 l. Leaves firm-chartaceous, subentire or obscurely serrate, bullate above, tomentose beneath 29. *E. Stuebelii*.
 l. Leaves subcoriaceous, small (1.5–2.7 cm. long), glabrous above, sparingly hirtellous on

the nerves and principal veins beneath, entire from the base nearly or quite to the middle

30. *E. arcuans*.
- l. Leaves membranaceous, conspicuously toothed from much below the middle m.
- m. Heads pedicelled; leaves large, 5-6.5 cm. wide; petiole about 4 cm. long. 31. *E. Vargasianum*.
- m. Heads sessile in glomerules n.
- n. Hispid-pubescent; teeth of leaves rounded. 32. *E. smilacinum*.
- n. Pubescence, when present fine and soft o.
- o. Leaves suborbicular-ovate, 5-8 cm. wide. 33. *E. acuminatum*.
- o. Leaves lance-ovate, 2-4 cm. wide. 34. *E. pseudoglomeratum*.
- k. Leaves rhombic-ovate or -lanceolate, cuneately decurrent on short petioles or narrowed to a subsessile base. 35. *E. inulaefolium*.
- f. Heads in dense ovoid or pyramidal panicles or thyrses p.
- p. Petioles at least 1 cm. long q.
- q. Leaves coarsely serrate-dentate; teeth 2-3 mm. high; petioles 2-4 cm. long. 36. *E. morifolium*.
- q. Leaves finely serrate; teeth 0.5-0.8 mm. high; petioles 1-1.5 cm. long. 37. *E. thyrsigerum*.
- p. Leaves sessile or nearly so. 38. *E. densum*.
- b. Heads numerously (20-∞) flowered r.
- r. Leaves 3(-7)-nerved from or somewhat above the base s.
- s. Involucral scales 2-3(-5)-ribbed; heads 3-8 mm. high t.
- t. Leaves lanceolate, small (2-5 mm. wide). 39. *E. miserum*.
- t. Leaves ovate (or in the glandular-pubescent *E. perezoides* ovate-elliptical), 1 cm. or more wide u.
- u. Weak annual; heads numerous, small (4 mm. high), separate on filiform pedicels in an open panicle. 40. *E. microstemon*.
- u. Perennial herbs or shrubs, never viscid; heads clustered in terminal corymbs or small usually dense cymes, these separate and disposed in a convex corymb v.
- v. Heads about 25-flowered w.
- w. Heads 3.5-5.5 mm. high, in rather dense terminal glomerules x.
- x. Florets rose-colored or purplish; achenes hispid at least on the angles; perennial herb. 41. *E. pycnocephalum*.
- x. Florets white; achenes glabrous; rusty-pubescent herb or shrub. 42. *E. Klattianum*.
- w. Heads about 7 mm. high, in somewhat looser cymes; florets white. 43. *E. Pennellii*.
- v. Heads 35-70-flowered, 7-8 mm. high; florets roseate or lilac; leaves ovate-lanceolate, dull, punctate, drying dark. 44. *E. obscurifolium*.
- u. Perennial herb; heads rather few in a lax diffuse panicle; pedicels 1-2 cm. long. 45. *E. perezoides*.
- u. Perennial herb or shrub, smoothish, viscid about the nodes and petioles; leaves slightly succulent,

- with pellucid veinlets; heads in a thyrsoid panicle;
 involucre scales acute.....46. *E. magdalenense*.
t. Leaves broadly elliptical, glabrous.....59. *E. tinifolium*.
s. Scales multistriate; heads 1 cm. or more high *y*.
y. Leaves membranaceous, coarsely crenate-dentate
 85. *E. paezense*.
y. Leaves coriaceous, obscurely serrate.....47. *E. vitalbae*.
r. Leaves pinnately veined *z*.
z. Leaves perfoliate.....48. *E. ornithophorum*.
z. Leaves on winged petioles; these biauriculate at base.
 89. *E. nemorosum*.
z. Leaves sessile, the petiole (wingless) rarely 3 mm.
 long *aa*.
aa. Involucral scales about 20, substramineous, obtuse
 49. *E. turbacense*.
aa. Scales 30-50, narrow, acutish.....50. *E. amygdalinum*.
z. Petioles (wingless) about 1 cm. long *bb*.
bb. Heads sessile in glomerules, these disposed in a
 divaricately branched panicle; scales about 30,
 obtuse.....51. *E. fuliginosum*.
bb. Heads pedicelled, in dense cymose corymbs; scales
 about 17-18, acute or acutish.....52. *E. popayanense*.

21. ***E. gynoxoides*** Wedd. Stoutish shrub, 1.2-2 m. high; branches thick, rusty-tomentose; leaves petiolate, entire, oblong-lanceolate, thickish, 2.5-6 cm. long, puberulent-tomentellous and at length glabrate and shining above, covered beneath with a thick coating of rusty wool; petiole 2-10 mm. long; heads 15-20, 6-8 mm. long, disposed in a dense corymb the size of a walnut; scales of the campanulate involucre about 15, in about 3 ranks, linear, sharp-pointed; corollas slightly hairy especially toward the top; achenes slightly hispid on the angles; pappus-bristles very unequal.—Chlor. And. i. 216 (1857).

CUNDINAMARCA: cold places of the Prov. of Bogotá, *Goudot*, acc. to Wedd. l. c.

Apparently never rediscovered. The characters, here compiled from Weddell's original diagnosis, are unfortunately insufficient to show the affinities of the plant within the section.

22. ***E. organoides*** HBK. Shrub, 1-3 m. high, climbing or leaning, with slender forking or trichotomous branches; branchlets terete, spreading, finely white-woolly; internodes often 1 dm. long or more, much exceeding the ovate-oblong undulate-crenulate leaves; leaf-blade rounded at the tip, rounded or truncate at the base, 2-5 cm. long, 1-1.8 cm. wide, rather firm in texture, finely bullate-rugulose and glabrescent above, white-lanulate and prominently reticulate-veiny beneath; petiole 8-13 mm. long; corymbs terminal on the

branches, subglobose, 2-4 cm. in diameter; heads about 11-flowered, pedicellate; scales of the involucre oblong, stramineo-scarious, rounded at the tip, woolly on the back; corollas white.—Nov. Gen. et Spec. iv. 114 (1820).

“REGNO NOVO-GRANATENSI?” *Humboldt & Bonpland*, acc. to Kunth in HBK. l. c.

[Ecuador.]

This species, founded by Kunth on material of Humboldt & Bonpland without precise indication of its source, was by him doubtfully attributed to Colombia. Subsequently rediscovered in Ecuador, it is probably also a native of Colombia although not as yet fully demonstrated in the latter country.

23. **E. niveum** HBK. Shrub 1-2 m. high, in habit very like the preceding, but the leaves (also silvery-white beneath) deltoid-ovate, acute or acutish, more finely and definitely crenate; heads more massed in large compound corymbs (1-2 dm. in diameter); involucre, corollas, etc., as in the preceding.—Nov. Gen. et Spec. iv. 115, t. 342 (1820).

CAUCA: near Popayan? *Humboldt & Bonpland*, acc. to Kunth in HBK. l. c.

NARIÑA: between Menezes and Pasto in the Cordillera Meridional, alt. about 3000 m., *André* (Gr.).

[Ecuador.]

24. **E. sciaphilum** Robinson. Straggling shrub; stems soft-woody, 2-4 m. long; branches terete, glabrate; branchlets tawny-puberulent; leaves opposite, spatulate-obovate, quite entire, glabrous, thick-coriaceous, sessile or nearly so, 5-8 cm. long, 1.8-3.2 cm. wide, 1-nerved; heads in a loose very convex corymb, about 10-flowered; scales of the cylindrical involucre few (about 9), very unequal, acutish, ciliolate but otherwise smooth; corollas much exerted, dark purplish-violet.—*Proc. Am. Acad.* liv. 256 (1918).

ANTIOQUIA: in light shade, alt. 2292-2350 m., *Kalbreyer*, no. 1445 (K.).

Noteworthy for its fleshy entire leaves and attractive deeply colored flowers. Seemingly promising for horticulture.

25. **E. iresinoides** HBK. Spreading, reclining, or weakly climbing, perennial, quite herbaceous or more or less woody, 0.5-2 m. long, light gray-green, short-velvety at least as to the branchlets and lower surface of the leaves; the latter ovate, narrowed or acuminate to a

mostly obtuse or rounded tip, serrate to undulate or subentire, 4–6 cm. long, 2–3 cm. wide, 3-nerved from above the base; this cuneately decurrent on the petiole; heads about 5-flowered, slender, shortly pedicelled in open forking cymose panicles; involueral scales 11–16, stramineous and subscarious, very unequal, rather loosely imbricated, acute; corollas pale yellowish (Smith); achenes pubescent.—Nov. Gen. et. Spec. iv. 106, t. 340 (1820); Klatt in Engl. Bot. Jahrb. viii. 34 (1887); Heering, Mém. Soc. neuchât, Sci. Nat. v. 419 (1913). *E. iresinoides*, var. *a. villosum* Steetz in Seem. Bot. Herald, 145 (1854); Hieron. in Engl. Bot. Jahrb. xxviii. 573 (1901). *E. celosioides* Willd. ex Steetz, l. c. (invalid name, needlessly published). *E. celtidifolium* Klatt, l. c., not Lam.

MAGDALENA: Las Nubes and Onaca, alt. about 600 m., *H. H. Smith*, no. 503 (Gr., U. S.); lower hills between Rio Frio and S. Andres de la Sierra, alt. about 200 m., *Pittier*, no. 1716 (U. S.).

TOLIMA: at the base of the Andes near Ibagué, *Humboldt & Bonpland*.

HUILA: east of Neiva, *Rusby & Pennell*, no. 1048 (N. Y.); Patico, *Lehmann*, no. 4768 (N. Y.).

EL VALLE: among shrubs on savannahs about Tocotá, alt. 1600 m., *Lehmann*, no. 3430 (Gr.); on stony sterile soil along the Rio Dagua, *Lehmann*, no. 3813 (Gr.); La Paila, *Holton*, no. 320 (Gr., K.).

[Venez., Margarita, St. Vincent, Martinique, Panama. Said by Hemsl. Biol. Cent.-Am. Bot. ii. 96 (1881) to extend southward to Peru.]

Var. *a. villosum* Steetz, l. c. Copiously pubescent; leaves softly and conspicuously tomentose beneath.—Synon. and distrib. as above.

Var. *β. glabrescens* Steetz, l. c. Finely and often rather inconspicuously pubescent.

MAGDALENA: on rocky hills by the seashore near Plaza Brava, *H. H. Smith*, no. 607 (Gr.).

[Panama, Venez., Trinidad.]

Poorly marked and of merely formal value.

The flowers of this species are sometimes reported on field-labels as yellow. Since, however, really yellow flowers are decidedly rare in the *Eupatorieae* it is not unlikely that they are here nearly or quite white and that the impression of yellow color arises from the stramineous scales, which in this species are considerably more conspicuous than the minute and almost included florets.

26. *E. salicinum* Lam. Shrub; branches somewhat angular, puberulent when young; leaves opposite, subsessile, oblong-lanceolate,

attenuate at both ends, pinnately veined, entire, revolute on the margin, 8-17 cm. long, 1-2 cm. wide, firm in texture, glabrous and rugose above, sordidly tomentose beneath; heads about 10-flowered, in dense convex compound corymbs at length disposed in a more or less pyramidal panicle; scales oblong, obtuse (except the outermost), dorsally pubescent and ciliolate; florets much exerted; achenes beset on ribs and faces with sessile glands.—Encyc. ii. 409 (1786); HBK. Nov. Gen. et Spec. iv. 131 (1820).

“NEW GRENADA”: without precise locality, *Triana*, no. 1218 (K.).
[Ecuador and Peru.]

27. **E. baccharoides** HBK. Smooth shrub, the young parts viscid and often vernicose; branches leafy; leaves opposite, lance-oblong, short-petioled, acute at both ends, thickish and rather firm, 6-8 cm. long, 1.7-2.5 cm. wide, pinnately veined, serrulate; corymbs 7-10 cm. in diameter, many-headed, often nodding or pendulous; heads about 7-flowered; scales about 12, lance-oblong, acutish, loosely 3-ranked, commonly glutinous, covered with minute sessile glands and a few inconspicuous hairs; corollas with short gland-dotted proper tube and a much longer smoothish cylindrical throat; achenes beset on the angles with sessile glands.—Nov. Gen. et Spec. iv. 132 (1820); Benth. Pl. Hartw. 199 (1845). *E. bogotense* DC. Prod. v. 181 (1836).

CAUCA: near Almaguer, *Humboldt & Bonpland*, no. 2085 (Par., phot. Gr.).

CUNDINAMARCA: Santa Fé de Bogotá, specimen from herb. of Delessert and now in DeCandolle's Prod. herb. (phot. Gr.); near Bogotá, *Hartweg*, no. 1100 (N. Y.); *Holton*, no. 309 (N. Y.); Guadalupe, alt. 3000 m., *Bros. Apollinaire & Arthur*, no. 87 (Gr.).

WITHOUT EXACT LOCALITY: *Purdie* (Gr.).

A species striking on account of its curved or actually inverted inflorescences. Whether this trait is constant or holds good only at certain stages of development or under particular conditions cannot be satisfactorily determined from the scanty material as yet available.

28. **E. arbutifolium** Benth. Shrub 9-12 dm. high, with round smooth leafy branches; leaves smooth and leathery, opposite, lance-oblong, at each end narrowed to an obtuse termination, inconspicuously serrulate (the teeth minute, cuspidate, 2-3.5 mm. apart), coriaceous, 5-7.5 cm. long, 1.5-2 cm. wide, glabrous, pinnately veined; heads

6-7-flowered, in dense round-topped rusty-hirtous corymbs (about 8 cm. in diameter); scales about 3-ranked, oblong, obtuse; achenes with ciliate ribs.—Pl. Hartw. 199 (1845).

CAUCA: in woods near Huambia, Prov. Popayan, *Hartweg*, no. 1100 (K., phot. Gr.).

A species as yet known only from the original collection.

29. **E. Stuebelii** Hieron. Shrubby; branches arcuate, terete, sordid-tomentose; internodes 5-10 cm. long; leaves opposite, petiolate ovate, acuminate, rounded or subcordate at base, rather inconspicuously and remotely serrulate, above deeply rugose-bullate, nearly glabrous and shining; below tawny-tomentose, 4-6 cm. long, 3-4 cm. wide, 3-ribbed from the base, supplementary nerves arising near the origin of the lateral ones; ribs connected by irregular transverse veins; petiole slender, 1-2 cm. long, tomentose; corymbs compact, trichotomous, tomentose; heads 10-flowered, subsessile or shortly pedicelled; involucre cylindrical; the scales 4-5-seriate, 2-3-ribbed, obtuse or acutish, mostly purple toward the tip; corollas lilac; achenes slightly hispidulous on the angles toward the summit.—Hieron. in *Engl. Bot. Jahrb.* xxi. 329 (1895).

BOYACÁ: Páramo de Coper, *Stübel*, no. 164 (Berl., phot. and fragm. Gr.). [Ecuador.]

Said to have terete branches and campanulate-cylindric involucre, and to belong to § *Subimbricata*, yet in many respects suspiciously similar to *E. columbianum* of § *Cylindrocephal*, a species in which the branches are rather conspicuously grooved.

30. **E. arcuans** Robinson. Shrub with terete very flexuous glabrate branches and arcuate angled rusty-tomentose very leafy branchlets; leaves small (1.5-3 cm. long, 1-1.5 cm. broad), opposite, petiolate, ovate, subacuminate, rounded to an acutish base, serrately 2-3-toothed on each side above the middle, thick-membranaceous, conspicuously 3-ribbed from the base, subglabrous and with nerves depressed above, olive-green and essentially glabrous beneath except on the prominent sparingly pubescent nerves; petiole slender, about 5 mm. long; heads 7 mm. long, about 10-flowered; involucre subcylindrical; scales about 16, very unequal, in about 3 loosely imbricated ranks, oblong, obtuse or rounded at the tip, 3-5-ribbed, glabrous except for an obscure ciliation; corolla glabrous, 4 mm. long, with the proper tube 2.4 mm. in length and a somewhat amplified

throat about half as long; achenes glabrous, 2.5 mm. long.—*Proc. Am. Acad.* liv. 237 (1918).

“NEW GRENADA”: without more exact locality, *Triana*, no. 1191 (K., phot. Gr.).

31. **E. Vargasianum** DC. Shrub with terete ascending branches clothed with dense sordid tomentum of purplish-brown jointed hairs; leaves opposite, ovate-oblong, acute to acuminate, crenate-serrate, shallowly cordate or more often rounded at base, 7-20 cm. long, 5-12 cm. wide, above closely beset with somewhat swollen persistent bases of small hairs and with subsessile glands, below gray-tomentose, 3-nerved from a point decidedly above the base (2-4 pairs of minor veins pinnately arranged between the actual base and the origin of the main lateral nerves); petiole 1.4-3.7 cm. long, thick, densely tomentose; corymbs terminal, dense, trichotomous, many-headed; heads about 10-flowered, on short thick hirsute pedicels; scales about 3-ranked, stramineous, more or less stained with claret color, oblong-lanceolate, thin, subscarios, 3-5-nerved, merely acutish to subattenuate, smooth on the back; achenes grayish or yellowish-brown, studded with sessile glands.—*Prod.* v. 155 (1836); Klatt in *Engl. Bot. Jahrb.* viii. 36 (1887); Heering, *Mém. Soc. neuchât. Sci. Nat.* v. 420 (1913).

CAUCA: in open woods on mountain slopes near Popayan, *Lehmann*, no. 938, acc. to Klatt, l. c.

ANTIOQUIA: in central Andes on a hill above America near Medellin, alt. 1700 m., *Mayor*, no. 392, acc. to Heering, l. c.

[Venezuela.]

No material from Colombia has been seen by the writer. The species, however, appears to be frequent and somewhat widely distributed in Venezuela, from Caracas to Tovar.

32. **E. smilacinum** HBK. Twining herb with furrowed and ribbed stem and hispid-pubescent widely spreading almost divaricate branches; leaves opposite, petiolate, ovate, entire at the acute to acuminate apex and abruptly narrowed to a rounded base, elsewhere coarsely crenate-serrate, 3-nerved from the base, membranaceous, hispidulous on the nerves and veins above, hispid beneath, about 5 cm. long, 2-2.4 cm. wide; heads sessile in spherical glomerules, these disposed in a divaricately branched corymb or panicle; involucre short-cylindric; scales oblong, green, striate, ciliated.—*Nov. Gen.*

et Spec. iv. 111 (1820); DC. Prod. v. 144 (1836). *Osmia smilacina* (HBK.) Sch. Bip. Pollichia, xxii.-xxiv. 252 (1866).

TOLIMA? on the Quindio Mountains near Alto de Guayaval and Quebrado de Toche? acc. to Kunth in HBK. l. c.

A species never rediscovered and known only from the original immature specimen secured without certain record of locality by Humboldt & Bonpland. The type is in the Museum of Natural History at Paris and a (rather poor) photograph of it, taken by the writer in 1905, is now in the Gray Herbarium. From this it has been possible to check and verify most of the characters of the original description, and to make reasonably sure that the species is distinct from any other known in Colombia. On the other hand, the precise position in the genus is still doubtful. DeCandolle (whose knowledge of the *Compositae* of Humboldt & Bonpland has in several other cases proved defective or erroneous) places this species in § *Cylindrocephala*, but Kunth, who certainly must have had access to the original material, grouped it with species of § *Subimbricata*, where for the present it seems best to give it provisional location.

33. ***E. acuminatum*** HBK. Branched perennial herb or soft-and pithy-wooded shrub, 2-4 m. high; stems hexagonal, smooth, pale green to straw-colored or at length brownish; leaves opposite, slender-petioled, ovate, acuminate, sharply or sometimes bluntly serrate-dentate, rounded or shallowly cordate at the broad and often unsymmetrical base, 5-7-nerved, thin, light-green, often and in varying degree pellucid-veined, 8-15 cm. long, 6-8 cm. wide, obscurely puberulent at least on the nerves beneath; heads 6-7-flowered, slender, sessile in subglobose glomerules disposed in convex corymbs; involucre cylindrical, 5.5 mm. long; scales about 14, delicate, stramineous, oblong, rounded at the tip; corollas slender-tubular, light violet-blue (Lehmann) or occasionally whitish (André), fragrant; achenes 2 mm. long, with black hispid faces and lighter glabrous ribs.—Nov. Gen. et Spec. iv. 107 (1820); Klatt in Engl. Bot. Jahrb. viii. 33 (1887). *E. pellucidum* HBK. l. c. 108 (1920). *E. tolimense* Hieron. in Engl. Bot. Jahrb. xix. 45 (1894), see Robinson, Proc. Am. Acad. xlii. 46 (1906).

ANTIOQUIA: *Jervise* (K.).

CUNDINAMARCA: at Fusagasuga near Bogotá, alt. 1800 m., André, no. 1333 (Gr.).

† TOLIMA: in densely bushy places near Dolores, alt. 1400-1800 m., Lehmann, no. 7487 (Berl., fragm. Gr.); in field loam, "La Trinidad," Libano, alt. 1000-1200 m., Pennell, no. 3357 (Gr.).

HUILA: Neiva, *Rusby & Pennell*, no. 658 (N. Y.).

EL VALLE: in shady places near Buga, alt. 900 m., *Lehmann*, no. 796 (Gr.); shrubby spots of savannahs near Tocotá, alt. 1600 m., *Lehmann*, no. 3429 (Gr.).

CAUCA: forests in highlands of Popayan, alt. 1300-2000 m., *Lehmann*, no. B. T. 598 (Gr.); in densely shrubby places of the high plains about Popayan, alt. 1600-2000 m., *Lehmann*, no. 6081, acc. to Hieron. l. c. xxviii. 572 (1901).

WITHOUT LOCALITY: *Triana*, no. 1180 (K., N. Y.); *Linden*, no. 861 (K.).

34. **E. pseudoglomeratum** Hieron. Perennial, herbaceous or somewhat woody, 1 m. high; stems several, erect, terete, leafy, when young finely sordid-pubescent; leaves opposite, short-petioled, ovate-lanceolate, attenuate-acuminate, sharply serrate at the sides, entire toward the rounded or somewhat cuneate base, 3-nerved, glabrous or early glabrate and with depressed nerves above, below pubescent on the nerves, 2.5-6.5 cm. long, half as wide, firm-membranaceous, drying dark; heads 6-7-flowered, sessile or nearly so in spherical glomerules corymbosely disposed at the ends of the branches; scales about 12, glabrous, stramineous, pale toward the base, brownish toward the acute or acutish tip, imbricated in about 3 series, mostly 4-ribbed and 5-nerved; corollas glabrous.—Hieron. in *Engl. Bot. Jahrb.* xxix. 8 (1900).

WITHOUT PRECISE LOCALITY: merely from "Nouvelle Grenade," *Triana*, no. 16 (Gr.).

[Ecuador.]

35. **E. inulaefolium** HBK. Tall erect sparingly branched pale grayish-green shrub sometimes attaining 4 m. in height; stem when young and lower surface of the leaves densely tomentose; branches terete or obscurely hexagonal, velvety (tomentum often yellowish or even tawny in dried material); leaves opposite, rhombic-ovate to oblong-lanceolate, caudate-attenuate at the entire apex, cuneate at the also entire but more abruptly narrowed short-petioled or subsessile base, coarsely few-toothed to finely crenate or subentire on the lateral margins, above grayish-puberulent, below canescent-velvety, 1 dm. long, 2-4 cm. wide, thick-membranaceous, 3-nerved well above the base; heads 8-14-flowered, in terminal usually large flattish or convex compound corymbs, subsessile; scales about 12, oval to narrowly oblong, rounded at the tip, stramineous, the inner nearly or quite smooth, the outer somewhat velvety on the back; florets pure white (Smith, Pennell) or ochroleucous or erubescens (Langlassé), often very

fragrant; achenes from nearly smooth to finely and upwardly ciliate on the ribs and (microscopically) glandular-punctate on the faces.—*Nov. Gen. et Spec.* iv. 109 (1820); Hieron. in *Engl. Bot. Jahrb.* xxii. 765 (1897), where synonymy is considerably extended. *E. molle* HBK. l. c. *E. pallescens*, var. *hirsutum* DC. *Prod.* v. 154 (1836); Bak. in *Mart. Fl. Bras.* vi. pt. 2, 325 (1876), as *hirsuta*. *E. cinereum* Griseb. *Fl. Brit. W. Ind.* 359 (1861). *E. decemflorum* Klatt in *Engl. Bot. Jahrb.* viii. 34 (1887), not DC. *E. inulifolium* Heering, *Mém. Soc. neuchât. Sci. Nat.* v. 419 (1913).

TOLIMA: near Mariquita, alt. 850 m., *Humboldt & Bonpland* (Par., phot. Gr.).

CAUCA: in light thickets about Inzá, alt. 1200–2000 m., *Lehmann*, no. 2185, (Gr.); in open woods near Popayan, alt. 2500–3000 m., *Lehmann*, no. 897 (Gr., U. S.), being the number which by clerical or typographical error was cited by Klatt, l. c., as 98.

CUNDINAMARCA: slopes of Montserrate above Bogotá, alt. 2900 m., *Mayor*, no. 70, acc. to Heering, l. c.

MAGDALENA: common on campo, Jiracasaca near Santa Marta, alt. 762 m., *H. H. Smith*, no. 326 (Gr., U. S.); clearing, edge of forest, alt. 1370 m., *H. H. Smith*, no. 624 (Gr.).

CORDILLERA OCCIDENTAL: in clayey soil, *Langlassé*, no. 53 (Gr.).

[Southern Antilles to Venezuela and Argentina.]

A characteristic species of wide range and easily recognized when taken in a broad and natural sense, but varying considerably in the amount and persistence of the pubescence, in the density of the inflorescence, and in the dentation of the leaves. The following forms are often, but not always, distinguishable:

Forma **typicum**. Leaves densely and permanently canescent-tomentose beneath, the reticulation of the veins being so covered as to be obscure or invisible. (Synonymy and exsiccatæ as above.)

Forma **suaveolens** (HBK.) Hieron. Leaves somewhat harsher, above more bullate, beneath at least in age thinly tomentose or merely soft-pubescent, the reticulated veins clearly evident.—Hieron. in *Engl. Bot. Jahrb.* xxix. 11 (1900), xxviii. 572 (1901). *E. suaveolens* HBK. *Nov. Gen. et Spec.* iv. 109 (1820).

TOLIMA: in temperate regions of the mountains near Santa Ana, Mariquita, and Ibagué, alt. 730–1280 m., *Humboldt & Bonpland* (Par., phot. Gr.); clearing, in loam, Libano, alt. 1100–1400 m., *Pennell*, no. 3236 (Gr.).

HUILA: Eastern Cordillera near Neiva, *Rusby & Pennell*, no. 498 (N. Y.). "fls. yellow"; nos. 497 (N. Y.) and 1055 (N. Y.), "fls. white."

CAUCA: in woods of the plateau near Popayan, alt. 1500–2000 m., *Lehmann*,

no. 5541, acc. to Hieron. l. c.; on savannahs and in thickets about Inzá, alt. 1000–1700 m., *Lehmann*, no. 7994, acc. to Hieron., l. c.

META: in loam east of Villavicencio, alt. 450–500 m., *Pennell*, no. 1595 (Gr.). [Venezuela.]

36. **E. morifolium** Mill. Large shrub or even small tree; branches thick, green, angulate-ribbed, pithy or often fistulose, when young slightly woolly, soon nearly or quite glabrate; leaves opposite, large, broadly ovate to ovate-oblong, coarsely serrate (teeth 1–2 mm. high, 4–8 mm. wide at base), mostly short-acuminate at the tip, rounded to an entire usually obtuse, rarely acute or sometimes cordate base, 12–20 cm. long, 8–13 cm. wide, firm-membranaceous or somewhat thick-chartaceous, green on both sides, 3-ribbed above the base (in other cases almost regularly pinnate-veined), pellucid-punctate; the smaller veins light-colored and slightly prominent beneath; heads (4–)8–12-flowered, subsessile to shortly pedicellate, in large dense terminal leafy-bracted thyrsoïd panicles; involueral scales stramineous, ovate, obtuse or rounded at the apex, smoothish or arachnoid-woolly, about 5-ranked; corollas (greenish to yellowish-white) tubular, 4 mm. long, slightly constricted just below the limb; teeth lance-oblong; achenes 2 mm. long, dark-olive to nearly black, with narrow lighter-colored ribs.—*Dict. ed.* 8, no. 10 (1768); *Robinson, Proc. Am. Acad.* xlii. 42 (1906). *E. populifolium* HBK. *Nov. Gen. et Spec.* iv. 111 (1820). *E. critonioides* Steetz in *Seem. Bot. Herald*, 145 (1854). *E. megaphyllum* Bak. in *Mart. Fl. Bras.* vi. pt. 2, 322 (1876); *Hieron. in Engl. Bot. Jahrb.* xxviii. 569 (1901).

MAGDALENA: near Santa Marta on road to Onaca, alt. 305 m., *H. H. Smith*, no. 669 (Gr., U. S.).

EL VALLE: La Paila, *Holton*, no. 317 (N. Y.); in dense thickets near Las Juntas del Dagua, alt. 2000–2800 m., *Lehmann*, no. 7697, acc. to Hieron. l. c. as *E. megaphyllum*.

WITHOUT LOCALITY: *Triana*, no. 1181 (N. Y.).

[Mexico to Brazil.]

A coarse species of wide range, originally described from Vera Cruz, passing without easy demarcation into several forms differing in leaf-contour, number of florets, and greater or less pubescence on the inflorescence. Abundant material is now available from Mexico and Central America, but it does not fall into satisfactory varieties.

37. **E. thyrigerum** Hieron. Soft-woody shrub with liana-like terete striate stems sometimes 5 m. in length; leaves opposite, ovate, 12 cm. or more long, 5 cm. or more wide, acute or somewhat attenuate

at the tip, rounded at the base, firm-membranaceous or somewhat chartaceous, pinnately veined and finely reticulated, shallowly serrate (the teeth about 0.5 mm. high, 3-5 mm. wide at base), glabrous or nearly so above, covered beneath with a sparse tawny or gray arachnoid pubescence; petioles 1-1.5 cm. long, slender; heads about 10-flowered, on short pedicels, disposed in dense thyrse-like panicles; involucre narrowly campanulate to subcylindric, pale, stramineous; scales 3-5-ranked, narrowed to a mostly obtuse apex, 3-5-striate; florets fragrant, greenish- or bluish-white (Lehmann).—Hieron. in Engl. Bot. Jahrb. xxviii. 570 (1901).

HUILA: in bushy places of the mountain savannahs, alt. 1000-1500 m., La Plata, *Lehmann*, no. 8445 (Berl., fragm. and phot. Gr.).

When known from more copious material this species may perhaps be found to pass into the preceding, but thus far it appears fairly marked.

38. **E. densum** Benth. Erect smooth shrub, 2 m. high, with round ascending branches; leaves opposite, sessile, oblong- or ovate-lanceolate, caudate-attenuate, 7-10 cm. long, 2-2.4 cm. wide, horizontally spreading or deflexed, serrate from somewhat below the middle, entire at the rounded base, pinnately veined; veinlets pellucid; panicle trichotomously branched, pyramidal, 1.5 dm. in diameter; heads scarcely 5 mm. high, 5-8-flowered, sessile and closely packed in often subspherical glomerules; involucral scales few-ranked, scarious-margined, ciliate, the inner narrowly oblong, the outer progressively shorter, ovate; corolla with scarcely differentiated proper tube; achenes glabrous.—Pl. Hartw. 200 (1845).

CUNDINAMARCA: Cordillera de los Andes near Bogotá, *Hartweg*, no. 1105 (K., phot. Gr.).

Known only from the original collection, but to be easily recognized by its dense paniculate inflorescence and sessile round-based very sharp-pointed leaves.

39. **E. miserum** Robinson. Slender erect inconspicuous perennial, 2-2.5 dm. high; root of slender tough fibres; stems 1-3, terete, about 1 mm. in diameter, obscurely tawny-tomentellous, simple to the paniculately branched leafy-bracted rather few-headed inflorescence; leaves opposite, lanceolate, attenuate to an obtusish tip, crenate except at the narrowly cuneate entire base, membranaceous, green and somewhat puberulent on both surfaces, 3-nerved essentially from the base, 1-2 cm. long, 2-5 mm. wide; petiole 2-3 mm. long;

panicle diffuse, its lower branches opposite and upper mostly alternate, very slender; pedicels filiform, 1-9 mm. long; heads 4.5 mm. high, about 25-flowered, 3.5 mm. in diameter; involucre turbinate-campanulate, persistent and at length reflexed; scales lanceolate to lance-linear, thin, green, the inner subequal, glabrous, a few of the outer considerably smaller, successively graduated, and more or less puberulent dorsally; receptacle small, flat; corollas lilac-tinged or pinkish, 2 mm. long; the proper tube 0.5 mm. long, much exceeded by the distinctly enlarged subcylindric throat; limb externally hispidulous; achenes (immature) pubescent, at least on the angles.—Proc. Am. Acad. liv. 253 (1918).

INTENDENCIA DEL CHOCO: Falls of Truandó, *Schott*, nos. 2 (Field Mus., phot. Gr.), 1 (Field Mus., phot. Gr.).

A delicate species with habit of the Costa-Rican *E. sideritidis* Benth. but more slender, with leaves more pubescent, only half as long, and crenate instead of incisely serrate. The related *E. Sinclairii* Benth. of Costa Rica and Panama has broadly ovate leaves with relatively longer petioles. The Ecuadorian *E. lloense* Hieron., of somewhat similar habit and inflorescence, has longer but much fewer-flowered heads, larger leaves, etc.

40. ***E. microstemon*** Cass. Annual, erect, weak and slender, 1.5-7 dm. high, puberulent; stem soft, terete, often flexuous; leaves opposite (except sometimes the uppermost), deltoid-ovate, 2.5-7 cm. long, 2-5.5 cm. wide, somewhat acuminately narrowed to a mostly obtuse tip, crenate-serrate except at the subtruncate base, thin, green on both surfaces, scarcely paler beneath; heads about 4 mm. high, loosely paniculate; pedicels filiform; involucre campanulate; scales thin, about 3-4-seriate, with mostly 2 pale ribs and 3 green nerves; the outer scales lanceolate, acute, the inner linear-oblong, rounded at the somewhat scarious tip; corollas white or (in the formal var. LILACINUM Ktze.) lilac.—Diet. xxv. 432 (1822); Ktze. Rev. Gen. i. 338 (1891). *E. paniculatum* Schrad. Comm. Gott. vi. 130 (1827). *E. Berterianum* (Spreng.) Colla, Mem. Acad. Taur. xxxiii. 130, t. 8 (1929). *E. urticifolium* Banks ex Griseb. Fl. Brit. W. Ind. 362 (1861). "*Eriopappus paniculatus* Bess. Cat. Sem. Hort. Volh. a. 1819" and "*Ageratum paniculatum* Hornem. Cat. Sem. Hort. Hafn. a. 1822" acc. to Schrad. l. c. (1827). *Mikania Berteriana* Spreng. Syst. iii. 423 (1826). *E. guadalupense* DC. Prod. v. 170 (1836); Hieron. in Engl. Bot. Jahrb. xxviii. 573 (1901), excl. syn. *E. Sinclairii*; Heering, Mém. Soc. neuchât. Sci. Nat. v. 418 (1913); not Spreng., see Urb. Symb. Ant. iv. 625 (1910).

INTENDENCIA DEL CHOCO: mouth of the Nercua, *Schott*, no. 4 (Field Mus.).

ANTIOQUIA: roadsides at Guaca, alt. 1480 m., *Mayor*, no. 576, acc. to Heering, l. c.

MAGDALENA: a common weed at several points near Santa Marta, alt. 150 m., *H. H. Smith*, no. 522 (Gr., U. S.).

TOLIMA: river-gorge below Nalagaima, *Rusby & Pennell*, no. 1167 (N. Y.) field loam, "La Trinidad," Libano, *Pennell*, no. 3372 (Gr.).

EL VALLE, La Paila, *Holton*, no. 319 (N. Y.); near Cali, alt. 300-1000 m., *Lehmann*, no. 7700, acc. to Hieron. l. c.

[Mex. to Boliv., Venez., Lesser Antil., Porto Rico., and Jam.]

A common and weedlike plant of wide distribution in the warmer parts of America. The nearly related but distinct *E. Sinclairi* Benth. of Panama and Central America may well occur in the northern parts of Colombia. It is more delicate and has an involucre more turbinate at the base, the very small and sharply pointed outermost scales being inclined to extend down upon the summit of the almost capillary pedicel.

41. ***E. pycnocephalum*** Less. Herbaceous perennial, 4-8 dm. or more high, finely pubescent, the hairs incurved; internodes, especially the upper cauline, elongated (6-12 cm. in length); leaves opposite, slender-petioled, deltoid-ovate, acuminate, crenate-serrate except at the abruptly cuneate or more often truncate or sometimes shallowly cordate base, 3.5-6 cm. long, 2-5 cm. wide, green and at least sparingly pubescent on both surfaces, 3-nerved from the base, the lateral nerves sometimes again forking almost from the start; inflorescence with spreading or ascending branches each bearing a terminal subglobose glomerule of 7-20 or more short-pedicelled heads; these about 25-flowered, 3-5 mm. high; involucre campanulate; scales about 3-ranked, the inner oblong, scarious-margined, obtuse or rounded at the tip, mostly with 3 green nerves and 2 pale ribs united at base in a more or less conspicuous callosity, the intermediate and outer gradually shorter oval and obtuse to rather narrowly lanceolate and decidedly acute, nearly smooth to conspicuously pubescent; florets normally roseate or purplish; achenes black with lighter ribs, somewhat pubescent at least on the ribs.—*Linnaea*, vi. 404 (1831); Heering, *Mém. Soc. neuchât. Sci. Nat.* v. 419 (1913). *E. Schiedeanum* Schrad. *Ind. Sem. Hort. Goett.* 1832, p. 3 (1832); Heering, l. c. *E. Schiedeanum*, var. *virgatum* (Schrad.) DC. *Prod.* v. 159 (1836); Hieron. in *Engl. Bot. Jahrb.* xix. 45 (1894).

MAGDALENA: near Santa Marta, alt. 762 m., *H. H. Smith*, no. 623 (Gr.), distrib. as *Ageratum mexicanum*.

HUILA: Cordillera Oriental, east of Neiva, *Rusby & Pennell*, no. 1049 (N. Y.).

ANTIQUUA: Cordillera Central, near Medellín, alt. 1600 m., *Mayor*, no. 577 acc. to Heering, l. c., as *E. Schiedeianum*.

CUNDINAMARCA: in thickets near Pacho, alt. 1600–2200 m., *Lehmann*, no. 7496 (N. Y.); Cordillera Oriental, above Bogotá, alt. 2500 m., *Mayor*, no. 54, acc. to Heering, l. c.

WITHOUT LOCALITY: *Triana*, nos. 1183 (K.) and 1189 (K.).

[Southwestern U. S., Mex., Cent.-Am., Venezuela.]

Common and weed-like, with the habit of *Ageratum*. Fairly constant in inflorescence and floral character, but through considerable and apparently independent variation of several features (notably the shape, texture, and pubescence of the outer scales of the involucre) passing into many perceptibly different yet not readily delimitable forms not as yet correlated with habitat or range. The early attempts by Schrader and by DeCandolle to divide the plant specifically or varietally appear on examination of the material now available to break down entirely. It is unaccountable that a plant so common and widely distributed in the warmer parts of America should have so completely escaped the notice of the earlier collectors including Humboldt & Bonpland.

42. **E. Klattianum** Hieron. A soft-woody shrub with weak ascending or drooping rusty-pubescent branches; leaves subopposite, deltoid-ovate, cordate, membranaceous, crenate-serrate, 3 cm. long, nearly as wide, acuminate, puberulent above, rusty- or sordid-pubescent beneath; petiole (of the upper cauline leaves) about 1 cm. long; inflorescence and heads as in the preceding; florets greenish-white and fragrant (*Lehmann*); achenes entirely glabrous.—*Hieron.* in *Engl. Bot. Jahrb.* xxviii. 573 (1901). *E. umbrosum* Klatt in *Engl. Bot. Jahrb.* viii. 35 (1887), not Benth.

CUNDINAMARCA: in open woods about Pasca, alt. 2000 m., *Lehmann*, no. 2520 (Gr.).

Notwithstanding its reported shrubby character, white florets, and glabrous achenes, this species corresponds so closely in many minor features with the preceding as to suggest at least very recent common origin if not varietal relationship.

43. **E. Pennellii** Robinson. Erect perennial herb, 1.5 m. high, nigrescent in drying; stem terete, entirely glabrate at maturity, purple, its internodes 1–1.5 dm. long; leaves opposite, slender-petioled, ovate, long-acuminate, rounded at the base, rather finely serrate (teeth 14–18 on each side, 0.7 mm. high, 1.5–2.5 mm. broad),

mostly 5-nerved from the base, membranaceous, 5 cm. long, 3.5 cm. wide, above sparingly pubescent on the nerves, below nearly or quite glabrous; petiole 1-1.5 cm. long; heads 7 mm. high, about 25-flowered, in small rather loose 4-7-headed cymes disposed in a very open terminal leafy-bracted panicle; pedicels puberulent, 3-6 mm. long; involucre smoothish, campanulate, stramineo-scarious; scales 3-4-ranked, usually 2-ribbed (ribs uniting in a callosity at base); the inner scales elliptic-oblong, with scarious erose mostly rounded tip; the outer progressively shorter, ovate, ciliate and somewhat pubescent on the back; corollas white; achenes 2 mm. long, short-pubescent, dark with lighter ribs.—Proc. Am. Acad. liv. 254 (1918).

HUILA: foot of Cordillera Oriental, near Neiva, *Rusby & Pennell*, no. 626 (Gr., N. Y.).

A species near the variable *E. pycnocephalum* but with more open cymes, slightly larger heads, white florets, and almost caudate-acuminate many-toothed leaves somewhat nigrescent in drying.

44. **E. obscurifolium** Hieron. Perennial, herbaceous, 2 m. high, branched above, minutely incurved-puberulent, the hairs rusty-brown or purplish; internodes long; leaves opposite, petiolate, lance-ovate, acuminate, rounded at base, serrate, dull, punctate, nigrescent in drying, 4-6 cm. long, 3-3.5 cm. wide; heads 35-70-flowered, in a convex trichotomous cymose corymb (1-1.5 dm. in diameter); pedicels 5-10 mm. long; involucre campanulate; scales narrow, linear-oblong, acutish, all (even the outer) with a long callosity at the base; florets reddish-lilac.—Hieron. in Engl. Bot. Jahrb. xxix. 9 (1900); Heering, Mém. Soc. neuchât. Sci. Nat. v. 420 (1913).

CUNDINAMARCA: above Ubaqué, between the village and the Páramo Cruz Verde, about 2500 m., *Mayor*, no. 53, acc. to Heering, l. c.; slope of Montserrate, above Bogotá and Páramo Cruz Verde, alt. 2700-3200 m., *Mayor*, no. 76, acc. to Heering, l. c.

[Ecuador.]

No Colombian material of this has been seen by the writer. The character is here drawn from the Ecuadorian type, of which there are now a fragment and photograph in the Gray Herbarium.

45. **E. perezioides** Robinson. Slender erect perennial 4-5 dm. high; stem terete, simple to the inflorescence, fuscous-tomentose and glandular; lower internodes very short (2-12 mm. in length), the upper 2-3 cm. long; leaves opposite, ovate-elliptical or oval, obtuse, cordate, crenate-serrate, firm, subcoriaceous, dark-green and sprinkled

with sessile or short-stipitate glands above, much paler, gray-tomentose, and glandular beneath, 4-7 cm. long, 2.5-4 cm. wide, prominent-reticulate on both surfaces; petioles 2-3 mm. long, fuscous-tomentose; panicle very diffuse, 12-30-headed, the branches opposite, divaricate, long, flexuous, almost filiform; pedicels 1-2.5 cm. long; heads about 36-flowered, about 8 mm. high, 5 mm. in diameter; involucre campanulate, 3-4-seriate; scales purplish-brown, about 3-nerved, the outer short, broadly ovate, obtuse, the inner progressively longer, narrower, and more acute; corollas pale greenish-yellow, tinged with dark purple at the limb; achenes 2 mm. long, dark reddish-brown, upwardly hispid on the angles.—Proc. Am. Acad. liv. 255 (1918).

META: woodland, "Buenavista," west of Villavicencio, alt. 1000-1200 m., Pennell, no. 1678 (Gr.).

46. **E. magdalenense** Robinson. Perennial herb, erect or straggling, 3-9 dm. high; branches brown, often obscurely hexagonal, soon glabrate and very smooth; branchlets in the inflorescence somewhat beset with very fine incurved hairs; leaves opposite or the rameal alternate, narrowly ovate, attenuate-acuminate, rounded at base, sharply serrate, thickish-membranaceous as if slightly succulent, green and glabrous on both surfaces, 4-4.5 cm. long, 2-2.5 cm. wide, 3(-7)-ribbed from the base, the reticulated veinlets translucent; petiole 8-14 mm. long; primary branches of the inflorescence wide-spreading, curved-ascending, each bearing several (3-7) short and subequal spreading branchlets (1-3 cm. in length); these 2-3-leaved and floriferous toward the tip, bearing 5-20 heads, the clusters about 2 cm. in diameter; heads pedicelled, 25-flowered; involucre campanulate, 5 mm. high and thick; scales lanceolate, acute, minutely ciliate, about 3-ranked, subherbaceous, becoming brownish in age, very persistent; corollas white; achenes 1.7 mm. long, black, the lighter-colored ribs remotely and microscopically hispidulous.—Proc. Am. Acad. liv. 250 (1918).

MAGDALENA: moderately common on open ridges, Sierra del Libano, alt. 1677-1982 m., near Santa Marta, H. H. Smith, no. 1993 (Gr., Mo.).

Marked by the short and uniform secondary branches of the inflorescence.

47. **E. vitalbae** DC. Vigorous somewhat climbing shrub, with stems often 6-8 m. or more in length; branches, petioles, and inflorescence finely pubescent; leaves opposite, petiolate, leathery,

elliptic-ovate or ovate-lanceolate, acuminate, mostly round-based, 3-5-nerved, shallowly and remotely serrate; panicles ample, 2-3 dm. or more in diameter; heads 45-70-flowered, separate, 12 mm. high, nearly as thick; pedicels 3-25 mm. long; outer scales of the involucre broadly ovate-oblong, acute, many-striate, the inner narrowly lance-oblong; corollas roseate or lilac, 7 mm. long, slightly enlarged near the limb, glabrous; achenes 3 mm. long, glabrous (DC.) or at least microscopically hispid on the angles; receptacle slightly concave.—Prod. v. 163 (1836); Hieron. in Engl. Bot. Jahrb. xxviii. 572 (1901). *E. ecuadorae* Klatt, Ann. k. k. Natur. Hofmus. Wien, ix. 356 (1894). *Campuloclinium surinamense* Miq. Linnaea, xvii. 69, (1843), & Stirp. Surinam. 182, t. 53 (1850).

MAGDALENA: open damp places in forest, generally near streams, Aqua Dulce near Santa Marta, alt. 305 m., *H. H. Smith*, no. 920 (Gr., U. S.).

CAUCA: near Tuquerres, alt. 1400-1800 m., *Lehmann*, no. 5208, acc. to Hieron., l. c.

[Central America to Peru and Brazil.]

Leaves, according to a note of Lehmann, quoted by Hieronymus, l. c., pale, yellowish-green.

48. **E. ornithophorum** Robinson. Perennial herb, grayish-green, tomentellous; stem striate-angulate, gray-brown; leaves lanceolate, caudate-acuminate, pinnate-veined, bluntly and irregularly toothed, bullate and scabrid above, paler and gray-tomentose beneath, 1 dm. long, 2.5-3.5 cm. wide, toward the base at first contracted then expanded into a suborbicular toothed perfoliate disk about 1.2-2 cm. in radius; heads about 22-flowered, 7 mm. high, subsessile in glomerules disposed in a large open terminal cymosely branched panicle; receptacle flat; involucre turbinate, about 4-ranked; scales lanceolate to (the innermost) linear, acute; corollas 3 mm. long, purplish or violet; achenes 1.2 mm. long, coarsely granular on the faces.—Proc. Am. Acad. liv. 254 (1918).

HUILA: Cordillera Oriental, east of Neiva, 7 Aug. 1917, *Rusby & Pennell*, no. 1034 (N. Y., fragm. and phot. Gr.); foot of Cordillera Oriental, near Neiva, *Rusby & Pennell*, no. 479 (N. Y., fragm. Gr.).

Noteworthy on account of the perfoliate leaves, a feature not found in any other Colombian species of the genus as yet recorded. The name has been suggested by a perceptible resemblance of the pairs of connate leaves to birds with wings extended in flight.

49. **E. turbacense** Hieron. Perennial herb, slightly woody at

base, 2 m. high; branches round or nearly so, tawny-pubescent; leaves opposite, nearly sessile, lanceolate, membranaceous, green and glabrous above, scarcely paler and rusty-pubescent on the midrib and chief veins beneath, attenuate to each end, remotely cuspidate-denticulate, 13-15 cm. long, 5-6 cm. wide; panicle rusty-pubescent, open; heads 25-28-flowered, about 5 mm. high, some sessile but mostly pedicelled; involucre campanulate; scales ovate-oblong, 3-4-ranked, mostly 3-4-ribbed toward the base, somewhat silky-pubescent dorsally toward the tip; florets doubtfully reported as yellowish (Hieron.).—Hieron. in Engl. Bot. Jahrb. xxi. 332 (1895), xxviii. 573 (1901).

BOLIVAR: on the volcano Turbaco, *Stübel*, no. 51, acc. to Hieron., l. c.

CAUCA: in dense woods on savannahs along the Rio Ortega, district of Popayan, alt. 1500-1800 m., *Lehmann*, no. 5971 (Berl., frag. Gr.).

Var. **typicum**. Leaves lanceolate, 5-6 cm. wide; heads 25-30-flowered. (Lit. and exsicc. as above.)

Var. **ovatifolium** Hieron. Leaves ovate, about 7 cm. broad, abruptly contracted to the cuneate base; florets fewer, 12-19.—Hieron. in Engl. Bot. Jahrb. xxviii. 573 (1901), as *ovatifolia*.

WITHOUT LOCALITY: *Triana*, no. 1450.

No material of this variety has been seen by the writer and the character has been compiled from the original description.

50. **E. amygdalinum** Lam. Suffruticose, either smooth or (in extra-limital forms) in varying degree pubescent or glandular, often viscid, 3-6 dm. high; stems erect, leafy, mostly simple to the inflorescence; leaves opposite, sessile, lance- or elliptic- or ovate-oblong, firmly chartaceo-coriaceous, brownish-green, mostly obtuse, subentire or undulate or crenate-serrate, veiny, 5-10 cm. long, 2-4 cm. wide; panicle terminal, somewhat fastigiately branched, 3-10 or more cm. in diameter; heads about 40-flowered, 7-8 mm. high; involucre turbinate-campanulate; scales about 40, linear, usually purple-tinged; florets rose-colored or lilac, rarely white.—Encyc. ii. 408 (1786); Bak. in Mart. Fl. Bras. vi. pt. 2, 312, t. 83 (1876), which see for extended synonymy; Hieron. in Engl. Bot. Jahrb. xxviii. 574 (1901). *E. loniceroides* HBK. Nov. Gen. et Spec. iv. 116 (1820). *E. amygdalinum*, forma *lonicerodes* [HBK.] Ktze. Rev. Gen. i. 337 (1891).

MAGDALENA: near Santa Marta, alt. 610 m., *H. H. Smith*, no. 614 (Gr.).

CUNDINAMARCA: eastern slope of the Andes of Bogotá, near Quetame, *André*, no. 881 (Gr.).

HUILA: foot of the Cordillera Oriental, near Neiva, *Rusby & Pennell*, no. 477 (N. Y.).

EL VALLE: La Laguna near Palmira, Cauca Valley, alt. 1300 m., *Pittier*, no. 909 (Gr.).

CAUCA: in dry places between Popayan and Pindamon, *Humboldt & Bonpland*, no. 1914 (Par., phot. Gr.); Buenos Aires, alt. 1000–1500 m., *Lehmann*, no. B. T. 1158 (N. Y.).

DEPART. NOT INDICATED: *Lehmann*, no. B. T. 1283 (N. Y.); in clayey soil on eastern slope of the Cordillera Occidental, *Langlassé*, no. 71 (Gr.).

Rather attractive, highly variable species. Several formal variations, which have passed in different regions under many names, are summarized (briefly and by no means clearly) by Kuntze, l. c. In Colombia the plant appears to be exclusively of the typical smooth variety, but it exhibits strikingly different leaf-forms, namely 1) with rather narrowly oblong leaves, cuneate at base; 2) a broader-leaved form or state (corresponding to *E. loniceroides* HBK.) in which the leaves are widely oblong to ovate, abruptly contracted or rounded at base; and 3) an extreme of the preceding tendency with leaves nearly orbicular. The last is illustrated by André's no. 881, said to have whitish florets. These forms, while striking in their extremes, have little classificatory value, leaves of different shapes occurring on shoots from the same root.

51. ***E. fuliginosum*** HBK. Slightly woody rusty-tomentose climber; leaves opposite, lance-oblong, rather distantly denticulate, acuminate, cuneate at base, 15 cm. or more long, about a third as wide, green and scabrous above, dusky-tomentose beneath; veins pinnate, prominent, the veinlets reticulated; petiole 2.5 cm. long; panicle long-peduncled, divaricately branched, rusty-tomentose; heads about 25-flowered, sessile or shortly pedicelled, crowded; involucre hemispherical; scales oblong, obtuse, dorsally pubescent, ciliate, about 3-ranked; florets supposed to be white; achenes dark, 2 mm. long, hispid on the angles.—*Nov. Gen. et Spec.* iv. 110 (1820); Hieron. in *Engl. Bot. Jahrb.* xxviii. 572 (1901).

TOLIMA: in the Quindío Mountains near Alto de Guayabal and Quebrado de Toche, alt. 430–610 m., *Humboldt & Bonpland* (Par., phot. Gr.).

EL VALLE: at edge of dense woods near Tocotá, alt. 1600–2000 m., *Lehmann*, no. 7698, acc. to Hieron. l. c.

CAUCA: in dense moist forests on western slopes of the Cordillera Occidental, near Popayan, alt. 1500–2000 m., *Lehmann*, no. 8509, acc. to Hieron.

WITHOUT LOCALITY: *Triana*, no. 1520, acc. to Hieron.

52. ***E. popayanense*** Hieron. Pithy and soft-wooded shrub reaching 3–4 m. in height; branches purplish or brownish-green,

deeply sulcate, glabrous, leafy; leaves opposite, petiolate, serrulate except at the cuneate base, acuminate, pinnately many-veined, 10-18 cm. long, 2.4-5 cm. wide, firm in texture; petiole 1-2 cm. long; heads 20-25-flowered, in ample sessile compound flattish-topped or decidedly convex corymbs (9-18 cm. in breadth); involucre campanulate, about 6 mm. high and thick; scales 3-4-seriate, stramineous, lanceolate, acute or acutish, often viscid; florets ochroleucous or white tinged with violet (Mayor); achenes dark, tapering toward the base, nearly or quite glabrous, 1.8 mm. long.—Hieron. in Engl. Bot. Jahrb. xl. 373 (1908); Heering, Mém. Soc. neuchât. Sci. Nat. v. 420 (1913).

ANTIOQUIA: talus-slopes of the Cafetal La Camelia, near Angelopolis, alt. about 1600 m., *Mayor*, no. 641, acc. to Heering, l. c.

EL VALLE: El Saladito, above Cali, road to Buenaventura, Cordillera Occidental, alt. 1400 m., *Pittier*, no. 772 (U. S.).

CAUCA: in thickets on plateau near Popayan, alt. 1600-1900 m., *Lehmann*, no. 5539, acc. to Hieron. l. c.

WITHOUT LOCALITY: *Triana*, no. 1227 (K.).

Sect. III. EXIMBRICATA (DC.) Hoffm. Involucre campanulate, turbinate, or subcylindric, seldom more than twice as long as thick; scales (persistent) 1-2(-3)-seriate, most of them subequal, but often 1-3 of the outermost considerably and progressively reduced. Receptacle flat or nearly so, glabrous.—Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Abt. 5, 140 (1890). *Eupatorium* ser. *Eximbricata* DC. Prod. v. 164 (1836). *Kyrstenia* Neck. Elem. i. 81 (1790). *Batschia* Moench, Meth. 567 (1794). *Gyptis* Cass. Bull. Soc. Philom. 139 (1818). *Ageratiopsis* Sch. Bip. ex Benth. & Hook. f. Gen. ii. 246 (1873).

The separation of this section from the preceding, while practical for purposes of classification, is obviously artificial. The distinction, whether stated in terms of the greater equality of the involucreal scales and the fact that they appear to be in fewer series, or based upon their relatively slighter imbrication, is incapable of precise definition and unaccompanied by concomitant differences either of habit or technical characters.

KEY TO SPECIES.

- a. Leaves coriaceous, reticulated, oblong to elliptical (sometimes ovate in *E. rorulatum* and *E. vacciniaefolium*); shrubs, usually viscid or vernicose *b.*
- b. Heads 5-14-flowered or rarely (in nos. 58 and 59) 20-25-flowered *c.*

- c. Heads in an open pyramidal panicle 53. *E. amplum*.
- c. Heads in dense flat or rounded corymbs d.
- d. Leaves soft-pubescent beneath e.
- e. Leaves lance-oblong, 6-9 cm. in length; achenes copiously glandular on the faces as well as the ribs 54. *E. angustifolium*.
- e. Leaves lance-oblong, 3.5-6 cm. in length; achenes not at all glandular on the faces 55. *E. pomaderrifolium*.
- e. Leaves ovate-oblong, 3-nerved from above the base 56. *E. rorulentum*.
- d. Leaves glabrous beneath f.
- f. Heads 5-6-flowered; internodes 1-3 mm. long; leaves rarely over 1.5 cm. long 57. *E. vacciniaefolium*.
- f. Heads 12-25-flowered; internodes 1-6 cm. long; leaves rarely less than 2 cm. long g.
- g. Leaves 4-9 cm. long, the exerted veinlets on the lower surface rounded, not furrowed h.
- h. Leaves lance-oblong to typically oblong, 2-3 cm. wide; inflorescence well overtopping the foliage 58. *E. fastigiatum*.
- h. Leaves broadly elliptic-oblong, 3-3.5 cm. wide; inflorescence about equalled or often surpassed by the upper leaves 59. *E. tinifolium*.
- g. Leaves with the exerted veinlets on the lower surface furrowed i.
- i. Leaves large, about 1.5 dm. long, coarsely toothed 60. *E. glyptophlebium*.
- i. Leaves much smaller, 2-3.7 cm. long, finely crenate-serrate 61. *E. theaeifolium*.
- b. Heads 30-40-flowered 62. *E. latipes*.
- a. Leaves membranaceous, lanceolate to ovate-suborbicular, broadest below the middle; shrubs or more often perennial herbs j.
- j. Heads 5-19-flowered k.
- k. Leaves cuneate at base, 3-3.5 cm. long 63. *E. serratifolium*.
- k. Leaves rounded or cordate at base, 6-18 cm. long l.
- l. Heads in loose often leafy-bracted pyramidal panicles; leaves caudate-acuminate, the cauline 5-7 cm. wide m.
- m. Leaves 3-nerved from the base 64. *E. solidaginoides*.
- m. Leaves 3-nerved from much above the base 65. *E. celtidifolium*.
- l. Heads in dense flattish corymbs; leaves only acutish, the cauline 9-12 cm. wide 66. *E. hylibates*.
- j. Heads 25-60-flowered n.
- n. Leaves linear, alternate 67. *E. Trianae*.
- n. Leaves broader, opposite (except sometimes a few of the uppermost) o.
- o. Petioles very short, 1-3 mm. long in the middle cauline leaves, those of the lower leaves sometimes 5-6 mm. long p.
- p. Pedicels finely pubescent, the hairs somewhat incurved or moderately spreading, attenuate, perceptibly (under a microscope) articulated, not gland-tipped 68. *E. gracile*.
- p. Pedicels glabrous or nearly so . . . (68) *E. gracile*, v. *epilobioides*.
- p. Pedicels densely pubescent, the hairs horizontally spreading, tipped with spherical glands 69. *E. sotarense*.

- o. Petioles longer, mostly 0.8-5 cm. in length *q*.
- q*. Leaves deltoid; achenes with supplementary ribs between the 5 chief angles or ribs.....70. *E. intercostulatum*.
- q*. Leaves ovate-lanceolate to suborbicular; achenes 5-costate *r*.
- r*. Entirely glabrous or the branchlets and pedicels with traces of minute pubescence of incurved non-glandular hairs; leaves rounded at base; heads about 25-flowered.....71. *E. Dombeyanum*.
- r*. Puberulent at least in the inflorescence, the hairs gland-tipped; leaves 2-4 cm. long, obtuse, rounded, or subcordate at base.....72. *E. azangaroense*.
- r*. Puberulent; leaves rather large, as much as 1 dm. long and 8 cm. wide, cordate with an open sinus and shortly acuminate at the insertion; heads 4-6 mm. long, about 30-flowered.....73. *E. microcephalum*.
- r*. Villous with long spreading attenuate dark-jointed hairs; heads 25-45-flowered *s*.
- s*. Petioles 8-15 mm. long; leaves coarsely and crenately 7-10-toothed on each side.....74. *E. articulatum*.
- s*. Petioles (1.5-)2-6 cm. long; leaves serrately or crenately 12-18-toothed on each side *t*.
- t*. Heads 25-35-flowered, about 6 mm. high; pappus-bristles white, connate at base into a somewhat conspicuous ring; achenes usually rather copiously pubescent.....75. *E. ibaguense*.
- t*. Heads 40-45-flowered, about 8 mm. high; pappus-bristles at first white but soon slightly reddish- or brownish-tinged, scarcely at all connate at base; achenes hispid on the angles.....76. *E. pichinchense*.
- r*. Densely pubescent chiefly with gland-tipped hairs; leaves deeply cordate by a closed sinus; heads 50-60-flowered.....77. *E. Apollinairei*.

53. **E. amplum** Benth. Smooth and viscid shrub, 1-2 m. high; branches nearly or quite terete, dark-purple and very sticky, leafy to the terminal sessile pyramidal panicle; leaves opposite, petiolate, firm, coriaceous, glabrous and with a fine prominent reticulation on both surfaces, oblong, acuminate, rounded at base, serrulate, 1.5-2 dm. long, 3-4 cm. wide or more, pinnately veined; panicle 1-2 dm. in diameter, lax; heads 11-15-flowered, 6 mm. high, about 3 mm. in diameter; scales of the campanulate involucre 1-nerved, subequal, ciliate, the outermost linear, the intermediate oblong, acutish, the innermost spatulate; corolla 4 mm. long (young), beset with sessile glands on the proper tube.—Pl. Hartw. 200 (1845).

CUNDINAMARCA: on the Cordillera de los Andes, near Bogotá, Hartweg, no. 1103 (sk. and fragm., Gr.).

WITHOUT LOCALITY: Triana, no. 1226 (K.).

54. **E. angustifolium** (HBK.) Spreng. Shrub or small tree attaining 6 m. in height (André), grayish-woolly; leaves opposite, petiolate, oblong or elliptic, acute or obtusish, entire or undulate or sinuate-dentate above the entire rounded base, 6–10 cm. long, 2.5–5 cm. wide, pinnately veined, glabrate and obscurely reticulated above, gray-tomentose beneath; petiole stoutish, 5–8 mm. long; heads about 7-flowered, 1 cm. long, in compound terminal corymbs; involucrel scales about 11, subequal, 3–5 mm. long, bluntly pointed, the outer pubescent on the back; florets much exerted; corolla with short proper tube and longer slightly amplified then somewhat contracted throat; achenes beset with sessile glands.—Syst. iii. 415 (1826). *Cacalia asclepiadea* L. f. Suppl. 352 (1781). *Mikania angustifolia* HBK. Nov. Gen. et Spec. iv. 138 (1820). *E. coperense* Hieron. in Engl. Bot. Jahrb. xxi. 330 (1895), see Robinson, Proc. Am. Acad. xlii. 37 (1906).

BOYACÁ: Páramo de Coper, *Stübel*, no. 1629 (Berl., fragm. Gr.).

CUNDINAMARCA: Montserrate, near Bogotá, from the herb. of *de Parseval-Grandmaison*, no. 46 (Gr.); at foot of the Cordillera Occidental, near Bogotá, alt. 2800 m., *André*, no. 888 (Gr.); Guadalupe, alt. 3000 m., *Bros. Apollinaire & Arthur*, nos. 69 (U. S.) and 72 (Gr.).

TOLIMA: between Ibagué and Cuesta de Tolima, *Humboldt & Bonpland* (Par., phot. Gr.).

WITHOUT LOCALITY: *Mutis* (Linn. Soc., phot. Gr.).

A characteristic species, but, as now placed in its proper genus, very ineptly named.

55. **E. pomaderrifolium** Benth. Much branched firm-wooded shrub; branches very leafy, round, gray-tomentellous; leaves opposite, petiolate, elliptical, entire, acutish, mucronate, 3.5–6 cm. long, 1–2.2 cm. wide, chartaceo-coriaceous, pinnately veined, glabrous (except on midrib) and reticulated above, thinly gray-tomentose beneath; petiole slender, 3–10 mm. long; heads about 14-flowered, 9 mm. high, in dense compound leafy-bracted round-topped corymbs; involucrel scales about 14, subequal, loosely imbricated, lance-oblong, pubescent, claret-colored toward the obtusish apex, 2–3 of the outermost much smaller, slightly separated bractlets; corollas inferred to be purple-tinged, with short gland-sprinkled proper tube and longer upwardly villous cylindrical throat; achenes beset on the angles with sessile glands.—Pl. Hartw. 199 (1845); Heering, *Mém. Soc. neuchât. Sci. Nat.* 419 (1913).

CUNDINAMARCA: near Bogotá, *Hartweg*, no. 1098 (K., phot. Gr.); on mountains near Bogotá, *Holton*, no. 321 (Gr.), slope of Montserrate, above Bogotá, alt. 2800 m., *Mayor*, no. 71, acc. to Heering, l. c.

56. **E. rorulentum** Robinson. Shrub or tree with terete hardwooded fuscous branches and somewhat fastigiately sordid-tomentose branchlets; leaves opposite suborbicular-ovate, obtuse, serrate except at the cordate base, coriaceous, somewhat 3-nerved from well above the base (but with 1-2 pairs of lesser and pinnately arranged veins between the forking of the lateral nerves and the base), 2-2.8 cm. long, 1.5-2 cm. wide, finely reticulated on both surfaces, densely sprinkled with lucid globular sessile glands or resinous atoms but otherwise glabrous above, softly tawny-pubescent and more sparingly atomiferous beneath; petiole 1-3 mm. long; heads about 10-flowered, clustered in rather dense round-topped corymbs terminating the branchlets; involucreal scales 7-10, subequal, lance-oblong, acutish, dorsally tawny-tomentose; florets inferred to be whitish; achenes tapering downward, beset on the angles with shortly stiped glands.—Proc. Am. Acad. liv. 255 (1918).

CUNDINAMARCA: at Guadalupe, alt. 2900 m., *Bros. Apollinaire & Arthur*, no. 27 (Gr.).

Obviously near to *E. prunifolium* HBK. of Ecuador, which, however, has longer relatively narrower subentire leaves, rounded but not cordate at base.

57. **E. vacciniaefolium** Benth. Low fastigiately branched evergreen shrub 1 m. or less in height; branches rusty-hirsute, very leafy, the internodes exceedingly short; leaves opposite, subsessile, elliptic-ovate, narrowed to an obtuse apex, rounded at base, crenately few-toothed, coriaceous, green on both surfaces, 1-2 cm. long, 5-10 mm. wide; petiole 2 mm. long; heads 5-6-flowered, in dense round-topped terminal corymbs; involucreal scales oblong, subequal, loosely imbricated, ciliolate, the tip and margins often claret-colored; achenes glabrous (Benth.) or hispid on the angles.—Pl. Hartw. 200 (1845). *E. confertifolium* Klatt, Abh. naturf. Ges. Halle, xv. 324 (1882), & in advance reprint p. 4 (1881).

CUNDINAMARCA: in Cordillera de los Andes, near Bogotá *Hartweg*, no. 1104; in mountains near Bogotá, *Holton*, no. 310 (Gr.).

WITHOUT LOCALITY: *Triana*, no. 3 (Gr.).

An attractive little alpine undershrub, easily distinguished from the related species by its small thick leaves, which are very close together.

58. **E. fastigiatum** HBK. Smooth shrub with angulate ascending leafy branches; leaves opposite, lance-oblong to typically oblong,

serrate except at the mostly bluntish sometimes slightly cuspidate tip and cuneate to abruptly narrowed or almost rounded base, 4-6 cm. long, 1.5-3 cm. wide; petiole slender 6-13 mm. long; corymb erect, flattish-topped, fastigiately branched, 7-20 cm. in diameter; heads crowded, pedicelled, about 12-flowered; scales narrowly oblong, obtuse, thin, viscid, often vernicose, in 2-3 subequal series; florets much exserted; corollas white.—Nov. Gen. et Spec. iv. 125, t. 347 (1820).

CUNDINAMARCA: Guadalupe, *Bros. Apollinaire & Arthur*, nos. 84 (U. S.) and 86 (Gr.).

NARIÑA: on an excursion to the volcano of Cumbal, *Stübel*, no. 436 (Berl., fragm. Gr.).

WITHOUT LOCALITY: *Triana*, nos. 40 (Gr.) and 1229 (K.).
[Ecuador, Peru.]

By obvious clerical error Kunth in HBK. Nov. Gen. et Spec. iv. 125 (1820), records the type of this species as from "frigidis montium Novo-Granatensium," but the more detailed locality cited, namely "inter pagum Guancabamba and Paramo de Guamani" makes it clear that the specimen in question came from northern Peru.

59. ***E. tinifolium*** HBK. Similar in many ways to the preceding and likewise with considerable resinous or varnish-like viscosity; leaves larger and much more broadly elliptic, 7-10 cm. long, half as wide, thin-coriaceous, reticulate-veiny on both surfaces, usually with 2 pairs of pinnately arranged more prominent curving intramarginal nerves somewhat above the base; heads much as in the last, but in smaller more compact less fastigiately branched round-topped corymbs; flowers white.—Nov. Gen. et Spec. iv. 133 (1820). *E. Lehmannianum* Klatt in Engl. Bot. Jahrb. viii. 34 (1887).

CUNDINAMARCA: Ubaté, 3 Jan. 1853, *Holton* (N. Y.), Guadalupe, alt. 3000 m., *Bros. Apollinaire & Arthur*, no. 32 (Gr.).

WITHOUT LOCALITY: *Humboldt & Bonpland* (Par., phot. Gr.), *Lehmann*, no. CII. (Gr.).

60. ***E. glyptophlebium*** Robinson. Shrub with terete flexuous tawny-tomentulose pithy branches; leaves pale green, opposite, petiolate, oblanceolate-oblong, obtuse, coarsely serrate-dentate except at the entire slightly narrowed then rounded finally short-cuneate base, essentially glabrous except for the tomentulose midrib, thin-coriaceous, 1.5 dm. long, a third as wide, sprinkled with minute lucid resinous globules, the finely reticulated veinlets exserted both above

and beneath, being on the under surface furrowed (under a lens); petioles 1.5 cm. long; heads about 14-flowered, 10–11 mm. high, slender-pedicelled, nodding in dense compound trichotomous leafy-bracted corymbs (about 13 cm. in diameter); involucre cylindrical, 5 mm. high, gray-green, pubescent; scales 10–12, linear, subequal, scarcely imbricated, ciliate, obtusish; corollas about 6 mm. long, white with roseate tinge; proper tube exceeded by the gradually enlarged then slightly contracted throat; achenes 4–5 mm. long, remotely knobbed with sessile glands on the ribs, otherwise glabrous; pappus-bristles 5–6 mm. long, roseate, minutely scabrous.—*Proc. Am. Acad.* liv. 245 (1918).

CUNDINAMARCA: hillside near Tequendama, alt. 2500–2700 m., *Pennell*, no. 2641 (Gr.).

Sharing with *E. theaeifolium* the peculiar trait of having the veinlets on the under surface of the leaves exserted but furrowed as if channelled by an engraver's tool. Hence the name.

61. ***E. theaeifolium*** Benth. Compactly branched shrub 1–1.2 m. high; stem terete, hard-wooded; cortex grayish-brown; branchlets slender, flexuous, rusty-pubescent and somewhat glandular; leaves opposite, small, 2–3.5 cm. long, 9–12 mm. wide, oblong, acutish at both ends or roundish at base, crenate-serrate, puberulent on the midnerve and sprinkled on both surfaces with glistening sessile glands, finely reticulated, the veinlets beneath prominent and finely sulcate; heads small, pedicellate, about 12-flowered, 8 mm. high, in many small round-topped corymbs terminating the branches; scales few, lance-linear, acutish, subequal, viscid-pubescent dorsally; florets much exserted; corollas apparently white; achenes dark brown, 3 mm. long, minutely granular on the angles.—*Pl. Hartw.* 199 (1845).

CAUCA: collected on the ascent to Sotar, in the Prov. of Popayan, *Hartweg*, no. 1101 (K., sk. and phot. Gr.).

[Venezuela.]

62. ***E. latipes*** Benth. Viscid undershrub 3–9 dm. high, with decumbent ascending leafy stem terminating in a dense or at length open fastigiately branched corymb; leaves opposite, oval-oblong, acutish to very obtuse at tip, rounded at base, serrulate, 3–7 cm. long, 2.2–3.7 cm. wide, coriaceous, pinnately veined, prominent-reticulated and punctate beneath; petiole 3–5 mm. long, broad, concave above, often hairy and sometimes viscid; bracts spatulate to linear; heads pedicelled, somewhat larger and more numerous flowered

than in the two preceding, but otherwise similar; flowers pinkish (Rusby & Pennell).— Pl. Hartw. 200 (1845).

CUNDINAMARCA: in Cordillera de los Andes, near Bogotá, *Hartweg*, no. 1106 (K.), *Holton*, no. 311 (Gr.), *Rusby & Pennell*, no. 1307 (N. Y.); shrubby slope, Chapinero, alt. 2700–2800 m., *Pennell*, no. 2039 (Gr.).

WITHOUT LOCALITY: *Triana*, nos. 19 (Gr.) and 1236 (N. Y.).

Varying from smoothish to pubescent, the hairs when present being tawny and stiffish, occurring chiefly below the middle of the stem and on the young branches about the base. The species is suspiciously close to *E. viscosum* HBK., supposed to have come from Ecuador (see p. 361).

63. ***E. serratifolium*** (HBK.) DC. Smooth shrub with opposite curved-ascending striate and somewhat hexagonal branches; leaves opposite, petiolate, rhombic-ovate, acuminate, about 3 cm. long, incisely serrate except toward the cuneately narrowed base, membranaceous, smooth, 3-nerved and reticulate-veiny; petiole 6–8 mm. long; heads numerous, about 5-flowered, in terminal flattish-topped trichotomous compound corymbs; involucre short-cylindric; scales about 5, narrowly oblong, blunt, sticky, ciliate but otherwise smoothish; achenes dark, 2 mm. long, hispid on the angles.— *Prod.* v. 181 (1836). *Mikania serratifolia* HBK. *Nov. Gen. et Spec.* iv. 138 (1820).

TOLIMA? near Mariquita? *Humboldt & Bonpland* (Par., poor phot. Gr.).

As yet known only from the original material of uncertain origin, but doubtfully supposed by Kunth to have been collected in the place cited and at an altitude of about 1000 m.

64. ***E. solidaginoides*** HBK. Slender-stemmed shrub, reaching 3 m. in height (André); branches subterete or obscurely hexagonal, finely pubescent; internodes usually 4–10 cm. long; leaves opposite, slender-petioled, ovate, caudate-acuminate, rounded or cordate at base, dentate, thin, membranaceous, 5–12 cm. long, half as wide, subglabrous or hirtellous above, sparingly to rather densely pubescent beneath; petioles 1–3 cm. long; the axils often proliferous; panicle terminal, leafy-bracted, pyramidal, its branches widely spreading; heads small, on filiform pedicels, disposed in often subglobose glomerules on short secondary branchlets; florets 10–15, greenish- to yellowish-white, much exerted; involucre scales about 12, subequal, oblong, acute, green or pinkish, thin.— *Nov. Gen. et Spec.* iv. 126 (1820). *E. filicaule* Sch. Bip. ex Gray, *Proc. Am. Acad.* xxi. 384 (1886). *E. stipuliferum* Rusby, *Mem. Torr. Bot. Club*, iv. 210 (1895).

Ophryosporus solidaginoides (HBK.) Hieron. in Engl. Bot. Jahrb. xxix. 4 (1900), see Robinson, Proc. Am. Acad. xlii. 27 (1906).

HUILA: around Huila, an Indian village in the Rio Paez valley, Tierra Adentro, alt. 1600–1900 m., *Pittier*, no. 1245 (Gr.).

CAUCA: Quebrada de Dolores, alt. 1800 m., *André*, no. 2832 (Gr.).

WITHOUT LOCALITY: *Triana*, no. 1185 (N. Y.).

[Mexico to Venezuela and Bolivia.]

65. **E. celtidifolium** Lam. Shrub or slender tree with slender grayish stems and spreading pale-green to dull ivory-white branches, glabrous to the inflorescence; leaves opposite, ovate-oblong, caudate-acuminate, thin, firmish in texture, green and glabrous on both sides or slightly pubescent on the nerves beneath, serrate-dentate, 1–1.5 dm. long, 3–5 cm. wide, 3-nerved from well above the base and with small intramarginal as well as transverse veins; panicles terminal and to some extent lateral; heads small, about 11-flowered; involucre narrowly campanulate, 2.7 mm. high; scales about 10, oblong, obtusish, subequal (usually 1–2 of the outermost lanceolate and much shorter); florets much exerted; corollas white.—*Encyc.* ii. 406 (1786); *Hook. f. & Jacks. Ind. Kew.* i. 916 (1893), where attributed to Colombia. *Mikania verrucosa* Spreng. *Syst.* iii. 423 (1826).

[Var. **typicum**. Pedicels and branches of the inflorescence glabrous; achenes hispid on the angles but nearly or quite glabrous on the faces].

[Lesser Antilles, e. g. Martinique, Guadeloupe, Dominica.]

Var. **hirtellum** Robinson. Pedicels and branches of the inflorescence puberulent; leaves with traces of pubescence at least on the midnerve beneath; achenes hirtellous on the faces as well as the ribs.—*Proc. Am. Acad.* liv. 238 (1918).

MAGDALENA: at Minca, Prov. Santa Marta, alt. 915 m., *Schlim*, no. 909 (K., phot. Gr.); locally common in dry forest near Bonda, below 150 m., *H. H. Smith*, no. 525 (Gr., Mo.).

It is probably to this hirtellous form that the *Index Kewensis* refers in accrediting the species to "N. Granat." Except in the matter of pubescence the plant of Colombia agrees closely with typical material from the Antilles.

66. **E. hylibates** Robinson. Soft-wooded shrub, 1.2–2.4 m. high; foliage yellow-green; stems thick, pithy, tawny-woolly; internodes 8 cm. or more in length; leaves large, opposite, long-petioled, ovate-oblong, acutish, rounded or subcordate at base, crenate-dentate, 11–

18 cm. long, 7-12 cm. wide, smoothish and green above, much paler, tawny-gray, and tomentose beneath; petiole 5 cm. or more in length; heads about 14-flowered, 7 mm. high, in a dense terminal trichotomous corymb 1.5-2 dm. wide; corollas white, the proper tube somewhat exceeded by the campanulate-cylindrical throat; achenes dark, smooth on the faces.—*Proc. Am. Acad. liv.* 246 (1918).

MAGDALENA: open places in the border of forest, Rio Frio, alt. 2300-2750 m., *Kalbreyer*, no. 1956 (K., phot. Gr.).

67. **E. Trianae** Robinson. Presumably herbaceous perennial (base unknown); stems terete, flexuous, covered with very short purplish-brown tomentum; leaves alternate, lance-linear, 6-10 cm. long, 5-10 mm. wide, attenuate at both ends, obscurely and remotely denticulate or entire, reticulate-rugulose above, paler and sordidly gray-tomentose beneath; petiole 2-3 mm. long; heads about 28-flowered, 5 mm. high and thick, in dense sessile or shortly peduncled globose glomerules together forming an irregular corymb.—*Proc. Am. Acad. liv.* 260 (1918).

"NEW GRENADA"; without more precise locality, *Triana*, no. 1196 (K., phot. Gr.).

Exceedingly different from any other Colombian species of the genus and easily recognized by its narrow alternate leaves and small sessile heads. In habit suggesting a *Vernonia*, but by character clearly a *Eupatorium*.

68. **E. gracile** HBK. Slender usually several-stemmed decumbent or suberect perennial 3-8 dm. high, essentially herbaceous or slightly lignescent, finely pubescent or glabrous throughout; leaves opposite, ovate to (rarely) lanceolate, acute or acuminate, abruptly narrowed to an obtusish or rounded base, crenately or sharply serrate, 1.5-2.5(-4) cm. long, 7-20 mm. wide, membranaceous, usually glabrous, tending to darken in drying, 3-nerved from slightly above the base; petiole 1-6(-10) mm. long; internodes, especially the upper, elongated, much exceeding the leaves; branches of the inflorescence ascending, slender, flexuous, trichotomously divided, the branchlets almost filiform, mostly 3-headed; pedicels at maturity often 1-2.5 cm. long, usually curved; heads often nodding, 30-40-flowered, 6-8 mm. high, 4-5 mm. in diameter; involucre campanulate; scales subequal, lance-oblong to linear, thin, closely 2(-3)-ribbed, acutish to attenuate; corollas 3 mm. long, glabrous, the slender proper

tube about equalling the distinctly cylindric-campanulate throat; achenes slightly attenuate toward the base and perceptibly contracted just below the summit, hispidulous on the angles or quite glabrous; pappus-bristles 20-25.—Nov. Gen. et Spec. iv. 124 (1820); Klatt in Engl. Bot. Jahrb. viii. 34 (1887).

CUNDINAMARCA: in temperate region near Guaduas, alt. 1100 m., *Humboldt & Bonpland* (Par., phot. Gr.); Bogotá, *Rusby & Pennell*, no. 1306 (N. Y.); shrubby hillside, southwest of Sibate, alt. 2800-2900 m., *Pennell*, no. 2390 (Gr.).

HUILA: Las Escaleretas, Moras Valley, Rio Paez basin, Tierra Adentro, alt. 2500-3000 m., *Pittier*, no. 1380a (U. S.).

WITHOUT LOCALITY: *Triana*, no. 1188 (N. Y.); *Lehmann*, no. CX. (Gr.).

Persistent search has failed to disclose between the following varieties any constant or natural differences which would justify their maintenance as separate species.

Var. **typicum**. Stem, branches, pedicels, and often outer involucreal scales, as well as the margins, nerves, and rarely the surface of the leaves finely pubescent, the hairs delicate, short, dark, purplish or brownish, ascending or somewhat spreading.—Lit. and exsicc. as above.

Here, provisionally and somewhat doubtfully, may be placed *E. sotarense*, var. *breviflora* Hieron. in Engl. Bot. Jahrb. xxviii. 574 (1901), known as yet only from the original material from open thickets on the slopes of Mt. Guálcala in the district of Tuquerres, alt. 2500-2900 m., *Lehmann*, no. 5195 (Berl., fragm. Gr.). Although the heads are slightly smaller than usual in the species and the leaves a trifle larger and more pubescent, these differences are of degree rather than kind, and are no greater than are usually bridged by complete intergradation. The pubescence of the pedicels, while more copious, is precisely of the sort prevalent in *E. gracile*, and not gland-tipped as in the typical *E. sotarense*.

Var. **epilobioides** (HBK.) Robinson, comb. nov. Glabrous throughout or with only minute vestiges of pubescence on the branches of the inflorescence.—*E. epilobioides* HBK. Nov. Gen. et Spec. iv. 125 (1820). *E. caducisetum* DC. Prod. v. 165 (1836).

CUNDINAMARCA: in temperate region near Guaduas, *Humboldt & Bonpland* (Par., phot. Gr.); about Santa Fé de Bogotá, [specimen from herb. of] *Desert* (DC., phot. Gr.); at the falls of Tequendama, 8-11 Dec. 1852, *Holton* (K., N. Y.); near Bogotá, in mountains, 18 Nov. 1852, *Holton* (N. Y.); near Bogotá, alt. 2700 m., *Bros. Apollinaire & Arthur*, no. 93 (Gr.); dry open hill-

side, Quetame, alt. 1300–1500 m., *Pennell*, no. 1871 (Gr.), a doubtful specimen but clearly related although with slightly longer petioles.

WITHOUT LOCALITY: *Triana*, no. 1187 (K.).

The type-specimen of *E. caducisetum* shows it to have been a somewhat more loosely grown individual than the type of *E. epilobioides*, but the differences, notably in the length of the internodes and petioles, are completely bridged by intermediates now at hand, and are of a kind permitting no clear or natural distinction.

69. **E. sotarense** Hieron. Erect, herbaceous or suffruticose; stem terete, somewhat glandular-pubescent; leaves opposite or ternate, ovate, acuminate, rounded at the base, 2.5–3 cm. long, 2 cm. wide, crenate-serrate, nearly glabrous except for a scattered pubescence on the nerves, 3-nerved from the base, the lateral nerves forking; branches of the inflorescence and pedicels closely beset with dark divaricately spreading gland-tipped hairs; pedicels 3–5 mm. long; heads about 30-flowered, 7 mm. high; involucre scales about 18, lance-linear, 2–3-ribbed, the outer dorsally covered with dark purplish-brown more or less glandular tomentum, acute; corollas about 4 mm. long, with slender proper tube slightly exceeded by the cylindric-campanulate throat; achenes at maturity black, 2.5 mm. long, slightly tapering at both ends.—Hieron. in *Engl. Bot. Jahrb.* xxviii. 574 (1901). *E. sotatense* Hieron. l. c. xxi. 333 (1895), not Klatt.

CAUCA: on the cone of the volcano Sotará, alt. 4000 m., *Stübel*, no. 329b (Berl., fragm. Gr.).

Obviously near *E. gracile*, but to be distinguished by the more copious and gland-tipped pubescence on the inflorescence.

70. **E. intercostulatum** Robinson. Shrub, very finely grayish-puberulent, not glandular; stems subterete, costate, grayish-buff; branches ascending, when young hexagonal; leaves opposite, petiolate, deltoid, 3–3.5 cm. long, nearly as wide, coarsely crenate-dentate except at the acute apex and broad truncate or very shallowly subcordate base, short-acuminate at the insertion, 3-ribbed from the base, sparingly pulverulent-puberulent on both surfaces, scarcely paler beneath, membranaceous; petiole about 1 cm. long; corymbs dense, round-topped, many-headed, terminal and single or supplemented by smaller corymbs from the upper axils; heads pedicellate, about 15-flowered, 6.5 mm. high, 6 mm. in diameter; involucre campanulate, 3 mm. high; scales lance-linear, acute, subequal except 2–3 of the considerably reduced outermost, pulverulent; corollas (presumably

white or nearly so) glabrous, 3.5 mm. long, with short proper tube and longer distinctly enlarged throat; achenes 2.3 mm. long, at maturity almost black, hispidulous, prominently 5-costate-angulate and with 3-5 secondary ribs each in an interval between the primary. — Proc. Am. Acad. liv. 247 (1918).

INTENDENCIA DE CHOCO: Truandó, *Schott*, no. 3 (Field Mus., phot. Gr.).

A species clearly of the genus *Eupatorium*, yet somewhat anomalous in the supernumerary ribs of the achenes.

71. **E. Dombeyanum** DC. Nearly glabrous or somewhat hirtellous in the inflorescence and on the nerves of the leaves, 6-9 dm. high (Smith), herbaceous or slightly shrubby; stems erect, terete; internodes 5-6 cm. long; branches slender, bearing 1-3 pairs of leaves and terminating in open compound cymes together forming a loose leafy-bracted panicle; leaves opposite, ovate, attenuate-acuminate, sharply serrate except at the rounded base, green and very smooth on both surfaces, 3-5-nerved from slightly above the base, membranaceous, 6-8 cm. long, about 3 cm. wide; petiole slender, 1.5-2.3 cm. long; bracts linear; pedicels filiform; heads often nodding, about 25-flowered; involucre campanulate; scales subequal, lance-linear, acute, thin; corollas inferred to be purplish but perhaps white; achenes black, glabrous or slightly hispid on the angles toward the summit. — Prod. v. 167 (1836).

MAGDALENA: in clearings, not common, Las Nubes near Santa Marta, alt. 1372 m., *H. H. Smith*, no. 621 (Gr., U. S., Mo.).

TOLIMA: edge of woods, alt. 2000-2300 m., *Murillo, Pennell*, no. 3190 (Gr.).

Originally described from material collected by Dombey in South America, presumably in Peru. The type in the DeCandolleian Herbarium was examined some years ago by the writer and there is a clear photograph of it in the Gray Herbarium. With this, as well as with the original diagnosis, the Colombian plants just cited correspond closely in all significant details.

72. **E. azangaroense** Sch. Bip. Puberulent shrub or undershrub 3-5 or more dm high; leaves lanceolate- to triangular-ovate, sub-acuminate at the apex, obtuse or rounded or subcordate at the base, coarsely serrate, 2-4 cm. long; corymbs few-headed; heads many-flowered; involucre scales more than 20, linear-lanceolate, acuminate, glabrous or glandular-puberulent, almost equal. — *Bonplandia*, iv. 54 (1856), without char.; *Wedd. Chlor. And.* i. 217 (1857), where described.

MAGDALENA: on the Sierra Nevada de Santa Marta, *Funck*, no. 391, acc. to Weddell, l. c.
 [Ecuador, Peru, and Bolivia, acc. to Weddell, l. c.]

A poorly known species, in its described characters not clearly distinguished from the earlier and variable *E. glechonophyllum* Less., which appears to extend from the Andes of Ecuador to the coast of central Chili. No Colombian material of *E. azangaroense* has been seen by the writer.

73. **E. microcephalum** Regel. Erect, suffruticose, paniculately branched, puberulent on stem and terete branches; leaves opposite, petioled, cordate or "cordate-ovate," 3-nerved, coarsely crenate-toothed, acuminate to an acutish tip, entire at base and cuneate-attenuate at the insertion of the petiole, hispid with single hairs on both surfaces, as much as 1 dm. long and 8 cm. wide; cymes axillary and terminal, disposed in a panicle; peduncles pubescent, exceeding the leaves; heads 4-6 mm. high, about 30-flowered; involucre lance-linear, acute, hirtellous on the back; florets white; achenes hirtellous on the angles.— *Ind. Sem. Hort. Petrop.* 1860, p. 35 (1860).

COLOMBIA: described from plants raised at the Imperial Gardens in Petrograd and thought to have been from Colombia.

Known only from the original description, of which the above character is a condensed compilation.

74. **E. articulatum** Sch. Bip. Somewhat lignescent, erect or ascending, perennial, 3-4 dm. high, villous, the hairs jointed; leaves opposite, petiolate, membranaceous, broadly ovate, acuminate at apex, rounded or slightly cordate at base, coarsely crenate-dentate, sprinkled above with sessile glands, below sparingly villous especially on the (mostly 5) nerves, at most 5.5 cm. long, 4 cm. wide; heads 30-40-flowered, corymbose or cymose at the ends of the stem and branches; scales of the involucre nearly equal, about 20, lance-linear, pale-green and tending to be scarious, acute, 3-ribbed, dorsally pubescent, the outermost reduced and more or less distant on the pedicel; corollas purplish; the slender proper tube slightly exceeded by the somewhat enlarged throat; achenes roughened on the angles; pappus bristles caducous.— *Sch. Bip. ex Hieron. in Engl. Bot. Jahrb.* xl. 385 (1908).

TOLIMA: near Ibagué, *Humboldt & Bonpland*, acc. to Hieron., l. c.
 [Venezuela to Peru.]

A species unknown to the writer; the character condensed from the original diagnosis.

75. **E. ibaguense** Sch. Bip. Herbaceous, branched; stem terete, brown, pithy, spreading-villous, the hairs attenuate, non-glandular, jointed; internodes 8–11 cm. long; leaves opposite, petiolate, ovate, acuminate, serrate or crenate-dentate (teeth of the cauline 12–16 on each side, often again 1–2-toothed), rounded or subtruncate at the base, thin-membranaceous, green on both surfaces, scarcely paler beneath, spreading-villous on the nerves and veins to nearly glabrate, 6–8.5 cm. long, 3.5–6 cm. wide, 3-nerved from the base, the lateral nerves quickly again branched; corymbs terminal and from several of the upper axils, rather dense; heads about 30-flowered; pedicels slender, pubescent, 2–6 mm. long; involucreal scales 12–16, lance-linear, acutish, subequal, thin, pale-green and somewhat stramineous, pubescent especially toward the acutish erose tip; corollas white, villous toward the summit, the slender tube about equalling the enlarged subcylindric throat; pappus-bristles about 28, white, united at the base into a little white disk or ring; achenes black, hispid.—Sch. Bip. ex Hieron. in Engl. Bot. Jahrb. xl. 384 (1908).

CAUCA: Capilla-highlands of Popayan, alt. 1700–1800 m., *Lehmann*, no. B. T. 1155 (N. Y.).

WITHOUT LOCALITY: *Lehmann*, no. 5194 (N. Y.); *Linden*, no. 2219, acc. to Sch. Bip., l. c.; *Karsten*, acc. to Sch. Bip., l. c.
[Venezuela.]

A species in technical characters close to the following and also nearly related to the Mexican *E. pazcuarensis* HBK.

76. **E. pichinchense** HBK. Herbaceous perennial, flexuous and said to be climbing, villous; the hairs long, soft, attenuate, not gland-tipped, but with dark articulations; leaves opposite, petiolate, broadly ovate or suborbicular, acuminate, rounded or cordate with an open sinus at the base, serrate (teeth about 14 on each side, mostly sharp, sometimes rounded, often again 1–2-toothed), 3-nerved, finely and sparingly appressed-villous and green on both surfaces, 5–6 cm. long, 3–4 cm. wide; petiole 2–4 cm. long, villous; heads 40–45-flowered, pedicellate, in terminal trichotomous rather dense corymbs; involucreal scales 15–20, lance-linear, subequal, thin, acute, ciliate, dorsally villous, 1–3 of the outermost shorter, narrow and bractlike; corollas white, with slender proper tube somewhat exceeded by the cylindrical-campanulate throat; achenes slender, dark-brown to almost black, upwardly hispid on the angles.—Nov. Gen. et Spec. iv. 122 (1820); DC. Prod. v. 165 (1836).

MAGDALENA: open places, clearings and ridges, Sierra del Libano near Santa Marta, alt. 1830 m., *H. H. Smith*, no. 1994 (Gr., U. S.); San Sebastian near Santa Marta, *Funck*, no. 524 (K.), immature and doubtful.

[Ecuador.]

The specimens comprising the sheet of Smith's no. 1994 in the U. S. National Museum show considerable variation in the leaf-contour, the basal sinus being deeper and narrower and the teeth more rounded in portions of this material than in any other seen. The identity in the pubescence, floral characters, etc., indicates that this is individual variation rather than the mixing of species.

77. **E. Apollinairei** Robinson. Stems terete, flexuous as if weakly scandent, closely covered with short spreading stipitate glands; internodes 1-1.5 dm. or more long; leaves opposite, petiolate, deltoid-suborbicular, bluntly short-acuminate, deeply cordate by a narrow sinus, coarsely crenate, 5-9-nerved, green and smoothish above, slightly paler and glandular-tomentose on the veins beneath, 7-13 cm. long and broad; petioles 3.5-7 cm. long, densely glandular-tomentose; heads about 58-flowered, slender-pedicelled, 7-10 mm. high, in long-peduncled moderately convex many-headed compound corymbs (1 dm. or more in diameter); involucre campanulate; scales about 24, subequal, lance-linear, attenuate, becoming stramineous, dorsally pubescent, the hairs both jointed and gland-tipped; corollas white, pubescent externally on the limb; the slender proper tube about equalling the enlarged cylindrical throat; achenes 2 mm. long, hispid on the angles.—*Proc. Am. Acad.* liv. 236 (1918).

CUNDINAMARCA: near Bogotá, alt. 2700 m., *Bros. Apollinaire & Arthur*, no. 94 (Gr., U. S.), in mountains near Bogotá, *Holton*, no. 312 (N. Y.).

WITHOUT LOCALITY: *Triana*, no. 22 (Cr.).

Sect. IV. **PRAXELIS** (Cass.) Benth. Involucre campanulate- or turbinate-subcylindric; the scales mostly acute, imbricated in 3-4 graded series, deciduous before the florets loosen from the receptacle. Summit of the peduncle cylindrical, exhibiting after the fall of the involucre scales depressed scars mostly rhombic in form. Receptacle moderately convex to conical, glabrous.—Benth. acc. to Bak. in *Mart. Fl. Bras.* vi. pt. 2, 241 (1876); Hoffm. in *Engl. & Prantl, Nat. Pflanzenf.* iv. Abt. 5, 140 (1890). *Praxelis* Cass. *Dict.* xliii. 261 (1826). *Ooclinium* DC. *Prod.* v. 133 (1836).—Weedlike annuals of somewhat characteristic habit, mostly decumbent and usually setose, the heads few, singly terminating what for the genus are unusually long peduncles.

KEY TO SPECIES.

Cauline leaves ovate, petiolate.....78. *E. pauciflorum*.
 Cauline leaves lance-linear, sessile or nearly so.....79. *E. kleinioides*.

78. ***E. pauciflorum*** HBK. Weak hispid-pubescent decumbent annual 2-5 dm. high; leaves opposite, short-petioled, ovate, acutish, sharply serrate (the teeth few, often only 3-4 on each side), acutish at the base, 1.5-6 cm. long, two-thirds as wide, sparingly to rather densely covered with jointed white long non-glandular hairs; heads about 30-flowered, long-pedicelled, erect, mostly in irregular 3-5-headed terminal cymes; involucreal scales stramineous, about 3-seriate, 3-nerved, the inner obtusish and usually mucronate, the outer acute, all promptly deciduous; corollas bluish-white or pale lilac; achenes black, 2 mm. long, 5-angled but often somewhat flattened, tapering somewhat toward the base and contracted at the summit, upwardly hispid on the faces.—Nov. Gen. et Spec. iv. 120 (1820). *Praxelis villosa* Cass. Dict. xliii. 261 (1826). *Bulbostylis* ? *pauciflora* (HBK.) DC. Prod. v. 139 (1836). *Ooclinium depressum* Gardn. in Hook. Lond. Jour. Bot. vi. 437 (1847). *E. urticifolium* Bak. in Mart. Fl. Bras. vi. pt. 2, 343, t. 91 (1876); probably also Hieron. in Engl. Bot. Jahrb. xix. 45 (1894), not *E. urticaefolium* L. f. *Ooclinium Sideritis* DC. Prod. v. 134 (1836). *O. villosum* (Cass.) DC. l. c. *Haberlea divaricata* Pohl ex Bak. l. c., in syn. *Bembicium pilosum* Mart. ex Bak. l. c. 344, in syn.

CAUCA: Popayan alt. 1500-2000 m., *Lehmann*, no. B. T. 1149 (Gr.).

TOLIMA?: in open thickets of savannahs near Dolores, alt. 1200-1600 m., *Lehmann* no. 7486, cited by Hieron. l. c. as *E. urticifolium*.

WITHOUT LOCALITY: *Humboldt & Bonpland* (Par., phot. Gr.).

[Venezuela, Guiana, Brazil.]

The name *E. pauciflorum* appears to be the oldest available of many which this somewhat variable yet always pretty readily recognizable species has borne, the name *urticaefolium* (arbitrarily altered to *urticifolium*) being inapplicable both because the type of Linnaeus filius, still in existence, has proved to be quite a different species and because the name is antedated by the valid homonym of Reichard now in use for a North American plant.

79. ***E. kleinioides*** HBK. Slender fibrous-rooted annual 1.5-6 dm. high, erect or ascending, with sparse spreading setose pubescence; leaves opposite, sessile, acute, subentire or remotely serrate, setose on both surfaces, the cauline linear or narrowly lanceolate, mostly

2-3 cm. long and 2-4 mm. wide, obscurely 3-ribbed, the basal spatulate-ob lanceolate, sometimes as much as 8-12 mm. wide, more clearly 3-ribbed, narrowed to a petiole-like base; peduncles erect or ascending, 1-headed, 3-8(-15) cm. long; heads 12-14 mm. high, about 1 cm. in diameter, the disk at maturity strongly convex; involucre turbinate-subcylindric, about 3-seriate; inner scales lance-oblong, obtusish and often erose-marcescent at the tip, 3-5-nerved, the intermediate progressively shorter, acute to attenuate, the outermost linear to filiform, usually ciliate and often spreading at the attenuate apex; receptacle convex; corollas pale purple; achenes black, 5-ribbed but usually more or less compressed, hispid on the paler ribs or subglabrous.—Nov. Gen. et Spec. iv. 120 (1820); Bak. in Mart. Fl. Bras. vi. pt. 2, 342, t. 90, f. 1 (1876), where the range is extended to Colombia; Hieron. in Engl. Bot. Jahrb. xxii. 782-3 (1897), where also credited to Colombia. For extended synonymy see Bak. l. c.

COLOMBIA: *Humboldt & Bonpland*, and *Funck*, no. 223, acc. to Bak. l. c. [Venezuela to Paraguay and Peru.]

It is suspected that the particular specimens on the basis of which Baker ascribed this species to Colombia may have come from Venezuela, yet there is even in that event much likelihood that this weed-like annual widely distributed in South America occurs in Colombia.

Sect. V. CONOCLINIUM (DC.) Benth. Involucre campanulate; the scales acute, subequal or more often moderately graduated, mostly 2-4-seriate, persisting (except some of the innermost) after the fall of the achenes. Receptacle conical, naked.—Benth. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 360 (1876); Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Abt. 5, 140 (1890). *Conoclinium* DC. Prod. v. 135 (1836).—Herbaceous or suffruticose plants, chiefly perennial, rarely annual.

KEY TO SPECIES.

- a. Leaves 3(-5)-nerved from slightly above the base *b*.
- b*. Leaves (often alternate) mostly 2-5 cm. long, softly membranaceous; teeth rounded, (7-)9-14 on each side. 80. *E. ballotaefolium*.
- b*. Leaves (opposite) very small, 4-15 mm. long (sometimes larger in no. 84, coriaceous; crenatures 3-5(-8) on each side *c*.
- c*. Leaves covered above with rather coarse white hairs *d*.
- d*. Flowering stems nearly naked and scapelike above the decumbent leafy base; leaves oval, rounded at base then somewhat cuneately narrowed to the petiole. 81. *E. humile*.

- d. Flowering stem leafy to above the middle; leaves triangular, the base truncate or nearly so. 82. *E. pauperatum*.
- c. Leaves glabrous above (or with obscure vestiges of arachnoid puberulence), white-woolly beneath e.
- e. Leaves deltoid-ovate to suborbicular, rounded, truncate, or cordate at the base. 83. *E. microphyllum*.
- e. Leaves lance-ovate to lanceolate, acute at base. 84. *E. lanulatum*.
- a. Leaves pinnately veined f.
- f. Leaves lanceolate, small, mostly 1-2 cm. long; lateral veins 4-6 on each side of the midrib. 84. *E. lanulatum*.
- f. Leaves narrowly oblong, 3-6 cm. long; veins 12-18 on each side of the midrib. 85. *E. stoechadifolium*.

80. ***E. ballotaefolium*** HBK. Weak branching herb or undershrub reaching 1 m. in height; stems flexuous, green, densely glandular-puberulent to -tomentellous; leaves opposite or (at least the upper) alternate, light-green, softly membranaceous (sometimes becoming stiffish in age), acute, subtruncate or shallowly cordate at base, 2.5-4 cm. long, three-fourths as wide, 3-5-nerved, softly pilose on both surfaces, paler beneath; petiole about 1.5 cm. long; heads 30-50-flowered, 5 mm. high, in small dense terminal corymbs disposed in a loosely and often irregularly branched open inflorescence; involucre campanulate, the scales about 30, acute; corollas lilac or blue (Pennell).—Nov. Gen. et Spec. iv. 121 (1820); Bak. in Mart. Fl. Bras. vi. pt. 2, 360 (1876); Klatt in Engl. Bot. Jahrb. viii. 34 (1887). *E. urticaefolium* L. f. Suppl. 354 (1781), not Reichard, nor Bak. *Conoclinium prasiifolium* DC. Prod. v. 135 (1836); Deless. Ic. iv. 6, t. 15 (1839). *E. nepetoides* Lindl. ex DC. l. c. in synonym. *Conoclinium ballotaefolium* (HBK.) Sch. Bip. ex Bak. l. c. in synonym. *E. ballotaefolium* [HBK.] Ktze. Rev. Gen. i. 337 (1891); Heering, Mém. Soc. neuchât. Sci. Nat. v. 418 (1913).

CUNDINAMARCA: Guadalupe, alt. 3000 m., *Bros. Apollinaire & Arthur*, no. 30 (U. S.); La Peña, alt. 2800 m., *Bros. Apollinaire & Arthur*, no. 46 (U. S.); dry meadow near Bogotá, alt. 2800-2900 m., *Pennell*, no. 2311 (Gr.).

ANTIOQUIA: San Cristobal, alt. 2800 m., *Bros. Apollinaire & Arthur*, no. 98 (Gr.); cultivated ground, Yarumito, *Mayor*, no. 569, acc. to Heering, l. c.

WITHOUT LOCALITY: *Matis* (Linn. Soc., phot. Gr.); *Humboldt & Bonpland* (Par., phot. Gr.); *Otto*, no. 687 (Gr.); *Triana*, no. 1190 (K.).

[Venezuela, Margarita Island, Brazil.]

Variable, passing in Brazil into forms with smaller and more sharply toothed leaves. In Colombia the following varieties may be distinguished on involucre characters:

Var. **typicum**. Involucre scales lanceolate, moderately firm in

texture and ribbed nearly or quite to the gradually narrowed tip, the outer successively shorter and narrower.—Lit., synonym., and exsicc. as above.

Var. **caucense** Robinson. Involucral scales subequal, tending to be oblanceolate, the upper portion less gradually attenuate and of softer more herbaceous texture, scarcely ribbed and dorsally more pubescent.—Proc. Am. Acad. liv. 238 (1918). *E. ballotaefolium* Hieron. in Engl. Bot. Jahrb. xxviii. 575 (1901), not precisely of HBK.

TOLIMA: dry open grass-land, "El Convenio," west of San Lorenzo, alt. 1000–1200 m., Pennell, no. 3453 (Gr.).

HUILA: common in scattered bushy places on savannahs, along the Rio Paez, Lehmann, no. 5675 (U. S.).

EL VALLE: under low isolated thickets, on savannahs near Anserma Nueva, alt. 1000 m., Lehmann, no. 3279 (Gr.).

While such variation in the involucre is unusual in a single species, it has been found impossible to detect any concomitant differences in habit, foliage, florets, or achenes. Furthermore some approaches to the involucre of var. *caucense* have been observed in the variable Brazilian forms of the species.

81. **E. humile** (Benth.) Robinson, comb. nov. Low perennial herb; stems several, hirsute, leafy at the prostrate and somewhat repent base, then erect, almost leafless and scapelike, 1.5–2 dm. high; leaves opposite, petiolate, oval, obtuse or rounded at both ends but at the very base somewhat cuneate, crenately about 3-toothed on each side, densely hirsute on both surfaces, 4–12 mm. long, 3–10 mm. wide; petiole 2–7 mm. long; corymb terminal, about 3–4 cm. in diameter, convex; pedicels spreading-hirsute; heads about 20-flowered, 5–6 mm. high, crowded; involucre campanulate, about 3-seriate; scales lanceolate, attenuate, very acute, thin-margined, 2–4-ribbed, at least the outer sparingly and rather coarsely pubescent on the back; receptacle, low-conical; corollas apparently whitish but perhaps blue, externally puberulent near the limb; achenes dark-gray, tapering to the callose base, rounded to the summit.—*Conoclinium humile* Benth. Pl. Hartw. 199 (1845).

CUNDINAMARCA: in Cordillera de los Andes, near Bogotá, Hartweg, no. 1102 (N. Y., phot. Gr.)

Known as yet only from the original collection. The leaves are green on both surfaces, but are covered by coarse white attenuate mostly curved hairs. The prostrate portion of the stems has very

short internodes and numerous leaves often proliferous in the axils, while the upright part bears only 2-3 pairs of remote somewhat reduced leaves.

82. **E. pauperatum** HBK. Pubescent, suffruticose, 3 dm. high, erect from a decumbent base, leafy two-thirds of the way to the small dense rounded terminal pedunculate corymb; leaves deltoid, acute, truncate at the base, crenate-serrate (teeth about 7 on each side, the proximal rounded, the distal acutish), 3-nerved, somewhat pubescent above, softly so beneath, 1.2 cm. long, 1 cm. wide; petiole about 6 mm. long; involucre campanulate; scales lanceolate, subulate-tipped, green, ribbed, ciliate, the slightly shorter outer ones dorsally pubescent; florets 5 mm. long; corollas glabrous, violet-tinged at the summit; achenes glabrous.— Nov. Gen. et Spec. iv. 121 (1820).

NEW GRENADA? with no more definite locality, *Humboldt & Bonpland* (Par., phot. Gr.).

Known only from the original collection. Placed doubtfully in § *Conoclinium* from its resemblance to other members of the group. The writer has had no opportunity to ascertain the nature of the receptacle, a feature not mentioned in the original description.

83. **E. microphyllum** L. f. Small decumbent herb, 1-3 dm. high, perennial or at times fruticulose (but sometimes exhibiting fibrous apparently annual roots); stem terete, covered with fine spreading curved white hairs, leafy to the middle or somewhat higher; leaves opposite, petiolate, very small, thick, coriaceous, ovate, obtuse, rounded or more often cordate at base, crenately about 3-toothed on each side, 3-nerved, green and glabrous above, white-woolly on the under surface, 6-10 mm. long, 4-7 mm. wide; petiole 2-4 mm. long, hirsutulous; peduncular summit of the stem often 1 dm. long, flexuous, bearing 1-2 pairs of reduced leaves and a dense terminal rounded corymb (1.5-4 cm. in diameter); heads about 18-flowered; involucre scales 2-3-seriate, lanceolate, gradually attenuate to a subulate tip, green or often purple-tinged, 2-4-ribbed, the outer successively shorter, ciliate, pubescent on the back; corollas violet-tinged or blue (Rusby & Pennell), externally puberulent; achenes almost black, 2.3 mm. long, tapering downward, rounded at summit, glabrous.— Suppl. 355 (1781); Heering, Mém. Soc. neuchât. Sci. Nat. v. 419 (1913). *Conoclinium microphyllum* (L. f.) DC. Prod. v. 135 (1836).

CUNDINAMARCA: Montserrate near Bogotá, *Holton*, no. 318 (Gr.); slopes of Montserrate and Páramo Cruz Verde, *Mayor*, no. 75, acc. to Heering, l. c.;

on highway to La Peña, *Stübel*, no. 102 (Berl., phot. and fragm. Gr.); Guadalupe, alt. 3000 m., *Bros. Apollinaire & Arthur*, no. 31 (Gr.); Bogotá, *Rusby & Pennell*, no. 1278 (N. Y.).

EL VALLE: La Paila, *Holton*, no. 250 (350) N. Y.

WITHOUT LOCALITY: *Mutis* (Linn. Soc., phot. Gr.); *Triana*, nos. 37 (Gr.) and 1169 in part (K.).

84. ***E. lanulatum*** Robinson. Low decumbent herbaceous or slightly woody plant, much branched and very leafy at least to the middle; root fibrous as if annual; stem terete, covered with a thin arachnoid flocculent wool; branches ascending, flexuous, ending in 1-3 dense rounded pedunculate corymbs; leaves opposite, petiolate, lanceolate, gradually narrowed to an obtusish tip, cuneate at the base, 1-1.5(-3) cm. long, 2-4(-10) mm. wide, with about 7 crenations on each side, glabrous or nearly so above, canescent-lanulate beneath; involucre and florets as in the preceding.—*Proc. Am. Acad.* liv. 249 (1918).

CUNDINAMARCA: Guadalupe, alt. 2900 m., *Bros. Apollinaire & Arthur*, no. 33 (U. S., phot. and fragm. Gr.).

WITHOUT LOCALITY: *Triana*, no. 1169 in part (K.).

Obviously close to the preceding, yet readily distinguishable both by its very different leaf-contour and by its pubescence of exceedingly fine white wool, the individual hairs being obscure and implexed, not clearly spreading as in *E. microphyllum*.

85. ***E. stoechadifolium*** L. f. White-woolly perennial, herbaceous or distinctly shrubby, 8-15 dm. high; stems forking above; leaves opposite (or the upper alternate), narrowly oblong, tapering or rather abruptly rounded to an obtusish apex, cuneate to a short-petioled base, crenately many-toothed on each side, 3-6 cm. long, 4-10 mm. wide, pinnately many-veined from a strong midrib, grayish-puberulent above, white-woolly beneath; corymbs terminal on long erect almost leafless opposite or alternate branches; heads crowded, about 6 mm. high and 4 mm. in diameter, about 27-flowered; involucre campanulate, about 3-seriate, cottony at the base; scales lance-oblong, acuminate, green or toward the tip often dark-purple, at length somewhat tawny-stramineous; disk alveolate, at maturity more or less elevated; corollas lilac, blue, or white (*Rusby & Pennell*), the proper tube about equalling the gradually enlarged throat; achenes 1.8 mm. long, dark, glabrous except for traces of hispidity near the summit.—*Suppl.* 355 (1781); *J. E. Sm. Ic.* iii. t. 69 (1791); *HBK. Nov. Gen. et Spec.* iv. 116, t. 343 (1820).

CUNDINAMARCA: mountains near Bogotá, *Holton*, no. 322 (Gr.); *Rusby & Pennell*, nos. 1238 (N. Y.), 1308 (N. Y.), *Pennell*, no. 2324 (Gr.); Montserrat and plateau of Bogotá, [from the herb of] *de Parseval-Grandmaison*, no. 104 (Gr.).

WITHOUT LOCALITY: *Mutis* (Linn. Soc., phot. Gr.); *Humboldt & Bonpland* (sk. Gr.).

[Venezuela.]

Sect. VI. *CAMPULOCINIUM* (DC.) Benth. Heads large 1-2 cm. high, many-flowered. Involucre campanulate; scales subequal, in about 2(-3) series, several-many-nerved or -striate rather than ribbed. Receptacle hemispherical to conical, glabrous, sometimes crowned by the persistent rudiments of abortive florets.— Benth. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 354 (1876); Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Abt. 5, 140 (1890). *Campuloclinium* DC. Prod. v. 136 (1836), in part. *Campyloclinium* [DC.] Endl. Gen. 369 (1838). *Campulochinium* & *Campylochinium* Hook. f. & Jacks. Ind. Kew. i. 409 (1893), by typographical errors.

KEY TO SPECIES.

- Leaves ovate, rounded or cordate at base, slender-petioled.
 Leaves green on both surfaces, deeply cordate. 86. *E. diplodictyon*.
 Leaves grayish-tomentose beneath, rounded at the base. 87. *E. paezense*.
 Leaves oblanceolate-oblong, narrowed to a subsessile base
 88. *E. macrocephalum*.
 Leaves ovate-elliptical or -lanceolate, sessile by a rounded base
 89. *E. zinniiifolium*.

86. ***E. diplodictyon*** Robinson. Presumably herbaceous; stem round, flexuous, dusky-tomentose, the hairs widely spreading and articulated; leaves opposite, triangular-ovate, long-acuminate, cordate with a deep narrow sinus, dentate, 7-10 cm. long, 4-6.5 cm. wide, 3-5(-7)-nerved, reticulate on both surfaces, bright green, shining and nearly glabrous above, green and pilose on the veins beneath; corymb terminal, long-peduncled, dusky-tomentellous with articulated hairs and stipitate glands; pedicels about 7 mm. long; heads 13 mm. high, about 30-flowered; involucre scales about 13, green, finely striate, sharply acuminate, spreading-pubescent on the back; receptacle bearing persistent vestiges of abortive florets at its elevated apex; corollas smooth, the proper tube exceeding the campanulate-cylindric throat; achenes olivaceous, shining, 2.8 mm. long.— Proc. Am. Acad. liv. 242 (1918).

COLOMBIA: without more precise locality, *Lobb* (K., phot. Gr.).

87. **E. paezense** Hieron. Suffruticose, much branched, light green, 2 m. high; stem terete, short-woolly; leaves opposite, petiolate, ovate, acute, rounded at the base, coarsely crenate to serrate, 7–8 cm. long, 3–4.5 cm. wide, membranaceous, 3(–5)-nerved; corymbs terminating the stem and curved-ascending branches, 5–12-headed; heads 1 cm. high, mostly about 125-flowered (florets varying from 60 to 140, acc. to Hieron.); involucreal scales about 30, imbricated in 3–4 series, the outermost (1–3) lance-linear or narrowly lanceolate and bractlike, the intermediate very broadly ovate-oblong, acute to acuminate, multistriate and with a broad callosity at the base, covered dorsally with a fine and often glandular pubescence, the inner scales gradually narrower, the innermost linear; florets reddish-lilac, 4.5 mm. long, tubular, only slightly and gradually dilated toward the limb; achenes 2.8 mm. long, black, hispid on the angles.—Hieron. in Engl. Bot. Jahrb. xxviii. 574 (1901). *E. thespesiaceifolium* Klatt in Engl. Bot. Jahrb. viii. 35 (1887), not in the least of DC.

HUILA: in woods on savannahs between La Plata and La Topa at the Rio Paez, alt. 1000–1500 m., *Lehmann*, no. 5672 (Berl., N. Y.).

EL VALLE: on talus about Narango at the Rio Dagua, alt. 600–800 m., *Lehmann*, no. CXII. (Gr.).

WITHOUT LOCALITY: *André*, no. 1592 (Gr.); *Triana*, no. 1171 (K.).

88. **E. macrocephalum** Less. Coarse erect or slightly decumbent perennial herb, 6–10 dm. high, setulose and scabrous; leaves opposite (or the upper alternate), subsessile, oblanceolate-oblong, crenate-serrate except at the narrowed base, 5–8 cm. long, 8–20 mm. wide, punctate and scabrously setose on both surfaces; branches of the terminal long-peduncled few-headed corymb fastigiate, unequal; heads erect, 1.2–1.5 cm. high, 1.8–2.5 cm. in diameter; scales subequal, lanceolate, acute, densely but shortly pubescent on the back; florets very numerous; corollas roseate, the long-exserted clavate style-branches conspicuous; achenes 5 mm. long, slender, slightly roughened on the ribs or quite glabrous, deeply sulcate between the angles.—*Linnaea*, v. 136 (1830); *Bak.* in *Mart. Fl. Bras.* vi. pt. 2, 358 (1876), which see for synonymy and varietal subdivision.

SANTANDER: boggy places near Velez, 11 Oct. 1845, *Purdie* (K.).

WITHOUT LOCALITY: 1846, *Purdie* (K.).

[Mexico, Brazil.]

89. **E. zinniifolium** Robinson. Shrub, covered with a short dense dark and gland-tipped tomentum, probably somewhat viscid

to the touch; branches terete, curved-ascending, leafy to the terminal corymbs; leaves opposite, closely sessile, ovate-oblong or elliptic-lanceolate, narrowed to an obtusish apex, serrate, sordid-pubescent on both surfaces, 5-7-nerved, about 7 cm. long, half as wide, rounded at the base; corymb umbelliform, about 10-headed; heads long-pedicelled, about 100-flowered, 12-13 mm. high; involucre campanulate; scales subequal, little imbricated, lance-oblong, acute, toward the base somewhat 2-4-nerved, dorsally pubescent and glandular, probably purplish-tinged; corollas rose-colored, the proper tube 2.6 mm. long, very slender, the throat 3.7 mm. long, campanulate-cylindrical, hispid on the outside toward the limb.— Proc. Am. Acad. liv. 261 (1918).

MAGDALENA: on the Sierra Nevada, Prov. of Rio Hacha, *Schlim*, no. 812 (K., phot. Gr.).

A species with conspicuous and somewhat massed heads of pink florets suggesting possible value in horticulture.

Sect. VII. *HEBECLINIUM* (DC.) Benth. Involucre 3-∞-seriate; scales graduated (the outer progressively shorter), persistent, usually acute. Receptacle strongly convex, ellipsoidal to hemispherical, hairy; the hairs (minute and obscure in the first species) usually conspicuous on the fall or removal of the achenes.— Benth. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 345 (1876); Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Abt. 5, 140 (1890). *Hebeclinium* DC. Prod. v. 136 (1836).— A small and probably somewhat artificial section, ranging from Mexico to Brazil and Argentina.

KEY TO SPECIES.

- Leaves on winged auriculate-based petioles; florets 200-300 90. *E. nemorosum*.
- Petioles not winged
 - Florets about 20
 - Leaves densely white-silky beneath; corolla with a perceptibly enlarged throat about as long as the proper tube 91. *E. sericeum*.
 - Leaves subglabrous or sparingly pubescent on the veins beneath; corolla slender, uniformly tubular..... 92. *E. erioclinium*.
 - Florets 50-75..... 93. *E. macrophyllum*.

90. *E. nemorosum* Klatt. Erect herb 0.6-2 m. high; stem terete, pithy, pubescent with both weak articulated and gland-tipped hairs; leaves (about 6 remote pairs) opposite, lanceolate or lance-

oblong, attenuate or acuminate, serrate except at the much contracted petiolar base, light-green, pubescent on both surfaces, pinnately veined, the expanded portion of the blade 7-15 cm. long, half as wide, the petiolar portion 2-7 cm. long, 3-12 mm. wide, somewhat dilated at the bi-auriculate and clasping base; heads numerous, paniculate, about 220-flowered, pedicellate, about 1 cm. high; involucre campanulate, about 3-seriate; the scales lanceolate, acute, not very strongly graduated; receptacle an oblate spheroid, slightly and at times rather obscurely puberulent; corollas slender-tubular, without distinct throat, white or greenish-yellow; achenes black, lucid, glabrous or nearly so.—Klatt in Engl. Bot. Jahrb. viii. 35 (1887); Hieron. xxix. 14 (1900), where affinity with § *Hebeclinium* was first indicated, and xxviii. 576 (1901); Robinson, Proc. Bost. Soc. Nat. Hist. xxxi. 251 (1904). *E. Rusbyi* Britton, Bull. Torr. Bot. Club, xviii. 334 (1891).

CUNDINAMARCA: Arroya "Guayabetal," alt. 1300-1500 m., Pennell, no. 1750 (Gr.); dry cliff, "Susumuco," alt. 1400 m., Pennell, no. 1353 (Gr.).

META: moist bank, Villavicencio, alt. 500 m., Pennell, no. 1508 (Gr.).

EL VALLE: borders of woods and in clearings of thick moist woods, on the Cordillera Occidental, Calif., alt. 2000 m., Lehmann, no. 3777 (sk. and fragm. Gr.).

CAUCA: in dense forests at the Rio Ortega, on the eastern slopes of the Cordillera Occidental, in the district of Popayan, alt. 1500-1700 m., Lehmann, no. 5964, acc. to Hieron., l. c.

[Costa Rica; Ecuador; Bolivia.]

A highly characteristic species, sometimes fibrous-rooted as if annual or at least flowering during the first season, but in other cases exhibiting a thickened and somewhat lignescent base as if perennial.

91. ***E. sericeum*** HBK. Tall vigorous perhaps climbing herb or more likely soft-wooded shrub; stem white-silky, terete or nearly so, flexuous; internodes elongated (often 1.5-2 dm. in length); branches widely spreading; leaves opposite, petiolate, ovate, caudate-acuminate, rounded at the base, serrate, 3-nerved from above the base, pale-green and shortly gray-silky above, canescent and silky-tomentose beneath, 7-15 dm. long, 4-10 cm. wide; petioles white-silky, about 3 cm. long; heads small, in ample panicles, about 20-flowered, about 5 mm. high; involucre campanulate; the scales regularly graduated, fusco-stramineous, obtusish to rounded at the tip; receptacle elevated, alveolate, densely woolly; corollas (doubtfully reported as violet) 3 mm. long, the proper tube slightly exceeding the

campanulate throat; achenes (immature) 1.3 mm. long; the ribs beset toward the summit with a few sessile glands.— Nov. Gen. et Spec. iv. 110 (1820); DC. Prod. v. 142 (1836). *Osmia sericea* (HBK.) Sch. Bip. Pollichia, xxii.–xxiv. 252 (1866).

WITHOUT LOCALITY: *Humboldt & Bonpland* (Par., phot. Gr.); *Triana*, no. 1173 (K.).

A striking species (with somewhat the habit of a *Mikania*) erroneously placed by DeCandolle in his § *Cylindrocephala*, and by Schultz, who perhaps knew the plant only from description, similarly referred to *Osmia*, from which of course it is clearly distinguishable both by its campanulate more loosely imbricated involucre and its hairy receptacle. It is unfortunate that the data of collection appear to have been lost on both occasions on which the plant has been secured.

92. **E. erioclinium** Robinson. Apparently herbaceous, erect, 12–15 dm. tall; stem round, tawny-tomentulose; leaves opposite, petiolate, suborbicular-ovate, acuminate, crenate-dentate to undulate or subentire, rounded or truncate or subcordate at the base, 1.2–2.6 dm. long, 10–22 cm. wide, membranaceous, subglabrous or somewhat tawny-tomentose on the nerves and veins, at the base pinnately veined, then palmately 3-nerved; petiole 3–8 cm. long; panicles ample, pyramidal, 2–3 dm. high and thick; heads about 20-flowered, subsessile in glomerules; involucre campanulate; scales about 16, ovate-oblong, unequal, obtuse; receptacle strongly convex, densely white-woolly; corollas white (Smith), tubular, without distinct throat, hispid at the summit; achenes glabrous or minutely hispid near the summit, 1.3 mm. long, black.— Proc. Am. Acad. liv. 243 (1918).

MAGDALENA: occasional in thickets near water, Las Nubes, near Santa Marta, alt. 1372 m., 15–20 Dec., *H. H. Smith*, no. 625 (Gr., U. S., Mo.); near Valparaiso, in ravines, alt. 1220–1525 m., *H. H. Smith*, no. 1995 (N. Y.).

93. **E. macrophyllum** L. Herbaceous or suffruticose, erect, tawny-tomentellous; stem terete; internodes long (often 1 dm. or more); leaves opposite, petiolate, broadly ovate, acuminate, broadly cordate with a short acumination at the insertion, crenate, membranaceous, gray-green and finely pubescent on both surfaces or sometimes velvety beneath; panicles terminal, dense, with spreading branches; heads 50–75-flowered, about 7 mm. high; involucre campanulate, many-seried, regularly graduated; scales lanceolate, acute or acutish, light-green with whitish ribs; corollas slenderly tubular, greenish- or yellowish-white or sometimes purplish- or bluish-lilac; achenes dark

gray, the white ribs slightly roughened near the summit.— Sp. Pl. ed. 2, ii. 1175 (1763); Bak. in Mart. Fl. Bras. vi. pt. 2, 345, t. 92 (1876); Hieron. in Engl. Bot. Jahrb. xxviii. 576 (1901); Heering, Mém. Soc. neuchât. Sci. Nat. v. 419 (1913). *Ageratum guianense* Aubl. Guian. ii. 800 (1775). *E. molle* Sw. Prod. 111 (1788). *Coleosanthus tiliaefolius* Cass. Bull. Soc. Philom. 1819, p. 157 (1819) & Dict. xxiv. 519 (1822). *Hebeclinium macrophyllum* (L.) DC. Prod. v. 136 (1836). *E. dryadeum* DC. Prod. vii. 269 (1838). *E. populifolium* Mart. Flora, 1837, pt. 2, Beibl. 105 (1837).

MAGDALENA: dry forest near Camp Alegre, alt. 458 m., *H. H. Smith*, no. 628 (N. Y.); near Santa Marta, alt. 762 m., *H. H. Smith*, no. 629 (Gr., U. S.).

HUILA: foot of the Cordillera Oriental, Neiva, *Rusby & Pennell*, no. 485 (N. Y.).

CALDAS: waysides between Filadelfia and Neira, alt. 1260 m., *Mayor*, no. 122, acc. to Heering, l. c.

EL VALLE: in bushy places near Las Juntas del Dagua, Prov. Calí, alt. 300–1000 m., *Lehmann*, no. 7696, acc. to Hieron., l. c.

[Widely distributed in tropical and subtropical America.]

III. KEYED RECENSIONS OF THE EUPATORIUMS OF VENEZUELA AND ECUADOR.

In the course of work primarily directed toward a revision of the Colombian Eupatoriums it was found needful to devote considerable attention to the identical or closely related species of Venezuela and Ecuador, and finally it has seemed desirable to list and key all the species of this genus known from those countries. As it appears likely that the matter thus assembled from very scattered sources will be found useful pending a monographic treatment of the whole group which cannot be completed for some years to come, it is here put on record.

EUPATORIUMS OF VENEZUELA.

Since Kunth, working upon the specimens secured by Humboldt & Bonpland, enumerated in 1820 five species of *Eupatorium* from Venezuela, there appears to have been no attempt to bring together, catalogue, key out, or otherwise to give any separate treatment for the Venezuelan members of this large genus. Although similar to Colombia in territorial extent and indeed comparable in its diversity of soil and variety of climatic conditions Venezuela is to our present knowledge much less rich in its flora, and in the case of *Eupatorium* has less than half as many species.

This difference, however, is probably more apparent than real, and it is to be remembered that of all the South American countries Venezuela has to date received the least botanical exploration. Indeed except for a few scattered and essentially coastal points which have been frequently visited, such as those around Caracas and La Guaira, Cumana and Carupano, Cumarebo and Porto Cabello, the only regions which appear to have had any serious botanical attention since the hurried journey of Humboldt and Bonpland more than a century ago have been the uplands of Mérida, visited by Moritz, Pittier, Jahn, Haman, and others, especially the region of Tovar, for some months the base of the indefatigable collector Fendler, the Paraguaná Peninsula, recently explored for its forestry resources by Curran & Haman, the islands of Margarita and Coche, diligently explored and carefully

described by J. R. Johnston, and portions of the delta region of the Orinoco Valley, traversed by Rusby & Squires in their journey of 1896.

Of the species here enumerated, nearly all rest, as to their Venezuelan occurrence, upon specimens from definitely located places within the present limits of the country. However, a few (nos. 1, 7, 21, and 30), although examined in specimens said to have come from Venezuela, have either been unaccompanied by more definite locality, or have had place-names not capable of location by any of the maps or atlases available. Of no. 16 (*E. vitalbae*) no Venezuelan material has as yet been seen or reported, but the species is known so close to Venezuela and is so frequent on both sides of the country as to make its ultimate discovery within the limits of Venezuela almost certain.

In all these cases it has seemed best to err rather on the side of fullness than of critical elimination in drawing up the present list and therefore to include all species even somewhat vaguely recorded for Venezuela.

For a key to the sections of the genus reference may be made to p. 269.

Sect. I. CYLINDROCEPHALA DC. (see p. 270).

KEY TO SPECIES.

- a. Leaves pointed (acutely or at least obtusely) at the base b.
- b. Pedicels sulcate-angulate, glabrous c.
- c. Leaves lanceolate, caudate-acuminate; involucre obtuse in bud d.
- d. Heads 45-75-flowered; leaves 3-nerved above the base
 - 1. *E. pellium*.
 - d. Heads 10-20-flowered; leaves definitely pinnate-veined.....2. *E. Moritzianum*.
 - c. Leaves ovate, obtusish to short-acuminate; involucre acute in bud.....3. *E. laevigatum*.
- b. Pedicels terete or nearly so, pubescent or puberulent e.
- e. Involucral scales subherbaceous at tip f.
- f. Leaves lanceolate to narrowly oblong or linear; heads about 20-flowered.....4. *E. iwaefolium*.
- f. Leaves rhombic-ovate; heads 45-60-flowered.....5. *E. urticoides*.
- e. Involucral scales often somewhat more deeply colored but in texture not much changed at tip g.
- g. Leaves strongly bullate above, narrowly lanceolate, attenuate to a sessile base.....6. *E. meridense*.
- g. Leaves never strongly bullate above, ovate h.
- h. Scales rounded at the tip or slightly narrowed to an obtuse point i.
- i. Leaves usually 6-10 cm. long; veins not forming

an exerted network beneath; heads in compound corymbs *j.*

j. Leaves subchartaceous, subglabrous, ovate to ovate-lanceolate, attenuate, rather obscurely serrate (none in the least hastate); pedicels usually 1-1.5 cm. long, mostly curved or hooked

7. *E. subscandens.*

j. Leaves membranaceous, somewhat thicker, rhombic- to deltoid-ovate, rather coarsely and often somewhat hastately crenate-toothed, densely and softly villous or even tomentose beneath; pedicels usually 2-8 mm. long, mostly straight.

8. *E. odoratum.*

i. Leaves 2-5 cm. long; veins exerted and prominently reticulated beneath; heads in a leafy panicle.

9. *E. squalidum*, v. *subvelutinum.*

h. Scales lance-linear, acute; heads in a leafy-bracted thyrsoid panicle; leaves small (2-4 cm. long), not conspicuously reticulated beneath

10. *E. oxylepis*, v. *caracasenum.*

a. Leaves cordate at base. 11. *E. restolepis.*

1. *E. PELLIMUM* Klatt (see p. 272). VENEZUELA, without precise locality, *Funk & Schlim*, no. 522 (Gr.).

2. *E. MORITZIANUM* Sch. Bip. (see p. 273). MÉRIDA: in subalpine places, Mérida, *Moritz*, no. 1366 (Gr.).

3. *E. LAEVIGATUM* Lam. (see p. 273). FEDERAL DIST.: Caracas, *Birschel* (Gr., N. Y.).

4. *E. IVAEFOLIUM* L. (see p. 275). MÉRIDA: Tovar, *Fendler*, no. 1948 (Gr.).

5. *E. URTICOIDES* Sch. Bip. Nearly or quite herbaceous, 5 dm. high: stems round, branched above, sparingly beset with spreading jointed hairs; leaves opposite, rhombic-ovate, subchartaceous, coarsely serrate-dentate (the teeth sometimes again toothed), 6 cm. long, half as wide; panicles both terminal and from the upper axils, the ultimate cymes 3-7-headed; pedicels 7-18 mm. long; heads 45-60-flowered; involucre campanulate; scales 5-7-seriate, the inner long and narrow, scarious and with 1 green nerve, the apex subherbaceous, purplish and covered with orange glands, the outer scales gradually shorter, broader, and 3-striate, with subtriangular herbaceous appendages; corollas purple, 4.5 mm. long, glabrous; achenes (very immature) dark, the ribs stramineous and roughened.—Sch. Bip. ex Hieron. in *Engl. Bot. Jahrb.* xxviii. 568 (1901).—MÉRIDA: in warm places on the Victoriana road of Tovar, near La Viscaina, *Moritz*, no. 834, acc. to Hieron. l. c. FEDERAL DIST.: between La Guaira and Desaguados, near the city of Caracas, *Gollmer*, acc. to

Hieron. l. c. WITHOUT LOCALITY: *Lansberg*; acc. to Hieron. l. c. Not seen by the writer. The description compiled.

6. *E. MERIDENSE* Robinson. Herbaceous or somewhat shrubby perennial: stem erect, closely covered with short tawny wool of very fine matted hairs; internodes 3–6 cm. long; leaves opposite, lanceolate, attenuate-acuminate to each end, crenulate or subentire, firmish in texture, 4–6 cm. long, 1–1.5 cm. wide, bullate and puberulent above, tawny-tomentose on the 3 nerves and prominently reticulated veins beneath; corymb much rounded, compound, 1 dm. in diameter; heads numerous, pedicelled, about 10-flowered, 9 mm. high, 3.5 mm. in diameter; involucre slender-cylindric, 4–5-seriate; scales oblong, rounded or subtruncate at the ciliolate brownish summit; corollas presumably purple; achenes very slender, 3.2 mm. long or more, papillose on the ribs.—*E. scabrum* Sch. Bip. ex Hieron. in Engl. Bot. Jahrb. xxviii. 569 (1901), not L. f.—MÉRIDA: Mérida, *Moritz*, no. 1365 (Gr.).

7. *E. ODORATUM* L. (see p. 280). MÉRIDA: near Tovar, alt. 915 m., *Fendler*, no. 636 (Gr.), same locality, alt. 610 m., *Fendler*, no. 1949 (Gr.).

Var. *PAUCIFLORUM* Hieron. (see p. 281). MIRANDA: La Venta, *Wagner*, acc. to Hieron. in Engl. Bot. Jahrb. xxviii. 564 (1901). STATE NOT INDICATED: in bushy places at "Guajaca rumbo," alt. 600 m., *Wagner*, no. 277, acc. to Hieron. l. c.

8. *E. SUBSCANDENS* Hieron. (see p. 279). MÉRIDA: near Tovar, alt. 700 m., *Fendler*, nos. 1950 (Gr.) and 1950 β (Gr.).

9. *E. SQUALIDUM* DC. Shrub 1–2 m. in height, much branched above, densely pubescent; stems terete; branches ascending; leaves opposite, ovate, short-petioled, subcoriaceous, 2–5 cm. long, 1.5–3 cm. wide, 3-nerved from above the base, somewhat prominently reticulate-veiny beneath, puberulent above, slightly paler and more copiously sordid-pubescent beneath as well as closely beset with orange glands (appearing finally as a dark punctation); petiole 2–4 mm. long; inflorescence a leafy panicle; heads short-pedicelled, about 30-flowered, 8–10 mm. long, slender; involucre cylindric; scales firm, stramineous, somewhat browned toward the summit, closely imbricated in about 6 series, regularly graduated, rounded or usually somewhat narrowed to an obtuse apex, faintly 3-nerved, ciliolate; achenes slender, 3.5 mm. long, smooth or nearly so on the almost black faces, ciliolate on the light-colored ribs.—*Prod.* v. 142 (1836); *Bak.* in *Mart. Fl. Bras.* vi. pt. 2, 281 t. 77 (1876).

[Var. *typicum*. Stem hirsute-villous, the hairs spreading; leaves hirsute-villous beneath.—Common on plains in the interior of Brazil.]

Var. *SUBVELUTINUM* (DC.) Bak. Stem covered with a very fine incurved puberulence; leaves puberulent to sparingly tomentellous beneath.—Bak. l. c. 282.—MÉRIDA: near Tovar, *Fendler*, no. 1952 (Gr.).

Without adequate material to determine the extent to which the forms of this variable species are actually connected by intergradation, it has seemed best provisionally to accept Baker's disposition of the present plant as a variety of *E. squalidum*. It may be remarked that the leaves of the Fendler specimen are larger and more pointed than in any other material of *E. squalidum* seen by the writer, but concomitant differences of significance have not been observed.

10. *E. OXYLEPIS* DC. Shrubby, 1-2 m. high, much branched, scented; branches ascending, terete, somewhat woody, grayish-pubescent; leaves opposite, elliptic-ovate to ovate-lanceolate, subentire to crenate-serrate (often with a single tooth or sometimes with 2-4 teeth on each side), slightly roughened above, velvety-hirsute beneath, 2.8 cm. long, 1.6 cm. wide, 3-nerved from the base; petiole 2-4 mm. long; panicle much branched, very leafy; heads 14-20-flowered, 7-10 mm. high; involucre cylindrical, acute in bud; scales stramineous, firm, regularly graduated in 5-7 series, closely appressed, glabrous, slightly lucid, lanceolate to lance-linear, gradually narrowed to a really acute or (especially in the case of the outer) somewhat darkened and obtuse actual tip; corollas purple, cylindrical, glabrous.—Prod. v. 145 (1836); Bak. in Mart. Fl. Bras. vi. pt. 2, 284 (1876), excl. syn. *E. pungens* Gardn.

[Var. *typicum*. Heads about 1 cm. long; corollas 4-5 mm. long; achenes 3-4 mm. long.—Plains of Brazil, in provinces of Goyaz, Minas Geraës, São Paulo, etc.]

Var. *CARACASANUM* (Sch. Bip.) Hieron. Closely similar in habit, foliage, pubescence, etc.: heads somewhat smaller; involucre about 7 mm. long; corollas and achenes proportionally shorter.—Hieron. in Engl. Bot. Jahrb. xxviii. 567 (1901), as *caracasana*. *E. caracasenum* Sch. Bip. ex Hieron. l. c.—FEDERAL DIST.: Caracas, *Birschel* (Gr.), *Moritz*, no. 65, acc. to Hieron. l. c. MÉRIDA: on stony hills near Incantados de Petare, *Gollmer*, acc. to Hieron. l. c. MÉRIDA: near Tovar, alt. 671 m., *Fendler*, no. 1951 (Gr.), identified with the type material at the Royal Botanical Museum in Berlin by Dr. J. M. Greenman.

11. *E. XESTOLEPIS* Robinson (see p. 261). Stems round, woolly when young, almost smooth in age, dusky, pithy; branches widely spreading, curved (either upward or downward), sordidly and densely

woolly-villous; leaves opposite, ovate, sharply acuminate, cordate at the rounded base, crenate-serrate, 3-5 cm. long, 2-3 cm. wide, bullate and puberulent above, below gray-tomentose and prominently reticulated with transverse veins between the 3(-7) nerves; corymbs open and few-headed; pedicels spreading, slender, pubescent, 2-12 mm. long; heads about 9 mm. high, 6 mm. in diameter, about 28-flowered; involucre campanulate-subcylindric, the scales about 27, somewhat rigid, ivory-white, shining, 1-3-nerved, 4-5-seriate, promptly deciduous; corollas glabrous, 4 mm. long, the proper tube considerably exceeding the campanulate throat; pappus-bristles about 26, slightly clavellate and yellowish toward the top; achenes black, 4-5-angled, slightly scabrid on the angles.—MÉRIDA: near Tovar, *Fendler*, no. 638 (Gr.). FEDERAL DIST.: Caracas, *Birschel* (Gr.); on the old road from Caracas to La Guaira, alt. 1100-1700 m. *Pittier*, no. 5880 (U. S., N. Y.).

Sect. II. SUBIMBRICATA (DC.) Hoffm. (see p. 281).

KEY TO SPECIES.

- a. Perennial herbs or shrubs *b*.
b. Heads separate or in small (2-5-headed) glomerules, disposed in open panicles *c*.
c. Involucral scales 2-3(-5)-nerved or -ribbed *d*.
d. Leaves pinnately veined *e*.
e. Heads about 13-flowered; leaves attenuate at base, about 3 cm. wide; corolla with a perceptibly enlarged throat about as long as the proper tube. .12. *E. tovarense*.
e. Heads about 21-flowered; cauline leaves mostly rounded at base, 4.5-10 cm. wide; corolla without differentiated throat.13. *E. Squiresii*.
d. Leaves palmately 3(-5)-nerved *f*.
f. Heads about 5-flowered *g*.
g. Leaves crisped-puberulent to tomentose but not glandular beneath.14. *E. iresinoides*.
g. Leaves copiously glandular-pubescent beneath.15. *E. Wageri*.
f. Heads 20-25-flowered.22. *E. pycnocephalum*.
c. Involucral scales multiseriate; heads 1.2-1.6 cm. high.16. *E. vitalbae*.
b. Heads in flattish-topped fastigiately branched cymose panicles; leaves firm-coriaceous.17. *E. amygdalinum*.
b. Heads crowded in corymbose or thyrsoid panicles *h*.
h. Leaves lanceolate to rhombic-ovate, attenuate to an essentially sessile base.18. *E. inulaefolium*.
h. Leaves ovate-oblong to suborbicular, mostly rounded or obtuse at the distinctly petioled base *i*.
i. Shrubs (except *E. tenuifolium*); heads 4-10-flowered *j*.

- j. Leaves thickish and velvety or firm and subcoriaceous *k*.
k. Heads in thyrsoid panicles; scales rounded or obtuse at the somewhat narrowed tip; stem glabrate
 19. *E. morifolium*.
k. Heads in a corymbosely branched flattish-topped panicle; scales acute; stem tomentose. . . 20. *E. Vargasianum*.
 j. Leaves thin and delicate, glabrous, rhombic-ovate
 21. *E. tenuifolium*.
i. Herbaceous perennial; heads 20-25-flowered. 22. *E. pycnocephalum*.
a. Annual; leaves thin, ovate; heads small, in an open panicle
 23. *E. microstemon*.

12. *E. TOVARENSE* Robinson (see p. 259). Branches slender, virgate, leafy, sordidly puberulent; leaves opposite, short-stalked, lance-oblong, attenuate-acuminate, cuneate at the base, feather-veined, 7-11 cm. long, 2.8-3.3 cm. wide, remotely and obscurely cuspidate-denticulate, membranaceous, green on both surfaces, glabrous above, puberulent on the veins and atomiferous beneath; petiole about 1 cm. long; panicle divaricately branched, leafy-bracted, puberulent, its branches naked toward the base; pedicels 1-3 mm. long; heads about 13-flowered, 6 mm. high, 3.5 mm. in diameter; involucre campanulate; scales about 21, stramineous-scarious, 3-4-seriate, dorsally puberulent toward the rounded tip, mostly 3-nerved and 2-4-ribbed; corollas 3 mm. long, microscopically granulate on the outside of the limb, the proper tube about equalling the slightly but distinctly enlarged throat; achenes 1.5 mm. long, black, slightly papillose on the angles; pappus-bristles about 36, white, delicately capillary.—MÉRIDA: near Tovar, alt. 1200 m., *Fendler*, no. 1947 (Gr.).

13. *E. SQUIRESII* Rusby (see p. 258). Tall perennial herb or virgate-branched shrub; stem smooth, green; leaves opposite, short-petioled, oblong, narrowed to both ends, short-acuminate at apex, usually rounded at base but sometimes slightly decurrent on the petiole, repand-dentate, feather-veined, membranaceous, green on both surfaces, glabrous throughout or sordid-puberulent on the midrib and veins beneath, 9-22 cm. long, about half as wide; panicle large, terminal, leafy-bracted to the middle, as much as 3 dm. long and 2 dm. in diameter, its branches divaricate, some bearing heads (on short secondary branchlets) almost or quite from the base; heads about 22-flowered, 6 mm. high; involucre pale straw-colored and scarious; scales in 3-4 series, graduated, dorsally somewhat pubescent toward the rounded apex; corollas yellowish-white; achenes black, 1.3 mm. long.—DELTA AMACURO: Paloma, *Rusby & Squires*, no. 2 (N. Y., Gr.).

14. *E. IRESINOIDES* HBK. (see p. 285).

Var. *a.* *VILLOSUM* Steetz. Leaves copiously villous to tomentose beneath; scales of the involucre acute to acuminate.—Steetz in Seem. Bot. Herald, 145 (1854).—MÉRIDA: Tovar, *Moritz*, no. 1722, *Fendler*, nos. 624 (Gr.), 1946 (Gr.). FEDERAL DIST.: Caracas and La Guaira, *Moritz*, acc. to Steetz, l. c. ARAGUA: Las Adjuntas, *Eggers*, no. 13,346 (U. S.). MARGARITA ISL.: El Valle, *Miller & Johnston*, no. 129 (Gr.); San Juan Mountain, *Johnston*, no. 95 (Gr.).

Var. *β.* *GLABRESCENS* Steetz. Leaves sparingly villous or nearly smooth; scales of the involucre acute or acuminate.—Steetz in Seem. Bot. Herald, 145 (1854).—FEDERAL DIST.: on mountains and in mountain gorges, in moist shady places among Agaves, La Guaira, *Otto*, no. 383 (Gr.); also *Moritz*, acc. to Steetz, l. c. CARABOBO: Puerto Cabello, *Curran & Haman*, no. 1153 (Gr.).

Var. *γ.* *BREVIFLORUM* Hieron. Stems whitish-tomentellous; leaves deltoid-ovate, conspicuously and cuneately decurrent upon the petioles; heads slightly smaller; involucre about 4 mm. long, the scales broader, the inner and middle obtuse, the outermost acutish.—Hieron. in Engl. Bot. Jahrb. xxviii. 573 (1901), as *breviflora*.—MÉRIDA: near Tovar, *Fendler*, nos. 623 (Gr.), 1946 (Gr.). FEDERAL DIST.: Caracas, *Birschel*. The type of this well marked variety was a plant cultivated in the Royal Garden at Berlin, about 1843 (phot. Gr.).

15. *E. WAGENERI* Hieron. Doubtfully shrubby; branches slightly sulcate-angled or subterete, velvety; internodes as much as 4.5 cm. long; leaves opposite, petiolate, broadly deltoid-ovate, shortly acuminate to an acutish or obtusish point, entire or undulate, cuneate and decurrent on the petiole, membranaceous, glandular-puberulent above, densely glandular-pubescent beneath, 3-nerved well above the base, as much as 4.5 cm. long and 3 cm. wide; panicle terminal; heads 5-flowered, cymosely glomerate, sessile or very shortly pedicelled; involucre turbinate-cylindric; scales about 12, scarious, dark-stramineous, ciliolate toward the obtusish but spinulose-mucronate tip; the inner about 4 mm. long, the outer gradually shorter; corolla (in dried state) yellowish, 2.5 mm. long, the proper tube scarcely more than 0.75 mm. long, the throat funnel-formed, 1.25 mm. long; style-branches scarcely thickened; pappus-bristles yellowish-white, connate into an annulus at the base; achenes 1.5 mm. long, the concolorous ribs roughened, the faces scabrid-pilose.—Hieron. in Engl. Bot. Jahrb. xl. 375 (1908).—VENEZUELA: without locality, *Wagner*, no. 178, acc. to Hieron. l. c. Not seen by the writer, the description compiled.

16. *E. VITALBAE* DC. (see p. 299). A species of frequent occurrence and wide distribution in the warmer parts of America, but not yet reported from Venezuela. However, as it is known to occur in Colombia, to the west, Dutch Guiana to the east, and Brazil, to the south, its ultimate discovery in this as yet very slightly explored country, seems highly probable.

17. *E. AMYGDALINUM* Lam. (see p. 301). VENEZUELA: without locality, *Moritz*, no. "6(80)" (Gr.). MÉRIDA: near Tovar, *Fendler*, no. 654 (Gr.). FEDERAL DIST.: Galipan near Caracas, *Kuntze*, no. 1525b (N. Y.).

A very sketchy subdivision of this species has been attempted by *Kuntze*, *Rev. Gen.* i. 337 (1891). Quite without detailed statement of differential characters, ranges, previous literature, or of critically determined exsiccatæ the treatment is of little value. The subdivisions are based on characters which are confessedly subject to independent variation, their combinations being numerous and inconstant, so that they have almost no classificatory value. Finally to make the matter worse, even the rank of the proposed subcategories is in several cases left wholly obscure.

18. *E. INULAEFOLIUM* HBK., forma *TYPICUM* (see p. 292). Widely distributed from Colombia to Brazil, and with scarcely a doubt to be found in Venezuela.

Forma *SUAVEOLENS* (HBK.) *Hieron.* (see p. 292). MÉRIDA: near Tovar, *Fendler*, no. 641 (Gr.).

19. *E. VARGASIANUM* DC. (see p. 289). BERMUDEZ: Aragua, *Cruger* (K.) FEDERAL DIST.: Caracas, *Vargas* (DC., phot. Gr.), *Linden*, no. 137 (K.). MÉRIDA: near Tovar, *Fendler*, no. 647 (Gr.).

20. *E. MORIFOLIUM* Mill. (see p. 293). MÉRIDA: near Tovar, *Fendler*, no. 646 (Gr.).

To this species may be provisionally referred *Critonia heteroneura* *Ernst*, *Flora*, lvii. 210 (1874). FEDERAL DIST.: on Mt. Galipan near Caracas, *Ernst*. No material authentically representing *Ernst's* species has been seen, yet his description is careful and so detailed that it is possible to check up the many points in which his plant agrees fully with *E. morifolium*. It is true the florets are said to be only four, while in *E. morifolium* they are often considerably more numerous, but the number appears to be quite variable even in specimens obviously otherwise identical. The peculiar nervation, on which *Ernst* laid stress as a differential character and which suggested the name he chose for his plant, can be accurately matched even in specimens from Vera Cruz, the type-region of *E. morifolium*.

21. *E. MACROPHYLOIDES* Robinson (see p. 249). Tall soft-wooded shrub 3-4 m. high; stems round, tawny-woolly; leaves opposite, triangular-ovate, acute or acuminate, subtruncate at base but shallowly cordate at the point of insertion, crenulate practically from the base, about 1 dm. long and 8 cm. wide, membranaceous, soft in texture, 3-nerved (the lateral nerves bearing on the outer side several branches almost from the base), dusty-puberulent above, grayish and softly pubescent beneath; petioles as much as 6 cm. long; inflorescence a trifid compound corymb, the parts dense, rounded, many-headed; heads short-pedicelled, about 11-flowered; involucre subcylindrical, rather loosely imbricated; scales about 4-seriate, thin, straw-colored, the inner oblong-linear, rounded at the apex, the outer gradually shorter, obtuse, ciliolate; corolla probably whitish, 4 mm. long; the slender proper tube about as long as the perceptibly and gradually enlarged throat; style-branches filiform; achenes 2 mm. long, hispid; pappus-bristles about 36, unequal.—VENEZUELA (state not indicated): at "Sanchoquig," *Eggers*, no. 13,413 (U. S.).

22. *E. TENUIFOLIUM* HBK. Herbaceous perennial; stem slightly angled, branching toward the top and leafy almost to the summit; internodes as much as 7 cm. long; leaves opposite, slender-petioled, rhombic-ovate, acute, sharply dentate except at the cuneately contracted base, 3-nerved, membranaceous, thin, 6-7 cm. long, 3-4.5 cm. wide, glabrous above, pubescent on the nerves and veins beneath; heads about 7-flowered, sessile in dense subglobose glomerules; involucre cylindrical; scales about 14, very unequal, the inner linear-oblong, obtuse or rounded at the tip, subglabrous, the outer gradually shorter, ovate, ciliate, subacute.—*Nov. Gen. et Spec.* iv. 107 (1820).—BERMUDEZ: between Bordones and Cumana, *Humboldt & Bonpland* (Par., phot. and trac. Gr.).

23. *E. PYCNOCEPHALUM* Less. (see p. 296). MÉRIDA: near Tovar, *Fendler*, no. 1953 (Gr.). A form somewhat more pubescent than the nearly smooth Mexican type, but without other differences of moment.

24. *E. MICROSTEMON* Cass. (see p. 295). *E. microstemon*, *a. albiflorum* Ktze. *Rev. Gen.* i. 338 (1891). MÉRIDA: near Tovar, *Fendler*, nos. 648 (Gr.), 1943 (Gr.). VENEZUELA, without locality, acc. to Kuntze, l. c.

Var. *LILACINUM* Ktze. Florets lilac.—*Rev. Gen.* i. 338 (1891).—MÉRIDA; near Tovar, *Fendler*, no. 6493 (Gr.).

Sect. III. EXIMBRICATA (DC.) Hoffm. (see p. 303).

KEY TO SPECIES.

- a. Leaves 3(-5)-nerved from or slightly above the base b.
 b. Heads 10-15-flowered, panicle 25. *E. solidaginoides*.
 b. Heads 20- α -flowered, corymbed c.
 c. Villous, the hairs rather long, slender, clearly articulated; herbaceous or suffruticose d.
 d. Creeping; rhizome filiform; stems several; leaves about 1.8 cm. long and 1.3 cm. wide 26. *E. sillense*.
 d. Not creeping; leaves 5-7 cm. long, 4-5 cm. wide e.
 e. Leaves coarsely and crenately 7-10-toothed on each side 27. *E. articulatum*.
 e. Leaves serrately or crenately 12-18-toothed on each side 28. *E. ibaguense*.
 c. Puberulent, the hairs very short, not articulated or very obscurely so 28a. *E. n. sp.?*
- a. Leaves pinnate-veined, oblong or elliptical, coriaceous; shrubs, often viscid on the involucre g.
 g. Heads about 6-flowered; leaves 6-9.5 cm. long, woolly on the midrib beneath 29. *E. Jahni*.
 g. Heads 10-15-flowered; leaves 2-3.5 cm. long h.
 h. Leaves elliptical, the exserted veinlets beneath not sulcate; pubescence of spreading attenuate bristles . . . 30. *E. flavisetum*.
 h. Leaves oblong, the exserted veinlets beneath sulcate; pubescence scanty, of short incurved hairs 31. *E. theaeifolium*.

25. *E. SOLIDAGINOIDES* HBK. (see p. 310). MÉRIDA: near Tovar, alt. 1067 m., *Fendler*, no. 629 (Gr.).

26. *E. SILLENSE* Hieron. Creeping by means of threadlike rhizomes; stems several, as much as 4 dm. high, sparingly villous, the hairs articulated; internodes sometimes as much as 5 cm. long; leaves opposite, petiolate, ovate, short-acuminate, crenate except at the rounded or cordate base, membranaceous, green and slightly glaucous on both surfaces, villous especially on the nerves, the largest 1.8 cm. long, 1.3 cm. broad; petiole scarcely over 1 cm. long; heads rather loosely cymose-corymbed at the top of the stem, 20-25-flowered; pedicels as much as 8 mm. long; involucre campanulate, the scales 12-14, linear, obtusish, nearly equal, 4.5 mm. long, thin, scarious and somewhat stramineous, villous-ciliate, 3-nerved; corollas about 3.25 mm. long, yellowish-white (in dried state); the proper tube about equalling the campanulate throat.—Hieron. in Engl. Bot. Jahrb. xl. 382 (1908).—FEDERAL DIST.: on Mt. Silla de Caracas, 20 January, 1856, *Gollmer*, without number. Not seen by the writer; said to resemble *E. caducisetum* DC. and *E. glechonophyllum* Less. Description compiled.

27. *E. ARTICULATUM* Sch. Bip. (see p. 316). MÉRIDA: in grassy places on the Sierra de Mérida, *Moritz*, nos. 1371 and 1410, acc. to Hieron, l. c. 385.

28. *E. IBAGUENSE* Sch. Bip. (see p. 317). MÉRIDA: near Tovar, *Fendler*, nos. 642 (Gr.), 643 (Gr.). FEDERAL DIST.: Caracas, *Moritz*, no. 252 (sk. and fragm. Gr.).

28a. *E. n. sp.?* At this point in keying the available material of the Venezuelan Eupatoriums is to be placed a doubtfully distinct plant represented from Tovar by Fendler's nos 649 and 650, both being in the Gray Herbarium. In nearly all technical characters close to the preceding, this plant differs in being smoother. The whole plant, in the two specimens seen, is strongly nigrescent in drying. The stem, with arched-ascending opposite branches, becomes smooth and strongly lignified toward the base. Although the plant is probably undescribed, it seems best pending further knowledge of its near relatives to leave it unnamed, especially as the material is too young to show the flowers in full anthesis.

29. *E. JAHNII* Robinson (see p. 248). Shrub; stems stout, jointed, virgate, leafy, terete, dark-purple, at first sparingly sordid-woolly, soon glabrate; internodes 2-3 cm. long; leaves oblong, acute or acutish at both ends, serrate-dentate, pinnately veined (about 10 veins on each side of the midrib), coriaceous, 6-9.5 cm. long, 2.3-4 cm. wide, above subglabrous and slightly lucid, the midrib somewhat woolly-villous, beneath sordid- or tawny-villous or woolly on the midrib and chief veins; petiole about 8 mm. long; corymb terminal, flattish or moderately convex, 7-9 cm. in diameter, crowded, many-headed, its branches and pedicels purplish-brown, pubescent; heads about 6-flowered, about 11 mm. high and 4 mm. in diameter; involucre subcylindric-campanulate, often viscid, the scales about 11, about 2-seriate, loosely imbricated but unequal, thickish except on the edges, dorsally convex, puberulent and somewhat glandular; corolla (probably purplish but in dried state pale brownish-yellow) 6 mm. long, glabrous, the proper tube much exceeded by the subcylindrical perceptibly enlarged throat; achenes 3.5 mm. long, very shortly hispidulous on the angles; pappus-bristles about 37, yellowish-white, stiffish, unequal.—MÉRIDA: Sierra de Mérida (Rio de Nuestra Señora), alt. 3000-4000 m., 16 January, 1910, *Dr. Alfredo Jahn*, no. 80 (U. S., phot. Gr.).

30. *E. FLAVISETUM* Robinson (see p. 244). Shrub with round ascending jointed branches; branchlets leafy, at first densely covered with yellowish or tawny spreading short but attenuate often curved

bristles; leaves opposite, elliptical, obtuse or rounded at both ends, crenate-serrate, coriaceous, 3-3.5 cm. long, 1.3-2 cm. wide, finely reticulated on both surfaces (the veinlets exerted but not sulcate), sparingly setulose above, more copiously setose chiefly on the midrib and larger veins beneath; petioles 1-3 mm. long; corymbs small, dense, terminal, 2-3 cm. in diameter; pedicels short, stout, shaggy with yellowish bristles; involucre campanulate, pubescent; scales about 20, of firm texture, lanceolate, loosely imbricated in about 2 series, ciliolate, often darker toward the tip; corollas glabrous, 5.5 mm. long; the proper tube 2 mm. long, the perceptibly enlarged throat campanulate-subcylindrical, 3 mm. long; anthers rounded at base, the apical appendage blunt or retuse; achenes 3.5 mm. long, hispidulous especially on the angles.—“VENEZUELA, &c.” coll. of 1842-3, *Funcke*, no. 520 (K., phot. Gr.).

31. *E. THEAEFOLIUM* Benth. (see p. 309). VENEZUELA: without locality, *Linden*, no. 464 (Gr.). TRUJILLO: Páramo de Jabón, alt. 3000-3200 m., *Jahn*, no. 29 (U. S.).

Sect. IV. PRAXELIS (Cass.) Benth. (see p. 318).

32. *E. PAUCIFLORUM* HBK. (see p. 319). *E. urticifolium* Bak. in Mart. Fl. Bras. vi. pt. 2, 343 (1876), t. 91, not *E. urticaefolium* L. f.—MÉRIDA: near Tovar, alt. 610 m., *Fendler*, no. 1955 (Gr.).

Sect. V. CONOCLINIUM (DC.) Benth. (see p. 320).

Leaves ovate, 3-nerved, green beneath 34. *E. ballotifolium*.
Leaves narrowly oblong, pinnately many-veined, white beneath.

35. *E. stoechadifolium*.

33. *E. BALLOTAEFOLIUM* HBK. (see p. 321). *E. ballotifolium* [HBK.] Ktze. Rev. Gen. i. 337 (1891).—MÉRIDA: near Tovar, alt. 1067 m., *Fendler*, no. 653 (Gr.). FEDERAL DISTRICT: around Caracas, alt. 800-1200 m., *Pittier*, no. 5869 (N. Y.); La Guaira to Caracas, *Kuntze*, no. 1244 (N. Y.); Coticita, *Curran & Haman*, no. 1065 (Gr.); between La Guaira and Rio Grande, *Curran & Haman*, no. 1032 (Gr.); La Guaira, *Robinson & Lyon*, acc. to Johnston, Proc. Bost. Soc. Nat. Hist. xxxiv. 267 (1909). STATE NOT CLEAR: Quebreda de Anoisco, *Eggers*, no. 13,108 (U. S.). MARGARITA ISL.: El Valle, *Miller & Johnston*, no. 234 (Gr.); San Juan Mountain, alt. 500 m., *Johnston*, no. 95 (Gr.).

34. *E. STOECHADIFOLIUM* L. f. (see p. 324). MÉRIDA: Páramo de Mucuchies, *Moritz*, no. 1409 (Gr.).

Sect. VI. *HEBECLINIUM* (DC.) Benth. (see p. 327).

35. *E. MACROPHYLLUM* L. (see p. 329). MÉRIDA: near Tovar, alt. 915 m., *Fendler*, no. 644 (Gr.).

EXCLUDED SPECIES.

It has been impossible to ascertain upon just what material "*E. heptanthum* Sch. Bip." was reported by Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907) from Venezuela where "apparently collected by Seemann." From Rusby's description, however, and from Bolivian material referred by him to *E. heptanthum* it has become entirely clear that he applied the name to a plant wholly distinct from the one so named and described by Weddell, Chlor. And. i. 217 (1857).

For *E. azangaroense* Sch. Bip. the following station, which might be inferred to have been Venezuelan, is given by Weddell, Chlor. And. i. 217 (1857): "CARACAS: dans la Sierra-Nevada de Santa Marta¹, h. 2600 m. (Funck, *exsicc.* no. 391)". However, from the sequence of Funck's numbers mentioned elsewhere in the same work it appears clear that the Sierra-Nevada de Santa Marta mentioned here was the well known one in Colombia.

EUPATORIUMS OF ECUADOR.

The most complete previous treatments of the Ecuadorian Eupatoriums have been those of Jameson, Syn. Pl. Aeq. ii. 79-90 (1865), and of Hieronymus in Engl. Bot. Jahrb. xxix. 5-15 (1900). In these Jameson described 1 species of *Hebeclinium*, which he maintained as a separate genus, and 25 species of *Eupatorium*, while Hieronymus, enumerating only such plants as were contained in the extensive collections of the late Prof. A. Sodiro, listed 31 species and 2 varieties of *Eupatorium*, giving many helpful notes regarding the older species as well as diagnoses of several newly recognized members of the group. In neither of these treatments was there any attempt to key the plants.

In comparing the Eupatoriums of Ecuador with those of Colombia one is struck by the considerably altered proportions of the sections. Thus of the common and widely distributed Sect. *Cylindrocephala*, represented in Colombia by no less than 20 species and several well marked varieties, there are in Ecuador only 4 species. The two small

sections, *Praxelis* and *Campuloclinium*, represented in Colombia, are as yet unrecorded in Ecuador. Of Sect. *Conoclinium*, with 6 chiefly endemic species in Colombia, there are but 2 species in Ecuador. On the other hand, Sect. *Hebeclinium*, with but 4 species in Colombia, has no less than 6 species in the much smaller area as yet botanically explored in Ecuador. By far the greater part of the Ecuadorian Eupatoriums fall into Sect. *Subimbricata* and Sect. *Eximbricata*. These sections are about equally represented and in Ecuador as elsewhere they are quite confluent, their separation, although convenient and almost necessary for purposes of classification, being manifestly artificial.

The absence from Ecuador of certain species known to occur both in Colombia and Peru may well be due to imperfect exploration. In this connection it is to be remembered that botanical investigation of the country has as yet been restricted to limited and relatively accessible areas, but that the country as a whole presents such remarkable diversity in altitude, temperature, precipitation, exposure, and soil conditions that when more fully explored, especially when the large and little known Prov. Oriente has been investigated, it can scarcely fail to yield an exceedingly rich flora greatly extending the representation of this as well as other large genera.

Of species pretty certain to be found in Ecuador *E. amygdalinum* Lam., *E. pauciflorum* HBK., and *E. macrophyllum* L. may be mentioned with a fair degree of confidence.

For a key to the sections of the genus, see p. 269.

Sect. I. CYLINDROCEPHALA DC. (see p. 270).

KEY TO SPECIES.

- a. Leaves ovate or lanceolate, long-acuminate or gradually narrowed to the apex b.
- b. Petiole one sixteenth to one eighth the length of the leaf-blade; heads 7-8(-10)-flowered, very slender, acute or acutish in bud.....1. *E. leptcephalum*.
- b. Petiole at least one-fifth as long as the blade; heads 10-35-flowered, obtuse or obtusish in bud.....2. *E. odoratum*.
- a. Leaves oval or elliptical, merely acutish to short-acuminate c.
- c. Heads in flattish or moderately convex corymbs; involucrel scales viscid, scarcely or not at all ciliate.....3. *E. laevigatum*.
- c. Heads subsessile in paniced glomerules; involucrel scales conspicuously ciliate, not noticeably viscid.....4. *E. Eggersii*.

1. *E. LEPTOCEPHALUM* DC. (see p. 278). To this species the writer would refer *E. tequendamense*, vars. *glanduloso-pubescentis* and *glabrata* Hieron. in Engl. Bot. Jahrb. xxix. 6 (1900). Examined in fragments kindly supplied to the Gray Herbarium some years ago by the management of the Royal Botanical Garden at Berlin, these varieties are found to differ but slightly and in degree only, either from each other or from authenticated material of *E. leptoccephalum*. On the other hand they may be distinguished from the typical Colombian form of *E. tequendamense* (= *E. subscandens* Hieron.) in having more slender fewer-flowered heads, straight pedicels, and leaves much more attenuate at the base. To *E. leptoccephalum* the following Ecuadorian material may be referred. PICHINCHA: Quito, Jameson (Gr.); Nieblí, Sodiro, no. 6/26 (Berl., fragm. Gr.). PROVINCE NOT INDICATED: Seemann (Gr.).

2. *E. ODORATUM* L. (see p. 280). *E. floribundum* HBK. Nov. Gen. et Spec. iv. 118, t. 344 (1820); Jameson, Syn. Pl. Aeq. ii. 80 (1865). *E. conyzoides*, var. *floribundum* (HBK.) Hieron. in Engl. Bot. Jahrb. xxix. 5 (1900), as *floribunda*.—LOJA: between Loja and the Rio Catamayo, Humboldt & Bonpland, no. 3426 (Par., phot. Gr.); in mountains, acc. to Jameson, l. c. CHIMBORAZO: in the Valley of Pallatanga, alt. 1600 m., Sodiro, no. 6/27, acc. to Hieronymus, l. c.

3. *E. LAEVIGATUM* Lam. (see p. 273); Hieron. in Engl. Bot. Jahrb. xxix. 5 (1900).—PICHINCHA: in temperate region, near Nieblí, alt. 1400–2000 m., Sodiro, no. 6/25, acc. to Hieronymus, l. c.

4. *E. EGGERSII* Hieron. Climbing smoothish shrub with round widely spreading branches; leaves opposite, elliptical-ovate, obtusish or shortly acuminate to an obtuse point, rounded at base, glabrous, 3–4.5 cm. long, 2.4–2.8 cm. wide, conspicuously 3-nerved, the nerves prominent beneath, depressed in furrows above; panicles leafy-bracted, the opposite spreading branches capituliferous chiefly toward their ends; heads about 10-flowered, subsessile in ovoid to subglobose glomerules; involucreal scales stramineous, about 4-seriate, ovate, ciliate, narrowed to an obtuse hairy appressed tip, mostly with a broadish median nerve closely flanked by two narrow lateral ones; corollas glabrous, the tube about 3 mm. long, scarcely enlarged into a throat about 2 mm. long; achenes glabrous, blackish, 5(–7)-costate, about 3 mm. long; pappus-bristles stiffish, yellowish-white.—Hieron. in Engl. Bot. Jahrb. xxviii. 566 (1901).—MANABÍ: near the Hacienda El Recreo, Eggers, no. 15,414 (Berl., phot. and fragm. Gr.).

Sect. II. SUBIMBRICATA (DC.) Hoffm. (see p. 281).

KEY TO SPECIES.

- a. Leaves pinnately veined; shrubs or trees *b*.
- b. Heads 4-12-flowered *c*.
- c. Leaves ovate to broadly oblong, 8-13 cm. wide, pellucid-punctate.....14. *E. morifolium*.
- c. Leaves narrowly oblong, 1-2 cm. wide, not pellucid-punctate.....5. *E. salicinum*.
- b. Heads 14-40-flowered *d*.
- d. Leaves lance-oblong, cordate at base.....6. *E. glutinosum*.
- d. Leaves not cordate; a group of very closely related and perhaps wholly artificial species likely to be found confluent when better known *e*.
- e. Erect shrubs or small trees *f*.
- f. Branches tetragonal; leaves cuneate at base *g*.
- g. Heads about 20-flowered; leaves elliptic-lanceolate, almost equally pointed at the ends, white-tomentose beneath, 3 times as long as wide...7. *E. cacalioides*.
- g. Heads about 15-flowered; leaves oblong-lanceolate, gradually acuminate to the apex, more abruptly cuneate at base, about 4 times as long as wide, yellowish-tomentose beneath....8. *E. buddleaeifolium*.
- f. Branches hexagonal; leaves rounded at base or very shortly acuminate to the point of attachment *h*.
- h. Leaves white-tomentose beneath; erect shrub
9. *E. persicifolium*.
- h. Leaves delicately and somewhat obscurely pubescent beneath; tree.....10. *E. arboreum*.
- e. Climbing shrub; branches round, sulcate; leaves rounded at the base, canescent-tomentose beneath
11. *E. salviaefolium*.
- a. Leaves palmately 3(-7)-nerved from the base or from a point somewhat above the base or if pinnately veined having 2 of the lower lateral veins considerably longer and more conspicuous than the rest *i*.
- i. Heads 4-12- or rarely (in *E. lloense*) as many as 16-flowered *j*.
- j. Leaves strongly discolorous, the lower surface conspicuously whitened by a minute lanulate pubescence; heads about 11-flowered *k*.
- k. Leaf-blade ovate-oblong, obtuse, rounded at the base
12. *E. organoides*.
- k. Leaf-blade deltoid-ovate, acutish, cordate at the base
13. *E. niveum*.
- j. Leaves (when mature) never whitened beneath *l*.
- l. Heads thyrsoid; leaves very large (12-20 cm. long, 8-13 cm. wide).....14. *E. morifolium*.
- l. Heads corymbed or loosely paniced; leaves considerably smaller *m*.
- m. Inflorescence an open panicle *n*.
- n. Heads 12-16-flowered; leaves ovate-lanceolate, glabrous beneath.....15. *E. lloense*.

- n. Heads about 5-flowered, disposed singly or by few-headed glomerules in a loose forking cymose panicle; leaves sparingly pubescent to velvety beneath.....16. *E. iresinoides*.
- m. Inflorescence compact; heads crowded o.
- o. Leaves obtusish or barely acute p.
- p. Heads sessile or nearly so; leaves crenate almost from the base; shrub.....17. *E. chamaedrifolium*.
- p. Heads slender-pedicelled; leaves crenate from about the middle or subentire; tree.....18. *E. prunifolium*.
- o. Leaves acuminate or attenuate q.
- q. Leaves ovate, slender-petioled r.
- r. Leaves thin, delicately membranaceous; involucreal scales ciliate but slightly if at all dorsally pubescent; corollas about 3.5 mm. long.....19. *E. pseudoglomeratum*.
- r. Leaves thickish or somewhat firm s.
- s. Scales dorsally pubescent as well as ciliate; corollas (probably white) 3.5 mm. long
20. *E. pseudoriganoides*.
- s. Scales ciliate but essentially glabrous dorsally; corollas (lilac-blue) 5.5-6 mm. long. 21. *E. Stuebelii*.
- q. Leaves rhombic-ovate or lanceolate, subsessile or on short thickish petioles.....22. *E. inulaefolium*.
- i. Heads 18-70-flowered t.
- t. Heads densely corymbed u.
- u. Leaves deltoid-ovate, 2-3 cm. long, coarsely crenate; petioles 2-4 mm. long.....23. *E. rugosum*.
- u. Leaves 6-9 cm. long; petioles 5-10 mm. long v.
- v. Leaves ovate or ovate-lanceolate, more than half as long as broad, punctate but essentially glabrous beneath.....24. *E. obscurifolium*.
- v. Leaves ovate-lanceolate, about a third as long as broad, pubescent and glandular-atomiferous beneath.....25. *E. chimborazense*.
- t. Heads loosely paniced w.
- w. Climbing shrub; leaves coriaceous; heads 10-12 mm. high.....26. *E. vitalbae*.
- w. Annual herb; leaves thin, membranaceous; heads about 4 mm. high.....27. *E. microstemon*.

5. *E. SALICINUM* Lam. (see p. 286); HBK. Nov. Gen. et Spec. iv. 131 (1820); Jameson, Syn. Pl. Aeq. ii. 81 (1865); Hieron. in Engl. Bot. Jahrb. xxix. 11 (1900).—PICHINCHA: at the base of Mt. Pichincha, alt. 3050 m., Jameson, no. 154 (K.). CHIMBORAZO: at the foot of the Volcano Tunguragua, near the village of Penipe, alt. 2470 m., Humboldt & Bonpland (Par., phot. Gr.). PROV. NOT INDICATED: in shade among thickets on high plains, Sodiro, no. 6/28, acc. to Hieron. l. c.

Although no material of *E. Jamesonii* Turcz. Bull. Soc. Nat. Mosc. xxiv. pt. 1, 169 (1851) has been seen by the writer, it is impossible from its character and habitat to doubt its identity with *E. salicinum* Lam., with which it appears to agree fully in all important features.

6. *E. GLUTINOSUM* Lam. Shrub or small tree 2-3 m. high; branches terete, striate-angulate, purple, glandular-pubescent, vernicose and very sticky; leaves opposite, petiolate, lanceolate, gradually narrowed from near the cordate base to the attenuate tip, 7-12 cm. long, 2-3 cm. wide, thickish, glabrous and lucid but deeply bullate and rugulose above, white-velvety beneath; petiole 1-1.8 cm. long; corymbs terminal, scarcely exceeding the leaves, many-headed but not very crowded; pedicels mostly 1-1.5 cm. long, purple, glandular-puberulent, viscid, flexuous; heads 1 cm. high and equally thick, about 30-flowered; involucre campanulate, 5 mm. high; scales about 22, moderately unequal but rather loosely imbricated (transitional between § *Subimbricata* and § *Eximbricata*), the outer ovate, the intermediate lanceolate, acute or acuminate, dorsally convex, glandular-puberulent, the innermost linear; corollas purple, smooth, 5.5 mm. long, very slightly and gradually enlarged from near the base to the summit but without clearly marked throat; achenes glabrous; pappus-bristles about 37, yellowish-white, slightly stiffish, finely hispidulous.—*Encyc.* ii. 408 (1786); *HBK. Nov. Gen. et Spec.* iv. 131 (1820); *Benth. Pl. Hartw.* 198 (1845); *Jameson, Syn. Pl. Aeq.* ii. 84 (1865); *Hieron.* in *Engl. Bot. Jahrb.* xxix. 10 (1900), xxviii. 571 (1901).—*PICHINCHA*: 1833, *F. Hall* (sk. and fragm. Gr.); Andes of Quito, *Jameson* (Gr.). *PICHINCHA* OR *LEON*: between Mulaló and El Tambillo, alt. 2745 m., *Humboldt & Bonpland*. *CHIMBORAZO*: in the upper region of thickets near Pangor and Huangopod, near Cajabamba, alt. 2900-3400 m., *Lehmann*, no. 5191 (N. Y.); in scattered thickets on the western slopes of Chimborazo and Mt. Tiupullo, alt. 3000-3300 m., *Lehmann*, no. 7960, acc. to *Hieron.* l. c. *PROV. NOT INDICATED*: in the Achupoyas Mountains, *Hartweg*, no. 1094 (sk. and fragm. Gr.). *VERNACULAR NAMES*: *matico*, *chusalonga*.

7. *E. CACALIOIDES* HBK. A shrub with tetragonal dark-purple viscid or vernicose branches; leaves opposite, petiolate, oblong-lanceolate, acuminate at apex, almost equally pointed at base, 7-8 cm. long, 2-2.6 cm. wide, subcoriaceous, glabrous, finely reticulated and dark-green above, canescent-tomentose beneath; petiole 1.5 cm. long, smoothish, channelled above; corymbs terminal, dense, not exceeding the leaves; branchlets and pedicels pubescent; heads sessile and pedicelled, about 8 mm. high, about 20-flowered; corollas tubular, glabrous, blue (*Townsend*); achenes dark, 3 mm. long, hispidulous-roughened on the ribs.—*Nov. Gen. et Spec.* iv. 130 (1820); *Jameson, Syn. Pl. Aeq.* ii. 86 (1865).—*PICHINCHA*? "in Regno Quitensi?" *Humboldt & Bonpland* (*Par.*, phot. Gr.). *CHIMBORAZO*:

Cordillera de Riobamba, acc. to Jameson, l. c. LOJA: between Utuana and Colaisaca, alt. 2540-2640 m., *C. H. T. Townsend*, no. 995 (U. S.). Pressed leaves have the odor of licorice (Townsend).

8. *E. BUDDLEAEFOLIUM* Benth. Shrub; branches purplish-brown, smooth, shining, vernicose; internodes about 5 cm. long, somewhat compressed-tetragonal, with concave slightly costulate surfaces; leaves opposite, petiolate, lance-oblong, serrulate-denticulate from the cuneate base to the gradually acuminate apex (teeth very numerous, 0.4-0.8 mm. high, 1.5-2.3 mm. broad), green, glabrous, and lucid above, strongly 1-costate and pinnately many-veined (veins 30-40 on each side, leaving the midrib at an angle of 65° - 87°), reticulated beneath, the surface gray-tomentose, the veins nearly smooth, slightly coriaceous, 1-1.5 dm. long, 2-3.2 cm. wide; petiole 1-1.8 cm. long; corymb terminal, trichotomous, surpassed by the leaves, glabrous but viscid; heads 14-15-flowered, sessile or nearly so, 11 mm. long, 5 mm. in diameter; involucre subcylindric-campanulate, about 5-seriate; scales about 25, stramineous, long-ciliate, otherwise subglabrous, viscid, the outer ovate to ovate-lanceolate, often purple-tipped, the innermost linear, readily deciduous; corollas presumably purple, 4.8 mm. long, glabrous, the tube gradually enlarged from near the base to the limb but without distinctly marked throat; achenes about 3 mm. long, sparingly hispid on the angles; pappus-bristles very numerous (about 70) and finely capillary, yellowish-white.—*Pl. Hartw.* 135 (1844); Jameson, *Syn. Pl. Aeq.* ii. 81 (1865). Incorrectly reduced to *E. arboreum* by Hieron. in *Engl. Bot. Jahrb.* xxix. 10 (1900).—LOJA: in mountains, *Hartweg*, no. 757 (K., sk. Gr.). PROV. NOT INDICATED: Quitensian Andes, 1855, *Couthouy* (Gr.). [Peru, Prov. of Chachapoyas, *Mathews*.] Compared by Bentham to *E. salicinum* Lam., but not closely related. *E. salicinum* has tomentose branches and subsessile nearly entire leaves of different texture and venation, the lateral veins being only 6-8 on each side and leaving the midrib at an angle of only about 45° .

9. *E. PERSICIFOLIUM* HBK. Erect shrub; branches hexagonal, subglabrous, arcuate or flexuous; internodes 4-8 cm. long; leaves opposite, petiolate, oblong-lanceolate, attenuate-acuminate at the apex, at base rounded in general contour but slightly cuneate at the point of insertion on the petiole, denticulate or crenulate, subcoriaceous, glabrous and rugulose above, white-tomentose beneath, about 9 cm. long and 2.5-3 cm. wide; petiole about 1.5 cm. long; corymb terminal, exceeded by the leaves, rounded, trichotomous; heads about 25-flowered, mostly pedicelled though crowded in the partial inflores-

ences; involucre about 4-seriate, narrowly campanulate; scales about 30, ovate-lanceolate to linear, acute, viscid; corollas about 5.5 mm. long, glabrous; achenes 5 mm. long, sparingly glandular between the scabrous ribs (f. Hieron.).— Nov. Gen. et Spec. iv. 130 (1820); Hieron. in Engl. Bot. xxix. 10 (1900). *E. persicaefolium* [HBK.] DC. Prod. v. 162 (1836); Jameson, Syn. Pl. Aeq. ii. 86 (1865).— LEON: base of Cotopaxi, near Mulaló, alt. 2928 m., *Humboldt & Bonpland* (Par., phot. Gr.). TUNGURAGUA: near Mocha, *Sodiro*, no. 6, 23a, acc. to Hieron. l. c.

10. *E. ARBOREUM* HBK. A small tree in technical characters exceedingly close to the preceding; branches also hexagonal and smooth, those of the inflorescence sordid-pubescent; leaves much as in the preceding but in the type-material really rounded at base, densely sordid-pubescent beneath; corymbs rounded, about equalling or slightly exceeding the leaves; heads about 25-flowered; involucre somewhat turbinate-campanulate; scales fuscous-stramineous, ciliate and dorsally somewhat puberulent or pulverulent, inclining to viscidness, acute, the outer ovate-lanceolate, the inner linear.— Nov. Gen. et Spec. iv. 131 (1820); Jameson, Syn. Pl. Aeq. ii. 87 (1865); Hieron. in Engl. Bot. Jahrb. xxix. 10 (1900), excl. syn. *E. buddleae-folium*.— CHIMBORAZO: between Pomallacta and Alausí, alt. 2562 m., *Humboldt & Bonpland*, no. 3240 (Par., phot., sk., and fragm. Gr.); on slopes of Chimborazo, *Sodiro*, no. 6/16, acc. to Hieron. l. c.— TUNGURAGUA: near Ambato, *Sodiro*, no. 6, 23b, acc. to Hieron. l. c. The Peruvian *E. discolor* DC. Prod. v. 161 (1836), reduced by Hieronymus, l. c., to this species, is shown by the original in the Prodrum Herbarium at Geneva to have leaves cuneate at base, much less toothed (indeed only obsoletely crenulate), and much more densely and copiously white-tomentose beneath.

11. *E. SALVIAEFOLIUM* HBK. A climbing shrub with terete shallowly furrowed sticky branches; leaves opposite, deflexed, oblong-lanceolate, gradually acuminate, rounded at base, deeply crenulate-denticulate (some of the teeth triangular and rather sharp, others ovate-oblong and rounded at the tip), coriaceous, glabrous and green but bullate-rugose above, white-tomentose beneath, 7-8 cm. long, 1-2.5 cm. wide; petiole about 1 cm. long; corymb terminal, rounded; heads glomerulate; involucre and florets as in the two preceding species.— Nov. Gen. et Spec. iv. 131 (1820); Jameson, Syn. Pl. Aeq. ii. 88 (1865).— CHIMBORAZO: in cool places on slopes of Chimborazo, alt. 3294 m., *Humboldt & Bonpland*, no. 3144 (Par., phot. Gr.).

12. *E. ORIGANOIDES* HBK. (see p. 284); Benth. Pl. Hartw. 198

(1845); Jameson, Syn. Pl. Aeq. 85 (1865); Hieron. in Engl. Bot. Jahrb. xxix. 9 (1900).—PICHINCHA: Andes of Quito, 1855, *Couthouy* (Gr.); 1859, *Jameson* (Gr., N. Y.); near Guapulo, *Hartweg*, acc. to Benth. l. c.—PROV. NOT INDICATED: in subandean thickets, alt. 2000–3400 m., *Sodirol*, no. 6/24, acc. to Hieron. l. c. [Colombia.]

13. *E. NIVEUM* HBK. (see p. 285); Benth. Pl. Hartw. 198 (1845); Jameson, Syn. Pl. Aeq. 83 (1865); Hieron. in Engl. Bot. Jahrb. xxix. 7 (1900).—PICHINCHA: alt. 3050 m., *Couthouy* (Gr.); Rumibamba, *Hartweg*, no. 1096; Andes of Quito, *Jameson* (Gr., N. Y.). PROV. NOT INDICATED: in subandean thickets, alt. 2000–3400 m., *Sodirol*, no. 6/24, acc. to Hieron. l. c.

14. *E. MORIFOLIUM* Mill. (see p. 293). *E. populifolium* HBK. Nov. Gen. et Spec. iv. 111 (1820); Hieron. in Engl. Bot. Jahrb. xxix. 7 (1900).—PICHINCHA: near San Nicolas, alt. 800–900 m., *Sodirol*, no. 6/29, acc. to Hieron. l. c.

15. *E. LLOENSE* Hieron. Herbaceous perennial, perhaps slightly woody toward the base; stems slender, flexuous, terete, dark-colored, puberulent; leaves opposite, petiolate, rhombic-ovate or -lanceolate, crenate-serrate except at the acuminate or attenuate apex and more abruptly cuneate entire base, 3-nerved, membranaceous, sparingly pubescent above when young, at maturity essentially glabrous, dark-green above, dull and somewhat paler beneath, 3–5 cm. long, 1.4–2 cm. wide; petiole 1–2 cm. long; panicle terminal, opposite-branched, subcorymbose, loose; pedicels filiform, 4–9 mm. long, often curved, finely pubescent and somewhat glandular; heads about 12–16-flowered, often nodding; involucre campanulate; scales about 12, thin, subscarios, very unequal, the outer short, ovate-oblong, acute, dorsally puberulent, the inner oblong-linear, mostly with 3 fine green nerves and 2 pale ribs, almost smooth; corollas white or nearly so, 3–3.5 mm. long, glabrous; proper tube about 1 mm. long, gradually passing into a scarcely enlarged cylindrical throat; achenes about 1.6 mm. long, grayish-brown, glabrous, callose at base; pappus-bristles delicately capillary, white.—Hieron. in Engl. Bot. Jahrb. xxix. 11 (1900).—PICHINCHA: Andes of Quito, 1855, *Couthouy* (Gr.); Valley of Lloa, alt. 2745 m., *Jameson*, no. 373 (K.); in bushy places, valley of Lloa, at the base of Mt. Pichincha, *Sodirol*, no. 9/2 (Berl., fragm. Gr.).

16. *E. IRESINOIDES* HBK. (see p. 285). *E. iresinoides*, var. *villosum* Steetz, in Seem. Bot. Herald, 145 (1854); Hieron. in Engl. Bot. Jahrb. xxix. 12 (1900).—GUAYAS: at borders of woods, near Guayaquil, *Sodirol*, no. 6/21, acc. to Hieron. l. c.

17. *E. CHAMAEDRIFOLIUM* HBK. Upright shrub; stems virgate or trichotomously forked; the branches curved-ascending, terete, velvety-pubescent; leaves opposite, subsessile or shortly petioled, ovate or oval, obtuse or rounded at the tip, rounded at base, crenulate, thickish, subcoriaceous, 3-nerved, sparingly pubescent above, softly sordid- or dark-pubescent beneath, about 2 cm. long and 1.5 cm. wide; petiole 2-3 mm. long; corymbs terminal, compact, 3-6 cm. in diameter; heads 10-12-flowered; involucre campanulate-cylindrical; scales closely appressed, oval to oblong-linear, green, somewhat striate, ciliate, often purplish at the obtuse tip; corollas violet, glabrous; achenes almost black, roughened on the angles, 2 mm. long.—Nov. Gen. et Spec. iv. 113 (1820); Jameson, Syn. Pl. Aeq. ii. 81 (1865).—LOJA: in the mountains, acc. to Jameson, l. c. [Peru.]

18. *E. PRUNIFOLIUM* HBK. Small tree, about 4 m. high; branches terete, shallowly ribbed or furrowed, pubescent; leaves opposite, ovate-oblong, scarcely acute at the tip, rounded at base, quite entire or shallowly crenate above the middle, coriaceous, 3-ribbed from somewhat above the base, 3-3.6 cm. long, half as wide, dark-green, smooth, and glabrous above, paler, pubescent, and prominently reticulated beneath; petiole 6-8 mm. long; corymbs chiefly terminal (occasionally becoming lateral), rounded, about 6 cm. in diameter, dense; pedicels 4-6 mm. long, pubescent; heads about 12-flowered, 1 cm. high; involucre campanulate-subcylindrical, loosely imbricated, 5-6 mm. high; scales about 12, oblong to linear, glabrous, purplish at tip, the outer acute, glutinous; corollas white, with differentiated tube and throat, smooth; achenes about 3 mm. long, black; pappus-bristles dusky, roughened.—Nov. Gen. et Spec. iv. 132, t. 349 (1820); Jameson, Syn. Pl. Aeq. ii. 83 (1865).—PICHINCHA: in the gorge of Tarqui near Quito, alt. 2470 m., *Humboldt & Bonpland*, no. 3287 (Par., phot. and sk. Gr.). Referred here, as by DeCandolle, to § *Subimbricata* but in involucre character transitional between this group and § *Eximbricata*.

19. *E. PSEUDOGLOMERATUM* Hieron. (see p. 291).—PICHINCHA: Andes of Quito, 1855, *Couthouy* (Gr.); environs of Quito, *Jameson*, no. 893 (K.). PROV. NOT INDICATED: in moist bushy places, alt. 2000 m., *Sodirol*, nos. 6/2 (Berl., fragm. Gr.), 6/4 (Berl., phot. Gr.), and 6/10 (Berl.). [Colombia.]

20. *E. PSEUDOGLOMERATUM* Hieron. Shrub; branches spreading, terete, finely striate, at first pubescent, later glabrate; leaves opposite, ovate, long-acuminate, rounded at base, crenate to subentire, thickish, subcoriaceous, above glabrous, lucid, bullate and rugose, beneath

dull and covered with a soft olivaceous pubescence, 3(-5)-ribbed, 2.5-4 cm. long, half as wide; petiole 4-12 mm. long; inflorescence a much branched compound terminal hemispherical corymb or a leafy-bracted dense pyramidal panicle; heads 10-12-flowered, 7 mm. high, shortly slender-pedicelled or some sessile in the forks of the cymose branching; involucre campanulate, about 3-seriate; scales pale, scarious-stramineous, thin, ciliate, dorsally pubescent or at least pulverulent-puberulent, the outer broadly ovate, rounded at the tip, the inner oblong, obtuse; corollas 3 mm. long, apparently white, the proper tube about equalling the scarcely differentiated but slightly expanded throat, glabrous; achenes 1.8 mm. long, glabrous.— Hieron. in Engl. Bot. Jahrb. xxix. 10 (1900).— PICHINCHA: Andes of Quito, *Jameson*, no. 68 (K.). AZUAY: Surucucho, near Cuenca, *Jameson* (K.). PROV. NOT INDICATED: sterile places in the interandean region, *Sodi-ro*, no. 6/24b (Berl., phot. and fragm. Gr.); without locality, *Jameson* (U. S.).

21. *E. STUEBELII* Hieron. (see p. 288).— CHIMBORAZO: Campamento Utiñag, valley of the Rio Chambo, alt. 3045 m., *Stübel*, no. 272 (Berl., phot. and fragm. Gr.). [Colombia.]

22. *E. INULAEFOLIUM* HBK., f. *SUAVEOLENS* (HBK.) Hieron. (see p. 291).— CHIMBORAZO: Pallatanga Valley, alt. 2000 m., *Sodi-ro*, no. 6/12, acc. to Hieron. l. c.

23. *E. RUGOSUM* HBK. Shrub; branches trichotomous, round, softly pubescent, curved-ascending; leaves opposite, short-petioled, triangular-ovate, obtuse at apex, subtruncate, rounded, obtuse, or barely acute at base, crenate, scabrid and bullate-rugose above, canescently hispid-tomentose beneath, 3-3.6 cm. long, 2.4-2.8 cm. wide; petiole 4-5 mm. long; corymbs dense, terminal, 4.5-7.5 cm. in diameter; heads 18-20-flowered, 1.4 cm. high; involucre narrowly campanulate; scales about 30, the inner narrowly oblong, pale-green, substramineous, ciliate, obtuse, the intermediate and outer much broader, firmer in texture, dark-violet toward the broadly rounded tip, narrowed below, mostly 5-ribbed, the ribs united at base; corollas pale-purple, smooth, except for some granulation on the outside of the limb, 5-nerved, about 5 mm. long; achenes hispid near the summit; pappus-bristles yellowish-white, hispid-roughened, unequal.— Nov. Gen. et Spec. iv. 114 (1820); *Jameson*, Syn. Pl. Aeq. ii. 87 (1865).— CHIMBORAZO: on dry open hills between Alausí and Cerro de Sitzan, alt. 2288 m., *Humboldt & Bonpland*, no. 3227 (Par., phot., sk., and fragm. Gr.).

24. *E. OBSCURIFOLIUM* Hieron. Erect or somewhat decumbent

herb, reaching 2 m. in height; stem terete, sordid-puberulent; hairs short, spreading, flexuous, attenuate; internodes 4-6(-8) cm. long; leaves opposite, petiolate, narrowly ovate, gradually narrowed to an acutish or acuminate apex, rounded at the base, bluntly serrate-dentate, membranaceous, 3-nerved from the base, puberulent on the nerves, fuscous-brown or dark-olivaceous in drying, dull, 4-6 cm. long, about half as wide; petiole 8-11 mm. long; corymbs trichotomous, leafy-bracted at base; heads 30-70-flowered (Hieronymus), 9 mm. high, pedicellate; involucre scales about 25, somewhat graduated, about 3-seriate, lance-linear, mostly 2-ribbed, the ribs united at base into a conspicuous elongated callosity; corollas reddish-lilac (Lehmann), 4.5 mm. long, slender, slightly and gradually enlarged upward, hispidulous near the limb; achenes smooth, shining, dark-brown, 2 mm. long.—Hieron. in Engl. Bot. Jahrb. xxix. 9 (1900).—AZUAY: in dense thickets, near Chagál and Yerbas-buenas, on the slopes of the western Andes, near Cuenca, alt. 2000-2700 m., *Lehmann*, nos. 4884 (Berl., fragm. Gr.) and 7984 (Berl., phot. Gr.). CHIMBORAZO: in the subandean region, *Sodi*, no. 6/7b, acc. to Hieron. l. c. [Colombia, acc. to Heering.]

25. *E. CHIMBORAZENSE* Hieron. Presumed to be suffruticose and climbing; the round stems glandular-pubescent; internodes 4-5 cm. long; leaves opposite, slender-petioled, ovate-lanceolate, caudate-attenuate, rounded at base, serrulate, firm-membranaceous or sub-chartaceous, above puberulent, in age rugose and bullate, below sordid- or olivaceous-pubescent and copiously covered with sessile glands, subtripinerved then pinnate-veined and prominently reticulated, 7-9 cm. long, 2.4-3 cm. wide; petiole 1.3-2 cm. long; corymb dense, terminal, about 6 cm. in diameter; heads subsessile or on short thick and densely pubescent pedicels, 25-40-flowered, about 9 mm. long; involucre campanulate; scales graduated, about 4-seriate, narrowed to an acute tip, the outer ovate, dorsally crisped-puberulent, the intermediate and inner gradually longer, narrower, and smoother, mostly 3-nerved; corollas (in dried material showing 5 dark nerves) 5 mm. long, glabrous, slenderly tubular, slightly and gradually enlarged upward; achenes 2.5 mm. long, glabrous; pappus-bristles yellowish-white, minutely scabrid.—Hieron. in Engl. Bot. Jahrb. xxix. 7 (1900).—CHIMBORAZO: on slopes of Mt. Chimborazo, *Sodi*, no. 6/15 (Berl., phot. and fragm. Gr.).

26. *E. VITALBAE* DC. (see p. 299); Hieron. in Engl. Bot. Jahrb. xxix. 11 (1900). *E. ecuadorae* Klatt, Ann. k. k. Naturh. Hofmus. Wien, ix. 356 (1894).—GUAYAS: in dense woods near Naranjal.

Lehmann, no. 5686 (N. Y.); near Balao, *Eggers*, no. 14,086 (N. Y.). PICHINCHA: in subtropical region, alt. 2000 m., near Nieblí, *Sodi*ro, no. 6/22, acc. to Hieron. l. c. PROV. NOT INDICATED: without locality, *Jameson* (sk. and fragm. Gr.).

27. *E. MICROSTEMON* Cass (see p. 295). *E. guadalupense* DC. Prod. v. 170 (1836) and probably of Hieron. in Engl. Bot. Jahrb. xxix. 12 (1900), excl. syn. "*E. Sinclairii*" [*Sinclairi*], although described as "herba prostrata."—CHIMBORAZO: San José, on western slopes of Mt. Chimborazo, *André*, no. 6 of his second series (Gr.); ? in woods of subtropical valleys, Pallatanga, *Sodi*ro, no. 6/29, acc. to Hieron. l. c. (as *E. guadalupense*).

Sect. III. EXIMBRICATA (DC.) Hoffm. (see p. 303).

KEY TO SPECIES.

- a. Leaves coriaceous b.
 - b. Leaves (the mature cauline) cordate c.
 - c. Delicate flexuous herb; leaves 3-nerved from the base, 2-2.5 cm. long. 41. *E. cuencanum*.
 - c. Viscid shrub; leaves feather-veined, 7-12 cm. long. 6. *E. glutinosum*.
 - b. Leaves not cordate d.
 - d. Heads 3-12-flowered e.
 - e. Leaves pubescent beneath. 18. *E. prunifolium*.
 - e. Leaves glabrous on both surfaces f.
 - f. Heads 3-7-flowered; very closely related species likely to prove more or less confluent when known from more copious material g.
 - g. Leaves more or less nerved, either 3-nerved from the base or with 2 pairs of nerves one nearly basal the other starting somewhat above the base h.
 - h. Leaves 5-13 cm. long, 2.4-4.5 cm. wide. 28. *E. pseudochilca*.
 - h. Leaves 3-4 cm. long, 1.8-2.6 cm. wide i.
 - i. Leaves obsoletely serrulate above the middle; teeth 4-7 on each side. 29. *E. umbrosum*.
 - i. Leaves serrate-dentate at least above the middle; teeth 9-19 on each side. 30. *E. cotacachense*.
 - g. Leaves truly feather-veined, the lower veins not enlarged or more conspicuous than the others j.
 - j. Leaves 3-9 cm. long; reticulation relatively coarse (ultimate areolae about 1 mm. in diameter); petiole 8-10 mm. long. 31. *E. exserto-venosum*.
 - j. Leaves 9-12 cm. long; reticulation very fine (ultimate areolae about 0.5 mm. in diameter); petiole about 2 cm. long. 32. *E. dendroides*.
 - f. Heads about 12-flowered. 33. *E. fastigiatum*.
 - f. Heads 20-∞-flowered k.
 - k. Leaves elliptical, rounded at base; petiole about 5 mm. long. 34. *E. elegans*.

- k. Leaves ovate, acute at base; petiole 1.4–1.8 cm. long.....35. *E. viscosum*.
- a. Leaves membranaceous l.
- l. Leaves sessile; pedicels copiously glandular.....36. *E. glanduliferum*.
- l. Leaves petioled (shortly so in *E. gracile*, v. *epilobioides*, which, however, does not have glandular pedicels) m.
- m. Heads subracemously disposed in a pyramidal panicle.....37. *E. solidaginoides*.
- m. Heads corymbose or in flattish cymes n.
- n. Leaves ovate-suborbicular o.
- o. Spreading-villous; teeth of leaves about 14 on each side; heads 40–45-flowered.....38. *E. pichinchense*.
- o. Puberulent; teeth of leaves 6–9 on each side; heads 25–30-flowered.....39. *E. Sodiroi*.
- n. Leaves deltoid-ovate to ovate-lanceolate p.
- p. Petiole short, one-tenth to one-fifth as long as the blade; inflorescence sparingly pubescent, the hairs slender, attenuate, articulated, curved-ascending or subappressed.....40. *E. gracile*, v. *epilobioides*.
- p. Petiole relatively longer, one-fourth to two-thirds as long as the blade; inflorescences puberulent with stipitate glands q.
- q. Heads 16–19-flowered; stems glabrous to the inflorescence.....41. *E. cuencanum*.
- q. Heads 25–40-flowered; stem puberulent much below the inflorescence r.
- r. Heads about 7 mm. high.....42. *E. glechonophyllum*.
- r. Heads slightly larger, about 9 mm. high; leaves lanceolate to deltoid-ovate.....43. *E. azangaroense*.

28. *E. PSEUDOCHILCA* Benth. Shrub, smooth but viscid, 9–15 dm. high; branches round, very leafy; internodes mostly 1.5–2 cm. long; leaves opposite, ovate-oblong, petiolate, 6–7 cm. long, 3–4 cm. wide, scarcely acute, rather finely serrate except at the entire and rounded base, firm in texture, glabrous and reticulated on both surfaces, lucid above, dull beneath; petiole about 1 cm. long; corymb dense, rounded, 8 cm. in diameter, many-headed, slightly puberulent, or beset with sessile glands; heads 5–6-flowered, about 7 mm. long; involucre scales few, subequal, 3–4 mm. long, oblong, obtuse, dark-purple toward the tip, beset with sessile glands: corollas 5.5 mm. long; proper tube 1.5 mm. long, beset with a few sessile glands; throat about 4 mm. long, glabrous; achenes (immature) 1.5 mm. long, hispidulous toward the summit especially on the angles; pappus-bristles about 30, unequal, yellowish-white, slightly stiffish, somewhat roughened, the longest about 4 mm. in length.—Pl. Hartw. 198 (1845); Jameson, Syn. Pl. Aeq. ii. 85 (1865); Hieron. in Engl. Bot. Jahrb. xxix. 7 (1900), excl. syn. *E. prunifolium* Klatt, which is a much smaller-leaved plant apparently not distinguishable from *E. cotacachense* Hieron.—PICHINCHA: Rumibamba (thus on original label but incor-

rectly cited as Riobamba by Benth. l. c.), village of Guapulo, Hacienda de Pinantura, *Hartweg*, no. 1095 (K., N. Y., phot. G.); Andes of Quito, alt. 3050 m., *Jameson* (Gr.).

29. *E. UMBROSUM* Benth. Sticky shrub with flexuous slightly hexagonal branches; leaves opposite, short-petioled, elliptical, 2.5-4 cm. long, 15-20 mm. wide, acutish, mucronate, rather abruptly cuneate at base, obsoletely serrulate above the middle, the teeth very few (4-7 on each side), 3-nerved from the base, rather firm, glabrous on both surfaces; petiole 2-5 mm. long; inflorescence considerably exceeding the leaves, pedunculate, fastigiately branched, dense, many-headed, strongly convex, about 8 cm. in diameter; heads 6-7-flowered; involucre narrowly campanulate, its scales 8-10, lance-oblong, acutish, viscid, about 2-seriate, subequal.—Pl. *Hartw.* 198 (1845); *Jameson*, *Syn. Pl. Aeq.* ii. 84 (1865).—PICHINCHA: in shade, Rumibamba, near Quito, *Hartweg* (unnumbered unicate, K., phot. Gr.).

30. *E. COTACACHENSE* Hieron. Shrub, 2-3 m. high, smooth except for a sparing and somewhat obscure puberulence on the young often vernicose and sticky parts; branches erect or curved-ascending, irregularly quadrangular, leafy; internodes 1-4 cm. long; foliage yellowish-green when fresh, often fuscous after drying; leaves lanceolate-oblong to elliptical, acute or obtusish, serrate or crenate except at the entire more or less cuneate base, 3-4 cm. long, 2-2.6 cm. wide, firm in texture, 3-nerved from above the base, a pair of smaller intramarginal nerves between the main nerves and the actual base, both surfaces finely reticulated, the veinlets prominent, teeth 9-19 on each side; petiole about 5 mm. long, canaliculate above; corymbs dense, many-headed, 4-6 cm. in diameter, strongly convex, fastigiate, about equalling or sometimes exceeding the leaves; heads 3-5-flowered, about 7 mm. high; involucre narrowly campanulate, the scales 5-7, subequal, lance-oblong, obtusish to rounded at the apex, 3(-5) mm. long, viscid, usually 2-ribbed; corolla white, 5 mm. long; the proper tube 1.5 mm. long, beset with sessile glands, the throat glabrous, 3.5 mm. long; achenes (immature) 1.5 mm. long, granulated.—*Hieron.* in *Engl. Bot. Jahrb.* xxi. 331 (1895). *E. prunifolium* Klatt in *Engl. Bot. Jahrb.* viii. 35 (1887), not HBK.—IMBABURA: Cerro Cotacachi, *Stübel*, no. 59 (Berl., phot. and fragm. Gr.). CARCHI: Páramo de Tuza [Tusa], alt. 3400 m., *Lehmann*, no. 587 (Gr.); in the Andes of Ecuador without precise locality, *Spruce*, no. 5805 (Gr.). Locally called *chilca blanca* (André).

31. *E. EXSERTO-VENOSUM* Klatt. Glabrous shrub 9-12 dm. high,

slightly viscid-verniceous on the younger parts and inflorescence; branches ascending or erect, at first somewhat quadrangular, leafy; leaves opposite, petiolate, elliptical, obtuse, rounded at the base, crenulate, coriaceous, green and lucid above, slightly paler and somewhat lucid beneath, 2.5-5(-8) cm. long, about half as wide, pinnately veined from base to apex, the veins diverging at a wide angle from the midrib, veinlets reticulated and prominent on both surfaces; corymb strongly convex, 5-7 cm. in diameter, many-headed, fastigiately branched, dense; heads 6-7-flowered, about 7-8 mm. high; involucre narrowly campanulate; scales 8-10, oblong, obtuse, thickish, obscurely ribbed, essentially glabrous but viscid; corollas about 5 mm. long; proper tube slender, 1-1.5 mm. long, granulated; throat subcylindric, 3.5-4 mm. long, glabrous; achenes (immature) viscidulous; pappus-bristles yellowish-white, stiffish, unequal, the longest about 4 mm. in length.—Abh. Naturw. Ges. Halle, xv. 324 (1882), in advance reprint p. 4 (1881). *E. exerto-venosum* [Klatt] Hook. f. & Jacks. Ind. Kew. i. 917 (1893), by misprint. *E. pseudofastigiatum*, var. *crenata* Hieron. in Engl. Bot. Jahrb. xxxvi. 468 (1905).—[Peru: without locality or number, Mathews (fragm. Gr.); Cutero, von Jelski, no. 789 (Berl., fragm. Gr.)] This form with elliptical crenately toothed leaves, typical of Klatt's species and of Hieronymus's var. *crenata*, does not thus far appear to have been found in Ecuador. Hieronymus is probably right in classing it and two or three other leaf-forms as varieties of the same species, but seems to have overlooked the prior description of the Mathews plant by Klatt, which necessarily becomes the type of the species, to which the Ecuadorian plant may be appended as a variety, thus:

Var. **pseudofastigiatum** (Hieron.), comb. nov. Leaves ovate-lanceolate, acute or acutish at the apex, rather sharply serrate-dentate from somewhat below the middle, entire and decidedly cuneate at the base; leaf-texture and venation, as well as inflorescence and floral characters, as in the typical variety.—*E. fastigiatum* ? Benth. Pl. Hartw. 135 (1844), not HBK. *E. loxense* Hieron. in Engl. Bot. Jahrb. xxi. 331 (1895), not Klatt. *E. pseudofastigiatum* Hieron. l. c. xxxvi. 467 (1905).—LOJA: in mountains, Hartweg, no. 758 (K., Berl., phot. and fragm. Gr.); ECUADOR: without number or more precise locality, Seemann (Gr.).

32. *E. DENDROIDES* (HBK.) Spreng. Tree with glabrous at first somewhat angled soon subterete dark-purple branches; leaves opposite, petiolate, ovate-oblong, narrowed or somewhat acuminate to a mostly obtusish and slightly cuspidate tip, crenate or cuspidate-

serrulate except at the entire cuneate base, 10–12 cm. long, 4–5 cm. wide, pinnate-veined, finely and prominently reticulate-veined on both surfaces (ultimate areolae about 0.5 mm. in diameter), glabrous and somewhat lucid; midrib sulcate on the upper surface toward the base; petiole 2 cm. long; corymbs compound, as much as 2 dm. in diameter, moderately convex, obscurely puberulent; heads very numerous, shortly pedicelled, usually by 2's or 3's, 5-flowered, 7 mm. long, 4 mm. in diameter; involucre campanulate, 4–5 mm. long; scales about 7, lance-oblong, obtuse, unequal, dorsally granular and viscid, the inner ciliolate at the broadish summit; corollas violet, granulate on the short proper tube, the throat scarcely enlarged, nearly or quite smooth; achenes 2 mm. long, roughened on the angles; pappus-bristles about 21, unequal, hispidulous.—Syst. iii. 415 (1826); Hieron. in Engl. Bot. Jahrb. xxii. 776 (1897), not Bak. *Mikania arborea* HBK. Nov. Gen. et Spec. iv. 139 (1820), not *E. arboreum* HBK. l. c. 131.—LOJA: near Loja, alt. 2013 m., *Humboldt & Bonpland*, no. 3367 (Par., phot. Gr.). [Peru.]

33. *E. FASTIGIATUM* HBK. (see p. 307).—LOJA: in mountains, acc. to Jameson, Syn. Pl. Aeq. ii. 86 (1865). [Colombia.]

34. *E. ELEGANS* HBK. Shrub with round virgate pilose-tomentose leafy branches; leaves opposite, subsessile or very shortly petioled, elliptic-ovate, obtuse, crenate-serrulate except at the rounded entire base, feather-veined and reticulated, coriaceous, slightly scabrous on both surfaces, somewhat pubescent on the midnerve and veins beneath, about 3 cm. long, half as wide; corymbs terminal, small, 3–5 cm. in diameter, congested, subsessile, scarcely exceeding the surrounding leaves; heads subsessile; involucre campanulate, the scales 10–15, lanceolate, obtuse; corollas inferred to be white; pappus-bristles whitish, equalling the corolla, hispidulous.—Nov. Gen. et Spec. iv. 133 (1820); Jameson, Syn. Pl. Aeq. ii. 89 (1865).—AZUAY?: in ravine of Tarqui ? *Humboldt & Bonpland* (Par., phot. Gr.). Even in the original description of this species its type-locality is stated with doubt. The plant does not appear to have been rediscovered.

35. *E. VISCOSUM* HBK. Glabrous viscid shrub; branches hexagonal, leafy; internodes 3–5 cm. long leaves opposite, petiolate, ovate-oblong, narrowed to a scarcely acute apex, crenate-serrate except at the obtusish entire base, conduplicate, coriaceous, 8 cm. long, 3–3.5 cm. wide, smooth and sticky, reticulate-veiny, dark-green and shining above, pale and dull beneath; petiole 1 cm. long; corymb composite, open, irregularly and somewhat fastigiately branched; bracts linear, entire; heads pedicelled, about 40-flowered, 8 mm. high;

involucre campanulate; scales about 17, lanceolate, acute, subequal, dusky-purple, loosely imbricated, a few of the outermost shorter; corollas inferred to be violet, smooth, enlarged in the throat; achenes hispid on the angles; pappus-bristles dusky, hispid.—Nov. Gen. et Spec. iv. 129 (1820); Jameson, l. c. 88.—Inferred (by Kunth) to have been collected in ECUADOR (“crescit in Regno Quitensi?”), *Humboldt & Bonpland* (Par., phot. Gr.).

This species, known to the writer only from the type-material at Paris, is suspiciously close to the Colombian plant subsequently described by Bentham, *Pl. Hartw.* 200 (1845), as *E. latipes*, which, however, has smaller leaves (3–7 cm. long) and broad petioles only 3–5 mm. in length. It is probable that the latter species will have to be reduced, and it seems not improbable that the original material of *E. viscosum* came not from Ecuador but from the mountains around Bogotá, the source of many of Humboldt & Bonpland’s specimens.

36. *E. GLANDULIFERUM* Hieron. Branching undershrub 1–1.5 m. high; stems terete, often purplish-brown, densely clothed with widely spreading very unequal articulated and for the most part gland-tipped hairs; leaves opposite, sessile, ovate, acuminate, rounded at the slightly clasping base, serrate, 5–6 cm. long, about half as wide, membranaceous, green and slightly glandular-puberulent above, paler and especially on the nerves copiously pubescent beneath; 3-nerved from the base; corymbs terminal, trichotomous, many-headed, rather loose; pedicels filiform, densely glandular-pubescent, 8–18 mm. long; heads about 40-flowered, 8–9 mm. high; involucre campanulate, the scales about 14, subequal, linear, acute, mostly 2-costulate; corollas white, glabrous, 4 mm. long; proper tube slender, 1.5 mm. long; throat cylindrical, 2.5 mm. long; achenes 2.5 mm. long, brownish-black, upwardly hispidulous on the angles, slightly contracted just below a pale pappus-bearing cuplike annulus or disk at the summit.—Hieron. in *Engl. Bot. Jahrb.* xxix. 13 (1900).—CHIMBORAZO: at the edge of woods on Mt. Chimborazo, *Sodi-ro*, no. 6/7a (Berl., fragm. Gr.).

37. *E. SOLIDAGINOIDES* HBK. (see p. 310); Jameson, *Syn. Pl. Aeq.* ii. 83 (1865). *E. filicaule* Sch. Bip. in Gray, *Proc. Am. Acad.* xxi. 384 (1886); Robinson, *Proc. Am. Acad.* xxxviii. 213 (1902). *Ophryosporus solidaginoides* (HBK.) Hieron. in *Engl. Bot. Jahrb.* xxix. 4 (1900).—CHIMBORAZO: between Ticsan and Alausí, *Humboldt & Bonpland* (Par., phot. and trac. Gr.). GALÁPAGOS IDS.: Iguana Cove, Albemarle Id., *Snodgrass & Heller*, no. 29 (Gr.).

Var. **typicum**. Leaves at maturity glabrous or nearly so above,

punctulate and sparingly pilose beneath. (Lit., synon., and exsicc. as above.)

Var. *BONPLANDIANUM* (Sch. Bip.) Robinson. Leaves finely pubescent above, velvety-tomentose beneath.—Proc. Am. Acad. xlii. 27 (1906). *E. syringaeifolium* Turcz. Bull. Soc. Nat. Mosc. xxiv. pt. 1, 169 (1851). *Ophryosporus solidaginoides*, var. *Bonplandianus* (Sch. Bip.) Hieron. in Engl. Bot. Jahrb. xxix. 4 (1900), as *Bonplandiana*.—IMBABURA: ravines near Ibarra, Jameson, no. 676 (Gr.); in bushy places near Ibarra, alt. 1200 m., Sodiro, no. 6/19 (Berl., fragm. Gr.).

38. *E. PICHINCHENSE* HBK. (see p. 317); Hieron. in Engl. Bot. Jahrb. xxix. 13 (1910).—PICHINCHA: slopes of Mt. Pichincha, Humboldt & Bonpland, no. 3116 (Par., phot., Gr.); Quitensian Andes, Couthouy (Gr.); in woods on the Volcano Pasochoa, alt. 2900 m., Sodiro, no. 6/6a, acc. to Hieron, l. c. [Colombia.]

39. *E. SODIROI* Hieron. Weak branched undershrub 1-2 m. high; branches curved-ascending, terete, puberulent (hairs minute, jointed, purplish); leaves opposite, petiolate, suborbicular-ovate, obtuse, 3-5 cm. long and wide, few-toothed except at the entire and commonly oblique or strongly asymmetrical base, subglabrous on both surfaces; petiole 9-14 mm. long; corymbs terminal and lateral from the upper axils, together forming a large leafy-bracted flattish-topped inflorescence; heads somewhat glomerate, pedicelled, 25-30-flowered; involucre campanulate; scales about 18, lance-linear, thin, green, loosely villous on the back, subequal, about 2-seriate; corollas white, 4 mm. long, shortly villous toward the limb; the proper tube slender, about equalling the much larger cylindrical throat; achenes upwardly hispid on the angles.—Hieron. in Engl. Bot. Jahrb. xxix. 12 (1900).—PROV. NOT INDICATED: in subandean thickets, Sodiro, no. 6/6b (Berl., fragm. Gr.).

40. *E. GRACILE*, var. *EPILOBIOIDES* (HBK.) Robinson (see p. 313). *E. caducisetum* DC. Prod. v. 165 (1836); Benth. Pl. Hartw. 201 (1845). *E. caducisetum* Jameson, Syn. Pl. Aeq. ii. 90 (1865).—PICHINCHA: between Quito and the village of Guapulo, acc. to Benth. l. c., as *E. caducisetum*; environs of Quito, acc. to Jameson, l. c., as *E. caducisetum*. [Colombia.]

The Ecuadorian plant mentioned by Bentham is said to have slightly smaller leaves than the original Colombian one. The author has had no opportunity to examine or verify the identity of the Ecuadorian material of this plant. Belonging as it does to a highly technical group it should have further study before its presence in the flora of Ecuador can be regarded as established.

41. *E. CUENCANUM* Robinson (see p. 241). Slender decumbent

perennial herb, glabrous up to the inflorescence, this beset with short dark stipitate tack-like capitate glands; stem terete, flexuous, very smooth, purplish-brown; leaves opposite, petiolate, ovate, cordate at base, narrowed to an obtusish tip, firmly membranaceous, 2-2.5 cm. long, 1.2-1.6 cm. wide, 3(-5)-nerved from the base; petiole slender, 8-12 mm. long; inflorescence a loose terminal trichotomous few-headed cyme; heads 16-19-flowered, about 7 mm. high, 3-4 mm. in diameter; involucre campanulate, the scales about 18, acute or a little erose, mostly 2-costulate and 3-nerved, 5 mm. long, beset with a few stipitate glands; corollas apparently white, 3.5 mm. long, the proper tube 1.7 mm. long, the throat cylindrical, moderately enlarged, the limb sparingly short-villous; achenes 3 mm. long, pale brown, glabrous; crowned by a disk, pappus-bristles about 14, caducous.—AZUAY, Cuenca, *Sallé* (K., phot. Gr.).

42. *E. GLECHONOPHYLLUM* Less. Perennial herb or slender under-shrub; stem terete, flexuous, usually purplish, at first puberulent, at length glabrate; hairs all very short, some spreading and gland-tipped, others incurved and attenuate; branches opposite, curved-ascending; leaves deltoid-ovate, slender-petioled, more or less caudate-acuminate at the apex, rounded, subtruncate, or open-cordate at the base, thin-membranaceous, serrate to more often rather coarsely crenate, varying greatly in size (1-7 cm. long, 0.8-5 cm. wide), nearly glabrous; petiole 0.4-3 cm. long, pubescent; corymbs terminal, leafy-bracted at base, mostly rather loose; heads about 30-flowered, slender-pedicelled; involucral scales narrowly lanceolate, obtuse to acuminate, subequal, the outer dorsally pubescent; corollas white, with roseate tinge, glabrous except near the slightly hispid limb; proper tube slender, about equalling the distinctly enlarged cylindrical throat; achenes about 2 mm. long, black or nearly so, hispidulous.—Linnaea, vi. 105 (1831); Gay, Fl. Chil. iii. 474 (1847); Reiche, Fl. Chil. iii. 265 (1902), which see for synonym.—PICHINCHA: Andes of Quito, *Jameson* (Gr.), *Couthouy* (Gr.). [Chili, Peru.] *E. Sternbergianum* DC. to which some of the Ecuadorian material has at times been referred is a doubtfully separable Peruvian species.

43. *E. AZANGAROENSE* Sch. Bip. (see p. 315); Hieron. in Engl. Bot. Jahrb. xxix. 13 (1900).—PROV. NOT INDICATED: in subandean thickets, *Sodi-ro*, no. 6/3, Weddell's narrower-leaved forma *a*, acc. to Hieron. l. c.; in andean pastures, *Sodi-ro*, no. 6/5 (Berl., fragm. Gr.), the broader-leaved forma *β*, acc. to Hieron. l. c.

This species is scarcely distinguishable from the preceding but the writer hesitates to reduce it to synonymy without study of authentic material not at present accessible.

Sect. IV. CONOCLINIUM (DC.) Benth. (see p. 320).

KEY TO SPECIES.

- Leaves deltoid-ovate, cordate, scabrid above; corymbs terminal
 44. *E. lamiifolium*.
 Leaves ovate-lanceolate, truncat at base, glabrous above;
 corymbs axillary..... 45. *E. Turczaninowii*.

44. *E. LAMIIFOLIUM* HBK. Doubtfully herbaceous (Kunth), suffruticose (Jameson), or shrubby and climbing (Sodirol); stems round, striate, densely pubescent, the hairs delicate, attenuate, and articulated; leaves opposite, petiolate, triangular-ovate, shallowly cordate, crenate-dentate, thickish-membranaceous, 3(-5)-nerved from the base, rugose, bullate, and scabrid above, coarsely reticulated and gray-velvety beneath, 6-7 cm. long, 4-5 cm. wide; petiole 2 cm. long; corymb terminal, dense, rounded, 5 cm. in diameter; heads about 36-flowered (26-50 acc. to Hieron. l. c.), 9 mm. long, 5 mm. in diameter; involucre narrowly campanulate, about 4-seriate; scales about 40, acute, lanceolate, pubescent, green or the inner purple-tinged; florets blue (Jameson); achenes about 2 mm. long, nearly or quite glabrous.—Nov. Gen. et Spec. iv. 113 (1820); Jameson, Syn. Pl. Aeq. ii. 88 (1865); Hieron. in Engl. Bot. Jahrb. xxix. 7 (1900).—PROV. NOT INDICATED: "In regno Quitensi," *Humboldt & Bonpland* (Par., phot. Gr.). PICHINCHA: Andes of Quito, alt. 2745 m., *Jameson*, no. 617 (Gr.); in low subandean woods near Quito and Nono, *Sodirol*, nos. 6/8 and 6/13, acc. to Hieron. l. c.

45. *E. Turczaninowii*, nom. nov. Stem suffruticose, round, smooth; branches sticky-pubescent; leaves rather long-petioled, opposite, ovate-lanceolate, acuminate, truncate at base, revolute on the margin, crenate, much wrinkled and glabrous above, white-tomentose beneath; corymbs axillary, nodding; heads many-flowered; involucre 3-seriate, the scales colored, slightly viscid, ovate-oblong, the outer obtuse, the inner longer and acuminate; receptacle conical; corollas smooth, violet; style-branches linear-clavate, thick; style-base bulbous.—*Conclinium rugosum* Turcz. Bull. Soc. Nat. Mosc. xxiv. pt. 1, 168 (1851), not *Eupatorium rugosum* HBK. (1820).—PICHINCHA: Quito, *Jameson*, no. 209. A species not seen by the writer but from character (here compiled) seemingly of this affinity and distinct.

Sect. V. *HEBECLINIUM* (DC.) Benth. (see p. 327).

KEY TO SPECIES.

- a. Petioles not winged; florets 20-60 b.
 b. Stem conspicuously quadrangular.....46. *E. guapulense*.
 b. Stem terete or merely ribbed c.
 c. Scales of the involucre about 20 subequal, somewhat
 ligulate-appendaged; leaves short, cuneate at the base.....47. *E. ovatifolium*.
 c. Scales 30-50, graduated; leaves not cuneate at the base d.
 d. Leaves 3-nerved from a point 5-10 mm. above the
 rounded base; involucre scales lacerate-ciliate toward
 the tip and bearing a thin membranaceous obtuse appen-
 dage; heads 20-25-flowered.....48. *E. recreense*.
 d. Leaves 3-nerved essentially from the cordate base;
 scales ovate to oval, very obtuse, not appendaged;
 heads 25-40-flowered.....49. *E. obtusisquamosum*.
 a. Petioles winged; florets 100-300.....50. *E. nemorosum*.

46. *E. GUAPULENSE* Klatt. Shrubby, climbing, 2-3 m. high, finely and closely rusty-puberulent; branches flexuous, rather sharply quadrangular, the angles rib-like, the faces (at least one pair of them) concave; internodes about 1 dm. long; leaves opposite, long-petioled, broadly ovate, soft, membranaceous, finely serrate almost from the shallowly cordate base to the acuminate tip, 3-nerved from the base, pubescent above, rusty-tomentose beneath; heads 20-30-flowered in paniculately disposed glomerules rather than in a corymb; corollas light-blue; scales of the involucre 3-4-seriate, obtuse, striate; achenes slightly roughened.—Leopoldina, xx. 90 (1884); Hieron. in Engl. Bot. Jahrb. xxix. 14 (1900). *Hebeclinium tetragonum* Benth. Pl. Hartw. 198 (1845); Jameson, Syn. Pl. Aeq. ii. 79 (1865).—PICHINCHA: rather rare, between the village and bridge of Guapulo near Quito, Hartweg, no. 1097 (K., phot. Gr.); in moist subandean thickets, Sodiro, no. 6/26b, acc. to Hieron. l. c.

47. *E. OVATIFOLIUM* Hieron. Herbaceous perennial 5 dm. high or more; stem simple and glabrate below, above pubescent, dark-violet, terete; leaves opposite, petiolate, ovate, crenate-dentate except at the acutish or obtusish apex and the shortly cuneate or acuminate base, membranaceous, sparingly villous above, glabrous beneath, 3-nerved, 6 cm. long, 3.5-4 cm. wide; petiole 0.5-3 cm. long, not winged; heads 60-65-flowered, in crowded terminal cymes; pedicels pubescent, sometimes 2 cm. long; involucre broadly campanulate; scales about 20, subequal, linear-lanceolate, shortly acuminate, somewhat ligulate-appendaged and often purplish at the tip; corollas 5 mm. long, the

proper tube about 2 mm. in length, the funnel-formed throat slightly longer; achenes blackish, hispidulous on the angles.— Hieron. in Engl. Bot. Jahrb. xl. 387 (1908).— PICHINCHA: in thickets at the base of Mt. Pichincha, alt. 300 m., *Sodi*ro, no. 3, acc. to Hieron. l. c. (whence above char. is here compiled).

48. *E. RECREENSE* Hieron. Herbaceous and probably perennial, 2–2.5 m. high; leaves opposite, petiolate, round-ovate, very closely and obscurely crenate except at the acuminate and mucronate apex and rounded base, membranaceous, puberulent on the nerves above and over the entire lower surface, the largest 15 cm. long, 13.5 cm. wide; petioles as much as 5 cm. long; heads 20–25-flowered, in dense terminal cyme-like corymbs; pedicels 2–10 mm. long; involucre narrowly campanulate, 4–5-seriate; scales 30–40, the upper part lacerate-ciliate on the hyaline margin but otherwise smooth, the apex provided with a thin obtuse appendage; corollas 3.5 mm. long; achenes glabrous, dark-colored.— Hieron. in Engl. Bot. Jahrb. xl. 389 (1908).— MANABÍ: near Hacienda El Recreo, *von Eggers*, no. 15,148, acc. to Hieronymus, l. c., from whose original description the above character is condensed.

49. *E. OBTUSISQUAMOSUM* Hieron. Shrub with habit of *E. macrophyllum* and *E. guapulense*; stems subterete or somewhat angulate or flattened, covered with closely matted tawny tomentum; internodes about 1 dm. long; leaves opposite, slender-petioled, round-ovate, broadly cordate, obtusish or slightly acuminate, obscurely crenulate, membranaceous, puberulent and green above, canescent-tomentose beneath, 10–13 cm. long, as broad or slightly broader, 3-nerved somewhat above the base; petioles 2–5 cm. long; heads in a compact terminal corymb, 28–33-flowered; involucre campanulate, about 4-seriate, essentially glabrous, the outer scales broadly ovate, 3–7-costate, brownish-green, narrowly scarios-margined, rounded at the tip, the innermost linear and readily deciduous; receptacle hemispherical, shortly pilose; corollas slenderly tubular, 5 mm. long, the throat slightly and gradually enlarged, glabrous, the limb very short and hispidulous; achenes 1.6 mm. long, dark-brown with pale ribs.— Hieron. in Engl. Bot. Jahrb. xxix. 14 (1900).— PROV. NOT INDICATED: in moist subandean thickets, *Sodi*ro, no. 6/20a (Berl., phot. and fragm. Gr.)

50. *E. NEMOROSUM* Klatt (see p. 327). From this species it has been impossible to separate the Bolivian *E. Rusbyi* Britton, Bull. Torr. Bot. Club, xviii. 334 (1891). Furthermore, although the writer has had no opportunity to examine material of *E. pteropodum* Hieron.

in Engl. Bot. Jahrb. xxix. 15 (1900), its characters, very fully described by its author, coincide in all significant features with those of *E. nemorosum*. The differences are almost entirely in the greater size, of the leaves and the more numerous florets. Neither of these matters seems likely to be of specific value. Klatt's sketch of his type, a rather careful drawing now in the Gray Herbarium, shows the lower leaves more than 25 cm. in length (including the winged petiole, which is 7 cm. long and 1 cm. wide). The blade is about 8 cm. in breadth. It will be seen on comparison that the differences between these dimensions and those given for the lower leaves of *E. pteropodium* by Hieronymus are in no way greater than are usual in individuals of the same species. As to the number of florets, it is true that Klatt, apparently without actual count, roughly estimated it at 100 in his *E. nemorosum*; but a head from Colombian material, collected by Rusby & Pennell and closely matching the type-fragments in Klatt's herbarium, had by careful count no less than 221 florets. The difference between 221-flowered in the case of *E. nemorosum* and 250-300-flowered as stated by Hieronymus for his *E. pteropodium* has no great significance, since variations of much greater latitude have often been observed in individuals of the same species or even in heads of the same individual. It seems strange that Hieronymus, in describing *E. pteropodium* makes no comparison of it with *E. nemorosum* so closely resembling it in all described respects but states that his new plant was not nearly related to any previously described species. The fact, however, that he elsewhere in the same paper lists *E. nemorosum* Klatt and states that it should be placed in Sect. *Hebeclinium* next "*E. macrocephalum* L." — a clerical slip, by which he certainly meant *E. macrophyllum* L., a species with which, however, it has no close affinity, strongly suggests that in some manner Hieronymus has been misled as to the real identity of *E. nemorosum*, and that having referred to it some quite different plant similar to *E. macrophyllum* he therefore failed to notice the identity of his *E. pterophyllum* with the true *E. nemorosum*.— PROV. (CHIMBORAZO?) NOT INDICATED: in tropical and subtropical region near El Puente de Chimbo, *Sodiro*, no. 6/30, acc. to Hieron. l. c., as *E. pteropodium*.

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I. FURTHER NEW OR OTHERWISE INTERESTING
LILIACEAE

BY J. FRANCIS MACBRIDE

SCHOENOCAULON Gray, Ann. Lyc. N. Y. iv. 127 (Nov., 1837).
Sabadilla Brandt in Hayne, Arzn. Gew. xiii. t. 27 (1837), essentially
in synonymy. *Skoionolon* Raf. Fl. Tellur. iv. 27 (1838).

By Dalla Torre & Harms, Gen. Siph., the name "*Sabadilla*
Brandt & Ratzebg." is maintained for this genus in place of
Schoenocaulon Gray which, in the estimation of these authors, is a
later published name. They give for the publication of *Sabadilla*
the date "1836 vel 1837 init." and indeed it seems evident that
volume thirteen of Hayne's work came out late in 1836 or early
in 1837 which probably antedates volume four of the Ann. Lyc.
N. Y. by several months. In the Bot. Zeitung xix, vol. ii. Intelli-
genzblatt, no. i. 4-5 (1836) we learn regarding Hayne's publica-
tion that "nach dem Tode des Verfassers die letzte Hälfte des
12ten und die erste des 13ten Bandes erschienen, die letzte wird
noch im Laufe des Jahres nachfolgen" and in Linnaea, Litteratur-
Bericht for 1837, 224-226, there is a review of volume thirteen.
This review occurs toward the end of the 1837 volume. But even
though it is granted that *Sabadilla* is the earliest name for this
group of plants it may be questioned seriously, it seems to me,
whether it was originally given generic status in the sense defined
by either the American Code or the International Rules. Refer-
ence to Brandt & Ratzeburg's paper discloses the fact that they
do not jointly assume responsibility for the name, since under the
heading, "*Veratrum officinale*" occur the words, "Untergattung
Sabadilla Brandt," accompanied by an asterisk which refers to this
footnote, "Es schien uns daher besser, für jetzt ein Subgenus
unter dem Namen *Sabadilla* vorzuschlagen um jene auffallenden
Eigenthümlichkeiten anzudeuten. Die Zukunft wird lehren, ob
es zur Bedeutung eines Genus erhoben werden kann oder mit einem
der oben genannten verschmelzen muss. Daher können wir den

künftig ihm vielleicht zu ertheilenden Namen, *Sabadilla officinarum* nur fraglich andeuten." From this it would appear that Brandt was desirous of treating *V. officinale* as a distinct genus but that he lacked the requisite courage! He therefore seems to have attempted a compromise by suggesting the binomial necessary should his subgenus *Sabadilla* ever be accorded generic rank. That he himself thought that he was publishing a generic name, as Dalla Torre & Harms have construed, is not to me evident and, moreover, the one time he attaches a specific name to *Sabadilla* he does so in a manner which makes it virtually in synonymy. Accordingly the name to be used for this group of plants is *Schoenocaulon* rather than *Sabadilla*, even though volume thirteen of Hayne's work appeared before volume four of the Ann. Lye. N.Y. since the name *Sabadilla* was not originally given generic status.

Dichopogon fimbriatus (R. Br.), comb. nov. *Arthropodium fimbriatum* R. Br. Prod. 276 (1810). *A. laxum* Sieb. in Roem. & Schult. Syst. vii. 441 (1829). *D. Sieberianus* Kunth, Enum. iv. 623 (1843).

Bentham in his Flora Australiensis vii. 59 (1878) wrote, "*A. fimbriatum*, R. Br. . . . of which no specimen is preserved in his herbarium, is probably this species," i.e. *D. Sieberianus*. There is little doubt, it seems to me, but that this supposition is correct from the essential agreement of the original diagnoses. Robert Brown's plant, furthermore, came from Port Jackson (Sidney) and it was there or in that vicinity that Sieber secured his specimens. Accordingly I am taking up for this plant the earliest specific name, *A. fimbriatum*.

Arthropodium milleflorum (Red.), comb. nov. *Anthericum milleflorum* Red. Lil. i. t. 58 (Feb., 1804). *A. paniculatum* Andr. Bot. Rep. t. 395 (Sept., 1804).

Apparently this attractive Australian lily has never been properly christened.

Trichopetalum plumosum (R. & P.), comb. nov. *Anthericum plumosum* R. & P. Fl. Peruv. iii. 68 (1802). *T. gracile* Lindl.? Bot. Reg. 1535 (1832).

There seems to be no doubt that this genus is not monotypic as some botanists have inferred. The plate in Ruiz & Pavon's Flora shows a plant with obtuse lanceolate-obovate perianth segments and in this respect at least it resembles the plate of Lindley's

T. gracile. Lindley, l. c., called attention to the differences between his species and the *A. plumosum* of Hooker figured in Bot. Mag. 3084 (1831), and proposed for Hooker's plant the name *T. stellatum*. Apparently this is the commoner species and may be distinguished readily from *T. plumosum* by the acute linear-oblong perianth segments. *Bottionea thysanthoides* Colla, Mem. Acad. Torin. xxxvii. 45. t. 1 (1834), is evidently the same as *T. stellatum*. But whatever disposition eventually may be made of these several plants the earliest available name is that of Ruiz & Pavon cited above.

Corynotheca micrantha (Lindl.), comb. nov. *Asparagus micranthus* Lindl. Swan River App. 58 (1840). *Thysanotus micranthus* Endl. in Lehm. Pl. Preiss. ii. 36 (1846). *Caesia dichotoma* Muell. Fragm. i. 215 (1859). *Corynotheca dichotoma* Muell. ex Benth. Fl. Austr. vii. 50 (1878).

Schoenolirion albiflorum (Raf.), comb. nov. *Amblostima albiflora* Raf. Fl. Tellur. ii. 26 (1837). *Oxytria albiflora* (Raf.) Pollard, Bull. Torr. Club, xxiv. 406 (1897). *S. Elliottii* Feay ex Gray, Am. Nat. x. 427 (1876).

Pollard, l. c., pointed out that Rafinesque first named this plant. The above new combination is necessary, however, because the generic name *Schoenolirion* is included in the list of *nomina conservanda* validated at Vienna. This genus is confined to the southeastern United States. Some botanists have considered two plants which grow in northern California and Oregon as congeneric but now that the seeds of these are known there is no doubt as to the validity of Watson's genus *Hastingsia*. Besides the points of difference which Watson notes as existing between *Hastingsia* and *Schoenolirion* there is a very definite difference in the character of seeds, those of the latter genus being smooth and highly polished while those of *Hastingsia* are rugulose and dull.

Schizobasopsis, nom. nov. *Bowiea* Harv. ex Hook. f. in Bot. Mag. t. 5619 (1867), not *Bowiea* Haw. in Phil. Mag. lxiv. 299 (1824).

Schizobasopsis volubilis (Harv.), comb. nov. *Bowiea volubilis* Harv. ex Hook. f. in Bot. Mag. t. 5619 (1867).

Berger, Bot. Jahrb. xxxvi. 43 (1905) and Pflanzenreich, iv. Fam. 38: 122 (1908), has shown that *Bowiea* Haw. is distinct and not to be merged in *Aloe* as has been done by Baker and others. He has erred, however, in renaming Haworth's genus since, according

to the International Rules Art. 51. 1, it is Harvey's genus, published much later than Haworth's which requires a new name. *Chamaealoe* Berger, l. c., therefore, becomes a synonym of *Bowiea* Haw. and the resurrection of this generic name requires the changing of the much later *Bowiea* Harv. which may bear the name *Schizobasopsis* since it somewhat resembles and is most closely related to *Schizobasis* Baker.

ALOE DISTICHA Mill., var. **brachyphylla** (Baker), comb. nov. *A. Saponaria* (Ait.) Haw., var. *brachyphylla* Baker, Journ. Linn. Soc. xviii. 164 (1880).

Baker, l. c., rejected Miller's name but stated, "nomen primum sed ineptum." Durand & Schinz, *Consp. Fl. Afr.* v. 311 (1893) concurred and even Berger in his revision, *Pflanzenreich*, iv. Fam. 38: 201 (1908) has adopted the later name *A. Saponaria*. This action is contrary to the principle expressed in Art. 50 of the International Rules.

Acanthocarpus mucronatus (R. Br.), comb. nov. *Xerotes mucronata* R. Br. Prod. 260 (1810). *A. Preissii* Lehm. Pl. Preiss. ii. 274 (1848).

There seems to be no reasonable doubt as to the identity of the plant of Robert Brown and that of Lehmann. Since the former's name has priority it is to be adopted and the above new combination accordingly becomes necessary.

LOMANDRA Labill. Nov. Holl. i. 92 (1804). *Xerotes* R. Br. Prod. 259 (1810).

Although the name *Lomandra* has been generally conceded in books of reference, such as the *Natürl. Pflanzenf.*, to be the proper name for this group of Australian plants, comparatively few of the thirty odd species have been transferred from the later published genus *Xerotes*. Britten has made the necessary new combinations in the case of two species, *L. filiformis* (Thunb.) Britten and *L. multiflora* (R. Br.) Britten, but there are several others represented in the Gray Herbarium which may now be transferred.

Lomandra effusa (Lindl.), comb. nov. *Xerotes effusa* Lindl. in Mitch. Three Exped. ii. 101 (1839).

Lomandra Endlicheri (Muell.), comb. nov. *Xerotes Endlicheri* Muell. Fragm. viii. 205 (1874).

Lomandra glauca (R. Br.), comb. nov. *Xerotes glauca* R. Br. Prod. 260 (1810).

Lomandra leucocephala (R. Br.), comb. nov. *Xerotes leucocephala* R. Br. Prod. 260 (1810).

Lomandra obliqua (Thunb.), comb. nov. *Dracaena obliqua* Thunb. Diss. Drac. 6. fig. 2 (1808). *Xerotes flexifolia* R. Br. Prod. 260 (1810).

Lomandra spartea (Endl.), comb. nov. *Xerotes spartea* Endl. in Lehm. Pl. Preiss. ii. 51 (1846).

Gagea villosa (Labill.), comb. nov. *Anthericum villosum* Labill. Pl. Syr. v. 14 (1812). *Phalangium villosum* (Labill.) Poir. Encycl. Suppl. iv. 381 (1816). *Ornithogalum pedunculare* Presl, Delic. Prag. 150 (1822). *G. peduncularis* (Presl) Pascher, Sitzb. Lotos, 114 (1904).

Ascherson & Graebner, Synops. Mitteleurop. Fl. iii. 81 (1905), have indicated the identity of the plants of Presl and Labillardière but have erred in following Pascher in the adoption of Presl's later name. *Gagea villosa* Duby, Bot. Gall. ed. 2, i. 467 (1828) is "universally regarded as a synonym" of *G. arvensis* Dumort. Fl. Belg. 140 (1827).

ALLIUM CERNUUM Roth, var. **neo-mexicanum** (Rydb.), comb. nov. *A. neo-mexicanum* Rydb. Bull. Torr. Club, xxvi. 541 (1899).

A. cernuum in typical form is a plant with rather thin and keeled leaves often 4 or 5 mm. wide and light pink numerous flowers. From Alberta to New Mexico and British Columbia this typical form, common in many of the Atlantic states, is largely but not entirely replaced by the var. *obtusum* Ckl. (*A. recurvatum* Rydb.). This variety is not sharply defined but may often be distinguished by the narrow (only 1-3 mm. wide) and thick leaves which are more or less rounded on the back rather than keeled. The flowers are generally darker than in the eastern state of the species. In the southwestern Rocky Mountain region another geographical variant occurs, the var. *neo-mexicanum*. This plant is intermediate in some respects between true *A. cernuum* and the var. *obtusum* since the leaves are thin and flattish like those of the former but as narrow as those of the latter. From both the typical form and the var. *obtusum*, however, the var. *neo-mexicanum* may be distinguished by the usually very small (about 5 mm. long) bracts. Yet another segregate species has been proposed in this group, viz. *A. allegheniense* Small, Bull. N.Y. Bot. Gard. i. 279 (1899), the author distinguishing his species by the urn-shaped perianth and the obtuse or retuse sepals. This plant is confined to the south-

eastern United States although it does not replace *A. cernuum* entirely in that section of the country according to Small, Fl. S.E.U.S. 2d ed. 263 (1913). No authentic material of *A. allegheniense* has been available for examination but specimens from the northeastern states of true *A. cernuum* in the Gray Herbarium frequently have the sepals quite as obtuse, and the perianth seemingly urn-shaped, as is the case with material from the southern states. These facts do not suggest, therefore, that *A. allegheniense* is specifically or even varietally distinct from *A. cernuum*.

ALLIUM MUTABILE Michx. This species is the type of a group of very closely related plants which seem distinct from each other and yet are with difficulty defined so that they may be at all times distinguished. For instance there is *A. mobilense* Regel, All. Monog. 121 (1875) which may usually be distinguished from *A. mutabile* by its narrow leaves, shorter perianth and pedicels and generally less robust habit and from *A. Nuttallii* by the softer and finer fibres of the outer bulb-coats, the narrower perianth segments and the more slender habit. *A. mobilense* constitutes therefore a distinct race or state intermediate between *A. mutabile* and *A. Nuttallii* and on the whole distinct enough except for a form in New Mexico which approaches *A. Nuttallii* too closely. *A. microscordion* Small, Fl. S.E.U.S. 263 (1903) and *A. arenicola* Small, Bull. Torr. Club, xxvii. 276 (1900) are both referable to *A. mobilense*. Then there is *A. Drummondii* Regel, All. Monog. 112 (1875) which Watson, Proc. Am. Acad. xiv. 227 (1879) referred to *A. mutabile* but which has very different bulb-coats, these being firm with the fibres closely woven. *A. Helleri* Small, Fl. S.E.U.S. 264 (1903) is not to be distinguished. From *A. Nuttallii* Wats. *A. Drummondii* is least readily separated but the character of the bulb-coats here again furnishes the best means of distinction. In the southern Rocky Mountains *A. Nuttallii*, like *A. mobilense*, occurs in very perplexing forms which cannot be placed very satisfactorily. It seems possible that the ranges of this group of closely related forms, each generally distinct enough, meet in the southern Rockies and that there plants occur which display a union of the characters of two or more species. Thus certain specimens from southern Colorado, Utah and New Mexico while possessing some of the characters of *A. Nuttallii* are referable in other respects to *A. mutabile* or *A. Drummondii* or even *A. mo-*

bilense. The presence of these forms would make a treatment of the group which would recognize one species and several varieties seem not unpalisable but until more is known of these apparently intermediate plants the species indicated above may conveniently be recognized.

Allium Rydbergii, nom. nov. *A. fibrosum* Rydb. Bull. Torr. Club, xxiv. 188 (1897), not *A. fibrosum* Regel, Act. Hort. Petrop. x. 322 (1887).

This excellent species bears superficial resemblance to *A. canadense* but, as shown by the crested capsule, is most nearly related to *A. Geyeri* from which it is nicely distinct by virtue of the obtuse perianth segments and the bulbet-bearing umbels.

Allium jubatum, nom. nov. *A. cristatum* Boiss. Fl. Or. v. 237 (1884), not *A. cristatum* Wats. Proc. Am. Acad. xiv. 232 (1879).

Allium cristatum Wats., a valid species of North America, is not cited in the Index Kewensis.

BLOOMERIA Kellogg, Proc. Cal. Acad. ii. 11 (1863). *Muilla* Wats. Proc. Am. Acad. xiv. 215 & 235 (1879).

When Watson described his genus, l. c., he had before him the single species *M. maritima* (Torr.) Wats., a several-leaved plant with greenish-white flowers borne on unarticulated pedicels and with filiform filaments. This plant could scarcely be considered congeneric with the monophyllic *Bloomeria aurea* which has yellow flowers, jointed pedicels and long filaments winged toward the base. Since then, however, additional species have been discovered which show conclusively, it seems to me, that these plants are really congeneric and that accordingly *Muilla* should become sunk in *Bloomeria*, the earlier name. In 1887 and 1888 Greene described two species of *Muilla* (*M. transmontana* and *M. coronata*, Pitt. i. 73 and 165) which he distinguished primarily from the original species *M. maritima* by the petaloid filaments, "their margins meeting at base . . . forming a shallow . . . cup around the ovary." Now this is essentially true in the case of *Bloomeria aurea* and indeed Engler, Pflanzenf. ii. Abt. 5: 57 (1887), found no other character by which to distinguish *Bloomeria* and *Muilla* but this sufficed as the filaments of *M. maritima*, the only species known to him, are very narrow. We are forced to discard, then, the character of the filaments as possessing value here for purposes of generic definition, but it is to be noted that *M. transmontana* Greene (with

which *M. coronata*, as Mrs. Brandegee has suggested, Zoe, iv. 101, should be merged) has the unarticulated pedicels of *M. maritima*. Although the presence of the jointed pedicel might serve as a means of distinguishing generically *Muilla* and *Bloomeria* it would result in arbitrarily keeping in separate genera plants which are quite similar in all respects which possess any degree of taxonomic moment. For instance *Bloomeria Clevelandii* with its pale flowers and several leaves simulates closely in habit *Muilla maritima* and although in this particular example a distinct difference in the structure of the corolla could be shown this difference is not so great nor so well marked as is the case in certain groups of *Brodiaea* some of which, furthermore, have jointless, others jointed pedicels, but which, nevertheless, every conservative botanist retains under the one generic name. But it so happens that recently a plant has been collected in Mexico which has the narrow filaments of true *Muilla* but the pedicels jointed like those of *Bloomeria*! This fact is not mentioned by Brandegee who described the plant as *Muilla Purpusii*, Univ. Cal. Publ. Bot. iv. 177 (1911). The blue-green flowers and the general aspect suggest at once a relationship to *M. maritima*. When therefore all the known species of *Muilla* and *Bloomeria* are considered it becomes apparent that they belong to one genus which must be known as *Bloomeria*, since it is the earlier name.

Bloomeria maritima (Torr.), comb. nov. *Hesperoscordium?* *maritimum* Torr. Pac. R. R. Rep. iv. 148 (1857). *Muilla maritima* (Torr.) Wats. Proc. Am. Acad. xiv. 235 (1879).

BLOOMERIA MARITIMA (Torr.) Macbr., var. **serotina** (Greene), comb. nov. *Muilla serotina* Greene, Eryth. i. 152 (1893).

This montane form of southern California differs from the typical state of the species chiefly in the more robust habit and more numerous flowers. These are differences which are in no way fundamental, however, so this southern plant may best be treated as a geographical variant. Moreover the typical form has been secured recently by Abrams in Orange and Kern counties, which collections indicate a period of flowering that corresponds with that of the variety. Brandegee's no. 3382 from San Diego, referred by Miss Eastwood to *M. serotina*, is an intermediate state.

Bloomeria transmontana (Greene), comb. nov. *Muilla transmontana* Greene, Pitt. i. 73 (1887). *M. coronata* Greene, l. c. 165 (1888).

This inland plant may be found to pass into *B. maritima* but the collections before me show no such tendency. Besides the very broad filaments, which, according to Mrs. Brandegee, *Zoe*, iv. 101 (1893), furnish the only means of separating *B. maritima* and *B. transmontana*, the anthers of the latter appear to be constantly yellow; those of the former, lurid purple.

Bloomeria Purpusii (Brandg.), comb. nov. *Muilla Purpusii* Brandg. Univ. Cal. Publ. Bot. iv. 177 (1911).

Brodiaea grandiflora (Lindl.), comb. nov. *Triteleia grandiflora* Lindl. Bot. Reg. xv. sub. t. 1293 (1830). *B. Douglasii* Wats. Proc. Am. Acad. xiv. 237 (1879).

The restoration of the name *Brodiaea coronaria* (Salisb.) Hort. for the plant commonly known under the later name, *B. grandiflora* Sm. necessitates the taking up of Lindley's name for the plant more recently called *B. Douglasii* Wats. since the specific name *grandiflora* is no longer "already borne by a valid species."

BRODIAEA CAPITATA Benth., var. **insularis** (Greene), comb. nov. *B. insularis* Greene, Bull. Calif. Acad. Sci. ii. 134 (1886).

The insular plant differs from the typical form of the mainland only in its larger size and usually longer-pedicelled flowers. Greene, in 1885, l. c. i. 216, referred his plant to *B. capitata*, "which is found exceedingly common, . . . and differing rather strikingly from the rankest California specimens in its much greater size. Its leaves, in Guadalupe, are an inch broad, and its scape not seldom more than three feet high."

✓ **Brodiaea coerulea** (Scheele), comb. nov. *Milla coerulea* Scheele, *Linnaea*, xxv. 260 (1852). *Androstephium violaceum* Torr. Bot. Mex. Bound. 219 (1859). *A. coeruleum* (Scheele) Greene, Pitt. ii. 57 (1890).

✓ **Brodiaea breviflora** (Wats.), comb. nov. *Androstephium breviflorum* Wats. Am. Nat. vii. 303 (1873). *B. Paysonii* A. Nels.? Bot. Gaz. lvi. 63 (1913).

There is room for much difference in the interpretation of generic limitations in this group of plants and indeed few groups have been subjected to more diverse treatment. In as much as Greene in the Bull. Cal. Acad. ii. 125 (1886) has devoted five pages to a historical résumé and a discussion of this subject under the title "Some Genera which have been Confused under the Name *Brodiaea*" it is now only necessary to call attention to Greene's

paper. There is one phase of the situation, however, upon which I would comment.

Most of the genera segregated from *Brodiaea* depend for their recognition upon characters which are virtually only modifications of the same phenomenon. Much importance, for instance, has been ascribed to the degree of development of the filament-appendages. Their absence, or, when present, the degree of their attachment to the corolla and to each other, has been used as a means of distinguishing genera although it is apparent that it is only a step from broadly winged filaments to filaments united into a tube by the union of the appendages. The fallacy of ascribing generic value to this type of characters is well shown in the results to which it inevitably leads. One who adopts in this group these or characters of similar nature for the definition of genera soon finds himself compelled, in order to be consistent, to go to ridiculous limits in his segregation. Rydberg himself admits as much in his argument for his segregate genus *Dipterostemon* Rydb. Bull. Torr. Club, xxxix. 110-111 (1912).

The maintenance of the genus *Androstephium*, then, would call for the assignment of generic value to the sort of characters discussed above and the consequent recognition of several other groups of closely related species as genera. That these plants are anything but Brodiaeas in aspect and fundamental character cannot be doubted and for the most part they have been regarded as species of this single and in its broader sense rather natural group.

Brodiaea so constituted may be said to be too close to *Milla*. Baker at one time even referred many of the species of the former to the latter genus. Later he rejected his earlier work, no doubt because he realized that, considered in the light of all the species, two characteristic groups were concerned which on the whole were amply distinct. One could argue not without reason for the suppression on grounds of technical character of *Brodiaea* and *Milla* both in *Allium* but common sense should forbid such action even as it should restrain the extreme segregation of natural elements. Rarely does it seem to make its influence felt however in thwarting the carrying out of this latter tendency.

In this connection I would question the validity of the several segregate genera of *Milla* proposed to take care of certain South American plants. These genera appear to be based on the same

class of characters that have proved unreliable in the case of *Brodiaea*. The material at hand however is so meager that this question cannot be taken up satisfactorily at present.

Bessera tenuiflora (Greene), comb. nov. *Behria tenuiflora* Greene, Bull. Cal. Acad. ii. 143 (1886).

As observed by Greene, l. c. 129–130, the exclusion from *Brodiaea* of *Brevoortia* naturally calls for the recognition of the genus *Behria* Greene to take care of a plant from Lower California which has a quite similar perianth but very different staminal structure. Likewise the inclusion in *Brodiaea* of *Brevoortia* and especially of *Androstephium* (as discussed above) sets aside Greene's arguments for the creation of yet another genus for this plant (i. e. *B. tenuiflora*) because the character of *Brodiaea* when so amplified suffices, at least so far as the characters Greene uses as a means of distinguishing his genus *Behria* are concerned. But even so there are points of difference between *Behria* and *Brodiaea* which, after all, may keep them apart. The stamens in *Behria* are long-exserted from the bright red corolla and the filaments are united at base into a short tube — a combination of characters not found in any species of *Brodiaea* even when that genus is taken to include *Brevoortia* and *Androstephium*. The former has a similarly formed red perianth but the stamens are free and included; the latter has the perianth of *Brodiaea* but the stamens (included, however) are joined in a tube. *Behria*, then, may be said to possess as diagnostic character the long-exserted stamens and the combined feature of the red perianth and partially united filaments. But is this not the salient character of *Bessera*? Indeed that genus differs only in the greater division of the perianth segments and the union of the filaments into an elongate tube — differences purely of degree. The situation resolves itself, therefore, into a question as to the validity of the genus *Bessera*. With *Androstephium* sunk in *Brodiaea* the technical position of *Bessera* is indeed weakened but on the other hand it must be remembered that whereas the species of the former group are characterized by the more or less united filaments they are *Brodiaeas* in every other respect, notably in the included stamens, color of the flowers and general aspect, whereas the species of *Bessera* are at once unique both in character and aspect by the combination of red flowers and long-exserted stamens. Finally it may be mentioned that no *Brodiaea* is truly a component

of the Mexican flora although one or more species may sometime be found across the international boundary. The two species of *Bessera*, on the other hand, are peculiar to Mexico and Lower California. Altogether it seems best to regard *Bessera* as a genus distinct from *Brodiaea* even when the latter is considered in its largest sense as I have done.

CALOCHORTUS ALBUS Dougl. ex Benth. in Maund & Hensl. Botanist, ii. t. 98 (1839). *C. Englerianus* Hort. Berol. Notizbl. Bot. Gart. Mus. Berl. ii. 318 (1899).

Ascherson & Graebner, Synopsis, iii. 218 (1905) have taken up the name *C. Englerianus* for this plant because of the existence of the name *Fritillaria alba* Nutt. Gen. i. 222 (1818), a name which refers to another species of *Calochortus* but which is not to be used. Art. 53 of the International Rules states: "When a species is moved from one genus into another, its specific epithet must be changed if it is already borne by a valid species of that genus." Therefore *F. alba* must take the name *C. Nuttallii* T. & G. on being transferred to *Calochortus* because of the presence there of *C. albus* Dougl., a valid species which cannot, according to these rules, be renamed *C. Englerianus* as has been done by Ascherson & Graebner. It is well, indeed, that this lovely garden plant may continue to be known under the name it has always borne, *C. albus* Douglas.

CALOCHORTUS NANUS (Wood) Piper, Bull. Torr. Club, xxxiii. 537 (1906). *C. elegans* Pursh, var. *nanus* Wood, Proc. Acad. Phil. 168 (1868).

When Piper, l. c., raised this plant to specific rank he wrote: "This species is nearer true *C. elegans* Pursh than any other Californian species." *C. elegans* does not grow in California, as indeed Piper himself indicated, l. c. 540. In fact, *C. nanus* appears to me to be related much more closely to *C. coeruleus* (Kell.) Wats. than to *C. elegans*. It has the fimbriately ciliate petals of the former and so far as I can see is indistinguishable except by the acuminate anthers. The anthers of typical *C. coeruleus* are rounded at apex but tipped with a more or less obvious apiculation. There are, however, several collections which seem to indicate that this difference in the anthers is not always constant and if in future more material proves this to be the case *C. nanus* can scarcely be kept as a species distinct from *C. coeruleus*. Two of the specimens referred by Piper without question to *C. nanus* appear intermediate

in anther-character, viz., Piper, no. 6398, and Applegate, no. 725. The latter specimen as represented in the Gray Herbarium consists of one entire plant and two stems. The flowers of the former portion of the specimen show only anthers that are merely rather long-apiculate instead of acuminate. The specimen, furthermore, comes from Sisson, California, where *C. coeruleus* is not uncommon as is evidenced by collections by Purdy and L. E. Smith (713).

CALOCHORTUS WEEDII Wood, var. *VESTUS* Purdy. Abrams, Fl. Los Ang. & Vic. 83 (1917) cites this variety as a synonym of the var. *purpurascens* Wats. The latter is scarcely more than a form with purplish petals. The var. *vestus*, on the other hand, is more distinct since the very truncated petals are densely fringed with brown hairs. The Santa Barbara specimen, referred by Watson to his variety, represents rather the var. *vestus*. Although Watson mentions this plant first in his citation of specimens, Proc. Am. Acad. xiv. 265 (1879) it is evident from his description that his name may be applied properly only to the specimen from Cajon Pass, that is, to the plant with "petals purple or blotched with purple." Although there is essentially only a color-difference concerned here this variation may continue to be given varietal recognition since, as Parish indicates, Bull. So. Cal. Acad. Sci. i. 120 (1902), it is separated geographically from the typical form.

CALOCHORTUS BRUNEAUNIS Nels. & Macbr. Bot. Gaz. lv. 372 (1913). Rydberg, Fl. Rocky Mts. & Adj. Pl. 172 (1917) gives this species (for which he makes "A. Nels." the authority) as a synonym of *C. macrocarpus* Dougl. It is at once distinct by the glabrous petal faces and the short (6–8 mm.) anthers. The petals of *C. macrocarpus* are always more or less pubescent about the gland and the anthers are very long, 10–14 mm. Except for the very definite green band of the petals and the few-ribbed anthers, *C. bruneaunis* could be referred to the *C. Nuttallii* group. It is now known from southern Idaho and adjacent Oregon and Nevada.

There are two other plants which Rydberg, l. c., also refers to *C. macrocarpus*, namely *C. cyaneus* and *C. maculosus*. According to Rydberg, Aven Nelson is responsible for both names; as a matter of fact he is the author of the first only. Both plants are fully as distinct as *C. acuminatus* Rydb. which, of course, is kept up as a species. However, since the characters upon which *C. cyaneus* and *C. maculosus* are based are known to be inconstant in

other groups in this genus these plants may better be treated as varieties of the typical form. The former is remote geographically — it grows in southwestern Idaho and adjacent Nevada — and the color of the somewhat less hairy petals is a peculiar delicate blue-green. The latter, *C. maculosus*, represents a variation known to many species — the occurrence of a purple spot on the petals. This form seems to be local in northern Idaho and adjacent Washington.

✓ *CALOCHORTUS MACROCARPUS* Dougl., var. **cyaneus** (A. Nels.), comb. nov. *C. cyaneus* A. Nels. Bot. Gaz. liii. 219 (1912).

✓ *CALOCHORTUS MACROCARPUS* Dougl., var. **maculosus** Nels. & Macbr., in herb. *C. maculosus* Nels. & Macbr. Bot. Gaz. lvi. 471 (1913).

Scilla hyacinthina (Roth), comb. nov. *Ledebouria hyacinthina* Roth, Nov. Pl. Ind. Or. 195 (1821). *Barnardia indica* Wight, Ic. Pl. Ind. Or. vi. t. 2041 (1853). *S. indica* (Wight) Baker in Saund. Refug. iii. App. 12 (1870).

It is not clear why Durand & Schinz retain in their *Conspectus Florae Africae* v. 393 (1893) the binomial *S. indica* for this plant unless they considered the presence of *S. hyacinthoides* as invalidating Roth's name. The former binomial, however, cannot possibly be construed as conflicting with the name *S. hyacinthina*.

r *Camassia Walpolei* (Piper), comb. nov. *Quamasia Walpolei* Piper, Proc. Biol. Soc. Wash. xxix. 81 (1916).

To the list of specimens given by Piper as belonging to this seemingly local species may be added Applegate, no. 723 from Swan Lake Valley, Klamath County, Oregon.

Hyacinthus atroviolaceus (Regel), comb. nov. *Bellevalia atroviolacea* Regel, Act. Hort. Petrop. viii. 654 (1884).

The opinion seems to be nearly universal now among botanists that *Bellevalia* Lapeyr. is to be sunk in *Hyacinthus* L.

MUSCARI RACEMOSUM (L.) Mill. Gard. Dict. ed. 8. no. 3 (1768); Lam. & DC. Fl. Franc. ed. 3. iii. 208 (1805).

Schinz & Thellung, in Bull. Herb. Boiss. 2^e sér. vii. 562 (1907), insist that the proper second authority for this binomial is "Lam. et DC." rather than "Miller," because "*M. racemosum* Miller, l. c., ist ein Mixtum-Compositum, das nur zum kleinern Teil dem *M. racemosum* (L.) Lam. et DC. et auct. rec. omn., zum grössten Teil dagegen dem *M. botryoides* (L.) Lam. et DC. (non Miller)

entspricht. . . . Es ist also dringend geboten, nach Art. 51, Al. 4 die Miller'schen Kombinationen fallen zu lassen und zu *M. racemosum* . . . '(L.) Lam. et DC.' als Autoren zu zitieren." They apply the same argument to *M. botryoides*. This action however is *not* in accord with the International Rules and in citing Art. 51, 4 of those rules as authority they misinterpret this rule which reads, "Everyone should refuse to admit a name . . . when the group which it designates embraces elements altogether incoherent, or when it becomes a permanent source of confusion or error." One generic name (*Schebera* L.) and one specific name (*Rosa villosa* L.) are then cited as examples of the working of Art. 51, 4. These names (the first, because it "derives its characters from two genera"; the second, because "certain identification seems impossible") are to be abandoned altogether in order to avoid "a permanent source of confusion or error." The case of *Muscari racemosum* does not come under this rule because it is well-known to what plant Linnaeus applied the specific epithet "*racemosum*"; and the fact that Miller, in transferring this name from *Hyacinthus* to *Muscari* misapplied it in large part has no bearing whatsoever on the validity of the combination *M. racemosum* (L.) Mill. as is shown clearly by Art. 41, which reads, "An alteration of the constituent characters or of the circumscription of a group does not warrant the quotation of another author than the one who first published the name or combination of names," and also by Art. 43. "When, in a genus, a name is applied to a group which is moved into another group . . . the change is equivalent to the creation of a new group and the author who has effected the change is the one to be quoted. The original author can be cited only in parenthesis." However badly, then, Miller may have applied the name *Muscari racemosum* he was the first to publish the combination and he and he alone is to be cited as second authority. If one wishes to show that Lam. & DC. were the first to apply the name correctly it may be written, in accord with Art. 41 (2d paragraph), *Muscari racemosum* (L.) Mill. em. Lam. & DC.

***Yucca Treleasei*, nom. nov.** *Y. brevifolia* Schott ex Engelm. Trans. Acad. St. Louis, iii. 46 (1873), not *Y. brevifolia* Engelm. Bot. King. Exp. 496 (1871).

A detailed and critical exposition by Dr. Trelease on the proper application of the names *Y. Schottii* and *Y. brevifolia* may be

found in Rep. Mo. Bot. Gard. xiii. 101-103 (1902). This lucid interpretation of an involved nomenclatorial situation will doubtless prove conclusive but the plant to which the name *Y. brevifolia* Schott has been applied must receive a new name because this cognomen has been given earlier to another (and valid) species.

Nolina juncea (Zucc.), comb. nov. *Dasyllirion junceum* Zucc. Abhandl. Akad. München Cl. iv. 2: 19 (1845). *D. Hartwegianum* Zucc. l. c. 21, nomen nudum; Kunth, Enum. v. 41 (1850). *Cordylina longifolia* Benth. Pl. Hartw. 53 (1840), not *N. longifolia* (Karw.) Hemsley, Biol. Centr. Am. iii. 372 (1884). *N. Hartwegiana* (Zucc.) Hemsley, l. c. 371.

Dasyllirion longistylum, spec. nov., habitu ignotum; foliis e lata basi (6-7 mm. latis) lineari-subulatis 4-5 dm. longis glaucis apice fere integris vel breviter fasciculo fibrarum emarcidarum terminatis supra plus minusve scabridis margine minute serrulatis spinosisque, spinis flavo-viridibus subulatis sursum curvatis; spica composita 3-5 dm. longa, spiculis dense multifloris; bracteis e lata basi subulatis; e floribus stamineis filamentis breviter exsertis; capsulis 5 mm. latis, apicibus valde dentatis sed stylo exserto, 1.5-fere 2 mm. longo; pedicellis 2 mm. longis. — MEXICO: San Luis Potosi, Minas De San Rafael, 1911, *Purpus*, no. 5561 (TYPE, Gray Herb.).

The discovery of a species of the *Nolineae* referable in all diagnostic characters to *Dasyllirion* as that genus is defined by Trelease in his tentative revision, Proc. Am. Phil. Soc. 1. 412 (1911) except that the pedicels are not "articulated close to the flowers" but rather "somewhat below the flowers" in the manner of those species referred to *Beaucarnea*, seems to furnish the additional evidence needed to prove that Trelease with good reason raised the question, l. c. 406, "whether *Beaucarnea* is more than a well-marked subgenus of *Dasyllirion* which, strictly limited, itself consists of two quite dissimilar groups." Unless *Dasyllirion longissimum* is removed the only distinctive characters remaining to *Beaucarnea* are the entire perianth segments and the paniced inflorescence. *D. longissimum* is peculiar in its 4-sided unarmed leaves but an occasional slight roughness and low elevations on the leaf-edges suggest the minute serrulations and the spines of true *Dasyllirion*. It would not be possible, therefore, except by the employment of rydbergianesque methods, to separate *D. longissimum* generically. When the species *D. longistylum* and *D. longissimum* are both taken into consideration, then, the futility of

retaining *Beaucarnea* as distinct from *Dasyliirion* seems evident. In accord with this view the following species of *Beaucarnea* represented in the Gray Herbarium are transferred.

Dasyliirion recurvatum (Lemaire), comb. nov. *Beaucarnea recurvata* Lemaire, Ill. Hort. viii. misc. 61, pl. 1 (1861).

Dasyliirion strictum (Lemaire), comb. nov. *Beaucarnea stricta* Lemaire, Ill. Hort. viii. misc. 61 (1861).

Dasyliirion gracile (Lemaire), comb. nov. *Beaucarnea gracilis* Lemaire, Ill. Hort. viii. misc. 61 (1861). *D. gracile* (Brongn.) Zucc. is a synonym of *D. acrotriche* (Schiede) Zucc.

Cordyline mauritiana (Bojer), comb. nov. *Dracaena mauritiana* Bojer, Hort. Maur. 348 (1837). *Cohnia floribunda* Kunth. Enum. v. 36 (1850).

Asparagus Krausianum (Kunth), comb. nov. *Myrsiphyllum Krausianum* Kunth, Enum. v. 107 (1850). *A. Krausii* Baker, Journ. Linn. Soc. xiv. 628 (1875).

It is apparent, from the statement in Recommendation ix of Article 26, International Rules, to the effect that "it will be well, in the future, to avoid the use of the genitive and the adjectival form of the same name to designate two different species of the same genus [for example *Lysimachia Hemsleyana* Maxim. (1891) and *L. Hemsleyi* Franch. (1895)]" that the genitive and adjectival forms of the same name are to be regarded as distinct and therefore are both valid for different species of the same genus. This being the case it is not correct to accept the name *A. Krausii* Baker for the plant called originally *M. Krausianum* Kunth, since, as shown above, these specific epithets are to be treated as entirely distinct names.

ASPARAGUS ASPARAGOIDES (L.) W. F. Wight, var. **angustifolius** (Mill.), comb. nov. *Medeola angustifolia* Mill. Gard. Dict. ed. 8. no. 2 (1768). *A. medeoloides* (L.) Thunb., forma *angustifolius* (Mill.) Baker ex Durand & Schinz, Cons. Fl. Afr. v. 286 (1893).

This narrow-leaved form is striking and well-deserving, it would seem, varietal rank.

Asparagus Fysoni, nom. nov. *A. subulatus* Steud. ex Baker, Journ. Linn. Soc. xiv. 614 (1875), not *A. subulatus* Thunb. Prod. Pl. Cap. 66 (1794).

Since there is another valid species in this genus already bearing the specific name *subulatus* it becomes necessary to rename this later christened plant. Prof. Fyson, in his admirable Flora of the

Nilgiri and Pulney Hill-Tops, i. 414 (1915) notes that this species is "peculiar to these hills." This fact suggests that the plant may appropriately be called *A. Fysoni* in recognition of the careful work of Prof. Fyson on the flora of its region.

CLINTONIA ALPINA (Royle) Kunth, var. **udensis** (Trautv. & Mey.), comb. nov. *C. udensis* Trautv. & Mey. Fl. Ochot. 92 (1856).

In spite of the fact that Hooker, Fl. Brit. Ind. vi. 361 (1892) wrote (under *C. alpina*), "the Chinese *C. udensis*, F. & M., hardly differs" and that Baker before him, Journ. Linn. Soc. xiv. 585 (1875) questioned (under *C. udensis*) "An sit varietas mera *C. alpinae*?" no one since seems to have compared the two plants with the idea in mind that possibly only one species is represented. Yet this seems to be the true situation if I may judge from the considerable herbarium material which is before me. In flower the specimens from the Orient may be distinguished from the Indian collections by the absence of the small bracts in the raceme which are evident in the latter but caducous. In fruit the plants appear separable only on geographical grounds. Accordingly it seems desirable to regard the later described form of the Orient as merely representing a geographical variant of the plant from India.

SMILACINA AMPLEXICAULIS Nutt., var. **glabra**, var. nov., caulis folisque viridibus, paullo glaucescentibus, glabris. — Eastern California to Oregon. — CALIFORNIA: South Fork Kaweah River, Tulare Co., July 22, 1904, *Culbertson*, 4252 (TYPE, Gray Herb.): 1872, *Gray*. OREGON: Crater Lake, Klamath Co., Aug. 14, 1896, *Applegate*, 709; Ashland Butte, July, 1886, *Henderson*.

This is the plant to which Hall in his Yosemite Flora, 59 (1912) refers as follows under the description of *S. amplexicaulis*: "a perfectly smooth and glabrous form (or species?) occurs at 8500 ft. in Matterhorn Cañon and elsewhere in the Sierra Nevada." However, so far as I can see (from herbarium material) the only difference between this high montane plant and the typical form of lower altitudes is its entire lack of pubescence.

SMILACINA PURPUREA Wall., f. **pallida** (Royle), comb. nov. *S. pallida* Royle, Ill. Him. i. 380 (1839). *Jocaste purpurea* (Wall.) Kunth, var. *albiflora* Kunth, Enum. v. 155 (1850).

A series of specimens shows this plant to be only a white-flowered form of the typical purple-flowered state since the inflorescence of the latter is often also quite simple rather than branched

as shown by Wallich in his plate 144, *Plant. As. Rar.* ii. 38 (1831). Hooker, *Fl. Brit. Ind.* vi. 323 (1892) credits Wallich with having published, l. c., a species *S. albiflora* Wall. As a matter of fact, Wallich merely indicates the existence of a white-flowered plant with simple inflorescence which he regards as possibly more than a white-flowered variety. He does not assign to it, however, a name, so that the first published name for this white-flowered form is that of Royle.

POLYGONATUM ODORATUM (Mill.) Druce, var. **ambiguum** (Link), comb. nov. *P. ambiguum* Link in Schult. f. *Syst. Veg.* vii. 299 (1829). *P. Polygonatum* (L.) Jirasek, *B. ambiguum* (Link) Aschers. & Graebn. *Fl. Nordostd. Flachl.* 196 (1898). *P. officinale* All., var. *ambiguum* (Link) Schinz & Thell. in Schinz & Keller, *Fl. Schweiz*, ed. 3, ii. 66 (1914).

Art. 55 of the International Rules states that specific names must be rejected "when they merely repeat the generic name." This plant, therefore, cannot be called *Polygonatum Polygonatum* but must be known by the next available specific name, *odoratum*. The variety *ambiguum* differs from the typical form of the species in the 3-5 (rather than 1-2)-flowered peduncle.

TRILLIUM UNDERWOODII Small, var. **luteum** (Muhl.), comb. nov. *T. sessile* L., var. *luteum* Muhl. *Cat.* 38 (1813). *T. luteum* (Muhl.) Harb. *Biltm. Bot. St.* i. 21 (1901).

As indicated by Gates, *Annals Mo. Bot. Gard.* iv. 46 (1917), this plant is distinguished from *T. Underwoodii* merely by the yellow color of the flowers and may therefore best be treated as a variety especially since intermediate forms occur. There is great need for careful field-study of this group, characterized by *T. sessile*, since the finer differences between the species are not well-preserved in the herbarium. Of particular interest is the relationship of the plant treated above to *T. sessile* L., var. *giganteum* H. & A. (or perhaps better *T. giganteum* (H. & A.) Heller) of the Pacific coast. It seems to me probable that only one variable species is concerned here and if so *T. Underwoodii* is the first available specific name. On the other hand someone who has the opportunity to study living eastern and western material may find that there are a number of distinct things. In the meantime I think any attempt to treat satisfactorily the group from dried specimens alone will prove futile.

ALETRIS PAUCIFLORA (Klotsch) Franchet, var. *khasiana* (Hook. f.), comb. nov. *A. khasiana* Hook. f. Fl. Brit. Ind. vi. 265 (1892). *A. lanuginosa* Bur. & Franchet, var. *khasiana* (Hook. f.) Franchet, Journ. de Bot. x. 202 (1896).

I think there is no doubt as to the identity of *A. pauciflora* and *A. lanuginosa*. Since the former is the earlier name the new varietal combination given above becomes necessary. The variety differs in the pyramidal gradually acute rather than ovate-oblong, abruptly rostrate capsule.

Luzuriaga polyphylla (Hook.), comb. nov. *Callixene polyphylla* Hook. Ic. vii. t. 674 (1844). *L. erecta* Kunth, Enum. Pl. v. 280 (1850).

It is not clear why Kunth, in describing this plant under *Luzuriaga*, failed to adopt Hooker's name which seems quite applicable. However this may be, the latter name being the older, must, of course, take precedence.

II. A REVISION OF MIRABILIS, SUBGENUS HESPERONIA

MIRABILIS L., subgenus HESPERONIA (Standley) Jepson, Fl. of Calif. pt. iv. 457 (1914). *Hesperonia* Standley, Contrib. U. S. Nat. Herb. xii. 360 (1909).

The treatment by Standley, N.A. Fl. xxi. 233-237 (1918), of those species of *Mirabilis* referable to the subgenus *Hesperonia* seems to me, in many regards, unsatisfactory, but nevertheless there is a distinctly useful purpose served in the bringing together of a rather difficult synonymy and in the indication of certain characters that may be used in defining the several components of the group. Then there is the treatment by Jepson, l. c., of the Californian species. Here the variability of *M. californica* is recognized but there is error in the application of certain names.

As Jepson has hinted, l. c. 459, one encounters a genuine difficulty in attempting to discriminate between the species because the form first described is so meagerly known. This is *M. laevis* (Benth.) Curran and seemingly only two or three collections have been made. One of these is represented in the Gray Herbarium, — an ample specimen secured by Brandegee, Jan. 18, 1889, on Magdalena Island, the vicinity of the type-locality. This plant is essentially glabrous. Even the most glabrate forms of other

species (known to be variable in the degree of pubescence) are never so nearly smooth throughout. But the diagnostic feature of *M. laevis* is not to be found alone in the lack of pubescence but rather consists of this character taken in conjunction with the nature of the involucre. The involucre lobes are ovate-lanceolate, attenuate and usually longer than the tube. They thus suggest those of *M. tenuiloba* but are shorter and broader at base. There is a form of *M. californica* which has somewhat elongate acute involucre lobes but the involucre is relatively short-campanulate in the manner of typical *M. californica* and I have seen no specimens I should regard as transitional to *M. laevis*. For the present, then, or until there is definite evidence that *M. laevis* is variable in one or the other of the characters discussed above it seems desirable to regard it as a local species confined to the region of Magdalena Bay rather than to refer to it as a mere variant the more distinctly pubescent *M. californica* variable as the latter is in the matter of pubescence but fairly constant in the character of involucre. Besides *M. tenuiloba*, *M. laevis* and *M. californica* it seems possible to distinguish two other plants as species, *M. Heimerlii* and *M. oligantha*. The salient feature of the former is found in the fruit. This is remarkably spherical so that it resembles a tiny marble. Although it is true that there seems to be some variation in the shape of the fruit of *M. californica* in the examination of considerable fruiting material I have found no anthocarps that were not definitely longer than thick. The latter species (*M. oligantha*), on the other hand, has greatly elongate fruits and moderately slender involucre lobes; it is apparently a distinct species. Its involucre suggests a relationship to *M. tenuiloba*. This plant occurs in two forms. The typical state is viscid-pubescent to the base and the fruiting involucres are mostly 13–15 mm. long. The other form, described by Standley as *M. polyphylla*, is glabrous below and the involucres are usually somewhat shorter even in fruit (10–12 mm. long). Standley in his key character, l. c. 233, separates these plants not only upon the characters just noted but also upon the relative size of leaves and thickness of stems. It seems evident even from the rather few specimens I have seen that these supposed differences are individual in character and are not concomitant with the extent of pubescence or the size of the involucre. *M. polyphylla* at best there-

fore is no more than a variety of *M. tenuiloba* and typifies the same sort of variation that is found in *M. californica*.

There remains to be noted the variants of *M. californica*. On the whole I agree with Jepson's treatment of these forms except that (as indicated by Standley, l. c. 236) the var. *glutinosa* and the var. *retrorsa* represent one and the same plant. In spite of the fact that Jepson writes that *Hesperonia cedrosensis* Standley "seems no more than a form of *M. californica*" he makes the combination *M. cedrosensis* (Standley) Jepson, l. c. 459. It is indeed only a variant of Gray's plant as is shown by some specimens from San Diego county which are evidently transitional since they exhibit in no small part the same peculiar scabrous pubescence of short conic hairs that characterizes Standley's species.

The plants here discussed may be summarized as follows:

- a. Plants evidently more or less pubescent at least above.
- b. Fruit never truly globose, longer than broad.
 - c. Involucre (10-) 13-15 mm. long, in fruit the lanceolate or oblong-lanceolate lobes distinctly longer than the tube.
 - Stems pubescent to the base; typical 1. *M. tenuiloba*.
 - Stems glabrous toward the base 1a. var. *polyphylla*.
 - c. Involucre not over 10 mm. long, the usually ovate lobes often shorter than the tube.
 - d. Fruit oblong-cylindrical, 7-8 mm. long; involucre 9 mm. long 2. *M. oligantha*.
 - d. Fruit subglobose but evidently longer than thick, 4-5(-6) mm. long; involucre 5-7(-8) mm. long.
 - e. Pubescence villous or at least the hairs mostly slender, not predominantly short-conic.
 - f. Plant somewhat villous, at least above; peduncles, at least all the upper, much shorter than the involucre; perianth usually red-purple.
 - Stems glabrate below; lower leaves acutish or at least not broadly rounded at apex; typical 3. *M. californica*.
 - Stems villous nearly or quite to the base; leaves broadly rounded at apex 3a. var. *aspera*.
 - f. Plant scabrous with fine retrorse pubescence, especially above, scarcely if at all villous; peduncles even the upper often as long, or half as long, as the involucre; perianth white 3b. var. *glutinosa*.
 - e. Pubescence for the most part consisting of short conic hairs 3c. var. *cedrosensis*.
- b. Fruit truly globose; known only from Guadalupe Island. 4. *M. Heimerlii*.
- a. Plant glabrous or the inflorescence minutely and sparsely pubescent; known only from Magdalena Bay 5. *M. laevis*.

1. *M. TENUILOBA* Wats. Proc. Am. Acad. xvii. 375 (1882). *Hesperonia tenuiloba* (Wats.) Standley, N.A. Fl. xxi. 234 (1918). — Extreme southern California and northern Lower California. — CALIFORNIA: 1880, *Wright*, 106; West Cañon, Colorado Desert, *Parish*, 6072.

1a. *M. TENUILOBA* Wats., var. **polyphylla** (Standley), comb. nov. *Hesperonia polyphylla* Standley, Contrib. U.S. Nat. Herb. xii. 364 (1909). — San Diego Co., California and Lower California. — CALIFORNIA: Escondido, *Chandler*, 5332. LOWER CALIFORNIA: Los Angeles Bay, *Palmer*, 600; San Borgia, May 6, 1889, *Brandegee*.

2. ***M. oligantha*** (Standley), comb. nov. *Hesperonia oligantha* Standley, Contrib. U.S. Nat. Herb. xii. 363 (1909). — Known only from Calmolly, Lower California.

3. *M. CALIFORNICA* Gray in Torr. Bot. Mex. Bound. 173 (1859). *Hesperonia californica* (Gray) Standley, Contrib. U. S. Nat. Herb. xii. 364 (1909). *M. californica* Gray, var. *glutinosa* Jepson, Fl. Calif. iv. 458 (1914), in part. — Southern California and Lower California. — CALIFORNIA: San Diego, *Thurber*, 569, *Brandegee*, 826; San Bernardino, *Parish*, 4159; Pampa Station, *Heller*. 7644; Whitewater, *Wright*, 151; La Jolla, *Clements*, 61; Sweetwater Valley, *Cleveland*; Sweetwater, *Orcutt*, 1049; Winchester, *Hall*, 418; Palm Springs, *Mary F. Spencer*, 759; Los Angeles, *Nevin*, *Gray*, *Abrams*, 2504; Tia Juana, *Abrams*, 3506; Azusa, *Macbride & Payson*, 732; Santa Lucia Mts., *Plaskett*, 93; Riverside, *Boyd*; Santa Barbara, *Elmer*, 3764; Pasadena, *Grant*; Santa Catalina Island, *Macbride & Payson*, 847. LOWER CALIFORNIA: Guadalupe Island, *Palmer*, 82; Los Angeles Bay, *Palmer*, 601.

3a. *M. CALIFORNICA* Gray, var. **ASPERA** (Greene) Jepson, Fl. Calif. iv. 458 (1914); subsp. *aspera* (Greene) *Parish*, *Muhl*. iii. 125 (1907). *M. Bigelovii* Gray, Proc. Am. Acad. xxi. 413 (1886). *M. aspera* Greene, Eryth. iv. 67 (1896). *Hesperonia Bigelovii* (Gray) Standley, N.A. Fl. xxi. 235 (1918). *H. aspera* (Greene) Standley, Contrib. U.S. Nat. Herb. xii. 362 (1909). — Eastern San Diego Co., Calif. to Arizona. — ARIZONA: *Pringle*, 181; Grand Cañon, *Gray*; Tempe, *Ganong & Blaschka*. CALIFORNIA: Mojave Desert, *Parish*, 3757; Argus Mts., *Coville & Funston*, 741, *Purpus*, 5432; *Bigelow*.

3b. *M. CALIFORNICA* Gray, var. **GLUTINOSA** (A. Nels.) Jepson, Fl. Calif. iv. 458 (1914); var. *retrorsa* (Heller) Jepson, l. c.; var. *aspera* Jepson, l. c. in part. *Hesperonia retrorsa* (Heller) Standley, N.A. Fl. xxi. 236 (1918). — Southeastern California to southern Utah and Nevada. — UTAH: St. George, *Goodding*, 778, *Parry*, 211. NEVADA: Pah Ute Mts., *Watson*, 963; Truckee Pass, *Kennedy*, 2011, 1585, *Heller*, 8643; Las Vegas, *Goodding*, 2347; Rhyolite, *Heller*, 9662; Mount Grant, *Heller*, 10908; Pyramid Lake,

Kennedy, 1977. CALIFORNIA: Bishop, *Heller*, 8248; Parry & Lemmon, 349; Southern Belle Mine, *Heller*, 8336; Mojave Desert, *Abrams & McGregor*, 417.

3c. *M. CALIFORNICA* Gray, var. **cedrosensis** (Standley), comb. nov. *Hesperonia cedrosensis* Standley, Contrib. U. S. Nat. Herb. xii. 362 (1909). *M. cedrosensis* (Standley) Jepson, Fl. Calif. iv. 459 (1914). — LOWER CALIFORNIA: San Quentin, *Palmer*, 640; Cerros Island, *Dr. Street*; Cedros Island, *Palmer*, 737.

4. *M. Heimerlii* (Standley), comb. nov. *Hesperonia Heimerlii* Standley, Contrib. U.S. Nat. Herb. xiii. 412 (1911). — LOWER CALIFORNIA: Guadalupe Island, *Palmer*, 886.

5. *M. LAEVIS* (Benth.) Curran, Proc. Calif. Acad. ser. 2. i. 235 (1888). *Hesperonia laevis* (Benth.) Standley, Contrib. U. S. Nat. Herb. xii. 363 (1909). — LOWER CALIFORNIA: Magdalena Island, *Brandege*.

III. A REVISION OF MENTZELIA, SECTION TRACHYPHYTUM

My attention has been called to this group because of some excellent specimens collected by Mr. I. M. Johnston in southern California where this section (*Trachyphytum*), by a few botanists recognized as a genus under the name *Acrolasia*, of the genus *Mentzelia* culminates in a number of closely allied and somewhat variable forms. The group has been subjected to revision by Urban & Gilg in their, on the whole helpful, Monographia Loasacearum but unfortunately these authors failed in this instance to discriminate certain plants (notably *M. dispersa* and *M. albicaulis*) which are evidently distinct species. Dr. Davidson in the Bull. So. Calif. Acad. Sci. v. 13-18 (1906) has called attention to Urban & Gilg's misinterpretation of *M. albicaulis* but he in turn has failed in the correct application of certain names. His revision, furthermore, loses much from the standpoint of usefulness because of drawing specific lines too finely and more especially because of the failure to include *M. Veatchiana* and other species, although the title of the paper "A Revision of the Western Mentzelias" is promising and would seem to call for something more than an account of the species supposed to grow in southern California. Dr. Rydberg (of course under the generic name *Acrolasia*) attempts to distinguish, in his Flora of the Rocky Mts. and Adj. Plains, 573 (1917), nine species for the area covered by his flora. He con-

trasts properly *M. albicaulis* and *M. dispersa* but he assigns specific names to plants that indubitably are mere forms of these species and distinguishes them by characters which obviously represent the variations of the individual plants.

Mentzelia albicaulis and its immediate relatives may be distinguished, I believe, as follows:

- a. Seeds prismatic, grooved on the angles, minutely muricate, seemingly smooth except under rather strong magnification.
 - b. Leaves mostly ovate-lanceolate, entire or sinuate-pinnatifid; petals 2-5 mm. long.
 - c. Petals 2-3.5 mm. long.
 - Middle cauline leaves often mostly lanceolate; plants rather loosely branched; pods mostly over 15 mm. long; typical 1. *M. dispersa*.
 - Middle cauline leaves mostly ovate and plant densely branched; pods mostly shorter 1b. var. *compacta*.
 - c. Petals about 5 mm. long 1c. var. *latifolia*.
 - b. Leaves lanceolate, more or less (usually deeply) pinnatifid; corolla longer, the petals 6-8 mm. long. 2. *M. affinis*.
 - a. Seeds irregularly angled, not grooved (or rarely on one angle), obviously minutely tuberculate.
 - b. Inflorescence not congested or at least not at all concealed in bract-like floral leaves.
 - c. Petals 2-4 mm. long; leaves entire or sinuately (infrequently deeply) pinnatifid; typical 3. *M. albicaulis*.
 - c. Petals 5-15 mm. long; leaves various but mostly deeply pinnatifid.
 - d. Corolla distinctly less than 1 cm. wide, the petals 5-6(-8) mm. long; sepals about 3 mm. long
 - 3a. var. *Veatchiana*.
 - d. Corolla 1 cm. or more wide; petals often 10 mm. long; sepals about 5 mm. long.
 - Corolla golden-yellow; seeds usually definitely grooved on one angle 3b. var. *gracilentia*.
 - Corolla coppery-orange at base; seeds irregularly angled, usually not definitely grooved on one angle 3c. var. *pectinata*.
 - b. Inflorescence congested and more or less concealed in the bract-like floral leaves.
 - Bracts broadly ovate; leaves mostly sinuately toothed or pinnatifid; typical 4. *M. congesta*.
 - Bracts ovate-lanceolate; leaves mostly entire. 4a. var. *Davidsoniana*.

1. *M. DISPERSA* Wats. Proc. Am. Acad. xi. 115, 137 (1876).
M. albicaulis Dougl., var. *integrifolia* Wats. Bot. King Exp. 114 (1871). *M. integrifolia* (Wats.) Rydb. Mem. N.Y. Bot. Gard. i. 271 (1900). *M. albicaulis* Dougl., var. *genuina* Urb. & Gilg. Nova Acta Acad. C.L.C.G. Nat. Cur. lxxvi. 28 (1900). *M. pinetorum* Heller, Bull. So. Calif. Acad. Sci. ii. 69 (1903). *Acrolasia pinetorum* Heller, Muhl. ii. 99 (1905). *A. integrifolia* (Wats.) Rydb. Bull. Torr. Club, xxx. 278 (1903). *A. dispersa* (Wats.) Davidson, Bull. So. Calif. Acad. Sci. v. 14 (1906). *A. desertorum* Davidson, l. c.

16. *A. albicaulis integrifolia* (Wats.) Daniels, Fl. Boulder, Col. 174 (1911). — Colorado to southern California, north to British Columbia and Montana. — MONTANA: Bitterroot Valley, July 26, 1880, *Watson*; also July 15, 152; Spanish Basin, *Rydberg & Bessey*, 4544. IDAHO: Boise, *Clark*, 99; Owyhee Co., *Macbride*, 470; Lewiston, *Henderson*, 2715; Cœur D'Alene Mts., *Leiberg*, 1318; Clear Water, *Spalding*; Custer Co., *Macbride & Payson*, 3384; WYOMING: Wood's Creek, *A. Nelson*, 8046; Newcastle, *Bates*; Pole Creek, *A. Nelson*, 1375; Mammoth Hot Springs, *A. Nelson & E. Nelson*, 6006; Birds Eye, *A. Nelson*, 9408. COLORADO: Boulder, *Patterson*, 209. UTAH: Wasatch Mts., *Watson*, 430; Plymouth, *W. W. Jones*, 429. NEVADA: Peavine Mt., *Heller*, 9762; Glenbrook, *Baker*, 1345. ARIZONA: Tempe, 1892, *Ganong & Blaschka*. CALIFORNIA: San Antonio Mts., *I. M. Johnston*, 1602, 2090, 2052; Yosemite, *Abrams*, 4405; also *Smiley*, 491; Mt. Sanhedrin, *Heller*, 5910, Buck Mt., *Tracy*, 2843; Pah Ute Peak, *Purpus*, 5503, 5102; Mt. Wilson, *Davidson*, 1008; Red Clover Valley, *Heller & Kennedy*, 8722; Alma Soda Spring, *Heller*, 7503; Cold Creek Canyon, Mendocino Co., *Blankinship*; also Lake Co. OREGON: Harper Ranch, *Leiberg*, 2079; Swan Lake Valley, *Applegate*, 213; Pine Creek, *Leiberg*, 188; *Geyer*, 663. WASHINGTON: Spokane, *Piper*, 1846; Wenatchee River, *Sandberg & Leiberg*, 519; *Vasey*, 231. BRITISH COLUMBIA: Spence's Bridge, June 3, 1889, *John Macoun*.

✓ 1a. var. *latifolia* (Rydb.), comb. nov. *Acrolasia latifolia* Rydb. Bull. Torr. Club, xxxi. 567 (1904). *M. latifolia* (Rydb.) A. Nels. Coulter & Nelson Man. 324 (1909). — With the typical form. — COLORADO: foothills, June 26, 1895, *Cowen*, 249; *Hall & Harbour*, 571 in part. UTAH: Fort Douglas, May 5, 1908, *Mrs. Joseph Clemens*. NEVADA: Verdi, *Heller*, 10870; Hunter Creek Canyon, *Heller*, 10483. CALIFORNIA: Donner Lake, *Heller*, 6865; Plumas Co., 1878, *Mrs. Austin*; Modoc Co., *M. S. Baker*; Yosemite, *Bolander*, 4863; Webber Peak, *Lemmon*, 1207. OREGON: Shirk-ing Water, *Leiberg*, 2358; Juniper Springs, *Leiberg*, 2272.

✓ 1b. var. *compacta* (A. Nels.), comb. nov. *M. compacta* A. Nels. Bull. Torr. Club, xxv. 275 (1898). *Acrolasia compacta* (A. Nels.) Rydb. Bull. Torr. Club, xxx. 278 (1903). — Probably the range of the typical form. — IDAHO: Ketchum, *Nelson & Macbride*, 1248. WYOMING: Parkman, *A. Nelson*, 2454; Mammoth Hot Springs, *A. Nelson & E. Nelson*, 6013; Moorcroft, *A. Nelson*, 8552.

2. *M. AFFINIS* Greene, Pitt. ii. 103 (1890). *Acrolasia affinis* (Greene) Rydb. Bull. Torr. Club, xxx. 278 (1903). *A. viridescens* Heller, Muhl. ii. 98 (1905). — Central and southern California. — Tracy, *Baker*, 2781; San Bernardino, *Parish*, 2200; Tia Juana, *Abrams*, 3477; Kern, *Heller*, 7604; Byron Springs, *Eastwood*, 3817; *Davy*, 1742; *Davidson*, 1009; San Clement Island, *Lyon & Nevin*, 15.

3. *M. ALBICAULIS* Dougl. ex Hook. Fl. Bor. Am. i. 222 (1834); T. & G. Fl. N. A. 534 (1840). *Acrolasia albicaulis* (Dougl.) Rydb. Bull. Torr. Club, xxx. 277 (1903). *M. Tweedyi* Rydb. Mem. N.Y. Bot. Gard. i. 271 (1900). *M. tenerrima* Rydb. l. c. *M. parviflora* Heller, Bull. Torr. Club, xxv. 199 (1898). *Acrolasia Tweedyi* Rydb. Bull. Torr. Club, xxx. 277 (1903). *A. tenerrima* Rydb. l. c. *A. parviflora* Heller, Muhl. i. 138 (1906). — Montana to Washington, south to Arizona and New Mexico. — IDAHO: Shoshone, Nelson & Macbride, 1181; St. Anthony, Merrill & Wilcox, 840. WYOMING: Leekie, Merrill & Wilcox, 788; Badger, A. Nelson, 8339; Cummins, A. Nelson, 1471, 1455; Halleck Cañon, A. Nelson, 7443; Yellowstone River, A. Nelson & E. Nelson, 5759. COLORADO: Los Pinos, Baker, 467, 468; Black Cañon, Baker, 203. UTAH: Carrington, Wootton, 428. NEVADA: Meadow Valley Wash, Goodding, 932; Calientes, Goodding, 943. NEW MEXICO: Cliff, Metcalfe, 51; Santa Fe, Heller, 3750; Aztec, Baker, 469; 1852; Wright, 1380. ARIZONA: Flagstaff, MacDougal, 416a; Grand Cañon, Macbride & Payson, 963; Camp Lowell, April 18, 1881, Pringle. OREGON: arid sandy plains of the Columbia River Douglas; Simcoe Valley, 1860, Lyall; Harper Ranch, Leiberg, 2095; Cline Falls, E. Nelson, 812. WASHINGTON: 1899, Vasey, 233; Wallula, Cotton, 1037; Ritzville, Sandberg & Leiberg, 160.

3a. var. *VEATCHIANA* (Kell.) Urb. & Gilg. Nova Acta Acad. C.L.C.G. Nat. Cur. lxxvi. 28 (1900). *M. Veatchiana* Kell. Proc. Cal. Acad. ii. 99 (1863). *M. ctenophora* Rydb. Bull. Torr. Club, xxviii. 33 (1901). *Acrolasia ctenophora* Rydb. l. c. xxx. 277 (1903). *A. Veatchiana* (Kell.) Rydb. l. c. 278. *A. gracilis* Rydb. l. c. xxxi. 566 (1904). *A. montana* Davidson, Bull. So. Calif. Acad. Sci. v. 18 (1906). — California to Montana and British Columbia. — MONTANA: Jefferson River, Scribner, 60a. IDAHO: Payette, Macbride, 865; June, 1892, Mulford; Falk's Store, Macbride, 50. WYOMING: Fort Steele, A. Nelson, 4811. COLORADO: Larimer Co., Cowen, 248; Paradox, Walker, 109; Salida, Baker, Earle & Tracy, 14; Mesa Co., 1893, Long. NEVADA: Marmol Station, Kennedy, 1855; Reno, Heller, 8636; Mount Grant, Heller, 10906; Carson City, Baker, 974; Wadsworth, Heller, 9600; Peavine Mt., Heller, 9763. CALIFORNIA: Campo, Abrams, 3589; Plumas Co., 1878, Mrs. Austin; Caliente, Heller, 7614; east of Laws, Heller, 8232; San Bernardino, Parish, 4165; Panamint Mts., Coville & Funston, 748; Erskine Creek, Purpus, 5498; San Bernardino Co., Heller, 7675; Mojave Desert, Parish, 11819; San Antonio Mts., I. M. Johnston, 1755. OREGON: Nuttall; Klamath Valley, 1864, Cronkhite; Klamath Falls, Applegate, 212; Hoover Creek, Leiberg, 136.

3b. var. *GRACILENTA* (T. & G.) Wats. Bot. King Exp. 114 (1871). *M. gracilentata* T. & G. Fl. N. A. i. 534 (1840). *M. nitens* Greene,

Fl. Fran. 234 (1891). *M. albicaulis* Dougl., var. *Jonesii* Urb. & Gilg, Nova Acta Acad. C.L.C.G. Nat. Cur. lxxvi. 29 (1900). *M. albicaulis* Dougl., var. *spectabilis* Jones, Contrib. W. Bot. xii. 16 (1908). *Acrolasia gracilentia* (T. & G.) Rydb. Bull. Torr. Club, xxx. 278 (1903). *A. nitens* (Greene) Rydb. l. c. — Western Nevada and Arizona to California and Lower California. — NEVADA: Esmeralda Co., May, 1881, *Shockley*; Unionville, *Watson*, 429. ARIZONA: Tucson, 1881, *Lemmon*. CALIFORNIA: Topatopa Mts., *Abrams & McGregor*, 68; San Antonio River, *Brewer*, 506, 575; April, 1881, *S. B. & W. F. Parish*, 940; west of Laws, *Heller*, 8197; Acton, *Elmer*, 3657; Mojave Desert, *S. B. & W. F. Parish*, 1377; Pasadena, May, 1885, *O. D. Allen*; San Rafael Mts., June, 1887, *H. C. Ford*; "California," *Coulter, Douglas*. LOWER CALIFORNIA: Valley of Palms, *Orcutt*, 101; All Saints Bay, April, 1882, *Parry*.

3c. var. PECTINATA (Kell.) Urb. & Gilg, Nova Acta Acad. C.L.C.G. Nat. Cur. lxxvi. 29 (1900). *M. pectinata* Kell. Proc. Calif. Acad. iii. 40 (1863). — Southern California. — Kern River, *Heller*, 7634; White Mts., May 2, 1896, *Eastwood*; Cajon Summit, *Parish*, 11844.

4. *M. CONGESTA* T. & G. Fl. N. A. i. 534 (1840). *Acrolasia congesta* (T. & G.) Rydb. Bull. Torr. Club, xxx. 277 (1903). — Nevada to southeastern California. — NEVADA: Verdi, *Heller*, 10874; Mt. Rose, *Heller*, 10335; Franktown, *Heller*, 10518; Carson City, *Baker*, 968; Toyabe Mts., *Watson*, 431. CALIFORNIA: Argus Peak, *Purpus*, 5475; Pah Ute Peak, *Purpus*, 5286; Bishop, *Heller*, 8361.

✓ 4a. var. **Davidsoniana** (Abrams), comb. nov. *Acrolasia Davidsoniana* Abrams, Bull. Torr. Club, xxxii. 538 (1905). *M. Davidsoniana* Abrams, Fl. Los Ang. 235 (1917). — Southwestern California. — Mt. Wilson, *Davidson*, 1010; Lytle Creek Cañon, *Hall*, 1228; also *I. M. Johnston*, 2059; San Gabriel Mts., *Abrams & McGregor*, 622.

IV. CERTAIN NORTH AMERICAN UMBELLIFERAE

TAUSCHIA Schlecht. Linnaea, ix. 607 (1835). *Deweya* T. & G. Fl. i. 641 (1840). *Musenopsis* (Gray) Coult. & Rose, Rev. N.A. Umb. 26, 122 (1888). *Donnellsmithia* Coult. & Rose, Bot. Gaz. xv. 15 (1890). *Drudeophytum* Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 80 (1900).

It is with no little hesitation that I have decided to express an opinion upon generic limitations in this highly technical group of plants. Most of us, when we have specimens of the *Umbelliferae* to determine, feel so grateful toward the authors of the discriminating revisions of the group that we are inclined to take up the

names presented without further question. In the present instance, however, I have found myself involved in an analysis of the group of segregate genera listed above because of the lack, in any one treatment by Coulter & Rose, of a presentation in contrast of the characters relied upon by them to distinguish these several genera. Treatment of the Mexican genera apart from those of the United States has been responsible for this unfortunate situation.

Tauschia, as defined by Coulter & Rose, Proc. Wash. Acad. Sci. i. 134 (1900), is made to include only Mexican species which are, l. c. 134, "of low acaulescent habit, with pinnate leaves, obtuse ribs, and no stylopodium." After reading this statement it is rather startling to say the least to note that the species are divided in the key into two subgroups, one containing plants that are "Acaulescent or weak caulescent," the other, those that are "Caulescent, rather stout and somewhat branching." A similar instance in which the generic definition does not accord with the facts exists in the argument for the validity of *Drudeophytum* Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 80 (1900), which, we are told, "differs from *Deweya*, however, in having orbicular fruit, with slender filiform ribs and ternate leaves." In the original diagnosis, too, occurs the statement, "Fruit orbicular." Yet *D. Parishii* Coult. & Rose, a species referred by the authors to *Drudeophytum* without question, has oblong fruit; and indeed the fruit is so described, l. c. 82. Furthermore, so long as *D. vestitum* is retained in *Drudeophytum*, this genus cannot be said to differ from *Deweya* in having ternate leaves for, as Coulter & Rose remark, the leaves of *D. vestitum* are pinnate. The only constant character left then to distinguish *Drudeophytum* from *Deweya* is the character of "slender filiform ribs" and this feature cannot be said to possess in itself generic value since species in related genera show variation in the thinness and prominence of the ribs. Besides the difference between the ribs of the mature fruit of *Drudeophytum Parishii* and those of *Deweya arguta* is, it seems to me, without question purely a relative difference. The possibility of creating a new genus to care for the aberrant (and troublesome) *D. vestitum* may come in for consideration but such a disposition would be highly artificial since the plant possesses no characters that are admitted as being of value for the definition of genera in the Um-

belliferae. If *Drudeophytum* and *Deweya* are not to be distinguished satisfactorily what can be said of the relationship of this group of species to *Tauschia*? According to Coulter & Rose, l. c. 79, *Drudeophytum* is "more distinct from *Deweya* than is *Deweya* from *Tauschia*." If this is true the case at the start seems to be pretty weak for *Deweya* which is distinguished (according to the same author) by "its very sharp prominent ribs, prominent and persistent calyx teeth, as well as in its range." As regards the ribs they are quite as prominent in *T. edulis* as they are in *D. arguta*; in the former, however, they are obtuse. The calyx-teeth of *Tauschia* are obsolete, it is true, but *Drudeophytum* contains some species with conspicuous, others with merely evident, and still others obsolete calyx-teeth, so that this seems obviously to be a valueless character for generic discrimination. If *Deweya* (including *Drudeophytum*) is distinct from *Tauschia*, therefore, it must rest on the one character, the acute ribs of the fruit, a character which, as shown above, is more or less relative. But now the problem is only partially presented. There is yet another group of species which has been retained as a distinct genus, *Museniopsis*. This genus has the obsolete calyx teeth of *Tauschia* but the ternately compound leaves of *Drudeophytum* and, according to Coulter & Rose, Proc. Wash. Acad. Sci. i. 116 (1900), Contrib. U. S. Nat. Herb. vii. 24 (1900), the "slender and more or less indistinct ribs" of the latter genus. But more recently Rose, Contrib. U. S. Nat. Herb. viii. 337 (1905), has referred without question a new species to *Museniopsis* (*M. fusiformis*) which has the very prominent thick and obtuse ribs that generally characterize the fruits of *Tauschia*. *T. filiformis* Coult. & Rose, on the other hand, exhibits fruits with the thin wings of certain species of *Museniopsis*. Coulter & Rose have attached what seems to me undue significance to the manner in which the seed-face, in certain of these groups, is sulcate. The seed face of *Deweya*, *Drudeophytum* and *Tauschia* is involute but in varying degree of depth and width. The seed face of *Museniopsis* is merely deeply sulcate and the variation in this respect found in the other groups negatives whatever importance might otherwise be attached to this character as indicating generic values. Furthermore, *M. arguta* Rose, Contrib. U. S. Nat. Herb. viii. 336 (1905), has the deeply involute seed face of species of *Drudeophytum* although the author does not

question its standing as a species of *Museniopsis*. One other genus of this group is to be considered. This is *Donnellsmithia* which, now that more species of *Museniopsis* have been discovered, is evidently referable to that genus. Its only characters are, in nature, relative, and the fact that it is the only species known from Guatamala, can scarcely be interpreted as meaning that it merits generic recognition.

The facts brought out above prove conclusively, it seems to me, the futility of treating these several evidently poorly marked groups of species as distinct genera. Whatever one's theory as to generic limitation, no one admits that there is any advantage to segregation which results in the erection of genera with lines so indefinite that many species cannot with confidence be referred to any particular group. Furthermore, if these five genera we have been considering are maintained we should need, if consistent in our segregation, several new generic names to care for aberrant species — species which possess the same sort of distinctive characters we are using in discriminating these five genera. And if these characters are of value for the discrimination of genera in one instance, they must, logically, be of equal value in another. On the other hand, to retain these merging groups in one genus which is at once distinct from its nearest relative, *Arracacia*, does away with the necessity of assigning in unscientific fashion generic value to characters which are known to be variable, often of slight moment and usually not concomitant. As Coulter & Rose have shown, *Velaea* DC. to which Drude, Nat. Pflanzenf. iii. Abt. 8: 168 (1898) has referred these plants, must be referred to *Arracacia*. The first available name therefore is *Tauschia* Schlecht. to which Gray referred with good judgment his *T. texana*, later made the type of *Museniopsis*. In this connection it is interesting to note that Coulter & Rose in 1888 in their Rev. N.A. Umb. 120 wrote with evident conviction, "There is no doubt that our species that have been described under *Deweya* [including *Drudeophytum*] are the same generically as the Mexican *Velaea*, [i.e. *Tauschia*, as now understood] and as such must bear the older name."

At present I am transferring to *Tauschia* only those species which have come particularly to my attention during this study, although I have examined most of the described species referable to this genus. The groups of species discussed above may be distinguished, in general, as follows:

- Leaves pinnately compound or entire, never white-pubescent; fruit (usually) with conspicuous ribs.
 Calyx teeth obsolete; ribs of fruit obtuse or obtusish Sect. *Eutauschia*.
 Calyx teeth prominent; ribs of fruit acute. Sect. *Deweya*.
 Leaves ternately compound (except one white-pubescent species); fruit often with slender inconspicuous ribs.
 Seed face involute; calyx teeth evident or obsolete;
 United States species. Sect. *Drudeophytum*.
 Seed face deeply sulcate or rarely involute; calyx-teeth obsolete; mostly Mexican species. Sect. *Museniopsis*.

Sect. *Eutauschia*, sect. nov., calycis dentibus obsoletis; jugis obtusissimis. — Species typica *Tauschia nudicaulis* Schlecht. Linnaea ix. 608 (1835).

Sect. *Deweya* (T. & G.), comb. nov. *Deweya* T. & G. Fl. i. 641 (1840). A single species, *Tauschia arguta* (T. & G.), comb. nov. *D. arguta* T. & G. l. c. *Velaea arguta* (T. & G.) Coult. & Rose, Rev. N. A. Umb. 120 (1888).

Sect. *Drudeophytum* (Coult. & Rose), comb. nov. *Drudeophytum* Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 80 (1900). Typified by *Tauschia Hartwegi* (Gray), comb. nov. *Deweya Hartwegi* Gray, Proc. Am. Acad. vii. 342 (1867). *Velaea Hartwegi* (Gray) Coult. & Rose, Rev. N. A. Umb. 121 (1888). *Drudeophytum Hartwegi* (Gray) Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 81 (1900).

Sect. *MUSENIOPSIS* Gray, Bost. Journ. Nat. Hist. vi. 211 (1850). *Museniopsis* (Gray) Coult. & Rose, Rev. N. A. Umb. 122 (1888). Typified by *Tauschia texana* Gray, l. c.

✓ *Tauschia Parishii* (Coult. & Rose), comb. nov. *Velaea Parishii* Coult. & Rose, Rev. N. A. Umb. 121 (1888). *Drudeophytum Parishii* Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 82 (1900).

Tauschia vestita (Wats.), comb. nov. *Deweya vestita* Wats. Proc. Am. Acad. xvii. 374 (1882). *Velaea vestita* (Wats.) Coult. & Rose, Rev. N. A. Umb. 122 (1888). *Drudeophytum vestitum* (Wats.) Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 83 (1900).

✓ *Tauschia Howellii* (Coult. & Rose), comb. nov. *Velaea Howellii* Coult. & Rose, Rev. N. A. Umb. 122 (1888). *Drudeophytum Howellii* Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 82 (1900).

Tauschia fusiformis (Rose), comb. nov. *Museniopsis fusiformis* Rose, Contrib. U. S. Nat. Herb. viii. 337 (1905).

Tauschia biennis (Coult. & Rose), comb. nov. *Museniopsis biennis* Coult. & Rose, Proc. Wash. Acad. Sci. i. 130 (1900).

Tauschia peucedanoides (HBK.), comb. nov. *Cnidium peucedanoides* HBK. Nov. Gen. & Sp. v. 15 (1821). *Museniopsis peucedanoides* (HBK.) Coult. & Rose, Contrib. U. S. Nat. Herb. iii. 303 (1895).

Tauschia drudeophytoides, nom. nov. *Museniopsis arguta* Rose, Contrib. U. S. Nat. Herb. viii. 336 (1905), not *Tauschia arguta* (T. & G.) Macbr.

Tauschia pubescens (Coulter & Rose), comb. nov. *Museniopsis pubescens* Coulter & Rose, Proc. Wash. Acad. Sci. i. 134 (1900).

Tauschia scabrella (Coulter & Rose), comb. nov. *Museniopsis scabrella* Coulter & Rose, Contrib. U. S. Nat. Herb. iii. 304 (1895).

Tauschia guatemalensis (Coulter & Rose), comb. nov. *Donnell-smithia guatemalensis* Coulter & Rose, Bot. Gaz. xv. 15 (1890).

ANGELICA ARGUTA Nutt. in Torr. & Gray Fl. i. 620 (1840). When Watson described *A. Lyallii*, Proc. Am. Acad. xvii. 374 (1882), he indicated *A. arguta* among the species he considered most closely related. Unfortunately this plant has remained unknown to the present day except for the type preserved in the Torrey Herbarium. Coulter & Rose, after two examinations of Nuttall's specimen stated, Contrib. U. S. Nat. Herb. vii. 157 (1900), "*A. arguta* is different from *A. genuflexa*. It seems much nearer *A. lyallii*, to which we were once constrained to refer it. It grows at so much lower elevations, however, that it seems impossible to consider the two identical." Referring to the key to the species of *Angelica*, l. c. 153, one finds these species contrasted thus:

"Fruit 6 to 8 mm. long, with lateral wings thick and corky . . . 6. *A. arguta*.
Fruit 4-6 mm. long, with lateral wings not corky thickened . . . 7. *A. lyallii*."

A genuine difference would seem possibly to exist here especially when one considers the fact, mentioned by Coulter & Rose in the note quoted above, that *A. arguta* was secured from a low elevation while *A. Lyallii* has been known as a plant of the mountains. Accordingly when I received specimens from J. C. Nelson collected at Salem, Oregon "at less than 200 ft. elevation" I felt that his inference that he had rediscovered "the long-lost *A. arguta*, which Nuttall collected on Sauvies Island and which no one has been able to find since" would doubtless prove true. But upon examination of the abundant material at hand of *A. Lyallii*, much of it representing collections cited by Coulter & Rose, I find that the characters which they assign to *A. arguta* are exhibited by specimens which they themselves have referred to *A. Lyallii*. Thus the fruits of Henderson, no. 2666 and Sandberg, no. 393 often come within the measurements assigned to those of *A. arguta*,

i.e. 6–8 mm. in length. Moreover the lateral wings of these fruits are quite as “corky-thickened” as those of Mr. Nelson’s plants, some of which are also 6–8 mm. long. In short there appears to be no difference between the *A. Lyallii* Wats. and *A. arguta* Nutt. which indubitably is well represented by Mr. Nelson’s specimens. Nevertheless, Rydberg, Fl. Rocky Mts. 631 (1917), recognizes three species here which he distinguishes from each other by the shape of the leaflets and their teeth and the presence or absence of pubescence. For instance he distinguishes his *A. Piperi* by the presence of pubescence on the leaves and the obtuse teeth of the leaflets, overlooking the fact that plants from British Columbia which he refers to *A. Lyallii* are more or less pubescent as is also Watson’s plant from Montana, the latter being a part of the material upon which Watson founded *A. Lyallii*! And as for the obtuse teeth the fact is evident that the leaflets of Lyall’s specimen, which are essentially but not absolutely glabrous, have very broad obtuse teeth quite similar indeed to the dentation of the leaflets of cotype material of *A. Piperi*. In as much as there is no correlation between the shape of the teeth of the leaflets and the presence or absence of pubescence and since these characters exist in every degree they are not even of varietal let alone specific significance. Rydberg’s interpretation of specific values in some cases passes all understanding especially when viewed in connection with his conservative drawing of specific lines in certain other groups, as in *Calochortus*.

✓ ***Lomatium simplex*** (Nutt.), comb. nov. *Peucedanum simplex* Nutt. ex Wats. Bot. King Exp. 129 (1871). *P. triternatum* (Pursh) Nutt., var. *platycarpum* Torr. Stansb. Rep. 389 (1852). *Lomatium platycarpum* (Torr.) Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 226 (1900). *Cogswellia simplex* (Nutt.) Jones, Bull. Univ. Mont., Biol. ser. xv. 41 (1910).

In Contrib. Gray Herb. liii. 15 (1918) I have asserted the validity of the generic name *Lomatium* Raf.

CYNOMARATHRUM Nutt. ex Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 244 (1900). Several years ago when studying a specimen of *C. Nuttallii* (Gray) Coult. & Rose, I was impressed with the general resemblance of this plant to certain species of *Lomatium*. Now again I have had occasion to refer to *C. Nuttallii* and this time I have considered carefully its generic status and have be-

come convinced that the plants considered by Coulter & Rose, l. c., as constituting a distinct genus are much better, indeed more naturally treated as species of *Lomatium*. Prof. M. E. Jones, Contrib. W. Bot. xii. 32, 35 (1908) has expressed the same opinion and has shown that *Cynomarathrum* cannot be separated satisfactorily from *Lomatium* by virtue of the habit or the winging of the fruits as attempted by Coulter & Rose, l. c. 245. Nor does the fact that the calyx-teeth are evident furnish a means of distinction as they are quite obvious in *L. macrocarpum*. The one character at all times constant is the presence in the species that have been referred to *Cynomarathrum* of a more or less evident stylopodium. This is flat, however, and consequently scarcely obvious and surely not to be regarded as alone possessing value for defining a genus in a group of plants alike in aspect and in other characters of moment. Finally it may be mentioned that the original of *C. Nuttallii* collected by Nuttall bears on the sheet in Dr. Gray's hand the statement "Will do for a *Peucedanum*," that is, a *Lomatium* as now understood. Watson, Aven Nelson, Jones, Drude, and even Coulter & Rose have at one time or another regarded without question species of this alliance as good *Lomatiums*. This disposition of these plants will necessitate a number of new combinations of which the following may be made now.

✓ ***Lomatium Nuttallii*** (Gray), comb. nov. *Seseli Nuttallii* Gray, Proc. Am. Acad. viii. 287 (1870). *Cogswellia Nuttallii* (Gray) Jones, Contrib. W. Bot. xii. 32 (1908).

✓ ***Lomatium alpinum*** (Wats.), comb. nov. *Peucedanum graveolens* Wats., var. *alpinum* Wats. Bot. King Exp. 129 (1871). *Cynomarathrum alpinum* (Wats.) Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 245 (1900).

✓ ***Lomatium Parryi*** (Wats.), comb. nov. *Peucedanum Parryi* Wats. Proc. Am. Acad. xi. 143 (1876). *Cynomarathrum Parryi* (Wats.) Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 246 (1900).

✓ ***Lomatium Eastwoodae*** (Coult. & Rose), comb. nov. *Cynomarathrum Eastwoodae* Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 247 (1900).

✓ ***Lomatium Brandegei*** (Coult. & Rose), comb. nov. *Peucedanum Brandegei* Coult. & Rose, Bot. Gaz. xiii. 210 (1888). *Cynomarathrum Brandegei* Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 246 (1900).

V. RECLASSIFIED OR NEW COMPOSITAE, CHIEFLY
NORTH AMERICAN HELENIEAE

✓ **Ericameria Bloomeri** (Gray), comb. nov. *Aplopappus Bloomeri* Gray, Proc. Am. Acad. vi. 541 (1865). *Chrysothamnus Bloomeri* (Gray) Greene, Eryth. iii. 115 (1895).

✓ **Ericameria fasciculata** (Eastw.), comb. nov. *Chrysoma fasciculata* Eastw. Bull. Torr. Club, xxxii. 215 (1905).

This species is known only from Monterey County, California but since it has been secured there several times by different collectors it is apparently not uncommon. It is closely related to *E. pinifolia* of Los Angeles County and southward but may be distinguished by the fewer or even obsolete rays, much more pubescent achenes and longer pappus. The genus *Ericameria* as now taken must include the above species.

✓ **Aster deserticola**, spec. nov., humilis, 5-10(-18 rare) cm. altus; caulibus simplicibus flexuosis subdecumbentibus basi ad apicem aequabiliter foliosissimis mediocriter hirsuto-villosis; foliis internodio multo longioribus oblongo- vel lineari-lanceolatis 1.5-2 cm. longis 3-4 mm. latis abrupte apiculatis ubique parce subadpresse hispidulis, superioribus paullo reductis; capitulis solitariis, pedunculis bracteatis arcte adscendentibusque terminalibus saepius 2 cm. longis vel capitulis subsessilibus; involuero hemisphaerico 6 mm. alto diametro circa 10 mm.; squamis valde imbricatis 3-4-seriatis viridibus minute pubescentibus, exterioribus plerumque obovatis apice rotundatis apiculatis vel rare subacutis margine breviter ciliatis, interioribus lineari-lanceolatis acutis margine pallidis eciliatis; radii floribus 25-30, ligulis ut videtur violaceis circa 1 cm. longis apice minute dentatis, stylo pappi setis brevioribus; disci floribus circa 6 mm. longis, styli ramis lineari-lanceolatis; pappi setis mollibus sordidis, corollae aequilongis vel ea brevioribus; acheniis canescentibus. — CALIFORNIA: in sand, Mojave Desert, San Bernardino Co., Oct. 3, 1917, *Mary F. Spencer*, no. 629 (TYPE, Gray Herb.).

The habit of this Aster is totally different from that of *A. bernardinus* Hall which, however, it greatly resembles in technical characters. Indeed, I was at first inclined to consider it a dwarf state of that species until Mrs. Spencer wrote me that she "found a colony of no. 629 with no other Aster in the vicinity" and, "there were many plants, nearly all about an inch high; the tallest one I saw is included among your specimens." Over ten miles away typical *A. bernardinus* was secured and although it also was

growing in the sand it was normal height, 4-8 dm. It appears evident therefore that *A. deserticola* cannot be a reduced state of Hall's species since the conditions under which both have been found were altogether similar. Moreover there are slight but recognizable differences between these plants other than size and habit. The more numerous ligules of *A. bernardinus* are minutely bidentate; those of *A. deserticola* simply dentate. In the former, too, the pappus of the ray-flowers scarcely equals, rather than exceeds the style. The style-branches of the disk-flowers of *A. bernardinus* are ovate rather than linear-lanceolate as they are in *A. deserticola*. Finally, the foliage and bracts of the latter species are much less pubescent.

PERITYLE Benth. Bot. Voy. Sulph. 23 (1844). *Nesothamnus* Rydb. N. A. Fl. xxxiv. 12 (1914). *Monothrix* Torr. in Stansb. Expl. Utah 389 (1852). *Leptopharynx* Rydb. l. c.

I am glad to be able to agree essentially with Rydberg (l. c. 12, 24) in his definition of *Laphamia* Gray, Pl. Wright. i. 99 (1852). I would, however, follow Gray, l. c., and include in *Laphamia* the three species that have a pappus of about twenty awns. *Laphamia* as restricted by Rydberg, contains only those species with the pappus wanting or reduced to one or two bristles. It seems evident from a study of *Perityle* that the character of the pappus cannot alone be used satisfactorily for the definition of genera in this group of *Compositae*. *Pappothrix* (Gray) Rydb., l. c. 26, must, therefore, continue to be treated as *Laphamia* Gray, sect. *Pappothrix* Gray, l. c., since it differs constantly in no respect from true *Laphamia* except in this pappus-character. Thus constituted the salient feature of *Laphamia* is found in the nature of the involueral bracts. These are always flat and rather thin, never enclose the achenes and are not double-ribbed on the back.

On the other hand I cannot concur with Rydberg's delimitation of *Perityle*. He proposes the segregate genus *Leptopharynx*, l. c. characterized by the cylindric throat (which is distinctly longer than the tube) of the disk-corollas. The throat of the disk-corollas of *Nesothamnus*, *Perityle* and *Monothrix* is "campanulate or funnellform, not much if at all exceeding the tube." The pappus of *Leptopharynx* consists "normally of a minute crown of squamellae and 1 or 2 awns, but either or both in a few species wanting." Notwithstanding this acceptance of variation in the pappus of

Leptopharynx, *Monothrix*, *Perityle* and *Nesothamnus* are distinguished mainly upon the character of the pappus. It is true that the appendages of the style-branches of *Leptopharynx* are subulate-filiform; but those of *Monothrix* are subulate and those of *Perityle* and *Nesothamnus*, even though short are slender. In fact this tribe is characterized as having both the style-branches and their appendages slender. This character, therefore, which exists in every degree, is scarcely suitable for the definition of genera especially since it is not concomitant with a single constant character. The only really diagnostic character remaining to *Leptopharynx*, then, is the shape of the corolla-throat, as noted above. So far as I have been able to determine the throat of the disk-corollas of this group of species is, indeed, cylindric but this minute difference is surely not sufficient for assigning to these plants generic distinction. With *Leptopharynx* sunk in *Perityle*, the invalidity of *Monothrix* and *Nesothamnus* becomes apparent. The latter genus, even with *Perityle* restricted as by Rydberg, was palpably weak for it rested upon a single character peculiar to it, the tomentose pubescence. All other "characters" it shared in greater or less degree with *Perityle*. And *Monothrix* was hardly more distinct since it differed constantly only in the nature of the pappus which (when present) consisted of one awn instead of a crown of small squamellae and 0-2 awns.

But the futility of attempting to divide *Perityle* into several genera becomes even more evident when the general characters (including the aspect) of the plants concerned are taken into account. *Perityle* in the strictest sense consists of herbaceous annuals or perennials but there are a number of species which are more or less suffruticose at base and, in this characteristic, they simulate those species which Rydberg would treat under other generic names as discussed above. I am aware that this argument might be carried still further and applied to *Laphamia*. But *Laphamia* as restricted now, although not as well marked as might be desired, is definitely distinct by those characters of involucre already pointed out, and if it is to remain so certain species heretofore referred to it must be removed as Rydberg has done. In this delimitation (and consequent better understanding) of *Laphamia*, the treatment in the North American Flora is of genuine service because the attempted maintenance of Gray's genus upon the

absence of the crown of squamellae, when not a few species of both *Perityle* (in the larger sense) and *Laphamia*, regularly lack the pappus, resulted, of course, in a most arbitrary division of the group.

Certain of the more important species affected by this interpretation of the generic boundary lines of *Perityle* and *Laphamia* are the following:

✓*Perityle megalcephala* (Wats.), comb. nov. *Laphamia megalcephala* Wats. Am. Nat. vii. 301 (1873). *Monothrix megalcephala* Rydb. N. A. Fl. xxxiv. 20 (1914).

✓*Perityle Stansburii* (Gray), comb. nov. *Laphamia Stansburii* Gray, Pl. Wright. i. 101 (1852). *Monothrix Stansburiana* Torr. in Stansb. Expl. Utah 390 (1852). *M. Stansburii* (Gray) Rydb. N. A. Fl. xxxiv. 19 (1914).

✓*Perityle Toumeyi* (Rob. & Greenm.), comb. nov. *Laphamia Toumeyi* Rob. & Greenm. Am. Journ. Sci. ser. iii. 1. 176 (1895). *Monothrix Toumeyi* (Rob. & Greenm.) Rydb. N. A. Fl. xxxiv. 20 (1914).

✓*Perityle tenella* (Jones), comb. nov. *Laphamia tenella* Jones Proc. Calif. Acad. ser. ii. v. 703 (1895). *L. Palmeri* Gray, Proc. Am. Acad. xiii. 372 (1878), not *P. Palmeri* Wats. Proc. Am. Acad. xxiv. 57 (1889). *Monothrix Palmeri* (Gray) Rydb. N. A. Fl. xxxiv. 21 (1914).

✓*Perityle gilensis* (Jones), comb. nov. *Laphamia gilensis* Jones, Zoe, ii. 15 (1891). *Leptopharynx gilensis* (Jones) Rydb. N. A. Fl. xxxiv. 24 (1914).

Perityle Lemmoni (Gray), comb. nov. *Laphamia Lemmoni* Gray, Proc. Am. Acad. xvi. 101 (1880). *Leptopharynx Lemmoni* (Gray) Rydb. N. A. Fl. xxxiv. 24 (1914).

Perityle trisecta Rydb., in herb. *Leptopharynx trisecta* Rydb. N. A. Fl. xxxiv. 23 (1914).

✓*Bahia integrifolia* (Gray), comb. nov. *Schkuhria integrifolia* Gray, Am. Nat. viii. 213 (1874). *Bahia nudicaulis* Gray, Proc. Am. Acad. xix. 27 (1883). *Platyschkuhria integrifolia* (Gray) Rydb. Bull. Torr. Club, xxxiii. 155 (1906).

Dr. Gray's treatment of this plant as a species of *Bahia* with entire leaves seems to me eminently satisfactory. The correct binomial, however, is *B. integrifolia* rather than *B. nudicaulis* as is shown by the above citations, and the former specific name is available since *B. integrifolia* DC. Prod. v. 656 (1836) is not a species of *Bahia*.

ACTINEA Juss. Annal. Mus. Nat. ii. 425 (1803). *Actinella* Pers. Syn. Pl. ii. 469 (1807). *Tetraneuris* Greene, Pitt. iii. 265 (1898).

In 1891 Kuntze, in his *Revisio Generum Plantarum*, i. 303, outlined the history of the use of the generic name *Actinella* and adopted the name *Actinea* of Jussieu for those plants treated by Gray and others under the former name. In this connection he showed [as indeed Gray himself indicated in Proc. Am. Acad. xix. 31 (1883)] that Persoon merely renamed Jussieu's genus and that Nuttall, Gen. ii. 173 (1818), did not mean to establish a new genus under the name *Actinella* (as Nelson, Hall and others have taken) but simply thought that he had a plant referable to *Actinella* of Persoon. *Actinella* Pers. is therefore an out-and-out synonym of *Actinea* Juss. and *Actinella* of Nuttall is in no sense a new name but merely represents an interpretation on the part of Nuttall of a certain plant as belonging to Persoon's genus. In 1898, Greene, in Pitt. iii. 264, questioned the generic identity of the plants of Nuttall and Jussieu, proposing for the former the generic name *Tetraneuris* Greene, l. c. 265, and this name has been recently taken up by Rydberg in his treatment of the *Helenieae* in the North American Flora, xxxiv. 100, 101 (1915). Since neither the author of *Tetraneuris*, nor Rydberg, indicate in any way whatsoever the relationship of the plants included therein to *Actinea heterophylla* Juss. (the original species of both *Actinea* and *Actinella*) a discussion of the situation seems in order. As early as 1878 Dr. Gray in the Proc. Am. Acad. xiii. 374, wrote, "As to the original *Actinella* of Persoon (*Actinea heterophylla*, Juss.), which seems out of place among the globular- and discoid-headed *Cephalophorae*, it is intermediate in character between *Helenium* and *Actinella* of Nuttall, differing from the latter only in the looser, thinner, and smaller scales of the involucre. If, notwithstanding this, it were referred to *Actinella*, this genus would be restored to Persoon, or, under the form of *Actinea*, to Jussieu. But probably Persoon's plant should be referred to *Helenium*." Nevertheless in the Syn. Fl. i. 2 344 he wrote, "*Actinella* Pers., Nutt. (changed from *Actinea* Juss., . . . a S. American form, somewhat approaching *Helenium*)." This would seem to indicate that Gray considered the South American plant congeneric with ours especially when it is noted in Proc. Am. Acad. xix. 32 (1883) that he referred *A. heterophylla* Juss. definitely to *Actinella* with the remark "Certainly belongs here

rather than to *Cephalophora*." The genus *Cephalophora* Cav. Icon. vi. 79 (1801) is now generally regarded as nothing more than a rayless condition of *Helenium* and although, as Gray indicated, *A. heterophylla* approaches *Helenium* in some respects, the general habit is quite different and the pappus is rather that of *Gaillardia*. Indeed Dr. Rydberg writes me that he regards this plant "as probably nearest *Gaillardia* and perhaps could be squeezed into it." But in making this statement he has evidently forgotten that the receptacle of *Actinea* is smooth. It would scarcely be possible then to refer *Actinea* to *Gaillardia*, a genus typically characterized by a bristly receptacle. We have now reached the point where we may inquire as to what characters, if any, serve to distinguish *Actinea* (as to the original) and *Tetaneuris*. Careful comparison of mature material of *Actinea heterophylla* and representative species of *Tetaneuris* has resulted in merely corroborating Gray's judgment that the former differs "only in the looser, thinner, and smaller scales of the involucre." This is a difference which scarcely appeals to one as possessing generic value especially in a case where the plants concerned possess no considerable diversity in aspect. Dr. Rydberg refers to the bracts of true *Actinea* as becoming "reflexed in age as in *Helenium*." So far as the specimens before me show there seems to be only a tendency for the tips to spread but however this may be the plant is still more closely related to *Tetaneuris* than to *Helenium* because of the quite similar pappus. There seems to be no justification therefore for considering the group of plants treated by Gray, Nelson and others under the name *Actinella* as other than congeneric with *Actinea heterophylla* Juss. In a portion of the *Compositae* where the genera are distinguished at best with difficulty nothing appears to be gained by regarding one element — because it happens to have been described first and from a region remote — as generically separate from plants to which it bears such resemblance both technically and habitally as to require no "squeezing" on the part of a botanist to place it satisfactorily in the same genus. The name *Actinea* Juss. is therefore to be adopted for those plants recently treated in the North American Flora under the name *Tetaneuris* Greene. Gray included in *Actinella*, *Hymenoxys* Cass. but as indicated by Hall, Univ. Cal. Publ. Bot. iii. 203 (1907), this is a group of plants of totally different habit and with different

involucre and should be kept distinct. The above interpretation of *Actinea* necessitates the following new combinations.

✓ *ACTINEA DEPRESSA* (T. & G.) Ktze., var. *pygmaea* (Gray), comb. nov. *Actinella depressa* T. & G., var. *pygmaea* Gray, Mem. Am. Acad. ser. ii. iv. 100 (1849). *Tetraneris depressa* (Gray) Woot. & Standl. Contrib. U. S. Nat. Herb. xvi. 193 (1913).

This plant is confined to New Mexico and its leaves are glabrate or more or less silvery with an appressed silky pubescence. The leaves of typical *A. depressa* (T. & G.) Ktze., so far known only from Utah, are green and glabrous or sparsely long-villous.

✓ *ACTINEA ACAULIS* (Pursh) Spreng., var. *lanata* (Nutt.), comb. nov. *Actinella lanata* Nutt. Trans. Am. Phil. Soc. ser. ii. vii. 379 (1841). *Tetraneris lanigera* Daniels, Univ. Mo. Stud. Sci. ii. 393 (1911). *A. lanigera* Daniels, l. c.

The variety differs only in the looser pubescence and a somewhat different habit. Dr. Gray included this plant in *A. acaulis* (Pursh) Spreng. but it may be recognized as a geographical variety. *A. acaulis* in typical form is essentially a species of the Great Plains and is characterized by a closely appressed silvery pubescence. Its scapes are usually 1–2 dm. high. The var. *lanata* on the other hand is typically of the high mountains, is loosely villous and infrequently raises its scapes to a height of 1 dm. But plants intermediate in character between the typical form and the variety are not infrequent, as, for instance, Murdoch's no. 4042 from the Black Hills of South Dakota and Sturgis's material from Colorado Springs. The var. *lanata* occurs in two forms representing extreme development in opposite directions. One form grows on the high plains in rocks or on dry gravel bars and has reduced leaves and heads and a densely caespitose habit; the other form is a tall state with elongate scapes and except for the lanate pubescence closely approaches the glabrate variety of *A. acaulis*. These forms of the variety *lanata* may be known as

✓ *ACTINEA ACAULIS* (Pursh) Spreng., var. *LANATA* (Nutt.) Macbr., forma *caespitosa* (A. Nels.), comb. nov. *Tetraneris acaulis* (Pursh) Greene, var. *caespitosa* A. Nels. Bot. Gaz. xxviii. 127 (1899). *T. brevifolia* Greene, Pitt. iii. 266 (1898).

✓ *ACTINEA ACAULIS* (Pursh) Spreng., var. *LANATA* (Nutt.) Macbr., forma *arizonica* (Greene), comb. nov. *Tetraneris arizonica* Greene, Pitt. iii. 266 (1898), not Rydberg, N. A. Fl. xxxiv. 105 (1915).

There is yet another variation of *A. acaulis* which deserves recognition. This is a plant of the high plains and thus geographically it occupies a position intermediate in character between *A. acaulis* and the variety *lanata*. It passes directly into the typical form however but in general may be distinguished by its green leaves and large heads. The leaves vary from thinly appressed silky pubescent to nearly glabrous except for some more or less appressed hairs along the midrib. This plant may be known as

✓ *ACTINEA ACAULIS* (Pursh) Spreng., var. **simplex** (A. Nels.), comb. nov. *Tetaneuris simplex* A. Nels. Bot. Gaz. xxviii. 127 (1899). *Actinella simplex* A. Nels. in Coulter & Nelson Man. R. Mt. Bot. 558 (1909). *Tetaneuris epunctata* A. Nels. Bot. Gaz. xxxvii. 275 (1904). *T. glabriuscula* Rydb. Bull. Torr. Club, xxxiii. 155 (1906). *Actinella acaulis* (Pursh) Nutt., var. *glabra* (Nutt.) Gray, Syn. Fl. i.² 345, in small part.

In Rydberg's key, *T. epunctata* is distinguished by the statement "leaves glabrous, scarcely punctate." Clements no. 34 from Manitou is referred here by Rydberg (as shown by the specimen in the Gray Herbarium) and the leaves are not only punctate but distinctly pubescent. The type of *A. epunctata* is nearly glabrous and that of *A. simplex* is thinly appressed silky pubescent but numerous specimens show that these collections merely represent extremes in this matter, on the one hand passing into typical *A. acaulis* and on the other into the variety *lanata*.

It may be mentioned in this connection that all the species, even those recognized by Gray, undoubtedly at times merge or at least collections exist which it would be possible it seems to place with nearly equal reason in either of two given species. Nevertheless the species recognized by Gray (and one or two others which I am considering here) are in general easily distinguished and therefore, even though forms in some cases have been collected which seem intermediate in character, it appears desirable to continue to maintain as species those plants long so accepted. Six species were recognized in this alliance in the Synoptical Flora; Rydberg, in his treatment in the North American Flora, recognizes no fewer than twenty-six. In reality there appear to be about eight rather well marked specific units but as already indicated there are few of these that, though generally distinct enough, do not have forms or varieties through which they pass into related species.

✓**Actinea Torreyana** (Nutt.), comb. nov. *Actinella Torreyana* Nutt. Trans. Am. Phil. Soc. ser. ii. vii. 379 (1841). *Tetraneuris Torreyana* (Nutt.) Greene, Pitt. iii. 265 (1898).

This is an excellent species. The leaves are essentially glabrous but the scapes are woolly like those of *A. acaulis*, var. *lanata* and its forma *caespitosa* which blossoms about the same time.

✓**ACTINEA LEPTOCLADA** (Gray) Ktze., var. **Ivesiana** (Greene), comb. nov. *Tetraneuris Ivesiana* Greene, Pitt. iii. 269 (1898). *T. intermedia* Greene, Pl. Baker. iii. 29 (1901). *T. pilosa* Greene ex Rydb. Fl. Colo. 379 (1906). *T. arizonica* Rydb. N. A. Fl. xxxiv. 105 (1915) in large part, not Greene.

The variety differs principally in the narrower leaves and somewhat narrower heads. The leaves on the stem are frequently fewer and occur nearer the base or are rarely lacking. This form connects the species closely with *A. acaulis* through the variety *simplex*. In Bull. Torr. Club, xxxvii. 443-447 (1910) Rydberg devotes several pages to criticism of Nelson's treatment of this genus in the Coulter-Nelson Manual. This work on the whole is very much better than that in the North American Flora. It is impossible, for instance, to find *T. epunctata* (*A. acaulis*, var. *simplex*) by Rydberg's key, because the leaves are never glabrous (as the key-character states), nor *T. arizonica* because, as shown above, the original of this is a tall state of *T. acaulis*, var. *lanata* and belongs under the heading in Rydberg's key "Leaves, scape, and involucre decidedly villous." Rydberg places it next to his *T. Crandallii* under the key-character "Leaves glabrous or sparingly villous." *T. Crandallii* I have not seen but it is probably *A. leptoclada* or the variety *Ivesiana* to which Nelson referred it. *T. formosa* seems to be merely a luxuriant state of *A. leptoclada* since it has the pappus of that species rather than of *A. argentea* which it suggests by virtue of the broad leaves and large heads. *T. trinervata* Greene Pitt. iii. 267 (1898) is placed by Rydberg in the *A. acaulis* group. It is rather to be compared, because of the leafy stem, with *A. argentea*. Indeed it is probably only a narrow-leaved form of that species since it has the same pappus and the same very strongly 3-nerved leaf-bases. This plant furnishes an example of the impossibility of drawing a very definite line between the caulescent and acaulescent species.

ACTINEA SCAPOSA (DC.) Ktze., var. **LINEARIS** (Nutt.) Robinson, Proc. Am. Acad. xlix. 506 (1913).

So far as is evident from the treatment in the North American Flora neither the above specific nor varietal names have been published. If one may judge from the general style adopted in this work in other groups the intent seems to be to give complete synonymy. Nevertheless, for some reason not at all apparent (unless it be a policy to suppress so far as possible the name *Actinea*) none of the combinations made by Kuntze are cited although he transferred in his *Rev. Gen. Pl. i. 303* (1891) most of the species formerly included in *Actinella*.

Rydberg places seven species between *A. scaposa* and the var. *linearis* in which he sees, moreover, no fewer than four species, viz., *T. angustifolia*, *T. fastigiata*, *T. angustata* and *T. linearis*. Gray included these in the var. *linearis* and remarked, *Syn. Fl. i². 345*, "broader leaved and dwarfer forms very like glabrate *A. acaulis*," i.e. the var. *simplex* and some poor meagre material of the latter was actually referred to *A. scaposa*, var. *linearis* by Gray. These species are in general easily distinguished, however, by the character of the caudex. But I can see no constancy in the caudex-characters used by Greene and Rydberg to segregate the var. *linearis* into four species as these characters seem to depend largely upon age as a factor for their development. For instance *T. fastigiata* Greene is separated from *T. linearis* (Nutt.) Greene because its caudex is "branched underground" rather than above. In the Gray Herbarium Eggert's specimen from Big Spring, Texas is named by Rydberg *T. linearis* while Hitchcock's no. 290 from Kansas is referred to *T. fastigiata*. The latter sheet contains three plants, one of them with a branched caudex clothed with dead leaf-bases and is a close match for the Texan plant. The other two plants are similar but without elongate branches to the caudex simply no doubt because they are younger and have not had time to develop these as is shown by the fewer rows of leaf-bases left from the growth of former years. *T. angustifolia* Rydb. is an intermediate state between typical *A. scaposa* and the variety *linearis*. Rydberg distinguishes it from the three other segregates by the key-character "Bases of the leaves not wider than the oblanceolate or almost linear blades; branches of the caudex short and stout." By actual measurement the leaf-bases of Wooton's no. 374 from the White Mts. of New Mexico (co-type material of *T. angustifolia*) are nearly 5 mm. wide, the widest leaf-blades 3.5 mm. wide.

But the same measurements for the specimens of *T. fastigiata* and *T. linearis* discussed above are, for the leaf-bases 2–2.5 mm., for the blades 1.5–2.5 mm. yet the key-character reads “Bases of the leaves 2–4 times as wide as the linear leaf-blades; branches of the caudex or rootstock elongate.” As for the caudex-difference, the caudex of the Wooton plant is the same as that of one of the plants belonging to the Hitchcock specimen and referred to *T. fastigiata* by Rydberg himself. Finally there remains to be placed *T. angustata* Greene. Rydberg “keys” this from *T. fastigiata* and *T. linearis* by crediting it “with a slender rootstock.” The former two species are contrasted as being simply “Perennial with a caudex.” According to Rydberg, Pringle’s no. 136 from Chihuahua is this species and two of the plants composing this are old enough to have developed not only a “caudex” but a branched one at that in the manner of Hitchcock’s no. 290, already discussed. The pappus of *T. angustata* is said to be “awn-tipped”; that of *T. linearis* and *T. fastigiata* “lanceolate acuminate.” In both the Eggert and Hitchcock specimens the pappus is distinctly awn-tipped as indeed it is in *T. angustata*. The foregoing observations show conclusively, it seems to me, that if more than one somewhat variable specific unit is here concerned some other basis than that adopted in the treatment in the North American Flora must be used for separating the elements proposed as distinct. *T. linearis* may be said therefore to differ from *T. scaposa* in its narrower often less pubescent leaves and sometimes more tufted habit but since any number of intermediate states have been collected it is best treated as a variety as was done by Dr. Gray. *Actinella glabra* Nutt., not placed by Rydberg, is to be referred here. Some plants occasionally produce a leafy stem.

ACTINEA LINEARIFOLIA (Hook.) Ktze. Cockerell, Proc. Biol. Soc. Wash. xvii. 111 (1904), distinguished three variations of this plant as varieties. Rydberg recognizes all of them as species. Two are merely formal variations scarcely worthy any recognition and the third, *Tetraneuris Dodgei* (Ckll.) Rydb. is very probably a young plant of *A. scaposa*.

CEPHALOPHORA Cav. Icon. vi. 79, t. 599 (1801). As I have mentioned above it has been rather generally recognized that this group of plants constitutes only a rayless section of *Helenium* and indeed it was so treated by Hoffman in 1890 in Pflanzenfam. iv.

Abt. v. 263. Much earlier in the Synoptical Flora Dr. Gray wrote under *Actinella*, "*Cephalophora* is a reduced rayless *Helenium*." The group is comparatively small (Reiche recognizes 11 species in Chile) but only a few of the species have been treated as yet under *Helenium*. Bailey, Stand. Cyclop. Hort. iii. 1443 (1915), took up the name *H. aromaticum* (Hook.) Bailey for the species sometimes cultivated for its fragrance. *Santolina tinctoria* Molino must be taken up for a plant that has been referred by some botanists to *H. aromaticum*. There is, however, no doubt but that Molino had the plant commonly known in Chile as Poquil and at one time used "to make an excellent yellow dye." (cf. Hooker, Exot. Fl. iii. 189 (1827). Molino's choice of name, "tinctoria," would also indicate this plant rather than that of Hooker. In 1914 Stuntz applied the name *H. glaucum* (Cav.) Stuntz to the plant of Molino evidently being unaware of the presence of a name much earlier published than that of Cavanilles. Besides the species discussed here, two others are represented in the Gray Herbarium and these also may be transferred now from *Cephalophora* to *Helenium*.

Helenium tinctorium (Mol.), comb. nov. *Santolina tinctoria* Mol. Sagg. Chile, 142 (1782). *Cephalophora glauca* Cav. Icon. vi. 80 (1801). *H. glaucum* (Cav.) Stuntz, U. S. Bur. Pl. Ind., Inv., xxxi. 86 (1914).

Helenium plantagineum (DC.), comb. nov. *Cephalophora plantaginea* DC. Prod. v. 662 (1836).

Helenium Leguiffei (Phil.), comb. nov. *Cephalophora Leguiffei* Phil. Anal. Univ. Chile, xc. 30 (1895).

ANTHEROPEAS Rydb. N. A. Fl. xxxiv. 97 (1915). Rydberg, l. c., considers *Eriophyllum Wallacei* Gray and *E. lanosum* Gray (together with three forms of these species to which he assigns specific rank) as constituting a genus distinct from *Eriophyllum*. The key-characters, l. c. 82, by which these groups are contrasted are as follows:

- "Anthers with obtuse or acute tips; tube of the disk-corollas shorter than the throat. *Eriophyllum*.
- Anthers with subulate tips; tube of the disk-corollas equalling the throat. *Antheropeas*."

It should be noted here that Rydberg also recognizes the genus *Actinolepis* DC. which is similar to *Eriophyllum* except that the heads are sessile and the "pappus-squamellae lacerate-fimbriate."

The species referred to *Actinolepis* are altogether of the same aspect as those treated by Rydberg under *Antheropeas*. Gray in 1883, Proc. Am. Acad. xix. 24, showed that DeCandolle's genus should be merged in *Eriophyllum*. But to return to a consideration of *Antheropeas*. The key-character indicates that the tube and throat of the corolla of *Eriophyllum* are of unequal length; of *Antheropeas* of equal length. Unfortunately in the same work, l. c. 88, the description of *E. obovatum* Greene reads "tube nearly equaling . . . throat"; of *E. croceum* Greene, l. c. 89, "tube . . . fully as long as . . . throat"; of *E. caespitosum* Dougl., l. c. 90, "tube . . . fully as long as . . . throat"; of *E. Jepsoni* Greene, l. c. 92, "tube . . . equaling . . . throat." From Rydberg's own statements then it may be seen that there is no value whatever in the key-character "tube of the corolla equaling the throat" as a means of distinguishing *Antheropeas* from *Eriophyllum* because the latter genus contains a number of species which have corollas with "tubes fully as long as throat." According to Rydberg his genus differs also in having the anthers with subulate tips; the anthers of *Eriophyllum* are "obtuse or acute." This difference actually exists in greater or less degree but can scarcely be used as a basis for establishing a genus when the plants concerned in all other characters are good *Eriophyllums*.

ERIOPHYLLUM WALLACEI Gray, var. *RUBELLUM* Gray, Proc. Am. Acad. xix. 25 (1883). *Antheropeas rubellum* (Gray) Rydb. N. A. Fl. xxxiv. 98 (1915).

Hall, Univ. Cal. Publ. Bot. iii. 182 (1907), was inclined to regard this as merely a color-form but generally at least the petals are distinctly toothed. They are nearly though not quite entire in the typical form with which this variety no doubt will be found to intergrade. *Antheropeas australe* Rydb., l. c., is nothing but *E. Wallacei* Gray. It is supposed to have "achenes densely hairy" and "squamellae longer than the corolla-tube." Co-type material in this herbarium which, moreover, is marked in Rydberg's hand "*A. australe*" has very sparsely strigose achenes (the hairs are so few that they can be counted) and the squamellae barely equal the tube. The achenes of *E. Wallacei* are usually somewhat pubescent and the pappus varies in length. This material was referred to *E. Wallacei* by Gray without question. Rydberg proposes yet another new species, *A. tenuifolium* Rydb., l. c. 99,

which I have not seen but which in all probability is merely a state of *E. lanosum* Gray.

• *MONOLOPIA MAJOR* DC., var. **gracilens** (Gray), comb. nov. *M. gracilens* Gray, Proc. Am. Acad. xix. 20 (1883).

In Univ. Cal. Publ. Bot. iii. 176 (1907) Hall wrote "*M. gracilens* Gray, which should be considered only a small-flowered variety of *M. major*" and Rydberg in the N. A. Fl. xxxiv. 82 (1915) stated in regard to *M. gracilens*, "Characters as given for *M. major* (of which this is perhaps a geographic race), except that the whole plant is more slender and the heads and floral organs smaller." I concur in these observations and accordingly am treating this plant as a variety of the form named first.

Dyssodia Palmeri (Greenm.), comb. nov. *Urbarella Palmeri* Greenm. Proc. Am. Acad. xxxix. 117 (1903).

Since Dr. Greenman proposed the genus *Urbarella*, l. c., distinguishing it from *Dyssodia* and *Hymenatherum* by the character of the pappus and the involucre, Dr. Robinson in the Proc. Am. Acad. xlix. 506 (1913) has called attention to the advisability of recognizing here a single genus as has been done by Hoffman. This action necessitates the suppression of *Urbarella* since it is based on characters which are not recognized as possessing generic value. Dr. Rydberg in his treatment in the N. A. Fl. xxxiv. 171 (1915) has maintained Greenman's genus but he also recognizes *Hymenatherum* (i.e. *Thymophylla*), and several other genera, which indeed seems to be logical because the acceptance of *Urbarella* or any particular one of the segregate genera calls for the recognition of many of the others since the characters by which they may be distinguished are equally strong. But what is gained, either from a purely scientific standpoint of classification for its own sake or from a more liberal view that takes into account practicability and convenience in the method of classification followed, by dividing a natural entity into numerous genera which may be distinguished with difficulty? There would appear to be no advantage; nevertheless the treatment of this group in the North American Flora is symptomatic of just this method of classification.

Matricaria suffruticosa (L.), comb. nov. *Tanacetum suffruticosum* L. Sp. Pl. ii. 843 (1753). *T. multiflorum* Thunb. Prod. Fl. Cap. ii. 147 (1800). *M. multiflora* (Thunb.) Fenzl in Harv. & Sond. Fl. Cap. iii. 166 (1864). *Chamomilla suffruticosa* (L.) Rydb. N. A. Fl. xxxiv. 233 (1916).

The coast of Oregon is a great place for the occurrence of strange plants from far-away lands and this species from south Africa, adventive in Oregon, seems never to have been properly christened.

CIRSIIUM CALIFORNICUM Gray, var. **bernardinum** (Greene), comb. nov. *Carduus bernardinus* Greene, Proc. Phil. Acad. 1892, 361 (1893). *Carduus californicus* (Gray) Greene, var. *bernardinus* (Greene) Parish ex Hall, Univ. Cal. Publ. Bot. iii. 241 (1907).

With many specimens of typical *C. californicum* before one it seems evident that the only character assigned to the above plant which is in any degree constant is the relatively small involuere with more appressed bracts. Even this character is variable, however, so Parish's disposition of the plant as a variety seems excellent. The variety is the prevailing form near the coast of San Diego county. Therefore, Mrs. Spencer's no. 793, representing the typical state from Point Loma, San Diego, is of especial interest.

VI. VARIOUS AMERICAN SPERMATOPHYTES, NEW OR TRANSFERRED

Suaeda nigra (Raf.), comb. nov. *Chenopodium nigrum* Raf. Atl. Jour. i. 146 (1832). *C. maritimum* Torr. Ann. Lyc. N.Y. ii. 239 (1828), not *S. maritimum* (L.) Dumort. *S. diffusa* Wats. Proc. Am. Acad. ix. 88 (1874). *Dondia nigra* (Raf.) Standley, N. Am. Fl. xxi. 89 (1916).

In the course of determining certain specimens of *Suaeda* collected by Mrs. Spencer my attention has been called to the necessity of taking up the above name for the species commonly known as *S. diffusa*. Standley makes the combination under *Dondia*, the first available generic name according to the rule of priority, but the name *Suaeda* is to be used since it is "conserved" in accord with the International Rules.

Guatteria boyacana, spec. nov., arbor usque ad 30 m. alta; ramulis foliisque glabris; foliorum petiolo brevi 3-4 mm. longo supra sulcato, lamina coriaceo-chartacea elliptico-vel ovato-lanceolata 6-12 cm. longa 3-4.5 cm. lata basi fere rotundata vel acutiuscula apice subabrupte acuminata (acumine subobtusato vel rare apice obtuso) subtus pallidiore; baccis numerosis nigris oliviformibus circa 18 mm. longis circa 14 mm. crassis; stipitibus baccarum mediocriter gracilibus plerumque 4.5-5 cm. longis sed quandoque 2.5-3 cm. longis. — COLOMBIA: flooded valley of Rio Negro, Guaguaqui, Boyacá, July 14, 1917, H. N. Whitford & J. Pinzon, no. 13 (TYPE, Gray Herb.).

So far as I have been able to discover no known species of *Guatertia* has the fruits so long-stipitate as those of this species. The collectors' notes indicate that the tree has a spread of 90 m. The native name "Solera" probably originates from the resemblance of the fruits to rounded building stones.

Duguetia vallicola, spec. nov., arbor 20–25 m. alta; ramulis teretibus verruculosus; foliorum petiolo brevi 2–4 mm. longo robusto supra subsulcato, lamina chartacea oblongo-vel ovato-lanceolata 2–2.5 dm. longa 4.6–7 cm. lata basi rotundata apice acuminata, juventati lutescenti-tomentella supra praeter costam mox glabrata nitente subtus parce stellato-lepidota imprimis ad basi; pedunculis solitariis (vel rare 2) lateralibus circa 2.5 cm. longis; fructu 4–4.5 cm. diametro, toro dolioliforme circa 2.5 cm. alto, carpidiis glabris sed plus minusve pruinosis purpureo-nigris breviter et late stipitatis obovatis pentagonis obtusis solum minute apiculatis 12–17 mm. longis. — COLOMBIA: non-flooded valley of Magdalena, Buenavista, Caldas, July 11, 1917, H. N. Whitford & J. Pinzon, no. 3 (TYPE, Gray Herb.).

This species may be compared with *D. Spixiana* Mart., which, however, has more or less pubescent carpels tipped with a curved cusp. No described species with blunt merely apiculate carpels seems to be related closely to our plant.

KRAMERIA PARVIFOLIA Benth. Bot. Voy. Sulph. 6, pl. 1 (1844) has rather recently been confined, as to range, by Rose & Painter, Contrib. U. S. Nat. Herb. x. 108 (1906), to the region of the type-locality, southern Lower California. The shrub of northern Mexico and the southwestern United States which has passed as *K. parvifolia* is regarded by these authors as specifically distinct under the name *K. glandulosa*. To this species they seemingly refer all the specimens hitherto regarded as *K. parvifolia* except the material from Lower California which is distinguished by the lack of glandulosity and the greener and somewhat less mucronate leaves. They err, however, in this disposition of all of the collections from the United States as many specimens are not at all glandular and indeed are distinguished from typical material from the region of Magdalena Bay only by the shorter, more pubescent leaves and usually by the somewhat more compact habit of branching. The true relationship of these plants, therefore, would seem to be indicated best by treating as varieties of the typical form (which, indeed, appears to grow only in Lower California) the glandular and eglandular shrubs of more northern range. Incidentally, it

may be noticed that this genus is omitted, no doubt inadvertently, from Rydberg's Flora of the Rocky Mts. and Adjacent Plains.

✓*KRAMERIA PARVIFOLIA* Benth., var. **glandulosa** (Rose & Painter), comb. nov. *K. glandulosa* Rose & Painter, Contrib. U. S. Nat. Herb. x. 108 (1906). — UTAH: St. George, 1875, *Palmer*; *Parry*, 31. NEW MEXICO: *Wright*, 939. ARIZONA: 1867, *Palmer*; Fort Whipple, 1865, *Coues & Palmer*, 161; Grand Canon, 1885, *Gray*. MEXICO: Sonora, 1857, *Thurber*.

✓*KRAMERIA PARVIFOLIA* Benth., var. **imparata**, var. nov., foliis dense canescentibus plerumque 5–8 mm. longis non glandulosis. — UTAH: St. Thomas, *Goodding*, 704. NEVADA: Bunkerville, *Goodding*, 755; Las Vegas, *Goodding*, 2238. ARIZONA: Ft. Lowell, Tucson, 1880, *Lemmon*. CALIFORNIA: San Diego, 1875, *Cleveland*; Fort Mojave, *Cooper*; Jacumba, *Abrams*, 3662; Mountain Springs, *Mary F. Spencer*, 763 (TYPE, Gray Herb.). MEXICO: Guaymas, *Palmer*, 248; Sonora, *Thurber*, 965.

✓*Draba Paysonii*, nom. nov. *D. vestita* Payson, Am. Journ. Bot. iv. 261 (1917), not *D. vestita* Davidson, Bull. So. Calif. Acad. Sci. xv. 17 (1916).

Rydberg, Fl. Ry. Mts. & Adj. Plains, 353 (1917), refers this plant, with *D. Mulfordae* Payson, to *D. densifolia* Nutt. remarking that *D. Mulfordae* is the "typical form with elongate inflorescence and coarse pubescence"; *D. vestita* the "more common form with corymbose inflorescence and softer pubescence." I am inclined to agree with the first statement but not with the second. There is, in the Gray Herbarium, a specimen which I cannot distinguish from co-type material of *D. Mulfordae* and which is labeled in Durand's hand "*D. densifolia* Nutt. Rocky Mts. Nuttall." This plant agrees exactly with the original description of *D. densifolia*. If then this is the plant to which Nuttall assigned his name, as seems highly probable, the name *D. Mulfordae* passes into synonymy. *D. Paysonii*, however, is a different plant, closely related it is true, as, indeed, the species in this group all are, but constantly distinct from *D. densifolia*. The pubescence of the latter is mostly simple, the few branched hairs forking only once or twice and evidently hispid in character. The pubescence of *D. Paysonii* on the other hand, while largely composed of single hairs, is soft, the hairs becoming tangled and appearing as though much branched or even stellate. The petals of *D. densifolia* are 5 mm. long or even longer; those of *D. Paysonii* about 4 mm. long. But the best distinction between these species lies in the difference in the styles,

a difference apparently overlooked by Rydberg. The style of *D. densifolia* is slender and, as Nuttall described it, about one-third the length of the pod, or 1.5–2 mm. long. But the style of *D. Paysonii* is uniformly stout and shorter, scarcely over 1 mm. in length. It appears, then, that *D. Paysonii* is quite distinct from *D. densifolia*.

Machaerium Whitfordii, spec. nov., arbor circa 20 m. alta; ramulis glabris vel juventate parce fulvo-pubescentibus; internodiis 1.5–2 cm. longis; stipulis non vel tarde deciduis; petiolo communi 9–15 cm. longo subadpresso et dense fulvo-pubescente; foliis brevissime petiolulatis nunc alternis nunc oppositis vulgo 20–30 oblique oblongis vel rare ovato-oblongis plerisque 2 cm. longis 7 mm. latis, rare 3 cm. longis 1 cm. latis basi et apice rotundatis, nunquam retusis, lamina foliorum supra opaca parce subadpresso pubescente subtus discolori, pube laxa mediocriter densa, venulis reticulatis vix conspicuis, costa media prominente; legumine oblongo-ovato circa 7 cm. longo stipite 3–5 mm. longo incluso et 2.5 cm. lato (ad partem basilem seminiferam 1 cm. solum lato) sutura carinali fere recta, vexillari plus minusve valde arcuata ad semen mediocriter contracta; ala reticulato-venosa chartacea leviter adpresso fulvo-pubescente; legumine ad basin dense adpressequae fulvo-pilosulo. — COLOMBIA: low hills bordering Negro river, Guaguaqui, Boyacá, July 14, 1917, H. N. Whitford & J. Pinzon, no. 12 (TYPE, Gray Herb.).

This species belongs to the section *Oblonga* and is most closely related to *M. Moritzianum* Benth. and *M. sordidum* Benth. From the former it differs especially in the not at all retuse leaflets and the straight rather than curved base of the legume. From *M. sordidum* it may be distinguished at once by the short-stipe to the legume and the persistent stipules. The native name, according to the collectors is "Negrillo" in reference to the usually black heart wood.

HELIETTA LONGIFOLIATA Britton, Ann. N.Y. Acad. Sc. vii. 69 (1892). *H. cuspidata* (Engler) Chod. & Hass. Bull. Herb. Boiss. 2d Ser. iv. 1285 (1904). *Esenbeckia? cuspidata* Engler, Bot. Jahrb. xxi. Beibl. liv. 28 (1896).

Chodat & Hassler, l. c., have rightly indicated the identity of Engler's and Britton's plants but have obviously violated rules of botanical nomenclature in taking up Engler's much later published name. The three leaf-variations which they designate as "forms" appear to be so slight and superficial in nature as to be unworthy any formal recognition.

SWIETENIA MACROPHYLLA G. King in Hook. Ic. xvi. 1550 (1886). This species was described from plants grown in the botanic garden at Calcutta "from seeds stated to have been collected in Honduras." Mr. H. N. Whitford has discovered the species in the state of Boyacá, Colombia, "on low hills in the valley of Rio Negro." His specimens consist of leaves and "old fruits collected on the ground." There is no doubt however but that the leaves and fruit are from the same tree since they both agree precisely with King's original diagnosis which is accompanied by a good plate. Apparently this is the first record of the species in its native habitat. Prof. Whitford's notes indicate that it is a tree "25-30 m. in height with a diameter of 80 cm."

CARINIANA PYRIFORMIS Miers. Trans. Linn. Soc. xxx. 290 (1874). Prof. H. N. Whitford has secured specimens of this tree, and they agree with Miers's detailed description. Whitford's material comes from the State of Boyacá, Colombia, probably not far from the type locality. The collector's notes indicate a tree "25-30 m. high, diameter 100 cm."

Clarkia Dudleyana (Abrams.), comb. nov. *Godetia Dudleyana* Abrams, Fl. Los Ang. & Vic. 267 (1904).

A specimen secured in the Yosemite by Mrs. Spencer has been the means of calling to my attention this attractive species. Apparently it is not uncommon in the central Sierras where it has been collected by Abrams and others. For a discussion in regard to the generic status of this group of plants compare Bot. Gaz. l xv. 59-60 (1918).

CORNUS CALIFORNICA C. A. Mey., var. **pubescens** (Nutt.), comb. nov. *C. pubescens* Nutt. Sylva, iii. 54 (1849?).

Coulter & Evans, Bot. Gaz. xv. 37 (1890), treated *C. californica* C. A. Mey. Bull. Acad. Pétersb. iii. 373 (1845) as a variety of *C. pubescens*. The former name, however, has priority over the latter so it becomes necessary to reverse the order of species and variety. Nuttall's name was cited in synonymy in 1840 by Torrey and Gray but this did not constitute publication. The var. *pubescens* occurs throughout the range of the species and is poorly distinguished, the chief difference being the greater tendency of the leaves to be cuneate at base rather than rounded as in the typical form.

Rhododendron Warrenii (A. Nels.), comb. nov. *Azaleastrum Warrenii* A. Nels. Bot. Gaz. lvi. 67 (1913).

This species is at once distinct from *R. albiflorum*, its nearest relative, by virtue of the glandular-ciliolate essentially glabrous leaves. *Rhododendron* is here, of course, taken in its more comprehensive and as it is believed much more desirable sense. Anyone so situated that he can examine living material of the oriental section *Tsutsutsi* can hardly fail to discard completely the persistence of the leaves as a generic character; for in this section there are species which although in all other characters *Azaleas* yet have persistent leaves. Horticulturists, who have to do only with certain selected species, may feel it convenient to retain *Azalea* and other segregates, but from the standpoint of sound botanical taxonomy *Rhododendron* in its more comprehensive sense is clearly more natural and for purposes of classification more definite.

ARCTOSTAPHYLOS TOMENTOSA (Pursh) Lindl. *A. columbiana* Piper in Piper and Beattie, Fl. N. W. Am. 279 (1915).

In a note accompanying the publication of *A. columbiana* there occurs the following remark: "This is the common northern manzanita that has usually been referred to *A. tomentosa* Lindl. but the type specimens of that species are, according to Miss Alice Eastwood, from Monterey Bay, California, and are identical with *A. vestita* Eastwood." Piper seems to have regarded the fact that the original specimen of *A. tomentosa* came from Monterey as furnishing sufficient justification for separating the northwestern form as a distinct species. At any rate he does not point out any differences between the Californian and Washington plants nor does he bring out any distinctive characters in his meagre description. However, it happens that this point is immaterial in this instance because Miss Eastwood has erred in her location of the type region of *A. tomentosa*, the species having been based by Pursh upon material secured by Menzies on the northwest coast of America; cf. Pursh Fl. Am. Sept. i. 282 (1814). Accordingly the common manzanita of the northwestern coastal region may continue to be known as *A. tomentosa*. Both Abrams, N. A. Fl. xxix. 97 (1914), and Piper, l. c., give the range of this plant as extending south through the coast ranges of California but the former recognizes Miss Eastwood's *A. vestita* which he distinguishes by the exfoliating bark of the older branches. This latter species,

however, Abrams confines to the vicinity of Monterey. Whether *A. vestita* is more than a geographical variant of *A. tomentosa* may be questioned, but the latter apparently does not occur in typical state in California nor is the former confined to Monterey if one may judge from herbarium material. Macbride & Payson's no. 879, for example, from Pasadena seems to be the same as Miss Eastwood's own collections from Monterey Bay.

FRASERA Walt. Fl. Carol. 87 (1788). *Leucocraspedum* Rydb. Fl. Ry. Mts. & Adj. Plains, 665 (1917).

Dr. Rydberg maintains that the presence or absence of the "crown" in certain members of the *Gentianaceae* is of vital importance in the definition of genera within the group. At least such appears to be his contention from his segregation of *Frasera*, l. c., for his genus *Leucocraspedum* rests primarily upon the character "corolla with a crown." It is true that those species which he refers to his new genus are characterized by a more or less obvious white border to the leaves but in as much as this border is not uniformly pronounced in the case of different species and in as much as it displays some variation in the degree of development even within a given species its use as a generic character appears palpably weak. But if the development of the crown seems of such importance to Rydberg in the generic classification of the *Gentianaceae* how can he retain *Amarella ventorum*, *A. propinqua* and *A. arctophila* in the genus *Amarella* when these species form a group at once distinct from all other species of *Amarella* because their corollas are "without a crown"? And if it be argued that this case is not analogous to the segregation of *Frasera* because there the absence of the crown was supported by another character, namely the absence of the white margin to the leaves, I would call attention to the fact that here also the crown-character is accompanied by another difference, which, if anything, is even stronger than the leaf-character used so successfully by Rydberg for the cleavage of *Frasera*. These three "crownless" species of *Amarella* have evident glands at the base of the corolla; the glands at the corolla-base of the other, and "crowned," species are "obsolete or wanting." Can this be the botanist who has argued so vigorously for consistency in both our "lumping" and our "splitting," for instance in Bull. Torr. Club, xxx. 271 (1903); cf. also Contrib. Gray Herb. liii. 2-4 (1918)?

GILIA DEBILIS Wats., var. **Larseni** (Gray), comb. nov. *G. Larseni* Gray, Proc. Am. Acad. xi. 84 (1876). *Collomia debilis* (Wats.) Greene, var. *Larsenii* (Gray) Brand, Pflanzenreich, iv. Fam. 250, 52 (1907).

Brand's treatment of this variety — distinguished from the typical form only by the tendency of the leaves to be parted pedately several times — is certainly justifiable. But in accordance with the view as expressed in Bot. Gaz. lxi. 34 (1916) and Contrib. Gray Herb. xlix. 54 (1917) that the genus *Collomia* cannot be maintained distinct from *Gilia* the above new combination becomes necessary. There is another member of this group of plants to which my attention has been called by a specimen secured by John Murdoch, Jr. (his no. 2667) in the Sierra National Forest of Madera County, California, which, in accordance with my interpretation of the genus *Gilia* must be known as

Gilia Rawsoniana (Greene), comb. nov. *Collomia Rawsoniana* Greene, Pitt. i. 221 (1888).

Gilia effusa (Gray), comb. nov. *Loeselia effusa* Gray, Proc. Am. Acad. xi. 86 (1876). *G. Dunnii* Kellogg, Pacif. Rural Press (May 31, 1879).

To my mind Gray's definition of the genus *Loeselia*, Syn. Fl. ii. pt. 1. Suppl. 412 (1886), is preferable to Brand's, Pflanzenreich, iv. Fam. 250. 172 (1907). So constituted it is a homogeneous group in aspect as well as in character. The inclusion in *Gilia* of the above species (and its three allies, *G. Harvardi*, *G. tenuifolia* and *G. guttata*) disturbs in no fundamental way the definition of *Gilia* since these plants are aberrant only because of the more or less bilabiate corolla. Their inclusion in *Loeselia*, on the other hand, destroys the now perfect homogeneity of that group, since, in all respects save for the bilabiate corollas, they are good *Gilias*.

GILIA GRANDIFLORA (Dougl.) Gray, var. **axillaris** (A. Nels.) Nels. & Macbr., in herb. *Collomia grandiflora* Dougl., var. *axillaris* A. Nels, Bot. Gaz. lii. 270 (1911).

Gilia biflora (Ruiz & Pavon), comb. nov. *Phlox biflora* Ruiz & Pavon, Fl. Per. ii. 17 (1799). *Collomia biflora* (Ruiz & Pavon) Brand. Engl. Bot. Jahrb. xxxvi. 72 (1905).

This species entirely replaces in western South America the closely related *G. linearis* (Nutt.) Gray of western North America.

Cryptantha echinosepala, spec. nov., mediocriter robusta 1-2 dm. alta plus minusve cum pilis patentibus hispida stricta vel

plerumque a basi ipsa laxe ramosa; foliis caulinis inferioribus oblongis vel oblanceolatis circa 2 cm. longis 2-3 mm. latis apice subobtusis basi plus minusve attenuatis utrinque subadpresse papilloso-hispidis, superioribus similibus sed brevioribus; cymis saepius 2-3-radiatis, spicis post anthesin laxifloris; calycis fructiferi laciniis lineari-lanceolatis, tribus circa 3 mm. longis solum mediocriter setoso-hispidis, duabus circa 4 mm. longis et dense setoso-hispidis, pilis fulvescentibus; nuculis (3-4) subtrigonis circa 1 mm. longis minute muriculatis saepius uno longiore, sulco ventrali albido fere ad apicem dilatato. — LOWER CALIFORNIA: Magdalena Island, March, 1917, *Orcutt*, no. 15 (TYPE, Gray Herb.); Santa Agueda, March 4-6, 1890, *Palmer*, no. 242; La Paz, Jan. 20-Feb. 5, 1890, *Palmer*, no. 26.

When studying the Palmer specimens in 1915 I referred them very doubtfully to *C. angustifolia* (Torr.) Greene but because of the immaturity of the specimen from La Paz and because the Santa Agueda plants were found in "an old garden" I hesitated to base a new species on this material. With Mr. Orcutt's excellent specimen before me, however, it is obvious that the plant is quite distinct from *C. angustifolia* to which species it bears nearest relation, as is shown by the heteromorphous asperulous nutlets. The diagnostic character of *C. echinosepala* is found in the calyx; two of the sepals are inordinately bristly, much more so and longer than the only slightly bristly other three. It may be noticed that the open ventral groove of the nutlets is not abruptly dilated at the base as in *C. angustifolia*.

Cryptantha quentinensis, spec. nov., undique adpresse strigilosa mediocriter a basi ipsa diffuse ramosa circa 1.5 dm. alta; ramis gracilibus foliosissimis; foliis caulinis linearibus sursum gradatim reductis inferioribus circa 2 cm. longis vix 0.5 mm. latis; spicis plerumque terminalibus, fructiferis mediocriter laxifloris; calycis fructiferi laciniis linearibus circa 3 mm. longis adpresse villosa-hispidis, pilis nonnullis longioribus firmiusculis subadpressis intermixtis; corollae limbo circa 5 mm. lato; nuculis (4) vix 2 mm. longis acutis subnitidulis plus minusve obscure muriculatis, angulis lateralibus rotundatis, sulco ventrali tenui basi divaricato-furcato plerumque clauso. — LOWER CALIFORNIA: San Quentin, 1889, *Palmer*, no. 695 (TYPE, Gray Herb.).

This species belongs to the group typified by *C. oxygona* (Gray) Greene and indeed is seemingly most nearly related to that plant of southern California. It may be distinguished at once, however, by the very rounded angles of the nutlets. The nutlets of *C. oxygona* are acutely margined. As pointed out in Contrib. Gray Herb.

xlviii. 48 (1916) *C. oxygona* has apparently a very restricted range and *C. quentinensis* may likewise be local in its distribution.

✓ *CRYPTANTHA BARBIGERA* (Gray) Greene, var. **Fergusonae**, var. nov., corollae limbo 5–6 mm. lato; nticulis formae typicae similibus sed sulco fere ad apicem dilatato. — CALIFORNIA: Palm Springs, April 1, 1917, *Margaret C. Ferguson*, no. 42 (TYPE, Gray Herb.; co-type, Wellesley College Herb.).

The specimens of this species secured by Dr. Ferguson of the department of botany of Wellesley have been the means of calling to my attention the existence of two well marked forms. The typical form has small narrow inconspicuous flowers and the groove of the nutlets is dilated but a short distance above the base. The specimens secured by Parry & Palmer cited in the Syn. Fl. ii. pt. 1. 194 (1878), belong here although the expression "limb of the corolla sometimes 3 lines in diameter" in the description of *Eritrichium barbigerum* indicates that Dr. Gray saw material of the large-flowered form proposed above as a variety. Besides the much larger flowers the groove of the nutlets is dilated much higher up.

C. INTERMEDIA (Gray) Greene exhibits the same sort of variation. In the vicinity of Los Angeles I have seen large- and small-flowered plants growing together that were otherwise indistinguishable. Since the first material sent to Dr. Gray by Nevin, upon whose specimens the species was largely based, consisted of the inconspicuously flowered state it may be regarded as the typical form. Recently Mr. I. M. Johnston of Upland, California, has kindly furnished me with a large series of specimens of both forms and I take pleasure in connecting his name with this *Cryptantha* which is more common in many places than true *C. intermedia* itself. An analogous variation occurs also for *C. Torreyana* (Gray) Greene, which has been designated var. *grandiflora* (Rydb.) Nels. & Macbr.

✓ *C. INTERMEDIA* (Gray) Greene, var. **Johnstonii**, var. nov., corollae limbo 5–6 mm. lato. — CALIFORNIA: dry rocky ground, Claremont, Los Angeles Co., May 15, 1918, *I. M. Johnston*, 1938 (TYPE, Gray Herb.).

PEDICULARIS CANADENSIS L., var. **fluviatilis** (Heller), comb. nov. *P. fluviatilis* Heller, Minn. Bot. Stud. ii. 33 (1898).

Heller, when proposing his species, l. c. 34, wrote that it "seems to be closely related to the common eastern *P. Canadensis*." But

he failed to state what difference he found between his plant and *P. canadensis* and indeed he brought out no character in his description that does not nicely apply to the latter plant! Neither Rydberg in his Flora of the Rocky Mountains nor Nelson in the Coulter-Nelson Manual mention Heller's segregate but include *P. canadensis* L. as a component of the Coloradan flora. However, in Wooton & Standley's Flora of New Mexico, U. S. Nat. Herb. Contrib. xix. 597 (1915), we find *P. fluviatilis* accepted but accompanied, as though by way of apology, by this note: "This is closely related to the eastern *P. canadensis* L., but appears to be fairly distinct." One would gather from this that neither Heller nor Wooton & Standley found any reliable characters by which to separate the plant of the southern Rocky Mountains from the more eastern form. And as a matter of fact the western plant possesses no characters that are stable or definite enough to cause it to be considered specifically distinct. It may, however, be treated as a geographical variant. True *P. canadensis* does not occur west of Kansas and Oklahoma, although its range extends eastward to the Atlantic. Throughout this area it is uniform in its characters and only as it occurs in New Mexico and southern Colorado does it display any variation worthy a place in classification. The Rocky Mountain form, occupying as it does a range isolated from the western edge of the area occupied by the typical state, might therefore be expected to be somewhat different and evidently upon the strength of this expectation rather than upon the actual discovery of differences Mr. Heller has proposed his new species. And indeed only in the character of the corolla, and less definitely in the nature of the foliage may the isolated western plant be separated varietally. In the typical form the slender corolla-tube is only 1.5-2 mm. wide at the base toward which it tapers slightly, while the corolla-tube of the western form is nearly or quite 3 mm. in width at base and throughout is much less slender. The corolla averages somewhat shorter, too, usually measuring a trifle less than 2 cm. long, while the corolla of true *P. canadensis* is generally quite 2 cm. in length or even longer. Finally the leaves of the western plant are always of a linear-oblong type, a type infrequently exhibited by true *P. canadensis*, at least the basal leaves of which are generally more or less ovate-lanceolate. The secondary toothing too of the typical form is usually deeper and

the upper surface of the leaves more pubescent. But since the only difference between the western and eastern plant which appears to have acquired any considerable degree of stability is the minor difference in the shape of the corolla and since even this difference is not entirely dependable for the distinguishing of certain specimens, were data indicating the part of the United States in which they were gathered obliterated, the most satisfactory way of treating the western plant, the only method indeed which will indicate in classification the real relationship of the plants in nature, is to consider it a variety.

PEDICULARIS CRENULATA Benth., forma **candida**, f. nov., corolla alba. — COLORADO: Sapinero, June 19, 1901, *Baker*, no. 174 (TYPE, Gray Herb.).

This plant is often the principal species in large areas of meadowlands and during the height of its season lights the landscape with the brilliance of its red-purple corollas. The occasional presence of an albino is therefore always pleasing and furnishes a striking contrast. Although only one specimen is at hand for citation this color-form is not uncommon.

Plantago Parishii, spec. nov., annua plus minusve ubique rubescens tenella, 5–10 cm. alta; caulibus breviter parceque adpresse hirsutis; foliis glabris vel subglabris fere linearibus basin versus sensim attenuatis, apice breviter cuspidatis, 2–5 cm. longis, 1–2 mm. latis; spicis oblongis vel oblongo-linearibus 7–22 mm. longis, vix 3 mm. crassis; bracteis dorso valde convexis cuspidatis vix 2 mm. longis minute adpresse pubescentibus; sepalis similibus sed subobtusis et margine suberoso-ciliatis circa 2.5 mm. longis; floribus apertis; laciniis corollae anguste lanceolatis subacuminatis; capsula circa 2 mm. longa acuta sepalis paullo brevior. — CALIFORNIA: in a dessicated pool, Pebble Beach, Santa Catalina Island, March 31, 1916, *S. B. Parish*, no. 10751 (TYPE, Gray Herb.).

This plant belongs in the group of closely related species typified by *P. erecta* Morris. It is to be at once distinguished, however, by the slender spikes, the fine appressed pubescence and the short capsule. Mr. Parish has kindly given me the pleasure of describing this interesting little plant and I have welcomed the opportunity of connecting his name with it.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM
OF HARVARD UNIVERSITY.

NEW SERIES.—No. LVII.

I.	THE UNITY OF THE GENUS ARENARIA	1
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VI.	THE AMERICAN VARIATIONS OF ARENARIA VERNA	21

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I. THE UNITY OF THE GENUS ARENARIA.

IT seems wisest to maintain the genus *Arenaria* in its broad sense, although the great majority of European authors and some in America distinguish from *Arenaria* proper (with the valves of the capsule notched or cleft at apex, and seeds numerous and reniform) the following genera which occur in boreal America: *Alsine* Wahlenb. or *Minuartia* L. similar to *Arenaria* but with uncleft valves; *Ammodenia* Gmel. or *Honkenya* Ehrh., with unusually developed disk, globose capsule, and few obovoid seeds; *Moehringia* L., with well developed disk and with the seeds strophiolate; and *Merckia* Fisch., with 3-5 celled ovary and inflated capsule.

Although in a limited area, like Europe or like northeastern America, the lines usually indicated for the separation of these genera are fairly definite, an examination of species from a broad range of territory at once shows that no two of the traditional characters are concomitant throughout a long series of species.

In order to test the value of these genera it is well to tabulate the characters depended upon by those who maintain the segregated genera as distinct from *Arenaria*; and even in this it is difficult to find authors in entire agreement. Thus, some authors state that the seeds of the monotypic *Ammodenia* or *Honkenya* are "numerous," others "few," while Pax, in Engler's *Natürlichen Pflanzenfamilien*, retains under *Alsine* with "Discusschuppen meist kurz" *Ammodenia*

	Habit and foliage	Inflorescence	Disk	Ovary and capsule	Seeds
ARENARIA L.	Annual or perennial: mainly tufted: leaves not fleshy	Terminal, rarely axillary.	Perigynous or subhypogynous.	Ovary 1-celled, many-ovuled; capsule dehiscent at tip into 3 cleft or notched valves.	Numerous, reniform or compressed, with the hilum marginal, estrophiolate.
MINUARTIA L. = ALSINE Wahlenb., not L	As above.	As above.	Obscurely perigynous, more or less glandular-lobed.	As above, but valves of capsule entire.	As above.
AMMODENIA Gmel. = HONKENYA Ehrh.	Succulent perennial with fleshy leaves.	Flowers axillary or in leafy cymes.	Well developed, with 10 glandular lobes.	Ovary more or less completely 3- or 5-celled (1-celled according to Pax); capsule fleshy or bladdery, with 3 or 5 entire valves.	Few, pyriform or obovoid, with the hilum obliquely basal, estrophiolate.
MOEHRINGIA L.	Flaccid herbs with spreading usually flat leaves.	Terminal, often becoming lateral by prolongation of axillary branches, or axillary.	Well developed, nearly hypogynous.	Ovary 1-celled (but in <i>M. lateriflora</i> distinctly 2, 3, or 4-celled); valves of capsule twice as many as the style.	Seeds reniform, lustrous, estrophiolate.
MERCKIA Fischer	Similar to <i>Ammodenia</i> but less fleshy.	As <i>Ammodenia</i> .	Obscure or very narrow.	Ovary 3-5-celled; capsule bladdery, membranaceous.	Seeds lustrous, estrophiolate.

which is separated by others because it has "a conspicuous 10-lobed and glandular slightly perigynous disk." Again Pax defines *Alsine* (including *Ammodenia*) as having a 1-celled ovary, while *Merckia* is distinguished by its 3-5-celled ovary; yet Gray, in his *Genera*, described (correctly) the ovary of *Ammodenia* as 3-5-celled. The tabulation on the opposite page, however, presents the significant characters most relied upon in the separation of these five genera.

When these so-called differential characters are checked by examining species from remote areas of the world we get the following results.

Most species of *Arenaria* (in the strict sense) and of *Minuartia* have a tufted habit, with terminal inflorescences and numerous reniform seeds. But the common *A. lanuginosa* (Michx.) Rohrb. of South America, Mexico and the southern United States has elongated stems with broad leaves and axillary pedicels, thus in habit strongly simulating the European *Moehringia trinervia* (L.) Clairv. The latter plant, on account of its habit and its lustrous strophiolate seeds, is unquestionably a species of *Moehringia*. Yet the seeds of *Arenaria lanuginosa*, a plant which in habit belongs to *Moehringia*, are quite like those of *M. trinervia* in form and lustre, but they lack the strophiole; i. e. only by its lack of a strophiole does *Arenaria lanuginosa* find a place in *Arenaria*, not in the habitally similar *Moehringia*.

Between *Arenaria* proper and *Minuartia* the only distinction is in the valves of the capsule, cleft in *Arenaria*, entire in *Minuartia*, the species of these so-called genera otherwise so closely simulating one another as to be often nearly inseparable. Thus, *Arenaria paludicola* Robinson, which has the entire valves of *Minuartia*, is habitally close to *A. lanuginosa*, a true *Arenaria*, and to species of *Moehringia*. Furthermore, it is by no means easy to determine whether some of our American species belong with *Arenaria* or with *Minuartia*, some species having the valves so slightly cleft that in their capsules they lie between the most characteristic species of the two groups. Thus *A. sajanensis* and the species related to it (and discussed below, pp. 12-17) have emarginate valves as does *A. laricifolia* of Europe, beautifully illustrated by Reichenbach (Ic. Fl. Germ. v. t. 292, fig. 4933) with notched valves, although these plants are universally placed in the so-called genus which is distinguished by having entire valves!

From all the segregate-genera *Ammodenia* is supposed to be separated by the highly developed glandular-lobed disk, by its bladdery capsule and by the few pyriform seeds with nearly basal hilum, and, of course, by its succulent stems. Yet Pax correctly states that *Merckia* has the habit of this plant, Pax separating *Merckia* because it has the ovary and fruit "mehr oder weniger vollkommen 3-5 fächerig" and because of its obsolete disk. *Ammodenia* is left by Pax in *Alsine* or *Minuartia*, a genus distinguished by 1-celled ovary and the entire valves of the capsule, and he states under *Merckia* that that monotypic genus perhaps belongs also with *Alsine*. Nevertheless, *Ammodenia*, as already pointed out by Asa Gray, has the ovary "more or less completely three-five-celled, the dissepiments soon breaking away from the walls and adhering to the more persistent columella;"¹ i. e., the supposed ovary-difference between *Ammodenia* and *Merckia* is not constant. Furthermore, the seed of *Merckia* is exactly intermediate in outline between the seed of *Ammodenia* and the most typical seeds of *Arenaria* and *Minuartia*, i. e., it is suborbicular to obovate-orbicular, with the hilum nearly basal. The development or obsolescence of the stamineal disk is certainly not constant in the group, for, although *Merckia physodes* as a species is readily distinguished from *Ammodenia peploides* by its obscure disk, it should be noted that some species referred to true *Arenaria* and to *Minuartia* (*Alsine*) have highly developed disks, while the disk of *Moehringia* is well developed. The American *Arenaria macradenia* Wats., for example, is the best kind of *Arenaria* in its caespitose habit, acicular leaves, terminal inflorescence, capsule and seeds, but its stamineal disk and glands are quite as conspicuous as in *Ammodenia*. *Ammodenia* is supposed to be distinguished from *Arenaria*, furthermore, by its few obovoid seeds in contrast with the many reniform seeds of the latter genus; yet *Arenaria Hookeri* Nutt., a characteristic caespitose species with acicular leaves and terminal cymes, has but 3 seeds to a capsule, these obovoid and with a basal hilum as in *Ammodenia*.

Moehringia is distinguished by its habit, well-developed disk, 1-celled ovary, capsule-valves as in *Arenaria*, and reniform, lustrous, strophiolate seeds. But as already pointed out *Moehringia* is exactly simulated by species of *Arenaria* which differ merely in having the

¹ Gray, Gen. ii. 31 (1840).

seeds estrophiolate, and it does not require great experience with the seeds of *Mochringia* to assure any investigator that the strophiole is readily deciduous and therefore likely not to be found at all on the ripe seeds. The American *Mochringia lateriflora* (L.) Fenzl is a member of this genus in habit, disk, and seeds, but unfortunately for the constancy of the genus, as long ago pointed out by Asa Gray, the ovary is "plainly divided in *M. lateriflora* into as many cells as there are styles by manifest dissepiments: STYLES 3. . . sometimes 2 or 4."¹ In other words, although a *Mochringia* in everything else, *M. lateriflora* is a *Merckia* in its 3-celled ovary!

It would be easy to point out in our North American flora many other species which in one character or another break down the differences which have been relied upon to separate as genera *Arenaria*, *Minuartia*, *Ammodenia*, *Mochringia* and *Merckia*, but the above notes should suffice to demonstrate that these are not true genera but are, rather, freely confluent subgenera of the single genus *Arenaria*.

In organizing the material of *Arenaria* in the Gray Herbarium it has been found necessary to make the following nomenclatorial changes.

ARENARIA arenarioides (Crantz), n. comb. *Stellaria Arenaria* L. Sp. Pl. 1196 (1753). *Cerastium arenarioides* Crantz, Inst. ii. 402 (1766). *Ar. cerastioides* Poir. Voy. Barb. ii. 166 (1789). *Ar. spathulata* Desf. Fl. Atlant. i. 358 (1798).

ARENARIA bryophylla, n. nom. *Ar. musciformis* Edgew. & Hook. f. in Hook. f. Fl. Brit. Ind. i. 237 (1872), not Triana & Planch. Ann. Sci. Nat. ser. 4, xvii. 150 (1862).

Edgeworth & Hooker ascribe their *A. musciformis* to Wallich, Cat. no. 6401 as does also *Index Kewensis*; but Wallich's no. 6401 is a *Buddleia* and at best the names in Wallich's Catalogue are *nomina nuda*.

ARENARIA Funkii (Jord.), n. comb. *Alsine Funkii* Jord. Pugill. 36 (1852).

ARENARIA cymifera (Rouy & Fouc.), n. comb. *Alsine cymifera* Rouy & Fouc. Fl. Fr. iii. 275 (1896).

ARENARIA iberica, n. nom. *Minuartia dichotoma* L. Sp. Pl. 89 (1753), not *Ar. dichotoma* Krock, Fl. Sil. ii. pt. 1, 55 (1793).

ARENARIA caucasica (Boiss.), n. comb. *Alsine caucasica* Boiss. Diagn. ser. 2, fasc. 1, 87 (1853), not *Ar. caucasica* Adams ex Ledeb.

¹ Gray, Gen. ii. 35 (1849).

Fl. Ross. i. 354 (1842), the latter merely a name published in synonymy. *Minuartia montana* L. Sp. Pl. 90 (1753), not *Ar. montana* L. Amoen. Acad. iv. 272 (1759). *M. campestris* DC. Prodr. iii. 380 (1828), not L. Sp. Pl. 89 (1753) nor *Ar. campestris* All. Fl. Ped. ii. 114 (1785).

ARENARIA **anatolica** (Boiss), n. comb. *Alsine anatolica* Boiss. Diagn. ser. 1, fasc. 8, 97 (1849).

ARENARIA **Thevenaei** (Reut.), n. comb. *Alsine Thevenaei* Reut. Exs. 1855 (name only); Loret, Bull. Soc. Bot. Fr. x. 381 (1863). *Al. verna*, var. *Thevenaei* Loret, l. c. (1863).

ARENARIA **attica** (Boiss. & Sprun.), n. comb. *Alsine attica* Boiss. & Sprun. Diagn. ser. 1, fasc. 5, 84 (1844).

ARENARIA **sphagnoides** (Froel.), n. comb. *Sabulina sphagnoides* Froel. in Reichenb. Fl. Germ. Exc. 790 (1832).

ARENARIA **aizoides** (Boiss.), n. comb. *Alsine aizoides* Boiss. Diagn. ser. 1, fasc. 1, 47 (1842).

ARENARIA **decipiens** (Fenzl), n. comb. *Alsine decipiens* Fenzl, Pugill. Pl. Nov. Syr. 12 (1842).

ARENARIA **dianthifolia** (Boiss.), n. comb. *Alsine dianthifolia* Boiss. Diagn. ser. 1, fasc. 8, 99 (1849).

ARENARIA **intermedia** (Boiss.), n. comb. *Alsine intermedia* Boiss. Fl. Orient. i. 685 (1867).

ARENARIA **leucocephala** (Boiss.), n. comb. *Alsine leucocephala* Boiss. Diagn. ser. 1, fasc. 1, 45 (1842).

ARENARIA **pulvinaris** (Boiss.), n. comb. *Alsine pulvinaris* Boiss. Diagn. ser. 1, fasc. 1, 46 (1842), fasc. 5, 84 (1844).

ARENARIA **makmelensis**, n. nom. *Alsine libanotica* Boiss. Diagn. ser. 1, fasc. 8, 98 (1849), not *Ar. libanotica* Kotschy in Boiss. Fl. Orient. i. 699 (1867). Known only from the alpine region of Makmel, Lebanon, at 2590 m.

ARENARIA **rimarum** (Boiss. & Balansa), n. comb. *Alsine rimarum* Boiss. & Balansa in Boiss. Fl. Orient. i. 678 (1867).

ARENARIA **Schimperii** (Hochst.), n. comb. *Alsine Schimperii* Hochst. in A. Rich. Tent. Fl. Abyss. i. 47 (1847).

ARENARIA **stellata** (Clarke), n. comb. *Cherleria stellata* Clarke, Trav. iv. 211 (1816). *Alsine parnassica* Boiss. & Sprun. Diagn. ser. 1, fasc. 1, 46 (1842).

ARENARIA **diversifolia** (Dolliner), n. comb. *Moehringia diversifolia* Dolliner ex Koch, Flora, xxii. 2 (1839).

ARENARIA **Grisebachii** (Janka), n. comb. *Moehringia Grisebachii* Janka, Oesterr. Bot. Zeitschr. xxiii. 194 (1873).

ARENARIA **Jankae** (Griseb.), n. comb. *Moehringia Jankae* Griseb. ex Janka, Oesterr. Bot. Zeitschr. xxiii. 195 (1873).

ARENARIA **dasyphylla** (Bruno), n. comb. *Moehringia dasyphylla* Bruno in Balbis, Misc. Bot. in Mém. Acad. Turin Sc. Phys. i. 391 (1804).

ARENARIA **DASYPHYLLA**, var. **sedoides** (Cumino), n. comb. *Moeh-*

ringia muscosa β . *sedoides* Cumino in Balb. Mém. Acad. Turin Sc. Phys. i. 391 (1804).

ARENARIA **Tommasinii** (Marches.), n. comb. *Moehringia Tommasinii* Marches. Bull. Adr. Soc. Sc. Nat. Trieste, v. 327 (1880).

ARENARIA **glauco-virens** (Bertol.), n. comb. *Moehringia glauco-virens* Bertol. Fl. Ital. vi. 626 (1844).

ARENARIA POLYGONOIDES Wulf., var. **obtusa** (All.), n. comb. *A. obtusa* All. Fl. Pedem. ii. 114, t. 64, fig. 4 (1785). *Moehringia ciliata* (Scop.) Dalla Torre, var. *obtusa* (All.) Gürke, Pl. Eur. ii. 280 (1899).

ARENARIA **papulosa** (Bertol.), n. comb. *Moehringia papulosa* Bertol. Fl. Ital. iv. 363 (1839).

ARENARIA **platysperma** (Maxim.), n. comb. *Moehringia platysperma* Maxim. Bull. Acad. Petrop. xviii. 373 (1873).

ARENARIA **Cossoniana**, n. nom. *Moehringia stellarioides* Coss. Bull. Soc. Bot. Fr. ix. 170 (1862), not *Ar. stellarioides* Willd. in Schlecht. Ges. Naturf. Fr. Berl. Mag. vii. 209 (1813).

II. THE TYPE OF THE GENUS ALSINE.

As published by Linnaeus *Alsine* consisted of two species as follows:

ALSINE.

- media*. 1. ALSINE petalis bipartitis, foliis ovato-cordatis. *Fl. lapp.* 186. *Fl. succ.* 369. *Hort. cliff.* 173. *Gron. virg.* 161. *Roy. lugdb.* 449.
 Alsine media. *Bauh. pin.* 250.
 Alsine minor. *Dod. pempt.* 29.
Habitat in Europae cultis. ☉
- segetalis*. 2. ALSINE petalis integris, foliis subulatis.
 Spergula foliis filiformibus unum latus spectantibus, stipulis membranaceis vaginantibus, pedunculis umbellatis. *Guett. stamp.* 299. *Dalib. paris.* 133.
 Alsine segetalis, gramineis foliis unum latus spectantibus. *Vaill. paris.* 8. t. 3. f. 3.
Habitat Parisiis. ☉¹

By many scholarly European botanists, Hiern,² Britton & Rendle,³ & Schinz & Thellung,⁴ Briquet,⁵ and others, *A. segetalis* is taken with-

¹ L. Sp. Pl. i. 272 (1753).

² Hiern, Journ. Bot. xxxvii. 317, 318 (1899).

³ Britton & Rendle, List Brit. Seed-Pl. 6 (1907).

⁴ Schinz & Thellung, Bull. Herb. Boiss. sér. 2, vii. 402, 404 (1907).

⁵ Briq. Fl. Corse, i. 529 (1910).

out question as the type of the Linnean *Alsine*, and since *A. segetalis* belongs to the genus known variously as *Spergularia* Pers. (1805), *Tissa* Adans. (1763) or *Buda* Adans. (1763) it is obvious that *Alsine* is synonymous with them. By the International Rules *Spergularia*, being a *nomen conservandum*, is retained over all competitors, but by those who attended the International Congress at Vienna as regular Commissioners or as delegates but who have felt no obligation to accept the majority rulings of that representative convention¹ and by those who prefer the provincial American Code to an international agreement, the name *Alsine* L. should be used for *Tissa*, *Buda*, or *Spergularia*.

It is not clear upon what ground followers of the American Code apply the name *Alsine* to *Stellaria* L. The American Code is explicit as to the type of a Linnean genus, and by its ruling the type of *Alsine* is unquestionably *A. segetalis*. The portions of the American Code bearing upon this point are in Canon 15:

"The nomenclatorial type of a genus or subgenus is the species originally named or designated by the author of the name. If no species was designated, the type is the first binomial species in order eligible under the following provisions:

"(b) A figured species is to be selected rather than an unfigured species in the same work. In the absence of a figure, preference is to be given to the first species accompanied by the citation of a specimen in a regularly published series of exsiccatae. IN THE CASE OF GENERA ADOPTED FROM PREBINOMIAL AUTHORS (WITH OR WITHOUT CHANGE OF NAME), A SPECIES FIGURED BY THE AUTHOR FROM WHOM THE GENUS IS ADOPTED SHOULD BE SELECTED. [Capitalization of the last sentence ours.]

EXAMPLES.—*Lespedeza* Michx. Fl. Bor. Am. 2: 70 (1803), is typified by *L. procumbens* Michx. loc. cit. pl. 39, the species first figured."

Now, referring to *Alsine* L., there were but two species: 1st, *A. media*, which is *Stellaria media* Vill. and 2d *A. segetalis*, which is

¹ Even the most painstaking students sometimes fail to view international agreements subjectively. Thus, Dr. Witmer Stone, writing in September, 1911, finds it "quite impossible to accept certain of the features of these codes [the International Rules and the American Code]" — *Plants So. N. J.* 34 (1911); and, therefore, as a zoölogist making a temporary excursion into the botanical field, adopts in his botanical writing methods which are quite at variance with those sanctioned by either the International Rules or the American Code. Nevertheless, when certain zoölogists proposed alterations of their International Code of Nomenclature, Dr. Stone felt, in May, 1912, as most of us do, that, "if we are to shift back and forth to accommodate the views of now one coterie of investigators, now another, we might as well abolish all codes and lapse into nomenclatural chaos" — *Science*, n. s. xxxv. 818 (1912).

Spergularia segetalis Don. The references under the 1st species, *Alsine media*, indicate no figure, but the 2d species, *A. segetalis*, goes back to "*Alsine segetalis, gramineis foliis unum latus spectantibus*. Vaill. paris. 8. t. 3. f. 3," which shows a beautifully clear illustration. By the American Code, therefore, the type of *Alsine* is *A. segetalis*.

The definition of *Alsine* in the *Genera Plantarum*, ed. 5, 132 (1754) likewise indicates *A. segetalis* in the character "COR. Petala quinque aequalia, calyce longiora," for in *A. segetalis* the petals are, as described by Rouy & Foucaud, "une fois plus longs que les sépales"¹ while the petals of *A. media* are, as defined by Britton in his key to species, "shorter than the calyx."² Incidentally, it is unfortunate for Dr. Britton's argument that *A. media* is the type of *Alsine* that he should have selected for his artist a flower of the latter which so beautifully shows 10 stamens (Ill. Fl. fig. 1752), for both in the *Genera Plantarum* and in the *Species Plantarum* the genus *Alsine* was placed in the *Pentandria Trigynia* and in the definition of the genus Linnaeus distinctly said "*Filamenta quinque*." In *A. media* plants with 5 stamens do sometimes occur, but in *A. segetalis* this number is tolerably constant.

It should be sufficiently clear, then, that Hiern, Britten & Rendle, Schinz & Thellung, and Briquet are correct in making *Alsine segetalis* the type of the genus, and that in not so doing the professed followers of the American Code are violating Canon 15 *b* of that code.

III. THE EARLIER NAMES FOR ALSINOPSIS.

Very recently Small has rechristened *Alsine* Wahlenb., not L., as *Alsinoopsis*,³ transferring to it many eastern American species, *Alsinoopsis groenlandica*, *A. glabra*, *A. stricta*, *A. caroliniana*, etc. but designating no type except "*Alsine* Wahl., not L.," and more recently others, content to follow Small without looking into the validity of his work or into the literature which he has so obviously ignored, have given us the new combinations *Alsinoopsis verna* (L.) Cockerell, based on *Arenaria verna* L., *Alsinoopsis propinqua* (Richardson) Rydberg, based on *Arenaria propinqua* Richardson, *Alsinoopsis sajanensis*

¹ Rouy & Foucaud, Fl. de France, iii. 301 (1896).

² Britton in Britton & Brown, Ill. Fl. ed. 2, ii. 42 (1913).

³ Small, Fl. S. E. U. S. 419, 1330 (1903).

(Willd.) Cockerell, based on *Arenaria sajanensis* Willd., *Alsinoopsis arctica* (Stev.) Heller, based on *Arenaria arctica* Stev., etc. etc.

Nevertheless, had they looked into the standard works of reference, without study of which no taxonomist should allow himself to publish, they would have found that the plants which made up the original *Alsine* Wahlenb.¹ and the species which are universally placed with them have already had more than a grocer's dozen of generic names most if not quite all of which are clear from duplication! The sounder European botanists reduce *Alsine* Wahlenb. to the Linnean *Minuartia* (1753), but if *Minuartia* is held to be distinct there are still plenty of names from which to select. *Leptophyllum* Ehrh. Beitr. iv. 147 (1789),² was based on *Arenaria tenuifolia* L. which is placed by Pax

¹ Wahlenb. Fl. Lap. 127 (1812).

² The International Rules of Botanical Nomenclature wisely state that "The mere indication of species as belonging to a new genus... does not allow us to accept the genus... as characterized and effectively published"; but the so-called "American" Code rules that a genus is published by "a reference to a specific description, which is associateable by citation with a previously published binomial species," the authors of the American Code regarding the retention by the International Congress of *nomina conservanda* as "in the highest degree arbitrary, as controverting a cardinal principle [priority of publication]" — Am. Code of Bot. Nom. in Bull. Torr. Bot. Cl. xxxiv. 167, 168 (1907). As an illustration of such publication of a genus the American Code states that: "*Dryopteris* Adans. Fam. Pl. 2: 20 (1763), is published with a reference to a specific description associateable by citation with the previously published *Polypodium Filix-mas* L. Sp. Pl. 1090 (1753), inasmuch as both Adanson and Linnaeus cite *Filix mas* of Fuchs." (Canon 10, Examples). However, when one turns to the page in Adanson stated in the American Code which was devised "To reach greater precision" (p. 167), he finds no mention, as is stated in the Code, of *Filix mas*; merely the following:

" <i>Dryopteris</i>	Id. [referring to the character- ization of <i>Filix</i>].	Id. [Enveloppe] enparasol.	Id."
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In other words, on page 20 there is no mention of *Filix mas*, and the only word of diagnosis "enparasol" describes the *pellate* indusium of *Polystichum*, not the reniform indusium of *Filix mas*. The American Code would have won more respect for its "precision" if it had stated the fact, that the only reference to *Filix mas* is on p. 551, in the index or "table," where it is placed not under "*Dryopteris*" but under "*Druopteris*."

But surely if *Dryopteris* satisfies the American Code as good publication of a genus, *Leptophyllum* Ehrh. Beitr. iv. 147 (1789) based, as stated, on *Arenaria tenuifolia* L., is admirably published. Some other generic names similarly published on the same or adjacent pages, which by the American Code, but not by the International Rules, should be taken up are

- PHAECEPHALUM Ehrh. l. c., 146 (1789), based on *Schoenus fuscus* L. = RYNCHOSPORA Vahl (1806).
- R/ HYDROPHILA Ehrh. l. c. (1789), based on *Tillaea aquatica* L., which was also the type of TILLAEASTRUM Britton (1903).
- TRICHOPHYLLUM Ehrh. l. c. 147 (1789), based on *Scirpus acicularis* L. = ELEOCHARIS R. Br. (1810).
- MONANTHUM Ehrh. l. c. 148 (1789), based on *Pyrola uniflora* L., which was the type of MONESES Salisb. (1821).
- HELICTONIA Ehrh. l. c. (1789), based on *Ophrys spiralis* L., which was also the type of IBIDIUM Salisb. (1812).
- AETOPTERON Ehrh. l. c. (1789), based on *Polypodium aculeatum* L. = POLYSTICHUM Roth (1799).

Is it possible that these are all of Ehrhart's names the neglect of which, by those whose code calls for priority of publication at all costs, is likely to seem "in the highest degree arbitrary"?

under the subgenus *Eualsine* and should therefore be a fairly typical member of the genus. *Somerauera* Hoppe, *Flora*, ii. 26 (1819) with the single species *S. quadrifaria* is identified by all modern European botanists as *Arenaria octandra*¹ or *Alsine octandra* (Sieb.) Kern. while *Siebera* of the same author, l. c. 24 (1819) with a single species *S. cherlerioides* is likewise considered inseparable from *Arenaria octandra*. *Sabulina* Reichenb. *Fl. Germ. Excurs.* 785 (1832) contained 25 species, the first one, *S. tenuifolia*, based upon the same *Arenaria tenuifolia* L. which was the sole type of Ehrhart's *Leptophyllum*. Some other species were *S. verna*, based upon *Arenaria verna* L., one of the original species in Wahlenberg's genus *Alsine* and the plant now renamed *Alsinopsis verna* (L.) Cockerell, *Am. Nat.* xl. 864 (1906); *S. laricifolia*, based on the Linnean *Arenaria laricifolia*, one of the species which later formed the basis of the genus *Wierzbickia* Reichenb. *l. c.* *Fl. Germ.* v. 30 (1841), and which now appears as *Alsinopsis laricifolia* (L.) Heller, *Muhlenbergia* viii. 96 (1912); *S. stricta*, based upon *Spergula stricta* Swartz, which was the first species of Wahlenberg's *Alsine*, the type of Small's genus *Alsinopsis*, and *S. biflora*, based upon *Stellaria biflora* L., which was the basis of *Alsine biflora* (L.) Wahlenb. *Fl. Lapp.* 128 (1812) and therefore one of the types of *Alsinopsis* Small, which afterward appeared as a type of the genus *Alsinanthe* Reichenb. *l. c.* *Fl. Germ.* v. 29 (1841) and which is identical with *Arenaria sajanensis* Willd., which has now taken on another alias, *Alsinopsis sajanensis* (Willd.) Cockerell, *Am. Nat.* xl. 864 (1906). Reichenbach had still more generic names for members of the genus *Alsine* Wahlenb., not L. For instance *Tryphane*, Reichenb. *l. c.* 28 (1841), which included *T. verna*, based on *Arenaria verna*, which had already been one of the original species of *Alsine* Wahlenb., and which, as above pointed out, has been rechristened *Alsinopsis verna* by Cockerell; or *Facchinia* Reichenb. *l. c.* 29 (1841), based on *Arenaria lanccolata* All., which is the *Alsine rupestris* (Scop.) Fenzl; or *Neumayera* Reichenb. *l. c.* 30 (1841) with the two species *N. austriaca* and *N. Villarsii*, which are *Ar. austriaca* Jacq. or *Alsine austriaca* (Jacq.) Wahlenb. *Fl. Lapp.* 129 (1812) and therefore belonging with *Alsinopsis* Small; and *Ar. Villarsii* Balbis or *Alsine Villarsii* (Balbis) Mert. & Koch.

As if Reichenbach had not already provided enough generic names for *Alsine* Wahlenb. not L., Gay in 1845 published the genus *Greniera*

¹ *ARENARIA octandra* (Sieb.), n. comb. *Cherleria octandra* Sieb. *Fl. Austr. Exs.* n. 149 (1813)
Alsine octandra (Sieb.) Kern. *Sched. Flor. Exs. Austro-Hung.* ii. n. 564 (1882).

J. Gay, Ann. Sci. Nat. sér. 3, iv. 27 (1845) with the two American species, *G. Douglasii* and *G. tenella* based on *Alsine Douglasii* Fenzl and *Arenaria tenella* Nutt.; but, disregarding the name *Greniera*, which had never been published for a genus prior to Gay's use of it, Heller enriches the synonymy with the names *Alsinopsis Douglasii* (Fenzl) Heller, Muhlenbergia, viii. 20 (1912) and *Alsinopsis tenella* (Nutt.) Heller, l. c. 96 (1912). There are still other names which might be discussed, *Xeralsine* Fourr., etc.; but it is sufficiently clear that even if we keep *Alsine* Wahl. distinct from *Arenaria*, there are plenty of well published names for it which antedate by many decades *Alsinopsis* Small; and, furthermore, the three species which were formally described by Wahlenberg under his *Alsine*, the basis of *Alsinopsis*, are members of the following so-called genera:

ALSINE STRICTA (Swartz) Wahlenb. belongs to ALSINELLA Swartz (1814), a name antedated by *Alsinella* Moench (1794); to SABULINA Reichenb. (1832), a name which had not been previously used for a genus; and to ALSINANTHE Reichenb. (1841), again a perfectly valid generic name.

ALSINE BIFLORA (L.) Wahlenb. belongs likewise to ALSINELLA Swartz (1814); to SABULINA Reichenbach (1832); and to ALSINANTHE Reichenb. (1841).

ALSINE RUBELLA Wahlenb. belongs likewise to ALSINELLA (1814) and to SABULINA (1832); while *A. verna*, to which *A. rubella* is so closely related as often to be considered conspecific, was one of the original species of TRYPHANE Reichenb. (1841), again a name which had not been previously used.

There is, then, no possible need for the generic name *Alsinopsis* Small.

IV. THE AMERICAN REPRESENTATIVES OF ARENARIA SAJANENSIS.

The plants which were included by Robinson in the *Synoptical Flora* under *Arenaria sajanensis* Willd. prove, when better understood, to be four quite definite species, which may be distinguished by the following characters:

The few short filiform herbaceous or subherbaceous basal shoots bearing obscurely keeled leaves: petals 0.5-1 mm. wide, shorter than to barely exceeding the glabrous or puberulent sepals: anthers 0.2-0.3 mm. long: capsule 4-6 mm. long, with membranaceous pale valves: seeds smooth, reniform-orbicular, not obviously beaked, 0.6-0.8 mm. in diameter.

A. sajanensis.

The crowded trailing freely forking subliguous branches densely clothed with highly marcescent thick-ribbed leaves: petals 1.5–2.5 mm. broad, conspicuously exceeding the pilose or hirsute sepals: anthers 0.5–1 mm. long: capsule 6–10 mm. long, with firm stramineous valves: seeds reniform-obovate, with the micropyle prolonged into a beak, 0.7–1.2 mm. long.

Leaves round-tipped.

Leaves oblong, ciliate, pale-green, 1–5 mm. long, about 1 mm. broad, very densely imbricated: calyx glandular: seed rugose or papillose. *A. obtusiloba*.

Leaves linear, glabrous-margined, deep green, 4–8 mm. long, 0.3–0.5 mm. broad, loosely imbricated: calyx not glandular: seed smooth or obscurely pebbled. *A. marcescens*.

Leaves sharp at apex. *A. laricifolia*.

A. SAJANENSIS Willd. in Schlecht. Berl. Gesell. Nat. Fr. Mag. vii. 200 (1816); Seringe in DC. Prodr. i. 408 (1824). *Stellaria biflora* L. Sp. Pl. 422 (1753), not *Arenaria biflora* L. Mant. 71 (1767). *Cerastium biflorum* (L.) Crantz, Inst. ii. 402 (1766). *Alsine biflora* (L.) Wahlenb. Fl. Lapp. 128 (1812). *Alsine biflora* (L.) Swartz, Summ. Veg. Scand. 17 (1814). *Ar. occulta* Fisch. ex Seringe in DC. Prodr., i. 408 (1824). *Ar. polygonoides*, β *occulta* Ser. in DC. l. c. (1824). *Ar. scandinavica* Spreng. Syst. ii. 402 (1825). *Sabulina biflora* (L.) Reichenb. Fl. Germ. Excurs. 790 (1832). *Ar. stenopetala* Turcz. Bull. Soc. Nat. Mosc. (1838) 89. *Ar. alpina* Porter & Coult. Syn. Fl. Colo. 14 (1874), chiefly. *Ar. biflora* Watson, Bibl. Ind. 94 (1878), not L. *Alsinanthe biflora* (L.) Reichenb. Ic. Fl. Germ. v. 30. t. 209 fig. 4939 (1842). *Ar. sphagnoides* Thomas ex Koch, Syn. Fl. Germ. ed. 2, 123 (1843). *Alsinopsis sajanensis* (Willd.) Cockerell, Am. Nat. xl. 864 (1906).—Arctic regions, south with us to the Torngat Mts., Labrador, the Shickshock Mts., Gaspé Co., Quebec, and alpine regions of Arizona and Oregon. The following specimens belong here. GREENLAND: Baals River, *J. Fahl*; Pilekrat ved S. Kangerdluarsuk Fjord, Holsteinsborg Distr., August 5, 1884, *Warming & Holm*. HUDSON STRAITS: Nottingham Island, August 24, 1884, *R. Bell*. LABRADOR: Rama, July 15–August 30, 1894, *July-August, 1899, A. Stecker*, nos. 208, 355, August 20–24, 1897, *J. D. Sornborger*, no. 286 (distributed as *A. verna*, var. *hirta*); Kangalaksiorvik Bay, September 1–10, 1908, *Owen Bryant*; Hebron, *Mentzel*; Okkak, *Fratres Morar*. QUEBEC: Mt. Albert, Gaspé Co., July 25–27, 1881, *J. A. Allen*; crevices and detritus of serpentine, barrens and brook-ravines, alt. 700–1050 m., Mt. Albert, August 8–15, 1905, *Fernald & Collins*, no. 77; July 25, 1906, *Fernald & Collins*, no. 550. ALBERTA: meadows above Banff, July 8, 1907, *Butlers & Holway*, no. 91; Elbow River, June, July, 1897, *J. Macoun*, no. 18, 286; Silver City, August 6, 1885, *J. Macoun* (distributed as *A. arctica*); Mt. Molar, alt. 1980 m., July 9, 1904, *J. Macoun*, no. 64, 688; Lake Louise, alt. 2200 m., July 20, 1904, *J. Macoun*, no. 64, 687; Pipestone Creek, alt. 1980 m., July 7, 1904, *J. Macoun*, no. 64, 689; summit of Otterhead Pass, alt. 2135 m., August 10, 1904, *J. Macoun*,

no. 64,690. MONTANA: Upper Marias Pass, alt. 2440 m., August 4, 1883, *W. M. Canby*, no. 44; Old Hollowtop, near Pony, alt. 2745 m., July 7, 1897, *Rydberg & Bessey*, no. 4041. WYOMING: Teton Mts., August 21, 1894, *Aven Nelson*, no. 1009. COLORADO: Gray's Peak, alt. 3965 m., August 15, 1885, *Letterman*; high mountains, Gray's Peak and vicinity, alt. 3350-4270 m., 1885, *Patterson*; Twin Lakes, 1875, *Brandegee*; South Park, *Wolf & Rothrock*, nos. 343, 344; Mt. Ouray, alt. 3660 m., August 20, 1901, *C. F. Baker*, no. 841. UTAH: Uinta Mts., alt. 3350 m., August, 1869, *Watson*, no. 173. ARIZONA: summit of Mt. Agassiz, August, 1884, *Lemmon*, no. 3289. OREGON: cliffs of Wallowa Mts., alt. 2745 m., July 31, 1899, *Cusick*, no. 2301a. WASHINGTON: Cascade Mts. near Mt. Baker, July 16, 1898, *J. B. Flett*, no. 860; Engel Creek near Mt. Stewart, 1883, *Brandegee*, no. 672. BRITISH COLUMBIA: mountain summits, alt. 2290 m., Kicking Horse Lake, July, 1885, *J. Macoun*; summits of Selkirk Mts., alt. 1675-2440 m., August 2-4, 1890, *J. Macoun*, nos. 13, 16; summit of Rocky Mts., alt. 2135 m., August 18, 1890, *J. Macoun*, no. 15; small peak above timber line, alt. 2285 m., Selkirk Mts., July 26, 1905, *C. H. Shaw*, no. 1037; summit of Mt. Arrowsmith, Vancouver I., July 16, 1887, *J. Macoun*.

A. obtusiloba (Rydberg), n. comb. *A. obtusa* Torr. Ann. Lyc. N. Y. ii. 170 (1826) not All. Fl. Pedem. ii. 114 (1785). *A. arctica* γ Torr. & Gray, Fl. i. 181 (1838). *A. biflora*, var. *obtusiloba* (Torr.) Watson, Bibl. Ind. 94 (1878). *Alsinopsis obtusiloba* Rydberg, Bull. Torr. Bot. Cl. xxxiii. 140 (1906), as to first citation, *Ar. obtusa* Torr., but only in small part as to other citations (see discussion below).— Alberta to New Mexico. The following belong here. ALBERTA: Sheep Mt., Waterton Lake, July 28-31, 1895, *J. Macoun*, no. 10,094. MONTANA: Bridger Mts., August 21, 1902, *W. W. Jones*; Spanish Peaks, 1901, *J. Vogel*; Old Hollowtop, near Pony, alt. 2440 m., July 7, 1897, *Rydberg & Bessey*, no. 4039. WYOMING: stony sub-alpine parks, Brooklyn Lake, Albany Co., August, 1909, *Aven Nelson*, no. 9235; open hillsides, Telephone Mines, Albany Co., August 3, 1900, *Aven Nelson*, no. 7951; Little Bald Mt., Bighorn Mts., July 13, 1900, *J. G. Jack*. COLORADO: high mountains, Gray's Peak and vicinity, alt. 3350-4270 m., July and August, 1885, *H. N. Patterson*, no. 11; alpine, Pikes Peak, August 27, 1895, *Canby*; alpine ridges east of Middle Park, 1861, *Parry*, no. 141; barren rocky places above the limit of trees on James Peak, August 18, 1870, *E. L. Greene*; Sierra Blanca, 1877, *Hooker & Gray*; South Park, 1873, *Wolf & Rothrock*, no. 364; among rocks at 3660 m., mountain northwest of Como, July 31, 1895, *Crandall & Cowen*, no. 82; Mt. Garfield, alt. 3800 m., July 25, 1901, *F. E. & E. S. Clements*, no. 496; near Pagosa Peak, alt. 3500 m., August, 1899, *C. F. Baker*, no. 310 (distributed as *A. verna*). UTAH: moist soil, alt. 3810 m., La Sal Mts., Grand Co., July 15, 1912, *E. P. Walker*, no. 279. NEW MEXICO, northern New Mexico, 1867, *Parry*, no. 17.

According to *Index Kewensis*, *Arenaria alpina* Porter & Coulter, Syn. Fl. Colo. 14 (1874) is *A. obtusa* Torr., but it is in every way inadvisable to take up the name. Porter & Coulter obviously supposed they were listing a Linnean species, although Linnaeus had no *A. alpina*. They cite *Alsine biflora* Wahl, as a synonym, i. e. *Arenaria sajanensis* Willd; their description of the leaves as "narrowly linear, 3''-3½'' long" belongs clearly to *A. sajanensis*, not *A. obtusa* Torr. and their citation, *Hall & Harbour* 77 is inconclusive, since no. 77, at least in the Gray Herbarium, is a mixed number, consisting mostly of *A. sajanensis*.

The name *Alsiniopsis obtusiloba* Rydberg is not much clearer in its application, although it may be fairly inferred that Rydberg was changing the name of *Arenaria obtusa* Torr. on account of Allioni's earlier species of that name. But the other citations given by Rydberg are not helpful: *Ar. biflora* Wats. was based definitely on *Alsine biflora* Wahl. and is, therefore, *Ar. sajanensis* Willd; while "*Arenaria sajanensis* Robinson, Proc. Am. Acad. 29: 304. 1894. Not *A. sajanensis* Willd. 1816" was largely *A. sajanensis* Willd, but with all the species here discussed, *A. obtusiloba*, *A. marcescens* and *A. laricifolia?* confused with it. Only through inferring, then, that Rydberg's *Alsiniopsis obtusiloba* was intended as a renaming of *Ar. obtusa* Torr. does Rydberg's name become definite.

A. marcescens, n. sp., dense caespitans, caudiculis epigaeis lignescentibus ramosissimis 0.5-2.5 dm. longis, foliorum remnantibus marcescentibus rigidis imbricato-tunicatis; foliis coriaceis viridibus glaberrimis lineari-setaceis obtusis 4-8 mm. longis 0.3-0.5 mm. latis, nervo crasso; cauliculis adscendentibus 2-5 cm. altis 1-floris glanduloso-pilosis remote bracteatis, bracteis 2-4-jugis lanceolato-subulatis; pedunculo 0.6-1.5 cm. longo; calycibus purpurascensibus vel fuscis turbinate-campanulatis 3.8-5 mm. longis basi plus minusve pilosis, sepalis oblongis vel oblongo-lanceolatis obtusis valde carinatis plerumque nerviis lateralibus; petalis spathulatis vel spathulato-obovatis albis vel lilacinis basi luteis 6-8 mm. longis 2-2.5 mm. latis; antheris albidis 0.5-1 mm. longis; capsula subcylindrica 0.6-1 cm. longa; valvis coriaceis stramineis lineari-oblongis apice emarginatis; seminibus olivaceis vel brunneis reniformi-obovatis, laevissimis 0.8-1.2 mm. longis apice radiculari rostellata.

Densely caespitose, with the trailing and freely forking lignescent branches 0.5-2.5 dm. long and closely covered with the rigid marcescent remnants of the leaves: leaves coriaceous, bright green, strictly glabrous, linear-setaceous, obtuse, 4-8 mm. long, 0.3-0.5 mm. wide, with a thick midrib: flowering stems ascending, 2-5 cm. high,

no. 64,690. MONTANA: Upper Marias Pass, alt. 2440 m., August 4, 1883, *W. M. Canby*, no. 44; Old Hollowtop, near Pony, alt. 2745 m., July 7, 1897, *Rydberg & Bessey*, no. 4041. WYOMING: Teton Mts., August 21, 1894, *Aven Nelson*, no. 1009. COLORADO: Gray's Peak, alt. 3965 m., August 15, 1885, *Letterman*; high mountains, Gray's Peak and vicinity, alt. 3350-4270 m., 1885, *Patterson*; Twin Lakes, 1875, *Brandegee*; South Park, *Wolf & Rothrock*, nos. 343, 344; Mt. Ouray, alt. 3660 m., August 20, 1901, *C. F. Baker*, no. 841. UTAH: Uinta Mts., alt. 3350 m., August, 1869, *Watson*, no. 173. ARIZONA: summit of Mt. Agassiz, August, 1884, *Lemmon*, no. 3289. OREGON: cliffs of Wallowa Mts., alt. 2745 m., July 31, 1899, *Cusick*, no. 2301a. WASHINGTON: Cascade Mts. near Mt. Baker, July 16, 1898, *J. B. Flett*, no. 860; Engel Creek near Mt. Stewart, 1883, *Brandegee*, no. 672. BRITISH COLUMBIA: mountain summits, alt. 2290 m., Kicking Horse Lake, July, 1885, *J. Macoun*; summits of Selkirk Mts., alt. 1675-2440 m., August 2-4, 1890, *J. Macoun*, nos. 13, 16; summit of Rocky Mts., alt. 2135 m., August 18, 1890, *J. Macoun*, no. 15; small peak above timber line, alt. 2285 m., Selkirk Mts., July 26, 1905, *C. H. Shaw*, no. 1037; summit of Mt. Arrowsmith, Vancouver I., July 16, 1887, *J. Macoun*.

A. obtusiloba (Rydberg), n. comb. *A. obtusa* Torr. Ann. Lyc. N. Y. ii. 170 (1826) not All. Fl. Pedem. ii. 114 (1785). *A. arctica* γ Torr. & Gray, Fl. i. 181 (1838). *A. biflora*, var. *obtusiloba* (Torr.) Watson, Bibl. Ind. 94 (1878). *Alsinosopsis obtusiloba* Rydberg, Bull. Torr. Bot. Cl. xxxiii. 140 (1906), as to first citation, *Ar. obtusa* Torr., but only in small part as to other citations (see discussion below).— Alberta to New Mexico. The following belong here. ALBERTA: Sheep Mt., Waterton Lake, July 28-31, 1895, *J. Macoun*, no. 10,094. MONTANA: Bridger Mts., August 21, 1902, *W. W. Jones*; Spanish Peaks, 1901, *J. Vogel*; Old Hollowtop, near Pony, alt. 2440 m., July 7, 1897, *Rydberg & Bessey*, no. 4039. WYOMING: stony sub-alpine parks, Brooklyn Lake, Albany Co., August, 1909, *Aven Nelson*, no. 9235; open hillsides, Telephone Mines, Albany Co., August 3, 1900, *Aven Nelson*, no. 7951; Little Bald Mt., Bighorn Mts., July 13, 1900, *J. G. Jack*. COLORADO: high mountains, Gray's Peak and vicinity, alt. 3350-4270 m., July and August, 1885, *H. N. Patterson*, no. 11; alpine, Pikes Peak, August 27, 1895, *Canby*; alpine ridges east of Middle Park, 1861, *Parry*, no. 141; barren rocky places above the limit of trees on James Peak, August 18, 1870, *E. L. Greene*; Sierra Blanca, 1877, *Hooker & Gray*; South Park, 1873, *Wolf & Rothrock*, no. 364; among rocks at 3660 m., mountain northwest of Como, July 31, 1895, *Crandall & Cowen*, no. 82; Mt. Garfield, alt. 3800 m., July 25, 1901, *F. E. & E. S. Clements*, no. 496; near Pagosa Peak, alt. 3500 m., August, 1899, *C. F. Baker*, no. 310 (distributed as *A. verna*). UTAH: moist soil, alt. 3810 m., La Sal Mts., Grand Co., July 15, 1912, *E. P. Walker*, no. 279. NEW MEXICO, northern New Mexico, 1867, *Parry*, no. 17.

According to *Index Kewensis*, *Arenaria alpina* Porter & Coulter, Syn. Fl. Colo. 14 (1874) is *A. obtusa* Torr., but it is in every way inadvisable to take up the name. Porter & Coulter obviously supposed they were listing a Linnean species, although Linnaeus had no *A. alpina*. They cite *Alsine biflora* Wahl, as a synonym, i. e. *Arenaria sajanensis* Willd; their description of the leaves as "narrowly linear, 3''-3½'' long" belongs clearly to *A. sajanensis*, not *A. obtusa* Torr. and their citation, *Hall & Harbour* 77 is inconclusive, since no. 77, at least in the Gray Herbarium, is a mixed number, consisting mostly of *A. sajanensis*.

The name *Alsiniopsis obtusiloba* Rydberg is not much clearer in its application, although it may be fairly inferred that Rydberg was changing the name of *Arenaria obtusa* Torr. on account of Allioni's earlier species of that name. But the other citations given by Rydberg are not helpful: *Ar. biflora* Wats. was based definitely on *Alsine biflora* Wahl. and is, therefore, *Ar. sajanensis* Willd; while "*Arenaria sajanensis* Robinson, Proc. Am. Acad. 29: 304. 1894. Not *A. sajanensis* Willd. 1816" was largely *A. sajanensis* Willd, but with all the species here discussed, *A. obtusiloba*, *A. marcescens* and *A. laricifolia?* confused with it. Only through inferring, then, that Rydberg's *Alsiniopsis obtusiloba* was intended as a renaming of *Ar. obtusa* Torr. does Rydberg's name become definite.

A. marcescens, n. sp., dense caespitans, caudiculis epigaeis lignescentibus ramosissimis 0.5-2.5 dm. longis, foliorum remnantibus marcescentibus rigidis imbricato-tunicatis; foliis coriaceis viridibus glaberrimis lineari-setaceis obtusis 4-8 mm. longis 0.3-0.5 mm. latis, nervo crasso; cauliculis adscendentibus 2-5 cm. altis 1-floris glanduloso-pilosis remote bracteatis, bracteis 2-4-jugis lanceolato-subulatis; pedunculo 0.6-1.5 cm. longo; calycibus purpurascensibus vel fuscis turbinate-campanulatis 3.8-5 mm. longis basi plus minusve pilosis, sepalis oblongis vel oblongo-lanceolatis obtusis valde carinatis plerumque nerviis lateralibus; petalis spathulatis vel spathulato-obovatis albis vel lilacinis basi luteis 6-8 mm. longis 2-2.5 mm. latis; antheris albidis 0.5-1 mm. longis; capsula subcylindrica 0.6-1 cm. longa; valvis coriaceis stramineis lineari-oblongis apice emarginatis; seminibus olivaceis vel brunneis reniformi-obovatis, laevissimis 0.8-1.2 mm. longis apice radiculari rostellata.

Densely caespitose, with the trailing and freely forking lignescent branches 0.5-2.5 dm. long and closely covered with the rigid marcescent remnants of the leaves: leaves coriaceous, bright green, strictly glabrous, linear-setaceous, obtuse, 4-8 mm. long, 0.3-0.5 mm. wide, with a thick midrib: flowering stems ascending, 2-5 cm. high,

1-flowered, glandular-pilose, remotely bracted, with 2-4 pairs of short lance-subulate bracts: peduncle 0.6-1.5 cm. long: calyces purplish or fuscous, turbinate-campanulate, 3.8-5 mm. long, more or less pilose at base; the oblong or oblong-lanceolate obtuse sepals strongly keeled and usually with 2 lateral nerves: petals spatulate or spatulate-obovate, white or lilac, yellow at base, 6-8 mm. long, 2-2.5 mm. wide: anthers whitish, 0.5-1 mm. long: capsule subcylindric, 0.6-1 cm. long; its coriaceous stramineous linear-oblong valves emarginate; seeds olive or brown, very smooth, reniform-obovate, 0.9-1.2 mm. long, with the tip of the radicle prolonged into a beak.—Serpentine and magnesian limestone ledges and gravel, western Newfoundland and Gaspé Co., Quebec. NEWFOUNDLAND: serpentine tablelands, altitude about 380 m., Bonne Bay, August 27, 1910, *Fernald, Wiegand & Kittredge*, no. 3366; serpentine and magnesian limestone barrens, northeastern bases and slopes of Blomidon ("Blow-me-down") Mts., July 24, 1910, *Fernald, Wiegand & Kittredge*, no. 3365 (TYPE in Gray Herb.), August 21, 1910, *Fernald & Wiegand*, no. 3365a (ripe seeds of no. 3365); Blomidon Range, July 3-5, 1911, *C. C. Stewart*, no. 13; sandy plains, Serpentine (or Coal) River, July 16, 1896, *Waghorne* no. 6 (distributed as *A. verna*). QUEBEC: Mt. Albert, Gaspé Co., July 31, 1881, *J. A. Allen*, no. 4 (distributed as *A. groenlandica* or *A. arctica*); Shickshock Mts. (presumably Mt. Albert), 1882, *J. Macoun*; crevices and detritus of serpentine, barrens and brook-ravines, alt. 900-1058 m., Mt. Albert, August 8, 1905, *Fernald & Collins*, no. 78, July 23, 1906, *Fernald & Collins*, nos. 551, 552.

The *Fernald & Collins* and *Fernald & Wiegand* material has been distributed as *A. arctica* Stev.; but *A. arctica* has broader leaves, glandular calyx and very large broadly obovate petals.

?*A. LARICIFOLIA* L. Sp. Pl. i. 424 (1753). *Ar. striata* L. Amoen. Acad. iv. 315 (1756) in part, not All. *Alsine laricifolia* (L.) Crantz, Inst. ii. 407 (1766). *Stellaria laricifolia* (L.) Scop. Fl. Carn. ed. 2, i. 317 (1772). *Sabulina striata* (L.) Reichenb. Fl. Germ. Excurs. 789 (1832). *Alsine striata* (L.) Gren. Mem. Soc. Doubs (1841) 33, t. 1, fig. 1. *Wierzbickia striata* (L.) Reichenb. Ic. Fl. Germ. v. 30, t. 211, fig. 4932 (1842). *Alsinopsis laricifolia* (L.) Heller, *Muhlenbergia*, viii. 96 (1912).—The plant which is passing in America as *Arenaria laricifolia* is more western and northern than *A. obtusiloba*, occurring from Yukon and Alaska to northwestern Wyoming, Nevada and Oregon. There is doubt as to just what Linnaeus had as *Ar. laricifolia* and a further doubt as to whether our American plant is identical with the European. The material seen by the writer is all fragmentary and until it is better known may pass as *A. laricifolia*. It is highly important to secure abundant flowering and fruiting specimens for critical study. The following specimens are tentatively referred here. YUKON: Yukon River, August 15, 1887, *Dawson*;

Bonanza Creek, Dawson, June 12, 1914, *Eastwood*, no. 204; Dawson Slide, Dawson, June 12, 1914, *Eastwood*, no. 207. MONTANA: Bald Mt., alt. 3050 m., July 22, 1880, *S. Watson*, no. 54; plains near Cutbank Creek, August 5, 1883, *Canby*, no. 45. WYOMING: high mountains, Yellowstone Park, August 13, 1893, *J. N. Rose*, no. 483. NEVADA: East Humboldt Mts., alt. 3050 m., August, 1868, *Watson*, no. 173. OREGON: on cliffs at 2440 m., Eagle Creek Mts., 1881, *Cusick*, no. 969. WASHINGTON: rocky ridges near snow, at 2440 or 2740 m., Mt. Paddo, September 15, 1883, *Suksdorf*, no. 175.

V. THE SPECIFIC IDENTITY OF *ARENARIA GROENLANDICA* AND *A. GLABRA*.

It has been customary to treat the boreal *Arenaria groenlandica* (Retz.) Spreng. and the more southern *A. glabra* Michx. as distinct species, the former extending from Greenland to the higher granitic mountains of New England and New York and locally southward along the Alleghenies to the mountains of North Carolina, the latter confined to the mountains of North Carolina, Tennessee and Georgia. The characters as stated by those who maintain the two as species are as follows:¹

A. GROENLANDICA. Stems 2-8 in. long, 1-5-flowered (*Robinson*); 3-20 cm. tall, sparingly forked (*Small*); leaves linear, $1\frac{1}{2}$ -7 lines long, the basal in a dense cluster (*Robinson*); leaf-blades filiform to subulate, 0.3-1.5 cm. long, the basal in a dense cluster (*Small*); pedicels 0.5-1.5 cm. long (*Small*); sepals broadly ovate, $1\frac{1}{2}$ -2 lines long (*Robinson*); sepals oblong or oblong-lanceolate, 3-4 mm. long (*Small*); petals obovate (*Robinson*, *Small*); capsule subglobose to oblong (*Robinson*); capsule ovoid, or rarely subglobose or nearly oblong, 5-6 mm. long (*Small*).

A. GLABRA. Stems 6-12 in. high (*Robinson*); stems 0.5-3 dm. tall, often bushy (*Small*); leaves narrowly linear, equaling or exceeding the internodes (*Robinson*); leaf-blades narrowly linear or nearly filiform, 1-2.5 cm. long (*Small*); pedicels elongated (*Robinson*); pedicels 1-4 cm. long (*Small*); sepals ovate-oblong, $1\frac{1}{2}$ lines long (*Robinson*); sepals oblong or ovate-oblong, 2.5-3 mm. long (*Small*); petals spatulate (*Small*); capsule ovoid (*Robinson*); capsule ovoid, 3 mm. long (*Small*).

That the specific lines between the two are not satisfactory has long been evident from the fact that plants referred by one author to *A.*

¹ These characters are taken from the treatments by Robinson in Gray, *Synop. Fl. i.* 243 (1897) and by Small, *Fl. S. E. U. S.* ed. 2, 420 (1913).

glabra have been referred by others to *A. groenlandica*; and examination of herbarium-material shows at once that the characters depended upon are far from constant. Thus material of most typical *A. groenlandica* from Greenland and Labrador and the highest New England mountains shows sepals varying from 3-5 mm. in length, while plants of good *A. glabra* from the South (for example, *Biltmore Herb.* no. 664 from North Carolina; *Curtiss*, no. 304 from Nashville, Tennessee; and sheets from Lookout Mountain, near the line between Tennessee and Georgia), with pedicels up to 4.5 cm. long and with cauline leaves up to 3 cm. long, have sepals 3-5 mm. long, i. e. with the same variation in length as those of *A. groenlandica*. Similarly with the capsules: the material from Lookout Mountain, with long leaves and pedicels, has capsules up to 5.5 cm. long, while fully ripe material from Table-Top Mt., Gaspé, has the capsules less than 4 mm. long. The stems of the boreal plant may be as freely forking as the austral, having 1-30 flowers, while characteristic southern plants with long leaves and pedicels may have the stems subsimple or with only few flowers. The Lookout Mt. material collected by Judge Churchill has the petals as long and as broad as much of the northern material; and the seeds of the northern and southern specimens are quite alike.

Nevertheless in spite of the absence of good specific characters in the seeds (which usually display the best of specific differences in *Arenaria*), in the capsules, petals and sepals, there is a "look" about the two extremes which indicates that they are not strictly identical. The boreal *A. groenlandica* is more tufted and lower, usually with more developed basal leafy shoots; its cauline leaves are shorter; its pedicels become less elongate, and its petals are inclined to be longer. This typical *A. groenlandica* is confined in New England and New York to the very highest mountains, descending along brooks in the White Mountains only to 885 m. and occurring on the summit of Mt. Monadnock, New Hampshire, above 915 m.; in Vermont it is only on the summits of Mansfield and Camel's Hump; in New York only on the summit of Whiteface.

On the siliceous or granitic rocks of the Kittatinny Mts. in New Jersey, the Shawangunk and Catskill Mts. in New York, and exposed granitic ledges of Connecticut and southwestern Rhode Island occurs a plant which has always been referred to *A. groenlandica*. The writer had never had a field-acquaintance with this plant of southern

New England, southern New York and northern New Jersey, until the past June, when at the invitation of Mrs. Orra Parker Phelps, he visited with her an extensive area in Charlestown, Rhode Island, where she had found the *Arenaria* abundant in the dry *Cladonia* carpet on exposed granite ledges. At Charlestown the plant was passing out of flower and with much mature fruit. It had taller, more forking and more brittle stems than in the familiar alpine *A. groenlandica*, no tufted basal foliage, but the flowers and fruits were quite like those of *A. groenlandica*. The habitats at Charlestown, either exposed sunny ledges in the pastures where the plant mingled with *Krigia virginica*, *Hypericum gentianoides*, *Juncus secundus*, and other Carolinian plants, or crevices of ledges in the dry oak woods, were so far from boreal stations that it seemed highly improbable that this Rhode Island plant could be identical with the arctic-alpine *A. groenlandica*. Abundant material was collected and it proves to be identical with the plant from Middletown and North Guilford, Connecticut, and the specimens from the Catskills which have always passed as *A. groenlandica* and it is probable that the plants from the Shawangunk and Kittatinny Mts. (as well as from the mountains of Pennsylvania), which the writer has not seen, are the same; and in no point does this material from southern New England and southern New York differ from true *A. glabra* from North Carolina and Tennessee.

Furthermore, perfectly typical *A. glabra* occurs northward into New Hampshire and Maine; in New Hampshire found on the lower granite mountains with *Paronychia argyrocoma*, var. *albimontana* and other plants of austral affinity or occasionally on ledges in oak woods. It is on Welch Mt., a dry warm granitic mass south of the Franconia Range, and when Professor A. S. Pease found it in oak woods of Carroll Co., he was so impressed with the fact that this was not the proper habitat for *A. groenlandica* that he specially commented on "*A. groenlandica* (Retz.) Spreng., which is not uncommon on the mountains of the Montalban Range, but which is perhaps seldom found in so incongruous a situation as here, growing under the shade of red oak trees!"¹ In Maine *A. glabra* is found on the lesser granitic mountains (Streaked Mt., Oxford Co., Alamoosook, Hancock Co., Peaked Mt., Penobscot Co., etc.), and on ledges near the mouth of

¹ Pease, RHODORA, xvii, 233 (1915).

the Kennebec. Eastward, on Mt. Desert Island as well as at Halifax, Nova Scotia, the plant in stature and habit is perplexingly transitional to the boreal *A. groenlandica*, being usually more tufted and lower than in *A. glabra* but with the very bushy habit of the latter and with pedicels intermediate in length, and petals shorter than in most arctic-alpine plants. Similarly, on some of the secondary mountains of Maine and New Hampshire (White Cap, Rumford, Maine, Mt. Hope, Coös Co., New Hampshire, etc.) the plant is so transitional between the arctic-alpine and the Alleghenian plant that specimens might pass for either; while the plant from the summit of Roan Mt., North Carolina, has the habit of *A. groenlandica* but the longer leaves and slightly shorter petals of *A. glabra*.

In brief, there seem to be no absolute lines by which *A. groenlandica* and *A. glabra* can be distinguished, although the plants of arctic-alpine and those of Alleghenian range have certain tendencies of habit and foliage which in extreme colonies are well marked, though in transitional areas these tendencies break down. At best, then, *A. glabra* is a geographic variety of *A. groenlandica*. The characters and ranges of the two varieties are stated below.

A. GROENLANDICA (Retz.) Spreng. Syst. ii. 402 (1825). *Stellaria groenlandica* Retz. Fl. Scand. ed. 2, 107 (1795). *Alsine groenlandica* Gray, Man. ed. 2, 58 (1856). *Alsinopsis groenlandica* Small, Fl. S. E. U. S. 420, 1330 (1903).—Tufted, forming dense mats of short leafy basal shoots 1-13 cm. broad: stems few to very numerous, filiform, depressed, decumbent or suberect, simple to freely forking 2-10 (rarely -15) cm. high, 1-30-flowered: leaves linear, obtuse, soft, often flaccid, or the basal narrowly oblanceolate; the basal 3-15 mm. long; the uppermost cauline (below the first forking) 2-9 mm. long: pedicels erect or spreading becoming 0.6-2.3 cm. long: calyx 3-5 mm. long, campanulate; the ascending essentially nerveless oblong to oval scarious-margined sepals obtuse: petals broadly to narrowly obovate, usually retuse, white, 6-10 mm. long (sometimes smaller or wanting): capsule globose-ovoid to slender-conical, slightly exserted: seeds reddish-brown, 0.7-0.8 mm. long.—Greenland and Labrador, south to Table-top Mt., Gaspé Co., Quebec, the higher mountains of Maine, New Hampshire, Vermont and New York, and in uncharacteristic form to the coast of southern Nova Scotia and eastern Maine.

Var. *glabra* (Michx.), n. comb. *A. glabra* Michx. Fl. Bor.-Am. i. 274 (1803). *Alsine glabra* Gray, Man. ed. 2, 58 (1856). *Alsinopsis glabra* Small, Fl. S. E. U. S. 420, 1330 (1903).—Similar: less tufted, usually with few if any short leafy basal shoots: stems solitary-few,

erect or strongly ascending, simple to freely forking, 0.7–2.7 dm. high, 1–50-flowered; the uppermost cauline leaves (below the first forking) 0.8–3 cm. long: pedicels becoming 1.2–4.5 cm. long: calyx 3–5 mm. long: petals 4–8 mm. long.—Mountains of Georgia, Tennessee and North Carolina, locally north on exposed siliceous rocks to the Catskill Mts., New York, central Connecticut, southwestern Rhode Island, central New Hampshire, and central Maine.

VI. AMERICAN VARIATIONS OF *ARENARIA VERNA*.

In 1906¹ it was felt by the present writer that the variations of *Arenaria verna* with petals shorter than or barely equaling the calyx could be separated as three varieties: var. *propinqua* (Richardson) Fernald, a glandular-pubescent plant with the rather tall flowering branches (up to 1.5 dm.) 2–5-flowered, and with the fruiting calyx 2.5–3.5 mm. long; var. *hirta* (Wormskj.) Watson, similar but with fruiting calyx 4–5 mm. long; and var. *rubella* (Wahlenb.) Watson, glabrous or nearly so, with branches 1 (rarely 2)-flowered and with calyx 3–4 mm. long. Since that time the writer has collected the plants extensively in Labrador, Newfoundland and Quebec and material from other regions has been sent him for study. As a result of reconsidering his former attitude it may now be stated that these variations are so freely confluent as to be practically unrecognizable.² They should be merged as one North American variety which is also in boreal Eurasia, and the earliest varietal designation seems to have been that of Chamisso & Schlechtendal, in 1826, when they distinguished *Arenaria hirta* *a. glabra* (the same as *A. verna*, var. *propinqua*, forma *epilis* Fernald) and *β. pubescens* (which covers vars. *hirta* and *propinqua* of later authors). This variety should, then, be known as

ARENARIA VERNA L., var. *pubescens* (Cham. & Schl.), n. comb.
Ar. Gieseckii Hornem. Fl. Dan. ix. t. 1518 (1816). *Ar. hirta* Wormskj. Fl. Dan. x. t. 1646 (1819) excl. syn. *Ar. propinqua* Richardson in Frankl. Journ. 738 — reprint 10 (1823). *Ar. hirta β. pubescens* Cham. & Schlecht. Linnaea i. 56 (1826). *Alsine hirta* (Wormskj.) Hartm. Handb. Skand. Fl. ed. 3, 104 (1838). *Als. verna, η. hirta*

¹ RHODORA, viii. 32 (1906).

² Fenzl well understood the situation when he spoke of *A. verna* with "varietatum limitibus difficillime coërcenda, synonymia taediosa ac inextricabili fere modo confusa, botanicorum omnis aevi cruciamentum."—Fenzl in Ledeb. Fl. Ross. i. 348 (1842).

(Wormskj.) Fenzl in Ledeb. Fl. Ross. i. 349 (1842). *Als. hirta*, a. *fulvum* Hartm. Handb. Skand. Fl. ed. 6, 149 (1854). *Ar. verna*, var. *hirta* (Wormskj.) Watson in King, Rep. 41 (1871). *Als. propinqua* (Richardson) Lange, Fl. Dan. xvii. 7, 8 (1877) as to Greenland plant. *Als. verna*, f. *propinqua* (Richardson) Grönd. Isl. Fl. 33 (1881) as to name. *Als. rubella*, var. *hirta* (Wormskj.) Gürke, Pl. Eur. ii. 258 (1899). *Ar. verna equisetula* A. Nelson, Bull. Torr. Bot. Cl. xxvi. 352 (1899). *Ar. verna*, var. *propinqua* (Richardson) Fernald, RHODORA, viii. 32 (1906). *Alsinopsis propinqua* (Richardson) Rydberg, Bull. Torr. Bot. Cl. xxxiii. 140 (1906). *Alsinopsis hirta* (Wormskj.) Cockerell, Am. Nat., xl. 864 (1906).

A. verna, var. *pubescens*, forma *epilis* (Fernald), n. comb. *Alsin rubella* Wahlenb. Fl. Lapp. 128, t. 6 (1812). *Alsinella rubella* (Wahlenb.) Swartz, Summa Veg. Scand. 17 (1814). *Ar. quadrivalvis* R. Br. in Parry, 1st Voy. App. 371 (1824). *Ar. hirta* a. *glaberrima* Cham. & Schlecht. Linnæa, i. 56 (1826). *Ar. rubella* (Wahlenb.) Sm. Engl. Bot. Suppl. i. t. 2638 (1831). *Alsin verna*, f. *glauca* Fenzl in Ledeb. Fl. Ross. i. 350 (1842). *Alsin verna*, f. *rubella* (Wahlenb.) Hartm. Handb. Skand. Fl. ed. 6, 149 (1854). *Ar. verna*, var. *rubella* (Wahlenb.) Wats. Bibl. Ind. 99 (1875). *Ar. verna*, var. *propinqua*, forma *epilis* Fernald, RHODORA, viii. 32 (1906). *Alsinopsis quadrivalvis* (R. Br.) Rydberg, Bull. Torr. Bot. Cl. xxxiii. 140 (1906).

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PINUS BANKSIANA AND THUJA OCCIDENTALIS.

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IN the *Botanical Gazette* for December, 1918, Professor A. H. Hutchinson¹ discusses at length the factors which limit the northern ranges of various species of forest trees and presents maps and charts which at first glance may appear authoritative. When, however, one sufficiently examines the details to see that on the first map *Abies canadensis* (no. 9) is indicated as having a northern limit in Newfoundland, central Labrador and southern Keewatin, while *Picea canadensis* (no. 2) extends to northern Labrador, Ungava Bay, and the north-west side of Hudson Bay, he at once sees that this paper belongs in the same class as many other so-called phytogeographic and ecological articles which appear in our American journals. *Abies canadensis* and *Picea canadensis* are identical! The White Spruce was called by Miller (1768) *Abies canadensis* and by Link (1841) *Picea alba*, but on account of the earlier specific name of Miller's is now known as *Picea canadensis*. In 1803, to be sure, the name *Abies canadensis* was used by Michaux for the Hemlock, which since 1855 has been separated as a member of the genus *Tsuga*, but Hutchinson gives *Tsuga canadensis* a separate range, to the south of *Abies canadensis*. If he is using the name *Abies canadensis* in a novel sense it is unfortu-

¹ Hutchinson, Bot. Gaz. lvi. 465-493 (1918).

nate that no explanation is given of the exact identity of the tree intended.

Hutchinson has drawn his statements of ranges chiefly from a few authors, Bell, Macoun, and Low, and states that "the records of the explorers mentioned have been even more accurate than has generally been conceded." Certainly these records are a good basis but, like other records, they cannot be safely copied without careful sifting; and, although Bell's personal observations seem to be accurate, his generalizations and deductions from others are woefully inaccurate. Thus, Bell's statement that the American Elm occurs in Newfoundland goes back to old records of superficial and self-confident English travellers who wrote with a disregard of precise taxonomy which could commend their publications only to that group of American "phytogeographers" who abhor both taxonomic accuracy and the painstaking and unending study necessary for its achievement. The Elm has been included in various journals of travel in Newfoundland through a system of "back-door" determinations but in this case, as in most others, the identification of the species merely by looking up the local name in the index of a manual has led to confusion. The situation is as follows: in Newfoundland Yellow Birch, *Betula lutea*, is known as WITCH HAZEL while in England the latter name has been used for *Ulmus montana*. Therefore, what more natural than for Sir Richard Bonnycastle, writing of Newfoundland trees from a "first-hand unfamiliarity" with them, to refer to "ulmus montana, the wych hazel, or elm, which . . . grows all over the island"? Bonnycastle's record was forthwith seized upon as proof that *Ulmus americana* grows in Newfoundland, although others, relying merely on indices of American manuals, have treated it as *Hamamelis virginiana*. Neither *Ulmus* nor *Hamamelis* is known in Newfoundland!

By too closely following the now almost ancient paper of Bell¹ and quite disregarding the scores of very accurate and detailed accounts by later Canadian explorers, Hutchinson has slipped into some errors which a few hours of intelligent search of literature would have prevented. Thus he states (p. 476) that "the irregularity of the limits of *Pinus Banksiana* may be explained by the fact that although temperature conditions have so changed that this species has migrated to 56° N. lat. in the highlands of northern Quebec, it has

¹ Robert Bell, Geol. Surv. Can. Rep. for 1870-80, 44-56C (1881).

been limited in its northward progress by the low lying lands south and westward from James Bay," quite overlooking the fact that W. J. Wilson of the Geological Survey of Canada found and recorded¹ *P. Banksiana* in the valley of the Kapiskau River which flows through "the low lying lands . . . westward from James Bay," 160 miles north of Hutchinson's northern limit in that longitude.

On the other hand, by *not* closely following the trustworthy records of that wonderful authority on the Labrador Peninsula, A. P. Low, he has unfortunately abbreviated the northeastern limits of many species: *Betula papyrifera* by 160 miles and *Picea mariana (nigra)* and *Larix* each by 75 miles; while failure to get at other sources of information has materially shortened others of Hutchinson's limits: thus *Populus balsamifera*, as shown by the representation in the Gray Herbarium, reaches Hebron in latitude 58°, on the outer coast of Labrador, 185 miles beyond Hutchinson's northeastern limit. In fact, from Hutchinson's map one would infer that north of Hamilton Inlet the whole Atlantic slope of Labrador is treeless, but of course this is not the case. Witness the statement of Low who intimately knew Labrador: "The tree-line" after skirting Ungava Bay turns south-southeast, then "southward to the neighbourhood of Hebron, in latitude 58°, where trees are again found in protected valleys at the heads of the inner bays of the coast. At Davis Inlet, in latitude 56°, trees grow on the coast and high up on the hills, the barren grounds being confined to the islands and headlands. . . . These barren islands and bare headlands of the outer coast . . . have caused a false impression to be held regarding much of the Atlantic Coast."² With this definite statement and warning by Low, whom Hutchinson says he is following, it is unfortunate that he should have perpetuated the false impression that Atlantic Labrador is treeless.

But, although for the sake of precision it is important to call attention to these inaccuracies in compilation which at once alter the premises, the chief object of the present notes is to emphasize one dominant factor in determining the limits of ranges of plants, the neglect of which has so obviously led Hutchinson into confusion. Repeatedly in his paper he refers to what are described as the "anomalous" distribution of *Thuja occidentalis* and the "irregularities" and "inconsistencies" in the distribution of *Pinus Banksiana*; and

¹ Geol. Surv. Can. Ann. Rep. n. s. xv. 226A (1903).

² A. P. Low, Geol. Surv. Can. Ann. Rep. n. s. viii. 31L (1896).

although the same perfectly elementary law of phytogeography could as well be brought out by contrasting the detailed ranges of many other species, such as *Picea mariana* and *P. canadensis*, *Casiana dentata* and *Juglans cinerea*, *Quercus Prinus* and *Q. Muhlenbergii*, we may appropriately take for this examination the "anomalous" and "irregular" or "inconsistent" ranges emphasized by Hutchinson.

Briefly, the "anomalies" or "irregularities" consist in the facts that, although the White Cedar, *Thuja occidentalis*, is "unusually large and fine in New Brunswick and the Gaspé peninsula," it is unknown in Newfoundland, Cape Breton, and Nova Scotia where, we are told, "the climate, soil, etc., are the same"; and that, although Banksian Pine "extends northward to 56° N. lat. on the dry uplands east of Hudson Bay," it is "practically eliminated from the low lying lands to the south and west of Hudson Bay and James Bay, water [so Hutchinson says] being the limiting factor." It is further stated that the "anomalous" distribution of *Thuja occidentalis* "defies explanation by regarding temperature, water, or soil as the limiting factors" and, furthermore, that "COWLES has shown that the composition of the rock from which any soil may be derived seldom acts in a limiting capacity with respect to the species which that soil may support. It is only in exceptional cases that a soil newly weathered, is deficient in the mineral constituents necessary for plant growth. This generalization is particularly applicable in Ontario, where the soil, whether it be glacial drift toward the south or the weathered deposits and exposed rocks farther north, is derived from the dominantly granitic rock of the Laurentian Plateau. The original composition of the soil is seldom a limiting factor, at least in so far as the forests of Ontario are concerned."

When we carefully study, however, the detailed ranges of these two species and take pains to discover the lithological character of each region where the species truly prospers and of all their outlying or extra-limital stations we shall find that, far from "defying explanation," the broad ranges and especially the outlying stations are readily explained by the chemical character of the soil, whether acid or basic. PINUS BANKSIANA is confined to acid soils; THUJA OCCIDENTALIS chiefly to basic soils and it reaches its maximum development and all its outlying stations only in positively calcareous areas. The evidence upon which these generalizations are made is stated below.



Northern limits of *Pinus Banksiana* (broken lines) and of *Thuja occidentalis* (heavy spots): calcareous regions dotted.

PINUS BANKSIANA.

As Hutchinson states, on the Labrador Peninsula the Banksian Pine "extends northward to 56° N. lat. on the dry uplands east of Hudson Bay." This statement is supported by Low, from whom it was derived, and Low states with positiveness that "The soil of the greater part of the peninsula is derived from the underlying Archaean rocks," i. e. the acid granite-gneiss (Low, n. s. viii. 30L). West of the Labrador Peninsula the rocks on which the Banksian Pine grows are likewise invariably acid or neutral. The detailed accounts of the scores of areas described in the Annual Reports of the Geological Survey of Canada are replete with this evidence and a few brief but characteristic quotations are here included from the almost endless series of notes to the same effect, the name of the recorder and the number and page of the report being indicated in parentheses.

On the Noddoway River, emptying into Rupert Bay, an arm of James Bay, "Banksian pine is found, where suitable conditions exist, as far as Mattagami Lake, but its range towards James Bay is not restricted on account of the latitude, but by some other circumstance, for in a slightly more easterly longitude this tree ranges northward to Great Whale River, a distance of about 450 miles in a straight line from Mattagami Lake" (Robert Bell, n. s. viii. 79A). In the region southeast of Mattagami Lake "a considerable proportion of the area . . . consists of granitic rocks," but "from the above-mentioned point

(about six miles northward of the narrows or outlet of Mattagami Lake), gneisses with some granitoid patches and occasional bands of micaceous and hornblende schists were the only rocks met with *in situ* all the way to Rupert's House." "The rocks consist principally of a variety of schists, such as dioritic, chloritic, hornblendic, and micaceous and also slaty arkose, alternating with massive greenstones" (Bell, l. c. 83, 84A). In other words, *Pinus Banksiana* stops in its north-western range along the Noddoway as soon as it reaches the region of dioritic and hornblendic schists and greenstones, i. e. the calcareous region. Furthermore the drift of the region, derived from the shores of James Bay, contains a "certain proportion from the Manitounuck and Devonian rocks of James Bay, the percentage of these latter increasing as we went northward. Beyond Mattagami Lake this percentage became very considerable" (Bell, l. c.). The Manitounuck of James Bay is described as "made up mostly of limestones . . . sandstones and quartzites, shales, ironstones, amygdaloids and basalts" (Bell, Rep. for 1877-8, 11, 12C) while the Devonian rocks of James Bay consist "of dark grey bituminous limestone, interstratified towards the bottom with earthy drab limestone" (Bell, Rep. for 1875-76, 316). The drift material from Mattagami Lake northward, where the percentage of Manitounuck and Devonian fragments becomes "very considerable" is, therefore, also calcareous, and it is more than a mere coincidence that at this point the range of *Pinus Banksiana* along the Noddoway should abruptly end.

In the Nipissing and Temiscaming region "Jack-pine, called by some pitch-pine, or bastard spruce (*Pinus Banksiana*) is very often encountered in the more barren and rocky areas, and its presence seems an almost certain indication of the extreme poverty of the underlying soil" (Barlow, n. s. x. 34I). Somewhat farther west, in the area northeast of Lake Nipigon, "The height of land region . . . though level and swampy, is mostly of a sandy nature," "The timber in the height of land region is small spruce and tamarack with Bank-sian pine on the sand plains and higher land" (W. A. Parks, n. s. xv. 220A). Still farther west in Ontario, in the region west of Thunder Bay, "The greater part is occupied by Archaean rocks" (McInnes, n. s. x. 6H), and *Pinus Banksiana* is reported to be the most abundant tree of the region (McInnes, l. c. 11H).

Farther northwest, in Keewatin, in the valley of the Kanuchuan, "Everywhere, excepting on the muskeg areas, there is an open forest

of banksian pine" and the country which is a "sandy flat, gradually rises southward for five or six miles, then it sharply rises to a ridge of gravel and boulders [gneiss]" (McInnes, n. s. xvi. 155A). Similarly in other regions of the upper Severn where "the whole area is occupied by rocks of Archaean age" (Camsell, n. s. xvi. 147A) "banksian pine and birch are found everywhere over the whole district" (Camsell, l. c. 151A); and so on through many other reports.

Hutchinson finds the range of *Pinus Banksiana* "irregular" because "It is practically eliminated from the low lying lands to the south and west of Hudson Bay and James Bay," naively adding, "water being the limiting factor." When, however, we look into the lithology of the "low lying lands to the south and west of Hudson Bay and James Bay" the remarkable *regularity* or *consistency* of the range of *Pinus Banksiana* is made apparent, for this vast region from which *Pinus Banksiana* is "eliminated" consists of Silurian and Devonian limestones. On the splendid Geological Map of North America, published in 1911 by the United States Geological Survey, this limestone region to the south and southwest of Hudson Bay is indicated as extending from Rupert Bay to the Churchill River, a distance (air line) of 850 miles, with a breadth at the southwest of more than 200 miles. Yet Hutchinson, finding the Banksian Pine "practically eliminated" from this region but abundant on acid Labrador and there extending north to latitude 56° says that "water" is "the limiting factor"; and he fails to detect the real factor because at the very outset he had somehow got an idea that "COWLES has shown that the composition of the rock from which any soil may be derived seldom acts in a limiting capacity with respect to the species which that soil may support."

And it is not merely Cowles who has thus argued, for this dogmatic assertion has been repeatedly made by other leading American ecologists. We thus find Clements writing: "Apart from the effect which excessive amounts of acids and salts may have in reducing the chresard, the chemical character of the soil is powerless to produce structural modification in the plant. Since Thurmann's researches there has been no real support of the contention that the chemical properties of the soil, not its physical nature, are the decisive factors in the distribution and adaptation of plants."¹

¹ Clements, *Research Methods in Ecology*, 80 (1905).

Although *Pinus Banksiana* is, like other pronounced oxylophytes, "practically eliminated" from the vast limestone region to the south and southwest of Hudson Bay, it is important to note the adverb "practically," for where ridges of acid gravels or sands occur *Pinus Banksiana* is likely to occur with them. Thus, in ascending the Kapiskau River which flows through the limestones and calcareous clays into the west side of James Bay, W. J. Wilson (already referred to) left the river to explore an isolated ridge, which proved to be a kame "composed chiefly of gravel" (W. J. Wilson, n. s. xv. 226A) which was "covered with Banksian pine, canoe-birch and poplar."

All explorers agree that the Banksian Pine "does not touch either James' Bay or Hudson's Bay" (Bell, Rep. for 1879-80, 46C). Its essential absence from the region between the lower Noddoway and the Churchill River has already been sufficiently studied. How about the east side of James Bay? Low agrees with Bell that on the Labrador side it "does not come quite to the coast on Hudson or James Bay," adding the guess: "probably on account of the shore being generally low and swampy." Yet is it not significant that near the entrance of the East Main River into James Bay from the east, there should be bands of limestone "a few miles above its mouth, and along the coast of James Bay in the vicinity of that river" (Low, n. s. viii. 200L); that the next large river northward, the Big River, has its banks for several miles above its mouth "composed chiefly of bluish white clay" (Low, n. s. iii. 38J); and that, farther north, the lower stretches of the Great Whale River likewise flow through a "deposit of clay" which is full of "marine fossil shells" (Low, l. c. 53J)?

West and northwest of the calcareous "low lying lands to the south and west of Hudson Bay and James Bay," the region so generally avoided by *Pinus Banksiana*, occurs the great western Archaean barren region, extending from Lake Superior west to Lake Winnipeg, and north to the Arctic; and here, naturally enough, the Banksian Pine extends "north-westerly to the Athabasca River, . . . and northerly down the Mackenzie River to the arctic circle" (Macoun). The accounts of discerning explorers through this tremendous tract all emphasize the abundance of the pine on the most sterile areas: thus, throughout his extended report (n. s. viii. D) on the Athabasca Lake region, J. B. Tyrrell continually refers to the abundance of Banksian Pine on the sandy plains; and so on without seeming limit.

In fact, it is most difficult to comprehend how a phytogeographer, who must have seen a geological map of North America, can read Robert Bell's account of the broad northern range of *Pinus Banksiana* without suspecting the truth. Here is Bell's statement somewhat condensed: "from the head of the Bay of Chaleur," it extends north to Lake Mistassini, "from which it runs west to the Moose River, keeping about 100 miles south of James' Bay. . . . It does not touch either James' or Hudson's Bay. Southward it is common on the north shore of Lake Huron and around both shores of Lake Superior, whence it is met with all through the country to Lake Winnipeg." "From [the upper] Moose River it runs north-west to the Mackenzie, which it crosses about the Arctic Circle" (Bell, Rep. for 1879-80, 46C).

The southern outliers of *Pinus Banksiana*, too, are exclusively on acid and hopelessly barren rocks and sands or in acid bogs, for, although the species is commonly found on dry uplands, in the sterile southeastern area of New Brunswick it sometimes occurs on the acid bogs so that in that region at least "water" is not "the limiting factor." Although Bell has made the wholesale statement that *Pinus Banksiana* "occurs throughout Nova Scotia and New Brunswick" (Bell, Rep. for 1879-80, 46C), the Banksian Pine is, as a matter of fact, a highly localized tree in those provinces,¹ Fernow correctly stating that in Nova

¹ The loose and inaccurate generalization above referred to is an illustration of a type of statement which, when depended upon by others, at once leads to erroneous conclusions and which, most unfortunately, floods our so-called phytogeographic and ecological literature in America. Consequently those who have "a first-hand unfamiliarity" with the facts (for this apt phrase we are indebted to Dr. D. F. Jones's refreshingly straightforward review in *Science* for October 4, 1918) — consequently, those who are not in a position to weigh the values of statements are bound to be misled. Thus, in a recent sumptuously illustrated publication issued by the New York State College of Forestry and therefore bound to be considered "scientific," the state of New York is divided into a number of "Zones," the first the "Zone of Willow Oak, Sweet Gum, Persimmon, etc." "continuing along the Connecticut coast" (to New Haven, as indicated on the accompanying map). This "Zone" which is said to occupy the western coast of Connecticut is reported by Bray to be characterized by the following

"Indicator Species.

Short-leaf pine	= (<i>Pinus echinata</i> Mill.).
Willow oak	= (<i>Quercus phellos</i> L.).
Oak	= (<i>Quercus pagodaefolia</i> (Ell.) Ashe).
Black-jack Oak	= (<i>Quercus marilandica</i> Muench.).
Laurel magnolia	= (<i>Magnolia virginiana</i> L.).
Sweet gum	= (<i>Liquidambar styraciflua</i> L.).
Hop tree	= (<i>Ptelea trifoliata</i> L.).
Mistletoe	= (<i>Phoradendron flavescens</i> (Pursh) Nuttall).
Virginia spiderwort	= (<i>Tradescantia virginiana</i> L.).
Day flower	= (<i>Commelina virginica</i> L.)."

Now, the disheartening features of this list of "Indicator Species" are that, while 6 out of the 10 are locally indigenous in southeastern New York, 3 of the others (*Ptelea*, *Tradescantia*,

Scotia "it is found only in special localities on poorest sites in Colchester county."¹ In New Brunswick, too, the tree is localized and Robert Chalmers correctly understood the situation when he wrote of eastern New Brunswick the following accurate account:

"In New Brunswick, as indeed, in all glaciated countries, however, we cannot determine the exact limits of the areas of the forest growth affected by the geological formations. On the hills and ridges underlain by limestones, we meet with maple and birch groves, intermixed occasionally with spruce. The Cambro-Silurian and the old crystalline belts of rocks traversing the province from the Baie des Chaleurs to the Chiputnecticook Lakes, seem also to mark a boundary in the forest distribution. North of this lies the great area of Silurian limestones, south of it the Carboniferous sandstones. Owing to the larger extent of country which these formations occupy, the soil necessarily bears a closer relation to the underlying rock, and is less intermixed with extra-limital drift; consequently the vegetation and forest growth upon these areas ought to show the effect of each particular kind of soil upon the flora of the country. Have these districts any peculiar forms in their floral productions?

"On the Silurian limestones there is observable a paucity of ericaceous plants, of scrub pine [*P. Banksiana*] and black spruce, and an almost entire absence of hemlock, all of which are abundant on the Carboniferous sandstones, the latter tree, indeed, reaching fuller development on these as regards size and number than elsewhere in the province. White spruce, fir, white pine, the paper birch, and

and *Commelina*) are in southeastern New York usually considered merely garden-escapes and the 10th species (*Phoradendron*) is not known north of Monmouth County, New Jersey; furthermore, of the 10 "Indicator Species" only 1 (*Liquidambar*) is unquestionably indigenous in Connecticut, 2 (*Ptelea* and *Tradescantia*) are garden-escapes, though *Tradescantia* may be locally indigenous, and the remaining 7 are entirely unknown in the state of Connecticut!

Again, in Hawley & Hawes's *Forestry in New England*, a book now being freely quoted, we find such an amazing statement as that "PITCH PINE (*Pinus rigida*) . . . occurs throughout New England in the extreme northern part, and in the mountains"; whereas, as a matter of fact, the Pitch Pine is a coastal plain tree extending into New England from the south. In Vermont it is found only "in the northern portion of the Champlain Valley" and "in the Connecticut Valley as far north as Wells River" (Burns & Otis); but, although the "northern portion of the Champlain Valley" suggests northern New England, it should be borne in mind that the altitude is slight, that this sandy region has to a great extent a coastal plain flora and that northernmost New England is nearly 150 miles farther north than Lake Champlain. In New Hampshire Pitch Pine follows north "along the Merrimac valley to the [bases of the] White mountains and up the Connecticut valley to the mouth of the Passumpsic" (Dame & Brooks); in Maine it is confined to the southwestern sixth of the state and the coastal granites east to Mt. Desert Island. It is quite unknown among the higher mountains.

¹ Fernow, *Forest Conditions of Nova Scotia*, 11 (1912).

beechn appear also to be more abundant upon the Carboniferous area, though common also upon the Silurian uplands. But the striking features of the forests upon the latter are the groves and ridges of birch and maple occurring in almost every part. These are seldom met with on the sandstones except where Lower Carboniferous limestones prevail.

"The comparative abundance of ericaceous plants on the Carboniferous areas is doubtless due, in some measure, to the flat surface and consequent imperfect drainage, resulting in the formation of swamps, peat bogs, etc., where these forms of vegetation find a congenial habitat. But the difference in the sylvan growth occupying the drier grounds of the two regions in question is not explicable unless we admit that the geological formation has an influence upon it. On the sandstone area, the hemlock and scrub pine are most abundant trees compared with their distribution upon the Silurian uplands. Black birch, beech, and black spruce also appear to be more common and larger. These facts regarding distribution lead to the inference that the gravelly, siliceous soil overlying the sandstones is more favourable to the growth of these trees, or it may be that the limestones are unfavourable, or, perhaps, both causes operate." (Chalmers, n. s. vii. 140, 141M).

Although on the acid north shore of the lower St. Lawrence the Banksian pine "occurs abundantly" eastward to "the neighbourhood of the mouth of the Moisie River" (Low, n. s. viii. 34L), i. e. east to longitude 66° W., and although it is on thoroughly leached and consequently acid Permian sands of Prince Edward Island in longitude 64° W. and on the "poorest sites in Colchester county," Nova Scotia, to longitude 63° W., it is noteworthy that this species should be unknown on the calcareous Gaspé Peninsula which in latitude lies midway between the "north shore" and Nova Scotia and in longitude fails to reach eastward to the 64th meridian. In his account of the limestone region of northern New Brunswick and southern Gaspé (Bonaventure County) Chalmers enumerates the trees "in the order of their relative abundance" and, although, as would be expected in a calcareous tract, *Picea canadensis* with trunks 2-2½ feet in diameter and *Thuja occidentalis* with trunks 1-3 feet in diameter head the two lists, the first for "drier parts of the Silurian upland" the other for the "lower grounds," *Pinus Banksiana* is not mentioned at all in either list (see Chalmers, n. s. ii. 33, 34M). In an intensive study of

the Gaspé Peninsula and the literature bearing upon it the present writer has found absolutely no evidence of the Banksian Pine in that vast Silurian and Cambrian region, the only known stations on the peninsula being on the leached crests of some of the intrusives at the southwest corner of the peninsula, while farther west the pine reappears on the quartzites of Rimouski County.

It is also noteworthy that along the north shore of the lower St. Lawrence, after "occurring abundantly" eastward to "the neighbourhood of the mouth of the Moisie," *Pinus Banksiana* should abruptly stop, for on the acid barren lands of northwestern Canada it extends north quite to the Arctic. Is it not significant, then, that in "the neighbourhood of the mouth of the Moisie" there should be a great mass of anorthosite 60 miles broad, and east of that another, for analyses¹ of 24 samples of anorthosite from different regions of Labrador, Canada and the Adirondacks, show it to contain an average of 9 % of calcium, the amount often reaching 18 %; and that east of these anorthosites lies the extensive limestone tract including the Mingan Islands and "the neighboring coast," for "a distance of forty-five miles," "the Mingan development of the Calciferous formation" having a thickness of 250 feet (see Logan, Geol. of Canada, 119-121)?

In Maine there is not a single known station for *Pinus Banksiana* which is not on granite or the most highly siliceous of rocks. In New Hampshire the species is only on Welch Mt., a sterile granite mass south of the syenitic Franconia Range; in Vermont it "is one of the rarest of our trees" growing on "sandy, sterile soil; rocky slopes."² Similarly in New York and the Great Lake States the Banksian Pine belongs to the most sterile habitats, and very recently Rosendahl & Butters have stated that in Minnesota and Wisconsin "The Jack Pine (*P. Banksiana* Lamb.) occurred most abundantly on sandy outwash plains . . . and in the great paleozoic sand plains."³

These facts and many scores of monotonously similar ones which the writer refrains from merely piling up are sufficient evidence that the BANKSIAN PINE is a pronounced oxylophyte.

In spite of the fact that *Pinus Banksiana* is essentially absent from the great limestone region bordering the southwest side of

¹ Adams, Geol. Surv. Can. Ann. Rep. N. S. viii. 1305 (1896).

² Burns & Otis, Trees of Vermont, 31 (1916).

³ Rosendahl & Butters, Pl. World, xxi. 107 (1918).

Hudson Bay north to Churchill, from the calcareous Gaspé Peninsula and from Nova Scotia (with the exception of Colchester county on the isthmus which connects with New Brunswick) Transeau, discussing the ranges of forest trees, has issued a map¹ which carefully includes in the area where this species (as *P. divaricata*) is said by him to be "dominant," the 850 miles of limestones along the southwest side of Hudson Bay, and his dotted lines, which form the boundaries, embrace between their eastern terminals all of Nova Scotia, New Brunswick and Gaspé, as well as all of central and northern Maine. The absence of *Pinus Banksiana* from the west side of Hudson Bay, from Gaspé and from Nova Scotia has been sufficiently emphasized. Similarly in the region of Maine indicated on Transeau's map the species has but few limited areas, these all on the granites and quartzites of the upper Penobscot, Kennebec, and Androscoggin; but, although "Lumbermen call it a scarce tree in Northern Maine,"² south of Transeau's boundary it is truly dominant on some of the sterile regions of the Maine coast. Transeau's map, then, which has been accepted by other ecologists as authoritative, represents *Pinus Banksiana* as "dominant" on 150,000 square miles of country from which actually the tree is essentially unknown. To the ecologist this discrepancy may seem trivial. At least, when the present writer criticized³ the inaccuracies of Harshberger's work, where he made *Anemone narcissiflora*, which is actually unknown east of the alpine regions of Colorado, and *Cassiope tetragona*, unknown nearer than northernmost Labrador, typical forest plants of the Great Lake region, and confused *Vallisneria spiralis* of fresh water with the salt-water Eel Grass, *Zostera marina*, Cowles characterized these and the hundreds of other similar cases which crowd the pages of Harshberger's work as errors which "to taxonomic specialists of local areas . . . loom large," while "to those of broader view-point, however, the numerous errors will be subordinate."⁴ If such errors are merely "subordinate," how preposterous an error, one would like to know, would be required to "loom large" in the mind of an ecologist?

¹ Transeau, *Am. Nat.* xxxix. 875, fig. 1 (1905).

² Goodale, *Prelim. Report Nat. Hist. and Geol. Me.* 127 (1861).

³ *RHODORA*, xiii. 213-224 (1911).

⁴ Cowles, *Bot. Gaz.* liii. 181 (1912).

THUJA OCCIDENTALIS.

Hutchinson says that, "The 'anomalous' distribution of *Thuja occidentalis* defies explanation by regarding temperature, water or soil as the limiting factors: . . . 'It is absent in Newfoundland, Cape Breton, Nova Scotia, and the east half of Prince Edward Island, but unusually large and fine in New Brunswick and the Gaspé peninsula, in which the climate, soil, etc., are the same as in the adjacent regions, where no trace of the species is to be found.'" It is certainly startling to read that the climate and soil of Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, and Gaspé are so uniform, for in sections of western Nova Scotia peaches are raised with great success, but he would be a foolish man indeed who would think of planting a peach orchard in Newfoundland or in Gaspé county; and in view of the remarkably spotted and pied colorings of a geological map of this region it is further obvious that the generalization quoted above is wholly inaccurate.

Bell and following him Hutchinson are correct, however, in stating that in the Gaspé Peninsula and at least in northwestern New Brunswick *Thuja occidentalis* attains an unusual development, and had they been familiar with the region they would have extended the limits of this area of "unusually large and fine" trees into northeastern Maine. Chalmers's statement that in this Silurian limestone region the trunks of *Thuja* range from 1-3 feet in diameter has already been noted. These figures are, however, by no means the maximum, for at many points in northern Maine the writer has measured Cedars with trunks 4-6 feet in diameter. In southeastern New Brunswick *Thuja occidentalis* is localized and there chiefly a swamp shrub or dwarfed tree, obviously not in a wholly satisfactory environment. This region, the Eastern Plain of Ganong,¹ is the extensive area of Carboniferous sandstones, already referred to under *Pinus Banksiana*. To the southeast of the Carboniferous plain lie the Southeastern Highlands, in the east chiefly of granites and felsites, and at the extreme southeast lies the extensive Permian sandstone region which continues for 100 miles along the northern side of Nova Scotia. Chalmers describes this region as having some excellent farms along the coast and in the

¹ Ganong, Bull. Nat. Hist. Soc. N. B. iv. 236 (1899).

river-valleys where Pleistocene clays have been deposited; but "Upon the higher grounds . . . we meet with different soils, and in many cases poorer farms. . . . Upon the Middle Carboniferous of Kent and portions of Westmoreland counties, . . . the surface is flat and the drainage deficient; hence the soils are cold, boggy, and in many places covered with a stratum of white or gray bleached sand. . . . Upon the rolling surfaces, however, there are, as already stated, fair arable soils, though deficient in lime. . . . In Cumberland County, Nova Scotia, above the limits of the post-glacial subsidence, we meet with soils and rocks differing somewhat from those of the Middle Carboniferous just described. Here the prevailing surface beds are reddish in color, . . . here, as in New Brunswick, there is a deficiency of lime in the soil." (Chalmers, n. s. vii. 136-138M). With this extensive region "deficient in lime" extending from calcareous northern New Brunswick into Nova Scotia, it is only natural that *Thuja* should be practically absent¹ from the latter province. The failure of *Thuja* to reach Newfoundland is evidently due to the fact that the plants which reached Newfoundland from the southwest were forced to migrate on the siliceous Tertiary continental shelf which formerly connected the North American continent with Newfoundland. This point has already been sufficiently discussed elsewhere.²

On Prince Edward Island *Thuja occidentalis* is, as Hutchinson says, unknown from the eastern half of the island, but it is frequent and often abundant from slightly east of Badeque Bay northwestward, the half of the island where "calcareous conglomerate, the pebbles being of red shale, and containing white calcite in considerable quantity, form a feature which can be easily recognized" (Ells, Rep. for 1882-83-84, 13E).

Throughout the glaciated regions of New Brunswick and Maine, for many miles south of the region of calcareous rocks but where the soils are chiefly drift material or glacial till from the north, *Thuja occidentalis* is frequent or often abundant, and on the lower levels of

¹ By the statements of Bell, Fernow, and Hutchinson *Thuja* is said to be absent from Nova Scotia; but there is good evidence that it occurs, although very rarely and only as an unsuccessful swamp shrub, near the New Brunswick border. Thus in Lindsay's *Catalogue of the Flora of Nova Scotia* (Proc. N. S. Inst. Sci. iv. pt. 2, 209) it is recorded from Cumberland, the county immediately adjoining New Brunswick; and Professor H. G. Perry of Acadia University assures me that, although very rare and obviously not at home, *Thuja* has been observed by him in swamps of west-central Nova Scotia.

² Fernald, RHODORA, xiii. 161 (1911) and Am. Journ. Bot. v. 238 (1918).

New Brunswick and Maine where the non-calcareous rocks are deeply buried in Pleistocene marine clays the Cedar is often found. The very great difficulty of deciding off-hand in a drift-covered area whether a given colony of plants is in a calcareous or a non-calcareous soil has already been referred to in a quotation from Chalmers. This difficulty is made clear by the following incident. The argillaceous rocks which occupy much of the lower valley of the Penobscot are essentially non-calcareous. Yet at a few points, such as the ledges near the ferry at Veazie, there occur good developments of *Arbor Vitae*, accompanied by such well-recognized calcicolous herbs as *Anemone canadensis*, *A. riparia* and *Juncus brachycephalus*, species which abound in the limestone region of Aroostook County but which are exceedingly local on the lower Penobscot. The present writer called this area to the attention to one of his friends at the University of Maine, a prominent chemist and mineralogist, who, after visiting the spot and taking rock-samples, reported that the rock itself was non-calcareous but that when tested with acid the surfaces gave a marked effervescence. Further study of the region showed that at this point along the river the ledges were stained by seepage from the steep banks of an esker which follows the valley, and that the calcareous waters from the esker had here converted the non-calcareous rock into a definitely calcareous habitat.

Similarly, a small vein of calcite intruded into an otherwise non-calcareous rock will materially effect the neighboring soil, while trap dikes, which are commonly calcareous, often alter the soil-conditions of a granitic region. Again, the average botanist is likely to pass as *granite* any of the granitic series or even hornblende diorite; but the syenites and diorites furnish a slightly calcareous soil. Consequently we are too apt to infer, because a country is composed of intrusive or metamorphic rocks, that it is granite and that, therefore, plants which delight in truly calcareous soils are not to be expected. On just this point we have the clear statement of the great soil-chemist, Hilgard:

“A soil-formation overlying limestone on the slopes of a range may be wholly derived from non-calcareous formations lying at a higher elevation, or may have been leached of its original lime-content by abundant rains. The feldspars constituting rocks designated as granite, may or may not be partially or wholly of the soda-lime instead of the potash series; the mica may or may not be partially replaced by hornblende, in which cases the soil would be calcareous to the

extent of determining the character of the flora as calcifuge or calciphile, without its being at all evident in the physical character of the soil, which would still be 'granitic' or 'siliceous.' Such observations in order to be critically decisive, clearly require that the observer should be, not merely a systematic botanist, nor a mere geologist or chemist, but all these combined. There is good reason to believe that most or all of these supposed contradictions would disappear before a critical physical and chemical examination of both the soils and the rocks from which they are supposed to have been derived. Contejean himself, in placing so many of his long catalogue of plants into the doubtful groups, suggests many cases in which the above considerations may explain the apparent discrepancies.

"*What is a calcareous soil?* The definition adopted for this volume has been given in a previous chapter (chapter 19, page 367); viz, that a soil must be considered calcareous so soon as it naturally supports a calciphile flora — the 'lime vegetation' so often referred to above and named in detail. Upon this basis it has been seen that some (sandy) soils containing only a little over one-tenth of one per cent. of lime show all the characters and advantages of calcareous soils; while in the case of heavy clay soils, as has been shown, the lime-percentage must rise to over one-half per cent. to produce native lime growth."¹

It is, therefore, premature to say that in the region of its almost continuous occurrence, from New Brunswick and adjacent Quebec across northern New England, northern and central New York, southern Ontario, Michigan, Wisconsin and Minnesota, *Thuja* confines itself to calcareous soils for, like many other plants in the area where they are dominant, *Thuja* may prove to be ubiquitous or somewhat indifferent to moderate differences of soil; but that its finest development in this region is in the calcareous tracts cannot be seriously questioned.

In New Brunswick and Maine *Thuja* likewise delights in the river alluvium and terraces along the principal streams, which have their upper sources in calcareous tracts for, as Hilgard clearly shows,² although in water draining from mixed but unmanured soils "lime is the ingredient most abundant," river waters show a marked diminution "especially of lime . . . indicating a deposition of lime carbonate

¹ Hilgard, *Soils*, 523, 524 (1907).

² Hilgard, *Soils*, 24 (1907).

in the river deposits or alluvial lands"; but in such valleys as that of the Saco, a river draining the granitic eastern White Mountains and consequently with alluvium deficient in lime, *Thuja* is apparently unknown.

In New Hampshire *Thuja* is abundant in the region north and northwest of the White Mountains and along the Connecticut Valley south to Hanover,¹ and it is "Common in northern and central Vermont, and as far south as Woodstock and Hartland in eastern Vermont, up to 1,000 feet altitude."² An examination of Hitchcock's Agricultural Map of New Hampshire³ (the map overlapping into Maine and Vermont), shows that two-thirds of the region north and northwest of the White Mountains is indicated as having calcareous soil, partly derived from limestones, partly from calcareous slates and schists; and this calcareous area, which extends west to the granitic Green Mountains, follows south beyond Hanover, and on the Vermont side includes Woodstock and Hartland. At Hanover and at the southwestern border of Hartland and the southeastern border of Woodstock the limestone is shown as meeting regions of gneissic or granitic rock, although after skirting around these granitic masses the calcareous rocks continue southward along the Connecticut. In this calcareous area of northwestern New Hampshire and northeastern Vermont the primitive *Arbor Vitae* or White Cedar emulated the forests of northern Maine, northern New Brunswick and Gaspé, for in Dr. Kennedy's *Flora of Willoughby, Vermont*, we find the statement, that "Some stumps of old growth cedars, more than three feet in diameter, still remain."⁴

In Massachusetts *Thuja occidentalis* is confined to the calcareous upper Connecticut Valley and to the Stockbridge limestone region of Berkshire County.⁵

In Connecticut it is indigenous only in the limestone region of northern Litchfield county: "Canaan, on a limestone ridge and in a near-by swamp (C. K. Averill), Salisbury, rocky hillside and at another locality in a deep swamp (Mrs. C. S. Phelps)."⁶

In southern New York *Thuja occidentalis* was formerly known on

¹ Dame & Brooks, *Handb. Trees of New Eng.* 23 (1902).

² Burns & Otis, *Trees of Vt.* 51 (1916).

³ C. H. Hitchcock, *Geol. of N. H.* i. 548 and map opposite (1874).

⁴ Kennedy, *Rhodora*, vi. 103 (1904).

⁵ See Dame & Brooks, l. c.

⁶ Graves, Eames, and others, *Cat. Fl. Pl. and Ferns Ct.* 38 (1910).

the lower Hudson: "At Verplanck's Point . . . on . . . fine bluffs of palaeozoic limestone,"¹ where it was associated with other calcicoles, *Anemone canadensis*, *Arenaria stricta*, *Arabis lyrata*, etc.; and at other stations lower down the Hudson (now presumably extinct).

In New Jersey the only authentic records are from the lower Hudson, the old records from farther west, having been doubted.² In other words, in Connecticut and southeastern New York and adjacent New Jersey *Thuja occidentalis* occurs only in the localities indicated so clearly on Dana's map of limestone areas of the region (including the Palisade trap range), or as Dana concisely defines it "the belts of limestone . . . which extend southward in eastern New York and from Canaan and Salisbury in Connecticut"³ (In Connecticut *Thuja* is known only from Canaan and Salisbury!).

In Pennsylvania, according to Porter, *Thuja* is "Generally escaped from cultivation, but not definitely known in the native state;"⁴ and Long likewise emphasizes that the tree "appears to be quite unknown in a native state in the wide mountain area of Pennsylvania"⁵

In Virginia *Thuja occidentalis* seems to be confined to the calcareous valleys among the mountains. The records are few, as follows: at Natural Bridge "the great *Arbor Vitae* in Cedar Creek ravine;"⁶ "Plentiful along the creeks in the Valley of the Middle Fork of the Holston River, especially where the banks are rocky and cañon-like";⁷ "Alleghany Co., Steele."⁸ Both Cedar Creek and the Holston River are in the Great Valley or the Valley of Virginia, where the "Valley limestone . . . occupies the greater part of the floor,"⁹ and where, as described by W. B. Rogers, along the Holston Valley "Hills of limestone apparently arranged in rows . . . are stationed along the valley at nearly equal intervals."¹⁰ In Alleghany County, too, although Tidestrom does not give Steele's precise locality, it is certain that *Thuja* is upon either the Silurian or Devonian calcareous rocks of which that county is composed.

¹ F. J. H. Merrill, *Bull. Torr. Bot. Cl.* xiii. 6 (1886).

² See Britton, *Cat. Pl. N. J.* 299 (1889), Taylor, *Mem. N. Y. Bot. Gard.* v. 74 (1915).

³ Dana, *Man. Geol.* ed. 4, 529, 530 (1895).

⁴ Porter, *Fl. Penn.* 3 (1903).

⁵ Long, *RHODORA*, xv. 121 (1913).

⁶ A. M. Vail, *Mem. Torr. Bot. Cl.* ii. 38 (1890).

⁷ Small & Vail, *Mem. Torr. Bot. Cl.* iv. 167 (1893).

⁸ Tidestrom, *Elysium Marianum*, ed. 2, 38 (1907).

⁹ Bassler, *Va. Geol. Surv. Bull.* no. II-A, 36 (1909).

¹⁰ W. B. Rogers, *Geol. of Va.* 140 (1884).

In West Virginia *Thuja* is known from but two localities, in the extreme Northeast: Knobly Mountain in Mineral County and near Petersburg in Grant County.¹ Knobly Mountain extends across Mineral and Grant Counties and consists, according to Darton & Taff, of Silurian limestones and calcareous sandstones,² while Petersburg is on the South Branch of the Potomac, which drains these and the calcareous Devonian sandstones and shales.

"This is about the rarest tree in North Carolina. . . . It is said to occur in only a few places, as on Cripple Creek and Linville River, on limestone soil"³; while in Tennessee it is only "along Holston River [see above] in the mountains,"⁴ the Holston in Tennessee flowing through a highly calcareous region, the rocks, as indicated by Keith,⁵ being chiefly Cambrian and Silurian limestones.

In Ohio *Thuja* is known only in "Champaign, Franklin, Greene, Highland, Adams" counties;⁶ Orton, on his map of the Limestone Formations of Ohio,⁷ showing Champaign and Greene Counties as wholly limestone, Highland and Adams almost wholly so, and the western half of Franklin County calcareous.

In Indiana *Thuja* is known only in Lake County,⁸ which is Silurian, although thinly covered at the north by the wind-blown sand-dunes beside Lake Michigan. The "Tamarack-Arbor-vitae swamp is on the eastern boundary" of the sand dunes where *Pinus Banksiana* abounds, but not on the dunes themselves. Here, however, Nieuwland informs us, "The Arbor-vitae trees are not in the best of condition,"⁹ although he ascribes their poor condition to the cutting of a ditch some distance away.

So much for the southern colonies of *Thuja occidentalis*. Now turning in the opposite direction we find a strikingly similar restriction to calcareous soils of the extreme northern colonies.

In Labrador, Low states that "*Thuja occidentalis* Linn. (Cedar) hardly enters the southern limits of the peninsula. It occurs just south of the mouth of the Rupert River, at the foot of James Bay,

¹ Millspaugh, *Living Flora of W. Va.* 199 (1913).

² Darton & Taff, *Piedmont Folio* (no. 28), *Geol. Atlas U. S.* (1896).

³ Coker & Totten, *Trees of N. C.* 26 (1916).

⁴ Gattinger, *Flora of Tenn.* 32 (1901).

⁵ Arthur Keith, *Morristown Folio* (no. 27), *Geol. Atlas U. S.* (1896).

⁶ Shaffner, *Cat. Ohio Vasc. Pl.* 136 (1914).

⁷ Orton, *Geol. Surv. Ohio, ser. 4, Bull. no. 4* (1906).

⁸ Deam, *Indiana State Bd. Forestry, Ann. Rep. xi.* 116 (1912).

⁹ Nieuwland, *Am. Mid. Nat.* ii. 165 (1912).

and does not cross that stream in the eastern course of its northern limit. It is only found about the southwestern bays of Mistassini Lake, from which it extends south-east, crossing the St. Lawrence to the westward of Seven Islands. No cedar trees were seen along the Manicuegan River from its mouth upward" (Low, n. s. viii. 33L).

In regard to the region of Seven Islands, Sir William Logan tells us that the whole north shore of the lower St. Lawrence is Laurentian, "with the exception of a narrow border of Silurian strata on the strait of Belle Isle, another at the mouth of the Mingan River, and a third near the Seven Islands."¹ The Manicuegan where "no cedar trees were seen" was explored from mouth to headwaters by Low, who writes "Rocks, of Archaean age alone, were met with along the various routes followed" (Low, l. c. 104A); but *Thuja* is found at the southern end of Lake Mistassini, for "The soil of the region about Lake Mistassini is made up of boulder-clay, derived from the disintegration of the neighbouring rocks. . . . The finer material of the soil is sandy clay, with a large percentage of finely divided and intimately mixed limestone, *especially* [italics ours] about the southern and eastern shores" (Low, l. c. 69L). It is noteworthy that in his long canoe trip — up the Saguenay to Lake St. John, thence up the Mistassini River, across to Lake Mistassini and down the Rupert to Hudson Bay — André Michaux passed *north* of the southern end of the lake and consequently did not see this northern colony of *Thuja* at the southern end of Lake Mistassini. Writing on August 21st, 1792, from "la Rivière dite Mistassin," Michaux said, "Les Thuya cessent au Lac [St. Jean], dit-on, et je vis pas au long de cette riv."² This observation is significant for throughout its known length Mistassini River flows through acid country, but the northeastern, eastern and southeastern shores of Lake St. John are composed of anorthosite which, as already noted (p. 52), contains an average of 9 % of calcium.

Thuja is *not* found on the Rupert River which for its entire length flows over Laurentian gneiss, but it *is* found "just south of the mouth of the Rupert River," the eastern limit of the calcareous area already discussed (p. 47). Similarly it is on the lower Noddoway in the calcareous soils which reach south from James Bay (Bell, n. s. viii. 80A), the region from which *Pinus Banksiana* is absent (see p. 46).

¹ Logan, Geol. of Canada, 47 (1863).

² Michaux, Journal, 1787-1796, ed. Sargent, 76 (1888).

On the lower Abitibi *Thuja* occurs, the river for the lower 70 miles flowing over Devonian limestones (Wilson, xv.—for 1902-'03 — 233, 235A). On the Kwataboahegan which enters the mouth of the Moose River and which "flows over flat-lying, fossiliferous limestone for thirty-two miles," "cedar is common" (Wilson, l. c. 229-231A).

In the great Devonian and Silurian limestone region southwest and west of James Bay and Hudson Bay, *Thuja* does not stop in its northern extension at the lower Albany River as Hutchinson's map implies. It is found on most if not all of the rivers which enter James Bay from the west through this vast limestone lowland. It is on the Kapiskau, the banks of which for the lower 125 miles are composed of clay and sand "containing marine shells," but higher up of "a very soft reddish-brown argillaceous limestone" (Wilson, l. c. 224A); and it extends north to the Winisk which enters Hudson Bay in lat. 55° 20' (Wilson, l. c.—for 1903 — 103A).

Hutchinson finds the limits of *Pinus Banksiana* "irregular" because "this species has migrated to 56° N. lat." in Labrador (which is acid Laurentian country) but "has been limited in its northward progress by the low-lying lands south and westward from James Bay" (the calcareous area). Why not reverse the argument and say that the limits of *Thuja occidentalis* are "irregular," since on the low-lying country southwest of Hudson Bay it has extended beyond 55° N. latitude, while it "has been limited in its northward progress" in Labrador by the Laurentian upland?

On the headwaters of the Severn River, entering Hudson Bay northwest of the Winisk, *Thuja* reaches its northern limit in that direction, though it is "a rare tree," nearly the whole country being Archaean, "but it occurs on the east end of Slate lake, on Sesikinaga lake, on Cedar (Kishikas) lake, and also on Greenshields lake. On the shores of the last a few rusty looking trees are growing, and this is their northern limit" (Camsell, xvi. 151A). The whole region is granite and gneiss, except for a few limited areas: "The valley of Slate lake, which has been formed by the erosion of the soft calc schists" (Camsell, l. c. 148A); "Two narrow tongues, however, of basic rocks" which "intervene before reaching Gull lake. One of these occurs on the Sesikinaga river" (Camsell, l. c. 147A); "basic inclusions . . . on the lake at the head of Cedar river; on the lower end of Cedar (Kishikas) lake" (Camsell, l. c. 148A); while "The highest hill in the whole area is situated about three miles west of Greenshields

lake. It rises 300 feet above the level of the water and is composed seemingly entirely of boulders and drift material" (Camsell, l. c. 146A).

Hutchinson quotes Bell's old statement that "there is a remarkable outlier of white cedar brushwood around Cedar Lake on the upper part of the Saskatchewan River at a distance of 190 miles to the northwest of the nearest point of the main area covered by this species." It is, therefore, significant to find Dowling stating that the Devonian coralline limestones of James Bay "are similar to rocks of Silurian age on Cedar lake in the Saskatchewan district" (Dowling, n. s. xiv. 36F). And is it not significant, also, that Hutchinson, writing of a vast Archaean country should state that "it is notable that throughout great areas, for instance the Temagami region, *Thuja* is unknown?" At this point in his discussion he was near the answer to his problem and had he pursued the question with that "notable" fact as a basis he would quickly have discovered the truth: that *THUJA OCCIDENTALIS* is almost as pronouncedly calcicolous as *PINUS BANKSIANA* is calciphobous.

The impression seems to be very general that *Thuja* prefers swamps, yet it is certainly noteworthy that in really wet swamps it is usually only a shrub or small tree, there rarely developing trunks 1 foot in diameter. In the area of its best development, the calcareous region of northern Maine, northwestern New Brunswick, and the Gaspé Peninsula, the splendid trees with trunks often 3 feet in diameter and sometimes twice that size are always on the well drained river-terraces or alluvial banks or on rocky slopes. In New Brunswick Ganong likewise notes that *Thuja* "shows a marked dualism of habitat, occurring most characteristically in low wet places ('Cedar swamps') but also capable, (at least individual trees are) of existence upon upland where conditions approach the xerophytic."¹ Similarly Professor L. W. Bailey described the Tobique as passing "near the base of high and precipitous cliffs of ferruginous rock, overhung with cedar";² in Connecticut two of the three stations are on limestone ledges; on the lower Hudson it was "on . . . fine bluffs of paleozoic limestone," and nearly at the southern limit of the species, along the Holston River, at altitudes mostly under 1,000 feet, "especially where the banks are rocky and cañon-like . . . Measurements of the largest

¹ Ganong, Bull. Nat. Hist. Soc. N. B. xxi. 55 (1902).

² L. W. Bailey, Can. Nat. ser. 2, i. 82 (1864):

trees were taken which showed trunks at each locality of about fifteen feet in circumference."¹

These facts indicate conclusively enough that, although in swamps *Thuja* forms impenetrable tangles of low, usually interlocking, small trees, it is on the better-drained or even xerophytic rock-habitats that it develops its full stature. Consequently if, as Hutchinson says, water is the "limiting factor" which prevents *Pinus Banksiana* from spreading into the limestone region southwest of James Bay, it certainly cannot be argued that *lack of water* is the factor which keeps *Thuja* from pushing north on the acid Archaean country; but, even if it be urged that *Thuja* most commonly occurs in swamps, it must be evident that there are plenty of swamps on the Labrador Peninsula, for Low tells us that water covers "at a moderate estimate, at least one fourth of the total area" of the peninsula (Low, n. s. viii. 23L).

Hutchinson (p. 488) says, further, that "The presence of 'outliers' . . . indicates that the general area of its distribution does not extend to its ecological limit, in many instances at least. The northern area of its distribution is roughly outlined by a semicircle, a fact which contributes evidence that *Thuja* has migrated radiately from a limited area . . . it does not migrate rapidly . . . this form has lagged behind." When, therefore, following Hutchinson's suggestion, we draw the circle connecting the "outliers" (in western North Carolina, western Prince Edward Island, western Anticosti, and Cedar Lake on the Saskatchewan) it is impressive to find that the center of the circle falls in the great acid Archaean area northeast of Lake Superior, the Temagami region; for Hutchinson particularly informs us that "it is notable that throughout great areas, for instance the Temagami region, *Thuja* is unknown." And since the Temagami region was not accessible to forests until after the vanishing of the Pleistocene ice, by Hutchinson's interpretation that the tree has "migrated radiately" we are forced to the dramatic picture of the infant *Thuja occidentalis* created in very modern times in the center of the Temagami region and finding nothing to live on, migrating as rapidly as its "lagging" tendency would allow to the calcareous regions northwest, north, east, and south!

Wherever the "Cedar swamp" is open and full of glades or swales it supports a characteristic vegetation quite unlike that of the acid

¹ Small & Vail, Mem. Torr. Bot. Cl. iv. 167 (1893).

bog, the following species being found in many such swamps of northern Maine, New Brunswick or Gaspé: *Selaginella selaginoides*, *Equisetum palustre* and *E. scirpoides*, *Triglochin palustris* and *T. maritima*, *Scirpus pauciflorus* and *S. hudsonianus*, *Eriophorum viridi-carinatum*, *Carex gynocrates*, *C. chordorhiza* and *C. vaginata*, *Juncus stygius*, *Orchis rotundifolia*, *Calypso bulbosa*, *Microstylis monophyllos*, *Cypripedium hirsutum* and *C. parviflorum*, *Betula pumila*, *Caltha palustris*, *Geum rivale*, *Rhamnus alnifolia*, *Angelica atropurpurea*, *Veronica americana*, *Valeriana uliginosa*, *Galium palustre*, and *Lonicera oblongifolia*. This long list of species is here entered because in Europe nearly all of them or their immediate European allies occur in the "low-moors," and Warming, the father of modern ecology, correctly states that "The water coming from low-moor is rich in calcium and potassium."¹ The Canadian "Cedar swamp" is, then, a phase of Warming's calcareous "low-moor"; and every farmer in northern Maine and New Brunswick knows perfectly well that by clearing a "Cedar swamp" he will get a valuable addition to his tillable acreage, but, wherever *Pinus Banksiana* grows the farmer knows it is useless to attempt cultivation. In fact, even the most ignorant "habitant" will argue that whenever that pine ("Cyprès," as he calls it) takes possession it makes the region sterile, and so powerful is its sterilizing influence that it is considered positively dangerous for a pregnant woman even to walk near a Banksian pine!

The law that some plants are oxylophytes, some calcicoles, is "as old as the hills" and it is just as true today as it was when Linney wrote of Kentucky: "Altitudes had little, here, to do with the distribution of the trees; only two natural conditions seem to have modified their disposition: one of minor importance — the quantity of moisture; and the other of much consequence — the character of the soil";² or when that great geologist, J. W. Dawson, wrote:

"Until the botanical geographer pursues his studies of distribution with a geological map in his hand, and a knowledge of the habitudes of plants in reference to soils, his labours will be to a great extent fruitless. A little more lime or a little less alkali in the soil renders vast regions uninhabitable by certain species of plants. For many of the plants of our Laurentide hills to extend themselves over the calcareous

¹ Warming, *Oecology of Plants*, transl. Groom & Balfour, 197 (1909).

² Linney, *Bot. of Madison, Lincoln, Garrard, Washington and Marion Counties, Ky.* 8 (1882).

plains south of them, under any imaginable conditions of climate, is quite as far beyond the range of possibility as to extend across the wide ocean."¹

The fact that many plants are calcicolous, many calcifuge, is clearly recognized by the European ecologists. Tansley in his wonderfully lucid little book, *Types of British Vegetation*, saying with perfect positiveness: "Soils containing a comparatively large proportion of lime are always marked by the presence and usually by the abundance of certain species of plants — the so-called 'calcicole' species. . . . Contrasting with the 'calcicole' species there are others, called 'calcifuge' which appear to be really intolerant of much lime in the soil."²

Again, Præger in his monumental *Irish Topographical Botany* says without quibble: "The presence or absence of lime is the most important particular in which petrology affects the distribution of plants; and in Ireland the bold grouping of the calcareous and non-calcareous rocks helps to emphasize this feature of phytogeology. . . . A knob of Old Red Sandstone . . . breaking through the limestone crust of the Central Plain, immediately produces *Galium saxatile*, *Vaccinium Myrtillus*, *Rumex Acetosella*, *Deschampsia flexuosa*, and other characteristic calcifuge species. . . . The converse case — the absence of calcicole species in counties poor in or devoid of limestone — is more strongly marked. . . . A . . . conspicuous line of demarkation — indeed one of the most remarkable phytogeological boundaries in Ireland — is seen where the Central Plain limestones lie up against the ancient metamorphic highlands of Connaught. . . . Here, as we pass off the limestone, *Habenaria intacta*, *Gentiana verna*, *Sesleria*, and other interesting plants which have been our companions over many miles, give way abruptly."³

Why is this almost axiomatic law blindly ignored or only grudgingly admitted by so many American physiographic ecologists and phytogeographers? That it is fundamental is beyond dispute, and by the English, Irish, and many other European investigators is clearly recognized as an essential factor in phytogeography; and as someone has said, "If the English and Irish agree on it, it must be so." Until American physiographic ecologists and phytogeographers recognize and use this law as a constant guide their labors, as Dawson prophetically said, "will be to a great extent fruitless."

¹ J. W. Dawson, *Can. Nat. and Geol.* vii. 342 (1882).

² Tansley, *Types of Brit. Veg.* 144 (1911).

³ Præger, *Irish Topogr. Bot.*: *Proc. Royal Irish Acad.* vii. p. xxvii (1901).

Though, as just said, the law itself is "as old as the hills," the recognition of it, naturally, is much more recent. Nevertheless it was clearly comprehended by the ancient Greeks. Here are the words of Theophrastus, written about 300 B. C.: "Yet it is not strange that there should be some mountains which do not thus bear all things, but have a more special kind of vegetation to a great extent if not entirely: for instance the range of Ida in Crete, for there Cupressus grows; or the hills of Cilicia and Syria, on which Cedrus grows; or certain parts of Syria where the terebinth grows. For it is the differences of soil which give a special character to the vegetation."¹

Cowles, who has found it necessary elsewhere to explain that he is one of "those of broader viewpoint," says that "The world of morphologists, physiologists and ecologists has borne with" the sinning taxonomist "patiently and long . . . a little more and the sinning taxonomist will be 'cast out into the outer darkness where there shall be wailing and gnashing of teeth',"² but he says nothing about our toleration of the sinning ecologist.³ Two of the great truths of science taught by the ancient Greeks, and just as true now as prior to the Christian era, were (1) that "it is the differences of soil which give a special character to the vegetation"; and (2) that the earth is round. In these days anyone who seriously argues that the earth is flat is treated as a pitiable eccentric or is kept in confinement.

GRAY HERBARIUM.

¹ Theophrastus, Hist. Plant. lib. iii. cap. 3 (circ. 300 B. C.).

² Cowles, Am. Nat. xlii, 270, 271 (1908).

³ Everyone, however, will agree with Cowles when in the same paragraph he says: "Species-making by taxonomic tyros must be abandoned"; but it is certainly diverting, that on the preceding page Cowles tried his hand at a most difficult genus and published two brand-new combinations, "*Crataegus mollis ellwangeriana*" and "*C. mollis champlainensis*," although in doing so he violated three of the articles of the International Code, which in a preceding paragraph he seems to defend: publishing without an adequate bibliographic reference to the name-bringing synonym; making trinomial, without indicating the category (whether subspecies, variety, or form); and decapitalizing a personal name, *Ellwangeriana*. Naturally, if this represents an ecologist's conception of taxonomic work it is not surprising that Cowles should condemn the "sinning" taxonomist.

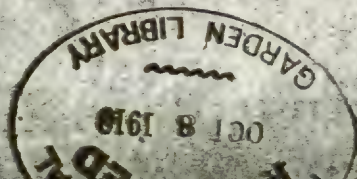
CONTRIBUTIONS FROM THE GRAY HERBARIUM
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NEW SERIES. — No. LIX ✓

- I. NOTES ON CERTAIN LEGUMINOSAE 1
II. RECLASSIFIED OR NEW SPERMATOPHYTES,
CHIEFLY NORTH AMERICAN 28

By J. FRANCIS MACBRIDE

HARVARD UNIVERSITY PRESS
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I. NOTES ON CERTAIN LEGUMINOSAE

BY J. FRANCIS MACBRIDE

In the course of ordering up portions of the *Leguminosae* at the Gray Herbarium it has become necessary from time to time to make new names and new combinations of names in order to have the work conform to the International Rules of Botanical Nomenclature. These matters are placed on record in this paper.

INGA VERA Willd., var. **lamprophylla** (Pittier), comb. nov. *Inga vera* Willd., subsp. *lamprophylla* Pittier, Contrib. U. S. Nat. Herb. xviii. 216 (1916).

INGA VERA Willd., var. **portoricensis** (Pittier), comb. nov. *Inga vera* Willd. subsp. *portoricensis* Pittier, Contrib. U. S. Nat. Herb. xviii. 217 (1916).

A few American botanists regard the terms "subspecies" and "variety" as synonymous and therefore interchangeable. Such an attitude must lead only to confusion because so many workers, especially European, in dealing with American plants, have used these categories (variety and subspecies) in quite different sense, the latter term invariably being applied to a rank just above the former, which of course is the interpretation placed upon these terms by the International Rules, Art. 12 and Art. 28. In accordance with this well established practice the plants cited above are better considered varieties, it seems to me, than subspecies, since, as Pittier has shown, they differ from the typical form only in matters of pubescence and even at times intergrade.

Enterolobium gummiferum (Mart.), comb. nov. *Pithecolobium gummiferum* Mart. Herb. Fl. Bras. 116 (1837). *E. ellipticum* Benth. in Hook. Lond. Journ. iii. 224 (1844).

Bentham, Trans. Linn. Soc. xxx. 598 (1875), referred Martius's plant to his *E. ellipticum* without doubt. The genus *Enterolobium* differs from *Pithecolobium* only in the character of the fruit as Bentham has pointed out, but this must suffice because many of the genera in the *Mimoseae* rest largely if not entirely upon

fruit-characters. Pittier, Contrib. U. S. Nat. Herb. xviii. 181 (1916), has called attention to the similarity of *Inga* and *Pithecolobium* even as regards characters of foliage when all the known species are taken into account. This fact, however, is no argument for the consideration of these plants under one generic name since both genera, on the whole, are quite distinct.

Merrill, Journ. Wash. Acad. Sci. vi. 42 et al. (1916), has shown, it seems to me conclusively, that the relationship of *Pithecolobium* and allied genera will become greatly simplified if the former be delimited so that it will no longer include species which are aberrant, especially in character of fruit, since these genera rest largely if not entirely upon fruit-characters. The same sort of characters used by Bentham and others to distinguish *Enterolobium*, *Albizzia* and *Calliandra* from *Pithecolobium* and from each other are exactly the type that present themselves for recognition in the case of the segregate genera *Samanea* (Benth.) Merrill and *Cathormion* Hassk. The situation resolves itself, therefore, into two possibilities, — either we must accord generic rank to certain species which have unique fruits and which cannot be placed logically in any of the genera maintained by Bentham or we must discard the character of the fruit as of vital moment for the definition of genera here and follow Mueller's proposal to recognize only one genus under the earliest name, *Albizzia*. This latter possibility has not been viewed with favor by any student of the group; Bentham commented adversely, Trans. Linn. Soc. xxx. 557 (1875), as did also Prain, Journ. As. Soc. Beng. lxvi. pt. 2. 253 (1897).

Samanea flexicaulis (Benth.), comb. nov. *Acacia flexicaulis* Benth. in Hook. Lond. Journ. i. 505 (1842). *Pithecolobium flexicaule* (Benth.) Coult. Bot. Gaz. xv. 270 (1890).

Samanea Schaffneri (Wats.), comb. nov. *Pithecolobium Schaffneri* Wats. Proc. Am. Acad. xvii. 352 (1882).

In spite of the presence of spines, the sessile flowers, and the at length indurated rather than pulpy mesocarp, these plants are to be regarded as species of *Samanea* since they have the strongly septate nearly straight pods that characterize the genus. Prain, Journ. As. Soc. Beng. lxvi. pt. 2. 253 (1897), has very properly stated that the differences which I have just listed between the above trees and *S. saman*, the type of the genus, are not distinc-

tions to which any importance can be attached for the definition of genera because of the variability of these characters within adjacent groups. Mr. Rieker, Bailey's Standard Cycl. Hort. vi. 3066 (1917), has transferred to this genus *Pithecolobium arboreum* (L.) Urban. The fruit of this tree is certainly not that of *Samanea*; it seems to be the same type as that which characterizes *Pithecolobium*.

Pithecolobium mangense (Jacq.), comb. nov. *Mimosa mangensis* Jacq. Stirp. Amer. 267 (1763). *M. parvifolia* Swartz, Fl. Ind. Occid. ii. 984 (1800). *P. parvifolium* (Swartz) Benth. in Hook. Lond. Journ. iii. 223 (1844).

There is no doubt as to the identity of the plant of Jacquin and that of Swartz and the former's name has priority.

Pithecolobium cochliocarpum (Gomez), comb. nov. *Mimosa cochliocarpos* Gomez, Obs. Pl. Bras. 30. t. 4. f. 3 (1803) (Mem. Acad. Lisboa, iii (1812), Mem. Corresp. 34). *Pithecolobium auaremotemo* Mart. Herb. Fl. Bras. 115 (1837).

Pithecolobium heterophyllum (Roxb.), comb. nov. *Mimosa heterophylla* Roxb. Fl. Ind. ii. 545 (1832). *P. angulatum* Benth. in Hook. Lond. Journ. iii. 208 (1844). *P. angulatum* Benth., var. *heterophylla* (Roxb.) Prain, Journ. As. Soc. Beng. lxvi. pt. 2. 275 (1897).

The first validly published name for this variable species is that of Roxburgh. Prain, l. c., has distinguished varietally the form with smaller more numerous leaflets. Merrill, Phil. Journ. Sci. v. 19 (1910), records only this variety from the Philippines which should be known as

PITHECOLOBIUM HETEROPHYLLUM (Roxb.) Macbr., var. **intermedium** (Prain), comb. nov. *P. angulatum* Benth., var. *intermedia* Prain, Journ. As. Soc. Beng. lxvi. pt. 2. 275 (1897).

Albizzia distachya (Vent.), comb. nov. *Mimosa distachya* Vent. Hort. Cels. t. 20 (1800). *Acacia lophantha* Willd. Sp. Pl. iv. 1070 (1806). *Albizzia lophantha* (Willd.) Benth. in Hook. Lond. Journ. iii. 86 (1844).

Albizzia Zygia (DC.), comb. nov. *Inga Zygia* DC. Mém. Lég. 440, t. 65 (1825). *Zygia Brownei* Walp. Rep. i. 928 (1842). *A. Brownei* (Walp.) Oliv. Fl. Trop. Afr. ii. 362 (1871). *Acacia Zygia* (DC.) Baillon in Drake del Castillo, Hist. Pl. Mad. i. 71 (1902).

Albizzia microphylla (Roxb.), comb. nov. *Mimosa microphylla* Roxb. Fl. Ind. ii. 549 (1832). *A. myriophylla* Benth. in Hook. Lond. Journ. iii. 90 (1844).

Albizzia sassa (Willd.), comb. nov. *Inga Sassa* Willd. Sp. Pl. iv. 1027 (1806). *Zygia fastigiata* E. Mey. Comm. Pl. Afr. Austr. 165 (1835). *A. fastigiata* (E. Mey.) Oliv. Fl. Trop. Afr. ii. 361 (1871). *Acacia Sassa* (Willd.) Baillon in Drake del Castillo, Hist. Pl. Mad. i. 71 (1902).

CALLIANDRA FORMOSA (Kunth) Benth., var. **gracilis** (Klotzsch), comb. nov. *C. gracilis* Klotzsch ex Baker, Saund. Refug. Bot. t. 294 (1871).

This variety differs chiefly in the presence of pubescence on the entire under surface of the leaves. The leaves of the typical form are quite smooth or slightly pubescent beneath toward the base. There is another and better marked variant which almost entirely replaces the typical form in the West Indies and which connects the species closely with the widely distributed and rather variable *C. portoricensis*. This form differs from genuine *C. formosa* in the narrower (elliptic-oblong) more numerous (8-12 pairs) leaflets. It may be known as

CALLIANDRA FORMOSA (Kunth) Benth., var. **cubensis**, var. nov., foliolis 8-12-jugis oblongo-ellipticis circa 17 mm. longis 7 mm. latis. — *C. gracilis* Griseb. Mem. Am. Acad. n. ser. viii. 180 (1861), as to some specimens, not as to descr. nor type. — CUBA: Wright, 2406 (TYPE, Gray Herb.), 154; Cayo Guajaba, *Schafer*, 2855; La Gloria, *Schafer*, 602; Santa Lucea, *Schafer*, 974. BAHAMAS: Andros, *Small & Carter*, 8439; Nassau, *Curtiss*, 83; Little Galiot Cay, *Britton & Millspaugh*, 2843.

CALLIANDRA UNIJUGA Rose, var. **pueblensis**, var. nov., ramulis et foliis et pedunculis plus minusve pubescentibus. — MEXICO: San Luis Tultitlanapa, Puebla, June, 1908, *Purpus*, 3185.

Except for the pubescence this shrub appears to differ in no fundamental way from the typical form of the species which is essentially glabrous and is known from Cuicatlan in adjacent Oaxaca.

Calliandra anomala (Kunth), comb. nov. *Inga anomala* Kunth, Mim. 70. t. 22 (1820). *C. grandiflora* Benth. in Hook. Journ. Bot. ii. 139 (1840), et al., at least in large part, not *Mimosa grandiflora* L'Hér. Sert. Angl. 30 (1788). *C. Kunthii* Benth., l. c.

CALLIANDRA ANOMALA (Kunth) Macbr., var. **Callistemon** (Schlecht.), comb. nov. *Acacia Callistemon* Schlecht. Linnaea, xii. 568 (1838).

The variety which passes into the typical form is ordinarily well-marked by the dense velvety pubescence which clothes the

young branchlets and peduncles. It is evident from the description of *Mimosa grandiflora* L'Hér. that it cannot be the same as Kunth's plant which has the divisions of the pinnae usually distinctly confluent and very oblique at base. I think there is no reasonable doubt but that it is rather referable to *C. Houstoni* (L'Hér.) Benth., a species which varies in the number of pinnae and the degree to which the leaflets are confluent. *C. Houstoni*, frequently distributed as *C. anomala*, is characterized by distinctly apiculate leaflets which are more or less pubescent (very rarely glabrous) beneath. The leaflets, too, are uniformly larger than those of *C. anomala* and its variety. Mr. G. Claridge Druce, Bot. Exch. Club, iii. v. 415 (1914), treats *C. Houstoni* under the name *C. inermis* (L.) Druce on the ground that *Gleditsia inermis* L. Sp. Pl. ed. 2. 1509 (1763) is the earliest name. Bentham, however, Trans. Linn. Soc. xxx. 557 (1875), has shown that *G. inermis* was based on several diverse elements only one of which, — the reference to Miller's figure (Ic. t. 5) — represents *C. Houstoni*. Linné's name, therefore, — if it is not to be rejected on the grounds that it "embraces elements altogether incoherent" — is to be taken up for *Acacia javanica* (Lam.) DC. since as to description (in large part) and habitat it applies to this plant of which only the foliage is known. It would seem, however, that this name, based on three widely different plants, viz., the thornless state of *Gleditsia triacanthos*, *Acacia javanica* and *Calliandra Houstoni*, is a name to be dropped in accord with Art. 51, 4 of the International Rules, quoted above.

Calliandra Selloi (Spreng.), comb. nov. *Acacia Selloi* Spreng. Syst. iii. 137 (1826). *C. brevipes* Benth. in Hook. Journ. Bot. ii. 140 (1840).

There is nothing in the description of *A. Selloi* to indicate that Bentham was not justified in referring it to his *C. brevipes*.

CALLIANDRA HIRSUTA (G. Don) Benth., var. **Sancti-Pauli** (Hassk.), comb. nov. *C. Sancti-Pauli* Hassk. Retzia, 214 (1855). *C. Tweedii* Benth., var. *Sancti-Pauli* (Hassk.) Benth. Trans. Linn. Soc. xxx. 553 (1875).

The more numerous (5-10 rather than 3-5) pinnae distinguish the variety. *C. Tweedii* Benth. in Hook. Journ. Bot. ii. 140 (1840) is not to be distinguished from *C. hirsuta* (G. Don.) Benth.

CALLIANDRA HAEMATOMMA (Bert.) Benth., var. **pubescens** (Urb.), comb. nov. *C. haematostoma* Urb., var. *pubescens* Urb. Symb. Ant. ii. 263 (1900).

CALLIANDRA HAEMATOMMA (Bert.) Benth., var. **minutifolia** (Urb.), comb. nov. *C. haematostoma* Urb., var. *minutifolia* Urb. Symb. Ant. ii. 263 (1900).

Urban, l. c., (before the Vienna Congress) changed Bertero's name for this species — as published by De Candolle, Mém. Lég. 448 (1825) — on the ground that it is incorrect. It is to be retained, however, as first published, in accord with Art. 57 of the International Rules as adopted at Vienna. The species exhibits three rather interesting variations all based upon the degree and positions of pubescence. The form first described (and this typical form, fortunately, is the most common) has glabrous or merely ciliate leaflets, glabrous calyx and densely pubescent corolla. The pubescence in the var. *pubescens* extends to the calyx and both sides of the leaflets. In the var. *glabrata* Griseb. even the corolla is glabrous. The var. *minutifolia* resembles the last except that the leaflets are usually more numerous and only 1–3 (rather than 4–6) mm. long.

Lysiloma divaricata (Jacq.), comb. nov. *Mimosa divaricata* Jacq. Hort. Schönbr. iii. 76. t. 395 (1798). *L. Schiedeana* Benth. in Hook. Lond. Journ. iii. 83 (1844).

This combination has not hitherto been made validly.

Acacia Bilimekii, nom. nov. *A. ambigua* Rose, Contrib. U. S. Nat. Herb. viii. 31 (1903), not *A. ambigua* Hoffmgg. Verz. Pfl. Nachtr. iii. 15 (1826). *A. sericocarpa* Rose, l. c. 300 (1905), not *A. sericocarpa* Fitzg. Journ. W. Austr. Nat. Hist. Soc. i. 9 (1904).

There is a specimen in the Gray Herbarium of this much named plant secured Jan. 10, 1866 at Cuernavaca by Bilimek, which is probably the earliest collection made of the species. I have never noticed that a plant has been named for Bilimek and it seems appropriate that this *Acacia* should bear his name. His specimens have from time to time come under my observation when studying Mexican plants but Hemsley does not seem to have known them. Bilimek was a gardener of Maximilian and was one of a commission sent in 1864 to explore the mining districts of Pachuca.

Acacia aculeatissima, nom. nov. *A. tenuifolia* Muell. Trans. Phil. Soc. Vict. i. 37 (1855), not *A. tenuifolia* (L.) Willd. Sp. Pl.

iv. 1091 (1806) a name which is to be revived to replace the later *A. paniculata* Willd. Sp. Pl. iv. 1074 (1806).

Acacia paniculata (Wendl.), comb. nov. *Mimosa paniculata* Wendl. Bot. Beob. 57 (1798). *M. discolor* Andr. Bot. Rep. t. 235 (1802). *A. discolor* (Andr.) Willd. Sp. Pl. iv. 1068 (1806).

The restoration of the name *A. tenuifolia* (L.) Willd. for the plant commonly known under the later name *A. paniculata* Willd. necessitates the taking up of Wendlan's name for the plant more recently called *A. discolor* (Andr.) Willd., since the specific name *paniculata* is no longer "already borne by a valid species."

Acacia terminalis (Salisb.), comb. nov. *Mimosa terminalis* Salisb. Prod. 325 (1796). *A. elata* A. Cunn. in Hook. Lond. Journ. i. 383 (1842).

It seems reasonably certain that Salisbury described the plant much later named by Cunningham. Port Jackson (Sidney), the type locality for *Mimosa terminalis*, is in the center of the range of *A. elata*, a species characteristic of the coast region. Furthermore Salisbury's characterization is in every way applicable to Cunningham's plant and accordingly I am taking up the former's name since it is the earlier.

Acacia binervia (Wendl.), comb. nov. *Mimosa binervia* Wendl. Bot. Beob. 56 (1798). *A. glaucescens* Willd. Sp. Pl. iv. 1052 (1806).

The specific name *binervia* is indeed inapplicable for this plant but since it is earlier than Willdenow's name it must be used in accord with the present rules of nomenclature. Wendlan himself, Comm. Acac. 53 (1820), indicated the identity of these Acacias.

ACACIA CAESIA (L.) Willd., var. **oxyphylla** (Grah.), comb. nov. *A. Intsia* (L.) Willd., var. *oxyphylla* Grah. ex Baker in Hook. Fl. Brit. Ind. ii. 297 (1878).

Bentham, Trans. Linn. Soc. xxx. 530 (1875), and Trimen, Fl. Ceylon, ii. 127 (1894), have indicated the identity of *A. caesia* and *A. Intsia*, two names of the same date, and have chosen the former. According to Art. 46 of the International Rules this choice must be abided by. It happens, too, that the name *caesia* has priority on the page. The above new combination, therefore, becomes necessary.

Acacia simplicifolia (L. f.), comb. nov. *Mimosa simplicifolia* L. f. Suppl. 436 (1781). *A. laurifolia* Willd. Sp. Pl. iv. 1053 (1806).

It is unfortunate, indeed, that this beautiful and unusual species of the South Pacific islands cannot, for reasons of priority, continue to be known by Willdenow's well-chosen name.

Acacia linearis (Wendl.), *comb. nov.* *Mimosa linearis* Wendl. Bot. Beob. 56 (1798). *M. linifolia* Vent. Jard. Cels, t. 2 (1800). *A. linifolia* (Vent.) Willd. Sp. Pl. iv. 1051 (1806).

The *Acacia* long known as *A. linearis* Sims, Bot. Mag. t. 2156 (June, 1820), must become *A. longissima* Wendl. Comm. Acac. 45, t. 11 (Jan., 1820). The specific name *linearis*, therefore becomes available, since it is no longer "already borne by a valid species," for the plant known as *A. linifolia* (Vent.) Willd., a name over which the earlier one of Wendland must now take precedence.

ACACIA PULCHELLA R. Br., var. **fagonioides** (Benth.), *comb. nov.* *A. fagonioides* Benth. in Hook. Lond. Journ. i. 387 (1842).

Diels & Pritzel in Engl. Bot. Jahrb. xxxv. 310 (1904) have indicated several of the more marked variants of this highly variable species. Although Bentham wrote, Fl. Austr. ii. 417 (1864), that these plants "are connected by too many intermediate forms to be separable even as varieties" they appear, after all, to be worthy a place in classification because they display, in their extreme development, such marked divergence from the type. The variety *fagonioides* is at once recognizable by the few small broadly obovate leaflets.

ACACIA CILIATA R. Br. in Ait. Hort. Kew. ed. 2, v. 465 (1813). *A. strigosa* Link, Enum. Hort. Berol. ii. 444 (1822).

Bentham and subsequent authors have followed Link, l. c., in rejecting Robert Brown's name because of the presence of *Acacia ciliata* Humb. & Bonpl. in Willd. Enum. Hort. Berol. 1055 (1809). But this latter name, as Bentham, Trans. Linn. Soc. xxx. 637 (1875), has shown, cannot be identified even approximately and therefore is to be discarded as is the case with *Rosa villosa* L. in accord with Art. 51, 4 of the International Rules, in order to avoid "a permanent source of confusion or error" since "certain identification seems impossible." This discardment, then, of *A. ciliata* Humb. & Bonpl. makes it possible to take up the first published name, *A. ciliata* R. Br., for the plant commonly known as *A. strigosa* Link because the specific name *ciliata* is no longer "already

borne by a valid species." Robert Brown's species is variable and in typical form seems to be confined to the region of King George's Sound. The few narrow and revolute leaflets as well as the branchlets are hispid-ciliate. There are four forms which differ considerably from this typical state and which consequently have received varietal recognition. Two of these varieties are represented in the Gray Herbarium. The variety *brevifolia* is characterized by the broad essentially plane and nearly or quite glabrous leaflets; the variety *intermedia* chiefly by the more numerous (6-7 pairs) but slightly revolute leaflets.

ACACIA CILIATA R. Br., var. **brevifolia** (Meissn.), comb. nov. *A. strigosa* Link, var. *brevifolia* Meissn. in Lehm. Pl. Preiss. i. 20 (1844).

ACACIA CILIATA R. Br., var. **intermedia** (E. Pritzel), comb. nov. *A. strigosa* Link, var. *intermedia* E. Pritzel in Engl. Bot. Jahrb. xxxv. 312 (1904).

ACACIA UNDULAEFOLIA Fraser, var. **piliger**a (A. Cunn.), comb. nov. *A. piliger*a A. Cunn. Bot. Mag. sub. t. 3394 (1835). *A. setiger*a A. Cunn. in Hook. Ic. t. 166 (1837).

This is distinguished from the typical form of the species by the long spreading hairs on the branches. The synonymy of this plant as given by Bentham, Trans. Linn. Soc. xxx. 465 (1875), is not entirely correct. In the first place the original publication is in Lodd. Bot. Cab. t. 1544 (1829) where Loddiges publishes the name *A. undulaefolia* for Fraser from whom he had received a specimen so labeled. Bentham credits the species to Cunningham "in G. Don, Gen. Syst. ii. 404." But this publication is three years later than Loddiges's. Among the synonyms Bentham lists "*A. uncinata*, Lodd.; Lindl. Bot. Reg. t. 1332." Lindley himself is the authority for this name, published in 1830, and it is an exact synonym of *A. undulaefolia* Fraser.

Schrankia microphylla (Dryand.), comb. nov. *Mimosa microphylla* Dryand. in J. E. Smith, Georgia Insects, ii. 123, pl. 62 (1797). *S. angustata* T. & G. Fl. N. A. i. 400 (1840). *Morongia microphylla* (Dryand.) Britton in Britton & Brown Ill. Fl. ed. 2. ii. 334 (1913).

Walter in his Fl. Car. 252 (1788) wrongly referred this plant to *Mimosa Intsia* L. to which indeed it bears superficial resemblance. *Mimosa Intsia* of Walter, therefore, is not a new name but repre-

sents merely an error in determination and accordingly is not to be taken up for this plant as Trelease has attempted, Rep. Ark. Geol. Surv. iv. 178 (1891). The first specific name is Dryander's as indicated above. The proper name for the closely related species commonly known as *S. uncinata* Willd. Sp. Pl. iv. 1043 (1806) is open to question. *Mimosa horridula* Michx. Fl. Bor. Am. ii. 254 (1803), if the same, is the earlier name and the correct binomial then is *S. horridula* (Michx.) Heller. But so far as can be determined from Michaux's description his plant may rather have been the earlier described *M. microphylla*. *M. horridula* Michx., therefore, would seem to be a name to be discarded in accord with Art. 51, 4 of the International Rules since "certain identification seems impossible." *Morongia occidentalis* Woot. & Standl. Contrib. U. S. Nat. Herb. xvi. 135 (1913) seems to be merely a pubescent state of *S. Roemeriana* (Scheele) Blankinship. This species exhibits a tendency to be more or less pubescent even in the region of the type (southern Texas) and this character becomes more evident in specimens from farther north. Tracy's no. 8018, for instance, from Big Springs, Howard County, is quite as pubescent as the New Mexican material. I am also unable to see any difference in the nature of the prickles on the fruit of the typical glabrate form and on that of the more pubescent state.

SCHRANKIA QUADRIVALVIS (L.) Merrill, var. **jaliscensis**, var. nov., foliolis lineari-lanceolatis aculeatissimis 10-15-jugis; pedunculis saepius elongatis. — MEXICO: Guadalajara, Jalisco, Pringle, 4453 (TYPE, Gray Herb.); also 5136; Rio Blanco, Jalisco, Palmer, 164.

This is very possibly a distinct species but I hesitate at this time to give it more than varietal recognition because of the seeming great variability displayed by all the species. Even those characters generally relied upon to distinguish species in this genus appear to be none too stable. For instance a series of specimens of *S. quadrivalvis* from Saltillo and Monterey displays remarkable variation in the prominence of the veins of the leaflets, yet the relative obviousness of the leaflet-veins of *S. microphylla* and *S. uncinata* furnishes the chief means of distinguishing these species and indeed it seems a reliable character so far as these plants are concerned. Bentham, Trans. Linn. Soc. xxx. 442 (1875), questioned the constancy of this character. But unfortunately none

of the species appears to be sharply defined, or the real characters are yet to be indicated.

Schrankia pilosa (Standley), comb. nov. *Morongia pilosa* Standley, Contrib. U. S. Nat. Herb. xviii. 105 (1916).

Seemingly specifically distinct from *S. distachya* DC. by virtue of the numerous crowded pinnae, leaflet-bearing nearly to the base. Standley also mentions the short peduncles and pilose stem as diagnostic characters but the heads of *S. distachya* are sometimes sessile and all the species seem to vary from glabrous to distinctly pubescent.

MIMOSA BOREALIS Gray, Mem. Am. Acad. n. ser. iv. 39 (1849). Wooton & Standley, Contrib. U. S. Nat. Herb. xix. 332 (1915), have confused, perhaps inadvertently, this species and *M. fragrans* Gray, Bost. Journ. Nat. Hist. vi. 182 (1850). At least this is the case if I interpret correctly their note to *M. fragrans* but their remarks are so poorly and obscurely worded that it is impossible to determine definitely to which species they refer. However this may be, the species are, as Dr. Robinson, Proc. Am. Acad. xxxiii. 324-325 (1898), has pointed out, very closely related and indeed it may be questioned whether they are truly distinct. The constancy of the characters which appear from herbarium material to differentiate *M. borealis* and *M. fragrans* can be proved only by observation in the field. It seems possible to distinguish specimens as follows.

- | | |
|---|---------------------|
| Leaflets 2-4 mm. long, crowded, rarely placed 2 mm. apart, 3-5 pairs; pod smooth or rarely more or less spiny | <i>M. borealis.</i> |
| Leaflets 4-7 mm. long, relatively distinct, about 3 mm. apart, 4-7 pairs; pod apparently not at all or but slightly spiny | <i>M. fragrans.</i> |

The pods of the type of *M. borealis* are spiny but material with smooth pods is not otherwise distinguishable and this character is known to be variable in the case of related species. Specimens of *M. borealis*, hitherto known from New Mexico and western Texas have been distributed from western Oklahoma by Dr. G. W. Stevens.

MIMOSA ACULEATICARPA Ort., var. **desmanthocarpa** (Robinson), comb. nov. *M. acanthocarpa* (Willd.) Benth., var. *desmanthocarpa* Robinson, Proc. Am. Acad. xxxvi. 472 (1901).

Since *M. aculeaticarpa* Ort. Dec. 134 (1800) is the earlier name the new varietal combination given above becomes necessary. Willdenow's name was published in his Enum. Hort. Berol. 1057 (1809).

MIMOSA ACULEATICARPA Ort., var. **imparilis**, var. nov., ramis granulo-glanduliferis et plus minusve hirsutis. — MEXICO: Los Fresnos, March 20, 1898, *Langlassé*, 54 (TYPE, Gray Herb.).

This plant has the pubescence of *M. Galeottii* Benth. but the pods are exactly those of *M. aculeaticarpa* Ort. The variety *desmanthocarpa* exhibits in some degree the granular glandulosity of the variety *imparilis* but, like the typical form of the species, it lacks the hirsute pubescence.

Mimosa Standleyi, nom. nov. *M. Williamsii* Standley, Contrib. U. S. Nat. Herb. xviii. 105 (1916), not *M. Williamsii* Rusby, Bull. N. Y. Bot. Gard. viii. 91 (1912).

Mimosa Benthami, nom. nov. *M. fasciculata* (Kunth) Benth. in Hook. Lond. Journ. v. 88 (1846), not *M. fasciculata* Benth. in Hook. Journ. Bot. iv. 383 (1842). *Acacia fasciculata* Kunth, Mim. 75, t. 23 (1821).

MIMOSA BENTHAMII Macbr. var. **malacocarpa** (Robinson), comb. nov. *M. fasciculata* (Kunth) Benth., var. *malacocarpa* Robinson, Proc. Am. Acad. xxxiii. 319 (1898).

It is necessary, in accord with the International Rules Art. 51, 1, to rename these species.

MIMOSA BIMUCRONATA (DC.) Ktze., var. **ADENOCARPA** Hassl.; *M. bimucronata* (DC.) Ktze., subsp. *sepiaria* (Benth.) Hassl., var. *adenocarpa* Hassl. Fedde, Rep. Spec. ix. 3 (1910).

MIMOSA BIMUCRONATA (DC.) Ktze., var. **hexandra** (Micheli), comb. nov. *M. hexandra* Micheli, Contr. Flor. Parag. ii. 91, pl. 27 (1889). *M. bimucronata* (DC.) Ktze., subsp. *hexandra* (Micheli) Hassl. in Fedde, Rep. Spec. ix. 3 (1910), and var. *intermedia* Hassl., l. c.

Although these varieties in their more pronounced forms (as Hassler has described them, l. c.) are well marked it is evident that their characters are inconstant and that consequently they intergrade with the type.

Mimosa leprosa (Bong.), comb. nov. *M. calodendron* Mart., var. *leprosa* Bong. ex Benth. Mart. Fl. Brasil. xv. pt. 2. 352 (1876).

I think this shrub is well deserving specific rank. Its larger more numerous closely approximate leaflets with dull upper surfaces give it an aspect at once different from that of the shrub to

which it has been referred varietally. The species may be contrasted as follows.

- | | |
|--|------------------------|
| Leaflets mostly 12 pairs, closely approximate, glabrous and dull above, lepidote or early becoming glabrate beneath, the larger 10–15 mm. long, 4–5 mm. broad; calyx glabrate in age | <i>M. leprosa.</i> |
| Leaflets mostly 8 pairs, relatively remote, very smooth and polished above, densely lepidote not early if ever glabrate beneath, the larger 7 mm. long, less than 4 mm. broad; calyx not glabrate in age | <i>M. calodendron.</i> |

Mimosa globosa (Gillies), comb. nov. *Prosopis globosa* Gillies in Hook. Bot. Misc. iii. 205 (1833). *M. Gilliesii* Benth. in Hook. Journ. Bot. iv. 413 (1842).

Since the specific name *globosa* has not as yet been used in this genus, Gillies' name, though not particularly apt, must be taken up for this peculiar Patagonian species.

MIMOSA INCANA (Spreng.) Benth., var. **robusta**, var. nov., ramis multo validioribus; foliis circa 15 mm. longis circa 5 mm. latis utrinque pubescentibus. — PARAGUAY: Upper Paraná, Fiebrig, 5629 (TYPE, Gray Herb.).

The much stouter branches and larger leaflets distinguish this variety. The leaflets of the typical form are rarely 8 mm. long and usually glabrous above.

Mimosa macrostachya (Benth.), comb. nov. *Schranckia macrostachya* Benth. in Hook. Journ. Bot. iv. 414 (1842). *M. millefoliata* Scheele, Linnaea, xvii. 337 (1843).

MIMOSA MACROSTACHYA (Benth.) Macbr., var. **glaberrima** (Chod. & Hassl.), comb. nov. *M. millefoliata* Scheele, var. *glaberrima* Chod. & Hassl. Bull. Herb. Boiss. ser. 2, iv. 554 (1904).

Since the specific name *macrostachya* is not "already borne by a valid species" of *Mimosa* (*M. macrostachya* Poir. is an *Acacia*), it is available for this plant and must replace the later published name of Scheele.

MIMOSA PARAGUARIAE Micheli, var. **induta** (Hassl.) comb. nov. *M. paraguayae* Micheli, var. *genuina* Hassl., forma *induta* Hassl. in Fedde, Rep. Spec. ix. 7 (1910).

This is a good variety differing from the typical form of the species not only in the presence of the eglandular indument among the gland-tipped trichomes but also in the more rigid character of the latter. Fiebrig's number 6124 from the upper Paraná is to be referred here.

Mimosa Herzogii, nom. nov. *M. eurycarpa* Herzog in Fedde, Rep. Spec. vii. 53 (1909), not *M. eurycarpa* Robinson, Proc. Am. Acad. xxxiii. 322 (1898).

The name chosen by Herzog for this unique *Mimosa* of Bolivia must be changed because it has already been used for a valid Mexican species.

DESMANTHUS ILLINOENSIS (Michx.) MacM., var. **glandulosus** (Michx.), comb. nov. *Mimosa glandulosa* Michx. Fl. Bor. Am. ii. 254 (1803). *Darlingtonia brachyloba* DC., var. *glandulosa* (Michx.), T. & G. Fl. N. A. i. 401 (1840).

This variety differs from the typical form of the species with which it merges, cf. Torrey & Gray, l. c., in the presence of a gland at the base of all the pinnae, rather than at the base of the lowest pair only.

Desmanthus pumilus (Schlecht.), comb. nov. *Mimosa pumila* Schlecht. Linnaea, xii. 557 (1838). *D. incurvus* Benth. in Hook. Lond. Journ. v. 84 (1846).

Bentham remarked, l. c., that Schlechtendal's plant "from the description would appear to differ only from *D. incurvus* in the breadth of the pod, which is stated to be 3 lines instead of 2 as in *D. incurvus*." And in his monograph, Trans. Linn. Soc. xxx. 387 (1875), he wrote "*Mimosa pumila*, . . . is probably, from the description, the same species, or one closely allied to it." I think that there is no reasonable doubt as to the identity of these plants. The slight discrepancy which Bentham noted in the description of the pod is of no moment for fully mature pods may attain a width of 6 mm. as is illustrated by Pringle's number 2852 from Coahuila. It may be noted furthermore that *M. pumila* was based on a specimen collected by Ehrenberg at Regla, Hidalgo, which is quite within the known range of Bentham's plant.

Desmanthus hexapetalus (Micheli), comb. nov. *Neptunia hexapetala* Micheli, Contrib. Fl. Parag. i. 50, pl. 17 (1883). *D. Michelii* Hassl. Bull. Herb. Boiss. ser. 2, vii. 5 (1907).

Hassler, l. c., has shown that this odd plant is a species of *Desmanthus* but he rejected Micheli's specific name *hexapetalus* on the ground that it is rarely applicable. Nevertheless, since the name is not already used for a valid species of *Desmanthus* it must be taken up as the proper name in accord with present-day nomenclature. From Hassler's interesting account of this unique species its aspect when growing must be even more extraordinary than appears from herbarium material.

NEPTUNIA PROSTRATA (Lam.) Baillon, Bull. Soc. Linn. Par. i. 356 (1883). *Mimosa prostrata* Lam. Diet. i. 10 (1783). *M natans* L. f. Suppl. 439 (1781) as to name and specimen cited, not as to description according to Vahl, Symb. Bot. iii. 102 (1794). *N. oleracea* Lour. Fl. Cochinch. ii. 654 (1790).

A very unfortunate situation in nomenclature exists here. *Mimosa natans* L. f. as to description at least is *M. triquetra* Vahl, subsequently treated as *Neptunia triquetra* (Vahl) Benth. But the specific name *natans* is quite inapplicable to the terrestrial plant of Vahl; and indeed the specimen cited by Linnaeus filius is said by Vahl, l. c., to be the floating plant commonly known as *N. oleracea*. Accordingly it does not seem that the interests of either accuracy or reason would be satisfied by taking up the name *natans* for the plant described by Linnaeus filius and later called *triquetra* by Vahl. But on the other hand there would seem to be no greater justification for applying the Linnaean name to the floating plant since this plant clearly is not described unless the word "natans" be accepted as description. The binomial *Mimosa natans* L. f., therefore, is, so far as regards its application to the hydrophytic *N. oleracea*, a *nomen nudum*, and in any case it is certainly a *nomen confusum* to be discarded in accord with Art. 51, 4 of the International Rules because it is a name which "becomes a permanent source of confusion or error" if used. With the rejection of the Linnaean binomial the first available name for the floating plant, then, is *M. prostrata* Lam., i. e., *N. prostrata* (Lam.) Baillon, l. c. Lamarck's name is based primarily on "Niti-Toddaraddi. Rheed. mal. 9. tab. 20" which is a good illustration of the characteristic *Neptunia* commonly known as *N. oleracea*. Furthermore, Lamarck describes definitely this plant so there can be no question whatever as to the application of his name even though he refers to it " β *Mimosa natans*" as a smaller state. And his characterization of this "variety" *Mimosa natans* cannot be regarded as defining by emendation the Linnaean species, which, even though he refers to it *binomially* he evidently treats *varietally*, since his characterization is in no way diagnostic but merely describes a less vigorous state. Lamarck's own specific name *prostrata*, therefore, being perfectly definite in its application, is the correct name for the plant later described as *Neptunia oleracea* Lour., l. c.

CAILLIEA Guill. & Perr. Fl. Seneg. 239 (1833). *Dichrostachys* (DC.) Wight & Arnott, Prod. i. 271 (1834). *Desmanthus* Willd., sect. *Dichrostachys* DC. Prod. ii. 445 (1825).

In spite of the fact that Guillemain & Perrottet carefully called attention to the fact that DeCandolle treated these plants as constituting only a section of *Desmanthus* their name has been neglected ever since publication although it is the first generic name for the group since the *Florae Senegambiae* appeared in 1833, a year before Wight & Arnott in their *Prodromus*, l. c., raised De Candolle's sectional name *Dichrostachys* to generic rank. The recognition of *Cailliea* will necessitate a number of new combinations of which the following may be made now.

Cailliea glomerata (Forsk.), comb. nov. *Mimosa glomerata* Forsk. Fl. Aeg. Arab. 177 (1775). *M. nutans* Pers. Syn. ii. 266 (1807). *C. dichrostachys* Guill. & Perr. Fl. Seneg. 240 (1833). *Dichrostachys nutans* (Pers.) Benth. in Hook. Journ. Bot. iv. 353 (1842).

Bentham, Trans. Linn. Soc. xxx. 633 (1875), included *Mimosa glomerata* Forsk. in his list of species unrecognizable from description. But notwithstanding Forskal's meager characterization of his plant it is obvious that he was naming the species later known as *Dichrostachys nutans* since this is the only member of the *Mimosidae* growing in Arabia which has "Folia bipinnata" and "Legumen nigrum contorto-globosum." Schweinfuth, Bull. Herb. Boiss. iv. App. 2. 218 (1896), has referred *Mimosa glomerata* Forsk. here without question.

Cailliea cinerea (L.), comb. nov. *Mimosa cinerea* L. Sp. Pl. 517 (1753). *Dichrostachys cinerea* (L.) Wight & Arnott, Prod. 271 (1834).

Cailliea platycarpa (Welw.), comb. nov. *Dichrostachys platycarpa* Welw. Apont. 576 (1858?).

Cailliea spicata (Muell.), comb. nov. *Neptunia spicata* Muell. Frag. Austr. iii. 151 (1863). *Dichrostachys Muelleri* Benth. Fl. Austr. ii. 299 (1864).

Cailliea tenuifolia (Benth.), comb. nov. *Dichrostachys tenuifolia* Benth. in Hook. Journ. Bot. iv. 353 (1842).

Prosopis cineraria (L.), comb. nov. *Mimosa cineraria* L. Sp. Pl. ed. 2. ii. 1500 (1763). *P. spicigera* L. Mant. 68 (1767). *P. spicata* Burm. Fl. Ind. 102 (1768).

In the Gray Herbarium copy of Mantissa the name given in all later references as *P. spicigera* is spelled "*P. picigera*."

Prosopis farcta (Russell), comb. nov. *Mimosa farcta* Russell, Nat. Hist. Alep. ed. 2. ii. 266 (1794). *M. Stephaniana* Bieb. Casp. 205 (1800). *P. Stephaniana* (Bieb.) Kunth ex Spreng. Syst. ii. 326 (1825).

Neither of these characteristic species of *Prosopis*, the former of southern Asia and the latter of the Mediterranean region, seems to have been properly christened.

Piptadenia gonoacantha (Mart.), comb. nov. *Acacia gonoacantha* Mart. Herb. Fl. Bras. 109 (1837). *P. communis* Benth. in Hook. Journ. Bot. iv. 337 (1842).

There is no doubt as to the identity of the plant of Martius and that of Bentham. The latter author in his revision, Trans. Linn. Soc. xxx. 370 (1875), refers here with doubt *Acacia callosa* Spreng. Syst. iii. 138 (1826). It is impossible to identify Sprengel's plant from description which applies quite as well to *P. filicicoma* as to *P. communis* except that in neither of these species are the spikes "paniculate." Sprengel's name, therefore is not to be taken up for a known species of *Piptadenia* unless its identity can be established by reference to the collection upon which the name was based.

Piptadenia fruticosa (Mart.), comb. nov. *Acacia fruticosa* Mart. Herb. Fl. Bras. 107 (1837). *P. latifolia* Benth. in Hook. Journ. Bot. iv. 335 (1842).

Piptadenia adiantoides (Spreng.), comb. nov. *Acacia adiantoides* Spreng. Syst. iii. 146 (1826). *P. laxa* Benth. in Hook. Journ. Bot. iv. 335 (1842). *P. laxa* Benth., var. *pubescens* Benth. in Mart. Fl. Bras. xv. pt. 2. 274 (1876).

As Bentham indicated, Hook. Journ. Bot. iv. 355, these plants are very closely related. A series of collections is needed, however, to show whether they intergrade. Typical *P. adiantoides* is somewhat pubescent and was treated by Bentham in the Flora Brasiliensis, l. c., as the var. *pubescens* of his *P. laxa*, the glabrate form, which should, perhaps, be recognized varietally.

Piptadenia grata (Willd.), comb. nov. *Acacia grata* Willd. Enum. Hort. Berol. 1056 (1809). *P. macrocarpa* Benth. in Hook. Journ. Bot. iv. 341 (1842).

Piptadenia obliqua (Pers.), comb. nov. *Sophora obliqua* Pers. Syn. Pl. i. 452 (1805). *Acacia Thibaudiana* DC. Prod. ii. 456 (1825). *P. moniliformis* Benth. in Hook. Journ. Bot. iv. 339 (1842).

These two *Piptadenias* of South America have seemingly not been given before their first specific designations, *grata* and *obliqua*, two names which have not already been used for species in this genus and which consequently are available for these plants.

GOLDMANIA Rose ex Micheli, Mém. Soc. Phys. Genève, xxxiv. 274, t. 20 (1903).

Harms in Ergänzungsheft ii. 148 (1906) of Die Natürlichen Pflanzenfamilien has observed, in regard to the above genus, "Es ist mir sehr fraglich, ob sich die Gattung aufrecht erhalten lässt; sie dürfte vor allem mit *Piptadenia* Benth. sehr nahe verwandt sein. Ob das Vorhandensein eines dünnen Endosperms genügt zur Abtrennung von *Piptadenia*, ist um so zweifelhafter, als die Samenstruktur durchaus nicht aller *Piptadenia*-Arten bekannt ist." And Micheli, in publishing the genus for Rose, l. c., remarked that "L'apparition générale de cette plante, la structure du fruit, etc., la rapprochent beaucoup du genre *Piptadenia* auquel nous l'avions d'abord rattachée; mais l'observation de M. Rose d'après laquelle l'embryon est entouré d'une mince couche d'endosperme la rapprochent des *Adéanthérées* et spécialement du genre *Prosopis* dont l'éloigne d'ailleurs son fruit déhiscent."

I fail to see that any useful purpose is served by the segregation of a genus upon a character so technical and difficult of observation as this when the plants concerned possess no other differences; and, as both Micheli and Harms indicate, the plants referred to *Goldmania* are good *Piptadenias* in all save this one respect. It is worthy of note that a co-type specimen in the Gray Herbarium of *G. constricta* was originally determined by Micheli as a new species of *Piptadenia*. The reduction of *Goldmania* to *Piptadenia* necessitates the transfer of the following species.

Piptadenia platycarpa (Rose), comb. nov. *Goldmania platycarpa* Rose, Mém. Soc. Phys. Genève, xxxiv. 274 (1903).

Piptadenia constricta (Micheli & Rose), comb. nov. *Goldmania constricta* Micheli & Rose, Mém. Soc. Phys. Genève, xxxiv. 274. t. 20 (1903).

ELEPHANTORRHIZA ELEPHANTINA (Burch.) Skeels, var. ***Burkei*** (Benth.), comb. nov. *E. Burkei* Benth. in Hook. Lond. Journ. v. 81 (1846).

The half dozen specimens of this species which I have seen appear to confirm Bentham's suggestion expressed in Trans. Linn.

Soc. xxx. 365 (1875) that the more northern plant "is probably a variety only" of the southern and typical form which has somewhat smaller more definitely apiculate leaflets but which exhibits considerable variation in these characters. It seems best, therefore, to regard *E. Burkei* as only a geographical variant generally recognizable by its larger scarcely apiculate leaflets.

Entada spicata (E. Mey.), comb. nov. *Mimosa spicata* E. Mey. Comm. Pl. Afr. Austr. 164 (1835). *Entada natalensis* Benth. in Hook. Journ. Bot. iv. 333 (1842). *Adenopodia spicata* (E. Mey.) Presl, Epimel. Bot. 207 (1849).

Since Merrill, Phil. Journ. Sci. v. 32-33 (1910), called attention to the fact that *Entada* is not the earliest name for the genus it has been conserved in accord with the International Rules.

Parkia Oliveri, nom. nov. *P. intermedia* Oliver, Fl. Trop. Afr. ii. 324 (1871), not *P. intermedia* Hassk. Hort. Bogor. 289 (1844).

The evidence submitted by Merrill, Phil. Journ. Sci. v. 34 (1910), and by Prain, Journ. As. Soc. Beng. lxvi. pt. 2, 240 (1897), as to the validity of *Parkia intermedia* Hassk. makes necessary the renaming of the species more recently given the name *intermedia* by Oliver since this name is no longer borne by a species "universally regarded as a synonym."

Parkia pedunculata (Roxb.), comb. nov. *Mimosa pedunculata* Roxb. Fl. Ind. ii. 551 (1832). *P. biglandulosa* Wight & Arnott, Prod. 279 (1834).

Prain, Journ. As. Soc. Beng. lxvi. pt. 2. 239 (1897), has shown that "the doubts expressed by Wight & Arnott as to the identity of their plant with Roxburgh's *Mimosa pedunculata* are unfounded." The latter's name, since it is the earlier, must therefore replace that of Wight & Arnott.

Parkia arborea (Karst.), comb. nov. *Paryphosphaera arborea* Karst. Fl. Colomb. ii. 7, t. 104 (1862). *P. Paryphosphaera* Benth. Trans. Linn. Soc. xxx. 363 (1875).

Cynometra phaselocarpa (Hayne), comb. nov. *Vouapa phaselocarpa* Hayne, Flora, x. vol. ii. 745 (1827). *C. racemosa* Benth. in Hook. Journ. Bot. ii. 100 (1840).

Cynometra Martiana (Hayne), comb. nov. *Trachylobium Martianum* Hayne, Flora, x. vol. ii. 744 (1827), excl. syn. *C. Spruceana* Benth. in Mart. Fl. Bras. xv. pt. 2. 247 (1870).

CYNOMETRA MARTIANA (Hayne) Macbr., var. **procera** (Benth.), comb. nov. *C. Spruceana* Benth., var. *procera* Benth. in Mart. Fl. Bras. xv. pt. 2. 248 (1870).

C. Martiana (Hayne) Baillon is a valid species of *Hymenaea* (*H. Martiana* Hayne). The specific name *Martiana* may be used therefore for the species of *Cynometra* which has heretofore borne the later published name *C. Spruceana* as indicated in the above synonymy.

Crudia glaberrima (Steud.), comb. nov. *Hirtella glaberrima* Steud. Flora, xxvi. 761 (1843). *Crudya obliqua* Griesb. Fl. Brit. W. Ind. 216 (1860). *Apalatoa glaberrima* (Steud.) Taub. Bot. Centralb. xlvii. 394 (1891).

Crudia tomentosa (Aubl.), comb. nov. *Parivoa tomentosa* Aubl. Pl. Guiana, ii. 759, t. 304 (1775). *Crudya Parivoa* DC. Prod. ii. 520 (1825). *Apalatoa tomentosa* (Aubl.) Taub. Bot. Centralb. xlvii. 394 (1891).

Crudia is included in the list of nomina conservanda of the International Rules. The name *C. bantamensis* (Hassk.) Benth. Trans. Linn. Soc. xxv. 315 (1865) is omitted in the Index Kewensis, a circumstance which has caused Merrill to make the combination as new in Phil. Journ. Sci. v. 39 (1910).

WESTIA Vahl, Sk. Naturh. Selsk. vi. 117 (1810). *Berlinia* Soland. ex Hook. f. & Benth. Fl. Nigrit. 326 (1849).

Vahl referred to his genus two plants, *W. grandiflora* and *W. parviflora*. The latter, according to Bentham and Hooker, Gen. Pl. i. 583 (1865) and Oliver, Fl. Trop. Afr. ii. 294 (1871) is not congeneric although its exact identity does not appear to have been determined. *W. grandiflora*, however, has been definitely identified by Oliver, who saw the type material, as *Berlinia acuminata* Soland. Since Vahl's characterization is evidently drawn from this plant, which moreover is the first mentioned species, it is to be taken as the type of his genus *Westia*, that is, it is the species upon which *Westia* is to be regarded as being based regardless of the fact that the author referred to the same genus a plant which is now known to belong elsewhere. Accordingly *Westia* becomes the proper name for the group of plants known later as *Berlinia*. The restoration of Vahl's genus will require a number of transfers of which the following may be made now.

Westia auriculata (Benth.), comb. nov. *Berlinia auriculata* Benth. Trans. Linn. Soc. xxv. 309 (1865).

Westia bracteosa (Benth.), comb. nov. *Berlinia bracteosa* Benth. Trans. Linn. Soc. xxv. 309 (1865).

Westia Eminii (Taub.), comb. nov. *Berlinia Eminii* Taub. ex Engl. Pfl. Ost-Afr. pt. C. 199 (1895).

Westia paniculata (Benth.), comb. nov. *Berlinia paniculata* Benth. Trans. Linn. Soc. xxv. 311 (1865).

Westia stipulacea (Benth.), comb. nov. *Berlinia stipulacea* Benth. Trans. Linn. Soc. xxv. 310 (1865).

Westia angolensis (Welw.), comb. nov. *Berlinia angolensis* Welw. ex Benth. Trans. Linn. Soc. xxv. 310 (1865).

Westia bifoliolata (Harms), comb. nov. *Berlinia bifoliolata* Harms in Engl. Bot. Jahrb. xxx. 83 (1901).

Westia Scheffleri (Harms), comb. nov. *Berlinia Scheffleri* Harms in Engl. Bot. Jahrb. xxx. 83 (1901).

Westia tomentosa (Harms), comb. nov. *Berlinia tomentosa* Harms in Engl. Bot. Jahrb. xxx. 321 (1901). *Isoberlinia tomentosa* (Harms) Craib & Stapf, Kew Bull. 1912. 93 (1912).

Harms' reference, Engl. Bot. Jahrb. liii. 465 (1915), to *Isoberlinia* connotes refutation rather than acceptance of the arguments Craib & Stapf advance in behalf of the validity of their segregate genus. I am not inclined to recognize *Isoberlinia* because its characters are relative in nature and most of them highly variable.

Macrolobium macrophyllum (Beauv.), comb. nov. *Anthonotha macrophylla* Beauv. Fl. Ouar. i. 71, t. 42 (1805). *Vouapa macrophylla* (Beauv.) Baill. Adans. vi. 178 (1865). *M. Palisoti* Benth. Trans. Linn. Soc. xxv. 308 (1865).

Bentham no doubt satisfied taxonomical courtesy by naming this plant for the author, Palisot de Beauvois, when he assigned it to *Macrolobium* but unfortunately this pleasing action conflicts with the inexorable rule of priority.

GRIFFONIA Baill. Adans. vi. 188, t. 2 (Oct. 7, 1865). *Bandeiraea* Welw. ex Benth. & Hook. f. Gen. Pl. i. 577 (Oct., 1865).

The latter name was retained by Oliver, l. c., and by Bentham, l. c. 1003, although both these authors were aware of the publication of *Griffonia*. After Bentham's suppression of Baillon's name, Taubert in Engl. & Prantl, Pflanzenf. iii. Abt. 3. 147 (1892) was the first to give it recognition. Since then it has been accepted by Dalla Torre & Harms, Gen. Siph. and by Thonner, in his "Flowering Plants of Africa," but none of these authorities states how he reached the conclusion that *Griffonia* is the earlier name and the name therefore to be adopted. The facts in regard to this seem to be these. We know *Griffonia* was published Oct. 7, but the date of publication of *Bandeiraea* is not so definite. It seems evident,

however, that it was not actually published until the last of October because it was not reviewed in the Gardner's Chronicle until Nov. 11. But the most convincing proof of its appearance later than Oct. 7, the date of publication of Baillon's name, is found in the Journal of Botany, iii. 355 (Nov. 1, 1865) where the reviewer of the Genera Plantarum writes, "The second part of this admirable work has just been published." It seems reasonably certain, therefore, that *Griffonia* is by two or three weeks the earlier name for this group and consequently the name to be used.

Bauhinia microstachya (Raddi), comb. nov. *Schnella microstachya* Raddi, Quar. Piant. Bras. Nuov. 33 (1820). *B. Langsdorffiana* Bong. Mém. Acad. Petrop. Ser. 6, iv. 109, pl. 1 (1836).

BAUHINIA MICROSTACHYA (Raddi) Macbr., var. **bahiensis** (Bong.), comb. nov. *B. bahiensis* Bong. Mém. Acad. Petrop. Ser. 6, iv. 114 (1836). *B. Langsdorffiana* Bong., var. *bahiensis* (Bong.) Benth. in Mart. Fl. Bras. xv. pt. 2. 204 (1870).

Bauhinia bauhinioides (Mart.), comb. nov. *Perlebia bauhinioides* Mart. in Spix & Mart. Reise Bras. i. 555 (1823). *B. microphylla* Vog. Linnaea, xiii. 301 (1839).

Bauhinia vestita (Benth.), comb. nov. *Schnella vestita* Benth. Pl. Hartw. 171 (1845).

The opinion seems to be universal that *Schnella* Raddi is to be sunk in *Bauhinia* L. This species is remarkable because of the dense soft pubescence on the lower surfaces of the leaves.

Bauhinia anamesa, nom. nov. *B. punctata* Burch. ex Benth. in Mart. Fl. Bras. xv. pt. 2. 211 (1870), not *B. punctata* Bolle in Peters, Reise Mossamb. Bot. i. 23 (1862).

This South American species, intermediate in character as Bentham showed, i. e., between *B. heterophylla* Kunth and *B. longipetala* (Benth.) Walp. must be renamed because of the earlier and valid *B. punctata* Bolle. Since there is already a *B. Burchellii* this plant may be given the above name.

Bauhinia Coulteri, nom. nov. *B. platypetala* Benth. ex Hemsl. Biol. Cent.-Am. Bot. i. 339 (1880), not *B. platypetala* Burch. ex Benth. in Mart. Fl. Bras. xv. pt. 2. 198 (1870), a valid species.

I have been unable to find that this beautiful and well-known species of Mexico has been given more than one name and this name, as indicated, cannot be used for this plant. Since there is already a *B. Benthamiana* and a *B. Benthami*, I have chosen to name the species for Dr. Thomas Coulter, the first collector.

Bauhinia Horsfieldii (Miq.), comb. nov. *Lasiobema Horsfieldii* Miq. Fl. Ind. Bot. i. pt. 1, 71 (1855). *B. anguina* Roxb., var. *Horsfieldii* Watt ex Prain, Journ. As. Soc. Beng. lxvi. pt. 2. 194 (1897); Craib, Contrib. Fl. Siam, 75 (1912).

This plant is closely related it is true to *B. anguina* Roxb. to which species Baker in Hook. Fl. Brit. Ind. ii. 284 (1878) reduces it outright but the characters Prain and Craib find and regard as signifying varietal rank appear to be constant and therefore the plant is better treated it seems to me as specifically distinct. These characters moreover are of no slight moment, — the difference in the size of the pods of *B. Horsfieldii* and *B. anguina* is marked and equally so is the contrast between the definitely pilose inflorescence of the former and the faintly puberulous inflorescence of the latter. Then, too, *B. anguina*, except for the inflorescence, is glabrous; the leaves of *B. Horsfieldii*, even in age, are more or less puberulent beneath.

Bauhinia Wallichii, nom. nov. *B. macrostachya* Wall. ex Baker in Hook. Fl. Brit. Ind. ii. 281 (1878), not *B. macrostachya* Benth. in Hook. Journ. Bot. ii. 96 (1840).

Taubert in Engl. & Prantl. Natürl. Pflanzenf. iii. Abt. 3. 149 (1892), renamed the plant of Bentham but it is rather that of Wallich that requires a new name. *B. macrostachya* Wall. Cat. 5774 (1831–1832) is a name only, not published with description until after the appearance of *B. macrostachya* Benth.

BAUHINIA DIPTERA Blume ex Miq. Anal. Ind. i. 12 (1850). *B. glabrifolia* Baker in Hook. Fl. Brit. Ind. ii. 281 (1878).

Prain, Journ. As. Soc. Beng. lxvi. pt. 2. 193 (1897), would suppress Blume's name and substitute that of Baker because the term *diptera* "is quite inappropriate when used in connection with flowering branches of adult plants" and accordingly "it seems much better to neglect it." However, the species must be known by Blume's name since it is the earlier. It is interesting to note that Prain's choice of name, *glabrifolia*, is as inappropriate during a portion of the species' history as *diptera* since young plants and leafy shoots are distinctly silky-pubescent!

Apuleja leiocarpa (Vogel), comb. nov. *Leptolobium ? leiocarpum* Vogel, Linnaea, xi. 393 (June–July, 1837). *A. praecox* Mart. Flora, xx. vol. ii. Beiblätter 8. 123 (Nov., 1837).

Although it has not been possible to determine the exact date of the publication of Vogel's name it seems evident without reason-

able doubt that it is earlier by several months than *A. praecox* of Martius. *Linnaea* came out in six parts and since Vogel's paper is in the third number it surely appeared not later than the early fall of 1837 and more probably in June.

Cassia keyensis (Pennell), comb. nov. *Chamaecrista keyensis* Pennell, Bull. Torr. Club, xlv. 344 (1917).

This Florida species is very closely related to *C. grammica* Spreng. of Cuba and perhaps should be regarded only as a geographical variant but I have seen no specimens that appear intermediate in character. Dr. Pennell's statement, "*C. grammica* . . . differs by its appressed pubescence and conspicuously stalked glands," seems rather misleading as the pubescence is not appressed in the sense that the hairs lie flatly against the stem, — they rather strongly diverge and then curl back at the tip. The pubescence of *C. keyensis* is strictly spreading and the individual hairs are straight even to the tip.

Cassia Deeringiana (Small & Pennell), comb. nov. *Chamaecrista Deeringiana* Small & Pennell, Bull. Torr. Club, xlv. 345 (1917).

Cassia brachiata (Pollard), comb. nov. *Chamaecrista brachiata* Pollard, Proc. Biol. Soc. Wash. xv. 20 (1902).

Specimens of *C. Deeringiana* that do not show the perennial root may be distinguished from material of *C. brachiata* only by the fewer and distinctly larger seeds. The latter species is very closely related, indeed, to the highly variable *C. fasciculata* but it is confined essentially to peninsular Florida and seems to be constantly recognizable by the depressed, rather than somewhat elongated, petiolar gland.

Dr. Pennell has shown that the plant commonly known as *C. Chamaecrista* L. is rather *C. fasciculata* Michx., the Linnean species being a quite different plant of the West Indies. But *Chamaecrista micrantha* Britton, Bull. Torr. Club, xliii. 463 (1916), likewise of the West Indies, appears to be scarcely separable. He has very properly interpreted *C. fasciculata* as being highly variable and has consequently recognized the forms that diverge from the type but show no constancy in their characters as unworthy specific recognition.

CASSIA FASCICULATA Michx., var. **robusta** (Pollard), comb. nov. *C. Chamaecrista* L., var. **robusta** Pollard, Bull. Torr. Club, xxi. 218 (1894).

CASSIA FASCICULATA Michx., var. **depressa** (Pollard), comb. nov. *C. depressa* Pollard, Bull. Torr. Club, xxii. 515, pl. 251 (1895).

Pennell, Bull. Torr. Club, xlv. 351-352 (1917), has recognized these variants as *Chamaecrista fasciculata* β and *Chamaecrista fasciculata* γ , respectively.

CASSIA FASCICULATA Michx., var. **Tracyi** (Pollard), comb. nov. *Chamaecrista Tracyi* Pollard, Proc. Biol. Soc. Wash. xv. 21 (1902). *Cassia mississippiensis* Pollard, Bull. Torr. Club, xxi. 219 (1894).

Pennell maintains this plant as a species but its only character that possesses any degree of constancy is the presence (more or less evident) of pubescence on the leaf-surfaces.

CASSIA FASCICULATA Michx., var. **littoralis** (Pollard), comb. nov. *Chamaecrista littoralis* Pollard, Proc. Biol. Soc. Wash. xv. 20 (1902).

Pennell treats this variant as *Chamaecrista mississippiensis* β .

CASSIA FASCICULATA Michx., var. **puberula** (Greene), comb. nov. *Chamaecrista puberula* Greene, Pitt. v. 134 (1903).

This plant, except for the more or less pubescent leaflets, is scarcely distinguishable from the var. *robusta*, to which, indeed, Pollard at one time referred it. Pennell separates it from *Chamaecrista mississippiensis* because of its purple anther-sacs but the original specimen is said to have "yellow or reddish anther-sacs" and, moreover, the character is known to be variable.

CASSIA NICTITANS L., var. **multipinnata** (Pollard), comb. nov. *C. multipinnata* Pollard, Bull. Torr. Club, xxii. 515, pl. 250 (1895).

As Pennell, Bull. Torr. Club, xlv. 359 (1917) remarks this seems to be only an ecological state scarcely worthy even varietal recognition but it is said to replace the typical form of the species in the long-leaf pine-land. There is another variant of *C. nictitans* which reminds one of the pubescent-leaved varieties of *C. fasciculata*. This form with more or less hairy leaves, recognized by Pennell as *Chamaecrista nictitans* γ , may be known as

CASSIA NICTITANS L., var. **Mohrii** (Pollard), comb. nov. *C. aspera* Muhl., var. *Mohrii* Pollard, Bull. Torr. Club, xxiv. 151 (1897).

CASSIA ASPERA Muhl., var. **Simpsoni** (Pollard), comb. nov. *C. Simpsoni* Pollard, Bull. Torr. Club, xxi. 221 (1894).

Indicated by Pennell, Bull. Torr. Club, xlv. 361 (1917), as meriting only varietal rank but not published by him. It may usually be distinguished from the typical form of the species by

the fewer leaflets and the more slender, diffuse, and less pubescent stems.

Cassia savannarum (Britton), comb. nov. *Chamaecrista savannarum* Britton, Bull. Torr. Club, xliii. 463 (1916).

This species is closely related to *C. aeschynomene* DC. but the leaflets seem to be constantly much smaller, the midrib very eccentric, and the plant much less robust. A specimen collected by A. A. Taylor (no. 124) and distributed as *C. virgata* is to be referred here.

Cassia granulata (Urban), comb. nov. *C. portoricensis* Urban, var. *granulata* Urban, Symb. Ant. i. 318 (1899). *Chamaecrista granulata* (Urban) Britton, Ann. Mo. Bot. Gard. ii. 41 (1915).

C. lineata Sw. scarcely differs from this species except that the petiolar gland is essentially sessile instead of long-stalked. And this seems, in this genus, always to be a constant and therefore a good specific character. *C. granulata* is not so closely related to *C. portoricensis* Urban as it is to *C. lineata* because the leaves of the former are lustrous and the gland also is subsessile.

Cassia pinetorum (Britton), comb. nov. *Chamaecrista pinetorum* Britton, Bull. Torr. Club, xliv. 7 (1917).

This plant is related to the preceding but is well marked by the narrow acute and cuspidate leaflets.

Cassia Tuerckheimii (Britton), comb. nov. *Chamaecrista Tuerckheimii* Britton, Bull. Torr. Club, xliv. 8 (1917).

I have not seen the type of this species and am referring to it with some hesitancy a specimen collected by Fuertes (his no. 684) in the Prov. de Barahona, Santo Domingo. This shrub has the densely villous branches described for *C. Tuerckheimii*, — a character which is very striking. It differs, however, in having considerably smaller leaflets but the large leaflets of the type, secured "in fields," may be due, in some part at least to the habitat. Fuertes' specimen grew in pine woods.

CASSIA GLANDULOSA L., var. **Swartzii** (Wickstr.), comb. nov. *C. Swartzii* Wickstr. Vet. Acad. Handl. 1825. 430 (1826). *Chamaecrista Swartzii* (Wickstr.) Britton, Bull. Torr. Club, xliv. 9 (1917).

Dr. Britton, l. c., restricts *C. glandulosa* to Jamaica and distinguishes it from *C. Swartzii* by the presence of pubescence on the under surface of the leaflets. This character might be used specifically, I suppose, if it held, but unfortunately the leaflets of the

Jamaica plant are sometimes quite glabrous. The typical state of *C. glandulosa* does indeed seem to be confined to Jamaica but since the more widely distributed glabrous form also occurs there this latter state may best be treated varietally, especially since the presence or absence of pubescence on the leaflets is known elsewhere in the genus to be a character highly variable.

CASSIA FRUTICOSA Mill. Dict. ed. 8, n. 10 (1768). *Mimosa nodosa* L. Sp. Pl. ed. 2. 1498 (1763), not *C. nodosa* Buch.-Ham. ex Roxb. Fl. Ind. ii. 336 (1832). *C. bacillaris* L. f. Suppl. 231 (1781).

The first available name for this rather common and widely distributed Cassia is that of Miller as indicated above, rather than *C. bacillaris* under which name it is generally known.

CASSIA BAUHINIOIDES Gray, var. **pilosior** Robinson, in herb., caulibus et ramulis et petiolis dense strigoso-pubescentibus cum nonnullis pilis longioribus patentibus intermixtis; aliter formae typicae simillima. — TEXAS: Bofecillos Mts., Sept., 1883, *Havard*, no. 14 (TYPE, Gray Herb.). MEXICO: Torreon, Coahuila, Oct. 13-20, 1898, *Palmer*, no. 455; 75 miles southwest of Parras, Coahuila, May, 1880, *Palmer*, no. 2132.

CASSIA BAUHINIOIDES Gray, var. **arizonica** Robinson, in herb. ubique parce adpresse strigosa vel foliis subglabra; pilis haud patentibus; aliter formae typicae simillima. — ARIZONA: Mule Mts., July 20, 1894, *Toumey*, no. 31 (TYPE, Gray Herb.); Bisbee, Oct. 4, 1890, *F. E. Lloyd*; Clifton, Sept. 1, 1902, *Davidson*, no. 1342; mesas near Camp Lowell, Aug. 3, 1881, *Pringle* (passing to the typical form). MEXICO: Sonora, 1851, *Wright*, no. 1030.

Both of the above varieties are fairly well marked but they unquestionably pass into the typical form of the species which is more or less densely clothed with a short villous-hirsute pubescence.

CASSIA ANDRIEUXII Benth. Trans. Linn. Soc. xxvii. 548 (1871). *Cassia fulva* Brandg. Zoe, v. 233 (1906), is to be referred here.

The species is now known from Oaxaca (*Nelson*, 1864) and Puebla (*Purpus*, 1195).

II. RECLASSIFIED OR NEW SPERMATOPHYTES, CHIEFLY NORTH AMERICAN

CALOCHORTUS BARBATUS (HBK.) Painter, var. **chihuahuanus** (Painter), comb. nov. *C. barbatus* (HBK.) Painter, subsp. *chihuahuanus* Painter, Contrib. U. S. Nat. Herb. xiii. 349 (1911).

My attention has been called to this plant by the discovery of a duplicate type (*Pringle*, 328) among some unmounted Mexican specimens of the *Liliaceae*. I have discussed the distinctness of the categories variety and species under *Inga vera* Willd., var., page 1 of this Contribution.

Cryptocarya Bowiei (Hook.), comb. nov. *Laurus Bowiei* Hook. Journ. Bot. iv. 419, t. 23 (1842). *Laurus australis* A. Cunn. Bot. Mag. under t. 3931 (1842). *C. australis* (A. Cunn.) Benth. Fl. Austr. V. 299 (1870).

There is a reference in the Botanical Magazine, l. c., to *L. Bowiei*, thus indicating that it is the earlier name.

✓ *Sanicula Peckiana*, spec. nov., planta perennis usque ad 3 dm. alta radice crassa sublignosa: caulibus circa 4, a basi ad apicem alterne et remote ramosis, ramis erecto-patentibus, apice, 3-4-furcatis; foliis plerumque basilaribus 6-10 cm. longis 3-5 cm. latis oblongo-ovatis vel lanceolatis pinnatifidis, vel subbipinnatifidis, pinnis ad rhachin decurrentibus ubique alam angustam subintegram vel parce setoso-dentatam formantibus, foliolis vel segmentis ovatis saepius profunde incisus, serrato-crenatis, dentibus ovatis solum mucronulatis, non setosis; umbellis paucifloris; floribus masculis flavis, pedicellis circa 3 mm. longis; fructibus 3-4.5 mm. longis basi nudis vel subnudis, apice parce aculeatis, aculeolis basi vix bulbosis, apice uncinatis. — OREGON: Siskiyou Mts., 14 miles west of Waldo. Josephine Co., July 4, 1918, *Morton E. Peck*, 8403 (TYPE, Gray Herb.).

This remarkable *Sanicula* is not closely related to any known species. In vegetative characters it approaches most nearly *S. bipinnatifida* from which it is at once distinct, however, by the partially naked fruit as well as by other characters of moment. Prof. Peck, of Willamette University, is enthusiastically helping to make known the interesting flora of Oregon and has generously shared his more recent collections from the southwestern part of the state with the Gray Herbarium. His work as a collector of *Myxomycetes* has been commemorated in the name *Stemonitis Mortonii* and he has been accorded the same recognition for

his endeavors in the study of British Honduras spermatophytes, but heretofore no Oregon plant, I believe, has been named for him.

Tauschia Kelloggii (Gray), comb. nov. *Deweya Kelloggii* Gray, Proc. Am. Acad. vii. 343 (1867). *Drudeophytum Kelloggii* (Gray) Coult. & Rose, Contrib. U. S. Nat. Herb. vii. 81 (1900).

Prof. Peck has secured this species in southwestern Oregon. For a discussion of the above genera compare Contrib. Gray Herb. lvi. 28-33 (1918).

VITICELLA Mitchell, Diss. Brevis Bot. & Zool. 42 (1769). *Nemophila* Nutt. in Barton, Fl. N. Am. ii. 71 (1822).

VITICELLA MICROCALYX (Nutt.) Nwd. Am. Mid. Nat. iii. 158 (1913).

Dr. J. A. Nieuwland, l. c., 156-158 has suggested the probable identity of Mitchell's genus and that of Nuttall. Gray referred *Viticella* to *Hydrophyllum appendiculatum* and in this has recently been followed by Brand in the latter's revision of the group, Pflanzenreich, iv. Fam. 251, 36 (1913). But a careful reading of Mitchell's rather full diagnosis must disclose characteristics that do not apply to *Hydrophyllum* but which at once suggest the plant now known as *Nemophila microcalyx* (Nutt.) F. & M. For instance the "short filaments," the "villous" ovary, the 2-seeded capsule, and the "large plano-convex ovate" seeds are features that are descriptive of Nuttall's plant but not at all of *Hydrophyllum*. *H. appendiculatum* is characterized by exerted filaments, a slightly hispid ovary and an always 1-seeded capsule with globose seeds. Indeed it seems clear that *Viticella* Mitchell is the same as *Nemophila* Nutt. and since it is the earlier name it is to be taken up for this genus. This necessary change in the name of a well-known genus is of course to be regretted. It may be mentioned that Mitchell is the author of *Pentstemon*, l. c. 36. The just recognition of another important genus from this early paper on the botany of Virginia, — a paper in which the descriptions are drawn with evident care and exactness — is not, however, a matter for regret.

Besides *V. microcalyx* the genus contains the following plants worthy, I believe, specific rank.

Viticella aurita (Lindl.), comb. nov. *Nemophila aurita* Lindl. Bot. Reg. xix. t. 1601 (1833).

Viticella racemosa (Nutt.), comb. nov. *Nemophila racemosa* Nutt. ex Gray, Proc. Am. Acad. x. 315 (1875).

Viticella phacelioides (Nutt.), comb. nov. *Nemophila phacelioides* Nutt. Journ. Acad. Phil. ii. 179 (1822).

Viticella maculata (Benth.), comb. nov. *Nemophila maculata* Benth. ex Lindl. Journ. Hort. Soc. iii. 319, 320 (1848).

Viticella Menziesii (H. & A.), comb. nov. *Nemophila Menziesii* H. & A. Bot. Beech. Voy. 152 (1833). *N. insignis* Dougl. ex Benth. Trans. Linn. Soc. xvii. 275 (1837). *N. Menziesii* H. & A., subsp. *insignis* (Dougl.) Brand, Univ. Cal. Publ. Bot. iv. 210 (1912).

There are four or five variations of this variable species which are constant enough in character to merit recognition in classification. Brand, Pflanzenreich, iv. Fam. 251. 47 (1913), has attempted to discriminate so many varieties, subvarieties and forms, mostly based upon characters entirely inconstant, that his treatment fails to serve a useful purpose. Chandler, Bot. Gaz. xxxiv. 201-205 (1902) and xlv. 381 (1907), has offered a much more practicable disposition of these variants which now are to be known as follows.

VITICELLA MENZIESII (H. & A.) Macbr., var. **liniflora** (F. & M.), comb. nov. *Nemophila liniflora* F. & M. Sert. Petrop. i. t. 8 (1846). *N. Menziesii* H. & A., subsp. *liniflora* (F. & M.) Brand. Pflanzenreich, iv. Fam. 251. 48 (1913); var. *intermedia* (Bioletti) Brand, l. c. *N. intermedia* Bioletti, Eryth. iii. 141 (1895).

This variety is intermediate between the typical form and the next and was not recognized by Chandler. It is, however, fairly constant in character, so it seems desirable to give it a place in classification. It differs from the typical form of the species in the fact that the often somewhat lighter petals are more or less prominently veined and from the next variety in the partial or entire absence of dots and the prominence of the veins.

VITICELLA MENZIESII (H. & A.) Macbr., var. **atomaria** (F. & M.), comb. nov. *Nemophila atomaria* F. & M. Ind. Sem. Hort. Petrop. ii. 42 (1835). *N. Menziesii* H. & A., subsp. *atomaria* (F. & M.) Brand, Pflanzenreich, iv. Fam. 251. 49 (1913). *N. Menziesii* H. & A., var. *atomaria* (F. & M.) Chandler, Bot. Gaz. xxxiv. 204 (1902).

VITICELLA MENZIESII (H. & A.) Macbr., var. **integrifolia** (Parish), comb. nov. *N. Menziesii* H. & A., var. *integrifolia* Parish. Eryth. vi. 91 (1898). *N. Menziesii* H. & A., subsp. *australis*

Brand, Pflanzenreich, iv. Fam. 251. 50 (1913); var. *incana* Brand, l. c.

The var. *incana* Brand is merely a more pubescent state.

VITICELLA MENZIESII (H. & A.) Macbr., var. *rotata* (Eastw.), comb. nov. *N. rotata* Eastw. Bull. Torr. Club, xxviii. 159 (1901). *N. Menziesii* H. & A., var. *rotata* (Eastw.) Chandler, Bot. Gaz. xlv. 381 (1907).

This variety connects the large- and small-flowered groups of the genus through *N. pulchella* Eastw. Brand's variety *minima*, Pflanzenreich, iv. Fam. 251. 50 (1913), probably belongs here. He considers it an intermediate state between *N. Menziesii* and *N. rotata* which he retains, but Chandler's disposition of Miss Eastwood's plant seems better because *N. rotata* is connected with *N. Menziesii* through the variety *integrifolia* and should not be accorded equal rank with the distinct *N. pulchella*.

Viticella **Kirtleyi** (Henderson), comb. nov. *Nemophila Kirtleyi* Henderson, Bull. Torr. Club, xxvii. 350 (1900).

Charles Kirtley (for whom this plant is named) is now a physician of Challis, Idaho. I recall pleasantly my unexpected meeting of him when collecting in the vicinity of Challis in 1916.

Viticella **pulchella** (Eastw.), comb. nov. *Nemophila pulchella* Eastw. Bull. Torr. Club, xxviii. 157 (1901).

Viticella **heterophylla** (F. & M.), comb. nov. *Nemophila heterophylla* F. & M. Sert. Petrop. i. under pl. 8 (1846). *N. nemorensis* Eastw. Bull. Torr. Club, xxviii. 155 (1901).

VITICELLA HETEROPHYLLA (F. & M.) Macbr., var. **flaccida** (Eastw.), comb. nov. *Nemophila flaccida* Eastw. Bull. Torr. Club, xxviii. 149 (1901). *N. heterophylla* F. & M., var. *flaccida* (Eastw.) Brand, Univ. Cal. Publ. Bot. iv. 212 (1912).

VITICELLA HETEROPHYLLA (F. & M.) Macbr., var. **tenera** (Eastw.) Nels. & Macbr. in herb. *Nemophila tenera* Eastw. Bull. Torr. Club, xxviii. 153 (1901). *N. heterophylla* F. & M., subvar. *tenera* (Eastw.) Brand, Univ. Cal. Publ. Bot. iv. 212 (1912); var. *tenera* (Eastw.) Nels. & Macbr. Bot. Gaz. lxxv. 66 (1918). *N. nemorensis* Eastw., var. *glauca* (Eastw.) Brand, l. c.

For a discussion of this species and the variety *tenera* see Bot. Gaz. lxxv. 66-67 (1918).

Viticella **exilis** (Eastw.), comb. nov. *Nemophila exilis* Eastw. Bull. Torr. Club, xxviii. 148 (1901).

A beautiful species seemingly confined to the region of the Yosemite.

Viticella parviflora (Dougl.), comb. nov. *Nemophila parviflora* Dougl. ex Benth. Trans. Linn. Soc. xvii. 275 (1837).

VITICELLA PARVIFLORA (Dougl.) Macbr., var. **Austinae** (Eastw.) Nels. & Macbr. in herb. *Nemophila Austinae* Eastw. Bull. Torr. Club, xxviii. 143 (1901). *N. parviflora* Dougl., var. *Austinae* (Eastw.) Brand, Pflanzenreich, iv. Fam. 251. 55 (1913); var. *quercifolia* (Eastw.) Chandler, Bot. Gaz. xxxiv. 210 (1902). *N. quercifolia* Eastw. Bull. Torr. Club, xxviii. 142 (1901). *N. explicata* Nels. & Macbr. Bot. Gaz. lv. 377 (1913).

VITICELLA PARVIFLORA (Dougl.) Macbr., var. **Plaskettii** (Eastw.), comb. nov. *Nemophila Plaskettii* Eastw. Bull. Torr. Club, xxviii. 147 (1901). *N. parviflora* Dougl., var. *Plaskettii* (Eastw.) Brand, Pflanzenreich, iv. Fam. 251. 55 (1913).

These two varieties are wholly formal yet in their pronounced development well-marked. The rounded rather than acute leaf-lobes is the conspicuous feature of the variety *Austinae* in which I should include the plant which has been called *N. quercifolia* and which seems to differ in no respect except that the corolla-appendages are more or less obvious. Chandler, Bot. Gaz. xxxiv. 213 (1902) and Nelson & Macbride, Bot. Gaz. lxxv. 66-67 (1918) have indicated that the relative development of these organs is of no importance taxonomically.

Viticella pedunculata (Dougl.), comb. nov. *Nemophila pedunculata* Dougl. ex Benth. Trans. Linn. Soc. xvii. 275 (1837).

VITICELLA PEDUNCULATA (Dougl.) Macbr., var. **sepulta** (Parish) Nels. & Macbr. in herb. *Nemophila sepulta* Parish, Eryth. vii. 93 (1899). *N. pedunculata* Dougl., var. *sepulta* (Parish) Nels. & Macbr. Bot. Gaz. lxxv. 65 (1918).

VITICELLA PEDUNCULATA (Dougl.) Macbr., var. **densa** (Howell) Nels. & Macbr. in herb. *Nemophila densa* Howell, Fl. N. W. Am. 466 (1901). *N. pedunculata* Dougl., var. *densa* (Howell) Nels. & Macbr. Bot. Gaz. lxxv. 66 (1918).

For a discussion of this species and its varieties see Bot. Gaz. lxxv. 65-66 (1918).

Viticella breviflora (Gray), comb. nov. *Nemophila breviflora* Gray, Proc. Am. Acad. x. 315 (1875).

Viticella spatulata (Coville), comb. nov. *Nemophila spatulata* Coville, Contrib. U. S. Nat. Herb. iv. 156 (1893).

Viticella humilis (Eastw.), comb. nov. *Nemophila humilis* Eastw. Bull. Torr. Club, xxviii. 150 (1901).

PHACELIA DASYPHYLLA Greene, var. **ophitidis**, var. nov., planta 1-1.5 dm. alta; foliis adpresse hispidis; caulibus strigillosis et

parce hispidis et superne plus minusve viscidis; corolla albida circa 5 mm. longa. — OREGON: on serpentine slope, Siskiyou Mts., 10 miles southwest of Waldo, Josephine Co., July 4, 1918, *Morton E. Peck*, 8415 (TYPE, Gray Herb.).

This plant does not appear to differ from the typical form of *P. dasyphylla* except by the appressed rather than spreading hispid pubescence and the pale corolla. Accordingly, notwithstanding the fact that heretofore the species has been known only from the Sierra Nevada of southern California I am disposed to treat this plant as only a variety of the typical and more southern form, especially in view of the analogous sort of variation which the closely related *P. heterophylla* and *P. magellanica* both exhibit. The discovery in North America of this additional form with glabrous filaments (a salient character of the South American *P. magellanica*) substantiates it seems to me the treatment of this group in *Contrib. Gray Herb.* xlix. 31-38 (1917) in which *P. magellanica* is excluded from North America for although it is true that the South American plant is characterized by glabrous filaments this character is generally (and *always* in the case of those variants corresponding in vegetative character to *P. dasyphylla*) correlated with very small corollas and scarcely exerted stamens. The very rare *P. dasyphylla* and its variety may be regarded indeed as intermediate between the South and the North American species but its existence can scarcely be used as an argument for the merging of these species so widely separated geographically since each on the whole is definitely distinct. *P. magellanica* and allies are characterized by constantly glabrous nearly included filaments and usually small flowers (or when these are larger the plants are very different in aspect from *P. dasyphylla*) and *P. heterophylla* and allies by very pubescent well-exserted filaments and relatively large flowers.

ALLOCARYA STIPITATA Greene. *Pitt.* i. 19 (1887).

Mr. G. Claridge Druce, *Bot. Exch. Club.* v. 38 (1918) has reduced the genus *Allocarya* to *Lappula*. It is to be regretted that he has not given the reasons which induced him to make this, to say the least, striking reduction, for the genera *Allocarya* and *Lappula* are even more distinct than *Eritrichium* and *Lappula*, genera universally accepted. It seems almost inconceivable that Mr. Druce had a specimen of *Allocarya* before him at the time

he referred it to *Lappula* (*L. stipitata* (Greene) Druce, l. c.). Rather does it seem probable that the plant collected as a waif in England was, in fact, one of the annual species of *Lappula* although the fact that the determination was made by Dr. Thellung decidedly weakens this theory. It may be remarked that *Lappula* is strongly characterized by the position of the prickly-margined nutlets. These are erect on an elevated receptacle. They are sometimes armed on the back as well as on the margins but the prickles are always hooked. The nutlets of *Allocarya* on the other hand are obliquely attached to a low-conical receptacle and are never armed with hooked prickles. *Allocarya* is most closely related to *Plagiobothrys* and if Mr. Druce had referred his plant to the latter genus some well-taken arguments for his action could be presented. These genera also, however, are nicely distinct although in nutlet-character they approach each other closely. The attachment of the nutlets of *Plagiobothrys* is nearly or quite medial rather than basal or supra-basal and the leaves are never opposite as are the lower ones of *Allocarya*. The fact that both genera contain numerous species none of which fail in any degree to conform to the generic character in each case is the best argument to my mind as to the validity of these genera.

Allocarya mexicana, spec. nov., ut videtur perennis; caulis medioeriter crassis subdecumbentibus usque ad 1.5 dm. longis glabris vel parce pubescentibus cum nonnullis pilis longioribus firmiuseulis plus minusve patentibus; foliis linearibus obtusis plerumque circa 2.5 cm. longis (superioribus non reductis) vix 2 mm. latis fere glabris vel parce ciliato-hispidis; floribus 3 mm. latis; calycis subadpresse villosa-hirsuti fructiferi laciniis circa 3 mm. longis plus minusve inaequalibus; pedicellis fructiferis 2-4 mm. longis; nuculis ovatis circa 1.5 mm. longis 1 mm. latis dorso minute sed medioeriter dense reticulato-rugosis, faciebus ventralibus fere laevibus, areola parva ovata suprabasilaris. — MEXICO: muddy hollows of prairies, Flor de Maria, Mexico, Sept. 9, 1892, Pringle, 4241 (TYPE, Gray Herb.).

This species is closely related to *A. linifolia* (Lehm.) Macbr. of South America from which it is nicely distinct, however, by nutlet characters. The nutlets of the South American plant are broadly ovate, almost deltoid, only about 1 mm. long and irregularly rugose dorsally rather than finely reticulate-rugose as they are in *A. mexicana*. *A. linifolia* is also more pubescent and in habit appears to be more tufted with the stems not greatly elongate.

CORDYLANTHUS Nutt. A discriminating revision by Roxana Stinchfield Ferris of this small but difficult group has recently been published in the Bull. Torr. Club, xlv. 399-423 (1918), under the name *Adenostegia*, however, since the work was evidently done under the direction of Prof. Abrams and consequently the nomenclature accords with the "American" Code. Nevertheless it is a little surprising that apparently Mrs. Ferris has ignored the existence of the International Rules of Botanical Nomenclature; at least such would seem to be the case if one may judge from the following statement (l. c. 399). "The proper generic name, according to present-day rules of nomenclature" is *Adenostegia* Benth. This name is carefully shown to have been published ten years before Bentham substituted Nuttall's manuscript name, *Cordylanthus*. But the name *Cordylanthus* is included among the *nomina conservanda* of the International Rules and it therefore, rather than *Adenostegia*, is the proper generic term according to present-day international rules of nomenclature. The proper generic name may indeed be *Adenostegia* according to a provincial code which, however, is not synonymous with "present-day rules of nomenclature."

In ordering up the material of this genus in the Gray Herbarium it has been necessary, therefore, to make the following changes in the nomenclature of the group but comparatively few changes have been made in the classification itself since on the whole excellent judgment has been shown by Mrs. Ferris in the drawing of specific lines. But one regrets that the care which she has used in determining the taxonomical status of these plants has not been applied to what may be referred to as the mechanics of her work. The presence of numerous errors of the sort that are generally detected in proof-reading cause one to question whether indeed proof was seen by the author. An outstanding error of this kind is found in the third and fourth lines of the description of *C. Orcuttianus*, l. c. 418. These lines consist of statements that are partly repetition and partly contradiction. Also the spelling of one collector's name in no fewer than three ways on two pages is scarcely indicative of the degree of care and exactness one has a right to expect in a scientific paper.

CORDYLANTHUS TENUIS Gray, var. **viscidus** (Howell), comb. nov. *Adenostegia viscida* Howell, Fl. N. W. Am. 537 (1901).

Mrs. Ferris, l. c. 407, wrote "*A. viscida* in Shasta and Plumas counties is inconspicuously glandular-pilose as compared with the typical form and approaches *A. tenuis*, to which this species is very closely related." The chief distinction, however, between these species has been found in the character of the bracts, those of *A. viscida* being three-parted. Unfortunately plants exhibiting both entire and divided bracts have been found, for instance Heller's number 11,586 from Butte County. Howell's plant is best treated therefore as a geographical variety of *C. tenuis* generally distinguishable by the parted bracts and mostly of more northern range although it meets the range of *C. tenuis* in Butte and Lassen Counties.

Cordylanthus Hanseni (Ferris), comb. nov. *Adenostegia Hanseni* Ferris, Bull. Torr. Club, xlv. 408 (1918). *C. pilosus* Gray, var. *trifidus* Robinson & Greenm. Bot. Gaz. xxii. 168 (1896).

This species differs from *C. pilosus* and *C. tenuis*, var. *viscidus* in the dense pubescence which is very long and harsher than in either of the other species. From the former, which it resembles most in aspect because of the relatively broad leaves, it also differs constantly in the tripartite bracts. In this respect it resembles *C. tenuis*, var. *viscidus* but the divisions of the bracts are more nearly equal and the leaves are relatively broad. *C. Hanseni*, furthermore, is restricted to the foothills of the Sierra Nevada from Shasta to Tuolumne Counties and where it meets the range of *C. tenuis* or its variety it shows no sign of intergradation. *C. pilosus*, var. *trifidus* is omitted by Mrs. Ferris.

ADENOSTEGIA PARVIFLORA Ferris, Bull. Torr. Club, xlv. 409 (1918).

This seemingly distinct species is not represented in the Gray Herbarium.

CORDYLANTHUS RIGIDUS (Benth.) Jepson, var. **FILIFOLIUS** (Nutt.) Macbr. Contrib. Gray Herb. xlix. 58 (1917).

Mrs. Ferris regards this variety as specifically distinct from the typical form of the species. Those specimens which I regarded as intermediate in character she refers to *C. rigidus* (Benth.) Jepson, var. *brevibracteatus* (Gray) Macbr., l. c., distinguishing this variety by the more distinctly caloused tips of the bracts. I am unable to interpret this character as of even varietal significance for material from Monterey County, the type locality of *C. rigidus*,

exhibits it to greater or less degree. The variety *brevibracteatus* was originally based on a plant with fewer flowers in the heads and greatly abbreviated bracts and in typical form is known only from Kern County. Specimens from this region show great variation, however, and confirm the opinion I expressed in 1917 (Contrib. Gray Herb. xlix. 59) that the variety *brevibracteatus* is intermediate between the typical form and the variety *filifolius*, and is evidence, therefore, that but a single specific unit is here concerned.

Cordylanthus littoralis (Ferris), comb. nov. *Adenostegia littoralis* Ferris, Bull. Torr. Club, xlv. 413 (1918).

CORDYLANTHUS RAMOSUS Nutt., var. **puberulus**, var. nov., ubique solum puberulus, bracteis haud ciliatis. — Northern Colorado to Wyoming. Oregon and Nevada. — NEVADA: sagebrush lands, Mountain City, Elko Co., Aug. 13, 1912, *Nelson & Macbride*, 2197 (TYPE, Gray Herb.).

Rydberg based his *Adenostegia ciliosa* Rydb. Bull. Torr. Club, xxxiv. 35 (1907), on a Tweedy specimen from western Wyoming which I have not seen but I feel confident I am correct in referring it to typical *C. ramosus* which was described originally, DC. Prod. x. 597 (1846), as having "ciliate bracts" and furthermore the bracts of a scrap in the Gray Herbarium, marked "*C. ramosus*" and purporting to be part of the type are, indeed, distinctly ciliate. The bracts of the variety are merely puberulent and it is the extreme development of ciliation in the typical form of the species as represented by the type, by Leiberg's number 848 and by Macbride & Payson's number 3840 that induces me to give the more common and merely puberulent form even varietal recognition for there appears to be no other character, such as a longer calyx as Rydberg's description implies, that is correlated with the absence of cilia.

Mrs. Ferris accepted Rydberg's assertion, Bull. Torr. Club, xl. 484 (1913), that *C. bicolor* A. Nels. "is evidently the same as *Adenostegia ciliosa* Rydb." and since *C. bicolor* is exactly *C. capitatus* (which has two stamens and 1-celled anthers) she has very naturally referred *C. ciliosus* to the same species, notwithstanding the fact that it has, of course, the four stamens and 2-celled anthers that characterize *C. ramosus*! Rydberg's superficial reduction of *C. bicolor* A. Nels. has thus caused considerable misappli-

cation of names and he now accepts Nelson's species as *Adenostegia bicolor* (A. Nels.) Rydb. Fl. Rocky Mts. & Adj. Plains, 797 (1917)!

CORDYLANTHUS KINGII Wats. This species, credited only to Utah and adjacent Nevada by Mrs. Ferris, l. c. 417, was collected in southwestern Colorado in 1875 by Brandegee. Payson's number 160 from Naturita, distributed as *C. ramosus*, rather belongs here.

Cordylanthus Helleri (Ferris), comb. nov. *Adenostegia Helleri* Ferris, Bull. Torr. Club, xlv. 417 (1918).

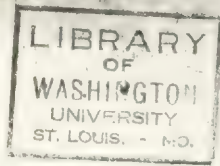
This coarse, very glandular-villous plant with shortly lobed bracts is certainly very distinct from *C. Kingii* which is also of different range.

Cordylanthus palmatus (Ferris), comb. nov. *Adenostegia palmata* Ferris, Bull. Torr. Club, xlv. 420 (1918).

A specimen of this species in the Gray Herbarium collected by Parry in 1881 at Stockton, San Joaquin County, gives a new locality for the plant heretofore known only from the type collection secured at Tule, Colusa County.

ERIOPHYLLUM CONFERTIFLORUM (DC.) GRAY AND ITS ALLIES. There is a striking contrast between the treatment by Hall, Univ. Cal. Publ. Bot. iii. 184-186 (1907), of this group of Californian plants and that by Rydberg, N. A. Fl. xxxiv. 94-96 (1915). The former author, who evidently knows the plants in the field, recognizes three species and four varieties. This is no increase over the number of species admitted by Gray in the Synoptical Flora. Rydberg, on the other hand, defines no fewer than twelve species. It is my impression that this author has never collected in California; and the key-characters which he has worked out from herbarium material and by means of which he attempts to distinguish the plants to which he has assigned names are the sort of characters that are highly variable and may be found in greater or less degree on a single specimen, a fact which should be evident, it seems to me, even from study restricted to the herbarium. The only segregate species recognized by Rydberg which I should at all hesitate to refer to one or the other of the long-established species or to one of their varieties are *E. tanacetifolium* Greene and *E. latilobum* Rydb. These plants are as yet known from comparatively few collections but the large frequently long-peduncled

heads and the broad leaves appear to be constant characteristics that serve rather definitely to distinguish the species from all the forms of the variable *E. confertiflorum*. The relationship of these two forms to each other, however, is not so clear; probably *E. latilobum* will prove to be merely a broad-leaved variety of *E. tanacetifolium* which, though, has denser pubescence and is mostly more southern in its range. *E. biternatum* Rydb., *E. tridactylum* Rydb. and *E. crucigerum* Rydb., l. c. 96, are merely states of *E. confertiflorum* (DC.) Gray, var. *trifidum* (Nutt.) Gray (*E. trifidum* (Nutt.) Rydb.), and *E. tenuifolium* (DC.) Rydb., l. c. 96 and *E. cheiranthoides* Rydb., l. c. 95, are both to be referred to *E. confertiflorum* (DC.) Gray, var. *laxiflorum* Gray. *E. artemisiaefolium* (Less.) Kuntze, Rev. Gen. i. 336 (1891), may be treated as a variety of *E. staechadifolium* Lag. Gen. & Sp. Nov. 28 (1816). The typical form of the latter has mostly entire leaves but it passes into the variety **artemisiaefolium** (Less.), comb. nov. (*Bahia artemisiaefolia* Less. Linnaea, v. 160 (1830)), characterized by more or less pinnatifid leaves.



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EUPATORIEAE.

BY B. L. ROBINSON.

Presented June 26, 1919.

Received June 26, 1919.

DURING the past year the writer has continued his studies on the South American members of the genus *Eupatorium*, giving particular attention to those of Peru and Bolivia. Of the Peruvian it has proved possible to complete a recension, which, by bringing together widely scattered data, placing on record a considerable number of new species, and furnishing specific keys in each section, will, it is hoped, render a knowledge of these plants much more readily accessible and considerably facilitate their precise identification.

There have been several sources of new information regarding tropical American Eupatoriums and many facts have been observed which were not available during the preparation of the writer's revision of the Colombian, Venezuelan, and Ecuadorian species, a treatment completed about a year ago (Proc. Am. Acad. liv. 235-367, 1918). Thus, for instance, the later portions of Dr. F. W. Pennell's extensive collections from Colombia proved to contain interesting *Eupatorium* material to an unsuspected extent, including several additional novelties. A small Colombian collection, prepared by Bro. Ariste-Joseph and received at the Gray Herbarium in continuation of exchange from the United States National Herbarium, has yielded still another new species from the vicinity of Bogotá, a region already exceptionally rich in its representatives of the genus. A somewhat extended collection of the flora of Caracas and adjacent portions of northern Venezuela has been obtained from Prof. H. Pittier. This has given considerable supplementary information regarding the Eupatoriums of the regions explored. Finally, the expedition of Dr. J. N. Rose to Ecuador has brought in the most notable single collection as yet received from that country, including a suite of some twenty-eight different Eupatoriums, among which at least four merit

recognition as new to science, while others show notable rediscoveries of plants not secured for many decades.

As has been the case in the preparation of several former papers relating to the *Eupatorium* tribe, much valued aid has been received from the New York Botanical Garden, the United States National Herbarium, and the Field Museum of Natural History, all of these establishments having lent for examination highly interesting material, which has formed the basis of many of the observations here recorded.

In elaborating the Peruvian species much aid has been derived from material borrowed from the Royal Gardens at Kew and from a considerable suite of specimens collected by Dr. A. Weberbauer and lent some years ago from the Royal Botanical Museum in Berlin for study and identification.

Prof. H. Pittier has kindly called to the writer's attention some geographical errors in the paper on the Venezuelan Eupatoriums. Among these are the employment of several obsolete and now supplanted place-names, and several orthographical slips which, while regretted, are happily not of a kind likely to cause serious error or misunderstanding. More annoying, however, in this respect was the writer's not unnatural but entirely erroneous identification of "Colonia Tovar"—a place frequently mentioned upon Fendler's labels—with the town of Tovar in the state of Mérida. In consequence, attention is here particularly directed to the fact that Colonia Tovar, the base of much of Fendler's Venezuelan work, is a small town not very distant from Caracas and situated in the mountains somewhat back from the coast in the northern part of the state of Aragua. This Tovar was unfortunately not recorded on the maps consulted during the preparation of the earlier paper.

A few notes, diagnoses, and transfers are here published concerning other *Compositae* which, mostly on account of habitual similarity, have been submitted for identification in connection with these studies on the Eupatoriums.

The abbreviations employed in the present publication to indicate the different botanical establishments are the same as in former papers, those of most frequent occurrence being as follows: *Gr.* for the Gray Herbarium; *U. S.*, the U. S. National Herbarium; *N. Y.*, the New York Botanical Garden; *Field Mus.*, the Field Museum of Natural History, Chicago; *K.*, the herbarium of the Royal Botanical Gardens, Kew; *Brit. Mus.*, the British Museum of Natural History, South Kensington, London; *Par.*, the Muséum d'histoire naturelle, Jardin des plantes, Paris; *DC.*, the "Prodrômus collection" in the

DeCandollean Herbarium, Geneva; *Berl.*, the Botanical Museum, Dahlem, Berlin. The few other similar abbreviations which occur are believed to be sufficiently clear without particular explanation.

Ophryosporus (§ **Euophryosporus**) **bipinnatifidus**, spec. nov., caulibus (vel ramis) curvato-adscendentibus vel erectis 2-3 mm. crassis ut videtur paullulo lignescentibus inferne delapsu foliorum nudatis nodulosis superne densissime foliosis; foliis alternis saepissime in axillis proliferis deltoideo-ovatis profunde bipinnatifidis utrinque dense griseo-pubescentibus 2-3 cm. longis et latis, lobis anguste oblongis vel oblanceolatis vix acutiusculis integris vel saepe lobatis; petiolo 5-12 mm. longo cuneatim alato; thyrso terminali solitario vel pluribus ovoideis densis ca. 3 cm. longis 2.5 cm. crassis; capitulis ca. 4-floris sessilibus vel breviter pedicellatis ca. 5.5 mm. longis; involucri squamis principibus plerisque 4 subaequalibus cum 1-2 multo minoribus calyculatis viridibus tenuibus sordide pubescentibus; corollis albis ca. 3.2 mm. longis, tubo proprio glandulari-puberulo; limbi dentibus 5 ovato-deltoideis patentibus; antheris apice omnino exappendiculatis basi subsagittatis; styli ramis filiformibus subtruncatis apice paullo incrassatis; achaeniis (valde immaturis) hispidulis; pappi setis ca. 18 inaequalibus ca. 2 mm. longis scabratis.— PERU: in very arid ground, Posco, between Mollendo and Arequipa, 6 Aug. 1914, *Dr. & Mrs. J. N. Rose*, no. 18,805 (U. S., phot. and fragm. Gr.). This beautifully distinct species adds a third to the alternate-leaved section of the genus. In habit and cutting of the leaves it recalls the Brazilian *Lomatozona artemisiaefolia* Bak. in *Mart. Fl. Bras.* vi. pt. 2, 199, t. 54, f. II (1876), but of course differs from it significantly in many technical characters, such as its exappendiculate anthers, longer pappus, alternate leaves, etc.

Ophryosporus (§ **Ophryochaeta**) **ovatus**, spec. nov., petiolis junioribus et inflorescentia puberulis exceptis glaberrimus; caule tereti purpurascente folioso; foliis oppositis graciliter petiolatis deltoideo-ovatis leviter crenato-serratis firmiusculis utrinque viridibus glaberrimis sublucidis a basi 3-nerviis minute prominulenterque reticulatis subacutis ca. 4 cm. longis 3 cm. latis; petiolo ca. 1 cm. longo; panicula ovoidea terminali ca. 1 dm. alta et crassa multicapitulata, ramulis pedicellisque crispe puberulis; capitulis 4.5 mm. altis 3 mm. diametro ca. 7-floris; involucri campanulati squamis ca. 6 tenuibus substramineis ellipticis subaequalibus apice rotundatis eroso-ciliolatis dorso glabris; corollis ca. 3.5 mm. longis a media parte modice ampliatis 5-dentatis extus ubique minutissime glanduloso-puberulis; antheris

omnino exappendiculatis; styli ramis apice incrassatis et fusciscentibus; achaeniis (immaturis) 1.3 mm. longis praecipue in angulis paulo glandulari-puberulis; pappi setis ca. 27 inaequalibus barbellatis.—PERU: at Chachapoyas, *Mathews*, no. 1370 (K.). Apparently nearest *O. Sodiroi* Hieron. but differing in its firmer-textured broader leaves which are subtruncate at base and more coarsely crenate-serrate.

Eupatorium (§ **Subimbricata**) **anisodontum**, spec. nov., habitu indumento, aliis multis *E. Gascue* subtus descriptae simile sed differt conspicue foliis triangulari-hastatis caudato-acuminatis basi profundius cordatis irregulariter grosse dentatis (dentibus aliis parvis plerisque rotundatis aliis acutis majusculis usque ad 1 cm. longis); petiolo 3-5 cm. longo; inflorescentia corymbosa bene pedunculata densissima ca. 1 dm. diametro valde convexa; capitulis 1 cm. longis ca. 10-floris; involucri campanulato-subcylindrici squamis ca. 14 stramineo-viridibus tenuibus puberulis plerisque ovatis obtusis, intimis angustioribus acutis; corollis glabris 6 mm. longis tubulosis leviter sursum ampliatis; achaeniis 4 mm. longis glabris; pappi setis ca. 50 stramineo-albidis inaequalibus.—PERU: Province of Chachapoyas, *Mathews*, 1836. 87. H. (K., phot. and fragm. Gr.).

E. ARCEANS Robinson, *Proc. Am. Acad.* liv. 237, 288 (1918). The type of this recently described species, namely *Triana*, no. 1191 (K.), though believed to have come from Colombia, was unaccompanied by data as to the exact locality of collection. Happily the species has now been rediscovered by Bro. Ariste-Joseph, being represented by his no. A250 (Gr.) from Guadalupe, near Bogotá. This specimen recently received from the U. S. National Museum proves to agree in all features very closely with the original plant of Triana. The species may therefore be definitely located as occurring in the mountains near Bogotá in the Department of Cundinamarca.

E. (§ **Eximbricata**) **Aristei**, spec. nov., fruticosum patenter ramosum; caulibus teretibus griseo-brunnescentibus glabris cum lenticellis instructis; ramis oppositis curvato-adscendentibus brevissime puberulis vel juventute sordide tomentellis vel griseo-tomentosis foliosis; foliis oppositis lanceolato-oblongis attenuatis acutis basi rotundatis crenulatis vel obtuse serrulatis vel subintegris coriaceis 7.5-9.5 cm. longis 2.5-3 cm. latis penniveniis supra (costa media paulo puberula excepta) glabris subluccidis sub lente valde reticulatis (areolis minutis, vix 0.3 mm. diametro), subtus paulo pallidioribus laxe pubescentibus obscuris; petiolo pubescente gracili 11-17 mm. longo; corymbis terminalibus planiusculis vel modice convexis multicapitulatis sordide pubescenti-tomentosis; bracteolis linearibus

saepius patentibus curvatis stramineis firmiusculis; capitulis 10-12-floris; involucri squamis ca. 13 ovato-oblongis obtusis ciliatis dorso laxe pubescentibus; corollis albidis 4 mm. longis, tubo proprio 1 mm. longo glanduloso-atomifero, faucibus paullo ampliatis 3 mm. longis glabris; pappi setis ca. 17, sordide albis barbellatis; achaeniis (immaturis) ca. 2 mm. longis in angulis cum glandulis globosis minutis sessilibus instructis.—COLOMBIA: at Verjón, Sept., 1917, *Bro. Aristei-Joseph*, no. 150A (Gr.).

The leaves of this species vary from crenulate or serrulate to essentially entire and at different stages of development their reticulation, as seen from above, is of strikingly different size of mesh. These differences, however, are very clearly those of age or of individual development and have no classificatory worth. *E. Aristei* is clearly related to the Venezuelan *E. Jahni* Robinson, Proc. Am. Acad. liv. 248 (1918), but that species has leaves of a more elliptic-oblong contour, scarcely more narrowed to the apex than to the base, their teeth somewhat larger, more salient, and mucronate, the petioles shorter, and the heads only about 6-flowered.

E. (§ Subimbricata) Bridgesii, spec. nov., ut videtur herbaceum (basi ignota) gracile erectum 3 dm. vel ultra altum; caule tereti 2-3 mm. diametro stramineo-viridi tenuiter puberulo (pilis brevissimis incurvatis); internodiis usque ad 6 cm. longis; foliis suboppositis vel superne alternis rhombéo- vel lanceolato-ovatis utroque attenuatis paullo supra basin 3-5-nervatis 5 cm. longis 1.5-1.8 cm. latis tenuiter membranaceis pallide viridibus supra praesertim ad marginem scabro-puberulis subtus vix pallidioribus in nervis et venis principibus albidis puberulis margine cum dentibus parvis mucronatis paucissimis (saepe utroque 1-2 solis) instructis; petiolo supra canaliculato anguste marginato 4-7 mm. longo; corymbo composito planiusculo 2-2.5 dm. diametro, ramis et pedicellis (3-6 mm. longis) stramineo-viridibus puberulis; capitulis numerosis ca. 25-floris 7 mm. altis 4 mm. diametro; involucri squamis ca. 22 valde inaequalibus gradatis pallide viridibus plerisque 2-costulatis, extimis brevibus ovato-lanceolatis acuminatis dorso paullo adpresse puberulis apice squarroso-recurvatis, intermediis gradatim longioribus lanceolatis attenuatis subglabris, intimis lineari-oblongis acutis glabris; corollis roseis 4 mm. longis glabris sursum sensim ampliatis limbo extus paullo granulatis; achaeniis atro-brunneis in costis pallidioribus sursum hispidulis; pappi setis ca. 27 vix 2.5 mm. longis barbellatis.—BOLIVIA: without locality, *Bridges* (K., phot. and fragm. Gr.).

E. CELTIDIFOLIUM Lam., var. *HIRTELLUM* Robinson, Proc. Am. Acad.

liv. 238, 311 (1918). This continental variety of the West Indian *E. celtidifolium* was, at the time of its description, known to the writer only from Colombia, where it had been twice collected near Santa Marta. It has been rediscovered in northern Venezuela at Lower Cotiza (Agr. Exp. Sta.), near Caracas, on the sunny side of a gorge, alt. 925 m., Pittier, no. 7897 (Gr.). Prof. Pittier describes it as a shrub or small tree, 3-4 m. high, with small greenish flowers on drooping branchlets.

E. (§ **Eximbricata**) **.choricephaloides**, spec. nov., ut videtur herbaceum (basi ignota) verisimiliter 1 m. vel ultra altitudine; caule ramisque gracilibus flexuosis teretibus dense patenterque glanduloso-puberulis; internodiis usque ad 1 dm. longis; foliis oppositis deltoideo-ovatis apice acuminatis basi subtruncatis vel leviter patenterque cordatis lateraliter serratis-vel crenato-dentatis (dentibus inaequalibus rotundatis vel subacutis utroque ca. 10) membranaceis supra dense puberulis et in nervis venisque maximis villosis ca. 6 cm. longis et 4.5 cm. latis a basi 3-nerviis; petiolo 1-3 cm. longo glanduloso-tomentello; panicula laxissima foliaceo-bracteata 4 dm. alta 3 dm. diametro dense glanduloso-puberula; pedicellis filiformibus 1-2.6 cm. longis; capitulis dissitis ca. 7 mm. altis 25-30-floris; involucri campanulati squamis subaequalibus anguste oblongis vel oblanceolatis acutis viridibus 2-3-costatis dorso puberulis ca. 4 mm. longis apicem versus scariosis et erosis; corollis albis glabris, tubo proprio fauces ampliatas subaequante; dentibus limbi brevissimis ca. 0.3 mm. longis; achaeniis pallide brunneis 1.8 mm. longis in angulis hispidulis in faciebus concavis laevibus; pappi setis ca. 12 albidis minute scabridulis.—PERU: Department Amazonas, Province Chachapoyas, Mathews (K., phot. and fragm. Gr.). In habit and very loose inflorescence recalling the Mexican *E. choricephalum* Robinson, but differing in many points.

E. (§ **Subimbricata**) **coelocaule**, spec. nov., fruticosum; ramis curvato-adscendentibus teretibus robustis griseo-brunneis maturitate glabris laevibus fistulosis; internodiis 3-4 cm. longis; foliis oppositis lanceolato-oblongis vel rhombeo-lanceolatis longe acuminatis serratis (basi cuneata integra excepta) penniveniis usque ad 17 cm. longis et 6 cm. latis firmissculis glaberrimis (maturitate) supra viridibus subtus pallidioribus glaucis puncticulatis; petiolo 1-4 cm. longo rubescente glabro; foliis supremis minoribus lanceolatis integerrimis; corymbo sessili terminali composito leviter convexo 1-1.5 dm. lato dense crispeque fulvo-tomentello; capitulis numerosissimis inter se binis vel trinis aggregatis sessilibus vel brevissime pedicellatis ca. 5-floris 10-12 mm. longis 2-3 mm. crassis graciliter cylindricis; in-

volueri squamis ca. 12 subtriseriatis stramineis extimis ovatis acutiusculis interioribus gradatim longioribus anguste ellipticis delicatule striatulis apice obtusiusculis glabris; corollis 7 mm. longis sensim sursum paullo ampliatis glabris; antheris fere liberis longiuscule appendiculatis; achaeniis 3 mm. longis nigris lucidis obsolete granulatis; pappi setis ca. 30 inaequalibus stramineo-albidis.—PERU: Province of Chachapoyas, 1835, *Mathews*, no. 1373 (K., phot. Gr.). In form the involucre of this species is nearly cylindrical yet the scales do not have the texture, nervation, or deciduous nature of § *Cylindrophala* and it seems best placed in § *Subimbricata*.

E. (§ *Subimbricata*) **Cookii**, spec. nov., fruticosum dense villosum, pilis primo longis gracillimis sub lente pulcherrime purpureo-articulatis tardius plus minusve attritis; caule tereti purpureo, internodiis usque ad 13 cm. vel ultra longis; ramis patentibus vel divaricatis plerisque curvato-adscendentibus; foliis ovatis acuminatis crenato-serratis (basi rotundata vel subcordata integra excepta) ima a basi 3(-5)-nervatis supra obscure viridibus et crispe puberulis subtus paullo pallidioribus sordide pubescentibus et glandulari-atomiferis 3-6 cm. longis 1.8-3.6 mm. latis; petiolo 1-2 cm. longo; pedicellis 1-4 mm. longis; capitulis glomeratis ca. 22-floris 7 mm. altis 4 mm. diametro; involucri campanulati ca. triseriati substraminei squamis ca. 19 valde inaequalibus, interioribus anguste oblongis apice rotundatis sed apiculatis saepe 2-costulatis viridibus vel purpureo-tinctis saepissime dorso granulatis vel leviter puberulis, intermediis et extimis gradatim brevioribus acuminatis ciliatis distinctius puberulis; corollis albis 3.8 mm. longis, tubo proprio vix 0.8 mm. longo, faucibus sensim ampliatis cylindricis, limbo hispidulo; achaeniis fusco-brunneis 1.5 mm. longis glabris; pappi setis ca. 27 laete albis minute scabidis.—PERU: Dept. Cuzco: Lucumayo Valley, alt. 1800-3600 m., 19 June, 1915, *O. F. Cook & G. B. Gilbert*, no. 1352 (TYPE, U. S., phot. Gr.). An old specimen, *Mathews*, no. 1126, collected at "Andimarca" and now in the Kew Herbarium, is apparently of this species. It differs chiefly in its shorter pubescence, which on the mature branches is scarcely more than a somewhat glandular puberulence. However, the longer and articulated pubescence, so copious on the Cook & Gilbert specimen, is found to some extent on the younger petioles, etc., of the *Mathews* plant, and its absence from the older parts may well be due to some form of attrition, disarticulation, or absorption. At all events, species have been noted elsewhere in the genus which appear to pass from a stage with copious articulated and non-glandular pubescence to one in which glandular puberulence is prevalent.

It seems probable that the "Andimarca" mentioned is Andamarca in the Department of Junin, a locality about 300 km. distant from Lucumayo Valley. The leaves in the Mathews plant are somewhat more deeply cordate and a little more bluntly toothed than in the Cook & Gilbert plant, but in the presence of pretty close agreement in all essential features these differences do not appear of much classificatory moment. There being, however, a slight doubt as to the locality of the Mathews specimen, it has seemed better to select the other as the type, particularly as a species (described below) had already been dedicated to Alexander Mathews.

E. CUTERVENSE Hieron. in Engl. Bot. Jahrb. xl. 383 (1908). This species was originally found from near Cutervo and Tambillo in Northern Peru by von Jelski. It is described (Hieron. l. c.) as having the stem up to 2.5 cm. in thickness. This certainly must be a clerical error for 2.5 mm., since surely no plant with a stem 2.5 cm. thick would be characterized as "suffruticosa vel fruticulosa." The species is furthermore described as having the leaves sessile or short-petioled, the petioles scarcely 2 mm. long. The corolla is said to be glabrous externally, the pappus whitish, and the achenes roughish on the upper part of the angles. So far as known to the writer the species has not been subsequently reported. However, specimens have now been collected in the vicinity of Nabón, Ecuador, 25-26 Sept., J. N. Rose, A. Pachano & G. Rose, no. 23,014 (Gr., U. S., N. Y.), which correspond closely in nearly all described features to *E. cutervense*, having the same much-branched habit, small, roundish-ovate subcordate, acute to very shortly acuminate leaves, which are similarly crenate on the somewhat revolute margins. The articulated pubescence is the same, the inflorescence, and numbers of florets (35), scales (15-16) and pappus bristles (18) fairly approximate those given by Hieronymus. The chief differences observed are as follows: the leaves in the Ecuadorian plant are never really sessile and the petioles are sometimes as much as 4 mm. long; the corolla-teeth are dorsally hispid; the achenes are hispidulous on the angles throughout their length; and the pappus-bristles are distinctly roseate. These minor differences, however, do not appear sufficient to justify the separation of the Ecuadorian plant, at least until it is possible to have it carefully compared with the type of *E. cutervense*. It is therefore provisionally referred to that species.

E. (§ Eximbricata) dasyneurum, spec. nov., herbaceum erectum virgatum ut videtur annuum 6 dm. vel ultra altum; caule tereti densissime piloso, pilis patentibus attenuatis articulatis saepe curva-

tis; internodiis 1.5–5 cm. longis; foliis oppositis breviter petiolatis ovatis acuminatis obscure serratis basi rotundatis vel levissime cordatis 2–3 cm. longis 1.5–2 cm. latis supra subglabris solum sparse in nervis venisque pilosis bullato-rugosis post exsiccationem nigrescentibus subtus pallidioribus praecipue in nervis venisque sordido-hirsutis (pilis densis attenuatis curvatis maturitate firmiusculis) a basi 3-nervatis submembranaceis margine juventate forte revolutis; petiolo 2–4 mm. longo hirsuto; inflorescentia e corymbo unico composito terminali convexo 1 dm. diametro sistente vel e corymbis minoribus densiusculis pluribus ramos terminantibus paniculam plus minusve elongatam conjunctim formantibus; capitulis numerosis 7 mm. longis et crassis ca. 30-floris pedicellatis; involucri campanulati squamis ca. 17 plerisque aequalibus lanceolato-vel oblongo-linearibus acute mucronatis substramineis 2–3-costulatis ciliolatis dorso plus minusve sordido-pubescentibus, 2–3 extimis angustissimis subulatis paullo brevioribus; corollis albis ca. 3.8 mm. longis limbum versus paullo hispidulis; tubo proprio fauces distincte ampliatas subaequante; achaeniis 1.8 mm. longis maturitate nigris hispidulis; pappi setis ca. 18 albidis corollam subaequantibus apicem versus sensim incrassatis.—COLOMBIA: in field, Antizales, Dept. Bolívar, alt. 1500–1800 m., Dr. F. W. Pennell, no. 4460 (N. Y., Gr.).

This species is obviously close to *E. sotarense* Hieron., which, however, has the pubescence on the pedicels of wide-spreading gland-tipped hairs, while in *E. dasyneurum* it is of incurved non-capitate hairs. *E. sotarense* also has the leaves, if one may judge from its description, considerably less pubescent beneath, and the involucreal scales less attenuate.

E. DENDROIDES Spreng. Syst. iii. 415 (1826). In treating this species in his recent study of the Ecuadorian Eupatoriums, Proc. Am. Acad. liv. 359 (1918), the writer by oversight omitted a reference to Bentham, Pl. Hartw. 135 (1844), where there is a record of its collection in the mountains of Loja, by Hartweg, no. 755. There is an unnumbered Hartweg specimen of the species from the same locality in the herbarium of the New York Botanical Garden. By error in the paper mentioned the species was given a parenthetical authority (HBK.) which should have been deleted.

E. DOMBEYANUM DC. Prod. v. 167 (1836). This species, described from material collected in South America by Dombey, but without indication of locality or even of the country, has never been satisfactorily identified. It belongs to § *Eximbricata* and is described as "fruticosum glaberrimum." The heads are in a loose panicle, many

of them nodding on curved or flexuous pedicels; the leaves are ovate and apparently membranaceous.

Entirely glabrous and at the same time thin-leaved members of § *Eximbricata* are not very numerous. Finding a plant of this general nature among the specimens collected by Mr. H. H. Smith near Santa Marta, Colombia, the writer (Proc. Am. Acad. liv. 315) ventured to place it doubtfully in *E. Dombeyanum* with which it appeared to have many points in common. However, further study of this and the related plants from Peru renders it decidedly unlikely that the Colombian plant can have anything to do with the original *E. Dombeyanum*. It is accordingly characterized below as a new species under the name *E. psilodorum*.

Similar efforts to identify with *E. Dombeyanum* DC. certain Peruvian plants, notably Weberbauer's nos. 860, 2766, and 3253, have likewise failed. No. 860 (described below as *E. stictophyllum*), while possessing rather closely the leaf-contour of *E. Dombeyanum* has considerably denser and corymbiform inflorescences, the young stems, branches, and pedicels are pulverulent-puberulent to a degree that DeCandolle would scarcely have described as "Glaberrimum;" the achenes are covered with sessile glands and the petioles are muriculate, which is clearly not the case in the type of *E. Dombeyanum* of which there is a photograph in the Gray Herbarium; finally, the leaves are rather conspicuously dark-punctate beneath — a feature, which had it been equally manifest in the type of *E. Dombeyanum*, would almost certainly have been mentioned by so careful a writer as DeCandolle.

Weberbauer's nearly related nos. 2766 and 3253 (below described as *E. simulans*) differ from *E. Dombeyanum* in having lanceolate (rather than ovate) leaves, which are pinnately veined rather than 3-nerved from above the base; the stems are much more leafy, with mostly short internodes; the branches, petioles, pedicels, and achenes are all perceptibly granular-puberulent, and the involucreal scales are more pubescent than is indicated by DeCandolle in his character of *E. Dombeyanum*.

After prolonged effort to take into account all characters and make reasonable allowance for individual variation, it has seemed impossible to refer any of these specimens to *E. Dombeyanum*. On the other hand, they are so close as to give added strength to the view that the species will ultimately be found in Peru, where the greater part of Dombey's South American collecting was accomplished.

E. (§ Subimbricata) drepanoides, spec. nov., fruticosum usque

ad 4 m. altum glabrum; ramis curvatis subteretibus foliosis post exsiccationem paullo costulatis; internodiis 1-2 cm. longis; foliis oppositis lanceolatis falcatis acuminatis basi acutis serratis (dentibus 0.6 mm. altis 2-3 mm. latis) firmiusculis supra minute atomiferis planis (sine reticulatione prominente venarum) subtus paullo pallidioribus supra basin 3-nerviis demum penniveniis 7-9 cm. longis 1.8-2.1 cm. latis; petiolo glabro ca. 2 cm. longo; corymbis terminalibus sessilibus compositis convexis 1 dm. vel ultra diametro, ramulis pedicellisque arachnoideo-puberulis; capitulis numerosis ca. 7-floris 6 mm. (valde immaturis) longis 3.5 mm. diametro; involucri anguste campanulati squamis ca. 13 ovato-oblongis acutiusculis striatulis purpurascenti-stramineis arachnoideis ciliatis; corollis graciliter tubulosis conspicue 5-nervatis granulatis; dentibus limbi 5 lanceolato-oblongis; achaeniis (valde immaturis) deorsum decrescentibus granulatis; pappi setis ca. 23.—PERU: open woods by a brook, Comin, Prov. Huari, Dept. Ancachs, alt. 3600-3700 m., 18 Apr., 1903, *Weberbauer*, no. 2918a (Berl., phot. and fragm. Gr.). This species, though pretty clearly undescribed, is represented only by fragmentary and immature material.

Near *E. coelocaule*, described above, but with much smaller and relatively narrower and duller leaves, arachnoid-ciliate involucreal scales, etc.

E. (§ Subimbricata) endytum, spec. nov., fruticosum 1-2 m. altum breviter ferrugineo-velutinum; caulibus teretibus fistulosis usque in paniculam foliosis; internodiis 5-8 cm. longis; foliis oppositis oblongo-ovatis acutis serrulatis (dentibus ca. 0.7 mm. altis 2-3 mm. latis) basi rotundatis utrinque tomentellis subtus distincte pallidioribus penniveniis 8-12 cm. longis 3.6-6 cm. latis paullo firmiusculis vix membranaceis; petiolo subtereti 1.5-2 cm. longo; panícula ovoidea oppositiramea ca. 1.5-1.8 dm. alta et diametro apice rotundata; ramis inflorescentiae late patentibus infra nudis solum apicem versus capituliferis; capitulis ca. 37-floris 7 mm. longis 7 mm. diametro; involucri campanulati squamis ca. 21 acutiusculis 2-3-seriatim imbricatis sed vix gradatis exterioribus ovato-oblongis persistentibus dorso brunneo-tomentellis nervis obscurissimis, squamis interioribus angustioribus parce pubentibus mox deciduis; corollis sordide albis 3.5 mm. longis sursum gradatim ampliatis glabris; styli ramis filiformibus rectiusculis laevibus vix clavellatis; antheris apice cum appendice tenui ovata instructis; achaeniis immaturis 1.5 mm. longis glabris; pappi setis ca. 20 corollam subaequantibus paullo scabratis.—PERU: between Sandia and the tambo Azalaya, on the

way from Sandia to Chunchusmayo, among bushes at an altitude of 1500-2000 m., 5 June 1902, *Dr. A. Weberbauer*, no. 1074 (Berl., phot. and fragm. Gr.).

E. (§ *Cylindrocephala*) *eripsimum*, spec. nov., suffruticosum 3-5 dm. altum ramosum decumbens; caule tereti et ramis saepissime curvato-ascendingibus foliosis teretibus puberulis; foliis parvulis oppositis lanceolatis vix petiolatis integriusculis vel utroque obscure 1-3 dentatis membranaceis 2.5-3.5 cm. longis (internodiis subaequantibus) 5-10 mm. latis a basi cuneata 3-nervatis supra glaberrimis sed saepe minute pustulatis subtus in nervis obscure appresseque puberulis; corymbis terminalibus 3-8-capitulatis laxis; capitulis ca. 4-floris; involucri campanulato-cylindrici squamis ca. 3-4-seriatim gradatis, extimis ovato-oblongis, intimis oblongo-linearibus, omnibus caducissimis praeter marginem ciliolatum glaberrimis stramineis 1-4-costulatis lucidulis; receptaculo planiusculo sed apice pedicelli post delapsam squamarum denudato subcylindrico; corollis lilacinis (post exsiccationem nigrescentibus) graciliter tubulosis vix sursum ampliatis glaberrimis 8.5 mm. longis; dentibus limbi 5 angustis recurvatis; styli ramis longissimis leviter clavellatis rectiusculis patentibus ca. 6 cm. longis; achaeniis gracilibus deorsum paullo decrescentibus adpresse puberulis 4.5 mm. longis; pappi setis ca. 35 albis barbellatis subaequalibus corollam subaequantibus. — PERU: in open places among grasses, bromeliads, and cacti, alt. 2200-2500 m., Caraz, Dept. Ancachs, 19 May, 1903, *Weberbauer*, no. 3003 (Berl., phot. and fragm. Gr.).

A species somewhat resembling *E. serratuloides* HBK. but with narrower less toothed leaves somewhat hairy beneath, and considerably longer florets. Like *E. serratuloides* it has somewhat the habit of § *Praxelis*. The excessively caducous nature of the scales and florets, giving the specimens a dilapidated appearance, has suggested the specific name, which, happily, is not likely to have been hitherto employed.

E. (§ *Eximbricata*) *flexile*, spec. nov., suffruticosum gracile subscandens 2 m. altum; caulibus teretibus flexuosis molliter breviterque sordido-tomentellis; foliis ovatis caudato-acuminatis cordatis a basi 5-7-nerviis tenuibus supra puberulis subtus praecipue in nervis griseo-pubescentibus ca. 6 cm. longis 3 cm. latis plus minusve lateraliter leviter remoteque pauci-dentatis; petiolo gracili flexuoso ca. 1 cm. longo; panicula ampla pyramidata 2-4 dm. alta 1.5-2.5 dm. diametro laxa foliaceo-bracteata; pedicellis filiformibus flexuosis griseo-tomentellis; capitulis ca. 20-floris 7 mm. altis 6 mm. diametro; involucri campanulati squamis ca. 16, intimis lineari-oblongis obtusiusculis sed

acute mucronatis plerisque ca. 5 mm. longis; corollis viridescenti-flavidulis tubulosis gradatim paullulo sursum ampliatis 3.5 mm. longis; dentibus limbi 5 breviter deltoideis extus granulatis; antheris apice breviter crassiusculeque appendiculatis; styli ramis filiformibus paullo ad apicem incrassatis et nigrescentibus, achaeniis griseis 2.7 mm. longis deorsum decrescentibus angulis hispidulis; pappi setis ca. 32 corollam subaequantibus albis vix barbellatis.—PERU: woods near a river, Caraz, Dept. Ancachs, alt. 2200 m., May 21, 1903, *Weberbauer*, no. 3027 (Berl., phot. and fragm. Gr.).

In many respects similar to *E. solidaginoides* HBK. but not as yet connected by intermediates and rather too different in appearance to be regarded as a variety until intergradation has been demonstrated. In *E. solidaginoides* the branches of the inflorescence present a somewhat racemose appearance, the heads being rather evenly distributed along them. In *E. flexile* this is not the case, the branches being floriferous chiefly toward the tip. In *E. solidaginoides* the heads are 10–15-flowered and the involucre (when fresh or softened by boiling) is rather narrowly campanulate, the scales being thin. In *E. flexile* the heads are about 20-flowered, the involucre broadly campanulate, and the scales somewhat firmer in texture. The achenes of *E. solidaginoides* are from 1.8–2.1 mm. long, while in *E. flexile* they are about 2.7 mm. long.

E. FULIGINOSUM HBK. Nov. Gén et Spec. iv. 110 (1820); Robinson, Proc. Am. Acad. liv. 302 (1918). Of this little known Colombian species further material is now at hand extending its recorded distribution to the department of Huila, where these specimens were collected in forests on the Cordillera Oriental, east of Neiva, Aug. 1–8, 1917, by Drs. Rusby & Pennell, nos. 573 (N.Y.) and 977 (N.Y.). In all characters these correspond closely with a photograph (Gr.) of the type (Par.) and of their specific identity there can be no doubt. However, the receptacle bears a short, thin and very fugacious pubescence which commonly disappears so completely with the fall of the achenes as to leave the receptacle entirely glabrous and merely punctate, as it was described in the original diagnosis of the species. Technically, having a hairy receptacle, *E. fuliginosum* must be transferred to § *Hebeclinium*. In practice, however, it will be well to retain at least a cross-reference to it in § *Subimbricatum*, for the differential character from its obscurity and fugacious nature is here very likely to be overlooked. The labels of the material at hand record the plant as a tall shrub with greenish-yellow flowers.

E. (§ *Subimbricata*) *Gascae*, spec. nov., dense villosa-tomentosa

sum, indumento brunneo vel fusciscenti patente glandulari longiusculo; caule (basi ignota) tereti 6 mm. crasso folioso meduloso; foliis oppositis petiolatis ovatis cordatis (sinu angusto) acutiusculis ca. 1 dm. longis 4-7 cm. latis supra atroviridibus conspicuiter bullato-rugosis puberulis subtus reticulatis sordido-tomentellis margine subregulariter dentatis, dentibus 1.5 mm. altis 3-4 mm. latis; petiolo 2-4 cm. longo dense piloso, pilis articulatis; corymbis terminalibus breviter pedunculatis densis 6-7 cm. diametro planiusculis vel modice convexis; capitulis ca. 22-floris 1.5 cm. longis 6 mm. crassis; involucri campanulato-subcylindrici squamis subtriseriatis ca. 21 ovatis acutis stramineo-viridibus costulato-striatulis dorso pubentibus, receptaculo plano; corollis graciliter tubulosis 5 mm. longis glabris paullulo sursum ampliatis; dentibus limbi 5 patentibus anguste deltoideis; achaeniis graciliter prismaticis 4 mm. longis; pappi setis ca. 45 stramineo-albidis firmissusculo-capillaribus vix scabratis.—PERU: Province of Chachapoyas, *Mathews* (TYPE, Gr.). The specimen at the Gray Herbarium bears no number, but an exact duplicate in the Kew Herbarium is marked "Mathews 1836. 91. H."

Though unusual to name plants for persons in no way connected with their discovery or investigation, the writer desires to perpetuate in the present interesting and attractive Peruvian species the memory of the extraordinary man, *Pedro de la Gasca* (born 1496, died 1569), styled by Charles V. the "President of the Royal Audience" and by the people of Peru "Father and Deliverer," concerning whom it may be said that he was the first Caucasian to reach Peru of whom the race has any reason to be proud.

E. (§ *Eximbricata*) *Gilbertii*, spec. nov., perenne vel fruticosum gracile glabriusculum; caule pallido-stramineo tereti ca. 2 mm. crasso flexuoso in maturitate glaberrimo juventate sparse obscureque villosulo; foliis oppositis ovatis acutis vel leviter acuminatis mucronulato-serratis vel -crenatis (dentibus ca. 0.6 mm. altis inter se ca. 5 mm. distantibus) tenuibus membranaceis supra viridibus in nervis puberulis subtus distincte pallidioribus glabris 6-7 cm. longis 3-3.5 cm. latis basi rotundatis vel subcordatis integris; petiolo gracili ca. 1.7 cm. longo supra canaliculato puberulo; corymbis compositis planiusculis sublaxis obscure villosulis basi foliaceo-bracteatis; pedicellis filiformibus 4-10 mm. longis bracteolatis; capitulis parvis vix 5 mm. altis et diametro ca. 26-floris; involucri campanulati squamis ca. 17 subaequalibus oblongo-lanceolatis stramineo-viridibus saepius 2-costulatis et 3-venis margine tenuibus subscariosis apice acutiusculis ciliatis dorso laxè pubescentibus (pilis tenuissimis fuscis non-glandulif-

eris); corollis albis ca. 3.3 mm. longis, tubo proprio glabro fauces campanulato-ampliatas subaequante, dentibus limbi hispidulis; achaeniis (valde immaturis) 1.2 mm. longis ut videtur glabris; pappi setis ca. 20 albis sursum hispidulis.—PERU: San Miguel, Urubamba Valley, Dept. Cuzco, alt. about 1800 m., 7 June, 1915, *O. F. Cook & G. B. Gilbert*, no. 1115 (U. S., phot. Gr.).

E. (§ *Eximbricata*) *gloeocladum*, spec. nov., fruticosum robustum vel arboreum; caulibus griseo-brunneis flexuosis teretibus juventate incurvo-puberulis glutinoso-viscosis tardius vix minute granulatis deinde omnino glabratis post exsiccationem longitudinaliter rugulosis usque ad 8 mm. diametro medullosis; medulla alba; internodiis 1–4 cm. longis; foliis ovato-oblongis argute acuminatis basi cuneatis 1–2 dm. longis 2.5–8 cm. latis integerrimis vel obsolete remoteque undulato-subdentatis penniveniis supra in nervo medio puberulis aliter glabris laevibus viridibus subtus pallidioribus reticulatis breviter denseque pubescentibus subcoriaceis; corymbis compositis valde convexis congestis ca. 1 dm. diametro a bracteis foliaceis plerumque superatis; pedicellis brevibus sordide pubescentibus; capitulis ca. 9-floris 8 mm. altis 4 mm. diametro; involucri campanulati squamis ca. 14 eroso-ciliatis dorso puberulis vel granulatis saepe aliquanto viscidulis vix imbricatis sed paucis extimis brevioribus et subgradatis; corollis verisimiliter albis vel roseis 5.5 mm. longis glabris paullo a basi ad limbum gradatim ampliatas; styli ramis vix clavellatis; achaeniis ca. 2.5 mm. longis juventate in angulis glanduloso-granulatis tardius glabratis laevibus brunneis vel fuscis; pappi setis ca. 26 stramineo-albidis vix scabratis.—*E. trichotomum* Sch. Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & *Linnaea*, xxxiv. 535 (1865–66), without char., not Sch. Bip. in sched. Riedel ex Bak. in Mart. Fl. Bras. vi. pt. 2, 305 (1876).—BOLIVIA: Department La Paz, Province Larecaja, in the neighborhood of Sorata, in temperate region, 2700–3000 m., on Mt. Chileca, near Challapampa, July–Sept. 1858, *G. Mandon*, no. 258 (Gr., N. Y.).

In giving this marked species what is believed to be its first description the author has duly considered the possibility of retaining the name *E. trichotomum* long ago applied to the plant by Schultz-Bipontinus. However, Schultz working in his usual rapid manner not only failed to give any diagnosis of this *E. trichotomum* but soon employed in manuscript the same binomial for a wholly different plant. *E. trichotomum* Sch. Bip. in the latter sense has seen light and received a certain amount of definition in Mart. Fl. Bras. vi. pt. 2, 305 (1876) where established by Baker as a variety of *E. Vauthierianum*

DC. Under these circumstances it appears unwise to describe a *Eupatorium trichotomum* Sch. Bip. in another sense. Therefore, an entirely new name is here chosen.

E. (§ Subimbricata) gracilentum, spec. nov., herbaceum perenne gracile 3-4 dm. vel ultra altum; radice e fibris paucis gracilibus lignescentibus elongatis sistente; caulibus solitariis vel pluribus teretibus purpurascens sordide puberulis vel tomentellis; foliis oppositis detoideo-ovatis acutis vel acuminatis crenato-dentatis basi rotundatis vel truncatis vel subcordatis integris 1.8-3 cm. longis 1.1-2.3 cm. latis tenuibus membranaceis supra pubescentibus subtus griseo-tomentosis ima a basi 3-nervatis; petiolo tenui 4-8 mm. longo griseo-pubescente; capitulis ca. 25-floris 6 mm. longis 3.7 mm. diametro in cymos laxos 1-4-capitulatos ad apices ramorum patentium gestis in paniculam laxam foliaceo-bracteata dispositis; involucri anguste campanulati squamis ca. 19 subtriseriatis stramineis, interioribus lanceolato-ellipticis obtusis laeviusculis 2-3-costulatis scarioso-marginatis, intermediis et extremis gradatim brevioribus ovato-lanceolatis acutis vel acuminatis brunneo-puberulis; corollis verisimiliter albis limbo excepto glabris; tubo proprio 0.7 mm. longo faucibus paullo ampliatis cylindricis 2.3 mm. longis; achaeniis 1.5 mm. longis fusco-brunneis, costis paullo pallidioribus hispidulis; pappi setis ca. 27 delicatule capillaribus sublaevibus albis.—PERU: without locality, *Mathews* (N. Y., phot. Gr.).

E. (§ Subimbricata) hylophilum, spec. nov., herbaceum ut videtur erectum obscure praecipue in novellis pulverulenti-puberulum; caule tereti flexuoso folioso pallide griseo-brunneo; foliis oppositis anguste lanceolatis utroque attenuatis peracutis subsessilibus remote denticulatis (dentibus 0.5-0.7 mm. altis inter sese ca. 1 cm. distantibus) supra glaberrimis viridibus subtus distincte pallidioribus nervo medio obsolete puberulis penniveniis (venis intra marginem anastomosantibus) ca. 1 dm. longis 1 cm. latis tenuiter membranaceis; panicula terminali ovoidea subthyrsioidea; ramulis pedicellisque fere filiformibus incurvato-puberulis; capitulis 5-6 mm. altis 2.6 mm. diametro ca. 21-floris; involucri squamis ca. 25, 3-4-seriatis gradatis stramineis tenuibus striatulis apicem versus griseo-tomentellis; corollis albis glabris graciliter tubulosis 3 mm. longis paullulo apicem versus ampliatis, dentibus limbi 5 deltoideis dorso granulatis; styli ramis cum appendice filiformi flexuosa papillato-puberula munitis; achaeniis 1.3 mm. longis nigris in angulis pallidioribus parce hispidulis; pappi setis capillaribus albis vix scabratis ca. 28 mm. longis.—COLOMBIA: forest, alt. 150-300 m., Boca Esmeralda, on Rio Sinu, Dept. Bolívar.

1 Mar. 1918, Dr. F. W. Pennell, no. 4561 (N. Y., phot. and fragm. Gr.).

This species with something of the habit of a *Solidago* is clearly of the affinity of *E. clatum* Steetz, *E. turbacense* Hieron., *E. Squiresii* Rusby, and *E. torarensis* Robinson. From all these it differs in its much narrower, much more gradually attenuate, and in texture more delicate leaves of somewhat different venation and essentially glabrous beneath. In style-branches and some other features it recalls *E. Trianae* Robinson but differs in its opposite leaves, slender-pedicelled heads, etc.

E. (§ Subimbricata) hypargyrum, spec. nov., fruticosum; ramis curvato-ascendentibus juventate subadpresso-lanatis tardius glabratis brunneo-griseis cum lenticellis munitis; foliis oppositis petiolatis rhomboideo-ovatis falcato-acuminatis basi cuneatis obscure remoteque cuspidato-serrulatis supra glabris viridibus subtus arcte lepidoto-vel pannoso-lanatis argyris penniveniis (venarum jugis 1-2 paullo supra basin aliis multo longioribus, omnibus subglabris sursum incurvatis anastomosantibus) submembranaceis usque ad 1 dm. longis et 3.8 cm. latis; petiolo 1-1.6 cm. longo; corymbo terminali composito ca. 1 dm. diametro convexo multicapitato; capitulis ca. 9-floris ca. 1 cm. longis 3.8 mm. diametro; involucri subcylindrico-campanulati squamis 3-seriatis ovato-lanceolatis vel anguste oblongis acutiusculis obscure 3-nervatis arachnoideo-ciliatis aliter subglabris viridibus saepius purpureo-tinctis; corollis laete purpureis glabris subcylindricis 6 mm. longis paullo sursum ampliatis sine faucibus distinctis; achaeniis (valde immaturis) 2.7 mm. longis granulatis; pappi setis ca. 28 laete stramineo-albis basin versus paullo incrassatis corollam subaequantibus vix scabratis.—ECUADOR: vicinity of Azogues, 16-17 Sept. 1918, J. N. & G. Rose, no. 22,774 (Gr., U. S., N. Y.). Not closely related to any hitherto described Ecuadorian species. The lower surface of the leaves is closely covered with a somewhat lepidote pubescence except the midnerve and chief veins which are essentially bare. In habit and foliage the species recalls several *Eupatoriums* of Peru and Bolivia, but these are of § *Eximbricata* rather than § *Subimbricata* to which the present species is clearly referable.

E. (§ Eximbricata) iodotrichum, spec. nov., herbaceum perenne ca. 8 dm. altum; caule tereti erecto vel paullo decumbente supra mediam partem oppositirameo atropurpureo villosulo, pilis aliis deli-
catulis attenuatis purpureo-articulatis aliis (plerumque in parte superiore) rectis divaricatim patentibus purpureis glanduloso-capitatis;

internodiis 4-11 cm. longis; foliis deltoideo- vel subreniformi-ovatis brevissime acuminatis cordatis grosse dentatis (dentibus utroque 5-7 vix acutis 1-1.8 mm. altis 3-4 mm. latis) a basi 3(-5)-nerviis utrinque sparse pubescentibus viridibus subtus paullo pallidioribus 2-2.5 cm. longis 2.5-2.8 cm. latis; petiolo ca. 1 cm. longo pubescente; cymis plerisque 3-capitulatis ramos graciles curvato-ascendentes folioso-bracteatos terminantibus laxis; pedicellis 1-1.5 cm. longis filiformibus dense cum glandulis stipitatis instructis; capitulis ca. 46-floris 1 cm. altis et crassis; involucri campanulati squamis ca. 20 ca. 6 mm. longis lanceolato-linearibus subaequalibus attenuatis glandulari-puberulis saepissime atropurpureis basin versus plerisque 2-costulatis; corollis 5-5.5 mm. longis ut videtur albis limbo hispidis aliter glabris; tubo proprio ca. 2.5 mm. longo, faucibus distincte ampliatis subcylindricis ca. 2.8 mm. longis; achaeniis (immaturis ca. 2.5 mm. longis fusciscentibus in angulis sursum hispidulis; pappi setis ca. 17 caducis pulcherrime roseis corollam subaequantibus.— ECUADOR: vicinity of Cañar, 15-16 Sept., 1918, *J. N. & G. Rose*, no. 22,766 (Gr., U. S., N. Y.). Clearly of the affinity of *E. gracile* HBK., *E. prunellae-folium* HBK. etc., but characterized by leaves which are broader than long and rather deeply cordate.

E. IRESINOIDES HBK. *Nov. Gen. et Spec.* iv. 106, t. 340 (1820); Robinson, *Proc. Am. Acad.* liv. 285, 338 (1918), where vars. *villosum* Steetz, *glabrescens* Steetz, and *brevisflorum* Hieron. are distinguished. Of this always characteristic yet somewhat polymorphous species it is now possible to add another variety as follows:

Var. **adenotrichum**, var. nov., habitu foliisque fere ut apud var. *α villosum* differt tamen ramulis pedicellisque inflorescentiae glandulari-puberulis; capitulis paullo minoribus ca. 5.3 mm. longis; involucri squamis numerosioribus ca. 22 omnibus peracutis vel attenuatis.— COLOMBIA: in a ravine, alt. 700-1500 m., Cordillera Oriental, east of Neiva, Dept. Huila, *Rushby & Pennell*, no. 480 (N. Y., Gr.).

It is, of course, impossible to say whether the glandular indumentum will prove to be regularly correlated with the slightly smaller heads and more numerous and sharper-pointed scales or whether these features will be found to have independent variability. However, the combination present in the material at hand seems to warrant varietal rather than formal distinction.

E. (§ Eximbricata) isillumense, spec. nov., fruticosum gracile subscandens exsiccatione nigrescens petiolis basi que nervorum puberulis exceptis glaberrimum; caulibus teretibus 2.5 mm. diametro pallide brunneis, internodiis 3-8 cm. longis; foliis oppositis ovato-

oblongis (supremis lanceolatis) acuminatis basi levissime cordatis mucronato-serratis (serraturis vix 1 mm. altis 6-8 mm. latis) tenuibus a basi 3-5-nerviis (nervis inter sese a venis transversis connexis) 10-12 cm. longis 3-4.5 cm. latis; petiolo brevi gracile viscidulo-tomentello 4-6 mm. longo; panicula oppositiramea laxa ovoidea basi vel saepe ad mediam partem foliaceo-bracteata; pedicellis filiformibus glabris saepe cum bracteolis squamiformibus solitariis instructis 8-15 mm. longis; capitulis ca. 52-floris 7 mm. altis 9 mm. diametro; involucri late campanulati squamis ca. 30 (1-3 extimis brevioribus exceptis) subaequalibus linearibus acutissimis glabris obscure 1-3-nervatis; corollis 3 mm. longis albis vix sursum gradatim ampliatis glabris; antheris apice cum appendice ovata integra munitis; achaeniis (immaturis) ca. 2 mm. longis ut videtur glabris; pappi setis ca. 28 tenuibus albis sublaevibus.—PERTU: in woods near the tambo Isillum between Sandia and Chunchusnago, alt. 1000 m., 23 June, 1902, *W. C. C. Oberbauer*, no. 1206 (Berl., phot. and fragm. Gr.).

In habit and foliage recalling the Brazilian *E. laeve* DC. but readily distinguished by its much looser inflorescence, puberulent petioles, leaves nerved from the very base, more numerous florets, etc.

E. (§ Eximbricata) lobatum, spec. nov., herbaceum perenne pluricaule decumbens 1-4 dm. altum; caulibus teretibus viridibus vel fusciscentibus flexuosis simplicibus vel oppositirameis foliosis, internodiis 1-2 cm. longis; foliis oppositis graciliter petiolatis in axillis saepe proliferis, laminis ovatis 1-2 cm. longis fere aequilatis profunditer crenato-lobatis vel inferioribus etiam subpinnatis 3-foliolatis utrinque viridibus et pilosulis subtus vix pallidioribus, lobis 5-9 integris vel crenato-lobatis apice obtusissimis vel rotundatis, petiolo 5-15 mm. longo; capitulis mediocriter solitariis et terminalibus vel in corymbis parvis paucicapituliferis erectis vel saepius nutantibus, pedicellis 3-10 mm. longis gracilibus tomentellis; involucri campanulato 8-11 mm. diametro multifloso, squamis 1-2-seriatim imbricatis subaequalibus oblanceolatis-oblongis subherbaceis acutis vel obtusis viridibus vel apice scarioso-purpurascensibus 6-8 mm. longis; corollis verisimiliter albis externe granulosis 4-5 mm. longis, tubo proprio gracili faucibus cylindricis breviori, dentibus limbi brevissimis suberectis; achaeniis gracilibus griseo-brunneis fere ab apice ad basin gradatim angustatis basi substipitatis in costis pulcherrimè ciliolatis; pappi setis albis tenuissimis fragilibus 3-4 mm. longis.—*E. scopulorum* Sch. Bip. Bull. Soc. Bot. France, xii. 82 (1865) & *Linnaea*, xxxiv. 535 (1865-6); Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907); not Wedd.—BOLIVIA: on cliffs in the subalpine region, near

Yani, Prov. Larecaja, alt. 3500 m., *Mandon*, n. 263 (Gr., N. Y.); without exact locality, *Bang*, no. 1912 (Gr., N. Y., U. S.). Both specimens distributed as *E. scopulorum*. It is quite impossible to believe that this plant, with very characteristic, deeply lobed or even divided leaves, is conspecific with the plant which Weddell, *Chlor. And.* i. 216 (1857), described and illustrated as having serrate leaves.

E. (§ *Cylindrocephala*) **mallotum**, spec. nov., lignescens verisimiliter elatum et subscandens molliter tomentosum vel tomentellum, pilis densis brevibus incurvis; caule tereti oppositirameo; foliis oppositis deltoideo-ovatis acuminatis integris basi rotundatis vel subtruncatis vel etiam paullo cordatis 2-3.5 cm. longis 1.4-2.7 cm. latis ima a basi 3-nerviis supra griseo-tomentellis subtus canescenti-tomentosis; petiolo dense tomentoso 3-5 mm. longo; capitulis 13 mm. longis 8 mm. diametro ca. 30-floris numerosis corymbo composito planiusculo terminali dispositis; pedicellis 6-20 mm. longis; involucri maturitate cylindrici squamis 5-6-seriatis arcte imbricatis apice rotundatis ciliolatis, extimis ovatis dorso tomentosis, ceteris dorso glabriusculis saepe apicem versus fusciscentibus vel viridimaculatis; corollis verisimiliter violascentibus glabris, 6 mm. longis paullo gradatim sursum ampliatis; achaeniis gracilibus deorsum decreascentibus 5.2 mm. longis, faciebus nigris glabris, angulis pallidis sursum hispidulis; pappi setis sordide albis inaequalibus scabridis vix sursum incrassatis.—*E. Clematitis*, var. *tomentosum* Sch. Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), without char., & *Linnaea*, xxxiv. 535 (1865-66), as *Clematidis* var. *tomentosa* and also without char. *E. conyzoides*, var. *incanum* Britton, Bull. Torr. Bot. Club, xviii. 333 (1891), and probably of Baker in Mart. Fl. Bras. vi. pt. 2, 278 (1876).—**BOLIVIA:** Dept. LaPaz, Prov. Larecaja: "viciniis Sorata; inter Munaypata et rivum Chalassayo, in schistosis. Reg. temp. 2600-2700 m.", *Mandon*, no. 249 (TYPE, Gr., N. Y.); Sorata, alt. 2440 m., *Rusby*, no. 1626 (N. Y.); Prov. Yungas, alt. 1220, *Rusby*, no. 1625 (N. Y.).

From the expression "*an spec.?*" appended to his identification Schultz seems to have surmised the probable distinctness of this plant, though provisionally treating it as a variety of *E. clematitis* DC. The latter, a rare and little known Peruvian species, founded upon Poeppig's no. 3108 (of which a small and poor fragment from the herbarium of the late F. W. Klatt is now in the Gray Herbarium) has narrowly triangular to lance-oblong thinnish and essentially glabrous leaves, much longer and more slender petioles, and a more elongated and looser inflorescence. Prof. Britton, l. c., is very likely

right in identifying the Bolivian plant with Baker's inadequately characterized *E. conyzoides* Vahl, var. *incanum* of Brazil. However, as has been shown elsewhere, *E. conyzoides* Vahl (as well as the much earlier *E. conyzoides* Mill.) drops definitely into the synonymy of *E. odoratum* L., a plant with smaller heads, paler involucre scales, more rhombic-ovate leaves of much greater size and less pubescence, longer petioles, etc. Of the varietal names, neither *tomentosum* nor *incanum* is satisfactorily available for use in the specific rank because of earlier homonyms of possible validity. Accordingly it seems best to give this doubtful plant a new start as an independent species under a fresh name.

Var. ? **aporum**, var. nov., foliis lanceolato-ovatis gradatim acuminatis basi rotundatis supra densiuscule puberulis subtus pallidioribus griseo-tomentellis usque ad 5.2 cm. longis et 2.4 cm. latis; petiolo fere 1 cm. longo; aliter ut apud var. *typicum* supra descriptum.— BOLIVIA WITHOUT LOCALITY: *Bang*, no. 2875 (Gr., U. S.). This plant with its tomentellous round-based leaves and rather dense inflorescence cannot be satisfactorily placed in the Peruvian *E. clematitis* DC. (under which name it was distributed). Its fine and rather copious pubescence keeps it also from being placed in the nearly related *E. subscandens* Hieron. It is obviously close to the species just described as *E. mallotum*, but while the several collections of that plant already secured have consistently the small deltoid-ovate very short-petioled leaves which give the species a highly characteristic appearance, this possible variety differs considerably in the form and dimensions of the leaf-blade and in having decidedly longer petioles, in these regards showing an approach to *E. subscandens*. Until much more copious material is available to show the direction and extent of its variability, the plant must remain uncertain and for the present it seems best to give it the provisional classification above indicated.

E. (§ **Subimbricata**) **Mathewsii**, spec. nov., fulvo-tomentosum perenne verisimiliter fruticosum basi ignotum; caulibus ramisque curvato-ascendentibus teretibus foliosis 4 mm. diametro post exsiccationem paullulo costulatis; internodiis 3–6 cm. longis; foliis oppositis lanceolatis utroque attenuato-acuminatis caudatis remote cuspidato-serratis (dentibus acutis 1–2 mm. longis ca. 1.5 cm. distantibus) penniveniis supra lucidulis cum venulis depressis reticulatis in nervo medio pubescentibus aliter subglabris subtus rufescenti-pubescentibus leviter reticulatis ca. 1 cm. longis 2 cm. latis; petiolo 1–1.5 cm. longo; panicula oppositiramea pyramidata ca. 1.5 dm.

alta et diametro foliaceo-bracteata; pedicellis 3-7 mm. longis fulvo-tomentosis; capitulis ad apices ramorum subdense dispositis ca. 56-floris ca. 9 mm. altis et crassis; involucri campanulati squamis subtriseriatim imbricatis paullo gradatis ovato-lanceolatis costulatis purpureo-tinctis glanduloso-ciliolatis et dorso sparse tomentellis; receptaculo plano glabro; corollis 5.5 mm. longis sensim sursum ampliatis extus limbum versus paullo granulatis; styli ramis clavelati-filiformibus; achaeniis pallide griseis 2.3 mm. longis plerisque basi curvata callosis; pappi setis ca. 25 laete albis 3.5 mm. longis corolla conspicue brevioribus.—PERU: Yambrasbamba, 1835, *Mathews*, no. 1386 (K., phot. Gr.).

E. (§ *Conoclinium*) *metense*, spec. nov., herbaceum erectum oppositirameum breviter tomentosum saltem 6 dm. altum (basi ignota); caule ramisque adscendentibus teretibus leviter multicostulatis; internodiis usque ad 7 cm. longis; indumento denso primo griseo tardius fusco-brunneo; foliis oppositis ovato-oblongis obtusis grosse crenatis saepius deflexis et conduplicatis 3-6 cm. longis 1.5-3 cm. latis basi abrupte angustatis supra griseo-viridibus tomentellis subtus pallidioribus griseo-tomentosis a basi 3-nerviis, venis laxae anastomosantibus; petiolo 2-6 mm. longo; corymbis ramos terminantibus irregulariter compositis densiusculis convexis; capitulis breviter pedicellatis 6.5 mm. altis 4.5 mm. diametro ca. 28-floris; involucri campanulati squamis ca. 20 subaequalibus leviter imbricatis oblongo-lanceolatis acutis pallide viridibus plerisque 2-costulatis et 3-nerviis dorso griseo-hirsutulis; corollis laete roseo-purpureis glabris 3.7 mm. longis supra mediam partem paullo in fauces indistinctas ampliatis; dentibus patenti-recurvatis; styli ramis longe exsertis vix incrassatis 3.5 mm. longis; achaeniis nigris glabris 1.7 mm. longis; pappi setis albis minute barbellatis 3 mm. longis basi in anulum paullo connatis.—COLOMBIA: grassy llano east of Villavicencio, Intendencia Meta, 1-2 Sept. 1917, *Dr. F. W. Pennell*, no. 1617 (N. Y., phot. and fragm. Gr.).

This species has so closely the habit and involucre of § *Conoclinium* that it seems best to place it there provisionally, although the receptacle is only moderately convex, considerably less so than is usual in the section. Among the Colombian Eupatoriums of § *Conoclinium* this new species approaches most nearly *E. ballotifolium* HBK., but differs from it in its strictly opposite short-petioled leaves of oblong rather than deltoid-ovate contour and of considerably firmer texture.

E. (§ *Subimbricata*) *orgyaloides*, spec. nov., verisimiliter fruticosum (basi ignota) petiolis et ramis inflorescentiae obscure puber-

ulum aliter glaberrimum; caulibus ut videtur erectis gracilibus paullo (post exsiccationem) costato-angulatis fusco-brunneis ad inflorescentiam foliosis; internodiis 4-5 cm. longis; foliis oppositis petiolatis lanceolato-oblongis utroque acuminatis paullo undulatis obscure remoteque cuspidato-denticulatis penniveniis (venis principibus utroque 4-6 prorsus curvatis) chartaceo-membranaceis supra atroviridibus sublucidis subtus paullo pallidioribus opacis utrinque glabris delicatule reticulato-venosis, maximis 1.6 dm. longis 6 cm. latis, petiolo supra canaliculato brevissime fusco-puberulo 4-7 mm. longo; panícula breviter lateque pyramidata 11 cm. alta 17 cm. diametro oppositramea basi foliaceo-bracteata; ramis gracilibus divaricatim patentibus apicem versus solum capituliferis; capitulis ea. 20-floris 4.5 mm. altis et crassis brevissime pedicellatis subcongestis; involucri campanulati squamis ca. 21 fusco- vel viridistramineis ciliolatis aliter glabris modice gradatis, interioribus oblongis vel linearibus, extimis ovatis acuminatis 5-costulatis apice saepe recurvatis; corollis 2.5 mm. longis paullo sursum gradatim ampliatis glabris, dentibus limbi recurvantibus; achaeniis (immaturis) glabris 1.7 mm. longis; pappi setis ca. 30 vix scabratis 2 mm. longis.—PERU: Depart. Loreto, near Tarapoto, *Spruce*, no. 4546 (K., phot. Gr.). In habit recalling *E. orgyale* DC. of eastern Brazil, which however has pubescent conspicuously dentate leaves, 6-12-flowered heads, and other differences.

E. (§ *Subimbricata*) **Pachanoi**, spec. nov., suffruticosum 3 dm. vel ultra altum ramosissimum; caulibus teretibus plus minusve flexuosis basin versus delapsu foliorum nudatis nodulosis juventate cum indumento brevi lanuginoso griseo-fulvescente obtectis; ramis gracilibus saepissime oppositis curvato-adscendentibus foliosissimis, internodiis 3-12 mm. longis; foliis ovato-lanceolatis acutiusculis basi obtusis vel rotundatis supra mediam partem serratis (dentibus utroque 3-4) supra subaveniis obscure praecipue in nervo medio puberulis subtus vix pallidioribus laete viridibus punctatis glabris supra basin 3-nerviis 1.5-2.2 cm. longis 7-10 mm. latis; corymbis pluribus ca. 3 cm. diametro valde convexis subovoideis ramulos terminantibus a ramis foliiferis superatis; pedicellis 4-8 mm. longis fulvescenti-pubescentibus bracteolatis; capitulis ca. 10-floris 8 mm. altis 5 mm. diametro; involucri campanulati ca. 3-seriati laxè imbricatis squamis ca. 13 viridibus vel purpureo-tinctis ciliatis dorso pubescentibus et glanduliferis, extimis brevibus ovatis vel lanceolato-oblongis vix acutis, intermediis late spatulato-ovatis apice rotundatis, intimis lineari-oblongis; corollis ut videtur purpureis 4.3 mm. longis supra

basin paullo constrictis aliter subcylindricis, usque ad mediam partem et in limbo extus atomiferis; achaeniis 2 mm. longis brunneo-fuscis deorsum decreescentibus in faciebus et in costis cum glandulis globosis sessilibus conspersis; pappi setis ca. 35 inaequalibus patenter barbellatis.— ECUADOR: vicinity of Nabón, Prov. of Azuay, Sept. 25, 26, 1918, *Dr. J. N. Rose, A. Pachano, & George Rose*, no. 22,978 (Gr., U. S., N. Y.).

A well-marked species, in its habit and small ovate-lanceolate leaves recalling several species of *Vaccinium*. From *E. vaccinaefolium* Benth. of Colombia it differs in having longer internodes, membranaceous leaves, broader, blunter, and much more pubescent involucreal scales, and more numerous florets. From *E. umbrosum* Benth. it differs in having considerably smaller ovate-lanceolate rather than elliptical leaves, which are fewer-toothed, and also in having a more imbricated involucre.

E. (§ Hebeclinium) phoeniticum, spec. nov., herbaceum ut videtur erectum oppositirameum; caulibus ramisque teretibus dense lanato-tomentosis; indumento primo pulchriter purpureo deinde brunneo vel griseo; internodiis 1-1.5 dm. longis; foliis majusculis oppositis ovatis vel (superioribus) lanceolatis acuminatis basi breviter cuneatis margine leviter obtuseque serratis penniveniis (venis lateralibus principibus utroque 3-4) supra scaberrimis dense papilloso-pubentibus subtus molliter fulvo-lanuginosis 7-14 cm. longis 3.5-7.5 cm. latis; petiolo 1-3.4 cm. longo tomentoso; corymbis terminalibus di- vel trichotomis densis; ramis curvato-adscendentibus; capitulis numerosis congestis sessilibus 5-6 mm. longis ca. 13-floris; involucri ovoideo-subcylindrici squamis ca. 25, 3-5-seriatis regulariter gradatis ovatis vel oblongo-lanceolatis obscure ciliolatis aliter glabris 1-3-nerviis purpureo-tinctis; receptaculo planiuseculo vel leviter convexo longe piloso; corollis roseis graciliter tubulosis vix sursum ampliatis 4 mm. longis glabris; styli ramis filiformibus flexuoso-recurvatis; achaeniis glabris 1.7 mm. longis (vix maturis); pappi setis ca. 36 laevibus vel vix barbellatis apicem versus paullulo incrassatis plerisque corollam subaequantibus albidis.— COLOMBIA: herb in field, alt. 2200-2600 m., Murillo, Dept. Tolima, 18 Dec. 1917, *Dr. F. W. Pennell*, no. 3159 (N. Y., Gr.).

This species in habit and inflorescence rather closely resembles *E. fuliginosum* HBK., but differs from it in the serrate (not mucronate-denticulate) leaves, which have fewer lateral veins; also in having its involucreal scales (which are purple rather than fuscous) glabrous except for an obscure ciliation. It is also related to *E. sericeum* HBK.

which, however, has white woolly stems and petioles, and broader as well as more caudate-acuminate leaves, which are 3-nerved from above the base rather than feather-veined.

E. PSEUDO-DALEA (DC.) Gomez & Molt. Ann. Hist. Nat. Madrid. xix. 272 (1890). *Critonia pseudo-dalea* DC. Prod. v. 140 (1836). Recent material, agreeing with this species in all essential characters of habit, inflorescence, florets, and achenes, as well as in the toothing, venation, and punctation of the leaves, still exhibits such marked differences in the rounded leaf-base closely sessile upon the stem as to present a decidedly exceptional appearance when compared with typical specimens. There is also a tendency on the part of some material now available to have much more coarsely toothed leaves than the type. To provide appropriate classification for these variations the following varieties may be proposed.

Var. **typicum**, foliis breviter serrato-dentatis (dentibus 0.6–0.9 mm. altis 3–5 mm. latis) basi cuneatis; petiolo 6–8 mm. longo.—CUBA: *Ramon de la Sagra* (Gr.); in crevices of rocks at the Farallones, *Wright*, no. 1311 in part (Gr.).

Var. **apodophyllum**, var. nov., foliis breviter serrato-dentatis (dentibus ut apud var. *typicum*) basin versus angustatis sed ima basi rotundatis arcte sessilibus vel cum petiolo brevissimo 1–2 mm. longo munitis.—CUBA: base of coastal cliffs near Rio Yamuri, Oriente, 6, 8 Dec. 1910, *J. A. Shafer*, no. 783 (TYPE, Gr., N. Y.); margin of rivulets near Pinar del Rio, 3 Dec. 1860–1864, *Wright*, no. 1311 in part (Gr.).

The plant of Shafer has sessile leaves, that of Wright has leaves of closely similar form, but very shortly petioled (petioles 1–2 mm. long).

Var. **macrodontum**, var. nov., foliis arguteserrato-dentatis, dentibus 2–4 mm. altis 4–6 mm. latis acuminatis; lamina basi cuneata; petiolo 1.4–2.5 cm. longo.—CUBA: Guajaibon, 4 Nov. 1860–1864, *Wright*, no. 2812 (TYPE, Gr.), limestone cliff, Baños San Vicente, Prov. Pinar del Rio, 12–16 Sept. 1910, *N. L. & E. G. Britton & C. S. Gager*, no. 7451 (Gr.).

E. (§ **Eximbricata**) **psilodorum**, spec. nov., aspectu primo glaberrimum solis in petiolis pedicellisque obscure puberulum herbaceum perenne vel fruticosum (basi ignota); caule tereti laevissimo flavido-viridi erecto folioso superne paniculatim ramoso; foliis oppositis lanceolato-ovatis longe acuminatis saepe falcatis argute serratis (dentibus ca. 1 mm. altis ca. 3–4 mm. latis incurvis) basi rotundatis aliquando obliquis utrinque glaberrimis flavido-viridibus a basi vel paulo supra basin 3–5-nerviis impunctatis 6.5–7.5 cm. longis 2–3 cm.

latis; petiolo gracili vix supra villosulo ca. 2 cm. longo; corymbis compositis terminalibus trifidis laxiusculis inferne foliaceo-bracteatis; pedicellis 8-15 mm. longis cum bracteolis 1-3 filiformibus instructis; capitulis ca. 22-floris 6-7 mm. altis 5 mm. diametro plerisque erectis; involucri campanulati squamis ca. 18 linearibus acutis glabriusculis substramineo-herbaceis apicem versus scariosis et fimbriato-ciliatis subaequalibus; corollis albis ca. 3.5 mm. longis glabris; tubo proprio ca. 1.5 mm. longo fauces campanulato-cylindricas aequante, limbi dentibus 5 ovato-deltoides ca. 0.5 mm. longis; achaeniis 2 mm. longis maturitate nigris in angulis hispidulis; pappi setis 18-25 delicatulis albis scabridulis ca. 2.8 mm. longis fragilissimis.—*E. Dombeyanum* Robinson, Proc. Am. Acad. liv. 315 (1918), not DC.—COLOMBIA: in clearings, not common, Las Nubes near Santa Marta, Dept. Magdalena, alt. 1372 m., *Herbert H. Smith*, no. 621 (Gr., U. S., N. Y., Mo.).

The real *E. Dombeyanum* DC. (see p. 11) is probably a Peruvian plant, with roseate or purplish corollas. Its leaves, while of similar form, have decidedly more salient teeth and relatively shorter petioles. These in *E. Dombeyanum* are about one-eighth as long as the blade, while in *E. psilodorum* they are more than one-fourth its length. To *E. psilodorum* may be referred with scarcely a doubt also Dr. Pennell's no. 3190 from Murillo, Dept. Tolima.

E. (§ Eximbricata) rhyodes, spec. nov., herbaceum erectum 4-5 dm. altum virgatum vel superne mediocriter ramosum; caule tereti densissime glanduloso-tomentoso; pilis patentibus atropurpureis glandulari-capitulatis; internodiis 1.5-9 cm. longis, nodis paullo incrassatis; foliis oppositis vel ternatis membranaceis suborbiculari-ovatis breviter acuminatis serrato-crenatis (dentibus utroque 5-8 ca. 1 mm. altis 3 mm. latis) basi cordatis supra pubescentibus subtus dense villosis 2-4 cm. longis et latis, petiolo 7-10 mm. longo densissime glanduloso-tomentoso; panicula terminali plerumque trichotoma 5-9 cm. diametro planiuscula maturitate modice laxa; ramis et pedicellis (8-14 mm. longis) dense tomentosis; pilis atropurpureis aliis attenuatis articulatis aliis glandulari-capitulatis; capitulis ca. 45-floris 7-8 mm. altis et diametro; involucri campanulati squamis subaequalibus anguste lanceolati-oblongis acutis usque ad mediam partem plerisque 2-costulatis viridibus vel purpureo-tinctis cum pilis purpureis (aliis capitatis aliis attenuatis articulatis) sparsis; corollis albis 3.6-3.8 mm. longis; tubo proprio gracili 1.5 mm. longo; faucibus campanulato-cylindricis ca. 2.5 mm. longis, limbo patenter villosulo 0.6 mm. longo; achaeniis nigris gracilibus 2.7 mm. longis ad apicem et ad basin paullo attenuatis praecipue in angulis

sursum hispidis basi callosis apice cum disco parvo flavescente pappifero coronatis; pappi setis albis roseo-tinctis sursum scabridulis apicem versus paullulo incrassatis.—ECUADOR: vicinity of Las Juntas, *J. N. Rose, A. Pachano, & G. Rose*, no. 23,179 (Gr., U. S., N. Y.).

This plant differs from *E. pichinchense* HBK. in its copiously gland-tipped pubescence, much smaller, fewer-toothed leaves, etc. From *E. glanduliferum* Hieron. it may be distinguished by having the leaves petiolate and their blades essentially as wide as long. In many respects it corresponds pretty closely with the Colombian *E. sotarensis* Hieron., but that species, according to Hieronymus, has leaves glabrescent or subglabrescent (while they are here densely and permanently pubescent to villous on both surfaces), rounded at the base (while here distinctly cordate), and longer than wide.

E. RORULENTUM Robinson, Proc. Am. Acad. liv. 255 (1918). This species, described from young material with the heads merely in bud, has been collected near Laguna de Verjón, Colombia, by Bro. Ariste-Joseph, no. B20 (Gr.). From this material, which, agreeing as to habit and foliage in all details with the original, is decidedly more mature, it is possible to add the following characters to those recorded in the diagnosis: heads at length 8–9 mm. high; corolla whitish 5 mm. long, sparsely atomiferous, proper tube 1 mm. long, the throat about 3.4 mm. long, the limb about 0.6 mm. long, the teeth deltoid, acutish; mature achenes dark brown, about 3 mm. long.

E. (§ *Cylindrocephala*) **Roseorum**, spec. nov., brevissime griseo-tomentellum; caule tereti usque ad 4 mm. vel ultra diametro pilis albis minutis curvatis eglandularibus tecto; internodiis ad 6 cm. longis; foliis oppositis saepe in axillis proliferis deltoideo-ovatis acute acuminatis basi subtruncatis lateraliter paullo crenato-serratis vel undulatis vel integris a basi 3-nervatis perisque ca. 5 cm. longis 3.5 cm. latis membranaceis subconcoloribus vix subtus pallidioribus utrinque tomentellis; petiolo gracile flexuoso 10–18 mm. longo; corymbis modice convexis ramos oppositos vel supra alternos terminantibus multicapitulatis densiusculis conjunctim paniculam semiglobosam vel ovoideam foliaceo-bracteata formantibus; pedicellis perisque ca. 5 mm. longis; capitulis ca. 17-floris 1.5 cm. longis 4 mm. latis; involucri cylindrici squamis ca. 30 gradatim regulariterque imbricatis ciliolatis; extimis brevissime oblongis apice rotundatis dorso puberulis et sparsim atomiferis subherbaceis; intermediis et intimis gradatim longioribus ciliatis aliter glabriusculis obtusis vel (intimis) acutiusculis albis pulcherrime lilaceo-tinctis

3(-1)-viridi-nerviis; corollis glabris gracilibus ca. 5 mm. longis a basi ad limbum paullo gradatimque ampliatis; achaeniis graciliter subprismaticis basin versus paullo attenuatis griseo-fuscis adpresse in angulis et faciebus puberulis; pappi setis ca. 28 scabratis delicatulis albis ca. 4 mm. longis.— ECUADOR: vicinity of Guayaquil, 30 August to 2 Sept., 1918, *J. N. & G. Rose*, no. 22,464 (Gr., U. S., N. Y.). A handsome species with deltoid-ovate leaves recalling those of *E. iresinoides* HBK. but with involucre characteristic of § *Cylindrocephala*. The involucre scales (green, white, and lilac) recall those of *E. iridolepis* Robinson. An attractive and seemingly very distinct species which it is a pleasure to dedicate to Dr. J. N. Rose of the United States National Museum and to his son, who was his assistant on a recent collecting trip to Ecuador.

E. (§ **Subimbricata**) **roupalifolium**, spec. nov., robustum verisimiliter fruticosum; caule (vel ramo) ca. 5 mm. crasso medullosa purpureo-brunneo glaberimo lucidulo; internodiis 1-2.5 cm. longis; foliis oppositis ovato-oblongis firme coriaceis crassiusculis penniveniis utroque angustatis apice vero obtusis basi acute cuneatis 8-11 cm. longis 3.5-5 cm. latis basi integra excepta grosse serratis (dentibus 1-2 mm. altis 4-7 mm. latis) glaberrimis lucidulis exsiccatione fuscescentibus; venis lateralibus numerosis parallelis aliis conspicuis aliis obscuris; petiolo 1.4-2 cm. longo; corymbo terminali composito trichotomo denso valde convexo multicapitulato fulvo-puberulo; bracteis inferioribus lanceolato-oblongis ca. 2 cm. longis 3-4 mm. latis obscure crenato-serratis, bracteolis subulatis minimis; capitulis ca. 5-floris subsessilibus (immaturis) ca. 6 mm. longis et 2.4 mm. crassis; involucri subcylindrici ca. 3-seriatim imbricati squamis crassis eveniis valde inaequalibus anguste oblongis glabris obtusis paullo carinatis apicem versus paullo brunnescentibus; corollis (valde immaturis) ca. 3 cm. longis brevissime 5-dentatis limbum versus granulatis vel hispidulis aliter glabris; antheris apice cum appendice membranacea ovato-oblonga instructis; pappi setis ca. 40 albis distinctis.— BRITISH GUIANA: Mt. Roraima, ledge, 18-12-'84, alt. 2135 m., *E. Jenman*, no. 311 (TYPE, U. S.); ledge, Roraima Exp., *E. F. Im Thurn* (K., phot. Gr.). These specimens appear absolutely identical, both being tips of branches carrying two or three of the upper leaves and a terminal corymb in bud. In each there has been some damage from insects, especially to the immature achenes. This is certainly the plant mentioned by Daniel Oliver, *Trans. Linn. Soc. ser. 2, Bot., ii. 277* (1887), as "No label. EUPATORIUM, sp.? (not identified)." Although the material is poor, it discloses practically

all the features important for classification. It appears to be very different from any species known and may well have published record. It has somewhat the habit of a *Symphypappus*, but the pappus-bristles are capillary and distinct to the base, showing no tendency to become firm or to be connate into a ring. It may here be mentioned that recent examination of *Symphypappus* leads to the belief that it is an exceedingly weak genus of very doubtful distinctness and little taxonomic value. Its distinctions from *Eupatorium*, both technical and habitual, break down completely.

E. SCIAPHILUM Robinson, Proc. Am. Acad. liv. 256 (1918). This interesting species, originally collected in Dept. Antioquia, Colombia, by *Kalbreyer*, appears to have been rediscovered by Dr. Pennell in the shrub zone, alt. 2800-3000 m., below Paramo de Chaquiro, Dept. Bolívar, Colombia, no. 4349 (N. Y.). Dr. Pennell's plant while agreeing with the original material in all the more essential points differs in having the leaves crowded, somewhat smaller (about 4 cm. long) and less rigidly coriaceous, the contour being elliptic-oblong rather than spatulate-oblong. In the presence of close agreement in the inflorescence, involucre, florets, achenes, pappus, pubescence, etc., it is probable that these differences are largely the result of individual environment or are at most only of a formal nature.

E. SCIATRAPHÉS Robinson, Proc. Am. Acad. liv. 257 (1918). Among the plants recently collected in Venezuela by Prof. H. Pittier is a *Eupatorium* in bud. It is labeled as follows: "Niquibao. Fls. pale lilac. Medicinal, pectoral. Around Caracas: altitude 800 to 1000 meters. Cultivated. - June, 1918. *H. Pittier*, no. 7882." In habit, foliage, pubescence, as well as in the details of inflorescence and florets, so far as shown, this plant so closely coincides with the Santo Domingan *E. sciatraphes* that its specific identity seems practically assured. As in the original material the number of florets in the closely fastigate heads shows considerable variability, ranging in the Venezuelan material from 4 to 8, while in the Santo Domingan specimens examined it ranged from 8 to 13. More mature material of the Venezuelan plant would be essential to prove with absolute certainty the identity, yet the highly characteristic habit, texture, lucidity, and nervation of the leaves, etc., give fairly conclusive evidence. It is to be observed that the Venezuelan material is from cultivated stock, so there is as yet no evidence that the plant is indigenous on the continent.

E. (§ Eximbricata) simulans, spec. nov., ut dicitur herbaceum vel fruticosum 1-2 m. altum; caule tereti griseo-brunneo juventate

granulari-puberulo tardius subglabrato flexuoso oppositirameo folioso vel basin versus delapsu foliorum nudato et nodoso; foliis oppositis lanceolatis caudato-acuminatis argute serratis basi plerumque abrupte angustatis vel subcuneatis 5-7 cm. longis 1.3-2.5 cm. latis penninerviis (sed 2-3 venis inferioribus utroque latere aliis saepe distincte majoribus) membranaceis utrinque obscure viridibus; petiolis 8-11 mm. longis nullo modo muriculatis; corymbis caulem ramosque terminantibus valde convexis 8-10 cm. diametro laxiusculis; pedicellis filiformibus ca. 1 cm. longis bracteolatis glabris vel obscure granulato-puberulis; capitulis ca. 22-floris ca. 1 cm. longis et crassis; involucri campanulati squamis ca. 20 linearibus attenuatis dorso parce granulatis vix costulatis apicem versus textura flaccidis; corollis purpureis vel roseis glabris paullo sursum gradatim ampliatis 6.5 mm. longis; achaeniis valde immaturis primo aspectu glabris parce granulatis gracilibus obscure griseis cum costis paullo pallidioribus; pappi setis ca. 36 corollam subaequantibus scabridulis.—PERU: Dept. Ancachs. among bushes in the gorge of a brook on the slopes of the Cordillera Blanca, above Caraz, alt. 3200-3600 m., 9 June, 1903, *Dr. A. Weberbauer*, no. 3253 (TYPE, Berl., phot. and fragm. Gr.); also among small bushes on a brook, above Oeros, Prov. Cajatambo, alt. 3300 m. 2 Apr. 1903, *Weberbauer*, no. 2766 (Berl., phot. and fragm. Gr.).

A species closely simulating *E. stictophyllum* described below, but having smaller impunctate feather-veined leaves and petioles without muriculate roughening.

E. SOLIDAGINOIDES HBK., var. **Armourii**, var. nov., foliis bracteisque triangulari-hastatis basi profunde cordatis; lobis basilaribus acutiusculis patenti-deflexis; dentibus marginis rotundatis.—MEXICO: Palenque, Chiapas, Feb., 1895, *A. V. Armour*, no. 1 (Field Mus., phot. Gr.). This plant is exceedingly puzzling. The hastate lobing and deeply crenate instead of serrate-dentate margins of the leaves give it a very different appearance from the usual forms of *E. solidaginoides* HBK. However, the species exhibits considerable variability and specimens have long been known (e. g. *Pringle*, no. 3956, from limestone ledges, Tamasopo Cañon, San Luis Potosi) in which the leaves are in a similar manner cordate by a deep and narrow sinus and exhibit some tendency to become hastate through the production of an external basal angle at least on one side. It seems probable, therefore, with such approaches already evident, that complete intergradation as to foliage will ultimately be found between the typical form and the present variety, notwithstanding its striking character. In all traits of inflorescence, flowers, achenes, etc., the

correspondence is pretty close and in many details amounts to identity.

E. (§ *Subimbricata*) *Sprucei*, spec. nov., suffruticosum 2-3 dm. altum suberectum; radice e fibris paucis gracilibus duris elongatis sistente; caule curvato-adscedente, basin versus distincte lignescente 4 mm. crasso noduloso griseo-brunneo a delapsu foliorum nudato, in parte media folioso, internodiis brevibus, in parte superiore gracili erecto crispe fulvo-puberulo paniculatim florifero paullo foliaceo-bracteato, internodiis elongatis; foliis oppositis sessilibus oblanceolatis utroque attenuatis acutisque subremote denticulatis (dentibus 0.5 mm. altis 5 mm. distantibus) penniveniis (venis utroque 6-7 adscedentibus curvatis inter se anastomosantibus) membranaceis supra viridibus glaberrimis obscuris subtus pallidioribus praecipue in nervo venisque sordide pubescentibus 5-10 cm. longis 1-1.8 cm. latis; capitulis 6 mm. longis 5 mm. crassis ca. 18-floris; pedicellis filiformibus valde inaequalibus (1-6 mm. longis); involucri turbinatis squamis ca. 20 lineari-oblongis valde inaequalibus obtusis stramineis plerisque medio 2-costulatis apicem versus dorso puberulis, extimis brevissimis ovalibus subherbaceis; corollis verisimiliter albis 3 mm. longis glabris, tubo proprio gracillimo 1.8 mm. longo, faucibus turbinatis distincte ampliatis 1.2 mm. altis; styli ramis cum appendicibus tenuibus attenuatis flexuosis papilloso-scabratis munitis; antheris apice cum appendice membranacea angusta instructis; achaeniis (submaturis) fuscis 1.5 mm. longis in angulis parce hispidulis; pappi setis ca. 25 delicatissimis albis 2.5 mm. longis vix scabratis.— PERU: along the River Huallaga, September, 1855, *Spruce*, no. 4167 (Gr.).

This low, upright undershrub is obviously a member of the peculiar group of § *Subimbricata* to which the following species may be referred: *E. elata* Steud. of the Panama region, *E. Squiresii* Rusby of the delta regions of the Orinoco in Venezuela and the Magdalena in Colombia, *E. turbacense* Hieron. also from Colombia, and *E. tovarensis* Robinson from western Venezuela. In all these species the leaves are of the oblong-lanceolate type, opposite and feather-veined, the heads are small, in a loose, somewhat divaricately branched panicle; the involucre is stramineous, of delicate graduated scales, which are obtuse and usually a little tufted with a sparse puberulence on the back toward the tip; finally in all the style-branches have appendages which are slender-filiform, more delicate, more flexuous, and more distinctly hispidulous than is usual in *Eupatorium*. In regard to the style-branches these species recall conditions usual in *Vernonia* and in *Brickellia diffusa*. *E. Sprucei*, geographically remote from the others, differs from all of the others in its much lower stature, being only

2-3 dm. high as opposed to plants of a meter or so in height, considerably looser growth, and mostly herbaceous character. In *E. Squiresii* and *E. elatum* the upper surface of the leaves is distinctly though sparingly puberulent. In *E. towarensense* the leaves are lanceolate not oblanceolate and are strikingly glandular-atomiferous beneath. *E. turbacense* is said to attain 2 m. in height. It has lanceolate to ovate leaves 5-7 cm. wide, and its involucre is more campanulate and has the scales usually 3-4-costulate. The florets are also somewhat more numerous, 25-28.

It is clear that *E. Sprucei* cannot at present be united with any of these, yet they are all exceedingly close and may sometime be found to intergrade.

E. SQUALIDUM DC., var. **Rusbyanum**, var. nov., laxe ramosum: caule ramisque flexuosis griseo-tomentellis; pilis albidis minutis plerisque incurvis non evidenter articulatis; foliis membranaceis ovato-lanceolatis vel ovatis supra cum pilis minutis albis subappressis sparse conspersis, subtus sordide tomentellis et glandulari-punctatis. indumento densiusculo glandulas obscurante; capitulis 18-20-floris: involucri squamis laevissimis saepissime brunnescentibus apice rotundatis vel obtusis arcte appressis ciliolatis; achaeniis 2.5 cm. longis.—*E. scabrum* Britton, Bull. Torr. Bot. Club, xviii. 333 (1891, not L. f. *E. Martiusii* Ktze. Rev. Gen. iii. pt. 2, 148 (1893), not DC. — BOLIVIA: at Guanai in Prov. Larecaja, Dept. La Paz, alt. 610 m., May, 1886, *Rusby*, no. 1623 (TYPE, N. Y., phot. Gr.); in Prov. (East) Velasco, Dept. Santa Cruz, alt. 200 m., July, 1892, *Kuntze* (N. Y.). PERU: without locality, *Mathews* (N. Y.).

This plant differs from *E. scabrum* L. f. considerably in the form and texture of the leaves as well as in the much shorter not obviously jointed pubescence. This variety may be distinguished from both var. *Martiusii* (DC.) Bak. and var. *subvelutinum* (DC.) Bak. by its denser pubescence on the lower surface of the leaves, the hairs being so close as to obscure almost wholly the glandular punctation which is clearly evident, indeed rather conspicuous, in the varieties just mentioned. From var. *tomentosum* (Sch. Bip.) Bak. the present plant differs in its distinctly smaller heads, fewer florets, more cylindrical and less ovoid involucre, etc.

E. SQUIRESII Rusby in Robinson, Proc. Am. Acad. liv. 258, 337 (1918). Soon after the publication of this species two specimens were received at the Gray Herbarium of much interest in connection with it. They were Dr. Pennell's nos. 3928 and 3929, collected in an alluvial thicket, alt. 80-90 m., at Badillo, Rio Magdalena, Dept.

Santander, Colombia, 16 Jan. 1918. These correspond closely in all essential and most minor features with the original material of *E. Squiresii* from the delta of the Orinoco and certainly appear to be conspecific with it. The only differences found during a rather detailed examination were that the leaves of the Colombian plant were slightly firmer in texture and even more shortly petioled or subsessile. These differences are precisely of the kind and degree that occur very frequently between exposed and shade forms of the same plant. The range of the species is thus extended some 1500 km. and over the watershed from the Orinoco Valley into that of the Magdalena. However, there is little difference in the latitude, and the habitat, low alluvial thickets, is similar. Renewed examination of the plants of this group brings out what had not been previously noticed, namely, the affinity between this species and *E. turbacense* Hieron. Of the latter species the writer has not seen the type, Stübel's no. 51, collected at Turbaco, Dept. Bolívar, in the delta region of the Magdalena. However, Hieronymus when publishing upon the plants of Lehmann (Engl. Bot. Jahrb. xxviii. 573) identifies with his *E. turbacense* Lehmann's no. 5971, and of this a leaf and a bit of the inflorescence were received at the Gray Herbarium some years ago in an exchange from the Royal Botanical Garden at Berlin. This plant of Lehmann's was collected on the Rio Ortega in the Dept. Cauca, that is to say, some 900 km. to the south of the original station. If Hieronymus has been right in referring it to his *E. turbacense*, the following differences may be pointed out between that species and the later *E. Squiresii*. In *E. turbacense* the leaves are entirely glabrous above, while in *E. Squiresii* they are puberulent at least on the midnerve and sometimes perceptibly so on the surface as well; in *E. turbacense* the lowest two pairs of lateral veins leave the midnerve at an angle of about 40° and in length considerably exceed those arising at a greater distance from the base, while in *E. Squiresii* the lower pairs of veins are no longer, indeed are usually shorter than some of the others, and all of them leave the midnerve at a considerable angle, usually at about 70° . In *E. turbacense* the involucre is campanulate, in *E. Squiresii* it is somewhat longer and campanulate-subcylindric (in the fresh state) or campanulate-subturbinate (in the dried state). In *E. turbacense* the pubescence of the pedicels is distinctly longer and more sordid-tawny than in *E. Squiresii*. The two species are certainly very close. In both the lower leaves have a peculiar form, the lance-oblong blade being narrowed at the base into a more or less elongated portion like a broadly winged petiole. It

must be emphasized that the validity of the distinctions made above depends upon the accuracy with which Hieronymus identified Lehmann's no. 5971 from the region of Popayan with Stübel's no. 51, the original material of *E. turbacense* from near the mud-volcano of Turbaco. The writer has had no opportunity to have this identification controlled by a re-examination.

E. (§ Subimbricata) Steetzii, spec. nov., fruticosum ramosum robustum 2-3 m. altum; ramis teretibus dense cum tomento purpureo-brunneo obtectis, capillis articulatis patentibus; foliis oppositis ovato-oblongis acutis vel acuminatis, crenato-serratis basi saepius rotundatis rarius paullo cordatis 7-20 cm. longis 5-12 cm. latis supra cum basibus incrassatis capillorum dense scabratis et cum glandulis subsessilibus interspersis subtus griseo-tomentosis supra basin 3-nervatis; petiolo 1.2-3.8 cm. longo crasso dense tomentoso; corymbis densis trichotomis pluricapitulatis; capitulis ca. 15-18-floris breviter pedicellatis; involucri campanulati squamis ca. 15 subtriseriatis stramineo-purpureis oblongo-lanceolatis acutiusculis vel subattenuatis dorso glabris; corollis 5 mm. longis gradatim sursum ampliatis glabris albis marginem versus purpurascensibus (Fendler); achaeniis 2.8 mm. longis brunneis cum glandulis sessilibus scabratis; pappi setis ca. 40 stramineo-albidis barbellatis 5 mm. longis saepius purpureo-tinctis.—*E. Vargasianum* Robinson, Proc. Am. Acad. liv. 289 (1918), as to character, not DC., also Robinson, l. c. 339 excl. pl. of Vargas.—**VENEZUELA**: in the State of ARAGUA: near Colonia Tovar, Fendler, no. 647 (TYPE, Gr.); without exact locality, Cruger (K.). In the FEDERAL DISTRICT: Caracas, Linden, no. 137 (K.); in forest, Boca de Tigre, Altos de Galipán, Cerros del Avila, alt. 1600 m., Pittier, no. 8302 (Gr.); La Ciénega, alt. 2280 m., Silla de Caracas, Coastal Range, alt. 2000-2640 m., Pittier, no. 8314 (Gr.). Dedicated to the memory of Joachim Steetz (1804-1862), a physician of Hamburg and a discriminating investigator of the *Compositae*, who by some unpublished notes on a drawing of this plant now in the Gray Herbarium appears to have been the first to recognize its probable novelty.

E. (§ Eximbricata) stictophyllum, spec. nov., fruticosum usque ad 1 m. altum; caule tereti purpureo-brunneo oppositirameo juventate obscure puberulo; foliis oppositis ovato-lanceolatis caudato-acuminatis basin versus rotundatis deinde abrupte subacuminatis serratis firmiuscule membranaceis glabris supra obscure viridibus subtus pallidius viridibus nigro-puncticulatis delicatule reticulatos venulosus (venulis non prominulentibus) 6-8 cm. longis 3-4 cm. latis a puncto ca. 5 mm. supra basin 3-nervatis, nervis lateralibus brevi

spatio furcatis vel aliquando pro nervo uno latere nervis duabus proximis substitutis; petiolo puberulo parce muriculado; corymbis terminalibus compositis planiusculis foliaceo-bracteatis, particularibus densiusculis fastigiatis ramosis convexis; capitulis ca. 24-floris 1 cm. longis; pedicello filiformi 6–10 mm. longo bracteolato; involucri campanulati squamis ca. 24 anguste lanceolato-linearibus inaequalibus sed vix imbricatis acutis purpureo-viridibus extus granulati-pulverulentis; corollis 7.8 mm. longis roseis glabris vix sursum ampliatis; achaeniis (immaturis) 3 mm. longis cum glandulis subsessilibus instructis; pappi setis ca. 27 albis scabridis corollam subaequantibus. — PERU: in bushy places about Cuyocuyo, Prov. Sandia, Dept. Puno, alt. 3100 m., *Dr. A. Weberbauer*, no. 860 (Berl., phot. and fragm. Gr.).

E. (§ *Subimbricata*) **tarapotense**, spec. nov., verisimiliter fruticosum oppositirameum; caulibus subteretibus purpureis crispe fulvo-puberulis (pilis articulatis), internodiis 4–6 cm. longis; foliis oppositis ovato-ellipticis petiolatis acuminatis basi rotundatis remote serratis (dentibus ca. 1 mm. altis ca. 1 cm. inter se distantibus) penniveniis (venis principibus ca. 5-jugis) coriaceis supra atroviridibus nitidis in nervo venisque depressis puberulis subtus pallidioribus tomentellis et atomiferis 4–8 cm. longis 1.5–4 cm. latis; petiolo ca. 1 cm. longo fulvo-puberulo; cymis paucicapitulatis ramos ramulosque terminantibus conjunctim paniculam laxiusculam foliaceo-bracteata formantibus; pedicellis 1–3 mm. longis; capitulis ca. 37-floris ca. 1 cm. altis; involucri campanulati squamis ca. 18 gradatis acutiusculis, extimis late ovatis 5–7-costulatis fusco-brunneis dorso pubescentibus, intermediis ovatis 3–5-costulatis substramineis, intimis lineari-oblongis acutis stramineis ciliolatis dorso plus minusve puberulis; corollis glabris ca. 6 mm. longis, tubo proprio gracili ca. 4 mm. longo, faucibus paullo sed distincte ampliatis 1.5 mm. altis, dentibus 5 detoideis 0.5 mm. longis extus granulatis; achaeniis graciliter prismaticis fusco-brunneis 2.3 mm. longis; pappi setis inaequalibus corolla distincte brevioribus. — PERU: in the mountains along the river Mayo, near Tarapoto, Dept. Loreto, July–Aug., 1850, *Spruce*, no. 4014 (Gr.). In habit similar to *E. Lobbiai* Klatt, but readily distinguished by its much thicker, pinnately veined leaves, which are shining above.

E. (§ *Eximbricata*) **uber**, spec. nov., fruticosum 4 m. altum; ramis oppositis robustis griseo-brunneis foliosis granuloso-puberulis medullo-sis; foliis oppositis magnis petiolatis deltoideo-ovatis acuminatis integris vel obsolete undulato-denticulatis basi abrupte subcuneatis supra glabris viridibus (venulis reticulatis depressis) subtus sordide puberulo-

tomentellis 16–19 cm. longis 6–9 cm. latis; nervis lateralibus principibus (2-jugis) ca. 1 cm. supra basin laminae nervo medio orientibus; petiolo 3–5 cm. longo granulati-puberulo; panicula terminali corymbiformi planiuscula usque ad 2 dm. diametro breviter crispeque pubescenti; capitulis numerosissimis breviter pedicellatis ca. 13-floris ca. 9 mm. longis; involucri anguste campanulati squamis ca. 16 lineari-oblongis acutiusculis (obscure 2-costatis) subaequalibus (1–3 extimis brevioribus) dorso granularibus margine eroso-ciliolatis; corollis ca. 5 mm. longis albis sursum gradatim mediocriter ampliatis; limbi dentibus 5 deltoideis; achaeniis griseo-brunneis deorsum decrescentibus 2.5 mm. longis in angulis hispidulis basi conspicue callosis; pappi setis ca. 31 barbellatis corollam fere aequantibus sordide albidis.— PERU: woods near a brook, below Pampa Romas, between Samanco and Caraz, Dept. Ancachs, alt. 2100 m., 29 May, 1903, *Weberbauer*, no. 3184 (Berl., phot. and fragm. Gr.). A species of exceptional luxuriance both as to flowers and foliage, somewhat resembling the Bolivian *E. longipetiolatum* Sch. Bip. ex Rusby, Mem. Torr. Bot. Club, iii. no. 3, 52 (1893), which, however, has a more open inflorescence, shorter, relatively broader, and dorsally more pubescent involucreal scales, purple corollas, more or less clearly crenate leaves, etc. *E. uber* is also close to the Bolivian *E. gloeocladum* Robinson described above, which, however, has smaller lance-ovate, regularly feather-veined leaves, viscid stems, etc.

E. (§ Subimbricata) urubambense, spec. nov., herbaceum et perenne vel fortasse fruticosum (basi ignota); caulibus (vel ramis) erectis teretibus purpureis crispe albo-puberulis; foliis oppositis ovato-lanceolatis fere a basi ad apicem gradatim angustatis sed apice vero saepissime obtusiusculis basi obtusis vel rotundatis crenatis a puncto supra basin 3-nervatis crassiusculo-membranaceis supra obscure viridibus puberulis leviter rugulosis subtus griseo-tomentosis 5–6.6 cm. longis 1.8–2.7 cm. latis; petiolo 5–8 mm. longo; corymbis trichotomis foliaceo-bracteatis; inflorescentiis particularibus densis rotundatis 3–6 cm. diametro; capitulis ca. 10-floris ca. 8 mm. altis subsessilibus; involucri subcylindrico-campanulati squamis ca. 3-seriatis apice rotundatis, exterioribus brevissimis, intermediis late ellipticis brunneo-stramineis saepissime 3-nervatis et 4-costulatis aliquanto marginatis, intimis lineari-oblongis apice paullo eroso-ciliatis; corollis 4.8 mm. longis graciliter tubulosis supra basin sensim constrictis glabris; achaeniis fuscis 2.6 mm. longis deorsum attenuatis sursum in costis villosis; pappi setis ca. 28 lucidulis flavido-albidis 4.3 mm. longis sublaevibus.— PERU: Urubamba in the Valley of Ymay [?], *Pentland* (K., phot. and fragm. Gr.).

E. VALLINCOLA DC. Prod. v. 168 (1836). Of this species two varieties

with markedly different pubescence but otherwise of close similarity can be distinguished, namely:

Var. *a. typicum*, caulibus et ramis et petiolis dense patentisque villosis; pilis longis tenuibus flexuosis articulatis.—PERU: without locality, *Haenke* (DC., phot. Gr.); on calcareous rock, near Lima, alt. 300–600 m., *Weberbauer*, no. 1650 (Berl., fragm. Gr.).

Var. *β. brevopilum*, var. nov., puberulum vel tomentellum; pilis perisque brevibus inarticulatis paucis passim longioribus.—PERU: on the Lima-Oroya Railroad, between Matucana and Tambo de Viso, on rocks, alt. 2370–2650 m., 26 Dec. 1901, *Weberbauer*, no. 103 (TYPE, Berl., fragm. Gr.); on slopes of eruptive rock, Matucana, alt. 2370 m., 24 Dec. 1901, *Weberbauer*, no. 66 (Berl.).

E. VARGASIANUM DC. Prod. v. 155 (1836). Further study of this species leads to the belief that it has been misinterpreted and that to it should be referred *E. macrophylloides* Robinson, Proc. Am. Acad. liv. 249, 340 (1918). The only two collections of the species known to the writer are as follows: at Caracas, *Vargas* (DC., phot. Gr.), and at Sanctorquiz, *Eggers*, no. 13,413 (U. S.). The localities, both in the Federal District of Venezuela, are not far apart.

The species has been reported twice from Colombia, namely by Klatt in Engl. Bot. Jahrb. viii. 36 (1887), on the basis of Lehmann's no. 938 from near Popayan, and by Heering, Mém. Soc. Neuchât Sci. Nat. v. 420 (1913), on Mayor's no. 392, from near Medellin. The writer has seen neither of these specimens and cannot confirm the accuracy of their determination, indeed is inclined to question it.

A related plant, confused with *E. Vargasianum* by Klatt in herb. and by the writer, ll. cc., appears to be a new species and is described above as *E. Steetzii*. The confusion of these two plants and the accidental omission of one species from the author's key to § *Subimbricata* of the Venezuelan Eupatoriums, Proc. Am. Acad. liv. 337 (1918), necessitates a revision of the last few lines of the key, thus:

- i. Shrubs; leaves (5–) 6–13 cm. wide *j*.
- j*. Heads in thyrsoïd panicles; scales rounded or obtuse; stem glabrate 19. *E. morifolium*.
- j*. Heads in corymbosely branched flattish-topped panicles; scales acute; stem tomentose *k*.
- k*. Leaves about two-thirds as wide as long; petioles 1.2–3.8 cm. long; heads 15–18-flowered; achenes covered with sessile globules 20. *E. Steetzii*
- k*. Leaves about four-fifths as wide as long; petioles 4–6 cm. long; heads 10–11-flowered; achenes hispid-puberulent 21. *E. Vargasianum*.

- i. Perennial herbs; leaves 2-4.5 (-5) cm. wide; heads crowded l.
 l. Heads about 7-flowered, sessile in dense subglobose glomerules; involucre subcylindric.....22. *E. tenuifolium*.
 l. Heads 20-25-flowered; pedicels 1-9 mm. long; involucre turbinate-campanulate.....23. *E. pycnocephalum*.
 i. Delicate annual; leaves thin, 2-5.5 cm. wide; inflorescence diffuse.....23. *E. microstemon*.

Brickellia ? Arsenei, spec. nov., herbacea perenne virgata 7 dm. vel ultra alta; caule tereti gracili usque ad 3 mm. crasso folioso paullo flexuoso atropurpureo crispe griseo-puberulo; internodiis 1.5-4 cm. longis; foliis suboppositis vel saepe ternatim verticillatis sessilibus lanceolatis argute acuminatis basi rotundatis serrulatis chartaceis 3-4.5 cm. longis 1-1.6 cm. latis penniveniis supra reticulatis et minute granulatis subtus paullo pallidioribus reticulatis et in costa media et in venis majoribus puberulis; inflorescentia terminali multicapitata corymbosa convexa; capitulis graciliter pedicellatis ca. 12-floris ca. 1 cm. longis; involucri squamis ca. 20, 3-4-seriatim imbricatis regulariter gradatis, extimis brevissimis puberulis ceteris lanceolato-oblongis obtusiusculis glabris 3-nerviis in parte exposita atro-vinaceis; flosculis valde immaturis; corollae dentibus anguste oblongis; antheris angustis ad apicem longiusecule appendiculatis; pappi setis albidis vix scabridis.—MEXICO: vicinity of Morelia, State of Michoacan, 26 Oct., 1911, alt. 2500 m., Bro. G. Arsène, no. 5608 (Gr., U. S.), distributed as *Eupatorium pulchellum* HBK. It is unfortunate that this beautifully distinct plant, obviously of the *Eupatorium* tribe, is available only in bud, so that it is impossible to determine the form of the mature achenes. However, as it is unlikely that the locality will be visited by a botanist for some time to come, and as the habit and such details of floral structure as are shown pretty clearly indicate that this is a new species of *Brickellia* § *Steviastrum*, the writer ventures to give it provisional record on this theory. It is a pleasure to dedicate it to Bro. Arsène, whose careful collections are among the most extended and valuable which have come from Mexico in recent years.

CALEA CARACASANA (HBK.) Ktze., var. **PILOSIOR** Ktze. Rev. Gen. i. 324 (1891). Of this more hairy variety of this common and in northern South America somewhat widely distributed and variable species, there is, besides the more common radiate state, a discoid form which may be recorded as follows:

Forma **discoidea**, forma nova, pubescens ut apud var. *pilosiorum*, capitulis homogamis, radiis nullis.—COLOMBIA: forest, alt. 1200-1500 m., "La Virginia," Libano, Dept. Tolima, 22 Dec., 1917, Pennell, no. 3264 (N. Y.). Florets greenish-yellow.

SCHIZOTRICHIA EUPATORIOIDES Benth. in Benth. & Hook. f. Gen. ii. 410 (1873). A specimen of this rare and highly interesting generic monotype has been found among some *Eupatoriums* kindly lent to the writer from the New York Botanical Garden. Although unidentified, this specimen, collected in Peru by Mathews and corresponding in all described details with Bentham's clear diagnosis, is with scarcely a doubt a part of the original material secured by Mathews at Chachapoyas about 1836. Bentham in his treatment (l. c.) places the genus among the *Helenieae*, but adds at the end the remark that the plant might perhaps rather belong to *Eupatorium*. However, its short, blunt, and strongly recurved style-branches, its involucrel scales marked with the immersed elongated glands characteristic of certain *Helenieae*, the subterete achenes, and the peculiar pappus of fimbriate scales all are foreign to or very unusual in the *Eupatorium* tribe, with which it certainly can have nothing to do.

Although Bentham gives a somewhat detailed generic character and mentions a specific name, he gives no specific diagnosis. To place the plant upon a somewhat more regular footing in this regard the following brief character may be put on record:

S. EUPATORIOIDES Benth., l. c., lignescens paullo pubescens; ramis dichotomis subteretibus foliosis; foliis elliptico-ovatis crenulatis tenuibus apice rotundatis et mucronatis basi rotundatis penniveniis 2-2.5 cm. longis 1-1.5 cm. latis breviter petiolatis; cymis sessilibus laxis compositis; bracteis minutis squamiformibus, pedicellis filiformibus glabris usque ad 1.5 cm. longis; capitulis ea. 8 mm. altis et crassis; involucri squamis principibus ca. 8 elliptico-oblongis tenuibus glabris subaequalibus dorso cum glandulis flavidis elongatis munitis; flosculis ut a Benthamio descriptis.—PERU: Chachapoyas, *Mathews*. In habit somewhat suggesting *Porophyllum*.

II. A RECENSION OF THE EUPATORIUMS OF PERU.

The literature of the Peruvian Eupatoriums is not extensive, the more important records on the subject being as follows: In 1786, Lamarck (Encycl. ii.) described as from Peru four species of *Eupatorium*, but of these one has since proved a *Stevia* and the others, collected by Joseph de Jussieu, came presumably from what is now Ecuador. Kunth in 1820, having worked over the collection of Humboldt & Bonpland, published (HBK. Nov. Gen. et Spec. iv.) descriptions of six species of *Eupatorium* from Peru, all being new to science. In 1836 the eldest DeCandolle (Prod. v.) indicated the Peruvian occurrence of twenty-one species of the genus, but several of these have subsequently dropped into synonymy or passed to other genera such as *Ophryosporus* and *Helogyne*. Poeppig in 1845 (Nov. Gen. ac Spec. iii.) added to the group five Peruvian species. Of these, however, at least two have since fallen into synonymy. In 1857, Weddell (Chlor. And. ii.) ascribed six species of *Eupatorium* to Peru, of which four were described as new, two of them being his own and the other two being species proposed but never characterized by Schultz-Bipontinus. In 1876, Baker (in treating the genus *Eupatorium* for von Martius's Flora Brasiliensis vi. pt. 2) incidentally mentions eleven species as extending into Peru. In 1883, Oliver (in Hook. Ic. xv. t. 1462) added an interesting species secured by John Ball. Klatt (Abh. Nat. Gesellsch. Halle, xv. and Ann. Nat. Hofmus., Vienna, ix.) described two new Eupatoriums from Peruvian material. Finally Hieronymus (in Engl. Bot. Jahrb. xxix., xxxvi., xl., and Verh. Bot. Ver. Brandenburg, xlviii.), after working over collections chiefly of von Jelski and of Weberbauer, mentions or discusses some twenty-eight species and varieties of Peruvian Eupatoriums, nineteen of these being characterized as new.

At no time has any effort been made to catalogue the Peruvian members of this group as such or to synopsise or key them. The present paper is put forth to assemble data previously scattered and to place on published record several species found in material recently worked. It is hoped that the treatment, while representing merely a stage in the course of work still in progress, will furnish what has certainly never before existed, namely, a means of speedy and accurate identification of the Peruvian Eupatoriums, besides adding some new elements to the group.

To save space, references are made where possible to the sectional,

specific, and varietal descriptions in the author's recent paper on the Eupatoriums of Colombia, Venezuela, and Ecuador. In the case of Peruvian species and varieties not occurring in any of these countries and therefore not described in the paper just mentioned, diagnoses are here given. Thus, by the use of the two papers together, anyone desiring to identify a Peruvian *Eupatorium* will be able to consult a fairly detailed diagnosis of each species and variety of the genus thus far known from the country.

Sect. I. CYLINDROCEPHALA DC. (See Robinson, Proc. Am. Acad.
liv. 270.)

KEY TO SPECIES.

- a. Involucral scales squarrose, considerably altered in texture and somewhat spreading at the subtruncate or very bluntly pointed tip; leaves linear or narrowly oblong, nearly or quite sessile 1. *E. ivaeifolium*.
- a. Involucral scales closely appressed at the often darkened but not greatly modified tip; leaves lanceolate to deltoid- or rhombic-ovate, petiolate b.
- b. Heads solitary, long-pedicelled; leaves scabrous above, glabrous beneath; habit of § *Praxelis* 2. *E. serratuloides*.
- b. Heads corymbose or cymose-paniculate; leaves never pubescent above if glabrous beneath c.
- c. Heads 40-50-flowered; leaves small, lanceolate, 2.5-3.5 cm. long 3. *E. eripsimum*.
- c. Heads 7-35-flowered; leaves (except in *E. squalidum*) rarely less than 4 cm. long d.
- d. Pedicels glabrous or at most minutely granulated, furrowed; leaves glabrous on both surfaces, elliptical to rhombic, acute at both ends, thickish 4. *E. laevigatum*.
- d. Pedicels (when developed) pubescent e.
- e. Heads very slender, 7-10-flowered, acute in bud f.
- f. Involucre essentially glabrous; leaves attenuate-cuneate at base, mostly thin and nigrescent in drying 5. *E. leptcephalum*.
- f. Involucral scales (at least when young) definitely pubescent, especially toward the dark and mucronulate tip; leaves subrotund or only shortly cuneate at base, thickish-membranaceous, drying green 6. *E. tenuicapitulatum*.
- e. Heads thicker, mostly 15-35-flowered, obtuse in bud g.
- g. Heads about 8 mm. long, borne in a leafy panicle; leaves 1.5-4 cm. long; petioles 1-4 mm. long 7. *E. squalidum*, v. *Rushyanum*.
- g. Heads 1-1.2 cm. long; leaves 6-10 cm. long on petioles (except in *E. scabrum*) 1-2 cm. long h.

- h. Heads in dense terminal and lateral corymbs *i*.
- i*. Stems when young furrowed and angulate, covered with long, spreading conspicuously dark-jointed hairs; leaves olive-green beneath, prominently and loosely reticulate-veiny on lower surface, in age strongly bullate-rugose above. 8. *E. scabrum*.
- i*. Stems rather finely ribbed, nearly terete, softly and often sparsely pubescent, the hairs short, light-colored, not conspicuously jointed; leaves not prominently netted beneath nor bullate above. 9. *E. odoratum*.
- h. Heads in (at maturity) open panicles *j*.
- j*. Leaves deltoid-lanceolate, truncate at the base. 10. *E. clematitis*.
- j*. Leaves elliptic-lanceolate, cuneate at the base. 11. *E. Jelskii*.

1. *E. IVAEFOLIUM* L. Syst. ed. 10, 1205 (1759) [as *ivaefolium*]; Robinson, Proc. Am. Acad. liv. 275 (1918). *E. fasciculare* Poepp. in Poepp. & Endl. Nov. Gen. ac Spec. iii. 54 (1845).—HUANUCO: Cassapi, Jan. 1830, *Poeppig*, no. 1660 (Vienna Hofmus., phot. Gr.). WITHOUT LOCALITY: *Mathews*, in 1862 (N. Y.). The plant of *Poeppig* is rather slender and short-leaved in the manner of var. *EXTORSUM* (Sch. Bip.) Bak. in Mart. Fl. Bras. vi. pt. 2, 290 (1876), as *extorsa*, which, however, appears to be merely a reduced state, the result perhaps of local drought. [Braz. to southern U. S.]

2. *E. SERRATULOIDES* HBK. Upright opposite-branched smoothish herb 4–6 dm. high; stem round, striate but nearly smooth; internodes rather long, much exceeding the leaves; these opposite, ovate, short-petioled, crenately 4–6-toothed on each side, 3-nerved, narrowed to an obtuse or rounded apex (not actually acute as stated in original diagnosis), roughish above, ciliate on the margin, glabrous beneath, 1.5–3 cm. long, half as wide, entire at the cuneate base, membranaceous; petiole 3.5–4.5 mm. long; heads subsolitary on the short upper branches, pedicellate, 8 mm. long; involucre campanulate-cylindric, the scales numerous, closely appressed in several series, rounded at the dark-purple tip, ciliate but otherwise glabrous and shining, excessively caducous; florets 7–8 mm. long, scarcely exceeding the involucre; corolla slenderly tubular, scarcely amplified above, violet and smooth; pappus whitish, barbellate, nearly as long as the corolla.—Nov. Gen. et. Spec. iv. 117 (1820); DC. Prod. v. 143 (1836). *Osmia serratuloides* (HBK.) Sch. Bip. Pollichia, xxii.–xxiv. 252 (1866).—PIURA: steep slopes in cool region, Huancabamba, *Humboldt & Bonpland*, no. 3525 (Par., phot. Gr.).

3. *E. ERIPSIMUM* Robinson (p. 14). Decumbent undershrub; stems

(3-5 dm. high) and branches curved-ascending to erect, terete, incurved-puberulent, the hairs minute, white, non-glandular; leaves opposite, lanceolate, about equalling the internodes, 2.5-3.5 cm. long, 5-10 mm. wide, subentire or remotely and obscurely 1-3-toothed on each side, 3-nerved from the cuneate short-petioled or subsessile base, attenuate to a narrow but ultimately rounded tip, glabrous but often minutely pustulate above, finely appressed-pubescent on the nerves beneath; heads erect, terminal on the branches of 3-several-headed at length rather loose corymbs; pedicels 5-45 mm. long; involucre cylindric, the scales several-ranked and apparently graduated, the outer ovate to oblong, so excessively caducous as to have entirely fallen away in the material at hand; the inner linear-oblong to linear, all pale, stramineous, 1-4-costulate, especially toward the narrowed but rounded tip, ciliolate, otherwise glabrous; florets about 44; receptacle flattish; corolla slenderly tubular, lilac when fresh but drying dark-purple toward the scarcely dilated throat, 8.5 mm. long, glabrous; teeth 5, narrow, recurved; stamens with an oblong appendage; style-branches lilac, drying dark-purple, 6 mm. long; clavate, widely spreading; achenes prismatic, slightly tapering toward the often curved base, slender, 4.5 mm. long, finely appressed-pubescent, the faces grayish-brown, the ribs stramineous; pappus-bristles about 45, white, barbellate, nearly equalling the corolla.—ANCACHS: in an open formation consisting both of shrubs and herbs, especially bromeliads and cacti, alt. 2200-2500 m., at the town of Caraz, 19 May, 1903, *Weberbauer*, no. 3003 (Berl., phot. and fragm. Gr.).

In habit somewhat suggesting § *Praxelis*, but referred better to § *Cylindrocephala* on account of its flattish receptacle and the nature of its involucre. Most nearly related to the preceding, but certainly distinct.

4. *E. LAEVIGATUM* Lam. Encyc. ii. 408 (1786); Bak. in Mart. Fl. Bras. vi. pt. 2, 286 (1876); Hieron. in Engl. Bot. Jahrb. xxxvi. 465 (1905); Robinson, Proc. Am. Acad. liv. 273, 333, 346 (1918). *E. resinosum* Poepp. in Poepp. & Endl. Nov. Gen. ac Spec. iii. 54 (1845).—CAJAMARCA: between Chota and Cutervo, *von Jelski*, no. 793, acc. to Hieron. l. c. LORETO: Moyobamba, *Mathews* (Gr.). CUZCO: Santa Ana, *Cook & Gilbert*, no. 1493 (U. S.); Machu Picchu, alt. 2100 m., *Cook & Gilbert*, no. 1025 (U. S.). HUANUCO: on open savannahs, subandean region, at Cassapi, *Poeppig* no. 1217 (Hofmus. Vienna, phot. Gr.); without locality, *Mathews*, nos. 1361, 1362, and 1363 in part (all N. Y.). [Mex. to Argent.]

5. *E. LEPTOCEPHALUM* DC. Prod. v. 148 (1836); Robinson, Proc.

Am. Acad. liv. 278, 346 (1918). PERU: on the Andes, but without record of exact locality, *Haenke* acc. to DC. l. c. [Ecuador, Colombia.] No Peruvian material or more precise record of this species has been seen by the writer, though it appears to be tolerably frequent in Ecuador.

6. *E. TENUICAPITULATUM* Hieron. Opposite-branched, erect, 5 dm. high, herbaceous; stems and branches terete, dull purple, covered at first with a scanty delicate appressed and jointed pubescence; leaves opposite, ovate-lanceolate, caudate-acuminate, finely serrate, firmly membranaceous, appressed-puberulent on the nerves and chief veins, green and glabrous above, lighter green and punctate beneath, about 1 dm. long and 3 cm. wide, base entire, rounded but at the insertion subcuneate; petiole 5–12 mm. long; corymbs terminal, compound, crowded, flattish; heads about 10-flowered, subsessile by 2's and 3's, about 8 mm. long and 2 mm. thick (acc. to Hieron.); involucre scales about 20, stramineous, with dark purplish mucronate pubescent at length slightly squarrose tips.—Hieron. in Engl. Bot. Jahrb. xxxvi. 465 (1905).—CAJAMARCA: near Tambillo, *von Jelski*, no. 598 (Berl. fragm. Gr.).

7. *E. SQUALIDUM* DC. Prod. v. 142 (1836); Bak. in Mart. Fl. Bras. vi. pt. 2, 281, t. 77 (1876); Robinson, Proc. Am. Acad. liv. 334 (1918).

[Var. *TYPICUM* Robinson, l. c. Branches villous-hirsute, the hairs mostly straight, widely spreading, attenuate, with dark articulations; leaves roundish-ovate, of firm texture, very shortly petioled.—Eastern Brazil, e. g. at Marianna, Minas Geraës, *Vauthier*, no. 279 (DC., Gr.), etc.]

Var. *RUSBYANUM* Robinson (p. 34). Stem and branches covered with short whitish mostly incurved and unjointed hairs; leaves ovate-lanceolate to rhombic-ovate, above sparingly appressed-puberulent, beneath sordid-tomentellous and glandular-punctate, the indumentum sufficiently dense to obscure the punctation.—PERU WITHOUT PRECISE LOCALITY: *Mathews* (N. Y.). [Boliv.]

8. *E. SCABRUM* L. f. Suppl. 354 (1781); J. E. Sm. Ic. iii. t. 67 (1791); Bak. in Mart. Fl. Bras. vi. pt. 2, 299 (1876); Robinson, Proc. Am. Acad. liv. 277 (1918).—PERU WITHOUT LOCALITY: Baker, l. c., extends the distribution of this Colombian species to Peru but does not mention the collector [Mathews?]. The species has been so variously interpreted in the past that this single and undetailed record of its occurrence in Peru must until verification be subject to considerable doubt. [Colombia.]

9. *E. ODORATUM* L. Syst. ed. 10, 1205 (1759); Robinson, Proc. Am. Acad. liv. 280, 346 (1918). *E. conyzoides* Mill. Dict. ed. 8, no. 14 (1768);

Vahl, *Symb.* iii. 96 (1794); Bak. in Mart. *Fl. Bras.* vi. pt. 2, 277 (1876). *E. floribundum* HBK. *Nov. Gen. et Spec.* iv. 118, t. 344 (1820). *E. conyzoides*, var. *floribundum* (HBK.) Hieron. in *Engl. Bot. Jahrb.* xxxvi. 463 (1905), as *floribunda*. *E. conyzoides*, var. *tambillense* Hieron. l. c. 464.—CAJAMARCA: near Tambillo, von Jelski, nos. 783 (Berl., fragm. Gr.), 785 (Berl., fragm. Gr.), and acc. to Hieron. l. c. (under his varieties founded on the highly inconstant number of florets and degree of pubescence) also von Jelski, nos. 780–782, 784, 786. [Widely distributed in the warmer parts of America; common and variable.]

10. *E. CLEMATITIS* DC. Shrub with round flexuous smoothish green or brownish stems and opposite divaricate curved-ascending branches; leaves opposite, slender-petioled, rather thin, ovate- or deltoid-lanceolate, acuminate, subentire or shallowly and bluntly 2–3-toothed on each side, subtruncate, rounded or obtusely pointed at the base, 3-nerved, green on both sides, sparingly hirtellous chiefly on the nerves and glandular-punctate or resinous-atomiferous (the resin globules at first golden brown, at length turning whitish), 3–5 cm. long, 1.3–3 cm. wide; petiole about 1 cm. long; corymbs open, mostly few-headed; heads cylindric, 1 cm. long, about 25-flowered; pedicels mostly 6–15 mm. in length; involucreal scales smooth, closely appressed, rounded or obtuse at the greenish tips; achenes slender, fuscous, smooth, 4 mm. long.—*Prod.* v. 144 (1836).—PERU? without exact locality, *Poeppig*, no. 3108 (DC., phot. and fragm. Gr.).

This species has been studied from a clear photograph of the type in the Prodromus Herbarium at Geneva and a fragment of the type number in the Klatt collection purchased by the Gray Herbarium.

11. *E. JELSKII* Hieron. Hirsute-villous undershrub 1 m. high; branches somewhat virgate, terete, purplish, leafy up into the terminal opposite-branched panicle; hairs articulated, rusty, spreading or somewhat tangled; leaves thin, lanceolate, coarsely few(2–8)-toothed, acute, cuneate at base, 6–9 cm. long, 1.4–3 cm. wide, above sparingly sordid-villous or at length only scabrid, below densely villous-hirsute chiefly on the nerves and larger veins, 3-nerved from near the base; petiole mostly 5–7 mm. long, densely tawny-villous; heads slender, cylindrical, about 20-flowered, about 1 cm. in length, on filiform pedicels at maturity nearly as long; involucreal scales about 30, reddish-purple, green-nerved toward the rounded or obtuse slightly puberulent and ciliate tip; corollas apparently purple, slightly enlarged toward the summit, granulate on the outside; achenes dark-colored.—Hieron. in *Engl. Bot. Jahrb.* xxxvi. 464 (1905).—CAJAMARCA: near Tambillo, von Jelski, no. 665 (Berl., fragm. Gr.). WITHOUT LOCALITY: *Mathews* (N. Y.).

Sect. II. SUBIMBRICATA (DC.) Hoffm. (See Proc. Am. Acad. liv. 281.)

KEY TO SPECIES.

- a. Leaves pinnate-veined, the lower veins not conspicuously longer or larger.
- b. Leaves on wingless petioles; blade cordate or hastate at the broad base.
 Petioles very short, rarely over 1.5 mm. long 54. *E. Weberbaueri*.
 Petioles 1 cm. or more in length.
 Leaves cordate, with an open triangular sinus 24. *E. glomeratum*.
 Leaves with a deep narrow sinus at the base.
 Leaves cordate, acutish, almost regularly crenate-dentate 25. *E. Gascae*.
 Leaves hastate, caudate-attenuate, with coarse and very unequal rounded teeth 26. *E. anisodontum*.
- b. Leaves on wingless petioles; blade rounded at the base (in *E. persicifolium* sometimes shortly acuminate at the point of insertion from a generally rounded base).
 Leaves ovate or elliptical, 1.5-2 times as long as wide, acute or barely acuminate.
 Leaves membranaceous, dull and puberulent to tomentellous above, the veins not depressed 27. *E. endytmum*.
 Leaves coriaceous, shining and glabrous above, the veins reticulated and depressed 28. *E. tarapotense*.
 Leaves ovate- or lance-oblong, 2.5-4 times as long as wide, gradually acuminate or attenuate.
 Heads about 25-flowered; involucre campanulate-subcylindric, scales 30-40, at length of firm texture, in 4-6 rows; achenes 5.5 mm. long; leaves permanently canescent-tomentellous beneath 12. *E. persicifolium*.
 Heads 16-19-flowered; involucre campanulate, scales 16-20, thin, in 3-4 rows; achenes 4-4.5 mm. long; leaves at length green, subglabrate and prominently reticulated beneath 15. *E. Salvia*.
- b. Leaves lanceolate to ovate or broadly elliptical, cuneate or at least obtusely pointed at base; petioles wingless, rarely less than 1 cm. long c.
- c. Leaves puberulent to villous beneath d.
- d. Leaves lanceolate, caudate-attenuate, remotely few-toothed; pubescence conspicuously ferruginous . . . 29. *E. Mathewsii*.
- d. Leaves lance-oblong, denticulate, crenulate, or subentire; pubescence white or merely dull, not ferruginous.
 Heads 13-15-flowered.
 Leaves denticulate, canescent-tomentellous beneath, often 15-18 cm. long 13. *E. buddleaefolium*.
 Leaves serrulate, green and finely puberulent on the veins beneath, rarely over 1 dm. long . . . 17. *E. pseudarboreum*.
 Heads about 25-flowered; leaves somewhat canescent-tomentellous beneath.
 Leaves subentire, scarcely crenulate, cuneate at the base 14. *E. discolor*.
 Leaves crenate-denticulate, the base rounded but sometimes shortly acuminate at the point of insertion 12. *E. persicifolium*.

- d. Leaves ovate or elliptical.
 Heads about 16-flowered; involucre scales obtuse;
 leaves rhombic-ovate, 3-4.5 cm. wide 31. *E. helianthifolium*.
 Heads 20-24-flowered; involucre scales acute; leaves
 elliptical, at maturity about 1 dm. wide 32. *E. vestitum*.
- c. Leaves glabrous or merely tomentose beneath.
 Heads in a divaricately branched pyramidal panicle;
 leaves undulate-margined and with a delicate promin-
 ent reticulation above 33. *E. orgyaloides*.
 Heads in broad terminal rounded corymbs; veinlets not
 prominent on the upper surface of the serrate leaves.
 Involucre scales conspicuously arachnoid-ciliate;
 leaves dull above, 1.5-2.3 cm. wide 34. *E. drepanoides*.
 Involucre scales minutely and obscurely ciliate;
 leaves lucid above, 3-6 cm. wide 35. *E. coelocaulis*.
- b. Leaves narrowly lance-oblong to linear, sessile or on very
 short petioles (1-4 mm. long) e.
 e. Heads large, 1.4-2.5 cm. long.
 Involucre scales regularly graduated in 3-4 series;
 heads 1.4-1.8 cm. long.
 Leaves linear, about 3 mm. wide 18. *E. Gayanum*.
 Leaves lance-oblong, 8-15 mm. wide 19. *E. Ballii*.
 Involucre scales much imbricated, but the outer scarcely
 shorter; heads 2.5 cm. long 20. *E. Cursonii*.
- e. Heads 7-10(-12) mm. high f.
 f. Heads mostly 30-40-flowered, in loosely fastigate-
 branched panicle 36. *E. amygdalinum*.
 f. Heads 7-15-flowered, mostly in dense thyrsoid inflo-
 rescence g.
 g. Leaves linear or nearly so, 3-6 mm. wide.
 Leaves strongly deflexed, tardily glabrate and
 smoothish (not conspicuously rugose-bullate)
 above, entire (the margins strongly revolute)
 21. *E. lavandulaefolium*.
 Leaves spreading, promptly glabrate and strongly
 rugose-bullate above, appearing crenulate from
 the depressed veins in the very revolute
 margins 22. *E. chotense*
- g. Leaves narrowly lance-oblong, 1-2 cm. wide in
 the middle.
 Shrubs 1-2 m. high; leaves thickish, of firm texture,
 chartaceous or coriaceous 23. *E. Volkensii*.
 Herbaceous or nearly so, 2-3 dm. high; leaves thin,
 membranaceous, of soft texture 37. *E. Sprucei*.
- b. Leaf-blade contracted below into a winged petiolar por-
 tion, either cuneate or cordate-auriculate at its insertion on
 the stem.
 Heads 14-17-flowered; leaves entire, tomentose beneath.
 38. *E. pilluanense*.
 Heads about 20-flowered; leaves coarsely toothed or lobed,
 coarsely pubescent on the veins beneath 39. *E. Commersonii*.
 Heads 200-300-flowered. Here may be sought 81. *E. nemorosum*.
- a. Leaves palmately 3-7-nerved from or somewhat above the
 base, or subpinnately veined, but with one of the lower pairs
 of veins considerably longer or thicker than the others h.
 h. Heads 4-7-flowered i.

- i. Leaves velvety-puberulent to tomentose beneath.
 Leaves entire, rounded at base.....40. *E. trachyphyllum*.
 Leaves crenate-dentate, cordate at base.....24. *E. glomeratum*.
- i. Leaves glabrous beneath j.
- j. Leaves 4-10 cm. long or more.
 Leaves broadly ovate, thin, rounded or cordate at the wide base.....41. *E. acuminatum*.
 Leaves ovate-lanceolate to elliptical, thickish, acute at the base.
 Heads subsessile on the flexuous ascending branches of an ample racemose panicle; leaves elliptical, reticulated on both surfaces.....42. *E. crenulatum*.
 Heads in dense round-topped corymbs.
 Involucral scales conspicuously arachnoid-ciliate; leaves dull above, 1.5-2.3 cm. wide. 34. *E. drepanoides*.
 Involucral scales minutely and obscurely ciliate; leaves lucid above, 3-6 cm. wide.....35. *E. coelocaula*.
- j. Leaves small, less than 1 cm. in diameter, broadly ovate, obovate, or suborbicular.....53. *E. incarum*.
- h. Heads 8-12-flowered k.
- k. Leaves lanceolate, ovate, or suborbicular, obtuse, rounded or cordate at base (in some cases very shortly acuminate at attachment of petiole) l.
- l. Leaves small (about 1.6 cm. long), obtuse. 55. *E. chamaedrifolium*.
- l. Leaves larger (4-12 cm. long), acute or acuminate, or conspicuously narrowed to a blunt apex m.
- m. Leaves rather deeply cordate with a triangular sinus; heads nearly sessile in globose glomerules.
 24. *E. glomeratum*.
- m. Leaves obtuse, rounded, truncate at base, or shallowly and broadly cordate; heads often crowded in compound corymbs but not in dense globose glomerules.
 Petioles (of the mature cauline leaves) 17-32 mm. long.
 Leaves at length rugose-bullate above, conspicuously reticulated beneath, the nerves connected by prominent and subregular cross-veins, these densely villous.....43. *E. Stuebelii*.
 Leaves membranaceous, neither bullate above nor prominently reticulated beneath.....44. *E. callacatense*.
 Petioles 8-10 mm. long.
 Involucral scales broad, the intermediate and inner elliptical, stramineous, nearly smooth, 3-5-ribbed, the outer suborbicular, loosely pubescent.....45. *E. urubambense*.
 Involucral scales narrowly oblong, densely white-tomentose, obscurely 1-nerved.....46. *E. leucophyllum*.
- k. Leaves rhombic-ovate or -lanceolate, acutish to acuminate or attenuate at base.
 Leaves merely acutish at base and definitely petioled, soft-pubescent above, glandular-punctate and puberulent beneath.....31. *E. helianthifolium*.
 Leaves attenuate at base to an often short and obscure petiole, somewhat scabrous to tomentose above, densely canescent-tomentose beneath.....47. *E. inulaefolium*.

h. Heads 14–30-flowered *l.*l. Perennial herbs or shrubs *m.*

m. Leaves rhombic-ovate, attenuate to a sessile base.....47. *E. inulaefolium*.

m. Leaves ovate-lanceolate to suborbicular, obtuse, rounded, or cordate at base.

Leaves pubescent or scabrous above.

Middle and outer involucrel scales acute.

Heads rather few and loosely disposed in open panicles; pubescence of short light-colored hairs neither gland-tipped nor conspicuously jointed.

48. *E. gracilentum*.

Heads many, glomerate at ends of branches of an open panicle, pubescence dense, dark, purplish-brown, the hairs perceptibly dark-jointed. 49. *E. Cookii*.

Middle and outer involucrel scales obtuse or rounded at the tip.....56. *E. marrubiiifolium*.

Leaves glabrous above, and merely puberulent on the nerves and veins beneath.....50. *E. marginatum*.

l. Delicate annual; leaves slender-petioled.....51. *E. microstemon*.

h. Heads 45–100-flowered.

Heads numerous, glomerate or at least crowded at the ends of the branches in a leafy-bracted panicle; pedicels mostly 0–3 mm. long.....30. *E. Lobtii*.

Heads numerous, in an open loose panicle; pedicels mostly 1–2 cm. long; involucrel scales multistriate.....52. *E. vitalbae*.

Heads in few (mostly 1–5)-headed corymbs; pedicels 5–20 mm. long; involucrel scales 3-ribbed.....16. *E. tahonense*.

12. *E. PERSICIFOLIUM* HBK. Nov. Gen. et Spec. iv. 130 (1820); Ball, Jour. Linn. Soc. xxii. 43 (1885); Robinson, Proc. Am. Acad. liv. 350 (1918). *E. arboreum* HBK. l. c. 131; Robinson l. c. 351. *E. compactum* Benth. Bot. Sulph. 112 (1844).—LIMA: Huamantango, Barclay (K., phot. Gr.); Obrajillo, Wilkes Exp. (Gr.); Chicla, Ball, acc. to Ball, l. c. ANCACHS: Prov. Cajatambo: on grassy plains with numerous scattered bushes, alt. 3400–3700 m., Ocos, 28 March, 1903, Weberbauer, no. 2682 (Berl., fragm. Gr.). CUZCO: Ollantaytambo, alt. 3000 m., Cook & Gilbert, nos. 330 (U. S.), 335 (U. S.); Piñasniocj, Panticalla Pass, alt. 3600 m., Cook & Gilbert, no. 1809 (U. S.).

In a recent paper the writer, l. c., endeavored to maintain *E. arboreum* HBK. as distinct from *E. persicifolium*, but the characters are so slight that it now seems impossible to keep these species satisfactorily apart or key them from each other with any clearness whatever. [Ecuad.]

13. *E. BUDDLEAEFOLIUM* Benth. Pl. Hartw. 135 (1844); Robinson, Proc. Am. Acad. liv. 350 (1918).—AMAZONAS: Prov. Chachapoyas, Mathews (Gr.). [Ecuad.]

14. *E. DISCOLOR* DC. Shrubby; branches flexuous, slender, hexagonal, nearly smooth; leaves opposite, oblong-lanceolate, acuminate,

acute at base, slightly revolute and obscurely crenulate (at first sight entire), above glabrous but finely bullate-rugulose, beneath closely cinereous-tomentose, feather-veined (the veins 22-28 on each side, somewhat darker than the rest of the surface), about 9 cm. long, 1.5-2.5 cm. wide; petiole about 8 mm. long; corymbs terminal, few-headed, rather dense, 3-5 cm. in diameter, convex; heads about 25-flowered, short-pedicelled; involucre several-seried, subturbinate-campanulate; scales acute, ciliate; achenes roughened on the angles.—Prod. v. 161 (1836).—HUANUCO: near the city of the same name, *Haenke* (DC., phot. Gr.). The locality was cited by DeCandolle under the unrecognized name "Huanaceria," but it seems probable that this was a mere misreading of Huanuco, formerly spelled Huanacco, where Haenke did much of his work. The species is closely related to *E. persicifolium* HBK., but the leaves are cuneate at base, more decidedly discolorous, and nearly entire.

15. *E. SALVIA* Colla. Shrub 8-10 dm. high, somewhat sticky on the younger parts; branches subterete, somewhat ribbed (when dried), purplish-brown to buff, at first glandular-puberulent, soon glabrate, ascending, usually very leafy, terminating in compound round-topped corymbs; leaves (often proliferous in the axils) lanceolate, gradually narrowed from below the middle to a sharp point, irregularly dentate (teeth small, obtuse or merely acutish), of firmish texture but rather thin, feather-veined, rounded or obtusish at base, above glabrous and bullate, beneath finely reticulated, paler, more or less arachnoid-puberulent but often nearly or quite glabrate and pale-green, 5-8 cm. long, 1.5-2.4 cm. wide; petiole 2-8 mm. long, slender; corymbs 3-8 cm. in diameter, somewhat peduncled (i. e. uppermost leaves reduced and bractlike); heads 16-19-flowered, 1.3 cm. high, 8 mm. in diameter, pedicelled; involucre scales 16-20, graduated, 2-3-seriate, partly purplish-tinged, the outer ovate, somewhat viscid-pubescent, the inner lance-oblong to linear, nearly glabrous, finely nerved; corollas purple, 6 mm. long, glabrous; achenes 4.3 mm. long, slender, obscurely puberulent, with dark concave faces and lighter-colored ribs, 4.3 mm. long; pappus-bristles about 46, often purple-tinged.—Mem. Tor. xxxviii. 8 (1835); Gay, Fl. Chil. iii. 473 (1847); Reiche, Fl. Chil. iii. 264 (1901). *E. reticulatum* Hook. & Arn. Bot. Beech. 29 (1830), not Desv.—PERU WITHOUT LOCALITY: *Hayne* (Berl.). [Chile.] VERNACULAR NAME: *Salvia Macho*, acc. to Gay, l. c.

16. *E. TAHONENSE* Hieron. Suffruticose, attaining 1 m. in height; branches round, at first sticky-glandular; lower internodes 1-2.5 cm. long, the upper as much as 7 cm. in length; leaves opposite, ovate,

acutish or obtusish, cordate at base but with a short acumination at the insertion, subrenate-dentate (teeth 15-20 on each side, the largest 1.5 mm. high, 2.5 mm. broad, with revolute mucro), above slightly roughened in age and somewhat bullate, beneath loosely glandular-tomentulose, 3-nerved from the very base, about 4 cm. long, 2.25 cm. wide; corymbs about 5-headed from the axils of the upper leaves; heads 70-100-flowered, on sticky-glandular pedicels (5-20 mm. in length); involucre campanulate, 3-4-seriate; scales 40-55, the inner densely glandular, lance-linear, acute, the outer gradually shorter and broader, acuminate, ovate-oblong, 5-7-nerved at the base, the nerves anastomosing; corollas about 5.5 mm. long, scarcely amplified toward the summit, glabrous; style-branches moderately thickened; achenes brown, 4 mm. long, roughened throughout; pappus-bristles 30-40, dirty-white.—Hieron. in Engl. Bot. Jahrb. xl. 372 (1908).—CAJAMARCA: below the Hacienda La Tahona near Hualgayoc, alt. 2600 m., *Weberbauer*, no. 4037. Not seen by the writer, the description here compiled with condensation from the original character.

17. *E. PSEUDARBOREUM* Hieron. Shrub; branches somewhat hexagonal, glabrous, grayish-brown, when young viscid and slightly vernicose; internodes 1-5 cm. long; leaves opposite, lanceolate to lance-oblong, acuminate, serrulate except near the cuneate base (teeth about 0.7 mm. high, 1-1.5 mm. wide), feather-veined (chief veins about 15 on each side), deep green, smooth, lucid, and nearly glabrous above, beneath olive-green, puberulent on the prominent and reticulated veinlets, chartaceo-membranaceous, 7-10 cm. long, 2.4-3.5 cm. wide; petiole slender, about 1 cm. long; corymbs terminal on the branches, together forming a leafy panicle; heads about 14-flowered, on puberulent pedicels (2-5 mm. long); involucre 3-4-seriate, graded, ovate to lanceolate, acute, ciliate, green, with 3-5 pale ribs; corollas glabrous, slender, slightly and gradually enlarged upwards, 5 mm. long; achenes yellowish-brown, ciliolate on the angles, 3.3 mm. long (scarcely mature); pappus-bristles about 40, whitish with a slight yellow tinge, nearly smooth.—Hieron. in Engl. Bot. Jahrb. xxxvi. 469 (1905).—CAJAMARCA: Callacate, May, 1879, *von Jelski*, no. 766 (Berl., fragm. Gr.).

18. *E. GAYANUM* Wedd. Shrubby, 1 m. high; branches slender, ascending, nodulose after the fall of the leaves, at first closely enveloped in a yellowish-white wool, at length nearly glabrate, brownish, terete; internodes 5-35 mm. long; leaves opposite, subsessile crowded on the branchlets, linear, 3-5 cm. long, about 2 mm. wide, obtusish, grayish-pubescent and somewhat bullate above, densely covered beneath with yellowish-white wool; margins revolute, apparently entire; cymes loose,

terminal or somewhat lateral, 3-5-headed; pedicels woolly, 5-15 mm. long, filiform, mostly recurved; heads rather large, 1.3 cm. high, about 1 cm. in diameter; involucre narrowly campanulate, the scales lanceolate, attenuate, the inner long, stramineous, smoothish, the outer progressively shorter, rather densely woolly; corollas glabrous, greenish (Weberbauer), 8-10 mm. long, the style-branches clavate, purple; achenes (immature) pale, 4 mm. long, slightly hispidulous on the angles.—Chlor. And. i. 216, t. 40A (1857).—Cuzco: on mountains, *Gay*, acc. to Wedd. l. c. JUNIN: calcareous rocks, alt. 3700-4000 m., between Tarma and La Oroya, Feb., 1903, *Weberbauer*, nos. 2524 (Berl.) and 2583 (Berl., fragm. Gr.).

19. *E. BALLII* Oliver. Similar to the preceding in habit and inflorescence; leaves narrowly lance-oblong, acute, cuneate at the sessile base, 5-8 cm. long, 7-13 mm. wide, thinnish, sparingly arachnoid and finely bullate above, paler and sparingly sordid-woolly beneath; cymes loose, few-headed; heads large, 1.5-1.8 cm. long, mostly nodding on slender (at maturity) dark glandular-puberulent pedicels; involucre scales ovate-elliptic, acuminate, thin, finely many-striate, 3-5-seriate, graduated, the outer distinctly shorter and more woolly; florets as in the preceding.—Oliv. in Hook. Ic. xv. 49, t. 1462 (1884).—LIMA: on ledges of the Andes, near Chicla, alt. 3660-3965 m., *Ball* (Gr.).

20. *E. CURSONII* Robinson. Probably shrubby and with the habit of the two preceding species; branchlets round, slender, fusco-tomentulous, leafy toward the summit; internodes about 8 mm. long; leaves opposite, linear-lanceolate, attenuate to both ends, above slightly puberulent and bullate-rugulose; beneath paler, reticulate-venose, tomentose, 9 cm. long, 8 mm. wide, thickish, the margin strongly revolute, slightly crenulate; petiole about 1 mm. long; heads in terminal 3-headed cymes, about 80-flowered, very large for the genus, 2.5 cm. long about equally thick; pedicels slender (short in fragmentary type but with greater maturity presumably elongating); involucre scales much imbricated in 3-5 series but not graduated as to length, lanceolate, acute, the outer thickish, 2 cm. long, 4 mm. wide, finely striate, granular-puberulent on the back, subherbaceous, scarious-margined; the inner narrower, smoother and more stramineous; receptacle apparently somewhat paleiferous toward the edge; pales very narrow, filiform-attenuate; corollas 1 cm. long, slenderly tubular, glabrous; style-branches, clavate, somewhat flattened, dark purple; achenes 7 mm. long, slightly roughened on the angles; pappus-bristles about 50, some of the outer shorter.—Proc. Am. Acad. xlii. 38 (1906).—AREQUIPA: Arequipa, *Curson* (Brit. Mus., phot. Gr.).—Known only from a single

branch bearing a few leaves and a very large, fairly mature head flanked by two heads still in bud.

21. *E. LAVANDULAEFOLIUM* DC. Slender branched shrub; branches suberect, when young densely clothed with yellowish-white wool; internodes 2-4 cm. long; leaves opposite, subsessile, linear, entire, slightly narrowed to an obtusish point, strongly revolute on the margins, 2-3 cm. long, 1.3-3.4 mm. wide, above glabrate, bullate-rugulose, beneath white-woolly; heads glomerate at the ends of the branches of small terminal panicles, subsessile, 9-10-flowered, about 8 mm. high; involucre narrowly campanulate, 3-4-seriate; scales graduated, thin, scarioso-stramineous, obtusish, the outermost somewhat woolly; corollas conspicuously granulate toward the limb.—Prod. v. 154 (1836).—PERU WITHOUT LOCALITY: in valleys of the Andes, *Haenke* (Gr.), from South America, presumably Peru, *Dombey* (fragm. and sk. Gr.).

22. *E. CHOTENSE* Hieron. Erect branching shrub attaining 5 dm. in height; branches round, when young cinereous-tomentose, soon only sordid-arachnoid, internodes 2-7 (the uppermost as much as 12-15) mm. long; leaves opposite, shortly but distinctly petiolate, linear-oblong, obtuse, 3.4-4.5 cm. long, 4-6 mm. wide, distinctly feather-veined, the lateral veins 20 or more on each side, leaving the midnerve at a large angle (about 80°-85°), upper surface glabrous, lucidulous, bullate-reticulated, the lower gray-tomentose, margin strongly revolute and from the depressed veins appearing crenulate; corymbs compound, terminal, strongly convex subhemispherical, 3 cm. in diameter; heads 10-11-flowered; involucre subcylindric, multiseriate in the manner of § *Cylindrocephala* but of looser nature, the scales about 24, scarioso-stramineous, the inner purple-tinged toward the somewhat narrowed but at the apex rounded tips, the short outer scales webby-woolly; corollas glabrous, slightly enlarged upward, about 4 mm. long; achenes dark, nearly or quite smooth, about 2 mm. long.—Hieron. in Engl. Bot. Jahrb. xxxvi. 466 (1905).—CAJAMARCA: between Chota and Cutervo, *von Jelski*, no. 794 (Berl., fragm. Gr.); near Cutervo, *von Jelski*, no. 631 (Berl., fragm. Gr.).

23. *E. VOLKENSII* Hieron. Branching shrub, attaining a height of 1 m. (Weberbauer) or 1.2-1.5 m. (Cook & Gilbert); branches at first slightly pubescent, at length glabrate; leaves opposite, linear-lanceolate, narrowed to an acutish or mucronulate tip, cuneate at base, crenate-serrate (teeth scarcely 1 mm. high, as much as 3.5 mm. wide), above scabrid-puberulent, beneath white-pubescent, feather-veined (the more prominent veins 8-10 on each side), chartaceous, 6-12 cm. long and 9-19 mm. wide, the reticulated veinlets depressed above, prominent

beneath; petiole 1-4 mm. long; heads in terminal corymbs, 10-12-flowered, about 1 cm. high; involucre narrowly campanulate; scales about 20, dusky-stramineous, scarious, obtuse, slightly lacerate-ciliate toward the tip, the outer gradually shorter, about 5-nerved; corollas gradually enlarged toward the summit, scarcely 5 mm. long, glabrous, pale-blue or pale-purple; achenes dark, hispidulous on the angles and slightly so on the upper part of the faces; pappus-bristles 30-35, yellowish-white.— Hieron. in Engl. Bot. Jahrb. xl. 370 (1908).— Cuzco: on the hill Sacsahuamán, near Cuzco, alt. 3500-3600 m., *Weberbauer*, no. 4850; Ollantaytambo, alt. about 3000 m., *Cook & Gilbert*, nos. 369 (U. S.) and 589 (U. S.).

This species in habit and many essential characters is exceedingly close to *E. salicinum* Lam., of which it may ultimately prove a variety. However, the leaves are less thick and not so firm nor so deeply wrinkled; their margins are less strongly revolute, and the upper surface permanently hirtellous — the hairs (not readily visible except with a lens) being white, subappressed, and slightly tuberculate-thickened at the base. In *E. salicinum*, on the other hand, the leaves, even when young, are quite glabrous on the upper surface, which is strongly bullate-rugose and somewhat lucid. Furthermore, the achenes (at least in the form occurring in Colombia) are sparsely covered with short-stiped capitate glands. The flower-color in *E. Volkensii* was noted by Dr. Weberbauer as bluish, a statement questioned by Hieronymus. Cook & Gilbert give the flower-color of their no. 369 as "pale wistaria violet" and of their no. 589 as "pale blue." In the dried material of both of these numbers the limb and upper part of the throat of the corollas still show in the dried material a pale purple coloration.

In regard to the recorded Peruvian occurrence of *E. salicinum*, see below (p. 87).

24. *E. GLOMERATUM* DC. Suffruticose, shortly but rather coarsely spreading-pubescent; branches terete, leafy to the inflorescence; internodes 6 cm. or more long; leaves opposite, ovate-lanceolate, acuminate to scarcely acute, crenate-dentate except at base, where cordate by an open sinus, slightly pubescent above, softly but not very densely sordid-tomentose and somewhat veiny beneath, 4-6 cm. long, 2-3 cm. wide; petiole slender, 8-14 mm. long; globose glomerules 1-3 cm. in diameter, terminal on the divaricate branches of a leafy-bracted open ovoid or subpyramidal panicle; heads sessile, 7-8-flowered; involucre subcylindric-campanulate, the scales brownish-stramineous, striate, the inner oblong, obtuse, essentially glabrous, the outer progressively shorter, ovate, somewhat hairy dorsally near the blunt or rounded tip.— Prod.

v. 154 (1836).—LIMA: Obrajillo, *Wilkes Exp.* (U. S., phot. Gr.). Originally described from material from the herbarium of *Haenke* (DC., phot. Gr.), said by DeCandolle to have been found "inter Chilenses."

25. *E. GASCAE* Robinson (p. 15). Robust, densely covered with spreading and jointed dark-brownish glandular hairs; leaves opposite, ovate, cordate, subacute, rather coarsely and evenly dentate, deep green, strongly bullate-rugose and puberulent above, somewhat paler, sordid-tomentose and conspicuously netted beneath, about 1 dm. long, 4–7 cm. wide; petiole densely dark-hairy, 2–4 cm. long; corymbs terminal, dense, sessile; heads about 22-flowered, 1.5 cm. high, 6 mm. thick; involucre scales about 21, greenish-straw-colored, ovate, acute, finely striate-ribbed; receptacle flat; corollas slender, gradually and very slightly enlarged toward the top; achenes 4 mm. long.—AMAZONAS: Prov. Chachapoyas, *Mathews* (Gr.). A very marked species with foliage suggesting some of the coarser *Salvias*. In habit and inflorescence recalling § *Conoclinium*, but with a flat receptacle.

26. *E. ANISODONTUM* Robinson (p. 6). In habit, foliage, and pubescence similar to the preceding, but leaves triangular-hastate, caudate-acuminate, with unequal teeth (some short and rounded, others 2–3 times as long and acutish), basal sinus deep and narrow; corymb pedunculate, strongly convex, congested; heads about 10-flowered, 1 cm. long; involucre cylindrical-campanulate; corollas 6 mm. long, smooth; achenes 4 mm. in length, glabrous.—AMAZONAS: Prov. Chachapoyas, 1836, *Mathews*, no. 87 H (K., phot. and fragm. Gr.).

27. *E. ENDYTUM* Robinson (p. 13). A stoutish shrub, 1–2 m. high, covered with a short, dense and somewhat matted reddish-brown velvety pubescence; stems round, hollow, leafy well into the large opposite-branched ovoid panicle; leaves opposite, oblong-ovate, acute, serrulate, feather-veined, thickish-membranaceous, tomentellous on both surfaces, paler beneath, 8–12 cm. long, 3.6–6 cm. wide; petiole 1.5–2 cm. long, densely rusty-velvety; heads crowded at the ends of the widely spreading branches of the panicle, about 39-flowered, 7 mm. high and thick; involucre campanulate, 2–3-seriate; scales scarcely graded, acutish, obscurely nerved, the outer ovate, persistent, dorsally tomentellous, the inner narrower, subglabrous, promptly deciduous; corollas 3.5 mm. long, smooth; achenes glabrous; pappus-bristles about 20, somewhat unequal, nearly as long as the corolla.—PUNO: between Sandia and the tambo Azalaya, on the road from Sandia to Chunchusmayo, in bushy places alt. 1500–2000 m., *Weberbauer*, no. 1074 (Berl., phot. and fragm. Gr.).

28. *E. TARAPOTENSE* Robinson (p. 37). Rusty-tomentellous shrub; leaves opposite, elliptic-ovate, acuminate, remotely serrate (teeth about

1 mm. high and 1 cm. apart), rounded at base, coriaceous feather-veined, above sparingly pubescent, lucid, deeply rugose-reticulated, beneath paler, pubescent and minutely atomiferous, 4-8 cm. long, 1.5-4 cm. wide; petiole about 1 cm. long; heads about 37-flowered, about 1 cm. high and thick, densely cymose at the ends of the leafy-bracted branches in an open panicle; involucre campanulate; scales about 18, clearly graduated, acutish, distinctly striate-costulate; corollas about 6 mm. long, with slightly but clearly enlarged throat.—LORETO: in mountains along the river Mayo, near Tarapoto, *Spruce*, no. 4014 (Gr.).

29. *E. MATHEWSII* Robinson (p. 23). Tawny-velvety, probably shrubby (the base unknown); stems and branches terete, leafy to well within the inflorescence; internodes 3-6 cm. long; leaves opposite, lanceolate, caudate-acuminate, attenuate to a relatively short-petioled base, remotely and rather sharply 4-6-toothed on each side (teeth 1-2 mm. long, about 1.5 cm. apart), feather-veined, 1 dm. long, 2 cm. wide, above sparingly tawny-pubescent on the midrib, the surface otherwise subglabrous, somewhat shining, the reticulated veinlets depressed, beneath rusty- or tawny-pubescent or subtomentose, paler, the veinlets slightly prominent; panicle leafy; the heads crowded at the ends of the branches, about 56-flowered, nearly 1 cm. high and thick; involucre campanulate, about 3-ranked; scales ovate to (the inner) linear, acutish, striate-costate, glandular-ciliolate, the outer dorsally a little tawny-hairy; corollas 5.5 mm. long, slightly and gradually enlarged toward the summit, the upper part externally a little granulated; achenes dull-grayish, 2.3 mm. long; pappus-bristles about 25, white, scarcely roughened, about a third shorter than the corolla.—DEPARTMENT NOT ASCERTAINED: at Yambrasbamba (an unidentified name perhaps not correctly read from a somewhat obscure label), 1835, *Mathews* no. 1386 (K., phot. Gr.).

30. *E. LOBBII* Klatt. Shrub; branches round, striate-costulate (after drying), fistulose, densely purplish- or later tawny-tomentose (at last subglabrate), the hairs slender, spreading, attenuate, purple-jointed; internodes 3-7 cm. long; leaves rhombic-ovate, attenuate to a slightly obtusish apex, abruptly cuneate at the base, quite entire or undulate-dentate (with 3-6 low broad irregular rounded teeth on each side), 7-9 cm. long, 2.8-3.5 cm. wide, membranaceous, dark-green and finely tawny-pubescent above, paler, tawny-tomentellous beneath, 3-nerved from a point about 1 cm. above the base; petiole about 1.2 cm. long, panicle ovoid, opposite-branched, leafy-bracted, 1.3-2 dm. in height and diameter; heads clustered at the ends of the branches, 1 cm. high and thick; involucre campanulate, 2-3-seriate; scales moderately

graduated, 2-ribbed and 3-nerved, the inner stramineous, acutish, tawny-tomentellous toward the tip, the outer oblong, round-tipped, subherbaceous, dorsally tawny-tomentellous; corollas slenderly tubular, without evident throat, glabrous, 5.5 mm. long; achenes 2.8 mm. long, slender, tapering downward, fuscous, upwardly setulose toward the summit; pappus-bristles about 30, dull-white, nearly smooth, almost equalling the corolla.—Ann. Naturh. Hofmus. Vienna, ix. 356 (1894). *E. sordescens* Bak. in Mart. Fl. Bras. vi. pt. 2, 306 (1876), in part, not DC.—LORETO: in mountains along the Mayo River, near Tarapoto (incorrectly given by Klatt as Jarapoto), *Spruce*, no. 4804 (Gr.). WITHOUT EXACT LOCALITY: *Lobb* (Hofmus. Vienna, sk. and fragm. Gr.).

This is one of several widely different plants included by Baker under *E. sordescens* DC., which in its typical form is a pretty well marked species of Atlantic Brazil with much smaller (about 25-flowered) heads, linear and acute involueral scales, and petioles (as stated by DeCandolle) 1.8–2 cm. long. The real *E. sordescens* seems to be well represented by Riedel's no. 1348 (Gr.) determined by Schultz-Bipontinus.

31. *E. HELIANTHIFOLIUM* HBK. Shrubby; branches opposite, round, dark-hispid; internodes 4–6 cm. long; leaves opposite, ovate, narrowed from below the middle to an acute point, serrate except toward the abruptly pointed base (teeth 1–1.7 mm. high, 4–6 mm. wide, mostly acute), feather-veined, membranaceous, above scabrid, beneath hispid with minute hairs and closely beset with orange-colored glands, the largest leaves about 12 cm. long, 5 cm. wide; petiole subterete, densely hispid, canaliculate above, 7–10 mm. long; inflorescence a trifold very leafy flattish panicle; heads pedicellate, about 10-flowered, 8 mm. high; involucre campanulate-cylindric, the scales about 16, imbricated, but not very strongly or regularly graduated, the inner oblong-linear, smoothish, obtuse, the outer somewhat shorter, oblong, acutish, hispidulous.—Nov. Gen. et Spec. iv. 127 (1820).—PIURA: near Ayavaca, *Humboldt & Bonpland* (Par., phot. Gr.).

From the photograph in the Gray Herbarium this species appears to resemble in habit the variable *E. inulaefolium* HBK. The leaves, however, appear to be more regularly feather-veined, the petiole more sharply defined, and the inflorescence more leafy. From the original character it is to be inferred that the pubescence is more hispid and of darker color. The type-material is immature and until rediscovery the status of this species must probably remain doubtful.

32. *E. VESTITUM* Poepp. Erect shrub with terete somewhat flexuous leafy branches; pubescence on younger axes, as well as on the midrib and chief veins of the leaves short, dense, rusty-velvety; leaves petiolate,

opposite, ovate-elliptic, acuminate, serrate, except toward the obtuse or rounded base (teeth 0.4–0.7 mm. high, 4.5–7 mm. wide), feather-veined (chief veins about 5 on each side, leaving the midnerve at an angle of 60° – 65° and curving forward), reticulate-veiny, above scabrid, dark-green, beneath pubescent, paler, membranaceous, 12–15 cm. long, half as wide; petiole densely rusty-velvety, 8–25 mm. long; corymbs pedunculate, raised well above the leaves, compound, rounded, the branches wide-spreading; 1.5–4.5 cm. in diameter; heads short-pedicelled, about 7.5 mm. high; involucre campanulate; scales 2–3-seriate, graduated, the outer apparently ovate-oblong, narrowed to an obtusish apex; corollas white, scentless.—Poepp. in Poepp. & Endl. Nov. Gen. ac Spec. iii. 55 (1845).—ANCACHS (or possibly HUANUCO) in mountain woods at Pampayaco (Cuchero), *Poeppig* (Hofmus. Vienna, phot. Gr.).

33. *E. ORGYALOIDES* Robinson (p. 24). Shrub or tall herb with slender dark-brown branches, nearly smooth and leafy to the inflorescence; internodes 4–6 cm. long; leaves opposite, lance-oblong, acuminate at each end, undulate-margined and remotely cuspidate-denticulate, chartaceo-membranaceous, feather-veined, glabrous and delicately net-veined on both surfaces, a little paler beneath, the largest 1.6 dm. long, 6 cm. wide; petiole minutely dusky-puberulent 4–7 mm. long; panicle broadly pyramidal, leafy-bracted below, its slender opposite branches widely spreading and flowering only toward the tip; heads about 20-flowered, 4.5 mm. high and thick; involucre bell-shaped, dusky- or greenish-stramineous, the scales imbricated but not very clearly graduated, ciliolate but otherwise glabrous, the inner oblong to linear, the outermost ovate, acuminate, often recurved at the tip; corollas glabrous, only slightly and gradually enlarged upward, 2.5 mm. long; achenes (immature) 1.7 mm. long, glabrous; pappus dull-white, 2 mm. long, the bristles about 30.—LORETO: near Tarapoto, 1855–56, *Spruce*, no. 4546 (K., phot. Gr.).

In many respects near the preceding, but with essentially glabrous stems and obscurely toothed, or subentire leaves acuminate at the base.

34. *E. DREPANOIDES* Robinson (p. 12). Glabrous shrub reaching a height of 4 m.; branches nearly round, curved-ascending, leafy; internodes 1–2 cm. long; leaves opposite, lanceolate, broadly scythe-shaped, acuminate, acute at base, serrate (teeth 0.6 mm. high, 2–3 mm. wide), firmish, above flat, dull, sprinkled with fine granules, beneath slightly paler, 3-nerved above the base, then feather-veined, 7–9 cm. long, 1.8–2.1 cm. wide; petiole glabrous, about 2 cm. long; corymbs terminal, sessile, compound, rounded, 1 dm. or more in

diameter; branchlets and pedicels webby-puberulent; heads many, about 7-flowered, 6 mm. (very immature) high, 3.5 mm. in diameter; involueral scales about 13, ovate-oblong, acutish, finely striate, stramineous with purplish tinge, graduated, webby-ciliate; corollas slenderly tubular, 5-nerved, granulated; achenes tapering downward, finely granulated; pappus-bristles about 23.—ANCACHS: open woods by a brook at Comin, Prov. Huari, alt. 3600–3700 m., *Weberbauer*, no. 2918a (Berl., phot. and fragm. Gr.).

35. *E. COELOCAULE* Robinson. Shrubby; branches stout, round, grayish-brown, at length glabrous, smooth, hollow; internodes 3–4 cm. long; leaves opposite, lance-oblong or rhombic-lanceolate, long-acuminate, serrate (except at the cuneate base), feather-veined, of firmish texture, at maturity green, glabrous, and somewhat shining above, somewhat glaucous and punctulate beneath; petiole 1–4 cm. long, smooth, reddish; upper leaves smaller, lanceolate, entire; corymb terminal, sessile, compound, slightly convex, 1–1.5 cm. broad, densely covered with a short and curly fulvous tomentum; heads very numerous, shortly pedicelled or sessile by 2's or 3's, about 5-flowered, 10–12 mm. high, 2–3 mm. thick, slenderly cylindrical; scales about 12, stramineous, about 3-seriate, the outer ovate, acutish, the inner gradually longer, narrowly elliptical, delicately striatulate, obtusish, glabrous; corollas smooth, slightly enlarged upward, 7 mm. long; achenes dark, shining, obsoletely granulate; pappus-bristles about 30, unequal, yellowish-white.—AMAZONAS: Prov. Chachapoyas, *Mathews*, no. 1373 (K., phot. and fragm. Gr.).

36. *E. AMYGDALINUM* Lam. Encyc. ii. 408 (1786); Hieron. in Engl. Bot. Jahrb. xxxvi. 470 (1905); Robinson, Proc. Am. Acad. liv. 301, 339 (1918). *E. dodoneaeifolium* DC. Prod. v. 161 (1836). *E. fraternum* DC. l. c. 163.—LORETO: near Tarapoto, *Spruce*, no. 4116 (Gr.). SAN MARTIN: open grassy plains at Yurimaguas, Prov. Maynas, *Poeppig*, no. 2075 (DC., phot. Gr.). CAJAMARCA: Tambillo, *von Jelski*, no. 728, acc. to Hieron. l. c. CUZCO: Santa Ana, alt. 900 m., *Cook & Gilbert*, no. 1613 (U. S.). ANCACHS: on open hills at Cuchero, *Poeppig*, no. 18 (DC., phot. Gr.). WITHOUT LOCALITY: *Mathews* (N. Y.). The original specimen of *E. amygdalinum* said to have been collected in Peru by Joseph de Jussieu is still extant (Par., phot. Gr.), but probably came from what is now Ecuador. [Nicaragua to Bolivia and Brazil.]

37. *E. SPRUCEI* Robinson (p. 33). Low undershrub, 2–3 dm. high; stem curved-ascending and distinctly woody toward the soon defoliated base; internodes very short below; leaves opposite, oblan-

ceolate, sessile, attenuate to each end, rather remotely denticulate, green and glabrous above, paler and on the midnerve sordid-pubescent beneath, 5-10 cm. long, 1-1.8 cm. wide, thin, membranaceous, feather-veined, veins about 6 or 7 on each side, curved forward and anastomosing with each other; panicle terminal, its slender branches and filiform pedicels clothed with short dirty-brownish curly hairs; heads about 18-flowered, about 6 mm. high; involucre turbinate, several-seried, its scales stramineous, mostly linear-oblong, obtuse or rounded at the tip and often slightly tufted on the back near the summit, mostly 2-costulate; corollas 3 mm. long, glabrous; proper tube slender 1.8 mm. long, the throat 1.2 mm. high, turbinate; style-branches with flexuous very delicate attenuate and papillose appendages; achenes blackish, 1.5 mm. long, sparingly hispidulous on the angles; pappus-bristles about 25, very delicate, nearly smooth, white.—LORETO: along the Huallaga River, *Spruce*, no. 4167 (Gr.).

38. *E. PILLUANENSE* Hieron. Suffruticose, 5 dm. high; stems puberulent, striate; leaves opposite, elliptic- to rhombic-ovate, acute or obtuse, entire, cuneately narrowed below but cordate and half-clasping at the sessile base, chartaceous, puberulent above, densely tomentulose beneath, feather-veined (lateral veins 6-8 on each side, leaving the midrib at about 45° and then curved-ascending, connected by reticulation), the largest 12 cm. long, 4-4.5 cm. wide; panicle terminal, compound, leafy-bracted below; heads corymbose or sub-racemose toward the tips of the branches, some also borne directly from the axils of the bracts, pedicellate or more rarely sessile, 14-17-flowered; involucre about 4 mm. long, the scales about 20, obtuse, the inner linear-oblong, stramineous, 1-3-nerved and striate, the outer gradually shorter and broader, 4-nerved, the outermost ovate, about 3 mm. long; achenes about 1.5 mm. long, dark, smooth.—Verh. Bot. Verein Brand. xlviii. 201 (1907).—LORETO: Salinas de Pilluana, *Ule*, no. 6780.

This species has not been seen by the writer. The description is condensed from the original, in which the plant is said to be nearly related to *E. iresinoides* HBK. but to differ in its firmer more pin-nately veined leaves, larger heads, and more numerous florets.

39. *E. COMMERSONII* (Cass.) Hieron. Nearly herbaceous, decumbent, rather densely grayish-pubescent, 3-5 dm. high; stem round, stoutish, curved-ascending, leafy below, nearly naked above the middle to the terminal, rather dense, often nodding inflorescence; leaves chiefly opposite, oblong, obtuse, 1 dm. long, 3 cm. wide, irregularly and coarsely serrate-crenate or lobed except on the long gradually cuneate

petiole-like entire base; heads short-pedicelled, in dense rounded corymb or at length loose irregular corymbose panicle, about 20-flowered; involucre campanulate, about 2-seriate, the inner scales oblong 2-3-ribbed and smoothish to the middle, ending in tomentelous and erubescens rounded slightly dilated tips of softer texture, a few of the outer scales progressively shorter and narrower, the outermost linear, acutish; corollas said to be red, glabrous, slightly and gradually enlarged upward; achenes dark, 2.5 mm. long, puberulent, tapering to a sharp villous base; pappus-bristles about 30, yellowish-white, barbellate.— Hieron. in Engl. Bot. Jahrb. xxii. 771 (1897). *Gyptis Commersonii* Cass. Dict. xx. 178 (1821). *Eupatorium Bacleanum* DC. Prod. v. 157 (1836). *Gyptis Commersoni* [Cass.] Bak. in Mart. Fl. Bras. vi. pt. 2, 314 (1876), in syn.— PERU WITHOUT LOCALITY (as "inter Peruanas"): *Haenke*, acc. to DeCandolle, l. c. [Southern Brazil, Uruguay, and Argentine.]

40. *E. TRACHYPHYLLUM* Hieron. Woody climber; branches round, closely clothed with a short and stiffish reflexed tawny pubescence, the hairs pointed, non-glandular; leaves opposite, ovate-oblong, caudate-acuminate, rounded at base, entire, concolorous, firmly membranaceous, 3-nerved from somewhat above the base, above dull green, scabrous-puberulent, rugulose-reticulated, beneath tomentelous especially on the prominent reticulation, mostly 7-12 cm. long, about a third as wide, petiole 1-2 cm. long, retrorsely velvety-puberulent; panicle branched at right angles, the branches naked except at the densely floriferous tip; heads 6-7-flowered, subsessile, numerous in close subglobose glomerules; involucre narrowly campanulate, scarious, stramineous, the scales very unequal, mostly linear-oblong, slightly ciliate toward the obtuse or rounded tip, 3-5-costulate, the inner promptly deciduous; corollas pale, probably flesh-colored, glabrous, slenderly tubular, slightly and gradually enlarged upward, 6 mm. long; achenes purplish-black 2.3 mm. long tapering toward the callose base, at the summit slightly constricted into a short neck bearing the pappiferous disk; pappus-bristles about 30, white with a light yellow tinge, barbellate.— Hieron. in Engl. Bot. Jahrb. xxxvi. 467 (1905).— CAJAMARCA: near Tambillo, 29 Aug., 1878, *von Jelski*, no. 697 (Berl., fragm. Gr.).

41. *E. ACUMINATUM* HBK. Nov. Gen. et Spec. iv. 107 (1820); Hieron. in Engl. Bot. Jahrb. xxxvi. 469 (1905); Robinson, Proc. Am. Acad. liv. 290 (1918).— CAJAMARCA: near Tambillo, 13 Aug., 1878, *von Jelski*, no. 790, acc. to Hieron. l. c. [Colombia.]

The writer has had no opportunity to verify the Peruvian record of

this species, indeed has seen no specimens of it except from central and southwestern Colombia where it appears to be abundant. If Hieronymus is correct in his identification, the plant of von Jelski extends the known range southward toward 1000 km.

42. *E. CRENULATUM* Spreng. Glabrous shrub, with ascending slender more or less flexuous purple branches leafy up to the loose terminal racemose panicle; leaves opposite, lance-oblong to rather broadly elliptic, acute or obtuse, cuneate at base, finely serrate, 3-nerved from the base, of firmly coriaceous texture, punctate, scarcely paler beneath, 5-7.5 cm. long, 1-3.5 cm. wide, 5-15 mm. long; heads very numerous, about 5-flowered, about 6 mm. high, shortly pedicelled, racemosely disposed on long flexuous branches of a more or less pyramidal panicle; involucre subcylindric, of few purple-tinged stramineous very unequal elliptic-lanceolate firmish round-tipped scales, the inner paler, ciliolate, the outer darker and somewhat puberulous; corollas 4.5 mm. long, the proper tube slender, granulated, 2.5 mm. long, the throat definitely though not greatly enlarged, smoothish, limb short densely granulated on the outside; achenes at maturity black and shining, almost prismatic; pappus-bristles 25-30, firmish, stramineous, tapering from near the base, obscurely barbellate.—Spreng. ex Hieron. in Engl. Bot. Jahrb. xxii. 776 (1897). *Baccharis crenulata* Spreng. Syst. iii. 465 (1826). *Eupatorium dendroides* Bak. in Mart. Fl. Bras. vi. pt. 2, 321 (1876), excl. syn. *Mikania arborea* Kunth. For further synon. see Bak. l. c.—Cuzco: San Miguel, Urubamba Valley, alt. 1800 m., Cook & Gilbert, no. 1113 (U. S.). PERU WITHOUT LOCALITY: 1902, Weberbauer without number (Berl.).

This species is not closely related to any other in Peru. Its leaves recall those in some species of *Baccharis*, the genus to which it was first referred. [Brazil, Argentina, Bolivia.]

43. *E. STUEBELII* Hieron. in Engl. Bot. Jahrb. xxi. 329 (1895); Robinson, Proc. Am. Acad. liv. 288, 354 (1918).—AMAZONAS: Prov. Chachapoyas, Mathews (Gr.). This Peruvian specimen was identified with the type at Berlin by Dr. J. M. Greenman. [Ecuador, Colombia.]

44. *E. CALLACATENSE* Hieron. Suffruticose; branches slender, terete, spreading, flexuous, covered with short dense somewhat deflexed brownish-gray scarcely or not at all glandular pubescence; leaves opposite, ovate, acute, crenate-serrate except at the nearly truncate base (teeth 0.8-1.4 mm. high, 3-4 mm. wide), 3-nerved from a slightly acuminate attachment (the lateral nerves soon branched

on the outer side), dull-green above, slightly paler beneath, sordid-pubescent on both surfaces, 5 cm. long, 2.8-3.5 cm. wide; petiole slender, 2-2.5 cm. long; corymbs trifid, leafy-bracted at base, the bracts lanceolate, entire, petiolate; partial inflorescences rounded, rather dense, 2-4 cm. in diameter, the branchlets and filiform pedicels (1-3 mm. long) densely covered with a short brownish-gray pubescence; heads 5-6 mm. high, about 10-flowered; involucre scales about 15, obtuse, brownish-stramineous, somewhat scarious, the outer short, ovate, loosely-pubescent, the intermediate elliptic-oblong, 3-5-ribbed, slightly puberulent toward the tip; corollas about 4 mm. long, with slender proper tube 2 mm. long, slightly enlarged into a cylindrical throat 1.7 mm. long; style-branches filiform, not clavate; achenes (very immature) 2 mm. long, grayish-pubescent; pappus-bristles about 30, delicate, white, distinctly shorter than the corolla.—Hieron. in Engl. Bot. Jahrb. xxxvi. 468 (1905).—CAJAMARCA: near Callacate, May, 1879, *von Jelski*, no. 670 (Berl., fragm. Gr.).

45. *E. URUBAMBENSE* Robinson (p. 38). Perennial herb or perhaps shrub (the base unknown); stems (or branches) erect, terete, purple, covered with fine white crisped puberulence; internodes 1.5- (the upper) 8-11 cm. long; leaves opposite, ovate-lanceolate, gradually narrowed from much below the middle to a mostly obtusish tip, crenate except toward the obtusish or rounded base (the teeth 0.7-1.5 mm high, 3-4 mm. wide), 3-nerved from somewhat above the base (the lateral nerves quickly branching), thickish-membranaceous, dull-green, slightly rugulose and puberulent above, gray-tomentose beneath, 5-6.6 cm. long, 1.8-2.7 cm. wide; petiole 5-8 mm. long, slender except at the somewhat expanded base; corymbs trichotomous, leafy-bracted at the base (the bracts like the leaves only smaller, similarly crenate and petioled); partial inflorescences dense, rounded, 3-6 cm. in diameter; heads about 10-flowered, about 8 mm. high, essentially sessile; involucre subcylindric-campanulate; the scales about 3-seriate, rounded at the summit, the outer very short, the intermediate broadly elliptical, brownish-stramineous, mostly 3-nerved and 4-costulate, somewhat margined, the innermost linear-oblong, slightly erose-ciliate at the blunt summit; corollas 4.8 mm. long, slenderly tubular, perceptibly constricted just above the base and sometimes slightly so just beneath the limb, glabrous; teeth lanceolate; style-branches filiform, scarcely clavellate; anthers with long narrow apical appendage; achenes fuscous, 2.6 mm. long, tapering downward, upwardly villous on the nerves; pappus-bristles about 28, lucid, yellowish-white, tapering, 4.3 mm. long, nearly smooth.—

Cuzco: Urubamba in the Valley of Ymay [?], *Pentland* (K., phot. and fragm. Gr.); Ollantaytambo, alt. about 3000 m., *Cook & Gilbert*, no. 336 (U. S.).

46. *E. LEUCOPHYLLUM* HBK. Distinctly shrubby, the stems, spreading-ascending terete branches, inflorescence, and under-surface of leaves closely white-woolly; leaves opposite, narrowly ovate, attenuate, acutish, crenulate, 3-nerved essentially from the rounded to subtruncate entire base, pale-green and very finely puberulent above, white-tomentose but with perceptibly darker nerves and reticulated veins beneath, 3-5 cm. long, half as wide; petiole about 1 cm. long; heads about 10-flowered, 5 mm. long, very numerous in rounded intricately branched corymbiform terminal panicles; involucre subcylindric-campanulate; the scales about 15, narrowly oblong, obtuse, very unequal, dorsally white-woolly, often with a single perceptible mid-nerve; corollas glabrate, 2 mm. long; proper tube shorter than the gradually enlarged throat; achenes glabrous, shining, 1.7 mm. long; pappus-bristles, whitish, essentially smooth.—*Nov. Gen. et Spec.* iv. 115 (1820); *Benth. Pl. Hartw.* 135 (1844); *Jameson, Pl. Aeq.* ii. 82 (1865).—Although generally attributed to Peru and with scarcely a doubt extending into the northern part of the country, this plant seems never to have been collected south of the present boundary of Ecuador, the only collections known to the writer being in favored spots of the temperate region of the Andes near the villages Cajanuma and Gonzanama, alt. 1976 m., *Humboldt & Bonpland* (Par., phot. Gr.), and in mountains of Loja, *Hartweg*, no. 756. Of the latter collection (though unnumbered) there is a specimen in the herbarium of the New York Botanical Garden.

This species was by oversight omitted from the writer's recension of the *Eupatoriums* of Ecuador. It is closely related to *E. niveum* but may be distinguished by its more attenuate leaves which are dull and finely pubescent above instead of being green, glabrous, and lucid as in *E. niveum*. In *E. leucophyllum* the involucreal scales are thicker, narrower, more densely tomentose, and less scarious than in *E. niveum*. *E. leucophyllum* furthermore gives the impression of being rather the more xerophytic of the two.

47. *E. INULAEFOLIUM* HBK. *Nov. Gen. et Spec.* iv. 109 (1820); *Hieron. in Engl. Bot. Jahrb.* xxii. 765 (1897), which see for synonym.; *Robinson, Proc. Am. Acad.* liv. 291 (1918). *E. decemflorum* DC. *Prod.* v. 154 (1836); *Poepp. in Poepp. & Endl. Nov. Gen. ac Spec.* iii. 54 (1845); *Klatt in Engl. Bot. Jahrb.* viii. 34 (1887).—Cuzco: Santa Ana, alt. about 900 m., *Cook & Gilbert*, no. 1633 (U. S.). HUAN-

ECO: in bushy places at Cassapi, *Poeppig*, no. 30 (DC., phot. Gr.). WITHOUT INDICATION OF DEPARTMENT: *Haenke*, acc. to DC., l. c.; in Andes of Peru, *Wasner* [doubtfully legible], no. 1349 [apparently of the Mathews series] (N. Y.); *Mathews*, without number (Gr.).

Forma SUAVEOLENS (HBK.) Hieron. in Engl. Bot. Jahrb. xxix. 11 (1900), xxviii. 572 (1901), xxxvi. 470 (1905); Robinson, Proc. Am. Acad. liv. 292 (1918). *E. suaveolens* HBK. Nov. Gen. et Spec. iv. 109 (1820).—CAJAMARCA: near Tambillo, 7 August, 1878, *von Jelski*, nos. 692, 742, acc. to Hieron. l. c. xxxvi. 470. [Ecuad., Colomb., Venez.]

48. *E. GRACILENTUM* Robinson (p. 18). Slender perennial herb 3-4 dm. or more high; root of a few strong slender lignescant elongated fibres; stems 1-several from the base, erect, or at least decumbent, terete, purplish, 1-2 mm. in diameter, sordid-puberulent or -tomentellous; internodes 2-11 cm. long; leaves opposite, deltoid-ovate, acute to acuminate, crenate-dentate except at the rounded, truncate or subcordate base, 1.8-3 cm. long, 1.1-2.3 cm. wide, thin, membranaceous, softly pubescent above, grayish-tomentose beneath, 3-nerved from the insertion; petiole slender, subterete, gray-pubescent, 4-8 mm. long; heads about 25-flowered, 6 mm. long, 3.7 mm. in diameter, borne in loose irregular 1-5-headed cymes at the ends of the spreading branches of an open leafy-bracted panicle; involucre narrowly campanulate, scales about 19, about 3-seriate, stramineous, the inner narrowly lance-elliptic, obtuse, smoothish, 2-3-costulate, scarious-margined; the intermediate and outer progressively shorter, ovate-lanceolate, acute to acuminate, brownish-puberulent; corollas probably white, glabrous except at the short limb; proper tube 0.7 mm. long, throat slightly enlarged, cylindrical, 2.3 mm. long; style-branches filiform, scarcely at all clavellate, achenes 1.5 mm. long, fuscous-brown, with lighter-colored obscurely hispidulous ribs; pappus-bristles about 27, delicately capillary, white, essentially smooth.—PERU WITHOUT INDICATION OF LOCALITY: *Mathews* (N. Y., phot. Gr.). Like several other specimens of Mathews's Peruvian plants from the herbarium of Meisner, two sheets of this plant, now in the herbarium of the New York Botanical Garden, bear a yellow label in the hand of Meisner, reading merely "Peruvia Matthews, 1862." Alexander Mathews, the well-known collector in Peru (who spelled his name with one *t*) died in 1841. It has been impossible to get information of any subsequent collector in Peru of this name and it is accordingly inferred that errors have here arisen in the copying of labels, and that these plants were in reality collected by Alexander Mathews about 1835-1840.

49. *E. COOKII* Robinson (p. 9). Shrubby, densely spreading-villous, the hairs at first long, soft, and under a lens beautifully purple-jointed; stems round, purple, the internodes elongated, sometimes 13 cm. or more in length; branches spreading, usually curved upward, bearing about 2 pairs of leaves and terminating in a mostly dense trifold corymb; leaves ovate, acuminate, crenate-serrate except at the rounded, or subcordate base, dull-green and sparingly pubescent above, slightly paler, sordid-villous and somewhat glandular-atomiferous beneath, about 5 cm. long and 3–3.4 cm. wide; petioles 1.2–2 cm. long; corymbs trifold, dense; pedicels short, woolly, with long soft brown and jointed hairs; heads crowded, about 20-flowered, about 7 mm. high, 4 mm. in diameter; involucre campanulate, about 3-seriate, substramineous, the scales about 19, lance-oblong, acute, mostly 2-ribbed and 3-veined, dorsally pubescent, the innermost narrower, less pubescent, obtusish or rounded at the more or less scarious summit; corollas apparently white, hispidulous on the limb, otherwise essentially glabrous, about 3.8 mm. long, the proper tube only 0.7–0.8 mm. long, much exceeded by the cylindrical throat; achenes dark brown, nearly black, 1.5 mm. long, glabrous; pappus-bristles about 40, clear white, scarcely roughened.—Cuzco: in the Lucumayo Valley, alt. 1800–3600 m., *Cook & Gilbert*, no. 1352 (U. S., phot. Gr.). JUNIN: Andamarca, *Mathews*, no. 1126 (K., phot. and fragm. Gr.), a doubtful form with shorter pubescence and more distinctly cordate leaves, with crenate rather than serrate margins.

50. *E. MARGINATUM* Poepp. Climbing shrub; branches round, slender, divaricate as they leave the stem, but curved-ascending, very finely puberulent; internodes 4–7 cm. long; leaves opposite, lance-ovate, acuminate, serrate, except at the rounded base, 3–4.5 cm. long, 1–2.4 cm. wide, membranaceous, 3-nerved essentially from the base, glabrous except for a delicate puberulence on the nerves beneath; the margin narrowly revolute and slightly indurated; petiole slender, 5–10 mm. long; panicle opposite-branched, leafy-bracted, ovoid, open, about 4 dm. long; heads small, about 15-flowered, slender-pedicelled, in convex fairly dense terminal corymbs on the branchlets of the finely puberulent composite inflorescence; involucre scales about 3-seriate, narrowly oblong, stramineous, the inner glabrous, obtuse, the outer pubescent: corollas white; achenes glabrous.—Poepp. in Poepp. & Endl. *Nov. Gen. ac Spec.* iii. 54 (1845).—HUANTCO: in bushy places at Cassapi, August, *Poeppig*, no. 1254 (Hofmus. Vienna, phot. Gr.). This species has somewhat the habit of an *Ophryosporus*, into which genus it would fall should the anther-tips

prove to be unappendaged, a matter not to be determined from a photograph, the only source of information at hand.

51. *E. MICROSTEMON* Cass. Dict. xxv. 432 (1822); Robinson, Proc. Am. Acad. liv. 295, 340, 356 (1918).—Cuzco: in cultivated ground, Santa Ana, alt. about 900 m., *Cook & Gilbert*, no. 1544 (U. S.). A weed widely distributed in the warmer parts of America. Not present in the earlier collections from Peru and perhaps a recent introduction in the country.

52. *E. VITALBAE* DC. Prod. v. 163 (1836); Bak. in Mart. Fl. Bras. vi. pt. 2, 305 (1876), excl. syn. *E. remotifolium* DC. which is exceedingly different.—LORETO: near Tarapoto, *Spruce*, no. 4106 (Gr.).

53. *E. INCARUM* Robinson. Smooth, but sticky, much branched shrub; leaves small, suborbicular, obtuse, shortly subcuneate at base, denticulate, 3-nerved from the base, punctate; heads about 5-flowered, short-pedicelled, racemously disposed on the branchlets of the panicle, about 6 mm. long; involucre subcylindric; scales about 3-seriate, oblong, rounded at the tip, obscurely 2-3-ribbed, thin, subscarios brownish straw-colored, slightly puberulent; corollas 3.7 mm. long, glabrous; the proper tube slender, 1.7 mm. long, the throat distinctly enlarged, cylindrical, 2 mm. long; anthers with an ovate round-tipped membranaceous apical appendage; style-branches filiform, recurved, rounded and perceptibly enlarged at the tip; achenes dark-brown, 1.5 mm. long, tapering downward, somewhat atomiferous on the faces; pappus-bristles about 30, fulvous, attenuate, 3 mm. long, nearly smooth.—Mem. Gray Herb. i. 122 (1917). *Baccharis microphylla* DC. Prod. v. 406 (1836), not HBK. *B. Candolleana* Steud. Nom. ed. 2, i. 177 (1840). *Brickellia microphylla* (DC.) Hieron. in Engl. Bot. Jahrb. xxviii. 583 (1901), not Gray.—PERU WITHOUT LOCALITY, *Haenke* (DC., detail sk. Gr.).

54. *E. WEBERBAUERI* Hieron. Round-branched shrub 1 m. high; branches dark-velvety, leafy; internodes rarely exceeding 6 mm. in length; leaves opposite, broadly ovate-oblong, obtusish or acutish, cordate, nearly entire or slightly crenulate, feather-veined and reticulated, above a little puberulent on the nerves, but soon glabrate and somewhat shining, below shortly white-velvety, the largest 1.5 cm. long, 1 cm. wide, on thickish petioles rarely more than 1.5 mm. long; heads densely and cymosely paniculate, 7-8-flowered, on pubescent pedicels (2-5 mm. long); scales of the 4-5-seriate involucre about 15, obtusish or (the outer) acutish, 3-5-striate, scarios, ochraceous, puberulent, deciduous; corollas dull-yellowish, turbinâte-subcylindric, gradually a little enlarged toward the summit, sprinkled with short-

stalked glands; achenes brown, covered throughout with subglandular hairs; pappus-bristles 50–60, yellowish-white.—Hieron. in Engl. Bot. Jahrb. xl. 369 (1908).—AMAZONAS: near Molinopampa east of Chachapoyas, alt. 2000–2300 m., *Dr. A. Weberbauer*, no. 4359.

Not seen, the description here condensed from the original diagnosis by Hieronymus.

55. *E. CHAMAEDRIFOLIUM* HBK. Nov. Gen et Spec. iv. 113 (1820); Benth. Pl. Hartw. 135 (1844); Robinson, Proc. Am. Acad. liv. 353 (1918).—PIURA? Originally collected "on the whole range of mountains" between Gonsanama, Ecuador, and Ayavaca, Peru, obviously close to the boundary between the two countries, *Humboldt & Bonpland* no. 3485 (Par., phot. Gr.). A specimen collected in the mountains of Loja, Ecuador, by Hartweg, and although unnumbered doubtless being a portion of his no. 759 cited by Bentham, l. c., is in the herbarium of the New York Botanical Garden. [Ecuador.]

56. *E. MARRUBIIFOLIUM* Hieron. Grayish villous-hirsute herb; stems terete, purplish, covered with a loose, at first spreading, at length mostly deflexed pubescence of slender white hairs; leaves opposite, broadly ovate, obtuse, crenulate except at the subcordate base, 1–1.5 cm. long 8–13 mm. wide, thickish, above finely bullate-reticulate with depressed veins, gray-pubescent, beneath shaggy gray-velvety, 3(–5)-nerved nearly from the base; petiole 3–5 mm. long, shaggy-villous; corymbs trifid, dense, the parts rounded; heads about 20-flowered, sessile or shortly pedicelled; involucre campanulate, 3–4-seriate, brownish-stramineous; scales mostly ovate-elliptical, thin, rounded at the summit; corollas 3.5 mm. long, glabrous, scarcely enlarged upward; achenes (young) 2.2 mm. long, stramineous, at length turning dark-brown, slightly hispid toward the summit; pappus-bristles about 30, bright white, nearly equalling the corolla.—Hieron. in Engl. Bot. Jahrb. xxxvi. 466 (1905).—CAJAMARCA: between Chota and Cutervo, June, 1879, *von Jelski*, no. 799 (Berl. fragm. Gr.).

Sect. III. EXIMBRICATA (DC.) Hoffm. (See Robinson, Proc. Am. Acad. liv. 303.)

KEY TO SPECIES.

- a. Heads 3-10-flowered b.
- b. Leaves pinnately veined.....58. *E. exserto-venosum*.
- b. Leaves 3-5-nerved from or somewhat above the base.
Branchlets and leaves glabrous; at least the lower teeth of
the leaves widely spreading and very acute.
Petioles about 2 mm. long; leaf-blade about 8 mm.
wide.....59. *E. chilca*.
Petioles 8-10 mm. long; leaf-blade about 1.6 cm. wide. 60. *E. affine*.
Branchlets and leaves puberulent or pubescent, sometimes
glandular-puberulent.....61. *E. heptanthum*.
- a. Heads 12-∞-flowered c.
- c. Leaves sessile, but the blade gradually narrowed to a petiole-like base, thickish; involueral scales rounded at tip, grayish-velvety.....39. *E. Commersonii*.
- c. Leaves on wingless usually slender though sometimes short petioles d.
- d. Leaves entire, large, 8-10 cm. wide.....62. *E. uber*.
- d. Leaves crenate to serrate, rarely more than 6 cm. wide e.
- e. Leaves acute or acuminate at the base f.
- f. Leaves 3-nerved from or somewhat above the base.
Heads 13-14-flowered; leaves 3-4.5 cm. long, on
petioles 4-6 mm. in length.....63. *E. cuzcoesne*.
Heads 20-25-flowered; leaves at maturity 5-8 cm.
long, on petioles 1-2.5 cm. in length.
Scales of the involucre loosely ciliate toward the
the tip with jointed hairs; petiole pubescent,
1-2.5 cm. long; serratures 5-12 on each side of
the leaf-blade.....64. *E. tambillense*.
Scales nearly or quite glabrous toward the tip;
petiole minutely puberulent and sparingly
muriculate, at most about 1 cm. long; serratures
11-23 on each side of the leaf-blade..65.. *E. stictophyllum*.
- f. Leaves pinnately veined.
Involueral scales linear, attenuate; leaves mem-
branaceous.....66. *E. simulans*.
Involueral scales narrowly oblong, obtuse to
rounded at tip; leaves coriaceous, with prominent
reticulation on both surfaces.....57. *E. fastigiatum*.
- e. Leaves obtuse to cordate at base g.
- g. Leaves pinnately veined.....27. *E. endytmum*.
- g. Leaves 3-5-nerved from or somewhat above the base h.
- h. Stems villous to hispid-pubescent with widely spreading and jointed hairs i.
- i. Petioles rarely over 2 mm. long, about one-tenth the length of the leaf-blade.....67. *E. cutervense*.
- i. Petioles 5-25 mm. long, mostly one-sixth to two-thirds the length of the leaf-blade j.

- j.* Heads 20-40-flowered; pubescence of the stem sparingly if at all gland-tipped.
Leaves crenate-dentate, more than two-thirds as wide as long.
Leaves deltoid-ovate, acute, mostly 2-3 cm. long..... 68. *E. vallincola*.
Leaves suborbicular-ovate, acuminate, mostly 4-6 cm. long..... 69. *E. articulatum*.
Leaves serrate, about half as wide as long. 64. *E. tambillense*.
- j.* Heads 80-100-flowered; pubescence of stem gland-tipped and viscid..... 70. *E. probum*.
- h.* Stems sparingly to densely puberulent *k.*
- k.* Heads paniculate; inflorescence usually ovoid to pyramidal, the branches widely spreading *l.*
- l.* Heads subglomerate at the tips of the divergent branches of the panicle; leaves crenate; crenatures 13-22 on each side..... 49. *E. Cookii*.
- l.* Heads loosely disposed in the panicle *m.*
- m.* Leaves nerved essentially from the base. Stem covered with a dark and dense gland-tipped puberulence; leaves crenate-serrate; teeth about ten on each side. 71. *E. choriccephaloides*.
Stem covered with white or gray incurved scarcely or not at all glandular puberulence; leaves remotely cuspidate-dentate; teeth 4-6 on each side..... 72. *E. sterile*.
- m.* Leaves nerved from a point 5-10 mm. above the base.
Petiole 8 mm. long; achenes glabrous; leaves sharply serrate; teeth 11-19 on each side..... 72a. *E. Dombeyanum*.
Petiole 10-25 mm. long; achenes somewhat roughened between the ribs; leaves mucronate-serrate; teeth 5-12 on each side..... 64. *E. tambillense*.
- k.* Heads (tending to be crowded) in flattish or round-topped compound corymbs, or (when few) irregularly cymose on chiefly erect or ascending branches *n.*
- n.* Leaves for the most part conspicuously unequal-sided at the base; internodes very long (10-14 cm. in length)..... 74. *E. Sodiroi*.
- n.* Leaves essentially symmetrical at the base; internodes usually 2-5 (rarely 8) cm. long *o.*
- o.* Leaves small, 1-1.5(-2) cm. long, typically ovate, finely crenate-serrate; teeth about 5-7 on each side; slender-stemmed copiously branched shrub..... 75. *E. scopulorum*.
- o.* Leaves (at least the mature cauline) larger, 2-7 cm. long *p.*
- p.* Heads small, about 5 mm. high; leaves very shallowly mucronulate-serrate; stems nearly smooth but slightly and obscurely villous toward the summit; the hairs very slender, short, mostly straight, not glandular..... 73. *E. Gilbertii*.

- p. Heads 7-9 mm. high; leaves more coarsely serrate; stems closely crisped- or glandular-puberulent.
- Heads numerous in dense strongly convex or rounded corymbs; leaves broadly ovate, mostly rounded at the base (though sometimes with a short acumination at the point of attachment), serrate-dentate, the teeth numerous, usually 15-19 on each side, commonly blunt. 76. *E. Sternbergianum*.
- Heads few, in flattish open corymbs or loosely cymose; leaves deltoid-ovate or -lanceolate, commonly subtruncat or subcordate at base, coarsely and unequally crenate-serrate, the teeth mostly 5-10 on each side.
- Heads about 7 mm. high. 76a. *E. glechonophyllum*.
- Heads slightly larger, about 9 mm. high 77. *E. azangaroense*.
- h. Stems glabrous.
- Heads about 5 mm. high; leaf-blade about 4 times as long as the petiole. 73. *E. Gilbertii*.
- Heads 7-10 mm. high; leaf-blade 8-20 times as long as the petiole
- Leaves rounded at base; petioles glabrous; involucre scales subscariosus at tip. 72.a. *E. Dombeyanum*.
- Leaves subcordate at base; petioles spreading-puberulent; involucre scales attenuate to a sharp non-scarious tip. 78. *E. isillumense*.

57. *E. FASTIGIATUM* HBK. Nov. Gen. et Spec. iv. 125, t. 347 (1820); Robinson, Proc. Am. Acad. liv. 307 (1918).—PIURA: in the cooler regions of the mountains between Guancabamba [Huancabamba] and the Paramo de Guamani, *Humboldt & Bonpland*, no. 3524 (Par., phot. Gr.).

This species is still somewhat problematic, being known only from the type material with which to date it has been impossible to identify precisely any of the modern collections. The species is clearly very close in habit, inflorescence, leaf-texture and leaf-venation to the variable *E. exserto-venosum* Klatt, but the leaves are more obovate or oblanceolate than in any as yet described variety of the latter plant. Moreover, the leaves are rather conspicuously and bluntly cuspidate at the tip. Finally Kunth, l. c., in describing the species states that the heads are about 12-flowered, that is to say have half again to twice as many florets as are found in *E. exserto-venosum* Klatt. Material approximating *E. fastigiatum* has been collected in Colombia (see Robinson, l. c.) but its identity must be subject to doubt until the type can be re-examined.

58. *E. EXSERTO-VENOSUM* Klatt, Abh. Naturh. Ges. Halle, xv.

324 (1882); Robinson, Proc. Am. Acad. liv. 358 (1918).—Variable in leaf-form as follows:

Var. **α. crenatum** (Hieron.), comb. nov. Leaves elliptical, obtuse, rounded at the base, shallowly crenate, 1.7–4.5 cm. long, 1.2–2.4 cm. wide.—*E. pseudofastigiatum*, var. *crenata* Hieron. in Engl. Bot. Jahrb. xxxvi. 468 (1905).—CAJAMARCA: near Cutervo, von Jelski, no. 789 (Berl., fragm. Gr.). PERU WITHOUT LOCALITY: Mathews (fragm. Gr.).

Var. **β. PSEUDOFASTIGIATUM** (Hieron.) Robinson. Leaves ovate-lanceolate, 3–5 cm. long, 1.6–2.6 cm. wide, acute or acutish at the apex, acute at base, finely serrate-dentate, the teeth subacute.—Proc. Am. Acad. liv. 359 (1918). *E.?* *fastigiatum* Benth. Pl. Hartw. 135 (1844), not HBK. *E. loxense* Hieron. in Engl. Bot. Jahrb. xxi. 331 (1895), not Klatt. *E. pseudofastigiatum* Hieron. l. c. xxxvi. 467 (1905).—PERU WITHOUT LOCALITY: Mathews (N. Y.). [Southern Ecuador.]

Var. **γ. crenato-dentatum** (Hieron.), comb. nov. Leaves elliptic-lanceolate, acute or acutish at the apex, rounded at base, 5–8 cm. long, crenate-dentate or crenate-serrate, the teeth slightly coarser than in the preceding.—*E. pseudofastigiatum*, var. *crenato-dentata* Hieron. l. c. 468.—CAJAMARCA: near Cutervo, von Jelski, no. 730 (Berl., fragm. Gr.).

Var. **δ. lanceolatum** (Hieron.), comb. nov. Leaves lance-oblong, 9 cm. long, 3.2 cm. wide, acutish at the apex, cuneate at the base, crenate-serrate, the teeth again sparingly mucronulate-serrulate.—*E. pseudofastigiatum*, var. *lanceolatum* Hieron. l. c.—CAJAMARCA: near Tambillo, von Jelski, no. 729 (Berl., fragm. Gr.).

It is possible that this species, highly variable in its leaf-form, will ultimately be found to merge with *E. fastigiatum* HBK., but that is said to have heads about 12-flowered and its leaves, although possessing closely the pinnate venation and reticulation of *E. exserto-venosum*, differ in being oblanceolate, bluntly mucronate at the apex and narrowly cuneate at base. Much more ample material of these forms is essential before they can be classified with confidence. With the present fragmentary representation they can neither be reduced with certainty nor maintained with much satisfaction. But, as they differ, it seems best to keep them up until evidence of intergradation becomes available.

59. *E. CHILCA* HBK. Glabrous somewhat viscid shrub; branches opposite, erect, or curved-ascending, leafy when young, at maturity apt to be denuded; leaves opposite, rather narrowly lanceolate,

broadest about a sixth of the length above the entire rather rapidly narrowed base, gradually attenuate to an acutish tip, about 3 cm. long, 7-8 mm. wide, thickish-membranaceous and of rather firm texture, 3-ribbed from near the base, serrate from the broadest part to the tip, teeth about 8 on each side slightly curved outward, the lowest narrow and often slightly longer than the rest; petiole about 2 mm. long; corymb compound, many-headed, round-topped, rather dense, 6-9 cm. in diameter, leafy-bracted; heads sessile or short-pedicelled, about 4-flowered, 4 mm. long; corollas white, glabrous, slightly enlarged upward, fragrant; style-branches filiform, slightly thickened at the summit; pappus-bristles hispid-pubescent.—Nov. Gen. et Spec. iv. 125 (1820). *Ophryosporus chilca* (HBK.) Hieron. in Engl. Bot. Jahrb. xxii. 706 (1897).—CAJAMARCA: at the base of Mt. Sta. Polonia, near the city of Cajamarca, *Humboldt & Bonpland*, no. 3682 (Par., phot. Gr., Berl., phot. Gr.).

This and the two following species are very closely related and with the Bolivian *E. eleutherantherum* Rusby form a group doubtfully intermediate between *Eupatorium* and *Ophryosporus*. Their final disposition must await better and far more copious material than is yet available.

60. *E. AFFINE* HBK. Glabrous shrub, closely resembling the preceding; differing chiefly in its larger leaves (4 cm. long and 1.6 cm. wide) and longer petioles (8-10 mm. in length), also in its more loosely branched panicle, and 5-6-flowered heads of somewhat greater size (6 mm. long).—Nov. Gen. et Spec. iv. 126 (1820).—CAJAMARCA: thought to have been collected with the preceding, *Humboldt & Bonpland* (Par., phot. Gr.).

61. *E. HEPTANTHUM* Sch. Bip. Shrub, closely related to the two preceding, but the young branches and peduncles glandular-pubescent; leaves lanceolate or ovate-lanceolate, 1.5-2.5 cm. long, 5-12 mm. wide, acute at the apex, varying from obtuse to attenuate at the base, glandular-puberulent on both surfaces; petiole short and pubescent; heads in densish corymbs, about 7-flowered; involucreal scales 7-8, subequal, linear, acutish.—*Bonplandia*, iv. 54 (1856), without descript.; Wedd. Chlor. And. i. 217 (1857), where first described; Sch. Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), without char.; not, however, Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907).—PUNO: mountains about Azangaro, *Lechler*, no. 1751; on stony slopes among herbaceous plants and scattered shrubs, Puno, alt. 3600 m., 19 Aug. 1902, *Weberbauer* no. 1366 (Berl., fragm. Gr.). AREQUIPA: on sparsely covered ground, on the west slope of the Volcano Misti, near

Arequipa, alt. 3200–3600 m., 8 Sept. 1902, *Weberbauer*, no. 1426 (Berl., fragm. Gr.). TACNA (debated region): Cordillera of Tacora, *Weddell*.

62. *E. UBER* Robinson (p. 37). Robust shrub 4 m. high, with luxuriant foliage; branches grayish-brown, granular-puberulent, leafy; leaves opposite, deltoid-ovate, acuminate, slightly undulate-denticulate or quite entire, abruptly narrowed and subcuneate at base, 16–19 cm. long, 6–9 cm. wide, above glabrous green, the reticulated veinlets depressed, beneath sordid-puberulent or -tomentellous; chief lateral nerves mostly 2 pairs leaving the midnerve about 1 cm. above the base; petiole 3–5 cm. long, granular-puberulent; panicle corymbiform, as much as 2 dm. in diameter, flattish or moderately convex, rather dense; heads excessively numerous, shortly pedicelled, about 13-flowered, about 9 mm. long; involucre narrowly campanulate; scales about 16, linear-oblong, acutish, subequal, erose-ciliolate, dorsally granular; corollas 5 mm. long, white, gradually and moderately enlarged upward; achenes grayish-brown, 2.5 mm. long, tapering downward, hispidulous on the angles; pappus-bristles about 31, dirty-white, barbellate, nearly equalling the corolla.—ANCACHS: woods, below Pampa Romas, between Samanco and Caraz, alt. 2100 m., *Weberbauer*, no. 3184 (Berl., phot. and fragm. Gr.).

63. *E. CUZCOENSE* Hieron. Shrubby, 1 m. high; stems terete, grayish-brown, smooth; branches opposite, ascending, finely puberulent, hairs crisped, incurved or appressed, not glandular; leaves opposite, lanceolate, attenuate, obtusish at base, serrate (teeth 5–12 on each side), firmly membranaceous, 3–4.5 cm. long, 1.3–2 cm. wide, glabrous, above dull-green, beneath somewhat paler, finely reticulated and punctate, subtrinervate from a point 1–2 mm. above the base, the lateral nerves reaching about to the middle; veinlets not prominent; petiole 2–5 mm. long; corymbs terminal, strongly convex to semiglobose, rather dense, 3–6 cm. in diameter, disposed in a leafy-bracted compound corymb; pedicels slender, 5–14 mm. long; obscurely puberulent, usually bearing a filiform bractlet; heads about 12–14-flowered, about 9 mm. long; involucre subcylindric-campanulate; scales subequal (except 2–4 of the outermost smaller ones), lance- or oblong-linear, acutish to acuminate, dorsally puberulent and sparsely glandular, ciliolate, mostly 2-costulate and 3-nerved; corollas purple-tinged, 5 mm. long, beset with sessile glandular granules; proper tube about 1.8 mm. long, slender; throat perceptibly enlarged, subcylindric, 3.2 mm. long; achenes brownish-black, at full maturity about 3 mm. long, tapering somewhat toward the base, closely beset with sessile and short-stiped capitate glands;

pappus-bristles about 25, white, scarcely roughened, slightly united into an annulus at the summit of the achene.—Hieron. in Engl. Bot. Jahrb. xl. 376 (1908).—Cuzco: near the city of Cuzco, *Squier* (Gr.), *Dr. & Mrs. J. N. Rose*, no. 19,028 (Gr., U. S., N. Y.); on Sacsahuamán Hill, in grassy and bushy places, alt. 3500–3600 m., *Weberbauer*, no. 4852; Ollantaytambo, alt. about 3000 m., *Cook & Gilbert*, no. 534 (U. S.).

64. *E. TAMBILLENSE* Hieron. Branches round, pubescent, at length glabrate and brown; internodes up to 8 cm. long; leaves opposite, ovate or ovate-lanceolate, acuminate, serrate except at the acute apex and rounded or shortly cuneate base (teeth 5–12 on each side, at most 1.5 mm. high, 7 mm. broad, mucronate), firmly membranaceous, bright yellowish-green, 3-nerved from a point 5–10 mm. above the base (nerves connected by subparallel transverse veins), attaining 8 cm. in length and 4 cm. in breadth, above puberulent on the nerves, the reticulated veinlets depressed, beneath pubescent on the nerves; petiole 1–2.5 cm. long; panicle leafy-bracted; pedicels as much as 1.5 cm. long, puberulent, bracteolate; heads 20–25-flowered; involucre narrowly campanulate; scales about 15, lance-linear, acutish, 3-nerved, about 6 mm. long, 2–3 of the outermost shorter; corollas about 4 mm. long, with more or less differentiated proper tube and throat, glabrous except on the limb, where sparingly beset with jointed hairs; achenes dark-brown, 1.75 mm. long (scarcely mature), smooth and shining on the faces, scabrid on the concolorous angles; pappus-bristles about 25, yellowish-white, not thickened toward the tip.—Hieron. in Engl. Bot. Jahrb. xl. 380 (1908).—CAJAMARCA: near Tambillo, 11 Aug. 1878, *von Jelski*, no. 668. No material of this has been seen by the writer. The description is here compiled from the original character.

65. *E. STICTOPHYLLUM* Robinson (p. 36). Shrubby, 1 m. high; stem subterete, costulate (when dried), purplish-brown, when young obscurely puberulent, opposite-branched, leafy up to or into the broad and flattish or moderately convex compound corymb; leaves opposite, ovate-lanceolate, caudate-acuminate at apex, abruptly subacuminate at the roundish base, serrate (teeth 11–23 on each side, mucronulate, often again toothed), firmly membranaceous, glabrous, above dull-green, beneath paler green, finely reticulate-veined and dark-punctate (veinlets not prominent), 6–8 cm. long, half as wide, 3-nerved from a point about 5 mm. above the base, the lateral nerves often dividing shortly after leaving the midnerve (or occasionally replaced by 2 adjacent and pinnately disposed nerves on one side);

petiole 7-11 mm. long, puberulent and sparingly muriculate; partial inflorescences rounded moderately dense fastigiately branched corymbs; heads about 24-flowered, 1 cm. long; pedicels filiform, 6-10 mm. long, bearing a filiform bractlet; involuclral scales about 24, narrowly lance-linear, unequal but little imbricated, acute, mostly 3-nerved and 2-costulate, purplish-green, dorsally granular-pulverulent; corollas about 7.8 mm. long, deep rose-colored, gradually and but little enlarged upward, glabrous; style-branches subuniformly filiform, not distinctly clavate; achenes (still immature) 3 mm. long, beset with sessile or subsessile glands; pappus-bristles about 27, white, scabrid, nearly equalling the corolla.—PUNO: Cuyocuyo, Prov. Sandia, in bushy places, alt. 3100 m., *Weberbauer*, no. 860 (Berl., phot. and fragm. Gr.).

66. *E. SIMULANS* Robinson (p. 31). Herbaceous or shrubby, 1-2 m. high, exceedingly similar in habit and foliage to the preceding; leaves smaller, 5-7 cm. long, 1.3-2.5 cm. wide, acute at base, scarcely or not at all punctate beneath, feather-veined, some of the lower lateral veins (often 2-3 on each side) somewhat more prominent than the others; petiole not at all muriculate; involuclral scales mostly 1-ribbed, the upper part of softer texture, the outer scales somewhat pubescent and ciliate toward the base.—ANCACHS: among bushes in the gorge of a brook on the slopes of the Cordillera Blanca, above Caraz, alt. 3200-3600 m., 9 June, 1903, *Weberbauer*, no. 3253 (Berl., phot. and fragm. Gr.); among small bushes on a brook, above Ocos, Prov. Cajatambo, alt. 3300 m., 2 Apr. 1903, *Weberbauer*, no. 2766 (Berl., phot. and fragm. Gr.).

67. *E. CUTERVENSE* Hieron. Low, much branched, scarcely lignescent, 1.5-4 dm. high; stems round, covered with dark articulated stiffish hairs; leaves opposite, subsessile or on very short petioles (scarcely 2 mm. in length), broadly ovate, cordate, short-acuminate, chartaceous, somewhat shallowly crenate, dull yellowish-green drying dark, when young sparingly beset on both surfaces chiefly on the nerves with rigid hairs, later glabrate above, somewhat 5-nerved, at most 2 cm. long, 18 mm. wide; corymbs or cymes loose, few-headed; pedicels sometimes as much as 5 cm. long; heads 30-35-flowered; involucre campanulate; the scales subequal, little imbricated, about 20, dull-green, lanceolate, acuminate, mucronate, villous-ciliate, sparingly villous dorsally on the upper part, the hairs jointed, flexuous, hyaline; corollas yellowish-white after drying, glabrous outside, 4.5 mm. long, the slender proper tube about equalling the enlarged throat; achenes dark, roughened on the upper part of the concolorous

ribs, scarcely 3.5 mm. long; pappus-bristles about 20, whitish.— Hieron. in Engl. Bot. Jahrb. xl. 383 (1908).— CAJAMARCA: near Cutervo, *von Jelski*, nos. 637, 701; near Tambillo, *von Jelski*, no. 612. [Southern Ecuador? see p. 10.]

This species, said to be near the Colombian *E. sotarense* Hieron., has not been seen by the writer and the above description is condensed from the original of Prof. Hieronymus. The species from character appears clearly distinct from other Peruvian Eupatoriums of its affinity by its small broadly ovate and nearly sessile leaves.

68. *E. VALLINCOLA* DC. Shrubby, erect or nearly so, 5 dm. high; stems (when young) and branches spreading-villous, the hairs jointed; internodes 2-3(-9) cm. long; leaves opposite, often proliferous in the axils, deltoid-ovate, acute, subtruncate to shallowly and openly cordate (shortly acuminate at the attachment), 2-3.5 cm. long and wide, 3-nerved from the very base, coarsely and often somewhat doubly crenate-dentate, above sparingly pubescent, beneath loosely villous especially on the nerves and veins (the hairs slender, flexuous, jointed); petiole 1.4-2.5 cm. long; corymbs terminal, fastigiately branched, rounded, few-many-headed; pedicels 6-9 mm. long; heads 20-25-flowered, 8-10 mm. high; involucre campanulate, the scales subequal, linear, acute, pubescent, mostly 2-ribbed; corollas white, 4.5 mm. long, hispid on the limb, with slender proper tube and moderately enlarged throat; achenes (immature) 1.6 mm. long, slightly contracted at the summit and tapering to the base, hispidulous on the angles; pappus-bristles very few, often about 10, delicate, white.— Prod. v. 168 (1836).— LIMA: mountains of Barranco near Lima, on calcareous rock, alt. 300-600 m., 23 Oct. 1902, *Weberbauer*, no. 1650 (Berl., fragm. Gr.). PERU WITHOUT EXACT LOCALITY: *Haenke* (DC., phot. Gr.).

Var. *a.* TYPICUM. Hairs of the stem, petioles, pedicels, and sometimes on the lower surface of the leaves long, slender, spreading, more or less conspicuously jointed.— Lit. and exsicc., as above.

Var. *β.* BREVIPILUM Robinson (p. 39). Puberulent to tomentellous, the hairs mostly short, neither gland-tipped nor conspicuously jointed; otherwise closely like var. *a.*— LIMA: on the Lima and Oroya Railroad, between Matucana and Tambo de Viso, on rocks, alt. 2370-2650 m., 26 Dec. 1901, *Weberbauer*, no. 103 (Berl., fragm. Gr.); on slope of eruptive rock, alt. 2370 m., 24 Dec. 1901, *Weberbauer*, no. 66 (Berl.).

69. *E. ARTICULATUM* Sch. Bip. ex Hieron. in Engl. Bot. Jahrb. xl. 385 (1908); Robinson, Proc. Am. Acad. liv. 316, 342 (1918).— CAJAMARCA: between Choto and Cutervo, *von Jelski*, no. 674, acc. to Hieron.

l. c. The following are with some doubt referred here: LORETO: Tarapoto, 1835, *Mathews*, no. 1417 (K.), and AMAZONAS: Prov. Chachapoyas, *Mathews* (K.).

Persistent effort has thus far failed to disclose in North American herbaria any material which can with entire confidence be placed in this species. It is hard to understand just why Hieronymus takes the trouble to distinguish the plant from the geographically remote and as to habit dissimilar *E. prunellaefolium* HBK. of Mexico, yet appears to feel no obligation to point out the much-needed distinctions between *E. articulatum* and the closely related *E. vallincola* DC. and *E. pichinchense* HBK. of similar Andean distribution. While it is impossible at present to unite these species, the types of which appear to differ in several minor features, the characters thus far known to separate them are exceedingly trifling, such as pubescence, length of the petiole, number and size of the teeth of the leaves, etc., matters in which considerable variation has already been observed.

70. *E. PROBUM* N. E. Brown. Herbaceous (at least above), much branched and very leafy, covered throughout with soft gland-tipped and viscid hairs; stems round, weak, pithy; leaves opposite or the upper subalternate, ovate, acute to acuminate, the cauline rounded to truncate or open-cordate at base, serrate (teeth about 7 on each side), thin, green and thinly pubescent on both surfaces, 3-nerved from the very base (the nerves villous beneath), 2-4.5 cm. long, 1.3-3 cm. wide, delicately membranaceous; petiole 1.5-2.5 cm. long, glandular-pubescent; corymbs terminal, fastigiately branched, flattish topped, sometimes 1 dm. in diameter, 12-15-headed, sometimes much smaller and only 1-5-headed; pedicels (in greenhouse material) 2-5 cm. long; heads 80-100-flowered, 12 mm. high and thick; involucre about 2-seriate, campanulate, the scales about 20, lance-linear, acute, thin, green and pubescent toward the mostly 2-ribbed base, scarious on the margin and toward the tip; corollas white, slightly puberulent on the short limb, the tube about 1.7 mm. long, slender, the throat subcylindric-campanulate, 3 mm. long; achenes upwardly hispid on the angles, about 2.5 mm. long, crowned by a shallow stramineous saucer-shaped disk; pappus-bristles bright white, delicate, nearly smooth.—Gard. Chron. ser. 3, vii. 321, fig. 48 (1890).—PERU: introduced into horticulture about 1870 by Mr. Wilson Saunders, who raised it from seed collected presumably in Peru by Mr. Farris. The cultivated specimen from which the above character is drawn is in the herbarium at Kew. It has thus far proved impossible to match it with any material collected in Peru.

71. *E. CHORICEPHALOIDES* Robinson (p. 8). Apparently herbaceous (the base unknown); stems and branches terete, flexuous, densely puberulent, with short brownish gland-tipped spreading hairs; internodes sometimes 1 dm. long; leaves opposite, deltoid-ovate, acuminate, subtruncate or shallowly and broadly cordate at base, serrate- or crenate-dentate (teeth unequal, rounded to subacute, about 10 on each side, the largest 2.5 mm. high, 5 mm. broad), membranaceous, above densely puberulent, beneath puberulent and on the nerves and chief veins spreading-villous, about 6 cm. long, about 4.5 cm. wide, 3-nerved from the base; panicle very loose and open, leafy-bracted, 4 dm. high, 3 dm. in diameter, densely glandular-puberulent throughout; pedicels filiform, 1–2.6 cm. long, naked or inconspicuously bracteolate; heads separate, about 7 mm. high, about 25–30-flowered; involucre campanulate; scales subequal, narrowly oblong or oblanceolate, erose toward the acute scarious tip, green and 2–3-ribbed in the middle, puberulent on the back, about 4 mm. long; corollas white, glabrous, the proper tube about equalling the sub-cylindric distinctly enlarged throat; teeth very short, 0.3 mm. in length; achenes light-brown, 1.8 mm. long, hispidulous on the angles, smooth on the concave faces; pappus-bristles about 12, whitish, minutely scabridulous.—AMAZONAS: Province of Chachapoyas, *Mathews* (K., phot. and fragm. Gr.).

This species in its loose inflorescence recalls the Mexican *E. chori-cephalum* Robinson.

72. *E. FLEXILE* Robinson (p. 14). Suffruticose, slender, tending to climb, 2 m. high; stems terete, flexuous, softly and shortly dirty-tomentellous; leaves ovate, caudate-acuminate, cordate at base, 5–7-nerved, thin, puberulent above, below especially on the nerves grayish-pubescent, about 6 cm. long, 3 cm. wide, slightly and remotely toothed; petiole 1 cm. long, slender; panicle ample, pyramidal, 2–4 dm. high, 1.5–2.5 dm. thick, loose, leafy-bracted; pedicels filiform, grayish-tomentellous; heads about 20-flowered, 7 mm. high, 6 mm. in diameter; involucre campanulate; scales about 16, linear-oblong, obtusish but sharply mucronate, mostly about 5 mm. long; corollas pale greenish-yellow, tubular, slightly and gradually enlarged upward; achenes grayish, 2.7 mm. long, hispid on the angles; pappus-bristles about 32, white, scarcely barbellate, about equalling the corolla.—ANCACHS: in woods near a river at Caraz, alt. 2200 m., *Dr. Weberbauer*, no. 3027 (Berl., phot. and fragm. Gr.).

A species recalling *E. solidaginoïdes* HBK. but with larger, more numerous flowered heads, longer achenes, and various minor differences.

72a. *E. DOMBEYANUM* DC. Prod. v. 167 (1836). It seems by no means improbable that this species (discussed in some detail on page 11) was originally collected in Peru. It reached DeCandolle devoid of data beyond the fact that it had been gathered in South America by Dombey (DC., phot. Gr.), whose explorations were chiefly in Peru.

73. *E. GILBERTII* Robinson (p. 16). Slender and nearly glabrous perennial herb, or perhaps shrub; stems greenish straw-colored, round, about 2 mm. thick, flexuous, at maturity entirely glabrous, when young sparingly provided with an inconspicuous pubescence of minute straightish non-glandular hairs; these becoming somewhat more abundant on the inflorescence; leaves opposite, ovate, acute or slightly acuminate, mucronulate-serrate or -crenate (the teeth inconspicuous, about 0.6 mm. high and 5 mm. apart), thin, membranaceous, above green and puberulent on the nerves, beneath somewhat paler and glabrous, 6-7 cm. long, 3-3.5 cm. wide, 3(-5)-nerved essentially from the rounded or subcordate entire base; petiole slender, about 1.7 cm. long, puberulent above; corymbs compound, flattish, rather loose; pedicels 4-10 mm. long; heads small, scarcely 5 mm. high or thick, about 26-flowered; scales of the campanulate involucre about 17, nearly equal, oblong-lanceolate, greenish-stramineous, acutish, scarious-margined, ciliate, sparingly pubescent on the back; corollas white, about 3.3 mm. long, the proper tube glabrous, about equalling the campanulate throat, limb hispidulous; achenes (very immature) 1.2 mm. long, apparently glabrous; pappus-bristles about 20, white.—Cuzco: San Miguel, Urubamba Valley, alt. about 1800 m., Cook & Gilbert, no. 1115 (U. S., phot. and fragm. Gr.).

74. *E. SODIROI* Hieron. in Engl. Bot. Jahrb. xxix. 12 (1900); Robinson, Proc. Am. Acad. liv. 362 (1918). *E. Sternbergianum* Ball; Jour. Linn. Soc. xxii. 43 (1885), as to plant first mentioned.—LIMA: in the middle region of the Andes in the upper valley of the Rimac River, alt. 1830-3355 m., April, Ball (Gr.). Ball, l. c., remarks that the plant grows to a height of several feet. [Ecuador.]

75. *E. SCOPULORUM* Wedd. Fruticulose, much branched, 2-5 dm. high; stems terete, slender, often decumbent, dark, nodose below after the early fall of the leaves; lower internodes 5-10 mm., the upper often 3-5 cm. long; leaves ovate, acute, rounded or subcordate at base, crenate-serrate (teeth about 5 on each side), membranaceous, 3-nerved from the base, slightly puberulent on the nerves, 8-18 mm. long, 5-12 mm. wide, scarcely paler beneath; petiole slender, 3-6 mm. long; corymbs terminal, simple and 3-5-headed or compound and

about 8-12-headed; pedicels 1-2 cm. long; heads 6-8 mm. high and equally thick, about 46-flowered; involucre campanulate; scales about 20, lance-linear, attenuate, slightly puberulent, mostly 3-nerved and 2-costulate; corollas purplish (Weddell) or white (Weberbauer), with slender proper tube (1.7 mm. long) and perceptibly enlarged cylindrical throat (3.6 mm. long); achenes 2.5 mm. long, hispidulous on the angles and faces; pappus-bristles about 18, delicate, white, barbellate.—Chlor. And. i. 216, t. 40, f. B (1857).—JUNIN: near Oroya, *Dr. & Mrs. J. N. Rose*, nos. 18,711 (N. Y.), 18,712 (N. Y.). PUNO: on moist cliffs around Lake Titicaca, alt. 3900 m., *Weddell*. ANCACHS: in open grassy formation between Samanco and Caraz, alt. 3700 m., *Dr. Weberbauer*, no. 3054 (Berl., fragm. Gr.). [Bolivia.]

76. *E. STERNBERGIANUM* DC. Apparently herbaceous, 4 dm. or more in height; stem terete, at first minutely puberulent, at maturity glabrate, dark-purple; leaves opposite, ovate, acuminate, rounded at the base, incisely serrate-dentate or deeply crenate-dentate (the teeth numerous, unequal, often again toothed), membranaceous, 3-nerved from the base, sparingly puberulent to glabrous above, scarcely paler and somewhat puberulent beneath, 3-5 cm. long, 2.5-4.5 cm. wide; petiole about 1 cm. long; corymbs dense, rounded; heads about 28-flowered, pedicellate, about 6 mm. high; involucre campanulate, the scales subequal, linear, acutish, about 2-seriate, sparingly puberulent or subglabrous; corollas white to reddish (Weberbauer), with proper tube nearly equalling the cylindrical throat, nearly glabrous; achenes hispid.—Prod. v. 167 (1836).—ANCACHS: at Tallenga, alt. 3600-3800 m., *Dr. Weberbauer*, no. 2876 (Berl., fragm. Gr.). LIMA: at Obrajillo, *Wilkes Exp.* (Gr.); near Huarochirí, alt. 2100-3000 m., *Hrdlicka* (U. S.). JUNIN: near Oroya, alt. 3750 m., *Dr. & Mrs. J. N. Rose*, no. 18,685 (Gr., N. Y.). CUZCO: near Tinta, alt. about 3500 m., *Cook & Gilbert*, no. 213 (U. S.); Ollantaytambo, alt. about 3000 m., *Cook & Gilbert*, no. 331 (U. S.). DEPARTMENT NOT ASCERTAINED: among hills in the cordilleras of Peru, *Haenke* (DC.); at Pachacaya, *C. H. T. Townsend*, no. 1505 (U. S.).

This species according to *Dr. Weberbauer* is locally called *hualmi-hualmi*. He also states that the fresh roots, softened in lukewarm water, are employed as an abortive, and that a tea prepared from the leaves is used for kidney and bladder troubles.

[76a. *E. GLECHONOPHYLLUM* Less. *Linnaea*, vi. 105 (1831); *Robinson*, Proc. Am. Acad. liv. 363 (1918).—This species has not been seen from Peru, but as it occurs in the Chilean valleys and also without apparent distinction of form on the mountains of Ecuador,

it seems more than likely that further exploration will show its presence in the intermediate country of Peru.]

77. *E. AZANGAROENSE* Sch. Bip. ex Wedd. Chlor. And. i. 217 (1857); Robinson, Proc. Am. Acad. liv. 315 (1918).—PUNO: on calcareous rock, Azangaro, alt. 4000 m., 28 Feb. 1902, *Dr. Weberbauer*, no. 468 (Berl., fragm. Gr.). WITHOUT INDICATION OF DEPARTMENT: *de Castelnau* acc. to Weddell, l. c. [Bolivia, Ecuador, Venezuela acc. to Weddell.] A species doubtfully distinct from the preceding.

78. *E. ISILLUMENSE* Robinson (p. 20). Slender subscaudent shrub, glabrous except on the petioles and base of the nerves where puberulent, nigrescent in drying; stem terete, pale-brown, internodes 3–8 cm. long; leaves opposite, ovate-oblong (the uppermost lanceolate), acuminate, slightly cordate at the base, mucronate-serrate, thin, 3–5-nerved from the base (the nerves connected by transverse veins), 10–12 cm. long, 3–4.5 cm. wide; petiole slender, viscid-tomentellous, 4–6 mm. long; panicle ovoid, loose, leafy-bracted below; pedicels filiform, glabrous, 8–15 mm. long, often with scale-like bractlets; heads about 52-flowered, 7 mm. high, 9 mm. in diameter; involucre broadly campanulate; scales about 30, subequal (1–3 of the outermost shorter), linear, very acute, glabrous, faintly 1–3-nerved; corollas 3 mm. long, white, glabrous, slightly and gradually enlarged upward; immature achenes 2 mm. long, apparently glabrous; pappus-bristles about 28, white, delicate, nearly smooth.—PUNO: in woods near the Tambo Isillum, between Sandia and Chunchusnago, alt. 1000 m., *Dr. Weberbauer*, no. 1206 (Berl., phot. and fragm. Gr.). In habit and foliage recalling the Brazilian *E. laeve* DC.

Sect. IV. PRAXELIS (Cass.) Benth. (See Robinson, Proc. Am. Acad. liv. 318.)

KEY TO SPECIES.

Cauline leaves ovate, petiolate 79. *E. pauciflorum*.
Cauline leaves lanceolate to linear, sessile or nearly so 80. *E. kleinioides*.

79. *E. PAUCIFLORUM* HBK. Nov. Gen. et Spec. iv. 120 (1820); Robinson, Proc. Am. Acad. liv. 319, 343 (1918).—CUZCO: Santa Ana, alt. 900 m., *Cook & Gilbert*, no. 1606 (U. S.). PERU WITHOUT INDICATION OF DEPARTMENT: *Mathews*, no. 3081 (Gr.).

80. *E. KLEINIOIDES* HBK. Nov. Gen. et Spec. iv. 120 (1820); Robinson, Proc. Am. Acad. liv. 319 (1918).

Var. **typicum** (Hieron.), comb. nov. Hispid throughout; leaves lanceolate.—*E. kleinioides*, forma *typica* Hieron. in Engl. Bot. Jahrb. xxii. 782 (1897).—PERU WITHOUT LOCALITY: according to Hieronymus, l. c. 783. [Brazil, Venezuela, Argentina, Paraguay.]

Var. **SUBGLABRATUM** Hieron. Stems subglabrous or below sparingly and shortly pilose; leaves linear-lanceolate, glabrate except on the scabrid edge.—Hieron. l. c. 782, as *subglabrata*. *Ooclinium paucidentatum* DC. Prod. v. 134 (1836).—PERU WITHOUT LOCALITY: *Haenke* according to DeCandolle, l. c. [Argentina, southern Brazil.]

Sect. V. **HEBECLINIUM** (DC.) Benth. (See Robinson, Proc. Am. Acad. liv. 327.)

KEY TO SPECIES.

Heads 200–300-flowered; leaves on winged auriculate-based petioles.....81. *E. nemorosum*.
Heads 50–75-flowered; petioles not winged.....82. *E. macrophyllum*.

81. *E. NEMOROSUM* Klatt in Engl. Bot. Jahrb. viii. 35 (1887); Robinson, Proc. Am. Acad. liv. 327, 366 (1918). *E. pteropodum* Hieron. in Engl. Bot. Jahrb. xxix. 15 (1900).—CAJAMARCA: near Tambillo, von *Jelski*, nos. 737, 738, according to Hieronymus, l. c., as *E. pteropodum*. [Costa Rica, Colombia, Ecuador, Bolivia.]

82. *E. MACROPHYLLUM* L. Sp. Pl. ed. 2, ii. 1175 (1763); Bak. in Mart. Fl. Bras. vi. pt. 2, 345, t. 92 (1876); Robinson, Proc. Am. Acad. liv. 329 (1918).—CUZCO: Santa Ana, alt. 900 m., *Cook & Gilbert*, no. 1443 (U. S.). PERU WITHOUT LOCALITY: according to Baker, l. c. [Widely distributed in tropical and subtropical America.]

DOUBTFUL OR TRANSFERRED SPECIES AND VARIETIES.

E. ADENOPHORUM, var. *PERUVIANUM* Hieron. in Engl. Bot. Jahrb. xxxvi. 470 (1905). This problematic plant, collected in Cajamarca, near Tambillo, by von *Jelski*, no. 661 (Berl., sterile fragm. Gr.), was described by Hieronymus, l. c., as a possible variety of *E. adenophorum* Spreng. Syst. iii. 420 (1826). Sprengel's species, however, was a mere renaming of the Mexican *E. glandulosum* HBK. Nov. Gen. et Spec. iv. 122 (1820), on account of the earlier homonym of Michaux. As the latter is universally relegated to synonymy, there appears at

present no reason, according to the International Rules, to reject *E. glandulosum* HBK., a name which was amply characterized and put forward in all good faith. The plant of von Jelski, however, possesses a round-ovate instead of triangular-ovate leaf, and the indumentum, which Hieronymus finds similar, appears to the writer very different. In *E. glandulosum* the hairs are short, dense, and gland-tipped, in the von Jelski plant on the other hand they are flaccid, slender, jointed, and for the most part not gland-tipped. From the sterile fragment, kindly supplied to the writer at the Royal Gardens in Berlin during his visit in 1905, it would appear that the plant is certainly distinct from the Mexican *E. glandulosum* HBK. (*E. adenophorum* Spreng.), but until fertile specimens are available it is quite impossible to give the plant definite disposition.

E. AROMATICUM L., a species of Atlantic North America, extending from Massachusetts to Florida, was recorded as also from Peru by Lamarck, Encyc. ii. 406 (1786), on the basis of a specimen from Joseph de Jussieu. The plant was stated to be smaller than the North American and to have shorter petioles as well as other minor differences. Just what species Lamarck thus identified has not been ascertained, but there is no likelihood of its having been conspecific with the North American plant.

E. CANNABINUM L., the well-known European species, and the medicinal *E. TRIPLINERVE* Vahl (under the later name of *E. Ayapana* Vent.) were reported by Martinet, Enum. Jard. Med. Lima, 352 (1873), as cultivated in the Botanic Garden of the Medical Faculty at Lima; but there is little likelihood and certainly no evidence that either has at any time escaped or become established in Peru.

E. GLUTINOSUM Lam. Encyc. ii. 408 (1786); Robinson, Proc. Am. Acad. liv. 349 (1918). Described from a specimen in the Peruvian herbarium of Joseph de Jussieu, this species has been traditionally attributed to that country, though all its subsequent collections appear to have been in northern-central Ecuador. It is to be remembered that the boundaries of Peru in the middle of the 18th Century included what is now Ecuador and Bolivia, so it is pertinent to inquire where Joseph de Jussieu collected. According to Lasègue, Mus. Bot. Delessert, 484 (1845), Joseph de Jussieu went to South America as a botanist accompanying an astronomical expedition, which reached Quito in 1756 by way of Guayaquil. Thus de Jussieu must have been in the very region of Ecuador where *E. glutinosum* is now known to be frequent. It is true that he later traveled both in Peru proper and in what is now Bolivia, but the fact that he was also in the Ecuadorian

habitat of *E. glutinosum* makes it more than probable that it was there that he obtained the species. Certainly under these circumstances the fact that Lamarek's label mentions Peru as the place of origin can in no sense be taken as evidence that the plant came from what is now Peru. While it is by no means impossible, nor even very unlikely, that *E. glutinosum* may ultimately be found in Peru as now delimited, there is as yet no good basis for its inclusion in the Peruvian flora.

E. Kuntzei Hieron. in Engl. Bot. Jahrb. xxii. 766 (1897). This species, carefully studied from a portion of the material originally collected near Cochabamba by Kuntze (U. S.) and in better specimens subsequently secured in Southern Bolivia by Fiebrig (no. 3150, Gr.), proves to have the anthers destitute of apical appendages and the style-tips rather abruptly thickened, bluntish, and dark. It is unquestionably of the Subtribe *Piquerinae* and belongs to *Ophryosporus* § *Ophryochaeta*. When placed in its proper affinity, it has been found to match in all significant details *OPHRYOSPORUS MACRODON* Griseb. Abh. Goett. xxiv. 173 (1879), a species heretofore known only from the Nevado del Castillo, Prov. of Salta, in northern Argentina, a locality within about 300 km. of Fiebrig's Bolivian station. To the writer the species appears to have no close resemblance to the well known and widely distributed *Eupatorium inulaefolium* HBK. to which Hieronymus regarded it most nearly related.

E. piquerioides DC. Prod. v. 175 (1836), from the mountains of Peru, is *OPHRYOSPORUS PIQUERIOIDES* (DC.) Benth. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 188 (1876); Robinson, Proc. Am. Acad. xlii. 23 (1906).

E. SALICINUM Lam. Encyc. ii. 409 (1786); Robinson, Proc. Am. Acad. liv. 286, 348 (1918). Although credited to Peru originally by Lamarek and by various subsequent authors (including the writer) following his lead, the type of this species presumably came from northern-central Ecuador, through which Joseph de Jussieu, its collector, passed, a region where the plant has since been collected on several occasions so that its presence in some abundance there seems likely. Ecuador had not then been set off as a separate country. To date the writer has found no satisfying record of *E. salicinum* from within the present limits of Peru.

E. stramineum DC. Prod. v. 150 (1836). This species, supposed to have been originally collected in Peru by Haenke, has hitherto been represented, so far as known, by a single branch in the Prodromus Herbarium at Geneva. However, there is a photograph of this type in the Gray Herbarium, and this on careful microscopic study proves

to be unquestionably an *Helogyne* probably identical with *H. Weberbaueri* Robinson, Proc. Am. Acad. xlii. 32 (1906). The plant therefore should bear the name ***Helogyne straminea*** (DC.), comb. nov.

E. VAUTHIERIANUM DC. Prod. v. 159 (1836). By Baker in Mart. Fl. Bras. vi. pt. 2, 305 (1876), this species is said to extend from Peru to Panama and Nicaragua. Baker, l. c., cites certain specimens including Hayes's no. 589 from Panama and one of Tate's from Nicaragua. These are subsequently cited by Hemsley, Biol. Cent.-Am. Bot. ii. 102 (1881), under *E. vitalba*[*e*] DC. As *E. vitalbae* is a species well known and widely distributed from Peru to Nicaragua, while *E. Vauthierianum* is decidedly a plant of Atlantic Brazil, by no one else recorded in the Andean countries, there can be no doubt that Baker's note was intended not for *E. Vauthierianum* but for *E. vitalbae*, as confirmed by Hemsley's subsequent placing of the same Central American exsiccatae.

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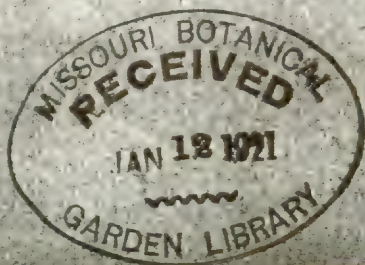
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I. FURTHER DIAGNOSES AND NOTES ON TROPICAL
AMERICAN EUPATORIEAE. # 4185

DURING the past year the writer has continued his study of the *Eupatorium* Tribe of the *Compositae*, devoting his chief attention to the Eupatoriums of Bolivia and the Mikantias of Andean South America. Some novelties and a few plants seemingly in need of further definition or transfer were inevitably encountered in the course of this work, and these may be placed on record as follows:

Ageratum (§ *Coelestina*) **rivale**, spec. nov., herbaceum perenne repens; caulibus prostratis vel valde inclinatis 4-5 mm. crassis ad nodos plus minusve copiose radicanibus; ramis (cauliformibus) decumbentibus vel erectis 3-6(-8) dm. altis ad mediam partem foliosis purpureis sparse griseo-pubescentibus; foliis oppositis ovato-oblongis acutis serratis (dentibus 1-2 mm. altis 3-6 mm. latis utroque 5-11) basi obtusiusculis vel subrotundatis integris utrinque viridibus supra subglabris paullo bullatis subtus vix pallidioribus minute punctulatis et sparse in nervis venisque hispidulis 4-7 cm. longis 2-3 cm. latis; petiolis 2-3 mm. longis subsetoso-pubescentibus; pedunculis 1-1.5 dm. longis; cymis irregulariter ramosis plerisque 5-7-capitulatis; pedicellis 5-60 mm. longis; capitulis 10-14 mm. diametro; involucri squamis anguste lanceolatis plerisque 2-costulatis laevibus viridibus apicem versus atropurpureis; receptaculo epaleaceo; corollis ca. 3 mm. longis, tubo proprio viridescente, faucibus albescentibus infundibuliformibus, limbo lilaceo-caeruleo; achaeniis glabris ca. 2 mm. longis nigrescentibus; pappi squamis in coronam ca. 0.4 mm. altam irregulariter dentatam eburneam connatis.— PANAMA: vicinity of El Boquete, Chiriqui, alt. 1000-1300 m., a trailing herb along wet bank of a brook in partial shade, 2-8 Mar. 1911, *W. R. Maxon*, no. 5240 (TYPE U. S., Gr.), in pastures, 2 Mar. 1911, *Prof. H. Pittier*, no. 2905 (U. S.).

The only species likely to be confused with this are *A. petiolatum* (Hook. & Arn.) Hemsl., a Nicaraguan plant with petioles mostly 8-36 mm. long and narrower awn-pointed involucreal scales; *A. scabriusculum* (Benth.) Hemsl., a plant described as an annual, scabrous to the touch, and having somewhat smaller heads (about 8 mm. in diameter); and finally the Mexican *A. lucidum* Robinson, which is a shrub with white flowers and closely scabrid-puberulent branches.

During a re-examination of this group it has been noticed that two Nicaraguan specimens, namely an unnumbered plant collected by Charles Wright and C. F. Baker's no. 2220 (both in the Gray Herbarium) were by the writer, Proc. Am. Acad. xlix 478 (1913), through an error recorded as *A. scabriusculum*. They should unquestionably be referred to *A. petiolatum* (Hook. & Arn.) Hemsl.

Alomia (§ **Eualomia**) **chiriquensis**, spec. nov., verisimiliter herbacea perennis (basi ignota); caule tereti purpurascente juventate obscure puberulo maturitate glabrato ca. 3 mm. diametro medulloso; internodiis 4-8 cm. longis; foliis ternatis lanceolatis utroque attenuatis crenato-serratis sed basin versus tertiam partem longitudinis integerrimis 3(-5)-nerviis coriaceis glaberrimis supra pallide viridibus subtus albidiviridibus utrinque puncticulatis 8-10 cm. longis 1.5-1.8 cm. latis; petiolo brevissimo et puberulo 1-2 mm. solum longo; axillis saepe proliferis; corymbis convexis 2.5-4 cm. diametro pedunculatis 6-12-capitulatis; bracteis linearibus; pedicellis ca. 7 mm. longis fulvido-puberulis; capitulis ca. 37-floris 7 mm. altis et crassis; involucri squamis extimis paucis brevioribus angustis linearibus, intermediis lanceolatis acutis obscure puberulis subaequalibus, intimis anguste linearibus; receptaculo conico nudo glabro; corollis verisimiliter albidis 3 mm. longis tubo proprio 1.5 mm. longis glandulari-granulato, faucibus anguste infundibuliformibus glabriusculis; achaeniis 0.8 mm. longis nigris annulo corollae gerente coronatis; pappo proprio nullo.—PANAMA: between Cerro Vaca and Hato del Loro, eastern Chiriqui, alt. 850-1100 m., Prof. H. Pittier, no. 5389 (U. S., phot. Gr.).

The ternate arrangement of the leaves in this plant may perhaps be only casual, for ternate-leaved individuals occasionally occur in species which are habitually opposite-leaved. Quite apart, however, from its ternate leaves this plant is clearly distinct from any previously described species with epaleaceous receptacle in § *Eualomia*.

Eupatorium (§ **Subimbricata**) **aequinociale**, spec. nov., herbaceum verisimiliter perenne 4-6 dm. vel ultra altitudine; caule (basi aliquando decumbente et radicante) tereti striato fusco-viridi crispe puberulo oppositi-rameo; ramis curvato-adscendentibus; foliis oppositis ovatis petiolatis acutis crenato-serratis (dentibus 1-1.3 mm. altis 3-4 mm. latis utroque 6-12) basi rotundatis vel subacutis usque ad 5 cm. longis et 3.2 cm. latis firmiuscule membranaceis utrinque viridibus a basi 3-nerviis praecipue in nervis venisque puberulis et subtus glandulari-atomiferis; petiolo 4-16 mm. longo crispe puberulo; cymis in caule ramisque terminalibus trichotomis,

particularibus 3-12-capitulatis umbelliformibus saepe hemisphaericis ca. 3 cm. diametro; pedicellis filiformibus 6-12 mm. longis minute scabratis quasi granulatis; capitulis ca. 50-floris ca. 5 mm. altis et crassis; involucri campanulati squamis ca. 28 inaequalibus (eorum 5-8 aliis gradatim brevioribus) lanceolatis vel anguste oblongis acutis plerisque 2-costulatis vix puberulis apicem versus atropurpureis; corollis 5 mm. longis albis glabris sed in limbo carneis vel roseis et hispidulis, tubo proprio 1.5 mm. longo; faucibus vix ampliatis cylindricis 3 mm. longis, dentibus limbi 0.5 mm. longis ovato-deltoides; achaeniis pallide brunneis vel maturitate nigrescentibus 1.5 mm. longis glaberrimis; pappi setis ca. 36 laete albis ca. 3 mm. longis minute scabratis.—ECUADOR: Prov. Chimborazo, vicinity of Huigra, mostly on the Hacienda de Licay, Aug. 1918, *Dr. J. N. & G. Rose*, nos. 22,229 (TYPE, Gr., U. S., N. Y.) and 22,209 (Gr., U. S., N. Y.); same locality and collectors, Sept., 1918, no. 22,510 (Gr., U. S., N. Y.); 21 Aug., alt. 1525-1677 m., no. 24,082 (Gr., U. S., N. Y.); 7 Sept., no. 24,082b (Gr.); near Bucay, 30 Aug., *Rose, Pachano & Rose*, no. 22,448 (Gr. U. S., N. Y.).

This species most nearly approaches the Guatemalan *E. pynocephaloides* Robinson but the correspondence is not so exact that the two cannot be readily distinguished by the longer pedicels, umbelliform inflorescence, and some minor details of pubescence, etc. Both of these species differ from the common, variable, and widely distributed *E. pynocephalum* Less. in having distinctly larger heads and more acute intermediate and inner involucreal scales.

E. AMYGDALINUM Lam. Encyc. ii. 408 (1786). In a preliminary treatment of the Eupatoriums of Ecuador, Proc. Am. Acad. liv. 345 (1918), the writer drew attention to the fact that this species, widely distributed in the American tropics, seemed never to have been collected in, or at least not to have been reported from, Ecuador. The opinion was ventured that it was pretty certain to be found there. It is now possible to record the Ecuadorian occurrence of the plant thus: Between Loja and Portovelo, 3-6 Oct., 1918, *J. N. Rose, Pachano & G. Rose*, no. 23,384 (Gr., U. S., N. Y.).

E. (§ Subimbricata) Blakei, spec. nov., annum ca. 8 dm. altum erectum ramosum; radice fibrosa; caule tereti puberulo, pilis brevissimis incurvis brunnescentibus inconspicuis, internodiis superioribus usque ad 8 cm. longis; ramis oppositis late patentibus curvato-adscentibus; foliis lanceolatis 4-6.5 cm. longis 7-16 mm. latis plerisque utroque attenuatis a basi 3-nerviis pauciserratis (serraturis utroque 2-4 vix 1 mm. altis 7-12 mm. inter se distantibus) utrinque

viridibus in nervis obscure puberulis subtus vix pallidioribus membranaceis; petiolis gracilibus 8-30 mm. longis; cymis compositis in caule ramisque terminalibus trifidis conjunctim paniculam foliaceo-bracteata formantibus, particularibus subglomerato-congestis; pedicellis gracilibus flexuosis 1-2 mm. longis; capitulis ca. 20-floris 5 mm. altis 4 mm. diametro; involucri squamis ca. 3-seriatis gradatis, extimis ovatis vel ovato-lanceolatis saepe acutiusculis puberulis, interioribus anguste elliptico-oblongis apice rotundatis viridi-striatis; corollis lilaceis 2.5 mm. longis glabris, tubo proprio 0.7 mm. longo, faucibus cylindraceutis 1.4 mm. longis, limbo 5-dentato suberecto 0.4 mm. longo; pappi setis ca. 18 delicatule capillaribus albis scabratis; achaeniis glabris 1 mm. longis fuscis sparse hispidulis.—HONDURAS: Department of Copan, on rocks along the Moljá River, Hacienda Limón, 11 May, 1919, *Dr. S. F. Blake*, no. 7347 (U. S., phot. and fragm. Gr.).

In all characters of inflorescence, involucre, florets, and achenes this plant appears essentially identical with the common and variable annual weed *E. pycnocephalum* Less. However, the leaves are here exceedingly different, being on the average no less than 5 times as long as broad while in *E. pycnocephalum* they average 1.5 times as long as wide or on secondary shoots of injured, mowed, or browsed individuals at most 2.5 times as long as wide. Furthermore, the teeth of the leaves are here only 2-4 on each side while in *E. pycnocephalum* there are 7-25 on each side. It is not impossible that this plant may ultimately be found to intergrade with *E. pycnocephalum* but as no intermediates have thus far been found in an examination which has included upward of 100 sheets of the latter species it seems best to give this striking plant from Honduras specific rank. It is a pleasure to name it for its collector, Dr. S. F. Blake, who among other activities has contributed much to the knowledge of the tropical American *Compositae*.

E. (§ **Subrimbricata**) **eucosmum**, spec. nov., fruticosum inflorescentia puberula excepta glaberrimum; caule tereti rufescenti-brunneo maturitate cum cortice griseo oblecto; ramis patenter curvato-adscendentibus; foliis oppositis ovatis acuminatis basi rotundatis vel acutis ca. 1 dm. longis 5 cm. latis argute serratis (dentibus 1-1.8 mm. altis 2-4 mm. basi latis) utrinque glabris firmiter coriaceis subtus pallidioribus non punctatis reticulato-venosis sed venis immersis vel vix prominulis 2-4 mm. supra basin 3-nerviatis et cum nervulis intramarginalibus instructis; petiolo ca. 2 cm. longo atropurpureo flexuoso; corymbis terminalibus valde convexis ca. 1 dm.

diametro densiusculis puberulis, pilis brevissimis purpurascensibus incurvis; pedicellis ca. 5 mm. longis; capitulis 7 mm. altis ca. 19-floris; involucri campanulati 3-4 mm. longi squamis ca. 16 modice imbricatis et gradatis lanceolato-oblongis obtusis obscure 2-3-striatis; corollis purpureis 4 mm. longis glabris sursum gradatim paullo ampliatis; pappi setis ca. 27 albidis sublaevibus; achaeniis (immaturis) 2.4 mm. longis glabris,—BOLIVIA: in the southern part of the country at Padeaya, Dept. Tarija, alt. 2300 m., *Fiebrig*, no. 2576 (Gr.).

This species is most nearly related to *E. Pentlandianum* DC. which, however, has punctate leaves only half as large and nerved from the very base instead of well above it as in this species.

E. gynoxymorphum Rusby, nom. nov. *E. gynoxioides* Rusby, Bull. N. Y. Bot. Gard. iv. 380 (1907), not *E. gynoxioides* Wedd. Chlor. And. i. 216 (1857). Although the first name assigned to this Bolivian plant by Dr. Rusby differs by a single letter from the one previously employed by Weddell for a Colombian species, it has appeared both to Dr. Rusby and to the writer, as well as to several other botanists whose judgment has been consulted, that it would be highly undesirable to perpetuate for two species, both Andean and of the same genus, names so nearly identical and so likely to lead to confusion. Dr. Rusby therefore permits the publication of the above substitute.

E. (§ Eximbricata) huigrense, spec. nov., ut videtur herbaceum et perenne (basi ignota) 4 dm. vel ultra altitudine molliter pubescens; caule tereti viridi breviter patenterque pubescente superne ramoso; ramis paucis curvato-adscedentibus; foliis ovatis acuminatis basi obtusis vel saepius rotundatis serratis (dentibus utrinque 6-12, ca. 1-2.5 mm. altis 3-7 mm. latis) tenuiter membranaceis utrinque viridibus delicatule pubescentibus ima a basi 3-nervatis usque ad 5 cm. longis 3.5 cm. latis; cymis in caule ramisque terminalibus 3-10-capitulatis umbelliformibus 2.5-4 cm. diametro; pedicellis gracilibus rectiusculis 4-35 mm. longis; capitulis ca. 90-floris 11 mm. altis 9 mm. diametro; involucri campanulati 7 mm. alti squamis ca. 18 plerisque oblongis subaequalibus tenuibus herbaceis sed ad apicem breviter acutatum violascentibus et subdiaphanis dorso villosulis late scarioso-marginatis; receptaculo plano nudo glabro; corollis 4.5 mm. longis glabris (limbo paullo hispidulo excepto); tubo proprio 1.4 mm. longo et faucibus cylindricis vix ampliatis 2.8 mm. longis viridi-albidis; limbo carneo vel roseo; achaeniis 1.5 mm. longis nigrescentibus glabris basi pallido-callosis; pappi setis ca. 28 albis tenuibus sublaevibus.—ECUADOR: Prov. Chimborazo, vicinity

of Huigra, mostly on the Hacienda de Licay, 28 Aug.-8 Sept., 1918, Dr. J. N. & G. Rose, no. 24,085 (Gr., U. S., N. Y.).

This species in its group and region is unusual for its many-flowered heads with large thin subequal involueral scales (about 7 mm. long and 2-3 mm. wide), which are somewhat diaphanous and violet-tinged toward the tip.

E. (§ Subimbricata) Kalenbornianum, spec. nov., caule vel ramotereti gracili dense sed brevissime incurvo-puberulo vel tomentello, indumento flavescenti-albido; internodiis (supremis solis visis) 3-5 cm. longis; foliis oppositis anguste ovatis fere a basi integra rotundata gradatim ad apicem acutum angustatis lateraliter crenato-serratis 3.5-4.5 cm. longis 1.4-1.8 cm. latis a basi 3(-7)-nervatis utrinque viridibus obscure (sub lente) puberulis; petiolo 4.5-6 mm. longo gracili tomentello; corymbo terminali trichotomo 8 cm. diametro modice convexo multicapitulato denso; capitulis ca. 7 mm. altis plerisque sessilibus vel subsessilibus ca. 8-floris; involucri squamis ca. 12 ca. 4-seriatim gradatis ovato-oblongis glabris firmiusculis apice rotundatis cum costulis 2-4 et lineis (post exsiccationem) fusco-brunneis, his apicem versus paullo dilatatis et confluentibus; corollis ut videtur albis 3.6 mm. longis glabris a basi gradatim ampliatis sed sine faucibus definitis; dentibus limbi acutis recurvatis; acheniis brunneis 2.4-2.7 mm. longis praecipue in angulis hispidulis; pappi setis ca. 33 delicatule capillaribus albidis.—PERU: vicinity of Oroya, Dept. Junin, alt. 3000-3900 m., Margaret & A. S. Kalenborn, no. 69 (N. Y.).

This plant is clearly related to *E. urubamense* Robinson with which it shares many traits. However, that species differs in having much greater pubescence, the leaves being grayish-tomentose beneath; its corolla is 4.8 mm. long, and the involueral scales are broader, decidedly thinner and more translucent, the outermost being loosely pubescent.

E. LAVANDULAEFOLIUM DC. Prod. v. 159 (1836). In a recent paper on the Peruvian species of *Eupatorium*, Proc. Am. Acad. lv. 55, the writer was able to record this species only on the unsatisfactory basis of specimens collected in Peru without stated locality by Haenke and in South America (presumably Peru) by Dombey. Two undoubted specimens of the species, corresponding in all regards to the material of Haenke and Dombey, have recently become available at the Gray Herbarium, and for the first time in the history of the plant afford a record of its more exact locality. Both the specimens come from Oroya, Dept. Junin, Peru, one having been collected

14 July, 1914, by *Dr. & Mrs. J. N. Rose*, no. 18,708 (U. S., Gr.), and the other by *Mr. A. S. Kahlenborn*, no. 111 (Gr.). The latter specimen, still preserving the hitherto unstated flower-color, shows both the limb of the corollas and the long-exserted style-branches to be of a clear lilac-blue.

E. LONGIPETIOLATUM Sch.-Bip. ex Rusby. This Andean species, hitherto known only from Bolivia, has recently been found in southern Ecuador by *Dr. J. N. Rose* and his assistants. At first sight the Ecuadorian plant appears identical with the Bolivian, so close is the correspondence of habit, pubescence, foliage, and inflorescence. Closer examination of the heads, however, discloses several minor differences amply justifying varietal distinction, thus:

Var. α . **typicum**, fruticosum ramosum 2-2.5 m. altum; capitulis ca. 16-floris ca. 8-9 mm. altis; involucri squamis apicem versus saepe paullo spatulato-dilatatis dorso tomentello-puberulis et glandulari-atomiferis; corollis saltim limbum versus purpureis vel violaceis.—For lit., synonym., and exicc. see p. 66.—WESTERN BOLIVIA: Dept. La Paz.

Var. β . **arbusculare**, var. nov., var. *typico* multis simillimum differt statura majore subarborea; capitulis ca. 23-floris 10-11 mm. altis; involucri squamis nunquam apicem versus dilatatis dorso non atomiferis; corollis ut videtur albis.—ECUADOR: Prov. Loja, in the vicinity of Zaragura, *J. N. Rose, Pachano & G. Rose*, no. 23,144 (TYPE, Gr., U. S., N. Y.); a small tree in the vicinity of Las Juntas, where secured by the same collectors, no. 23,229 (Gr., N. Y., U. S.).

There is, of course, no absolute proof as yet that these plants intergrade, but it seems very probable that they do so. Their similarity in many points amounts to identity, and the distinguishing features, such as stature, number of florets, size of heads, and color of the corollas, are all of a kind particularly likely to break down. The stations, it is true, are rather remote, being separated by some 1700 km., but in this connection it should be borne in mind that the intermediate territory in eastern Peru and northwestern Bolivia is botanically almost unknown.

E. PICHINCHENSE HBK. Nov. Gen. et Spec. iv. 122 (1820); DC. Prod. v. 165 (1836); Robinson, Proc. Am. Acad. liv. 317, 262 (1918). This species, like many other *Compositae* has two pretty readily distinguishable forms, as follows:

Forma α . **typicum**, ramis pedicellisque villosis; pilis tenuibus longis attenuatis nullo modo capitatis sed (sub lente) pulcherrime articulatis; articulis saepissime purpureis.—Mountains of ECUADOR and COLOMBIA.

Forma β . **glandulare**, forma nova, ramis pedicellisque glandulari-puberulis vel -pilosus; pilis plerisque rectiusculis patentibus glandulari-capitellatis; aliter formae typicae simillimum.—ECUADOR: Prov. Chimborazo, vicinity of Huigra, mostly on the Hacienda de Licay, August, 1918, *Dr. J. N. Rose & G. Rose* no. 22,210 (TYPE, Gr., U. S., N. Y.); same locality and collectors, alt. 1525 m., 21 August, no. 24,078 (Gr., N. Y., U. S.), 28 August, no. 24,078a (Gr., N. Y., U. S.), and 6 September, no. 24,078b (Gr., N. Y., U. S.).

It may be noted that the pappus of this species, both in the typical and glandular form, often becomes a beautiful rose-color. As the depth of this shade is variable even in different heads of the same specimen no taxonomic significance is attached to it.

E. (§ **Subimbricata**) **polopolense**, spec. nov., suffruticosum laxe ramosum ca. 5 dm. altum petiolis et marginibus et venis principibus foliorum paullo villosopubentibus exceptis glaberrimum; caule erecto tereti purpureo-brunneo; internodiis usque ad 13 cm. longis; ramis oppositis adscendentibus gracilibus foliosis; foliis oppositis ovatis acuminatis argute serrato-dentatis basi rotundatis (sed saepe ad insertionem breviter acuminatis) 3.6–5 cm. longis 1–2 cm. latis ima a basi 3-nervatis membranaceis utrinque viridibus vix subtus pallidioribus ciliolatis; petiolis 6–13 cm. longis; cymis terminalibus trifidis particularibus saepissime 3–5-capitulatis sparse puberulis non glandulosus; capitulis 24–30-floris breviter pedicellatis 7 mm. altis 5 mm. diametro; involucri campanulati squamis subtriseriatis ca. 20 ovalibus ciliolatis 3–5-viridi-striatis et 4-albido-costulatis, extimis dorso puberulis; receptaculo parvo convexo glabro; corollis albis 3 mm. longis, tubo proprio faucibus subcylindricis vix ampliatis distincte brevioribus, limbo hispidulo; achaeniis 1.6 mm. longis, faciebus nigris, angulis pallidis; pappi setis ca. 22 albis gracilibus.—BOLIVIA: Polo-Polo near Coroico, alt. 1100 m., *Buchtien* nos. 429 (Gr., N. Y.) and 3934 (N. Y.).

E. PRIONOPHYLLUM Robinson, Proc. Am. Acad. xxxvi. 484 (1901). To this species, originally collected in Costa Rica, there may now be added what seems to be a Guatemalan variety. The chief distinctions between the varieties appear to be as follows:

Var. α . **typicum**, arboreum; foliis ovatis lateraliter symmetricis vel vix irregularibus in lateribus (argute dentatis) rotundatis non angulatis; ramis inflorescentiaque obscure puberulis.—COSTA RICA: on the banks of the Rio Toros, *Pittier*, no. 1705 (Gr.); near the Rancho Flores, alt. 2030 m., *Pittier*, no. 1900 (Gr.).

Var. β . **asymmetrum**, var. nov., fruticosum humile; foliis (etiam argute dentatis) saepius in latere uno acuminatim uniangulatis et in latere altero rotundatis; ramis et inflorescentia brunneo-villosis, pilis tenuibus patulis articulatis.—*E. ianthinum* Hemsl. Biol. Cent.-Am. Bot. ii. 96 (1881), in part, i. e., as to pl. of Guatemala, not of Mexico.—GUATEMALA: in cheirostemon forest, Volcan de Agua, alt. 2440 m., 1861, *Salvin & Godman*, no. 326 (K., phot. Gr.). This plant differs from the Mexican *E. ianthinum* in having thinner, truly membranaceous sharply acuminate leaves, smaller (12-18—instead of 35-40-flowered) heads and considerably shorter and apparently less deeply colored corollas (about 3.6 mm. instead of 6.4 mm. long.)

E. trinitense (Ktze.) Rusby & Robinson, comb. nov. *Baccharis trinitensis* Ktze. Rev. Gen. i. 319 (1891). *Eupatorium Squiresii* Rusby in Robinson, Proc. Am. Acad. liv. 258 (1918). Prof. N. L. Britton has recently sent to the Gray Herbarium for study and identification the type-sheet of Dr. Otto Kuntze's *Baccharis trinitensis*, having observed that it appeared to be a *Eupatorium* rather than a *Baccharis*. At Cambridge it was quickly found to be identical with the plant from the delta-region of the Orinoco Valley recently described as *E. Squiresii*. When the source of the two types is considered there are no phytogeographic grounds why they should not prove identical, indeed every reason to expect that a plant of Trinidad would subsequently be discovered on the delta of the Orinoco and vice versa. However, no blame can possibly attach to Dr. Rusby for overlooking the prior description of the species in this instance, since it had been placed by its German author in quite another tribe of the *Compositae* and in a genus most easily distinguished from *Eupatorium* by its dioecious character. It is fortunate that the herbarium of Kuntze is now readily accessible at the New York Botanical Garden. Otherwise this blunder of his might long have remained uncorrected and his so-called *Baccharis trinitensis*, mistakenly described as dioecious, would have presented a puzzling problem. Dr. Rusby, who was first to describe the plant in its correct genus, has kindly consented to join the writer in transferring Kuntze's earlier name to the proper position. During renewed study of the plant in question a previous collection of identical material has been brought to light as follows: Trinidad, in Oroupouche Lagoon, 1865, *Finlay*, no. 2566 (Gr.).

Mikania (§ **Corymbosae**) **amblyolepis**, spec. nov., volubilis herbacea gracili; caule tereti minutissime granuloso-puberulo 1-2 mm.

vel ultra crasso, internodiis 6-14 cm. longis; foliis (supremis solis visis) triangulari-ovatis obtusis cuspidatis basi late cordatis lateraliter grosse crenato-dentatis tenuiter membranaceis prope marginem et in nervis inconspicuite puberulis utrinque fusco-punctatis 1-2.5 cm. longis, 7-20 mm. latis; petiolo gracili 1.6-2 cm. longo puberulo; panicula ampla usque ad 5 dm. vel ultra longa laxa oppositiramea granuloso-puberula, particularibus ca. 1 dm. longis pedunculatis plerisque alternirameis laxe irregulariter cymosis; pedicellis 0.5-2.5 mm. longis et ramulis inflorescentiae teretibus; bracteolis ad apicem pedicelli locatis parvis; capitulis dissitis vel contiguis ca. 5 mm. longis; involucri squamis obovato-vel oblanceolato-oblongis erosis ca. 4 mm. longis, extimis dorso puberulis vix striatis; corollis albis ca. 2.2 mm. longis glabris, tubo proprio ca. 0.8 mm. longo, faucibus turbinato-campanulatis 1.2 mm. longis; achaeniis atrobrunneis vel fusciscentibus in faciebus granulati-atomiferis 1.7 mm. longis; pappi setis ca. 30 albidis.—COLOMBIA: grassy open places, alt. 70-250 m., Buenavista, east of Sincé, Dept. Bolívar, 24 Jan. 1918, *Dr. F. W. Pennell*, no. 4002 (N. Y., Gr.).

M. (§ **Corymbosae**) **Andrei**, spec. nov., volubilis ut videtur herbacea et perennis; caule gracili ca. 1.3 mm. diametro glabrato brunneo torto 4-costato, costis binis utroque latere approximatis; internodiis usque ad 6 cm. longis; ramis brevibus simplicibus foliosis primo crispe puberulis; internodiis rameis 3-15 mm. longis; foliis pro genere minimis 7-14 mm. longis 4-10 mm. latis oppositis graciliter petiolatis ovato-hastatis obtusis vel acutiusculis basi cordatis vel subtruncatis utroque hastatim 1(-3)-dentatis vel -lobatis a basi 3-nerviis supra vix hirtellis subtus pallidioribus subglabris punctatis; petiolo 6-9 mm. longo crispe puberulo; corymbis terminalibus densis modice convexis 3 cm. vel ultra diametro; bracteis ovatis vel obovato-ellipticis herbaceis; bracteolis similibus angustioribus etiam herbaceis obtusis involucri ca. tertiam partem brevioribus; involucri squamis lanceolati-linearibus 8-9 mm. longis apice plus minusve angustatis obtusis vel rotundatis ciliolatis basi paullo angustatis et calloso-tumidis; corollis (valde immaturis) ca. 6 mm. longis glabris; tubo proprio ca. 2.5 mm. longo; faucibus eum subaequantibus; dentibus limbi ca. 0.8 mm. longis; achaeniis (valde immaturis) gracilibus 3.6 mm. longis deorsum attenuatis subglabris; pappi setis 80-90 capillaribus vix scabriusculis apice non incrassatis flavidulo-subcarneis.—ECUADOR: Zamora, alt. ca. 3000 m., 1876, *Ed. André* no. 4528 (Gr.).

This species closely approaches in habit and many of its features the Peruvian *M. brachyphylla* Hieron. in Engl. Bot. Jahrb. xxxvi.

472 (1905), but the (still immature) involueral scales are no less than 8-9 mm. long and only 1.4-1.5 mm. wide, nearly smooth, and narrowed to a rounded or obtuse tip, while in *M. brachyphylla* the scales even at full anthesis are only 5.5-6 mm. long, fully 2 mm. wide, perceptibly villosulous, and terminate in a triangular acutish tip—differences which seem unlikely to occur within the limits of a single species.

M. (§ **Paniculatae**) **bullata**, spec. nov., fruticosa volubilis; caulibus teretibus dense cum tomento fulvo patento vel deflexo mox deciduo obtectis; internodiis 5-18 cm. longis vel ultra; foliis ovatis acutis obscure denticulatis (dentibus 0.3 mm. altis 3-8 mm. inter se distantibus) cum sinu angusto acuto cordatis aliquando conduplicatis 9-10 cm. longis ca. 6 cm. latis chartaceo-coriaceis supra fulvido-pilosis valde bullatis et scaberrimis subtus persistenter fulvo-villosis et delicatule punctatis pinnativeniis; venis venulisque subtus valde exsertis; petiolo robusto tereti fulvo-tomentoso 1-2.5 cm. longo; panicula densa fulvo-tomentella foliaceo-bracteata; bracteis magnis saepe paniculas particulares superantibus; pedicellis plerisque 2-3 mm. longis; involucri squamis oblongis 4 mm. longis apice rotundatis paullo primo fulvo-pilosis deinde subglabratiss et plus minusve punctatis; corollis 4 mm. longis sublaevibus; tubo proprio gracili ca. 1.5 mm. longo; faucibus late campanulatis 1.2 mm. longis; dentibus limbi ca. 1.3 mm. longis; achaeniis brunnescenti-olivaceis 3 mm. longis deorsum aliquid attenuatis in faciebus obsolete papillosis; pappi setis 35-45 sordido-albis distincte apicem versus incrassatis.—**PERU:** in bushy places between Tambo Ichubamba and Tambo Yuncacoyo, on the way from Sandia to Chunchusmayo, Dept. Puno, alt. 1800-2000 m., *Dr. A. Weberbauer* (Berl., phot. and fragm. Gr.).

M. (§ **Spiciformes**) **clematidiflora** Rusby in herb., volubilis ubique glaberrima gracilis; caulibus 4-5 m. longis; ramis teretibus atrobrunneis; internodiis 4-8 cm. longis; foliis ovatis ad apicem mucroniformem subcaudatum acuminatis basi rotundatis vel obtusis margine obsolete undulatis coriaceis utrinque laete viridibus perucidis 7-9 cm. longis 3-5 cm. latis 5-nervatis, nervorum jugo primo submarginali, secundo a nervo medio ca. 6-19 mm. supra basin decedente; petiolo gracili flexuoso 15-22 mm. longo, panicula terminali ovoidea 1.2-2 dm. alta 1-1.8 dm. crassa foliaceo-bracteata, ramis primariis adscendentibus, secundariis divaricatis; capitulis sessilibus 1 cm. longis plerisque oppositis vel terminalibus; involucri squamis linearibus obtusis apicem versus tenuioribus paullo

angustatis ciliolatis; corollis albis, tubo proprio vix 1 mm. longo, faucibus subcylindricis ca. 3 mm. longis, limbi dentibus deltoideis 0.5 mm. longis fusco-olivaceis cum faciebus glandulari-atomiferis et angulis costiformibus laevibus multo pallidioribus; pappi setis ca. 35 flavescenti-albidis corollam subaequantibus.—COLOMBIA: twining in thickets by streams, Las Nubes, alt. 1373 m., 16 Dec. 1898, *H. H. Smith*, no. 634 (N. Y., Gr.). An unusually neat and handsome species.

M. (§ *Corymbosae*) **flicifolia**, spec. nov., gracilis herbacea prostrata patenter ramosa; caule sulcato-costato vel leviter angulato purpurascenti-brunneo ca. 2 mm. crasso primo crispe puberulo mox glaberrimo; foliis bi- vel etiam tri-pinnatim divisus 2-3 cm. longis 1.5-2.4 cm. latis triangularibus graciliter petiolatis; rhachibus crispe puberulis; segmentis ovato-ellipticis vel suborbicularibus saepe petiolulatis obtusis (terminali saepius lanceolato acutoque) 3-6 mm. diametro integris paullo puberulis saltim subtus in costa media; corymbis trifidis 4-7.5 cm. latis planiusculis puberulis; pedicellis gracilibus 1.5-2.5 mm. longis; bracteolis late ovatis acutis herbaceis 2.5-4 mm. longis; capitulis ca. 8 mm. longis; involucri squamis lanceolati-linearibus attenuatis stramineis ca. 7 mm. longis basi paullo callosis; corollis 5.5 mm. longis glabris tubo proprio 3 mm. longo gracili; faucibus 1 mm. longis vix ampliatis; dentibus limbi anguste oblongis 1.5 mm. longis; achaeniis (valde immaturis) deorsum deerescentibus 5-costatis summa in parte in discum pappiferum paullo expansis; pappi setis 40 vel pluribus delicatule capillaribus albis apicem versus non incrassatis.—PERU: a trailing vine, Machu Picchu, Dept. Cuzco, alt. 2100 m., *O. F. Cook & G. B. Gilbert*, no. 853 (U. S., phot. and fragm. Gr.).

M. (§ *Corymbosae*) **flabellata** Rusby in herb., volubilis ut videtur herbacea vel subherbacea; caulibus aliquando 5 m. longitudine attingentibus teretibus fistulosis infirmis striato-costulatis glaberrimis; internodiis 1 dm. longis vel ultra; foliis oppositis late elliptico-ovatis acuminatis remote obscureque denticulatis basi rotundatis ca. 17 cm. longis 10 cm. latis tenuibus membranaceis juvenate subtus obscure puberulis maturitate utrinque glabris paullo supra basin 5(-7)-nervatis; nervis a venis aliquid irregulariter transversis conjunctis; inflorescentiis axillaribus compositis 4-6 cm. latis foliaceo-bracteatis pedunculatis; corymbis particularibus oppositis pedunculatis compositis 4-6 cm. latis planiusculis subdensis glabris; pedicellis 1-8 mm. longis; bracteolis herbaceis spatulatis ca. 9 mm. longis; capitulis 15-17 mm. altis; involucri squamis 10-11 mm.

longis oblongo-lanceolatis obtusiusculis mucronulatis 5(-7)-nervatis apicem versus paullo puberulis ciliatisque; corollis albis 1 cm. longis graciliter infundibuliformibus glabris; tubo proprio 4.5 mm. longo; faucibus turbinatis 2.5 mm. longis; dentibus limbi lanceolato-oblongis 3.5 mm. longis subacutis; achaeniis glabris 6 mm. longis; pappi setis numerosissimis ca. 175 scabridis capillaribus ad apicem non incrassatis.—COLOMBIA: moderately common in clearings, Sierra del Libano, near Santa Marta, Dept. Magdalena, alt. 1830 m., *H. H. Smith*, no. 2002 (N. Y., Gr.).

M. (§ **Globosae**) **globifera** Rusby in herb., subherbacea volubilis longitudine usque ad 6 m. vel ultra attingens; caule tereti fistuloso juventute subpuberulo deinde glabrescente sed plus minusve (sub lente) papilloso-scabrato post exsiccationem aliquanto costulato; foliis ovatis caudato-acuminatis cuspidato-denticulatis (dentibus 0.5–0.8 mm. altis inter se ca. 6 mm. distantibus) membranaceis basi rotundatis 12–19 cm. longis 6–10.5 cm. latis supra juventute sparse granulati-puberulis subtus paullo pallidioribus, nervis lateralibus pinnatim 3-jugis; petiolo 3–5 cm. longo gracili primo puberulo; inflorescentia interrupta subpyramidalis 2–2.5 dm. longo foliaceo-bracteata; glomerulis 12–17-capitulatis sphaericis 1.5–1.8 cm. diametro; pedunculis (glomerulorum) 8–12 mm. longis; capitulis 7 mm. longis arcte sessilibus; involucri squamis oblongis pallide viridibus nerviis apice deltoideis obtusiusculis basi callosis; corollis albis 5.5 mm. longis gradatim sursum ampliatis sine faucibus distinctis, dentibus limbi deltoideis 0.5 mm. longis glabris; pappi setis ca. 36 albidis.—COLOMBIA: forest, Minca road near Santa Marta, Dept. Magdalena, alt. about 366 m., *H. H. Smith*, no. 1986 (N. Y., Gr.). Only one individual seen by the collector.

Nearly related to *M. globosa* Coult. Bot. Gaz. xx. 46 (1895) of Guatemala but differing in its hollow stems, thinner and denticulate instead of undulate leaves, larger glomerules, and longer, more pointed involucreal scales.

M. (§ **Paniculatae**) **gracilipes**, spec. nov., gracilis ut videtur scandens, caule teretiusculo striato-angulato brunneo praecipue nodos versus strigilloso denique glabriusculo medullosa non fistuloso; foliis oppositis ovatis acuminatis (apice obtusiusculo) basi rotundatis margine undulatis obsolete mucronato-dentatis firmiter membranaceis vel subcoriaceis utrinque viridibus glabris 9–10 cm. longis 5–6 cm. latis subquinqvenerviis; nervorum jugo uno minore ca. 3 mm. supra basin oriente vix tertiam partem laminae percurrente, jugo secundo majore ca. 5–6 mm. supra basin oriente fere ad apicem attingens.

gente; venis tenuibus laxe reticulatis utrinque prominulentibus; petiolo 1.5 cm. longo gracili flexuoso glabriusculo supra canaliculato; panicula composita foliaceo-bracteata ca. 3 dm. alta ca. 2 dm. crassa pyramidata maturitate laxiuscula, partialibus longiuscule pedunculatis patenter ramulosis breviter incurvo-puberulis vel substri-gillosis; pedicellis filiformibus 3-5 mm. longis; bracteolis ovalibus obtusis 1.5 mm. longis stramineis; capitulis maturitate ca. 7 mm. altis; involucri squamis anguste oblongis dorso striatulis apicem rotundatum versus puberulis juventate 3-3.5 mm. longis substramineis maturitate 4 mm. longis brunnescentibus; corollis albis ca. 3 mm. longis; tubo proprio gracili 1.5 mm. longo; dentibus limbi ovatis fauces campanulatas subaequantibus; acheniis gracilibus apicem versus obscure hispidulis aliter glabris 3.5 mm. longis deorsum attenuatis; pappi setis ca. 30 maturitate fulvescentibus.—VENEZUELA: between Valencia and Campanero (probably in the state of Carabobo), alt. 915 m., *August Fendler*, no. 2348 (Gr.). Under this number there was distributed material seemingly identical but of two quite different stages of development collected 7 Mar. 1857 and 12 Feb. 1858.

This species, having its heads somewhat irregularly cymose on the ultimate branchlets of the large and loose panicle, is closely related to *M. trinervis* Hook. & Arn. of Southern Brazil, which, however, has thicker more truly coriaceous leaves tending to be of more elliptical-ovate outline and lacking the prominent reticulation of the veins.

M. (§ **Racemosae**) **Hioramii** Britton & Robinson, spec. nov., gracilis scandens; caule oppositirameo obscure hexagono multico-stato maturitate subtereti fistuloso ca. 2 mm. diametro glaberrimo vel nodos versus obscurissime puberulo; internodiis 4-10 cm. longis; foliis rhomboideo-ovatis caudato-acuminatis integerrimis vel saepius undulato-sublobatis (lobis utroque 1-3 obtusissimis usque ad 4 mm. altis et 1-2 cm. latis) basi cuneatis supra basin 3-nervatis et cum nervulis minimis intramarginalibus etiam munitis utrinque glaber-rimis supra viridibus delicatule reticulatis subtus pallidioribus crassi-uscule reticulatis 6-12 cm. longis 3-6 cm. latis subcoriaceis; petiolo 5-10 mm. longo gracili; inflorescentia terminali racemoso-panicu-lata ca. 1.5 dm. longa ca. 8 cm. diametro basin versus foliaceo-brac-teata; racemis gracilibus patentibus ca. 4 cm. longis aliquando basi compositis 12-20-capitulatis; axe glaberrimo; pedicellis ca. 2 mm. longis; bracteolis lineari-subulatis 1.5 mm. longis; capitulis 5 mm. altis; involucri squamis 4 anguste elliptico-oblongis aequalibus ca. 2.8 mm. longis apice rotundatis eroso-ciliolatis; corollis albis glabris

ca. 2 mm. longis graciliter tubulosis, tubo proprio fauces vix ampliatas subaequante; pappi setis ca. 35 corollam aequantibus delicatule capillaribus albis; achaeniis fusco-brunneis glabris ca. 2 mm. longis.—CUBA: Las Ninfas, Guantanamo, Sept. 1918, *Bro. Hioram*, no. 2210 (N. Y., phot. and fragm. Gr.).

This species is apparently near *M. polycephala* Urb. of Haiti, which however is described as having the leaves tending to elliptic-oblong, obtuse or obtusish at base, and 4-5-nerved, while they are here rhombic-ovate acute at base and 3-nerved. There are other minor differences and it seems very unlikely that the two plants, growing as they do upon different islands, are conspecific.

M. (§ Paniculatae) Jamesonii, spec. nov., gracilis verisimiliter subherbacea et volubilis inflorescentia excepta glabriuscula; caule tereti post exsiccationem multicostulato laevi brunneo medullosa ca. 3 mm. crasso; internodiis usque ad 1.5 dm. longis; foliis ovatis subito caudato-acuminatis utroque 5-6-dentatis basi obtusis vel subacutis 7-9 cm. longis 5-7 cm. latis submembranaceis utrinque viridibus et glabris, nervis lateralibus pinnatim trijugis jugo primo intramarginali, secundo 6-7 mm. et tertio 1.5 cm. supra basin a costa media divergentibus, venis supra immersis subtus prominulentibus laxe reticulatis, dentibus 2-4 mm. altis inter se 1 cm. vel ultra distantibus divaricatis cuspidatis; paniculis ovoideo-pyramidalibus pedunculatis 1-2 dm. altis et crassis fulvo-puberulis; ramis late patentibus; capitulis sessilibus ternis ad apices ramulorum et binis paullo infra; bracteolis minutis lanceolatis 1-1.5 mm. longis; involucri squamis lineari-oblongis paullo angustatis ad apicem obtusiusculum ciliolatis dorso brunnescentibus glabriusculis vix nervatis 5 mm. longis; corollis laevibus; tubo proprio gracili 1.5 mm. longo; faucibus ampliatis campanulato-subcylindricis tubum subaequantibus; dentibus limbi 0.7 mm. longis; achaeniis gracilibus, laevibus 4 mm. longis; pappi setis 30-35 vix sursum incrassatis aetate paullo fulvescentibus.—ECUADOR: forest on the western side of Mt. Pichincha, *Jameson*, no. 833 (K., phot. and fragm. Gr.). A characteristic species, the leaves, with their few coarse, spreading, and cuspidate teeth being quite unlike those of other species having sessile paniculate heads.

M. (§ Paniculatae) lancifolia, spec. nov., fruticosa volubilis; caule primo angulato mox tereti molliter lignoso medullosa juventate sparse flavido-villoso deinde omnino glabrato post exsiccationem sulcato-striato; foliis (supremis solis visis) saepe deflexis lanceolatis attenuatis remote obscureque calloso-denticulatis basi subacutis ca. 7 cm. longis 1.5-2.6 cm. latis penniveniis supra subglabris rugosis et

rugulosis subtus praecipue in costa et venis adpresse pubentibus chartaceo-coriaceis; petiolo gracili 7-9 mm. longo; panicula terminali ca. 3 dm. longa et 2 dm. crassa fere ad apicem foliaceo-bracteata; inflorescentiis particularibus oppositis pedunculatis hirtellis patentibus; pedicellis plerisque 3-4 mm. longis; bracteolis lanceolato-linearibus ca. 2 mm. longis e summo pedicello orientibus; involucri squamis lineari oblongis acutiusculis atrorubescenti-brunneis subglabris maturitate 4.5 mm. longis; corollis albis glabris, tubo proprio 1.5 mm. longo, faucibus campanulatis eum longitudine subaequantibus dentibus limbi ca. 1 mm. longis; achaeniis fusco-olivaceis lucidis 3.7 mm. longis; pappi setis ca. 36 brunnescenti-albidis.—PERU: in shrubby places between Tambo Yuncacoya and Tambo Cachicachi on the way from Sandia to Chunchumayo, Dept. Puno, alt. 1800-2200 m., *Dr. A. Weberbauer*, no. 1137 (Berl., phot. and fragm. Gr.).

This species differs from the other Peruvian members of § *Paniculatae* which have pinnate-veined leaves as follows: from *M. lanceolata* Hieron. by its slender-pedicelled heads, from *M. trachodes* Robinson in its much narrower leaves and (at maturity) smooth stem, and from *M. Mathewsii* Robinson by its narrower and thicker leaves which are not whitened or glaucous beneath.

M. LIGUSTRIFOLIA DC., var. **subsessilis**, var. nov., habitu et multis var. typicae similis differt foliis ternatim verticillatis subtus fusco-punctatis subsessilibus integriusculis; petiolo latiore quam longo (vix 1 mm. longitudine excedente).—BRAZIL: shrub on savannas, Campos do Jordão, São Paulo, Feb. 1890, alt. 1800-2000 m., *J. T. de Moura*, no. 829 (Berl., phot. Gr.). In typical material (var. *typica*) of this species the leaves are opposite and narrowed at the base to a slender petiole 4-12 mm. in length. Although by DeCandolle and by Baker described as glabrous, this species seems normally to be (under a lens) more or less glandular-puberulent at least in the inflorescence.

M. (§ Paniculatae) Mathewsii, spec. nov., verisimiliter volubilis; caule tereti striato usque ad 5 mm. vel ultra diametro lignescente juventate fulvescenti-villoso (pilis patentibus plerisque curvatis) denique glabriusculo; internodiis usque ad 7 cm. longis; foliis late ovatis acuminatis apice vero obtusiusculis basi breviter acuminatis membranaceis 9-14 cm. longis 4-9 cm. latis integerrimis margine anguste revolutis penniveniis supra glabris sublucidis subtus griseis fusco-punctulatis in costa media et in venis principibus (4-jugis) puberulis aliter glabris tenuiter laxaque reticulato-venulosis; panicula composita magna foliaceo-bracteata 3 dm. vel ultra longa, par-

tialibus thyrsoideis pedunculatis ca. 1 dm. longis et 5 cm. crassis brunneo-pubescentibus, pedicellis filiformibus pubescentibus 1-3 mm. longis; capitulis ca. 7 mm. altis in glomerulis convexis aggregatis; bracteolis ovatis acutiusculis ciliatis; involucri squamis ovato-oblongis obtusis tenuibus glabriusculis ca. 3 mm. longis basi in media parte paullo incrassatis et puberulis; corollarum tubo proprio gracili 1.3 mm. longo, faucibus campanulatis 1.7 mm. altis glabris, limbi dentibus ovatis 0.8 mm. longis subacutis minute hispidulis; achaeniis ca. 3 mm. longis brunneis glaberrimis vel in faciebus paullo granulatis; pappi setis ca. 30 sordide albidis vix sursum incrassatis.—PERU: without indication of locality, *Mathews*, no. 1368 (TYPE, Gr., N. Y.); *Fielding* (Gr.). Readily distinguished from the related Peruvian species by the pale grayish under-surface of its large thin leaves, which are not at all rugose.

M. (§ Paniculatae) miconioides, spec. nov., fruticosa volubilis; caulibus teretibus primo ferrugineo-puberulis maturitate glabriusculis fistulosis usque ad 6 m. attingentibus longitudine et 8 mm. vel ultra crassitudine; foliis elliptico-oblongis caudato-acuminatis basi rotundatis integerrimis vel paullo undulatis 13-18 cm. longis 6.5-7.5 cm. latis concoloribus supra glabris delicatule prominulenterque reticulatis impunctatis subtus in venis puberulis vel ubique subglabris membranaceis vel subcoriaceis; venis principibus 3-4-jugis pinnatim dispositis; panicula ampla pyramidata 1.5-3 dm. alta puberula; capitulis sessilibus; involucri squamis oblongis apice rotundatis dorso puberulis 3-3.5 mm. longis; corollis puberulis, faucibus turbinato-campanulatis tubo proprio vel limbo longioribus; achaeniis ca. 2 mm. longis apicem versus puberulis deorsum decrescentibus, faciebus fuscis, angulis pallidioribus; pappi setis ca. 35 flavescenti-albis vix sursum incrassatis.—COLOMBIA: in thickets near stream and in forest, Las Nubes, Dept. Magdalena, alt. 1373 m., *H. H. Smith*, no. 631 (TYPE, Gr., N. Y., U. S.); at the falls of Tequendama, Dept. Cundinamarca, *Holton*, no. 244 (344), N. Y. VENEZUELA: near Colonia Tovar, State of Aragua, alt. 1525 m., 12 Feb. 1858, *Fendler*, no. 2558 (Gr.).

M. (§ Paniculatae) Pennellii, spec. nov., volubilis herbacea caule tereti atropurpureo glaberrimo, internodiis 6-12 cm. longis; foliis triangulari-ovatis subhastatim 3-lobatis acuminatis dentatis basi late cordatis tenuibus utrinque viridibus a basi 5-nerviis plerisque 6-8 cm. longis 5-6 cm. latis tenuissime ciliolatis et aliquando in nerviis obscure puberulis; petiolis 3-5 cm. longis; panicula laxa irregulariterque composita foliaceo-bracteata, partialibus oppositis

pedunculatis ovoideis puberulis 5–20 cm. longis; capitulis ca. 6 mm. longis in ramis ultimis inflorescentiae breviter sed plerumque distincte racemosis, pedicellis 0.5–2.5 mm. longis cum bracteola seu basi seu in media parte seu ad apicem ornatis; involucri squamis oblanceolatis acutis glabris flavescenti-viridibus plerisque 2-costulatis 4.5 mm. longis, costulis basi in callum tumidum minimum confluentibus; corollis viridi-flavis 2.8 mm. longis, tubo gracili basin versus a nectario intus magno et alto sensim distento, limbo subrotato patente, faucibus vix ullis; acheniis 2.6 mm. longis prismaticis deorsum paullo decrescensibus fusco-griseis cum angulis pallidis; pappi setis tenuibus ca. 26 pallide flavescenti-erubescensibus.—**COLOMBIA**: shaded roadside between Villavicencio and “Buena-vista,” Intendencia Meta, alt. 700–900 m., *Dr. F. W. Pennell*, no. 1649 (N. Y., Gr.). This species, although with somewhat similar foliage and habit, should be readily separated from the *M. scandens* group by its somewhat racemose inflorescence, throatless corolla, and greenish-yellow flowers.

M. (§ **Paniculatae**) **rugosa**, spec. nov., fruticosa volubilis; caule plus minusve hexagono dense breviterque fulvo-tomentello; internodiis ca. 1 dm. longis; foliis anguste ovatis gradatim attenuatis primo aspectu integerrimis sed obscure cuspidato-denticulatis basi sinu angusto cordatis supra breviter fulvo-pilosis conspicuiter bullatorugosis et minute papillosis subtus dense molliterque fulvo-tomentosis a basi 3(–7)-nervatis ca. 1 dm. longis 5 cm. latis; petiolo robusto tereti fulvo-tomentoso 2.5 cm. longo, eis ejusdem jugi annulo tumido basi connexis; panicula magna laxiuscula basi foliaceo-bracteata; ramulis (saepe alternis) fusco- vel fulvo-tomentellis; pedicellis 3–5 mm. longis (terminali multo brevioribus) apicem versus bracteolatis; bracteolis lanceolato-oblongis 2 mm. longis dorso tomentellis; involucri squamis oblanceolato-oblongis subacutis dorso tomentellis ca. 4 mm. longis; corollis ca. 5 mm. longis albidis, faucibus late campanulatis glabris dentes limbi lanceolatos et tubum proprium paullulo hirtellum subaequantibus; acheniis fusco-brunneis 3 mm. longis deorsum decrescensibus paullulo in faciebus scabratis; pappi setis ca. 30 flavescens-albidis.—**PERU**: in bushy places, alt. 2400–2500 m., Ramospata, between Sandia and Chunchusmayo, Dept. Puno, 27 July, 1902, *Dr. A. Weberbauer*, no. 1323 (Berl., phot. and fragm. Gr.).

M. (§ **Corymbosae**) **Seemannii**, spec. nov., verisimiliter volubilis et subherbacea; caule subangulato primo hispidulo-puberulo deinde cum basibus pilorum incrassatis muriculatim scabrato ultimo sublaevi plus minusve lucidulo flavido-brunneo; internodiis 1–5 cm.

vel ultra longis; foliis ovatis acuminatis utroque latere ca. 3-5-dentatis basi rotundatis vel aliquid acutatis firmiter coreaceis a basi 7-nervatis supra lucidis scaberrimis subtus paullo pallidioribus scabris opacis 5-8 cm. longis 3.5-5 cm. latis, dentibus 1-2.5 mm. altis 7-15 mm. inter se distantibus obtusis vel plerisque cuspidatis; petiolis 1-1.4 cm. longis hispidulo-puberulis; corymbis terminalibus late ovoideis densiusculis ca. 7 cm. altis et crassis foliaceo-bracteatis; pedicellis 2-4 mm. longis hispidulo-puberulis; bracteolis rhombeo-ovatis acutis ad apicem pedicelli orientibus; capitulis ca. 1 cm. longis; involucri squamis oblongis acutis 7-9 mm. longis subaveniis, interioribus dorso sublaevibus paullo pulverulentis tenuibus ciliatis stramineo-olivaceis, exterioribus firmioribus atrobrunneis dorso hispidulo-puberulis margine pallidioribus revolutis; corollis 7-7.5 mm. longis; tubo proprio ca. 2.5 mm. longo in fauces turbinatas ca. 3 mm. longas gradatim dilatato; dentibus limbi oblongo-lanceolatis 2 mm. longis apicem versus papillosis; achaeniis glabris gracilibus deorsum decreescentibus ca. 4.5 mm. longis saepe cum costulis spuriis 1-2 inter costis 5 principibus distributis.—ECUADOR: at Loja, *Seemann*, no. 652 (K., phot. and fragm. Gr.).

In many respects this plant corresponds with the description of *M. lloensis* Hieron., which, however, is said to have membranaceous 5-nerved leaves with smaller teeth, a rufescent pubescence, and 3-nerved involueral scales—expressions far from applicable to the present plant. The achenes show, in somewhat marked degree, a tendency noticed elsewhere, namely that of having one or two false ribs or rib-like folds or angles in the surface between the primary ribs. Careful investigation shows these to be without vascular tissue and not of sufficient definiteness to warrant placing the plant in *Kanimia*, which at best is a doubtful segregate from *Mikania*.

M. (§ **Racemosae**) **tarapotensis**, spec. nov., verisimiliter scandens et paullo lignescens; caule tereti post exsiccationem obscure striato 4 mm. vel ultra diametro juventate fulvescenteque puberulo; ramis oppositis patentibus; foliis oblongo-oblanceolatis cuspidato-acuminatis basi longe cuneatis integerrimis 5-10 cm. longis 2-3 cm. latis subcoriaceis supra glabris verisimiliter atroviridibus subtus fulvescentibus densissime minutissimeque glandulari-punctatis et obscure puberulis 5(-7)-nerviis; nervorum jugo primo intramarginale obscuro, jugo secundo a puncto 7-10 mm. supra basin oriente majore, jugi tertii nervis (saepe alternis) a punctis 1.6-3 cm. supra basin a costa media divergentibus; nervis omnibus a venis transversis conjunctis; petiolo ca. 5 mm. longo; panícula pyramidata laxiusecula ca.

1.4 dm. longa et 1.2 dm. crassa fulvescenti-puberula; ramis ultimis 2-5 cm. longis; capitulis racemose dispositis; racemis basi saepe plus minusve irregulariter ramosis; pedicellis filiformibus 2-2.5 mm. longis, bracteolis 1.4-1.7 mm. longis linearibus; involucri squamis linearibus 4.5-5 mm. longis acutiusculis apice obscure puberulo excepto glaberrimis; corollis 3 mm. longis glabris, tubo proprio 1.5 mm. longo gracili, faucibus infundibuliformibus ca. 1 mm. longis, limbi dentibus ovato-deltaideis 0.5 mm. longis; achaeniis 2-2.2 mm. longis nigris apicem versus paullulo granulatis vel omnino glaberrimis; pappi setis ca. 30 albidis vix sursum incrassatis.—PERU: in the mountains along the River Mayo near Tarapoto, July-Aug., 1850, *R. Spruce*, no. 4822 (Gr.).

M. (§ **Paniculatae**) **trachodes**, spec. nov., robusta fruticosa volubilis; caulibus teretibus post exsiccationem striato-costulatis medullosis 5 mm. vel ultra diametro flavescenti-brunneis strigilloso-papillois scaberrimis; internodiis 12 cm. vel ultra longitudine; ramis teretibus subadpresse villosis vel setulosis; foliis late ovatis acuminatis remote calloso-denticulatis (dentibus vix 0.5 mm. altis inter se ca. 1 cm. distantibus) basi rotundatis haud quaquam in petiolum decurrentibus 13-15 cm. longis ca. 8 cm. latis chartaceo-subcoriaceis pinnativeniis supra adpresse in venis fulvo-puberulis subtus patenter villosis in venis venulisque reticulatis; petiolis subteretibus flavido-tomentosis ca. 1.5 cm. longis flexuosis eis ejusdem jugi ab annulo vel plicatura crassa papilloso-tomentosa conjunctis; panícula maxima 4 dm. vel ultra longitudine decomposita subdensa villosa-setulosa; pedicellis gracilibus inaequalibus; bracteolis lanceolatis tenuibus acutis dorso villosulis e summa parte pedicelli orientibus involuero dimidio brevioribus; involucri squamis lanceolati-linearibus vel anguste oblongis acutiusculis brunneo-stramineis dorso paullo villosis 4 mm. longis; corollis albidis ca. 3.8 mm. longis extus aliquid villosulis praesertim ad basin faucium et in dentibus; tubo proprio ca. 1.2 mm. longo; faucibus 1.6 mm. longis; dentibus limbi ca. 1 mm. longis; achaeniis olivaceis lucidis 2 mm. longis; pappi setis ca. 40 sordido-albidis paullulo sub apicem acuto incrassatis.—PERU: in bushy places on mountains southwest of Monzon, Dept. Huamalies, alt. 2500-2900 m., *Dr. A. Weberbauer*, no. 3395 (Berl., phot. and fragm. Gr.).

M. (§ **Spiciformes**) **vitrea**, spec. nov., ubique inflorescentia puberula excepta glaberrima robusta volubilis; caule brunneo usque ad 7 mm. vel ultra crasso maturitate fistuloso; internodiis 12 cm. vel ultra longis; foliis late ovatis subito caudato-acuminatis integris vel

obsolete undulatis crassis firmiter coriaceis utrinque glaberrimis perucidis basi rotundatis vel subtruncatis a basi 5-nervatis subtus pallidioribus laxe prominenterque reticulatis 10–12.5 cm. longis 7–10.3 cm. latis margine revolutis; petiolis teretibus robustis 2.8–4 cm. longis flexuosis inter se annulo tumido connexis; paniculis (aliquando axillaribus) foliaceo-bracteatis 3 dm. vel ultra longis 1.3 dm. vel ultra crassis alternirameis, particularibus 1 dm. longis pedunculatis pyramidatis oppositirameis, ramis supra mediam partem dense capituliferis; capitulis 7.5–8.5 mm. longis arcte sessilibus; involucri squamis purpurascensibus anguste oblongis obtusis enerviis basi tumidis et pallidioribus; corollis ca. 5 mm. longis tubulatis sursum paullo gradatimque ampliatis, limbo post exsiccationem atrobrunneo paullo granulato; achaeniis descriptu nimius immaturis; pappo fulvescente.—VENEZUELA: Colonia Tovar in the State of Aragua, alt. 1983 m., *August Fendler*, no. 2349 (Gr.). The specific name has been suggested by the thick and very glossy leaves.

THE PROPER STATUS OF SPHAEREUPATORIUM.—In his Bolivian journey of 1892 Dr. Otto Kuntze collected among several eupatorioid novelties a plant with compound heads on which Hoffmann in Engl. & Prantl, *Nat. Pflanzenf. Nachtr.* 322 (1897), founded his *Eupatorium* § *Sphaereupatorium*, defined solely by the words “Kf. etwa 15 zu kugeligen Kf. 2. Ordnung vereinigt.—1 Art, *E. Hoffmannii* O. Kuntze in Bolivien.” The following year Kuntze, *Rev. Gen.* iii. 147, accepting Hoffmann’s judgment as to the generic position of this plant gave it a fairly detailed specific description under the name *E[upatorium]* (*Sphaereupatorium*) *Hoffmannii*, but seeing opportunity for further naming appended at the end of his diagnosis the following words “Manche werden die merkwürdige Eigenschaft der neuen § *Sphaereupatorium* O. Hoffm., dass nach dessen Diagnose: “Die Blütenköpfe zu einem Kopfe zweiter Ordnung vereinigt sind, analog ähnlich basirten Compositengenera für genügend zur Aufstellung einer neuen Gattung halten und haben dann die Art **Sphaereupatorium** *Hoffmannii* zu nennen.” Kuntze’s childish and often amusing greed for new names is sufficiently well known. It is evident that he here wished—without the trouble of reaching a final decision as to the generic validity of the group—to secure to himself in any event the naming of it.

Were one so disposed, it would be easy to challenge the legality of the names *Sphaereupatorium* (O. Hoffm.) Ktze. and *S. Hoffmannii* Ktze. for they were both published as it were in synonymy or by incidental mention. Indeed, the genus *Sphaereupatorium* as such

has never had a generic diagnosis, and the International Rules for Botanical Nomenclature are explicit in their statement that a genus is not validly published by the mere mention of species (even of previously described species) as belonging to it.

However, the writer has no wish to deprive Kuntze either of his generic name *Sphaereupatorium* or of the specific combination *S. Hoffmannii*. The point at issue is the one from which Kuntze by his ambiguous phrases desired to escape responsible decision, namely whether the plant is or is not of generic rank.

Happily Kuntze's original material is now in the herbarium of the New York Botanical Garden and has been lent to the writer for study. In its general habit there is nothing to exclude the species from the large and multiform genus *Eupatorium*. Even the so-called heads of a secondary order form no fundamental difference; for, at several other points in *Eupatorium*, species occur in which the individual heads are essentially sessile in subglobose glomerules, as, for instance, *E. glomeratum* DC. of Peru, *E. pseudoglomeratum* Hieron. of Ecuador and Colombia, *E. acuminatum* HBK. of Colombia, and even the highly peculiar *E. monanthum* Sch.-Bip. of Mexico.

If one stopped, as the German investigators obviously did, at a very superficial examination of the plant, it would certainly appear unworthy of generic separation; but careful dissection discloses a character of much greater significance, for the receptacles in the individual heads are regularly chaffy throughout their entire extent. Not only is this trait one of considerable importance in separating Composite genera, but it has already been employed as a differential character in distinguishing certain eupatorioid genera. It seems unwise to extend the diversity and add to the already cumbersome size of the genus *Eupatorium*, when distinctions of this definiteness and general significance can be found for separation. Accordingly, to put the genus *Sphaereupatorium* on a more regular footing, its characters may be here stated in a brief diagnosis.

Sphaereupatorium (O. Hoffm.) Ktze. gen. nov. *Eupatoriacearum-Ageratarum*. Capitula homogama tubiflora in glomerulos globosos paniculatos arcte congesta. Involucrum campanulatum, squamis subaequalibus. Receptaculum parvum planum ubique paleaceum. Corollae regulares aequales, limbo 5-dentato. Antherae apice appendiculatae basi obtusae. Styli rami elongati filiformes leviter clavulati longissime exserti. Achaenia 5-angulata. Pappi setae capillares numerosae simplices.—*Eupatorium* § *Sphaereupatorium* O. Hoffm. in Engl. & Prantl, Nat. Pflanzenf. Nachtr. 322 (1897). *Sphaer-*

eupatorium (Hoffm.) Ktze. Rev. Gen. iii. 147 (1898) by incidental mention and without generic diagnosis.—A Bolivian monotype with the following specific character.

S. Hoffmannii Ktze. l. c. An erect slightly ligneous perennial 1.5 m. high; stem terete, 4-5 mm. thick, purplish-brown, puberulent when young, at length merely granulated or glabrate; branches opposite, spreading-ascending; leaves opposite, ovate, acuminate, rounded to a somewhat cuneate base, shallowly mucronate-dentate, chartaceo-membranaceous, 6-8 cm. long, 3-5 cm. wide, above sparsely puberulent, beneath slightly paler, puberulent on the midrib and loosely reticulated veins, glandular-punctate; heads about 11-flowered (with 5-7 partially developed rudiments in the centre) sessile in dense globose glomerules (about 11 mm. in diameter); involucre little imbricated, the scales about 3 mm. long, lance-oblong, obtusish, mostly 2-3-costulate, hispidulous dorsally; corollas 2.7 mm. long, somewhat bulbous at base, slightly and gradually enlarged upward, essentially glabrous; achenes about 1.7 mm. long, dark-brown and somewhat glandular-roughened on the faces, hispidulous on the angles; pappus-bristles about 20.—*Eupatorium Hoffmannii* Ktze. ex. Hoffm. l. c. (1897) without specific char., also Rev. Gen. iii. 147 (1898) where described.—BOLIVIA: Dept. Santa Cruz, Prov. East Velasco, alt. 200 m., Kuntze (N. Y., phot. Gr.).

The only other genus of this particular affinity to exhibit a paleaceous receptacle is the Mexican *Eupatoriastrum* Greenman, a plant of quite different habit, large simple heads, pales expanded toward the tip, and other distinctions.

FURTHER NOTES ON THE GENUS *OPHRYSOPORUS*.—The most desirable boundary between *Eupatorium* and *Ophryosporus* has long been subject to doubt. When some years ago engaged on the revision of *Ophryosporus* (Proc. Am. Acad. xlii. 17-27) the writer hesitated to include in the genus several Peruvian and Bolivian species (much too scantily represented for satisfactory investigation) in which the anther appeared to have at least some slight rudiment of an appendage. In recent work upon South American plants of this affinity, this boundary problem has again been studied, particularly from the side of the genus *Eupatorium*. It has been found that of the species in question at least four not only possess all the essential features of *Ophryosporus* but are certainly related to undoubted species of that genus. These are *Eupatorium chilca* HBK., *E. affine* HBK., *E. hepanthum* Sch.-Bip., and *E. leutheranthemum* Rusby. Concerning one of these species, namely *E. chilca*, the writer was

formerly misled by a supposed authentic fragment in the herbarium of Dr. Klatt exhibiting a well-formed apical anther-appendage, but he has since seen reason to doubt the authenticity of this material and after a re-examination of type-photographs and other available sources of information now feels that *E. chilca* is clearly an *Ophryosporus* as pointed out by Prof. Hieronymus in Engl. Bot. Jahrb. xxii 706 (1897).

So closely related are these four species, not merely among themselves but to *Ophryosporus origanoides* (Meyen & Walp.) Hieron. and *O. venosissimus* (Rusby) Robinson, that intergradation is by no means unlikely and some reduction may well prove needful. It may be worth while, however, to place on record in key form the most distinctive (although manifestly weak) characters by which these species may be separated.

- a. Heads about 5 mm. long, 4-6-flowered b.
 - b. Leaves 3-4 cm. long, the teeth sharp and widely spreading, veins not exerted beneath; Peru.....1. *O. chilca*.
 - b. Leaves 5-7.5 cm. long, serrate, the veins prominent-reticulate beneath; Bolivia.....2. *O. venosissimus*
- a. Heads 7-10 mm. long, 8-11-flowered (except in var. of no. 4) c.
 - c. Stem-leaves lanceolate, attenuate, rather firmly membranaceous, about 4-4.5 cm. long and one-third as wide, mostly 11-14-toothed on each side.....3. *O. eleutherantherus*.
 - c. Stem-leaves ovate-lanceolate, acute or acuminate, limp-membranaceous, about 1.5-2.5 cm. long, usually over two-fifths as wide, mostly 5-9-toothed on each side.....4. *O. origanoides*.

1. *O. CHILCA* (HBK.) Hieron. in Engl. Bot. Jahrb. 706 (1897). *Eupatorium chilca* HBK. Nov. Gen. et Spec. iv. 125 (1820); Robinson, Proc. Am. Acad. iv. 74 (1919). *E. affine* HBK. l. c. 126 (1820); Robinson, l. c. 75 (1919), a larger-leaved form but apparently not otherwise different.—PERU: Cajamarca at the base of Mt. Sta. Polonia, *Humboldt & Bonpland*, no. 3682 (Par., phot. Gr.; Berl., phot. Gr.); also a specimen of *E. affine* HBK. (Par., phot. Gr.) supposed to have been collected at the same locality; shrub, 2 m. high, at Chiquan, Prov. Cajatambo, Dept. Ancachs, alt. 3000-3300 m., *Weberbauer*, no. 2832 (Berl., fragm. Gr.).

This imperfectly known species was described as glabrous but viscid. Photographs of the original material show clearly that the stems are in fact smoother and more distinctly striate than in other members of the group.

2. *O. VENOSISSIMUS* (Rusby) Robinson, Proc. Am. Acad. xlii 24 (1906). *E. venosissimum* Rusby, Mem. Torr. Bot. Club, vi. 57 (1896).—BOLIVIA: Cochabamba, *Bang*, no. 1113 (Gr., Mo.). This

species, with smaller heads, less herbaceous involuere, and prominent veinlets, appears to be certainly distinct.

3. *O. eleutherantherus* (Rusby), comb. nov. *Eupatorium eleutherantherum* Rusby, l. c. iii. no. 3, 53 (1893); Buchtien, Contrib. Fl. Boliv. 189 (1910); Weberbauer, Veg. der Erde, xii. 181 (1911).—BOLIVIA: vicinity of La Paz, alt. 3050 m., *Bang*, nos. 27 (Gr., N. Y., U. S., Mo.), 193 (Gr., N. Y., K.); also *Buchtien*, no. 977, acc. to Buchtien, l. c.—PERU: in the central Peruvian sierra-zone, acc. to Weberbauer, l. c. This species was by Hieronymus in Engl. Bot. Jahrb. xxii. 707 (1897) reduced without question to the following species but, after the examination of several specimens of each, there appear to be a number of slight differences which in conjunction warrant independent treatment at least pending proof of actual intergradation.

4. *O. ORIGANOIDES* (Meyen & Walp.) Hieron. in Engl. Bot. Jahrb. xxii. 707 (1897); Robinson, Proc. Am. Acad. xlii. 23 (1906). *Eupatorium origanoides* Meyen & Walp. Nov. Act. Acad. Caes.-Leopold. xix. Suppl. I. 257 (1843). *E. heptanthum* Sch.-Bip. Bonplandia, iv. 54 (1856), nomen; Sch.-Bip. ex Wedd. Chlor. And. i. 217 (1857), where described; Bull. Soc. Bot. Fr. xii. 82 (1865), & Linnæa. xxxiv. 536 (1865-66); Robinson, l. c. lv. 75 (1919); not Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907).—PERU: Azangaro, *Lechler*, no. 1751 acc. to Sch.-Bip.; in plains around Tacora, alt. 4200-5000 m., *Meyen* (Berl., phot. Gr.); Cordillera de Tacora, *Weddell*; Puno, *Weberbauer*, no. 1366 (Berl., fragm. Gr.); west slope of Misti, Arequipa, *Weberbauer*, no. 1426 (Berl., fragm. Gr.). BOLIVIA: in stony places of the alpine region, Omasuyos, Dept. La Paz, alt. 4000 m., *Mandon*, no. 260 (Gr., N. Y. in part); Isla Titacaca (Isla del Sol), in Lake Titacaca, alt. 3840 m., *Buchtien*, no. 3022 (Gr., N. Y.).

This species is here interpreted (as successively by Steetz, by Klatt, and by Hieronymus) in the light of a Meyen specimen from Tacora preserved in the Berlin Herbarium. Although thought to be a part of the type-material or at least of the original collection, this specimen does not fully accord with the description, which calls for an herbaceous plant with glabrous involueral scales and cordate-ovate leaves. However, an attentive reading of Meyen & Walpers's diagnosis discloses such evidence of haste and carelessness as to destroy all confidence in its detailed accuracy. Thus, for instance, the leaf-blade is said to be "utrinque glabra," but at another point the leaves are described as "ferrugineo-tomentosis" on the nerves. It seems best therefore to discount to some extent the described

characters in the light of what apparently was a portion of the original material even if not absolutely authentic.

A smaller-headed variety has been described by Hieronymus, namely var. *MICROCEPHALUS* Hieron. in Engl. Bot. Jahrb. xxii. 708 (1897) as *microcephala*; Ktze. Rev. Gen. iii. 165 (1898); Robinson, Proc. Am. Acad. xlii 24 (1906).—BOLIVIA: Challapass, Cochabamba, alt. about 4000 m., *Kuntze* (N. Y.).

EUPATORIUM BILLBERGIANUM AND ITS ALLIES.—A small group of Eupatoriums belonging to the ever perplexing Sect. *Cylindrocephala* has given the writer considerable difficulty, but now seems to resolve itself into elements which may be pretty clearly defined. It consists of four nearly related slightly shrubby climbers in which the heads are glomerate in a pyramidal panicle (not at all cymose or corymbose) and the leaves are from typically ovate to ovate-oblong or elliptical, entire or undulate to remotely mucronulate-denticulate, with no tendency to hastate form or toothing. As thus far known these species have wholly distinct ranges, one being from Panama and Guatemala, another from Costa Rica, the third from Nicaragua, and the fourth, remote from the others, in Ecuador. They are of very similar habit and at first examination suggested probable variations of a common specific type. However, they appear to maintain the following distinctions.

- a. Leaves elliptical-ovate, shortly and bluntly pointed, slightly undulate or entire, not definitely pellucid-punctate; Ecuador.....1. *E. Eggersii*.
- a. Leaves ovate, gradually acuminate or even subcaudately pointed, inconspicuously but definitely glandular-toothed b.
- b. Leaves distinctly (under lens) pellucid-punctate c.
- c. Inflorescence densely puberulent or tomentellous; leaves dull, 3-nerved from above base and with conspicuous and subregular transverse veins between the ribs, their pellucid punctation of very fine dots; Costa Rica.....2. *E. laurifolium*.
- c. Inflorescence subglabrous to sparingly puberulent chiefly near the nodes; leaves tending to be lucid, pinnate-veined, without regular or conspicuous cross-veining, the punctation coarser and more definitely of the dot and dash type; Nicaragua. .3. *E. nicaraguense*.
- b. Leaves not definitely pellucid-punctate but with a subtranslucent network of veinlets often discontinuous; inflorescence essentially glabrous; Panama and Guatemala.....4. *E. Billbergianum*.

1. *E. EGGERSSII* Hieron. in Engl. Bot. Jahrb. xxviii. 566 (1901).—ECUADOR: Prov. Manabi, near the Hacienda El Recreo, *Eggers*, no. 15,414 (Berl., phot. and fragm. Gr.). Since treating this species, Proc. Am. Acad. liv. 346 (1918), the writer has seen a second specimen which seems referable to it, namely *Eggers*, no. 15,671 (K.), also from Ecuador though without stated locality. It is said to be a

climbing shrub with greenish flowers. It corresponds with the type in all important features but has considerably larger leaves, in some instances as much as 8.5 cm. long and 5 cm. wide.

2. *E. LAURIFOLIUM* Robinson, Proc. Bost. Soc. Nat. Hist. xxxi. 251 (1904).—COSTA RICA: hill near the Rio Chirripó, *Pittier*, no. 16,065 (Gr.).

3. *E. nicaraguense*, spec. nov., praecedentibus habitu et characteribus multis simile ramulis inflorescentiae et squamis involucri exceptis glaberrimum; caule tereti gracili, internodiis 4-8.5 cm. longis; foliis oppositis lanceolato-vel oblongo-ovatis acuminatis glandulari-denticulatis basi obtusis penniveniis (venis plerumque 4-5-jugis vel superioribus alternis) 8-12 cm. longis 3-5.2 cm. latis pellucidi-punctatis et lineolatis firmiter membranaceis utrinque viridibus supra saepe sublucidis margine aliquando undulatis cum dentibus mucronuliformibus utroque latere 6-9; petiolo gracili 1-2 cm. longo glabro; panicula pyramidata 1-1.5 dm. alta et crassa, rhachi ramisque solum nodos versus paullo puberulis; capitulis arcuato sessilibus ad apices ramulorum glomeratis 1 cm. longis ca. 10-floris; involucri squamis 18-20 valde inaequalibus regulariter gradatis pallide viridibus albido-striatis ovatis vel ovato-oblongis obtusis vel rotundatis plus minusve eroso-ciliolatis apicem versus paullo puberulis; corollis tubularibus ca. 5.5 mm. longis sine faucibus distinctis viridi-albis glabris, limbi dentibus oblongis 0.8 mm. longitudine; achaeniis fusco-brunneis 3.5 mm. longis sublucidis paullo hispidulo-pubescentibus; pappi setis ca. 36 flavescenti-albidis.—NICARAGUA: Chontales, 1867-68, *R. Tate*, no. 158 (444), TYPE (K., phot. Gr.); also from Nicaragua but without record of station, 1867-68, *R. Tate*, no. 157 (K., Gr.).

4. *E. BILLBERGIANUM* Beurl. Prim. Fl. Portobellensis, 134, ex Actis Reg. Acad. Sci. Svec. (1854); Hemsl. Biol. Cent.-Am. Bot. ii. 93 (1881).—PANAMA: near Portobello, Apr., 1826, *J. E. Billberg*; Chagres, 20 Feb. 1850, *Fendler*, no. 154 (K.); Aspinwall, 6 Dec. 1861, *Sutton Hayes*, no. 565 (K.). GUATEMALA: Dept. Alta Verapaz, at Cubilquitz, alt. 350 m., May, 1902, *von Tuerckheim*, no. S240 (Gr.), and at the same locality "im Hochwald," Aug., 1907, *von Tuerckheim*, no. II, 1912 (Gr.). It has been impossible to find any constant or significant difference between Guatemalan specimens and those from the type region around Panama.

The species here discussed have in general involucre somewhat laxer than is usual in Sect. *Cylindrocephala*, that is to say, although the scales are regularly imbricated in four or more series, the inner tend early to spread so as to give the involucre (at least in the dried

state) a subcampanulate rather than cylindrical form. This suggests a transition toward the *Critonia*-group of Sect. *Subimbricata* in which also the leaves are commonly marked with round and oblong pellucid dots.

II. THE EUPATORIUMS OF BOLIVIA.

THE botany of Bolivia is an essentially recent subject, largely created by the activities of the present generation. The plants of the other Andean countries, Chili, Peru, Ecuador, and Colombia, were in some degree scientifically known even in the eighteenth century. A good many of them were described in the works of Linnaeus and Lamarck. Indeed, before 1800 Ruiz and Pavon were already publishing their elaborately illustrated folios on the flora of Peru and Chili. In regard to the plants of Bolivia, however,—or as it was formerly called, Upper Peru—the records prior to 1890 were exceedingly scanty and inaccurate.

Of the genus *Eupatorium*, so abundantly represented throughout tropical America, DeCandolle in his treatment published in 1836 (Prod. v. 141–186) included but a single species from Bolivia, namely his own *E. Pentlandianum*, and this appears to be the sole mention of the Bolivian occurrence of the genus prior to 1857 when Weddell, Chlor. And. i. 216–218, among his Andean *Compositae*, described as new three species of *Eupatorium* from the western part of Bolivia.

In 1865 there was published (Bull. Soc. Bot. Fr. xii. 79–83) a considerable list of plants collected by Gilbert Mandon, chiefly in the neighborhood of Sorata. The *Compositae* of this catalogue had been identified by Schultz-Bipontinus and among them he enumerated twenty-two species and varieties of *Eupatorium* including no less than thirteen which were named as new to science. Unhappily not one of these novelties was provided with a diagnosis. It is true, some happened to be mixed with other material, distributed under identical numbers in Mandon's exsiccatae, and in order to explain their identity Schultz in a few instances mentioned one or at most two salient features, such as the number of the florets or length of the petiole; but in no case was the description sufficient to establish the validity of the species. The *Compositae* of this list were some months later re-enumerated by Schultz (Linnaea, xxxiv, 527–536) with a very few supplementary notes. This catalogue of the Mandon numbers, having given the earliest clue to the identity of many Bolivian plants is of considerable historical importance in relation

to the flora of the country. However, as it contained many erroneous identifications and as its carelessly launched nomina nuda have led to some wholly mistaken interpretations, it gave Bolivian botany an unfortunate start.

In treating the *Compositae* for the Flora Brasiliensis Baker made a praiseworthy effort to give at least brief hints as to the extra-limital distribution of the plants discussed, but although he treats upward of 150 Brazilian species of *Eupatorium* he mentions the Bolivian occurrence of only one, *E. crenatum* (under the mistaken name of *E. dendroides*).

The flora of Bolivia was thus almost unknown when Dr. H. H. Rusby began in the middle eighties his courageous and energetic exploration of the Andes together with the adjacent slopes and lowlands in the Department of La Paz. His work was somewhat later continued by Mr. Miguel Bang and extended to the Department of Cochabamba which is also in the western and more mountainous part of Bolivia. The resulting series of plants were of course very rich in novelties and have been treated in a succession of important papers. The portions of these which refer to *Eupatorium* are as follows: Britton, Bull. Torr. Bot. Club, xviii. 333-334 (1891); Rusby Mem. Torr. Bot. Club, iii. no. 3, 52-53 (1893), iv. no. 3, 210-211 (1895), and Bull. N. Y. Bot. Gard. iv. 377-381 (1907).

In 1894, Dr. Klatt (Ann. Naturhist. Hofmus. ix. 356, 358) described two Bolivian species of *Eupatorium* from specimens collected by Cuming and by d'Orbigny presumably between 1825 and 1835.

As early as 1873, Lorentz & Hieronymus, well known for their extensive explorations in Argentina, entered extreme southern Bolivia and made a collection of plants in the Department of Tarija. Some *Compositae* acquired on this journey were mentioned by Hieronymus in Engl. Bot. Jahrb. xxii. 673-798 (1897).

In 1892 Dr. Otto Kuntze visited Bolivia and collected rather extensively in several parts of the country including the lowlands in the great eastern department of Santa Cruz. His plants are now in the herbarium of the New York Botanical Garden. Dr. Kuntze's *Compositae* of the Tribes *Vernoniaceae* and *Eupatoriaceae* were identified by Prof. Hieronymus and many of them were treated in his paper just cited. The collection as a whole was listed by Kuntze himself, Rev. Gen. iii (1898), where on pages 146-148 he enumerates twenty-seven species, varieties, and named forms of *Eupatorium* from Bolivia.

Hieronymus in Engl. Bot. Jahrb. xxix. 15 (1900) ascribed to Bolivia as well as Ecuador, and Peru, his *E. pteropodium*, which has since proved to be *E. nemorosum* Klatt.

In 1906, R. E. Fries, *Arkiv för Botanik*, v. no. 13, 8-10, listed the Eupatoriums observed and collected by him on the Swedish expedition of 1901-1902 to the Chaco Cordillera in northern Argentina and adjacent Bolivia. Of these, six are recorded as from Bolivia.

In 1908, Hieronymus, l. c. xl. 371-388, treating the *Compositae* in an important paper by Urban, described nine species of *Eupatorium* from Bolivia, collected chiefly by K. Fiebrig in the extreme southern part of the country.

The only local paper touching this group for Bolivia was published at La Paz in 1910, by Dr. Otto Buchtien, *Contrib. Fl. Boliv.* pt. 1, 189, and mentions in a list of his own plants six species of *Eupatorium*.

In 1912, Dr. Janet Perkins in *Engl. Bot.* xlix. 222 writing of the collections chiefly of Bender and Pflanz mentions the Bolivian occurrence of *E. scopulorum* Wedd.

Last year the writer (*Proc. Am. Acad.* lv. 7-34) described six new species and varieties of *Eupatorium* from Bolivia.

The present treatment follows closely the plan adopted in the author's recent papers on the Eupatoriums of Colombia, Venezuela, and Ecuador (*Proc. Am. Acad.* liv. 264-367) and of Peru (l. c. lv. 42-88). Therefore, in order to save space, species already treated in either of those papers are not here redescribed but merely cited with such bibliography as relates particularly to their occurrence in Bolivia.

As in similar undertakings in the past the writer has been greatly aided by the privilege of borrowing or personally examining material in several important herbaria, notably those of the United States National Museum, the Field Museum of Natural History in Chicago, the Missouri Botanical Garden, and particularly the New York Botanical Garden, the last mentioned being especially rich in Bolivian plants through having the most complete sets of the extensive collections of Dr. H. H. Rusby and Mr. Miguel Bang, as well as in the possession of the herbarium of the late Dr. Otto Kuntze.

To Dr. Rusby of the New York College of Pharmacy the writer is indebted for information which his personal familiarity with Bolivian geography and climatic conditions have enabled him to give in regard to some of the more obscure plant-stations. Mr. Bayard Long has kindly furnished data concerning Bolivian specimens of *Eupatorium* in the herbarium of the Philadelphia Academy of Natural Sciences. Mr. A. F. Hill, in charge of the herbarium of Yale University, has been so good as to lend for comparative study the South American Eupatoriums of that establishment. Miss Mary A. Day, librarian of the Gray Herbarium, has given much aid in regard to the bibliography and in verification of citations.

The abbreviations here employed to indicate the different herbaria are identical with those used and duly explained in the former papers already cited.

The maximum number of Bolivian Eupatoriums enumerated in any previous paper appears to have been twenty-seven. It will be seen, however, that by bringing together all available specimens and data it has been possible to include in the present revision sixty-eight species (not to mention several varieties and named forms), although it has been necessary to transfer several to neighboring genera, such as *Ophryosporus*, etc. Furthermore, there is reason to suppose that of the Eupatoriums indigenous in Bolivia a great part are still to be discovered. In this connection it may be noted with interest that from Peru, the adjacent country to the northwest, we now know seventy-nine¹ species of this genus and from Brazil, to the east, upward of two hundred. Bolivia, intermediate in position and with equal diversity of habitat, is therefore pretty sure to possess a much larger representation of the group than has yet been discovered within its borders.

Of the 68 species here listed 29 are, so far as our present knowledge goes, endemic, being confined to the country. The endemism of Bolivia as illustrated by this group is thus about 43% as against about 55% in Peru and 59% in Colombia.²

After deducting the 29 endemic species, there remain 39 Bolivian Eupatoriums which extend to other countries. Of these only 18 are known in Peru, while nearly all the others are species common to southern-central Brazil and northern Argentina. Beyond a very few species of wide distribution there is a surprisingly slight common element between the Bolivian and Paraguayan members of the genus, although *Eupatorium* is pretty well represented in both of these contiguous countries.

In Bolivia, so far as we know it to date, there is a striking absence of certain rather characteristic groups, namely:

1) A series of § *Subimbricata* which includes *E. glutinosum*, *E. persicifolium*, *E. buddleaeifolium*, *E. discolor*, and *E. Salvia*—shrubby

¹ Although 82 Peruvian species of *Eupatorium* were enumerated by the writer, Proc. Am. Acad. lv. 42-85, it has since been found probable that three, namely *E. chilca*, *E. affine*, and *E. heptanthum*—all of them imperfectly known species—would better be transferred to the nearly related genus *Ophryosporus*.

² The endemism of the genus *Eupatorium* for Colombia was in 1918 reckoned at 53%, but during the last two years several new endemic species have been discovered and one mistakenly reported (*E. Dombeyanum*) eliminated from the Colombian flora.

or arborescent species with prevailing oblong feather-veined bullate-rugulose leaves of peculiar texture, a group of xerophytes tending to viscidiness and passing through such species as *E. Ballii*, *E. Cursonii*, *E. Volkensii*, and *E. chotense* into a small group of linear-leaved species, such as *E. Gayanum* and *E. lavandulaefolium*.

2) That portion of § *Subimbricata* which includes *E. elatum*, *E. trinitense*, *E. turbacense*, *E. tovarense*, and *E. Sprucei*, species characterized by attenuate style-branches and lance-oblong feather-veined leaves. (For a discussion of this series see Proc. Am. Acad. Iv. 33-34.)

3) The peculiar little group represented by *E. origanoides*, *E. nivium*, and *E. leucophyllum*, species with the leaves whitened beneath.

4) Those species of § *Eximbricata* with prevailing elliptical coriaceous and finely reticulated leaves, namely such species as *E. fastigiatum*, *E. exserto-venosum*, *E. umbrosum*, *E. cotacachense*, and *E. elegans*.

The complete absence of these groups, elsewhere, often conspicuous elements in the other Andean floras, is not easily explained with our still exceedingly imperfect knowledge of the soil-relations and ecological conditions of Bolivia.

As to the different sections of the genus *Eupatorium* represented in Bolivia it may be observed that §§ *Cylindrocephala*, *Subimbricata*, and *Eximbricata* are here as elsewhere the prevalent groups and that they occur in about the same proportion as in Peru. As in other regions the separation of §§ *Subimbricata* and *Eximbricata* is in Bolivia difficult and obviously artificial. Even §§ *Cylindrocephala* and *Praxelis* appear so nearly confluent that certain species might with almost equal propriety be placed in either. The little § *Praxelis* is more than usually well represented, having no less than five species of which three are endemic. The §§ *Conoclinium* and *Campuloclinium* have only one Bolivian member each—in both instances species of wide range by no means peculiar to the country.

Baker's very weak sectional proposition *Urolepis* is represented in Bolivia by both of the species originally referred to it, namely *E. hecatanthum* and *E. trichobasis*. It was distinguished by Baker chiefly on account of the caudate appendages of its involucreal scales. This feature, conspicuous in *E. hecatanthum*, is obscure in *E. trichobasis*. The two show in other respects no marked similarity and are far from constituting a consistent or well marked section. Both have hairy receptacles and may be logically merged with § *Hebeclinium*.

Owing to additional distinctions observed in Hoffmann's § *Sphaerocypatorium* this peculiar Bolivian monotype seems best treated as a separate genus (see p. 23).

A key to the sections will be found in a former paper (Proc. Am. Acad. liv. 269) and need not be here repeated. Only one change is made here in the interpretation of the sections. Namely, certain species have been included in § *Praxelis* which are neither annual nor have peduncles of exceptional length.

Sect. I. CYLINDROCEPHALA DC. (See Robinson, Proc. Am. Acad. liv. 270, 332, 345.)

KEY TO SPECIES.

- a. Involucral scales closely appressed at the often more or less modified tip *b*.
b. Leaf-blade cuneately or at least obtusely narrowed at base *c*.
c. Heads 7-8-flowered, very slender, acute in bud . . . 1. *E. leptacephalum*.
c. Heads 14-35-flowered, obtuse (except no. 8) in bud *d*.
d. Pedicels glabrous 2. *E. laevigatum*.
d. Pedicels pubescent *e*.
e. Leaves of harsh texture, scabrous above *f*.
f. Herbaceous; mature heads 8-9 mm. high, on pedicels 3-16 mm. long 3. *E. waefolium*.
f. Shrubby; mature heads 11-13 mm. long, sessile or on short thickish pedicels rarely 4 mm. in length *g*.
g. Stems, pedicels, and lower surface of leaves sparingly pubescent; leaves scarcely over one-third as wide as long, drying green 5. *E. connivens*.
g. Stems, pedicels, and lower surface of leaves densely pubescent or velvety; leaves nearly one-half as long as wide, drying olivaceous or darkening 6. *E. tunariense*.
e. Leaves softly membranaceous to subchartaceous, often pubescent but not scabrous above *h*.
h. Involucre cylindrical, the scales broadly and conspicuously colored (green or purple) or modified in texture near the tip; leaves 5-7 cm. long *i*.
i. Leaves ovate, nearly half as wide as long . . . 6. *E. tunariense*.
i. Leaves lanceolate, about one-fourth as wide as long 7. *E. Arnottianum*.
h. Involucre usually somewhat ovoid, the scales brown or stramineous, slightly if at all purple-bordered toward the tip. 8. *E. squalidum*.
c. Heads 40-∞-flowered *k*.
k. Heads rather numerous in widely branched compound corymbs; involucre short-cylindric, 4-5 mm. thick 9. *E. extensum*.
k. Heads few, in terminal subsimple 3-8(-12)-headed cymes or corymbs; involucre campanulate-cylindric, 6-8 mm. thick *l*.
l. Achenes 4.2 mm. long; outermost involucral scales pubescent on the back, the intermediate ones rounded at the summit 10. *E. Bangii*.
l. Achenes 2.8 mm. long; involucral scales all essentially glabrous on the back, the intermediate mucronate 59. *E. toldense*.
b. Leaf-blade rounded, subtruncate, or subcordate at base (sometimes very shortly acuminate at the point of insertion from a base of broadly rounded contour) *m*.

- m.* Leaves subglabrous to thinly pubescent, bright green on both sides
11. *E. subscandens.*
- m.* Leaves softly grayish-tomentose especially beneath. 12. *E. mallotum.*
- a.* Involucral scales squarrose or subsquarrose *n.*
- n.* Heads 20–60-flowered; involucre about 5 mm. thick *o.*
- o.* Leaves lance-oblong to linear, usually obtusish; branchlets of inflorescence ascending. 3. *E. ivaeifolium.*
- o.* Leaves rhombic-ovate (the upper lanceolate), acute; branchlets of inflorescence divaricate; outer involucral scales with sessile orange-red glands on the back of the foliaceous tip. 4. *E. squarrosoramosum.*
- n.* Heads about 100-flowered; involucre 10–12 mm. thick
57. *E. phyllocephalum.*

1. ***E. leptcephalum*** DC. Prod. v. 148 (1836); Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & Linnaea, xxxiv. 535 (1865–66); Robinson, Proc. Am. Acad. liv. 278, 346 (1918), lv. 45 (1919).

BOLIVIA: without stated locality but presumably from near Mt. Sorata, Prov. Larecaja, Dept. La Paz, *Mandon*, no. 247, acc. to Sch.-Bip. l. c. [Peru, Ecuad., Colomb.]

The writer has not found this *Mandon* number in any herbarium consulted and it is therefore impossible here either to confirm or to correct this record by Schultz.

2. ***E. laevigatum*** Lam. Encyc. ii. 408 (1786); Buchtien, Contrib. Fl. Boliv. i. 189 (1910); Robinson, Proc. Am. Acad. liv. 273, 333, 346 (1918), lv. 45 (1919). *E. conyzoides* Britton, Bull. Torr. Bot. Club. xviii. 333 (1891), as to no. 1621; Rusby, Mem. Torr. Bot. Club, vi. 56 (1896); not Vahl. *E. Christicum* Rusby, Bull. N. Y. Bot. Gard. iv. 312 (1907), not Bak. *E. laevigatum*, f. *lilacinum* Ktze. Rev. Gen. iii. pt. 2, 147 (1898).

LA PAZ: Prov. Larecaja: Guanai, alt. 610 m., *Rusby*, no. 1621 (Gr., N. Y., Mo., also U. S. where mixed with *Salmea mikanioides* Britton); Guanai-Tipuani, *Bang*, no. 1444 (Gr., U. S., N. Y., Field Mus., Mo.); San Carlos and Charapampa, alt. 570 m., *Buchtien*. Prov. Caupolican: Apolo, alt. 1464 m., *R. S. Williams*, no. 87 (N. Y.).

SANTA CRUZ: Prov. East Velasco, alt. 200 m., *Kuntze* (N. Y., U. S.); Prov. Sara: Yapacani, alt. 400 m., *Kuntze* (U. S.).

[Mex. to Argent.]

Forma ***lilacinum*** Ktze. (typical). Corollas lilac.—Lit., synonym, and exsicc. as above.

Forma ***albiflorum*** Ktze. Corollas white.—Rev. Gen. iii. pt. 22, 147 (1898).

SANTA CRUZ: Prov. Sara: Yapacani, alt. 122 m., *Kuntze* (N. Y.).

Forma ***flavidum*** Ktze. Corollas yellowish.—Rev. Gen. iii. pt. 2, 147 (1898).

SANTA CRUZ: Sierra de Santa Cruz, *Kuntze* (N. Y.).

3. ***E. ivaefolium*** L. Syst. ed. 10, 1205 (1759), as *ivaefolium*; Amoen. Acad. v. 405 (28 Nov. 1759), as *irifolium*; Sp. Pl. ed. 2, ii. 1174 (1763); Robinson, Proc. Am. Acad. liv. 275, 333 (1918), lv. 44 (1919). *E. fasciculare* Poepp. in Poepp. & Endl. Nov. Gen. ac Spec. 54 (1845); Ktze. Rev. Gen. iii. pt. 2, 147 (1898). *E. guanaiense* Britton, Bull. Torr. Bot. Club, xviii 333 (1891); Rusby, Mem. Torr. Bot. Club, iii. no. 3, 53 (1893).

LA PAZ: Prov. Larecaja: Guanai, *Rusby*, no. 1735 (N. Y.); Prov. Yungas: *Bang*, no. 417 (Gr., N. Y., U. S., Mo.); Prov. North Yungas: Polo-Polo, near Coroico, *Buchtien*, no. 240 (Gr., N. Y., Mo.)

SANTA CRUZ: Prov. Sara: Yapacani, alt. 400 m., *Kuntze* (N. Y.).

DEPT. NOT IDENTIFIED: Machichoirisa, *R. S. Williams*, no. 1612 (N. Y.).

This species has a wide range from Florida to Brazil and Peru. While retaining its essential features with considerable fidelity it varies much in stature, size of leaves, size of heads, and degree to which the tips of the involucre scales are squarrose. A slender form with small leaves is frequent in the drier parts of Brazil, etc., and has been characterized as var. *EXTRORSUM* (Sch.-Bip.) Bak. in Mart. Fl. Bras. vi. pt. 2, 290 (1876) as *extrorsa*. This slender form occurs in Bolivia as follows: SANTA CRUZ: Prov. Chiquitos: *d'Orbigny*, no. 676 (Gr.). The most northern form in Florida and Mexico tends to have thinner leaves and shorter heads. The most luxuriant tropical form in Bolivia tends, on the other hand, to have large and thickish leaves and somewhat longer heads, but not more so than in some Central American specimens. Satisfactory distinctions, even for varietal division, other than those of mere luxuriance, have not been found. In all forms the roots are of fasciculate long tough dark fibres.

4. ***E. squarroso-ramosum*** Hieron. Perennial herb, 5-10 dm. high; stems slightly striate-sulcate, pubescent and glandular, branched from base; branches many, squarrose, leafy to the loose subcorymbose inflorescence; internodes sometimes as much as 1 dm. long; leaves opposite, rhombic-ovate (the upper lanceolate), acute, subcrenate-serrate with 3-6 teeth on each side, narrowed at base, membranaceous, somewhat pilose or roughish-pubescent on both surfaces, 5-6 cm. long, 2.5 cm. wide, with 2-4 pairs of pinnately disposed lateral veins, the lowest pair somewhat the most prominent and nerve-like; petiole 5-10 mm. long; branchlets of the panicle divaricate; pedicels 5-20 mm. long, sparingly pilose; involucre 7-8 mm. long, 4-5 thick, campanulate-subcylindric, about 6-seriate; the inner

scales linear-cuneate, subtruncate-obtuse, scarious, stramineous, dark or purplish toward the tip, minutely ciliate at the apex, 3-ribbed, the outer gradually shorter, their tips foliaceous, triangular, squarrose, bearing on the back some puberulence and reddish-orange glands, 3-5-ribbed; corollas 4-5 mm. long, tube subcylindric, perceptibly amplified, sprinkled with reddish-orange glands, teeth 0.5 mm. long, similarly gland-bearing on the back; achenes (not quite ripe) 2.5-3 mm. long, dark, subglabrous except for the scabrid straw-colored angles; pappus-bristles 20-25, pale straw-colored.—Hieron. in Engl. Bot. Jahrb. xxii. 754 (1897); R. E. Fries, Arkiv för Bot. v. no. 13, 8 (1906).

TARLJA: Chaco, Tatarenda, R. E. Fries, nos. 1438 and 1502, acc. to Fries, l. c.

[Northern Argent.]

Not seen; character here condensed from original diagnosis.

5. **E. connivens** Rusby. Shrubby; stems terete, at length covered by a brownish-gray cortex; branches opposite, ascending, scabrid-pubescent, the hairs attenuate, pale, spreading or more often curved upward; leaves chartaceous, opposite, ovate-lanceolate, attenuate to an often obtusish apex, cuneate to a nearly sessile base, rather coarsely and sharply 2-5-toothed on each side, bright green and scabrid-pubescent on both surfaces, 3-nerved essentially from the base; 6-9 cm. long 1.8-2.5 cm. wide; corymbs compound, dense, leafy-bracted at base; pedicels short, thick; heads about 12 mm. long, about 5 mm. in diameter, about 22-flowered; involueral scales about 25, closely and regularly imbricated, rounded or obtuse, ciliate, green and purple; corollas 6 mm. long, glabrous, presumably purple; achenes slender, tapering downward, about 4 mm. long, the faces black and smooth, the ribs stramineous, upwardly scabrid; pappus-bristles about 36, unequal, whitish, barbellate.—Mem. Torr. Bot. Club, vi. pt. 1, 57 (1896); Ktze. Rev. Gen. iii 147 (1898). *E. paucidentatum* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & *Linnaea*, xxxiv. 535 (1865-66), without character, not Sch.-Bip. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 297 (1876). *E. cochabambense* Hieron. in Engl. Bot. Jahrb. xxii. 745 (1897). *E. cochabambana* Ktze. l. c., by obvious clerical error.

COCHABAMBA: Vic. Cochabamba, 1891, *Bang.* no. 1114 (Gr., N. Y., U. S. Mo.); alt. 3000 m., 26 Mar. 1892. *Kuntze* (N. Y.).

LA PAZ: Prov. Larecaja: on schist in temperate region, alt. 2600-2700 m., between Munaypata and Challastuyo, *Mandon*, no. 248 (Gr., N. Y.).

SANTA CRUZ: Sierra de Santa Cruz, alt. 2000 m., *Kuntze*, acc. to himself, *Rev. Gen.* iii. pt. 2, 147 (1898).

6. ***E. tunariense*** (Hieron.), comb. nov. Shrubby, 1 m. high; copiously branched above; branches opposite, ascending, terete, densely and somewhat fulvously sordid-pubescent, the hairs short, transparent, incurved, attenuate, jointed; leaves opposite, ovate, soft-membranaceous but in age subchartaceous, acuminate and somewhat attenuate at the apex, more abruptly acuminate at the short-petioled base, 2-4-toothed on each side or sometimes merely undulate or subentire, dull green, sparingly pubescent but decidedly scabrous above, paler and somewhat densely sordid-pilose beneath, 3-nerved either from the base or from a point somewhat above the base; heads numerous in dense terminal compound leafy-bracted flattish corymbs, 20-30-flowered, about 1 cm. long, 3-4 mm. thick; involueral scales obtuse, ciliate, usually dark purple on the exposed surface; achenes about 5 mm. long, roughened on the angles, smoothish on the faces; pappus-bristles about 30, yellowish-white, barbellate.—*E. conyzoides*, var. *tunariensis* Hieron. in Engl. Bot. Jahrb. xxii. 742 (1897). *E. conyzodes* [Vahl] Ktze., var. *tunariense* Hieron. ex. Ktze. Rev. Gen. iii. pt. 2, 147 (1898). *E. conyzoides* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & Linnaea, xxxiv. 535 (1865-66); Britton, Bull. Torr. Bot. Club, xviii. 333 (1891), as to no. 1624; not Vahl.

SANTA CRUZ: Sierra de Santa Cruz, *Kuntze* (N. Y.).

COCHABAMBA: Prov. Ayopaya: Tunari, alt. 2400 m., *Kuntze* (N. Y.).

LA PAZ: Prov. Larecaja: Caracirca Hill, near Sorata, alt. 1700 m., *Mandon*, no. 250 (Gr.), immature and doubtful; Sorata, alt. 2440 m., *Rusby*, no. 1624 (U. S.).

This species cannot be satisfactorily included in *E. odoratum* L., which as to its Jamaican type, has longer-petioled leaves, never scabrous above, smaller heads, narrower green-maculate involueral scales and many other minor differences. While it is possible that the two may be connected by convincing intermediates, these have not been found in the considerable material thus far examined by the writer. Furthermore, in a group of this technicality were forms of such manifest and general diversity placed in the same species, it would be impossible to exclude many other forms the union of which would be highly unsatisfactory. Under these circumstances it appears the practical course to treat *E. tunariense* for the present as an independent species.

7. ***E. Arnottianum*** Griseb. Nearly or quite herbaceous, essentially erect, 4 dm. or more in height, finely grayish-puberulent, not scabrid; leaves rhombic-lanceolate, narrowed to an obtuse or rounded tip, obtusely 3-7-toothed on each side above the long cuneate-attenuate entire base, 3-nerved, submembranaceous, 5-7.5 cm. long,

1–2 cm. wide; corymbs branched, often subsimple, 4–10 cm. in diameter the lower branches conspicuously spreading and elongated, then curved upward toward the tip; heads about 18-flowered, 12 mm. long, 5 mm. high; scales about 28, stramineous and pale except at the obtuse subherbaceous green or purplish tinged pubescent tip, pale-margined; corollas purple, smooth, slender, 5.5 mm. long; achenes 3.5 mm. long, scabrid on the angles; pappus-bristles, dull yellowish-white, obscurely barbellate.—Symb. Fl. Argent. 169 (1879); Hieron. in Engl. Bot. Jahrb. xxii. 746 (1897). *E. Arnotianum* Griseb. Abh. Goett. xix. 167 (1874), as to plant but probably not exactly as to syn. *E. affine* Hook. & Arn. not HBK.

TARIJA: Prov. Mendez: Camataqui, alt. 2500 m., *Fiebrig*, no. 3076 (Gr.).
WITHOUT INDICATION OF LOCALITY: *Bridges* (K).
[Argent.]

8. *E. squalidum* DC. Prod. v. 142 (1836); Bak. in Mart. Fl. Bras. vi. pt. 2, 281, t. 77 (1876); Robinson, Proc. Am. Acad. liv. 334 (1918). Widely distributed in South America and subject to considerable variation especially in the amount and nature of the pubescence.

[Var. **typicum** Robinson, l. c. Stem and lower surface of the leaves villous-hirsute, the hairs spreading; leaves roundish-ovate; heads about 30-flowered.—Common on plains in the interior of Brazil.]

Var. **tomentosum** (Sch.-Bip.) Bak. More softly and densely pubescent, the hairs mostly incurved; branches fewer, more elongated and flexuous; leaves tending from rhombic-ovate to ovate-oblong with a somewhat prolonged cuneate entire basal portion; heads rather densely aggregated at the tips of the branches in trichotomous panicles, 28–33-flowered, the young involucre ovoid, acutish; achenes 3–3.4 mm. long.—Bak. in Mart. Fl. Bras. vi. pt. 2, 282 (1876), as *tomentosa*. *Osmia tomentosa* Sch.-Bip. ex Bak. l. c. in synon. *E. squalidum* Britton, Bull. Torr. Bot. Club. xviii. 333 (1891), not precisely of DC.

LA PAZ: Prov. Larecaja: Mapiri, alt. 1525 m., *Rusby*, no. 1622 (Gr., N. Y., U. S.).

In the interpretation of this variety I have regarded Pohl's no. 291 (Berl., phot. Gr.) as the most authentic material, since it bears in Schultz's own hand the label "*Osmia tomentosa* Sch. Bip. nov. spec." So far as can be judged from a fairly clear photograph of this type it is precisely matched by Dr. Rusby's specimen from Bolivia. However, some Brazilian material associated with var. *tomen-*

tosum by Baker looks in several respects different and suggests at least formal divergence. [Western Brazil.]

Var. **Rusbyanum** Robinson. Much branched; stem, branches and lower surface of leaves tawny-tomentellous, the hairs short and curved; leaves ovate-lanceolate to rhombic-ovate, rather sparingly beset above with fine white subappressed hairs, beneath too densely tomentellous to disclose the underlying glandular punctation; heads about 18-flowered; involucre bracts very smooth and brown on the exposed portion, rounded or obtusely pointed at the closely appressed tip, ciliolate; achenes 2.5 mm. long.—Proc. Am. Acad. iv, 34 (1919). *E. scabrum* Britton, Bull. Torr. Bot. Club. xviii, 333 (1891), not L. *E. Martiusii* Ktze. Rev. Gen. iii, 148 (1898), not DC.

LA PAZ: Prov. Larecaja: Guanai, alt. 610 m., May 1886, *Rusby*, no. 1623 (Gr., N. Y.).

SANTA CRUZ: Prov. East Velasco, alt. 200 m., July, 1892, *Kuntze* (N. Y., U. S.).

This plant differs from *E. scabrum* L. considerably in the form and texture of the leaves as well as in the much shorter not obviously jointed pubescence. From this variety both var. *Martiusii* (DC.) Bak. and var. *subvelutinum* (DC.) Bak. may be distinguished by their sparser shorter pubescence and consequently conspicuous glandular punctation. From var. *tomentosum* the present variety differs in its distinctly smaller heads and fewer florets.

9. **E. extensum** Gardn. Shrubby; stems terete opposite-branched, densely beset with widely spreading or deflexed transparent jointed attenuate bristle-like hairs (1-1.5 mm. long); leaves opposite, rhombic-ovate to subdeltoid-ovate or -lanceolate, long-acuminate, cuneate or rather abruptly narrowed at the base, subentire or 2-4-toothed on each side, 3-nerved from near the base, hispid-villous on both surfaces; primary branches of the inflorescence wide-spreading, usually curved upward, bearing at the summit a bracteate often umbelliform corymb; heads 40-50-flowered, rather short and thick (for the §), slender-pedicelled; involucre sub-ovoid-cylindric; scales broad, closely imbricated, strongly striate, much darkened toward the rounded or very obtuse tip, ciliate; corollas violet; pappus-bristles about 40, stramineous.—Gardn. in Hook. Lond. Journ. Bot. vi, 440 (1847); Britton, Bull. Torr. Bot. Club, xviii, 333 (1891).

LA PAZ: Prov. Larecaja; Guanai, alt. 610 m., *Rusby*, no. 1627 (N. Y., [Brazil].)

10. **E. Bangii** Rusby. Herbaceous perennial, 4-6 dm. high, suberect from a decumbent base, covered with a soft rather long widely

spreading pubescence of delicate white or purple-jointed attenuate hairs; leaves opposite, membranaceous, rhombic-ovate, obtusish to (the upper) attenuate at the apex, shallowly 3-7-toothed on each side except on the entire cuneately narrowed base, 4-8 cm. long, 1.5-3 cm. wide (often with smaller leaves from undeveloped axillary buds), 3-nerved from well above the base, concolorous, essentially sessile; corymbs terminal, trichotomous, 3-5 cm. in breadth; pedicels 0.5-2.5 cm. long, curved upward, tomentose; heads about 60-flowered; involucre ovoid, the scales broad, rounded and purple-bordered at the thin closely appressed apex, sparingly pubescent; the body of the scale with about 5 broad flattish ribs; corollas purple, at maturity well exerted and the outer spreading beyond the involucre, about 5 mm. long, gradually enlarged upward, smooth except for a slight granulation toward the short limb; achenes slender, tapering downward, nearly black, about 4 mm. long, with thin paler upwardly hispidulous angles; pappus-bristles about 32, stramineous, scabrid. —Mem. Torr. Bot. Club, vi. 56 (1896).

COCHABAMBA: near the city of the same name, *Bang*, no. 1133 (Gr., N. Y.).

11. ***E. subscandens*** Hierbn. in Engl. Bot. Jahrb. xxii. 742 (1897); Rusby, Bull. N. Y. Bot. Gard. iv. 278 (1907); Robinson, Proc. Am. Acad. liv. 279 (1918).

COCHABAMBA: Prov. Chapare: Espirito Santo, *Bang*, no. 1208 (Gr., N. Y., U. S.); Intahuacana, Espirito Santo, 160 km. north of Cochabamba, alt. 750 m., *Buchtien*, no. 2298 (N. Y.); near Cochabamba 1895, *Bang*, without number (N. Y.); *Bang*, no. 2050 (Gr., N. Y., U. S., Mo.).
[Colombia.]

This species is suspiciously close to the little known *E. clematitis* DC. of Peru, which, however, appears to be still more glabrous and to have smaller lance-oblong leaves subtruncate rather than, as here, rounded at base.

12. ***E. mallotum*** Robinson. Vigorous, somewhat lignescent, probably tending to climb, softly tomentose or tomentellous, the hairs dense, short, incurved; stems terete opposite-branched; leaves opposite, deltoid-ovate, acuminate, entire, rounded or subtruncate or even slightly cordate at base, 2-3.5 cm. long, 1.4-2.7 cm. wide, 3-nerved from the very base, grayish-tomentellous above, gray- or canescent-tomentose beneath; petiole densely tomentose, 3-5 mm. long; heads 13 mm. long 8 mm. in diameter, about 30-flowered, numerous, in rather dense compound flattish-topped terminal corymbs; pedicels 6-20 mm. long; involucre at maturity cylindrical scales 5-6-seried, closely imbricated, rounded at the ciliate tip,

the outermost ovate, dorsally tomentose, the others nearly smooth on the back, often with a conspicuous at length fuscous discoloration toward the tip, or at least with a greenish area from the broadened summit of the nerves; corollas supposed to be violet or bluish-purple, glabrous, 6 mm. long, slightly and gradually enlarged upward; achenes slender, tapering downward, 5.2 mm. long, the faces nearly black, glabrous, the angles pale, upwardly hispid; pappus-bristles dull-white, scabrid, unequal, scarcely or not at all thickened toward the summit.—Proc. Am. Acad. iv. 22 (1919). *E. Clematitis*, var. *tomentosum* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), without char., & Linnaea, xxxiv. 535 (1865–66), as *Clematidis* var. *tomentosa* and also without char. *E. conyzoides*, var. *incanum* Britton, Bull. Torr. Bot. Club, xviii 333 (1891), and probably of Bak. in Mart. Fl. Bras. vi. pt. 2, 278 (1876).

LA PAZ: Prov. Larecaja: "Viciniis Sorata; inter Munaypata et rivum Chalassayo, in schistosis. Reg. temp. 2,600–2,700 m.," Mandon, no. 249 (Gr., N. Y.); Sorata, alt. 2440 m., Rusby, no. 1626 (N. Y.); Prov. Yungas, alt. 1220 m., Rusby, no. 1625 (N. Y., U. S.).

Var. ? **aporum** Robinsoni. Leaves lance-ovate, gradually acuminate, rounded at base, rather densely puberulent above, paler and grayish-tomentellous beneath, the cauline as much as 5.2 cm. long and 2.4 cm. wide; petiole nearly 1 cm. long; inflorescence, heads, florets, etc., as in the typical variety.—Proc. Am. Acad. iv. 23 (1919).

BOLIVIA WITHOUT LOCALITY: *Bang*, no. 2875 (Gr., U. S., Mo.).

Sect. II. SUBIMBRICATA (DC) Hoffm. in Engl. & Prantl. Nat. Pflanzenf. iv. Abt. 5, 140 (1890); Robinson, Proc. Am. Acad. liv. 281 (1918).

KEY TO SPECIES.

- a. Heads 4–15-flowered (more numerous flowered in no. 26) b.
 - b. Leaves (or their lobes) linear to narrowly lance-linear, sessile c.
 - c. Leaves simple or deeply pinnatifid, the blade or its lobes 1–3 mm. wide; involueral scales narrowed to a usually somewhat pointed tip.....13. *E. bunifolium*.
 - c. Leaves simple, broader, 3–10 mm. wide; scales rounded at tip.....14. *E. bupleurifolium*.
 - b. Leaves lanceolate, ovate or oblong, rarely obovate d.
 - d. Heads subracemose on flexuous branches of panicle. 15. *E. crenulatum*.
 - d. Heads sessile or nearly so in fascicles, these disposed in an open panicle e.
 - c. Leaves oblong-spatulate or-oblancoelate, obtuse or rounded at tip, pinnate-veined.....16. *E. dentatum*.
 - c. Leaves ovate, acuminate, 3-nerved from near base. 17. *E. iresinoides*.
 - d. Heads in a dense ovoid thyrse or thyrsoid panicle. 18. *E. morifolium*.
 - d. Heads in corymbs or more rarely scattered (and slender-pedicelled) in open leafy-bracted panicles f.

- f. Achenes 4-5 mm. long; leaves (at least the rameal) entire or sub-hastately 1-3-toothed on each side near base. . . . 19. *E. patens*.
- f. Achenes 1.7-3.5 mm. long; leaves serrate or entire g.
- g. Leaves regularly feather-veined. 44. *E. gloeocladum*.
- g. Leaves 3-nerved from a point (5-)8-17 mm. above the base h.
- h. Heads subsessile or on pedicels rarely equalling the involucre, in flattish or moderately convex corymbs i.
- i. Leaves thickish, gray-tomentose at least beneath
21. *E. inulaefolium*.
- i. Leaves submembranaceous, puberulent and conspicuously atomiferous beneath. 22. *E. mapiriense*.
- h. Slender pedicels mostly equalling or exceeding the involucre at maturity j.
- j. Involucral scales sordid-puberulent or -lanulate, not striate-nerved. 50. *E. lasiophthalmum*.
- j. Involucral scales glabrous or nearly so, distinctly striate-nerved. 23. *E. sanlacruzense*.
- g. Leaves 3-nerved from the very base or from a point 1-2 mm. above it k.
- k. Heads 7-10-flowered. 24. *E. soratae*.
- k. Heads about 15-flowered (or in no. 26 as many as 21-flowered) l.
- l. Heads in dense corymbs; leaves acute or acutish at base
20. *E. Pentlandianum*.
- l. Heads in loose few-headed cymes or small corymbs disposed in a large loose leafy-bracted panicle; leaves obtuse or rounded at base m.
- m. Branches of inflorescence opposite, regular; cymes 12-20-headed, rounded, rather dense, together forming an elongated leafy panicle; corollas white. . . . 25. *E. marginatum*.
- m. Branches of the inflorescence of irregular length and mostly alternate, bearing chiefly 3-7-headed cymes in very lax panicle; corollas lilae. 26. *E. lamboense*.
- a. Heads 20- ∞ -flowered n.
- n. Leaves coriaceous or subcoriaceous o.
- o. Leaves ovate, more or less clearly 3-nerved from or slightly above the base p.
- p. Involucre nearly as long as the florets; heads about 20-flowered
27. *E. eucosmum*.
- p. Involucre nearly as long as the florets; scales elliptical, obtuse; heads 45-70-flowered. 28. *E. vitalbae*.
- p. Involucre nearly as long as the florets; scales oblong to linear, acuminate; heads about 130-flowered
29. *E. didymum*.
- o. Leaves linear to broadly elliptic-oblong, feather-veined q.
- q. Primary branches of inflorescence divaricate; leaves regularly crenulate. 30. *E. endytum*.
- q. Primary branches of the inflorescence ascending; leaves entire or remotely and obscurely undulate-crenate r.
- r. Leaves sessile, densely hirsute on both sides; heads about 25-flowered; scales linear, attenuate. 32. *E. pyramidale*.
- r. Leaves sessile or on petioles 1-14 mm. long, the upper leaves nearly or quite glabrous at least on the upper surface; heads 30-40-flowered; scales lance-oblong, obtusish
31. *E. amygdalinum*.
- r. Leaves smoothish, on petioles 2-4 cm. long; heads about 35-flowered. 33. *E. gynoxymorphum*.

- n.* Leaves membranaceous *s.*
- s.* Leaves small, 6-14 mm. long, petiolate 34. *E. thymifolium.*
- s.* Leaves 3-6 cm. long petiolate *t.*
- t.* Involucral scales squarrose 57. *E. phyllocephalum.*
- t.* Involucral scales appressed *u.*
- u.* Heads 45-50-flowered *v.*
- v.* Involucral scales ciliate but otherwise glabrous, colored toward the tip; herb 3-5 dm. high 59. *E. toldepse.*
- v.* Scales tomentose on back; shrub 1-3 m. high. 35. *E. Lobtii.*
- u.* Heads 20-30-flowered *w.*
- w.* Heads in an open usually diffuse panicle, not glomerate, deltoid-ovate, crenate-serrate; annual 36. *E. microstemon.*
- w.* Heads in rather dense mostly 6-12-headed corymbs terminating the branches of an open leafy-bracted panicle; leaves deltoid-ovate, usually crenate-serrate. 37. *E. pycnocephalum.*
- w.* Heads borne in 2-5-headed cymes terminating the divergent branches of a lax leafy-bracted panicle; leaves lance-ovate, acutely serrate; perennial or suffruticose *x.*
- x.* Leaves scabrid above, scabrous on nerves beneath; pedicels densely puberulent; branchlets covered with purple glandular pubescence; innermost involucral scales 0.75 mm. wide 26. *E. tamboense.*
- x.* Leaves smooth to touch above, sparingly puberulent on nerves and veins beneath; branchlets and pedicels nearly smooth or with sparse non glandular pubescence; innermost scales 1-1.3 mm. wide, elliptical-oblong 38. *E. polopolense.*
- w.* Heads numerous in rather dense terminal flattish corymbs *y.*
- y.* Leaves rounded or subcordate at base; petioles densely sticky-glandular; inner involucral scales 3-nerved 39. *E. Fiebrigii.*
- y.* Leaves obtuse or acute at base, glabrous above; young parts glandular-puberulent; branches dark-red 20. *E. Pentlandianum.*
- y.* Leaves attenuate at base, covered above with scabrous incurved or somewhat papillose puberulence; inner scales 1-2-costulate 40. *E. Bridgesii.*
- s.* Leaves 9-27 cm. long, sessile by an attenuate petiole-like base *z.*
- z.* Corollas hirsutulous toward the limb; heads about 36-flowered; receptacle flat, glabrous 41. *E. triosteifolium.*
- z.* Corollas glabrous; pedicels and branchlets glandular; heads 200-300-flowered; receptacle obovate-ellipsoidal, minutely pubescent 68. *E. nemorosum.*

13. ***E. buniifolium*** Hook. & Arn. Smooth fastigiately much branched shrub sometimes as much as 2.5 m. high; leaves opposite and excessively variable being either simple and linear or often on the same individual in different degrees deeply pinnatifid with linear segments; heads 5(-6)-flowered, slender-pedicelled, often nodding, in leafy-bracted panicles; involucral scales 12-17 lanceolate, purplish-brown and striatulate toward the narrowed but mostly rounded or merely acutish tip, stramineous and usually 3-costulate below the middle; corollas 4-5 mm. long, the gradually enlarged throat about

equalling the tube, glabrous but slightly papillose-granulate; achenes black, tapering toward the base, 2.5 mm. long, roughened on the angles; pappus-bristles about 33, nearly equalling the corolla, slightly barbellate or scabrid.—Comp. Bot. Mag. i. 240 (1836); Hieron. in Engl. Bot. Jahrb. xxii. 773 (1897); R. E. Fries, Arkiv för Bot. v. no. 13, p. 8 (1906). *E. virgatum* D. Don ex Hook. & Arn. l. c. 241 (1836). *E. pinnatifidum* DC. Prod. v. 149 (1836). *E. pinnatifidum* var. *virgatum* (D. Don) Bak. in Mart. Fl. Bras. vi. pt. 2, 321 (1876), as *virgata*. *E. buniifolium*, var. *Bakeri* Ktze. Rev. Gen. iii 146 (1898).

SANTA CRUZ: Sierra de Santa Cruz, alt. 1000 m., Kuntze (N. Y., phot. Gr.).

TARIJA: on open hill, Tarija, alt. 1900 m., Fries, no. 1219, acc. to Fries, l. c.

[Northern Argent., Uruguay, southern Braz.]

Varying considerably in the rigidity and size of the leaves and particularly in the degree to which they are pinnatifid. Hieronymus, l. c., has pointed out the leading tendencies in this variation but has wisely refrained from applying names to the resulting forms.

14. *E. bupleurifolium* DC. Erect, virgate to rather copiously branched, 1–1.3 m. high; stem and branches terete, somewhat lignescent, very leafy, at first sordid- or fulvous-puberulent, soon quite glabrate; internodes short 3–18 mm. long; leaves chiefly opposite (the upper alternate) sessile, linear or narrowly lance-oblong, entire or more often shallowly and rather sharply serrate especially toward the middle of each edge, attenuate, 5–12 cm. long, 2–10 mm. wide, subcoriaceous, with a moderately prominent midrib and 2 or more elongated lateral anastomosing veins, glabrous on both surfaces, somewhat paler beneath; corymb at first very dense and subglobose, at length fastigiately branched, flattish or only moderately convex, dense; heads 5-flowered, about 6 mm. high, short-pedicelled; involucre campanulate, about 3-seriate; the scales very unequal, glabrous, rounded at the granular tip; corolla apparently whitish, about 4.5 mm. long, sparingly glandular-atomiferous near the limb; achenes tapering downward, sparingly glandular-atomiferous, about 2 mm. long; pappus-bristles about 32, yellowish-white, lucidulous, nearly smooth.—Prod. v. 149 (1836); Bak. in Mart. Fl. Bras. vi. pt. 2, 332, t. 87 (1876); Hieron. in Engl. Bot. Jahrb. xxii. 777 (1897), where several varieties are distinguished. *E. Sonderi* Sch.-Bip. Linnaea, xxii. 571 (1849), & xxx. 182 (1859–60) acc. to Bak. l. c. *E. Mandonii* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), nomen, & Linnaea, xxxiv. 533 (1865–66), where briefly described.

LA PAZ: Prov. Larecaja: Cartaguata near Challapampa in the vicinity of Sorata, in the temperate region, alt. 3000 m., *Mandon*, no. 205 (Gr., N. Y.).
Tarija: Toldos near Bermejo. *Fieberg*, no 2399 (Gr.).
[Braz., Argent., Uruguay.]

A stately and variable species. The fragments originally described by De Candolle had very narrow quite entire leaves. These, however, were probably the upper rameal leaves which are normally narrow and entire while on the same individual the cauline leaves are often considerably broader and distinctly serrulate. Therefore a separation of the serrulate-leaved form as a variety, apparently attempted by Schultz-Bipontinus (in herb.) seems to lack basis.

15. **E. crenulatum** Spreng. ex Hieron. in Engl. Bot. Jahrb. xxii. 776 (1897); Ktze. Rev. Gen. iii. 147 (1898); Robinson, Proc. Am. Acad. iv. 64 (1919). *E. dendroides* Bak. in Mart. Fl. Bras. vi. pt. 2, 321, t. 84 (1876); Britton, Bull. Torr. Bot. Club, xix. 1 (1892); Rusby, Bull. N. Y. Bot. Gard. iv. 377 (1907) where Bang's no. 2123 is by error recorded as no. 2113.

LA PAZ: near Yungas, alt. 120 m., *Rusby*, no. 1580 (N. Y.); Prov. North Yungas: at Coripati, *Bang*, no. 2123 (Gr., N. Y., U. S., Field Mus., Mo.), a shrub in dry gravel and clay soil, fls. white; Prov. Caupolican: at Apolo, alt. 1364 m., *R. S. Williams*, no. 304 (N. Y.), a slender shrub, 1.2-3.6 m. high.
COCHABAMBA: Prov. Ayopaya: at Tunari, alt. 3200 m., *Kuntze* (N. Y.).
DEPT. NOT INDICATED: *Pentland*, acc. to Bak. l. c.
[Braz., Argent., Peru.]

16. **E. dentatum** Gardn. Branching shrub or lignescent perennial, clothed with a short dense grayish or at length tawny tomentum; leaves alternate or often opposite, oblanceolate, narrowed to a sessile base, rounded at the apex, entire or the cauline more often few-toothed toward the end, thickish, pinnate-veined, 4-12 cm. long, 1-4 cm. wide; heads 4-5-flowered, about 5 mm. long, nearly or quite sessile in terminal and lateral 3-5-headed fascicles, disposed in an open erect or ascending flexuous-branched panicle; involucre fulvous-tomentellous, about 3-seriate; scales about 12, ovate, acutish; corollas whitish, about 3.7 mm. long, slightly granulated toward the middle, without clear differentiation into proper tube and throat; apical appendage of the anthers definitely present and normally membranaceous but rather short, broad, and blunt; style-branches conspicuously clavate at the tip; achenes about 2.6 mm. long, hirsutulous both on and between the ribs; pappus-bristles about 37, yellowish-white, barbellate.—Gardn. in Hook. Lond. Jour. Bot. vi. 443 (1847); Bak. in Mart. Fl. Bras. vi. pt. 2, 337 (1876); Ktze. Rev. Gen. iii. 147 (1898).

SANTA CRUZ: East Velasco, alt. 200 m., *Kuntze* (N. Y., U. S., phot. Gr.). [Brazil.]

The Bolivian form of this species is the one with leaves prevailingly opposite being the *E. tetranthum* of Schultz-Bipontinus.

17. *E. iresinoides* HBK. Nov. Gen. et Spec. iv. 106, t. 340 (1820); Britton, Bull. Torr. Bot. Club, xviii. 333 (1891); Robinson, Proc. Am. Acad. liv. 285, 338, 352 (1918).

LA PAZ: Prov. Onasumos, near La Paz, alt. 3050 m., *Rusby*, no. 1637 (N. Y.) [Northward to Panama, Venezuela, and some of the Lesser Antilles.]

The Bolivian form is the typical one (var. *villosum* Steetz).

18. *E. morifolium* Mill. Dict. ed 8, no. 10 (1768); Robinson, Proc. Am. Acad. liv. 293, 339, 352 (1918). *E. megaphyllum* Bak. in Mart. Fl. Bras. vi. pt. 2, 322 (1876); Ktze. Rev. Gen. iii. 148 (1898); Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907).

LA PAZ: Prov. North Yungas: near the river, on dry gravelly soil, Coripata, *Bang*, no. 2298 (Gr., N. Y., U. S., Mo.), a plant 1.5–1.8 m. high, not abundant; fls. white.

SANTA CRUZ: Prov. Chiquitos; at Santa Cruz, alt. 800 m., *Kuntze* (N. Y.). [Widely distrib. Mex. to Argent.]

Somewhat variable in leaf-breadth, degree of pubescence, and number of florets, but in all other respects remarkably constant. The Bolivian form is the one with oblong-ovate or lance-ovate leaves, which has been called *E. megaphyllum*.

19. *E. patens* D. Don. Shrubby; branches usually pubescent at least when young; leaves opposite, petiolate, ovate-oblong to lanceolate, the lower more or less cordate, the rameal usually cuneate at the base, acute, entire for most of their length but commonly with 1–3 sharp and rather prominent teeth on each side near base; heads 7–12-flowered, about 1.3 cm. high, 5 mm. in diameter, glomerate in small dense corymbs terminating the slender widely spreading branches; involucre about 3-seriate, its scales about 15, very unequal, commonly arranged somewhat definitely in about 5 upright series (along orthostiches), ovate to lance-elliptical, ciliate, at least the outer more or less granular-puberulent dorsally; corollas slenderly tubular, pale-greenish, about 6 mm. long, the short proper tube and lower portion of the scarcely enlarged throat granular-puberulent, the upper portion of the throat glabrous, slightly contracted below the short limb; achenes 3.5 mm. long, attenuate toward the base, hispid on the light-colored angles and somewhat so on the darker faces; pappus-bristles about 30, barbellate.—D. Don in Hook. & Arn. Comp. Bot. Mag. i. 242 (Mar. 1836); Bak. in Mart. Fl. Bras.

vi. pt. 2, 323 (1876); Hieron. in Engl. Bot. Jahrb. xxii. 773 (1897). *E. xerolepis* Sch.-Bip. ex Bak. l. c.—Southern Brazil, Argentina, and southern Bolivia.

[Var. α . **typicum**. Leaves puberulent beneath; heads 8–10-flowered; involueral scales at least the outer ones obtuse; pappus-bristles whitish.—Lit. and synonym. as above.—Southern Brazil (Minas Gerais) and northern Argentina]

Var. β . **rhodolaenum** Griseb. Leaves resinous-dotted, slightly puberulent; heads about 8-flowered; involueral scales about 15, the outer obtuse or rounded at the ciliate summit; pappus-bristles about 30, rose-purplish.—Symb. 170 (1879), as *rhodolaena*; Hieron. in Engl. Bot. Jahrb. xxii. 773 (1897), as *rhodolaena*.

TARIJA: Prov. Mendez: Camataqui, alt. 2500 m., *Fiebrig*, no. 3075 (Gr.). [Argent.]

Var. γ . **tomentosum** Hieron. Leaves puberulent above, grayish-tomentose beneath; heads 10–12-flowered; involueral scales all acute or acutish.—Hieron. in Engl. Bot. Jahrb. xxii. 773 (1897), as *tomentosa*; Ktze. Rev. Gen. iii. 148 (1898).

SANTA CRUZ: Prov. East Velasco, alt. 200 m., July, 1892, *Kuntze* (N. Y.).

20. **E. Pentlandianum** DC. Shrubby, obscurely puberulent in the inflorescence but otherwise glabrous; the rameal internodes often short (about 1 cm.) and the joints prominent after the fall of the leaves; leaves opposite, ovate-lanceolate or -oblong, acuminate, subcuneate at base, sharply serrate, 3–6 cm. long, 1–2.7 cm. wide, 3-nerved from slightly above the base (the lateral nerves soon branched), of moderately firm texture though membranaceous, dull green above, paler beneath, perceptibly reticulate-veined and dark-punctate but the veins scarcely prominent; corymbs terminal, convex, composite, at first subsessile among leafy bracts, at length moderately exserted from the surrounding foliage; heads about 15-flowered, about 8 mm. high and 5 mm. in diameter, slender-pedicelled; involucre about 3-seriate, scarcely half as long as the florets; scales (for the section) not very unequal nor strongly imbricated, thin, narrowly lance-oblong, obtusish, obscurely puberulent and ciliate or nearly glabrous; corollas purplish, 3.5 mm. long, glabrous except for a slight hispidity on the teeth, slightly and gradually enlarged upward; achenes 2 mm. long, pale, at maturity nearly smooth; pappus-bristles about 28.—Prod. v. 157 (1836); Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), & *Linnaea*, xxxiv. 535 (1865–66). *E. incasicum* Wedd. Chlor. And. i. 217 (1857), from character and locality.

LA PAZ: Prov. Larecaja: everywhere in thickets in the alpine and subalpine temperate region about Sorata, *Mandon*, no. 259 (Gr., N. Y.); Isla Titicaca (Isla del Sol), alt. 3840 m., *Buchtien*, no. 3024 (N. Y., U. S.), *Mrs. A. F. Bandelier*, no. 4 (N. Y.).

BOLIVIA WITHOUT LOCALITY: *Pentland* (DC., phot. Gr.).

21. ***E. inulaefolium*** HBK. Nov. Gen. et Spec. iv. 109 (1820); Robinson, Proc. Am. Acad. liv. 291 (1918), lv. 66 (1919). Of this species two forms pretty readily distinguishable by their pubescence have been found in Bolivia, as follows:

Forma α . ***typicum*** Robinson, Proc. Am. Acad. liv. 292, 339 (1918). *E. inulifolium* [HBK.] Ktze. Rev. Gen. iii. 147 (1898).

COCHABAMBA: Prov. Ayopaya: at Tunari, *Kuntze* (N. Y.).

LA PAZ: Prov. South Yungas: Sirupaya near Yanacachi, alt. 2300 m., *Buchtien*, no. 193 (303), N. Y.

[Argent., Paraguay, S. Braz., Peru, Colomb., and Southern Antilles.]

Forma β . ***suaveolens*** (HBK.) Hieron. in Engl. Bot. Jahrb. xxix. 11 (1900); Robinson, Proc. Am. Acad. liv. 292, 339, 354 (1918), lv. 67 (1919). *E. suaveolens* HBK. Nov. Gen. et Spec. iv. 109 (1820). *E. glomeratum* Sch.-Bip. in sched. Mandon, also in Bull. Soc. Bot. Fr. xii. 81 (1865), & Linnaea, xxxiv. 535 (1865-66); Britton, Bull. Torr. Bot. Club, xviii. 334 (1891); Rusby, Bull. N. Y. Bot. Gard. iv. 377 (1907); not DC.

LA PAZ: Prov. Larecaja; in woods, hedges, etc., everywhere and throughout the year, *Mandon*, no. 256 (Gr., N. Y.); Prov. Yungas, at Coripati, *Bang*, no. 2112 (Gr., N. Y., U. S., Mo.), near Yungas, alt. 1220 m., *Rusby* (N. Y.); Prov. Caupolican, at Apolo, *R. S. Williams*, no. 60 (N. Y.).

[Common and widely distrib. in temp. and trop. S. Am.]

22. ***E. mapiriense*** Hieron. In habit, foliage, and inflorescence rather closely similar to the preceding species; stems with a much finer and shorter crisped puberulence; leaves rhombic-ovate, serrate, caudate-acuminate cuneate at base, 3-nerved from above the base, green on both sides, obscurely puberulent above, beneath glandular-atomiferous, glabrous except on the finely tomentellous nerves, much thinner and more delicate in texture than in *E. inulaefolium*, the veins subtranslucent in a dried state; heads about 10-flowered, subsessile in dense flattish corymbs (2-3 dm. in diameter); involucreal scales greenish or yellowish-white, subhyaline, nerved chiefly at the base, the inner narrow, linear-oblong, deciduous, the outer elliptical, obtuse; corollas apparently yellowish-white, 3.5 mm. long, the proper tube about equalling the slightly and gradually enlarged throat; achenes at full maturity nearly black, 2 mm. long, with a conspicuous light-colored callus at the base; pappus-bristles about 25, delicate, white, unequal, slightly connate into an annulus at the

base.—Hieron. in Engl. Bot. Jahrb. xl. 374 (1908). *E. glomeratum* Rusby, Mem. Torr. Bot. Club, vi. 56 (1896), not DC. *E. inulacifolium* Britton, Bull. Torr. Bot. Club, xviii. 334 (1891), not HBK.

LA PAZ: Mapiri, *Bang*, no. 1514 (Gr., N. Y., U. S., Mo.); near Yungas, alt., 1220 m., *Rusby*, no. 1607 (Gr., N. Y., U. S.).

23. ***E. santacruzense*** Hieron. Slightly woody, 1 m. or more in height; stems terete, opposite-branched, bearing scattered lenticels; branches slender, grayish-buff, leafy, finely puberulent when young; leaves opposite, petiolate, rhombic-ovate, serrate or the upper entire, attenuate-acuminate, acute to acuminate at base, thin membranaceous, finely pubescent on both surfaces or subglabrate above, paler beneath, 8–15 cm. long 4–10 cm. wide; petiole slender, 1.5–4.5 cm. long; partial inflorescences elevated from the upper axils on peduncles 3–4.5 cm. in length, loosely branched; heads about 10-flowered, 8 mm. high, 4 mm. in diameter; pedicels 3–9 mm. long, filiform, puberulent; bractlets subulate; involucreal scales about 17, stramineous, at first pale, at length fuscous, 4–5-seriate, graduated, mostly 3-nerved, all obtuse; corollas 4 mm. long, yellowish-white, subcylindric, sprinkled with scattered glands; achenes about 2.3 mm. long, at maturity dark-gray, tapering somewhat toward the base, minutely scabrid; pappus-bristles about 24, fragile, united at base into a slight annulus.—Hieron. in Engl. Bot. Jahrb. xxii. 762 (1897); Kuntze, Rev. Gen. iii. 148 (1898). *E. nemorense* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & *Linnaea*, xxxiv. 535 (1865–66), without char.

LA PAZ: PROV. LARECAJA: in woods of the temperate region, San Pedro near Sorata, alt. 2650 m., *Mandon*, no. 253 (Gr., N. Y.).

SANTA CRUZ: on the Sierra de Santa Cruz, alt. 2000 m., *Kuntze* (N. Y., Berl., phot. Gr.).

Kuntze's material on which this species was founded represents merely tips of some of the inflorescence-bearing branches with 1–3 of the uppermost somewhat bracteal leaves. These are subentire. However, Mandon's more carefully prepared specimens, which are clearly conspecific, exhibit not only these upper subentire leaves but also show the normal cauline leaves to be finely and very definitely serrate at the sides, the teeth being rather numerous, acute, about 0.7 mm. high and 4 mm. wide at base.

24. ***E. soratae*** Sch.-Bip. Probably herbaceous or nearly so (the base unknown); stems (or branches) slender, 1–2 mm. in diameter, flexuous, terete, glabrous; upper leaves opposite, ovate-lanceolate, petiolate, acuminate, serrate except at the apex and sub-

cuneate base, thin-membranaceous, somewhat translucent, 3-nerved, sparingly pubescent (chiefly on the nerves), about 2-4 cm. long, 8-15 mm. wide; petioles terete, flexuous, 3-4 mm. long, covered with short delicate spreading purple-jointed hairs; cymes 5-14-headed, 1.5-4 cm. in diameter, terminal and on short spreading opposite branches, moderately dense but together forming an elongated loose panicle; heads about 7-flowered, 6 mm. long; pedicels slender, puberulent, 1-3 mm. long, involucreal scales about 10, pale, stramineous, about 3-4-seriate, very unequal, mucronate from an obtusish summit, mostly 3-nerved, the outermost short, ovate, the intermediate oblong, the inner oblong-linear; corollas apparently white, subcylindrical, slightly hispidulous on the short limb, otherwise smooth; achenes black, with pale yellowish-white angles, 1.5 mm. long, slightly tapering downward, sparingly granular or quite smooth, callous at the base; pappus-bristles about 16, delicate, white, smoothish.—Bull. Soc. Bot. Fr. xii. 81 (1865), nomen, & Linnaea, xxxiv. 535 (1865-66), also without char.

LA PAZ: Prov. Larecaja: in woods of the temperate region in the valley of Challasuya, near Sorata, alt. 2700-2800 m., 8 Apr., 1858, *Mandon*, no. 251 (N. Y., phot. Gr.).

Efforts to place satisfactorily this delicate plant in any hitherto described species have failed. Apparently Schultz was right in regarding it as a novelty. Unfortunately the available material exhibits only the upper (floriferous) part of two stems, leaving the precise nature of the middle and lower cauline leaves unknown. It is believed, however, that as here keyed in among the related species of Bolivia the characters above given will amply distinguish it.

25. ***E. marginatum*** Poepp. in Poepp. & Endl. Nov. Gen. ac Spec. iii. 54 (1845); Robinson, Proc. Am. Acad. lv. 68 (1919).

LA PAZ: Prov. North Yungas: Polo-Polo near Coroico, alt. 1100 m., *Buchtien*, [Peru.] no. 3933 (N. Y.).

This species is known to the writer from a rather hurried examination of the type at the Natural History Museum in Vienna in 1905, and from a fairly clear photograph of it taken at that time. With this photograph, Dr. Buchtien's no. 3933 shows close agreement. To this species Prof. Hieronymus has referred a plant collected at Rio Juntas, Bolivia, by Kuntze, who mentions it (Rev. Gen. iii. 148) as *E. paniculatum* Schrad. var. *marginatum* (Poepp.) Hieron. Two sheets of this material are now in the herbarium of Kuntze recently purchased by the New York Botanical Garden. They do not appear to the writer identical with the plant of Poeppig. They

have a much looser alternate-branched inflorescence, and Kuntze notes the flower-color as lilac, while in *E. marginatum* the inflorescence is opposite-branched and regular as well as considerably more dense, and the flower-color according to Poeppig was white. To the writer it would seem that the plant of Kuntze from Rio Juntas does not differ essentially from *E. tamboense* Hieron., which exhibits a similar flexuous habit, has an exceedingly loose somewhat alternate-branched inflorescence, and furthermore, is said to have lilac flowers.

26. **E. tamboense** Hieron. Suffruticose, erect, 1 m. high, with few elongated ascending branches, nearly smooth at the base, elsewhere covered with a spreading purplish glandular puberulence; leaves opposite, petiolate, mostly rhombic-ovate (rarely deltoid-ovate or even cordate), entire toward the acute apex and abruptly cuneate base, elsewhere serrate (the teeth about 9 on each side), finely pubescent but green on both surfaces, membranaceous 3.8–5 cm. long, about half as wide; petiole slender, 1–1.7 cm. long, finely spreading-pubescent; cymes loose, few-headed, together forming an open leafy panicle; pedicels 5–12 mm. long, densely covered with short spreading glandular hairs; heads 15–21-flowered, 6 mm. high, 3 mm. in diameter; involucre campanulate, 4–5-seriate; scales about 22, the middle and outer ovate, greenish, densely puberulent, with translucent margin, ciliate, obtuse, mostly 2-ribbed; the inner oblong, nearly smooth; corollas greenish- or yellowish-white, about 3 mm. long, glabrous; the limb pale-lilac (Hieronymus); achenes dark, smooth on the faces, slightly hispidulous on the lighter-colored angles; pappus-bristles about 35 (20 acc. to Hieronymus), white.—Hieron. in Engl. Bot. Jahrb. xxii. 770 (1897). *E. paniculatum*, var. *marginatum* Hieron. ex Ktze. Rev. Gen. iii. 148 (1898), not *E. marginatum* Poepp.

COCHABAMBA: Prov. Tapicari: Cuesta del Tambo between El Tambo and Varvaez, Lorentz & Hieronymus, no. 888 (Berl., phot. Gr.).

LA PAZ: Prov. South Yungas: Sirupaya near Yanacachi, alt. 2100 m., Buchtien, no. 191 (300) N. Y., distrib. as *E. stipuliferum*.

DEPT. NOT CLEAR: on the Rio Juntas, alt. 900 m., Kuntze (N. Y., U. S.).

According to Hieronymus in Engl. Bot. Jahrb. xxii. 770 (1897) this species is identical with *E. guadelupense* Griseb. Symb. 172 (1879), not Spreng. Grisebach's reference was to Lechler's no. 2348 from Peru, a specimen which the writer has not been able to see.

27. **E. eucosmum** Robinson (p. 6). Shrubby, glabrous except for the puberulent inflorescence; stems terete, reddish-brown, at length covered with a grayish cortex; branches spreading, curved-ascending; leaves opposite, ovate, acuminate, rounded to acute at

base, about 1 dm. long, half as wide, sharply serrate (teeth 1-1.8 mm. high, 2-4 mm. broad at the base), glabrous on both surfaces, firmly membranaceous, paler beneath, not punctate, reticulate-veiny but the veins immersed or scarcely prominent; a pair of intramarginal nerves leaving the midnerve close to the base, these followed by a more prominent pair arising from the midnerve 2-4 mm. above the base; petiole about 2 cm. long, dark-purple, flexuous; corymbs terminal, strongly convex, compound, about 1 dm. in diameter; heads essentially as in the preceding.

TARLJA: Prov. Arce: Padeaya, alt. 2300 m., 12 Nov. 1903, *Fiebrig*, no. 2572 (Gr.), distrib. as *E. lasiophthalmum*, but differing in its greater smoothness, absence of punctuation on the leaves, thinner and somewhat striate involueral scales, etc.

28. *E. vitalbae* DC. Prod. v. 163 (1836); Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907); Buchtien, Contrib. Fl. Boliv. i. 189 (1910); Robinson, Proc. Am. Acad. liv. 299, 339, 355 (1918), lv. 69 (1919).

LA PAZ: Prov. Yungas: Coroico, *Bang*, no. 2389 (Gr., N. Y., U. S., Mo.); Prov. Larecaja: Charopampa, alt. 488 m., *Williams*, no. 772 (N. Y.); Charopampa and San Carlos, acc. to Buchtien, l. c.

DEPT. NOT ASCERTAINED: Machichoirisa, alt. 1068 m., *Williams*, no. 1610 (N. Y.).

[Cent. Am. to Peru and Braz.]

29. *E. didymum* Klatt. Suffruticose; probably 1 m. or more in height (base unknown); stem terete, when young grayish-puberulent or tomentellous, in age nearly glabrate, olivaceous or purplish-brown, with a few scattered lenticels; leaves opposite, petiolate, rhombic-lanceolate to lance-oblong, serrate except near the acute to acuminate tip and cuneate or rarely rounded base, somewhat coriaceous, 5-9 cm. long, 1.8-4 cm. wide, 3-5-nerved from above the base, green and crisped-puberulent on both surfaces though slightly paler beneath, at full maturity sometimes nearly glabrate; petiole 1-3 cm. long; corymbs 8-15-headed, rather dense, terminal on mostly curved-ascending branches; pedicels grayish-tomentellous, 4-25 mm. long; heads about 130-flowered, 12 mm. high, 15 mm. in diameter; involucre broadly campanulate, the scales multiseriate, narrowly lanceolate to linear, acute to attenuate, mostly 3-nerved and 2-4-costulate, dorsally grayish-puberulent to -tomentellous, the inner purpletinged and somewhat glandular-atomiferous toward the tip or even slightly viscid; corollas yellowish-white, 5 mm. long; slenderly tubular, without distinction of tube and throat; achenes black, 2 mm. long, upwardly hispidulous on the angles; pappus-bristles white, about 14, nearly equalling the corolla, slightly thickened near the

apex.—Ann. Naturhist, Hofmus. Wien. ix. 356 (1894). *E. hecatanthum* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), & Linnaea, xxxiv. 535 (1865–66), name only; Britton, Bull. Torr. Bot. Club, xviii. 334 (1891), not Sch.-Bip. Linnaea, xxx. 182 (1859), nor Bak.

LA PAZ: Prov. Larecaja: in thickets of the temperate region, alt. 2650 m., Moyabaya, near Sorata, *Mandon*, no. 262 (Gr., N. Y.); Prov. Yungas: alt. 1830 m., *Rusby*, no. 2127 (N. Y.); Polo-Polo, near Coroico, alt. 1100 m., *Buchtien*, no. 3944 (N. Y.).

DEPT. NOT INDICATED: *Cuming* (Naturhist. Mus. Vienna, fragm. Gr.); *Bridges* (K.); *Bang*, no. 2012 (Gr., U. S., Mo., K.).

This species is somewhat variable in the degree to which its leaves are glabrate, but the specimens are in other respects very consistent. In habit, inflorescence, and even in involucre rather strongly suggesting the genus *Aster*

30. ***E. endytum*** Robinson, Proc. Am. Acad. iv. 13 (1919). *E. sordescens*, var. *bolivianum* Rusby, Mem. Torr. Bot. Club, vi. 56 (1896).

LA PAZ: Prov. Larecaja: between Guanai and Tipuani, *Bang*, no. 1464 (Gr., N. Y., U. S., Mo.).

In some individuals shown by this Bolivian material collected by Bang the leaves show a tendency to become cuneate at the base, but in others the leaf-base is rounded precisely as in the Peruvian type-material of the species. This is clearly a matter of individual variation.

The real *E. sordescens* DC., with which this plant has been associated as a variety, is a native of eastern Brazil with smaller (about 25-flowered) heads and ovate leaves 3-nerved from the base, while in *E. endytum* the heads are about 40-flowered and the ovate-oblong leaves are pinnately veined.

31. ***E. amygdalinum*** Lam. Encyc. ii. 408 (1786); Britton, Bull. Torr. Bot. Club, xviii. 334 (1891); Ktze. Rev. Gen. iii. 146 (1898); Rusby, Bull. N. Y. Bot. Gard. iv. 377 (1907); Robinson, Proc. Am. Acad. liv. 301, 339 (1918), lv. 61 (1919).

LA PAZ: Prov. Yungas, *Rusby*, no. 1636 (Gr., N. Y., U. S.); near Yungas, alt. 1220 m., *Rusby*, no. 1635 (Gr., N. Y., U. S.); Coripata, *Bang*, no. 2291 (Gr., N. Y., U. S., Field Mus., Mo.); subtropical region, Polo-Polo near Coroico, *Buchtien* (N. Y.); Prov. Caupolican, at Apolo, alt. 1464 m., *R. S. Williams*, no. 1423 (N. Y.).

SANTA CRUZ: Prov. East Velasco, alt. 200 m., *Kuntze* (N. Y.); Prov. Sara, at Yapacani, alt. 400 m., *Kuntze* (N. Y., U. S.).
[Cent. Am. to Peru, Braz., and Paraguay.]

Lamarck probably underestimated the florets in this species when he placed them at 12 to 15. There is now at the Gray Herbarium a

clear photograph of the type-specimen (Par.) and it corresponds in all observable details with modern material from Bolivia, Peru, Colombia, and elsewhere in which the heads according to several counts are consistently 31-39-flowered. Baker, Kuntze, and Hieronymus all extend this species to include a great variety of material, even such forms as would from their dense pubescence, more leafy stems, fewer-flowered heads, and linear-attenuate involucre scales fall within the next species.

32. **E. pyramidale** Klatt. Shrubby; stems erect or ascending, branched, densely leafy, terete, sordid-tomentose; their hairs at first white, spreading, attenuate, perceptibly (under a lens) jointed, at length falling away except about the nodes or remaining only as slight papillae; leaves crowded and much imbricated, opposite, sessile, narrowly lance-oblong, mucronately subacuminate from an obtusish apex, cuneate at the base, entire or obsoletely crenate-dentate, scabrous and densely papillose-tomentose above, hirsute especially on the midnerve and pinnate veins beneath, 4-6 cm. long, 7-10 mm. wide, the margins strongly revolute; panicle fastigiate, many-headed, glandular-puberulent; heads 21-25-flowered; involucre turbinate-campanulate, the scales about 3-seriate, graduated, linear, attenuate, mostly 3-nerved and 2- or 4-ribbed, dorsally pubescent; corollas 5 mm. long, dull reddish or purplish, slenderly tubular, slightly and very gradually enlarged upward; style filiform, little exerted; achenes roughened on the angles; pappus-bristles about 25, delicate, white.—Abh. Naturf. Gesellsch. Halle, xv. 323 (1881), & reprint of same, p. 1 (1881). ? *E. amygdalinum*, var. *revolutum* (Pohl) Bak. in Mart. Fl. Bras. vi. pt. 2, 314 (1876), as *revoluta*. ? *E. revolutum* Pohl ex Bak. l. c.

SANTA CRUZ: Prov. Chiquitos, *d'Orbigny*, no. 680 (Gr.).
[Brazil?]

Two forms may be recognized as follows:

Forma α . **typicum**. Leaves lance-oblong, 4-6 cm. long, 7-10 mm. wide; heads about 21-flowered.—Synon., range, and exsicc. as above stated.

Forma β . **angustifolium** (Hieron.), comb. nov. Leaves linear or at most narrowly lance-linear, 2-6 cm. long, 2-5 mm. wide; heads about 21-flowered.—*E. amygdalinum*, var. *revolutum*, f. *angustifolium* Hieron. ex Ktze. Rev. Gen. iii. 146 (1898), without char.

SANTA CRUZ: Prov. East Velasco, alt. 200 m., *Kuntze* (N. Y., phot. Gr.).

Klatt described the heads in this species as 18-flowered, but the writer examining the type-material now in the Gray Herbarium

finds the heads about 25-flowered and in the narrow-leaved form, later collected by Dr. Kuntze, 21-flowered. In the nearly related *E. amygdalinum* Lam., rather common and widely distributed from Central America to Brazil, the heads examined have been 31-39-flowered.

33. **E. gnoxymorphum** Rusby (p. 7). Small tree 4-6 m. high; branches terete, grayish-buff, minutely scurfy, curved-ascending; leaves opposite, petiolate, ovate-oblong, subacuminate to an obtusish tip, acute or acutish at base, obscurely undulate, somewhat coriaceous, pinnate-veined (chief veins about 4-6 pairs), glandular-punctate, above green and glabrous, beneath distinctly paler, grayish green, minutely scurfy and along the midrib bearing traces of a tawny tomentum; leaf-blade 10-12 cm. long, half as wide; petiole 2.5-3.5 cm. long, subtomentellous; corymbs terminal, many-headed, flat-topped, 10-18 cm. in diameter, leafy-bracted at base; pedicels 7-12 mm. long; heads erect, about 35-flowered, about 7 mm. high and 6 mm. in diameter; involucre campanulate, about 3-seriate, the scales about 23, lanceolate, acute, scurfy, nerveless; corollas 4.5 mm. long, scarcely enlarged upward, obsoletely hispidulous toward the light red or purplish limb; achenes 2.3 mm. long, obscurely roughened on the angles; pappus-bristles about 18, dull yellowish-white, nearly smooth.—*E. gnoxioides* Rusby, Bull. N. Y. Bot. Gard. iv. 380 (1907), not *E. gnoxoides* Wedd.

LA PAZ: Pelechuco, alt. 2135-2440 m., Pearce (K.); Prov. North Yungas, at Coripati, in leaf-mould of wet forest, Bang, no. 2194 (Gr., N. Y., U. S., Mo., K.).

SANTA CRUZ: May, 1892, Kuntze (N. Y.)

34. **E. thymifolium** Britton. Slender, erect, herbaceous or nearly so; stems terete, 2-3 mm. thick, 7-8 dm. high, finely pubescent, brownish; branches mostly short, ascending, leafy; leaves small, opposite, short-petioled, ovate, obtuse, shortly cuneate at the base, entire or obsoletely crenate-undulate, above green and glandular-puberulent, beneath paler, punctate, and pubescent chiefly on the veins, 1-1.5 cm. long, half as wide; corymb terminal, fastigiately branched, few-headed; pedicels 1.5-2.5 cm. long, puberulent; heads apparently about 25-flowered, 8-9 mm. high, almost equally thick; involucre broadly campanulate, the scales about 15, obtuse, the inner narrowly oblong, substramineous, the outer progressively shorter, ovate- or oblanceolate-oblong, herbaceous, puberulent; corollas with short slender proper tube (1 mm. long), distinctly enlarged campanulate-cylindric throat (3 mm. long) and ovate-oblong teeth (nearly

1 mm. long); anthers with distinct but short and broad bluntish terminal appendage; achenes very slender, 4 mm. long, light-colored, tapering to the stipe-like base, slightly hispid on the angles; pappus-bristles dull-white, nearly smooth, unequal, the longest about 4 mm. in length.—Bull. Torr. Bot. Club, xix. 1 (1892).

LA PAZ: Prov. Larecaja: Ingenio del Oro, alt. 3050 m., *Rusby*, no. 1747 (Gr., N. Y., U. S.).

DEPT. NOT INDICATED: Cargadira, alt. 2440 m., *R. S. Williams*, no. 1521 (N. Y.).

35. **E. Lobbii** Klatt, Ann. Naturhist. Mus. Vienna, ix. 356 (1894); Robinson, Proc. Am. Acad. liv. 58 (1919). ? *E. sordescens* Buchtien, Contrib. Fl. Boliv. 189 (1910), not DC.

LA PAZ: Prov. Larecaja: San Carlos near Mapiri, alt. 750 m., *Buchtien*, nos. 1513 (N. Y., phot. Gr.), 1538 (N. Y.).
[Peru.]

In habit, pubescence, and many other traits this species is suspiciously close to *E. Lundianum* DC. of Atlantic Brazil. That, however, has smaller (about 20-flowered) heads and a less imbricated involucre with the outer scales much narrower and not, as in *E. Lobbii*, conspicuously rounded at tip.

36. **E. microstemon** Cass. Diet. xxv. 432 (1822); Robinson, Proc. Am. Acad. liv. 295, 340, 356 (1918), lv. 69 (1919). *E. guadalupense* Britton, Bull. Torr. Bot. Club. xviii. 333 (1891), as to pl. from Guanai in part (Gr.), not Spreng.

LA PAZ: Prov. Onasumos: vicinity of La Paz, alt. 3050 m., *Bang*, no. 504 (Gr., U. S., Mo.); Prov. Larecaja: at Guanai, alt. 610 m., *Rusby*, no. 1606 in part (Gr.); Prov. Caupolican: Tumupasa, flowers pale blue, *R. S. Williams*, no. 591 (N. Y.).

[An annual weed, frequent throughout the warmer parts of the American continent.]

37. **E. pycnocephalum** Less. Linnaea, vi. 404 (1831); Robinson, Proc. Am. Acad. liv. 296, 340 (1918). *E. Sternbergianum* Britton, Bull. Torr. Bot. Club, xviii. 334 (1891), in part, not DC.

LA PAZ: Prov. Yungas: alt. 1830 m., *Rusby*, no. 1608 (Gr., U. S.).
[Southw. U. S. to Braz.]

38. **E. polopolense** Robinson (p. 10). Suffruticose, branched, about 5 dm. high, slightly villous-pubescent on the petioles, leaf-margins, and chief veins, otherwise glabrous; stem erect, terete, purplish or brownish, 3 mm. thick, with white pith; internodes sometimes 10–13 cm. long; branches ascending, slender, leafy; leaves opposite, petiolate, ovate, acuminate, sharply serrate-dentate (teeth 1–1.8 mm. high and 3–5 mm. broad), rounded at base but often with

a slight acumination at point of insertion, 3.6–5 cm. long, 1–2 cm. wide, 3-nerved from the very base, membranaceous, green both sides, scarcely paler beneath, ciliolate on margin, also somewhat hairy on the nerves and chief veins on both surfaces, the hairs short, delicate, incurved; petioles 6–13 mm. long, pubescent; cymes terminal, trifid, the partial ones mostly 3–5-headed, sparingly puberulent (not glandular); heads 24–30-flowered, short-pedicelled, 7 mm. high, 5 mm. thick; involucre campanulate, about 3-seriate; scales about 20, oval, ciliolate and the outer dorsally puberulent, with 3–5 green nerves and mostly 4 white ribs; receptacle convex, glabrous; corollas white, 3 mm. long, with short proper tube and longer scarcely enlarged sub-cylindric throat; limb hispidulous; style-branches filiform-clavellate; achenes 1.6 mm. long, glabrous, black with lighter-colored angles; pappus-bristles about 22, white, delicate.

LA PAZ: Prov. North Yungas: Polo-Polo, near Coroico, alt. 1100 m., *Buchtien*, nos. 429 (Gr., N. Y.), 3934 (N. Y.).

Distributed as *E. soratae* Sch.-Bip., which, however, has much smaller (about 7-flowered) heads, mucronate and more stramineous involucre scales, as well as other points of difference.

39. **E. Fiebrigii** Hieron. An herbaceous perennial about 6 dm. high; stem pale glaucous-green, when young densely viscid-glandular, at length glabrate, branched, leafy to the inflorescence; internodes as much as 7 cm. long; leaves opposite, petiolate, ovate, acutish or obtusish at the apex, rounded or subcordate at the base, crenate-serrate (teeth 4–10 on each side, mucronate, as much as 2 mm. high and 5 mm. wide), membranaceous, glaucous-green, glandular-puberulent on both surfaces especially along the nerves, the largest about 3.5 cm. long and 2.5 cm. wide; petiole 5–10 mm. long, densely viscous-glandular; corymbs terminal, cymose, rather dense; heads 20–25-flowered; involucre campanulate; the scales 19–21, greenish-stramineous, scarios, with hyaline margin; the inner lance-linear, acutish, very finely ciliolate and often lilac-tinged toward the summit, glandulose on the back; the outer decreasing, scarcely wider, 3–4-nerved; the outermost ovate, about 2.5 mm. long; corollas glabrous, about 4 mm. long; tube cylindric, scarcely enlarged, yellowish-white; the limb lilac; style-branches lilac, scarcely thickened toward the summit; achenes (immature) 1.75 mm. long, dark-colored and glabrous on the faces, the angles yellowish-white and rough.—Hieron. in *Engl. Bot. Jahrb.* xl. 371 (1908).

TARIJA: Prov. Arce: in fields near Camacho, alt. 2700 m., *Fiebrig.* no. 3528.

This species has not been seen by the writer. The foregoing description is condensed from the original diagnosis of Prof. Hieronymus.

40. **E. Bridgesii** Robinson. Probably herbaceous or nearly so, slender, erect, 3 dm. or more in height; stem terete, 2-3 mm. thick, pale yellowish-green, densely covered with very short incurved hairs, corymbosely branched above, leafy up into the inflorescence; leaves subopposite or the uppermost alternate, rhombic- or lanceolate-ovate, acuminate at both ends, 3-5-nerved from above the base, 5 cm. long, 15-18 mm. wide, membranaceous, pale green, above (especially near the margin) scabrous-puberulent, beneath scarcely paler, puberulent on the light-colored nerves and chief veins, the margin entire or with very few (mostly 1-2 on each side) mucronate teeth; petiole 4-7 mm. long; corymb terminal, compound, flattish, 2-2.5 dm. wide; branches and pedicels (3-6 mm. long) slender, stramineous, puberulent; heads very numerous, about 25-flowered, 7 mm. high, 4 mm. thick; involucre scales about 22, graduated, very unequal, pale green, mostly 2-costulate, the outermost short, ovate-lanceolate, acuminate, dorsally appressed-puberulent, squarrose-recurved at the tip, the intermediate gradually longer, lanceolate, attenuate, subglabrous; the innermost linear-oblong, smooth; corollas pink, 4 mm. long, glabrous, gradually enlarged upward, a little granulate on the outside of the limb; achenes dark-brown, upwardly hispid on the lighter-colored angles; pappus-bristles about 27, scarcely 2.5 mm. long.—Proc. Am. Acad. lv. 7 (1919).

BOLIVIA WITHOUT LOCALITY: *Bridges* (K., phot. Gr.).

41. **E. triosteifolium** Rusby. Fruticose, 3-4 m. high; stems when young somewhat 6-angled, tomentellous; internodes 3-10 cm. long; leaves opposite, 2-3 dm. long, 6-11 cm. wide, oblong-lanceolate or -ovate, caudate-acuminate, mucronulate-serrate, sessile by a long entire gradually attenuated petiolar base (3-6 cm. in length), pinnately veined, membranaceous, green on both surfaces, puberulent on the mid-nerve, elsewhere glabrous or nearly so; corymb compound, trichotomous, convex, many-headed; pedicels 4-10 mm. long, tomentellous; heads 40-60-flowered, about 8 mm. high, 1 cm. thick; involucre subtriseriate, campanulate, yellowish-green; scales 25-40, thin, obtusish, mostly with 3 green nerves and relatively broad and pale margins; corollas white, slenderly trumpet-shaped, hispid on the limb, 5.5 mm. long; receptacle, flat, glabrous; achenes (immature) 2.2 mm. long, hispidulous on the angles.—Bull. N. Y. Bot. Gard. iv. 379 (1907).

LA PAZ: Prov. Yungas: scarce, in gravel and mould, near river, Coroico. *Bang*, no. 2380 (Gr., N. Y., Mo., K.).

Sect. III. EXIMBRICATA (DC.) Hoffm. (See Robinson, Proc. Am. Acad. liv. 303.)

KEY TO SPECIES.

- a.* Leaves (1.5–2 dm. in length) sessile by a long attenuate and winged petiolar base. 42. *E. latipaniculatum*.
- a.* Leaves with a distinct and wingless petiole *b.*
- b.* Leaves regularly feather-veined *c.*
- c.* Leaves serrate, thin, not reticulated, bright green beneath; involueral scales linear-attenuate, three-fourths as long as the florets
43. *E. jugipaniculatum*.
- c.* Leaves entire or nearly so, thickish, reticulated, pale beneath; scales lance-oblong, obtusish, half as long as the florets
44. *E. gloeocladum*.
- b.* Leaves more or less distinctly 3(–5)-nerved from or somewhat above the base *d.*
- d.* Heads 10–28-flowered *e.*
- e.* Heads loosely and subracemously paniculate; apical appendages of the anthers very short or obsolete. 45. *E. solidaginoides*.
- e.* Heads few in a cyme or more often numerous in dense rounded compound corymbs; anther-appendages well developed *f.*
- f.* Leaves entirely glabrous, sharply serrate *g.*
- g.* Leaves 1–3 cm. wide, punctate beneath. 20. *E. Pentlandianum*.
- g.* Leaves about 5 cm. wide, not punctate. 27. *E. cucosmum*.
- f.* Leaves pubescent or tomentose or at least puberulent on the nerves beneath *h.*
- h.* Cauline leaves 5–22 mm. wide *i.*
- i.* Involueral scales elliptical to linear-oblong, rounded at the tip *j.*
- j.* Leaves deeply lobed. 46. *E. lobatum*.
- j.* Leaves entire or nearly so. 34. *E. thymifolium*.
- i.* Involueral scales linear-lanceolate, acuminate
47. *E. azangaroense*.
- h.* Cauline leaves 2.5–10 cm. wide *k.*
- k.* Involueral scales about three-fourths as long as the florets, clearly 2–3-costulate. 48. *E. Sternbergianum*.
- k.* Involueral scales about half as long as the florets, scarcely or not at all costulate *l.*
- l.* Lower surface of leaves covered with a dense pubescence or tomentum hiding the veinlets. 49. *E. longipetiolatum*.
- l.* Lower surface of leaves (under a lens) clearly reticulated, very thinly pubescent or glabrate *m.*
- m.* Heads 10–13(–22)-flowered; leaves coarsely serrate
50. *E. lasiophthalmum*.
- m.* Heads 22–28-flowered; leaves entire, undulate, or 1–2-toothed on each side *n.*
- n.* Leaves suborbicular-ovate, 6–8 cm. wide, more than half as broad as long. 51. *E. rufescens*.
- n.* Leaves ovate-lanceolate, less than half as wide as long, 2–3 cm. broad. 52. *E. camataquiense*.
- d.* Heads 30–∞-flowered *o.*
- o.* Leaves 2–4.5 cm. wide *p.*

- p.* Leaves entire or obsoletely crenate.....53. *E. ignoratum*.
p. Leaves coarsely serrate-dentate *q.*
q. Shrub, 2 m. high; leaves glabrous....54. *E. grossidentatum*.
q. Perennial herb, 3-4 dm. high; leaves with scattered pubescence on nerves beneath.....55. *E. calderillense*.
o. Leaves 5-12 mm. wide.....56. *E. scopulorum*.

42. ***E. latipaniculatum*** Rusby. A slender shrub 2-3 m. high; stems flexuous, terete, purplish-brown, when young obscurely tomentellous, the hairs slender, with purple articulation; leaves opposite, sessile by a long narrow petiole-like base, oblong-lanceolate, caudate-acuminate, finely and sharply serrate except on the attenuate basal portion, feather-veined, puberulent on the mid-nerve and chief veins above, somewhat paler and more generally pubescent beneath, 1.4-2.2 dm. long, 4-9 cm. wide, membranaceous; panicle ovoid, opposite-branched, leafy-bracted, 2-3 dm. high and thick; heads about 9 mm. high and 10-12 mm. in diameter, crowded at the ends of the branches of the panicle; pedicels sometimes as much as 1 cm. long; involucre campanulate, the scales lanceolate to linear, gradually acuminate, purple-tinged, dorsally pubescent; corollas purple, slenderly funnel-shaped, hispidulous on the limb; achenes at maturity black, roughened both on the ribs and faces by a few short-stiped glands (not smooth as originally described); pappus-bristles white, delicate, barbellate.—Bull. N. Y. Bot. Gard. iv. 380 (1907).

La PAZ: Prov. Yungas; in forest-mould of wet shady places, abundant, Sacramento, *Bang*, no. 2386 (Gr., N. Y., U. S., Mo., K.).

43. ***E. jugipaniculatum*** Rusby. Shrub 2-2.5 m. high; stems terete, covered with fine upcurved or subappressed hairs, these at first delicate and purple-jointed, at length firm, sordid-stramineous and somewhat bristle-like; leaves opposite, lance-oblong, shallowly mucronulate-serrate except near the acuminate tip and narrowed but obtusish base, feather-veined, membranaceous, subappressed-pubescent on the midnerve and chief veins, green on both surfaces, 10-12 cm. long, 3.5-6.4 cm. wide; petiole terete, sordid-strigose, 1-1.5 cm. long; veins about 6 pairs; panicle pyramidal, about 1 dm. high and thick, sometimes reduced to a subsimple strongly convex corymb scarcely over 3 cm. high and thick, its branches and pedicels densely sub-appressed-pubescent; heads 8-10 mm. high and equally broad, often nodding; involucreal scales subequal, scarcely imbricated, lance-linear, attenuate, about 6 mm. long, densely pubescent; corollas white, glabrous; achenes slender, pale, smooth; pappus-bristles whitish, nearly smooth.—Bull. N. Y. Bot. Gard. iv. 379 (1908).

LA PAZ: Prov. Yungas: in wet forest-mould, Coroico, *Bang*, no. 2471 (Gr., N. Y., Mo., K.).

44. **E. gloeocladum** Robinson. Stout shrub or small tree; stems thickish, terete, at first sticky and vernicose, later minutely granulate, finally altogether glabrate; pith white; internodes 1-4 cm. long; leaves opposite, ovate-oblong, sharply acuminate, cuneate at base, 1-2 dm. long, 2.5-8 cm. wide, entire or obsolete and remotely undulate-dentate, feather-veined, glabrous above except for the puberulent midrib, paler and grayish-pubescent or -tomentose beneath, subcoriaceous; corymbs compound, rounded, crowded leafy-bracted, about 1 dm. in diameter; heads about 9-flowered, 8 mm. high, half as thick; involucre campanulate; the scales about 14, oblong, obtuse, erose-ciliolate, puberulent or granulated dorsally, somewhat sticky, little imbricated but some of the outermost shorter; corollas probably white or pink, 5.5 mm. long, smooth, slightly enlarged from the base to the limb; achenes 2.5 mm. long, glandular-granulate on the angles but at length glabrate and almost black; pappus-bristles about 26, yellowish-white, scarcely roughened.—*Proc. Am. Acad.* iv. 17 (1919). *E. trichotomum* Sch.-Bip. *Bull. Soc. Bot. Fr.* xii. 81 (1865), & *Linnaea*, xxxiv. 535 (1865-66), not Sch.-Bip. in sched. Riedel ex Bak. in *Mart. Fl. Bras.* vi. pt. 2, 305 (1876).

LA PAZ: Prov. Larecaja, in the vicinity of Sorata, in the temperate region, alt. 2700-3000 m., on Mt. Chilicea near Challapampa, *Mandon*, no. 258 (Gr., N. Y.).

45. **E. solidaginoides** HBK. *Nov. Gen. et Spec.* iv. 126 (1820); Robinson, *Proc. Am. Acad.* liv. 310, 341, 361 (1918). *E. guadelupense* Britton, *Bull. Torr. Bot. Club*, xviii. 333 (1891), as to pl. no. 1606; Rusby, *Mem. Torr. Bot. Club*, iii. no. 3, 53 (1893), not Spreng. *E. stipuliferum* Rusby, *Mem. Torr. Bot. Club*, iv. no. 3, 210 (1895), & *Bull. N. Y. Bot. Gard.* iv. 378 (1907). *Ophryosporus solidaginoides* (HBK.) Hieron. in *Engl. Bot. Jahrb.* xxix. 4 (1900).

LA PAZ: Prov. Yungas, *Bang*, no. 254 (Gr., N. Y., Mo.); North Yungas, at Polo-Polo near Coroico, alt. 1100 m., *Buchtien*, no. 3932 (N. Y.). Prov. Larecaja, at Guanai, alt. 610 m., *Rusby*, no. 1606 (N. Y.).

WITHOUT LOCALITY: *Bang*, no. 2876 (Gr., N. Y., U. S., Mo.).
[Northward to Venez. and Mex.]

46. **E. lobatum** Robinson. Several-stemmed herbaceous perennial 1-4 dm. high; stems often decumbent, slender, simple or opposite-branched, leafy, finely pubescent; internodes 1-5 cm. long; leaves opposite, petiolate, deeply lobed or trifid, ovate or deltoid in general outline, green and finely pubescent on both surfaces, 1-2 cm. long, nearly as wide, the main segments again lobed, the terminal

usually trifid and the lateral often unequally bilobed; lobes rounded at tip; heads about 26-flowered, few, solitary or cymose at the ends of the branches, 6–8 mm. high and thick; involucre campanulate; scales about 13, elliptic-oblong, acutish to rounded at the erose often purple-tinged tip; corollas white, 4 mm. long; the proper tube 0.8 mm. long, glandular-granulate; the throat distinctly enlarged, sub-cylindric, 2.4 mm. long, smooth; achenes 3.3 mm. long, slender, attenuate toward the base, hispidulous especially on the angles, yellowish-brown (submature); pappus-bristles about 30, dirty-white, barbellate.—Proc. Am. Acad. iv. 21 (1919). *E. scopulorum* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), & *Linnaea*, xxxiv. 535 (1865–66); Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907); not Wedd.

LA PAZ: Prov. Larecaja: on cliffs of the subalpine region near Yani, alt. 3500 m., *Mandon*, no. 263 (Gr., N. Y.).

WITHOUT LOCALITY: *Bang*, no. 1912 (Gr., N. Y., U. S., Mo.).

47. **E. azangaroense** Sch.-Bip. Shrub, 3–5 or more dm. high, covered almost throughout by a short incurved stiffish but rather inconspicuous puberulence; stems slender, terete, often purplish-green; branches opposite, spreading-ascending, leafy; leaves opposite, petiolate, chiefly deltoid-lanceolate or narrowly ovate, 1.7–3.6 cm. long, 1–2 cm. wide, subacuminate to a mostly obtusish point, rounded at base, the lateral margins finely or more often rather coarsely crenate-serrate (the teeth 3–7 on each side), green on both surfaces, scarcely paler beneath, 3-nerved from the base; petiole slender, 5–11 mm. long, heads about 40–45-flowered, nearly 1 cm. high and 8 mm. in diameter, crowded in 3–9-headed rounded terminal cymes; involucre campanulate; scales about 20, subequal, lance-linear, acutish, usually glandular-puberulent; corollas white, glabrous with slender proper tube 1.7 mm. long and distinctly enlarged campanulate-cylindric throat 3 mm. in length; achenes nearly black, slightly scabrid on the angles; pappus-bristles about 16, white, barbellate.—*Bonplandia*, iv. 54 (1856), name only; Sch.-Bip. ex Wedd. *Chlor. And.* i. 217 (1857); Sch.-Bip. *Linnaea*, xxxiv. 536 (1865–66); Robinson, Proc. Am. Acad. liv. 315, 344 (1918), lv. 84 (1917). *E. inconspicuum* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), & *Linnaea*, xxxiv. 535 (1865–66), nomen subnudum. *E. heptanthum* Britton, Bull. Torr. Bot. Club, xviii. 334 (1891), not Sch.-Bip.

LA PAZ: Prov. Onasuyos, near the city of La Paz, alt. 3500 m., *Rusby*, no. 1733 (Gr., N. Y., U. S., Mo.); *R. S. Williams*, no. 1671 (N. Y.); *Buchtien*, no. 55 (N. Y.); *Dr. & Mrs. J. N. Rose*, no. 18,912 (Gr., N. Y., U. S.); near Achacache, alt. 4000 m., *Mandon*, no. 260 in part.

[Peru; also, acc. to Wedd., Ecuad. and Colomb.]

As now interpreted, this plant, clearly abundant in western Bolivia and adjacent Peru, although nearly related to the Chilean *E. glechonophyllum* Less., differs in having slightly larger heads and a peculiar incurved and for the most part non-glandular puberulence. The leaves are also of a firmer texture. In *E. glechonophyllum* the inflorescence is closely puberulent with very short straight gland-tipped hairs and the leaves are thinly membranaceous. Absolutely authentic material of *E. azangaroense* has not been available for examination. The extension of this species to Santa Marta, Colombia, has not been verified.

48. ***E. Sternbergianum*** DC. Prod. v. 167 (1836); Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & *Linnaea*, xxxiv. 535 (1865-66); Britton, Bull. Torr. Bot. Club, xviii. 334 (1891), as to pl. no. 2719; Robinson, Proc. Am. Acad. iv. 83 (1919).

LA PAZ: PROV. LARECAJA: in thickets, everywhere, alt. 2650-3000 m., near Sorata, *Mandon*, no. 254 (Gr., N. Y.); Guanai, alt. 610 m., *Rusby*, no. 2719 (N. Y.).

ISLANDS IN LAKE TITICACA: Mrs. A. F. *Bandelier*, no. 25 (N. Y.); *Buch-tien*, no. 302 (N. Y., U. S.).
[Peru.]

Vernacular name (acc. to Mrs. *Bandelier*) *patairuani*.

Here probably belongs *E. heptanthum* *Rusby*, Bull. N. Y. Bot. Gard. iv. 378 (1907), not Sch.-Bip. Its type, *Bang*, no. 2037 (N. Y.), immature and insect-damaged, has some of its leaves decidedly cordate, but in other respects it appears to agree closely with *E. Sternbergianum*.

49. ***E. longipetiolatum*** Sch.-Bip. Bushy shrub, 2-2.5 m. high; stems terete, stoutish, flexuous, pithy, pale-brown, tomentellous; internodes 1-7 cm. long; branches spreading and curved, leafy chiefly toward the tip; leaves opposite, deltoid-ovate, crenate-ser-rate except near the acuminate apex and broad rounded base, firmly membranaceous or subcoriaceous, 3-nerved from a point 8-18 mm. above the base, pale-green and puberulent above, grayish-tomentulose beneath; petioles of the cauline leaves 4-7 cm. long, of the rameal often only 1-2 cm. in length; corymbs compound, terminal, strongly convex, together forming a leafy-bracted panicle 1.5-3 dm. high and thick; heads 16-24-flowered, about 8-9 mm. high, 6-8 mm. in diameter; involucre turbinate, scarcely half the length of the head, little imbricated; scales long-lanceolate, acutish, sordid-tomentellous, obscurely 1-nerved or without visible nerving; corollas purple, 4-5 mm. long, gradually enlarged from the base to the top and without sharply marked throat, smooth; achenes 2.2 mm. long, covered with

sessile globular glands; pappus-bristles about 20, dull-white, nearly smooth.—Bull. Soc. Bot. Fr. xii. 81 (1865), nomen; ex Rusby, Mem. Torr. Bot. Club, iii. no. 3, 52 (1893), where first described. *E. longe petiolatum* Sch.-Bip. Linnaea, xxxiv. 535 (1865-66), nomen. *E. sordescens* Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907), not DC.—

LA PAZ: Prov. Larecaja: everywhere in swamps and wet woods of the temperate region, alt. 2600-3000 m., in vicinity of Sorata, *Mandon*, no. 257 (Gr., N. Y.); Sorata, alt. 2288 m., *R. S. Williams*, no. 2408 (N. Y.). Prov. Yungas: Songo, *Bang*, no. 867 (Gr., N. Y., Mo.); Coroico, *Bang*, 2381 (Gr., U. S., N. Y., Mo.).

50. ***E. lasiophthalmum*** Griseb. Suffruticose, 2 m. tall, sparingly tufted with remnants of a grayish arachnoid pubescence particularly on the axillary buds, inflorescence, and in the axils of the lateral nerves and veins as they leave the midnerve on the lower surface of the leaf, otherwise smoothish; stem round, opposite-branched; leaves opposite, petiolate, broadly ovate, acutish to acuminate, serrate except near the base and apex, membranaceous, paler and punctate beneath, somewhat pinnately 5-nerved from near the base, 6-10 cm. long, more than half as wide; petiole about 2.5 cm. long; corymbs compound, trichotomous, 1-4 dm. in diameter, at length flattish, the branchlets and pedicels covered with a somewhat flocculent crisped puberulence; heads about 12-flowered, 7 mm. high; involucre subtriseriate, little imbricated, half as long as the florets; the scales narrowly oblong, acutish, covered dorsally with remnants of grayish tomentum obscuring the nervation; corollas reddish-violet, about 4 mm. long, gradually enlarged upward, the throat exceeding the proper tube; achenes slender, tapering downward, 2.5 mm. long; pappus-bristles dirty-white, about equalling the corolla.—Goett. Abh. xix. 167 (1874); Kuntze, Rev. Gen. iii. 147 (1898).

COCHABAMBA: Prov. Ayopana: in the mountains of Tunari, alt. 3000 m., *Kuntze* (N. Y., U. S.).

LA PAZ: Prov. North Yungas: alt. 3300 m., *Buchtien*, no. 3028 (N. Y.).

DEPT. NOT ASCERTAINED: at Catana on the Ilimani, alt. 2400 m., *Buchtien*, no. 3288 (N. Y.).

Of this species no authentic material has been seen. It has been interpreted merely from the original diagnosis and from Dr. Kuntze's specimens so identified by Prof. Hieronymus who presumably has had access to authentic material from Argentina. Two of Dr. Kuntze's specimens are still doubtful, namely one from Sierra de Sta. Cruz, alt. 3000 m., May, 1892 (U. S.) and the other without data (N. Y.). These have closely the habit of this species as here

interpreted, also the same pubescence, texture, venation, and serration of the leaves; but have heads 18–22-flowered, showing in this respect some transition toward *E. ignoratum* Hieron.

51. ***E. rufescens*** Lund. Much branched shrub, 1 m. or more in height, densely grayish-pubescent; branches terete, ascending; leaves opposite, broadly ovate, caudate-acuminate, obtusish to rounded at base, entire, undulate, or irregularly few-toothed at the sides, 3–5-nerved from a point about 1 cm. above the base, chartaceo-membranaceous, 1–1.5 dm. long and wide, above glabrous and green, beneath more or less persistently grayish-tomentose; petiole 2.5–3.5 cm. long; heads about 24-flowered in compound many-headed panicles (1–1.5 dm. in diameter); pedicels slender, curved or flexuous, often 1 cm. long; involucre turbinate-campanulate; scarcely half the length of the head; scales narrow, unequal and somewhat graduated, little imbricated, lance-linear, acutish, finely pubescent on the back; corollas tubular, purplish; pappus dirty-white; achenes glabrous (acc. to DC.) or shortly pilose (acc. to Bak.).—Lund ex DC. Prod. v. 168 (1836); Bak. in Mart. Fl. Bras. vi. pt. 2, 348 (1876). *E. subtreplicinerve* Sch.-Bip. ex Bak. l. c., name only.—Varies as follows:

[Var. **typicum**. Leaves of somewhat firm chartaceo-membranaceous texture, persistently and rather densely grayish-pubescent to tomentose beneath.—Lit. and synonym. as above.—Atlantic Brazil, Rio Janeiro, Minas Geraes, etc.]

Var. **glabratum** Hieron. Leaves thinner, more delicately membranaceous, green on both sides, somewhat paler beneath and from the first only sparingly pubescent except on the nerves, the surface glandular-punctate and marked with a fine network of dark veins.—Hieron. ex Kuntze, Rev. Gen. iii. 148 (1898), without char.

COCHABAMBA: Prov. Tapacari, on the Rio Tapacari, alt. 3000 m., Kuntze (N. Y., phot. Gr.).

52. ***E. camataquiense*** Hieron. Shrub, 2 m. high; branches puberulent, soon glabrate, sulcate-angulate; internodes sometimes as much as 3.5 cm. long; leaves opposite, ovate-lanceolate, or ovate from a shortly cuneate base, acuminate, mucronate, entire or obsoletely 1–2-dentate toward the middle, chartaceous, glabrate, somewhat 3-nerved from a point 5–10 mm. above the base, when well grown 6.5 cm. long and 2.7 cm. wide, reticulate-veiny, glandular-punctate; petioles 5–10 mm. long; heads 22–28-flowered, corymbed or cymose on the uppermost branches; pedicels 8 mm. long, puberulent, beset with 8–10 small alternate bracteoles; scales of the campanulate involucre about 12, subequal, linear-lanceolate, green, 3-nerved at

base, the hyaline margin ciliate (the hairs jointed), dorsally beset with sessile or short-stiped capitate glands; corollas smooth, yellowish-white, narrowly funnel-formed; achenes 2.5 mm. long, scabrid on the angles, beset with sessile glands on the faces; pappus-bristles 20–25, yellowish-white.—Hieron. in Engl. Bot. Jahrb. xl. 377 (1908).

TARIJA: Prov. Mendez: in wet places near Camataqui, *Fiebrig*, no. 3069 in part.

No material of this species has been seen by the writer, the character is here condensed from the original diagnosis of Prof. Hieronymus.

53. ***E. ignoratum*** Hieron. Shrubby; branches subterete, when young obscurely puberulent, soon glabrate, purplish-gray; leaves opposite, petiolate, lance-ovate, acuminate, subcuneate to rounded at base, essentially entire or obscurely crenate-undulate, firmly membranaceous, soon entirely glabrate on both surfaces, 3-nerved from a point slightly above the base, mostly 4–5 cm. long, 2–3 cm. wide, dull, glandular-punctate, finely reticulated with veinlets immersed; petioles slender, 7–10 mm. long; panicle rounded-pyramidal, 2 dm. in diameter; heads 40–50-flowered (acc. to Hieron.), crowded at the ends of the branches of the panicle, nearly 1 cm. high and equally thick; pedicels 1–8 mm. long; involucre campanulate, about half as long as the head; scales lanceolate, subequal, little imbricated, sordid-pubescent; corollas whitish, subcylindric-infundibuliform, 4.5 mm. long; achenes slender, papillose, at length fuscous; pappus-bristles about 20, dirty-white, scabrid.—Hieron. in Engl. Bot. Jahrb. xl. 379 (1908). *E. longipetiolatum* Hieron. l. c. xxii. 786 (1897); Ktze. Rev. Gen. iii. 147 (1898), as to pl. of Santa Cruz; not Sch.-Bip.

SANTA CRUZ: alt. 2600 m., *Kuntze* (N. Y.).

54. ***E. grossidentatum*** Hieron. Shrub, attaining a height of 2 m.; branches round, at first green and pubescent, later glabrate and dark or brown; leaves opposite, rhombic-ovate, coarsely and irregularly dentate except at the acute apex and toward the cuneate base (teeth 4–12 on each side, 2–5 mm. high and equally wide at base), subchartaceous, glaucous-green, wholly glabrous, subtriplicate-nerved from a point 2–3 mm. above the base, finely reticulate-veiny, sometimes as much as 9 cm. long and 3.5 cm. wide, punctate with immersed glands; petiole 5–15 mm. long; cymes dense, terminal on the uppermost branches; peduncles puberulent, becoming 1 cm. long; heads 30–35-flowered; involucre campanulate, its scales 12–16, subequal, lanceolate, acutish, 3 mm. long, herbaceous, lacerate-

denticulate on the hyaline margin, dorsally sticky-glandular; corollas 4.5–5 mm. long, perceptibly though slightly enlarged upward; submature achenes dark, 2.5 mm. long, sprinkled on the angles and faces with sessile glands; pappus-bristles 25–30, yellowish-white.—Hieron. in Engl. Bot. Jahrb. xl. 377 (1908).

TARIJA: Prov. Mendez, Camataqui, *Fiebrig*, no. 3069 in part.

Not seen by the writer; the character condensed from the original of Prof. Hieronymus, where it may be noted, the internodes were stated to be as much as "4 mm." long,—doubtless a misprint for 4 cm.

55. ***E. calderillense*** Hieron. An herbaceous perennial, 3–4 dm. high; stems sulcate-angulate and somewhat pubescent when young, becoming 2.5 mm. thick, terete and glabrate, green or dark-purple; leaves opposite, broadly ovate, acuminate, mucronate, cordate, coarsely and unequally dentate-serrate (teeth as much as 4 mm. high and 6 mm. wide), subchartaceous, bright yellowish-green, glabrous above, sparingly hirtellous beneath, subtriplinerved from the very base, at most 5.5 cm. long and 4.5 cm. wide; cymose corymbs dense, borne at summit of stem and branches; heads 35–40-flowered; pedicels becoming 7 mm. long; involucre campanulate, its scales 13–15, nearly equal, linear-lanceolate, 3-nerved at base, long-ciliate with jointed hairs, subscarious, substramineous, sparingly beset on the back with sessile glands; corollas 4.5 mm. long, funnel-shaped throat 2.5 mm. long, sparingly villous above; achenes (young) 2 mm. long, smooth between the scabrid concolorous angles; pappus-bristles 16–18, yellowish-white.—Hieron. in Engl. Bot. Jahrb. xl. 381 (1908).

TARIJA? near Caldarrillo, alt. 3000 m., in moist soil on hills, *Fiebrig*, no. 3522.

No material of this species has been available for examination. The description is here compiled from the original diagnosis.

56. ***E. scopulorum*** Wedd. Chlor. And. i. 216, t. 40, f. B (1857); Ktze. Rev. Gen. iii. 148 (1898); Perkins in Engl. Bot. Jahrb. xlix. 222 (1913); Robinson, Proc. Am. Acad. lv. 82 (1919); not Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), & *Linnaea*, xxxiv. 535 (1865–66); nor Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907). *E. guadelupense*, Bull. Torr. Bot. Club, xviii. 333 (1891), as to pl. no. 1609, not Spreng.

LA PAZ: Prov. North Yungas: Unduavi, alt. 3000 m., *Buchtien*, no. 3027 (N. Y., U. S., fragm. Gr.); Prov. Yungas, alt. 830 m., *Rusby*, no. 1609 (N. Y.); Prov. not clear, at Hacienda Huacapampa-Palca, alt. 3800 m., *Pflanz*, no. 72, and alt. 4000 m., no. 72a, acc. to Perkins, l. c.

POTOSI: on slaty ground, Quechisla, alt. 3450–3500 m., *Bender*, no. 12, acc. to Perkins, l. c.

DEPT. NOT INDICATED: *Kuntze* (N. Y.).
[Peru.]

Vernacular name: *kinchamali* (as reported by Bender acc. to Perkins).

Sect. IV. PRAXELIS (Cass.) Benth. (See Robinson, Proc. Am. Acad. liv. 318.)

KEY TO SPECIES

- a. Involucral scales conspicuously squarrose, the middle and outer with herbaceous tips.....57. *E. phyllocephalum*.
a. Involucral scales appressed, not herbaceous-tipped b.
b. Leaves rhombic-ovate; pedicels one-half to two and a half times as long as the involucre c.
c. Perennial herbs or undershrubs; heads 45-50-flowered d.
d. Receptacle elongate-conical; outer involucral scales lance-ovate, attenuate, obsoletely serrulate; decumbent undershrub, mostly 1.5-3 dm. high.....58. *E. conoclinanthium*.
d. Receptacle hemispherical; outer scales ovate to ovate-oblong, ciliate; erect or suberect herb, mostly 3-5 dm. high
59. *E. toldense*.
c. Coarsely pubescent annual; heads 25-30-flowered. 60. *E. clematideum*.
b. Leaves linear to narrowly oblong; pedicels conspicuously elongated, often 5-20 times as long as the involucre.....61. *E. kleinoides*.

57. ***E. phyllocephalum*** Klatt. Copiously opposite-branched; stem terete, slender, soft as if herbaceous (base unknown), sparsely sordid-pubescent; internodes 3-9 cm. long; leaves opposite, lanceolate, attenuate to an acute point, rather abruptly cuneate to a sessile base, coarsely serrate (the teeth 3-5 on each side), sparingly appressed-pubescent above, scarcely paler and sordid-hirsute beneath, limp-membranaceous, the largest about 5 cm. long and 1.7 cm. wide; heads about 100-flowered, 1 cm. high, 12 mm. in diameter, borne solitary or by 2's or 3's at the ends of the ascending branches; involucre strongly squarrose, the outermost broadly ovate, herbaceous, the intermediate with dilated somewhat spreading herbaceous apical appendage, the inner with the somewhat expanded apical appendage erect, ciliolate, diaphanous; corollas purple, 5.5 mm. long, glabrous; achenes 3.6 mm. long, slender, the faces dark, smooth, the angles lighter-colored, sparingly upwardly hispid; pappus-bristles 27. —Ann. Naturhist. Hofmus. Vienna, ix. 358 (1894).

CHUQUISACA: *d'Orbigny*, no. 1226 (Gr.).

58. ***E. conoclinanthium*** Hieron. Undershrub, 1.5-3 dm. high; stems several or branched from near the base, curved-ascending, sometimes rooting at the lower nodes, leafy to the middle, subterete, mostly purplish, subappressed-pubescent (the hairs upturned, at-

tenuate, purple-jointed; leaves lance-oblong, acutish, cuneate at base, finely to coarsely serrate, sparsely appressed-puberulent chiefly on the nerves and veins, green both sides, 1.5-3.5 cm. long, 7-16 mm. wide, 3-nerved from slightly above the base; cymes simple or compound, terminal, 3-9-headed; pedicels filiform, 6-22 mm. long, flexuous, bracteolate; heads about 45-50-flowered, 8-10 mm. high and nearly as thick; involucre campanulate, 3-5-seriate, purple-tinged; scales appressed, thin, graduated, ovate to oblong, the outer acute, the inner obtuse to rounded, but all tending to be mucronate; corollas slender, tubular-subinfundibuliform, about 5 mm. long, deep-purple toward the limb and dorsally granulated on the teeth; achenes dark, concolorous, 1.8-2 mm. long, 5-angled but often somewhat compressed, upwardly hispid on the angles; pappus-bristles about 30, yellowish-white.—Hieron. in Engl. Bot. Jahrb. xl. 388 (1908). *E. erythrolepis* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), & *Linnaea*, xxxiv. 535 (1865-66), name only.

LA PAZ: Prov. Larecaja: in grassy places of the temperate region on Caltarguata Hill, in open ground near Challapampa in the vicinity of Sorata, alt. 2700 m., *Mandon*, no. 261 (Gr., N. Y.).

TARJJA: in open moist stoney places near Pinos, alt. 220 m., *Fiebrig*, nos. 3152 (Gr.), 3152a acc. to Hieron. l. c.

SOUTHERN BOLIVIA (dept. not indicated): *Fiebrig*, nos. 3514 and 3515 acc. to Hieron, l. c.

59. **E. toldense** Hieron. Perennial herb, 3-5 dm. high, hirsute-villous, the hairs spreading, jointed; root a fascicle of slender but tough fibres; stems terete, ascending, leafy; leaves opposite, lance-ovate, narrowed to an obtusish tip, cuneate to a short petiole, serrate (the teeth only 2-6 on each side), membranaceous, 3-nerved from the base, mostly 4-5 cm. long, 1.6-2.2 cm. wide, sparsely villous-hirsute on both surfaces; petiole 6-13 mm. long; inflorescence terminal, mostly a trifold compound cyme, at first rather dense and rounded, at length open, flattish; heads about 50-flowered, 1 cm. high, 8 mm. thick; pedicels 2-10 mm. long, grayish-pubescent; involucre campanulate, about 3-seriate; scales ovate-oblong to (the inner) linear-spatulate, obtuse, mucronate, purple-tinged, mostly 3-nerved, ciliate but otherwise glabrous; corollas smooth, about 4.5 mm. long, gradually enlarged from near the base to a subcylindric throat, lilac-purple at least toward the limb; style-branches long, lilac-purple, scarcely clavate; pappus-bristles about 22, yellowish-white, slightly scabrid, perceptibly thickened toward the summit, nearly as long as the corolla; achenes slender, about 2.6 mm. long, hispidulous on the angles.—Hieron. in Engl. Bot. Jahrb. xl. 378 (1908.)

TARIJA: Toldos near Bermejo, alt. 1800 m., *Fiebrig*, no. 2371 (Gr.).

60. ***E. clematideum*** Griseb. Apparently annual, though often somewhat woody toward the base, mostly 3–6 dm. but sometimes (acc. to Grisebach) toward 2 m. high, loosely and often sparsely hirsute-pubescent; stems terete, weak and pithy; internodes especially the upper often 1–1.5 dm. long; leaves opposite, rhombic-ovate, acute or obtusish, coarsely crenate-serrate except near the cuneate base, membranaceous, green and sparingly hirsute on both surfaces, mostly 2.5–5.5 cm. long, 1.8–3.5 cm. wide, 3-nerved from the base; the teeth about 6 on each side, mostly obtuse, 2–4 mm. high, 5–8 mm. wide at base; cymes rather dense, 3–10-headed, terminating the stem and spreading-ascending branches; pedicels 2–10 mm. long; heads 25–30-flowered, 7–9 mm. high, 4–5 mm. in diameter; receptacle ovoid-conical; involucre narrowly campanulate, substramineous; scales smooth, slightly lucid, 3–5-nerved, lanceolate to oblong, the outer sharply acute; corollas light purplish-blue, tubular, slightly enlarged upward, smooth; achenes about 2 mm. long, nearly black, hispid toward the summit; pappus-bristles about 15, almost white, lucid, slightly thickened toward the base.—Symb. Argent. 172 (1879). *E. urticifolium*, var. *clematideum* (Griseb.) Hieron. ex Ktze. Rev. Gen. iii. 148 (1898); Chod. Bull. Herb. Boiss. ser. 2, iii. 711 (1903).

SANTA CRUZ: Prov. East Velasco, alt. 200 m., *Kuntze* (N. Y.).
[N. Argent., Paraguay.]

This plant is very closely related to *E. pauciflorum* HBK. but is considerably stouter and has much shorter pedicels and in consequence decidedly denser cymes giving it a characteristic habit. It seems best to accord it specific rank as did Grisebach. Attention may be here once more called to the fact that the binomial *E. urticifolium* L. f. (sometimes arbitrarily charged to *E. urticifolium*), which was founded on a plant of quite different affinity, is in any event invalid owing to the earlier homonym, *E. urticifolium* (L.) Reichard, now in use for a common North American species. See Robinson, Proc. Am. Acad. xlii. 46 (1906).

61. ***E. kleinioides*** HBK. Nov. Gen. et Spec. iv. 120 (1820); Britton, Bull. Torr. Bot. Club, xviii. 334 (1891); Robinson, Proc. Am. Acad. liv. 319 (1918), lv. 84–85 (1919) as to var. *typicum*.

LA PAZ: Prov. Larecaja, Guanai, alt. 610 m., *Rusby*, no. 1734 (N. Y.). Prov. Caupolican, Ixiamus, alt. 457 m., *R. S. Williams*, no. 272 (N. Y.); San Josa, alt. 550 m., *R. S. Williams*, no. 388; hills near Apolo, alt. 1830 m., *R. S. Williams*, no. 136 (N. Y.). All of these are of the typical hirsute-pubescent variety.

[Widely distributed in tropical South America.]

Sect. V. *CONOCLINIUM* (DC.) Benth. (See Robinson, Proc. Am. Acad. liv. 320, 364.)

62. ***E. betonicaeforme*** (DC.) Bak. Herbaceous or nearly so, perennial, erect or decumbent, 6-9 dm. high; stem terete, purplish, puberulent or tomentellous; upper internodes 10-12 cm. long; leaves opposite, petiolate, ovate to rather narrowly deltoid-ovate, obtusish, cordate or somewhat hastate, puberulent above, grayish-tomentellous beneath, 3.5-5(-7) cm. long, 2.5-4 cm. wide, crenate, 3-nerved from the base, membranaceous; petiole slender, tomentellous, 1-1.6 cm. long; corymbs terminal, dense, rounded, rather few-headed, mostly 2-4 cm. in diameter; heads about 35-flowered, 4-6 mm. high and equally thick; involucre campanulate, about 2-seriate; scales subequal, little imbricated, lance-linear, acute, glandular-pubescent on the back, herbaceous; receptacle low-conical or subhemispherical; corollas, tubular without distinct throat, puberulent toward the limb, purple; achenes nearly black at maturity, 1.5 mm. long, sparsely atomiferous; pappus-bristles dirty-white, nearly smooth.—Bak. in Mart. Fl. Bras. vi. pt. 2, 362, t. 96 (1876); Hieron. in Engl. Bot. Jahrb. xxii. 789 (1897). *Conoclinium betonicaeforme* DC. Prod. v. 135 (1836).

TARIJA? Salinas, Valle del Tambo, Lorentz & Hieronymus, no. 943, acc. to Hieron. l. c.

[Eastward to Atlantic Brazil.]

No Bolivian specimen of this well known Brazilian species has been found in any North American herbarium, but there is no reason to doubt the accuracy of Prod. Hieronymus's identification.

Sect. VI. *CAMPULOCINIUM* (DC.) Benth. (See Robinson, Proc. Am. Acad. liv. 325.)

63. ***E. macrocephalum*** Less. Linnaea, v. 136 (1830); R. E. Fries, Ark. för Bot. v. no. 13. 10 (1906); Robinson, l. c. 326.

TARIJA: Pinos near Tarija, alt. 2200 m., Fiebrig, no. 3144 (Gr.); Fries, no. 1298, acc. to Fries, l. c.

[Argent., Paraguay, Uruguay, S. Braz., Colomb., Mex.]

Sect. VII. *HEBECLINIUM* (DC.) Benth. (See Robinson, Proc. Am. Acad. liv. 327, 344, 365, lv. 85.)

KEY TO SPECIES.

- a. Leaves on wingless petioles; heads 40-60-flowered b.
- b. Leaves rhombic-ovate to lance-oblong; petioles of the main stem-leaves 1-2.5 cm. in length c.
- c. Corollas with narrowly campanulate throat . . . 64. *E. camachense*.

- c. Corollas with funnel-shaped throat.....65. *E. trichobasis*.
 b. Leaves suborbicular-ovate; petioles of the main stem-leaves mostly
 4-8 cm. in length *d*.
d. Involucral scales unappendaged.....66. *E. macrophyllum*.
d. Involucral scales with long puberulent and colored tail-like append-
 ages.....67. *E. hecatanthum*.
 a. Leaves sessile by a contracted petiolar base; heads 200-300-flowered
 68. *E. nemorosum*.

64. ***E. camachense*** Hieron. Suffruticose, 6-10 dm. high; stems upright, branched above, subterete, when young densely clothed with capitate-glandular hairs, at length subglabrate; leaves opposite, broadly deltoid-ovate, long-acuminate, irregularly dentate-serrate except at the entire apex and rounded-truncate or -cordate (teeth sometimes as much as 2.5 mm. high and 4 mm. wide, mucronate, acute), membranaceous, bright yellowish-green, somewhat 5-7-nerved (the 2-3 basal pairs of nerves originating near together), the blades at most about 6 cm. long and 4 cm. wide; heads in rather dense terminal corymbose cymes, about 55-65-flowered; pedicels sometimes as much as 3.5 mm. long; involucre campanulate, the scales about 20, subequal, linear-lanceolate, acutish, dorsally glandular-viscid; corollas about 4 mm. long, in dried state yellowish-white, the proper tube (somewhat bulbous at base) about 1.75 mm. long, the throat narrowly campanulate, 1.5 mm. long; nearly mature achenes about 2 mm. long, dark, rough on the concolorous angles; pappus-bristles 20 or more, somewhat deciduous, whitish, connate into an annulus at the base, a few much shorter than the others.—Hieron. in Engl. Bot. Jahrb. xl. 386 (1908).

TARIJA: PROV. Arce: on steep river-bluffs, near Camacho, alt. 2500 m., *Fiebrig*, no. 2861.

No material of this species has been seen by the writer. The character is here condensed from the original diagnosis of Prof. Hieronymus. The species appears to be close to the following.

65. ***E. trichobasis*** Bak. Herbaceous, probably perennial, about 6 dm. high, erect, simple below, branching toward the summit; stem terete, weak, pithy, covered with a short dense grayish pubescence; leaves opposite, ovate-rhombic or lanceolate, narrowed to an acute apex, cuneate to obtuse or sometimes rounded or even subtruncate at base, incisely crenate- to serrate-dentate, membranaceous, puberulent above, densely gray-tomentellous beneath, 3-9 cm. long, 1-4 cm. wide; petiole densely gray-pubescent, 1-2.5 cm. long; corymbs terminal on stem and branches, rather dense, 2.5-5 cm. in diameter, few-headed; heads 60-80-flowered (acc. to Bak.); pedicels flexuous, densely gray-pubescent; involucre 4-5 mm. high, nearly as broad;

scales about 30, linear to lanceolate, acuminate, densely pubescent on the back, herbaceous; corollas pale red (acc. to Bak.); achenes 1.5 mm. long.—Bak. in Mart. Fl. Bras. vi. pt. 2, 364 (1876). *E. steviacifolium* Britton, Bull. Torr. Bot. Club, xviii. 334 (1891), not DC.

SANTA CRUZ: Kuntze (N. Y.).

DEPT. NOT CLEAR: at junction of the rivers Beni and Madre de Dios, Rusby, no. 1656 (Gr., N. Y., U. S., Mo., K.).
[S. Braz.]

Of this species the writer has seen no positively authentic material. However, the Bolivian specimen of Kuntze (cited above and now in the herbarium of the New York Botanical Garden) is thus labelled in the hand of Hieronymus who doubtless had access at Berlin to the Brazilian type of the species collected by Sello. There is furthermore at the Gray Herbarium a sketch of the species drawn by Klatt from Brazilian material. With both of these sources of information Rusby's no. 1656 appears to be in agreement.

66. *E. macrophyllum* L. Sp. Pl. ed. 2, ii. 1175 (1763); Britton, Bull. Torr. Bot. Club, xviii. 334 (1891) in part; Ktze. Rev. Gen. iii. 148 (1898); Rusby, Bull. N. Y. Bot. Gard. iv. 377 (1907); Robinson, Proc. Am. Acad. liv. 329 (1918), lv. 85 (1919).

LA PAZ: Prov. Yungas: in wet clay, Coripati, the flowers white, Bang, no. 2042 (acc. to Rusby) and 2183 (Gr., N. Y., U. S., Mo.); Prov. Larecaja: Guanai, alt. 610 m., Rusby, no. 1606 (Gr., where mixed with *E. microstemon* Cass.).

DEPT. NOT CLEAR: Rio Juntas, alt. 1000 m., Kuntze (N. Y.); junction of the rivers Beni and Madre de Dios, Rusby, no. 1605 (U. S., N. Y., Mo., Gr. where mixed with *Schistocarpha Hoffmannii* Ktze.).

[Widely distrib. in the warmer parts of America.]

67. *E. hecatanthum* (DC.) Bak. Erect or slightly decumbent glandular-pubescent and somewhat viscid annual, 6–9 dm. high; stem terete, striate-costulate, often purplish, corymbosely branched above; branches spreading-ascending, often alternate; leaves opposite or the uppermost alternate, broadly ovate to suborbicular, acuminate, open-cordate, serrate-dentate, 3–5-nerved from the very base, thin, membranaceous, bright green on both surfaces, sparingly pubescent to glabrous above, short-villous chiefly on the nerves and veins beneath, 6–15 cm. long and broad; petiole 2–7 cm. long; corymbs compound, rather dense, moderately convex or at length nearly flat; heads 8–9 mm. high, 10–12 mm. in diameter, about 60–80-flowered; involucre campanulate; scales subequal, little imbricated, linear to narrowly lance-oblong, green, puberulent, 2–4-striate-costulate, passing at the tip into a conspicuous velvety lilac-purple

caudate appendage; corollas about 2.5–2.8 mm. long, with slender tube and gradually expanded funnel-formed throat, lilac-purple toward the limb; achenes prismatic, brownish-black, 1.5 mm. long, sparingly atomiferous; pappus-bristles about 25, bright-white.—Bak. in Mart. Fl. Bras. vi. pt. 2, 365 (1876); Hieron. in Engl. Bot. Jahrb. xxii. 789 (1897); Ktze. Rev. Gen. iii. 147 (1898); R. E. Fries, Ark. för Bot. v. no. 13, 10 (1906); Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907). *E. populifolium* Hook. & Arn. Comp. Bot. Mag. i. 242 (1836), not HBK. *Hebeclinium hecatanthum* & *Urolepis* DC. Prod. v. 136 (1836). *E. appendiculatum* Less. ex Bak. l. c. in synonym. *E. betoniciforme* Griseb. Symb. Argent. 172 (1879), partim, acc. to Hieron. l. c., not *E. betonicaeforme* Bak. *E. macrophyllum* Britton, Bull. Torr. Bot. Club, xviii. 334 (1891), in part, not L.

LA PAZ: Prov. Yungas, alt. 1810 m., *Rusby*, no. 1610 (Gr., U. S.); Prov. Larecaja, Mapiri, alt. 763 m., *Rusby*, no. 2125 (Gr., U. S., Mo.).

SANTA CRUZ: Prov. Sara, Yapacani, alt. 400 m., *Kuntze* (N. Y., U. S.); Prov. West Velasco, alt. 200 m., *Kuntze* (N. Y., U. S.).

TARIJA: Chaco, Tatarenda, in grassy swamp, *R. E. Fries*, no. 1492, acc. to Fries, l. c.

DEPT. NOT ASCERTAINED: *Bang*, no. 2114a (N. Y., U. S., Mo., K.); Chiquiaca, alt. 1000 m., *Fiebrig*, no. 2723 (Gr.).

[Argent., Paraguay, Uruguay, S. Braz.]

68. **E. nemorosum** Klatt in Engl. Bot. Jahrb. viii. 35 (1887); Robinson, Proc. Am. Acad. liv. 327, 366 (1918), lv. 85 (1919). *E. Rusbyi* Britton, Bull. Torr. Bot. Club, xviii. 334 (1891). *E. pteropodium* Hieron. in Engl. Bot. Jahrb. xxix. 15 (1900), as to all essential characters.

LA PAZ: Prov. Larecaja, Mapiri, alt. 763 m., *Rusby*, no. 2723 (N. Y., fragm. and sk. Gr.).

[Peru to Colomb., also Costa Rica.]

SPECIES TRANSFERRED OR REDUCED.

Eupatorium capitatum Rusby, Bull. N. Y. Bot. Gard. iv. 380 (1907) = TRICHOGONIA CAPITATA (Rusby) Robinson, Proc. Am. Acad. xlvi. 193 (1911).

E. Clematitis, var. *tomentosum* Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & Linnaea, xxxiv. 535 (1865–66), as *Clematidis* var. *tomentosa* = *E. MALLOTUM* Robinson (see p. 42).

E. cochabambana Ktze. Rev. Gen. iii. 147 (1898) = *E. CONNIVENS* Rusby (see p. 38).

E. cochabambense Hieron. in Engl. Bot. Jahrb. xxii. 745 (1897) = *E. CONNIVENS* Rusby (see p. 38).

E. CONYZOIDES Vahl, var. *CILIATUM* (Hook. & Arn.) Hieron. in Engl. Bot. Jahrb. xxii. 741 (1897), as *ciliata*; R. E. Fries, Ark. för Bot. v. no. 13, 8 (1906), also as *ciliata*. *E. ciliatum* Hook. & Arn. Comp. Bot. Mag. i. 240 (1836), not Less. *E. Hookerianum* Griseb. Pl. Lorentz. 118 (1874).—This, as yet rather obscure, plant was reported by Hieronymus, l. c., as having been collected at various stations in northern Argentina, and also on the Cuesta de Aguayrenda between Itaperenda and Yucaiva in southwestern Bolivia, and by Fries, l. c., in shade of bushy places at Tarija. The writer has not had an opportunity to examine any material of the plant in question. Baker in Mart. Fl. Bras. vi. pt. 2, 277 (1876) reduces it without comment to the synonymy of *E. conyzoides* Vahl. Hieronymus, l. c., states that it differs from *E. conyzoides*, var. *Maximiliani* (Schrad.) Bak. chiefly by having the leaves long-cuneate at the base and with the lowest pair of lateral nerves arising somewhat above the base of the blade. He also states that the florets vary from 20 to 30, and that the mature involucre is 8–9 mm. long, the scales being green at the tip and distinctly ciliate. Should this plant prove separable as a distinct species—which from its trifling characters seems rather unlikely—it may bear the name *E. Hookerianum* Griseb. If, however, as is much more probable, it proves only a varietal phase or tendency of *E. odoratum* or some other of the already rather numerous and very closely related species and varieties of this perplexing affinity, it is clear that it will have to be renamed, since *E. conyzoides* Vahl is certainly an invalid name. Without access to either the type material of *E. cilatum* Hook. & Arn. or to any Bolivian specimen identified with it, the writer must defer any attempt to pass critically upon this plant.

E. conyzoides, var. *tunariense* Hieron. in Engl. Bot. Jahrb. xxii. 742 (1897) as *tunariensis* = *E. TUNARIENSE* (Hieron.) Robinson (see p. 39).

E. dumosum Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865–66), where the description is confined to the expression “(fol. subintegr.)”; also in Linnaea, xxxiv. 535 (1865–66), where the heads are stated to be 39-flowered. It is said that this species, mixed with *E. Sternbergianum* DC., was distributed as Mandon’s no. 254. Of this number two sheets (Gr. and N. Y.) have been examined but on neither has any mixture of material been found. The plants on both have conspicuously crenate-serrate leaves and heads about 25-flowered as in *E. Sternbergianum*, to which they appear to be correctly referred. *E. dumosum* Sch.-Bip. is too slightly described to have any claim as a valid species even if it is as yet impossible to reduce it to synonymy.

E. erythrolepis Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), & Linnaea, xxxiv. 535 (1865-66), name only = *E. CONOCLINANTHIUM* Hieron. (see p. 70).

E. glomeratum Rusby, Mem. Torr. Bot. Club, vi. 56 (1896), not DC. = *E. MAPIRIENSE* Hieron. (see p. 50).

E. glomeratum Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & Linnaea, xxxiv. 535 (1865-66); Britton, Bull. Torr. Bot. Club, xviii. 334 (1891); Rusby, Bull. N. Y. Bot. Gard. iv. 377 (1907); not DC. = *E. INULAEFOLIUM* HBK., f. *SUAVEOLENS* (HBK.) Hieron. (see p. 50).

E. guanaiense Britton, Bull. Torr. Bot. Club, xviii. 333 (1896) = *E. IVAEFOLIUM* L. (see p. 37).

E. gynoxioides Rusby, Bull. N. Y. Bot. Gard. iv. 380 (1907) = *E. GYNOXYMORPHUM* Rusby (see p. 57).

E. hecatanthum Sch.-Bip. ll. cc., not Bak. = *E. DIDYMUM* Klatt (see p. 55).

E. heptanthum Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907), not Sch.-Bip. = (probably) *E. STERNBERGIANUM* DC. (see p. 65).

E. heptanthum Sch.-Bip. Bonplandia, iv. 54 (1856), name only; ex Wedd. Chlor. And. i. 217 (1857), where described = *OPHRYOSPORUS ORIGANOIDES* Meyen & Walp. (see p. 27).

E. Hoffmannii Ktze. Rev. Gen. iii. 147 (1898) = *SPHAEREUPATORIUM HOFFMANNII* Ktze. l. c. (see p. 25).

E. inconspicuum Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), where without description, and Linnaea, xxxiv. 535 (1865-66), where given a wholly inadequate character (consisting merely of the words "capitula multiflora, folia longe petiolata") was distributed with *E. heptanthum* Sch.-Bip. as Mandon's no. 260. A sheet of this number in the herbarium of the New York Botanical Garden exhibits in fact two quite different plants. One of these, having heads 7-10-flowered and petioles only 2-4 mm. long, doubtless represents *E. heptanthum* Sch.-Bip. (i. e. *Ophryosporus origanoides* Meyen & Walp.). The other element has heads about 25-30-flowered and petioles 7-14 mm. long and must with scarcely a doubt be the undescribed *E. inconspicuum*. To the writer, however, it appears in no respect satisfactorily distinct from *E. AZANGAROENSE* Sch.-Bip. though somewhat more glandular than usual.

E. Kuntzei Hieron. in Engl. Bot. Jahrb. xxii. 766 (1897) = *OPHRYOSPORUS MACRODON* Griseb. See Robinson, Proc. Am. Acad. iv. 87 (1919).

E. LORENTZII Hieron. in Engl. Bot. Jahrb. xxii. 787 (1897). Kuntze, Rev. Gen. iii. 148 (1898), records this plant as from Bolivia,

but this appears to be merely a clerical error, since the station mentioned is Salta, a place located in northern Argentina. No Bolivian material of this species has been found in the herbarium of Dr. Kuntze which is now at the New York Botanical Garden.

E. Mandonii Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), name only, & *Linnaea*, xxxiv. 533 (1865-66), where briefly described = *E. BUPLEURIFOLIUM* DC. (see p. 46).

E. megaphyllum Bak. in Mart. Fl. Bras. vi. pt. 2, 322 (1876); Ktze. Rev. Gen. iii. 148 (1898); Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907) = *E. MORIFOLIUM* Mill. (see p. 48).

E. paucidentatum Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & *Linnaea*, xxxiv. 535 (1865-66) = *E. CONNIVENS* Rusby (see p. 38).

E. piptopappum Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), & *Linnaea*, xxxiv. 535 (1865-66), was not described beyond the words "involucri folia acuta" and is therefore a nomen subnudum. Material of *E. piptopappum* is said to have been distributed under Mandon's no. 259, but to have been mixed with *E. Pentlandianum* DC. and a variety of *Stevia Haenkeana* DC. Nothing separable from *E. Pentlandianum* DC. has been found on the available sheets of Mandon's number in question.

E. nemorense Sch.-Bip. Bull. Soc. Bot. Fr. xii. 91 (1865), & *Linnaea*, xxxiv. 535 (1865-66), without character = *E. SANTACRUZENSE* Hieron. (see p. 51).

E. piqueioides DC. Prod. v. 175 (1836) = *OPHRYOSPORUS PIQUEIROIDES* (DC.) Benth. ex Bak. in Mart. Fl. Bras. vi. pt. 2, 188 (1886); Robinson, Proc. Am. Acad. xlii, 23 (1906).

E. pteropodium Hieron. in Engl. Bot. Jahrb. xxix. 15 (1900) = *E. NEMOROSUM* Klatt (see p. 76).

E. Rusbyi Britton, Bull. Torr. Bot. Club, xviii. 374 (1891) = *E. NEMOROSUM* Klatt (see p. 76).

E. scabrum Britton, l. c. 333, not L. f. = *E. SQUALIDUM*, var. *RUSBYANUM* Robinson (see p. 41).

E. scopulorum Sch.-Bip. Bull. Soc. Bot. Fr. xii. 82 (1865), & *Linnaea*, xxxiv. 535 (1865-66); Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907); not Wedd. = *E. LOBATUM* Robinson (see p. 63).

E. sordescens Buchtien, Contrib. Fl. Boliv. 189 (1901), not DC. If, as seems probable, this is the plant distributed as *Buchtien*, no. 1518 (N. Y.) from San Carlos, alt. 750 m., it is *E. LOBBII* Klatt, a species which also on previous occasions has been confused with *E. sordescens* DC., a very different plant of Atlantic Brazil, belonging to § *Eximbricata* and having heads about 25-flowered and involucreal

scales linear and acute. While Buchtien's plant seems best placed in *E. Lobbii* it shows on the part of that species a suspicious approach to *E. Lundianum* DC. of southeastern Brazil.

E. sordescens Rusby, Bull. N. Y. Bot. Gard. iv. 378 (1907), not DC. = *E. LONGIPETIOLATUM* Sch.-Bip. (see p. 65).

E. sordescens, var. *bolivianum* Rusby, Mem. Torr. Bot. Club, vi. 56 (1896) = *E. ENDYTUM* Robinson (see p. 55).

E. trichotomum Sch.-Bip. Bull. Soc. Bot. Fr. xii. 81 (1865), & Linnaea, xxxiv. 535 (1865-66), without description = *E. GLOEOCLADUM* Robinson (see p. 63).

E. urticaefolium L. f. Suppl. 354 (1781). R. E. Fries, Ark. för Bot. v. no. 13, 9 (1906), reports this species as occurring on grassy banks of a brook at Tatarenda in the Chaco region of southeastern Bolivia, on the basis of his own no. 1476. As pointed out more than once by the writer (Proc. Am. Acad. xlii. 46; liv. 321), *E. urticaefolium* L. f. is a name quite mistakenly applied by many recent writers including Baker, Hieronymus, and others, and is in any event quite untenable on account of the earlier and now valid homonym of Reichard. As no specimen of Fries's no. 1476 has been available for examination it is impossible here to place it beyond the inference that it may well be *E. clematideum* Griseb. or possibly *E. pauciflorum* HBK., plants closely related and both at times confused with *E. urticaefolium* by authors.

E. Vauthierianum Britton, Bull. Torr. Bot. Club, xviii. 333 (1891), not DC. This Bolivian record of the Atlantic Brazilian *E. Vauthierianum* DC. rested on Rusby's no. 2126, which proves to be *SCHISTOCARPHA HOFFMANNII* Ktze. Bang's no. 2184, also distributed as *E. Vauthierianum*, is the same.