

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. crenulatum* (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 *Vernonieae* and *Eupatorieae* 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. pteropodum*, 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. buddleaefolium*, *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 prevailingly oblong feather-veined bullate-rugulose leaves of peculiar texture, a group of xerophytes tending to viscosity 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. towarensense*, 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. lv. 33-34.)

3) The peculiar little group represented by *E. origanoides*, *E. nivum*, and *E. leucophyllum*, species with the leaves whitened beneath.

4) Those species of § *Eximbricata* with prevailingly 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 § *Sphaer eupatorium* 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. leptcephalum*.
- 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. ivaefolium*.
- 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. iwaefolium.*
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. squarroso-ramosum.*
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. Christieanum* 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 mikanoides* 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., synon., 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 *ivifolium*; 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. *EXTORSUM* (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).

TARIJA: 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; involucre 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 Challasuyo, *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; involucreal 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 involucreal 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 synonym. *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. lv. 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. Larecacha: 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. Larecacha; 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*** Hieron. 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 ciliolate 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. lv. 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** Robinson. 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. lv. 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; involucre scales narrowed to a usually somewhat pointed tip..... 13. *E. buniifolium*.
- 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.
- e. Leaves oblong-spatulate or -oblanceolate, obtuse or rounded at tip, pinnate-veined..... 16. *E. dentatum*.
- e. Leaves ovate, acuminate, 3-nerved from near base. 17. *E. iresinoides*.
- d. Heads in a dense ovoid thyrses 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 sessile 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. santacruzense*.
- 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 lilac.....26. *E. tamboense*.
- 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. Lobbii*.
 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 oblate-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. lv. 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. Caupolicán: 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; involucre scales at least the outer ones obtuse; pappus-bristles whitish.—Lit. and synonym. as above.—Southern Brazil (Minas Geraes) and northern Argentina]

Var. β . **rhodolaenum** Griseb. Leaves resinous-dotted, slightly puberulent; heads about 8-flowered; involucre 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; involucre 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 erose-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. inulaefolium* 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; involucral 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, involucre 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. iv. 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. Suffrutescent, 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.

TARIJA: 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 punctation 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 purple-tinged 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. lv. 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 exserted; 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. gynoxymorphum*** 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. gynoxioides* Rusby, Bull. N. Y. Bot. Gard. iv. 380 (1907), not *E. gynoxoides* 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. lv. 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. Dict. xxv. 432 (1822); Robinson, Proc. Am. Acad. liv. 295, 340, 356 (1918), lv. 69 (1919). *E. guadelupense* 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, trifold, 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 subcylindric 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, scarious, 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 petio-
lar 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; involu-
cral 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 subracemosely 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. eucosmum*.
- f. Leaves pubescent or tomentose or at least puberulent on the
nerves beneath h.
- h. Cauline leaves 5–22 mm. wide i.
- i. Involucral 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. Involucral scales linear-lanceolate, acuminate
47. *E. azangaroense*.
- h. Cauline leaves 2.5–10 cm. wide k.
- k. Involucral scales about three-fourths as long as the florets,
clearly 2–3-costulate.....48. *E. Sternbergianum*.
- k. Involucral 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 obsoletely 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.* lv. 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. Chilieca 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 trifold 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, subcylindric, 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. lv. 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) *patairuaní*.

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-seriate 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. subtriplinerve* 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, subscarios, 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 Caldarillo, 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, obsolete 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 Catarguata Hill, in open ground near Challapampa in the vicinity of Sorata, alt. 2700 m., *Mandon*, no. 261 (Gr., N. Y.).

TARIJA: 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 trifid 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. urticaefolium* 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. urticaefolium* (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. *CAMPULOCLINIUM* (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 appendages.....67. *E. hecatanthum*.
- a. Leaves sessile by a contracted petiolar base; heads 200–300-flowered
- 68. *E. nemorosum*.

64. **E. camachense** Hieron. Suffrutescent, 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. steviaefolium* 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. xlvii. 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. MALLOWUM* 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* (Schr.) 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. ciliatum* 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. DIDYMU* 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. hepanthum* 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. hepanthum* 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. lv. 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 "involucris 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. piquerioides DC. Prod. v. 175 (1836) = *OPHRYOSPORUS PIQUE-RIOIDES* (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 involucrel

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.



Robinson, Benjamin Lincoln. 1920. "The Eupatoriums of Bolivia." *Contributions from the Gray Herbarium of Harvard University* (61), 30–80.

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