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TWO NEW CLIFF DWELLING SPECIES OF *PINAROPAPPUS* (ASTERACEAE,
LACTUCEAE) FROM NORTHERN MEXICO

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ABSTRACT

Two new cliff dwelling species of *Pinaropappus* are described from México: *P. pattersonii* B. Turner from near La Trinidad, Nuevo León, and *P. pooleanus* B. Turner from Basaseachic Falls, Chihuahua. Both taxa are related to the cliff dwelling *Pinaropappus parvus* S.F. Blake, which is largely endemic to the White Mountains of southern New Mexico and the Guadalupe Mountains of closely adjacent Texas. The latter is readily distinguished from both of the new species by its reduced habit, the stems thick, woody and much branched from the base, forming low rosulate mats.

KEY WORDS: *Pinaropappus*, Asteraceae, Lactuceae, México

Preparation of a treatment of *Pinaropappus* for the Asteraceae of México (Turner & Nesom, in prep.) has occasioned the present paper.

Pinaropappus pattersonii B. Turner, *sp. nov.* TYPE: MEXICO. Nuevo León: Mpio. Montemorelos, 5 km SE of La Trinidad, in Canyon Cebolla near Ojo de Agua (25° 11' N, 100° 08' W), basswood-oak-hickory-walnut association, growing on limestone cliff, ca. 2000 m, Aug 1988, *Thomas F. Patterson 6322* (HOLOTYPE: TEX!; Isotype: MEXU!).

Pinaropappo pooleano B. Turner *similis sed plantis majoribus* (15-20 cm altis vs. 3-6 cm) *stolones arios valde arcuatos efferentibus, foliis longioribus nonlobatisque, et pedunculis proxime infra capitula recurvatis differt.*

Perennial acaulescent glabrous cliff dwelling herbs 15-20 cm high, arising from slender rhizomes. Lower shoots producing an array of slender, stoloniferous, arcuate, aerial stolons or offshoots which apparently root at the nodes.

Leaves of primary rosettes linear-oblongate, glabrous, mostly 10-12 cm long, 0.3-0.5 cm wide, weakly nervate, minutely white punctate, the margins entire, the apices acute to obtuse. Heads single on naked scapes 14-22 cm long, the upper portion of peduncle, just below the heads, arcuate to reflexed. Involucres turbinate, 9-10 mm high, the bracts 2-3 seriate, linear-lanceolate, glabrous, the apices obtuse to acute, usually purplish. Receptacles paleate, the pales linear-lanceolate, scarious. Florets ca. 15 per head, the corollas pale pink (dried), the ligules 6-8 mm long. Achenes (immature) ca. 4 mm long, glabrous, seemingly somewhat beaked for ca. 1.5 mm; pappus of ca. 40 tawny uniseriate very weakly barbellate bristles 4-5 mm long.

Pinaropappus pattersonii is obviously closely related to *P. pooleanus* but can be readily distinguished by its taller habit, larger, unlobed leaves, recurved heads, and lower, lateral stems which are markedly arcuate stoloniferous.

It is a pleasure to name this species for its only known collector, Mr. Thomas J. Patterson, graduate student in Botany, University of Texas, Austin, who has collected extensively in the area concerned.

Pinaropappus pooleanus B. Turner, *sp. nov.* TYPE: MEXICO. Chihuahua: Mpio. Ocampo, area of Cascada de Basaseachic at the confluence of Río Basaseachic and Río Durazno, ca. 1.2 km S of village of Basaseachic (28° 02' N, 107° 55' W), "abundant on wet cliff faces directly below falls with *Erigeron basaseachensis*; also in crevices at top of falls," ca. 1800 m, 27 Apr 1986, *Guy Nesom 5444*, with R. Spellenberg, R.D. Corral *et al.* (HOLOTYPE: TEX!; Isotypes: MEXU,US).

Pinaropappo pattersonii B. Turner similis sed plantis nanis absque stolonibus et pedunculis brevioribus (3-6 cm longis vs. 14-22 cm) non recurvatis infra capitula differt.

Dwarf acaulescent glabrous cliff dwelling herbs 2-10 cm high, arising from relatively slender rhizomes. Lower stems apparently not producing lateral aerial stolons. Leaves mostly 30-60 mm long, 1.5-7.5 mm wide, linear-oblongate, glabrous, the margins entire or with 2-5 deltoid lobes, the apices mostly acute. Heads single on naked scapes 2-10 cm high, the peduncles not recurved or reflexed apically. Involucres turbinate, 9-10 mm high, the bracts 2-3 seriate, linear-lanceolate, the apices mostly obtuse or rounded, rarely acute, usually rosy tinged. Receptacle paleate. Florets 10-15 per head, the ligules 8-10 mm long, white with purple midstripes beneath. Achenes (immature) ca. 2 mm long, glabrous, gradually tapered apically; pappus of ca. 40 tawny, uniseriate, weakly barbellate bristles 4-5 mm long.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Chihuahua: Mpio. Ocampo, Basaseachic Falls, just S of Basaseachic, ca. 0.3 km downstream from the bottom of the falls, pine-oak forest, rocky basaltic substrates, 16

May 1985, *Lavin 5405* (TEX); in canyon along Río Basaseachic leading to the falls, crevices in rock at edge of cliffs at top of falls, ca. 1800 m, 1 Aug 1988, *Spellenberg et al. 9606* (TEX).

This material was first recognized as distinctive by Ms. Jackie Poole through the several collections cited above, all of which she examined and provided an unpublished name for. Since she has long been a consummate scholar of the group, having worked with the genus in the field and in the herbarium, beginning when she was Curator of the Plant Resources Center collections (LL, TEX), I take much satisfaction in naming the taxon in her honor. She is currently working for the Texas Parks and Wildlife in Austin, Texas, in their program for the preservation of endangered plant taxa.

ACKNOWLEDGMENTS

I am grateful to Guy Nesom for the Latin diagnoses and to him and T.P. Ramamoorthy for reviewing the manuscript.

GRINDELIA VILLARREALII (ASTERACEAE: ASTEREAEE), A NEW SPECIES FROM NORTHEASTERN MEXICO

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ABSTRACT

A new species of *Grindelia* is described from the Peña Nevada area of southeastern Nuevo León: *G. villarrealii*. It is closely related to *G. turneri*, also endemic to the Sierra Madre Oriental, and is apparently its evolutionary vicariad.

KEY WORDS: *Grindelia*, Astereae, Asteraceae, New Mexico, Texas

Since an earlier conspectus of problematic Mexican *Grindelia* (Nesom 1990), variation in recent collections from the Sierra Madre Oriental of Nuevo León and Coahuila has received careful attention. Almost all of them have been placed within the bounds of taxa delimited earlier, but one additional species must be recognized.

Grindelia villarrealii Nesom, *sp. nov.* TYPE: MEXICO. Nuevo León: Mpio. Zaragoza, ca. 2-3 mi N of Siberia on road to Zaragoza from San Antonio de Peña Nevada; broad valley, ca. 2500 m, area of oaks and aspen at the bottom (N-facing margin) and agave-scrub on the SW-facing slope, the *Grindelia* around the aspen grove, scattered but common at base of the slope in deep soil; 26 Aug 1989, *G. Nesom 7149* with M. Carranza, J. Norris, and J. Villarreal (HOLOTYPE: TEX; Isotypes: ANSM, MEXU).

Grindelieae turneri Nesom *duratione perenni, caulibus glabris vel glabratis, foliis non-punctatis, et acheniis monomorphis rasilibus vel tantum sculptis similis sed foliorum dentibus induratis non-glandulosisque et aristis pappi brevioribus carinatisque marginibus ciliolatis differt.*

Short lived perennial or biennial herbs from a distinct taproot. Stems erect or basally ascending, 3-5 cm tall, ca. 5-8 stems arising from the base, each with 1-3 branches above the lower third, glabrous or with a few small, scattered hairs, eglandular. Leaves not punctate, glabrous to minutely puberulent with glands and barely perceptible hairs, margins serrate with blunt to acute, eglandular, white indurated teeth, not scabrous, the basal and lower cauline 5-8 cm long, petiolate with obovate blades, the upper cauline 15-30 cm long, 5-9 mm wide at midstem, oblong oblanceolate to oblong, epetiolate, subclasping to clasping, slightly or not at all auriculate, only slightly reduced upwards and continuing to immediately beneath the heads. Heads 13-15 mm wide, solitary; phyllaries linear-lanceolate, green in the upper 1/2-1/4, not punctate, with apices erect or spreading, in 3-4 strongly graduated series, the inner 8-9 mm long, the outer 1/2-1/3 as long. Ray flowers 20-31, yellow, the corollas (including tube) 11-13 mm long, ligules distinctly coiling. Disc corollas 5-6 mm long, abruptly ampliate in the upper half. Achenes 3.0-3.5 mm long, monomorphic, somewhat 4 angled but compressed, the fruit wall slightly longitudinally rugose at maturity; pappus awns 2, with distinctly scabrous-ciliate margins and a narrow keel at least on the lower third, easily caducous, about as long as the disc corollas. Known only from the type collection.

The new species is named for Jose Villarreal, Curator of Herbarium ANSM in Saltillo, in recognition of his continuing studies and valuable collections of the flora of northeastern México.

Grindelia villarrealii apparently is most closely related to *G. turneri*. The two species are similar in their perennial duration, glabrous to glabrate stems, nonpunctate, nearly glabrous to minutely glandular puberulent leaves, and monomorphic, barely sculptured achenes. The new species differs (from *G. turneri*) in its leaves with indurated, nonglandular teeth (vs. glandular) and its shorter, keeled pappus awns with scabrous-ciliate margins (vs. longer than the disc corollas, unkeeled, with smooth margins). *Grindelia turneri* is restricted to large valleys immediately north and northwest of Cerro Potosí (Nuevo León) and is separated by about 130-140 kilometers from the locality of *G. villarrealii*. Other pairs of taxa in various families with similar geographic distributions are known to be related as evolutionary vicariads (McDonald 1992).

Grindelia villarrealii and *G. turneri* are peripherally related to the "*G. oxylepis* E. Greene group" (Nesom 1990) but differ in their montane habitats (vs. low elevation), minutely puberulent foliar vestiture (vs. completely glabrous), and abruptly ampliate disc corollas (vs. tubular). The only other species of *Grindelia* besides *G. villarrealii* known from the Peña Nevada area are *G. obovatifolia* S.F. Blake and *G. greenmanii* Steyererm. The first differs from *G. villarrealii* in its rhizomatous habit, lightly villous stems, mostly obovate leaves with gland tipped teeth, and phyllaries with linear, sharply reflexing to nearly coiling apices; the second differs most conspicuously from *G. villar-*

realii in its stipitate glandular leaves, villous stems, leaves with gland tipped foliar teeth, and more herbaceous, nearly equal phyllaries.

Grindelia villarrealii is also at least superficially similar to *G. inuloides* Willd., which occurs in central Nuevo León, although its center of distribution is much further south (Nesom 1990). The latter species differs most prominently from *G. villarrealii* in its villous stems, leaves with distinctly sharp pointed teeth, the upper cauline strongly reduced and triangular lanceolate to linear, its shorter (4-5 mm long) disc corollas, achene walls with a strong tendency to produce transverse incisions near the apex, and smooth edged pappus awns.

ACKNOWLEDGMENTS

I thank Dr. B.L. Turner and Dr. T.P. Ramamoorthy for their review of the manuscript.

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- Nesom, G.L. 1990. Studies in the systematics of Mexican and Texan *Grindelia* (Asteraceae: Astereae). *Phytologia* 68:303-332.

**LAENNECIA SPELLENBERGII (ASTERACEAE: ASTEREAEE), A NEW
SPECIES FROM DURANGO, MEXICO**

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ABSTRACT

Laennecia spellenbergii, *sp. nov.*, is described from two localities in Durango, México, separated by more than 250 kilometers. It is most closely related to other *Laennecia* species of northwestern México with eglandular, woolly leaves with nonclasping bases.

KEY WORDS: *Laennecia*, Asteraceae, Astereae, México

Recent collections by R.W. Spellenberg have brought to light a previously undescribed species of *Laennecia*. The genus has recently been treated by Nesom (1990a) with the subsequent addition of another species (Nesom 1990b). The species described here is the seventeenth in the genus and forms part of a species group that has radiated almost entirely in northwestern México. The plants of this group are characterized by a densely and persistently woolly, eglandular vestiture, leaves that are nonclasping at the base, relatively large, often glandular achenes, and a large number of pappus bristles.

Laennecia spellenbergii Nesom, *sp. nov.* TYPE: MEXICO. Durango: Mpio. Suchil, ca. 47 air km SSW of Vicente Guerrero on road to Las Margaritas, on the Reserva de la Biosfera "La Michilia," on general S slope of Cerro Blanco, 2590 m, with *Quercus* cf. *hartwegii*, shrubby oaks, *Pinus*, *Dasylirion*, *Arctostaphylos*, *Scleria*, and grasses, 23 Jul 1990, *Spellenberg 10285* with S. González E. (HOLOTYPE: TEX!; Isotypes: distributed from NMC to ARIZ, CIIDIR, IEB, MEXU!, NMC, NY, and UC).

Laenneciae chihuahuanae Nesom similis sed capitulis majoribus floribus numerosioribus, floribus radii biseriatis, acheniis minoribus, acheniis radii stipitatis, et glandibus achaeniorum ad apicem fasciculatis differt.

Perennial, fibrous rooted herbs, the stems, leaves, and phyllaries densely and persistently white woolly, eglandular. Stems erect, 15-30 cm tall, with 1-3 branches in the upper third. Leaves persistently woolly above and beneath, the basal persistent but withering by flowering, oblanceolate-obovate, 1-3 cm long, 4-8 mm wide, entire or with 1-2(-3) pairs of mucronate teeth on the distal half, the cauline linear to linear-oblanceolate, 10-19 mm long, 1-3 mm wide, with a thick, terminal mucro, entire, strictly ascending, not basally clasping or ampliate. Heads hemispheric, 10-13 mm wide (pressed), solitary on bracteate, ascending-divergent peduncles; phyllaries narrowly elliptic-lanceolate with an abruptly and broadly acute apex, with a green midregion and hyaline, distinctly purple margins, in 3-4 strongly graduated series, the inner 7-8 mm long, the outermost 3-4 mm long. Ray flowers pistillate, 55-70 in 2 series, the ligules white, 2-3 mm long, 0.5-0.8 mm wide, conspicuous and exceeding the involucre. Disc flowers hermaphroditic, numerous, the corollas gradually ampliate, ca. 4 mm long; style branches with linear-triangular collecting appendages 0.5 mm long. Achenes glabrous except for a dense cluster of resinous glands at the very apex, obovate, strongly flattened with 2, thickened, lateral ribs, 1.9-2.0 mm long, 0.6-0.8 mm wide, the ray achenes with a prominent, cylindrical-stipitate base 0.2 mm long; pappus of ca. 40-65 barbellate bristles 4.0-4.5 mm long, with an outer series of slightly flattened bristles or linear scales 0.4-0.8 mm long.

Additional collection examined: MEXICO. Durango: Mpio. Santiago Papatzi, on the road to Topia and Canelas, 96 km W of the jct with the road from Santiago Papatzi to Tepehuanes, 21 km W of Altares, 38 km E of El Ojito de Camellones; canyon, pale powdery and rocky S-facing slope, with pine, *Arbutus*, *Quercus macvaughii*, and *Q. coccolobifolia*, 28 Jun 1992, R. W. Spellenberg 11027 (TEX, MEXU).

Plants of *Laennecia spellenbergii* are fibrous rooted and produce relatively large heads with two series of conspicuously ligulate ray flowers. In these features, they are similar to *L. confusa* (Cronq.) Nesom, but the latter differs in (1) glabrescent upper leaf surfaces that quickly become distinctly green glabrate in contrast to the persistently woolly lower surfaces, (2) small achenes (1.0-1.8 mm long) with thin ribs and almost always with nonglandular duplex hairs as well as glands, the glands usually scattered over the whole achenial face, and (3) a smaller number (14-22) of pappus bristles.

Laennecia spellenbergii is probably most closely related to *L. pimana* Nesom & Laferrière and *L. chihuahuana*. All three species produce large, thick ribbed achenes that are glandular but otherwise glabrous. Both differ from the new species in their production of a taproot, smaller heads with fewer flowers, ray flowers in a single series, and ray achenes without a stipitate base. *Laennecia pimana* differs further in its eligulate ray flowers; *L. chihuahuana* differs further in its larger achenes with achenial glands scattered over the whole face.

ACKNOWLEDGMENTS

I thank Billie Turner and Rich Spellenberg for their review of the manuscript.

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- Nesom, G.L. 1990b. *Laennecia mapimiana* (Asteraceae: Astereae), a new species from northwestern México. *Phytologia* 69:348-350.

A NEW SPECIES OF *DEPREA* (SOLANACEAE) FROM VENEZUELA

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ABSTRACT

A new species from Venezuela, *Deprea paneroi*, is described and illustrated, and a taxonomic summary of the other five species of the genus is presented.

KEY WORDS: Solanaceae, *Deprea*, Venezuela

Deprea paneroi Benítez & Martínez, *sp. nov.* (Fig. 1, A-E). TYPE: VENEZUELA. Trujillo: Parque Nacional Guaramacal, 2350 m, 30 Nov 1991, Carmen Benítez de Rojas 4320, with Victor Badillo and José Panero (HOLOTYPE: MY; Isotypes: MERF,MO,NY,TEX,VEN).

Frutices usque ad 1.5 m alti, omnino dense puberuli glandibus ac trichomatibus multicellularis simplicibusque, ramis dichotome ramosis valde geniculatis. Folia ad apices ramorum ovata. Flores purpurati staminibus luteis.

Shrubs 0.7-1.5 m high, stem fistulous, profusely branched, branches persistently dichotomous and geniculate, with simple pluricellular hairs and glands throughout, leaves readily deciduous, restricted to the distal portion of the branches. Petioles 0.5-1.7 cm long. Leaves ovate to elliptic ovate, 3.5-9.0 cm long, 1.5-4.5 cm wide, the apices attenuate to abruptly acute, secondary veins 4-5 to a side, the base attenuate to abruptly attenuate with purple spots, undulate between principal veins, asperous in fresh, smooth in dried material,

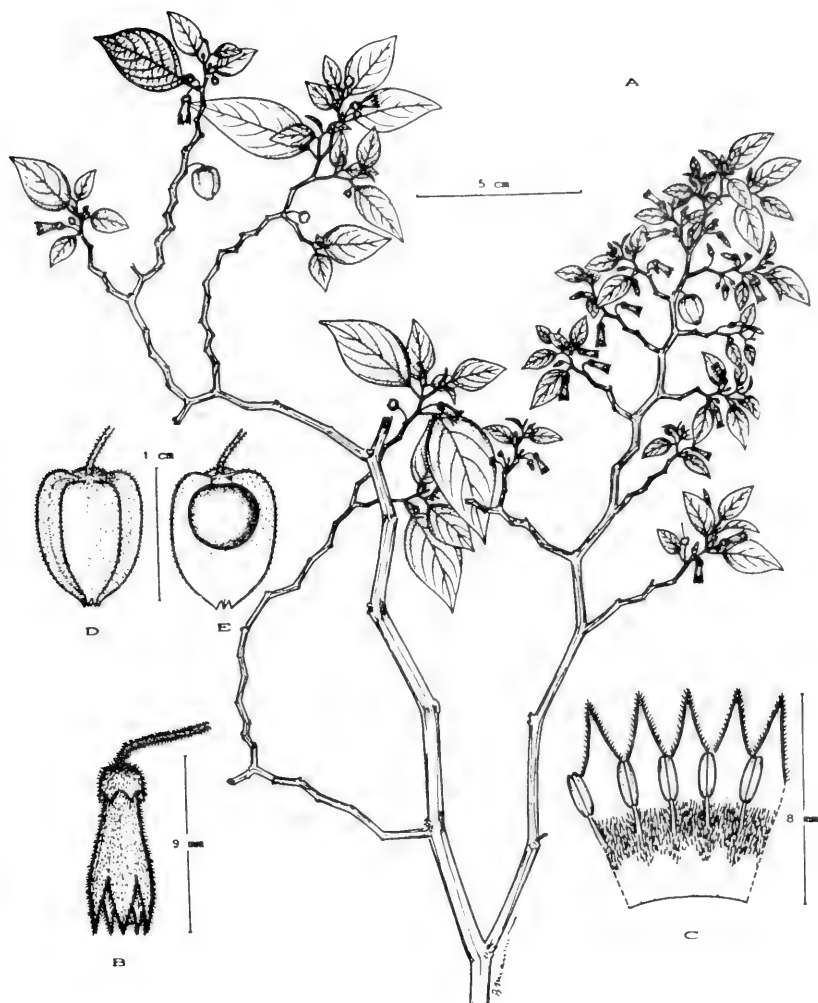


Figure 1. *Deprea paneroi*; A. habit; B. flower; C. longitudinal flower section; D. fruit; E. longitudinal fruit section. Based on Benítez, Badillo, & Panero 4320 (MY).

villous on both surfaces, more so on the veins. Flowers in fasciculated clusters arising from the leaf axils, usually 4 but sometimes reduced to one. Pedicels 4-8 mm long. Calyx 2-3 mm long, light green, almost white, densely pubescent, tube 1.5-3.0 mm long, 5 lobed, the lobes acute, 0.5-1.0 mm long. Corolla purple, infundibular, 6-12 mm long, pilose externally with glandular hairs except in the portion covered by the calyx, pilose internally, tube 5.0-7.5 mm long, 5 lobed, 2.5-5.0 mm long, lobes reflexed and recurved at anthesis, margins and outer surface densely pubescent. Disc discontinuous, surrounding the ovary. Stamens 5, included, free portion of the filaments 2-3 mm long, adnate portion 2-4 mm long, anthers 1.0-2.5 mm long, yellow, dorsifixed, longitudinally dehiscent. Ovary 1.5-1.8 mm long, 1.0-1.2 mm wide, glabrous, style 3.0-4.5 mm long, glabrous, stigma clavate, bilobed, protruding beyond the anthers. Fruit a berry 6.5-10.0 mm in diameter, loosely enclosed by the accrescent calyx 10-15 mm long, 20 mm wide, 8-10 angled, clearly nerved, open apically. Seeds 20-60, ca. 4 mm long and ca. 5 mm wide, reniform, foveolate.

Deprea is probably most closely related to *Physalis*, based on their mutual production of a berry loosely enclosed by the accrescent calyx. *Deprea*, in contrast to *Physalis*, produces tubular corollas and the fruiting calyx is not invaginated at the base. The genus has never been the subject of a taxonomic summary, but as presently understood, it comprises the five South American species listed below, in addition to the new one described in the present paper.

1. *Deprea orinocensis* (Kunth) Raf., *Sylv. Tell.* 57. 1838.

Physalis orinocensis Kunth, *Nov. Gen. & Sp. Pl.* 3:12. 1818.

Presumably with yellow corollas 12 mm long, apparently restricted to lowland habitats in Venezuela.

2. *Deprea sylvarum* (Standl. & Morton) A.T. Hunz., *Kurtziana* 10:25. 1977.

Athenaea sylvarum Standley & Morton, *Field Mus. Nat. Hist. Publ. Bot.* 18:1036. 1938.

With pale green corollas ca. 5.5 mm long, from Costa Rica.

3. *Deprea glabra* (Standl.) A.T. Hunz., *Kurtziana* 10:25. 1977.

Athenaea glabra Standley, *Trop. Woods* 42:32. 1935.

With greenish corollas, these red within, 12 mm long, from Ecuador.

4. *Deprea cardenasiana* A.T. Hunz., Kurtziana 10:27. 1977.

With whitish corollas 17-22 mm long, from Bolivia.

5. *Deprea granulosa* (Miers) A.T. Hunz., Bol. Soc. Argent. Bot. 26(1-2):104. 1989.

Hebecladus granulosis Miers, London J. Bot. 7:352. 1848.

With yellow corollas ca. 10 mm long, from Colombia.

Deprea paneroi differs from the other species of *Deprea* in its dark purple corollas, which contrast with the yellow or greenish yellow corollas typical of the other species. In addition, the dichotomous and geniculate growth and the leaves mostly restricted to the branch apices are not seen elsewhere in *Deprea*. It occurs in cloud forest at 2000-2800 m above sea level in the Venezuelan Andes (states of Trujillo and Táchira). The species name honors José Luis Panero, who participated in its collection.

Additional specimens examined: VENEZUELA. Trujillo: Guaramacal, cerca de Boconó, 2000-2600 m, 20 Nov 1982, *Badillo 7723* (MY); Distrito Boconó, Páramo de Guaramacal W of road summit, 2800 m, 28 Apr 1988, *Dorr 5016* with Barnett, Cuello, & Diggs (VEN); Boconó-Guaramacal road, 13 km SSE of Boconó, 2750 m, 20 Jan 1978, *Luteyn, Lebron-Luteyn, Ruiz T., & Dugarte 5200* (MERF,NY); Cerro Guaramacal, Boconó, bajando hacia el caserío de Guaramacal, 26 Nov 1982, *Stergios, Aymard, & Smith 4712* (MY,PORT); Páramo de Guaramacal, 1.5 km S of turnoff to microwave station on road to Las Vegas de Guaramacal, 2850 m, 30 Nov 1991, *Panero 2647, Benítez & Badillo 2647* (TEX,MY). Táchira: Dto. Junín, Páramo Pata de Judío, 14 Feb 1973, *Antonio Fernández 1910* (MY); El Hato, carretera a Pregonero, 2700 m, 24 Feb 1968, *López P. 1968* (MERF,MY).

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**EUSTACHYS RETUSA (POACEAE), THE FIRST REPORT IN FLORIDA AND
A KEY TO EUSTACHYS IN FLORIDA**

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ABSTRACT

Eustachys retusa (Lag.) Kunth, Chlorideae:Poaceae, previously un-
reported in Florida has been found in the southern coastal plain of the
panhandle in Okaloosa County.

KEY WORDS: *Eustachys*, *Eustachys retusa*, tribe Chlorideae,
Poaceae, Florida

Eustachys Desv. in Nouv. is composed of ten species, principally of the New
World tropical savannas (Clayton & Renvoize 1986). Six species of *Eustachys*
are now found in Florida: *Eustachys distichophylla* (Lag.) Nees, *E. floridana*
Chapm., *E. glauca* Chapm., *E. neglecta* (Nash) Nash, *E. petraea* (Swartz)
Desv., and *E. retusa* (Lag.) Kunth. Long & Lakela (1971), Wunderlin (1982),
Clewell (1985), nor Anderson (1984, 1986, 1988) have listed *E. retusa* as occur-
ring in Florida. It has been recorded in Georgia, New York, South Carolina,
and Texas (McKenzie *et al.* 1987). *Eustachys retusa* can be confused with
small or depauperate specimens of *E. distichophylla*. *Eustachys distichophylla*
is usually a much larger and more robust plant with more numerous panicle
branches, much longer, flexuous spikes, and upper, acute, sterile florets. The
following key will separate the taxa of *Eustachys* found in Florida (modified
from McKenzie *et al.* 1987).

KEY TO *EUSTACHYS* IN FLORIDA

1. Lateral veins of the fertile lemma glabrous. *E. glauca*
- 1' Lateral veins of the fertile lemma pubescent. 2

- 2.(1') Keel of fertile lemma glabrous. 3
 3.(2.) Spikelets shorter than 2.1 mm; sterile floret widely cuneate,
 truncate. *E. retusa*
 3' Spikelets 2.4 mm or longer; sterile floret oblanceolate, acute. .
E. distichophylla
 2' Keel of fertile lemma ciliate. 4
 4.(2') Spikelets shorter than 2.5 mm. *E. petraea*
 4' Spikelets longer than 2.5 mm. 5
 5.(4') Spike usually 1-3; spikelets 3 mm or longer; fertile lemma
 awn 0.6 mm or shorter. *E. floridana*
 5' Spikes usually 4-9; spikelets 3 mm or shorter; fertile lemma
 awn 0.6 mm or longer. *E. neglecta*

Specimens collected: UNITED STATES. Florida: Okaloosa Co.: 12 July 1991, *J.K. Wipff 2108 & S.D. Jones* (FLAS,GA,TAES,TEX,SWSL,VDB,US,USF). Northwest corner of Leonard Burnes Road and U.S. 90, between U.S. 90 and the railroad tracks; 10.8 miles (17.3 kilometers) NE on U.S. 90 from its jct. with FL 87, NE of Milton. This taxon was abundant along U.S. 90 in an open disturbed roadside with the soils of the Lakeland-Troup-Alpin association. The site is nearly level at about 200 feet (61 m) elevation with acid sand throughout and a very thick sandy surface layer over a loamy subsoil. The geology of the site is of the Citronelle (Pc) formation; Pliocene series (mid-upper Miocene). Associated taxa include *Paspalum notatum* Flüggé, *Cynodon dactylon* (L.) Pers., *Aristida* sp., *Eragrostis* spp., *Richardia brasiliensis* Gomes., *Senna* sp., *Rubus* sp., *Ipomoea quamoclit* L., and *I. coccinea* L.

ACKNOWLEDGMENTS

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**MATELEA MAGALLANESII, A NEW SPECIES OF ASCLEPIADACEAE
FROM WESTERN MEXICO**

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ABSTRACT

A striking new species of *Matelea* from western México is described and illustrated. It is perhaps most closely related to *M. pilosa* (Benth.) Woods.

KEY WORDS: *Matelea*, *Matelea magallanesii*, Asclepiadaceae, Jalisco, México

Continuing work on a guide to the flora of the Chamela Bay region of Jalisco, México, necessitates the publication of a number of new species from the area, including the following:

Matelea magallanesii E.J. Lott, *sp. nov.* Fig. 1. TYPE: MEXICO. Jalisco: Mpio. La Huerta, Estación de Biología Chamela UNAM, antiguo camino a Nacastillo, [a 8 km al E de la carretera Puerto Vallarta-Barra de Navidad], 19° 30' N, 105° 03' W, 24 Sep 1981, (fl & fr), *E.J. Lott 552* (HOLOTYPE: MEXU; Isotypes: MICH,MO).

Matelea magallanesii E.J. Lott; species insignis floribus viridulus majusculis (ad 6 cm diam), lamina petali triangularis, longi-attenuatus, coronae echinatus.

Plants twining vines. Stems woody at the base, to 1 cm diam, with a corky, somewhat winged, pale brown bark, herbaceous above, whitish to yellowish pubescent throughout with a mixture of straight multicellular trichomes mostly 1-3 mm long and short glandular trichomes 0.05 mm long. Leaf blades 2.5-10. x 1.0-5.5 cm, ovate, narrowly cordate; the upper surfaces dark green, moderately and evenly short hirsute; the lower surfaces paler, short hirsute

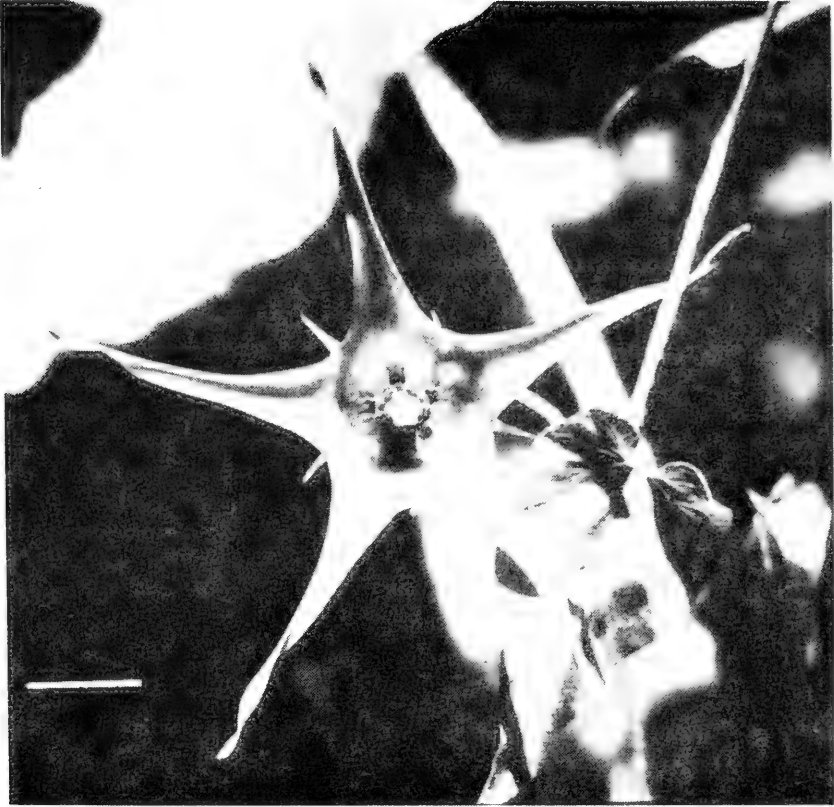


Figure 1. Flower of *Matelea magallanesii* (Lott 3879). White line = 1 cm.

with multicellular trichomes up to 1 mm or more long and minutely glandular, the hairs similar to those on the stems, trichomes coarser and denser on the veins, tending to be appressed; secondary veins 4-5 pairs, somewhat prominent beneath, yellowish; apices acuminate, base deeply cordate, the lobes straight to convergent, with 0-4 fingerlike yellowish glands at the junction of petiole and blade; margins lightly ciliate; petioles (20-)30-60 x 1.0-1.5 mm, the indument as on the stems. Inflorescences axillary, 1-4 flowered, loose cymes, 0.5-1.5 times the length of the petioles of subtending leaves, the primary peduncle 1.5-4.0 cm long, the indument of short trichomes mostly 0.5-1.0 mm long and minute glandular trichomes ca. 0.050-0.075 mm long; bracts linear-lanceolate, 8-10 x ca. 1 mm, acute; pedicels 0.8-2.0 cm long. Flowers 3.5-6.0 cm diam. Calyx lobes 8-15 x 1.5-3.0 mm, lanceolate, the apex acuminate, the base slightly imbricate, with 2-3 small white glands between each pair of lobes. Corolla pale green with purplish tinges, minutely and inconspicuously puberulent throughout, the tube shallowly and broadly campanulate-rotate, with darker green veins extending onto the corolla lobes and becoming somewhat reticulate; 6-8 mm (fresh) from base to sinus, the limb scarcely distinct, the lobes convolute in bud, (20-)25-30 x 6-9 mm, widely spreading, narrowly triangular, long attenuate to an acuminate apex, whitish on the margins. Corona exceptionally ornate, exceeding the corolla tube; the free portion of the corona lobes ca. 2 mm long, basically concave in outline from above, each lobe with two reflexed filiform appendages ca. 2 mm long. Anther head with ornate, callous, echinate, bihorned appendages ca. 4 mm wide, exceeding the stigma apex, free above, adnate to the corona lobes below and connivent with them above, glabrous, dark reddish purple; each anther with a broad dorsal stripe ca. 0.9 mm wide, minutely papillose, pale yellowish-brown, apical anther appendages hyaline, obtuse, covering ca. 1/2 of apex, each ca. 1.5 mm wide. Gynostegium 1 mm x 2.5-4.0 mm at apex, stipitate, white, the apex white, pentagonal, concave. Pollinia horizontal, pollen sacs ca. 0.5 x 0.3 mm, subtriangular, somewhat excavated at the tip; corpusculum sagittate, reddish brown, 0.4 x 0.2 mm. Follicles 10-15 cm long, narrowly fusiform, smooth, glaucous. Mature seeds unknown, immature seeds 4 x 2 mm, obovate, the apex truncate, more or less smooth, pale brown, margins paler and erose; coma white.

Additional specimens examined: MEXICO. Jalisco: Mpio. La Huerta, Estación de Biología Chamela UNAM, Camino Antiguo X Vereda Chachalaca, 6 Aug 1981 (fl), *S.H. Bullock 978* (Est. Biol. Chamela,MO); same locality, antiguo camino a Nacastillo, [a 8 km al E de la carretera Puerto Vallarta-Barra de Navidad], 19° 30' N, 105° 03' W, 2 Aug 1983 (fl & fr), *E.J. Lott 1732* (MEXU); same locality, 10 Aug 1983 (fl), *E.J. Lott 1812* (MEXU); same locality, Camino Entrada, 17 Jul 1984 (fl), *J.A. Solís Magallanes 4255* (MEXU); camino a La Rumorosa, km 60 de la carretera Puerto Vallarta-Barra de Navidad, 12 Oct 1982 (fl), *E.J. Lott & R. Hernández M. 1464* (UCR); same locality, 28 Sep 1985 (fl & fr), *M.G. Ayala 245* (ENCB,F,MEXU,TEX); camino a Playa La

Virgen, a 3.8 km al NO de la entrada a la Estación de Biología Chamela, 2 Oct 1985 (fl), *E.J. Lott et al. 2642* (MEXU,MICH,US); Rancho Cuixmala, 27 Aug 1988 (fl), *G. Castillo C. et al. 5367* (XAL); same locality, 22 Aug 1991 (fl & fr), *E.J. Lott 3864* (CAS,RSA,UCR); same locality, 19° 23' N, 104° 59' W, 22 Aug 1991 (fl), *E.J. Lott & T. Upson 3879* (FLAS,K,MO,NY,UCR).

The new species is named in honor of J. Arturo Solís Magallanes, now of the Reserva Joyas de Manantlán, Jalisco, outstanding collector of the flora of the Chamela coast.

Matelea magallanesii is thus far known only from coastal Jalisco between Chamela and Cuitzmala, Jalisco, where it is uncommon. It is usually found among herbs and shrubs at the edge of clearings in tropical dry forest from near sea level up to about 200 m.

Matelea magallanesii cannot be placed with certainty in any of Woodson's (1941) subgenera; understanding of its relationships must await further taxonomic study. However, the new species does resemble *M. pilosa* (Benth.) Woods., which differs in its much smaller purplish flowers with shorter, blunter corolla lobes, and much simpler floral structure. *Matelea gonoloboides* (Robins. & Greenm.) Woods., of Chiapas, can be distinguished from *M. magallanesii* by its much smaller, purplish flowers in umbellate inflorescences. *Matelea magallanesii* can be distinguished from other Chamela mateleas, especially *M. quirosii* (Standl.) Woods., by its large green flowers, and longer and narrower fruit.

ACKNOWLEDGMENTS

W.D. Stevens first pointed out this and several other new Chamela Asclepiadaceae during routine determinations of our collections at MEXU. I thank A.C. Sanders and E. Sundell for their review and helpful comments on the manuscript., Tim Upson for the photograph, and F. Chiang C. for the Latin diagnosis. Field work at Rancho Cuixmala in 1991 was supported by Fundación Ecológica de Cuixmala through the I.U.C.N.

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TAXONOMIC OVERVIEW OF THE GENUS *COLOGANIA* (FABACEAE,
PHASEOLEAE)

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ABSTRACT

A taxonomic overview of the mostly Mexican genus *Cologania* is provided. Ten species are recognized, one of which, *C. hintoniorum* B. Turner, is described as new. All of these occur in México, but two (*C. broussonettii* and *C. procumbens*) extend throughout much of South America. *Cologania broussonettii* (including *C. ovalifolia*) also extends into the southwestern U.S.A.; atypical populations of this have been called *C. pallida*. Complete synonymy is given for all of the taxa and, when appropriate, comments are made regarding typification. A key to the ten species is constructed along with maps showing their distribution.

KEY WORDS: Fabaceae, Phaseoleae, *Cologania*, México

Cologania is a widespread highly variable genus of perennial, mostly twining vines or less often low, trailing to erect herbs. The species are largely confined to montane habitats extending from the southwestern U.S.A. to Argentina in South America. México is clearly the center of diversity for the genus, all of the species confined to, or emanating out of this region (cf. Figures 2-5).

Natural variability among species in the genus has been compounded by the occurrence of cleistogamy, especially when following interspecific hybridization. This has been nicely documented by Fearing (1959) in his unpublished monographic study of the genus. After obtaining his doctorate and joining the biological faculty at Trinity University, San Antonio, Texas, Dr. Fearing essentially ignored *Cologania*, his passport to Academia. This in spite of the fact that his thesis was a sound production for its time, being based upon considerable field work and examination of several thousand specimens on loan from eighteen or more institutions.

In his doctoral thesis Fearing recognized ten species of *Cologania*, one of these, *C. cordata*, newly proposed. These were arranged numerically, according to their perceived morphological nearness, as follows.

- | | |
|---------------------------|----------------------------|
| 1. <i>C. procumbens</i> | 6. <i>C. hirta</i> |
| 2. <i>C. cordata</i> | 7. <i>C. biloba</i> |
| 3. <i>C. capitata</i> | 8. <i>C. pallida</i> |
| 4. <i>C. angustifolia</i> | 9. <i>C. broussonettii</i> |
| (with two varieties) | |
| 10. <i>C. ovalifolia</i> | 5. <i>C. obovata</i> |

It is unfortunate that Fearing's study was not published, mainly because he had made considerable taxonomic sense out of a jumble of specimens from over a large region. He attempted to resolve the nomenclature by examination of type materials and constructed distribution maps for all of the included taxa. The only individual to add significantly to the taxonomy of *Cologania* since his study has been McVaugh (1987), who in treating *Cologania* for his *Flora Novo-Galiciana* recognized most of Fearing's taxa, including *C. cordata* Fearing *ex* McVaugh. He did not, however, recognize Fearing's submergence of *C. jaliscana* into *C. angustifolia*, nor did he accept the recognition of *C. ovalifolia*, at least as occurring within the area of Novo-Galiciana.

Numerous (*i.e.*, at least ten or more) workers, over the 30 years since Fearing completed his thesis have xeroxed his entire study or else abstracted material from it. Indeed, it has been about the only source for reliable taxonomic information regarding *Cologania*, yet none of this is available in published form. Because of this I have taken the opportunity to read critically, once again, his entire thesis, and study all of the collections assembled at LL, TEX since his work, including selected materials at MICH, for the loan of which I am most grateful. In the overview that follows I have attempted to render a reasoned and just account of the group as if I had studied the genus from my 40+ years of taxonomic activity, including field work in the area concerned. My work was made much easier by the considerable accumulation of new material since Fearing's study, but more so by the careful manner in which he documented typification: clear black and white photographs of most of the types concerned.

In my present revised and updated account of Fearing's work I also recognize ten species, but some of his proposed taxa have been submerged, one or two resurrected, and one newly described taxon proposed. The following key and comments will account for the taxa recognized; in addition, I have provided distribution maps for all of the North American taxa based upon both Fearing's records and those assembled since.

Where my treatment differs from those of Fearing or McVaugh, I have explained my stance. Additionally, I have given a formal account of the names

proposed for the genus, including typification, all of this looked at afresh and every attempt made to recognize meaningful morphogeographical units (*i.e.*, biological species as inferred from morphological, ecological, and geographical data).

Fearing's study provided both meiotic and somatic chromosome counts for the following taxa of *Cologania*:

<i>C. angustifolia</i>	$n = 22$ pairs	$2n = 44$
<i>C. broussonettii</i>	$n = 22$ pairs	$2n = 44$
<i>C. obovata</i>		$2n = 44, 88$

Cologania Kunth

Perennial usually twining herbaceous vines or, less often, merely erect or trailing herbs. Tap roots large, ligneous or woody, fusiform or clavate, deeply buried and usually forming new stem growth each year from the crown. Leaves mostly trifoliate, less often unifoliate, rarely 5 foliate, the petiolule of the middle leaflet of trifoliate leaves longer than those of lateral leaflets. Stipules linear to asymmetrically lanceolate. Flowers axillary or terminal, solitary, in pairs, or several or more in congested or loose subfasciculate clusters, or clearly racemose, the flowers bracteate or not. Calyx (in chasmogamous flowers) tubular, gibbous at the base, the sepals 5, united for 2/3 of their length, the upper two lobes variously united. Corolla purple to magenta, or reddish to reddish purple, the banner prominent, usually notched at the apex, the claw ca. 1/3 the length of the blade; wings auriculate, often sharply so, the claw 1/2 as long or more than the blade; keel auriculate, the claw ca. as long as the blade. Stamens 10, diadelphous, enclosed in the keel. Style filiform, gradually curved so as to form an angle of 10-60 degrees with the extended axis of the ovary. Fruit (from chasmogamous flowers) a linear to falcate pod, at maturity terete and usually producing 6-12 seeds. Cleistogamic flowers and fruits are usually quite different from those of chasmogamous flowers and fruits. In general, cleistogamic flowers are much reduced throughout, the calyx tube markedly narrowed below, scarcely gibbous and fertilization occurs at an early developmental stage, the resulting pods also much reduced and atypical. Base chromosome number, $x = 11$.

Lectotype species, *Cologania angustifolia* Kunth.

Key to species (based upon chasmogamous flowers)

1. Leaves unifoliate. 2

2. Leaves cordate; Jalisco. *C. cordata*
2. Leaves linear lanceolate to lanceolate, or elliptic lanceolate to elliptic, rarely broadly ovate but never cordate; widespread. *C. procumbens*
1. Leaves 3(-5) foliolate. 3
3. Leaflets linear to linear lanceolate, rarely narrowly ovate, mostly 3 times longer than wide or more. 4
4. Flowers arranged in axillary bracteate clusters of 5-10, the pedicels 2-4 mm long; Nayarit. *C. capitata*
4. Flowers single in the axils or in groups of 2-3, the pedicels mostly 5-10 mm long; widespread. *C. angustifolia*
3. Leaflets ovate to obovate or oval, mostly 1.0-2.8 times as long as wide. 5
5. Petioles 1-5 mm long; leaflets sessile or nearly so; stems procumbent or trailing, not twining. *C. obovata*
5. Petioles 10 mm long or more; leaflets clearly stalked; stems twining. 6
6. Flowers borne in distinct racemes; pedicels subtended by distinct bracts. 7
7. Banners red, 30-40 mm long (measured from the base of calyx to banner tip); bracts of the raceme ovate, 12-14 mm long, 3-4 mm wide. 8
8. Leaflets sharply acute; near Michoacán and Guerrero. *C. hintoniorum*
8. Leaflets broadly obtuse to rounded; Oaxaca. *C. hirta*
7. Banners lavender purple to violet, 18-30 mm long; bracts of the raceme mostly linear to linear lanceolate, 4-6 mm long, 0.5-1.0 mm wide. 9
9. Racemes mostly 6-12 cm long, evenly floriferous, the flowers mostly 20-25 mm long (measured from the base of calyx to apex of banner); Durango, Nayarit, and Jalisco along western sierras. *C. racemosa*
9. Racemes mostly 1.5 cm long, unevenly floriferous, the flowers mostly 26-30 mm long; Hidalgo to Oaxaca along eastern sierras. *C. biloba*
6. Flowers axillary, mostly 1-2 or in groups of 3-4, but never distinctly racemose; pedicels without bracts. 10
10. Leaves pallid (pale green); leaflets mostly 1-3 cm long; U.S.A. and closely adjacent México. *C. pallida*

10. Leaves green to dark green, never pallid; leaflets mostly 3-10 cm long; widespread. *C. broussonettii*

COLOGANIA ANGUSTIFOLIA Kunth. Distribution map Figure 2.

Cologania angustifolia Kunth, *Mimosas* 209. pl. 58. Jun 1824; H.B.K., *Nov. Gen. & Sp. Pl.* 6 [folio]: 325; 6 [quarto]:44. Sep 1824. *Amphicarpaea angustifolia* (H.B.K.) Taubert, in Engler & Prantl, *Natur. Pflanzenf.* 33:359. 1894. TYPE: MEXICO. Hidalgo: "prope La Magdalena, between Real del Moran and Actopan," May-Jun 1803, *Humboldt & Bonpland 4115* (HOLOTYPE: P; Photoholotype: TEX!).

Cologania intermedia H.B.K., *Nov. Gen. & Sp. Pl.* 6 [quarto]:414. Sep 1824. TYPE: MEXICO. Hidalgo: "Crescit prope Real del Monte," May-Jun 1803, *Humboldt & Bonpland 4080* (HOLOTYPE: P; Photoholotype: TEX!).

Cologania mexicana Zucc., *Abhandl. Akad. Muench.* 1:339, pl. 14 & 15. 1832. *Neurocarpon mexicanum* (Zucc.) Steud., *Nomenclator Botanicus*, ed. 2, 2:193. 1840. TYPE: "Crescit in imperii mexicani regionibus calidioribus," w/o date, *D. Keerl s.n.* (HOLOTYPE: M, not examined, but as noted by Fearing, the description and illustrations leave little doubt as to its synonymy here).

Galactia radicata DC., *Prodr.* 2:238. 1825. TYPE: MEXICO. State not known: Based upon a collection of *Sessé & Moçino s.n.* (*Sessé & Moçino* illustration: G; Photo of type illustration: TEX!). This name was not accounted for by Fearing, but the illustration leaves little doubt as to its identity.

Cologania longifolia A. Gray, *Pl. Wright.* 2:35. 1853. TYPE: U.S.A. New Mexico: Grant Co., "Hills near the copper mines," Aug 1851, *C. Wright 959* (LECTOTYPE [selected here]: GH!; Photolectotype: TEX!). Gray cited several of Wright's collection numbers in his protologue, assigning subscripts to each and referring to these as leaf "forms." Fearing annotated *Wright 959a* as "holotype," which is redesignated here as a lectotype.

Cologania martia S. Wats., *Proc. Amer. Acad. Arts* 17:345. 1882. TYPE: MEXICO. San Luis Potosí: "Sandy places about San Luis Potosi," w/o date, *Schaffner 802* (LECTOTYPE [selected here]: GH!). In the protologue Watson cited two additional collections, 191 and 193 of *Parry & Palmer*.

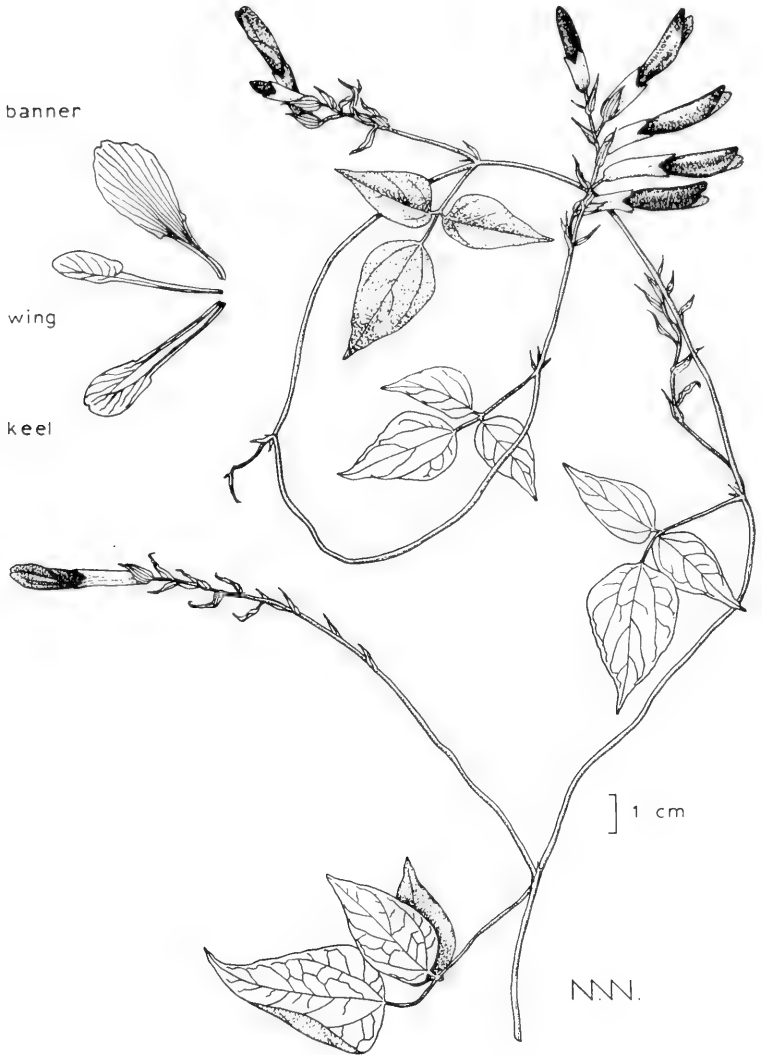


Fig. 1. *Cologania hintoniiorum*, from holotype.

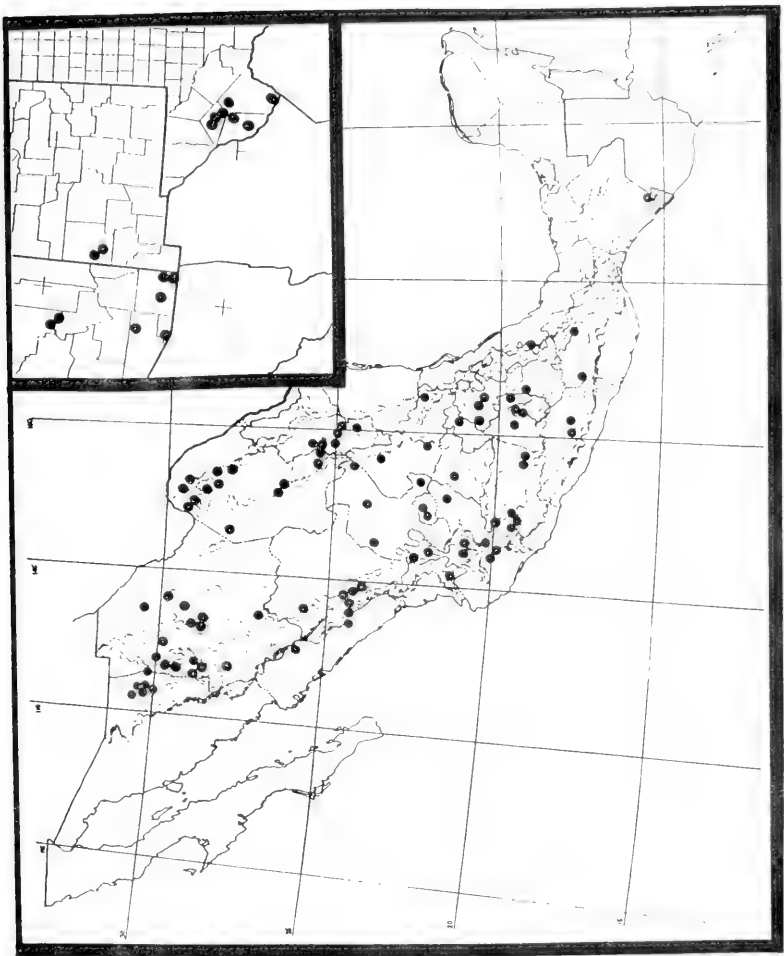


Figure 2. Distribution of *Cologania angustifolia* in México (inset, U.S.A.).

Cologania confusa Rose, Contr. U.S. Natl. Herb. 8:37. 1903. TYPE: U.S.A. Texas: El Paso Co., 1851, *C. Wright 958* (HOLOTYPE: US; Photoholotype: TEX!; Isotype: GH!).

Cologania longifolia A. Gray var. *stricta* M.E. Jones, Contr. West. Bot. 12:12. 1908. TYPE: MEXICO. Chihuahua: "near Chuichupua [Chuhuichupa]," Sep 1903, *M.E. Jones s.n.* (HOLOTYPE: POM, not located). Fearing, unable to locate the type at POM, suggested that there was some labeling error and that the sheet concerned might have been collected by Jones in Soldier Canyon, 16 Sep 1903 (CAS,DS,F,US). From among these he selected the CAS specimen as a lectotype; a lectotype, if needed, should be housed at POM.

Cologania pringlei S. Wats, Proc. Amer. Acad. Arts 25:147. 1890. Not *Cologania pringlei* S. Wats. (1888). *Cologania jaliscana* S. Wats., Proc. Amer. Acad. Arts 26:136. 1891. TYPE: MEXICO. Jalisco: hillsides near Guadalajara, 2 Jul 1889, *C.G. Pringle 2788* (HOLOTYPE: GH!; Photoholotype: TEX!; Isotypes: F,MO,UC,US).

Fearing noted that the name *Cologania confusa* had been applied to plants which are "somewhat intermediate between *C. pallida* and *C. angustifolia*." He also noted that "*Cologania jaliscana* is morphologically intermediate between *C. broussonettii* and *C. angustifolia*." I agree with his assessments but believe plants relegated to *C. jaliscana* (including the type) are morphologically closer to *C. broussonettii* and have therefore positioned these in synonymy with the latter. McVaugh (1987) retained *C. jaliscana* as a good species, believing such plants to have a limited range in central and eastern Jalisco, and that these could be distinguished from typical *C. angustifolia* by leaf shape and pubescence. The leaf shape and pubescence found in "*C. jaliscana*" are much like that found in *C. broussonettii* and I have little hesitation in accepting Fearing's overall evaluation (*i.e.*, of hybrid origin) but believe its total characters are more those of *C. broussonettii*.

Fearing recognized a var. *stricta*, based upon *Cologania longifolia* var. *stricta* M.E. Jones, but I take these to be but early sprouting, erect forms of *C. angustifolia*, before the plants begin to twine. Such forms occur through most of the range of *C. angustifolia* and appear to have no other characters to distinguish these from the more typical twining forms.

Fearing noted that the name *Cologania intermedia* has been applied to plants "which exhibit characters intermediate between *C. angustifolia* and *C. broussonettii*," which appears to be the case. He also noted that *C. longifolia* (largely recognized by its glabrate upper leaf surfaces) appears to be but sporadically occurring forms of *C. angustifolia*.

As treated by Fearing, *Cologania angustifolia* is a widespread, highly variable taxon. Its infraspecific variation has probably been compounded by oc-

casual interspecific hybridization with other taxa. Indeed, Fearing has documented natural hybridization between *C. angustifolia* and *C. obovata* in the area west of Cd. Durango where the two species grow together (documentary vouchers on file at TEX). He observed a wide range of populational phenotypes along a 56 km transect along highway 40. No doubt the locally variable, but seemingly stabilized, populations reflect the effects of cleistogamy: following hybridization and presumably some backcrossing, cleistogamic (self pollinating) forces act to form local, rather uniform populations. Indeed, after examining numerous herbarium sheets of *Cologania* over a wide range of habitats, I surmise that cleistogamic seed production probably exceeds that of chasmogamous seed production. Cleistogamic flowers and fruits are readily distinguished from chasmogamous flowers and fruits, both by size and shape. Regardless, I suspect that any time two species of *Cologania* grow together or near one another, an occasional hybrid or backcross might be expected. Populations derived from such intermixing need not be recent, for ancestral hybridization with cleistogamic stabilization of this or that genotypic pool is more likely to be the rule than the exception.

COLOGANIA BILOBA (Lindl.) Nicholson. Distribution map Figure 3.

Cologania biloba (Lindl.) Nicholson, *Ill. Dict. Gard.* 1:363. 1887. BASIONYM: *Glycine biloba* Lindl., *Bot. Reg.* 17:pl. 1418. 1831. TYPE: MEXICO. Type grown from Mexican seeds transmitted by George Ackermann to Mr. Tate in 1827, and brought to flower in the greenhouse. Fearing did not examine type material, nor have I, but the original description and its accompanying illustration leave little doubt as to its identity.

Cologania purpurea Mart. & Gal., *Bull. Acad. Roy. Sci. Bruxelles* 10:191. 1843. TYPE: MEXICO. Hidalgo: "dans les bois de Regia, pres de Real del Norte," 6500 ft, Jun-Oct 1840, *H. Galeotti 3346* (HOLOTYPE: BR; Photoholotype: TEX!).

Cologania nelsonii Rose, *Contr. U.S. Natl. Herb.* 8:40. 1903. TYPE: MEXICO. Oaxaca: mountains about Yalalag, 1300 m, 1 Aug 1894, *F.W. Nelson 976* (HOLOTYPE: US!).

Cologania grandiflora Rose, *Contr. U.S. Natl. Herb.* 8:41. 1903. TYPE: MEXICO. Distr. Federal: valley of México, Aug 1896, *C.G. Pringle 7264* (HOLOTYPE: US; Photoholotype: TEX!; Isotypes: F,GH).

The seed from which the type of *Cologania biloba* was grown apparently came from the environs of México City, or perhaps elsewhere along the eastern



Figure 3. Distribution of *Cologania biloba* (closed circles), *C. hintoniorum* (closed squares), *C. hirta* (open squares), and *C. racemosa* (open circles).

sierras. I could not locate information relating to the whereabouts of George Akermann in 1827, at least the plant illustration along with the type description matches well material from the eastern sierras, but not that of material here referred to as *C. racemosa* or *C. hintoniorum*. From the former it differs in having longer corollas; from the latter by its violet or purple corollas (vs. red).

Fearing (1959) positioned *Cologania grandiflora* within his concept of *C. ovalifolia* (= *C. broussonettii* of the present treatment), but the type appears to be in all ways like *C. biloba*, except that the raceme is much shortened so as to superficially resemble the axillary flowers characteristic of *C. broussonettii*.

Other than the types cited above, I have examined the following collections: MEXICO. Morelos: barrancas, Cuernavaca, 28 Jul 1896, Pringle 7250 (MICH). Tlaxcala: Amaxac de Guerrero (near Sta. Cruz), 20 Aug 1944, Hernández X. s.n. (LL).

COLOGANIA BROUSSONETTII (Balb.) DC. Distribution map, Figure 4.

Cologania broussonettii (Balbis) DC., *Prodr.* 2:237. 1825. BASIONYM: *Clitoria broussonettii* Balbis, *Cat. Taur.* 26. 1813. TYPE: CHILE(?). w/o specific locality, collector and date unknown. (HOLOTYPE: TO; Photoholotypes: F,GH,TEX!). McVaugh (1987) noted that De Candolle, in his transfer of this species, calls to the fore that Balbis published the present name with a double n; the holotype material, however, is annotated with the spelling having a single n, as adopted by most workers.

Cologania ovalifolia H.B.K., *Nov. Gen. & Sp. Pl.* 6:412 [quarto]. Sep 1824. *Falcata ovalifolia* (H.B.K.) O. Ktze, *Rev. Gen. Pl.* 3(3):63. 1898. *Amphicarpaea ovalifolium* (H.B.K.) Seckt., *Fl. Cordoba*, Cordoba, 1927-30. TYPE: PERU. Prov. Bracamorencia: "Crescit ad repam flumiris Amazonum, prope Tomependam, alt. 200 hex.," Aug 1802, *Humboldt & Bonpland s.n.* (HOLOTYPE: P; Photoholotype: TEX!).

Cologania pulchella H.B.K., *Nov. Gen. & Sp. Pl.* 6:413 [quarto]. Sep 1824. *Amphicarpaea pulchella* (H.B.K.) Taubert, in Engler & Prantl, *Nat. Pflanzenf. Abt.* 3(3):359. 1894. TYPE: MEXICO. Michoacán: near Patzcuaro, Sep 1803, *Humboldt & Bonpland 4348* (HOLOTYPE: P; Photoholotype: TEX!).

Cologania affinis Mart. & Gal., *Bull. Acad. Roy. Sci. Bruxelles* 10:188. 1843. TYPE: MEXICO. Veracruz: near Mirador, "3,000 pieds," Jun-Oct 1840, *H. Galeotti 3283* (HOLOTYPE: BR; Photoholotypes: F,GH,TEX!).

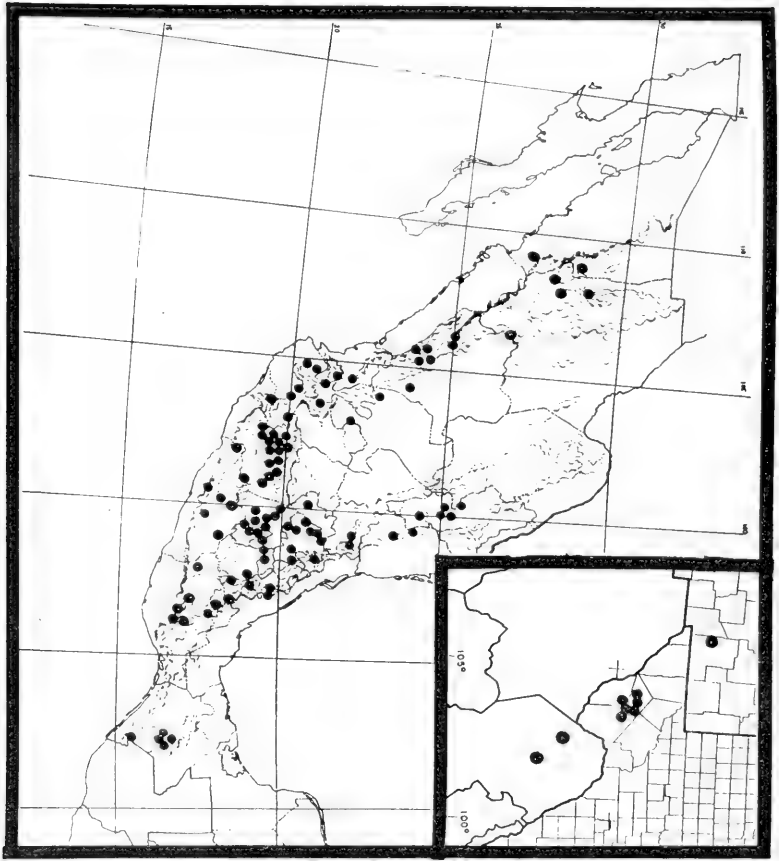


Figure 4. Distribution of *Cologania brousseonettii* in México (inset, populational types referred to as *C. pallida*).

- Cologania australis* Griseb., in Goett., Abh. 19:124. 1874. TYPE: ARGENTINA. Tucumán: Siambon, Sierra de Tucumán, Feb 1874, *P.G. Lorentz & Hieronymus 779* (HOLOTYPE: LIL; Photoholotypes: F,TEX!).
- Cologania jaliscana* S. Wats., nom. nov., Proc. Amer. Acad. Arts 26:136. 1891. *Cologania pringlei* S. Wats., Proc. Amer. Acad. Arts 25:147. 1890. Not *Cologania pringlei* S. Wats., 1888. TYPE: MEXICO. Jalisco: hillsides near Guadalajara, 2 Jul 1889, *C.G. Pringle 2788* (HOLOTYPE: GH!; Isotypes: F,MO,UC,US).
- Cologania grandiflora* Rose, Contr. U.S. Natl. Herb. 8:41. 1903. TYPE: MEXICO. Distr. Federal: valley of México, Aug 1896, *C.G. Pringle 7264* (HOLOTYPE: US; Photoholotypes: TEX!; Isotypes: F,GH!).
- Cologania glabrior* Rose, Contr. U.S. Natl. Herb. 8:38. 1903. TYPE: GUATEMALA. Jalapa: Laguna de Ayarza(?), 1892, *E.T. Heyde 454* (HOLOTYPE: US; Photoholotype: TEX!).
- Cologania rufescens* Rose, Contr. U.S. Natl. Herb. 8:38. 1903. TYPE: GUATEMALA: Quiche: in Chiul, Sep 1890, *Heyde & Lux 4460* (HOLOTYPE: US; Photoholotype: TEX!; Isotype: US; Photoisotype: TEX!).
- Cologania congesta* Rose, Contr. U.S. Natl. Herb. 8:312. 1905. TYPE: MEXICO. México: Toluca, 4 Sep 1903, *Rose & Painter 6768* (HOLOTYPE: US!).
- Cologania tenuis* Rose, Contr. U.S. Natl. Herb. 10:100. 1906. TYPE: MEXICO. Morelos: near El Parque, 21 Sep 1903, *J.N. Rose 7233* (HOLOTYPE: US; Photoholotype: TEX!; Isotype: GH!).
- Cologania lozanii* Rose, Contr. U.S. Natl. Herb. 10:100. 1906. TYPE: MEXICO. Nuevo León: near Monterrey, 7 Sep 1904, *Pringle & Lozano 13425* (HOLOTYPE: US; Photoholotype: TEX!).

This is a widespread variable species, especially in leaf shape. It ranges throughout most of the tropical and subtropical montane regions of western North America and South America (Fig. 2). Fearing (1959) recognized *Cologania ovalifolia* (including *C. australis* and *C. grandiflora*) as distinct, positioning this next to *C. broussonettii* but noted in his discussion that the two species are taxonomically the most difficult portions of *Cologania*. Comparison of herbarium materials shows that they exhibit almost complete intergradation of morphological characters. In South America these taxa are more sharply separated than these are in the northern portions of their range. However, with reference to the Mexican collections, their morphological characters are known to intergrade to such an extent that one is tempted to treat these two

taxa as members of a single variable species. The South American material, especially collections from Argentina, contains plants in which the morphological extremes are well marked. Because of the sharp distinction of these two taxa in the southern part of their range, they are treated as distinct, though it is apparent that their biological status can only be determined by detailed populational studies.

I have gone over much of the material examined by Fearing and much additional material assembled since his study and must conclude that I cannot recognize but a single taxon from among this complex. The hypothetical taxon, *Cologania ovalifolia*, has an almost identical range as that of *C. broussonettii* and its variation is such that one must be exceedingly arbitrary in assigning specimens to this or that taxon on the characters proposed by Fearing in his key to species. McVaugh (1987) came to a similar conclusion for the area covered in his study noting, "In Nuevo Galicia I cannot distinguish more than one species [of this pair]. Flowers and fruit of the supposed species are for all practical purposes identical. The stated differences between the two involve leaflet-shape, width of stipules, and length of the leaf - radius, peduncles, and pedicels ..." I concur with McVaugh's assessment regarding this matter and believe, further, that such observations hold throughout most of the range of the species concerned.

COLOGANIA CAPITATA Rose. Distribution map, Figure 5.

Cologania capitata Rose, Contr. U.S. Natl. Herb. 8:41. 1903. TYPE: MEXICO. Nayarit: near Santa Teresa, 13 Aug 1897, J.N. Rose 3459 (HOLOTYPE: US; Photoholotype: TEX!; Isotype: GH).

This taxon is a localized endemic of northern Nayarit. Except for its exceptional capitate inflorescence it is similar to *Cologania angustifolia*.

COLOGANIA CORDATA Fearing ex McVaugh. Distribution map, Figure 5.

Cologania cordata Fearing ex McVaugh, in *Flora Novo-Galiciana* 5:356. 1987. TYPE: MEXICO. Nayarit: near km 866, ca. 40 km SE of Tepic, 4 Sep 1957, R. McVaugh 18717 (HOLOTYPE: MICH).

McVaugh, in his publication of this taxon, discussed its distinctiveness, and provided an excellent illustration. More detailed study might show this species to be a population form of *Cologania procumbens*; occasional nearly cordate leafed forms of *C. procumbens* occur elsewhere (e.g., Oaxaca: Baldwin 14337, LL).

COLOGANIA HINTONIORUM B. Turner. Distribution map, Figure 3.

Cologania hintoniorum B. Turner, *sp. nov.* Fig. 1. TYPE: MEXICO. Michoacán: Distr. Coalcoman, S. Torricillas, oak woods, 2400 m, 16 Dec 1938, *George B. Hinton et al. 12767* (HOLOTYPE: LL!; Isotype: MICH!).

Cologaniae hirtae (Mart. & Gal.) Rose similis sed foliis majoribus tenuioribusque apicibus acutis (vs. obtusis vel rotundatis) differt.

Slender perennial twining herbs, the stems up to 2 m long. Stems pilose with retrorse or spreading hairs. Leaves trifoliate, the leaflets broadly ovate, rounded or obtuse at the base, the apices acute. Stipules linear, attenuate, 5-9 mm long, 1.0-1.5 mm wide; stipels filiform 1-3 mm long. Inflorescences racemose, axillary, the flowers rather evenly disposed along the axis, the latter 5-16 cm long. Pedicels of flowers mostly 5-10 mm long, the basal bracts persistent, lanceolate to narrowly ovate, 5-12 mm long, (1-)2-4 mm wide. Calyx thinly pilose, 18-22 mm long; bracteoles large, broadly ovate, mostly 8-10 mm long, 4-5 mm wide. Corollas red; standards 3-4 cm long, the banner 11-14 mm wide, retuse, hardly recurved at anthesis; wings and keel petals ca. as long or somewhat shorter than the standard. Fruits (chasmogamous) glabrous or nearly so, up to 7 cm long, 7 mm wide; mature seeds not examined.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Guerrero: Distr. Mina, Aguazarca-Filo, 8 Nov 1937, *Hinton et al. 11262* (GH,LL,MICH,US); Distr. Montes de Oca, "San Antonio Buenos Aires," 21 Dec 1937, *Hinton et al. 11694* (LL,MICH).

Fearing (1959) cites an additional collection of this taxon from Guerrero (Distr. Mina, 4 Dec 1939, *Hinton 14947*; GH,US) which I have not examined. MEXICO. Michoacán: steep mountainsides NW of Aguililla, ca. 7 km S of Aserradero Dos Aguas, 2000 m, 3 Mar 1965, *McVaugh 22725* (MICH).

McVaugh (1987), in the description of *Cologania biloba* for his *Flora Novogaliciana*, essentially described *C. hintoniorum*, following which he noted:

Our plant evidently differs in some respects from typical *Cologania hirta* of central Oaxaca. The herbage is much less conspicuously hirsutulous, the leaflets are more strongly acuminate, the bracteoles are broadly ovate (linear and 1.5 mm wide in Oaxaca specimens seen), the blade of the standard is relatively narrower (up to 18 mm in typical *hirta*, according to Fearing), and the ovary and fruit are glabrous (not densely strigose). With its bright red flowers in axillary racemes, this is not only one of the most distinctive of our species of *Cologania*, but also one of the showiest.

Cologania hintoniorum, with its very large red corollas and narrowed standards, is markedly different from the smaller flowered *C. hirta*; in addition the leaves are quite different from the latter, having larger, thinner, more acute leaflets. The distributional relationships of this species pair is shown in Fig. 3, along with *C. biloba* and *C. racemosa*, all having racemose inflorescences, but each markedly distinct among themselves.

COLOGANIA HIRTA (Mart. & Gal.) Rose. Distribution map, figure 3.

Cologania hirta (Mart. & Gal.) Rose, Contr. U.S. Natl. Herb. 3:315. 1895. BASIONYM: *Galactia hirta* Mart. & Gal., Bull. Acad. Roy. Sci. Bruxelles 10:190. 1843. TYPE: MEXICO. Oaxaca: "dan les forets de chenes des regiones alpines de la cordillere orientale d' Oaxaca, a 7,500 pieds [Cerro de San Felipe]," Sep-Apr 1840, *H. Galeotti 3204* (HOLOTYPE: BR; Photoholotype: TEX!).

McVaugh (1987), while accepting *Cologania hirta* into his *Flora Novo-Galiciana*, nevertheless pointed out the distinction between his material and that from Oaxaca. I have provided the name *C. hintoniorum* for the plants of Novo Galicia, restricting *C. hirta* to those from the state of Oaxaca.

COLOGANIA OBOVATA Schlecht. Distribution map, figure 5.

Cologania obovata Schlecht., *Linnaea* 12:287. 1838. TYPE: MEXICO. Hidalgo: near "Mineral del Monte [Real del Monte]," Aug 1835, *C. Ehrenberg 575* (HOLOTYPE: HAL; Photoholotype: TEX!).

Cologania humifusa Hemsl., *Diag. Pl. Nov.* 3:47. 1880. TYPE: MEXICO. San Luis Potosí: near San Luis Potosí, 1879, *Parry & Palmer 194* (LECTOTYPE [selected here]: K!; Isolectotype: GH; Photoislectotype: TEX!). As noted by Rose (1903) the protologue cites several collections; Fearing designated the lectotype, selected here, as an holotype (at least by inference).

Cologania lemmonii A. Gray, Proc. Amer. Acad. Arts 19:74. 1883. TYPE: U.S.A. Arizona: Cochise Co., Chiricahua Mts., 1882, *Lemmon 2681* (HOLOTYPE: GH!; Photoholotype: TEX!; Isotypes: F, US).

Cologania pringlei S. Wats., Proc. Amer. Acad. Arts 23:271. 1888. TYPE: MEXICO. Chihuahua: base of Sierra Madre, pine woodlands, 9 Oct 1887, *C.G. Pringle 1499* (HOLOTYPE: GH!).

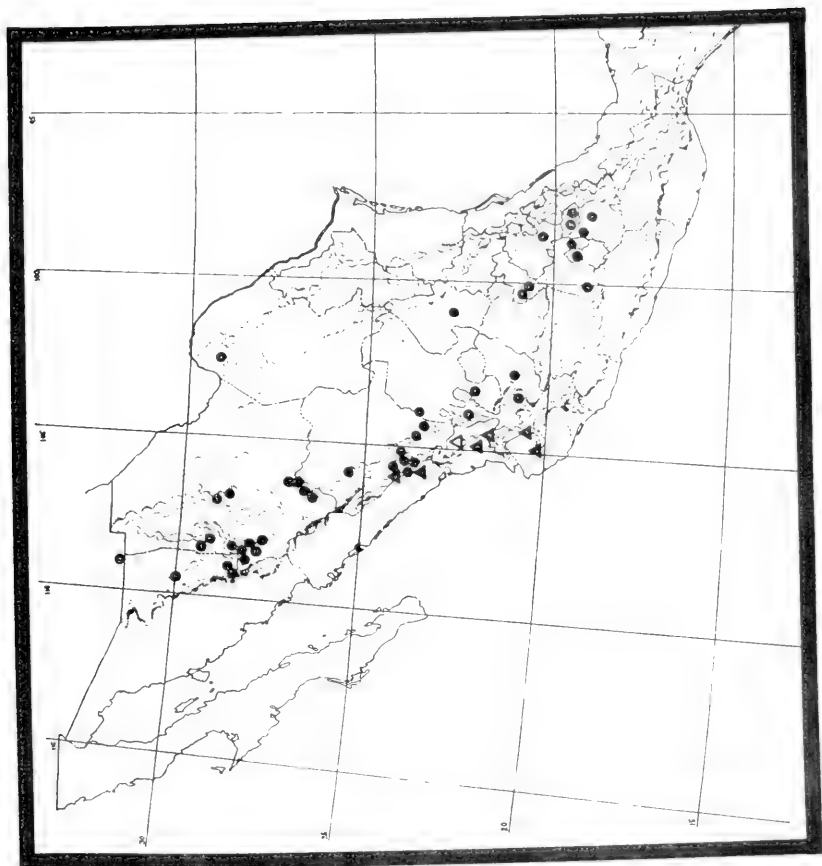


Figure 5. Distribution of *Cologania capitata* (open triangles), *C. cordata* (closed triangles), and *C. obovata* (closed circles).

Cologania deamii Fernald, Proc. Amer. Acad. Arts 26:492. 1901. TYPE: MEXICO. Morelos: near Cuernavaca, 7 Jul 1900, *C. Deam* 40 (HOLOTYPE: GH!; Photoholotype: TEX!; Isotype: MICH; Photoisotype: TEX!).

Cologania houghii Rose, Contr. U.S. Natl. Herb. 8:39. 1903. TYPE: MEXICO. Puebla: along railroad between Tepeaca and Santa Rosa, S of Puebla city, 27 Jun 1899, *J. N. Rose* 4797 (HOLOTYPE: US; Photoholotype: TEX!; Isotype: GH!).

Cologania humilis Rose, Contr. U.S. Natl. Herb. 8:40. 1903. TYPE: MEXICO. Nayarit: between Dolores and Santa Gertrudis, 7 Aug 1897, *J.N. Rose* 2042 (HOLOTYPE: US; Photoholotype: TEX!).

COLOGANIA PALLIDA Rose. Distribution map, figure 4.

Cologania pallida Rose, Contr. U.S. Natl. Herb. 8:38. 1903. TYPE: U.S.A. Texas: Jeff Davis Co., "Smiths' run to Providence Creek," 15 Jun 1851, *C. Wright* 957 (HOLOTYPE: US; Isotypes: GH,MO,UC; Photoisotypes: TEX!).

This is a weakly differentiated species belonging to the *Cologania broussonettii* complex. It appears to intergrade southeastwards with elements of the latter and more intensive field studies may well suggest varietal status for the taxon. Additionally, specimens of *C. broussonettii* from northwesternmost México (Sonora and Chihuahua) appear to have relatively short peduncled, axillary racemes and smaller leaves; these might ultimately prove varietally distinct.

COLOGANIA PROCUMBENS Kunth. Distribution map, figure 6.

Cologania procumbens Kunth, *Mimoses* 205. pl. 57. Jun 1874; H.B.K. *Nov. Gen. & Sp.* 6 [folio]:323. 12 Jul 1824; 6 [quarto]:412. Sep 1824. TYPE: COLOMBIA. "near Popayan, 912 hex," Oct-Nov 1801, *Humboldt & Bonpland s.n.* (HOLOTYPE: P; Photoholotype: TEX!).

Cologania erecta Rose, Contr. U.S. Natl. Herb. 5:136. 1897. TYPE: MEXICO. Jalisco: "rocky hills near Guadalajara, 21 Jun 1893, *C.G. Pringle* 4401 (HOLOTYPE: US; Photoholotype: TEX!; Isotypes: F,MICH,MO, US).

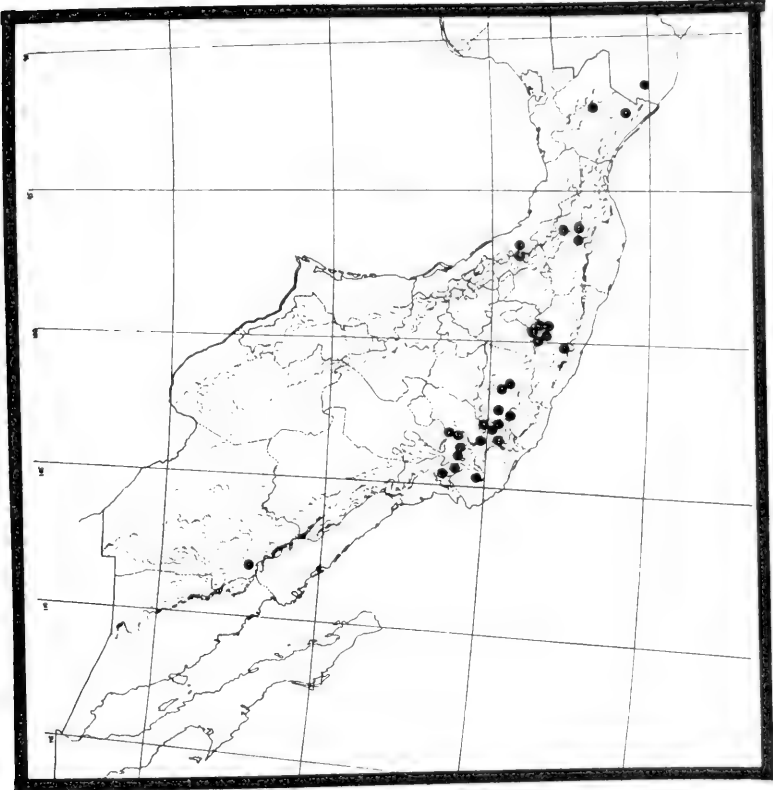


Figure 6. Distribution of *Cologania procumbens* in México.

McVaugh correctly noted, in my opinion, that this unifoliate, usually non-twining, herb may occasionally hybridize with yet other species, calling to the fore the possibility of such hybrids between it and *Cologania cordata*. Actually, the latter taxon itself may represent a rather stabilized, perhaps old, hybrid or hybrid derivative between *C. procumbens* and *C. broussonettii*, or yet some other taxon, such as *C. racemosa*, to judge from its variable populational structure.

COLOGANIA RACEMOSA (B.L. Rob.) Rose. Distribution map, figure 3.

Cologania racemosa (B.L. Rob.) Rose, Contr. U.S. Natl. Herb. 8:40. 1903. BASIONYM: *Cologania pulchella* H.B.K. var. *racemosa* B.L. Rob., Proc. Amer. Acad. Arts 29:315. 1894. TYPE: MEXICO. Jalisco: Tequila, Aug-Sep 1886, E. Palmer 379 (LECTOTYPE [selected here]: GH!; Photolectotype: TEX!; Isolectotypes: DS,US). Fearing incorrectly noted the "holotype" of this taxon to be at US. McVaugh (1987) and Rose (1903) both noted that two collections were cited in the protologue; I have selected the Palmer collection as lectotype).

Fearing (1959) and McVaugh (1987) treated this taxon as synonymous with *Cologania biloba*. The latter is readily distinguished by its mostly shortened racemes in which (or along which) the flowers tend to cluster; in addition the corollas are mostly longer (28-30 mm from base of calyx to banner tip vs. mostly 15-25 mm), and the leaves are mostly 2-3 times as long as wide (vs. 1.5-2.0 times as long as wide). *Cologania biloba* occurs in the state of México and along the highlands of eastern México, whereas *C. racemosa* is confined to the Sierra Madre Occidental from Durango southwards to western Michoacán.

The following specimens have been examined: MEXICO. Durango: 28 road km S of Cd. Durango (ca. 23° 52' N, 104° 46' W), 1800-2000 m, 18 Aug 1982, Worthington 8980 (TEX). Jalisco: 12 mi S of Autlán, 1150 m, 26 Sep 1966, Anderson & Laskowski 3756 (MICH); ca. 15 km E of Pihuamo, 1200-1300 m, 23 Oct 1963, Dieterle 3013 (MICH); ca. 20 mi N of Tepatitlán, ca. 1450 m, 27-28 Aug 1958, McVaugh 17418 (MICH); 10-12 mi SSE of Autlán, 1500-1800 m, 29 Sep 1960, McVaugh 19587 (MICH). Nayarit: 22.7 km NW of Jesus María, ca. 1380 m, 23 Sep 1989, Flores F. 1340 (MICH); 10 mi SE of Ahuacatlán, 1100-1300 m, 17-18 Nov 1959, McVaugh & Koelz 773 (MICH). Michoacán: Coalcomán, 1000 m, 18 Sep 1938, Hinton et al. 12204 (MICH).

Other than the type, Fearing examined only one of the above cited sheets (Hinton et al. 12204), the latter rather atypical. I believe had he access to the rather uniform suite of collections available today, he would have recognized the present taxon as distinct.

ACKNOWLEDGMENTS

I am grateful to Guy Nesom for the Latin diagnosis and to him and T.P. Ramamoorthy for reviewing the paper.

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**VERBESINA ZARAGOSANA (ASTERACEAE, HELIANTHEAE), A NEW
SPECIES FROM NUEVO LEON, MEXICO**

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ABSTRACT

A new species, *Verbesina zaragosana* B. Turner, is described from southern Nuevo León where it occurs on gypsum substrates. It is closely related to the gypsumphilic endemic *V. hintoniorum* B. Turner, but is readily distinguished by having larger leaves with an ashy white, densely tomentose vestiture on both surfaces (vs. sparsely to moderately pubescent with stout terete hairs, each hair arising from an enlarged basal complex of cells).

KEY WORDS: Asteraceae, Heliantheae, *Verbesina*, México, gypsumophile

Preparation of a systematic treatment of *Verbesina* for México has occasioned the present paper.

Verbesina zaragosana B. Turner, *sp. nov.* TYPE: MEXICO. Nuevo León: 3.7 mi N of Zaragosa on road to Aramberri, gypsum outcrops W of road, 10 Oct 1984, Tina J. Ayers & R. Scott 509 (HOLOTYPE: TEX!; Isotype: MEXU).

Verbesinae hintoniorum B. Turner similis sed foliis midcaulinis latioribus (plerumque 6-14 mm latis vs. 3-6 mm) dense cineracei-tomentosisque in superficiebus ambabus (vs. sparsim hispidis vel moderate strigosis trichomatibus crassis ascendentibusque, haud tomentosis) differt.

Stiffly erect perennial herbs 50-70 cm high. Leaves alternate throughout, or nearly so, gradually reduced upwards, those at midstem mostly 4-12 cm long, 0.6-1.4 cm wide, scarcely petiolate, densely matted tomentose on both

surfaces, the hairs ashy white, flattened, crinkly, not arising from a pronounced group of basal cells, the margins entire or nearly so. Heads numerous, arranged in foreshortened stiffly branched nearly flat topped cymes, the ultimate peduncles mostly 2-6 cm long. Involucres broadly campanulate to hemispheric, 5-7 mm high, 10-15 mm wide, the bracts 3-4 seriate, moderately graduate, elliptic lanceolate to oblanceolate, tomentulose, apically acute to acuminate. Receptacle broadly conical, the pales 5-7 mm long, glabrous, acuminate. Ray florets 5-8, pistillate, fertile, the ligules yellow, 3-6 mm long, 2-4 mm wide. Disk florets numerous, the corollas yellow, ca. 5 mm long, the tube 0.5-0.8 mm long. Achenes ca. 4 mm long, very broadly winged, the upper part of the wings extending well above the body of the achene and as wide or wider than the body, the inner achenes mostly glabrous, those along the periphery usually sparsely pubescent, somewhat warty with age.

ADDITIONAL SPECIMENS EXAMINED: MEXICO. Nuevo León: Mpio. Galeana, above El Nogal in stunted pine forest, 2250 m, 5 Nov 1983, *Hinton et al. 18093* (TEX); between Galeana and Rayones, 1270 m, 17 Oct 1990, *Hinton et al. 20825* (TEX); Mpio. Aramberri, above Puerto Los Borregos, gypsum hillside, 6 Nov 1991, *Hinton et al. 21762* (TEX).

This taxon is clearly closely related to *Verbesina hintoniorum* B. Turner, having the habit and most of the capitular features of that species. It differs markedly from *V. hintoniorum* in having a densely tomentose, ashy white vestiture on both surfaces of the leaves, the hairs thin and markedly flattened, each hair arising from a relatively thin basal cell (vs. coarsely pubescent, the hairs terete and arising from a group of broad basal cells, not at all ashy white tomentose). When I first examined collections of this taxon I misidentified these as *V. potosina* B. Robinson, the latter possessing foliage superficially similar to *V. zaragosana*. Subsequent collections, mostly by the Hinton family, have shown the latter species to be relatively widespread on gypsum outcrops, as is *V. hintoniorum*, but the two taxa have not been found growing together, nor have intermediates been detected. In short, *V. zaragosana* appears to be a good species, partially sympatric with *V. hintoniorum*, but not intergrading with it.

ACKNOWLEDGMENTS

I am grateful to Guy Nesom for the Latin diagnosis and to him and T.P. Ramamoorthy for reviewing the manuscript.

TWO NEW SPECIES OF *AGERATINA* (ASTERACEAE, EUPATORIEAE)
FROM OAXACA, MEXICO

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ABSTRACT

Two new species of *Ageratina*, *A. cruzii* B. Turner and *A. kochiana* B. Turner, are described from Oaxaca, México. Both belong to the subgenus *Neogreenella*, the former most closely related to *A. etlensis*, the latter to *A. chimalapana*.

KEY WORDS: Asteraceae, Eupatorieae, *Ageratina*, México

Routine identification of Mexican Asteraceae has revealed the following novelties.

Ageratina cruzii B. Turner, *sp. nov.* TYPE: MEXICO. Oaxaca: Distr. Teposcolula, Mpio. San Pedro Topiltepec, Santa María Tiltepec, bosque de encino, 2350 m, 5 Nov 1990, *E. Cruz C. 321* (HOLOTYPE: TEX!; Isotype: CHAPA).

Ageratinae etlensi (B.L. Rob.) King & H. Rob. similis sed capitulescentia laxis valde terminalibus (vs. capitulis plerumque axillaribus congestisque), paginis inferis foliorum puberulis (vs. glabris), et capitulis ca. 10 flosculos efferentibus (vs. 20-25) differt.

Suffruticose perennial glabrous herbs or shrublets to 1.5 m high. Stems reddish, glabrous, the internodes longer than the leaves. Leaves opposite throughout, gradually reduced upwards, mostly 5-7 cm long, 2.5-3.5 cm wide; petioles 1.0-1.5 cm long; blades broadly ovate to subdeltoid, abruptly tapering upon the petioles, reticulate nervate, with 3 major nerves arising from above the base, the margins rather evenly crenuloserrulate. Heads numerous, arranged in terminal, relative lax cymes, the ultimate peduncles mostly 10-20

mm long, appressed-puberulent with uniseriate, purple jointed, hairs. Involucres 3.5-4.0 mm high, narrowly campanulate, the bracts biseriate, subequal, linear-lanceolate, glabrous or nearly so. Receptacle plane, glabrous, epaleate, ca. 1 mm across. Florets 10 per head (1 count), the corollas white, ca. 5 mm long, glabrous, the tubes ca. 1.5 mm long, the lobes glabrous, ca. 0.5 mm long. Achenes ca. 2.5 mm long, sparsely hispidulous, the pappus of 25-30 barbellate bristles 3-4 mm long, not enlarged apically.

According to label data, the plant is a herb 1.5 m high and is reportedly frequent at the site indicated.

Ageratina cruzii is superficially similar to the widespread highly variable *A. ligustrina* DC. It is readily distinguished from the latter in having leaves with 3 principal basal nerves (vs. pinnately nervate), nonpunctate, minutely reticulate surfaces (vs. rather smooth and punctate), and relatively minute involucre 3.5-4.0 mm high (vs. 5.0-6.0 mm). Its actual relationship appears to be with the poorly known *A. etlensis* (B.L. Rob.) King & H. Rob., also a species of the mountain ranges north of Cd. Oaxaca. *Ageratina cruzii* differs from the latter in having a pronounced naked lax capitulescence of more numerous smaller heads with fewer florets (ca. 10 vs. 20-25), as noted in the Latin diagnosis.

Ageratina kochiana B. Turner, *sp. nov.* TYPE: MEXICO. Oaxaca: Distr. Teposcolula, Mpio. San Pedro Topiltepec, Santa María Tiltepec, bosque de encino, 2350 m, 5 Nov 1990, *E. Cruz C. 280* (HOLOTYPE: TEXL; Isotype: CHAPA).

Ageratinae chimalapanae B. Turner similis in characteribus involucri ac achaeniorum sed valde differt foliis majoribus laminis ovatis triplinerviis (vs. lanceolati-ellipticis pinnatinerviis), et petiolis 10-20 mm longis (vs. 1-2 mm).

Suffruticose perennial herbs or shrublets 1.0-1.2 m high. Stems sparsely puberulent to glabrate. Leaves opposite throughout, mostly 2-4 cm long, 1.0-1.5 cm wide; petioles sparsely puberulent beneath, especially along the veins, the surfaces reticulate venose, moderately atomiferous glandular, the margins hispidulous, crenulate to nearly entire. Capitulescence of 10-15 heads arranged in terminal congested cymes, the ultimate peduncles 1-7 mm long, puberulent. Involucres campanulate, 4-5 mm high the bracts subgraduate, triseriate, the middle series strongly 2 nerved with raised ribs, ovate-elliptic, ciliolate marginally with soft tawny hairs. Receptacle plane, glabrous, ca. 1.5 mm across, epaleate. Florets 15-20 per head, the corollas white or pinkish, ca. 5 mm long, glabrous, the tube ca. 1.5 mm long, the lobes ca. 0.8 mm long, glabrous. Achenes (immature) ca. 2.5 mm long, hispidulous; pappus double, an outer row of 15-20 short, narrow bristles mostly 0.5-2.5 mm long, the inner

row of ca. 20 white to reddish barbellate bristles 5-6 mm long, their apices somewhat expanded.

ADDITIONAL SPECIMEN EXAMINED: MEXICO. Oaxaca: Distr. Teposcolula, Mpio. San Pedro Topiltepec, Santa María Tiltepec, bosque de encino, 2455 m, 22 Nov 1990, *E. Cruz C. 299* (CHAPA, TEX).

According to label data the plant is a shrublet 1.0-1.2 m high and reportedly frequent at the sites indicated. The type has relatively more linear-lanceolate leaves than the second cited collection, the former being 3.0-3.5 cm long, the latter 2.0-2.5 cm long (3-4 times as long as wide, vs. 2-3 times as long as wide, respectively), otherwise they are essentially identical.

The leaves of this species resemble *Ageratina seleri* B. Turner in size and shape, but those of the latter are velutinous beneath. Features of the involucre, corolla and especially pappus, however, appear to relate *Ageratina kochii* to *A. chimalapana* B. Turner of easternmost Oaxaca, both having a double pappus with the outer series much shorter, as in the *A. mairetiana* (DC.) King & H. Rob. complex (cf. Turner 1987, 1989) *Ageratina chimalapana* is readily distinguished from *A. kochii* by its leathery trinervate, broadly ovate leaves, the petioles 10-20 mm long.

It is a pleasure to name this very distinct species in honor of Dr. Stephen D. Koch, Director of the Herbarium at Chapingo, México (CHAPA) who has assembled a remarkable and varied collection of plants from throughout México.

ACKNOWLEDGMENTS

I am grateful to Dr. Guy Nesom for the Latin diagnoses and to him and Dr. T.P. Ramamoorthy for reviewing the manuscript.

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NEW TAXA AND COMBINATIONS IN WESTERN NORTH AMERICAN
LILIACEAE

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ABSTRACT

New combinations are validated for two taxa of Liliaceae in California and Oregon so that the names may be used in forthcoming publications. These include: *Allium bolanderi* S. Watson var. *mirabile* (L. Henderson) McNeal and *Zigadenus micranthus* Eastwood var. *fontanus* O. Welsh ex McNeal. In addition, *Allium peninsulare* Lemmon ex Greene var. *franciscanum* McNeal & Ownbey is described as new.

KEY WORDS: Taxonomy, Liliaceae, *Allium*, *Zigadenus*, California, Oregon

In the process of completing treatments of *Allium* and *Zigadenus* for the *Jepson Manual: Higher Plants of California*, it is necessary to make two new nomenclatural combinations. Each of the new combinations is formally made below with a discussion of the reasons for making them. In addition, *A. peninsulare* var. *franciscanum*, a distinct variety discovered several years ago by myself and Dr. Marion Ownbey but never validly published, is described here.

NEW COMBINATIONS

Allium bolanderi S. Watson var. *mirabile* (L. Henderson) McNeal, *stat. et comb. nov.* BASIONYM: *Allium mirabile* L. Henderson, *Rhodora* 32:22. 1930. TYPE: UNITED STATES. Oregon: Josephine Co.: Eight Dollar Mt., near Selma, 17 June 1926, *L. Henderson 6098* (HOLOTYPE: ORE!; Isotypes: GH!, OSC!).

Allium bolanderi var. *mirabile* differs from the typical variety in its unique elongate, irregularly shaped bulbs which suggest small tubers; the typical variety has ovoid to subglobular bulbs. Variety *mirabile* also differs in its narrower perianth segments. Both varieties have a delicate, highly contorted bulb coat reticulation that is unique in the genus (Fig. 1). This reticulation pattern supports the conclusion of a close relationship between the two taxa. Because, presumably, the bulb shapes differ, the broken edge of the bulb coat in var. *bolanderi* tends to be sharply serrate and regular while that of var. *mirabile* is wavy and quite irregular.

Allium bolanderi var. *bolanderi* occurs on heavy clays, usually of serpentine origin, from Douglas and Josephine counties in southwest Oregon south in the coast ranges to Lake Co., California, with a disjunction on Mt. Hamilton in Santa Clara Co. Variety *mirabile* has been collected on similar habitats in Curry, Jackson, and Josephine counties in Oregon and south into Humboldt Co., California.

Representative Specimens: UNITED STATES. California: Humboldt Co.: Van Duzen River Valley, opposite Buck Mtn., June 27-July 30, *Tracy 2771* (UC). Siskiyou Co.: 2.5 mi. W. of Hilt, 16 May 1992, *McNeal 3910* (CPH). Trinity Co.: Mad River, 11 mi. SE. of Ruth. Oregon: Curry Co.: Rogue River Trail, 5 mi. E. of Illahe, 31 May 1947, *Baker 4400* (OSC). Douglas Co.: Glendale, 19 June 1902, *Jones s.n.* (DS). Jackson Co.: Eight Dollar Mtn., 18 June 1932, *Applegate 7308* (DS,GH,UC); Grants Pass, 17 May 1889, *Howell 1394* (ND).

Zigadenus micranthus var. **fontanus** (Eastwood) O.S. Walsh *ex* McNeal, *stat. et comb. nov.* BASIONYM: *Zigadenus fontanus* Eastw., *Leafl. West. Bot.* 2:41. 1937. TYPE: UNITED STATES. California, Marin Co.: Bootjack, Mt. Tamalpais, 7 June 1936, *J.T. Howell 12656* (HOLOTYPE: CAS!).

This combination was first proposed by O.S. Walsh in a Ph.D. thesis at the University of California, Berkeley (1940), but has never been validly published. Walsh demonstrated that varieties *micranthus* and *fontanus* were interfertile in reciprocal crosses. Seeds yielded a wide array of intermediate phenotypes. Variety *fontanus* is apparently a physiological variant adapted to vernal moist or saturated serpentine soils where the typical variety does not occur. It differs from var. *micranthus* in its larger size (stem 60-80 cm in variety *fontanus* vs. 15-50 for var. *micranthus*) and larger flowers and fruits. Further, variety *fontanus* has a paniculate inflorescence with the lowermost flowers of the lateral branches staminate while the typical variety is racemose or only rarely paniculate and then all flowers are perfect. In var. *fontanus* the stamens are subequal.

Generally, *Zigadenus micranthus* var. *fontanus* is confined to vernal wet areas and marshes from Mendocino Co., California south to Santa Cruz Co. A

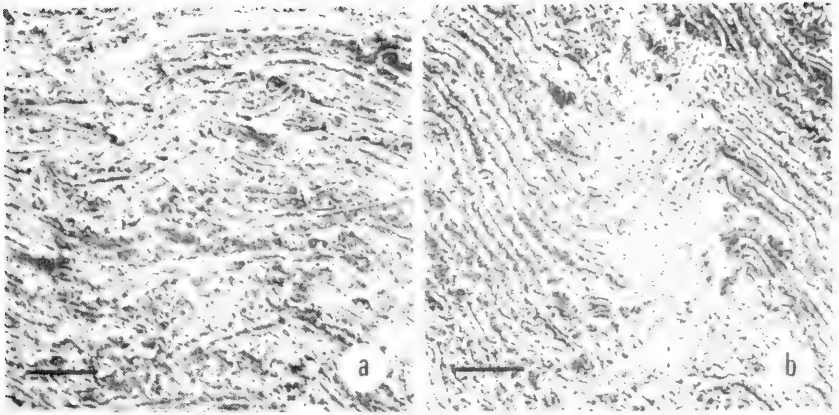


Fig. 1. Bulbcoat reticulation patterns in *Allium bolanderi* - a. var. *mirabile*.
b. var. *bolanderi*. Scale = 100 μ m.

single disjunct population is apparently found at the Pinnacles in San Benito Co.

Representative Specimens: UNITED STATES. California: Marin Co.: Lake Lagunitas, 11 May 1918, *Eastwood s.n.*; Little Carson Falls, 26 May 1940, *Howell 15532* (CAS). Mendocino Co.: Near Comptche, 14 May 1939, *Constance 2516* (CAS,UC). San Benito Co.: The Pinnacles, 3 May 1937, *Eastwood & Howell 4221* (CAS). Santa Cruz Co.: New Almaden Trail from Loma Prieta, 22 July 1893, *Liethold* (CAS). Sonoma Co.: Pitkin Marsh, 3 July 1938, *Howell 13961* (CAS).

NEW TAXON

Allium peninsulare Lemmon *ex* Greene var. **franciscanum** McNeal & Ownbey, var. *nov.* TYPE: UNITED STATES. California: San Mateo Co., Jasper Ridge Experimental Area (Grown at Pullman, Washington), June 1968, *Raven s.n.* (HOLOTYPE: WS!).

Folia 2-4, curvata ad arcuata; segmenta perianthii exterior erecta, expansa ad apices, 8-12 mm longa; stigma capitatum, vix incrassatum, integrum vel minute trilobum.

Variety *franciscanum* appears to be intermediate between var. *peninsulare* and *Allium dichlamydeum* E. Greene. *Allium dichlamydeum* is a very succulent species with erect pedicels, 3-6 arcuate to tortuous leaves per bulb and a capitate or obscurely 3 lobed stigma, it is found on the sea cliffs or open slopes above them from San Mateo Co., California to central Mendocino Co. Variety *peninsulare* is non succulent with spreading pedicels, 2 straight or nearly straight leaves per bulb and a trifold or distinctly 3 lobed stigma, it is widespread in the interior valleys and foothills from Butte Co. to northern Baja California. *Allium peninsulare* var. *franciscanum* is also non succulent with spreading pedicels, but has 3-4 arcuate leaves per scape and a capitate or obscurely 3 lobed stigma, it is found in dryer upland environments on the San Francisco Peninsula and at a few locations around the north end of San Francisco Bay. The distribution of var. *franciscanum* falls between and does not overlap with either var. *peninsulare* or *A. dichlamydeum*.

Variety *franciscanum* occurs on clay soils including serpentine in San Mateo and Santa Clara counties, California, and at the north end of San Francisco Bay in Sonoma Co.

Representative Specimens: UNITED STATES. California: San Mateo Co., Woodside, 4 May 1902, *Abrams 2411* (DS,NY); Jct. of Polhemus and Crystal Springs Rd., ca. 4 km W. of San Mateo, 13 May 1963, *Breedlove 4942* (CAS,JEPS,RSA,WS); Jasper Ridge near Sand Hill Caves, 13 May 1921, *Mason s.n.* (POM,WTU). Santa Clara Co.: Page Mill Creek. above Stanford U.,

9 May 1895, *Applegate 720* (DS). Sonoma Co.: Wood Rd., Hope Valley, SW of Kenwood, 1 May 1950, *Baker 12222* (RSA,UC); Petaluma, 2 June 1880, *Congdon s.n.* (UC).

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TAXONOMIC NOTES ON CALIFORNIA SPECIES OF *CIRSIUM*
(ASTERACEAE: CARDUEAE)

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ABSTRACT

Three new combinations are proposed for taxa of *Cirsium* occurring
in California: *Cirsium douglasii* var. *breweri*, *C. fontinale* var.
campylon, and *C. occidentale* var. *californicum*.

KEY WORDS: *Cirsium*, Asteraceae, Cardueae, California

In preparation of our treatment of *Cirsium* for the Jepson Manual, the
new identification manual for California plants, we encountered three instances
where the results of our investigation necessitate nomenclatural changes.

Cirsium douglasii DC. comprises two races. A long spined race with deeply
divided leaves occurs in the California Coast Ranges and along the coast
from Monterey County northward. A comparatively short spined race with
more shallowly lobed or unlobed leaves occurs from the northern North Coast
Ranges to the Modoc Plateau of northern California and southern Oregon and
the northern Sierra Nevada. Howell (1959) treated the Coast Range race as
var. *douglasii* and the interior race as var. *canescens* (Petrak) J.T. Howell, the
latter based on *C. breweri* Jepson var. *canescens* Petrak. Cronquist (in press;
pers. comm.) pointed out that although Howell's treatment was in accord with
the *International Code of Botanical Nomenclature* then in effect (Lanjouw &
Stafleu 1956), the present Code (Greuter *et al.* 1988) gives priority at the vari-
etal level to the epithet, *breweri*, an automatic tautonym created when Petrak

published var. *douglasii*. Cronquist (in press) chose not to make the new combination for the interior race of *C. douglasii*. We plan to recognize this taxon for our treatment of *Cirsium* in the Jepson Manual and therefore propose the following new combination.

Cirsium douglasii* DC. var. *breweri* (A. Gray) Keil & C. Turner, *comb. nov. BASIONYM: *Cirsium breweri* Jepson var. *breweri* [autonym created by publication of *Cirsium breweri* Jepson var. *canescens* Petrak, Beih. Bot. Centralbl. 35(2):462. 1917. *Cnicus breweri* A. Gray, Proc. Amer. Acad. Arts 10:43. 1874. *Carduus breweri* (A. Gray) E. Greene, Proc. Acad. Nat. Sci. Philadelphia 44:363. 1893 (1892). *Cirsium breweri* (A. Gray) Jepson, *Fl. W. Middle Calif.* 507. 1901.

Cirsium douglasii DC. var. *canescens* (Petrak) J.T. Howell, Leaflet. W. Bot. 9:11. 1959. BASIONYM: *Cirsium breweri* Jepson var. *canescens* Petrak, Beih. Bot. Centralbl. 35(2):462. 1917.

Cirsium campylon H.K. Sharsm. and *Cirsium fontinale* E. Greene comprise *Cirsium* sect. *Dermatolepis* Petrak (Sharsmith 1939). The former occurs in the eastern portions of the San Francisco Bay area. The latter has been treated as comprising two disjunct races: var. *fontinale* from San Mateo County in the southwestern San Francisco Bay region, and var. *obispoense* J.T. Howell, disjunct ca. 200 km to the south in San Luis Obispo County. All three taxa are rare endemics of wet serpentine soils. Pilz (1967) investigated the relationships and variation among the three taxa and concluded that *C. campylon* is actually more similar to *C. fontinale* var. *obispoense* than the latter is to var. *fontinale*. All three taxa are clearly very closely related. Pilz proposed to treat *C. campylon* as a variety of *C. fontinale*, a decision with which we concur. Pilz' study, however, was never published. We plan to treat *C. campylon* as a variety of *C. fontinale* in our treatment of *Cirsium* in the Jepson Manual and therefore propose the following new combination:

Cirsium fontinale* E. Greene var. *campylon* (H.K. Sharsm.) Pilz ex Keil & C. Turner, *comb. nov. BASIONYM: *Cirsium campylon* H.K. Sharsm., Madroño 5:85. 1939.

Cirsium occidentale (Nutt.) Jepson is part of a complex of incompletely differentiated and variable races that have been variously treated in the past. Jepson (1925) recognized *C. occidentale* with four varieties: var. *occidentale* of the coast and outer coast ranges from San Diego to Mendocino counties, var. *coulteri* (Harv. & A. Gray) Jepson of mountain slopes of the South Coast Ranges and Sierra Nevada, var. *venustum* (E. Greene) Jepson of the inner

North Coast Ranges, and var. *candidissimum* Macbr. with a northern distribution from the northern North Coast Ranges to the Modoc Plateau of California and adjacent Nevada. He treated *C. californicum* A. Gray, comprising plants of the South Coast Ranges, southern California mountains, and the Sierra Nevada, as a separate species.

Howell (1943, 1959, 1960) treated the various entities of this complex as species. He recognized *Cirsium occidentale* as a species without infraspecific taxa. Because of a nomenclatural conflict at the species level, Howell (1943) re-named var. *candidissimum* as *Cirsium pastoris* J. T. Howell (a *nomen novum*). Howell chose to combine the taxa treated by Jepson as vars. *coulteri* and *venustum* as a single species without varieties. However, no name was available for the combined taxon at the species level. After examination of types, Howell determined that *C. coulteri* Harv. & A. Gray, the basionym of var. *coulteri*, is taxonomically synonymous with *C. occidentale* [var. *occidentale*]. The epithet *venustum* could not be used at the species level for this taxon because its use would create a later homonym. Therefore, Howell (1959) proposed *C. proteanum* J.T. Howell as a *nomen novum* for the plants. Howell (1960) and other workers (Moore & Frankton 1963; Munz 1959, 1974; Ownbey & Hsi 1969; Ownbey *et al.* 1975) have continued to recognize *C. californicum* as a distinct species. However, Howell's concept of *C. californicum* apparently included some variants treated by Jepson as *C. occidentale* var. *coulteri*. This is nowhere explicitly stated, but it is evident from specimen determinations that Howell's concept of *C. californicum* encompassed some of the variation included by Jepson in *C. occidentale* var. *coulteri*.

Wells (1983) investigated hybridization and recombination in a series of sites along Happy Canyon Road in the San Rafael Mountains of Santa Barbara Co., California, involving what he described as *Cirsium occidentale* and *C. californicum*. It is evident from his descriptions of the plants and from collections made in the vicinity of the hybrid populations that Wells' *C. occidentale* is the taxon Jepson had treated as *C. occidentale* var. *coulteri* and that Howell had called *C. proteanum*. Wells investigated the populations using morphology, seed protein electrophoresis, pollen fertility, and ovule development in controlled crosses, and analyzed data using principal coordinate analyses and other morphometric techniques. He concluded that: "the Happy Canyon *Cirsium* population consists of one biological species with no sterility barriers; morphological and electrophoretic phenotypes correlated with habitat type appear to have a genetic basis; and that differentiation corresponding to habitat types suggests that several phenotypic traits may be subject to selection and that differentiation along new lines may have resulted after hybridization of *C. californicum* and *C. occidentale* in the Happy Canyon population."

Examination by the senior author of hundreds of herbarium specimens from California herbaria of the taxa involved and field investigations in the South Coast Ranges and western Transverse Ranges of Monterey, San Luis

Obispo, Santa Barbara, Ventura, and western Kern counties have revealed that the intergradation investigated by Wells is by no means a unique occurrence. Although isolated populations of these thistles may be well differentiated, the taxa co-occur in various areas, and where they are sympatric the recombination of morphological characteristics is as impressive as that observed by Wells.

The extent to which intergradation of these taxa is historical as well as modern is difficult to determine. Roadsides are among the most common habitats where thistles grow and from which many collections have been made. Construction of roads, fire breaks, etc., have provided disturbance corridors along which thistles have extended their ranges. This may have allowed previously isolated and differentiated populations to merge and intergrade. Data are inadequate, however, to document or refute this hypothesis. Most thistle collections, unfortunately, are just individual plants—understandable in view of the vicious nature and size of the plants involved. Label data seldom record the variation within populations from which individual plants were gathered. Assignment of some historical, as well as recent, collections to one or the other taxon is difficult; apparent character conflicts or overlap may represent past intergradation or merely within taxon variation.

In our treatment of *Cirsium* for the Jepson Manual we intend to recognize these and other members of the *C. occidentale* complex (*sensu lato*) as a single highly variable species that includes *C. californicum*. Names exist in *C. occidentale* at the varietal level for four of the five taxa we intend to recognize: var. *candidissimum*, var. *compactum* Hoover, var. *occidentale*, and var. *venustum*. Because *C. californicum* has never before been merged with *C. occidentale*, we propose the following combination:

Cirsium occidentale (Nutt.) Jepson var. ***californicum*** (A. Gray) Keil & C. Turner, *comb. nov.* BASIONYM: *Cirsium californicum* A. Gray, Pacific Railroad Report 4:112. 1856.

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A NEW GYPSOPHILIC SPECIES OF *XYLOTHAMIA* (ASTERACEAE:
ASTEREAE) FROM THE CUATRO CIENEGAS AREA OF COAHUILA, MEXICO

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ABSTRACT

A new and apparently rare species of *Xylothamia* is described from the area of Cuatro Cienegas in Coahuila, México. It is most closely related to *X. triantha*.

KEY WORDS: *Xylothamia*, Asteraceae, Astereae, México, gypsophile

In the Cuatro Cienegas area of Coahuila, México, in 1985, I collected branches from several plants that I assumed were malformed individuals of *Isocoma coronopifolia* (DC.) E. Greene. The seemingly "malformed" plants had heads peculiarly buried in the leafy apices of thick branches, and they were growing intimately intermixed with normal plants of the *Isocoma*. These plants have until now rested in a folder with other anomalies, but recent re-examination of this material clearly places them within the genus *Xylothamia* (Nesom *et al.* 1991). The 1985 collection apparently represents a previously undescribed species.

Xylothamia truncata Nesom, *sp. nov.* TYPE: MEXICO. Coahuila: Mpio. Cuatro Cienegas, ca. 2 km W of town of Cuatro Cienegas, along dirt road paralleling railroad, hard packed gypseous sand, with *Isocoma coronopifolia*, *Machaeranthera gypsophila*, and *M. restiformis*, 18 Oct 1985, G. Nesom 5254 (HOLOTYPE: TEX).

Xylothamiae trianthae (S.F. Blake) Nesom similis foliis involutis fere teretibus, capitulis eradiatis flosculis discii paucis, et appendicibus linearibus stylorum, sed caulibus pauciramosis crassisque, foliis confertim dispositis ad apices ramorum, capitulis sessilibus terminalibusque, et corollis dense strigosis in tubis ac faucibus differt.

Low perennial shrubs ca. 2-3 dm tall, with thick (mostly 1.5-2.0 mm thick) stems branched near the base. Leaves with a rough (slightly papillate), glutinous surface, not evidently punctate, linear, involuted and appearing terete, 4-8(-14) mm long, ca. 1 mm wide, straight or recurved, all densely clustered along the terminal 2-3 cm of the branches. Heads turbinate, 2.5-3.5 mm wide, sessile in groups of 2-3 at each branch apex, more or less imbedded in the surrounding leaves; phyllaries glutinous, not at all keeled, with a glandular, elliptic, apical patch ca. 1 mm long, enervate and white indurated below, ovate-lanceolate with broad, translucent margins, graduated in 2-3 series, the inner 3.5-4.0 mm long, the outer half as long. Ray flowers absent. Disc flowers 3-5, the corollas narrowly funnelform, 3.5-3.8 mm long, the tube ca. 2 mm long, zygomorphic, with 2 of the sinuses cut nearly to the base of the throat, one very shallow, and the other 2 intermediate in depth, the tube and lower throat prominently invested with long, stiff, uniseriate hairs; style branches 1.0-1.2 mm long, linear-triangular, the collecting appendages 0.6-0.8 mm long, sparsely pilose with spreading hairs. Achenes turbinate, ca. 1.5 mm long, densely sericeous, 5-6 nerved; pappus of ca. 40, slender, flattened, marginally ciliate bristles uneven in width and length. Known only from the type collection.

Among the species of *Xylothamia*, *X. truncata* clearly is most similar to *X. triantha* in its involute, linear and nearly terete leaves, eradiate heads with few disc flowers, and linear-triangular style appendages. The new species differs from *X. triantha* in its thick, few branched stems, leaves densely arranged at the branch apices, heads sessile and strictly terminal, and corollas densely hairy on the tube and throat; the stems of *X. triantha* are much thinner (0.5-0.8 mm wide) and somewhat intricately branched, the heads are sessile to subsessile in numerous few headed clusters that are arranged in a loose, more or less open capitulescence, the heads larger (inner phyllaries 4-5 mm long), and the corollas are glabrous and larger (4-5 mm long). Even among plants of *X. triantha* with stems broken or otherwise damaged (as seen on LL, TEX specimens), none even approach the peculiar habit of *X. truncata*. The epithet refers to the abruptly terminated branch tips crowded with leaves and heads.

Xylothamia triantha occurs at the eastern periphery of its range (Nesom *et al.* 1991, Fig. 1) in alluvial gypseous soils of the Cuatro Ciénegas area, where it is represented by numerous herbarium specimens. Two other species of *Xylothamia* also occur in or near the Cuatro Ciénegas basin, *X. pseudobaccharis* (S.F. Blake) Nesom and *X. purpusii* (Brandeg.) Nesom. Because of its inconspicuous habit and nearly hidden capitula, *X. truncata* may have been overlooked by collectors in the same area, but even if so, it must be a rare species. Few of the other known species of the genus are abundant, the Cuatro Ciénegas area has been visited by many perceptive botanists, and its flora is well known (Pinkava 1984).

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A NEWLY RECOGNIZED SPECIES OF MEXICAN *VERBENA*
(VERBENACEAE)

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ABSTRACT

Verbena johnstonii (comb. et stat. nov.) occurs from west central Tamaulipas to central Coahuila, México. It has been treated as a variety of *V. perennis* but differs in its densely and evenly hirtellous stems and leaves, white throated corollas, and papillate commissural faces of the nutlets. It has often been identified as *V. neomexicana* var. *hirtella*, but the latter differs in both its leaf and nutlet morphology.

KEY WORDS: *Verbena*, Verbenaceae, México

Taxonomic distinctions have been unclear among a group of *Verbena* species that occur both in México and the southwestern United States: *V. neomexicana* (A. Gray) Small, *V. menthaefolia* Benth., *V. halei* Small, *V. canescens* Kunth, *V. gracilis* Desf., and *V. plicata* E. Greene. Still other taxa closely related to *V. neomexicana*, but restricted to México, have been described as species by H.N. Moldenke in the last 50 years. Of all these species, *V. halei* and *V. neomexicana* were included in phenetic analyses by Barber (1982), but her study did not address problems of significant, formally recognized infraspecific variation within the latter species (e.g., Moldenke 1970 in Correll & Johnston).

Verbena neomexicana also appears to be relatively closely related to *V. perennis* Woot. through a taxon described as *V. perennis* var. *johnstonii* Mold. One of the most obvious taxonomic adjustments that needs to be made within the verbenas of the United States and northern México involves var. *johnstonii*, and the following solution is proposed.

Verbena johnstonii (Mold.) Nesom, comb. et stat. nov. BASIONYM:
Verbena perennis Woot. var. *johnstonii* Mold., Phytologia 2:150. 1946.
TYPE: MEXICO. Tamaulipas, Mpio. Miquihuana, 12 km NW of Palmillas on the road to Miquihuana, in broad, damp river beds, 1950 m,

14 Aug 1941, *L.R. Stanford, K.L. Retherford, & R.D. Northcraft 915* (HOLOTYPE: NY; Isotype: MO!). *Verbena perennis* Woot. forma *johnstonii* (Mold.) Mold., *Phytologia* 44:329. 1979. *Verbena shrevei* I.M. Johnston ex Mold., *Phytologia* 2:150, in syn. 1946.

Perennials arising from strongly woody roots; stems, leaves, bracts, and calyces densely and evenly hispidulous-hirtellous with thin, stiffly spreading, sharp pointed, eglandular hairs 0.1-0.3 mm long, mixed with stipitate glandular hairs of nearly the same length. Stems erect, 3-5 dm tall, simple or few branched, commonly 5-10 arising from the root crown. Leaves mostly linear, not clasping, 3-5 cm long, 1-2 mm wide, the lower sometimes with 1-2 pairs of linear, widely divergent to recurved lobes 5-10 mm long, margins narrowly but strongly revolute, midvein deeply impressed above. Spikes terminal, slender, ca. 10-25 cm long in fruit, with internodes 7-15(-45) cm long; bracts narrowly ovate-lanceolate, 3-4(-5) mm long. Calyces 3.5-4.0(-5.0) mm long, elongating slightly in fruit, the teeth linear-lanceolate, ca. 0.5 mm long; corollas dark blue with a white throat, 5-6 mm long, the tube 4-5 mm long, the limb 6-7 mm wide. Nutlets 2.0-2.8 mm long, the commissural faces not reaching the nutlet apex, the plates narrowly elliptic with smooth margins, at least the upper plates distinctly papillate. The epithet commemorates I.M. Johnston (Moldenke 1964).

Additional collections examined: MEXICO. Coahuila: Ca. 6 km airline W of Saltillo, E extremity of the Sierra de la Vega, 3 Mar 1973, *Johnston et al. 10500C* (LL); Sierra la Gavia, 2 km SW of Restaurant La Muralla, 18 Mar 1973, *Johnston et al. 10284D* (LL); Mina El Aguirreno, N side of Sierra Paila, 5 Jul 1973, *Johnston et al. 11687* (MO); Mpio. Castanos, Puerto de San Lazaro, Sierra de San Lazaro, 30 Aug 1939, *Muller 3045* (LL); Sierra de Parras, Mar [year], *Purpus 1094* (MO); 9 km S of Parras on Sierras Negras, 3 Jul 1941, *Stanford et al. 198* and *234* (MO); Ojo Caliente, limestone slope S of town, 16 Aug 1979, *Wagner et al. 4132* (LL,MO). Nuevo León: Mpio. Galeana: 5.3 km E of El Potosí on road to Cerro Potosí, 22 Apr 1984, *Cowan 4636* (ANSM,MEXU,MO,TEX,UAT); 5 km S of Puerto México, KM 812, carretera México-Saltillo, 18 May 1965, *Hernández s.n.* (LL); above Santa Rita, 14 May 1981, *Hinton et al. 18241* (TEX); W slope Postosí, 29 Jun 1983, *Hinton et al. 18487* (TEX); above San Ubert, 20 Mar 1992, *Hinton et al. 21853* (TEX); 1 km NE of Rancho Las Ovejas in the Cañon de Potrerillos, 16 Mar 1973, *Johnston et al. 10235B* (LL); foothills below Pablillo, 15 mi SW of Galeana, 21 May 1934, *Muller 506* (TEX); Mpio. Derrumbadero, Cañon de los Capulines, above San Enrique, Hacienda San José de Raices, 6 Aug 1935, *Mueller 2375* (MO,TEX); 5.6 mi S of jct Hwy 61 and Linares-San Roberto road, 26 Oct 1981, *Poole 2494* (TEX); ca. 15 mi E of San Rafael off Hwy 57, 22 Jul 1977, *Wells & Nesom 91* (LL). Zacatecas: Puerto de Rocamontes at the Zacatecas-Coahuila state line, 29 Mar 1973, *Johnston et al. 10489* (LL); 10.5 mi from Concepción del Oro

toward Mazapil, 24 Aug 1977, *Lehto 21751* (LL); 15 km W of Concepción del Oro, 20 Jul 1941, *Stanford et al. 507* (MO).

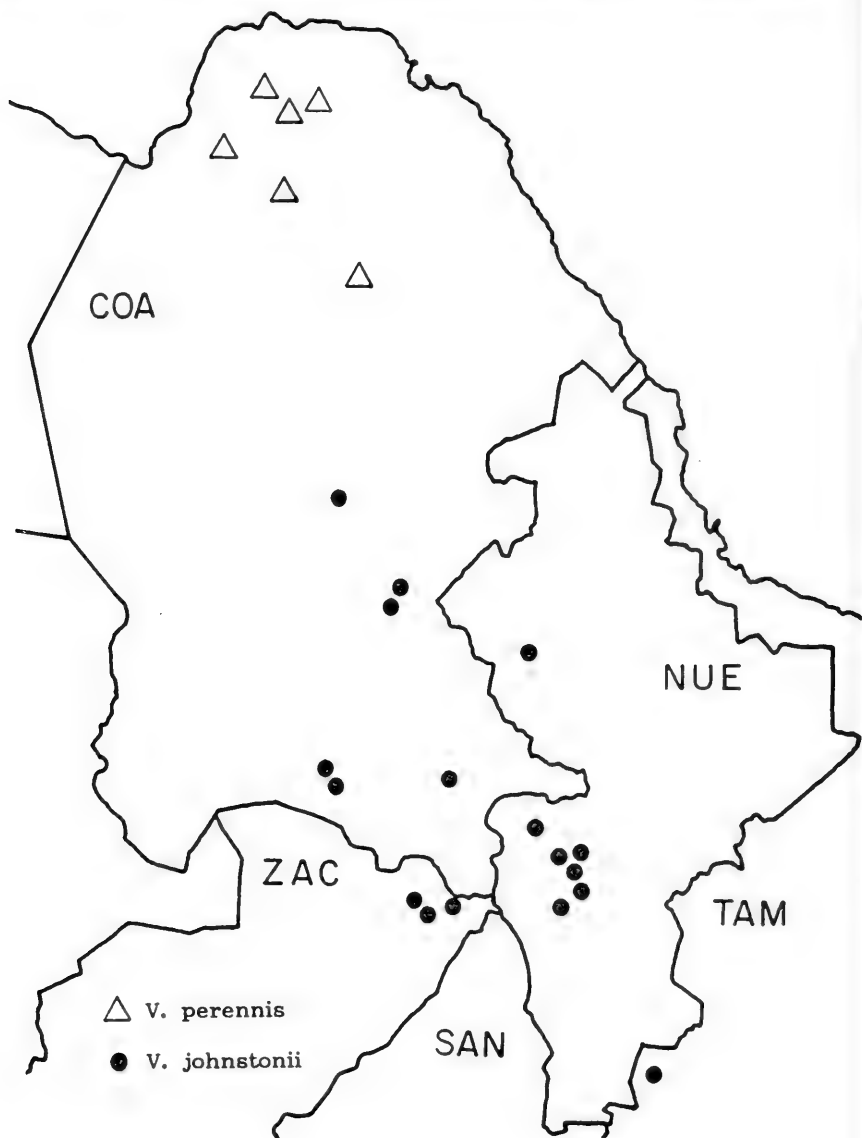
Tamaulipas, Nuevo León, Zacatecas, and Coahuila, México (Map 1); maritime to juniper and pine-oak woodlands, (750-)1800-2400 m; flowering March-October.

Verbena johnstonii is remarkably uniform in morphology, with little or no indication of intermediacy with co-occurring taxa that might be related (*V. neomexicana* and *V. canescens*). It is similar to the equally distinct *V. perennis* in its strongly perennial duration and tall habit and particularly in its linear leaves that are entire or with a few linear lobes and that have narrowly but strongly revolute margins. No other species produce similar leaves and the two may well be sister species. Moldenke gave no explanation for his original placement of *V. johnstonii* as a variety of *V. perennis* or for its subsequent reduction in taxonomic rank to forma, but presumably, the similarity he perceived was in leaf morphology. *Verbena johnstonii* differs from *V. perennis* in its white throated corollas and papillate commissural faces of the nutlets but most conspicuously in its distinctive vestiture; *V. perennis* has blue corollas, non-papillate commissural faces, and stems and leaves that are glabrous to sparsely or moderately strigose, rarely glandular. The two species appear to be completely allopatric (Map 1).

The only plants of *Verbena johnstonii* cited by Perry (1933) were identified by her as *V. neomexicana* var. *hirtella* Perry, but she noted that their linear leaves were peculiar (p. 299): "The leaves of *Purpus 1094* are so narrow and shallowly incised that it appears superficially like *V. perennis*; nevertheless, the character of the pubescence allies it with [var. *hirtella*]." *Verbena johnstonii* indeed is similar in vestiture to var. *hirtella*, but the two taxa are easily distinguished in other characters. Var. *hirtella* produces leaves that are oblanceolate to obovate or spatulate with coarsely serrate margins; its flowers are considerably smaller (the calyx 2.8-3.0 mm long, the corolla limb 4-5 mm wide); and the commissural plates of the nutlets are evenly bullate (not at all papillate) from top to bottom of the faces. Further, both *V. neomexicana* var. *neomexicana* and var. *hirtella*, which appear to be widely sympatric and perhaps genetically isolated from each other, intrude directly into the geographic range of *V. johnstonii* without intergrading with it.

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Map 1. Distribution of *Verbena johnstonii* and *V. perennis* in México. The range of *V. perennis* continues northwestward across trans-Pecos Texas into southeastern New Mexico and south central Arizona.

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SPECIES RANK FOR THE VARIETIES OF *GRINDELIA MICROCEPHALA*
(ASTERACEAE: ASTEREAEE)

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ABSTRACT

Each of the four taxa previously regarded as a variety of *Grindelia microcephala* is here considered to be a separate species. Two new combinations are required: *Grindelia adenodonta* and *G. pusilla*. Three of the species are primarily restricted to Texas, with at least one of them occurring also in immediately adjacent México. One strictly Mexican taxon has previously been accorded species rank as *G. oaxacana*. An updated key to the Texas taxa distinguishes them based on differences in glandularity, head size, achene morphology, geography, and phenology.

KEY WORDS: *Grindelia*, Astereae, Asteraceae, Texas, México

Steyermark (1934) viewed *Grindelia microcephala* DC. as comprising four varieties, three restricted to Texas and one restricted to Oaxaca, México. In a later study of the same species (Nesom 1990), I confirmed Steyermark's recognition of three varietal taxa in Texas but excluded the Mexican taxon (*G. microcephala* var. *montana* Steyerm.) and elevated it in rank as a separate species (*G. oaxacana* Nesom, nom. nov.). A summary statement from my study (p. 321) regarding the Texas taxa is as follows: "Three remarkably distinct varieties [of *G. microcephala*] occur, each occupying a relatively restricted geographic range, almost completely allopatric with the other varieties. Although heads with mature fruits are required to distinguish them with certainty, there appear to be but few collections that might be identified as intermediates." These taxa have been held together by similarities in essentially vegetative features: annual duration; stems sparsely to moderately, closely villous; heads numerous in a loose corymb; leaves with blunt, gland tipped crenations; and the cauline leaves but little reduced upwards, continuing to immediately below the heads.

Recent field experience has allowed me to examine in greater detail the vegetative morphology as well as the strongly constant achene morphology of two of these Texas taxa. It also has emphasized the distinctiveness of each taxon as well as the lack of intergradation among any of them. Further, the closest relationships of these taxa may not lie with the other, putatively conspecific varieties. The peculiar achene dimorphism (see description in key below) in *G. microcephala* var. *adenodonta* Steyerem. is similar to that found in *G. squarrosa* (Pursh) Dunal, *G. lanceolata* Nutt., *G. tenella* Steyerem., and *G. grandiflora* Hook. Also, var. *adenodonta* is essentially a late summer and fall flowering taxon, in contrast to the other two, which are primarily spring flowering. The achenes of *G. microcephala* var. *pusilla* Steyerem. are monomorphic and deeply sculptured, like those of *G. nuda* Alph. Wood, *G. ozylepis* E. Greene, *G. arizonica* A. Gray, and others. The achenes of var. *microcephala* are strongly dimorphic in that all the disc achenes are sterile and undeveloped (with the whole head size correspondingly smaller than in the other two taxa), and the mature, developed achenes of the ray flowers are strikingly dissimilar in morphology to those of the other two taxa.

Whatever their interrelationships may prove to be, the three primarily Texas taxa previously regarded as constituting *Grindelia microcephala* appear to be justifiably treated as separate species, based on discontinuities of morphology, phenology, and geography. A distribution map and details of typification are provided in an earlier study (Nesom 1990).

1. *Grindelia microcephala* DC., *Prodr.* 5:315. 1836.
2. *Grindelia adenodonta* (Steyerem.) Nesom, *comb. et stat. nov.* BASIONYM: *Grindelia microcephala* DC. var. *adenodonta* Steyerem., *Ann. Missouri Bot. Gard.* 21:467. 1934.
3. *Grindelia pusilla* (Steyerem.) Nesom, *comb. et stat. nov.* BASIONYM: *Grindelia microcephala* DC. var. *pusilla* Steyerem., *Ann. Missouri Bot. Gard.* 21:467. 1934.

An updated key to these three species is provided below.

- a. Leaves often with conspicuous sessile or stipitate resin glands, less commonly punctate resinous; ray achenes and outer 3-5 series of disc achenes plump but somewhat compressed and with 2 corky angles, the surfaces deeply and sharply cut with transverse furrows, the very innermost achenes abortive and undeveloped but these also commonly with transverse markings; South Texas Brush Country, barely onto the southern edge of the Edwards Plateau; common and abundant colonizer, March-June.
G. pusilla

- a. Leaves usually punctate resinous, rarely with sessile or minutely stipitate and inconspicuous resin glands; outer achenes rounded or compressed, the surfaces smooth, longitudinally furrowed, or slightly roughened-rugose, sometimes with a few, shallow, transverse furrows, all of the disc achenes abortive and undeveloped, or some of the disc fertile, strongly compressed and 2 angled, with many superficial, longitudinal nerves; north-east to southeast of *G. pusilla*; plants more scattered, not forming dense stands.(b)
- b. Ray and outer disc achenes fertile, slightly compressed, usually with 3 corky angles, the surfaces roughened-rugose, not incised but sometimes with short, shallow, transverse furrows, at least some of the inner disc achenes fertile, strongly compressed and 2 angled, as long as or longer than the outer achenes, with numerous, whitish, thin, superficial, longitudinal nerves; Blackland Prairies and Gulf Coast (Upland) Prairies; (June-)July-September. *G. adenodonta*
- b. Ray achenes fertile, smooth, swollen and rounded or slightly 3 sided, without corky angles, sometimes with a few, shallow, rounded, longitudinal furrows, commonly with a few short, shallow, transverse incisions, all disc achenes abortive and undeveloped; southeastern South Texas Brush Country and Coastal Sand Plains; (November-) March-June(-August). *G. microcephala*

The geographic distribution previously mapped for the three varieties of *Grindelia microcephala* (Nesom 1990) remains essentially correct, except for two details: (1) *G. pusilla* has recently been collected in México, immediately adjacent to its range in Maverick Co., Texas. [México: Coahuila, ca. 10 mi S of Piedras Negras on Hwy 57, 4 Jun 1992, Nesom 7954 (MEXU,TEX)]; (2) *G. microcephala* is assumed to occur in Tamaulipas, México, in areas immediately adjacent to its range in Texas. Correll & Johnston (1970) noted that *G. microcephala* (as var. *microcephala*) occurs in Tamaulipas, but I have not been able to locate a voucher for that Mexican record. *Grindelia microcephala* occurs abundantly in the Texas border counties of Cameron and Webb, and a search in peak flowering period will almost certainly confirm its existence in México.

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A SECOND SPECIES OF *HUNNEMANNIA* (PAPAVERACEAE) AND SYNOPSIS OF THE GENUS

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ABSTRACT

A second species of the previously monotypic genus *Hunnemannia* is described: *H. hintóniorum*. The new species apparently is a rare gypsophile restricted to a small area of Nuevo León, México. *Hunnemannia fumariifolia* is much more common and ranges from Nuevo León and Coahuila south to Oaxaca. A synopsis of the genus is presented, including a species key and distribution map. *Hunnemannia* apparently is the sister taxon of *Eschscholzia*, which has its native range primarily restricted to California and areas immediately adjacent to it.

KEY WORDS: *Hunnemannia*, Papaveraceae, México

Hunnemannia Sweet has been recognized as a monotypic genus endemic to eastern México, but it has never been the subject of a focused taxonomic discussion. The discovery of a second species of the genus has prompted the following review and taxonomic synopsis.

A close relationship among the genera *Hunnemannia* (1 species until now), *Eschscholzia* Cham. (ca. 13 species, primarily in California and immediately adjacent areas), and *Dendromecon* Benth. (ca. 2 species, restricted to California and Baja California) has long been recognized. *Hunnemannia fumariifolia* has been included within *Eschscholzia*, but Heynhold's nomenclatural transfer was no more than an entry in a list, and Baillon (1874) provided only superficial comments in justification of their merger. All subsequent botanists have maintained them as separate genera. Greene (1905b) proposed the segregation of two species of *Eschscholzia* as *Petromecon* E. Greene, adding a fourth genus to the group, but contemporary botanists have not accepted this segregate, referring both of Greene's species of *Petromecon* to *E. palmeri* Rose.

Reichenbach (1841) recognized *Eschscholzia*, *Hunnemannia*, and *Dendromecon* as a subgroup of the Chelidoniaeae, the Eschscholzieae Reichenb. (or the orthographic variant "Eschscholtzieae" - Chamisso's original spelling of the genus

was "*Eschscholzia*," although the name commemorated J.F. Eschscholtz). Reichenbach's applications of suffixes in subfamilial taxonomy were not consistent with modern usage, and his category of Eschscholzieae is approximately equivalent to a subtribe. Bentham & Hooker (1862) recognized the same three genera as the tribe Hunnemannieae Benth. (the rank explicitly stated) within the Papaveraceae (or their subfamily Papavereae of the Papaveraceae). In nearly the same restricted sense (including the same three genera, but also recognizing the segregate *Petromecon*), Fedde (1936) adopted the tribal designation Eschscholzieae (Reichenb.) Fedde (a new combination, as Fedde explicitly regarded the group as a tribe - an illegitimate name in any case, in view of Bentham's earlier Hunnemannieae). Most recently, Ernst (1962) recognized the three genera as subfamily Eschscholzioideae Ernst of the Papaveraceae. Within the family, plants of the Eschscholzioideae are distinguished by their production of stems, leaves, and floral organs completely glabrous or sparsely invested with unicellular hairs, watery sap, two sepals and four (to six or eight in *Eschscholzia*) yellow petals, bivalved fruits with ten, distinctly raised, longitudinal nerves and with elastically and acropetally dehiscent valves, and polycolpate pollen (Ernst 1962).

A chromosome number of $n=28$ (28 pairs) has been reported for *Hunnemannia fumariifolia* (Sugiura 1940; Ernst 1959; erroneously reported as $2n=28$ by Federov 1969), suggesting that it is an octoploid based on $x=7$. The base chromosome number of *Eschscholzia* apparently is $x=6$ (Lewis & Snow 1951; Ernst 1958, 1959). Only a single taxon, *E. glyptosperma* E. Greene, has a diploid number of $n=7$, but it has been hypothesized by Clark (in Clark & Jernstedt 1978) to be an aneuploid derivative of *E. parishii* E. Greene with $n=6$. Diploids through hexaploids are known in *Eschscholzia*; two other species have aneuploid numbers, these apparently representing the loss of a single chromosome pair from tetraploid and hexaploid levels of $x=6$ (Ernst 1958). Two chromosome counts for *Dendromecon* show it to have 28 pairs of chromosomes (Ernst 1958). Both $x=6$ and $x=7$, as well as $n=28$, are found elsewhere in the family, outside of the Eschscholzioideae.

Hunnemannia and *Eschscholzia* are most closely similar in morphology to each other within the subfamily Eschscholzioideae. Both are herbs with thrice ternately dissected leaves, stigmas with 4-8 lobes, and nonarillate seeds. *Dendromecon*, in contrast, is a woody shrub that produces simple, entire leaves, stigmas with two, short, thick, and erect lobes, and arillate seeds. An unequivocal hypothesis of phylogenetic relationship among these three genera, however, is more difficult to construct, as the similarities between *Hunnemannia* and *Eschscholzia* can be interpreted as plesiomorphic. Among other subfamilies of Papaveraceae (Ernst 1962), some genera of the Chelidonioideae Ernst appear to be most similar to the Eschscholzioideae.

While *Eschscholzia* is at least superficially similar to *Hunnemannia*, the former differs in its (1) perigynous flowers (the perianth and stamens borne

on the rim of the hypanthiumlike expansion of the receptacle), (2) "calyptrate" calyx, the sepals connate and forming a conical hood (shaped like a "candle snuffer") easily pushed off by the expanding petals, (3) stigmas with 4-8 linear, erect to spreading lobes, and (4) base chromosome number of $x=6$. Recent studies by Clark & Jernstedt (1978) of seed morphology have provided additional evidence that the two should be maintained as distinct genera. The seeds of *Hunnemannia* are larger, and the outer seed coat is without stomates and produces only weakly developed, irregularly arranged, and discontinuous ridges (also see Gunn & Seidin 1976).

Hunnemannia Sweet, *Brit. Fl. Gard.* 3:54, t. 276. 1828. TYPE SPECIES:
Hunnemannia fumariifolia Sweet (see below).

Perennial herbs from a strongly developed, woody taproot (in *Hunnemannia fumariifolia*), completely glabrous, without spines. Leaves alternate, not clasping, (2-)3 ternately dissected into narrow segments. Flowers solitary on long, naked pedicels, without an expanded, receptacular rim; sepals 2, greenish, apiculate, separate and fugaceous; petals 4 in 2 series, yellow, obovate; stamens numerous; ovary bicarpellate, unilocular, with 2 parietal placentas; stigma sessile, with 4 lobes united into a distinctly peltate structure, the inner portions densely invested with glandular appearing papillae. Fruits (in *H. fumariifolia*) linear and more or less terete, 2 valved, dehiscing acropetally and apparently explosively, the valves persistently attached at the style; seeds (in *H. fumariifolia*) numerous, more or less globose, the outer surface with numerous, minute, irregularly arranged and discontinuous ridges, without stomates. Base chromosome number, apparently $x=7$.

The genus was named for John Hunnemann (ca. 1760-1839), a London bookseller who acted as agent for the sale of herbarium specimens and introduced new plants for cultivation (Desmond 1977). In Sweet's own words: "We have named it in compliment to our friend, Mr. John Hunnemann, who, through his numerous correspondents in various countries, has been the means of introducing a greater number of plants to our collections than almost any other individual . . ." *Hunnemannia* is known in the horticultural trade as the "giant yellow tulip poppy" or the "Mexican tulip-poppy."

KEY TO THE SPECIES

1. Stems 4-10 dm tall, with 1-4 branches, densely leafy; leaves thin, with the venation easily visible but not at all raised, the ultimate segments 2-5 mm wide, mostly 10-30 mm long. *H. fumariifolia*

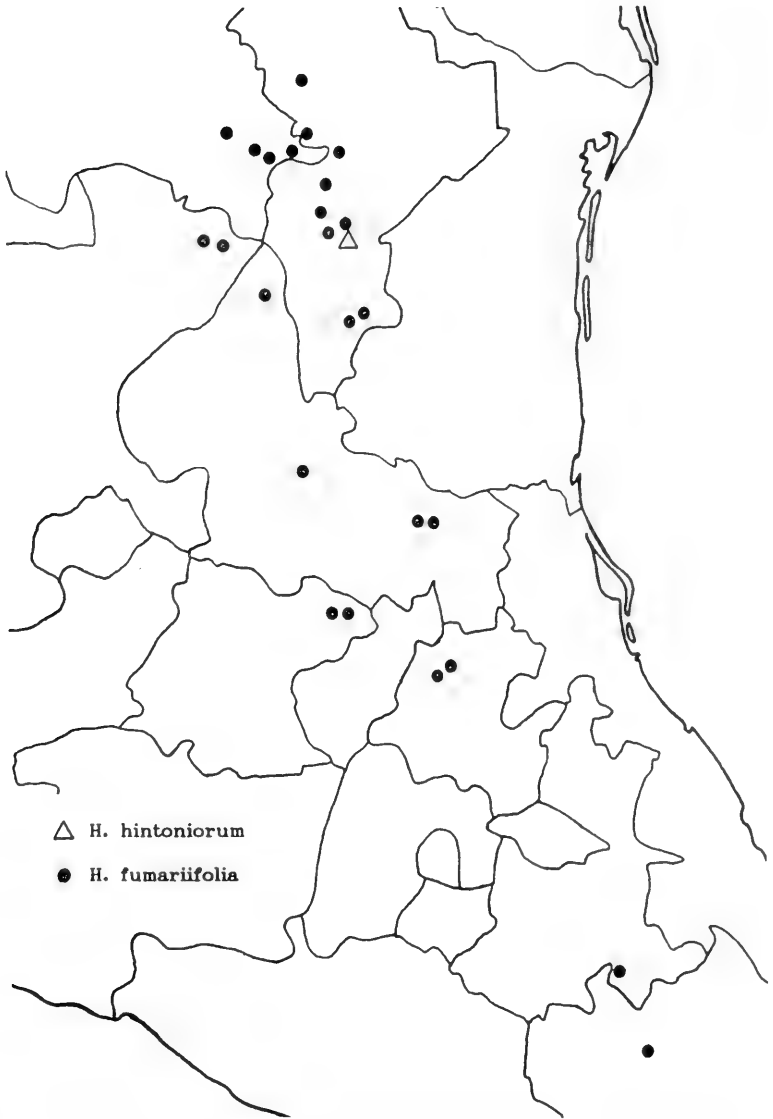
1. Stems 2-3 dm tall, unbranched, scapose, with a few minute bracts near the base, the leaves all basal; leaves thick and somewhat fleshy, with only the raised midvein perceptible, the ultimate segments 0.6-1.2 mm wide, mostly 3-6 mm long. *H. hintoniorum*

Hunnemannia fumariifolia Sweet, *Brit. Fl. Gard.* 3:54, t. 276. 1828. TYPE: MEXICO. Sweet noted that "Our drawing of this beautiful plant was taken in July last, from fine specimens received from the choice collection of Robert Barclay, Esq. of Bury Hill, where it was raised last year from seed received from Mexico." The drawing is detailed and diagnostic and may be taken as the type. *Eschscholzia fumariifolia* (Sweet) Heynh., *Nom. Bot. Hort.* 1:316. 1840.

Stems 4-10 dm tall, usually basally herbaceous, erect to ascending, with 1-4 branches originating above midstem; stems and leaves usually distinctly glaucous. Leaves thin, with venation prominently visible but not at all raised, densely crowded along the stem, little reduced in size upwards, 5-14 cm long with petioles (1-)2-6 cm long, the ultimate segments mostly 10-30 mm long and 2-5 mm wide. Flowers on naked pedicels (5-)10-15 cm long; sepals striate, 18-21 mm long; petals obovate to widely obovate or widely depressed obovate, (15-)25-45 mm long, (20-)25-45 mm wide; anther filaments 2-6 mm long, thecae 2-6 mm long; ovary 6-12 mm long, the stigma 2-4 mm wide. Fruit 9-15 cm long, bearing ca. 60-80 seeds. Two unique alkaloids have been isolated from *Hunnemannia fumariifolia* (Manske *et al.* 1942).

Coahuila, Nuevo León, San Luis Potosí, Hidalgo, Puebla, and Oaxaca in México (Map 1), also reported as an occasional "escape" in California (Abrams 1944; Munz & Keck 1959) and the island of Maui (Hawaii) from an introduction in 1920 (Wagner *et al.* 1990); mostly on open slopes or flats, also streambeds, abandoned fields, and roadsides, in matorral with *Larrea*, *Yucca*, *Agave*, *Acacia*, *Prosopis*, and other shrubs, to pine woodlands with juniper, oak, and fir, over limestone and gypsum, 750-2300(-2700) m; essentially flowering all year with available moisture. Bailey (1950, p. 1615) reported that "seed sown early in May in the East [United States] give bloom in July, and plants are covered with large yellow flowers until hard frost."

Hunnemannia fumariifolia is represented by many collections over a relatively wide geographic range, and there is little variation in its habit and distinctive morphological features. This apparently is in strong contrast to the variability in the two other genera of the Eschscholzioideae — *Eschscholzia*, where more than 100 species have been recognized by several botanists (Greene 1905a; Fedde 1909), and *Dendromecon*, where seventeen species were recognized by Greene (1905c).



Map 1. Distribution of *Hunnemannia fumariifolia* and *H. hintoniorum*.

Hunnemannia hintoniorum Nesom, *sp. nov.* TYPE: MEXICO. Nuevo León: Mpio. Galeana, near Río de San José, gypsum hillside, 1465 m, 24 Mar 1992, *Hinton et al.* 21876 (HOLOTYPE: TEX).

Differt a *Hunnemannia fumariifolia* Sweet caulibus scaposis brevioribusque et foliis omnino basalibus crassisque segmentis ultimis aliquantum brevioribus angustioribusque.

Stems 2-3 dm tall, several basally woody and ascending caudex branches arising from the root and forming a bowl shaped cluster, root not seen. Leaves strictly basal, originating in a dense cluster at the apex of the caudex branches, fleshy, not glaucous, 3-5 cm long with petioles 1.5-2.5 mm long, the ultimate segments mostly 3-6 mm long and 0.6-1.2 mm wide, with a raised, subepidermal midvein, the other venation not visible. Lower portion of the scape sometimes with 1-2 linear bracts 3-10 mm long. Sepals not seen; petals widely obovate, ca. 20 mm wide, ca. 25 mm long; anther filaments ca. 4 mm long, thecae 4.0-4.5 mm long; ovary 7 mm long, the stigma 2 mm wide. Fruits and seeds not seen. Map 1.

The new species differs from *Hunnemannia fumariifolia* in its shorter, scapose, and unbranched stems and its leaves completely restricted to a basal cluster, the blades thicker with shorter and narrower ultimate segments and a raised midvein (any other venation not visible). It is certainly a rare and narrowly endemic species, and it is clearly distinct from its sister species. Although the fruits of *H. hintoniorum* are not yet known, the peltate stigma and distinctly ribbed ovary are identical to those of *H. fumariifolia*.

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ORITROPHIUM ORIZABENSE (ASTERACEAE: ASTEREA), A NEW SPECIES AND THE FIRST REPORT OF THE GENUS FROM NORTH AMERICA

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ABSTRACT

Oritrophium orizabense is described from the northeastern slopes of Pico de Orizaba in Veracruz, México, where it was collected from a vertical rock wall. It is the first report from North or Central America of a genus largely restricted to the Andes of South America, with most of the species in Venezuela and Colombia. The new species apparently is most closely similar to several Venezuelan endemics, including *O. nevadense*, *O. blepharophyllum*, and *O. figueirasii*. The closest relatives of *Oritrophium* lie with other New World genera rather than with Australian *Celmisia*, as has been previously postulated. *Celmisia* is instead a member of a natural group of genera endemic to Australia and New Zealand.

KEY WORDS: *Oritrophium*, *Celmisia*, Asteraceae, Astereae, México

The species described here is the first representative of *Oritrophium* (Kunth) Cuatr. known outside of South America. Most of the other species are endemic to high elevation habitats primarily of Venezuela, Colombia, Ecuador, Perú, and Bolivia; *O. vahlii* (Gaud.) Cuatr. is primarily Argentinian and ranges as far south and west as Tierra del Fuego and Islas Malvinas. This group of species was first recognized within *Aster* L. as sect. *Oritrophium* Kunth, later as *Erigeron* L. sect. *Oritrophium* (Kunth) Benth. & Hook. Much later and nearly concurrently, they were considered to be a separate genus by Cuatrecasas (1961) but transferred to the genus *Celmisia* Cass. (Solbrig 1962). Most of the approximately 15-20 species of *Oritrophium* have been placed there by Cuatrecasas, either by nomenclatural transfers in his original paper or as descriptions of new species in his subsequent studies of Andean Astereae. The genus, however, has never received a taxonomic summary, aside from two floristic treatments (Aristeguieta 1964; Cuatrecasas 1969). The relationship between *Oritrophium* and *Celmisia*, a genus otherwise restricted to

New Zealand, Tasmania, and Australia, was evaluated by Solbrig (1962), who concluded that only a single genus was represented. Subsequent to Solbrig's study, however, all American species have been placed in *Oritrophium*.

Plants of *Oritrophium* are distinctive in their perennial, herbaceous habit, basal rosettes of leaves arising from a short, thick rhizome, long, thin, white hairs commonly produced by the lower petioles, monocephalous stems, non-carinate phyllaries, pistillate (ray) flowers with showy, white ligules, and functionally staminate (disc) flowers with sterile ovaries (the linear style branches with a corresponding lack of stigmatic lines). Cuatrecasas (1961) suggested that *Oritrophium* might be related to the South American genus *Diplostephium* Kunth "y a las Baccharidineae" on the basis of their similarity in sterile disc ovaries. In the "clave diagnóstica" of a more recent paper, Cuatrecasas (1986) again treated *Oritrophium* and *Diplostephium* as a pair. *Diplostephium*, however, is shrubby, not dioecious, and produces coriaceous leaves with strongly revolute margins, and it is probably more closely related to other South American genera with similar habit and morphology (e.g., *Chiliotrichum* Cass.) than to *Oritrophium* or any genera of the Baccharidineae.

Oritrophium appears to be somewhat isolated among its South American relatives in the Astereae, and it may be more similar to some groups of American *Aster* L. (Nesom, in prep.) in its rhizomatous perennation, vestiture (suppressed Type A trichomes), more or less tubular disc corollas (not goblet shaped), linear disc style appendages, and ray corollas with long, white ligules. The South American genus *Noticastrum* DC. has similarly been hypothesized to belong to a group of genera (the "goldenasters") occurring primarily in North and Central America (Nesom 1991).

Celmisia is similar to *Oritrophium* in habit as well as general morphological details. The disc flowers of *Celmisia*, however, differ in their fertile ovaries and extremely high chromosome numbers (12-ploid and 24-ploid, see below). This suggests that the South American elements referred to *Celmisia* are part of a clade separate from the New Zealand species. Most closely related to *Celmisia* sensu stricto (ca. 60 species) are species of four genera restricted to Australia, Tasmania, and New Zealand: *Olearia* Moench sensu lato (ca. 100 species), *Pleurophyllum* J.D. Hook. (2-3 species), *Pachystegia* Cheeseman (1 species), and *Damnamenia* Given (1 species). A similarity between *Celmisia* and *Pleurophyllum* has long been noted (Bentham & Hooker 1873; Allan 1961). Given (1973) included all of these genera except *Pachystegia* in his phenetic arrangement of generic level groups. *Olearia* has been hypothesized to be polyphyletic (Drury 1968; Given 1973), with some of the species more related to *Pleurophyllum*, some to *Celmisia*; other species apparently are outside of the *Celmisia* alliance. Given (1969) acknowledged the taxonomic relationship (sensu Solbrig) between *Oritrophium* and *Celmisia* but excluded the former from consideration in his investigations without further comment. The otherwise tacit exclusion of *Oritrophium* as a relative of the *Celmisia* alliance

probably reflects the distant geographic separation of the two groups.

Meiotic chromosome numbers of two species of *Oritrophium* have been reported: *O. hirtopilosum* (Hieron.) Cuatr. is tetraploid ($n=18$ pairs, Dillon & Turner 1982), and *O. aciculifolium* Cuatr. is diploid ($n=9$ pairs, Turner *et al.* 1967). Chromosome counts for 65 species of *Celmisia* *sensu stricto*, including representatives from all of the infrageneric categories proposed by Given (1969) are all 12-ploid or 24-ploid ($n=54$ or 108; Hair 1980), assuming that the base number is $x=9$. This high ploidy level is a highly specialized cytological feature within the Astereae. *Damnamenia* is 12-ploid (Hair 1980); *Pachystegia* is 12-ploid (Hair *et al.* 1967); species of *Olearia* are 12-ploid, 24-ploid, 32-ploid, 36-ploid, 48-ploid, and a few are diploid (approximately 20 species counted, many by Beuzenberg & Hair 1984). The chromosome number for *Pleurophyllum* Hook. apparently has not been determined, but the genus clearly belongs to the *Celmisia* alliance. All other Australasian genera of Astereae for which a count is available, including *Vittadinia* A. Rich., *Minuria* DC., *Tetramalopium* Nees, *Remya* Benth. (postulated by Wagner & Herbst 1987 to be closely related to *Olearia*), and others, are diploid or tetraploid ($n=9$ or $n=18$).

Based on these observations, it is a reasonably well supported hypothesis that the closest relatives of *Celmisia* are those morphologically and cytologically similar genera from the same geographic area (Australia and New Zealand). The herbaceous, scapose habit in *Celmisia* probably has been derived independently of that in *Oritrophium*, as many of the closest relatives of *Celmisia* are shrubs with multiheaded capitulescences. Further, some species of *Celmisia* are more like shrubs than rosette forming herbs, with leaves evenly distributed along erect, woody stems (Given 1969). The closest relatives of the new species described below are within South American *Oritrophium*.

Oritrophium orizabense Nesom, *sp. nov.* (Fig. 1) TYPE: MEXICO. Veracruz: Mpio. Calcahualco, El Desbarrancadero a unos 3 km del Ejido Jacal, [ca. 97° 12' W, 19° 04' N]; pared vertical rocosa, suelo andosol, 3220 m, 12 Mar 1992, C. Avila B. 112 (HOLOTYPE: TEX!; Isotype: CHAPA).

A *Oritrophio nevadensi* (Wedd.) Cuatr. differt foliis marginibus glabris, bracteis caulinis paucioribus minoribus integrisque, et capitulis minoribus flosculis radii ac disci paucioribus.

Perennial herbs, arising from a thickened (7-15 mm wide), short (2-6 cm long), vertical to horizontal, fibrous-rooted rhizome, the rhizomes sometimes with thin interconnectives among adjacent plants. Stems 1(-several) from each root crown, unbranched, erect, 3-7 cm tall, lightly but persistently woolly with



Figure 1. Habit of *Oritrophium orizabense* (from holotype).

unicellular (Type B; Nesom 1976) trichomes, eglandular, essentially scapose, the upper half with 3 or 4 linear-lanceolate bracts 4-6 mm long. Leaves all in a basal rosette, spreading, oblanceolate, 15-40 mm long, 3-7 mm wide, the margins (distal half) shallowly serrate with (2-)4-8 pairs of blunt teeth, only the midvein visible, the lower petiole margins producing a copious amount of persistent, long, silvery silken hairs (Type B trichomes) that appear to protrude from the root crown, the blades glabrous or sometimes with a few, barely persistent wisps of hair. Heads broadly turbinate, 9-12 mm wide; phyllaries in 2-3 graduated series, oblong-lanceolate, thin herbaceous and without apparent venation, slightly convex but not at all carinate, all 1.0-1.2 mm wide, the innermost 5-8 mm long with acute apices, the outermost ca. half as long with rounded apices, strongly purplish at least on the distal portions, the distal margins somewhat fringed ciliate; receptacles flat, epaleate. Ray flowers 21-37 in a single series, the corollas 12-14 mm long, the ligules 7-10 mm long, white, ca. 1.0-1.5 mm wide, apically coiling, densely invested with long, unicellular, viscid hairs around the tube-ligule junction. Disc flowers with regular corollas 5-6 mm long, narrowly funnelform, with triangular lobes equal in length, 0.8-1.0 mm long and apparently erect, with numerous, biseriate, glandular viscid trichomes (Type C), the tube with druse ("sand") crystals, without crystal in the throat; style branches linear-lanceolate, 1.3-1.5 mm long, densely long papillate, without stigmatic lines; anther thecae with slight basal extensions, the apical appendages linear-oblong, 0.2-0.3 mm long; ray achenes fertile, 5 veined, densely sericeous, eglandular, mature shape and size not seen; carpodium strongly elaborated into an asymmetric column 8-10 cells high; pappus simple, of 40-45 slender, barbellate bristles ca. 5 mm long, without a differentiated outer series; disc achenes with sterile ovaries, 4-5 veined, linear, sparsely strigose; pappus of 16-18 bristles inserted on a thickened rim. Known only from the type collection.

Although the position of *Oritrophium orizabense* within the genus is speculative, it appears to be most similar to several species restricted to Venezuela. *Oritrophium nevadense* (Wedd.) Cuatr. (illustrated in Aristeguieta 1964) produces more or less oblanceolate leaves without basal flanges and with margins serrulate from at least the middle to the apex, scapose (or scapiform) and eglandular stems, relatively broad (vs. linear) phyllaries, and pubescent achenes. In contrast to the new species, the leaves of *O. nevadense* have pilose ciliate margins, a greater number of cauline bracts, which are larger and toothed, and much larger heads with more ray and disc flowers. *Oritrophium figueirasii* Cuatr. and *O. blepharophyllum* (S.F. Blake) Cuatr. also are similar to the new species in their relatively small stature, merely bracteate stems, and serrulate leaves, but both produce stipitate-glandular leaves and stems.

Oritrophium orizabense might be confused with scapose species of *Erigeron* (although there is none in México that is similar). The new species, however, as well as all of *Oritrophium*, differs from *Erigeron* (New World species) in

the elaborated Type B trichomes (Type A trichomes absent; see Nesom 1976), phyllary veins very thin and without associated, conspicuous resin ducts, sterile disc ovaries, linear style branches, relatively long apical appendages of the anther thecae, the fertile achenes fusiform, 5 veined, with an elaborated, asymmetric carpodium, and the simple pappus, lacking a shorter "outer" series.

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