PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 67 September 1989 No.2

CONTENTS

Contents continued on inside cover.

Published by Michael J. Warnock
185 Westridge Drive
Huntsville, Texas 77340
U.S.A.

Price of this number $3.00; for this volume $16.00 in advance or $17.00 after close of this volume; $5.00 extra to all foreign addresses; 512 pages constitute a complete volume; claims for numbers lost in the mail must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.

Contents (cont.)

Phytologia (September 1989) 67(2):109-110.

NEW COMBINATIONS IN *ERICAMERIA* (ASTERACEAE: ASTEREAE)

Lowell E. Urbatsch
Department of Botany, Louisiana State University, Baton Rouge, Louisiana 70803-1705 U.S.A.

ABSTRACT

Two new combinations are made in *Ericameria*. These are **E. juarezensis** and **E. cooperi** var. **bajacalifornica**.

KEY WORDS: Systematics, *Ericameria*, México, Asteraceae.

In preparation for the Asteraceae of México by B.L. Turner and G. Nesom, two new combinations need to be made in the genus *Ericameria*.

Ericameria juarezensis (Moran) Urbatsch, comb. nov. BASIONYM: *Haplopappus juarezensis* Moran. Trans. San Diego Soc. Nat. Hist. 15:154-155. 1969. TYPE: MÉXICO. Baja Califórnia del Norte: 5 mi by road SE of Rancho las Filipinas, Sierra Juárez (near 31°47'N, 115°48'W), occasional on granitic hills, ca 1575 m, 17 Sep 1966, *Moran 13556*. (HOLOTYPE: SD!; Isotypes: CAS!,DAV!,GH!,MICH!,NY!, RSA!,UC!,US!).

Ericameria is sometimes accorded sectional status in the genus *Haplopappus* (Hall 1920; Keck 1959). That *Ericameria* warrants generic recognition has been reasonably well established (Clark 1979; Urbatsch & Wussow 1979) making the present combination necessary for this member of the *E. cuneata* (A. Gray) McClatchie species group.

Ericameria cooperi (A. Gray) Hall var. **bajacalifornica** (Urbatsch & Wussow) Urbatsch, stat. nov. BASIONYM: *Ericameria cooperi* (A. Gray) Hall ssp. *bajacalifornica* Urbatsch & Wussow. Brittonia 31:274. 1979. TYPE: MÉXICO. Baja Califórnia del Norte: 2 mi N of Llano Colorado (31°39'N, 115°55'W), ca 1125 m, 20 May 1967, *R. Moran 13874* (HOLOTYPE: SD!; Isotypes: ARIZ!,CAS!,COLO!,GH!,LL!,MICH!,RSA!,UC!, US!).

The Asteraceae of México format specifies consistent treatment of infraspecific taxa at the varietal level, necessitating the present combination.

ACKNOWLEDGMENTS

I am grateful to Guy Nesom and B.L. Turner for calling this problem to my attention and for their willingness to review the paper itself.

LITERATURE CITED

Clark, W.D. 1979. The taxonomy of *Hazardia* (Compositae: Astereae). Madroño 26:105-127.

Hall, H.M. 1928. The genus *Haplopappus*: a phylogenetic study in the Compositae. Publ. Carnegie Inst. Wash. No. 389.

Keck, D.D. 1959. *in* P.A. Munz *A California Flora.* University of California Press, Berkeley.

Urbatsch, L.E. & J.R. Wussow. 1979. The taxonomic affinities of *Haplopappus linearifolius* (Asteraceae: Astereae). Brittonia 31:265-275.

Phytologia (September 1989) 67(2):111-112.

NEW SPECIES AND COMBINATIONS FROM MÉXICO IN THE *BARTLETTINA* COMPLEX OF THE GENUS *EUPATORIUM* (ASTERACEAE)

B.L. Turner
Department of Botany, University of Texas, Austin, Texas 78713 USA

ABSTRACT

A new species, **Eupatorium calderonii**, and 4 new combinations in the *Bartlettina* complex of *Eupatorium* (*sensu lato*) are proposed. All of the taxa requiring new names were previously treated within the genus *Bartlettina* by King & Robinson (1987). These include **E. breedlovei** (King & H. Robins.) B. Turner, **E. cronquistii** (King & H. Robins.) B. Turner, **E. hintonii** (King & H. Robins.) B. Turner and **E. macdougallii** (King & H. Robins.) B. Turner.

KEY WORDS: Asteraceae, Eupatorieae, *Eupatorium*, *Bartlettina*, México.

Preparation of a systematic treatment of the *Bartlettina* group of *Eupatorium* of the tribe Eupatorieae (Asteraceae) for México has necessitated the description of a new species and several name changes. King & Robinson (1987) have presented a brief account of their genus *Bartlettina* in which they recognized 35 species. I have prepared a treatment of this taxon (Turner unpubl.) and note that the genus, as delimited by King & Robinson, appears to merge into *Hebeclinium*, *Guayania*, as well as other genera in South America. Because of this I have opted to treat *Bartlettina* within my broad view of *Eupatorium*.

Eupatorium calderonii B. Turner, sp. nov. TYPE: MÉXICO. Oaxaca: Mcpio. Comaltepec, Puerto Eligio, km 149 de la carretera Tuxtepec-Oaxaca, Sierra Juárez, 800 m, 26 Mar 1966, G. Martínez Calderon 770 (HOLOTYPE: MEXU!).

E. sordido Less. similis sed foliis anguste elliptici-ovatis petiolis 0.5-1.0 cm longis, capitulis flosculis 20-30, et lobis corollarum dense puberulis differt.

Perennial suffruticose densely pubescent herbs or shrubs to 2 m high. Leaves lanceolate-elliptic, 10-15 cm long, 3.5-5.5 cm wide, tapering at both ends, widest at or near the middle, pinnately nerved, the margins minutely serrulate; petioles 0.5-1.0 cm long. Heads numerous, arranged in somewhat pyramidal corymbose panicles, the ultimate peduncles 1-3 mm long. Involucres 7-8 mm high, campanulate, 3-4 seriate, the bracts gradate ovate to lanceolate, the inner bracts acute, hirsutullous. Receptacles convex, sclerose-alveolate, glabrous. Florets 20-30, the corollas purple, 4-5 mm long, glabrous except for the pubescent lobes, the latter ca 0.5 mm long. Achenes ca 2 mm long, sparsely hispid apically, the pappus of 35-40 white persistent bristles, 4-5 mm long.

The species is closely related to the widespread *E. sordidum* Less. but has narrowly elliptic-ovate (vs broadly ovate to cordate) leaves with petioles 0.5-1.0 cm long (vs 2-10 cm); it also has fewer florets to a head (20-30 vs 50-200) and pubescent corolla lobes (vs glabrous or nearly so).

Eupatorium breedlovei (King & H. Robins.) B. Turner, comb. nov. Based upon *Bartlettina breedlovei* King & H. Robins., Phytologia 28:286. 1974.

Eupatorium cronquistii (King & H. Robins.) B. Turner, comb. nov. Based upon *Bartlettina cronquistii* King & H. Robins., Phytologia 38:108. 1977.

Eupatorium hintonii (King & H. Robins.) B. Turner, comb. nov. Based upon *Bartlettina hintonii* King & H. Robins., Phytologia 31:62. 1975.

Eupatorium macdougallii (King & H. Robins.) B. Turner, comb. nov. Based upon *Bartlettina macdougallii* King & H. Robins., Phytologia 38:107. 1977.

ACKNOWLEDGMENTS

I am grateful to Dr. Guy Nesom for the Latin diagnosis and to both him and Dr. Carol Todzia for reviewing the manuscript.

LITERATURE CITED

King, R.M. & H. Robinson. 1987. The genera of the Eupatorieae (Asteraceae). Monographs Syst. Bot. 22:1-580. Missouri Bot. Garden, St. Louis.

Phytologia (September 1989) 67(2):113-114.

A NEW COMBINATION IN *STENOTUS* (COMPOSITAE: ASTEREAE)

Guy L. Nesom
Department of Botany, University of Texas, Austin, Texas 78713 USA

ABSTRACT

A new combination in *Stenotus* is presented.

KEY WORDS: *Stenotus, Haplopappus*, Asteraceae, México, systematics.

The following combination is necessary in a taxonomic study of the Mexican taxa included by Hall (1928) as *Haplopappus*.

Stenotus pulvinatus (R. Moran) Nesom, comb. nov. Based on *Haplopappus pulvinatus* R. Moran, Trans. San Diego Soc. Nat. Hist. 15:161. 1969.

Stenotus pulvinatus, which is endemic to the Sierra San Pedro Mártir of Baja Califórnia Norte, México, clearly belongs with the group of five other species circumscribed by Hall (1928) as *Haplopappus* sect. *Stenotus* (Nutt.) A. Gray. This relationship was noted by Moran (1969) in the original description of the species. In the separation of *Haplopappus* into component monophyletic groups, however, I believe that *Stenotus* Nutt. (1840) stands as a distinct genus. It is not congeneric with any other species of Mexican "*Haplopappus*." The species of *Stenotus* range from Canada through the western United States to Baja Califórnia Norte and include *S. acaulis* Nutt. (the type), *S. armerioides* Nutt., *S. lanuginosus* (A. Gray) E. Greene, *S. macleanii* (Brandegee) Heller and *S. stenophyllus* (A. Gray) E. Greene. *Stenotus pulvinatus* is the only species of the genus with discoid heads, and in other features "it represents an extreme of reduction and compaction . . ." (Moran 1969, p. 163).

Two of the six or seven species of *Haplopappus* sect. *Tonestus* (A. Nelson) H.M. Hall (the genus *Tonestus* A. Nelson, 1904) include names as *Stenotus* among their synonyms. The two groups are similar in their herbaceous habit, primarily monocephalous stems, 3 veined leaves, herbaceous, 3 veined phyllaries in 2-3 series and style appendages (disc flowers) with minute, short and dense collecting hairs. The species of *Tonestus* differ conspicuously from those of *Stenotus* in their leafy stems and heads immediately subtended by leaf-like

bracts. A clear understanding of the relationship between *Stenotus* and *Tonestus* has yet to be reached. *Haplopappus alpinus* L. Anderson & Goodrich, *H. aberrans* (A. Nelson) H.M. Hall and *H. graniticus* Tiehm & L. Shultz (of *Tonestus*, the last species somewhat anomalous but best placed there related to the previous two) have several headed capitulescences and in that respect are at least superficially similar to species of sect. *Macronema* in habit. This further complicates the taxonomic solution and suggests that *Macronema* Nutt. (1840) may ultimately have priority as the generic name for all these species.

ACKNOWLEDGMENTS

I thank Drs. Billie Turner and Linda Escobar for their comments.

LITERATURE CITED

Hall, H.M. 1928. Sect. *Stenotus*, in The Genus *Haplopappus*—A phylogenetic study in the Compositae. Carnegie Inst. Washington, Publ. 389:161-171.

Moran, R. 1969. Five new taxa of *Haplopappus* (Compositae) from Baja California, Mexico. Trans. San Diego Soc. Nat. Hist. 15:149-164.

Phytologia (September 1989) 67(2):115-117.

TWO NEW SPECIES OF *AGERATINA* (ASTERACEAE: EUPATORIEAE) FROM SOUTH-CENTRAL MÉXICO

B.L. Turner
Department of Botany, University of Texas, Austin, Texas 78713 USA

ABSTRACT

Two new species of *Ageratina*, **A. chazaroana** and **A. perezii**, belonging to the subgenus *Ageratina*, are described from the states of Veracruz and Morelos, México.

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

Identification of material for a treatment of the Asteraceae of México (Turner & Nesom, in prep.) has necessitated description of the following new species of *Ageratina*.

Ageratina chazaroana B. Turner, sp. nov. TYPE: MÉXICO. Veracruz: Mcpio. Coatepec, ca Tierra Grande, between Mesa de Los Laureles and Cuesto del Pino, 30 Aug 1986, *M. Chazaro B. & P.H. de Charazo 3993-a* (HOLOTYPE: TEX!; Isotypes: TEX!,WIS!,XAL!).

A. ciliatae (Less.) King & H. Robins. similis sed foliis sessilibus glabris et involucris glabris differt.

Erect perennial herbs, 30-60 cm high, the stems moderately pubescent with crinkled multiseptate trichomes and arising from slender rhizomes which presumably form colonies. Leaves opposite throughout, 3-5 cm long, 2-4 cm wide, sessile or nearly so; blades broadly ovate, 3-5 nervate from the base, sparsely pubescent along the veins, otherwise epunctate and glabrous. Heads 10-20 in rather congested terminal or subterminal corymbs, the ultimate peduncles mostly 1-5 mm long. Involucres 4-5 mm high, campanulate, the bracts biseriate, subequal, glabrous, except for the obtuse ciliate apices. Florets 15-25, corollas white, ca 3 mm long, the tube ca 1 mm long, the limb ampliate, ca 2 mm long, the lobes, at least some of them, with a few well developed erect trichomes. Achenes ca 1.5 mm long, sparsely hispid along the ribs, the pappus of ca 20 delicate bristles, ca 3 mm long, in a single series.

The species belongs to the subgenus *Ageratina*, having the habit and stem pubescence of *A. ciliata*, but differs markedly from that species in having sessile, nearly glabrous, coarsely serrate leaves. It is named for its major collector, Miguel Charazo, prolific plant collector working out of XAL.

Ageratina perezii B. Turner, sp. nov. TYPE: MÉXICO. Morelos: Mcpio. Tepoztlan, ca 8.5 km N Santo Domingo Ocotitlan, ca 2870 m, "bosque de pino-encino con zacatonal," 11 Oct 1987, *M.L. Espin, E. Cedillo, A. Villasenor & A. Vargas 259* (HOLOTYPE: TEX!; Isotype: CHAPA!).

A. parayanae (Espinosa) B. Turner similis sed differt foliis brevipetiolatis deltatis et capitulis in pedunculis longioribus in capitulescentia corymbosa terminali disposita.

Suffruticose perennial herb or shrub to 1.6 m high. Stems terete, striate, minutely pubescent with glandular, multiseptate trichomes, 0.5 mm long or less. Leaves opposite or subopposite below, those along the upper portions of the stem clearly alternate or subopposite, 5-12 cm long, 4-8 cm wide; petioles thick, 5-12 mm long; blades deltoid, 3 nervate from the base, sparsely pubescent above and below, the margins rather evenly crenulate. Heads numerous, arranged in rather strict, broad, flat topped, terminal cymes, the ultimate peduncles densely glandular pubescent, 1-2 cm long. Involucres 9-10 mm high, the bracts 13-15, linear lanceolate, glandular pubescent, the apices acute. Florets 20-50; corollas white, 5-6 mm long, the lobes ca 0.5 mm long, decidedly pubescent with 2 or more multiseptate trichomes. Achenes linear, ca 4 mm long, appressed hispidulous, the pappus uniseriate, of 30-40 white bristles, mostly 5-6 mm long.

According to label data, the species is an erect shrub to 1.6 m high, much branched from the base, the florets white and involucral bracts coffee red. It is said to be abundant in clearings of the forest.

Ageratina perezii is superficially similar to *A. cardiophylla* (B.L. Robins.) King & H. Robins., but the latter is quite distinct, possessing mostly cordate leaves with much longer petioles, and belongs to the subgenus *Neogreenella* (*sensu* King & Robinson 1987), whilst the former belongs to the subgenus *Ageratina*, where it apparently relates to *A. parayana* (Espinosa) B. Turner. The latter taxon is readily distinguished by its longer petioles and smaller heads on shorter ultimate peduncles.

It is a pleasure to name this taxon for José Garcia Pérez, long time herbarium assistant at CHAPA and dedicated worker on Mexican composites.

ACKNOWLEDGMENTS

I am grateful to Dr. Guy Nesom for the Latin diagnoses and to him and Dr. Andrew McDonald for a critical review of the paper.

LITERATURE CITED

King, R.M. & H. Robinson. 1987. The genera of the Eupatorieae (Asteraceae). Monographs Syst. Bot. 22:1-580. Missouri Bot. Garden, St. Louis.

Phytologia (September 1989) 67(2):118-120.

SENECIO BOLIVARIANUS IN THE PERUVIAN CENTRAL ANDES

Antonio Galán
Departamento de Botánica, Facultad de Farmacia, Universidad Complutense, 28040, Madrid ESPAÑA

ABSTRACT

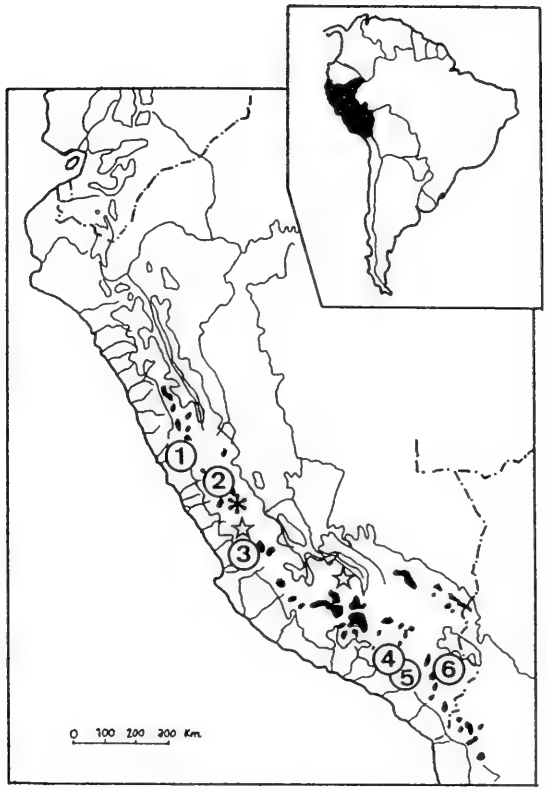
A range extension and ecological characteristics are reported for *Senecio bolivarianus*.

KEY WORDS: Asteraceae, *Senecio*, Perú, phytogeography.

Senecio bolivarianus was described by Cuatrecasas (1969) based on individuals coming from the regions of Huancayo and Urubamba, Perú. (TYPE: PERÚ. Huancayo: región de San José de Acobambilla, NW slope Huacravilca, 14800-15200 ft, cracks in granite, adpressed to crack, 27 Jul 1961, *J.R. Lloyd & J.K. Marshall 257* [HOLOTYPE: K; Isotype: US]. Paratype: PERÚ. Cuzco: Urubamba, Pumahuanca, Cuyo, 4000-4400 m alt, en rocas húmedas, 13 Oct 1961, *César Vargas 13702* [US]). During trips to central Perú, we have found a new location: PERÚ. Junín. Huancayo: Huaytapallana Peak, Cocha Grande Lagoon, *NE964801*; 4400 m, 19 Sep 1987, *O. Tovar, M. Chanco & A. Galán 1294* (MAF 127799, USM).

This new location is important because this species is an indicator of areas where glacial melt during the dry season causes a rupicolous condition with oozing water on vertical rocks. Such conditions are present at all three localities. Populations of this plant appear as monospecific quilt-like mats and are found in fissures caused by glacier tongue erosion (phytosociological inventories: 50 m^2 area, 10% cover, SE orientation, index 2.2,3.3; location Huaytapallana Peak). In the Puna region (*sensu* Rivas Martínez & Tovar 1983), the mid-minimum temperatures of the coldest month -m- (Rivas Martínez, Tovar & Galán 1988) decrease toward the south, thus allowing the formation of glaciers and probably accounting for the distribution of glacial melt plant communities in central and southern Perú.

figure 1



Senecio bolivarianus Cuatr. in Peru

☆	Cited locations	
*	New location	
m(°C)	In some weather bureaus	
1	Conococha - Ancash (4020 m)	- 4,6
2	Pachachaca - Junín (4000 m)	- 6,6
3	Accnococha - Huancavelica (4520 m)	- 7,4
4	Angostura - Arequipa (4155 m)	-11,1
5	Imata - Arequipa (4436 m)	-12,5
6	Collacachi - Puno (3900 m)	-14,5

LITERATURE CITED

Cuatrecasas, J. 1969. Observaciones sobre Compositae. An. Esc. Nac. Cienc. Biol. Méx. 18:9-15.

Rivas Martínez, S. & O. Tovar. 1983. Síntesis Biogeográfica de los Andes. Collect. Bot. (Barcelona) 14:515-521.

Rivas Martínez, S., O. Tovar & A. Galán. 1988. *Pisos Bioclimáticos y Cultivos del Perú.* ICI-INP, Madrid.

Phytologia (September 1989) 67(2):121-131.

AN OVERVIEW OF THE *BRICKELLIA (KUHNIA) EUPATORIOIDES* (ASTERACEAE, EUPATORIEAE) COMPLEX

B.L. Turner
Department of Botany, University of Texas, Austin, Texas, USA, 78713

ABSTRACT

Kuhnia eupatorioides is the generitype and principal species of the genus *Kuhnia*, which was retained by most workers up to the time of Shinners (1971), who reduced all of its members to synonymy under *Brickellia*. Subsequently, many workers have followed this submergence. Shinners recognized 7 species in the complex: *B. schaffneri*, *B. leptophylla* (with 2 varieties), *B. chlorolepis*, *B. oreithales*, *B. mosieri*, *B. eupatorioides* (with 4 varieties) and *B. adenolepis*. The distribution and morphological characters which distinguish these taxa are discussed and it is proposed that among those plants known to Shinners, only 3 species are involved: *B. oreithales* (a Mexican, montane element of SW Chihuahua and adjacent Durango); *B. adenolepis* (a local endemic of Jalisco, México); and *B. eupatorioides* (a widespread species of the U.S.A. and adjacent México). The latter species is believed to be composed of 6 regional varieties, 5 of which are contiguous, and all but one of which intergrade to some considerable extent with their allopatric consorts; these are: 1) var. *eupatorioides* of the eastern U.S.A., which grades into var. *texana* to the southwest and into the more western var. *corymbulosa* to the west and northwest; 2) var. *texana* (including var. *ozarkana*), which grades into the var. *corymbulosa* to the west and with var. *eupatorioides* to the east; 3) var. *corymbulosa*, which grades into the var. *eupatorioides* to the northeast and into the var. *texana* to the southeast and into the more montane var. *chlorolepis* to the west and south; 4) var. *gracillima*, of south central Texas, which grades into the var. *chlorolepis* to the west; 5) var. *floridana* (of which *B. mosieri* is a synonym), which is disjunct in south Florida from the other taxa; and 6) var. *chlorolepis* which occurs in the more montane western portions of the U.S.A. extending southwards along the Central Plateau to south central México. The var. *chlorolepis* contains as synonyms the following taxa recognized by Shinners: *B. chlorolepis*, *B. microphylla*, *B. schaffneri* and *B. leptophylla* var. *mexicana*. A key to the various taxa is provided and maps showing their distributions are constructed.

The only new combinations needed to accommodate the above treatment are **B. eupatorioides** var. **chlorolepis** (Woot. & Standl.) B. Turner; **B. eupatorioides** var. **gracillima** (A. Gray) B. Turner; and **B. eupatorioides** var. **floridana** (R. Long) B. Turner.

KEY WORDS: Asteraceae, Eupatorieae, *Brickellia, Kuhnia*, United States, México.

The genus *Kuhnia* has been retained as distinct from *Brickellia* by most workers (Robinson 1917; Fernald 1950; Steyermark 1963; Correll & Johnston 1970; Barkley 1986; etc.) up to the time of its submergence into the latter by Shinners (1971). Subsequent workers (e.g. McVaugh 1984; King & Robinson 1987), including the present author, have agreed with this submergence, there being few, if any, characters by which to distinguish between them.

Shinners (1946) rendered a definitive revision of the group, treating these as I have indicated in the above abstract. His was an excellent treatment, based upon the study of several thousand specimens and, to a limited extent, field work with most of the taxa in the United States. For a complete synonymy of the taxa recognized in the present paper, the interested reader is referred to the treatments of Shinners (1946; 1971). Where I differ with his nomenclature, this is discussed in the account that follows.

Shinners was most familiar with the widespread *Brickellia eupatorioides* and treated this as comprising 4 regional varieties: an eastern var. *eupatorioides*, a western var. *corymbulosa*, and the var. *ozarkana* and var. *texana*, which together occupied a relatively narrow range between the varieties *eupatorioides* and *corymbulosa*. Shinners was well aware that these several taxa intergraded and cited several intermediates. Unfortunately, he tended to identify most of the plants he examined (by annotation or citation) as either this or that variety, without indication of intermediacy, tending to rely on only 1 or 2 of his "key characters" for recognition purposes. This resulted in the occasional occurrence of "typical" elements outside of the purported range of his recognized varieties; though, for the most part, his arrangement is solid, (except for his ignoring, by annotation, the many intermediate plants he must have examined).

The complexity of the *Brickellia eupatorioides* group is well illustrated in the treatment of this complex by Steyermark (1963), who mapped 3 varieties as occurring in Missouri. As shown by his dot map, var. *eupatorioides* occurs throughout the state; var. *corymbulosa* occurs mostly in the northwestern portion of the state; and var. *texana* (as var. *angustifolia*) occurs in the central and southern portions of the state. In 2 widely separated counties of Missouri, he shows the occurrence of all 3 of these varieties in each of the counties. Indeed, the state of Missouri is an area, within the broader region of *B. eupatorioides*, where several of the varieties of *B. eupatorioides* come into contact

and presumably intergrade, hence the difficulty in assigning names, **especially where individuals are labeled** as opposed to populations. It is unlikely that this intergradation is due to present day hybridization between distinct taxa; rather, the intergradation is probably more the result of a sorting out of this or that combination of characters due to local or regional climatic or edaphic factors so that a mosaic of characters might occur in regions of contact. In any case, the only utilitarian way to treat such variation is to provide names for the **populational** units concerned as best one can, based upon the characters that, in combination, best exemplify those populations.

In the overview that follows, I have treated var. *texana* and var. *ozarkana*, both recognized by Shinners (1946; 1971), as the same; he distinguished these largely by floret number (the former said to possess 18-33 florets per head vs 10-14 florets) and little else. Because of this, I see no point in the recognition of 2 taxa. Possibly the var. *texana* (including var. *ozarkana*), with its filiform outer phyllaries, evolved *in situ* out of the ancestral complex which gave rise to the var. *corymbulosa* to the northwest and var. *eupatorioides* to the east.

Shinners recognized *B. chlorolepis* as a good species, differing from *B. eupatorioides* by its sessile or subsessile, mostly narrower leaves, and reportedly, fewer heads in looser clusters on longer peduncles. Nevertheless, he clearly noted (1951, p. 125) that "intermediates with [*B. e.* var. *corymbulosa*] occur in eastern Colorado, northwestern Texas and adjacent New Mexico" which is painfully so, and because of this I reduce *B. chlorolepis* to varietal status under *B. eupatorioides*. The var. *chlorolepis* largely occupies the drier, more montane, portions of Colorado, New Mexico, Arizona and Texas, extending southwards along the Central Plateau of México to near México City. The var. *corymbulosa* occurs primarily in the great central grasslands of the U.S.A. from Canada to central Texas.

Within México, Shinners (1946) proposed *Kuhnia microphylla* to accommodate specimens from the southern Central Plateau which were said to be small (10-30 cm high) with relatively large involucres (8.8-11.2 mm high). He subsequently resurrected the name *Brickellia schaffneri* for this (because of changes in the Code of Botanical Nomenclature) and the latter name was accepted by McVaugh (1984) in his treatment of *Brickellia* for the *Flora Novo-Galiciana*. McVaugh noted, however, that the ranges of *B. chlorolepis* and *B. schaffneri* (*sensu* Shinners) appear to coincide in the Central Plateau of México and that "it is very difficult to distinguish between these taxa." Indeed, I cannot treat *B. schaffneri* as anything but a synonym of var. *chlorolepis*.

Amongst the Mexican taxa recognized by Shinners (1946; 1971), this leaves only *B. leptophylla* var. *mexicana*, which is typified by material from near Cd. Durango, Durango; the only other specimens cited by Shinners were thought to be doubtful, perhaps belonging to *B. chlorolepis*, these being a Pringle collection from near Chihuahua City, Chihuahua and a Wright collection from New Mexico (U.S.A.). In my opinion, all of these are but leaf forms of var.

chlorolepis. Certainly, they do not relate directly to *B. leptophylla* (=*B. e.* var. *gracillima*). The latter is typified by material from central Texas and is treated here as a localized varietal endemic, largely because it seems to be confined to stream bottoms along the Balcones Escarpment.

The map (Figure 1) showing the general distribution of *Brickellia eupatorioides* and its 6 varieties in the U.S.A. is based upon the numerous citations of Shinners (1946) and several hundred collections assembled since his study (TEX,LL). The map (Figure 1) showing the general distribution of *B. eupatorioides*, and the dot maps of *B. adenolepis* and *B. oreithales* in México, are mostly based upon the numerous specimens of these taxa housed at LL and TEX.

KEY TO TAXA WITHIN THE *B. EUPATORIOIDES* COMPLEX

1. Mature heads mostly pendulous or nodding, in a raceme-like capitulescence; w Chihuahua and Durango (México) .....2. *B. oreithales*

1. Mature heads not pendulous, mostly erect or ascending in a terminal or subterminal, stiffly branching capitulescence .....(2)

2. Involucral bracts, some or most of them, with glandular ciliate margins; montane mesophytic habitats of S Zacatecas, Aguascalientes and Jalisco (México) .....1. *B. adenolepis*

2. Involucral bracts without glandular ciliate margins; widespread, mostly drier woodlands and grassland habitats (U.S.A. to south-central México) .....3. *eupatorioides*.....(3)

3. Stem leaves narrowly linear, 1-3 mm wide .....(5)

3. Mid stem leaves linear, lanceolate, or narrowly ovate, mostly 3-30 mm wide .....(4)

4. Heads with 9-13 florets; southernmost Florida .....var. *floridana*

4. Heads with 15-25 florets; south central Texas .....var. *gracillima*

5. Mid stem leaves predominantly sessile or subsessile, the blades mostly 2-9 mm wide; ultimate peduncles mostly 1-10 cm long; montane regions of western U.S.A. (Colima, New Mexico, Arizona, W Texas) and Central Plateau of México .....var. *chlorolepis*

5. Mid stem leaves mostly with petioles 1-10 mm long, the blades mostly 6-50 mm wide; ultimate peduncles mostly 0.2-2.0 cm long; eastern temperate deciduous forests and grasslands of the central U.S.A. .....(6)

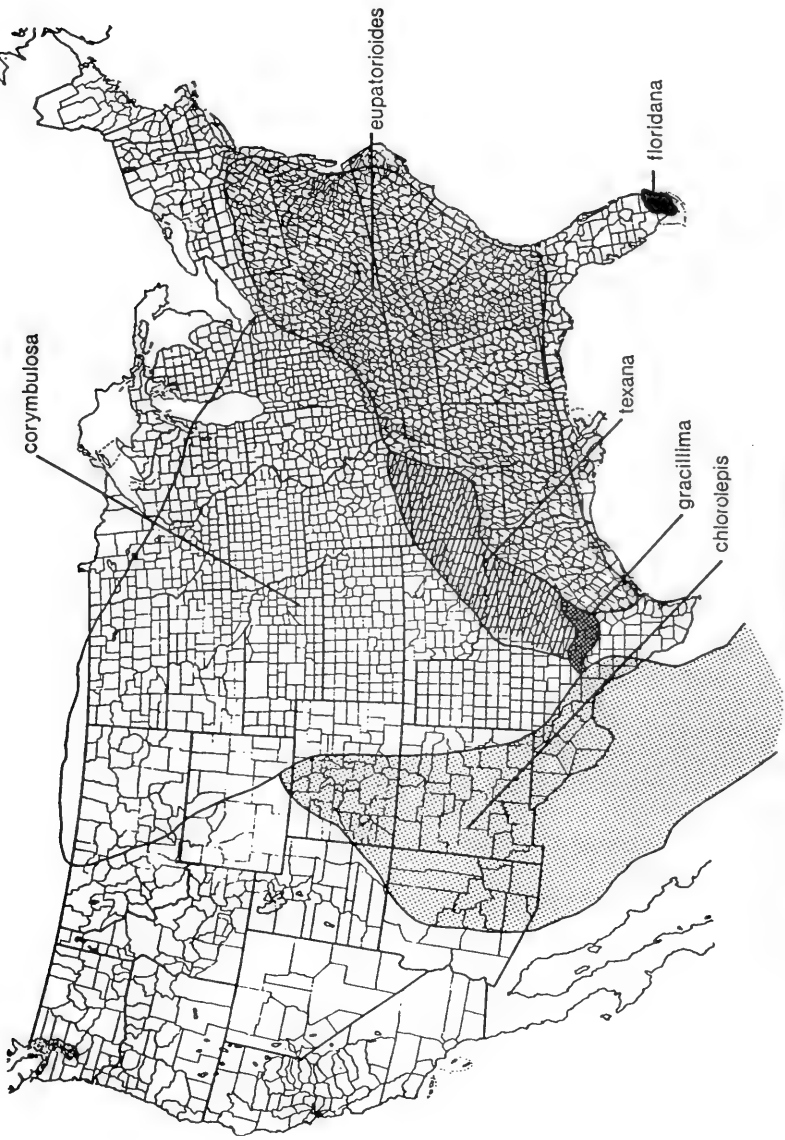


Fig. 1.. Generalized distribution of B. eupatorioides showing varieties.

6. Middle and outer involucral bracts mostly with elongate, filiform, often contorted, apices, usually 1/2 as long or more than the inner bracts; central Texas northeastwards to S Illinois ..... var. *texana*

6. Middle and outer involucral bracts acute or merely acuminate, mostly not contorted and usually 1/2 or less as long as inner bracts ..... (7)

7. Involucres mostly 7-11 mm high; florets mostly 6-15 per head; mostly sandy or silty soils in forested areas of the eastern U.S.A. ..... var. *eupatorioides*

7. Involucres mostly 9-15 mm high; florets mostly 15-35 per head; mostly calcareous or silty clay soils in grassy areas of the central and western U.S.A. ..... var. *corymbulosa*

1. *Brickellia adenolepis* (B.L. Robins.) Shinners, Sida 4:274. 1971. BASIONYM: *Kuhnia adenolepis* B.L. Robins.

Distribution as shown in Figure 3 where it reportedly occurs in pine-oak forests from 1500 to 2300 m (McVaugh 1984). The species appears closely related to *B. oreithales*, both taxa possessing simple, mostly unbranched, stems and relatively naked capitulescences. McVaugh, who provided a thorough description, noted that the heads of *B. adenolepis* may droop prior to anthesis, but at maturity these become stiffly erect on slender peduncles, much like those of *B. eupatorioides*. So far as known, the small, peculiar, brown, glandular hairs found along the margins of the involucral bracts are unique among the *Kuhnia* complex.

2. *Brickellia oreithales* (B.L. Robins.) Shinners, Sida 4:274. 1971. BASIONYM: *Kuhnia oreithales* B.L. Robins.

Brickellia extranea McVaugh.

Kuhnia triplinervis S.F. Blake.

Distribution as shown in Figure 3. Closely related to *B. adenolepis* but readily distinguished by several characters, as noted in the above key. McVaugh (1984) compared his *B. extranea* with *B. adenolepis* but in my opinion it is synonymous with *B. oreithales*, differing from the latter only in its somewhat shorter hairs along the pappus bristles. The type is from the southernmost portion of the distribution of *B. oreithales* and the length of the pappus hairs becomes somewhat longer northwards. *Brickellia oreithales* is occasionally mistaken for *B. eupatorioides* var. *chlorolepis*, with which it is partially sympatric; the latter however, occurs in drier sites at lower elevations.

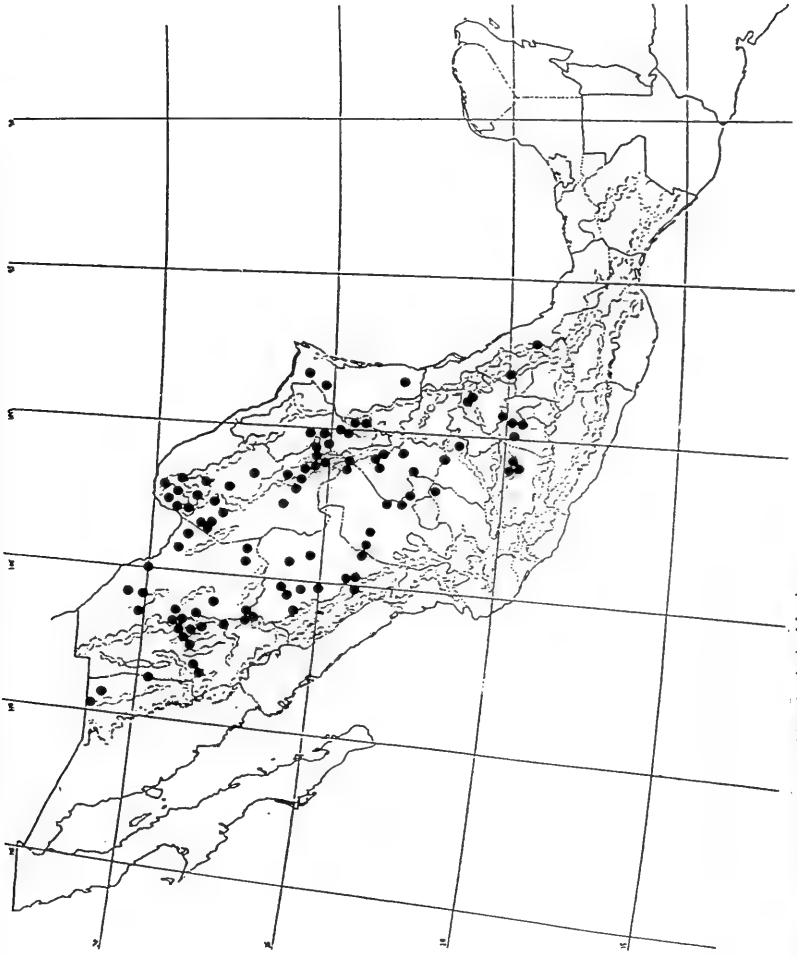


Fig. 2. Distribution of var chlorolepis in Mexico.

Fig. 3. Distribution of Brickellia spp., as indicated.

4. *Brickellia eupatorioides* (L.) Shinners, Sida 4:274. 1971. var. *eupatorioides*

Distribution as shown in Figure 1. Shinners (1946) has given a fairly complete synonymy. I add here the recently proposed *Brickellia rosmarinifolia* (Vent.) W.A. Weber, Phytologia 53:187. 1985, at least as to intent (for which see the discussion under var. *chlorolepis*, below).

4a. *B. eupatorioides* var. *texana* (Shinners) Shinners, Sida 4:274. 1971. *Kuhnia eupatorioides* var. *texana* Shinners.

Brickellia eupatorioides var. *ozarkana* (Shinners) Shinners. *Kuhnia eupatorioides* var. *ozarkana* Shinners.

Distribution as shown in Figure 1. Its relationship to the other varieties is discussed in the above introduction.

4b. *B. eupatorioides* var. *corymbulosa* (Torr. & Gray) Shinners, Sida 4:274. 1971.

Distribution as shown in Figure 1. Shinners (1946) has given a complete synonymy.

4c. **B. eupatorioides** var. **chlorolepis** (Woot. & Standl.) B. Turner, comb. nov. Based upon *Kuhnia chlorolepis* Woot. & Standl., Contr. U.S. Natl. Herb. 16:177. 1913. *Kuhnia rosmarinifolia* var. *chlorolepis* (Woot. & Standl.) Blake (1940). *Brickellia rosmarinifolia* ssp. *chlorolepis* (Woot. & Standl.) W.A. Weber (1983).

Clavigera corymbosa DC. (1836). *Brickellia corymbosa* (DC.) A. Gray (1852). *Coleosanthus corymbosus* (DC.) Kuntze (1891).

Kuhnia schaffneri A. Gray (1882).

Kuhnia leptophylla var. *mexicana* Shinners (1946). *Brickellia leptophylla* var. *mexicana* (Shinners) Shinners (1971).

Kuhnia microphylla Shinners (1946).

Distribution as shown in figures 1 and 2. This is a relatively common roadside plant across most of the Central Plateau of México. As indicated in the above synonymy, if treated as a variety of *B. eupatorioides*, the earliest available name for that category is var. *chlorolepis*, Blake having proposed this in 1940. The automatic name, var. *rosmarinifolia*, cannot apply to this taxon, or any other taxon of the *Brickellia eupatorioides* complex, since it is apparently typified by an element that probably does not belong to the complex, perhaps not even to *Brickellia* itself (Shinners 1946 p. 143).

I have included *Brickellia corymbosa* (DC.) A. Gray in synonymy here (not to be confused with *B. eupatorioides* var. *corymbulosa*) since, by its description, type locality (vicinity of León, Guanajuato, México, *Mendez s.n.*, G-DC) and my examination of the excellent microfiche of the type (G-DC!), the plant concerned appears to belong to the var. *chlorolepis*. Nevertheless, Robinson (1918), McVaugh (1984) and King & Robinson (1987) maintain the species. McVaugh, however, keyed it next to his *B. schaffneri* (=*B. eupatorioides* var. *chlorolepis* of the present treatment), distinguishing between these largely by the length of the lateral hairs along the pappus bristles, a weak and variable character for specific recognition.

4d. **B. eupatorioides** var. **floridana** (R.W. Long) B. Turner, comb. nov. Based upon *Kuhnia eupatorioides* var. *floridana*, R.W. Long, Rhodora 72:39. 1970.

Kuhnia mosieri Small, Man. S.E. Fl. 1329,1508. 1933. *Brickellia mosieri* (Small) Shinners, Sida 4:274. 1971.

Distribution as shown in Figure 1. Long, correctly I think, reduced this taxon to varietal rank, placing it under the generic name *Kuhnia*. Unfortunately, he provided a new varietal name based upon a newly designated type. If treated at the varietal level, this is the correct name to be used, hence the new combination within *Brickellia* as adopted here.

4e. **B. eupatorioides** var. **gracillima** (A. Gray) B. Turner, comb. nov. Based upon *Kuhnia eupatorioides* var. *gracillima* A. Gray, Boston J. Nat. Hist. 6:218. 1850. *Kuhnia rosmarinifolia* var. *gracillima* (A. Gray) Blank (1907).

Kuhnia leptophylla Scheele (1848). *Brickellia leptophylla* (Scheele) Shinners (1971).

Distribution as shown in Figure 1. If treated at the varietal level, this taxon must take the name var. *gracillima*, in spite of the earlier specific name, *K. leptophylla*.

The var. *gracillima* is clearly closely related to, and probably derived from, the var. *chlorolepis*. Gray, as noted above, treated it as a variety of *Kuhnia eupatorioides*, but Shinners (1946), maintained it as a species, largely because he thought it to be confined to a unique habitat, gravelly stream beds along the Balcones Escarpment of central Texas. I have observed quite large, relatively uniform, populations of the taxon in such habitats, especially along the upper reaches of Barton Creek in Travis County. In this area, *B. eupatorioides* var. *corymbulosa* may be found on the drier calcareous hillsides, usually in grassy sites of juniper-oak woodlands. I have yet to find the taxa growing together

or with any indication that they might be forming hybrids. Nevertheless, var. *gracillima* appears to intergrade westward into the var. *chlorolepis* and I can see little justification in its recognition at the species level, since there is little other than leaf width to distinguish between the two.

ACKNOWLEDGMENTS

I am grateful to Dr. Guy Nesom and Dr. Carol Todzia for a review and helpful comments on the present manuscript.

LITERATURE CITED

Barkley, T. 1986. *Kuhnia*, in *Flora of the Great Plains*, Univ. of Kansas Press, Lawrence, Kansas, p. 966.

Correll, D. & M.C. Johnston. 1970. *Kuhnia*, in *Manual of the Vascular Plants of Texas*. Contr. Texas Res. Found., Bot. Studies 6:1547-1549.

Fernald, M.L. 1950. *Kuhnia*, in *Gray's Manual of Botany*. Dioscorides Press, Portland, Oregon, p. 1370.

King, R.M. & H. Robinson. 1987. The genera of the Eupatorieae (Asteraceae). Monographs Syst. Bot. 22:1-580. Missouri Bot. Garden, St. Louis.

McVaugh, R. 1984. *Brickellia*, in *Flora Novo-Galiciana* 12:153-187.

Shinners, L.H. 1946. Revision of the genus *Kuhnia* L. Wrightia 1:122-144.

Shinners, L.H.. 1971. *Kuhnia* L. transferred to *Brickellia*. Sida 4:274.

Steyermark, J. 1963. *Kuhnia*, in *Flora of Missouri*, Iowa State Univ. Press, Ames, Iowa, p. 1468.

Phytologia (September 1989) 67(2):132-133.

PASSIFLORA CHLORINA A NEW SPECIES OF SUBGENUS *ASTROPHEA* (PASSIFLORACEAE) FROM THE CERRADO VEGETATION OF BRAZIL

Linda K. Escobar
Departamento de Biología, Universidad de Antioquia, Apartado Aéreo 1226, Medellín, COLOMBIA*

ABSTRACT

During the course of a taxonomic revision of *Passiflora* subgenus *Astrophea* (Passifloraceae) a new species was found from the cerrado vegetation of the state of Minas Gerais, Brazil. **Passiflora chlorina** most closely resembles *P. sclerophylla* which is known from collections made on the sandstone tepuis of Venezuela and Guyana.

KEY WORDS: Passifloraceae, *Passiflora*, systematics, Neotropics.

Passiflora chlorina L. Escobar, sp. nov. TYPE: BRAZIL. Minas Gerais: ca 17 km SW of the Minas Gerais-Bahia state border along Highway BR-116, 30 Mar 1976, *Davidse et al. 11605* (HOLOTYPE: MO!).

P. sclerophyllae Harms similis sed nectariis foliaribus infra laminam in paginis adaxialibus vel lateralibus petiolorum, stipitibus florum brevioribus, et forma filamentorum coronae differt.

Lianas with concentric rings of secondary wood and stout tendrils. Plants pubescent with straight to curved yellow-green trichomes ca 0.1 mm long, the adaxial surface of leaves and inner flower parts glabrous. Young stems with smooth, dark red-black, flaking bark. Leaf blades obovate to elliptic, 3.8-5.7 cm long, 2.3-3.5 cm wide, rounded and retuse at apex, mostly acute at base, entire at margins, stiffly coriaceous, lustrous on adaxial surface, with scattered trichomes on mid vein, drying reddish brown; lateral veins 5-7, with expanded fine veins forming an incrassate reticulum on abaxial surface; petioles 8.5-11.0 mm long, 1.1-1.2 mm diam, with 2, paired, subspherical, bordered nectaries 1.5-2.0 mm diam below blade on adaxial or lateral surfaces; stipules triangular, ca 3 mm long, ca 1.2 mm wide at base, deciduous.

*Present address: Plant Resources Center, Department of Botany, University of Texas, Austin, Texas 78713 USA.

Peduncles stout, solitary in leaf axil, 2.8-7.0 mm long, 1.1-1.5 mm diam; bracts triangular, ca 1 mm long, ca 0.5 mm wide, reddish. Flowers narrowly campanulate, ca 3 cm long, 2.0-2.5 cm diam, white; flower stipe stout, 4-5 mm long, 1.1-1.2 mm diam; hypanthium campanulate, 8-9 mm long, 3.2-3.5 mm wide at base, ca 6 mm wide at apex; sepals oblong, 18-20 mm long, 4.3-5.0 mm wide, subcoriaceous; petals subequal to sepals, membranaceous; corona in 2 series, at apex of hypanthium, the outer ca 9 mm long, ca 1 mm wide at base, abruptly widening ca 2.5 mm from apex to 1.5 mm, then tapering to blunt apex; the second series linear, ca 3 mm long, ca 0.2 mm wide, bent to ca 45 degree angle in upper 1/3; operculum erect, arising ca 3 mm from base of hypanthium, ca 3 mm long, composed of fleshy, papillose filaments; ovary oblong, ca 3.5 mm long, ca 2 mm wide, 12 ribbed, densely pubescent, with straight, tan trichomes; styles ca 2.3 mm long, ca 0.6 mm diam, pubescent ca 2/3 their length from base. Fruits unknown.

Passiflora chlorina is only known from the type collection in cerrado vegetation of Brazil, on the border of the States of Minas Gerais and Bahia, at 950 meters elevation. It is most similar to *P. sclerophylla* Harms, by virtue of the stiffly coriaceous leaves with thickened fine veins of the abaxial surface forming an incrassate reticulum. It is distinguished from *P. sclerophylla* by the placement of the foliar nectaries below the blade on the adaxial or lateral surfaces of the petioles, the shorter flower stipe and the shape of the coronal filaments. The specific epithet refers to the yellow green color of the pubescence, which is especially noteworthy on the flowers.

ACKNOWLEDGMENTS

I am indebted to Dr. Guy Nesom for criticism of the manuscript and for the Latin diagnosis.

Phytologia (September 1989) 67(2):134-138.

A FURTHER NOTE ON *AGROSTIS ELLIOTTIANA* (GRAMINEAE) IN ARIZONA

Charlotte G. Reeder & John R. Reeder
Herbarium, University of Arizona, Tucson, Arizona 85721 USA

ABSTRACT

It has been discovered that *Agrostis elliottiana*, thought to be new to Arizona and New Mexico in 1986, was actually collected by C.G. Pringle near Tucson, Pima County, AZ, more than 100 years ago. The only voucher specimen is apparently at VT. Included also is information about other species collected in the area at about the same time, with notes on habitat changes.

KEY WORDS: *Agrostis elliottiana*, Arizona, Pringle.

Three years ago we reported the occurrence of *Agrostis elliottiana* Schultes in Arizona and New Mexico (Reeder & Reeder 1986); these were considered to be first records. In the spring of 1985 and again in 1986 we had encountered this delicate annual grass in Pima County, Arizona, along Ash Creek which flows near the border with Cochise County on the eastern side of the Rincon Mountains. While we were studying the collections, we received a specimen of the same species from R.D. Worthington (UTEP), who had found it on the westernmost edge of the Peloncillo Mountains in Hidalgo County, New Mexico, near the Arizona border. Like our specimens, his had been found growing along the edge of a stream. These records extended the known distribution for *A. elliottiana* westward from central Texas.

We believed that a thorough search of the literature had been made before we published our account. Neither Hitchcock (1951), Gould (1951), nor Swallen (1960) gave any clue that this grass had ever been found in Arizona. At the time we recorded our findings, we had studied *Agrostis exigua* Thurber, an annual California species, and concluded that the two are conspecific; *A. elliottiana* Schultes is the older binomial.

Recently, while researching an unrelated matter, we were alerted to a startling bit of information in a series of papers by F. Lamson Scribner (1882-1883). Among the 85 species mentioned, some 16 had been collected in California, while the remainder had come from Arizona. Most of the Arizona collections were from the area around Tucson, particularly Fort Lowell. Others were from the Santa Cruz Valley, Santa Rita Mts., Santa Catalina Mts.,

one from Pantano and another from near Yuma. To our surprise, we noted *Agrostis arachnoides* Elliott [=*A. elliottiana*] in the list, as having come from "near Fort Lowell"!! ARIZ had no such collection, and it is clear US had none. It seemed unlikely that this was a misidentification; Scribner, who had studied the grasses in Tennessee and the southeastern United States, would certainly have known this species. There seemed a chance that the Pringle Herbarium (VT) might have the specimen we were seeking. We made inquiry, and through the courtesy of Dr. David S. Barrington, we shortly received the loan of an herbarium sheet with a fine example of this delicate awned annual species of *Agrostis*. The label data are: "FLORA OF THE PACIFIC SLOPE, Arizona, *Agrostis arachnoides* Ell., near Camp Lowell, April, 1881. C.G. Pringle." (Above the label someone had written in pencil: "*A. Elliotiana* [sic!] Schultes." This left no doubt that the species, indeed, had been collected in Arizona over 100 years before our gatherings!

At present the locality "near Fort Lowell" seems a most unlikely habitat for this little grass which is to be found growing along the sandy margins of running streams. Fort Lowell is now surrounded by the city of Tucson, and the washes nearby are dry except for short periods during heavy summer rains. One must look back in time to understand this distribution.

Pringle made his first trip to the Pacific Slope in the autumn of 1880, the year the railroad arrived in Arizona. No doubt he utilized this newly available means of transportation. During this time, he had three objectives: 1) to explore the forests of the area for the U.S. Census Department; 2) to collect woods for the Jesup Collection of the American Museum of Natural History; and 3) to make general collections for Dr. Gray's studies. At that time, Asa Gray was working on *The Synoptical Flora of North America* and felt the need for material from the arid Southwest. Pringle was permitted to make duplicate specimens for his own herbarium and for sets which were to be sold to help defray the expenses of the trip. He worked at these tasks through 1884 (Brainerd 1911).

It was in 1881 that Pringle collected rather extensively around Tucson, probably staying at Fort Lowell. Camp Lowell or Fort Lowell, as it was variously called, was first established in 1862 by California Volunteers at a site which is now in the center of downtown Tucson. It remained active for two years when in September, 1864, it was abandoned, but was reoccupied in May, 1865. In 1866 the site was made a permanent post and given the name Camp Lowell. It developed that the original site was not a good location. The need for an adequate water supply for the post, as well as hay for the horses, resulted in the Camp's being moved in 1873 to a spot on which the ruins of the once lively fort now stand. The new location was at the edge of the then running Rillito stream, where there was an abundant growth of grass nearby. Soon it became a thriving community with a public school, church, two weekly papers and various places of entertainment for the soldiers. It remained an

important Fort until the 1880's when the Apaches were finally subdued. In 1886 it was abandoned, and the area left to become ruins. Within recent years, however, efforts have been made to restore portions of the old Fort; the immediate surroundings now constitute Fort Lowell Park (Barnes 1960).

The list of grasses presented in the above mentioned list by Scribner included 14 species which had come from Camp Lowell. In addition to *Agrostis arachnoides*, there were the following which are commonly found in moist soil: *Agrostis exarata* Trin. "of two forms," one from the banks of the Rillito in May; the other with a more slender panicle from the Santa Rita Mts. in July. (It is of interest that Hitchcock in 1905 p. 38, confirms these two forms of *Agrostis exarata.*) Also, *Panicum sanguinale* L. [=*Digitaria sanguinalis* (L.) Scop.]; *Poa annua* L. var. *stricta* Vasey, from the banks of the Rillito (=*Poa bigelovii* Vasey & Scribner). The Pringle gathering of 1881 is the type collection for this latter taxon, one of Arizona's early spring blooming grasses. Other species collected by Pringle in 1881 from the Santa Cruz Valley and Camp Lowell area appear to be grasses of the foothills and/or mesas in that vicinity: e.g. (with the modern binomials): *Digitaria insularis* (L.) Mez ex Ekman; *Hilaria belangeri* (Steud.) Nash; *Aristida adscensionis* L.; *Aristida hamulosa* Henr.; *Sporobolus contractus*, A.S. Hitchcock and several species of *Bouteloua: B. aristidoides* L., *B. chondrosioides* (H.B.K.) Benth. ex S. Wats., *B. barbata* Lag. (It is noteworthy that in 1901 Scribner & Merrill described *Bouteloua micrantha* based on *Griffiths 1556* from Fort Lowell. This is now regarded as a synonym of *B. barbata.*) *Pappophorum apertum* Munro ex Scribner, which was said to have come from the "Mesas near Camp Lowell, Arizona" was also described from a Pringle collection of the 1881 set. This is now considered to be a synonym of *Pappophorum vaginatum* Buckley. Another name based on a Pringle collection of 1881 is *Sporobolus cryptandrus* (Torrey) A. Gray var. *strictus* Scribner. The author indicated that it was from "Banks of the Rillita [sic!] near Camp Lowell. June." This is *Sporobolus contractus* A.S. Hitchcock, which is based on the same type.

J.J. Thornber (1909) discussed the vegetation groups of the Desert Laboratory Domain, which included such areas as I. Tumamoc Hill [location of the Laboratory buildings]; II. Mesa-like Mountain Slopes; III. Santa Cruz Floodplain; and IV. Santa Cruz River and Irrigation Ditches. Among the numerous grass species listed for the Santa Cruz flood-plain, there is no mention of any *Agrostis* species. In the category of Santa Cruz River and Irrigation Ditches, he does list *Agrostis verticillata* Vill. [=*Polypogon viridis* (Gouan) Breistr.] and *Paspalum distichum* L., both species to be found in moist places. In the ARIZ Herbarium there are numerous specimens collected by Thornber from Fort Lowell during the early 1900's, but we found no *Agrostis elliottiana.* Both Thornber and David Griffiths were actively collecting plants, especially grasses, in 1901-1903 in southern Arizona. Most of the Thornber collections and many of the Griffiths numbers are in ARIZ. Two collections of *Agrostis*

scabra Willd., which came from Fort Lowell are: *Thornber s.n.*, June 1, 1903 and *Thornber 491*, May 25, 1903. This perennial species was associated with the annual, inconspicuous, ephemeral *Agrostis elliottiana* where we found it in 1985 and 1986. This would tend to suggest that in the early 1900's there was some water in the Rillito Stream, which joins the Santa Cruz River not far from the Fort Lowell site.

Agrostis elliottiana is not a newcomer to Arizona. It was here in 1881, and presently is to be found in at least one locality in the State. It is not likely that it will again be found in the Fort Lowell area. In our experience, this little grass is confined to riparian habitats – Fort Lowell scarcely qualifies for that designation today.

The fact that Pringle found *Agrostis elliottiana* in 1881 demonstrates again that he was a keen plant observer. Although neither Griffiths nor Thornber collected the species, this does not necessarily mean that it was there only in the year Pringle found it. We emphasize again that it is a delicate, inconspicuous plant, which is frequently (perhaps always) found in association with *Agrostis scabra*. It might easily be mistaken for a young plant of that species.

ACKNOWLEDGMENTS

Our thanks to David S. Barrington (VT) for the loan of the Pringle specimen, and to Charles T. Mason, Jr. for use of the Herbarium facilities at ARIZ. Richard S. Felger and Laurence J. Toolin reviewed the manuscript and offered valuable suggestions.

PERTINENT LITERATURE

Barnes, W.C. 1960. *Arizona Place Names.* 1960. Revised and Enlarged by Byrd H. Granger. Tucson: Univ. Arizona Press.

Brainerd, Ezra. 1911. Cyrus Guernsey Pringle. Rhodora 13(155):225-232.

Gould, F.W. 1951. *Grasses of the Southwestern United States.* Tucson: Univ. Arizona Press (Reprinted 1973).

Hitchcock, A.S. 1905. North American Species of *Agrostis.* Bull. U.S. Dept. Agric. Bur. Plant Industry 68.

_____. 1951. Manual of the Grasses of the United States. U.S. Dept. Agric. Misc. Publ. 200. (Ed. 2, revised by Agnes Chase.)

Reeder, C.G. & J.R. Reeder. 1986. *Agrostis Elliottiana* (Gramineae) new to Arizona and New Mexico. Phytologia 60(6):453-458.

Scribner, F.L. 1882-1883. A list of grasses collected by Mr. C.G. Pringle in Arizona and California during the summer of 1881, with descriptions of those species not already described in American publications. Bull. Torrey Bot. Club 9:74-77,86-89,103-105,145-149; 10:29-32.

Swallen. J.R. 1960. Gramineae, pp. 70-145. *In*: Kearney, T.H., R.H. Peebles, & Collaborators. *Arizona Flora.* Ed. 2 + Suppl. Berkeley: Univ. California Press.

Thornber, J.J. 1909. Vegetation groups of the Desert Laboratory Domain. Publ. Carnegie Inst. Wash. 113:103-112.

Phytologia (September 1989) 67(2):139-141.

A RECONSIDERATION OF *UROSPATHELLA* (ARACEAE)

George S. Bunting
101 Linden Avenue, Pocomoke City, Maryland 21851 USA

ABSTRACT

The relationships of *Urospathella* are discussed; anatomical data of the seed are presented to support its separation from *Urospatha* and information justifying its exclusion from *Cyrtosperma* is evaluated.

KEY WORDS: *Urospathella*, Araceae, Neotropics, anatomy.

The genus *Urospathella* Bunting has a single species, *Urospathella wurdackii* (Bunting) Bunting, a small plant known to occur only in white sand savannas of Amazonian Venezuela. It differs from *Urospatha sagittifolia* (Rudge) Schott by its slender habit, oblong or elliptic leaf blades lacking posterior lobes and a unilocular ovary with two sub-basal ovules. The lack of precise data concerning the presence of endosperm in the seed has caused speculation about its correct generic placement. Originally described in the genus *Cryptosperma*, it has subsequently been transferred to *Urospatha* (Hay 1988) and then to *Urospathella* (Bunting 1988).

Recent study of a seed of *Urospathella wurdackii*, by Dr. James C. French at Rutgers University, revealed that the seed "most definitely contains endosperm [with the] large plump embryo surrounded by a layer of cells filled with lipid droplets and small irregular crystalline particles." He " did not determine if they were starch, but their birefringence was not typical of starch grains. Outside the endosperm was the thick seed coat." Dr. French has "no doubt about the presence of endosperm in *U.* [*Urospathella*] *wurdackii*. The other species. . .sent [*Urospatha sagittifolia*], reputed to lack endosperm, differed in lacking this lipid-rich layer of cells."

The albuminous nature of the seeds of *Urospathella wurdackii* obliges a reconsideration of the genus *Urospathella*, since the seeds were originally described as apparently without endosperm. With this character negated, the slender habit of this species and its leaf form remain the chief morphological features to distinguish it from *Cyrtosperma* (cf. Hay 1988). Even the sparsely and finely verruculose condition of the petiole suggests the spiny condition well developed in *Cyrtosperma*. However, the petiole of *Urospathella wurdackii* does

not appear to be geniculate as in the latter genus. Moreover, the geographic isolation of this species in north-central South America reinforces its segregation from *Cyrtosperma*, now considered to be an entirely Asian genus.

Hay (1988 and in personal correspondence) indicated that the Neotropical species previously placed in *Cyrtosperma* must, on the basis of their exalbuminous seeds or aspect, be excluded from this genus. These include the following:

"*Cyrtosperma americanum* Engl. in Martius = *Anaphyllopsis americana* (Engl.) A. Hay, ined.

Cyrtosperma spruceanum (Schott) Engl. = *Dracontium* sp.

Cyrtosperma wurdackii Bunting = *Urospatha wurdackii* (Bunting) A. Hay, comb. nov."

The last transfer was formally made, but because this species has seeds with endosperm, its inclusion in *Urospatha* is untenable. Further, Hay's comments about the comparable unilocular condition of the ovary of this species and that of *Urospatha savannarum* Steyerm. (Publ. Field Mus. Nat. Hist. Bot. Ser. 28:102. 1951) seem tenuous. The type specimen of this latter name cannot be located for restudy to verify the unilocular condition of its ovary with a single ovule arising from the base at one side, as described by Steyermark. It is my experience that the removal of a pistil from a spadix of *Urospatha*, done even with great care, often results in all or part of the ovules, together with the very short partition, remaining fast to the axis of the spadix and being pulled out of the ovary rather than remaining *in situ* in the latter. Until its ovary characters can be verified, it appears unwise to consider *Urospatha savannarum* in these discussions, since the drawing accompanying its original description depicts a plant very similar in both foliage and inflorescence to a young plant of the widespread *Urospatha sagittifolia* (Rudge) Schott *sensu lato*.

NOMENCLATURE SYNOPSIS

Urospathella wurdackii (Bunting) Bunting, Phytologia 65:391. 1988. *Cyrtosperma wurdackii* Bunting, Acta Bot. Venez. 10:285. 1975. *Urospatha wurdackii* (Bunting) A. Hay, Blumea 33:457. 1988.

ACKNOWLEDGMENTS

I am very grateful to Dr. James C. French, of Rutgers University, for determination of the endosperm content of seeds of pertinent material and to Dr. D.H. Nicolson and Dr. T. Croat for their reviews of the manuscript.

LITERATURE CITED

Bunting, G.S. 1988. *Urospathella*, new genus of Venezuelan Araceae. Phytologia 65:391-392.

Hay, A. 1988. *Cyrtosperma* (Araceae) and its Old World allies. Blumea 33:427-469.

Phytologia (September 1989) 67(2):142-147.

NEW SPECIES OF MEXICAN *SOLIDAGO* (COMPOSITAE: ASTEREAE)

Guy L. Nesom
Department of Botany, University of Texas, Austin, Texas 78713 USA

ABSTRACT

Three new species and a new variety of *Solidago* are described from Nuevo León and Coahuila in NE México. **Solidago ericamerioides** and **S. gypsophila** are apparently obligate gypsophiles with highly restricted distributions in Nuevo León and Coahuila, respectively. **Solidago hintoniorum** is known from a number of localities in the mountains of southeastern Coahuila, central Nuevo León and adjacent Tamaulipas. **Solidago wrightii** var. **orientalis** is known from a single collection from the Sierra La Marta of Coahuila and is the only collection of this species from the eastern sierra of México.

KEY WORDS: *Solidago*, Asteraceae, México, floristics.

In the preparation of a taxonomic treatment of Mexican *Solidago*, three previously undescribed taxa warrant recognition as species and another as a variety. Two of the species apparently are obligate gypsophiles and narrow endemics. The third species is relatively more widespread and known from a number of collections.

Solidago gypsophila Nesom, sp. nov. TYPE: MÉXICO. Coahuila: Mpio. Cuatro Cienegas, ca 9 air mi SW of Cuatro Cienegas, ca 2 mi N of Poza Becerra, in a fen-like area, with *Flaveria, Baccharis, Scirpus, Anemopsis, Sporobolus, Distichlis*, 709 m, 10 Oct 1976, *J. Henrickson 15576* with M. Dillon (HOLOTYPE: LL!).

S. canadensi L. similis sed paginis infernis foliorum dense et grosse hispidulis laminis profunde recessis et nervaturis valde protrudentibus differt.

Herbaceous perennials 1.5-2.0 m tall, base not seen. Stems 5-7 mm thick at mid stem, yellowish, densely villous-pilose with white, crinkly hairs. Leaves erect-ascending, crowded and overlapping with internodes mostly 1 cm long, 3 veined, densely and evenly hispidulous-hirtellous on both surfaces, with deeply

recessed lamina and strongly protruding venation, oblanceolate-obovate, 8-12 mm wide, 35-75 mm long, attenuate to a petioliform base 1-2 mm long, the upper ovate to obovate, slightly reduced in size. Heads campanulate on bracteate ultimate pedicels 1-2 mm long, secund and crowded on lateral branches with narrowly elliptic bracteal leaves, the whole capitulescence a pyramid 30 cm broad at base and 35 cm high; receptacles deeply foveolate; phyllaries yellow, glabrous, with a prominently raised, resinous midvein, in 3-4 strongly graduated series, the inner 2.5-3.0 mm long. Ray flowers 7-10, the corollas 3.0-3.5 mm long, glabrous, the ligules 1.5-2.0 mm long, 0.5 mm wide, apically toothed or cleft. Disc flowers 4-5, the corollas 3.5 mm long, the lobes triangular-lanceolate, ca 1.5 mm long, the throat 1 mm long, tube 1 mm long; style appendages triangular. Achenes sparsely strigose, mature size not seen; pappus a single series of 26-32 barbellate bristles 2.5-3.0 mm long.

Additional collections examined: MÉXICO. Coahuila: Mpio. Cuatro Cienegas, Cuatro Cienegas Basin, small laguna between Lagunas Churince and Grande, 13 Aug 1967 [just into flower], *Cole, Minckley & Pinkava 3790* (ASU); Dos Quatos, 21 Aug 1967 [immature], *Cole, Minckley & Pinkava 4336* (ASU).

Solidago gypsophila is similar and obviously related to *S. canadensis* var. *canescens* A. Gray in its villous stem pubescence, crowded leaves, large, triangular capitulescence and the small heads with few disc flowers. The new taxon could be added to the numerous varieties of *S. canadensis*, but it differs strongly from it and all other species in its leaves with deeply recessed lamina and strongly protruding venation and in its dense, even length, stiffly hispid-hirtellous foliar pubescence.

The closest known locality for *Solidago canadensis* var. *canescens* is about 150 miles north of Cuatro Cienegas. The widespread and commonly collected *S. velutina* DC. is the only other species of the genus that occurs close to the type locality. Typical plants of *S. velutina* have been collected from several localities in the nearby Sierra de la Madera and Sierra de la Gavia and from within the Cuatro Cienegas basin itself ("summit - Anteojo Complex," *Meyer s.n.*, ASU), but the latter site may be a limestone outcropping rather than gypsum. *Solidago gypsophila* almost certainly is an obligate gypsophile.

Solidago ericamerioides Nesom, sp. nov. TYPE: MÉXICO. Nuevo León: Mpio. Galeana, 10 km NE of Pocitos, gypsum cliff over water, 1850 m, 26 Aug 1984, *Hinton et al. 18763* (HOLOTYPE: TEX!; Isotype: ASU!,NY!).

S. missouriensi Nutt. similis sed differt statura brevioribus (6-15 cm alto), caulibus pubescentibus pilis crassis brevis, foliis brevioribus (8-20 mm longis) elliptici-oblanceolatis, capitulescentiis corymbosis capitulis paucioribus, phyllariis 3 nervatis, flosculis radii paucioribus, et acheniis longioribus.

Suffrutescent perennials 6-17 cm tall, producing basal offsets or stolons that thicken and lignify. Stems moderately to densely pubescent with thick, short, upturned hairs. Leaves apparently fleshy when fresh, wrinkling upon drying, entire, elliptic-oblanceolate or oblanceolate-obovate, 8-20 mm long, 2-3 mm wide, not at all reduced in size upwards but the internodes lengthening to 2-4 mm, margins scabrous-ciliate, the lower surface sparsely and microscopically strigose. Heads campanulate on bracteate pedicels 3-10 mm long, in compact corymbs 2.0-3.5 mm broad of 8-20 heads each; phyllaries in 3-4 series, oblong-oblanceolate, whitish indurated except for the prominent, orange resinous midvein, the middle series 3 veined, the inner series 4.5-5.0 mm long with minutely ciliolate margins, the outermost 1/2-1/3 as long as the rest. Ray flowers 6-10, yellow, the corollas 4-5 mm long, the ligules 2-3 mm long, 1 mm wide, 3-4 veined, with 3 shallow apical teeth, the tube glabrous. Disc flowers 6-13, the corollas ca 3.5 mm long, tubular-funnelform, the lobes lanceolate, 1.0 mm long, throat 1.5 mm long, tube 1 mm long; style appendages deltate-lanceolate. Achenes fusiform-cylindric, 2.0-2.3 mm long, densely strigose, with 5-7 raised, orange resinous nerves; pappus a single series of 29-34 barbellate bristles mostly 2-3 mm long.

Solidago ericamerioides may be closely related to *S. missouriensis* Nutt., although they are very different in a number of features. Forms of *S. missouriensis* occur in the same gypseous area as *S. ericamerioides* around Galeana, Nuevo León, but even in a highly gypseous substrate, plants of *S. missouriensis* maintain a general morphology relatively typical of the species in its main range in the United States. The two species (in México) are distinguished by the following couplet.

1. Plants 6-17 cm tall with thick-hairy stems; leaves 8-20 mm long, elliptic-oblanceolate; capitulescence corymbose, distinctly flat topped, few headed; phyllaries of nearly equal length, the middle 3 veined; ray flowers 6-10; achenes 2.0-2.3 mm long ..... *S. ericamerioides*

1. Plants 50-100 cm tall with glabrous to glabrate stems; leaves 40-90(-110) mm long, linear-lanceolate; capitulescence cylindric to oval or pyramidal with numerous heads; phyllaries strongly graduated in length, the middle 1 veined; ray flowers 13-18; achenes 1.0-1.5 mm long ..... *S. missouriensis*

Typical plants of *Solidago missouriensis* have been collected on gypsum very near the type locality of *S. ericamerioides* (*Hinton et al. 18780*, TEX). This sheet appears to be a mixed collection, bearing six typical plants of *S. missouriensis* and one small plant that has the habit and capitulescence of *S. ericamerioides*, but longer leaves and strongly graduated phyllaries. I believe this individual may represent a hybrid or introgressant.

Collections of the following undescribed species have been accumulating at TEX-LL for some time, identified as *Solidago muelleri* Standley, which however, has proved to be a synonym of *S. missouriensis* Nutt.

Solidago hintoniorum Nesom, sp. nov. TYPE: MÉXICO. Nuevo León: Mpio. Galeana, Cerro El Potosí, clearing in pine forest, 3150 m, 15 Sep 1969, *Hinton et al. 17264* (HOLOTYPE: TEX!).

S. petiolari Ait. similis sed caulibus et foliis sparsim villosis, phyllariis eglandulosis glabris 3 nervatis marginibus hyalinis, et acheniis strigosis differt.

Rhizomatous perennials. Stems 0.5-1.0 m tall, sparsely hairy with spreading crisped hairs mostly 0.5-1.0 mm long, eglandular. Leaves entire to serrate with 3-6(-9) teeth, obovate to obovate-oblanceolate, the basal often persistent, basally attenuate to a broad petiolar region, lower to midcauline 5-9 cm long, 10-25(-35) mm wide, little reduced upwards but becoming sessile, eglandular, margins spreading ciliate, the major veins usually sparsely villous, the lamina glabrous to sparsely villous. Heads 5-6 mm wide, sessile to subsessile on ultimate peduncles 1-2 mm long, in tightly cylindrical panicles mostly 6-15 cm long, the capitulescence sometimes branched and producing lateral ascending cylinders below the primary one; phyllaries oblong with erect, rounded to obtuse apices, with a prominent, green apical patch with numerous visible stomates, glabrous or with a few, minute hairs near the apex, strongly graduated in 3-4 series with the inner 5-6 mm long, midvein thick and orange resinous, often flanked by 1-2 pairs of smaller, lateral veins on the middle and inner, margins with broad, hyaline flanges, sometimes slightly lacerate-ciliate near the apex. Ray flowers 5-10, the corollas 5.5-6.0 mm long, ligules 2.5-3.5 mm long, 0.8-1.3 mm wide. Disc flowers (6-)8-11, the corollas 5.0-5.5 mm long. Achenes moderately strigose, cylindric, mature size not observed; pappus of 25-36 barbellate bristles.

Additional collections examined: MÉXICO. Coahuila: Mpio. Arteaga: Sierra La Marta, with *Pinus, Ceanothus, Quercus* and *Garrya*, 24 Oct 1981, *Poole 2449* (TEX); Sierra Los Camargos, bushy hillside, 2920 m, 19 Jul 1980, *Hinton et al. 17884* (TEX); Sierra Los Camargos, 2870 m, 4 Aug 1980, *Hinton et al. 17925* (ASU); Sierra La Viga, N side, with *Pinus, Pseudotsuga, Abies* and *Picea*, 2700-3000 m, 24 Oct 1984, *McDonald & Gomez 1179* (TEX); Sierra La Viga, SE side, *Pinus culminicola* and *P. hartwegii*, 3300 m, 25 Oct 1984, *McDonald & Gomez 1216* (TEX); Sierra de Arteaga, Las Vigas, cañon de la Carbonera, *Pinus, Pseudotsuga, Abies, Quercus* and *Ceanothus*, 2100-2600 m, 15 Sep 1988, *Villarreal et al. 4590* (TEX). Nuevo León: Mpio. Galeana: Sierra La Marta, rocky mountainside, 2870 m, 4 Aug 1980, *Hinton et al. 17925* (TEX); Sierra La Marta, rocky mountain, 2800 m, 6 Sep 1981, *Hinton et al. 18335* (TEX); El Carrizo, oak woods, 1900 m, 16 Oct 1983, *Hinton et al.*

18613 (TEX,WAT); Dulces Nombres, open rocky places, 2000 m, 12 Aug 1948, *Meyer & Rogers 2955* (MO); W of Galeana, 7.5 mi SW of Dieciocho de Marzo along the road to the top of Cerro Potosí, pine and fir forest with shrubby oaks, 12 Oct 1984, *Sundberg 3114* (TEX). Tamaulipas: 3-5 km S of Huisachal, limestone slopes, ca 6000 ft, 27 Jun 1949, *Stanford et al. 2096* (SMU,TEX).

The Tamaulipan collections have strongly reduced upper cauline leaves but are otherwise typical of *Solidago hintoniorum*. They are perhaps hybrids between *S. hintoniorum* and *S. simplex*. Plants of another collection (*Meyer & Rogers 2955*) may also be hybrids between the same two species. I have tentatively identified them as *S. simplex*, however, because they have the reduced habit, purplish stems, and weakly 3 nerved leaves of that species, but in vestiture they are much more similar to *S. hintoniorum*. The long ciliate petioles of *S. hintoniorum* are distinctive from both of the putative hybrids. Both *S. simplex* and *S. hintoniorum* have a cylindrical capitulescence, mostly 1 nerved, obovate (lower) leaves and glabrous, oblong phyllaries with rounded apices.

Solidago hintoniorum is similar to *S. petiolaris* and *S. wrightii* in its 1 nerved leaves, which are relatively unreduced upwards and its large, prominent ray flowers. With *S. petiolaris* it shares a cylindric capitulescence and with *S. wrightii* strigose achenes. It is different from both species in its glabrous phyllaries and completely non glandular, sparsely villous vestiture.

Solidago wrightii and *S. petiolaris* appear to be more similar to each other than either is to *S. hintoniorum*, although the three clearly form a closely related group. In fact, the first two are so similar they perhaps should be treated as a western and eastern phase of a single species. They are distinguished by capitular features and achene vestiture, as in the key below, but intergradient population systems occur in southwest Texas, where their geographic ranges meet. A review of the taxonomy of the whole group is in progress (Nesom, in prep.).

The following key identifies the Mexican taxa of *Solidago* that have 1 nerved leaves, not or only slightly reduced in size upwards, and heads in corymbs or cylindrical panicles, not at all secund. The geographic ranges are only for México.

1. Phyllaries (1-)3(-5) veined, glabrous, eglandular; capitulescence cylindrical; stems and leaves sparsely villous with spreading crisped hairs 0.5-1.0 mm long; southeast Coahuila to central Nuevo León and adjacent Tamaulipas ..... *S. hintonii*

1. Phyllaries 1 veined, hairy, glandular, or both; capitulescence cylindrical to corymbose; stems and leaves stipitate glandular or merely hairy, but if the latter the hairs mostly 0.1-0.2 mm high ..... (2)

2. Capitulescence a terminal corymb usually as wide as long or an open,

paniculate cluster of similar corymbs; achenes obviously strigose; Chihuahua to central Durango and southwest to east central Coahuila ..... *S. wrightii*

2. Capitulescence a tightly cylindric panicle; achenes glabrous or nearly so; N Coahuila and central Nuevo León ..... *S. petiolaris*

A collection from mountains of Coahuila east of Saltillo is related to *Solidago wrightii* and deserves recognition at the varietal level.

Solidago wrightii var. **orientalis** Nesom, var. nov. TYPE: MÉXICO. Coahuila: Mpio. Arteaga, Sierra La Marta, pine and spruce woods, 3100 m, 6 Sep 1981, *Hinton et al. 18333* (HOLOTYPE: TEX!; Isotype: NY!,TEX!).

Varietatibus aliis *S. wrightii* A. Gray similis sed marginibus foliorum serrat-crenatis dentibus 5-10(-14) imprimis differt.

Perennials, base not seen. Stems 0.5-0.6 m tall, puberulous with a mixture of stipitate glands and short, spreading, upturned hairs ca 0.2 mm high. Leaves thick, elliptic to elliptic obovate, 35-75 mm long, 15-25 mm wide, serrate with 5-10(-14) pairs of teeth, the lamina hirtellous and stipitate glandular. Heads sessile to subsessile on ultimate peduncles 1-3 mm long, in compact, terminal corymbs; phyllaries thick, oblong to lanceolate oblong, often with spreading-reflexing apices, with the inner often strongly convex, graduated in 3-4 series, the innermost 5-6 mm long. Ray flowers 4-6. Disc flowers 9-12. Achenes sparsely strigose.

The plants of this collection have a corymbose capitulescence and densely stipitate glandular upper stems, leaves and phyllaries. Leaves of plants from elsewhere in the range of *Solidago wrightii* are entire but they very rarely produce 1 or 2 pairs of small teeth. The prominently toothed leaves of var. *orientalis* may reflect genetic input from *S. petiolaris*, which is known from several areas in the eastern Sierra and has similarly toothed leaves in the area where *S. wrightii* occurs. The plants of var. *orientalis* are the only ones of the species known from the eastern Sierra Madre, but *S. wrightii* has been collected from the Sierra de Jimulco of southwestern Coahuila, and the species may have migrated eastward across Coahuila. In qualification, however, the number of ray flowers of var. *orientalis* (4-6) is more similar to that of plants of *S. wrightii* in New Mexico (6-11) than in the western Sierra of México (9-14).

ACKNOWLEDGMENTS

I thank Billie Turner and T. P. Ramamoorthy for reviews of this manuscript and ASU, MO and SMU for loans of specimens.

Phytologia (September 1989) 67(2):148-154.

A NEW SPECIES OF *CAREX* (SECT. *OLIGOCARPAE*) FROM THE EDWARDS PLATEAU OF TEXAS

Edwin L. Bridges
The University of Texas Herbarium, Austin, Texas 78713 USA
and
Steve L. Orzell
Texas Natural Heritage Program, Texas Parks and Wildlife Department
Austin, Texas 78744 USA

ABSTRACT

Carex edwardsiana, a new species of sect. *Oligocarpae*, is described and its diagnostic features, habitat and relation to other endemics of the Balcones Escarpment of the Edwards Plateau of Texas are discussed. This species has previously been considered to fall within the variability known for *C. oligocarpa*, but it is morphologically distinct and geographically isolated from this more northern and eastern species.

KEY WORDS: *Carex*, Cyperaceae, systematics, Texas, Edwards Plateau.

In the process of an intensive field study of the distribution and ecology of the Cyperaceae of Texas, we have noted for several years that the central Texas entity identified as *Carex oligocarpa* Schkuhr. does not closely resemble specimens of that species from northern and eastern states. The discussion of this entity (as *C. oligocarpa*) by Dr. Marshall Johnston noted some of these differences, and he stated that it should perhaps not be referred to *C. oligocarpa* (Correll & Johnston 1970). However, this species had rarely been collected in Texas before 1970, and the consistency of its differences was not known. After making field observations at several sites and examining a series of collections made after the Texas flora was published, we are convinced that it represents a distinct, previously undescribed species.

Carex edwardsiana Bridges & Orzell sp. nov. (Figure 1). TYPE: UNITED STATES. Texas: Travis County, mesic colluvial limestone slope forests with rock outcrops in valley of Barton Creek, ca 2 mi upstream from Barton Springs in Zilker Park, and 2.5 mi upstream from Colorado River,

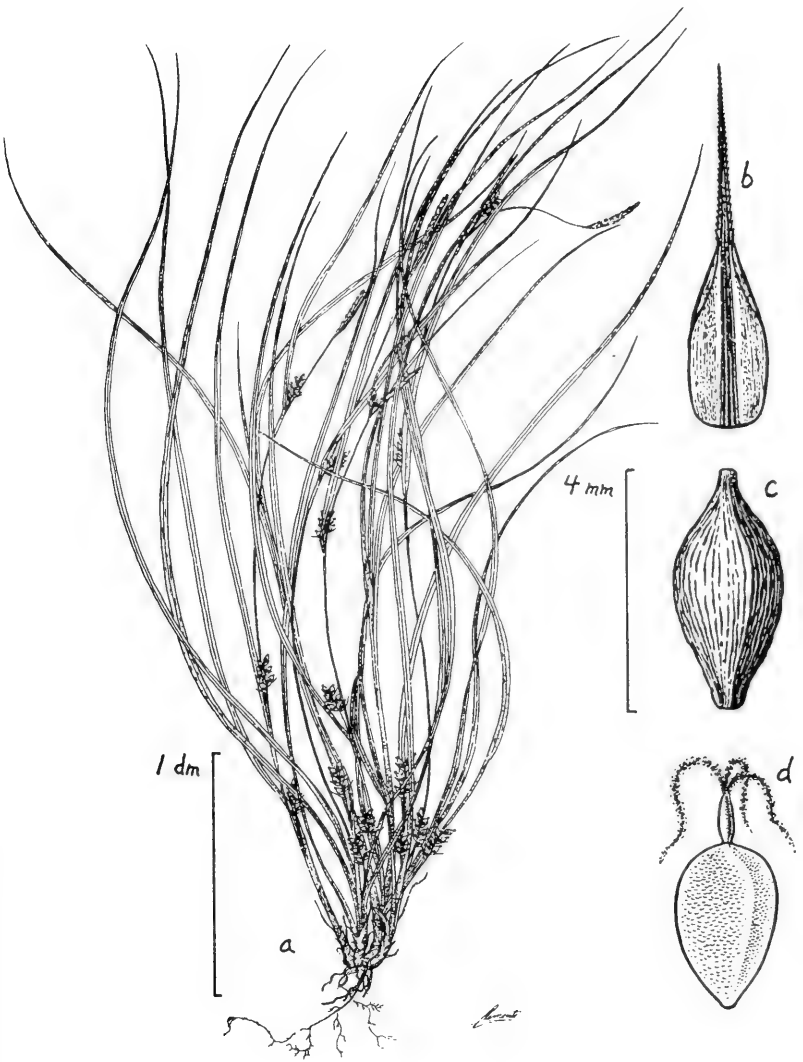


Figure 1. ***Carex edwardsiana*** **Bridges & Orzell (from type). a. Habit; b. Lower pistillate scale; c. Perigynium; d. Fruit with attached style and stigmatic branches.**

ca 0.5 air mi NE of Loop 360 bridge over Barton Creek, Oak Hill 7.5' Quad, 30° 14' 55" N, 97° 47' 47" W, 17 Apr 1989, *Orzell & Bridges 9280* (HOLOTYPE: TEX!; Isotypes: GH!,MICH!,MO!,NCU!,NY!,SMU!,US!).

Planta perennis, 25-35 cm longa, laxe vel dense cespitosa, vel breviter crasse rhizomatosa, foliis principalibus culmo longioribus. Cataphylla infra folia oblonga vel ovata, ca 5-40 mm longa, multicostata, distaliter carinata, acuta, brunneola vel fuscopurpurea. Pseudoculmi laterales steriles foliosissimi. Folia principalia approximata; vaginae foliorum brevissimae, pallide albovirides, saepe rubropunctatae, laeves, ventraliter subscariosae; ligula erecta squamiformis, angusta, ca 1 mm lata, hippocrepica; laminae patulae, compressae, anguste lineares, 20-40(-65) cm longae, 2-4 mm latae, margine scabridulae, pagina valde nervosa, glabra. Spicae 2-5, lineares vel anguste oblongae, remotae, ad basin plantae confertae. Spica ultima mascula, anguste lineari-ellipsoidea, 1.8-2.5 cm longa, 2-3 mm crassa, straminea, sessilis vel pedunculo 8 cm usque longo elevata, ultimam spicam femineam multo superans vel ei brevior. Bractea spicae masculae sine vagina, 5-50 mm longa; glumae masculae 4-5 mm longae, zona costali angusta, viridi, matrice scariosa, lata, alba; antherae 2.5-3 mm longae. Pedunculi spicarum femininarum crassi, filiformes vel lineares, scaberuli, 4-20 mm longi, infimi longissimi, pro parte maxima in vaginis bracteis inclusi; bracteae spicae feminae foliaceae, infimae longissimae, vaginis 4-15 mm longis, laminis erectis, spicas et culmos multo superantibus, saepe foliis longissimis aequilongis. Spicae laterales omnino femineae, (3-)7-9 florae, 7-20 mm longae, 4-7 mm crassae, floribus approximatis, rhachidi recta vel leviter fractiflexa; glumae femineae ovatae vel lanceolatae, cuspide aut mucrone incluso (2-)4-5(-11) mm longae, 1-1.5 mm latae, zona costali viridi, 3-costata, de latere scariosae, albidae, ad apicem contractae vel retusae, apice omnes valde cuspidatae, cuspide valde scabro, in ultimis glumis abbreviato. Perigynia obovoidea vel ellipsoidea, 4.5-5.0 mm longa, 2.0-2.2 mm lata, obscure vel acute trigona, faciebus in medio planis vel leviter concavis, subtiliter impressinerviis, viridibus vel brunneolis, rostro brevi (0.5 mm), recto vel leviter ad angulum 30° excurvato. Achenia sessilia aut stipite ad 0.1 mm longo insidenti, obovoidea, quasi sine rostro, 2.5-3.0 mm longa, 1.5-2.0 mm lata, trigona, arcte inclusa, minute papillosa, cum styli basi tumida articulata.

Perennial, 25-35 cm long, loosely to densely cespitose, or with stout, short rhizomes, the principal leaves longer than the culms. Cataphylls below leaves oblong to ovate, ca 5-40 mm long, multicostate, distally carinate, acute, brown

or reddish brown. Pseudoculms lateral, sterile, very leafy. Principal leaves approximate, sheaths short, pale greenish white, often with scattered reddish dots, smooth, ventrally subscarious; ligule an erect narrow scale, ca 1 mm wide, horseshoe shaped; blades spreading, flattened, narrowly linear, 20-40(-65) cm long, 2-4 mm wide, marginally scabridulous, surface strongly nerved, smooth. Spikes 2-5, oblong-linear, borne remotely on culms but densest at base of plant. Terminal spike male, narrowly ellipsoid-linear, 1.8-2.5 cm long, 2-3 mm thick, stramineous, sessile or on a peduncle to 8 cm long, from shorter than to much overtopping the upper female spike. Male spike bract sheathless, 5-50 mm long, male scales 4-5 mm long, white hyaline to stramineous with green midnerve; anthers 2.5-3 mm long. Peduncles of female spikes stout, filiform to linear, scaberulous, 4-20 mm long, the lowest longest, mostly included in the bract sheaths; female spike bracts as leaves, the lowest longest, with sheaths 4-15 mm long, the blades erect, much exceeding the spikes and culms, often as long as the longest leaves. Lateral spikes all female, (3-)7-9 flowered, 7-20 mm long, 4-7 mm thick, flowers approximate, rachis straight to slightly zigzag; female scales ovate to lanceolate, including cusp or mucro (2-)4-5(-11) mm long, 1-1.5 mm wide, the costal zone green, 3-ribbed, the sides scarious, white, tapered to retuse at apex, the tips of all scales strongly cuspidate, cusps strongly scabrous, with cusp length reduced in upper scales. Perigynia obovoid-ellipsoid, 4.5-5.0 mm long, 2.0-2.2 mm wide, obscurely to sharply trigonous, the faces at middle flat to slightly concave, finely impressed nerved, greenish to brownish, the beak short (0.5 mm), straight to slightly excurved, to a 30 degree angle. Achene sessile or with a stipe to 0.1 mm long, obovoid, essentially beakless, 2.5-3.0 mm long, 1.5-2.0 mm wide, trigonous, tightly included, minutely papillose, jointed with the swollen style base.

Additional collections examined (Paratypes): UNITED STATES. Texas: Kendall Co., mesic, wooded, N facing rocky slope on S bank of Guadalupe River, from W boundary of Guadalupe River State Park to at least 500 ft E; Anhalt 7.5' Quad, 29° 52' 22" N, 98° 29' 48" W, 18 Apr 1989, *W.R. Carr 9557* (SMU,TEX). Medina Co., mesic, rocky, wooded, N facing slope on S bank of Bandera Creek, ca 500-1000 ft E of W boundary of Hill Country State Natural Area; Twin Hollow 7.5' Quad, 29° 37' 12" N, 99° 12' 17" W, 20 Apr 1989, *W.R. Carr 9595* (SMU,TEX). Travis Co.: same as type locality, 7 Apr 1986, *Bridges 86-175* (SMU,TEX); 25 Apr 1987, *Bridges 87-140* (TEX); 30 Mar 1989, *Orzell & Bridges 8809* (GH,MICH,MO,NCU,NY,TAES,TEX); 30 May 1989, *Orzell & Bridges 10145* (SMU,TEX); seasonally mesic upper N facing slope forest at head of ravine on N side of Mountain Trail, ca 0.4 mi N of Comanche Trail, ca 2.5 air mi NW of int FM 2222 and FM 620 at Four Points, between Cypress Creek Arm and main pool of Lake Travis, Mansfield Dam 7.5' Quad, 30° 25' 07" N, 97° 53' 16" W, 8 Apr 1989, *Orzell & Bridges 9062* (MICH,MO,NCU,SMU,TEX); wooded slopes in ravine, E end of 200 ft limestone cliff on S bank of Bull Creek, SE of Loop 360, 0.5 mi NE of Lakewood

Drive; Jollyville 7.5' Quad, 30° 22' 38" N, 97° 46' 22" W, 9 Apr 1983, *W.R. Carr 4654* (SMU); rocky bank of ephemeral creek in cedar woods ca 2700 ft NE of summit of Cat Mtn., Austin West 7.5' Quad, 30° 21' 24" N, 97° 46' 38" W, 1 May 1983, *W.R. Carr 4794* (SMU,TEX); in stream bottom, in shade of walnuts and hackberries, between limestone ridges ca 0.75 mi NNW of int Loop 360 and Lakewood Drive, Jollyville 7.5' Quad, 30° 22' 57" N, 97° 47' 28" W, 8 Apr 1984, *W.R. Carr 6009* (SMU,TEX); in cedar/Texas oak woods on steep slope in limestone ravine, ca 1200 ft W of Spicewood Springs Rd, ca 0.7 mi S of Loop 360, Jollyville 7.5' Quad, 30° 22' 33" N, 97° 45' 58" W, 14 Apr 1984, *W.R. Carr 6010* (SMU,TEX); along banks of ephemeral stream in small cedar-wooded ravine, ca 2500 ft NW of int Loop 360 and N branch of Spicewood Springs Rd, Jollyville 7.5' Quad; 30° 23' 15" N, 97° 46' 40" W, 22 Apr 1984, *W.R. Carr 6042* (SMU).

Carex edwardsiana is locally abundant in moist, rich, black, clayey to loamy soil rich in humus, mostly in protected slope and ravine forests in the Eastern and Southern Balcones Escarpment sections of the Edwards Plateau of Texas. These forests are similar to the north slope deciduous forests described by Van Auken (1988) and the canyon flora of Palmer (1920). The rich, calcareous, seasonally moist soils support many species at their western and southern range limits, as well as providing habitat for numerous local and regional endemics. Canopy trees associated with *C. edwardsiana* include *Quercus buckleyi, Q. durandii, Q. muhlenbergii, Juniperus ashei, Fraxinus texensis, Celtis reticulata, Carya illinoiensis* and *Prunus serotina.* Shrub and woody vine associates include *Aesculus pavia, Garrya lindheimeri, Lindera benzoin, Rhus radicans, Callicarpa americana, Ungnadia speciosa, Parthenocissus quinquefolia, Morus rubra, Cornus drummondii* and *Juglans microcarpa.* The herb layer at some sites includes the local endemics [primarily the PC1 endemics of Amos & Rowell (1988)] *Anemone edwardsiana, Commelinantia anomala, Euphorbia roemeriana, Onosmodium helleri* and *Ruellia drummondiana*, and the regionally endemic *Carex planostachys, Desmodium psilophyllum, Dichanthelium pedicellatum, Hedeoma acinoides, Mirabilis lindheimeri, Nolina texana, Polytaenia texana, Salvia roemeriana* and *Tetragonotheca texana.* More wide ranging herb associates, generally at their western limit, include *Aristolochia serpentaria, Aquilegia canadensis, Arisaema dracontium, Aster texanus, Chasmanthium latifolium, Geum canadense, Parietaria obtusa, Senecio obovatus* and *Verbesina virginica. Carex edwardsiana* is closest morphologically to *C. oligocarpa*, to which it has previously been referred. Both have the trigonous, basally tapering, apically constricted or beaked perigynia with numerous finely impressed nerves characteristic of section *Oligocarpae.* In general aspect, *C. edwardsiana* differs from *C. oligocarpa* in having shorter culms with more basally clustered spikelets and leaves usually much exceeding the culms. It is not as densely cespitose as *C. oligocarpa* and forms clumps from 10-20 cm in diameter by means of short, stout rhizomes. It tends to have more perigynia per

spikelet, with these more closely clustered on the spikelet axis. The perigynia and achenes are larger than those reported for *C. oligocarpa.* The achene lacks an apiculus, and is not as long stiped as *C. oligocarpa. C. oligocarpa* also has reddish zones on the staminate scales, while those of *C. edwardsiana* are all white hyaline. The following key can serve to distinguish these two species.

Plants densely cespitose, to 50 cm tall, culms about the length of the longest leaves, spikelets mostly in the upper half of the culms; perigynia averaging 4 per spikelet (-8 in some cases), overlapping each other less than half their length; perigynia 3.5-4 mm long, achene 2.0-2.3 mm long, distinctly stipitate and apiculate; scales of the staminate spike with white to reddish brown with green midnerve ..... *Carex oligocarpa* Schkuhr.

Plants loosely to densely cespitose, often forming clumps to 10-20 cm in diameter by short, stout rhizomes, 25-35 cm tall, longest leaves much exceeding the culms, spikelets mostly in the lower half of the culms, densest in the lowest 5 cm of the culm; perigynia averaging 7 per spikelet (fewer on upper spikelets or on poorly developed culms), overlapping for half of their length; perigynia 4.5-5.0 mm long, achene 2.5-3.0 mm long, essentially sessile and beakless; scales of staminate spike white hyaline with green midnerve ..... *Carex edwardsiana* Bridges & Orzell

The nearest approaches of *C. oligocarpa* to the range of *C. edwardsiana* appear to be in Dallas and Cooke counties in north central Texas, and perhaps in western Louisiana or extreme eastern Texas. Both of these regions are about 320 km from the nearest locations of *C. edwardsiana.* Although restricted to specific, isolated microhabitats, *Carex edwardsiana* seems to be frequent within this habitat and probably occurs in numerous localities in the Eastern and Southern Balcones Escarpment Sections of the Edwards Plateau. It may occur in all the counties between Travis and Medina and perhaps extends slightly farther to the north and west. Its total distribution is expected to follow the pattern of the other Balcones Escarpment endemics or near endemics (Amos & Rowell 1988), which are a conspicuous component of the vernal flora of these geographically isolated mesic ravines.

ACKNOWLEDGMENTS

Special thanks to William R. Carr of Austin, Texas, who gave us access to his collections of this species and provided ecological data from several localities. We wish to acknowledge Clemente F. Guzman III of Austin for preparing the illustration. Thanks to reviewers Guy Nesom and Marshall Johnston for useful comments and to Rupert Barneby for editing the Latin

description. Publication costs were provided by the Plant Resources Center at the University of Texas at Austin.

LITERATURE CITED

Amos, B.B. & C.M. Rowell, Jr. 1988. Floristic geography of woody and endemic plants. pp. 26-42 *in* B.B. Amos & F.R. Gehlbach, eds., *Edwards Plateau Vegetation.* Baylor University Press, Waco.

Correll, D.S. & M.C. Johnston. 1970. *Manual of the Vascular Plants of Texas.* Texas Research Foundation, Renner.

Palmer, E.J. 1920. The canyon flora of the Edwards Plateau of Texas. J. Arnold Arb. 1:233-239.

Van Auken, O.W. 1988. Woody vegetation of the southeastern escarpment and plateau. pp. 43-55 *in* B.B. Amos & F.R. Gehlbach, eds., *Edwards Plateau Vegetation.* Baylor University Press, Waco.

Phytologia (September 1989) 67(2):155-157.

SOLIDAGO SIMPLEX (COMPOSITAE: ASTEREAE), THE CORRECT NAME FOR *S. GLUTINOSA*

Guy L. Nesom
Department of Botany, University of Texas, Austin, Texas 78713 U.S.A

ABSTRACT

Solidago simplex Kunth, typified by plants from south central México, is an earlier name for a widespread species of the United States and Canada that has been variously called *S. decumbens, S. glutinosa, S. spathulata* var. *nana* and *S. spathulata* var. *neomexicanus*. The recognition of a "tall" and "short" form of *S. simplex* in the western United States is difficult and may reflect the existence of independently derived ecotypes rather than separate lineages.

KEY WORDS: *Solidago*, Asteraceae, taxonomy, México, North America.

A population system of *Solidago* in the eastern Sierra Madre of México is conspecific with a widespread taxon of the United States and Canada. The Mexican plants are *S. simplex* Kunth, which was described from plants from south central México, probably in the vicinity of México City, and they have been collected in the eastern Sierra Madre in the states of México, Hidalgo, Guanajuato, Tamaulipas and Nuevo León. Those from north of México have been variously called *S. spathulata, S. decumbens* and *S. glutinosa*. Rzedowski (1985) was the first to call attention to the probable synonymy of *S. simplex* with these taxa. Ringius (1986) and Ringius & Semple (1987) mapped the Mexican populations but apparently were unaware they had been named early in the 19th century. The latter workers essentially followed an earlier study by Cronquist (1947) by treating the western (diploid) and eastern (tetraploid) segments of this species complex (in the U.S. and Canada) as subspecies of *S. glutinosa* and recognizing varieties from within both subspecies. *Solidago spathulata* DC., a population system from the coastal strand of Oregon and California, was segregated by Ringius (1986) as a species distinct from widespread *S. glutinosa*, and I agree with this.

Since the earlier name for *S. glutinosa* and its infraspecific taxa is *S. simplex*, a number of new combinations will be necessary for taxa north of México, but with the exception of the caveat offered below, I defer to Dr. Ringius in applying a taxonomic scheme to the variation pattern he has studied in detail.

My view of the taxonomy of the western segment of *Solidago simplex* is presented below. The synonymy is representative but not complete.

Solidago simplex Kunth, Nov. Gen. Sp. 4 [folio]:81. 1818; 4 [quarto]:103. 1820. TYPE: MÉXICO. Santa Rosa ("Sanctae Rosae Mexicanorum"), September, *Humboldt & Bonpland s.n.* (HOLOTYPE: P, fiche!).

S. glutinosa Nutt., Trans. Amer. Philos. Soc. 2. 7:332. 1840. *S. spathulata* subsp. *glutinosa* (Nutt.) Keck, Aliso, 4:104. 1958. [tall form].

S. multiradiata var. *neomexicana* A. Gray, Proc. Amer. Acad. Arts 17:191. 1882. *S. neomexicana* (A. Gray) Woot. & Standl., Contr. U.S. Natl. Herb. 16:182. 1913. *S. spathulata* var. *neomexicana* (A. Gray) Cronq., Vasc. Pl. Pacif. Northw. 5:311. 1955. [tall form].

S. humilis var. *nana* A. Gray, Syn. Fl. N. Amer. 1(2):148. 1884. *S. glutinosa* var. *nana* (A. Gray) Cronq., Rhodora 49:76. 1947. *S. spathulata* var. *nana* (A. Gray) Cronq., Vasc. Pl. Pacif. Northw. 5:311. 1955. *S. purshii* var. *nana* (A. Gray) Farw., Amer. Midl. Nat. 12:72. 1930. [alpine, short form].

S. bonplandii O. Kuntze, Rev. Gen. Pl. 1:315. 1891.

S. decumbens E. Greene, Pittonia 3:161. 1897. [tall form].

S. oreophila Rydb., Mem. N.Y. Bot. Gard. 1:387. 1900. *S. decumbens* var. *oreophila* (Rydb.) Fernald, Rhodora 38:202. 1936. [tall form].

Two varieties have been distinguished among the plants of *Solidago simplex* in western North America (var. *nana* and var. *neomexicana* of *S. spathulata*, or var. *nana* and var. *glutinosa* of *S. glutinosa*). The alpine plants are generally shorter with a more compact, fewer-headed capitulescence and are restricted in distribution and habitat. The taller plants are found from British Columbia to central México in a much wider range of habitats. In my opinion, it is difficult to provide more than an arbitrary separation of an alpine variety (var. "*nana*") of short stature from a taller one of lower elevations (var. "*glutinosa*"). Both forms, with intermediates, have sometimes been collected from the same site and mounted on the same sheet. The taller plants may have a compact or more elongated capitulescence. Cronquist's observation (1955, p. 311) that the varietal names in this group refer to "intergradient but fairly well marked ecotypes" appears to be true, and I suggest that in the western United States the alpine forms may be independently derived at various localities rather than constituting a single lineage. If so, such forms should not receive formal taxonomic recognition.

The Mexican plants have noticeably less pubescent achenes than plants widespread in the western United States and a greater tendency to produce

scattered cilia along the petiole margins. The differences, however, are only of degree and do not call for separate taxonomic status. Comments on a putative hybrid between *S. simplex* and a species endemic to eastern México are found in a separate paper (Nesom 1989).

ACKNOWLEDGMENTS

I appreciate the helpful comments of B.L. Turner and Marshall Enquist.

LITERATURE CITED

Cronquist, A. 1947. Notes on the Compositae of northeastern United States. IV. *Solidago.* Rhodora 47:69-79.

_____. 1955. Part 5: Compositae. *In* Hitchcock, C.L. et al. *Vascular Plants of the Pacific Northwest.* Univ. of Washington Press, Seattle.

Nesom, G.L. 1989. New species of Mexican *Solidago* (Compositae: Astereae). Phytologia 67(2):142-147.

Ringius, G.S. 1986. A biosystematic study of the *Solidago spathulata* DC. - *S. glutinosa* Nutt. complex (Compositae: Astereae). Ph.D. dissertation, Univ. Waterloo, Waterloo, Canada.

Ringius G.S. & J.S. Semple. 1987. Cytogeography of the *Solidago spathulata* - *glutinosa* complex (Compositae: Astereae). Canad. J. Bot. 65:2458-2462.

Rzedowski, J. 1985. *Flora Fanerogamica del Valle de México.* Vol. 2, Dicotyledoneae. Instituto de Ecologia, México, D.F.

Phytologia (September 1989) 67(2):158-167.

NEW SPECIES, NEW SECTIONS, AND A TAXONOMIC OVERVIEW OF AMERICAN *PLUCHEA* (COMPOSITAE: INULEAE)

Guy L. Nesom
Department of Botany, University of Texas, Austin, Texas 78713 U.S.A

ABSTRACT

Two new species of *Pluchea*, both related to *P. foetida* and *P. rosea*, are proposed from México. **Pluchea yucatanensis** sp. nov. is described from Belize and the Yucatán peninsula of México and its occurrence is noted as an adventive in the United States. **Pluchea mexicana** comb. nov. is endemic to alkaline plains of northeastern San Luis Potosí. The two newly proposed species and others with sessile, clasping and mostly oblong leaves are segregated as **Pluchea** sect. **Amplectifolium** sect. nov., and a key is provided to the six American species of that group. In addition, the identity of sect. *Pluchea* is clarified and another section is proposed, sect. **Pterocaulis** sect. nov., with plants characterized by winged stems from decurrent leaves. *Pluchea sericea* is maintained within the genus as sect. *Phalacroline* A. Gray, possibly closely related to *Pluchea lanceolata*.

KEY WORDS: Asteraceae, *Pluchea*, México, floristics, taxonomy.

Pluchea comprises about 40 species. More than half of these are in the New World, with the remainder in Africa, Asia and Australia. Robinson & Cuatrecasas (1973) reviewed the generic boundaries among *Pluchea, Tessaria* and *Berthelotia*, but apart from this and the early studies of de Candolle and Asa Gray, there has been no attempt to delimit the infrageneric structure of *Pluchea*. In the the course of a floristic study of Mexican *Pluchea*, it quickly became clear that for the most part, the American species could be arranged in morphologically distinct groups, and in the present paper formal status is proposed for these as sections. Old World species have been associated with these groups in some cases, but a more complete view of the genus still remains to be provided. Nevertheless, I believe the preliminary structure proposed here will prove to be helpful. Descriptions are first presented for two new Latin American species.

Godfrey (1952) segregated *Pluchea rosea* Godfrey from *P. foetida* (L.) DC. Both are species primarily of the southeastern United States and the West

Indies. He also described *P. rosea* var. *mexicana* Godfrey, a series of populations restricted to México and disjunct from the main range of *P. rosea*. In reviewing the taxonomy of Mexican *Pluchea*, I find that two separate elements are represented among the plants cited by Godfrey as *P. rosea* var. *mexicana*, and I recognize one of them as a species distinct from *P. rosea*.

Pluchea mexicana (Godfrey) Nesom, comb. et stat. nov. Based on *Pluchea rosea* Godfrey var. *mexicana* Godfrey, J. Elisha Mitchell Sci. Soc. 68:269. 1952. TYPE: MÉXICO. San Luis Potosí: alkaline plains, Hacienda de Angostura, 5 Aug 1891, *C.G. Pringle 3813* (HOLOTYPE: GH; Isotypes: C,F!,MU!,NY,PH,US!).

Erect, herbaceous perennials ca 4-6 dm tall. Stems with a mixture of sessile and stipitate glands and long, thick, multicellular, non glandular trichomes. Leaves alternate, lanceolate- oblanceolate-oblong, erect-ascending, 25-45 mm long, 7-18 mm wide, with minutely serrulate margins, sessile, clasping, slightly auriculate, coarsely pubescent with a dense mixture of thick, long and short, gland tipped hairs and thick, viscid hairs with colored crosswalls, sessile resin glands absent or mixed with the stipitate ones. Heads 6-7 mm wide, sessile, immediately subtended by bracteal or reduced leaves. Phyllaries lanceolate, in 3-4 series of nearly equal length, the innermost 5-6 mm long, rose-purple with sharply delimited, light colored margins, sclerified and mostly glabrous on the lower half, stipitate glandular and viscid pubescent with thick trichomes on the upper half. Pistillate flowers numerous, the corollas filiform, pink to purplish, 4.4-4.9 mm long, minutely 3 lobed and glandular at the apex, the style branches barely if at all exserted; hermaphroditic flowers ca 25-30, the corollas 5 mm long, gradually ampliate, the lobes triangular-lanceolate, glandular, purplish. Achenes cylindrical, 6 nerved, very sparsely strigose and glandular, mature size not seen; pappus a single series of 18(-20) minutely barbellate bristles 4 mm long.

Additional collections examined. MÉXICO. San Luis Potosí. Media Luna, near Río Verde, *Palmer 75* (CM,F,MO,US); Minas de San Rafael, plains between Tiburcio and Angostura, June 1911, *Purpus s.n.* (F,US); and July 1911, *Purpus s.n.* (F,MO,US). These three collections were cited by Godfrey (1952) as *P. rosea* var. *mexicana*.

Pluchea mexicana is endemic to the gypseous, alkaline plains (ca 800-1000 m) north of Río Verde, San Luis Potosí and flowers June to July. This area is common to several other narrow endemics of Compositae (i.e., *Geissolepis suaedaefolia* B. Robinson, *Stephanodoria tomentella* (B. Robinson) E. Greene, *Viguiera potosina* S.F. Blake, *Pinaropappus multicaulis* Brandegee and *Cirsium excelsius* (B. Robinson) Petrak. Attempts in September 1988 to relocate populations of the *Pluchea* and *Cirsium* were unsuccessful, although the other species noted above were found.

Pluchea mexicana differs from *P. rosea* in its vestiture of stipitate glandular hairs, sometimes mixed with sessile glands and thick, viscid but non glandular hairs. *Pluchea rosea* has only sessile glands and a puberulous vestiture of non glandular hairs that are apically attenuate and usually drawn out into long filiform extensions. Additionally, the phyllaries of *P. mexicana* are mostly of even length, the basal portions are strongly sclerified, they are rosy with sharply delimited, white margins and only the outermost are densely hairy. The inner are glandular but otherwise sparsely hairy to glabrous. Godfrey (1952, p. 269) also observed some of these differences and noted that the vestiture of the plants from San Luis Potosí is ". . . quite unlike anything found in [*P. rosea*] elsewhere." I also call attention to the disjunct geographical position of the plants from San Luis Potosí and their very different habitat; *P. rosea* is known only from coastal or near coastal sites, and in México, it is known from scattered localities (cited below). I believe the distinctive morphological features of these inland plants are of enough significance to warrant separating *P. mexicana* at the specific rank, although it seems clear that the two taxa are closely related.

Pluchea rosea was noted by Godfrey (1952) to occur in the southeastern United States, West Indies and México. With the separation of *P. mexicana*, only one of the Mexican collections he cited as *P. rosea* remains correctly identified as that species (Quintana Roo), but I have studied additional collections of *P. rosea* from Central America, which are included among the following: BELIZE. Between London and Rancho along the old Northern Highway to Maskall, wet margin of *Eleocharis* marsh, 50 m, 20 Mar 1987, *Davidse & Brant 32896* (US).

HONDURAS. Depto. Gracias a Dios, W of Brus Laguna, cut over forest, sea level, 23 Apr 1971, *Nelson & Hernández s.n.* (MO).

MÉXICO. Quintana Roo, in savanna, Lake Chichancanab (Laguna Chankabnab), 28-29 Jul 1932, *Steere 2407* (F,US).

NICARAGUA. Dept. Zelaya: ca 11.9 km SW of Bismuna Tara, along river in savanna, 19 Apr 1978, *Stevens 7732* (F-2 sheets); vicinity of Awastara, savanna, 2 Jul 1980, *Stevens 17759* (F).

Another taxon distinctive in morphology but apparently unnamed is known from several collections primarily from the Yucatán peninsula of Belize and México.

Pluchea yucatanensis Nesom, sp. nov. TYPE: MÉXICO. Campeche: In savanna, Champoton, 7-15 Jul 1932, *Steere 1844* (HOLOTYPE: LL!; Isotype: US!).

P. mexicanae habitu et morphologia foliorum sed absentia trichomatum nonglandiferorum differt. Phyllaria interioria linearilanceolata, 5-6 mm longa, extima ovati-lanceolata longitudine interioria aequantia.

Perennials 2-6 dm tall, single stemmed from the base and unbranched until the capitulescence, the stems, leaves and phyllaries glandular but lacking other pubescence. Leaves leathery and slightly succulent, with sessile to slightly stipitate glands, alternate, mostly oblong-obovate with obtuse, mucronulate apices, subclasping and slightly auriculate, ascending to erect, 3-5 cm long, (6-)15-19 mm wide, slightly reduced in size immediately below the capitulescence, the margins serrulate with (6-)8-11 pairs of small teeth or mucros. Heads 8-14 in small, terminal, corymboid clusters, on ultimate pedicels 2-5 mm long, each immediately subtended by a lanceolate bracteal leaf, turbinate to campanulate turbinate, 4-5 mm wide; phyllaries densely and prominently stipitate glandular near the apices, stipitate to sessile glandular below, without other pubescence, in 3-4 slightly graduated series, the innermost linear lanceolate, 5-6 mm long, the outer ovate lanceolate, equally as long or nearly so, or sometimes only ca half as long. Pistillate flowers numerous, the corollas pink to lavender, filiform, 3.0-3.3 mm long, minutely 3 lobed and glandular at the apex, the style branches exserted 0.3-1.0 mm; hermaphroditic flowers 20-22, the corollas pink to cream, 4.5-5.0 mm long, gradually ampliate, the lobes linear lanceolate, 0.9-1.0 mm long, glandular. Achenes cylindrical, 0.8-0.9 mm long, 6-8 nerved, sparsely strigose, eglandular; pappus of 18-20, minutely barbellate bristles 4.3-4.8 mm long.

Additional collections examined: BELIZE. 9.8 mi S of Belize, mangrove swamp, 5 Jun 1973, *Croat 23817* (LL,MO,US); 1 mi W of jct with road to Ferguson Bank, ca 8 mi E of Hattiesville, along Hector Creek Rd, low, intermittently wet area, many temporary ponds, sedges, palmetto, and broad-leaved scrub, 16 Aug 1971, *Sorensen 7072* (F,MO,US); mile 13, Western Highway, growing in pools in sandy, waste ground, 30 Aug 1980, *Whitefoord 2268* (MO).

UNITED STATES. Mississippi: Hancock Co., sandy, low area along Jordan River S of Kiln, edge of mixed woods with *Serenoa, Sabal, Nyssa, Taxodium*, 30 May 1967, *Jones 12656* (TEX).

Pluchea yucatanensis appears to be restricted essentially to the Yucatán peninsula of México and Belize, where it occurs at low elevations near the coast and flowers June to August. One collection of *P. yucatanensis* has been made from a near coastal locality in Mississippi of the southern United States, where it probably is adventive. It is similar to *P. rosea* in habit and leaf morphology but the whole plant without any type of pubescence except primarily sessile glands. The leaves are leathery and slightly succulent and are restricted at flowering to the upper half of the strictly erect, unbranched stems.

PLUCHEA SECTION *AMPLECTIFOLIUM*

Both taxa newly proposed here as species, as well as *P. oblongifolia* of eastern South America and *Pluchea rosea, P. foetida* and *P. longifolia* of North and Central America, have erect to ascending, lanceolate to oblanceolate-oblong

leaves with serrulate margins and sessile, clasping, slightly auriculate bases. The plants are herbaceous perennials and produce strictly erect, mostly unbranched stems. The inner phyllaries are not strongly differentiated from the outer. The species vary among themselves in the production of glands and eglandular trichomes on the achenes. Both pistillate and hermaphroditic corollas have glandular lobes. In all of these species, the uppermost bracteal leaves in the capitulescence are reduced in size and petiolate, pointing to a close relationship with sect. *Pluchea*, which has petioled leaves. These taxa form a closely related cluster of species that I recognize as a distinctive section within the genus. The African species *Pluchea dioscoridis* (L.) DC. has similar leaf morphology and may also belong here, but it has eglandular corolla lobes and glandular anther appendages. A key to the American species of the section follows.

Pluchea sect. **Amplectifolium** Nesom, sect. nov. TYPE SPECIES: *Pluchea foetida* (L.) DC.

Folia erecti-ascendentia oblanceolati-oblonga marginibus serratis et basibus sessilibus amplectentibus parum auriculatis.

ARTIFICIAL KEY TO THE AMERICAN SPECIES OF SECT. *AMPLECTIFOLIUM*

1. Leaves mostly 8-20 cm long, 3-7 cm wide; heads campanulate-cylindric, the innermost phyllaries 9-11 mm long, middle phyllaries 2.5-3.0 mm wide; southern Florida ..... *P. longifolia* Nash

1. Leaves mostly 3-10 cm long, 1-3 cm wide; heads turbinate-campanulate, the innermost phyllaries 5-8 mm long, middle phyllaries 1.0-1.5 mm wide (2)

   2. Plants stipitate to sessile glandular, without other pubescence; Yucatán peninsula of México and Belize, adventive in Mississippi, United States ..... *P. yucatanensis* Nesom

   2. Plants glandular with sessile, resin glands or gland tipped hairs, also hairy ..... (3)

3. Plants with gland tipped hairs, sessile resin glands lacking or mixed with numerous stipitate ones; phyllaries in several series of nearly equal length, sclerified and mostly glabrous on the proximal half, viscid pubescent with thick trichomes and stipitate glandular on the distal half; east central San Luis Potosí, México ..... *P. mexicana* (Godfrey) Nesom

3. Plants with sessile, translucent, yellowish, resin glands, stipitate glands absent or rare; phyllaries in several strongly graduated or even series, relatively evenly thick-herbaceous, moderately to densely puberulent or appressed villous from base to tip with fine hairs ..... (4)

4. Heads basally rounded with a prominent impression at the peduncle insertion; phyllaries with 3-7, prominent, thin, longitudinal nerves, the outer and inner phyllaries of relatively even length, glandular and cobwebby ciliate margined but mostly without other vestiture; coastal Brasil ..... *P. oblongifolia* DC.

4. Heads basally rounded and impressed to obtuse; phyllaries 1 nerved, equal to prominently graduated in length, at least the outermost glandular and puberulent villous ..... (5)

5. Heads 6-12 mm wide, basally rounded to impressed; phyllaries thinly arachnoid pubescent, with sessile glands, the inner 5-8 mm high, the outer ovate, much shorter than the inner 2-3 series; phyllaries and corollas creamy white; southeastern United States to Texas, also Hispañola and Veracruz, México, where probably adventive .. *P. foetida* (L.) DC.

5. Heads 5-9 mm wide, basally obtuse to barely acute; phyllaries usually arachnoid and commonly also with dense, thick, viscid hairs, the inner 4-6 mm high, the outer ovate-acuminate to ovate-lanceolate, half to equally as long as the innermost; corollas and often the phyllaries pink to purplish; SE United States to Texas, West Indies, Gulf and scattered localities along the Caribbean coast from Campeche, México, to Nicaragua ..... *P. rosea* Godfrey

Pluchea rosea is very similar to *P. foetida* and many apparent intermediates are found in the southeastern United States. The notes by Cronquist (1980) are particularly helpful in distinguishing the two. The plants of *P. rosea* cited from Nicaragua may be influenced by genes from *P. yucatanensis*, because the heads are somewhat narrower and less pubescent and the phyllaries narrower and more equal in length than in plants typical of the southeastern U.S.

I have seen only one collection of *Pluchea foetida* from anywhere in Central America or México: Veracruz, 3 km antes de llegar a las Choapas, 13 May 1980, *Calzada 5964* (TEX). It is typical in morphology of conspecific plants of the southeastern United States.

PLUCHEA SECT. *PLUCHEA*

Pluchea Cass., Bull. Sci. Soc. Philom. Paris 1817:31. 1817. TYPE SPECIES: *Conyza marilandica* Michx. [=*P. purpurascens* (Sw.) DC. = *P. odorata* (L.) Cass., *sensu* Gillis, 1977].

Stylimnus Rafin., J. Phys. Chim. Hist. Nat. 89:100. 1819. TYPE SPECIES: *Conyza marilandica* Michx. *Pluchea* sect. *Stylimnus* (Rafin.) DC., Prodr. 5:540. 1836. Other synonyms as noted by Godfrey (1952).

The species of sect. *Pluchea* are herbaceous to suffrutescent perennials characterized by petioled, mostly elliptic lanceolate leaves with attenuate to obtuse bases. The inner phyllaries are but little differentiated from the outer, and the achenes are sparsely hairy and variably glandular on the nerves and faces. Both pistillate and hermaphroditic corollas have glandular lobes.

Species included: *Pluchea camphorata* (L.) DC., *P. odorata* (L.) Cass., *P. fastigiata* Griseb., *P. symphytifolia* (Miller) DC. and perhaps others. *Pluchea indica* Less., an Asian species, almost certainly belongs here, but it has more strongly differentiated inner phyllaries and glandular anther appendages. As noted by Cooperrider & Galang (1965), on Pacific islands it forms sterile hybrids with *P. symphytifolia*.

PLUCHEA SECT. *PTEROCAULIS*

Another group of primarily American species shows strong morphological unity and warrants recognition as a section, which is proposed here.

Pluchea sect. **Pterocaulis** Nesom, sect. nov. TYPE SPECIES: *Pluchea salicifolia* (Miller) S.F. Blake

Caules alati extensionibus foliorum lineari-lanceolatorum serratorum longi-decurrentium.

Species included: *Pluchea laxiflora* Hook. & Arn., *P. macrocephala* DC., *P. microcephala* Godfrey, *P. parvifolia* (A. Gray) Godfrey, *P. sagittalis* (Lam.) Cabr. (including *P. suaveolens* (Vell.) O. Kuntze and *P. salicifolia* (including *P. subdecurrens* Cass. and *P. adnata* (Willd.) Mohr). The African species *P. ovalis* (Pers.) DC. appears to belong here as well.

The species of *Pluchea* sect. *Pterocaulis* are suffrutescent perennials characterized by stems completely winged by the basal extensions of the linear-lanceolate, serrate, long decurrent leaves. Both pistillate and hermaphroditic corollas have glandular lobes. The achenes vary among species in their production of hairs and glands. The species limits among these taxa are in need of taxonomic study.

PLUCHEA SECT. *PHALACROLINE*

Robinson & Cuatrecasas (1973) presented a seminal discussion of generic limits among the New and Old World species centered around *Pluchea*, including *Tessaria* and *Berthelotia*, although I believe the groupings proposed in the

present paper will also prove to be useful as a starting point for understanding the phylogeny. In my opinion, Robinson & Cuatrecasas were correct in recognizing the polyphyletic aspect of *Tessaria sensu* Cabrera (1939) but incorrect in limiting the genus to only *T. integrifolia* Ruiz & Pavon, which clearly is congeneric with *T. absinthioides* (Hook. & Arn.) Cabrera. The two are set apart from the rest of *Pluchea* by their combination of alveolate and paleaceous receptacles, spreading reflexed inner phyllaries, extremely peculiar style nectary floral morphology, thickened margins of the hermaphroditic flowers, pappus bristles basally united into a thick cylindrical cup and glabrous achenes. *Tessaria integrifolia* is the more advanced of the two species in its typically solitary (but variable in number), hermaphroditic flowers with deeply cleft corolla lobes. The taxonomy accepted by Robinson & Cuatrecasas (1973) was summarized by their recognition of two genera among the plucheoid species: 1) a heterogeneous *Pluchea*, including *Berthelotia* and 2) *Tessaria*.

Pluchea sericea (Nutt.) Coville of the southwestern United States and northwestern México has recently been treated as *Tessaria* (Correll & Johnston, 1970), but it clearly does not belong with that genus, as it lacks the distinctive features of floral and pappus morphology. As suggested by Rydberg in the publication of his combination to *Berthelotia*, it may be related to the Afro-Asian species *P. (Berthelotia) lanceolata* (DC.) Hiern. (the type of *Berthelotia*), with which it shares pappus bristles with expanded apices and a sericeous vestiture. Gray also allied it with *Berthelotia* (see below). If treated as a monotypic genus, Aven Nelson's name is already available. Until more detailed and incisive techniques are applied to the study of its relationships, I maintain it as *Pluchea* and recognize its isolated position among American members of the genus, but possible relatedness to *P. lanceolata*, by treating it as a member of section *Phalacroline*.

Pluchea sect. *Phalacroline* A. Gray, Pl. Wright. 1:102. 1849. TYPE SPECIES: *Tessaria borealis* A. Gray (=*Pluchea sericea*). Gray discussed a possible relationship between the type species and *Berthelotia lanceolata*.

Pluchea sect. *Berthelotia* (DC.) A. Gray, Proc. Amer. Acad. Arts 17:212. 1882. *Berthelotia* DC., Prodr. 5:375. 1836. TYPE SPECIES: *B. lanceolata* DC. (=*Pluchea lanceolata* (DC.) Hiern.). Gray cited both *B. lanceolata* and *Tessaria borealis* as members.

Eremohylema A. Nelson, Univ. Wyoming Pub. Bot. 1:54. 1924. TYPE SPECIES: *E. sericea* (Nutt.) A. Nelson (=*Pluchea sericea*).

Because the nomenclature of *Pluchea sericea* has been somewhat confused, a summary is presented here.

Pluchea sericea (Nutt.) Coville, Contr. U.S. Natl. Herb. 4:128. 1893. Based on *Polypappus sericeus* Nutt., J. Acad. Nat. Sci. Philad. ser. 2, 1:178.

1847. TYPE: UNITED STATES. "Rocky Mountains of Upper California," *Gambell s.n. Berthelotia sericea* (Nutt.) Rydb., Bull. Torrey Bot. Club 33:154. 1906. *Eremohylema sericea* (Nutt.) A. Nelson, Univ. Wyoming Pub. Bot. 1:54. 1924. *Tessaria sericea* (Nutt.) Shinners, Sida 3:122. 1967.

Tessaria borealis Torrey & A. Gray ex A. Gray, Pl. Fendl. 75. 1849. Gray cited collections (SYNTYPES) by Fremont, Coulter and Emory. *Tessaria borealis* A. Gray, nom. superfl., Pl. Wright. 1:102. 1852. *Pluchea borealis* (Torrey & A. Gray ex A. Gray) A. Gray, Proc. Amer. Acad. Arts 17:212. 1882.

Tessaria borealis was attributed several times by Gray (1849; 1882) to Torrey & Gray (ex A. Gray in Pl. Fendl.). Shortly after his study of the Fendler collections, Gray republished the name with a type and Latin description as *T. borealis* A. Gray (1852), but this must be regarded as superfluous. In the same paper, he noted that a still earlier publication of the same name was mistakenly attributed to DeCandolle by Torrey (in Emory, Notes Military Reconn. 143. 1848) and that it had been intended as an enumeration, not a description. Nuttall's original name, *Polypappus sericeus* (1847), was given as a synonym in both of Gray's reports (1849; 1852).

Some shrubby species of *Pluchea* in South America do not belong with any of the groups discussed here. *P. dodoneaefolia* (Hook. & Arn.) H. Robins. & Cuatr., *P. zamalloae* (Cabrera) H. Robins. & Cuatr. and *P. fiebrigii* H. Robins. & Cuatr. were noted by Robinson & Cuatrecasas (1973, p. 280) to form a "macroscopically evident group," and *P. chingoyo* DC. of Perú appears to be morphologically isolated, although its cordate, short petiolate leaves may point to a relationship with the species of sect. *Amplectifolium*.

The only other named section of *Pluchea* of which I am aware is sect. *Hebephora* DC. (Prodr. 5:453. 1836). In it De Candolle included two Asian species, *P. hirsuta* (L.) Less. and *P. scabrida* DC., which have fimbrillate-hirsute receptacles. Judging from the descriptions, these may be related to sect. *Pluchea*.

ACKNOWLEDGMENTS

I thank Carol Todzia and Billie Turner for their reviews and comments and F, MO, US and CM for loans of specimens.

LITERATURE CITED

Cabrera, A.L. 1939. Las especies Argentinas del genero "*Tessaria*." Lilloa 4:181-189.

Cooperrider, T.S. & M.M. Galang. 1965. A *Pluchea* hybrid from the Pacific. Amer. J. Bot. 52:1020-1026.

Correll, D.S. & M.C. Johnston. 1970. *Manual of the Vascular Plants of Texas.* Texas Research Foundation, Renner, Texas.

Cronquist, A. 1980. *Vascular Flora of the Southeastern United States.* Volume I, The Asteraceae. Univ. North Carolina Press, Chapel Hill.

Gillis, W.T. 1977. *Pluchea* revisited. Taxon 26:587-591.

Godfrey, R.K. 1952. *Pluchea*, section *Stylimnus*, in North America. J. Elisha Mitchell Sci. Soc. 68:238-271.

Robinson, H. & J. Cuatrecasas. 1973. The generic limits of *Pluchea* and *Tessaria.* Phytologia 27:277-285.

Phytologia (September 1989) 67(2):168-206.

REVISIONARY TREATMENT OF THE GENUS *SINCLAIRIA*, INCLUDING *LIABELLUM* (ASTERACEAE, LIABEAE)

B. L. Turner
Department of Botany, University of Texas, Austin, Texas 78713 U.S.A

ABSTRACT

A revisionary study of the genus *Sinclairia* (including *Liabellum*) is rendered. It is composed of 23 species, all confined to México and Central America, except for *S. polyantha* which extends into Colombia in South America. Two subgenera are recognized: *Sinclairia* with 15 species and *Megaliabum* with 8 species. The latter subgenus contains 2 sections: *Megaliabum* with 3 species and *Liabellum* with 5 species. One new species, **S. hintoniorum** B. Turner, belonging to the section *Liabellum*, is described and illustrated, and a new variety of **S. hypoleuca, S. h.** var. **minor** B. Turner, is proposed. Keys to the species and distribution maps are provided and a diagram showing hypothetical relationships is presented.

KEY WORDS: Asteraceae, Liabeae, *Sinclairia, Liabellum*, México, Central America.

INTRODUCTION

Sinclairia is a wholly American genus of 23 species largely confined to tropical and subtropical regions of México and Central America. A single species (*S. polyantha*) just barely extends into Colombia. Prior to Rydberg's (1927) treatment, most of the species were placed in the large genus *Liabum*. Rydberg treated all of the species known to him, placing these in four genera: *Sinclairia, Sinclairiopsis, Megaliabum* and *Liabellum*.

Robinson (1983) provided an excellent overview of this complex, pointing out its relationship to *Liabum* and yet other genera of the tribe Liabeae. He placed the 29 species known to him in 2 genera, *Sinclairia* (25 spp) and *Liabellum* (4 spp); the former included Rydberg's genera, *Sinclairia, Sinclairiopsis* and *Megaliabum*; the latter included all of the species which Rydberg relegated to *Liabellum*. The present treatment places all of the species recognized by Rydberg (1927) and Robinson (1983) in the genus *Sinclairia*. I recognize two subgenera within the genus: *Sinclairia* and *Megaliabum*. The former contains

Rydberg's *Sinclairia* and *Sinclairiopsis*, the latter contains his *Megaliabum* and *Liabellum* (both of which I treat as sectional categories). My account differs from that of Robinson (1983) in that *Liabellum* and *Megaliabum* are treated as sections of *Sinclairia*, whereas Robinson positioned *Megaliabum* within his concept of *Sinclairia*, retaining *Liabellum* in the sense of Rydberg. The relationships of these several categories are shown in my Figure 1. Overall, I recognize but 23 species in the genus *Sinclairia*, 15 in subgenus *Sinclairia* and 8 in the subgenus *Megaliabum*.

CHROMOSOME NUMBERS

Chromosome counts are known for relatively few species of *Sinclairia* and these were summarized by Robinson *et al.* (1985). They gave the base chromosome number of *Sinclairia* as $x = 16$, but this is largely conjectural because the few counts reported are poorly documented. The numbers of only 3 species of *Sinclairia*, all belonging to the subgenus *Sinclairia*, have been reported. These are:

S. discolor $n = 17$ or 18 pairs
S. hypochlora $n = 15$ or 16 pairs
S. sublobata $n = 15$, 16 or 17 pairs.

Apparently the difficulty in establishing an accurate count for the genus relates to the presence of an exceptionally large chromosome "pair" at diakinesis in meiotic material. This "pair" might be a bivalent, tetravalent or perhaps a hexavalent. Most likely it is either a bivalent or tetravalent, making the base number $x = 15$ or 16.

GENERIC RELATIONSHIPS

Robinson (1983) has provided an admirable study of the generic relationships of the tribe Liabeae. He positioned *Sinclairia* (as conceived here) in the subtribe Liabinae, aligning it to the South American genera *Microliabum* and *Austroliabum* (cf. his figure 1, showing a suggested evolutionary scheme for the tribe). I am not able to improve upon his suggestions; my superficial examination of the genera concerned suggests the alignment is sound.

SPECIES RELATIONSHIPS

Sinclairia, with 23 species, nearly all of which are confined to México or Central America, appears to be a monophyletic group. Within this, three evolutionary lines can be recognized. I have recognized these as sectional groups: 1.) sect. *Sinclairia* with 15 species, these comprising subgenus *Sinclairia*; 2.) sect. *Megaliabum* with 3 species; and 3.) sect. *Liabellum* with 5 species. Sections *Megaliabum* and *Liabellum* have been positioned in the subgenus *Megaliabum*. Rydberg (1927) recognized these several sections as distinct genera

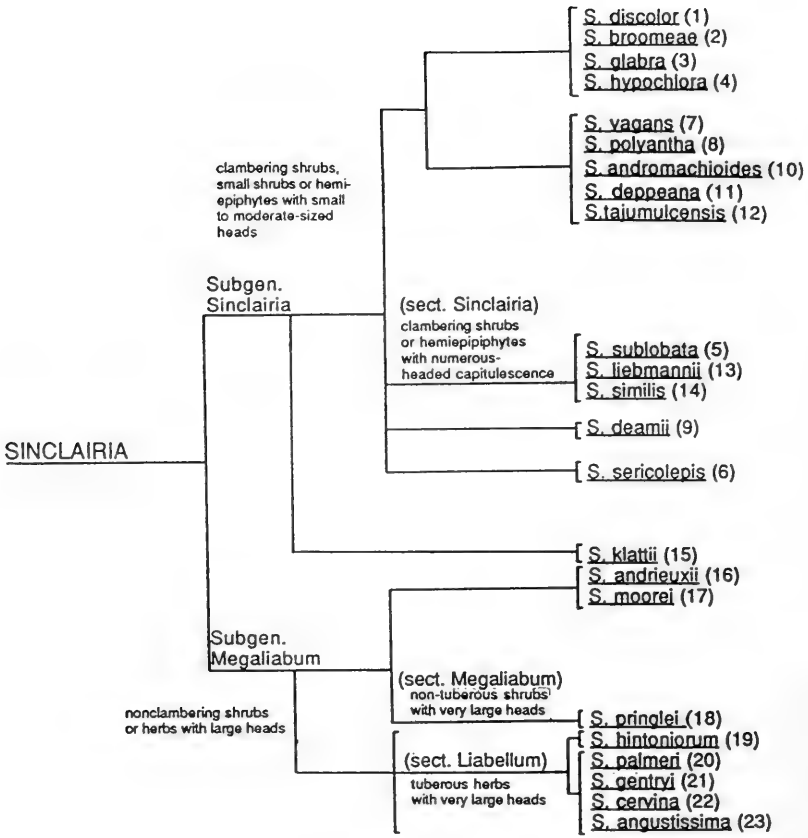


Fig. 1. Hypothetical relationships among species of Sinclairia (numbers in parenthesis refer to arrangement in text).

(plus the monotypic genus *Sinclairiopsis*, based upon *S. klattii*, which I position in the sect. *Sinclairia*). Robinson (1983), however, included the sect. *Megaliabum* in his concept of *Sinclairia*, but retained *Liabellum* as distinct. I tend to believe that *Megaliabum* stands, morphologically, somewhere between the largely clambering or hemiepiphytic sect. *Sinclairia* and the largely suffruticose or herbaceous sect. *Liabellum*. In total attributes the section *Megaliabum* appears closest to the section *Liabellum* and, therefore, I have included both of these in the subgenus *Megaliabum*. Their treatment as three subgenera within *Sinclairia* might be equally defensible but I have emphasized habit, capitulescence, involucral structure and biogeography in positioning *Megaliabum* with *Liabellum*. Robinson (1983) positioned the former within *Sinclairia* largely because of its habit (shrubby) and lack of tuber-like roots, *Liabellum* being strictly herbaceous with tuber-like roots. He also emphasized the mostly sessile leaves of the latter (vs petiolate in *Sinclairia*). My view of the relationships of the various species within these several sections is shown in Figure 1. Whether the newly described, *S. hintoniorum* has tuber-like roots or not is not known, but it appears to link the sect. *Megaliabum* to sect. *Liabellum* by yet other features (e.g. head size, achenial characters and suffruticose habit).

Clearly, the several sections recognized here are in much need of critical study, especially chromosomal and comparative DNA investigations. Until then, much that has been written about their relationships, one to the other, will remain speculative.

TAXONOMIC TREATMENT

Sinclairia Hook. & Arn., Bot. Beech. Voy. 433. 1841. TYPE SPECIES: *Sinclairia discolor* Hook. & Arn.

Liabellum Rydb., N. Amer. Fl. 34:294. 1927. (not *Liabellum* Cabrera, 1954).

Megaliabum Rydb., N. Amer Fl. 34:293. 1927.

Sinclairiopsis Rydb., N. Amer. Fl. 34:292. 1927.

Herbaceous or suffruticose perennials with tuber-like roots, 0.5-2.0 m high, soft wooded shrubs or small trees to 7 m high, clambering vines to 30 m high or hemiepiphytes (sprouting in trees but soon producing large aerial roots which make their way to the ground and become anchored). Leaves opposite, petiolate or not, usually simple, but often deeply lobed, 3 nervate from below, the undersurfaces usually densely white tomentose or arachnoid, rarely not. Heads turbicampanulate to campanulate, radiate or eradiate, very large and borne 1-15 in stiffly erect cymes (subgenus *Megaliabum*) or relatively small and numerous borne in divaricately branched, corymbose panicle or rarely in drooping subfasciculate corymbs. Involucres subturbinate to campanulate, 3-6 seriate, imbricate or subimbricate, gradate. Receptacle epaleate, plane to

somewhat convex, glabrous or rarely alveolate with pubescent ridges. Ray florets, when present, pistillate, fertile, the ligules yellow or rarely orange. Disk florets few to numerous, yellow, creamy white or orange, glabrous or sparsely pubescent without, the tube shorter than the poorly developed limbs, the lobes usually linear, 2-4 times as long as wide, but shorter than the throats. Anthers mostly yellow, the appendages lanceolate and acute to ovate rounded, tailed at the base, the filaments glabrous throughout. Style branches rather filiform, hispidulous like the upper shafts, merely recurving at maturity, the apices rounded. Achenes obpyramidal to prismatic, 8-10 ribbed, glabrous to densely pubescent, the carpopodium a sclerose annulus; pappus 1-4 seriate, the inner series of 30 or more, white or tawny, persistent, bristles, the outer series of much shorter, readily deciduous, squamellae, these often differentiated as whitened scales. Base chromosome numbers, $x = 15$, 16, 17 or 18.

KEY TO SPECIES

1. Involucres small (mostly 0.4-1.5 cm high; 0.5-1.0 cm wide), borne numerous in divaricately branched corymbose panicles or in drooping subfasciculate cymes ..... Subgenus I. *Sinclairia*

1. Involucres large (mostly 1-3 cm high, 1-4 cm wide), borne 1-7 in stiffly erect terminal cymes, the peduncles mostly (1-)2-8 cm long ..... Subgenus II. *Megaliabum*

I. SUBGENUS *SINCLAIRIA*

1. Heads arranged in drooping subfasciculate cymes, the ultimate peduncles mostly 2-5 cm long ..... 15. *S. klattii*

1. Heads arranged in divaricately branched corymbose panicles ..... (2)

2. Leaves glabrous or green on both surfaces, not at all bicolored ..... (3)

2. Leaves bicolored, the lower surfaces dirty white or white beneath with a matted or arachnoid tomentum ..... (4)

3. Involucres mostly 4-6 mm high; eastern Chiapas and Guatemala ..... 4. *S. hypochlora*

3. Involucres mostly 7-10 mm high; central and northwestern México ..... 3. *S. glabra*

4. Leaf blades, at least some of them, with distinct basal lobes or flanges; involucral bracts with rather rigid acute tips; Sinaloa to Oaxaca along the Pacific slopes ..... (5)

4. Leaf blades not noticeably lobed, if sublobate then the involucral bracts broadly acute, obtuse or rounded .....(6)

5. Involucres 8-9 mm high; florets 15-20 per head; peduncles with glandular hairs ..... 14. *S. similis*

5. Involucres 5-8 mm high; florets 9-12 per head; peduncles without glandular hairs ..... 13. *S. liebmannii*

6. Achenes evenly and moderately to densely pubescent throughout .....(7)

6. Achenes glabrous or nearly so, or else the upper portion moderately pubescent but the lower portion glabrous or nearly so, rarely somewhat sparsely atomiferous glandular throughout .....(12)

7. Involucres 12-15 mm high .....(8)

7. Involucres 4-9(-12) mm high .....(9)

8. Involucral bracts appressed, the apices acute; Guatemala .....12. *S. tajamulcensis*

8. Involucral bracts loosely appressed apically, the apices obtuse or rounded; Veracruz, México .....11. *S. deppeana*

9. Leaves densely brown villous beneath, not white tomentose; Veracruz, México ..... 10. *S. andromachioides*

9. Leaves densely white tomentose or white arachnoid beneath .....(10)

10. Branches of capitulescence with spreading, subglandular or glandular, trichomes; these often intermixed with a low tomentum; ray florets absent ..... 9. *S. deamii*

10. Branches of capitulescence tomentulose, arachnoid or subarachnoid, if spreading trichomes present then ray florets present or else the achenes glabrous or nearly so .....(11)

11. Inner involucral bracts glabrous or nearly so, the apices clearly rounded or broadly obtuse, without terminal apiculations; widespread ..... 8. *S. polyantha*

11. Inner involucral bracts clearly pubescent (glabrate with age), the apices mostly acute and often with minute terminal apiculations; southwestern Guatemala and adjacent Chiapas ..... 7. *S. vagans*

12. Involucres broadly campanulate, 8-12 mm wide at midsection, the bracts 30-40, closely and stiffly appressed; Veracruz ..... 6. *S. sericolepis*

12. Involucres turbocampanulate, 4-7 mm wide at midsection, the bracts 10-25, loosely or closely appressed .....(13)

13. Leaves, some of them, trullate or to some extent lobate or with basal flanges (rarely with merely large teeth); Guatemala to Nicaragua .....5. *S. sublobata*

13. Leaves ovate to elliptic, the margins unlobed and without basal flanges or teeth; Pacific slopes of México from Sinaloa to Oaxaca, or Gulf slopes of México and interior portions of Central America .....(14)

14. Ray florets absent; disk corollas orange or orange yellow; Pacific slopes of México, Sinaloa to Guerrero .....3. *S. glabra*

14. Ray florets present (rarely not); disk and ray corollas yellow .....(15)

15. Involucres 6-7 mm high, the inner bracts strictly appressed with acute or narrowly obtuse apices; disk florets 15-25; Pacific slopes of México, Jalisco to Guerrero .....2. *S. broomeae*

15. Involucres 8-15 mm high, the inner bracts usually somewhat loose and scarious above, the apices broadly obtuse or rounded; disk florets 10-15; Gulf slopes of México and Chiapas, southwards to Panamá .....1. *S. discolor*

II. SUBGENUS *MEGALIABUM*

1. Suffruticose branched herbs or soft wooded shrubs 1-4 m high, the stems arising (so far as known) from woody crowns, not forming tuber-like roots; leaves clearly petiolate, the petioles not winged, Sect. *Megaliabum* .....(2)

1. Perennial, rarely suffruticose, herbs 0.3-1.0(-2.0) m high with simple stems, the root system with prominent tuber-like structures (not known in *S. hintoniorum*); leaves sessile or the petiole broadly winged to the base, Sect. *Liabellum* .....(4)

2. Ray florets absent; petioles mostly 0.2-0.8 cm long; Jalisco, México .....18. *S. pringlei*

2. Ray florets present; petioles mostly 2-5 cm long; Guerrero, México to Guatemala .....(3)

3. Ray florets 11-13; disk florets 25-35; outer involucral bracts mostly 2.5-3.0 mm wide; Guerrero, México .....17. *S. moorei*

3. Ray florets 21-34; disk florets 50–; outer involucral bracts mostly 1-2 mm wide; Oaxaca and Chiapas, México and adjacent Guatemala ..... 16. *S. andrieuxii*

4. Leaves divided to the base, appearing whorled, the divisions narrowly linear, 1-3 mm wide ..... 23. *S. angustissima*

4. Leaves entire or variously divided, but not as above, the divisions mostly 4-20 mm wide ..... (5)

5. Leaves ovate elliptic, unlobed, confined to the very base ..... 21. *S. gentryi*

5. Leaves obovate or variously parted, clearly cauline ..... (6)

6. Suffruticose herbs 1-2 m high; achenes 5-6 mm long; pappus rusty red; México State ..... 19. *S. hintoniorum*

6. Non suffruticose herbs 0.3-9.0 m high; achenes 3-4 mm long; pappus tawny white or yellowish white; Chihuahua to Michoacán .....(7)

7. Leaves scattered along the entire length of the stem; peduncles without glandular hairs; outer pappus undifferentiated or nearly so ..... 22. *S. cervina*

7. Leaves mostly confined to the lower third of the stem; peduncles with glandular hairs; outer pappus of white scales .....20. *S. palmeri*

I. SUBGENUS *Sinclairia* (species 1-15)

1. *Sinclairia discolor* Hook. & Arn., Bot. Beech. Voy. 433. 1841. *Liabum discolor* (Hook. & Arn.) Benth. & Hook. ex Hemsl., Biol. Centr. Amer. Bot. 2:232. 1881. TYPE: NICARAGUA. Realejo, *Sinclair s.n.* (HOLOTYPE: K; Phototype: GH!).

Liabum platylepis Sch.-Bip. ex Klatt, Leopoldina 23:146. 1887. *Sinclairia platylepis* (Sch.-Bip.) Rydb., N. Amer. Fl. 34:296. 1927. TYPE: MÉXICO. Veracruz: Mirador, w/o date, *C. Sartorius s.n.* ("in Linden! n. 1236") (LECTOTYPE: GH!; fragment of lectotype: GH!).

Clambering vines or hemiepiphytes. Leaves thin, strongly discolored, the undersurfaces densely white tomentose. Heads numerous in terminal, congested, mostly rounded, corymbose panicles. Involucres mostly 8-15 mm high, the inner bracts mostly scarious and obtuse or rounded at the apices, usually loose and recurved with age. Ray florets 5-8, the ligules 3-8 mm long. Disk florets 10-15, the corollas ca 8 mm long, the tube ca 4 mm long, the lobes glabrous or nearly so. Achenes 1.5-2.0 mm long, glabrous or a few hispid hairs

near the apex, the inner pappus tawny or tawny white, 6-9 mm long, the outer pappus of well defined scales ca 1 mm long; chromosome number, $n = 17$ or 18 pairs.

DISTRIBUTION (Figure 2): Southern México (Gulf slopes of Veracruz and Chiapas) to Panamá, montane rain forests, 1200-2400 m; Dec-Mar.

REPRESENTATIVE SPECIMENS: MÉXICO. Chiapas: Mcpio. Siltepec, ridge above Siltepec, 2000-2400 m, 1 Feb 1982, *Breedlove 58311* (TEX); San Luis, 1300 m, 24 Jan 1945, *Matuda 5294* (LL); Mcpio. Tuxtla Gutierrez, 19 km from Tuxtla Gutierrez on road to canyon El Sumidero, 1210 m, 11 Mar 1978, *Garcia 578* (F,TEX). Veracruz: Mcpio. Los Reyes, ca 1600 m, 22 Mar 1976, *Torres W320* (F,XAL).

GUATEMALA. Alta Verapaz: Taitic, 1600 m, *Tuerckheim 2116* (GH,LL). Cortes: between Banaderos and Cusnco, 1400 m, 26 Mar 1963, *Molina 11456* (LL). GUATEMALA: Guatemala, 1465 m, 3 Feb 1907, *Kellerman 6277* (F,GH). Izabal: ca Lago Izabal, 500-600 m, 11 May 1966, *Jones 3366* (F). Quezaltenango: above Mujulia, ca 1800 m, 1 Feb 1941, *Standley 85651* (F). San Marcos: ca Aldea Fraternidad, 1800-2400 m, 10 Dec 1963, *Williams 26240* (F).

EL SALVADOR. San Salvador: Volcán de San Salvador, 1410-1800 m, 2 Feb 1946, *Carlson 442* (F). Santa Ana: Cerro Monte Cristo, 6000-6500 m, 17 Jan 1959, *Allen 7147* (F,GH,LL). Sonsonate: Cerro El Pilón, 1800 m, 23 Feb 1968, *Molina 21610* (F).

BELIZE. Toledo: Soloman Camp, 80-420 m, 5-12 Mar 1987, *Davidse 32036* (LL,MO); high ridge, Edwards Road, beyond Columbia, 20 Mar 1948, *Gentle 6479* (F,LL).

HONDURAS. Cortes: Montaña San Idalfonso, 1500 m, 27 Mar 1963, *Molina 11591* (F). Morazan: mountains above San Juancito, 1800 m, 20 Feb 1948, *Williams 1378* (GH); 24 Mar 1951, *Williams 17457* (GH). Ocotepeque: ca El Portillo, 2000 m, 23 Jan 1976, *Molina 31386* (F).

NICARAGUA. Granada: Volcán Mombacho, 9 Mar 1922, *Greenman 5792* (GH). Matagalpa: El Ocotal, 1300 m, 9 Mar 1967, *Molina 20431* (F).

COSTA RICA. San José: Cerro Zurqui, 1800-2000 m, 19 Feb 1978, *Almeda 3685* (F); La Palma, 5 Feb 1922, *Greenman 5499* (GH).

PANAMÁ. Goofy Lake to ca 8 mi S of Goofy, 26 Nov 1966, *Dwyer 7052* (GH).

A widespread species superficially similar to *S. polyantha* but the involucral bracts loose at maturity and the achenes glabrous or merely sparsely pubescent, especially just below the pappus.

2. *Sinclairia broomeae* H. Robins., Phytologia 33:287. 1976. TYPE: MÉXICO. Guerrero: "along the Milpillas-Atoyac road via Puerto del Gallo, about 47 miles southwest of México Highway 95, 16 miles southwest of Filo de Caballo and 10.4 miles southwest of Carrazal del Bravo, 12.4 miles northeast of Yerba Santa," 17 Oct 1975, *J.L. Reveal et al. 4267* (HOLOTYPE:

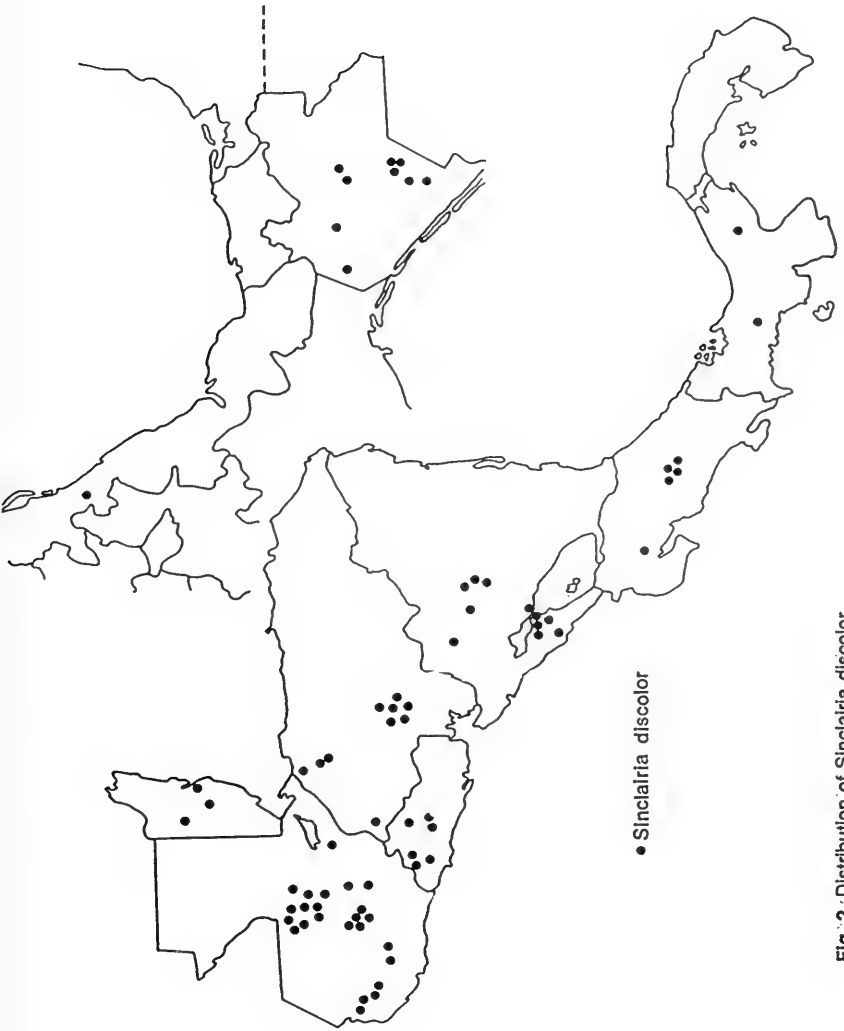


Fig. 2. Distribution of Sinclairia discolor.

US; Isotype: TEX!; Photoisotype: GH!).

Clambering shrubs and probably hemiepiphytic, occurring up to 40 m high in trees; leaves 12-16 cm long, 6-12 cm wide, thin, bicolored; petioles mostly 3-6 cm long; blades broadly ovate to subdeltoid, white tomentose beneath, the nerves brown, the margins minutely serrulate. Heads numerous in corymbose panicles, the ultimate peduncles 5-15 mm long. Involucres 6-7 mm high, turbocampanulate, the bracts appressed with mostly acute apices. Ray florets 5, the ligules 5-8 mm long, yellow. Disk florets 15-25, the corollas yellow, 8-10 mm long, the lobes ca 2 mm long. Achenes sparsely to densely pubescent above, glabrous below, 1.5-2.0 mm long, the inner pappus of tawny bristles ca 8 mm long, the outer pappus scales 1.2 mm long.

DISTRIBUTION (Figure 4): Jalisco (Sierra de Manantlan) and Guerrero, pine-oak cloud forests, 1800-2100; Oct-Dec.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Jalisco: Sierra Manantlan, Playa Las Joyas, 1900-1950 m, 21 Dec 1984, *Judziewicz & Cochrane 4798* (TEX,WIS) Sierra de Manantlan, 3 km S of Rincón de Manantlan, going to Las Joyas (crossing no. 4), 1850-2100 m, 11 Oct 1982, *Iltis et al. 28866* (TEX,WIS); Sierra Manantlan (19° 37', 104° 15'), 1980 m, 12 Nov 1985, *Vasquez 3764* (WIS); Las Joyas, Autlan, 1980 m, 12 Nov 1985, *Vasquez 3726* (WIS). Guerrero: Distr. Mina, Cerro Azul, 2550 m, 4 Dec 1939, *Hinton et al. 14951* (GH).

The species is closely related to *S. discolor* but is readily distinguished by its smaller involucres with appressed acute bracts. Recent collections have been obtained from the Sierra de Manantlan, as indicated in the above citations.

3. *Sinclairia glabra* (Hemsl.) Rydb., N. Amer. Fl. 34:297. 1927. *Liabum glabrum* Hemsl., Biol. Centr. Amer., Bot. 2:232. 1881. TYPE: MÉXICO. Morelos: Cuernavaca, Iturbide, 1865, *Bourgeau 1401* (HOLOTYPE: K; Isotypes: P,F!,GH!; Photoisotypes: F!,LL!).

Shrubs or small trees to 6 m high. Leaves 10-22 cm long, 3-8 cm wide; petioles 3-6 cm long; blades mostly ovate, with acute bases, the undersurfaces glabrous or nearly so. The margins serrulate. Heads discoid, numerous in rather congested terminal corymbose panicles, 2-3 times as long as wide, the capitulescence usually without leafy inclusions. Involucres campanulate, 7-9 mm high, the bracts appressed, glabrous with ciliate margins, the inner series obtuse or rounded at the apices. Ray florets absent. Disk florets 14-20 per head, glabrous, 8-10 mm long. Achenes 1.5-2.0 mm long, glabrous or sparsely pubescent above, rarely a few glandular hairs, the pappus of numerous tawny bristles 6-8 mm long, the outer scales ca 0.5 mm long.

I recognize 3 allopatric regional varieties under this taxon, as keyed below. The above description applies to the var. *glabra*; all of the varieties

Fig. 3. General distribution of Sinclairia glabra and its varieties (the related S. sublobatus indicated by 2), S. andromachioides and S. deppeana.

intergrade in regions of contact. Williams (1976) expanded *S. glabra* so as to include *S. sublobatus*, a species of Central America and southernmost México which has usually bicolored lobed leaves, strictly yellow corollas and heads arranged in both axillary and terminal corymbs, the entire capitulescence being leafy within at anthesis. *Sinclairia glabra* has orange or orange yellow, mostly longer, corollas, unlobed leaves and a strictly terminal capitulescence (without leafy inclusions).

Key to varieties (see Figure 3 for distributions).

1. Leaves not bicolored, glabrous beneath; corollas mostly 8-10 mm long; E Michoacán, México, Morelos and NE Guerrero ..... var. *glabra*

1. Leaves bicolored, variously white tomentose or arachnoid pubescent beneath; corollas 6-15 mm long; Sinaloa to central Michoacán and NW Guerrero ..... (2)

   2. Involucres mostly 7-8 mm high; corollas 9-14 mm long; pappus bristles yellow-white or pale tawny; Sinaloa to Colima and northern Michoacán ..... var. *hypoleuca*

   2. Involucres mostly 5-6 mm high; corollas 6-8 mm long; pappus bristles rusty tawny; S Michoacán and NW Guerrero ..... var. *minor*

S. glabra var. *glabra*. For nomenclature and synonymy, see above.

DISTRIBUTION: E Michoacán, México, Morelos and NE Guerrero, tropical deciduous and oak forests, 300-1700 m; Oct-Dec. As described above; intergrades between var. *glabra* and var. *hypoleuca* occur, as noted by McVaugh (1984).

REPRESENTATIVE SPECIMENS: MÉXICO. México: Distr. Temascaltepec, Vigas, 17 Nov 1932, *Hinton 2627* (GH). Morelos: barrancas near Cuernavaca, 5000 ft, 7 Nov 1895, *Pringle 6182* (F,GH). Michoacán: Zitacuaro, 24 Oct 1938, *Hinton 13401* (GH). Guerrero: Distr. Aldama, Temisco, 310 m, 12 Nov 1937, *Mexia 8797* (F,GH,LL).

S. glabra var. **hypoleuca** (Greenm.) B. Turner, comb. nov. Based on: *Liabum glabrum* var. *hypoleucum* Greenm., Proc. Amer. Acad. Arts 32:294. 1987. *Sinclairia hypoleuca* (Greenm.) Rydb., N. Amer. Fl. 34:297. 1927. TYPE: MÉXICO. Jalisco: canyons near Guadalajara, 8 Dec 1988, *C.G. Pringle 2169* (LECTOTYPE: GH!, as selected by McVaugh in *Flora Novo-Galiciana* 12:578. 1984).

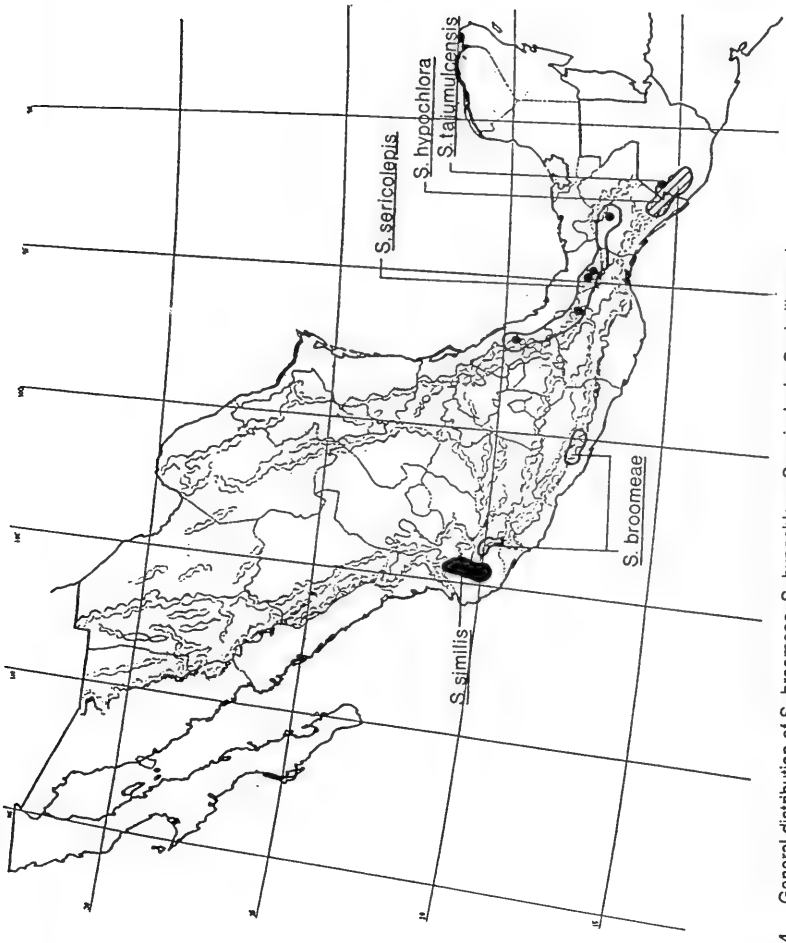


Fig. 4. General distribution of S. broomeae, S. hypochlora, S. sericolepis, S. similis, and S. taiumulcensis.

DISTRIBUTION: S Sinaloa, Nayarit, Jalisco, Colima and N Michoacán, tropical deciduous or pine-oak forests, 1000-2000 m, Oct-Dec.

My circumscription of this taxon is essentially the same as that of McVaugh (1984), who also recognized its probable intergradation with var. *glabra*.

REPRESENTATIVE SPECIMENS: MÉXICO. Sinaloa: 9 mi E of Chupoderas, 2600 ft, 22 Nov 1969, *Breckon 990* (LL). Nayarit: 9 mi N of Compostela, 1000-1200 m, 13 Nov 1959, *McVaugh & Koelz 557* (LL). Jalisco: 15 mi N of Talpa, 20 Oct 1983, *Ayers 277* (TEX). Colima: 18 road mi NE of Colima, 3600 ft, 30 Oct 1962, *Cronquist* (TEX). Michoacán: 5 mi N of Cotiga, 6000-6200 ft, 5-9 Oct 1961, *King & Soderstrom 4685* (TEX).

S. glabra var. **minor** B. Turner, var. nov. TYPE: MÉXICO. Michoacán: Distr. Coalcoman, Aguila, 17 Nov 1941, *G.B. Hinton et al. 16161* (HOLOTYPE: LL!).

> *S. hypoleucae* var. *hypoleucae* sed involucris minoribus (5-6 mm altis vs 7-8 mm) et corollis brevioribus (6-8 mm longis vs 9-14 mm) differt.

DISTRIBUTION: S Michoacán and adjacent E Guerrero, Pacific slopes in tropical deciduous forests, 600-1400 m; Oct-Dec.

The taxon differs from the var. *glabra* in possessing smaller involucres with mostly narrowly obtuse or acute involucral bracts, heads with fewer florets, leaves tomentose beneath and pappus bristles rusty tawny.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Michoacán: Distr. Coalcoman, Puerto Las Cruces, 1340 m, 28 Oct 1938, *Hinton 12467* (GH,LL); S. Naranjillo, 1360 m, 26 Nov 1938, *Hinton 12678* (GH,LL). Guerrero: Distr. Montes de Ocas., San Antonio, 16 Dec 1937, *Hinton et al. 11682* (GH,LL).

4. *Sinclairia hypochlora* (S.F. Blake) Rydb., N. Amer. Fl. 34:301. 1927. *Liabum hypochlorum* S.F. Blake, Contr. Gray Herb., n.s. 53:27. 1918. TYPE: GUATEMALA. Retalhuleu: San Felipe, wet places, 13 Jan 1917, *E.W.D. Holway 703* (HOLOTYPE: GH!).

Clambering shrubs or vines to 15 m high, probably also hemiepiphytic upon occasion. Leaves not bicolored, 10-25 cm long, 6-10 cm wide; petioles 2-5 cm long; blades ovate to elliptic ovate, glabrous on both surfaces, or nearly so, minutely glandular punctate, the margins minutely denticulate. Heads radiate, numerous in broad terminal and subterminal corymbose panicles, the ultimate peduncles mostly 2-5 mm long. Involucres 4-5 mm high, the bracts pubescent 2-3 seriate, rather stiffly appressed and acute at the apices. Receptacles with markedly pubescent alveolae. Ray florets 5-8, the ligules 1-3 mm long, 0.5-1.0 mm wide, yellow. Disk florets 5-7, the corollas yellow, 7-8 mm long, glabrous. Achenes ca 2.5 mm long, pubescent throughout, the pappus

of numerous yellowish bristles 6-7 mm long, the outer scales ca 0.5 mm long; chromosome number, $n = 15$ or 16 pairs.

DISTRIBUTION (Figure 4): Guatemala and adjacent Chiapas, montane cloud forests, 500-900 m; Nov-Jan.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Chiapas: Mt. Ovando, ca Escuintla, 14 Nov 1945, *Matuda 6194* (LL); Jalapa, Triunfo, 6 Nov 1948, *Matuda 18461* (F).

GUATEMALA. Quezaltenango: Colomba, 3000 ft, 29 Dec 1934, *Skutch 2031* (AA,F,GH,LL). Retalhuleu: San Felipe, 12 Jan 1917, *Holway s.n.* (GH). Schitepequez: Volcán Zunil, 2 Feb 1940, *Steyermark 35429* (F).

This species would appear to be but a populational form of *S. vagans*, or vice versa, but differs, in addition to its glabrous foliage, by having smaller rays and very pubescent alveolate ridges on the receptacle and corollas lobes nearly glabrous. In addition, *S. vagans* appears to occur mostly at higher elevations (2000-2500 m vs 500-1000 m).

In addition to the type itself, *Holway (cited above without number)* apparently collected a rayless form of this plant with weakly arachnoid tomentose leaves and peculiar glandular achenes. This is perhaps a hybrid or hybrid derivative with yet another species, possibly *S. sublobatus*, which has rayless heads and occurs with or near *S. hypochlora.*

5. *Sinclairia sublobata* (B.L. Robins.) Rydb., N. Amer. Fl. 34:297. 1927. *Liabum sublobatum* B.L. Robins., Proc. Amer. Acad. Arts 32:294. 1897. TYPE: GUATEMALA. Solola: San Lucas Toliman, 5100 ft, 2 Feb 1915, *E.W.D. Holway 179* (HOLOTYPE: GH!).

Sinclairia brachypus Rydb., N. Amer. Fl. 34:299. 1927. TYPE: GUATEMALA. Chiquimula: Volcán Ipala, 1700 m, Jan 1907, *H. Pittier 1886* (HOLOTYPE: US; Isotype: F!).

Slender erect shrubs or small trees to 12 m high. Leaves 10-20 cm long, 5-18 cm wide, probably deciduous shortly after flowering; petioles mostly 3-6 cm long; blades trullate to broadly ovate or somewhat subcordate, usually thickened with age, bicolored (a dense tomentum beneath but rarely only weakly arachnoid and not totally bicolored), 3 nervate, the basal portion to some extent with acute lobes or flanges (sometimes merely large teeth). Heads discoid, numerous in both terminal and axillary somewhat divaricate corymbs, the entire capitulescence therefore a leafy arrangement, the ultimate peduncles mostly 1-8 mm long. Involucres mostly 7-9 mm high, the bracts mostly appressed through maturity, the inner bracts with apices obtuse or rounded. Ray florets absent. Disk florets 8-10, the corollas yellow, glabrous, 7-9 mm long, the tube ca 3 mm long, grading into the throat, the lobes ca 2 mm long. Achenes 3-4 mm long, sparsely pubescent above, mostly glabrous below, the pappus of numerous, yellow white or tawny, bristles 6-7 mm long, the outer series of

short scales ca 1 mm long, these well differentiated; chromosome number, n = 15 or 16 pairs.

DISTRIBUTION (Figure 5): Southernmost México, Guatemala, Honduras, El Salvador and Nicaragua, mostly Pacific slopes along barrancas on dry slopes and ridges, 200-1800 m; Dec-Mar.

REPRESENTATIVE SPECIMENS: MÉXICO. Oaxaca: Mcpio. Sta. Maria Chimalapa, 4 km NE of Santa Maria, 170 m, 7 Mar 1984, *Wendt 4300* (CHAPA, TEX); 4 km N of Sta. Santa Maria, 300 m, 26 Feb 1925, *Hernández 916* (CHAPA, TEX). Chiapas: Mcpio. Tenejapa, pokolum, 520 m, 18 Mar 1985, *Breedlove 9435* (LL); Mcpio. Vajalon, Rancho Carmen, 25 Mar 1984, *Ton 7471* (MEXU, TEX).

GUATEMALA. Alta Verapaz: between San Cristobal and Chixoy, 1200-1300 m, 19 Feb 1942, *Steyermark 43896*(F,GH). Chimaltenango: ca Sibaja, ca 1050 m, 6 Jan 1939, *Standley 62256* (F,GH). Guatemala: ca Guatemala, 1465 m, 1 Jan 1907, *Kellerman 6298* (F). Retalhuleu: ca Retalhuleu, 240 m, *Standley 88799* (F,GH). Sacatepequez: ca Santa Maria, 5500 ft, 28 Jan 1937, *Hunnewell 14909* (GH). SANTA ROSA: Carrizal, 5000 ft, Jan 1893, *Heyde & Lux 4225* (GH).

HONDURAS. Morazan: Choluteca: ca San Marcos, 12 Jan 1949, *Standley 15717* (F). Cuesta La Moroloa, 1300 m, 15 Feb 1951, *Molina 3896* (F,GH). Sonsonate: Cerro Verde, 4 Feb 1959, *Allen 7223* (F).

EL SALVADOR. Ahuachapin: ca Apaneca, 24 Jan 1947, *Standley 3002* (F). Chalatenango: between San Ignacio and Citala, 1500-3000 ft, 19 Nov 1958, *Allen 7103* (F,GH). San Salvador: ca Tonacatepeque, 30 Dec 1921, *Standley 19530* (GH). Sonsonate: ca Sonsonate, 220-300 m, 18 Mar 1922, *Standley 22265* (GH).

NICARAGUA. Esteli: El Zacaton, 1400 m, 11 Feb 1984, *Moreno 22687* (F). Managua: Sierra de Managua, *Garnier 21* (F). Matagalpa: 5-10 km W of Matagalpa, 600-700 m, 3 Jan 1963, *Williams 23820* (F,LL). Ocotepeque: 15.1 m E of Santa Fe, 1460 m, 28 Jan 1987, *Croat 63834* (TEX).

Because of its lobed leaves, capitulescence and floral details, this species appears related to *S. liebmannii* of México. The latter, however, has smaller leaves, smaller involucres with acute involucral bracts and creamy white corollas (vs bright yellow). Occasional plants of *S. sublobata* possess weakly bicolored leaves (the tomentum beneath being mostly erased with age); these have been often identified as *S. glabra*, a species with unlobed leaves which is confined to central and northwestern México. The latter taxon has orange or orange yellow corollas (vs yellow) and a mostly leafless capitulescence.

6. *Sinclairia sericolepis* (Hemsl.) Rydb., N. Amer. Fl. 34:294. 1927. *Liabum sericolepis* Hemsl., Biol. Centr. Amer., Bot. 2:232. 1881. TYPE: MÉXICO. Veracruz: Valley of Cordoba, 10 Mar 1865, *Bourgeau 2177* (HOLOTYPE: K; Isotype: P; fragment of isotype: F!; Photoholotype:

Fig. 5. Distribution of Sinclairia klatti (○) and S. subolata (●).

GH!; Photoisotypes: F!,GH!).

Clambering shrub or small tree to 3 m high. Leaves bicolored, 8-25 cm long, 3-9 cm wide; petioles 1-5 cm long; blades ovate to elliptic ovate, white tomentose beneath, drying blackish above, the margins minutely serratulate to nearly entire. Heads eradiate, numerous in stiffly branching, terminal, corymbose, panicles, the ultimate peduncles mostly 3-12 mm long. Involucres campanulate, 8-10 mm high, 8-12 mm wide, the bracts 4-5 seriate, gradate, closely appressed, the apices decidedly acute. Ray florets absent. Disk florets 18-22 per head, the corollas ca 8 mm long, glabrous, the tube ca 4 mm long, grading into the throat, the lobes linear, ca 1.5 mm long. Achenes ca 2 mm long, glabrous below, hirsute-pubescent below the apex, often densely so, the pappus of numerous dirty white or tawny bristles 8-9 mm long, the outer series of short linear scales but not differentiated.

DISTRIBUTION (Figure 4): Veracruz, Oaxaca and Chiapas, tropical rain forests, 100-700 m; Mar-Apr.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Chiapas: Mcpio. Ocozocoantla de Espinosa, SW site of Presa de Malposa, 2200 ft, 2 Mar 1968, *Ton 3803* (F,LL). Oaxaca: ca Valle Nacional, 22 Mar 1964, *Quintero 648* (TEX). Veracruz: Mcpio. Hidalgotitlan, 4 km from Hermanos Cedillo, 150 m, 10 Apr, 1975, *Ortiz 106* (F); 10.3 km E of La Laguna, 140 m, 24 Mar 1981, *Wendt 3043* (CHAPA,TEX).

A very distinct species, not easily confused with another, although the leaves and habit are similar to *S. discolor*.

7. *Sinclairia vagans* (S.F. Blake) H. Robins. & Bret., Phytologia 28:62. 1974. *Liabum vagans* S.F. Blake, Brittonia 2:354. 1937. TYPE: GUATEMALA. Quiche: "Thicket on mountainside along Nebaj-Aguacatan trail," 2470 m, 12 Dec 1934, *A.F. Skutch 1913* (HOLOTYPE: AA!; Isotypes: F!,LL!).

The holotype is without collection data, but the isotype, collection of which Blake also annotated, gives the site as published. Clambering shrubs or small trees to 5 m high, probably also hemiepiphytic. Leaves 12-22 cm long, bicolored, 8-15 cm wide; petioles 3-6 cm long; blades broadly ovate, 3 nervate, densely white tomentose beneath, drying blackish above, the margins minutely serrulate. Heads radiate, numerous in terminal corymbose rounded panicles, the ultimate peduncles mostly 3-6 mm long. Involucres mostly 5-7 mm long, the bracts appressed through maturity, those of the inner series mostly pubescent, acute or narrowly obtuse, often with a small apical apiculation. Ray florets 5-8, the ligules yellow, 6-9 mm long. Disk florets 4-6, the corollas yellow, glabrous except for puberulent tufts at the apex of each lobe, 7-8 mm long, the tube ca 3 mm long, the lobes 1.5-2.0 mm long. Achenes ca 2 mm long, pubescent throughout, the pappus of numerous yellowish white or

tawny bristles 5-7 mm long, the outer series of small linear scales 1.0-1.5 mm long.

DISTRIBUTION (Figure 6): Southeastern Chiapas and adjacent Guatemala in montane rain forests, 2000-2700 m; Nov-Jan.

ADDITIONAL SPECIMENS EXAMINED: GUATEMALA. Chimaltenango: above Las Calderas, 2250-2400 m, 16 Dec 1940, *Standley 80193* (F). Jalapa: ca Soledad, 2000-2400 m, 4 Dec 1939, *Steyermark 32612* (F,GH). Guatemala: Volcán de Pacaya, 1800-2300 m, 20 Dec 1940, *Standley 80633* (F). Quezaltenango: Volcán Santa Maria, 8000-11,500 ft, 24 Jan 1896, *Nelson 3722* (F,GH). San Marcos: 6 km N of San Marcos, 2700 m, 13 Dec 1963, *Williams 25855* (F).

MÉXICO. Chiapas: Mcpio. Siltepec, ridge above Siltepec, 2000-2400 m, 18 Jan 1973, *Breedlove 31848* (TEX); 26 Nov 1981, *Breedlove 55917* (TEX). Mcpio. Motozintla de Mendoza, SW side of Cerro Mozotal, 2100 m, 23 Nov 1988, *Breedlove 55800* (TEX).

A weakly differentiated species, closely related to the widespread *S. polyantha*, but the latter occurring at mostly lower elevations and having inner involucral bracts mostly glabrous, scarious at the apex and becoming loose and somewhat recurved at maturity. *Sinclairia hypochlora*, with glabrous leaves, also appears very closely related and is perhaps but a populational form of *S. vagans*.

8. *Sinclairia polyantha* (Klatt) Rydb., N. Amer. Fl. 34:299. 1927. *Liabum polyanthum* Klatt, Bull. Bot. Belg. 31:209. 1892. TYPE: COSTA RICA: forests near General, Jan 1891, *Pittier 4319* (HOLOTYPE: C; Isotype: F!).

Liabum tonduzii B.L. Robins., Proc. Boston Soc. Nat. Hist. 31:270. 1904. *Sinclairia tonduzii* (B.L. Robins.) Rydb., N. Amer. Fl. 34:299. 1927. TYPE: COSTA RICA. San José: banks of Río Virillo, San José, Jan 1896, *Tonduz 9859* (LECTOTYPE, selected here: GH!; Isolectotype: F!).

Sinclairia pittieri Rydb., N. Amer. Fl. 34:300. 1927. TYPE: COSTA RICA. Alajuela: ca Alajuelita, Dec 1894, *Pittier 9093* (HOLOTYPE US; Isotypes F!,GH!)

Liabum dimidium Blake, J. Washington Acad. Sci. 22:385. 1932. *Sinclairia dimidia* (Blake) H. Robins. & Bret., Phytologia 28:61. 1974. TYPE: GUATEMALA. Peten: Tikal, 12-15 Apr 1931, *Bartlett 12602* (HOLOTYPE US; isotypes, F!,GH!,LL!,TEX!).

Clambering shrubs or woody vines to 30 m high. Leaves ovate to broadly elliptic, bicolored, 10-20 cm long, 3-14 cm wide; petioles 2-5 cm long; blades

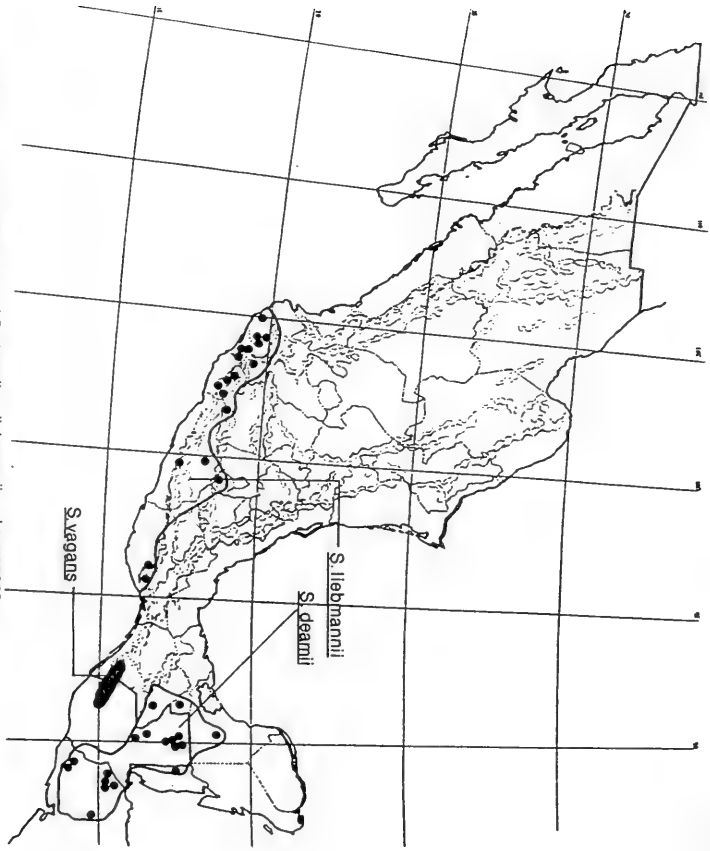


Fig. 6 General description of S. deamii, S. liebmannii and S. vagans.

densely white tomentose beneath, the margins serrulate to nearly entire. Heads radiate, numerous in terminal corymbose panicles, the ultimate peduncles mostly 0-10 mm long. Involucres 6-9(-12) mm high, the bracts usually appressed through maturity, obtuse or rounded at the apices and mostly glabrous, rarely pubescent. Ray florets 5-8, the ligules yellow, 3-6 mm long. Disk florets 10-15 per head, the corollas yellow, glabrous, 6-8 mm long, the tubes 1-2 mm long, the lobes ca 1 mm long. Achenes 1.5-2.5 mm long, densely pubescent throughout, the pappus of numerous bristles 5-7 mm long, the outer scales few, poorly developed or seemingly absent.

DISTRIBUTION (Figure 7): Veracruz, Oaxaca and adjacent Chiapas along the Gulf slopes, southwards to Panamá and Colombia, tropical and montane rain forests, 100-1600 m; Jan-Apr.

REPRESENTATIVE SPECIMENS: MÉXICO. Oaxaca: Belleville, 23 Feb 1910, *Orcutt 3064* (F); 49 mi N of Ixtlan de Juárez, 1450 m, 10 Jan 1982, *Bacon 1754* (F). Veracruz: Mcpio. Catemaco, Cerro de Buena Vista, ca Catemaco, ca 300 m, 12 Feb 1975, *Calzada 1744* (LL,MEXU); Mcpio. Hidalgotitlan, 30 km E of La Laguna, 100 m, 26 Feb 1981, *Wendt 2933* (CHAPA,TEX); Mcpio. San Andres Tuxtla, Volcán San Martin Tuxtla, 1630 m, 15 Feb 1972, *Beaman 5725* (F); Mcpio. Zongolica, Nacaxtla, ca 1050 m, 25 Feb 1976, *Torres W-137* (TEX,XAL).

GUATEMALA. Dept. Izabal: Río Duke, 1-3 m, 16 Apr 1940, *Steyermark 39559* (F). Dept. Peten: San Diego, 13 Apr 1935, *Aguilar 517* (LL); Lacandon, 16 Mar 1962, *Contreras 3534* (LL); Tikal, 24 Mar 1959, *Lundell 15784* (LL); Aguada Las Cucas, 5 Mar 1961, *Lundell 16901* (LL).

BELIZE. Toledo District: ca river beyond Columbia, 3 Feb 1947, *Gentle 6154* (LL); Temesh River, 28 Feb, 1945, *Gentle 5239* (F,LL); Cero Hills, 25 Mar 1950, *Gentle 7007* (F,LL).

NICARAGUA. Boaco: Cerro Membachito, ca 900 m, 8 Feb 1983, *Grijalva 2263* (F). Jinotega: NE of Wiwili, 13 Mar 1980, *Araquistan 1814* (F). Managua: Sierra de Managua, 1932, *Garnier A489* (LL). Matagalpa: Los Angeles, 900 m, 1 Mar. 1983, *Moreno 21049* (F). Rivis: Isla Ometepe, 21 Feb 1983, *Moreno 19875* (F). Zelaya: Cerro Walawas, 100-268 m, 16 Mar 1978, *Stevens 7423* (F).

COSTA RICA. Alajuela: ca La Laguna, 1200 m, 19 Feb 1966, *Molina 17514* (GH). Guanacaste: El Silencio, Tilaran, 900 m, 12 Feb 1963, *Jiménez s.n.* (F). Punta Arenas: Río Esquinos, ca 100 ft, 8 Dec 1949, *Allen 5437* (AA,F). San José: Las Nubes, 6000 ft, 24 Jan 1940, *Hunnewell 17038* (GH); ca El General, 1035 m, Feb 1939, *Skutch 4137* (LL).

PANAMÁ. Chiriqui: ca New Switzerland, 1800-2000 m, 6 Jan 1939, *Allen 1415* (GH). Cocle: ca El Valle de Anton, ca 1000 m, 2 Dec 1941, *Allen 2866* (GH). Panamá: Cerro Campana, 17 Aug 1960, *Ebinger 935* (F).

COLOMBIA: Dept. Caldas: La Selva, 1600-1900 m, 8 Jan 1946, *von Sneidern 5246* (F).

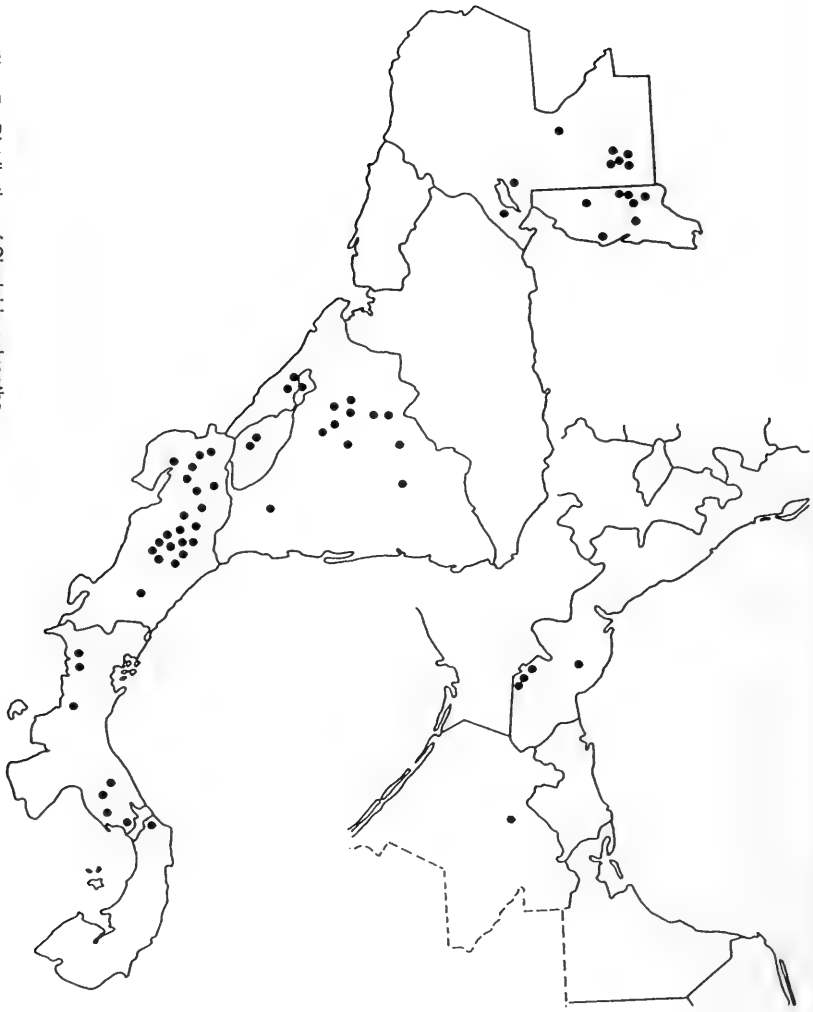


Fig. 7. Distribution of Sinclairia polyantha.

A widespread variable species but not readily divisible into regional variants. It is, nevertheless, easily recognized by a combination of characters, including densely pubescent achenes, rayed heads, involucral bracts which are mostly appressed at maturity and bicolored, nearly entire leaves, the upper surface of which darkens appreciably upon drying. Vegetatively it superficially resembles *S. discolor* but the latter is readily recognized by its glabrous achenes (or nearly so).

9. *Sinclairia deamii* (B.L. Robins. & Bartl.) Rydb., N. Amer. Fl. 34:299. 1927. *Liabum deamii* B.L. Robins. & Bartl., Proc. Amer. Acad. Arts 43:60. 1907. TYPE: GUATEMALA. Tacapa: Gualan, 420 ft, Jan 1905, *C.C. Deam 194* (HOLOTYPE: GH!; Isotype: F!).

Liabum subglandulare S.F. Blake, Contr. U.S. Natl. Herb. 24:31. 1922. *Sinclairia subglandularis* (S.F. Blake) Rydb., N. Amer. Fl. 34:298. 1927. TYPE: HONDURAS. Copan: "Hacienda La Zumbadora," between El Paraiso and La Florida, 13 May 1919, *S.F. Blake 7386* (HOLOTYPE: US).

Clambering shrubs or slender trees to 15 m high, probably also hemiepiphytic. Leaves bicolored, 10-20 cm long, 6-12 cm wide, deciduous at the time of, or soon after, flowering; petioles 3-4 cm long; blades broadly ovate, white tomentose beneath, moderately blackening upon drying, the margins minutely serrulate. Heads eradiate in numerous terminal or subterminal, congested, corymbose panicles, the ultimate peduncles mostly 1-3 mm long, the branches brown tomentose or glandular hirsute, or both. Involucres mostly 4-5 mm long, the bracts 2-3 seriate, ovate, pubescent, the apices mostly obtuse. Ray florets absent. Disk florets mostly 5, the corollas pale yellow or creamy white, ca 7 cm long, glabrous except for the hispid tufted apices of the lobes, the lobes ca 2 mm long. Achenes 2-3 mm long, densely pubescent throughout, the pappus of numerous dirty white or tawny bristles 6-8 mm long, the outer scales narrow,-1.5-2.0 mm long.

DISTRIBUTION (Figure 6): Lowland tropical forests of northern Guatemala and adjacent México, Belize, Honduras and El Salvador 100-700 m; Feb-Mar.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Campeche: Tuxpena, 23 Mar 1932, *Lundell 1437* (F). Chiapas: Mcpio. Copainala, 60 km NW of Soyala, 550 m, 13 Mar 1973, *Breedlove 34048* (F,LL). Tabasco: Mcpio. Tenosique, ca puentes Boca del Cerro, 270 m, 11 May 1984, *Cowan 4692* (TEX).

BELIZE. El Cayo: El Cayo, 13 Apr 1931, *Bartlett 12934* (F,GH,LL); hillside, Camp 6, 23 Mar 1938, *Gentle 2395* (GH,LL).

GUATEMALA. Alta Verapaz: Pantin, ca 600 m, 5 Apr 1939, *Standley 70872* (F). Peten: ca La Libertad, 9 Mar 1935, *Aguilar 484* (LL); Remate, 14 Mar 1960, *Contreras 662* (LL); Lake Peter Itza, 28 Mar 1961, *Contreras*

2063 (LL); Quexil, 7 Feb 1970, *Contreras 9615* (LL); Tikal, Mar 1961, *Ibarra 1* (LL); Tikal, on ruins, 3 Mar 1961, *Lundell 16843* (LL).

EL SALVADOR. Santa Ana: ca Santa Ana, 655-800 m, 8 Jan 1922, *Standley 19695* (GH). La Libertad: W of Santa Teda, 750 m, 19 Jan 1946, *Carlson 174* (F).

HONDURAS: Comayagua: Comayagua, ca 500 m, 20 Feb 1933, *Edwards P568* (AA). Cortes: San Pedro Sula, 21 Feb 1987, *Thieme 5332* (F). Santa Barbara: Quebrado de Limones, 150 m, 17 Apr 1947, *Standley 7541* (F).

A very distinct taxon, largely confined to lowland tropical rainforests, easily recognized by its small involucres (3-5 mm high), sessile heads, each with 5 pale yellow florets, the lobes of which have tufts of hispid hairs. Blake described forms with mostly glandular hairs as *L. subglandulare*. Williams (1976) correctly submerged this under the present species, as did Robinson (1983).

10. *Sinclairia andromachioides* (Less.) Sch.-Bip. ex Rydb., N. Amer. Fl. 34:298. 1927. *Vernonia andromachioides* Less., Linnaea 6:397. 1831. *Liabum andromachioides* (Less.) Hemsl., Biol. Centr. Amer., Bot. 2:231. 1881. TYPE: MÉXICO. Veracruz: forests ca Misantla, w/o date, *Schiede 1234* (HOLOTYPE: B; Photoholotypes: F!,GH!).

Clambering shrubs or hemiepiphytes. Leaves mostly 10-25 cm long, 6-18 cm wide; petioles 1-4 cm long; blades broadly ovate to ovate elliptic, not markedly bicolored, if at all, the lower surface decidedly brownish or dingy puberulent or tomentose, 3 nervate from above the base, the margins entire. Heads discoid, numerous in terminal corymbose panicles. Involucres 5-7 mm high, 3 seriate, the bracts gradate, the inner series glabrous with obtuse or rounded apices. Ray florets absent. Disk florets 15-25, the corollas yellow, 5-6 mm long, the tube ca 2.5 mm long, the lobes ca 1.5 mm long. Achenes ca 1.5 mm long, pubescent throughout, or nearly so; the pappus of numerous tawny bristles, the inner series 5-6 mm long, the outer scales similar to the inner but ca 0.7 mm long.

DISTRIBUTION (Figure 2): Known only from Veracruz, montane cloud forests in barrancas bordering streams along the eastern slopes of Pico de Orizaba and Cofre de Perote, ca 1200 m; Jan-May.

ADDITIONAL SPECIMENS EXAMINED: Veracruz: Orizaba, w/o date, *Botteri s.n.* (F,GH); valle de Cordoba, Feb 1866, *Bourgeau 1848* (GH); Fortin, Feb 1883, *Kerber 277* (GH); Mirador, Feb 1843, *Liebmann 399* (F,GH); ca Orizaba, 23 Jan 1895, *Pringle 5905* (GH); Zacuapan, Jan 1908, *Purpus 2942* (GH); Zacuapan, May 1919, *Purpus 8162* (GH); Zacuapan, Mar 1932, *Purpus 14233* (AA,F); w/o locality, May 1935, *Purpus 16452* (LL); Orizaba, Oct 1855, *Schaffner 368* (GH).

The species is closely related to the widespread *S. polyantha* but can be distinguished by its faintly, if at all, bicolored leaves and smaller involucres

(5-7 mm high vs 7-9 mm). The two taxa apparently do not coexist. It seems noteworthy that *S. andromachioides* has not been collected for over 50 years, suggesting that many of the original populations have been destroyed, probably for the cultivation of coffee.

11. *Sinclairia deppeana* (Less.) Rydb., N. Amer. Fl. 34:300. 1927. *Andromachia deppeana* Less., Linnaea 6:401. 1831. *Liabum deppeana* (Less.) Hemsl., Biol. Centr. Amer., Bot. 2:232. 1881. TYPE: MÉXICO. Veracruz. Cuesta Grande del Jalacingo, Dec 1819, *Schiede 1239* (HOLOTYPE: B; Photoholotypes: F!,GH!).

Clambering shrubs, small trees, or hemiepiphytes to 5 m high. Leaves bicolored, 12-26 cm long, 6-14 cm wide; petioles 4-10 cm long; blades broadly ovate to broadly elliptic, densely white tomentose beneath, drying blackish above, the margins minutely serrulate to nearly entire. Heads radiate, few to numerous in terminal, rounded, corymbose panicles, the ultimate peduncles stiffly divaricate, mostly 1-2 cm long. Involucres mostly 12-15 mm high, 3-4 seriate, unequally gradate, the inner bracts mostly glabrous with broadly rounded apices, these becoming loose and somewhat squarrose with age. Ray florets mostly 8, the ligules yellow, 8-12 mm long. Disk florets 15-20, the corollas yellow, 8-10 mm long, glabrous except for puberulent tufts on the lobes, the tubes ca 3 mm long, the lobes ca 1.5 mm long. Achenes 1.5-2.0 mm long, pubescent throughout, the pappus of numerous yellowish white bristles 9-11 mm long, the outer scales ca 0.5 mm long.

DISTRIBUTION (Figure 2): Veracruz and Oaxaca along the Gulf slopes in pine-oak montane cloud forests, 1300-2500 m; Oct-Feb.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Oaxaca: 70-75 km S of Tuxtepec on road to Oaxaca City, 1370 m, 5 Jan 1982, *Breedlove 56743* (TEX); 35 mi E of Teotitlan, 1650 m, 22 Feb 1979, *Croat 48249* (F). Veracruz: Mcpio. Orizaba, Orizaba, w/o date, *Botteri 1197* (F); Mcpio. Tatatila, between Tatalita and Escalona, 14 Feb 1986, *Chazaro 3972* (TEX,WIS,XAL); Mcpio. Xico, between Tonalco and Oxtlapa, 2500 m, 8 Oct 1986, *Chazaro 4028B* (TEX,WIS,XAL); between Xico and Buena Vista, 2000 m, 25 Dec 1987, *Chazaro B. 1988* (WIS); Mcpio. Zongolica, Nacaxtla, ca 1050 m, *Torres W141* (TEX,XAL); Mcpio. Acajete, Plan de Cedeno, 1740 m, 10 Dec 1971, *Ventura 4677* (MEXU,TEX); Mcpio. Yecuatla, El Cajon, 1380 m, 14 Dec 1971, *Ventura 4701* (MEXU,TEX).

The species appears to be a very large headed form of *S. discolor*, but it is readily distinguished from the latter by a number of characters including much larger, broader involucral bracts and pubescent achenes.

12. *Sinclairia tajumulcensis* (Standl. & Steyerm.) H. Robins. & Bret. Phytologia 28:62. 1974. *Liabum tajumulcense* Standl. & Steyerm., Publ.

Field Mus. Nat. Hist., Chicago, Bot. Ser. 23:27. 1943. TYPE: GUATEMALA. San Marcos: moist thicket bordering stream, barrancas SW of Tajulmulcom, 2300-2500 m, Feb 1940, *J.A. Steyermark 36543* (HOLOTYPE: F!).

Clambering shrub or small tree 4-5 m high. Leaves unknown, presumably deciduous shortly after anthesis. Heads numerous in congested, somewhat pyramidal, corymbose panicles, the ultimate peduncles 3-10 mm long. Involucres campanulate, 4-5 seriate, 14-17 mm high, 18-22 mm wide, the bracts gradate, linear lanceolate, acuminate, densely tomentulose or lanuginose. Ray florets absent. Disk florets 20-40, the corollas yellow, 10-12 mm long. Achenes ca 4-5 mm long, densely pubescent throughout, the inner pappus of 30-40 bristles 10-12 mm long, the outer pappus of numerous narrow scales 1.0-1.5 mm long, similar in color to the inner bristles. A very distinctive species, known only by the type collection (Figure 4).

13. *Sinclairia liebmannii* (Klatt) Sch.-Bip. ex Rydb., N. Amer. Fl. 34:300. 1917. *Liabum liebmannii* Klatt, Leopoldina 23:146. 1887. TYPE: MÉXICO. Oaxaca: "Bartolo," 1842, *F.M. Liebmann 357* (HOLOTYPE: C; possible fragment of holotype: GH!). Liebmann apparently collected type material at San Bartolo, Oaxaca, in 1842, along the main route between México City and Tehuantepec. Sousa (1979) showed the main route between these cities, which was traversed some 8 years earlier by the collector Andrieux. McVaugh (1972) noted that Liebmann collected in Oaxaca along the Pacific Coast during the year concerned. There is but little question that the packet material I examined at GH, cited above, belongs to what previously has been called *S. caducifolia* and is probable fragmentary type material of it S. liebmannii.

Vernonia hypoleuca DC., Prod. 5:27. 1836. *Liabum hypoleucum* (DC.) S.F. Blake, Proc. Biol. Soc. Washington 39:144. 1926.

Sinclairia blakei H. Robins. & Bret., Phytologia 28:60. 1974. [not *Sinclairia hypoleuca* (Greenm.) Rydb.] TYPE: MÉXICO. Guerrero(?): between Acapulco and México City, Nov 1790-Dec 1791, *Haenke s.n.* (LECTOTYPE: G-DC, microfiche!).

Liabum caducifolium B.L. Robins. & Bartl., Proc. Amer. Acad. Arts 43:59. 1907. *Sinclairia caducifolia* (B.L. Robins. & Bartl.) Rydb., N. Amer. Fl. 34:299. 1927. TYPE: MÉXICO. Guerrero: Acapulco and vicinity, Oct 1894-Mar 1895, *E. Palmer 245* (HOLOTYPE: GH!; Isotype: F!).

Slender, often arching, sometimes clambering shrubs or small trees to 10 m high which become deciduous at the time of, or soon after, flowering. Stems

slender and whip like above, but 5-7 cm thick below. Leaves 6-15 cm long, 3-12 cm wide, bicolored; petioles 1-4 cm long; blades mostly to some extent triangular with basal lobes or flanges, 3 nervate, white tomentose beneath, the margins weakly serrulate to nearly entire. Heads eradiate, numerous in rather stiffly branched corymbose panicles. The ultimate peduncles 3-8 mm long, at first loosely arachnoid but soon glabrate. Involucres 5-8 mm high, 2-3 seriate, gradate, the bracts 15-20, closely appressed with acute apices. Ray florets absent. Disk florets 6-12, the corollas glabrous, creamy white or pale yellow, 8-12 mm long, the tubes 3-4 mm long, grading into an ill defined tubular throat, the lobes ca 2 mm long. Achenes 3-4 mm long, moderately pubescent, more so above, the pappus of yellowish white or tawny bristles 7-9 mm long, the outer scales 1-2 mm long, scarcely differentiated.

DISTRIBUTION (Figure 6): Jalisco to Oaxaca along the Pacific slopes in tropical deciduous forests, 50-1200 m; Oct-Dec.

REPRESENTATIVE SPECIMENS: MÉXICO. Colima: 13 mi N of Santiago, 200-300 m, 10 Dec 1959, *McVaugh 1642* (LL,MICH). Jalisco: 6 mi SW of Pihuamo, 2200 ft, 29 Oct 1962, *Cronquist 9764* (GH,NY,TEX). Guerrero: Taxco, 16 Jan 1936, *Abbott 43* (GH). Michoacán: 10 km SE of Aquila, 50 m, 24 Nov 1963, *Feddema 2725* (MICH,TEX). Morelos: Cuernavaca, 3 Jan 1899, *Deam 7* (F,GH). Oaxaca: Mcpio. Jalapa del Marques, Cerro de la Huerta, 620 m, 17 Nov 1978, *Koch 78331* (CHAPA,TEX).

This fairly common species is noteworthy for its caducous leaves which drop soon after flowering commences. Unfortunately, the specific name long applied to this species by most workers, including McVaugh (1984), must be replaced by the earlier specific name, *Liabum liebmannii*, as noted above.

Sinclairia liebmannii appears most closely related to the largely Central American species, *S. sublobata*, both possessing similar, usually lobed, rather thick leaves which tend to drop shortly after flowering. The latter can be distinguished by its larger heads with obtuse involucral bracts and generally larger, less deltoid, leaf blades.

Liabum adenotrichum is positioned in synonymy here with some trepidation. The only plant known (the type) appears to be a hybrid derivative, perhaps a backcross from *S. klattii* into *S. liebmannii*. Both of the latter occur in the region of the type of *L. adenotrichum*. Most of the characters are those of *S. liebmannii*, but the larger heads with a few glands and the somewhat drooping capitulescence strongly suggest that an influx of genes from *S. klattii* has occurred.

14. *Sinclairia similis* (McVaugh) H. Robins. & Bret., Phytologia 28:62. 1974. *Liabum similis* McVaugh, Contr. Univ. Michigan Herb. 9:468. 1972. TYPE: MÉXICO. Nayarit: "Shaded places in pockets of trees (notably *Bursera* spp.) on rough lava flow at the base of Volcán Ceboruco," ca 6 mi NW of Ahuacatlan, 3200 ft, 4 Oct 1962, *A. Cronquist 9602*

(MICH,TEX!).

Slender arching shrubs 3-4 m high. Leaves 10-20 cm long, 6-10 cm wide; petioles 3-9 cm long; blades broadly ovate to deltoid, bicolored, white tomentulose beneath, 3 nervate from the base, the margins irregularly serrate. Heads eradiate, numerous in terminal corymbose panicles, the ultimate peduncles mostly 5-20 mm long. Involucres turbocampanulate, 8-10 mm high, 3-4 seriate, the bracts appressed at first, but squarrose with age, narrowly ovate, appressed pubescent, the apices acute. Ray florets absent. Disk florets 15-20, the corollas white, glabrous, 9-11 mm long, the tubes 2-3 mm long, gradually passing into the throat, the lobes 2-3 mm long. Achenes 3.5-5.0 mm long, sparsely short pilose, the pappus of tawny white bristles 7-9 mm long, the outer scales not much differentiated, 0.5-1.0 mm long.

DISTRIBUTION (Figure 4): Nayarit and adjacent Jalisco, mostly tropical deciduous forests along the Pacific slopes, 0-1000 m; Oct-Nov.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Jalisco: 3 km SE of Puerto Vallarta, ca 50 m, 12 Nov 1963, *Feddema 2507* (MICH,TEX).

This taxon is known by only 2 collections, cited above. It is clearly related to *S. liebmannii*, but is amply distinct, as noted by McVaugh (1984), who provides an excellent illustration of the species.

15. *Sinclairia klattii* (B.L. Robins. & Greenm.) H. Robins. & Bret., Phytologia 28:61. 1974. *Liabum klattii* B.L. Robins. & Greenm., Amer. J. Sci., ser. 3, 1:156. 1895. *Sinclairiopsis klattii* (B.L. Robins. & Greenm.) Rydb., N. Amer. Fl. 34:293. 1927. TYPE. MÉXICO. Oaxaca: Monte Alban, 6000 ft, 24 Nov 1894, *C.G. Pringle 6059* (HOLOTYPE: GH!; Isotypes: GH!).

Shrubs or small trees 2-5 m high, leafless when in flower. Leaves 10-18 cm long, 6-11 cm wide; petioles 3-7 cm long; blades broadly ovate, bicolored, dingy white tomentose beneath, the margins denticulate. Heads eradiate, mostly 10-30 in both terminal and axillary pendant clusters, the ultimate peduncles glandular pubescent and arachnoid tomentose, mostly 3-25 mm long. Involucres 15-17 mm high, narrowly campanulate, 2-3 seriate, the bracts lanceolate, 2-4 nervate, glandular pubescent, the apices narrowly acuminate. Ray florets absent. Disk florets 18-30, the corollas yellow, pubescent, tubular throughout or nearly so, 13-16 mm long, the lobes ca 3 mm long, decidedly hispid on the apices. Achenes 2-3 mm long, densely pubescent throughout, the pappus of numerous tawny bristles mostly 8-17 mm long, the outer series of similar, but very short scales.

DISTRIBUTION (Figure 5): Veracruz and adjacent Oaxaca, mostly barrancas in tropical deciduous forests, 200-1500 m; Nov-Mar.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. Oaxaca: 8-10 mi N of Oaxaca, along highway 175, 31 Jan 1960, *King 2499* (TEX); Estacion

Almoloyas, 800 m, 3 Mar 1907, *Conzatti 1751* (GH). Veracruz: Mcpio. Acultzingo, 3 km W of Acultzingo, ca 5000 ft, 26 Mar 1970, *Long 3279* (F); Mcpio. E. Zapata, Plan del Río, 210 m, 14 Feb 1973, *Hernández 1838* (F); Mcpio. Naolinco, 6 km ESE of San Antonio Paso del Toro, 650 m, 14 Jan 1984, *Nee 28816* (F,TEX,XAL); Zacuapan, barranca de Tenampa, Feb 1910, *Purpus 4336* (GH); Zacuapan, Feb 1914, *Purpus 7048* (GH).

II. SUBGENUS *MEGALIABUM* (species 16-23).
Sect. *Megaliabum* (species 16-18).

Sinclairia subgenus **Megaliabum** (Rydb.) B. Turner, stat. nov. Based upon: *Megaliabum* Rydb., N. Amer. Fl. 34:293. 1927. TYPE SPECIES: *Vernonia andrieuxii* DC., Prod. 5:16. 1836.

16. *Sinclairia andrieuxii* (DC.) H. Robins. & Bret., Phytologia 28:60. 1974. *Vernonia andrieuxii* DC., Prod. 5:16. 1836. *Liabum andrieuxii* (DC.) Hemsl., Biol. Centr. Amer., Bot. 2:231. 1881. *Megaliabum andrieuxii* (DC.) Rydb., N. Amer. Fl. 34:293. 1927. TYPE: MÉXICO. Oaxaca: between Tehuantepec and the river "Guaracoalcos" [Coatzacoalcos], Sep 1834, *G. Andrieux 269* (HOLOTYPE: G-DC, microfiche!; Photoholotype: F!).

Stiffly erect suffruticose herbs or soft wooded shrubs 1-3 m high. Leaves bicolored, mostly 10-25 cm long, 6-14 cm wide; petioles 1.5-7.0 cm long; blades deltoid to subcordate, 3 nervate, the lower surfaces densely white tomentose, the margins irregularly serrate to rarely lobed. Heads 1-4, very large, radiate, arranged in strict terminal cymes, the ultimate peduncles mostly 2-6 cm long. Involucres broadly campanulate, 2-3 cm high, 3-4 cm wide, 4-6 seriate, the bracts linear lanceolate, tomentose throughout. Ray florets 21-34, the ligules orange or yellow orange, 15-25 mm long. Disk florets numerous, the corollas 15-18 mm long, the tubes 6-7 mm long, the lobes 3-5 mm long. Achenes 3.5-5.0 mm long, densely white pubescent throughout, the pappus of numerous, tawny to purplish, bristles mostly 1-2 cm long, the outermost series shorter but scarcely differentiated from the inner.

DISTRIBUTION (Figure 8): Oaxaca, Chiapas and adjacent Guatemala, mostly Pacific slopes along barrancas in tropical deciduous forests, 300-1500 m; Jul-Nov.

REPRESENTATIVE SPECIMENS: MÉXICO. Chiapas: Mcpio. Arriaga, 13 km N of Arriaga, 830 m, 4 Oct 1972, *Breedlove 28286* (CAS,LL); Siltepec, 3 Nov 1940, *Matuda 4108* (F,GH,LL). Oaxaca: Mcpio. Pochutla, 8 km NE of Chacalapa, 24 Nov 1977, *Delgado 692* (TEX); 37 mi SE of Oaxaca, 13 Oct 1962, *Cronquist* (GH,NY,TEX).

GUATEMALA. Huehuetenango: on rocky cliff along River Selegua, 47 km from Huehuetenango, 1400 m, 20 Nov 1967, *Molina 21411* (F,GH); NW of Cuilco, Cerro Chiquihui, 17 Aug 1942, *Steyermark 50776* (F).

Fig. 8. Distribution of Sinclairia (Sect. Megaliabum).

This is a common species in Chiapas. Most all field collectors have described the species as having orange or orange yellow corollas.

17. *Sinclairia moorei* (H. Robins. & Bret.) H. Robins. & Bret., Phytologia 28:61. 1974. *Liabum moorei* H. Robins. & Bret., Phytologia 27:252. 1973. TYPE: MÉXICO. Guerrero: 36-38 km from Iguala on road to Teloloapan, streamsides and slopes by Río de los Sabinos near Los Sabinos, 5 Nov 1949, *H.E. Moore, Jr. 5518* (HOLOTYPE: US; Isotype: GH!).

Erect suffruticose herbs or shrubs to 3 m high. Leaves bicolored, 10-12 cm long, 6-8 cm wide; petioles 2-3 cm long; blades broadly ovate, white tomentose beneath, the margins minutely serratulate to nearly entire. Heads radiate, 2-5 in strict terminal cymes, the ultimate peduncles 1-3 cm long. Involucres campanulate, 20-22 mm high, 24-30 mm wide, the bracts 4-5 seriate, gradate, densely tomentose throughout. Ray florets 11-13, the ligules yellow, ca 20 mm long. Disk florets 25-32, the corollas yellow, 18-20 mm long. Achenes 3.5-4.5 mm long, densely pubescent throughout, the pappus of numerous bristles in 2-3 series.

ADDITIONAL SPECIMEN EXAMINED (Figure 8): MÉXICO. Guerrero: few miles W of Chilpancingo on dirt road towards Omiltemi, 16 Oct 1976, *Stuessy & Gardner 4218* (WIS).

The species appears to stand somewhere between *S. andrieuxii* and *S. pringlei*, but closer to the former, as noted by its authors.

18. *Sinclairia pringlei* (B.L. Robins. & Greenm.) H. Robins. & Bret., Phytologia 28:61. 1974. *Liabum pringlei* B.L. Robins. & Greenm., Proc. Amer. Acad. Arts 32:49. 1896. *Megaliabum pringlei* (B.L. Robins. & Greenm.) Rydb., N. Amer. Fl. 34:294. 1927. TYPE: MÉXICO. Jalisco: "rocky slopes, mountains near Lake Chapala," 7000 ft, 18 Oct 1895, *C.G. Pringle 6214* (published, in error, as *6215*) (HOLOTYPE: GH!; Isotype: F!).

Suffruticose perennial herbs or soft wooded shrubs 1-2 m high. Leaves bicolored, mostly 8-15 cm long, 5-12 cm wide; petioles 0.3-0.8 cm long; blades ovate to somewhat deltoid, 3 nervate, dirty white tomentose beneath, the margins irregularly serrate to denticulate. Heads 3-12, eradiate, arranged in strict terminal cymes, the ultimate peduncles mostly 1-4 cm long. Involucres 15-20 mm high, 25-35 mm wide, 3-5 seriate, the bracts ovate lanceolate, 3-5 mm wide, often squarrose with age. Ray florets absent. Disk florets 70-80, the corollas 10-12 mm long, glabrous, creamy white, the tubes 2-3 mm long, grading into the throat, the lobes 3-4 mm long. Achenes 3.5-5.0 mm long, densely pubescent throughout (rarely sparsely so), the pappus bristles tawny, 10-12 mm long, the outer scales well defined, 0.5-1.5 mm long.

Fig. 9. Distribution of Sinclairia (Sect. Liabellum).

DISTRIBUTION (Figure 8): Jalisco, Pacific slopes in tropical deciduous or oak forests, 1500-2000 m; Aug-Nov.

REPRESENTATIVE SPECIMENS: MÉXICO. Jalisco: ca 25 mi SW Guadalajara, 1650 m, 1 Oct 1952, *McVaugh 13300* (MICH,TEX); mountains N of Autlan, 1500-1650 m, 5 Oct 1960, *McVaugh 19913* (MICH,TEX); hills of Etzatlan, 6000 ft, *Pringle 10824* (F,LL,TEX,WIS); 8.7 mi W of Atenquillo, 30 Sep 1984, *Sundberg 2951* (TEX).

This species is closely related to *S. andrieuxii* and was positioned with that taxon in the segregate genus *Megaliabum* by Rydberg (1927), which would presumably also include the recently described *Sinclairia moorei*. All of these stand somewhere "between" the subgenera *Liabellum* and *Sinclairia* and constitute the principal reason for the submergence of the former within the latter.

Sect. *LIABELLUM* (species 19-23).

Sinclairia Sect. **Liabellum** (Rydb.) B. Turner, status nov. Based on: *Liabellum* Rydb., N. Amer. Fl. 34:294. 1927. (TYPE SPECIES: *Liabum palmeri* A. Gray)

19. **Sinclairia hintoniorum** B. Turner, sp. nov. (Figure 10.). TYPE: MÉXICO. México: Distr. Temascaltepec, Chorrera, hill, 23 Sep 1935, *G.B. Hinton et al. 8482* (HOLOTYPE: LL!; Isotype: GH!).

> *Liabum palmeri* (A. Gray) Rydb. similis sed differt plantis robustis 1-2 m altis herbaceis sed aliquantum suffruticosis, capitulis majoribus, acheniis majoribus (5-6 mm longis vs 3-4 mm), et pappo setis porphyreis serie exteriori et interiori similari.

Stiffly erect suffruticose herb to 2 m high (according to label data). Stems purplish, pubescent throughout with glandular trichomes. Leaves (only the uppermost examined) deeply 3 lobed, the lobes in turn 3 lobed, densely tomentose below, 5-9 cm long, 3-7 cm wide. Heads 5-30 in a strict terminal cyme, the ultimate peduncles thick, mostly 2-9 cm long. Involucres broadly campanulate to hemispheric, 15-20 cm high, the bracts 3-4 seriate, linear lanceolate, both appressed sericeous and glandular pubescent. Receptacle convex, decidedly pubescent, 6-9 mm across. Florets 50-60 per head, the corollas yellow, 15-16 mm long, the lobes ca 5 mm long, a few hairs at the apices. Achenes 4-5 sided, with 10-12 ribs, 5-6 mm long, appressed pilose, the pappus bristles rusty brown in 3-4 series, the inner series about 15 mm long, the outer series similar to those of the inner, but shorter (3-8 mm long).

The type locality is at ca 18° 52' N, 100° 11' W (Hinton & Rzedowski 1975).

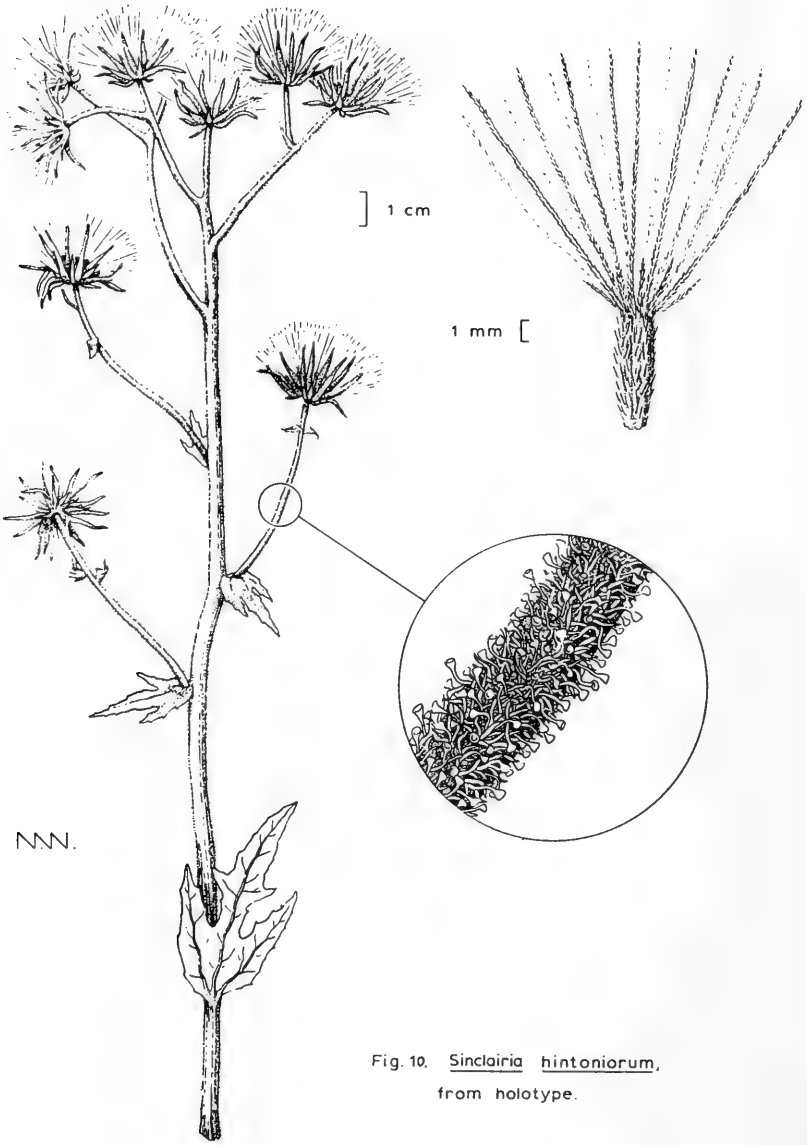


Fig. 10. Sinclairia hintoniorum, from holotype.

DISTRIBUTION (Figure 9): Known only from the type locality, as described above, having been collected on two different dates at that site.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. México. Distr. Temascaltepec, Charreua, 1230 m, 10 Sep 1932, *G.B. Hinton 2038* (F,GH).

The species is superficially similar to *S. palmeri*, but differs markedly from that species in its robust habit (ca 2 m high vs 30-75 cm) very large heads with more numerous florets, larger achenes (5-6 mm vs 3-4 mm long) with pappus rusty brown, the outermost series similar to those of the inner, not differentiated into short, flattened, scales. While not noted on the collectors' label, it is likely that the stems arise from subterranean tuber-like roots as in the other species of sect. *Liabellum.*

It is a pleasure to name this taxon for the remarkable Hinton family, constituting three generations of plant collectors in México: George (father), Jaime (son) and George (grandson), the latter two individuals still actively collecting out of their hacienda near Cerro Potosí, Nuevo León.

20. **Sinclairia palmeri** (A. Gray) B. Turner, comb. nov. BASIONYM: *Liabum palmeri* A. Gray, Proc. Amer. Acad. Arts 22:432. 1887. *Liabellum palmeri* (A. Gray) Rydb., N. Amer. Fl. 34:294. 1927. TYPE: MÉXICO. Jalisco: Río Blanco, 1886, *E. Palmer 586* (HOLOTYPE: GH!).

Herbaceous perennials 30-90 cm high, the stems leafy and crowded below, arising from well defined tuber-like roots. Leaves mostly 8-16 cm long, largely confined to the lower portion of the stems, deeply 3 lobed to pinnately dissected, the divisions mostly 5-20 mm wide, the undersurfaces densely white tomentose, the margins serrulate to nearly entire; petioles 2-8 cm long, winged throughout. Heads 1-10, arranged in rather strict terminal cymes, the ultimate peduncles 2-10 cm long, both arachnoid and densely stipitate glandular. Involucres turbocampanulate to campanulate, 15-20 mm high, 3-4 seriate, the bracts subimbricate, linear lanceolate, both tomentose and stipitate glandular. Ray florets absent. Disk florets 30-40, the corollas yellow, sparsely pubescent, ca 15 mm long, the lobes ca 4 mm long. Achenes obpyramidal, 2.5-3.0 mm long, densely appressed sericeous, the inner pappus bristles 10-15 mm long, tawny white, the outermost pappus composed of white scales 1.0-1.5 mm long.

DISTRIBUTION (Figure 9): Chihuahua, Sinaloa, Durango, Zacatecas, Nayarit and Jalisco, pine-oak woodlands, grassy hillsides and open rocky places, 1500-2700 m; Sep-Nov.

REPRESENTATIVE SPECIMENS: MÉXICO. Chihuahua: 4 mi SW of Matamoros, 6000-6300 ft, 4 Oct 1959, *Correll 22738* (LL); Sierra Chinatu, San Juan, 8900 ft, 8 Oct 1959, *Correll 22921-A* (LL). Durango: Canyon Cantero, Sierra Gamon , ca 2000 m, 21 Sep 1948, *Gentry 8365* (GH); ca 50 km W of Cd. Durango, 2550 m, 27 Sep 1962, *McVaugh 21655* (LL); 41 mi WSW of Cd. Durango, 27 Sep 1984, *Sundberg 2891* (TEX). Jalisco: 8-10 km SE

of El Mortero, 2450 m, 5 Nov 1963, *Feddema 2479* (TEX); ca Guadalajara, 7 Dec 1888, *Pringle 2127* (GH); W of Bolanos, 15-17 Sep 1897, *Rose 2983* (GH); Michoacán: 9 mi W of Cd. Hidalgo, 24 Sep 1984, *Spooner 2561* (TEX). Zacatecas: ca 1 km S of Valparaiso, 2000-2400 m, 11 Sep 1966, *Anderson 3603* (GH).

21. **Sinclairia gentryi** (H. Robins.) B. Turner, comb. nov. BASIONYM: *Liabellum gentryi* H. Robins., Phytologia 41:46. 1978. TYPE: MÉXICO. Nayarit: Arroyo del Obispo, 31 mi SE of Tepic, canyon with running stream in oak woodlands, on rocks, 2 Aug 1951, *H.S. Gentry 11030* (HOLOTYPE: DUKE; Isotype: ARIZ!; Photoholotype: TEX!).

Small, scapose, perennials 15-30 cm high, the 2-3 pairs of leaves all basal and seemingly opposite. Leaves bicolored, broadly ovate to ovate elliptic, 8-12 cm long, 3-6 cm wide, weakly 3 nervate to pinnately veined, the margins serrulate to nearly entire, the undersurfaces white tomentose. Heads 2-3 on a naked scape, the ultimate peduncles 2-8 cm long, both tomentose and stipitate glandular. Involucres campanulate, 10-14 mm high, 12-16 mm wide, the involucral bracts subimbricate, 3-4 seriate, linear lanceolate, both tomentose and stipitate glandular. Ray florets absent. Disk florets 20-30, the corollas yellow, ca 12 mm long, sparsely pubescent below, the lobes ca 3.5 mm long. Achenes obpyramidal, ca 2 mm long, densely appressed sericeous, the pappus of numerous tawny white bristles in 2-3 series, the inner series ca 8 mm long, the outer series similar to those of the inner, but 1-2 mm long.

DISTRIBUTION (Figure 9): Known only from the type locality, as described above.

The species is closely related to *S. palmeri* and was treated as synonymous with that species by McVaugh (1984). It differs, however, in a number of features, as noted by H. Robinson in his original description, including, scapose habit, unlobed leaves, larger heads, longer pappus bristles, the outer series of which are essentially like those of the inner, except as to size (*S. palmeri* has an outer series of white, scales, quite unlike the inner bristles). The species is known only by type material. Robinson did not have access to the isotype (ARIZ); while clearly a different plant, it retains all of the features found in the holotype.

22. **Sinclairia cervina** (B.L. Robins.) B. Turner, comb. nov. BASIONYM: *Liabum cervinum* B.L. Robins., Proc. Amer. Acad. Arts 29:317. 1894. *Liabellum cervinum* (B.L. Robins.) Rydb., N. Amer. Fl. 34:294. 1927. TYPE: MÉXICO. Jalisco: "Bluffs of barrancas, San Marcos," 9 Jun 1893, *C.G. Pringle 4398* (HOLOTYPE: GH!; Isotypes: F!,MU!).

Perennial herbs 50-80 cm high, the stems leafy throughout and arising from tuber-like roots. Leaves mostly 10-18 cm long, 3-10 cm wide, deeply tripartite, the divisions often again lobed, the ultimate divisions mostly 3-10 mm

wide with entire or irregularly serrate margins, arachnoid tomentose beneath. Heads 3-7 in strict terminal cymes, the ultimate peduncles 2-5 cm long, white tomentose or with scattered eglandular trichomes. Involucres turbinate, 16-22 mm high, 3-4 seriate, the bracts mostly 2.5-3.0 mm wide at midsection, densely appressed pubescent. Ray florets absent. Disk florets 50-60, the corollas yellow, or reportedly white, 15-20 mm long, the lobes 4-6 mm long. Achenes 2.5-3.0 mm long, densely appressed sericeous, the inner pappus bristles 12-14 mm long, tawny, the outer scales 1-3 mm long, not strongly differentiated.

DISTRIBUTION (Figure 9): Southern Sinaloa, Nayarit and Jalisco, oak woodlands and grassy areas, 1000-2000 m; May-Aug.

23. **Sinclairia angustissima** (A. Gray) B. Turner, comb. nov. BASIONYM: *Liabum angustissimum* A. Gray in S. Wats., Proc. Amer. Acad. Arts 22:432. 1887. *Liabellum angustissimum* (A. Gray) Rydb., N. Amer. Fl. 34:295. 1927. TYPE: MÉXICO. Jalisco: "Guadalajara," Jul 1886, *E. Palmer 215* (HOLOTYPE: GH!).

Perennial herbs 15-45 cm high, the stems leafy throughout and arising from tuber-like roots. Leaves tripartite to the base (rarely not), appearing ternate, the divisions entire, mostly 1-3 mm wide, 3-10 cm long, bicolored, the lower surfaces densely white tomentose. Heads 1 or 2 at the apices of solitary stems, the ultimate peduncles 2.5 cm long, white tomentose or glandular pubescent, or both. Ray florets absent. Disk florets 30-40, the corollas yellow, 12-14 mm long, the lobes 3-4 mm long. Achenes ca 2.5 mm long, appressed sericeous, the inner pappus bristles tawny white, 8-10 mm long, the outer bristles not well differentiated, 0.5-1.0 mm long.

DISTRIBUTION (Figure 9): Endemic to Nayarit and Jalisco, hillsides and along bluffs of barrancas, 1500-2000 m; Jul-Aug.

ADDITIONAL SPECIMENS EXAMINED: MÉXICO. JALISCO: hillsides near Guadalajara, 2 Jul 1889, *Pringle 2501* (F,GH); bluffs of the barranca of Guadalajara, 4500 ft, 18 Jul 1902, *Pringle 9934* (F,GH,LL). NAYARIT: Santa Gertrudis, 8 Aug 1897, *Rose 3406* (GH).

The species appears to be a small version of *Sinclairia cervina* but the leaves are nearly always parted to the base and the divisions are narrowly linear, giving the appearance of whorled leaves. The heads are also smaller with fewer involucral bracts. McVaugh (1984) notes that *S. angustissima, S. cervina* and *S. palmeri* are closely related, all occurring in the basin of the Río Santiago. Nevertheless, from the relatively few collections known, each appears to retain their distinct characters and intergrades between them have not been discerned. *Sinclairia cervina* apparently has not been collected since 1902.

ACKNOWLEDGMENTS

I am grateful to Dr. Guy Nesom for the Latin diagnoses and for a review of the manuscript. Specimens of *Sinclairia* were borrowed from the following institutions: F, GH, LL, MU, TEX, WIS; I am grateful to the Directors for this courtesy.

LITERATURE CITED

Hinton, J. & J. Rzedowski. 1975. George B. Hinton, Explorador Botanico en el Sudoeste de México. An. Escuela Nac. Cien. Biol. 21:1-114.

McVaugh, R. 1972. Botanical exploration in Nueva Galiciana from 1790 to the present time. Contr. Univ. Michigan Herb. 9:205-358.

_____. 1984. *Liabum*, in *Flora Novo-Galiciana* 12:576-584.

Robinson, H. 1983. A generic review of the tribe Liabeae (Asteraceae). Smithsonian Contr. Bot. 54:1-69.

_____, A.M. Powell, R.M. King, & J.F. Weedin. 1985. Chromosome numbers in Compositae, XI:Liabeae. Ann. Missouri Bot. Gard. 72:469-479.

Rydberg, P.A. 1927. Liabeae, in N. Amer. Fl. 34:289-360.

Sousa, S.M. 1979. Itinerario botanico de Andrieux in Mexico. Taxon 28:97-102.

Phytologia (September 1989) 67(2):207-208.

BOOK REVIEWS

Michael J. Warnock
Department of Life Sciences, Sam Houston State University, Huntsville, Texas 77341 USA

The *Rhododendron* Species Vol. II Elepidotes, Part 1 *Arboreum - Lacteum.* H.H. Davidian. Timber Press, 9999 SW Wilshire, Portland, OR, 97225 USA. 1989, 390 pp., illus, $54.95 + shipping, cloth. ISBN 0-88192-109-2.

At first glance, this book appears to be of the typical coffee table variety with lots of pretty pictures and with its primary use to be as a conversation piece. While the photographs and drawings are excellent, and a joy to examine, the text itself contains an abundance of information useful to practicing scientists and horticulturalists as well. The book begins with a series of maps of southeast Asia, where most of the *Rhododendron* species originate. The maps are followed by a brief glossary, with the next several pages occupied by an illustrated glossary which is used to clarify many of the terms used in the keys and descriptions to refer to leaf and corolla shapes, vestiture and seeds. Without the drawings in this illustrated glossary, many of the descriptions and keys would be extremely difficult to decipher, since many of the terms are not commonly used to describe features of other plants. A series of maps of horticultural hardiness zones for the northern hemisphere is included as a guide for successful outdoor cultivation of *Rhododendron* species. Keys to series, subseries and species seem adequate to separate the taxa, although I am not familiar enough with the plants to know if they really work. One difficulty that I had with the keys was the unnecessary splitting of couplets. For example, in the key to series, the primary lead to the first couplet is on the first page of the key and the secondary lead to the first couplet is at the end of the key, four pages later. The same is true of several other couplets in the keys. Completing short leads first will solve most of these separations and make the keys easier to use. Each taxon is described at length, and most of the species discussions include some historical background of the plant (when, where and by whom it was brought into cultivation–although many are not cultivated at the present time) as well as notes to aid prospective growers of the plants (particularly in Britain). Each description also includes the describing author and publication citation–not at all typical of the usual conversation piece. In fact, several new taxa are described and published in this work, making it

an essential for workers interested in the systematics of *Rhododendron.* This book would be a fine addition to the library of any *Rhododendron* enthusiast, whether they were interested in taxonomy, horticulture or simply want to look at the pictures.

McGraw-Hill Dictionary of Scientific and Technical Terms, 4th Ed. Sybil P. Parker, ed. McGraw-Hill Book Co., New York, NY. 1989, xvii, 2088 pp. + 49 pp. appendix, price unknown, cloth. ISBN 0-07-045270-9.

A monumental and possibly impossible task is attempted in this book. A laudable effort has been made to assimilate the terms and definitions from a tremendous diversity of fields into one volume (and quite a large one at that). In fact, the listing of fields runs the gambit from "Acoustics" to "Zoology." Each term has a brief definition, as in a typical dictionary. Many of the terms are quite specialized in use and scope. My impression is that practicing scientists will find this work of limited usefulness because most of the terms in this dictionary will not apply to their field and they will have no opportunity to use them, and they will already know the definitions for most of the terms that do apply to their particular field. The greatest usefulness for this book might be for politicians and administrators who frequently need to deal with scientific and technical terms with which they may be unfamiliar. For biologists (and botanists in particular), the book is even more limited in its utility since the bulk of the terms seem to apply to engineering and the physical sciences. The appendices include the familiar metric/American standard conversion factors, physical constants, computational formulae and abbreviations. A limited biographical listing is included in the final pages and some of the names which are or are not on the list are interesting. For instance, Copernicus and David Baltimore are included, while Arthur Cronquist, Asa Gray and Leonardo da Vinci are not. You might buy a copy for your favorite bureaucrat.

Information for Authors

Articles from all lines of botany, biographical sketches, critical reviews and summaries of literature will be considered for publication in PHYTOLOGIA. Manuscripts may be submitted either on computer diskette, or as typescript. Diskettes may be 5.25 inches or 3.5 inches but must be written in PC/DOS (MS/DOS) format or as flat ASCII files. Typescript manuscripts should be single spaced and will be read into the computer using a page scanner. The scanner will read standard typewriter fonts but will not read dot matrix print. Manuscripts submitted in dot matrix print cannot be accepted. Use underscore (not italics) for scientific names. Corrections made on typescript manuscripts must be complete and neat as the scanner will not read them otherwise. Language of manuscripts may be either English or Spanish. Figures will be reduced to fit within limits of text pages and therefore, should be submitted with an internal scale and have dimensions proportional to those for text pages. Legends for figures should be included in figures whenever possible. Each manuscript should have an abstract and key word list. Specimen citations should be consistent throughout the manuscript. Serial titles should be cited with abbreviations used in *Botanico Periodicum Huntianum*. References cited only as part of nomenclatural summaries should not appear in Literature Cited. Nomenclatural work should include one paragraph per basionym and must provide proper (as defined by the current *International Code of Botanical Nomenclature)* citation of sources of epithets and combinations.

Authors should arrange for two workers in the appropriate field to review the manuscript before submission. Copies of reviews should be forwarded to the editor with the manuscript. Manuscripts will not be published without review.

Cost of publication is currently $12.00 US per page for publication without reprints. Publication with 100 reprints is provided for $16.00 US per page, 200 reprints for $19.00 US per page. Page charges are due with manuscript and no paper will be published before payment is received in full. Reprints must be ordered and paid for in advance. Page charges will be determined on the basis of a typescript page (single spaced, elite type, 12 points, blank line between paragraphs) with all type inside a rectangle 143 mm (horizonal) by 219 (vertical), not including running head and page number. Title page should include title, author(s) name(s) and address(es). Two blank lines should appear above and below section headings (Abstract, Discussion, Literature Cited, etc.) in the manuscript. No extra charge is made for line drawings provided they conform to limitations of size and proportion for normal text. Halftones require an extra charge of $5.00 US per page.