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TAXONOMY OF THE *ERIGERON CORONARIUS* GROUP OF *ERIGERON* SECT. *GENICULACTIS* (ASTERACEAE: ASTEREAE)

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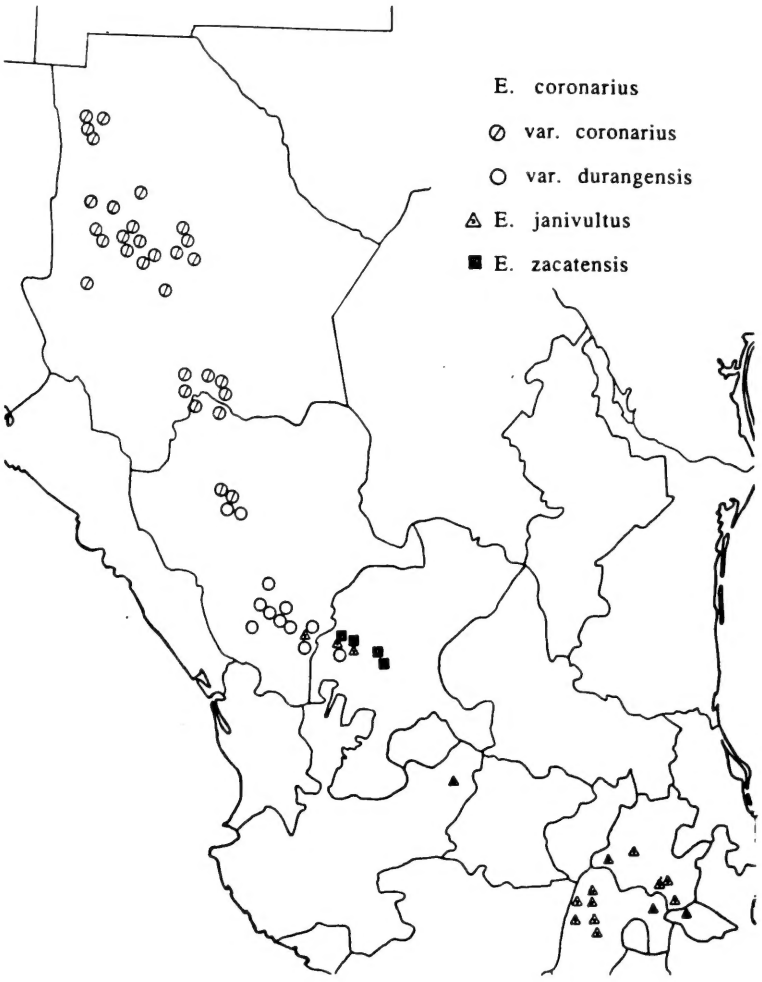
ABSTRACT

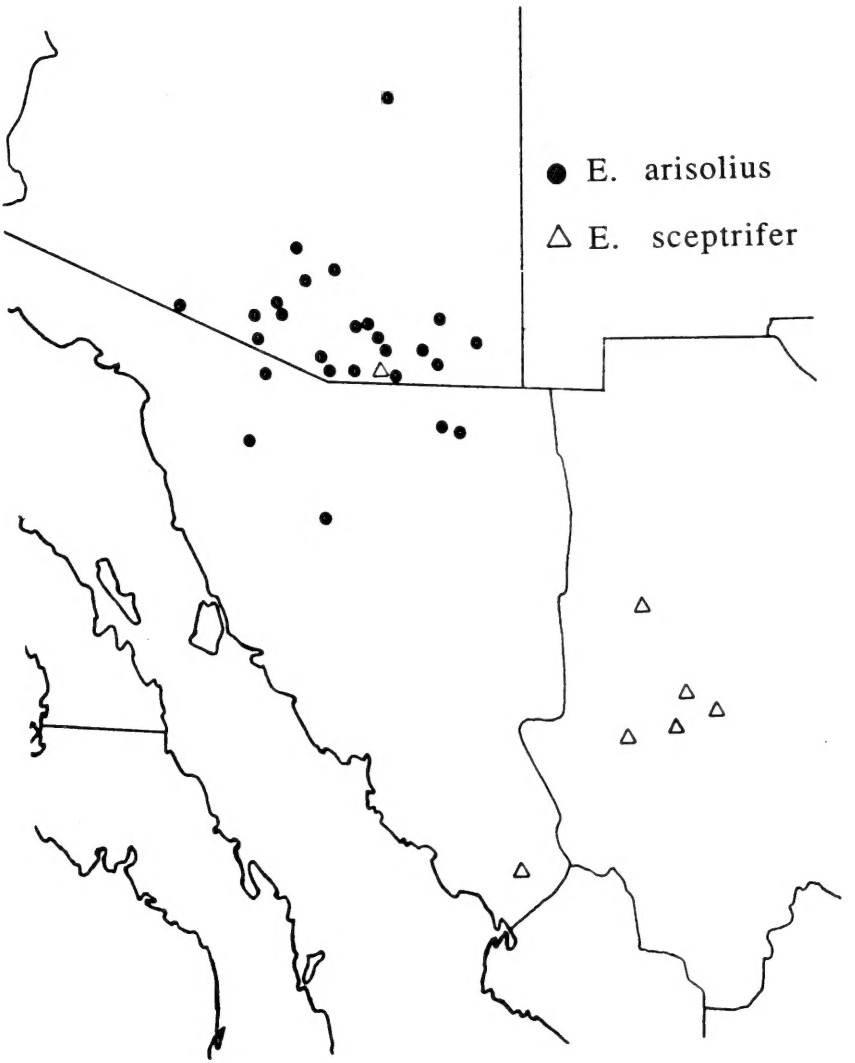
The *Erigeron coronarius* E. Greene group comprises five closely related species, ranging from south central México to the southwestern United States, and characterized by habitats primarily in grasslands, taproots, narrow and essentially entire leaves, erect buds, and narrow, white, reflexing ligules. *Erigeron janivultus* Nesom and *E. coronarius* have relatively wide ranges in México. **Erigeron zacatensis** *sp. nov.* is a relatively narrow endemic of Zacatecas and is probably derived from *E. coronarius* or *E. janivultus*. **Erigeron arisolius** *sp. nov.*, which occurs in southern Arizona and northern Sonora, is most similar to *E. coronarius*. **Erigeron sceptrifer** *sp. nov.* occurs in central Chihuahua, adjacent Sonora, and southeastern Arizona and appears to be more distantly related to the other taxa of the group. Four of the taxa are known to exist primarily as diploids, but tetraploids also have been discovered in three of them. In a broader context, the *E. coronarius* group is itself placed within a larger group of species and the whole assemblage is recognized here as a new section, **Erigeron** sect. **Geniculactis**, typified by *E. coronarius*.

KEY WORDS: *Erigeron*, Asteraceae, Astereae, Arizona, México

Erigeron coronarius E. Greene is a relatively common species of grassland habitats and disturbed sites in Chihuahua and Durango, México. In studies of Mexican *Erigeron*, the plants most closely similar to *E. coronarius* have been recognized, including several previously undescribed taxa, two species of which are known from both México and the United States. In the following study, all taxa of the *E. coronarius* group are mapped (Maps 1 and 2) and provided with a formal taxonomic treatment as well as an hypothesis regarding their position within the genus.



Map 1. Geographic distribution of *Erigeron coronarius*, *E. janivultus*, and *E. zacatensis*.



Map 2. Geographic distribution of *Erigeron arisolius* and *E. sceptrifer*.

I. TAXONOMY OF THE *ERIGERON CORONARIUS* GROUP

Erigeron coronarius E. Greene

Erigeron coronarius E. Greene, Pittonia 2:167. 1891. TYPE: MÉXICO. Chihuahua: Pine plains, base of the Sierra Madre, 2-3 mi S of Guerrero, 27 Sep 1887, *C.G. Pringle 1275* (HOLOTYPE: US!; Isotypes: GH!, MEXU!, NY!, PH!).

Erigeron howardii M.E. Jones, Contr. West. Bot. 12:45. 1908. TYPE: MÉXICO. Chihuahua: Colonia Juárez, Sierra Madre Mts., 12 Sep 1903, *M.E. Jones s.n.* (HOLOTYPE: POM!, US photo!). *Achaetogeron howardii* (M.E. Jones) S.F. Blake, Contr. U.S. Natl. Herb. 29:127. 1945.

Annuals to short lived perennials from a taproot. Stems 1-5 dm tall, single or multiple from the base, prominently yellow ribbed, coarsely hispid with thick based, spreading to slightly ascending, well spaced hairs, mostly along the ribs, minutely stipitate glandular. Leaves hispid-strigose, ascending, often strictly so, linear or narrowly oblong to linear lanceolate or linear oblanceolate, entire or sometimes with 1-2 pairs of coarse, rounded lobes, the midcauline 1-3 cm long, 1-2(-3) mm wide, narrowed upwards. Heads hemispheric, 5-6(-7) mm wide, erect in bud, loosely corymboid; phyllaries with thick, raised, dark orange midvein, abaxially and adaxially, hispid with stiffly spreading curved hairs, minutely granular glandular, the inner 2.5-4.0 mm long. Ray flowers ca. 80-200 in 2-3 series, the corollas white, less commonly light lavender or pinkish, 6-7 mm long, with ligules 0.3-0.6 mm wide, reflexing. Disc corollas 1.8-2.5 mm long, swollen just above the tube. Achenes 0.5-0.8 mm long, sparsely strigose to glabrate, with 2 orange nerves; pappus of (0-)4-8 fragile bristles, the outer a hyaline corona with a fimbriate or laciniate apex or sometimes a series of basally fused hyaline scales 0.1-0.3 mm high.

KEY TO THE VARIETIES

1. Plants annual; stem pubescence spreading above and below; phyllaries usually green; pappus of 4-8(-10) bristles, with a corona 0.1-0.2 mm high ..... var. *coronarius*

1. Plants annual to short lived perennial; stem pubescence spreading above, often ascending-appressed below; phyllaries usually purple tipped; pappus of 2-6 bristles, with a corona 0.2-0.3 mm high .... var. *durangensis*

Erigeron coronarius E. Greene var. *coronarius*

Chihuahua and northern Durango; roadsides, pastures, grasslands, oak or pine woodlands; (1450-)1850-2650 m; June-October. Chromosome numbers, n=9, 18.

Representative collections examined: MÉXICO. Chihuahua: Road to Majalco, 9 mi W of Hwy 45 turnoff, *De Jong & Longpre 922* (MU) (voucher for chromosome count of n=9, as *E. divergens* Torr. & A. Gray [De Jong & Longpre 1963]); near Balleza, 23 Sep 1898, *Goldman 136* (GH, NY, US); 2.6 mi N of jct of Hwy 16 on road to Barbidos, 4 Aug 1975, *Lewis & Bierner 213* (LL) (voucher for chromosome count of n=9 by B.L. Turner [as indicated on sheet], apparently previously unpublished); 8 mi N of Santo Tomas, 21 Sep 1939, *Mueller 3388* (GH, MICH, SMU, TENN); 21 mi ESE of Cuauhtémoc on Hwy 16, 8 Aug 1977, *Nesom 626* (MEXU, TEX) (voucher for chromosome count of n=9, reported here); 13 mi W of Cuauhtémoc on Hwy 16, 8 Aug 1977, *Nesom 626* (MEXU, TEX) (voucher for chromosome count of n=9, reported here); 13 mi W of Cuauhtémoc on Hwy 16, 8 Aug 1977, *Nesom 627* (MEXU, TEX) voucher for chromosome count of n=18, reported here); 15 mi W of Madera on logging road, 9 Aug 1977, *Nesom R636* (MEXU, NCU, TEX) (voucher for chromosome count of n=9, reported here); 30 mi SW of Parral on Hwy 24 toward El Vergel, 21 Aug 1981, *Nesom 4462* (MEXU, NMC, NY, TEX); 11 mi N of Madera on Hwy 16 toward Las Varas, 24 Aug 1981, *Nesom 4507* (ANSM, ASU, ARIZ, CAS, CIIDIR, COLO, ENCB, F, GH, GUADA, IBUG, MEXU, MICH, NCU, NMC, OBI, PATZ, RSA, TEX, UC, UCR, UNM, US, WIS); Rosario, E of La Junta, 14-15 Sep 1934, *Pennell 18736* (GH, NY, PH, US); 14 mi SW of Chihuahua City, 29 Aug 1961, *Powell & Edmondson 979* (TEX) (voucher for chromosome count of n=18 [Powell & Turner 1963]); Mapula Mts., 11 Nov 1886, *Pringle 897* (MEXU, NY, US); 39 mi W of Cd. Chihuahua on Hwy 16, 20 Aug 1967, *Stuessy 1025* (DUKE, COLO, TEX, UC, WIS) (voucher for chromosome count of n=9, as *E. divergens* [Keil & Stuessy 1975]); Cerro del Nido complex, 7.5 mi W of Bella Vista, on Mesa La Boquilla, 15 Jul 1981, *Worthington 7307* (COLO, TEX, UTEP). Durango: 7 mi S of Las Nieves on Hwy 45, 20 Aug 1981, *Nesom 4458* (ARIZ, ASU, ENCB, GH, MEXU, NMC, NY, TEX); 11 km NW of Santiago Papasquiaro, 22 Aug 1983, *Worthington 11251* (TEX); weedy playground in Santiago Papasquiaro, 25 Aug 1983, *Worthington 11461* (TEX).

Erigeron coronarius E. Greene var. **durangensis** Nesom, *var. nov.* TYPE: MÉXICO. Durango: 25 mi W of Cd. Durango on Hwy 40, 7400 ft, abundant along roadsides, 18 Aug 1981, *G. Nesom 4428* (HOLOTYPE: TEX!; Isotypes: GH!, MEXU!, US!).

Differt a *E. coronario* E. Greene var. *coronario* phyllariorum apicibus purpureis et pappi setis paucioribus atque corona leviter longiore.

Durango and west central Zacatecas; grassy roadsides, disturbed sites, areas of shrublands and juniper to pine-oak woodlands; 2050-2400 m; August-November. Chromosome numbers, n=9, 18 pairs.

Representative collections examined: MÉXICO. Durango: 14 mi W of Cd. Durango on Hwy 40, 7 Aug 1961, *DeJong & Longpre 973* (TEX) (voucher for chromosome count of n=9 [DeJong & Longpre 1963]); 38 mi W of Cd. Durango on Hwy 40, 8 Aug 1961, *DeJong & Longpre 994* (MEXU, NY, TEX) (voucher for chromosome count of n=9 [DeJong & Longpre 1963]); ca. 31 mi SW of Durango, 16 Aug 1960, *King 9746* (MICH, TEX, UC, US) (voucher for chromosome count of n=9 by B.L. Turner [as indicated on the sheet], previously unpublished); Tepehuanes, 28 Jul 1944, *Fisher 44261* (GH, SMU); 18 mi WSW of Durango on Hwy 40, 6 Aug 1977, *Nesom 614* (GUADA, MEXU, TEX, WIS) (voucher for chromosome count of n=9, reported here); 0.5 mi E of Llano Grande on Hwy 40, 18 Aug 1981, *Nesom 4433* (ENCB, GH, MEXU, TEX); 3.5 mi W of Llano Grande at Las Cumbres on Hwy 40, 19 Aug 1981, *Nesom 4448* (MEXU, TEX); city of Durango and vicinity, Apr-Nov 1896, *Palmer 351* (GH, MO, UC, US); city of Durango and vicinity, Apr-Nov 1896, *Palmer 929* (GH, MO, NY, UC, US); Otinapa, 25 Jul-5 Aug 1906, *Palmer 424* (CM, GH, MO, NY, UC, US); Sandia Station, 16 Oct 1905, *Pringle 13647* (ARIZ, CAS, GH, LL, MICH, SMU, TEX, US); 5 mi W of Durango on Hwy 40, 28 Jun 1974, *Roberts & Keil 10338* (OS) (voucher for chromosome count of n=9 [Keil & Stuessy 1977]); 11 km NW of Santiago Papasquiaro, 22 Aug 1983, *Worthington 11213* (TEX). Zacatecas: Ca. 2 mi W of Sombrerete on Hwy 45, 18 Aug 1981, *Nesom 4424a* (TEX).

My conclusions here contrast with those of an earlier, unpublished study (Nesom 1980), where I viewed the plants from the southern half of Durango as most closely related to *Erigeron janivultus* Nesom and referred to them as a variety of the latter species. Both of these taxa might be treated, with some justification, as varieties of *E. coronarius*, particularly since the Durango plants are intermediate in geography between typical *E. coronarius* and *E. janivultus*. However, although they have purplish phyllaries and appressed pubescence (on the lower stems) as in *E. janivultus*, they are more similar to *E. coronarius* in their minutely stipitate glandular upper stems with spreading hairs and their pappus with more numerous bristles and a much shorter corona. Further, there is a much stronger discontinuity in morphology between var. *durangensis* and *E. janivultus* than exists between var. *coronarius* and var. *durangensis*. Plants with distinctly purple tipped phyllaries but 6-8 pappus bristles and short coronas, morphologically intermediate and intergrading between var. *coronarius* and var. *durangensis*, occur from northern Durango into southern Chihuahua (e.g., *Nesom 4462, Pringle 13647, Worthington 11213*).

Diploids have been reported from both varieties of *Erigeron coronarius* as well as from *E. janivultus*. While diploids appear to be more common, tetraploids also are known from each of these three taxa (see citations and

references in "Representative collections" from this paper, and De Jong & Nesom, in prep.), but within a single taxon, the tetraploids appear to be morphologically indistinguishable from diploids. Only diploids have been reported from *E. arisolius*.

Erigeron arisolius Nesom

Erigeron arisolius Nesom, *sp. nov.* TYPE: UNITED STATES. Arizona: Cochise Co., W side of Chiricahua Mts., Hwy 181, ca. 9.5 mi S of jct with Hwy 186, near Turkey Creek Road, abundant along roadside and in grassy plains, 4800 ft, 28 Aug 1981, *G. Nesom 4521* (HOLOTYPE: TEX!; Isotypes: ARIZ!, ASU!, CAS!, COLO!, ENCB!, GH!, MEXU!, MO!, NMC!, NY!, RM!, UC!, UCR!, UNM!, US!, WIS!).

E. coronario E. Greene similis sed pappo setis (10-)12-17 atque serie exteriore setarum discretarum vel squamellarum anguste lanceolatarum differt.

Annuals to short lived perennials from a taproot. Stems 3-7 dm tall, single or multiple from the base, prominently yellow ribbed, coarsely hispid with thick based, spreading to slightly ascending, well spaced hairs mostly along the ribs, minutely stipitate glandular. Leaves hispid-strigose, ascending, often strictly so, linear or narrowly oblong to linear lanceolate or linear oblanceolate, entire or sometimes with 1-2 pairs of coarse, rounded lobes, the basal and lower cauline 2.5-5.0 cm long, 2-5 mm wide, narrowed upwards. Heads hemispheric, 5-8 mm wide, erect in bud, in loose corymbs; phyllaries with a thick, raised, dark orange midvein, abaxially and adaxially, hispid with stiffly spreading curved hairs, minutely granular glandular, narrowly lanceolate, nearly equal in length, 2.5-3.5 mm long. Ray flowers 125-180 in 2-3 series, the corollas white, less commonly light lavender or pinkish, 6-7 mm long, with ligules 0.6-1.0 mm wide, reflexing. Disc corollas 2.0-2.5 mm long, glabrous, swollen just above the tube. Achenes 0.7-1.0 mm long, sparsely strigose to glabrate, with 2 orange nerves; pappus of (10-)12-16 fragile bristles, with an outer series of separate setae or lanceolate scales 0.1-0.3 mm high. Chromosome number, n=9 pairs.

Arizona (Apache, Cochise, Pima, and Santa Cruz counties), Sonora; grasslands, often in moist areas, sometimes with mesquite, areas of oak woodlands in grassy openings or roadsides; (700-)1300-1650 m; May-October(-November).

Representative collections examined. MÉXICO. Sonora: Mpio. Altar, Rancho "La Discordia," 24 Aug 1969, *Araiza Q. 62* (ENCB); Fronteras, 25 Sep 1890, *Hartman 54* (GH, US); S-gogogsig village, SW of Baboquivaris,

floodwater field, 14 Aug 1980, *Nabham & Bahre 312* (ARIZ); 6 mi E of Fronteras on Fronteras-Nacozari hwy, Angostura Dam Road, 22 Aug 1981, *Roth s.n.* (TEX); Rancho Carrizo, 103 mi S of Nogales and 3 mi W of Hwy 15, 30 Aug 1967, *Tomelson s.n.* (ARIZ).

UNITED STATES. Arizona. Apache County: 27 mi W of Carrizo, 12 Jun 1937, *Peebles 13579* (ARIZ). Cochise County: Mule Mts., 25 Sep 1931, *Harrison 8242* (ARIZ, TEX, US); Chiricahua Mts., W Turkey Creek at Rock Creek Road, 28 Jul 1981, *Luetke s.n.* (TEX); Mexican boundary line, S of Bisbee, 14 Sep 1892, *Mearns 903* (US); W side of Chiricahua Mts., Pinery Creek Road, 4 mi SE of jct with road to Chiricahua Natl. Monument, 28 Aug 1981, *Nesom 4519* (ARIZ, ASU, GH, MEXU, NMC, NY, TEX, UNM, US); Huachuca Mts., 0.6 mi W of Hwy 92 on Ash Canyon Road, 30 Aug 1984, *Sanders 5138* (ARIZ, TEX); Parker Canyon Lake, Canelo Hills, 7 Jul 1985, *Sanders 5923* (TEX); Dragoon Mts., Sep 1930, *Thornber s.n.* (ARIZ). Pima County: Within city of Tucson, 2 Sep 1980, *Adams 271* (LL); Robles to San Fernando, 21 Aug 1932, *Harrison & Kearney 8941* (ARIZ, TEX, US); 10 mi N of San Miguel, Papago Indian Reserv. near international boundary, 16 Aug 1931, *Harrison & Kearney 8029* (ARIZ, TEX); ca. 2 mi W of Roble Jct along Ariz Rte 86, 18 Oct 1975, *Keil 11146A* (ASU); (voucher for chromosome count of n=9 pairs, reported as *E. divergens* [Keil & Pinkava 1976]); ca. 2 mi W of Roble Jct along Ariz Rte 86, 18 Oct 1975, *Keil 11158* (ASU) (voucher for chromosome count of n=9 pairs, reported as *E. divergens* [Keil & Pinkava 1976]); just off Hwy I-19 on Papago Rd exit, 6 Sep 1975, *Keil 11089A* (ASU) (voucher for chromosome count of n=9 pairs, reported as *E. divergens* [Keil & Pinkava 1976]); Santa Rita Mts., Box Canyon Road, 3.2 mi W of Hwy 83, 30 Aug 1985, *McLaughlin 9035* (ARIZ); mouth of Baboquivari Canyon, 15 Aug 1926, *Peebles, et al. 2788* (ARIZ, TEX); Santa Catalina, 1 May 1894, *Toumey s.n.* (GH). Santa Cruz County: Between Pena Blanca and Ruby, 2.4 mi W of road to Sycamore Canyon, 9 Sep 1976, *McGill & Lehto L20432* (ASU, TEX); NW of Sonoita, 3.7 on road toward Gardner Canyon from Hwy 83, 14 Aug 1982, *Sundberg 1595* (TEX) (voucher for chromosome count of n=9 pairs by S. Sundberg [as indicated on sheet], apparently previously unpublished); Pajarito Mts., Sycamore Canyon, 17 Aug 1976, *Van Devender & McCarten s.n.* (ARIZ).

Erigeron arisolius in Arizona has been identified as *E. divergens* Torr. & A. Gray, although a number of sheets have annotations noting that the plants are not typical of the latter. In spite of the morphological similarity between the two, *E. divergens* belongs to a different section of the genus (sect. *Oligotrichium* (see Nesom 1989), and there is no evidence of any form of gene flow between them. They are particularly distinct in the field, where the erect buds and reflexing rays of *E. arisolius* can be contrasted with the nodding buds and straight rays of *E. divergens*. The following couplet summarizes differences between them.

1. Stems with coarse, thick based hairs arising mostly from the cauline ribs, minutely but prominently stipitate glandular; buds erect; rays reflexing; achenes with orange nerves; pappus bristles 10-16 ..... *E. arisolius*

1. Stems with relatively thin based hairs arising evenly from the ribs and interstices, sometimes minutely granular glandular, rarely stipitate glandular near the heads; buds nodding; rays straight or closing upwards; achenes with whitish nerves; pappus bristles 7-10 ..... *E. divergens*

Erigeron arisolius is most similar to *E. coronarius.* Although the two species are similar in habit and most morphological features, they have entirely separate geographic ranges and I have seen no specimens that could be regarded as intermediate. They are distinguished by the contrasts in the following couplet, most sharply by features of the pappus.

1. Plants 3-7 dm tall; largest leaves 2.5-5.0 cm long, 2-5 mm wide; rays with ligules 0.6-1.0 mm wide; achenes 0.7-1.0 mm long; pappus of (10-)12-17 bristles, with an outer series of separate setae or narrowly lanceolate squamellae ..... *E. arisolius*

1. Plants 1-5 dm tall; largest leaves 1-3 cm long and 1-2(-3) mm wide; rays with ligules 0.3-0.6 mm wide; achenes 0.5-0.8 mm long; pappus of (2-)4-8(-10) bristles, with an outer, hyaline corona of broad, basally fused squamellae ..... *E. coronarius*

Although *Erigeron arisolius* is a discrete taxon, not intergrading with others of the *E. coronarius* group, it may be viewed as the northern extreme in a north/south trend of variation in several morphological characters, from *E. arisolius* to *E. coronarius* var. *coronarius*, to var. *durangensis*, and finally to *E. janivultus*, the southern extreme. From north to south, the plants of this assemblage generally become shorter in stature, longer lived, fewer headed, and the pappus bristles are reduced in number and the corona increased in height.

Erigeron janivultus Nesom

Erigeron janivultus Nesom (*nom. nov.*), Sida 9:223. 1982. Based on: *Erigeron linearifolius* S. Wats., Proc. Amer. Acad. Arts 26:139. 1891. TYPE: MÉXICO. México: Bluffs and plains near Flor de María, 4 Sep 1890, *C.G. Pringle 3242* (HOLOTYPE: GH!; Isotypes: CM!, ENCB!, MEXU-2 sheets!, MSC!, NY!, PH!, UC-2 sheets!, US-2 sheets!). Not *Erigeron linearifolius* Cav., 1801.

Achaetogeron ascendens Greenm., Proc. Amer. Acad. Arts 41:254. 1905. TYPE: MÉXICO. Hidalgo: Meadows near Buena Vista Station (Cuyamaloya), 4 Aug 1904, *C.G. Pringle 8851* (HOLOTYPE: GH!; Isotypes: CM!, ENCB!, MEXU-2 sheets!, NMC!, NY!, PH!, UC!, US-2 sheets!). Not *Erigeron adscendens* Turcz., 1851.

Short lived perennial herbs from a taproot, often with a short, woody caudex with slender branches. Stems 4-33 cm tall, sparsely but consistently strigose, sometimes minutely stipitate glandular just below the heads. Leaves strigose with appressed-ascending trichomes, minutely stipitate glandular, the basal usually absent by flowering, the cauline linear to linear lanceolate, sessile, mostly 5-30 mm long, 0.5-3.0 mm wide, even sized upwards, the margins entire or with 1-2 pairs of narrow, lateral lobes. Heads hemispheric, 5-9 mm wide, in a loose corymb on peduncles 3-28 mm long; phyllaries in 3-4 series of nearly equal length, the longest 4-5 mm long, mostly narrowly lanceolate, usually purple tipped or purple over the whole surface, hirsute-strigose, minutely stipitate glandular, remaining erect after maturation and release of the achenes. Ray flowers ca. 80-200 in 2-3 series, the corollas drying white or lavender tinged, 6-9 mm long, the ligules 0.7-0.9 mm wide, reflexing at maturity. Disc corollas 2-4 mm long, the lower limb somewhat inflated and indurated; collecting appendages of the style branches triangular to shallowly deltate. Achenes (0.8-)1.0-1.5 mm long, with 2(-3) thickened ribs, sparsely strigose; pappus of ray and disc a conspicuous hyaline corona with a fimbriate or laciniate apex 0.3-0.7 mm high, the inner series of 0-5 bristles 1/2-3/4 as long as the disc corollas. Chromosome numbers, n=9, 18 pairs.

Durango, Zacatecas, Jalisco, Hidalgo, México, Tlaxcala; roadsides, grasslands, openings in oak woods; 1850-2800 m; June-October.

Representative collections examined: MÉXICO. Hidalgo: 10 km W of Alfajayucan, 16 Jul 1965, *Gonzalez Q. 2702* (ENCB); toward Singuilucan, 2 mi S of jct with Hwy 130 at Cuyamaloya, 9 Aug 1981, *Nesom 4382* (ENCB, GH, MEXU, RM, TEX); Marques Station, 26 Aug 1905, *Pringle 13534* (ARIZ, MICH, MSC, NMC, SMU); 1 km S of Guajolote, near Epazoyucan, 22 Jul 1979, *Rzedowski 36242* (ENCB); 12 km E of Apam, 27 Jun 1966, *West FF10* (MICH, WIS). Jalisco: ca. 11 mi SE of Lagos de Moreno, 7 Sep 1952, *McVaugh 12815* (MICH). México: 5 km N of Atlacomulco, 28 Jun 1960, *Beaman 3370* (TEX) (voucher for chromosome count of n=9, as *E. coronarius* [Beaman & Turner 1962]); 9 mi E of Villa Victoria on Hwy 15, 29 Jul 1965, *Kral 25156* (ENCB); 11 km NNW of Ixtlahuaca on Hwy 55, 16 Aug 1981, *Nesom 4412* (ASU, ARIZ, CIIDIR, COLO, GH, GUADA, MEXU, MO, NMC, NY, RM, TEX, US, WIS); 1.5 km N of Atlacomulco, 16 Aug 1981, *Nesom 4420* (MEXU, TEX); Flor de María, 10 Sep 1892, *Pringle 7368* (NY, POM); 20 km NE of Texcoco, 23 Jun 1966, *Rzedowski 22462* (ENCB, MICH, MSC); 6 mi S of Acambay, 7 Nov 1970, *Webster & Breckon 16246* (MICH). Tlaxcala: NW of

Cauhula, W of San Antonio Calpulalpan, 8 Oct 1967, *Villegas 676* (ENCB). Zacatecas: ca. 2 mi ESE of Sombrerete on Hwy 45, 5 Aug 1977, *Nesom R611* (CIIDIR, GH, MEXU, MICH, NY, TEX, US); ca. 2 mi W of Sombrerete on Hwy 45, 18 Aug 1981, *Nesom 4424b* (CIIDIR, MEXU, MICH, NY, TEX).

Erigeron janivultus is distinguished from *E. coronarius* by its longer duration, lignescent, branching caudex, basally ascending stems, strigose stem pubescence, eglandular upper stems and phyllaries, and thicker ribbed, longer achenes with a longer coroniform pappus and fewer bristles.

Two collections from the vicinity of Sombrerete in west central Zacatecas (*Nesom 611* and *4424b*) are intermediate in some respects between *E. janivultus* and *E. coronarius*. Although I have identified them as the former, emphasizing their eglandular stems with appressed pubescence, they are similar to *E. coronarius* in their short disc corollas and pappus with a short (0.2-0.3 mm) corona and relatively numerous (5-8) bristles. In fact, further collections in this region might furnish evidence that the two taxa are best considered conspecific, even though they are very different at their geographic extremities. Earlier, Blake (1945) also recognized the close relationship between *E. coronarius* and *E. janivultus* and accurately described essential differences between them. At the collection site for *Nesom 4424b*, relatively typical *E. coronarius* was also collected (*Nesom 4424a*) as well as the discoid taxon referred to below as *E. zacatensis* (which see for additional comments).

Erigeron zacatensis Nesom, *sp. nov.* TYPE: MÉXICO. Zacatecas: ca. 2 mi W of Sombrerete on Hwy 45, at crest of hill overlooking town, grazed area with scattered, low Fabaceous shrubs and *Opuntia*, very scattered, 8200 ft, 18 Aug 1981, *G. Nesom 4423* (HOLOTYPE: TEX!; Isotypes: IBUG!, CIIDIR!, ENCB!, GH!, MEXU!, MICH!, NY!, US!).

Differt a *E. janivulto* Nesom ligulis multum redactis et pappi setis numerosioribus atque corona breviore.

Annual to short lived perennial herbs from a taproot, often with a short, woody caudex with slender branches. Stems 10-20 cm tall, erect to basally ascending, few branched at about the middle, sparsely pubescent with appressed to spreading ascending hairs, eglandular. Leaves strigose with appressed-ascending trichomes, eglandular, the basal usually absent by flowering, the cauline linear to linear lanceolate, sessile, mostly 5-30 mm long, 0.5-2.0 mm wide, even sized upwards, the margins entire. Heads hemispheric, 8-11 mm wide, in a loose corymb on peduncles mostly 2-6 cm long; phyllaries in 3-4 series of nearly equal length, the longest 2.5-4.0 mm long, mostly narrowly lanceolate, usually purple tipped, hirsute strigose, minutely granular glandular, spreading after maturation and release of the achenes, but not reflexing. Ray flowers ca. 150-250 in 2-3 series, fertile, the ligules 0.1-0.2 mm wide, 0.5-1.0 mm long, not extending past the phyllaries. Disc corollas 2.2-2.8 mm long,

the lower limb somewhat inflated and indurated; collecting appendages of the style branches triangular to shallowly deltate. Achenes 0.5-0.8 mm long, with 2(-3) thickened, whitish ribs, sparsely short strigose; pappus of ray and disc a conspicuous hyaline corona with a fimbriate or laciniate apex 0.2-0.3 mm high, the inner series of 5-10 bristles 3/4 as long as the disc corollas.

Zacatecas; shrublands, grasslands; 2150-2500 m; August-October.

Additional collections examined: MÉXICO. Zacatecas: ca. 20 mi NW of Fresnillo on Hwy 45, *Davidse 10005* (MO); 8 mi NW of jct in Hwys 45 and 49 on Hwy 49, 29 Jun 1972, *Denton 1721* (ENCB, MICH); Hwy 45, 1 km E of turnoff to Est. Frio, 23 Aug 1979, *Lane 2704* (TEX); between Fresnillo and Sombrerete on Hwy 45, 6.0 mi W of turnoff to Santa Rosa, 28 Sep 1984, *Sundberg 2914* (MEXU, TEX).

In their relatively short disc corollas and pappus of a short corona with 5-10 bristles, these plants are similar to *Erigeron coronarius*, but in their eglandular stems with appressed-ascending hairs, they are more similar to *E. janivultus*, particularly those plants so identified from Zacatecas. *Erigeron zacatensis* differs from both taxa in the greatly reduced ligules that barely extend past the involucral bracts, although it may be a derivative of one or the other or both (as a hybrid) of them. Nearly identical plants have been collected at several separate, relatively closely situated localities in west central Zacatecas (Map 1), apparently indicating that the taxon is stabilized and reproducing. Plants of both *E. coronarius* and *E. janivultus* also were growing at the type locality of *E. zacatensis* (see comments following *E. janivultus*).

Erigeron sceptrifer Nesom, *sp. nov.* TYPE: MÉXICO. Chihuahua: Mpio. Cuauhtémoc, 17.6 km W of Cuauhtémoc on Hwy 16, abundant along grassy roadsides, area of pine-oak-juniper, 23 Aug 1981, *G. Nesom 4477* (HOLOTYPE: TEX!; Isotypes: ANSM!, ARIZ!, ASU!, CAS!, CHAPA!, CIIDIR!, COLO!, ENCB!, F!, GH!, GUADA!, IBUG!, MEXU!, MICH!, MO!, NMC!, NY!, OS!, RM!, RSA!, WIS!, UC!, UCR!, US!).

E. coronario E. Greene similis sed corollis radii brevioribus et pappo setarum numerosioribus sine corona exteriore imprimis differt.

Plants annual from a slender taproot. Stems 3-8 dm tall, single from the base or more commonly with numerous, ascending branches from the base, moderately pubescent with ascending to spreading hairs arising primarily from the prominent ridges, minutely granular glandular to essentially eglandular. Leaves entire, linear to linear oblanceolate, 1-3 cm long, 0.5-1.5 mm wide (the lowermost sometimes up to 4.0 mm wide and with 1-2 pairs of teeth), minutely granular glandular above and below, moderately pubescent with ascending hairs, these commonly thicker based and more dense on the midrib and

marginal areas. Heads hemispheric, 4-6 mm wide, on short peduncles, numerous in corymboid panicles; phyllaries linear lanceolate, in 3-4 weakly graduated series, the inner 3.0-3.5 mm long, very sparsely hirsute strigose, eglandular or the outer sparsely and minutely granular glandular; receptacles shallow convex. Ray flowers (60-)85-130(-195), 3.8-5.0 mm long, the ligules 0.2-0.4 mm wide, white, drying pink to blue or purple. Disc corollas 1.8-2.3 mm long, with the lower limb somewhat indurate inflated; collecting appendages of the style branches deltate, 0.1 mm long. Achenes 0.6-0.7 mm long, compressed, with 2 orange nerves; pappus of 9-14 fragile bristles slightly shorter than the disc corollas, with a few outer setae or lanceolate scales 0.1-0.2 mm long.

Chihuahua, Sonora, southeastern Arizona; grasslands, with scattered juniper, oak, or oak-pine; 1900-2100 m; July-October.

Additional collections examined: MÉXICO. Chihuahua: 15.6 mi S of Zaragoza, road from Cuauhtémoc to Buenaventura, 4 Aug 1975, *Lewis & Bierner 216* (LL); Hwy 16, 1.5 mi E of jct at La Junta with road toward Creel, 23 Aug 1981, *Nesom 4483* (ANSM, ARIZ, ASU, CAS, CIIDIR, COLO, ENCB, GH, GUADA, MEXU, MICH, NMC, NY, RM, RSA, TEX, WIS, UCR, US); 7.5 mi SW of La Junta (Hwy 16 jct) on road toward Tomochic, 24 Aug 1981, *Nesom 4494* (ARIZ, ENCB, MEXU, TEX); 2 mi W of Matachic on Hwy 16, 24 Aug 1981, *Nesom 4497* (ASU, CIIDIR, MEXU, TEX); 9 mi W of Guerrero on Hwy 16, 24 Aug 1981, *Nesom 4495* (ARIZ, ASU, CHAPA, CIIDIR, ENCB, GH, MEXU, NMC, NY, TEX, US). Sonora: Dist. Alamos, lower part of Estrella Canyon, 31 Oct 1933, *Gentry 722* (DS).

UNITED STATES. Arizona: Cochise Co., Parker Canyon Lake, 12 Oct 1968, *Pinkava, et al. 14609* (ASU, NCU).

Erigeron sceptrifer Nesom is recognized by its annual duration, spreading-ascending stem pubescence, linear leaves, erect buds, numerous, very small heads with short rays that become purplish upon maturity or drying, small, orange-ribbed achenes, and its pappus of 9-14 fragile bristles, without an outer corona. The rays reflex at maturity, although they tend to be more curved reflexed than distinctly bent at the tube/ligule junction, as are the other species closely related to it. It is tentatively included here, but the ligules also have a slight tendency to turn upwards at night, a behavior that is anomalous among the species of the *E. coronarius* group. At two of its collection sites in Chihuahua, *E. sceptrifer* was growing intermixed with *E. coronarius*, which was the more abundant, but there were no plants with any degree of intermediacy between the two.

ARTIFICIAL KEY TO SPECIES OF THE *ERIGERON CORONARIUS* GROUP

1. Ray corollas not extending past involucral bracts, the heads appearing essentially discoid ..... *E. zacatensis*

1′ Ray corollas prominent, extending well past the involucral bracts .... (2)

2. Ray corollas 3.8-5.0 mm long; pappus of 9-14 bristles, with an outer series of separate bristles or scales ..... *E. sceptrifer*

2′ Ray corollas 6-9 mm long; pappus of 0-17 bristles, with an outer corona or series of separate bristles or scales ..... (3)

3. Pappus of (10-)12-17 bristles, with an outer series of separate setae or narrowly lanceolate squamellae ..... *E. arisolius*

3′ Pappus of 0-8 bristles, with an outer series fused into a definite, complete or nearly complete corona ..... (4)

4. Stems with appressed to appressed-ascending hairs; stems, leaves, and phyllaries eglandular; pappus with 0-5 bristles; disc corollas 2-4 mm long ..... *E. janivultus*

4′ Stems with spreading to spreading ascending hairs, at least on the upper portions of the stems; upper stems, leaves and phyllaries glandular; pappus with (2)4-10 bristles; disc corollas 1.6-2.5 mm long ..... *E. coronarius*

II. A NEW SECTION OF *ERIGERON*, INCLUDING THE *E. CORONARIUS* GROUP

Erigeron coronarius and its close relatives were tentatively positioned near the "*E. pumilus* group" of sect. *Asteroidea*, primarily based on their essentially entire leaves, erect buds, white, reflexing ligules, and basally persistent pappus bristles (Nesom 1989). The similarities among these taxa strongly suggest that the whole group is monophyletic, and I recognize it as a separate section. Distinctions among its taxa restricted to the United States were outlined in an earlier paper (Nesom 1983).

Erigeron sect. **Geniculactis** Nesom, *sect. nov.* TYPE SPECIES: *Erigeron coronarius* E. Greene.

Erigeron (sp. group) *Pumili* Rydb., *Fl. Colorado* 359. 1906, *in clave*. TYPE SPECIES: *Erigeron pumilus* Nutt., *Gen. N. Amer. Pl.* 2:147. 1818.

Habitationibus gramineis, radicibus palaribus, foliis angustis admodum integrisque, gemmis erectis, flosculis radii numerosis ligulis albis reflexis, pappo setis basaliter persistentibus et serie externa saepe valde evolutis dignoscenda.

Species included: *Erigeron aphanactis* (A. Gray) E. Greene, *E. arisolius* Nesom, *E. clokeyi* Cronq., *E. concinnus* (Hook. & Arn.) Torr. & A. Gray, *E. coronarius* E. Greene, *E. engelmannii* A. Nels., *E. goodrichii* Welsh, *E. janivultus* Nesom, *E. pumilus* Nutt., *E. sceptrifer* Nesom, and *E. zacatensis* Nesom.

The plants of sect. *Geniculactis* are distinguished by their grassland habitats, taproots, narrow and essentially entire leaves, erect buds, numerous ray flowers with white, reflexing ligules, disc corollas with swollen, white indurated throats, and pappus with relatively few, basally persistent bristles and a tendency to produce a strongly elaborated outer series. In contrast to the taxa occurring primarily in México (the "*Erigeron coronarius* group"), which tend to produce numerous heads in paniculate cymes and achenes mostly 0.6-1.0(-1.5) mm long, those species restricted to the United States (the "*E. pumilus* group") tend to produce solitary heads on monocephalous stems and achenes 1.6-2.2 mm long.

While it is almost certain that these two groups represent separate evolutionary lineages, several parallel developments between their respective species are notable. The pappus of *Erigeron concinnus* is a highly elaborated whorl of broad, sometimes basally united scales, very similar to the outer pappus of *E. coronarius*. Further, the ligules of the pistillate flowers of *E. aphanactis* vary from completely absent to filiform projections ca. 1 mm long, matching those found in *E. zacatensis*.

Elsewhere in *Erigeron*, outside of sect. *Geniculactis*, reflexing ligules are known with certainty only in sect. *Scopulincola* (Nesom 1989b, 1990), which is distinguished by its cliffside habitats, obovate leaves, erect buds, and relatively few ray flowers with broad ligules, and in sect. *Polyactis* (Nesom 1989a), which is distinguished by its pinnatifid or coarsely toothed leaves, arching-pendant buds, and basally caducous pappus bristles or lack of bristles. As noted earlier (Nesom 1989b), two monocephalous species of the *E. caespitosus* Nutt. group of sect. *Asteroidea* also appear to have reflexing rays and need to be investigated in more detail for the possibility of a close relationship with the *E. pumilus* group of sect. *Geniculactis*.

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TWO NEW SPECIES OF *ERIGERON* (ASTERACEAE: ASTEREAE) FROM MÉXICO

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ABSTRACT

Erigeron macdonaldii *sp. nov.* (sect. *Imbarba*) is described from the peak of Cerro Mohinora in southern Chihuahua, where apparently it is narrowly endemic. **Erigeron vicinus** *sp. nov.* (sect. *Olygotrichium*) is described from the Sierra Madera del Carmen in northwestern Coahuila.

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

Two previously undescribed species have come to light in studies of Mexican *Erigeron*. One is from an area of high elevation in southern Chihuahua, the other from a montane area of northwestern Coahuila.

Erigeron macdonaldii Nesom, *sp. nov.* TYPE: MÉXICO. Chihuahua: Mpio. Guadalupe y Calvo, ca. 13 mi SW of Guadalupe y Calvo; rock faces on NW side of uppermost summit of Cerro Mohinora; plants in crevices at lip of precipice, with scattered, "krumholz" pines, 3250 m, 21 Aug 1988, *McDonald & Nesom 2472* (HOLOTYPE: TEX!; Isotypes: GUADA!, GH!, MEXU!, NY!, US!).

E. fraternus E. Greene similis sed plantis parvioribus, capitulis solitariis, floribus radii parvioribus, et acheniis setas pappi efferentibus differt.

Perennial herbs from a system of short, slender, lignescent rhizomes with fibrous roots. Stems basally ascending, 9-13 cm tall, sparsely pubescent with spreading to ascending appressed hairs, eglandular. Leaves eglandular, strigose adaxially with closely appressed hairs, nearly glabrous abaxially, the basal leaves persistent, spatulate, 15-50 mm long with petioles 1/2-2/3 the length of the leaf, the blades 4-10 mm wide, entire or usually with 1-2(-3) pairs of teeth or shallow lobes, the cauline leaves narrowly oblanceolate, not clasping, entire, 5-12 mm long, widely and evenly spaced, little reduced upward. Heads solitary,

5-9 mm wide; phyllaries purple tipped, sparsely strigose hirsute, eglandular, in 2-3 series of nearly equal length, the longest 3-4 mm long. Ray flowers (9-)13-24 in a single series, the corollas 8-9 mm long, the ligules 1.5-2.0 mm wide, white, drying white to purplish, remaining essentially straight at maturity. Disc corollas 2.5-2.8 mm long, funnelform, not swollen or indurated; style branches with triangular collecting appendages 0.2 mm long. Achenes ca. 1.5 mm long, 2 nerved, sparsely strigose; pappus of 5-7 basally persistent bristles 1/2-2/3 the length of the disc corollas, with an outer series of minute squamellae ca. 0.1 mm long.

The epithet commemorates Dr. Andrew McDonald, who will be remembered for his comprehensive systematic studies of the Convolvulaceae as well as his surveys of the alpine vegetation of México.

In its geographic location and its rhizomatous habit, toothed leaves, erect buds, and basally 3 ridged phyllaries, *Erigeron macdonaldii* clearly is most similar to the seven species of sect. *Imbarba* Nesom (Nesom 1989b, 1989c), which are restricted to México and Guatemala, and primarily to the Sierra Madre Occidental of México. Particularly in their sparse vestiture, small heads with few, short rays, and thin, obovate-spatulate, strongly toothed leaves, the plants of *E. macdonaldii* are most similar to *E. fraternus* E. Greene. The latter ranges from central Chihuahua to central Durango and grows in the immediate area of Cerro Mohinora, although it is not found on the highest part of the peak itself.

Erigeron macdonaldii differs from *E. fraternus* in features summarized in the following couplet.

1. Plants from a relatively diffuse system of slender rhizomes; stems 9-13 cm tall; basal leaves 4-10 mm wide; heads solitary; ray flowers 9-24; pappus of 5-7 short, persistent bristles ..... *E. macdonaldii*

1. Plants usually with a definite caudex, producing basal offsets; stems mostly 15-60 cm tall; basal leaves mostly 5-17(-23) mm wide; heads few, but in a loose corymb; ray flowers 18-80; pappus without bristles ..... *E. fraternus*

The new species is the only member of sect. *Imbarba* to consistently produce a pappus with bristles, although the bristles are relatively few and short. *Erigeron fraternus* rarely produces one or two, apparently vestigial bristles, 0.3-1.0 mm long, but like the other species of the section, a short corona may be produced but the pappus normally is completely without bristles. In this respect, *E. macdonaldii* may be regarded as the most primitive among its immediate relatives.

Erigeron macdonaldii is known only from a single site and one collection from the uppermost reaches of the peak of Cerro Mohinora, where the plants grow on the steep rock walls that shear off toward the northwest. This peak and

the surrounding area in southern Chihuahua is particularly rich in species of *Erigeron*. Four species of sect. *Polyactis* (Nesom 1989a) are primarily restricted in geographic range to that area, and *E. mohinorensis* Nesom of sect. *Imbarba* is endemic to the open pine-fir woods in the area immediately around the peak.

Erigeron vicinus Nesom, *sp. nov.* TYPE: MÉXICO. Coahuila: Mpio. Ocampo, Sierra Madera del Carmen, logging road ca. 1 km past Campo 4 in mesic forest, ca. 2500 m, 15 Apr 1976, *D. Riskind & T. Patterson 1988* (HOLOTYPE: TEX!; Isotypes: MEXU!, TEX!).

E. pubescenti Kunth similis sed plantis rhizomata breves efferentibus et caulibus prope basim pilosis differt.

Fibrous rooted perennials producing slender, ligneous, rhizomelike basal offsets 1-7 cm long. Stems basally ascending, 10-30 cm tall, monocephalous or sometimes with a single branch, reddish at base, strigose above, pilose with spreading-deflexed hairs on the basal third or the very base. Basal leaves persistent, spatulate, blades obovate, entire or with 1(-2) pairs of shallow teeth, 2-4 cm long, the blades 5-11 mm wide, stiffly pilose with long-ciliate petioles, the cauline oblanceolate, not clasping, strigose. Heads 7-10 mm wide, solitary on nearly naked peduncles 4-12 cm long; phyllaries in 2-3 series of nearly equal length, the longest 4-5 mm long, sparsely hirsute, sometimes sparsely and minutely granular glandular. Ray flowers 65-95 in 1-2 series, the corollas 7-10 mm long, the ligules 0.4-0.8 mm wide, white above with a lilac midstripe beneath. Disc corollas 1.8-2.2 mm long, slightly swollen above the tube. Achenes sparsely strigose, 2 nerved, 0.6-0.8 mm long; pappus of 8-11 fragile bristles slightly shorter than the disc corollas, with an outer series of squamellae ca. 0.1 mm long.

Coahuila (Sierra Madera del Carmen); pine to pine-fir woods, 2200-2500 m; flowering April-August.

Additional collections examined: MÉXICO. Coahuila. Mpio. Ocampo, Sierra Madera del Carmen: upper end of Dos Canyon at road fork to Campo Uno, 23 Jun 1976, *Fryxell 2724* (LL); logging road from Campo 4 at head of mesic draw, 28 May 1975, *Riskind & Patterson 1817b* (LL); Campo El Tres, 5 Aug 1974, *Wendt & Adamcewicz 492* (LL); Cañon El Dos, ca. 3/4 mi SE of Campo Dos, above moist mesic central part of canyon, 3 Apr 1974, *Wendt, et al. 129c* (LL).

Erigeron vicinus is clearly a member of sect. *Olygotrichium* (Nesom 1989c) and in its perennial duration, fibrous roots, strigose upper stems, and ray corollas with a lilac midstripe, it is most similar to *E. pubescens* Kunth and the *E. modestus* A. Gray-*E. metrius* S.F. Blake complex. Particularly, in its stems that are reddish and pilose near the base, it is similar to *E. modestus* and *E. metrius*, but I have seen no other plants among hundreds of collections of these,

with the distinctive rhizomatous habit of *E. vicinus*. The new species appears to be highly localized geographically, and the five known collections are all very similar among themselves. The epithet is intended to reflect the locality of the species, which is near the international boundary between México and the United States.

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CROTALARIA LOTIFOLIA LINNAEUS AND *CROTALARIA PURDIANA* SENN, A CLARIFICATION OF THE SPECIES (WITH NOTES ON *CROTALARIA AXILLARIS* AITON)

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ABSTRACT

A study of the closely similar Central and South American taxa *Crotalaria lotifolia* L. and *C. purdiana* Senn, shows that they are indeed distinct species. A scatter diagram, a series of graphs and a new key summarize their differences. The African species *C. axillaris* Aiton appears to be related.

KEY WORDS: Taxonomy, Leguminosae, *Crotalaria*, West Indies, Central America, South America, Africa

Crotalaria lotifolia L. is a shrub which can be readily differentiated from most other native American species of the genus by its axillary inflorescences. It was first reported (in polynomial form) by Sloane (1725) from Jamaica and subsequently by Dillen (1732) in *Hortus Elthamensis.* When Linnaeus treated the species in *Species Plantarum*, he cited both polynomials and chose Dillen's words "*loti folio*" as the basis for his trivial name. An orthographic error led to the publication of the name in *Species Plantarum* as "*latifolia*," the correct spelling beirg *lotifolia.*

In 1920, Fawcett & Rendle selected the Sloane collection (Sloane Herbarium, Vol. 6, #5, BM!) as the lectotype for *Crotalaria lotifolia.* Previously, the species had been chosen as the lectotype species for the genus (Britton & Brown 1913; see also Farr, *et al.* 1979).

In 1938, H.A. Senn described a new species from Colombia which is morphologically related to *Crotalaria lotifolia* and named it *C. purdiana* Senn, after the collector, William Purdie. In his revision of the North American crotalarias, Senn (1939) separated the two species in the following way:

Q. Inflorescence few-flowered (1-3 flowers), leaves glabrous above (West Indies) ..... *C. lotifolia*

Q. Inflorescence several-flowered (4-8 flowers), leaves hirtellous above (Colombia and Cuba) ..... *C. purdiana*

During preparation of a revision of the American species of *Crotalaria*, the senior author questioned whether *C. lotifolia* and *C. purdiana* might better be treated as varieties of a single species or as a single variable species. Both are trifoliolate shrubs with axillary inflorescences and similarly shaped fruits. Senn's use of flower number per inflorescence as his main character was brought into question by the difficulty of counting flower pedicel scars on the short inflorescences. In addition, the leaf pubescence was found to be more variable than Senn had indicated in his key. All specimens of both species are pubescent beneath, usually with appressed trichomes, 0.2-0.3(0.5) mm long. The upper leaf surfaces of all *C. lotifolia* specimens and of *C. purdiana* from Barbados, Jamaica, and Martinique are glabrous. The upper leaf surfaces of *C. purdiana* specimens from Cuba, Colombia, and Venezuela have very short trichomes (0.1-0.2 mm) on the upper surface, either generally distributed or distributed in patches between glabrous areas.

With these factors in mind, the authors further examined Senn's delineation of the two species. During a preliminary survey of the material, the senior author observed that flowers of *Crotalaria lotifolia* had twisted carinal beaks, that those of *C. purdiana* lacked the twist, and that in general the leaves of *C. lotifolia* were smaller than those of *C. purdiana*. An analysis of 22 specimens of *C. lotifolia* and 30 specimens of *C. purdiana* for leaf measurements, inflorescence length, and number of flowers per inflorescence resulted in the data plotted in Figure 1. A more graphic comparison of the two species is shown in the scatter diagram (Figure 2).

Based on our observations, we accept *Crotalaria lotifolia* and *C. purdiana* as distinct and offer the following couplet to separate the species.

A. Terminal leaflets 35-82 mm long, petioles 20-90 mm long; inflorescence 2-12 mm long, bearing 4-8 flowers; carinal beak not twisted ..... *C. purdiana*

A. Terminal leaflets 13-30 mm long, petioles 14-30 mm long; inflorescence 1-2 mm long, bearing 1-3 flowers; carinal beak twisted ..... *C. lotifolia*

Senn (1939) recognized a variety of *Crotalaria lotifolia* and named it after the collector of the type, H.F. Eggers. The plants are small and in our view are facultative dwarf responses to dry conditions. We do not view his variety as distinct from the typical variety. Our concepts of the taxa are documented by the following citations.

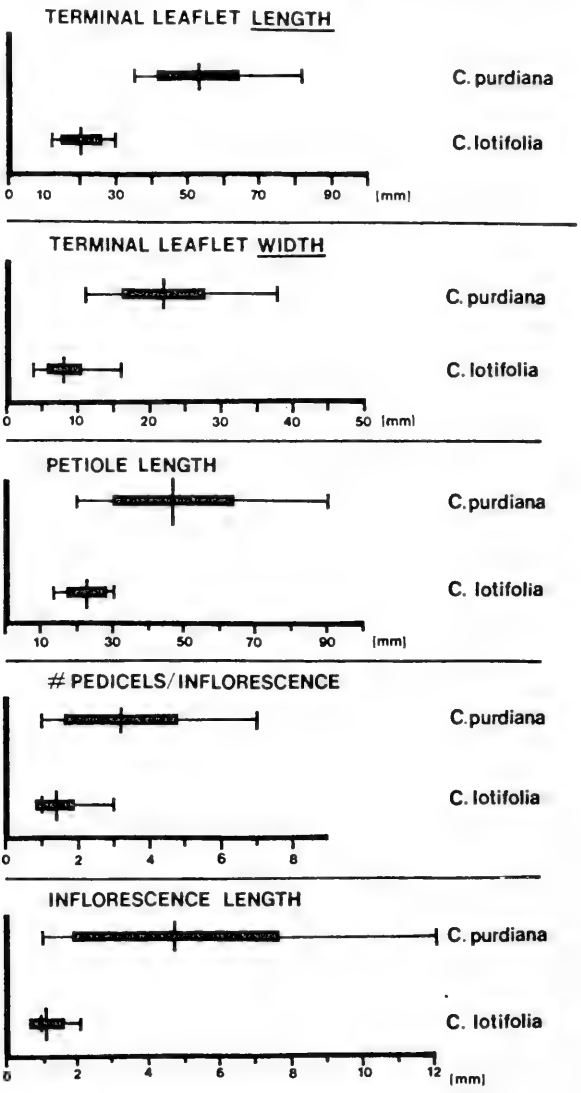

Figure 1. A comparison of diagnostic characters which separate two species of Crotalaria. Mean, range, and standard deviation are indicated for each character.

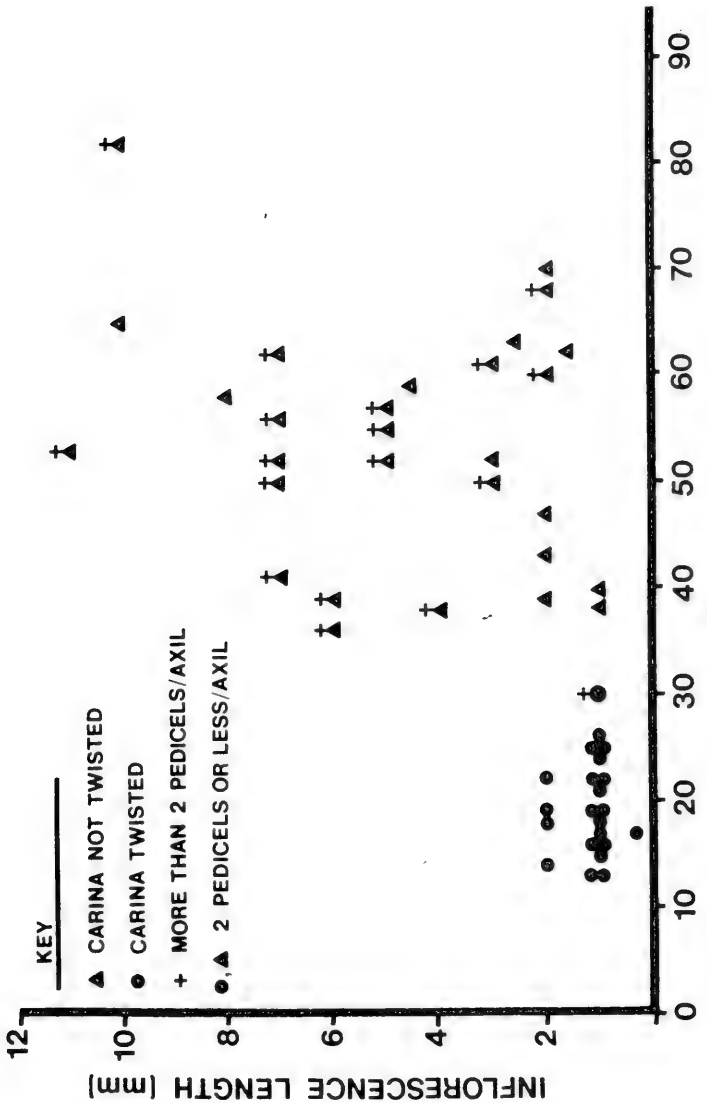

Figure 2. Scatter diagram depicting the separation of Crotalaria lotifolia and Crotalaria purdiana.

SPECIMENS STUDIED

CROTALARIA LOTIFOLIA

GUATEMALA. Santo Tomas, *Friedrichsthal 272* (W).

BAHAMA ARCHIPELAGO. Great Exuma, along Flamingo Drive, near Palm Hill Road, S of Georgetown, *Correll & Correll 47929* (BM, NY).

CUBA. Cayo Paloma, Camaguey, *Shafer 2572* (BM, NY); Vic. Puebla Romano, Camaguey, *Shafer 2478* (BM, NY, PH).

PUERTO RICO. Coamo, *Hess & Stevens 3975* (NY); Vic. Coamo Springs, *Britton, et al. 6364* (NY); Guanica, *Sintensis 3650* (MO, NY, P); Guayanilla, *Britton & Britton 9342* (NY); Ponce to Penuelas, *Britton & Cowell 1281* (NY); 8 mi W of Ponce, *Heller 6273* (G, MO, P, PH); Vieques Island, Clabaza to Ensenada Honda, *Shafer 2944* (NY); Ensenada Honda to Puerto Medio, *Shafer 3016* (NY).

VIRGIN ISLANDS. Angada, *Fishlock 001* (NY, PH). Saint Croix, Christiansted, *J.N. Rose, et al. 3620* (NY). Saint Jan, Coral Bay, *Raunkiaer s.n.* II-1906 (P); Lameshur, *Britton & Shafer 512* (NY). Virgin Gorda, N Sirma, *Fishlock 23* (NY). Saint Thomas, Soldier Bay Dalen, *Eggers s.n.* 1880 (MO, PH). Water Island, *Eggers 531* (G, P).

WINDWARD ISLANDS. Guadeloupe, St. Barthelemy, Grande Saline, *Le Gallo* (NY).

CROTALARIA PURDIANA

MÉXICO. Yucatán: Hda. San Francisco, *Enriquez 811* (MEXU); No specific locality, *Gaumer 24264* (F).

BAHAMA ARCHIPELAGO. No specific locality, *Brace 411* (NY).

CUBA. Camaguey: Tiffen, *R.L. Shafer 2891* (NY). Oriente: Antella, *Britton, et al. 12441* (NY); Puerto Padre, *Montenegro 17116* (NY); Santiago harbor, *Britton 1882* (NY); Santiago, *Britton & Britton 12915* (NY), *Ekman 7761* (NY), *Havard 80* (NY), *85* (NY), *C.L. Pollard, et al. 268* (MO, PH).

JAMAICA. Santa Catherine: Hellshire Hills, *C.D. Adams 10771* (MO). Clarendon: Harris Savanna, *Proctor 34308* (BM, NY); Inverness, *Harris 12723* (BM, MO). Manchester: Between Cut River and Canoe Valley, *Proctor 35474* (NY). Trelawny: 1.5 mi W of Rio Bueno, *Proctor 31562* (NY). Parish not given: Great Goat Island, *Harris 9323* (BM, NY), *12520* (BM, MO, NY, PH).

HAITI. Near Jean Rabel, *Leonard & Leonard 13024* (NY).

DOMINICAN REPUBLIC. Bellomar to Chedo, 10 mi NE of Cabo Rajo, *Liogier 16937* (NY, P); Near Boca de Yuma, *Liogier 12279* (NY, P).

WINDWARD ISLANDS. Martinique: Presquile de la Caravelle, commune Trinite, *Egler 39-236* (NY); also *C. lotifolia* (Herbarium Lamarck, P!); Saint

Vincent: Tobago Cays, *Howard 11030* (BM, NY). Beadimouns, *Eggers 7354* (P).

COLOMBIA. Magdalena: Cerrejon, *Haught 6718* (P).

VENEZUELA. Aragua: Costa de La Costa, *Aristeguieta 5142* (G, P).

In 1968, Polhill commented on the similarity between the African species *Crotalaria axillaris* Aiton and *C. lotifolia*, and stated that the latter lacks a twisted carinal beak. This statement is in conflict with our understanding of *C. lotifolia*. Since we do not know the nature of the material on which Polhill based his comment, we can only speculate that he was examining specimens of *C. purdiana* annotated by Senn as *C. lotifolia*. We have examined nine specimens of *C. axillaris* from the Belgian Congo at the Kew Herbarium. Leaflet size and petiole length are similar to *C. purdiana*. Characters of the inflorescence, including the twisted carina are more similar to *C. lotifolia*. The fruits of *C. axillaris* measured ranged from 3.5-5.0 cm long with a stipe of 0.6-1.0 cm long. *Crotalaria lotifolia* and *C. purdiana* have legumes measuring less than 2.5 cm and stipes measuring less than 0.3 cm. Seeds of *C. axillaris* range from 4 to 5 mm in length. The largest of the *C. lotifolia* and *C. purdiana* seeds is 3.8 mm long. In general appearance the three species are very similar, but the nature of their relationship is difficult to determine.

Polhill (1968; 1982) reorganized the subgeneric classification of the genus *Crotalaria* based on floral characteristics, including the twist of the carina. It is interesting that two seemingly closely related species such as *C. lotifolia* and *C. purdiana* would differ in this putatively conservative character.

ACKNOWLEDGMENTS

Appreciation is extended to the curators of the various herbaria from which specimens were borrowed (F, GH, K, MEXU, MO, NY, P, PH). Graphs and scatter diagrams were prepared by Ms. Vicki Dodson, Towson State University Graphic Arts Department. Dr. Robert DeFilipps, Botany Department, Smithsonian Institution and Dr. Guy Nesom, Herbarium, University of Texas are thanked for their reviews of this paper.

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NOTES ON ARIZONA *ASCLEPIAS* (ASCLEPIADACEAE) WITH A NEW COMBINATION

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ABSTRACT

Relationships between several pairs of closely related *Asclepias* taxa from the western United States are discussed. A new combination, **A. uncialis** E. Greene var. **ruthiae** *comb. nov.*, is proposed.

KEY WORDS: *Asclepias*, Asclepiadaceae, Arizona

Introduction

In the "Contributors' Guide for the New *Vascular Plants of Arizona*," the editorial committee recommends a conservative view in the recognition of species. "A describable morphological discontinuity between species is essential. Members of complexes that intergrade considerably in morphology are considered in infraspecific rank, and those that have no consistently diagnostic morphological characters are not treated formally." This is sensible editorial policy for a manual that will be broadly used; it is also sound taxonomy in the orthodox tradition, the lineal descendent of Charles Darwin's (1859) observation that "wide-ranging, much diffused, and common species vary most." At the inception of phylogenetic taxonomy, Darwin was able to clarify the role of the taxonomist who tries to make sense of this variability: "We have seen that there is no infallible criterion by which to distinguish species and well-marked varieties; and when intermediate links have not been found between doubtful forms, naturalists are compelled to come to a determination by the amount of difference between them, judging by analogy whether or not the amount suffices to raise one or both to the rank of species." Recognizable and describable discontinuities between groups do not automatically indicate species status or even formal taxonomic recognition for those groups; the discontinuities must also be significant.

During preparation of a treatment of the Asclepiadaceae for the Arizona flora project, I have puzzled over specimens representing several pairs of closely related *Asclepias* taxa. In his monograph of the North American species of *Asclepias*, Woodson (1954) recognized all of them at the rank of species: *A. engelmanniana* Woods. and *A. rusbyi* (Vail) Woods.; *A. involucrata* Engelm. *ex* Torr. and *A. macrosperma* Eastwood, and *A. uncialis* E. Greene and *A. ruthiae* Maguire. Yet the determinations supplied by Arizona botanists for their own, local collections of those taxa, in particular the first two pairs, suggest that Woodson's treatment is unsatisfactory. Annotations and re-annotations, sometimes by the same individual, pepper many of the specimens, jumping back and forth between the taxa in question. Woodson rightly described the species of *Asclepias* in the United States as "unusually well defined and properly appreciated by the botanical public." In order to more satisfactorily reflect the magnitude of their affinities, that is, "judging by analogy," it seems practical, in light of available taxonomic information, to restrict recognition of those taxa to infraspecific rank.

Asclepias uncialis E. Greene

Asclepias uncialis comprises a poorly understood complex of intergrading morphological phases from widely scattered localities on the high deserts and dry plains of Nevada, Utah, Colorado, Arizona, and New Mexico. Included in this complex are the more robust, broader leaved plants hitherto separated from *A. uncialis* as *A. ruthiae* (and including *A. eastwoodiana* Barneby). Whether those plants deserve formal recognition at even the infraspecific level is a question that future taxonomic and biosystematic studies must answer. My own morphological examination indicates that maintaining distinct entities at the rank of species is not warranted: I can find no clear, consistent, and significant discontinuity. For purposes of a floristic treatment of the Milkweed Family for the state of Arizona, where *A. uncialis* is not only rare, but represented by its extreme forms, it seems best to formally retain those forms at infraspecific rank. Therefore, the following new combination is proposed:

Asclepias uncialis E. Greene var. **ruthiae** (Maguire *in* Maguire & Woodson) Sundell, *comb. nov.* BASIONYM: *Asclepias ruthiae* Maguire *in* Maguire & Woodson, Ann. Missouri Bot. Gard. 28:245. 1941.

Asclepias eastwoodiana Barneby, Leafl. W. Bot. 4:210. 1945.

Asclepias sanjuanensis Heil, Porter & Welsh, Great Basin Naturalist 49:100. 1989.

Extreme forms of the two varieties can be distinguished according to the following key:

1. Plants relatively small, stems to 0.5-1 dm long; lower leaf blades lanceolate, grading to linear lanceolate or linear above, pubescent only on the margins and veins; flowers relatively small, corolla lobes 3-4 mm long, anther wings 1.1-1.4 mm long; crown hoods with marginal lobes well developed, the horns tangentially flat ..... var. *uncialis*

1. Plants relatively large, stems mostly 1-2 dm long; lower leaf blades mostly ovate, broadly elliptic or circular, grading to narrowly ovate or broadly lanceolate above, margins pubescent, upper and lower surfaces pubescent to glabrous; flowers relatively large, corolla lobes 4-6 mm long, anther wings 1.3-1.7 mm long; crown hoods with marginal lobes indistinct to well developed, the horns subdigitate ..... var. *ruthiae*

Asclepias uncialis var. *uncialis* occurs in the southern and eastern portion of the species' range, from western Arizona and southwestern New Mexico to Colorado and western Oklahoma; var. *ruthiae* is found farther to the west, where it appears to be more common, or at least more frequently collected, from central Nevada to southeastern Utah, northern Arizona, and northwestern New Mexico. Plants recently described as *A. sanjuanensis* (Heil, *et al.* 1989) from northwestern New Mexico are somewhat intermediate and, in stature, leaf outline, and crown form, bridge an already indistinct morphological gap.

Collections of the typical variety of *Asclepias uncialis* are apparently uncommon, a situation that tends to promote species inflation based on minor discontinuities. Of particular interest is an Alice Eastwood collection (*8259*, GH [photocopy seen], US!) from Silver City, New Mexico, the type locality, exhibiting a more robust habit and, as far as I am able to judge, indistinguishable from type material of *A. sanjuanensis* (*Heil 4338*, NMC!). The authors of *A. sanjuanensis* recognize a distant affinity to *A. uncialis*, but tentatively derive their new species, as well as *A. eastwoodiana*, from the geographically intermediate *A. ruthiae*. Collection of additional flowering and fruiting material from Arizona and western New Mexico will help to resolve the problem, most likely by further blurring the distinctions between these various entities.

Asclepias involucrata Engelm. *ex* Torr.

Asclepias involucrata of the southwestern United States and northern México is so variable in pubescence, leaf outline, and crown form, that its distinctiveness has been insufficiently appreciated. At least in Arizona, where it is sufficiently common to be rather well represented in state herbaria, the dwarf, spreading habit, more or less erect leaves with short-wooly margins, and terminal, bracteate umbels clearly mark it as a cohesive genetic and taxonomic

entity. In the northern part of the state, plants in some populations exhibit one or more of the following character extremes: ovate leaves (especially the lower ones), persistent wooly pubescence on leaf undersurfaces, oblong and upright crown hoods, and larger seeds. These have been segregated as *Asclepias macrosperma* or *A. involucrata* var. *tomentosa* Eastwood. However, these character states do not consistently correlate, nor are there clear morphological discontinuities discernible between contrasting conditions. Like McDougall (1973), I am unable to treat such plants formally.

Asclepias engelmanniana Woods.

This tall and distinctive milkweed is a common element of prairies and floodplains on the high plains of Nebraska, Colorado, and Kansas. To the southwest, it ranges as far as Arizona, where it occurs sporadically along creeks and in open woodlands in the northeastern half of the state. Plants with more or less well developed crown horns have been recognized by Kearney & Peebles (1960) at the infraspecific level as *A. engelmanniana* var. *rusbyi* (Vail) Kearney (*A. rusbyi* Vail). Most Arizona plants possess at least a nub of a horn and, with some misgiving, are assigned here. However, even within the same collection (*Lehto L23157* from Gila Co.), the horn can vary from well developed (ca. 1 mm long and scarcely exserted beyond the hood rim [ARIZ!]) to entirely suppressed and represented by a ridge at the base of the back wall of the hood (ASU!). Typical *A. engelmanniana* of the Great Plains, lacks both the horn and the ridge.

Additional Problems

Two additional pairs of species, each with one representative in the Arizona flora, pose similar, unresolved taxonomic problems.

Asclepias angustifolia Schweig. of México and southern Arizona has never been circumscribed broadly enough to include the relatively localized *A. texana* Heller of south Texas and northeast México. In the United States, the species are easily separated morphologically by leaf outline, mostly linear to narrowly lanceolate, to 12 cm long, in *A. angustifolia*, mostly oval to oblong elliptic, to 7 cm long, in *A. texana*. The difference is distinct, but certainly no greater than that between, *e.g.*, the subspecies of *Sarcostemma cynanchoides* Decne., also of the American Southwest. Plants with somewhat intermediate leaf outlines occur in northern México and, based on specimens at ARIZ, have no trouble passing as *A. angustifolia* to Arizona botanists and as *A. texana* to their Texas colleagues! Ecologically, the species differ very little, occuring along creeks and canyons in rocky and otherwise arid country.

Asclepias nyctaginifolia A. Gray of California, Arizona, and New Mexico is clearly a segregate of *A. oenotherioides* Cham. & Schlecht., which ranges from Texas southward into much of Central America. The species are maintained based on differences in the length and basal taper of the crown hoods. Invoking the Darwinian method of analogy to other members of the genus, I would suggest that the distinction, if it were to survive the examination of currently available specimens, is weak and the taxa good candidates for taxonomic reappraisal.

Good Field Notes for Milkweed Collections

Good morphological information accompanying milkweed collections is rare. In the arid Southwest, most *Asclepias* species are relatively undercollected. For example, of the 26 species of *Asclepias* recognized in Arizona, only five were sufficiently represented, among the specimens borrowed from the major Arizona herbaria, to occupy more than a single shelf in a herbarium case. Few botanists could be familiar with those milkweeds in the field. Thus the recording of appropriate detailed morphological data is not at all a formality.

Useful information that is more often than not lacking on milkweed collections includes the following:

–root morphology

–habit; in particular, stem number, disposition, and length

–corolla form and disposition, particularly of the lobes

–crown form: standard botanical terms are not always available to describe the three dimensional form and disposition of the hoods

–flower color: corolla, crown, and anther head should be noted.

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NEW GENERA OF BROMELIACEAE

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ABSTRACT

New combinations are enumerated in two new genera of Bromeliaceae.

KEY WORDS: Bromeliaceae, Neotropics, nomenclature

The generic names **Podaechmea** *stat. nov.* and **Platyaechmea** *stat. nov.* (Smith & Kress 1989) were invalidly published under Art. 33.2 because their basionyms were omitted by error. The new combinations within these genera were also invalidly published under Art. 43. All are herewith validated.

Podaechmea (Mez) Smith & Kress, *stat. nov.* BASIONYM: *Aechmea* subgen. 1. *Podaechmea* Mez, DC. *Monogr. Phan.* 9:191. 1896. TYPE SPECIES: *Podaechmea lueddemanniana* (K. Koch) Smith & Kress.

Podaechmea ferruginea (L.B. Smith) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea ferruginea* L.B. Smith, Contr. Gray Herb. 98:5, pl. 1, figs. 1-3. 1932.

Podaechmea galeottii (Baker) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea galeottii* Baker, *Handb. Bromel.* 51. 1889.

Podaechmea lueddemanniana (K. Koch) Smith & Kress, *comb. nov.* BASIONYM: *Pironneava lueddemanniana* K. Koch, Wochenschr. Gärtnerei Pflanzenk. 9:182. 1866.

Podaechmea macvaughii (L.B. Smith) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea macvaughii* L.B. Smith, Phytologia 10: pl. 1, figs.

Podaechmea mexicana (Baker) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea mexicana* Baker, J. Bot. 17:165. 1879.

Platyaechmea (Baker) Smith & Kress, *stat. nov.* BASIONYM: *Aechmea* section *Platyaechmea* Baker, J. Bot. 17:130. 1879. TYPE SPECIES: *Platyaechmea disticantha* (Lemaire) Smith & Kress.

Platyaechmea anomala (L.B. Smith) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea anomala* L.B. Smith, Caldasia 3:237, fig. 1945.

Platyaechmea caesia (Baker) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea caesia* E. Morren *ex* Baker, *Handb. Bromel.* 43. 1889.

Platyaechmea chantinii (Carrière) Smith & Kress, comb. nov. BASIONYM: *Billbergia chantinii* Carrière, Rev. Hort. 50:112, fig. 22. 1878; 52:272, figs. 54-56. 1880.

Platyaechmea contracta (Schultes *filius*) Smith & Kress, *comb. nov.* BASIONYM: *Billbergia contracta* Martius *ex* Schultes *filius* in Roemer & Schultes, *Syst. Veg.* 7(2):1263. 1830.

Platyaechmea dealbata (Baker) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea dealbata* E. Morren *ex* Baker, *Handb. Bromel.* 58. 1889.

Platyaechmea dichlamidea (Baker) Smith & Kress, *comb. nov. Platyaechmea dichlamidea* (Baker) Smith & Kress var. *dichlamidea.* BASIONYM: *Aechmea dichlamidea* Baker, J. Bot. 17:133. 1879.

Platyaechmea dichlamidea (Baker) Smith & Kress var. **pariaensis** (Pittendrigh) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea dichlamidea* Baker var. *pariaensis* Pittendrigh *in* L.B. Smith, Phytologia 18:137, pl. 1, fig. 1. 1969.

Platyaechmea dichlamidea (Baker) Smith & Kress var. **trinitensis** (L.B. Smith) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea dichlamidea* Baker var. *trinitensis* L.B. Smith, Proc. Amer. Acad. Arts (Contr. Gray Herb. #102) 68:145, pl. 1, fig. 3. 1933.

Platyaechmea disticantha (Lemaire) Smith & Kress, *comb. nov. Platyaechmea disticantha* (Lemaire) Smith & Kress var. *disticantha* forma *disticantha.* BASIONYM: *Aechmea disticantha* Lemaire, Jard. Fleur. 3:pl. 269. 1853.

Platyaechmea disticantha (Lemaire) Smith & Kress forma **albiflora** (L.B. Smith) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea disticantha* Lemaire forma *albiflora* L.B. Smith, Arq. Bot. Estado São Paulo 1:102. 1943.

Platyaechmea disticantha (Lemaire) Smith & Kress var. **glaziovii** (Baker) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea glaziovii* Baker, J. Bot. 17:133. 1879.

Platyaechmea disticantha (Lemaire) Smith & Kress var. **schlumbergeri** (Mez) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea disticantha* Lemaire var. *schlumbergeri* E. Morren *ex* Mez, Martius *Flora Brasiliensis* 3(3):343. 1892.

Platyaechmea disticantha (Lemaire) Smith & Kress var. **vernicosa** (E. Pereira) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea disticantha* Lemaire var. *vernicosa* E. Pereira, Bradea 2(947):308. 1979.

Platyaechmea fasciata (Lindley) Smith & Kress, *comb. nov. Platyaechmea fasciata* (Lindley) Smith & Kress var. *fasciata.* BASIONYM: *Billbergia fasciata* Lindley, Bot. Reg. 13: pl. 1130. 1828.

Platyaechmea fasciata (Lindley) Smith & Kress var. **flavivittata** (Reitz) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea fasciata* (Lindley) Baker var. *flavi-vittata* Reitz, Sellowia 33:55. 1981.

Platyaechmea fasciata (Lindley) Smith & Kress var. **pruinosa** (Reitz) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea fasciata* (Lindley) Baker var. *pruinosa* Reitz, Sellowia 33:55. 1981.

Platyaechmea fasciata (Lindley) Smith & Kress var. **purpurea** (Guillon) Smith & Kress, *comb. nov.* BASIONYM: *Billbergia rhodocyanea* Lemaire var. *purpurea* Guillon, Rev. Hort. 55:453. 1883.

Platyaechmea flavorosea (E. Pereira) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea flavo-rosea* E. Pereira, Bradea 2(49):321, fig. (p. 323). 1979.

Platyaechmea moorei (Luther) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea moorei* Luther, J. Brom. Soc. 30(4):176, fig. 1980.

Platyaechmea retusa (L.B. Smith) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea retusa* L.B. Smith, Phytologia 10:484, pl. 4, figs. 3-5. 1964.

Platyaechmea romeroi (L.B. Smith) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea romeroi* L.B. Smith, Phytologia 5:282, pl. 1, figs. 4-6. 1955.

Platyaechmea serrata (L.) Smith & Kress, *comb. nov.* BASIONYM: *Tillandsia serrata* L., *Sp. Pl.* 286. 1753.

Platyaechmea smithiorum (Mez) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea smithiorum* Mez, DC. *Monogr. Phan.* 9:246. 1896.

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Platyaechmea tillandsioides (Schultes *filius*) Smith & Kress var. **kienastii** (Mez) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea kienastii* E. Morren *ex* Mez, DC. *Monogr. Phan.* 9:243. 1896.

Platyaechmea wittmackiana (Regel) Smith & Kress, *comb. nov.* BASIONYM: *Quesnelia wittmackiana* Regel, Gartenflora 37:497, pl. 1281, fig. 2. 1888.

Platyaechmea zebrina (L.B. Smith) Smith & Kress, *comb. nov.* BASIONYM: *Aechmea zebrina* L.B. Smith, Phytologia 4:358, pl. 2, figs. 1, 2. 1953.

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MINOR NEW COMBINATIONS IN *TOXICODENDRON* (ANACARDIACEAE)

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ABSTRACT

Three new combinations are proposed within *Toxicodendron radicans* (L.) Kuntze: var. **pubens** (Engelm. *ex* S. Watson) *comb. nov.*, var. **barkleyi** (Gillis) *comb. nov.*, and var. **negundo** (E. Greene) *comb. nov.*

KEY WORDS: *Toxicodendron*, Anacardiaceae, poison ivy, North America

The variation within the *Toxicodendron radicans* (L.) Kuntze (Anacardiaceae) complex is better treated at the varietal rank than the subspecific; accordingly, the following new combinations are proposed:

Toxicodendron radicans (L.) Kuntze var. **pubens** (Engelm. *ex* S. Watson) Reveal, *comb. nov.* BASIONYM: *Rhus toxicodendron* L. var. *pubens* Engelm. *ex* S. Watson, *Bibliogr. Index N. Amer. Bot.* 185. 1878.

Toxicodendron radicans (L.) Kuntze var. **barkleyi** (Gillis) Reveal, *comb. nov.* BASIONYM: *Toxicodendron radicans* (L.) Kuntze subsp. *barkleyi* Gillis, Rhodora 73:224. 1971.

Toxicodendron radicans (L.) Kuntze var. **negundo** (E. Greene) Reveal, *comb. nov.* BASIONYM: *Toxicodendron negundo* E. Greene, Leafl. Bot. Observ. Crit. 1:117. 1905.

ACKNOWLEDGMENTS

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Phytologia (October 1990) 69(4):276-277.

COMBINATIONS MADE IN THE *CHECKLIST OF THE VASCULAR PLANTS OF TEXAS*

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ABSTRACT

Four new combinations, proposed by Gandhi in the *Checklist of the Vascular Plants of Texas* (Hatch, *et al.* 1990), are validated here.

KEY WORDS: Checklist, Texas, Asteraceae, Commelinaceae

In the *Checklist of the Vascular Plants of Texas* (Hatch, *et al.* 1990), Gandhi proposed four new combinations. Unfortunately, the requirements of Art. 33.2 of the *International Code of Botanical Nomenclature* (Greuter 1988) were not met and the combinations remain invalid. Hence, those combinations are proposed here for validation and the relevant page numbers of the Checklist are indicated.

Asteraceae

p. 119. **Haplopappus spinulosus** (Pursh) DC. var. **chihuahuanus** (B. Turner & Hartman) Gandhi, *comb. nov.* BASIONYM: *Machaeranthera pinnatifida* (Hook.) Shinners var. *chihuahuana* B. Turner & Hartman, Wrightia 5:311. 1976.

p. 120. **Heterotheca subaxillaris** (Lam.) Britt. & Rusby var. **psammophila** (Wagenkn.) Gandhi, *comb. nov.* BASIONYM: *Heterotheca psammophila* Wagenkn., Rhodora 62:76. 1960.

p. 120. **Hymenopappus scabiosaeus** L'Her. var. **riograndensis** (B. Turner) Gandhi, *comb. nov.* BASIONYM: *Hymenopappus artemisiifolius* DC. var. *riograndensis* B. Turner, Rhodora 58:305. 1956.

Commelinaceae

p. 38. **Tradescantia leiandra** Torr. var. **glandulosa** (Correll) Gandhi, *comb. nov.* BASIONYM: *Setcreasea leiandra* (Torr.) Pilg. var. *glandulosa* Correll, Madroño 19:187. 1968.

ACKNOWLEDGMENT

The author thanks Dr. John T. Kartesz for helpful comments.

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Phytologia (October 1990) 69(4):278-281.

A NEW SPECIES OF *ERIGERON* (ASTERACEAE: ASTEREAE) FROM CHIHUAHUA, MÉXICO

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ABSTRACT

A new species, **Erigeron byei** *spec. nov.*, is described from south-central Chihuahua, México. Based on similarities in habit, vestiture, and capitular and floral morphology, it appears to be most closely related to *E. ortegae* S.F. Blake and *E. oxyphyllus* E. Greene, and is placed as the third species in *Erigeron* sect. *Spinosi*. The new species has nine pairs of chromosomes.

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

The following previously undescribed species is recognized from the mountains of west-central Chihuahua, México.

Erigeron byei Sundberg & Nesom, *spec. nov.* (Figure 1) TYPE: MÉXICO. Chihuahua: Mpio. Batopilas, 2.5 mi S of Creel on main road to Batopilas, s'eep, terraced slopes, pine-oak woodlands, 19 May 1985, *R. Scott 471* with T. Ayers, M. Lavin, & A. Whittemore (HOLOTYPE: TEX!; Isotypes: ARIZ!, ASU!, COLO!, GH!, ILL!, MEXU!, NY!, OBI!, RM!, UNM!, US!).

E. ortegae S.F. Blake similis vestimento fere glabro, foliis caulinis bracteatis, gemmis erectis, phyllariis trinervibus, et ligulis circinatis sed differt statura multo parviore, rhizomatibus tenuibus, foliis basalibus persistentibus, et capitulis parvioribus flosculos parviores efferentibus.

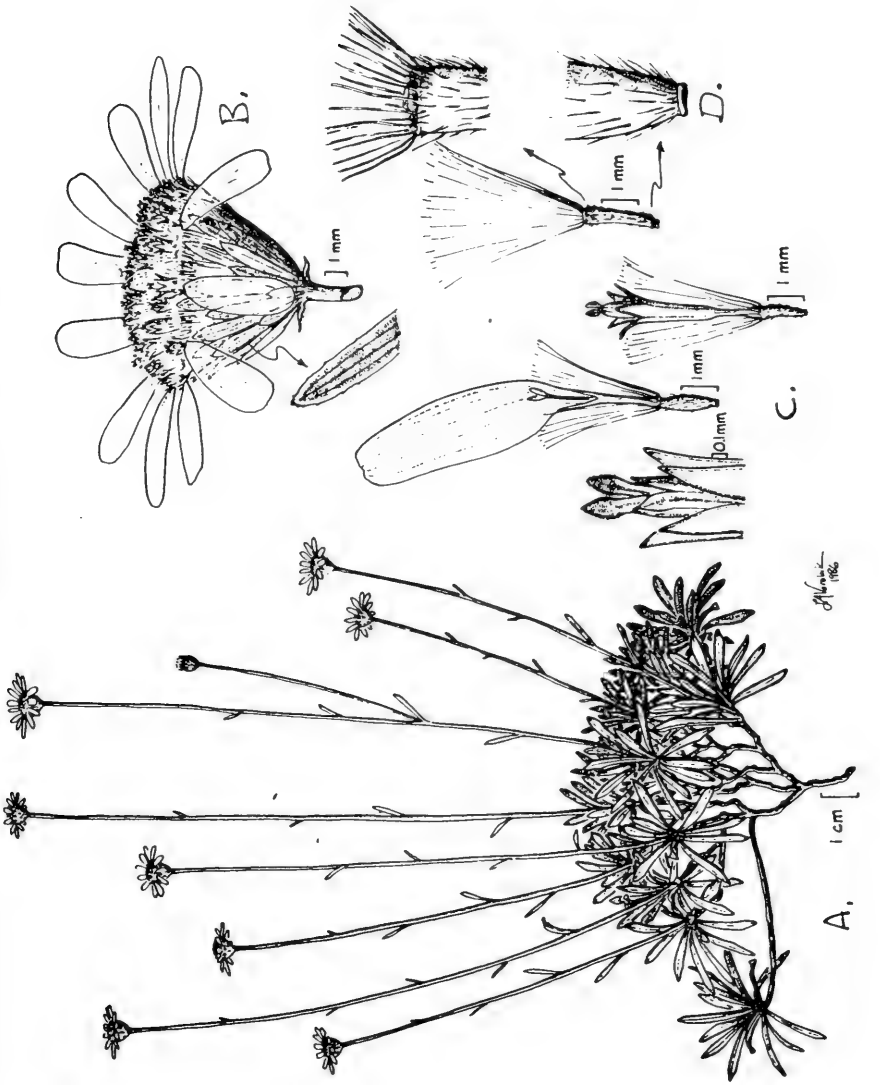

Figure 1. *Erigeron byei.* A. Habit. B. Capitulum and detail of phyllary. C. Details of ray and disc flowers. D. Achene.

Perennial, caespitose, glabrous herbs from a system of thin, lignescent, rhizomelike caudex branches. Stems 7-20 cm tall, usually with 1-2 ascending branches near midstem. Basal leaves persistent in rosettes, sessile, narrowly elliptic-oblanceolate, 8-26 mm long, 1-2 mm wide, entire, 1 nerved or faintly 3 nerved, with a mucronulate apex, the cauline leaves few and sharply reduced in size to linear bracts 1-4 mm long. Heads 5-8 mm wide, erect in bud, solitary on nearly naked peduncles 5-10 cm long; phyllaries in 3-4 strongly graduated series, elliptic-lanceolate with obtuse to acute apices, thin herbaceous with scarious margins and 1-3, filiform, orange resinous nerves, sometimes purple tinged, at least on the upper half, the inner series 4-5 mm long, 0.5-0.8 mm wide. Ray flowers 9-18, the corollas white, drying white or purplish, 5-7 mm long, the ligules 1.4-2.0 mm wide, coiling at the tips. Disc flowers 24-29, the corollas 3.5-4.2 mm long, not inflated or indurated; collecting appendages of style branches deltate, 0.1-0.2 mm long. Achenes sparsely strigose, cylindrical to slightly flattened, 1.8-2.5 mm long, 0.4-0.5 mm wide, with (2-3)4(5) thin, orange nerves; pappus of 15-27 barbellate bristles 2.9-3.8 mm long and a few outer setae 0.1-0.5 mm long. Chromosome number, n=9 pairs (Fig. 1), as determined from meiotic counts from buds collected with the type specimens, *Scott 471.*

Additional collections examined: MÉXICO. Chihuahua: Mpio. Batopilas: N of Quirire, pine-oak forest, along arroyo in crevice of bedrock, 3 Jun 1973, *Bye 3951* (UCR); 4.5 mi N of Quirire, in arroyo (Río Batopilas drainage), pine-oak forest with *Arbutus*, *Buddleia*, from rock ledge in arroyo, 2150 m, 31 May 1984, *Bye, et al. 12841* (COLO, TEX); 15.1 km SW of the Creel-Guachochi road on the road to Batopilas; on wet, vertical rock in small canyon, SE-facing, mostly shaded, 2390 m, with *Quercus hypoleucoides, Q. coccolobifolia, Q.* cf. *fulva, Pinus latifolia*, and *Alnus*, 18 Oct 1986 [past flr], *Spellenberg & Zucker 8932* (TEX).

Erigeron byei is named for Dr. Robert Bye, of the Jardin Botanico del Instituto de Biología, UNAM (México), who first collected the species. He continues to be an active collector and student of the flora of the Sierra Madre Occidental, particularly that of central Chihuahua. The new species appears to be narrowly endemic to the area just south of Creel, Chihuahua.

The new species is most similar to *Erigeron ortegae* S.F. Blake (= *Aster spinosus* Benth., see Sundberg 1986) and its putative sister species, *E. oxyphyllus* E. Greene (Nesom 1989), in its nearly glabrous vestiture, cauline leaves strongly reduced in size to linear bracts, erect buds, thin herbaceous phyllaries with three, prominent, orange resinous nerves, ray flowers with short, white, coiling ligules, deltate collecting appendages of the disc style branches, and 4-5 nerved achenes. It differs from both species primarily in its habit and much smaller stature. Both *E. ortegae* and *E. oxyphyllus* produce stems 0.5-2.5 m tall from a system of thick rhizomes, and the plants are essentially leafless by flowering. *Erigeron byei* is distinctly caespitose in habit, as the plants produce

a system of slender rhizomes or rhizomelike caudex branches with clustered rosettes of persistent basal leaves at the rhizome tips. Further, the heads of *E. byei* are smaller and have fewer rays than either of the other species.

Despite the striking difference in habit, these three species appear to be most closely related among themselves. *Erigeron ortegae* and *E. oxyphyllus* have been segregated as *Erigeron* sect. *Spinosi* (Alexander) Nesom & Sundberg (Nesom 1989), and *E. byei* joins them as the third species of the section. A full taxonomic treatment of *E. ortegae*, with a detailed discussion of relationships, will be presented separately (Sundberg in prep.).

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TAXONOMY OF *HETEROTHECA* SECT. *HETEROTHECA* (ASTERACEAE: ASTEREAE) IN MÉXICO, WITH COMMENTS ON THE TAXA OF THE UNITED STATES

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ABSTRACT

Four species are recognized in *Heterotheca* sect. *Heterotheca*, all of which occur in México: *H. grandiflora* Nutt., *H. subaxillaris* (Lam.) Britt. & Rusby, *H. inuloides* Cass. (with three varieties), and *H. leptoglossa* DC. *Heterotheca inuloides* and *H. leptoglossa* are endemic to México, and a new variety restricted to Oaxaca and Puebla is described: **H. inuloides** var. **viridis** *var. nov.* Significant variation also occurs within *H. subaxillaris*, but in a study of the species over its entire range, it has not been possible to recognize meaningful patterns so that even varietal names could be consistently applied. A key to the species is provided as well as discussions of variation and a distribution map for the Mexican taxa.

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

Heterotheca sect. *Heterotheca* was monographed by Wagenknecht (1960), who recognized seven species, and it was the subject of further biosystematic study and comments by Harms (1965a; 1968). The generalized distribution map presented by Harms (1965a) for the members of the *H. subaxillaris* (Lam.) Britt. & Rusby complex was based primarily on the discussion and cited specimens of Wagenknecht.

Within the genus, plants of sect. *Heterotheca* are characterized primarily by their dimorphic achenes. The disc achenes are compressed, strigose to sericeous, and with a well developed pappus, typically including 1-3 series of long barbellate bristles and a much shorter, outer series of bristles or scales; the ray achenes are 3 angled, smaller, glabrous or much less pubescent, and completely epappose or rarely with a few short bristles or a minute corona. Further, all species are taprooted and have stems, leaves, and phyllaries with a vestiture of stipitate glandular hairs and spreading, nonglandular hairs with

osteolate bases, midcauline leaves sessile and clasping, heads in a corymboid capitulescence, and yellow, coiling rays.

In the view of Semple, *et al.* (1980), *Heterotheca* also includes another group of approximately 25 species, sect. *Phyllotheca* (Nutt.) V. Harms. They are separated from sect. *Heterotheca* by their monomorphic achenes, although the ray achenes in sect. *Heterotheca* occasionally produce few to numerous pappus bristles, narrowing the morphological gap between the two sections. Two species are rayless, each of them apparently having been derived independently from taxa of sect. *Phyllotheca*, according to Semple, *et al.* (1988), who nevertheless retained one of the rayless species as the sect. *Ammodia* (Nutt.) V. Harms. In more conservative views (see Semple, *et al.* 1980, for a review), *Heterotheca* has been considered to include two groups primarily endemic to the southeastern United States, both now regarded with good evidence by Semple as separate genera: *Chrysopsis* (no Mexican taxa) and *Pityopsis* (one species ranging into México).

Even though the species of sect. *Heterotheca* have relatively recently been studied, identifications and annotations since then have been highly inconsistent. In contrast to the seven species previously recognized, the present report recognizes only four in the section, two of which encompass significant infraspecific variation. At the most general level, they are divided into a northern group of small headed taxa and a southern group of larger headed taxa. All four of the species occur in México.

Although this study was primarily intended to address the patterns of variation in México, it is based on a survey of plants over the entire range of the section, covering the United States as well, in an attempt to meaningfully apply varietal nomenclature to the Mexican representatives. The ecological summaries below, however, refer only to the Mexican plants. Additional synonyms and information on typology are provided by Wagenknecht (1960). Meiotic chromosome numbers of $n=9$ pairs are known for most of the taxa (as summarized by Harms 1965b, Semple 1977, and as noted below).

KEY TO THE SPECIES

1. Innermost phyllaries (8-)9-12 mm long; plants of south central México (3)

1′ Innermost phyllaries 5-9 mm long; plants of northern México and the United States ..... (2)

2. Upper cauline leaves usually at least slightly subclasping to not at all clasping; innermost phyllaries 5-8 mm long; ray achenes usually completely glabrous, disc achenes usually with 1-3 resinous veins; disc corollas glabrous or nearly so; outer pappus strongly developed; herbage drying green ..... *H. subaxillaris*

2′ Upper cauline leaves not clasping; innermost phyllaries 7-9 mm long; the ray achenes minutely strigose at least on the angles, commonly on the faces as well, the disc achenes usually without resinous veins; the disc corollas prominently hairy on the throat; the outer pappus weakly developed; herbage drying dark green to blackish green *H. grandiflora*

3. Perennials or biennials; phyllaries purple at the very apices, the outer 2-3 series with vestiture mostly restricted to the distal half, sparsely glandular to nearly eglandular, with appressed to ascending apressed, relatively thin based, nonglandular hairs along the midregion ..... *H. leptoglossa*

3′ Annuals or biennials; phyllaries either strongly purplish on the tips, margins, and midregions or not at all purplish, the outer 2-3 series with prominent vestiture from base to apex, with thick based, stipitate glands and spreading, thick based nonglandular hairs, or nonglandular hairs commonly absent in var. *rosei* ..... *H. inuloides*

1. *HETEROTHECA GRANDIFLORA* Nutt.

Heterotheca grandiflora Nutt., Trans. Amer. Philos. Soc. 2 7:315. 1840. TYPE: UNITED STATES. California: near Santa Barbara, [1836], *Nuttall s.n.* (PH, not seen).

Annuals to biennials or short lived perennials; stems and leaves sparsely to densely hispid pilose, the herbage with a strong tendency to dry with a pronounced dark cast. Cauline leaves narrowed to a sessile or subsessile, nonclasping, attenuate base, at least on the upper stems. Phyllaries with only glandular hairs, usually purple tipped, the innermost 7-9 mm long. Ray achenes minutely strigose at least on the angles and commonly on the faces as well; pappus with a weakly developed outer series of scales or bristles. Chromosome number, n=9 pairs.

Baja California Norte, Sonora, California, southern Arizona; commonly in disturbed sites, sandy soil, dunes, grasslands, chaparral; 3-50(-1200 in the US) m; (May-)June-October(-January).

Heterotheca grandiflora appears to be strongly genetically isolated from *H. subaxillaris*, which is distributed from its native range in the eastern United States westward to California, where it co-occurs with *H. grandiflora*. It is possible that gene flow has occurred from *H. grandiflora* to *H. subaxillaris* (see comments following *H. subaxillaris*), but there is no evidence, however, that the reverse might be true. The strongly darkening pigments do not occur in any other taxa of the section.

2. *HETEROTHECA INULOIDES* Cass.

Heterotheca inuloides Cass., Dict. Sci. Nat. 51:460. 1827. TYPE: MÉXICO. without other data (Probable holotype: FI–Herb. Webbianum *ex* Herb. Desfontaines, GH photo!). According to Cassini, this plant was said by Desfontaines to have originated in México, sent by de Candolle from Geneva to the Jardin du Roi (presumably in Paris). The sheet at FI was annotated in Cassini's hand as "*Heterotheca inuloides*, H. Cass." There is in G-DC (fiche!) a very similar specimen noted as from "J. de Paris 1828" that is possibly a duplicate of the type.

Annuals, biennials, or perennials; stems sparsely to moderately hispid-pilose. Lower leaves petiolate or epetiolate, coarsely serrate, the upper becoming entire, sessile, usually at least subclasping. Phyllaries with a dense vestiture of stipitate glands, on the outer phyllaries these distributed from the base to apex, also densely hirsute-pilose in two varieties with long, nonglandular hairs, but commonly lacking nonglandular hairs in var. *rosei*, the innermost phyllaries (8-)9-12 mm long. Ray achenes usually minutely but prominently strigose on the faces and angles, sometimes glabrous; pappus with a prominent outer series of scales or bristles, these sometimes weakly developed.

Key to the varieties

1. Outer phyllaries densely hispid-pilose from base to tip with spreading to spreading ascending, nonglandular hairs .....(2)

1′ Outer phyllaries without nonglandular hairs or the nonglandular hairs present mostly on the distal third .....var. *rosei*

2. Phyllaries distinctly purplish at least at the apices and commonly along the distal margins and midregion as well, with thick based, nonglandular trichomes .....var. *inuloides*

2′ Phyllaries completely without purple coloration, with relatively thin based nonglandular trichomes .....var. *viridis*

2a. *HETEROTHECA INULOIDES* Cass. var. *INULOIDES*

Chromosome number, n=9 pairs.

Nuevo León, Durango, Zacatecas, San Luis Potosí, Hidalgo, Veracruz, Colima, Michoacán, México, Tlaxcala, Puebla; roadsides, fields, openings in pine-oak or pine woodlands; 2000-3000 m; (May-)August-November(-December).

Plants of several scattered collections from far outside its main range must be identified as var. *inuloides*: Nuevo León: Dulces Nombres, 12 Aug 1948, *Meyer & Rogers 2951* (GH). San Luis Potosí: region of S.L.P., 1878, *Parry & Palmer 372* (GH). And as noted by McVaugh (1984), other populations with var. *inuloides*-like phyllaries occur well within the range of var. *rosei*, in the areas of northeastern Nayarit, southeastern Durango, and adjacent Zacatecas. To show their location, these are mapped (Map 1) as var. *inuloides*, although field study may prove these to be variants within more *rosei*-like populations. Further, plants that might be interpreted as intermediate between var. *inuloides* and var. *rosei* occur in the vicinity of Uruapan and Tancitaro, Michoacán, but these are mapped as var. *rosei*.

2b. *HETEROTHECA INULOIDES* Cass. var. *ROSEI* Wagenk.

Heterotheca inuloides Cass. var. *rosei* Wagenknecht, Rhodora 62:69. 1960. TYPE: MÉXICO. Jalisco: sandy soil, grassland and roadsides, 30 mi E of Guadalajara, 25 Jul 1956, *B.L. Wagenknecht 2846* (HOLOTYPE: KANU!).

In addition to the paucity or complete lack of nonglandular hairs, the phyllaries of var. *rosei* usually are completely lacking in purple coloration, they are more densely stipitate glandular than in var. *inuloides*, and the glands usually have thicker stipes. Judging from their more slender taproots, these plants also tend to be more short lived than those of the two eastern varieties of *Heterotheca inuloides*. Chromosome number, $n=9$ pairs.

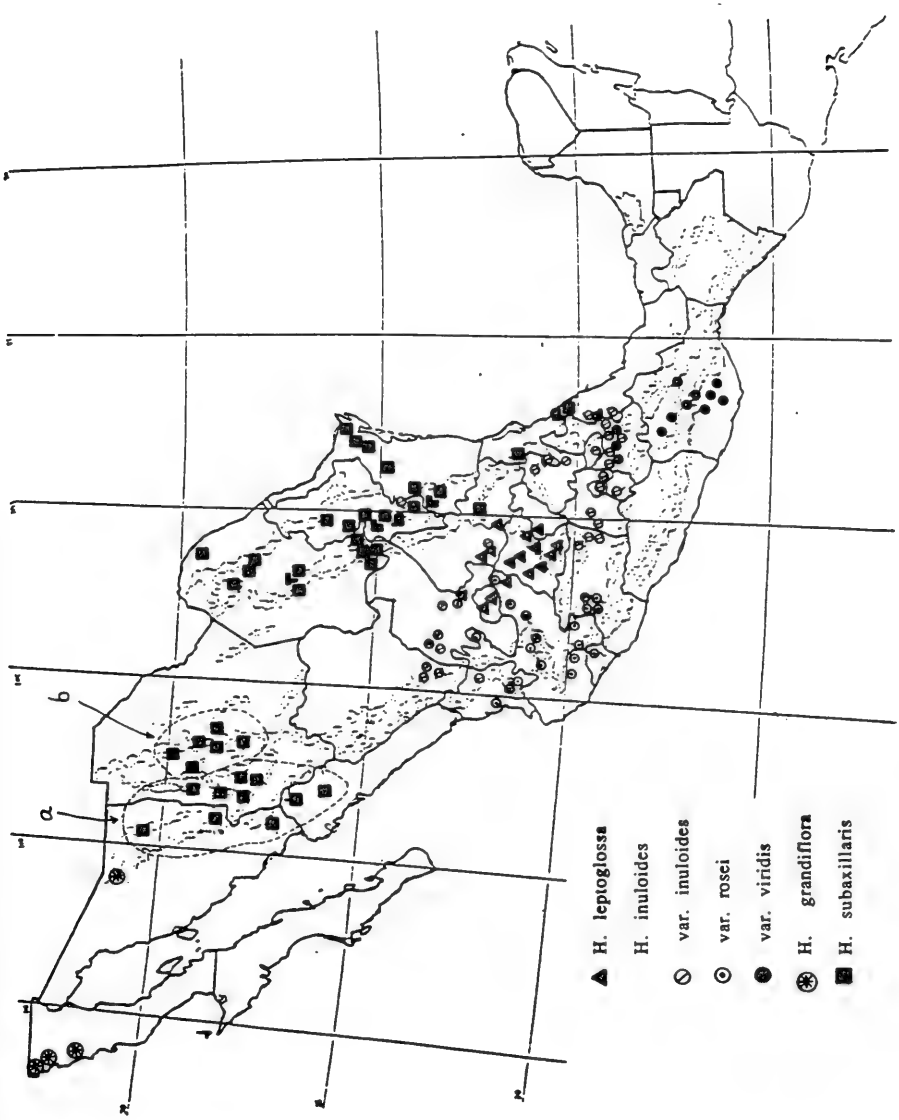
Durango, Zacatecas, Nayarit, Jalisco, Michoacán, Colima; matorral, shrublands, oak-juniper to pine-oak and pine woodlands, roadsides and other disturbed sites, pond edges; 1200-2400 m; (March-)June-November.

2c. *HETEROTHECA INULOIDES* Cass. var. *VIRIDIS* Nesom, *var. nov.*

Heterotheca inuloides Cass. var. **viridis** Nesom, *var. nov.* TYPE: MÉXICO. Oaxaca: Distrito del Centro, Monte Alban, 1850 m, 14 Oct 1932, *C. Conzatti 4794* (HOLOTYPE: LL!; Isotype: MEXU).

A *H. inuloides* Cass. var. *inuloides* differt phyllariis absque pigmento purpurato ac trichomatibus tenuioribus ad bases longioribusque.

These plants are similar to those of var. *inuloides* in their phyllaries with a densely hirsute-pilose vestiture but consistently different in their complete lack of purple coloration and the longer nonglandular trichomes with thinner bases. Intermediates between the two taxa occur in northern Puebla and along the adjacent border with Veracruz. Chromosome number, $n=9$ pairs.



Map 1. Geographic distribution of the taxa of *Heterotheca* sect. *Heterotheca* in México.

Veracruz, Puebla, Oaxaca; openings in oak-juniper and pine-oak woodlands, roadsides and other disturbed sites; 1550-2300 m; June-November (-February).

Representative collections examined: MÉXICO. Oaxaca: Valley of Oaxaca, 19 Apr 1896, *Conzatti 125* (GH); Km 58 S of Oaxaca on road to Puerto Escondido, 14 Aug 1975, *Davidse 9623* (LL); between Oaxaca and Puerto Escondido, 8 km S of Sola de Vega, 25 Jun 1986, *Diggs, et al. 4005* (NY); 20 mi S of Nochixtlan along rte 190, 1 Feb 1960, *King 2515* (TEX) (voucher for chromosome count of n=9, as annotated by Ellison, apparently previously unreported); ca. 40 mi SE of Oaxaca, 15 Jun 1960, *King 2897* (TEX) (voucher for chromosome count of n=9 pairs [Turner, *et al.* 1961]); 15 km SE of Miahuatlán, 6 Jul 1969, *Marcks & Marcks 1048* (LL); 19 mi W of Oaxaca along rte 190, 15 Aug 1961, *Powell & Edmondson 703* (TEX); 11 km N of Ixtlan, 17 Sep 1965, *Roe & Roe 1989* (LL); 33 km NE of Cuajimoloyas, 14 May 1983, *Torres 2891* (TEX). Puebla: Supercarretera México-Puebla, 24 Apr 1966, *Boege 66* (GH); Orizaba, 1829, *Botteri 799* (GH); 1 mi E of Hwy 125, N of San Salvador on road to Tlachichuca, 7 Jun 1983, *Dorr 2673* (TEX); 5 mi E of Tlahuapan along rte 190, 24 Jan 1960, *King 2236* (TEX); W of San Martín Texmelucan, 1 Aug 1953, *Manning & Manning 53689* (GH); 3 km E of center of San Nicolas Buenos Aires, 7 Sep 1986, *Nee & Soule 33040* (TEX). Veracruz: S of Totalco, 27 Aug 1968, *Ramos 269* (GH).

3. *HETEROTHECA LEPTOGLOSSA* DC.

Heterotheca leptoglossa DC., *Prodr.* 5:317. 1836. TYPE: MÉXICO. [Edo.] Guanajuato: León to Guanajuato, 1827, *Mendez s.n.* (HOLOTYPE: G-DC fiche!; Isotype: GH).

Perennials. Phyllaries linear-lanceolate, 0.5-0.7(-1.0) mm wide, the innermost 9-11 mm long, without scarious margins, purple at the very apices, nearly eglandular to sparsely sessile glandular or the glands short stipitate near the phyllary apex, sparsely strigose in the midregion with appressed to appressed ascending nonglandular hairs. Ray achenes commonly minutely strigose on the angles and faces, sometimes hairy only on the angles or still less commonly completely glabrous; outer pappus of strongly developed, lanceolate scales. Chromosome number, n=9 pairs (reported as *Heterotheca inuloides* by Turner & Johnston 1961).

Zacatecas, Aguascalientes, San Luis Potosí, Jalisco, Guanajuato, Querétaro; roadsides and other disturbed sites, brushlands; 1750-2350 m; July-December (-January).

Heterotheca leptoglossa was recognized by Wagenknecht (1960) as a distinct species, but he cited only two collections (other than the type) from the geographical area of the species as recognized here. He added, however,

citations of other collections from Chihuahua, Sinaloa, and Sonora, all recognized here as *H. subaxillaris* (Map 1, region "a"). McVaugh (1984) included *H. leptoglossa* within his concept of *H. inuloides* var. *rosei*.

This taxon might reasonably be considered as a fourth variety of *Heterotheca inuloides*, but it appears to be genetically isolated from both var. *inuloides* and var. *rosei*. The former is mostly contiguous with it in geographic range and the latter is partially sympatric (Map 1). *Heterotheca leptoglossa* is more similar to var. *rosei* in its very sparsely hairy phyllaries, but the former differs in its more strongly woody taproots (and presumably longer duration) and phyllaries that are purple tipped and less densely glandular with relatively thin stiped glands. Further, the nonglandular hairs are usually appressed in orientation, in contrast to the spreading-erect ones of var. *rosei*.

4. *HETEROTHECA SUBAXILLARIS* (Lam.) Britt. & Rusby

Heterotheca subaxillaris (Lam.) Britt. & Rusby, Trans. New York Acad. 7:10. 1887. BASIONYM: *Inula subaxillaris* Lam., *Encycl. Meth. Bot.* 3:259. 1789. TYPE: UNITED STATES. "Carolina," *D. Walter s.n.* (HOLOTYPE: P, not seen).

Heterotheca chrysopsidis DC., *Prodr.* 5:317. 1836. TYPE: MÉXICO. [Coahuila]: Saltillo, Jan 1828, *Berlandier 1830* [*109*] (HOLOTYPE: G-DC fiche!; Isotypes: F!, GH, NY, PH).

Heterotheca latifolia Buckl., Proc. Acad. Nat. Sci. Philadelphia 13:459. 1862. TYPE: UNITED STATES. Texas: Llano Co., *S.B. Buckley s.n.* (PH, not seen). *Heterotheca subaxillaris* (Lam.) Britt. & Rusby var. *latifolia* (Buckl.) Gandhi & Thomas, Sida, Bot. Misc. 4:110. 1989.

Heterotheca latifolia Buckl. var. *arkansana* Wagenk., Rhodora 62:105. 1960. TYPE: UNITED STATES. Arkansas: Logan Co., Magazine Mountain, 10 Sep 1930, *D.M. Moore 30142* (HOLOTYPE: TEX!).

Heterotheca latifolia Buckl. var. *macgregoris* Wagenk., Rhodora 62:103. 1960. TYPE: UNITED STATES. Kansas: Morton Co., 9 mi N of Elkhart, bluffs along Cimmaron River, dry sandy prairie, 27 Aug 1951, *R.L. McGregor 5163* (HOLOTYPE: KANU!).

Heterotheca psammophila Wagenk., Rhodora 62:76. 1960. TYPE: UNITED STATES. Arizona: Yavapai Co., 1 mi S of Sedona, 23 Aug 1957, *B.L. Wagenknecht 4824* (HOLOTYPE: KANU not seen).

Heterotheca subaxillaris (Lam.) Britt. & Rusby var. *petiolaris* Benke, Rhodora 30:201. 1928. TYPE: UNITED STATES. Texas: [Galveston Co.], Galveston, 12 Mar 1928, *H.C. Benke 4585* (HOLOTYPE: F!).

Heterotheca subaxillaris (Lam.) Britt. & Rusby var. *procumbens* Wagenk., Rhodora 62:75. 1960. TYPE. UNITED STATES. Alabama: Mobile Co., flattish dunes, ca. 1 mi SW of Dauphin Island Post Office, *R.M. Harper 3801* (HOLOTYPE: GH; Isotypes: F!, NY, PH, US).

Annuals to short lived perennials. Upper cauline leaves ovate lanceolate to oblong, with a sessile or subsessile, commonly cordate, subclasping base, but sometimes not at all clasping. Phyllaries lanceolate, the innermost 5-8(-9) mm long, purple at the apices or without purple pigments, sparsely to densely glandular, usually sparsely to moderately invested with nonglandular trichomes but sometimes only glandular. Ray achenes usually completely glabrous, rarely slightly and minutely strigose on the angles; outer pappus of strongly developed, lanceolate scales. Chromosome number, n=9 pairs.

Sonora, Chihuahua, Sinaloa, Coahuila, Nuevo León, Tamaulipas, San Luis Potosí, Veracruz, widely distributed from coast to coast in the United States, primarily in the southern half of the country; in a variety of habitats, often disturbed, from beach dunes to *Larrea* desert to pine woodlands; (0-)1200-2500 m; July-December(-February).

Within what is considered here as a single, variable species, Wagenknecht (1960) treated *Heterotheca subaxillaris* (with 2 varieties), *H. latifolia* Buckl. (with 3 varieties), *H. psammophila* Wagenk., and *H. chrysopsidis* DC. Before that, Shinners (1951) had accepted *H. latifolia* as a good taxon with the caveat that it was probably only varietally distinct from *H. subaxillaris*, "the southeastern representative of this species." The status of the Mexican *H. chrysopsidis* had never been evaluated, and *H. psammophila* had not previously been recognized. Characters used to delimit these taxa have included duration (as surmised from the taproot thickness), plant height, stem width, length of trichomes on the stems and leaves, petiole length of lower cauline leaves, size, shape, and insertion of upper cauline leaves, toothing of leaf margins, shape of the capitulescence, head size (including phyllary, disc corolla, and pappus length), degree of investment of phyllaries with glandular and nonglandular trichomes, and the pattern of pigmentation in the phyllaries.

Attempts to characterize taxa at any level within the *Heterotheca subaxillaris* complex must be based on the supposition that geographic patterns can be identified, but among what seem to be shifting and variable constellations of morphological features, I have not been able to discover patterns that would allow a consistent application of names at even varietal rank. Harms (1968, p. 9) ventured that perhaps the "entire complex should still be accepted as a single, polymorphic, polytypic species," and Cronquist (1980) apparently took the same conservative view as presented in the present study, although he did not list synonyms of what he considered to be the widespread *H. subaxillaris*. Geographic trends can be observed in this species, and plants can often be

identified as having originated in certain geographic areas, but in my opinion, plants occurring in broad areas of intergradation are significantly more numerous than those that have been given names and that are said to have a distinctive combination of traits. In this, my view seems to be very near that of Semple (1990, p. 226) with regard to plants of certain species of sect. *Phyllotheca*, who regards them as "morphotypes," " ... sometimes semidistinct regional 'races' that grade into each other to such an extent that continued recognition cannot be justified ...." Whoever may choose to recognize segregate taxa within the *H. subaxillaris* complex will be challenged to present more than simple diagnoses and taxonomic combinations to justify their decisions.

What has been considered typical *Heterotheca subaxillaris* (var. *subaxillaris* or var. *procumbens*) occurs in sandy habitats along the coast of the eastern United States to central México. These plants are said to be distinguished from *H. latifolia* by their procumbent or at least less than erect habit, merely scabrous stems and leaves, thicker leaves, and more densely hirsute-villous hairs on the phyllaries. Nearly identical plants, however, are found in sandy habitats far inland within the range of *H. latifolia*, and plants with none of the putatively diagnostic features of typical *H. subaxillaris* are commonly collected in coastal and near coastal sites. Further, Burk (1961), in a study apparently little appreciated by some systematists, demonstrated that plants of *H. subaxillaris* are phenotypically highly plastic in features of habit, vestiture, and leaf morphology. He transplanted sets of North Carolina plants from a barrier island (var. *procumbens*) and from an inland habitat (*H. latifolia*) to a common garden on the piedmont, where they "developed into virtually identical sets of plants." Using cloned individuals, he also observed that vestiture was significantly modified depending on the season and whether the plants were grown in a greenhouse or outdoors. Burk concluded that it was preferable to "retain the former concept of *H. subaxillaris* as a single, highly variable species." Harms (1965a) also documented the ease of environmental modification among plants of *H. subaxillaris*.

Harms (1965a, 1968) noted that he was able to distinguish *Heterotheca latifolia* var. *macgregoris* Wagenk. but that he could not separate it from var. *arkansana* Wagenk. Wagenknecht (1960) separated both of the latter two varieties from typical *H. latifolia* on the basis of their putatively more pilose or velutinous upper leaf surfaces, but I cannot confirm the existence of any morphological features or geographic localization consistent enough to warrant the formal recognition of either taxon. Hatch, *et al.* (1990) have listed (without comment) both var. *arkansana* and var. *macgregoris* as synonyms of var. *latifolia*.

Heterotheca subaxillaris var. *petiolaris* Benke has been considered a synonym of typical *H. subaxillaris* (Burk 1961) and of *H. latifolia* (Wagenknecht 1960). But plants similar to the type of var. *petiolaris* with particularly long petioles and narrowly oblong-lanceolate blades (basal and lower cauline leaves)

are common from Galveston County, Texas, into Tamaulipas of northeastern México and appear to represent a morphotype outside of both *H. subaxillaris* and *H. latifolia*, as conceived of by Wagenknecht. In any case, "var. *petiolaris*" intergrades with other morphotypes of the same region and cannot be consistently distinguished from them.

As noted by Wagenknecht, plants of *Heterotheca chrysopsidis* (from southern Coahuila and adjacent Nuevo León) are slightly longer lived, shorter in stature, have petiolate, prominently thickened (much like coastal variants) leaves with broadly ovate blades, and the pappus tends to be deep reddish brown. These features are most pronounced in plants from the gypseous areas of Nuevo León. Nevertheless, I have found it impossible to regard these traits as anything but tendencies, since many plants from the same area are identical with those that are common in central Texas, and the distinctive traits disappear gradually northward through Coahuila.

Heterotheca psammophila was recognized by Wagenknecht from Arizona, southwestern New Mexico, trans-Pecos Texas, and northern México as a taxon with particularly large leaves, large heads, and highly glandular phyllaries. The plants do seem to have consistently larger leaves, but plants with similar leaves grade eastward across a wide area and sometimes appear in populations of central Texas, Oklahoma, and Kansas. Further, in Arizona and western New Mexico, while some individuals produce heads that are among the largest in the species (innermost phyllaries 7-9 mm long), other large leaved plants in the same area commonly produce small heads (innermost phyllaries 5-7 mm long). There is no consistent distinction in the degree of glandularity, and in the United States, no consistency in the presence or absence of nonglandular hairs.

In contrast, there does appear to be a degree of isolation between two weakly differentiated "morphotypes" of *Heterotheca subaxillaris* in the mountains of northwestern México. Indeed, this is the only "real" boundary I have been able to discover in the *H. subaxillaris* complex. Plants of region "a" (Map 1) have phyllaries with purple tips, without non-glandular hairs, and the innermost are 6-8(-9) mm long. To the east in central Chihuahua (region "b"), the phyllaries usually lack purple tips, almost always produce nonglandular hairs, and the innermost are 5-6 (-7) mm long. The plants of region "a" might justifiably be regarded as a separate variety, presumably corresponding to *H. psammophila*, were it not for the apparent complete intergradation in Arizona of these "*psammophila*-like" plants with more typical *H. subaxillaris*.

The occurrence of dense glandularity and relatively large heads in the western part of the range of *Heterotheca subaxillaris* prompts the speculation that these features may have appeared in response to the input of genes from *H. grandiflora*.

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TWO NEW SPECIES OF *VERBESINA* (ASTERACEAE, HELIANTHEAE) FROM THE STATES OF JALISCO AND GUERRERO, MÉXICO

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ABSTRACT

Verbesina platanara *spec. nov.* and **Verbesina teotepecana** *spec. nov.*, new species from the states of Jalisco and Guerrero, respectively, are described. The former is seemingly related to *V. culminicola* McVaugh, but the latter apparently has no close relatives.

KEY WORDS: Asteraceae, *Verbesina*, México

Routine identification of Mexican Asteraceae has revealed the following novelties in the genus *Verbesina*.

Verbesina platanara B. Turner, *spec. nov.* TYPE: MÉXICO. Jalisco: Mpio. de San Martín Bolanos, Las Treinta Vueltas, 10 km al NW de El Platanar, 2200 m, *J. Rzedowski 26229* (HOLOTYPE: MICH!).

Verbesinae culminicolae McVaugh similis sed differt caulibus sine alis, capitulis majoribus ligulis longioribus, et acheniis sine pappo.

Shrubs to 1.5 m high. Stems strigulose, wingless, glabrate with age. Leaves alternate, simple, crowded along the upper nodes, lanceolate to oblanceolate, 10-14 cm long, 1.5-3.0 cm wide, about equally tapering at both ends, sparsely hispidulous to nearly glabrate, the margins remotely serratulate to nearly entire. Head about 25 mm across the extended rays, single and axillary, the peduncle ca. 6 cm long. Involucres ca. 4 mm high, the bracts 2-3 seriate, grading into the obovate receptacular bracts. Ray florets ca. 11, pistillate, the ligules yellow, ca. 1 cm long, ca. 4 mm wide. Disk florets numerous (50+), the corollas yellow, ca. 3.5 mm long, the tube densely pubescent, ca. 1 mm long. Achenes (immature) ca. 3 mm long, 1.5 mm wide, sparsely pubescent, epappose.

The species is apparently most closely related to *Verbesina culminicola* McVaugh on characters of the head and corolla, but differs in having wingless stems, larger heads borne singly in the leaf axils, and epappose achenes.

Verbesina teotepecana B. Turner, *spec. nov.* TYPE: MÉXICO. Guerrero: Mpio. Tlacotepec, Cerro Teotepec, pine-fir forests, 3300 m, 11 Apr 1963, *J. Rzedowski 16500* (HOLOTYPE: MICH!).

Frutices usque ad 2.5 alti. Folia opposita sessilia lanceolata ac auriculata. Caules teretes dense glandulosi-pubescentes sine alis. Capitula radiata ac hemisphaerica, discus ca. 2 mm lati; involucra 10-12 mm alta, bracteae 2-4 seriatae lineari-lanceolatae apicibus acutis. Flosculi disci numerosi (100+), corollis luteis ca. 6 mm longis. Achenia ca. 4 mm longa, pappus aristis 2 cito deciduis 3-4 longis contans.

Shrub to 1.5 m high. Stems terete, densely glandular pubescent. Leaves 12-15 cm long, 3-4 cm wide, sessile, auriculate at the base, the apices gradually and narrowly acute, densely glandular pubescent on both surfaces. Heads hemispheric, radiate, ca. 18, borne terminal in a rounded capitulescence, not much exceeding the leaves, if at all. Involucres 10-12 mm high, ca. 2 cm across, the bracts black, linear-lanceolate, glandular pubescent. Ray florets 15-21, pistillate, the ligules 6-8 mm long, 3-5 mm wide, yellow. Disk florets numerous, the corollas ca. 6 mm long, yellow, the tube ca. 1.5 mm long, the throat tubular, ca. 3.5 mm long. Achenes about 4 mm long, narrowly alate, the pappus of 2 awns 2-3 mm long.

The opposite sessile auriculate leaves, large heads and densely glandular pubescent foliage readily distinguish this taxon. It has no close relative among the species of *Verbesina* known to me.

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TWO NEW SPECIES OF *PERITYLE* (ASTERACEAE, HELENIEAE) FROM MÉXICO

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ABSTRACT

Two new species of *Perityle* belonging to the section *Perityle* are described: **P. pennellii** *spec. nov.*, from Cerro Mercado, near Cd. Durango, Durango and **P. stevensii** *spec. nov.* from near Emcosa, Sinaloa. Both species have white rays and yellow disks and are believed to relate to *P. hofmeisteria* Rydb. and several other taxa of northwestern México with similar characteristics. A brief key and map to these taxa are provided.

KEY WORDS: *Perityle*, Asteraceae, Helenieae, México

Preparation of a treatment of *Perityle* for the Asteraceae of México has revealed the following novelties belonging to the section *Perityle* (sensu Powell, 1974; Rhodora 76:229-306).

Perityle pennellii B. Turner, *spec. nov.* TYPE: MÉXICO. Durango: Cerro de Mercado, N of Cd. Durango, crevices of ferruginous rocks, 2000-2100 m, 24-25 Aug 1934, *Frances W. Pennell 18160* (HOLOTYPE: NY!).

Perityle canescenti Everly similis sed differt foliis simplicibus (vs. tripartitis) peranguste spathulatis differt.

Small suffruticose perennials 3-10 cm high; stems hispid-puberulous; leaves mostly 8-10 mm long, 1-3 mm wide; petioles mostly 4-6 mm long; blades ovate to elliptic, 2-4 mm long, 2-3 mm wide, sparsely hispid, glandular punctate, the margins entire, or rarely faintly 3 lobed; involucral bracts ca. 15, 4-5 mm high, sparsely puberulent, the apices acute; heads single on hispidulous peduncles 10-20 mm long; ray florets 5-8, the ligules 2-4 mm long, white; disk florets ca. 25, yellow, the corollas tubular, ca. 3 mm long, the lower portion glandular pubescent; achenes ca. 2.5 mm long with margins callous thickened, ciliate with

long hairs, the pappus of 2-3 rather persistent bristles 2-3 mm long, between these a crown of slender scales ca. 0.3 mm high.

Powell (1974) recognized four species of the sect. *Perityle* with white rays, yellow disks, and having large achenes (1.8-3.5 mm long) with prominent pappus bristles (1.5-3.0 mm long). These are: 1) *P. ciliata* (Dewey) Rydb. (known only from Arizona, U.S.A.); 2) *P. canescens* Everly, a taxon with 3 partite leaves with linear segments (known only from Sinaloa, Sierra Tacuichamona); 3) *P. coronopifolia* A. Gray, also with 3 partite leaves, but the achenes having margins with long-ciliate hairs as opposed to the merely puberulent margins in *P. ciliata* (known only from Arizona, U.S.A.); and 4) *P. hofmeisteria* Rydb., with leaves 10-60 mm long, 2-20 mm wide, the blades broadly ovate to flabellate in outline, with margins deeply lobed to serrate, the heads ca. 8 mm high (known only by a few collections from near Cd. Durango and in the vicinity of Rodeo, Durango).

Among the Mexican species described to date, *Perityle pennellii* is closest to *P. canescens*; it differs from the latter in possessing much smaller leaves which are very narrowly spatulate with essentially entire margins.

The distribution of the Mexican taxa which make up the above mentioned complex is shown in Figure 1. It is likely that additional taxa will come to the fore as the bluffs and ledges of northwestern México are more thoroughly explored.

Perityle stevensii B. Turner, *spec. nov.* TYPE: MÉXICO. Sinaloa: Mpio. San Ignacio, ca. 2.6 mi from Hwy 15 along road to microwave tower, ca. 17 mi SE of Emcosa, 10 Sep 1973, *Warren Douglas Stevens 2040* (and Mary Fairhurst) (HOLOTYPE: TEX!; Isotype: MSU).

Peritylae hofmeisteriae Rydb. similis sed differt foliis parvioribus magis conspicue glandulosi-punctatis petiolis brevioribus et acheniis setis pappi magis facile deciduis brevioribus (1.0-1.5 mm longis vs. 2-3 mm).

Suffruticose perennials 15-30 cm high; stems densely puberulent; leaves mostly 15-25 mm long, 8-15 mm wide; petioles 7-17 mm long; blades deltoid, irregularly crenulodentate, sparsely puberulent, glandular punctate on both surfaces; heads single on puberulent peduncles 10-25 mm long; involucral bracts 6-7 mm long, puberulent, the apices acute; ray florets ca. 11, the rays white, 2.5-3.5 mm long; disk florets ca. 40, the corollas yellow, ca. 3 mm long, atomiferous glandular; achenes (immature) ca. 2.5 mm long, sparsely setiferous, the pappus of 1 or 2 readily deciduous bristles 1.0-1.5 mm long, between these a short crown of scales ca. 0.2 mm high.

According to label data, the species is "common on steep rockface of roadcut, stems woody but extremely brittle, rays white, disc yellow."

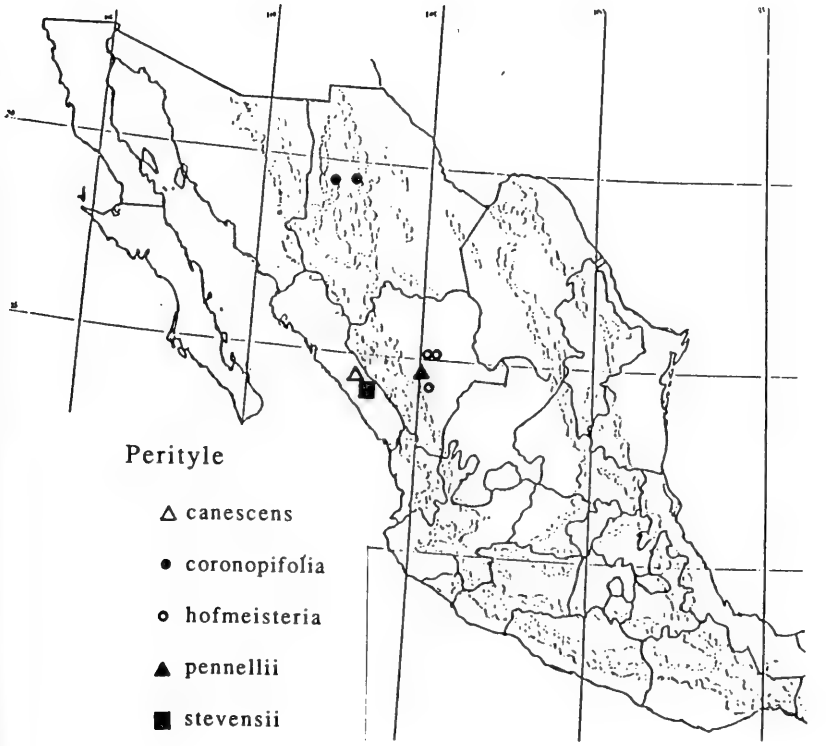

Fig. 1. Distribution of Perityle spp. discussed in text.

Dr. Stevens (pers. comm.) notes that the type was collected on a side road leading to Baila and Cerro de Culagua, which is about 79.5 road miles N of Mazatlán; it was identified by John Strother as *Perityle gentryi* A.M. Powell, but the latter species belongs to the section *Laphamia* and is markedly different from *P. stevensii*.

Perityle stevensii is apparently most closely related to *P. hofmeisteria*, which is discussed under the above species. It differs from that taxon in having smaller, less deeply lobed, leaves with mostly shorter petioles. In addition, the pappus bristles are shorter (1.0-1.5 mm long vs. 2-3 mm) and readily deciduous. It is possible that *P. stevensii* will be found to have achenes without callous-thickened margins; if so, the species will not readily relate to yet other Mexican taxa. The following key should help the interested worker in distinguishing among these taxa.

Key to the Mexican species of sect. *Perityle* having white rays, yellow disks and large achenes with callous-thickened margins:

1. Achenes mostly 2.0-3.5 mm long; leaves simple; pappus bristles mostly 1.5-3.0 mm long, rarely shorter ..... (2)

1′ Achenes mostly 1.3-2.0 mm long; leaves tripartite, pappus bristles mostly 0.5-1.5 mm long ..... (4)

2. Leaves narrowly spatulate, 2-4 mm wide, 8-10 mm long *P. pennellii*

2′ Leaves not spatulate, much larger ..... (3)

3. Leaves densely glandular punctate; pappus bristles 1-2 mm long; Sinaloa ..... *P. stevensii*

3′ Leaves sparsely glandular punctate, if at all; pappus bristles 2-3 mm long; Durango ..... *P. hofmeisteria*

4. Heads 2-5, borne in clusters; achenes with margins long-ciliate ..... *P. coronopifolia*

4′ Heads solitary; achenes merely puberulent ..... *P. canescens*

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NOMENCLATURAL NOTES FOR THE NORTH AMERICAN FLORA. IV.

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ABSTRACT

The authorship of the following names is discussed: *Bouteloua gracilis* (Willd. *ex* Kunth) Lag. *ex* Griffiths, *Brachiaria platyphylla* (Munro *ex* Wright) Nash *in* Small, *Bromus unioloides* Kunth, *Dichanthelium linearifolium* (Scribn. *ex* Nash) Gould, *Echinochloa frumentacea* Link, *Setaria sphacelata* (Schumach.) Stapf & Hubbard, and *Sporobolus vaginiflorus* (Torr. *ex* A. Gray) Wood. *Aira elegantissima* Schur and *Hymenachne amplexicaulis* (Rudge) Nees are accepted to be correct names.

KEY WORDS: Floristics, Nomenclature, Poaceae, *Aira, Bouteloua, Brachiaria, Bromus, Dichanthelium, Echinochloa, Hymenachne, Setaria*, and *Sporobolus*.

Introduction

Continuing with the "Nomenclatural notes for the North American flora" (Kartesz & Gandhi 1989; 1990a; 1990b), a fourth note in the series is presented here, toward advancing our understanding of North American plant names.

POACEAE

Aira elegantissima Schur

The European weed, commonly known as annual silver hair grass, has been treated by many workers as *Aira elegans* Willd. *ex* Gaudin. Tutin (1980) accepted the name *A. elegantissima* Schur for this grass and in synonymy stated that *A. capillaris* Host (*non* Savi) and *A. elegans* Willd. *ex* Gaudin

were illegitimate names. However, he did not elaborate on the illegitimacy of the latter name.

While reviewing Gaudin's (1811) work, we found that he numbered each of his accepted taxa, which has historically been a common practice by various workers. In the last paragraph of the protologue of *Aira caryphyllea* L. (number 7), he included the name "*A. elegans* Willd. *ined.*" and provided a brief description. Since the name *A. elegans* was not separately numbered, its inclusion within the protologue of *A. caryphyllea* could be interpreted as being a described name in synonymy, a provisional name, or both (Greuter 1988, Art. 34.1). Hence, the status of none of these can be considered legitimate. Therefore, the name *A. elegantissima* is the oldest legitimate name for this species complex.

Aira elegantissima Schur, Verh. Mitt. Siebenb. Ver. Naturw. 4(Sert. Fl. Transs.):85. 1853.

Aira capillaris Host, Icon. Gram. Austr. 4:20, t. 35. 1809, *non* Savi, 1798.

Aira elegans Willd. *ex* Gaudin, *Agrost. Helv.* 1:130. 355. 1811 (*pro syn.* and/or provisional name), *nom. invalid.*

Bouteloua gracilis (Willd. *ex* Kunth) Lag. *ex* Griffiths

Some authors, such as Gould (1975) and McVaugh (1983), attribute the name *Bouteloua gracilis* to (Willd. *ex* Kunth) Lag. *ex* Steud. In Steudel (1840), synonyms are provided in italics. On p. 219, 12 species of *Bouteloua* are listed in italics (including "*B. gracilis* Lag."). For the preceding name, Steudel cited "*Chondrosium gracile* H.B." as the accepted name. [The correct authorship for the name *C. gracile* is: Willd. *ex* Kunth, which was based on Willdenow's manuscript name *Actinochloa gracilis*]. On p. 355, Steudel listed the names of *Chondrosium* species that he accepted and their synonyms, but for *C. gracile*, he did not cite *B. gracilis*. Nevertheless, since Steudel did not accept the name *B. gracilis*, he did not validate the new combination (Greuter 1988, Art. 34.1a). Griffiths, who also attributed the name to Lagasca, inadvertently validated the combination.

Bouteloua gracilis (Willd. *ex* Kunth) Lag. *ex* Griffiths, Contr. U.S. Natl. Herb. 14:375. 1912. BASIONYM: *Chondrosium gracile* Willd. *ex* Kunth, *Nov. Gen. et Sp.* 1:176. 1814. *Bouteloua gracilis* (Willd. *ex* Kunth) Lag. *ex* Steud., *Nom.*, ed. 2. 1:219. 1840, *pro syn.*

Brachiaria platyphylla (Munro *ex* Wright) Nash *in* Small

Webster (1988, p. 606) concluded that "combining *Urochloa* and *Brachiaria*, excluding the type [of *Brachiaria*], is morphologically justified and taxonomically necessary." He made four new combinations in *Urochloa*. However, we consider *Brachiaria* as distinct from *Urochloa*.

The combinations *Panicum platyphyllum* (Griseb.) Munro *ex* Wright (1871), *Brachiaria platyphylla* (Griseb.) Nash, and *Urochloa platyphylla* (Griseb.) Webster were based on *Paspalum platyphyllum* Griseb. Unfortunately, this basionym is a later homonym of *Panicum platyphyllum* J.A. Schultes (1827). Hence, Grisebach must not be cited as the parenthetical author for these names. Wright's new combination should be treated as a *nomen novum*, without a parenthetical author (Greuter 1988, Art. 72.2, Note 1), and with its priority starting from 1871 (not from 1866). This name thus can serve as a basionym for *B. platyphylla* (Munro *ex* Wright) Nash and *U. platyphylla* (Munro *ex* Wright) Webster. The correct nomenclature is given below.

Brachiaria platyphylla (Munro *ex* Wright) Nash *in* Small, *Fl. Southeast. U.S.* 81. 1903. BASIONYM: *Panicum platyphyllum* Munro *ex* Wright, Anal. Acad. Cienc. Habana 8:206. 1871. *Urochloa platyphylla* (Munro *ex* Wright) R. Webster, Syst. Bot. 13:606. 1988. *Paspalum platyphyllum* Griseb., *Cat. Pl. Cubensium* 230. 1866, *non* J.A. Schultes 1827.

Bromus

Bromus catharticus Vahl

Although the names *Bromus unioloides* Kunth (1815) and *Festuca unioloides* Willd. (1803) share specific epithets, they are based on different types, the former from Ecuador, the latter from Carolina. In conjunction with his description of *B. unioloides*, Kunth did not cite Willdenow either directly or indirectly. For his *B. unioloides*, Kunth (1829) cited *Schenodorus unioloides* Roem. & Schult. (1817) in synonymy. Moreover, Kunth considered Willdenow's *F. unioloides* to be a different species, and in transferring it to *Bromus*, named it *B. willdenowii* Kunth (1829), citing *F. unioloides* and *Ceratochloa unioloides* (Willd.) P. Beauv. (1812) in synonymy. Some authors, such as Gould (1975), include the parenthetical author for *B. unioloides*, which is incorrect, whereas the author citation used by Hitchcock & Chase (1951, p. 833) and McVaugh (1983) is correct. We provide the following nomenclatural summary.

Bromus catharticus Vahl, Symb. Bot. 2:22. 1791.

Festuca unioloides Willd., *Hort. Berol.* 3, t. 3. 1803. *Ceratochloa unioloides* (Willd.) P. Beauv., *Ess. Agrost.* 75, t. 15, f. 7. 1812. *Bromus unioloides* (Willd.) Raspail, Ann. Sci. Nat. Bot. 5:439. 1825, *non* Kunth 1815. *Bromus willdenowii* Kunth, *Rev. Gramin.* 1:134. 1829.

Bromus unioloides Kunth in H.B.K., *Nov. Gen. Sp.* 1:151. 1815. *Schenodorus unioloides* (Kunth in H.B.K.) Roem. & Schult., *Syst. Veg.* 2:708. 1817. *Zerna unioloides* (Kunth in H.B.K.) Lindm., *Svensk Fanerogamfl.* 101. 1918.

Dichanthelium linearifolium (Scribn. *ex* Nash) Gould

Gould (1974) based his new combination *Dichanthelium linearifolium* on *Panicum linearifolium* "Scribn.," which was proposed in an appendix given in volume 3 of Britton & Brown (1898). The basionym authorship is discussed below.

The first edition of Britton and Brown's *Ill. Fl. N. U.S.* was issued in three volumes, with volume 1 in 1896 and volume 3 in 1898. The grass family was treated in vol. 1, in which (p. 94) Britton indicated in a footnote that the grass text was elaborated with the assistance of G.V. Nash. In his introduction to the second edition, Britton (in Britton & Brown 1913, p. XIII) explicitly stated that the "text of the grass family has been written by Mr. George V. Nash for both editions." Hence, all new names of grasses found in those editions must be attributed to Nash.

Britton (Britton & Brown 1898) stated that the appendix in volume 3 included "new discoveries or new determinations, mostly from the west, made while the work has been in press." Although the name *Panicum linearifolium* was attributed to Scribner, there was no indication that it was a new species nor that the text was from Scribner. The distribution was given as "New York, and New Jersey to Missouri." Thus, this was not one of the new species from the west, but a new determination. Had Nash mentioned this new species as "*P. linearifolium* Scribner, *sp. nov.*" (instead of "*P. linearifolium* Scribner"), we would accept Scribner to be the author of this species, but that was not the case. It was most likely that Scribner provided the material and epithet for this name. We conclude that the authorship of *P. linearifolium* should be: Scribn. *ex* Nash, and provide the following nomenclatural summary.

Dichanthelium linearifolium (Scribn. *ex* Nash) Gould, Brittonia 26:60. 1974. BASIONYM: *Panicum linearifolium* Scribn. *ex* Nash *in* Britton & Brown, *Ill. Fl. N. U.S.* 3:500. 1898.

Echinochloa frumentacea Link

The combinations *Echinochloa frumentacea* Link (1827), *Oplismenus frumentaceus* Kunth (1829), *Panicum crusgalli* L. var. *frumentaceum* Trimen (1885), and *E. crusgalli* (L.) P. Beauv. var. *frumentacea* Wight (1909) are presumed to have been based on *P. frumentaceum* Roxb. (1820), which is a later homonym of *P. frumentaceum* Salisbury (1796). Although the latter name is superfluous, and thus illegitimate (Salisbury cited *Holcus sorghum* L. in synonymy), *P. frumentaceum* Roxb. must be rejected as a later homonym (Greuter 1988, Art. 64.1, Note 1) and cannot serve as a basionym. Link's new combination must be considered as a *nomen novum* (Greuter 1988, Art. 72.2, Note 1), with priority from 1827 (not from 1820). The combination *E. frumentacea* Link can serve as a basionym for Kunth's and Trimen's combinations. We provide the following nomenclatural summary.

Echinochloa frumentacea Link, *Hort. Berol.* 1:204. 1827. *Oplismenus frumentaceus* (Link) Kunth, *Rev. Gram.* 1:445. 1829. *Panicum crusgalli* L. var. *frumentaceum* (Link) Trimen, *Syst. Cat. Fl. Pl. Ceylon* 104. 1885. *Echinochloa crusgalli* (L.) P. Beauv. var. *frumentacea* (Link) W. Wight, *Cent. Dict. Sup.* 810. 1909. *Panicum frumentaceum* Roxb., *Fl. Ind.* 1:307. 1820, *non* Salisb. 1796.

Elymus alaskanus (Scribn. & Merr.) Löve ssp. *latiglumis* (Scribn. & J.G. Smith) Löve

The subspecific new combination *Elymus trachycaulus* (Link) Gould *ex* Shinners ssp. *latiglumis* (Scribn. & J.G. Smith) Barkworth & D.R. Dewey (Great Basin Naturalist 43:562. 1983) was not validly made, because of the lack of citation of the basionym and a full and direct reference to its author and place of valid publication with page and date (Greuter 1988, Art. 33.2). Hence, to date, the above new combination remains invalid.

Barkworth (pers. comm.) informed us that although she was aware of the nomenclatural problem, she does not intend to correct it, since she presently prefers to follow Löve's treatment of this taxon (given below).

Elymus alaskanus (Scribn. & Merr.) Löve ssp. *latiglumis* (Scribn. & J.G. Smith) Löve, Taxon 29:166. 1980. BASIONYM: *Agropyron violaceum* (Hornem.) Lange var. *latiglume* Scribn. & J.G. Smith, U.S.D.A., Div. Agrost. Bull. 4:30. 1897. *Elymus trachycaulus* (Link) Gould *ex* Shinners ssp. *latiglumis* (Scribn. & J.G. Smith) Barkworth & D.R. Dewey, *nom. invalid.*

Hymenachne amplexicaulis (Rudge) Nees

The genus *Hymenachne* consists of eight species (*fide* Webster 1987). The species *H. amplexicaulis* (Rudge) Nees (1829), a native of the West Indies, is reported from Florida. This species was based on *Panicum amplexicaule* Rudge (1805). Hsu (1978) treated *H. amplexicaulis* as a synonym of *H. pseudointerrupta* C. Muell. (Bot. Zeit. 19:333. 1861), giving the range of this grass as "Assam, Burma, Malaya to Indo-China, China and Polynesia." Webster treated both *H. amplexicaulis* and *H. pseudointerrupta* as synonyms of *H. acutigluma* (Steud.) Gilliland (Gard. Bull. Singapore 20:314. 1964), with the latter name being based on *P. acutigluma* Steud. (1854). Webster commented that *H. acutigluma* is a native of Australia. In researching this problem, we found that the oldest name in this complex is *P. amplexicaule*. Hsu and Webster gave no reasons for rejecting this name and inexplicably accepting a later name.

Bor (1960) remarked that the grass in Assam (India), known as *Hymenachne amplexicaulis*, is distinct from the American *H. amplexicaulis*. He assigned the Indian element to *H. pseudointerrupta*. Koyama (1987) essentially followed Bor in accepting the name *H. pseudointerrupta* for a Japanese species and considered (p. 510) the name *H. amplexicaulis* to be misapplied to a grass in SE Asia.

We accept Bor's and Koyama's interpretation that the American element *Hymenachne amplexicaulis* is distinct from the SE Asian *Hymenachne*. Accordingly, we conclude that *H. amplexicaulis* is the correct name for the New World *Hymenachne*. If *H. acutigluma* and *H. pseudointerrupta* are conspecific (as indicated by Webster), then *H. acutigluma* has priority over *H. pseudointerrupta*. Both Hsu and Webster were correct at the time of their publications; the former choosing the name *H. pseudointerrupta*; the latter choosing the name *H. acutigluma*. However, both authors erred in citing *H. amplexicaulis* as a synonym of their respective combinations. For the American element, the correct nomenclature is given below:

Hymenachne amplexicaulis (Rudge) Nees, *Agros. Bras.* 276. 1829. BASIONYM: Panicum amplexicaule Rudge, *Pl. Guian.* vol. 1:21. 1805. Non *Hymenachne amplexicaule* sensu Hsu or Webster.

Setaria sphacelata (Schumach.) Stapf & Hubbard

The tropical African grass *Setaria sphacelata* has become naturalized in California and elsewhere in the U.S.A. The name has been attributed to "Stapf & Hubbard" (Chipp 1929), to "Stapf & Hubbard *ex* Moss" (Stapf & Hubbard

1930), to "(Schumach.) Stapf & Hubb. *ex* Moss" (Clayton 1966), to "(Schumach.) Moss" (Clayton 1972, 1979; Clayton & Renvoize 1982; Webster 1987), or to "(Schumach.) Stapf & Hubb." (Hitchcock & Chase 1951; Munz 1968, p. 197 in supplement; Kartesz & Kartesz 1980).

The name first appeared in T.F. Chipp's (1929, pp. 184, 195) article on the Imatong Mountains of Sudan, where he stated (p. 195) "*Setaria sphacelata* Stapf & Hubbard. E. of Kippia, 9000 ft. A grass 3 ft. high, one of the commonest constituents of the mountain meadows. No. 98." The serial no. 98 refers to the collector's field number of the collections made in the Imatong Mountains (as per * mark note on p. 179). A section of Chipp's article (pp. 195-197) includes new species that were attributed to M.B. Moss, and with all newly described species provided with detailed descriptions. However, the species in question is not one of the new species. Hence, we speculate that Chipp did not consider this grass to be new. Attribution of the new species to Moss might have misled some authors, such as Clayton, to believe that Moss was the author of the combination *S. sphacelata*.

On p. 184 (Chipp 1929), the mention of this species name is a *nomen nudum* and does not constitute a valid publication (Greuter 1988, Art. 32.1; Rec. 50B). In the protologue given on p. 195, no basionym is mentioned and no reference is made to Schumacher, either directly or indirectly. If Chipp intended the name *Setaria sphacelata* to be a new combination authored by (Schumach.) Stapf & Hubb., the protologue does not meet the minimum requirement, *i.e.*, an indirect reference to Schumacher's *Panicum sphacelatum*, and therefore, Chipp cannot be credited with the new combination. Because of the ambiguity of the description given by Chipp (a 5 word description: "A grass 3 ft. high"), the alternative possibility of considering the name as *sp. nov.* is also eliminated.

In light of the above analysis, we believe that the name *Setaria sphacelata* does not have valid taxonomic and nomenclatural standing in Chipp's article. To our best knowledge, Stapf & Hubbard (1930) used this name, attributing it to Stapf & Hubb. *ex* Moss, and cited the basionym (p. 796). Thus, the new combination (*S. sphacelata*) was not made in Chipp's article, but made by Stapf & Hubbard. Accordingly, the correct authority for *S. sphacelata* is: (Schumach.) Stapf & Hubbard (as given by Hitchcock & Chase, Munz, and Kartesz & Kartesz).

Sporobolus vaginiflorus (Torr. *ex* A. Gray) Wood

In 1861, Wood proposed the combination *Sporobolus vaginiflorus* and attributed the species epithet to Torrey. He also cited the following references: "*Agrostis* Muhl., *Crypsis* Nutt." Wood's combination has historically been presumed to be based on *Vilfa vaginiflora* Torrey. We came across discrepancies

on the authorship of both the basionym and new combination. The following names are involved in the taxonomy and nomenclature of *S. vaginiflorus*:

Agrostis virginica L. 1753; Muhl. 1817; Torr. 1824.

Crypsis virginica (L.) Nutt. 1818.

Vilfa vaginiflora Torr. "*in*" A. Gray 1834; Torr. 1843.

Sporobolus vaginiflorus (Torr.) Wood.

In 1824, Torrey used the name *Agrostis virginica* L. for a northern U.S. plant; however, he later realized that true *A. virginica* was taxonomically different and more widespread than the northern plant. For the northern grass, which he called "*A. virginica* L.," Torrey excluded the Linnean type and provided a new name: *Vilfa vaginiflora*. This is evident from his 1843 treatment of *V. vaginiflora*. He also asserted that even Muhlenberg's "*A. virginica*" belongs in Torrey's *V. vaginiflora*. Torrey's description of the plant, along with Muhlenberg's, although given under a misapplied name (*i.e.*, *A. virginica*), clearly apply to *V. vaginiflora*. Since *V. vaginiflora* was not a new species, but rather a new name, no new description was necessary; a mere reference to either Muhlenberg's or Torrey's description was all that was required to validate the new name.

Between his 1824 and 1843 publications, Torrey had the name *Vilfa vaginiflora* in manuscript form. Prior to Torrey's 1843 publication of the name *V. vaginiflora*, Gray (1834) used the name and attributed it to Torrey. Gray indicated that it was Torrey's manuscript name. With reference to authorship of the name, there has been difference of opinion, with some workers (*e.g.*, Voss 1966) attributing it to Torrey and others (*e.g.*, Kartesz & Kartesz 1980) to Torr. *ex* A. Gray. Even Torrey cited the authorship as "Torr. *in* A. Gray" in his 1843 work. Voss argued that Gray published Torrey's label information of this name (*Vilfa vaginiflora* Torrey, *Synop. Flora*, ined. *Agrostis virginica* Muhl., *Gram.* p. 74, Torrey, *Flora*, v. 1, p. 89, *non* Elliott et Auct.). Voss further emphasized that Torrey's label information was sufficient to validate the name and that Gray's description was nonessential; hence, Torrey alone should be credited with authorship.

We assessed the problem to determine correct authorship. Although it is evident that Gray's description was nonessential to validate the name, it was Gray who actually published it. Whenever Gray used verbatim descriptions of others, he usually provided such descriptions in quotation. However, in this case, the description is not a critical issue. We believe that in order for Torrey to receive credit of authorship, Gray should have specifically stated that he published the name for Torrey; however this was not done. Mere attribution to Torrey alone does not justify authorship to Torrey. Such attributions to

manuscript authors were customary in the Torrey-Gray era. According to the present practice of the ICBN committee for Spermatophyta, nomenclatural decisions must be made on the published text (Taxon 33:300. 1984; on the authorship of the genus *Burtonia*: R. Brown vs. R. Brown *ex* Ait. f.). Hence we disagree with Voss and concur with Kartesz & Kartesz on the correct authorship being: Torr. *ex* A. Gray.

With reference to the authorship of the new combination (*Sporobolus vaginiflorus*), Soil Conservation Service (1982) gave the transfer authors as: Torr. *ex* Wood. As we indicated earlier, Wood attributed the name to Torrey and cited the references to *Agrostis* Muhl. and *Crypsis* Nutt. These two references must be construed as *Agrostis virginica* sensu Muhl. *non* L. and *Crypsis virginica* sensu Nutt. (non *A. virginica* L.). According to Greuter (1988), Art. 48.1, Wood excluded the Linnean material. Certainly, Wood was aware of Gray's publication, which excluded the Linnean material. Wood's reference to Torrey must be considered as an indirect reference to the basionym. This interpretation is based on Greuter (1988), Art. 32, Ex. 5. Hence, Wood is the sole transfer author for the combination *S. vaginiflorus* as indicated below:

Sporobolus vaginiflorus (Torr. *ex* A. Gray) Wood, *Class-book Bot.* 775. 1861. BASIONYM: *Vilfa vaginiflora* Torr. *ex* A. Gray, *Gram. & Cyp.* 1:3. 1834.

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