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NEW COMBINATIONS IN THE GENUS *VACHELLIA* (FABACEAE: MIMOSOIDEAE) FROM THE NEW WORLD.

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ABSTRACT

Based on the evidence that the genus *Acacia* s.l. is polyphyletic, morphological and genetic differences separating the subgenera of *Acacia s.l.*, along with the change to a new conserved type for the genus necessitate the following new combinations: *Vachellia acuifera* (Benth.) Seigler & Ebinger, *V. albicorticata* (Burkart) Seigler & Ebinger, *V. allenii* (D. H. Janzen) Seigler & Ebinger, *V. anagadensis* (Britton) Seigler & Ebinger, *V. aroma* (Gillies ex Hook. & Arn.) Seigler & Ebinger, *V. barahonensis* (Urb. & Ekman) Seigler & Ebinger, *V. belairioides* (Urb.) Seigler & Ebinger, *V. biaciculata* (S. Watson) Seigler & Ebinger, *V. bilimekii* (J. Macbr.) Seigler & Ebinger, *V. brandegeana* (I. M. Johnst.) Seigler & Ebinger, *V. bucheri* (Marie-Victorin) Seigler & Ebinger, *V. californica* (Brandegee) Seigler & Ebinger, *V. campechiana* (Mill.) Seigler & Ebinger, *V. campechiana* forma *houghii* (Britton & Rose) Seigler & Ebinger, *V. caurina* (Barneby & Zanoni) Seigler & Ebinger, *V. caven* (Molina) Seigler & Ebinger, *V.* X *cedilloi* (Rico Arce) Seigler & Ebinger, *V. chiapensis* (Saff.) Seigler & Ebinger, *V. choriophylla* (Benth.) Seigler & Ebinger, *V. collinsii* (Saff.) Seigler & Ebinger, *V. constricta* (Benth.) Seigler & Ebinger, *V. cookii* (Saff.) Seigler & Ebinger, *V. cornigera* (L.) Seigler & Ebinger, *V. cucuyo* (Barneby & Zanoni) Seigler & Ebinger, *V. curvifructa* (Burkart) Seigler & Ebinger, *V. daemon* (Ekman & Urb.) Seigler & Ebinger, V. *gentlei* (Standley) Seigler & Ebinger, *V.* X *gladiata* (Saff.) Seigler & Ebinger, V. *glandulifera* (S. Watson) Seigler & Ebinger, *V. globulifera* (Saff.) Seigler & Ebinger, *V. hindsii* (Benth.)

Seigler & Ebinger, *V. insulae-iacobi* (L. Riley) Seigler & Ebinger, *V. janzenii* (Ebinger & Seigler) Seigler & Ebinger, *V. macracantha* (Humb. & Bonpl. ex Willd.) Seigler & Ebinger, *V. mayana* (Lundell) Seigler & Ebinger, *V. melanoceras* (Beurl.) Seigler & Ebinger, *V. oviedoensis* (R. García & M. Mejía) Seigler & Ebinger, *V. pacensis* (Rudd & Carter) Seigler & Ebinger, *V. pennatula* (Schltdl. & Cham.) Seigler & Ebinger, *V. polypyrigenes* (Greenm.) Seigler & Ebinger, *V. pringlei* (Rose) Seigler & Ebinger, *V. rigidula* (Benth.) Seigler & Ebinger, *V. roigi* (León) Seigler & Ebinger, *V. rorudiana* (Christophersen) Seigler & Ebinger, *V. ruddiae* (D. H. Janzen) Seigler & Ebinger, *V. schaffneri* (S. Watson) Seigler & Ebinger, *V. schottii* (Torr.) Seigler & Ebinger, *V. sphaerocephala* (Schltdl. & Cham.) Seigler & Ebinger, *V.* X *standleyi* (Saff.) Seigler & Ebinger, *V. tortuosa* (L.) Seigler & Ebinger, *V. vernicosa* (Britton & Rose) Seigler & Ebinger, *V. villaregalis* (McVaugh) Seigler & Ebinger, and *V. zapaensis* (Urb. & Ekman) Seigler & Ebinger. The following new combinations and new statuses are also necessary: *V. aroma* var. *huarango* (Ruiz & J. Macbr.) Seigler & Ebinger, *V. bravoensis* (Isely) Seigler & Ebinger, *V. farnesiana* var. *minuta* (M. E. Jones) Seigler & Ebinger, *V. farnesiana* var. *pinetorum* (F. J. Herm.) Seigler & Ebinger, *V. guanacastensis* (Clarke, Seigler, & Ebinger) Seigler & Ebinger, and *V. pennatula* var. *parvicephala* (Seigler & Ebinger) Seigler & Ebinger. Two other species that we recognize had previously been transferred to the genus by others: *Vachellia astringens* (Gillies in Hook. et Arn.) Speg. and *V. farnesiana* (L.) Wight & Arn.

KEY WORDS *Acacia* sensu lato, Fabaceae, Mimosoideae, *Vachellia.*

Recent morphological and genetic studies have shown that the genus *Acacia* s.l. is polyphyletic. Also, there has been an accumulation of data derived from molecular studies that has led to a better understanding of the probable relationships within the genus *Acacia* s.l., as well as the position of the genus within the Mimosoideae (Maslin 1988, Chappill and Maslin 1995, Clarke et al. 2000, Maslin et al. 2000, 2003, Miller and Bayer 2000, 2001, 2003, Luckow et al. 2003, Miller et al. 2003, Murphy et al. 2003). These studies suggest that the genus *Acacia* s.l. should be separated into as many as five

genera. These genera, for the most part, correspond to the four currently recognized infrageneric taxa of *Acacia*, namely the former subgenus *Acacia,* subgenus *Aculeiferum* sect. *Aculeiferum* and sect. *Filicinae*, and subgenus *Phyllodineae*, and a small group of North and Central America species related to *Acacia coulteri* Benth.

The genus *Acacia* s.l., has recently been retypified as a result of endorsement of a proposal by Orchard and Maslin (2003); the type was changed from *Acacia nilotica* to *Acacia penninervis* (subgenus *Phyllodineae*) (McNeill, personal communication). The morphological and genetic differences separating the subgenera of *Acacia s.l.*, along with the change to a new type for the genus necessitate the following new combinations. The earliest valid name available for members of *Acacia* subgenus *Acacia* is *Vachellia* Wight & Arnott (1834). This name honors Reverend G. H. Vachell who collected extensively in China.

Of these five groups, the former subgenus *Acacia* (series Gummiferae) consists of approximately 163 species, 60 species in the Americas, 73 species in Africa, 36 species in Asia (including ca. 15 that are also found in Africa), and 9 species in Australia (Maslin et al., 2003; Orchard and Maslin, 2003; http://www.worldwidewattle.com). Members of this subgenus can be separated from other members of the genus *Acacia s.l.* by a combination of characters: the presence of stipular spines, the absence of prickles, the presence of an involucre on the peduncle, bipinnately compound leaves, colporate pollen apertures, pollen columellae, and the smooth pollen exine ornamentation. Descriptions of most New World species of this subgenus are available in publications completed by the authors and their students during the past 20 years (Clarke et al. 1989, 1990, 2006, Ebinger et al. 2000, 2002, Lee et al. 1989, Seigler and Ebinger 1988, 1995). Complete synonymies are provided below.

In accord with the ICBN and an anonymous editor, we are using variety for all subspecific categories (Turner and Nesom, 2000)

VACHELLIA Wight & Arn., Prodr. fl. Ind. orient. 1: 272. 1834. – TYPE: *Vachellia farnesiana* (L.) Wight & Arn., based on *Mimosa farnesiana* L.. Sp. Pl. 521. 1753.

VACHELLIA ACUIFERA (Benth.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia acuifera* Benth., London J. Bot. 1: 496. 1842. *Bahamia acuifera* (Benth.) Britton & Rose, N. Amer. Fl. 23: 86. 1928. – TYPE: BAHAMAS. *W. Swainson s.n.* (holotype: K).

Pithecellobium micrantha Benth., Trans. Linn. Soc. London 30: 589. 1875. *Cojoba micrantha* (Benth.) Britton & Rose, N. Amer. Fl. 23: 30. 1928. – TYPE: DOMINICAN REPUBLIC. Santo Domingo, 1852, *R. Schomburgk 149* (holotype: B, destroyed; isotypes: F fragment and photo, P, NY fragment). NOTE: For additional information, see Rico-Arce 1991 and Barneby 1992).

VACHELLIA ALBICORTICATA (Burkart) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia albicorticata* Burkart, Darwiniana 7: 504. 1947. – TYPE: ARGENTINA. SALTA: Tartagal, alt. 500 m, 29 Oct 1924, *R. Schreiter 3355* (holotype: SI; isotype: LIL).

VACHELLIA ALLENII (D. H. Janzen) Seigler & Ebinger, **comb. nov.** Basonym: *Acacia allenii* D.H. Janzen, Smithsonian Contr. Bot. 13: 53. 1974. – TYPE: COSTA RICA. PUNTARENAS: Osa Peninsula, bank of tributary of Río Agua Buena, 3.5 mi. SW of Rincón, 9 Mar 1967, *D. H. Janzen 1769* (holotype: US; isotypes: F, GH, K, MEXU, MICH, MO, NY, UC).

VACHELLIA ANEGADENSIS (Britton) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia anegadensis* Britton, Mem. New York Bot. Gard. 6: 572. 1916. *Fishlockia anegadensis* (Britton) Britton & Rose, N. Amer. Fl. 23: 91. 1928. – TYPE: BRITISH VIRGIN ISLANDS. Anegada, rocky plains, The Settlement, 19-20 Feb 1913, *N. L. Britton & W. C. Fishlock 990* (holotype: NY; isotypes: F, GH, NY, US).

VACHELLIA AROMA (Gillies ex Hook. & Arn.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia aroma* Gillies ex Hook. & Arn., Bot. Misc. 3: 206. 1833. *Acacia lutea* (Mill.) Britton var. *aroma* (Gillies ex Hook. & Arn.) Kuntze, Revis. gen. pl. 3(2): 47. 1898. *Vachellia lutea* (Mill.) Speg. var. *aroma* (Gillies ex Hook. & Arn.) Speg., Bol. Acad. Nac. Ci. Córdoba 26: 307. 1924. *Vachellia lutea* (Mill.) Speg. f. *aroma* (Gillies ex Hook. & Arn.) Speg., Bol. Acad. Nac. Ci. Córdoba 26: 313. 1924. – TYPE: ARGENTINA. a little way south of San Juan, Dec 1823, *J. Gillies s.n.* (holotype: K).

VACHELLIA AROMA (Gillies ex Hook. & Arn.) Seigler & Ebinger var. AROMA

Acacia moniliformis Griseb., Abh. Königl. Ges. Wiss. Göttingen 19: 136. 1874. *Acacia lutea* (Mill.) Britton var. *moniliformis* (Griseb.) Kuntze, Rev. gen. pl. 3(2): 47. 1898 (as *monoliformis*). *Vachellia lutea* (Mill.) Speg. var. *moniliformis* (Griseb.) Speg., Bol. Acad. Nac. Ci. Córdoba 26: 303. 1924. *Vachellia lutea* (Mill.) Speg. f. *moniliformis* (Griseb.) Speg., Bol. Acad. Nac. Ci. Córdoba 26: 312. 1924. – TYPE: ARGENTINA. TUCUMÁN: La Cruz, 20-24 Apr 1872, *T. G. Lorentz 190* (holotype: GOET).

Acacia michelii Rusby, Mem. Torrey Bot. Club 6: 28. 1896. – TYPE: BOLIVIA. vic. Cochabamba, 1891, *M. Bang 1095* (holotype: K; isotype: NY).

Acacia aroma Gillies ex Hook. & Arn. var. *cochlearis* Griseb., Abh. Königl. Ges. Wiss. Göttingen 24: 122. 1879. – TYPE: ARGENTINA. CÓRDOBA: north of San Javier, 18 Mar 1876, *T. G. Hieronymus 558* (holotype: GOET).

Vachellia lutea (Mill.) Speg. f. *oocephala* Speg., Bol. Acad. Nac. Ci. Córdoba 26: 312. 1924. – TYPE: none cited.

Vachellia lutea (Mill.) Speg. f. *thlipsacantha* Speg., Bol. Acad. Nac. Ci. Córdoba 26: 312. 1924. – TYPE: none cited.

Vachellia lutea (Mill.) Speg. var. *aroma* (Gillies ex Hook. & Arn.) Speg. f. *leptocarpa* Speg., Bol. Acad. Nac. Ci. Córdoba 26: 305. 1924. – TYPE: none cited.

Vachellia lutea (Mill.) Speg. var. *aroma* (Gillies ex Hook. & Arn.) Speg. f. *pachycarpa* Speg., Bol. Acad. Nac. Ci. Córdoba 26: 307. 1924. – TYPE: none cited.

VACHELLIA AROMA (Gillies ex Hook. & Arn.) Seigler & Ebinger var. **HUARANGO** (Ruiz ex J. Macbr.) Seigler and Ebinger, **comb. nov.** Basionym: *Acacia huarango* Ruiz ex J. Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser. 8: 90. 1930. *Acacia aroma* Gillies ex. Hook. & Arn. var. *huarango* (Ruiz ex J. Macbr.) Ebinger, Seigler and Clarke, Syst. Bot. 25: 602. 2000. – TYPE: PERU. HUÁNUCO: near Huánuco, low spreading shrub, *Ruíz & Pavón s.n.* [lectotype, designated by Macbride (1943): F].

VACHELLIA ASTRINGENS (Gillies) Speg., Bol. Acad. Nac. Ci. Córdoba 26: 278. 1924. *Prosopis astringens* Gillies in Hook. & Arn. Bot. Misc. 3: 204. 1833. *Acacia atramentaria* Benth., London J. Bot. 1: 392. 1842. *Acacia farnesiana γ atramentaria* (Benth.) Kuntze, Revis. gen. pl. 3(2): 47. 1898. (based on same type). – TYPE: ARGENTINA. Mendosa and San Juan, *J.Gillies s.n.* (holotype: GL; isotype: K). NOTE: Not *Acacia astringens* A. Cunn. ex G. Don (1832), a species with phyllodes native to Australia and a synonym of *Acacia falciformis* DC. (Maslin, 2001a). Not *Acacia adstringens* Mart. in Spix and Martius (1828), an unarmed species of legume from Brazil that is not an *Acacia*.

Acacia prosopoma O. Schnyd., Anales Soc. Ci. Argent. 3: 152. 1877. – TYPE: none cited, from Argentina, Mendoza, Córdoba.

VACHELLIA BARAHONENSIS (Urb. & Ekman) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia barahonensis* Urb. & Ekman in Urb., Ark. Bot. 22a (8): 29. 1928. – TYPE: DOMINICAN REPUBLIC. BARAHONA: between Coueve-en-

Haut and Trujín, quaternary calcareous soil, 22 Sep 1926, *E. L. Ekman H7043* (holotype: B destroyed; isotype: S).

VACHELLIA BELAIRIOIDES (Urb.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia belairioides* Urb., Symb. antill. 9: 439. 1928. *Feracacia belairioides* (Urb.) Britton and León, N. Amer. Fl. 23: 87. 1928. – TYPE: CUBA. HOLGUÍN: Holguín, in carrascales (serpentine barrens) toward El Paraiso, 26 Aug 1916, *E. L. Ekman 7589* (holotype: S; isotypes: MT, NY).

VACHELLIA BIACICULATA (S. Watson) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia biaciculata* S. Watson, Proc. Amer. Acad. Arts 21: 452. 1886. *Acaciopsis biaciculata* (S. Watson) Britton & Rose, N. Amer. Fl. 23: 96. 1928. – TYPE: MEXICO. CHIHUAHUA: on sandy plains near Chihuahua, 20 Aug 1885, *C. G. Pringle 662* (holotype: US; isotypes: F, NY, VT).

VACHELLIA BILIMEKII (J. Macbr.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia bilimekii* J. Macbr., Contr. Gray Herb. 59: 6. 1919. *Acaciopsis bilimekii* (J. Macbr.) Britton & Rose, N. Amer. Fl. 23: 94. 1928. – TYPE: MEXICO. MORELOS: Cuernavaca, 10 Jan 1866, *D. Bilimek 128* (holotype: GH).

Acacia ambigua Rose, Contr. U. S. Natl. Herb. 8: 31. 1903. – TYPE: MEXICO. PUEBLA: on the hills above Matamoras, where it is common, 26 Jun 1899, *J. N. Rose & W. Hough 4698* (holotype: US). NOTE: Not *Acacia ambigua* Hoffannsegg (1826), which is based on a sterile specimen from Senegal, the identity of which is unknown (Ross 1979). Not *Acacia ambigua* Vogel (1836), a species from the Caribbean with prickles and lacking stipular spines, which is a synonym of *Acacia vogeliana* Steud. (Britton and Rose 1928).

Acacia sericocarpa Rose, Contr. U. S. Natl. Herb. 8: 300. 1905. – TYPE: MEXICO. PUEBLA: on the hills above Matamoras, where it is common, 26 Jun 1899, *J. N. Rose & W. Hough 4698*

(holotype: US). NOTE: Not *Acacia sericocarpa* Fitzgerald (1904), a phyllodinous acacia species from Western Ausralia (Maslin, 2001b).

VACHELLIA BRANDEGEANA (I. M. Johnst.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia brandegeana* I. M. Johnst., Contr. Gray Herb. 75: 27. 1925. *Acaciopsis brandegeana* (I. M. Johnst.) Britton & Rose, N. Amer. Fl. 23: 94. 1928. – TYPE: MEXICO. BAJA CALIFORNIA SUR: Agua Verde Bay, 26 May 1921, *I. M. Johnston 3881* (holotype GH; isotypes: A, F, MO, NY, UC, US).

Pithecollobium acuminatum M. E. Jones, Contr. W. Bot. 18: 38. 1933. – TYPE: MEXICO. BAJA CALIFORNIA SUR: above Primiera Aqua near Loreto, 20 Oct 1930, *M. E. Jones 27255* (holotype: RSA).

VACHELLIA BRAVOENSIS (Isely) Seigler & Ebinger, **comb. et stat. nov.** Basionym: *Acacia schaffneri* (S. Watson) F. J. Herm. var. *bravoensis* Isely, Sida 3: 383. 1969. – TYPE: UNITED STATES. TEXAS: San Patricio Co., 7 miles S of Taft in clay loam soil, 29 Mar 1950, *F. B. Jones 100* (holotype: SMU).

VACHELLIA BUCHERI (Marie-Victorin) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia bucheri* Marie-Victorin, Contr. Inst. Bot. Univ. Montréal 49: 57. 1945. – TYPE: CUBA. ORIENTE: Moa, sur la plateforme littorale serpentine-limonitique, 27-31 May 1943, *F. Marie-Victorin & Bro. Clément 21804* [holotype: MT, F photo; isotypes: F, HAC (Alvarez and Oliver 1991), MO, NY].

VACHELLIA CALIFORNICA (Brandegee) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia californica* Brandegee, Proc. Calif. Acad. Sci. II. 3: 221. 1892. *Acacia pringlei* Rose subsp. *californica* (Brandegee) Lee, Seigler & Ebinger, Syst. Bot. 14: 99. 1989. *Acaciopsis californica* (Brandegee) Britton & Rose, N. Amer. Fl. 23: 96. 1928. – TYPE: MEXICO. BAJA CALIFORNIA SUR: La Palma, 31 Mar 1892, *T. S. Brandegee s.n.* [lectotype, designated by Lee et al. (1989): UC].

Acacia sonorensis Rose, Contr. U. S. Nat. Herb. 8:31. 1903. *Acaciopsis sonorensis* (Rose) Britton & Rose, N. Amer. Fl. 23: 95. 1928. – TYPE: MEXICO. SONORA: near Guaymas, 5-11 Jun 1897, *J. N. Rose 1247* (holotype: US).

VACHELLIA CAMPECHIANA (Mill.) Seigler & Ebinger, **comb. nov.** Basonym: *Mimosa campeachiana* Mill. Gard. dict. ed 8, no. 20. 1768. *Poponax campechiana* (Mill.) Britton & Rose, N. Amer. Fl. 23: 90. 1928. *Acacia cymbispina* Sprague & Riley in Riley, Kew Bull. 1923: 394. 1923 (based on the same type). *Poponax cymbispina* (Sprague & Riley) Britton & Rose, N. Amer. Fl. 23: 90. 1928. *Acacia milleriana* Standl. Jour. Arnold Arb. 11: 29. 1928. (Based on the same type). (Rudd 1966, Seigler & Ebinger 1988). – TYPE: MEXICO. VERACRUZ: Veracruz, 1731, *W. Houstoun s.n.* (holotype: BM). NOTE: Not *Acacia campechiana* Schenck (1913), which is considered a synonym of the ant-acacia species *Acacia cornigera* (L.) Willd. by Seigler and Ebinger (1995). Note: We have used the spelling *Vachellia campechiana*.

VACHELLIA CAMPECHIANA (Mill.) Seigler & Ebinger f. CAMPECHIANA

Acacia cochliacantha Humb. & Bonpl. ex Willd., Sp. Pl. 4:1080. 1806. *Mimosa cochliacantha* (Humb. & Bonpl. ex Willd.) Poir. in Lam. Dict. Suppl. 1: 78. 1810. – TYPE: MEXICO. without exact locality [erroneously given as Guayaquil, Ecuador (Rudd 1966)], *Humboldt & Bonpland s.n.* (holotype: B destroyed, F photo, M0 photo).

Acacia cymbacantha Zucc. ex Benth., Trans. Linn. Soc. London 30: 501. 1875. – TYPE: MEXICO. *W. Karwinski s.n.* (holotype: M). NOTE: *Acacia cymbacantha* Zucc. ex Benth. is listed in synonomy in the original description of *Acacia cochliacantha* with the note "may be the same species with very much larger spines, at least 1 in. long and 1/2 in. broad".

Poponax attenuata Britton & Rose, N. Amer. Fl. 23: 90. 1928. – TYPE: MEXICO. PUEBLA: Río de Santa Lucia, in the vicinity of San Luis Tultitlanapa, near Oaxaca, Aug 1908, *C. A. Purpus 3050* (holotype: NY).

VACHELLIA CAMPECHIANA (Mill.) Seigler & Ebinger f. **HOUGHII** (Britton & Rose) Seigler & Ebinger, **comb. nov.** Basionym: *Poponax houghii* Britton & Rose, N. Amer. Fl. 23: 90. 1928. *Acacia cochliacantha* Humb. & Bonpl. ex Willd. f. *houghii* (Britton & Rose) Seigler & Ebinger, Syst. Bot. 13: 14. 1988. – TYPE: MEXICO. OAXACA: Tomellin Canon, 23 Jun 1899, *J. N. Rose & W. Hough 4669* (holotype: NY; isotype US).

VACHELLIA CAURINA (Barneby & Zanoni) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia caurina* Barneby & Zanoni, Moscosoa 5: 20. 1989. – TYPE: HAITI. NORD-OUEST. sprawling shrub on rocks, arid, steep mountain slope west of bay, vicinity of Port à l'Écu, 15-17 Mar 1929, *E. C. Leonard & G. M. Leonard 13863* (holotype: US; isotypes: A, GH, NY).

VACHELLIA CAVEN (Molina) Seigler & Ebinger, **comb. nov.** Basionym: *Mimosa caven* Molina, Sag. stor. nat. Chili, ed 1, 174. 1782. *Mimosa cavenia* Molina, Eassai hist. nat. Chili, 338. 1789. *Acacia caven* (Molina) Molina, Sag. stor. nat. Chili, 2nd. ed., 163, 299. 1810. *Acacia cavenia* (Molina) Hook. & Arn., Misc. Bot. 3: 206. 1833. *Acacia farnesiana* (L.) Willd. β *cavenia* (Molina) Kuntze, Revis. gen. pl. 3(2): 47. 1898. *Acacia farnesiana* (L.) Willd. var. *cavenia* (Hook. & Arn.) Arechav., Anales Mus. Nac. Montevideo 1: 436. 1901. *Vachellia farnesiana* (L.) Wight & Arn. f. *cavenia* (Molina) Speg., Bol. Acad. Nac. Ci. Córdoba 26: 297. 1923. *Acacia farnesiana* (L.) Willd. f. *cavenia* (Hook. & Arn.) E. C. Clos., Bol. Minist. Agric. Nac. (Argentina) 28: 455. 1930. – TYPE: CHILE. Raneagna, Oct 1828, *C. G. Bertero s.n.* [lectotype, designated by Aronson (1992): SG0]. NOTE: We interpret the specific epithet *cavenia* to be a misspelling.

Acacia adenopa Hook. & Arn., Bot. Misc. 3: 206. 1833. – TYPE: Islands of the Uruguay, *J. Tweedie s.n.* (holotype: K).

Acacia aromatica Poepp., Mart., Fl. Bras. 15: 395. 1879. – TYPE: CHILE. Valparaiso, *E. Poeppig 177* [lectotype, designated by Ebinger et al. (2000): W].

Acacia farnesiana (L.) Willd. var. *brachicarpa* Kuntze, Revis. gen. pl. 1: 156. 1891. – TYPE: none cited, from Argentina, Córdoba.

Acacia farnesiana (L.) Willd. γ *heterocarpa* Kuntze, Revis. gen. pl. 3(2): 47. 1898. – TYPE: ARGENTINA. CÓRDOBA: Dec 1891, *O. Kuntze s.n.* [lectotype, designated by Ebinger et al. (2000): MO].

Acacia caven (Molina) Molina var. *dehiscens* Burkart ex Ciald., Darwiniana 25: 76. 1984. – TYPE: ARGENTINA. CÓRDOBA: Ascochinga, 22 Sep 1936, *E. G. Nicora 962* (holotype: SI).

Acacia caven (Molina) Molina var. *microcarpa* (Speg.) Burkart ex Ciald., Darwiniana 25: 77. 1984. *Vachellia farnesiana* (L.) Wight & Arn. f. *microcarpa* Speg., Bol. Acad. Nac. Ci. Córdoba 26: 301. 1924. – TYPE: ARGENTINA. FORMOSA: Depto. Patino, Fortin Soledad, *A. Krapovickas 1283* [lectotype, designated by Cialdella (1984): SI; isotype: LIL].

Acacia caven (Molina) Molina var. *stenocarpa* (Speg.) Burkart ex Ciald., Darwiniana 25: 78. 1984. *Vachellia farnesiana* (L.) Wight & Arn. f. *stenocarpa* Speg., Bol. Acad. Nac. Ci. Córdoba 26: 301. 1924. – TYPE: ARGENTINA. MISIONES: Depto. Candelaria, Santa Ana, *A. Burkart 14734* [lectotype, designated by Cialdella (1984): SI].

Acacia caven (Molina) Molina var. *sphaerocarpa* Burkart ex Aronson, Ann. Missouri Bot. Gard. 79: 964. 1992. – TYPE: ARGENTINA. CORRIENTES: ca. 27° 27'S, 58° 46'W, 60 m. "alrededores de la ciudad de Corrientes, antiguo camino a Matadero, 50 m de la ruta,

17 Feb 1989, *S. G.Tressens & A. Radovancich 3539* (holotype: K; isotype: CTES).

Acacia caven (Molina) Molina var. *macrocarpa* Aronson, Ann. Missouri Bot. Gard. 79: 965. 1992. – TYPE: ARGENTINA. SALTA: Salta, Chicoana, El Carril, 19 Oct 1948, *A. Burkart 17577* (holotype: SI).

Vachellia farnesiana (L.) Wight & Arn. f. *brachypoda* Speg., Bol. Acad. Nac. Ci. Córdoba 26: 301. 1924. – TYPE: not cited, from Argentina, Buenos Aires Prov., San Fernanda, Gualeguaychu, Ibicuy y chaco santefecino.

VACHELLIA X CEDILLOI (L. Rico Arce) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia x cedilloi* L. Rico Arce, Acta Bot. Mex. 26: 7. 1994. – TYPE: MEXICO. QUINTANA ROO: km 6.5 de la carretera Vigia Chico-F. Carrillo Puerto, selva mediana subperennifolia, alt. 8 m, 9 Apr 1986, *R. Villanueva 714* (holotype: MEXU: isotypes: CIQRO, XAL).

VACHELLIA CHIAPENSIS (Saff.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia chiapensis* Saff., J. Wash. Acad. Sci. 5: 356. 1915. – TYPE: MEXICO. CHIAPAS: near San Fernando, between Tuxtla and Chicoasén, 12 Jan 1907, *G. N. Collins 164* (holotype: US, F photo).

VACHELLIA CHORIOPHYLLA (Benth.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia choriophylla* Benth., London J. Bot. 1: 495. 1842. *Lucaya choriophylla* (Benth.) Britton & Rose, N. Amer. Fl. 23: 87. 1928. – TYPE: BAHAMAS: *W. Swainson s.n.* (holotype: K).

VACHELLIA COLLINSII (Saff.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia collinsii* Saff., Science N.S. 31: 677. 1910. *Myrmecodendron collinsii* (Saff.) Britton & Rose, N. Amer. Fl. 23: 92. 1928. – TYPE: MEXICO. CHIAPAS: between Chicoasén and San Fernandino, 1,005 ft., 13 Jan 1907, *G. N.*

Collins & C. B. Doyle 180 (holotype: US, F photo). NOTE: Safford (1910) listed G. N. Collins as the only collector, and cited 14 Jan. 1907 as the date collected. On the label of the type specimen G. N. Collins and C. B. Doyle are listed as the collectors and 13 Jan. 1907 is given as the date of the collection.

Acacia glutea Ram. Goyena, Fl. Nicaragüense 1: 382. 1909. – TYPE: not cited. NOTE: Although the original description of Ramírez Goyena is in Spanish and no type is cited (Rico Arce, 2001), this species was described before either of these was required. Because this name is not used by most workers, is not supported by type material, nor is a designated herbarium extant, in order to contribute to nomenclatural stability, we have made a proposal to conserve the name of Safford (1910), which is widely used. If accepted, the name for this taxon must become *Vachellia collinsii* (Saff.) Seigler & Ebinger.

Acacia costaricensis Schenck, Repert. Spec. Nov. Regni Veg. 12: 361. 1913. *Myrmecodendron costaricensis* (Schenck) Britton & Rose, N. Amer. Fl. 23: 93. 1928. – TYPE: COSTA RICA. ALAJUELA: Alajuela, alt. 900 m, 1896, *J. D. Smith 6488* [lectotype, designated by Seigler and Ebinger (1995): S (B, destroyed); isotypes: BM, GH, K, MO].

Acacia panamensis Schenck, Repert. Spec. Nov. Regni Veg. 12: 362. 1913. – TYPE: PANAMA. ALAJUELA: *A. Koch s.n.* (holotype: B, destroyed).

Acacia yucatanensis Schenck, Repert. Spec. Nov. Regni Veg. 12: 361. 1913. – TYPE: MEXICO. YUCATÁN, 1895, *G. F. Gaumer 353* [lectotype, designated by Seigler and Ebinger (1995): US (B, destroyed); isotypes: BM, GH, F, MO].

Acacia nelsonii Saff., J. Wash. Acad. Sci. 4: 363. 1914. – TYPE: MEXICO. GUERRERO: Acapulco, sea level, 30 Apr 1903, *E. W. Nelson 7024* (holotype: US; isotypes: F, GH).

Acacia penonomensis Saff., J. Wash. Acad. Sci. 4: 363. 1914. – TYPE: PANAMA. COCLÉ: Penonomé, 50-1,000 ft., 23 Feb-22 Mar 1908, *R. S. Williams 113* (holotype: NY, F photo, US fragment and photo; isotype: US).

VACHELLIA CONSTRICTA (Benth.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia constricta* Benth. in Gray, Pl. Wright. 1: 66. 1852. *Acaciopsis constricta* (Benth.) Britton & Rose, N. Amer. Fl. 23: 96. 1928. – TYPE: MEXICO. CHIHUAHUA: May-Oct 1849, *C. Wright 162* (holotype: K; isotypes: GH, NY, US).

Acacia constricta Benth. var. *paucispina* Wooton & Standl., Bull. Torrey Bot. Club 36: 105. 1909. *Acaciopsis constricta* Benth. var. *paucispina* (Wooton & Standl.) Moldenke, Revista Sudamer. Bot. 4: 15. 1937. – TYPE: UNITED STATES. NEW MEXICO: Sierra Co., Animas Creek in the Black Range, alt. 1500 ft., 13 Jul 1904, *O. B. Metcalfe 1123* (holotype: US).

Mimosa arcuata M. Martens & Galeotti, Bull. Acad. Roy. Sci. Bruxelles 10: 310. 1843. – TYPE: MEXICO. OAXACA: se trouve sur le flanc des montagnes calcaires et cactiferes, à l'est de Tehuacan de las Grandas, vers 6,000 pieds. Fl. jaunes, *H. Galeotti 3222* (holotype: BR; isotypes: G, K). (Rudd 1976-1982). NOTE: Not *Acacia arcuata* Sieber ex Sprengel (1826), a taxon with phyllodes that is a synonym of *Acacia melanoxylon* R. Br. (Cowan and Maslin, 2001). In response to the recent conservation of the type for *Acacia* with an Australian species, the necessity to transfer species of the former subgenus *Acacia* to the genus *Vachellia*, the fact that the name *Acacia constricta* Benth. has been used by most workers, because this name is widely employed in floras of both Mexico and the United States, and in order to contribute to nomenclatural stability, we have made a proposal to conserve the name of Bentham (1852). If accepted, the name for this taxon must become *Vachellia constricta* (Benth.) Seigler & Ebinger.

VACHELLIA COOKII (Saff.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia cookii* Saff., Science N. S. 31: 677. 1910. *Myrmecodendron cookii* (Saff.) Britton & Rose, N. Amer. Fl. 23: 93. 1928. – TYPE: GUATEMALA. ALTA VERAPAZ: Finca Trece Aguas, near Secanguím, alt. 300 m, 8 Mar 1907, *G. P. Goll 102* (holotype: US).

Acacia bucerophora B. L. Rob., Proc. Amer. Acad. Arts 49: 502. 1913. – TYPE: BELIZE. Belize, about Toledo, 4 mi. from the coast and 5 miles from Punta Gorda, sea level, 29 Mar 1907, *M. E. Peck* 632 (holotype: GH, F fragment and photo, US fragment and photo; isotypes: F, K).

VACHELLIA CORNIGERA (L.) Seigler & Ebinger, **comb. nov.** Basionym: *Mimosa cornigera* L., Sp. Pl. 520. 1753. *Acacia cornigera* (L.) Willd., Sp. Pl. 4: 1080. 1806. *Tauroceras cornigerum* (L.) Britton & Rose, N. Amer. Fl. 23: 86. 1928. – TYPE: from a cultivated plant grown in the garden of George Clifford, between Haarlem and Leyden, Holland, collected by Linnaeus (No. 4) and bearing his label "*Mimosa cornigera*" presumably grown from Mexican seed (Rudd 1964). (holotype: BM, US fragment and photo).

Acacia spadicigera Schltdl. & Cham., Linnaea 5: 594. 1830. *Tauroceras spadicigerum* (Schltdl. & Cham.) Britton & Rose, N. Amer. Fl. 23: 85. 1928. – TYPE: MEXICO. VERACRUZ: near La Laguna Verde, Mar 1928, *C. Schiede & F. Deppe 685* [lectotype, designated by Seigler and Ebinger (1995): US fragment, (B, destroyed)].

Acacia campecheana Schenck, Repert. Spec. Nov. Regni Veg. 12: 361. 1913. – TYPE: MEXICO. CAMPECHE: *von Chrismar s.n.* (holotype: B, destroyed).

Acacia cubensis Schenck, Repert. Spec. Nov. Regni Veg. 12: 360. 1913. – TYPE: CUBA. N coast, 21 Apr 1863, *C. Wright 2402* [lectotype, designated by Seigler and Ebinger (1995): US, (B,

destroyed); isotypes: G, GOET, HAL, JE, K, MO, US]. NOTE: A note on one herbarium sheet (JE) indicates that the seeds came from Martinique.

Acacia interjecta Schenck, Repert. Spec. Nov. Regni Veg. 12: 361. 1913. – TYPE: *Engler 3870a* [lectotype, designated by Seigler and Ebinger (1995): JE, (B, destroyed)]. NOTE: From material growing in the Singapore and Kew Botanical Gardens (Janzen 1974).

Acacia nicoyensis Schenck, Repert. Spec. Nov. Regni Veg. 12: 360. 1913. – TYPE: COSTA RICA. GUANACASTE: shore of the Gulf of Nicoya, sea level, Feb 1900, *A. Tonduz* 13538 [lectotype, designated by Seigler and Ebinger (1995): US, (B, destroyed), isotypes: BM, GH, K, NY, US].

Acacia rossiana Schenck, Repert. Spec. Nov. Regni Veg. 12: 361. 1913. – TYPE: MEXICO. VERACRUZ: Santa Lucrezia, Isthmus of Tehuantepec, 8 Oct 1906, *H. Ross 918* [lectotype, designated by Seigler and Ebinger (1995): M, US photo].

Acacia furcella Saff., J. Wash. Acad. Sci. 4: 359. 1914. – TYPE: MEXICO. VERACRUZ: shore of Lake Catemaco, southern Veracruz, alt. 1,000 ft., 26 Apr 1894, *E. W. Nelson 427* (holotype: US).

Acacia hernandezii Saff., J. Wash. Acad. Sci. 4: 358. 1914. – TYPE: MEXICO. SAN LUIS POTOSÍ: vicinity of Rascón, 19-22 Jul. 1905, *E. Palmer 699* (holotype: US; isotypes: F, GH, NY).

Acacia turgida Saff., in W. M. Wheeler, Bull. Mus. Comp. Zoology Harvard Coll. 90: plate 45, 1942. – TYPE: (holotype: plate 45 in Wheeler 1942).

Acacia cornigera (L.) Willd. var. *americana* DC. Prodr. 2: 460. 1825. – TYPE: none cited.

VACHELLIA CUCUYO (Barneby & Zanoni) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia cucuyo* Barneby & Zanoni, Moscosoa 5: 14. 1989. – TYPE: DOMINICAN REPUBLIC. AZUA: Sierra Martín García, Loma del Copey, approximately 3 km (by air) SW of Barrero, 18° 18'N, 70° 56'W, alt. 780 m, 23 Feb 1987, *T. Zanoni, J. Pimentel, & R. García 38370* (holotype: JBSD; isotypes: FLAS, FTG, GH, K, MO, NY, S, TEX).

VACHELLIA CURVIFRUCTA (Burkart) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia curvifructa* Burkart, Las Leguminosas Argentinas, 2nd ed., 97, 541, 1952. – TYPE: PARAGUAY. CHACO: Puerto Casado, Dec 1916, *T. Rojas 2138* (holotype: SI).

VACHELLIA DAEMON (Ekman & Urb.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia daemon* Ekman & Urb., Symb. antill. 9: 438. 1928. *Feracacia daemon* (Ekman & Urb.) Britton & Rose N. Amer. Fl. 23: 86. 1928. – TYPE: CUBA. MATANZAS: prope Ceiba Mocha in cuabales ad Canasi versus locis valde sterilibus, 1 Mar 1924, *E. L. Ekman 18591* (holotype: S; isotypes: A, F, G, HAC photo, ILL, K, NY, US).

VACHELLIA FARNESIANA (L.) Wight & Arn., Prodr. fl. Ind. orient. 272. 1834. *Mimosa farnesiana* L., Sp. pl. 521. 1753. *Acacia farnesiana* (L.) Willd., Sp. pl. 4: 1083. 1806. *Poponax farnesiana* (L.) Raf., Sylva tellur. 118. 1838. – TYPE: Aldinus, Exactissima descriptio rariorum plantarum Romae in Horto Franesiano: 2-7, 1625, which provides, under the name Acacia Indica Farnesiana, a detailed description and two illustrations of a plant in cultivation in the garden of Cardinal Farnese in Rome [lectotype, designated by Ross (1975)].

VACHELLIA FARNESIANA (L.) Wight & Arn. var. FARNESIANA

Acacia pedunculata Willd., Sp. pl. 4: 1084. 1806. *Mimosa pedunculata* (Willd.) Poir., in Lam. Encycl. Suppl. 1:81. 1810. *Acacia farnesiana* (L.) Willd. f. *pedunculata* (Willd.) Kuntze,

Revis. gen. pl. 3(2): 47. 1898. – TYPE: JAVA: (holotype: B-Willd.).

Acacia acicularis Humb. & Bonpl. ex Willd., Enum. pl. 1056. 1809. – TYPE: in America meridionali (holotype: B-Willd.).

Acacia edulis Humb. & Bonpl. ex Willd., Enum. pl. 1056. 1809. – TYPE: in America meridionali (holotype: B-Willd.).

Acacia ferox M. Martens & Galeotti, Bull. Acad. Roy. Sci. Bruxelles 10: 314. 1843. – TYPE: MEXICO. OAXACA: se trouve abondamment dans les plaines d'Oaxaca, de Tlacolula et d'Etla, de 5,000 pieds, Fl. jaunes, *H. Galeotti 3223* (holotype: BR; isotype: K). NOTE: For more information, see Rudd 1976-1982.

Acacia lenticellata F. Muell., J. Proc. Linn. Soc., Bot. 3: 147. 1859. *Acacia farnesiana* (L.) Willd. var. *lenticellata* (F. Muell.) F. M. Bailey, Compr. Queensland Pl. 164. 1913. – TYPE: AUSTRALIA. NORTHERN TERRITORIES: McArthur River, *F. Mueller 43* (Pedley 1979).

Acacia smallii Isely, Sida 3: 384. 1969. – TYPE: UNITED STATES. LOUISIANA: Lafourche Parish, along Bayou La Fourche near Cut-off, 16 Apr 1931 and Aug 1931, *J. K. Small & E. J. Alexander s.n.* (holotype: NY; isotypes: US, WIS).

Farnesia odora Gasp., Descr. nuov. gen. Leg. 1836. – TYPE: none cited [lectotype, designated here, plate of *Farnesia odora* in Gasparrini (1836)].

Poponax venosa Britton in Britton and Killip, Ann. New York Acad. Sci. 35: 139. 1936. – TYPE: COLOMBIA. ANTIOQUIA: vicinity of Medellín, 20 Aug 1927, *R. A. Toro 478* (holotype: NY).

Vachellia densiflora Alexander ex Small, Man. s. e. fl. 655, 1505. 1933. *Acacia densiflora* (Alexander ex Small) Cory, Rhodora 38:

406. 1936. *Acacia minuta* (M. E. Jones) R. M. Beauch. subsp. *densiflora* (Alexander ex Small) R. M. Beauch., Phytologia 46: 7. 1980. – TYPE: UNITED STATES. LOUISIANA: Lafourche Parish, along Bayou La Fourche near Cut-off, 16 Apr 1931 and Aug 1931, *J. K. Small & E. J. Alexander s.n.* (holotype: NY; isotypes: US, WIS).

VACHELLIA FARNESIANA (L.) Wight & Arn. var. **MINUTA** (M. E. Jones) Seigler & Ebinger, **comb. et stat. nov.** Basionym: *Pithecellobium minutum* M. E. Jones, Contr. West Bot. 18: 38. 1933. *Acacia minuta* (M. E. Jones) R. M. Beauch., Phytologia 46: 5. 1980. *Acacia farnesiana* (L.) Willd. subsp. *minuta* (M. E. Jones) Ebinger & Seigler, Southw. Naturalist 47: 90. 2002. – TYPE: MEXICO. BAJA CALIFORNIA: Cacachilla Mts., 2 Oct 1930, *M. E. Jones 27265* (holotype: POM-RSA).

VACHELLIA FARNESIANA (L.) Wight & Arn. var**. PINETORUM** (F. J. Herm.) Seigler & Ebinger, **comb. et stat. nov.** Basionym: *Acacia pinetorum* F. J. Herm., J. Wash. Acad. Sci. 38: 237. 1948. *Acacia farnesiana* subsp. *pinetorum* (F. J. Herm.) Ebinger and Seigler, Southw. Naturalist 47: 90. 2002. – TYPE: UNITED STATES. FLORIDA: Dade Co., hammocks, Long Key (Everglades), 18-26 Jan 1909, *J. K. Small & J. J. Carter 2975*; in pinelands, Long Key, 6-7 May 1903, *J. K. Small & P. Wilson 1778* (syntypes: NY).

Vachellia insularis J. K. Small, Man. s. e. fl. 655, 1505. 1933. – TYPE: UNITED STATES. FLORIDA: Monroe Co., pinelands, Big Pine Key, 21 Mar 1915, *J. K. Small & C. A. Mosier 6018*; pinelands, Big Pine Key, 27 Feb 1911, *J. K. Small, J. J. Carter & G. K. .Small 3549* (syntypes: NY). NOTE: Not *Acacia insularis* A. Richard (1845), an herbaceous legume lacking stipular spines and prickles that is a synonym of *Neptunia pubescens* Benth. (Bässler 1998).

Vachellia peninsularis J. K. Small, Man. s. e. fl. 654, 1505. 1933. – TYPE: UNITED STATES. FLORIDA: Dade Co., hammocks,

Long Key (Everglades), 18-26 Jan 1909, *J. K. Small & J. J. Carter 2975*; in pinelands, Long Key, 6-7 May 1903, *J. K. Small & P. Wilson 1778* (syntypes: NY). NOTE: Not *Senegalia peninsularis* Britton & Rose (1928), a species from Baja California, Mexico that has prickles and lacks stipular spines, nor *Acacia peninsularis* (Britton & Rose) Standley (1936).

VACHELLIA GENTLEI (Standl.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia gentlei* Standl., Publ. Field Mus. Nat. Hist., Bot. Ser. 22: 77. 1940. – TYPE: BELIZE: *P. Gentle 185* (holotype: F).

VACHELLIA X GLADIATA (Saff.) Seigler & Ebinger. **comb. nov.** Basionym: *Acacia x gladiata* Saff., J. Wash. Acad. Sci. 5: 359. 1915. *Myrmecodendron gladiatum* (Saff.) Britton & Rose, N. Amer. Fl. 23: 92. 1928. – TYPE: MEXICO. SINALOA: vicinity of Rosario, 1849, *J. Gregg 1135* (holotype: MO, F photo, NY photo, US fragment and photo).

VACHELLIA GLANDULIFERA (S. Watson) Seigler & Ebinger, **comb. nov.** Basionym: Acacia glandulifera S. Watson, Proc. Amer. Acad. Arts 25: 147. 1890. *Poponax glandulifera* (S. Watson) Britton & Rose, N. Amer. Fl. 23: 88. 1928. – TYPE: MEXICO. COAHUILA: limestone hills, Carneros Pass, 7 Sep 1889, *C. G. Pringle 2861* (holotype: GH; isotypes: F, NY, VT). NOTE: Not *Acacia glandulifera* Schinz (1900) which is considered a synonym of *Acacia nebrownii* Burtt Davy, a species with stipular spines from Africa (Ross 1979).

VACHELLIA GLOBULIFERA (Saff.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia globulifera* Saff., J. Wash. Acad. Sci. 4: 360. 1914. *Myrmecodendron globulifera* (Saff.) Britton & Rose, N. Amer. Fl. 23: 93. 1928 – TYPE: MEXICO. YUCATÁN: at the port of Silam (Tzilam), N coast of Yucatán, Apr 1895, *G. F. Gaumer 1909* (holotype: F, US fragment and photo; isotypes: GH, MO, NY, US).

Acacia donnelliana Saff., J. Wash. Acad. Sci. 4: 361. 1914. *Myrmecodendron donnelliana* (Saff.) Britton & Rose, N. Amer. Fl. 23: 93. 1928 – TYPE: HONDURAS. SANTA BÁRBARA: San Pedro de Sula, Cortés, alt. 600 ft., Mar 1888, *C. Thieme 5216* (holotype: US).

VACHELLIA GUANACASTENSIS (Clarke, Seigler & Ebinger) Seigler & Ebinger, **comb. et stat. nov.** Basionym: *Acacia farnesiana* (L.) Willd. var. *guanacastensis* Clarke, Seigler & Ebinger, Syst. Bot. 14: 562. 1989. *Acacia guanacastensis* (Clarke, Seigler & Ebinger) Ebinger & Seigler, Syst. Bot. 25: 610. 2000. – TYPE: COSTA RICA. GUANACASTE: Great Swamp, Comelco, near Bagaces, 11 May 1976, *D. H. Janzen 10362* (holotype: MO; isotype: ILL).

VACHELLIA HINDSII (Benth.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia hindsii* Benth., London J. Bot. 1: 504. 1842. *Myrmecodendron hindsii* (Benth.) Britton & Rose, N. Amer. Fl. 23: 91. 1928. – TYPE: MEXICO. JALISCO: shore of Manzanilla Bay, sea level, 1841, *R. B. Hinds 248* (holotype: K, F photo).

Acacia bursaria Schenck, Repert. Spec. Nov. Regni Veg. 12: 363. 1913. – TYPE: GUATEMALA. AMATITLÁN: Laguna Amatitlán, alt. 3,900 ft., Feb 1890, *J. D. Smith 2304* [lectotype, designated by Seigler and Ebinger (1995): US (B, destroyed); isotypes: GH, K].

Acacia sinaloensis Saff., J. Wash. Acad. Sci. 4: 365. 1914. – TYPE: MEXICO. SINALOA: vicinity of Villa Unión, growing about a pond, 2 Apr 1910, *J. N. Rose, P. C. Standley & P. G. Russell 13972* (holotype: US; isotype: NY).

Acacia tepicana Saff., J. Wash. Acad. Sci. 4: 366. 1914. – TYPE: MEXICO. NAYARIT: thickets, vicinity of Acoponeta, Tepic, alt. 30 m, 10 Apr 1910, *J. N. Rose, P. C. Standley & P. G. Russell 14357* (holotype: US, F photo; isotype: NY).

VACHELLIA INSULAE-IACOBI (L. Riley) Seigler & Ebinger, **comb. nov.** Basionym: Acacia *insulae-iacobi* L. Riley, Bull. Misc. Inform. Kew 1925: 220. 1925. – TYPE: ECUADOR. GALÁPAGOS: San Salvador (James Island), James Bay, in ravine near seashore, 27 Jul 1924, *C. Penny & L. A. M. Riley 391* (holotype: K).

VACHELLIA JANZENII (Ebinger & Seigler) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia janzenii* Ebinger & Seigler, Southw. Naturalist 32: 245. 1987. – TYPE: MEXICO. TABASCO: 9.8 miles W of Lázaro Cárdenas on hwy. 180, 17 Jun 1966, *D. H. Janzen 515* (holotype: MO; isotypes: BM, CAS, F, GH, MICH, MO, UC, US).

VACHELLIA MACRACANTHA (Humb. & Bonpl. ex Willd.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia macracantha* Humb. & Bonpl. ex Willd. Sp. pl. 4: 1080. 1806. *Poponax macracantha* (Humb. & Bonpl. ex Willd.) Killip in Little, Caribbean Forester 9: 241. 1948. *Mimosa macracantha* (Humb. & Bonpl. ex Willd.) Poir. in Lam., Encycl. Suppl. 1: 78. 1810. – TYPE: MEXICO. without exact locality, *Humboldt & Bonpland s.n.* (holotype: B-Willd., GH photo; isotypes: NY, P). NOTE: In response to the recent conservation of the type for *Acacia* with an Australian species, the necessity to transfer species of the former subgenus *Acacia* to the genus *Vachellia*, the fact that the name *Acacia macracantha* Humb. & Bonpl. ex Willd. has been used for this widespread species by most workers, because this name is widely employed in floras of both Latin America and the United States, and in order to contribute to nomenclatural stability, we have made a proposal to conserve the name of Bentham (1852). If accepted, the name for this taxon must become *Vachellia macracantha* (Humb. & Bonpl. ex Willd.) Seigler & Ebinger.

Vachellia lutea (Mill.) Speg., Bol. Acad. Nac. Ci. Córdoba 26: 301. 1923. *Mimosa lutea* Mill., Gard. dict. ed. 8, 1768. *Acacia lutea* (Mill.) Britton, Bull. Torrey Bot. Club 16: 327. 1889. *Poponax*

lutea (Mill.) Britton & Rose, N. Amer. Fl. 23: 90. 1928. – TYPE: JAMAICA. 1731, *W. Houstoun s.n.* (holotype: BM; isotype: K). NOTE: Not *Acacia lutea* Leavenworth (1824) which is a synonym of *Neptunea lutea* (Leavenw.) Benth. (Correll and Johnston 1970).

Acacia flexuosa Humb. & Bonpl. ex Willd., Sp. pl. 4: 1082. 1806. *Mimosa flexuosa* (Humb. & Bonpl. ex Willd.) Poir. in Lam., Encycl. Suppl. 1: 79. 1810. *Poponax flexuosa* (Humb. & Bonpl. ex Willd.) Britton & Rose in Britton & Killip, Ann. New York Acad. Sci. 35: 139. 1936. – TYPE: VENEZUELA. CUMANÁ: *Humboldt & Bonpland 81* (holotype: B-Willd.; isotypes: HAL, P).

Acacia flexuosa Humb. & Bonpl. ex Willd. β *ambigua* DC., Prodr. 2: 463. 1825. – TYPE: GUADELOUPE. *C. G. Bertero s.n.* (holotype: G-DC).

Acacia flexuosa Humb. & Bonpl. ex Willd. β *lasiocarpa* Griseb., Abh. Königl. Ges. Wiss. Göttingen 7: 211. 1857. – TYPE: none cited, from Guadeloupe.

Acacia obtusa Humb. & Bonpl. ex Willd., Sp. pl. 4: 1087. 1806. *Mimosa obtusa* (Humb. & Bonpl. ex Willd.) Poir. in Lam., Encycl. Suppl. 1: 82. 1810. – TYPE: VENEZUELA. ORINOCO: *Humboldt & Bonpland s.n.* (holotype: P-H.B.K.; isotype: B-Willd.).

Acacia punctata Humb. & Bonpl. ex Willd., Sp. pl. 4: 1084. 1806. – TYPE: in America meridionali, *Humboldt & Bonpland 1162* (holotype: B-Willd.).

Acacia humboldtii Desv. in W. Ham., Prodr. Pl. Ind. Occid. 60. 1825. – TYPE: none cited, from Guyana.

Acacia macracanthoides Bertero ex DC., Prod. 2: 463. 1825. *Poponax macracanthoides* (Bertero ex DC.) Britton & Rose, N. Amer. Fl. 23: 89. 1928. – TYPE: JAMAICA. *C.G.Bertero s.n.* (holotype: G-DC).

Acacia subinermis Bertero ex DC., Prodr. 2: 463. 1825. – TYPE: JAMAICA. *C. G. Bertero s.n.* (holotype; G-DC, MO photo).

Acacia microcephala Macfad., Fl. Jamaica 1: 316. 1837. - TYPE: JAMAICA. at bridge beyond the second milestone on the windward road, *J. Macfadyen s.n.* (holotype: K). NOTE: Not *Acacia microcephala* Richard (1845) which has prickles and is considered a synonym of *Acacia tenuifolia* (L.) Willd. by Howard (1988).

Acacia platyacantha Schltdl., Linnaea 12: 565. 1838. – TYPE: MEXICO. HIDALGO: Mineral del Monte, *C. A. Ehrenberg s.n.* (holotype: B destroyed).

Acacia pellacantha Vogel, Meyen, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19. Suppl. 1: 45. 1843. – TYPE: PERU. Lima, *Dombey, F. J. F. Meyen & Cuming, n. 1013.* (holotype: not seen).

Acacia macracantha Humb. & Bonpl. ex Willd. var. *glabrescens* Griseb., Fl. Brit. W. I. 222. 1860. – TYPE: JAMAICA. in dry plains, Mar, *J. Macfadyen s.n.* (holotype: K).

Acacia macracantha Humb. & Bonpl. ex Willd. var. *glabra* Kitanov, Ann. Univ. Sofia Fac. Biol. 66(2): 31. 1974. – TYPE: CUBA. ORIENTE: sur de Guantánamo en Novaliches, 30 Jun 1936, *Hno. León s.n.*; Cuba, Prov. Oriente, Santiago de Cuba-Caney, bordes del mar en Arroyo de la Costa, 9 Sep 1951, *M. López Figueiras s.n.* (syntypes: SV).

Mimosa atomaria Poir. in Lam., Encylc. Suppl. 1:81. 1810. - TYPE: none cited.

Poponax cowellii Britton & Rose, N. Amer. Fl. 23: 89. 1928. *Acacia cowellii* (Britton & Rose) León in León & Alain, Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 9: 8. 1950. – TYPE: CUBA. ORIENTE: tree 5 m with spreading branches, hillside

thicket, vicinity of Santiago, 10-25 Mar 1912, *N. L. Britton, E. G. Britton & J. F. Cowell 12593* (holotype: NY).

Poponax canescens Britton ex Britton & Killip, Ann. New York Acad. Sci. 35: 139. 1936. *Acacia canescens* (Britton ex Britton & Killip) García-Barriga & Forero-Gonzáles, Cat. Il. Pl. Cundinamarca 3: 19. 1968. – TYPE: COLOMBIA. CUNDINAMARCA: Anapoima, alt. 400 m, 1851-1857, *J. Triana 4439* (holotype: NY). NOTE: Not *Acacia canescens* Martens & Galeotti (1843), a member of subgenus *Aculeiferum.*

VACHELLIA MAYANA (Lundell) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia mayana* Lundell, Publ. Carnegie Inst. Wash. 478: 210. 1937. – TYPE: GUATEMALA. EL PETÉN: near San Diego on the Rio Pasión, 10 Apr 1935, *M. Aguilar H. 495* (holotype: MICH, isotypes: GH, NY, US).

VACHELLIA MELANOCERAS (Beurl.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia melanoceras* Beurl., Kongl. Svenska Vetensk. Acad. Handl. 1854: 123. 1856. *Myrmecodendron melanoceras* (Beurl.) Britton & Rose, N. Amer. Fl. 23: 93. 1928. – TYPE: PANAMA. COLÓN: Portobello, sea level, Apr 1826, *J. G. Billberg 289* [lectotype, designated by Seigler and Ebinger (1995): S, F photo, MO photo].

Acacia multiglandulosa Schenck, Repert. Spec. Nov. Regni Veg. 12: 362. 1913. – TYPE: PANAMA. COLÓN: Portobello, *J. G. Billberg 1825* [lectotype, designated by Seigler and Ebinger (1995): US photo (B, destroyed)].

VACHELLIA OVIEDOENSIS (R. García & M. Mejía) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia oviedoensis* R. García & M. Mejía, Moscosoa 11: 7. 2000. – TYPE: DOMINICAN REPUBLIC. PEDERNALES: 22 km al W de Oviedo, El Papayo, lado Sur de la Carretera Oviedo-Pedernales. Bosque seco sobre roca caliza con: *Guaiacum, Senna, Opuntia, Harrisia* and *Reynosia.* 17°51'N, 71° 31'W, elev. 140 m, 13 May 1997, *R.*

García & R. Pujols 6543 (holotype: JBSD; isotypes: B, F, MAPR, MO, NY, S).

VACHELLIA PACENSIS (Rudd & A. M. Carter) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia pacensis* Rudd & A. M. Carter, Madroño 30: 177. 1983. – TYPE: MEXICO. BAJA CALIFORNIA SUR: La Paz, 1 Nov 1890, *T. S. Brandegee 190* (holotype: UC).

VACHELLIA PENNATULA (Schltdl. & Cham.) Seigler & Ebinger, **comb. nov.** Basionym: *Inga pennatula* Schltdl. & Cham., Linnaea 5: 593. 1830. *Acacia pennatula* (Schltdl. & Cham.) Benth., London J. Bot. 1: 390. 1842. *Poponax pennatula* (Schltdl. & Cham.) Britton & Rose, N. Amer. Fl. 23: 88. 1928. – TYPE: MEXICO. VERACRUZ: municipio de Xico, region of Jalapa, Hacienda de la Laguna, Aug. 1828, *C. Schiede & F. Deppe s.n.* (lectotype: HAL). NOTE: The sheet containing the type material is a mixture from Jalapa and from near Hacienda de la Laguna. Schlechtendal & Chamisso (1830) mention both in the original description and both are *Acacia pennatula.*

VACHELLIA PENNATULA (Schltdl. & Cham.) Seigler & Ebinger var. PENNATULA

Acacia lanata M. Martens & Galeotti, Bull. Acad. Roy. Sci. Bruxelles 10: 315. 1843. – TYPE: MEXICO. OAXACA: Misteca Alta, Apr 1840, a 7-8,000 pieds, *H. Galeotti 3231* (holotype: BR; isotypes: G, P). (Rudd 1976-1982).

Pithecollobium minutissimum M. E. Jones, Contr. W. Bot. 18: 38. 1933. – TYPE: MEXICO. JALISCO: Guadalajara, La Barranca, 25 Nov 1930, *M. E. Jones 27266a* (holotype: RSA-POM).

VACHELLIA PENNATULA (Schltdl. & Cham.) Seigler & Ebinger var. **PARVICEPHALA** (Seigler & Ebinger) Seigler & Ebinger. **comb. et stat. nov.** Basionym: *Acacia pennatula* (Schltdl. & Cham.) Benth. subsp. *parvicephala* Seigler and Ebinger, Syst. Bot.

13: 12. 1988. – TYPE: MEXICO. YUCATÁN: Chichén Itzá, in second growth, 6 Jun 1938, *C. L. Lundell & Lundell 7418* (holotype: F; isotypes: LL, NY, TEX, US).

VACHELLIA POLYPYRIGENES (Greenm.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia polypyrigenes* Greenm. in Combs, Trans. Acad. Sci. St. Louis 7: 419 and plate 33. 1897. *Poponax polypyrigenes* (Greenm.) Britton & Rose, N. Amer. Fl. 23: 89. 1928. – TYPE: CUBA. SANTA CLARA: District of Cienfuegos, not common, in open woods near long beach, near the entrance of the Bay of Cienfuegos, Faro Villa Nueva, E., 18 Sep 1895, *R. Combs 602* (holotype: GH; isotypes: F, MO, NY, US).

Acacia cupeyensis León in León and Alain, Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 9: 8. 1950. – TYPE: CUBA. ORIENTE: Puerto Padre, playa de El Cupey, 24 Feb 1930, *M. Curbelo 512* [holotype: HAC - Herb. *J. Roig 5075* (Bässler 1998); isotype: NY].

Acacia curbeloi León in León and Alain, Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 10: 241. 1951. – TYPE: CUBA. ORIENTE: Puerto Padre, playa de El Cupey, 1929, *M. Curbelo 60* [lectotype: HAC - Herb. J. Roig 5075 (Bässler 1998)].

VACHELLIA PRINGLEI (Rose) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia pringlei* Rose, Contr. U. S. Natl. Herb. 3: 316. 1895. *Acaciopsis pringlei* (Rose) Britton & Rose N. Amer. Fl. 23: 95. 1928. – TYPE: MEXICO. OAXACA: Tomellín Canyon, alt. 3000 ft. a tree 20-30 ft. high, 22 Dec 1894, *C. G. Pringle 6113* (holotype: US; isotypes: CM, F, MO, UC).

Acacia unijuga Rose, Contr. U. S. Natl. Herb. 8: 32. 1903. *Acaciopsis unijuga* (Rose) Britton & Rose, N. Amer. Fl. 28: 95. 1928. – TYPE: MEXICO. SAN LUIS POTOSÍ: Las Palmas, lowlands, 9 Mar 1899, *C. G. Pringle 6989* (holotype: US; isotypes: CM, F, LL, MO, UC).

Acacia conzattii Standl., Contr. U. S. Natl. Herb. 20: 186. 1919. *Acaciopsis conzattii* (Standl.) Britton & Rose, N. Amer. Fl. 28: 95. 1928. – TYPE: MEXICO. OAXACA: Estación Almaloyas, alt. 700 m, Mar 1907, *C. Conzatti 1756* (holotype: US).

Acaciopsis sesquijuga Britton & Rose, N. Amer. Fl. 28: 95. 1928. *Acacia sesquijuga* (Britton & Rose) Standl., Field Mus. Nat. Hist. Bot. Ser. 3: 277. 1930. – TYPE: MEXICO. YUCATÁN: Silam, *G. F. Gaumer 1307* (holotype: MO).

VACHELLIA RIGIDULA (Benth.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia rigidula* Benth., London J. Bot. 1: 504. 1842. *Acaciopsis rigidula* (Benth.) Britton & Rose, N. Amer. Fl. 23: 94. 1928. – TYPE: UNITED STATES. TEXAS: *T. Drummond 161* (holotype: K).

VACHELLIA ROIGII (León) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia roigii* León in León and Alain, Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 9: 7. 1950. – TYPE: CUBA. LAS TUNAS: Puerto Padre, yanales de El Cupey, 28 Feb 1930, *M. Curbelo 290* [holotype: HAC -Herb. *J. Roig 5077* (Bässler 1998); isotype: HAC (Alvarez and Oliver 1991)].

VACHELLIA RORUDIANA (Christophersen) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia rorudiana* Christophersen, Nyt Mag. Naturvidensk. 70: 76. 1931. – TYPE: ECUADOR. GALÁPAGOS: Santa Cruz Island (Indefatigable), Academy Bay, the dry zone, Dec 1926, *B. Rorud 12* (holotype: O).

Acacia tortuosa (L.) Willd. β *glabrior* Hook. f., Trans. Linn. Soc. London 20: 229. 1847. – TYPE: ECUADOR. GALÁPAGOS: San Salvador (James Island), *C. Darwin s.n.* (holotype: K).

VACHELLIA RUDDIAE (D. H. Janzen) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia ruddiae* D. H. Janzen, Smithsonian Contr. Bot. 13: 34. 1974. – TYPE: COSTA RICA. LIMÓN: ferry landing, Moin River, Moin, 13 Feb 1965, *D. H. Janzen 828*

(holotype: US; isotypes: CAS, F, GH, MEXU, MICH, MO, NY, UC).

VACHELLIA SCHAFFNERI (S. Watson) Seigler & Ebinger, **comb. nov.** Basionym: *Pithecellobium schaffneri* S. Watson, Proc. Amer. Acad. Arts 17: 352. 1882. *Samanea schaffneri* (S. Watson) J. Macbr., Contr. Gray Herb. 59: 2. 1919. *Popanax schaffneri* (S. Watson) Britton & Rose, N. Amer. Fl. 23: 89. 1928. *Acacia schaffneri* (S. Watson) F. J. Herm., J. Wash. Acad. Sci. 38: 236. 1948. – TYPE: MEXICO. SAN LUIS POTOSÍ: in the mountains about San Luis Potosí, *C. C. Parry & E. Palmer 219* [lectotype, designated by Rzedowski (1963): GH].

Acacia subtortuosa Shafer in Britton & Shafer, N. Amer. Trees, 524. 1908. – TYPE: MEXICO. DURANGO: near the city of Durango, Apr - Nov 1896, *E. Palmer 11* (holotype: NY; isotypes: F, MO, UC).

VACHELLIA SCHOTTII (Torr.) Seigler & Ebinger. **comb. nov.** Basionym: *Acacia schottii* Torr. in Emory, Rep. U. S. Mex. Bound. Surv. 2: 62. 1858. *Acaciopsis schottii* (Torr.) Britton & Rose, N. Amer. Fl. 23: 96. 1928. – TYPE: UNITED STATES. TEXAS: Brewster Co., near the canon of San Carlos, at the Comanche Crossing of the Río Grande, Sep, *C. C. Parry 330* (holotype: NY; isotype: GH).

VACHELLIA SPHAEROCEPHALA (Schltdl. & Cham.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia sphaerocephala* Schltdl. & Cham., Linnaea 5: 594. 1830. – TYPE: MEXICO. VERACRUZ: Actopán, sea level, Mar 1829. *C. Schiede & F. Deppe 684* [lectotype, designated by Seigler and Ebinger (1995): HAL (B, destroyed), US fragment and photo).

Acacia veracruzensis Schenck, Repert. Spec. Nov. Regni Veg. 12: 362. 1913. – TYPE: MEXICO. VERACRUZ: sand dunes south of Veracruz, sea level, 13 Oct 1908, culta in hort. bot. Darmstadt., *H. Schenck 916* [lectotype, designated by Seigler and Ebinger

(1995): M, (B, destroyed), US fragment and photo; isotypes: F, HAL].

Acacia dolichocephala Saff., J. Wash. Acad. Sci. 5: 355. 1915. – TYPE: MEXICO. VERACRUZ: along the shore north of the city of Veracruz, 24 Jan 1906, *J. M. Greenman 87* (holotype: F; isotypes: GH, NY, US).

VACHELLIA X STANDLEYI (Saff.) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia x standleyi* Saff., J. Wash. Acad. Sci. 4: 367. 1914. *Myrmecodendron standleyi* (Saff.) Britton & Rose, N. Amer. Fl. 23: 92. 1928. – TYPE: MEXICO. NAYARIT: along the river in the vicinity of Acaponeta, Territory of Tepic, W Mexico, 11 Apr 1910, *J. N. Rose, P. C. Standley & P. G. Russell 14374* (holotype: US, F photo).

Acacia x hirtipes Saff., J. Wash. Acad. Sci. 4: 367. 1914. *Myrmecodendron hirtipes* (Saff.) Britton & Rose, N. Amer. Fl. 23: 92. 1918. – TYPE: GUATEMALA. SANTA ROSA: along the Río de las Cañas, 3,000 ft., Apr 1892, *Heyde & Lux 3299b* (holotype: US, NY photo).

Myrmecodendron oaxacanum Britton & Rose, N. Amer. Fl. 23: 92. 1928. – TYPE: MEXICO. OAXACA: Fonameca, alt. 110 m, 3 Jul 1925, *E. Makrinius 488* (holotype: US).

VACHELLIA TORTUOSA (L.) Seigler & Ebinger, **comb. nov.** Basionym: *Mimosa tortuosa* L., Syst. Nat., 10th ed., 2: 1312. 1759. *Acacia tortuosa* (L.) Willd. Sp. Pl. 4: 1083. 1806. *Poponax tortuosa* (L.) Raf., Sylva tellur. 118. 1838. – TYPE: JAMAICA. without exact locality, *Patrick Brown(e) s.n.* (holotype: LINN, microfiche).

Acacia virescens DC., Cat. pl. horti monsp. 74. 1813. – TYPE: probably South American, the species was described from a plant grown in the Botanical Garden in Montpellier. The seeds for this

plant were obtained from the Botanical Garden in Madrid. (holotype: G-DC, microfiche).

Acacia leucacantha Bertero, Spreng., Syst. veg. 3: 144. 1826. – TYPE: JAMAICA. *C. G. Bertero s.n.* [lectotype, designated by Ebinger et al. (2000): MO].

Acacia seifriziana León in León and Alain. Contr. Ocas. Mus. Hist. Nat. Colegio "De La Salle" 9: 8. 1950. – TYPE: CUBA. ORIENTE: low forest near Maisí, Jul 1938, *León and Seifriz 18351* (holotype: HAC). NOTE: We have not been able to examine the type, however, based on the description, it appears referable to *Acacia tortuosa*, a conclusion also advanced by Bässler (1998).

Mimosa salinarum Rohr ex Benth., Trans. Linn. Soc. London 30: 501. 1875. – TYPE: none cited.

VACHELLIA VERNICOSA (Britton & Rose) Seigler & Ebinger, **comb. nov.** Basionym: *Acaciopsis vernicosa* Britton & Rose, N. Amer. Fl. 23: 96. 1928. *Acacia vernicosa* Standl. , Cont. U. S. Natl. Herb. 20: 187. 1919 (*nom. Illeg.*). Acacia *constricta* Benth. var. *vernicosa* L. Benson, Amer. J. Bot. 30: 238. 1943. *Acacia neovernicosa* Isely, Sida 3:380. 1969. (based on the same type). – TYPE: MEXICO. CHIHUAHUA: in the vicinity of Santa Rosalía, alt. 1200 m, 13-15 Jun 1908, *E. J. Palmer 385* (holotype: US; isotypes: GH, MO, NY). NOTE: Not *Acacia vernicosa* Fitzgerald (1904), an Australian species with phyllodes, presently considered a synonym of *Acacia incrassata* Hook. (Maslin 2001c).

VACHELLIA VILLAREGALIS (McVaugh) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia villaregalis* McVaugh, Flora Novo-Galiciana 5: 141. 1983. – TYPE: MEXICO. JALISCO: Cima Cerro de Tequila, bosque de *Quercus* spp. y *Pinus* spp., alt. 2850 m, 17 Mar 1974, *L. M. Villarreal 6171* (holotype: MICH).

VACHELLIA ZAPATENSIS (Urb. & Ekman) Seigler & Ebinger, **comb. nov.** Basionym: *Acacia zapatensis* Urb. & Ekman, Ark. Bot.. 22a(8): 30. 1928. – TYPE: CUBA. MATANZAS: Zapata Peninsula, in shrub forest towards Bahía de Cochinos, in open places on limestone, 31 Jan 1924, *E. L. Ekman 18358* (holotype: B, destroyed; isotype: NY).

EXCLUDED NAMES

The following species have been considered to belong to former subgenus *Acacia* by some authors:

Acacia amentacea DC., Prod. 2: 455. 1825., based on a Sessé and Mociño drawing that is ambiguous (Lee et al. 1989). No type specimen has been found and the quality of the drawing does not permit conclusive identification of the plant depicted.

Acacia haematomma Bertero in DC., Prod. 2: 456. 1825. Examination of the type specimen indicates that this is a *Calliandra* species (Britton & Rose, 1928, Barneby, 1998).

Acacia peruviana Willd., Enum. pl. 1056. 1809. The type specimen at P is not an *Acacia* as it has a single pair of pinnae and lacks stipular spines and prickles.

The following names appear on specimens, but were never validly published, to our knowledge:

Acacia *leoni* Marie-Victorin. -- Name appearing on the label of type specimens of *Acacia bucheri*.

Vacheliopsis cubana -- Name on the label of the isotype of *Acacia cupeyensis* (M.Curbelo 512) attributed to Britton & Wilson.

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STATUS AND MANAGEMENT OF *ERIOCAULON KOERNICKIANUM* (ERIOCAULACEAE) IN TEXAS

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ABSTRACT

A large body of information and misinformation has developed on the distribution of *Eriocaulon koernickianum* (Dwarf Pipewort) in Texas. We have sifted it, including both published and unpublished reports down to agency interoffice memos. About half of the distribution reports are in error. We searched herbaria and sites where *E. koernickianum* was reported, as well as other promising sites in Texas. We currently know of ten vouchered sites where *E. koernickianum* either currently exists or has recently existed. All sites are either in the Edwards Plateau or Post Oak Savanna regions; none is in the Pineywoods region. How the type specimen collected by Charles Wright became associated with Tyler County in east Texas remains unknown; where it was collected will probably remain a mystery.

The sites where *E. koernickianum* occurs range in size from less than a square meter to several hectares. Populations range from a few plants to thousands. And population numbers fluctuate wildly from year to year for reasons that are not altogether clear. It appears that the species is disturbance dependent and cannot tolerate shade or major ground disturbance such as hog rooting.

Of the ten known locations, four are protected on Texas Parks and Wildlife lands; the others are on private land and are mostly in bad condition. The future of the species in Texas is precarious.

KEY WORDS: *Eriocaulon koernickianum*, Eriocaulaceae, Dwarf Pipewort, Texas, rare species.

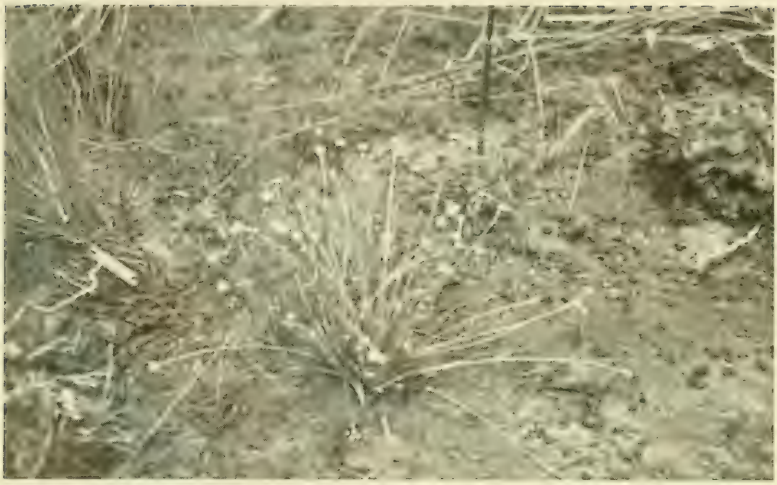

Figure 1. *Eriocaulon koernickianum* from Andrew's Bog, Gus Engeling Wildlife Management Area, Anderson County.

INTRODUCTION

Eriocaulon koernickianum Van Heurck & Muell.-Arg., Dwarf Pipewort, the most diminutive of the eleven North American eriocaulons (Figure 1), is widely disjunct in Arkansas, Georgia, Oklahoma, and Texas (Kral 2000)(Figure 2). It is a monoecious, outcrossing annual whose limited genetic variation across its range suggests that recolonization may explain current distribution (Watson et al. 2002). It is of conservation concern and is listed G2 (imperiled) federally and either S1 or S2 (critically imperiled/imperiled) in all states where it occurs (Kral 2000, NatureServe 2005). In Georgia, north Arkansas, and at one Texas site it occurs in moist depressions in granite outcrops; in south Oklahoma, south Arkansas, and most Texas sites, it is associated with bogs, marshes, and sandy seepage slopes below xeric sandylands (Jones and Carpenter 1995, MacRoberts and MacRoberts 2001, MacRoberts et al. 2002a).

Between 1998 and 2002, we surveyed for and made observations on *E. koernickianum* in Texas. We also examined the published and

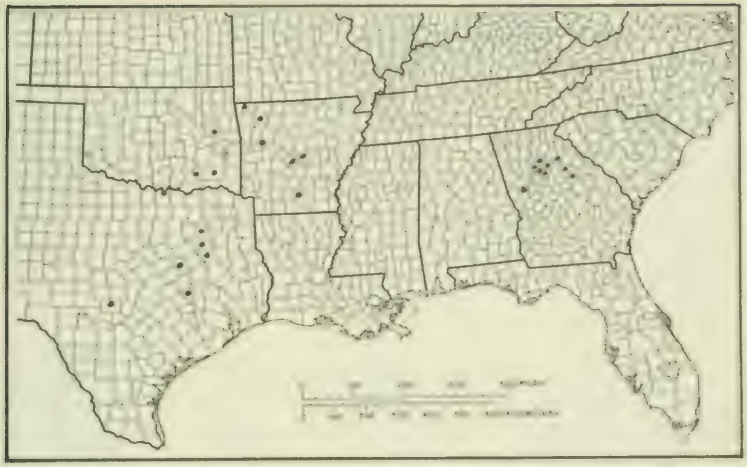

Figure 2. Distribution of *Eriocaulon koernickianum* (distribution outside Texas based on literature and personal communications and not vouched for in this study. Texas locations vouchered).

unpublished records relating to this species. This paper summarizes our findings previously reported in unpublished, largely non-circulating reports (MacRoberts and MacRoberts 1999a, 1999b, 2002). Some of the information in those reports has been omitted (notably maps showing specific site locations) since *E. koernickianum* is a rare species. Some of the information in our reports has now been incorporated into publications and other reports, correcting some previous distribution errors (e.g., Turner et al. 2003, Carr 2004, Texas Parks and Wildlife 2004). Nonetheless, since the bulk of the information in our reports is not accessible and is perhaps of interest to the general botanical community, we have decided to publish it.

DISTRIBUTION

We discovered, on surveying the published and unpublished literature and talking with botanists and ecologists, that considerable confusion exists about the Texas distribution of this species. The confusion begins

with the type specimen, which was collected by Charles Wright in Texas sometime between 1837 and 1852. Van Heurck (1870), who described it, recorded it as "Texas orientali;" the specimen apparently was then part of the Van Heurck herbarium in Antwerp. Moldenke (1942), after pointing out that he had seen no Texas material, says "the type is said to have been collected in 'East Texas' [=Tyler Co.]..." but he gave no explanation why East Texas = Tyler Co., nor did he in a previous publication (Moldenke 1937) equate east Texas with Tyler County. Correll and Johnston (1970) repeat Moldenke's (1942) statement almost verbatim, but Moldenke (1947) does not clear up the matter.

Subsequently, Moldenke's attribution of Tyler County for the type specimen has spread into the formal and informal literature, both as written statement and as a dot on distribution maps, and in Element Occurrence Records produced by such organizations as the Texas Natural Heritage Program (now Texas Parks and Wildlife). Kral's (1966) county dot distribution map for *E. koernickianum* in Texas shows it occurring in Brazos, Tyler, and Polk counties, but Kral does not comment or give vouchers. Geraldine Watson (1982) reports it for the Big Thicket National Preserve but without specific comment or vouchers. Her plant collections have been examined by Larry Brown (pers. comm.; data on file Big Thicket National Preserve), but he found no *E. koernickianum* among them. Tucker (1983), in a dot distribution map, shows *E. koernickianum* in Polk and Brazos counties but without comment or vouchers. Texas Organization for Endangered Species (1993) lists *E. koernickianum* for Brazos, Freestone, Leon, and Tyler counties but without vouchers or references. Kral (1983) gives a county dot map showing Hardin and Brazos counties, again without vouchers or comment. The Texas Natural Heritage Program (1995) reports *E. koernickianum* from "Anderson, Brazos, Limestone, Leon (?), and Tyler (H) Counties." The "?" is unexplained; "H" refers to an historical occurrence: "not observed or collected within fifty years," which is presumably the Charles Wright specimen from "Tyler Co." Hatch et al. (1990) report it from the pineywoods region of east Texas. Kral (2000) gives a distribution map, but it does not designate counties. There are six Element Occurrence Records for the taxon produced by Texas

County & site	Exact location known	First year located	Year last located	Pop. size
ANDERSON				
Andrew's Bog*	yes	1990	2002	2500+
Dale's Bog*	yes	2001	2002	5
Jim's Bog *	yes	2001	2002	100+
BRAZOS				
Wellborn	no	1947	1947	?
GILLESPIE				
Enchanted Rock*	yes	1993	1999	1000+
HENDERSON				
Baker Lake	yes	1999	1999	3
Curtis Boyd Bog	yes	1999	2001	3
Tindel's Bog	yes	2001	2001	3
LIMESTONE				
Perino's site	yes	1979	1995	7-8
VAN ZANDT				
Arc Ridge Ranch	yes	2001	2002	20

Table 1. Summary of information on confirmed *Eriocaulon koernickianum* sites in Texas by counties. The population numbers are based on field assessments at highest known population. Populations fluctuated radically. *Protected sites managed by Texas Parks and Wildlife.

Parks and Wildlife; none is verified, and three are incorrect. Watson et al. (1994) show the general distribution of *E. koernickianum* but without specific county locations or vouchers. Watson and Uno (1991) state that there were no recently confirmed populations in Texas but that it was known historically from four sites, and a 1994 correspondence among L. Watson (Oklahoma Natural Heritage Inventory), C. Norquist (U.S. Fish and Wildlife), and J. Poole (Texas Natural Heritage Program) indicates that at that time there was no certainty about any *E. koernickianum* site in Texas!

Site	Size of site in ha. (suitable habtat)	Area in which species found (ha.)	Condition of site
Andrew's Bog	20.0	several	Good
Dale's Bog	1.0	0.0001	Poor/Good
Jim's Bog.	0.4	0.2	Poor/Good
Wellborn	?	?	?
Enchanted Rock	0.0035-0.0045	0.0025	Good
Baker Lake	several	0.0001	Good
Curtis Boyd	1.0	0.0001	Poor
Tindel Bog	2.0	0.0001	Poor
Perino site	2.0	?	Very Poor
Arc Ridge	1.0	0.0001	Good

Table 2. Characestics of *Eriocaulon koernickianum* sites in Texas.

In order to determine the distribution of *E. koernickianum* in Texas, we searched *Eriocaulon* collections in the following herbaria: TEX, BRIT, VDB at BRIT, ASTC, SBSC, SHST, WWF, Corpus Christi Museum, and collections held at Rice University. Three other herbaria, BAYLU, TAES, LSU, and TAMU, were searched via the web and/or by correspondence with the curators or original collectors. We sifted all the literature, published and unpublished --- including interoffice memos and interagency letters, and we contacted many of the principals involved in *E. koernickianum* work, for example, Linda Watson (Miami University) and Jason Singhurst (Texas Parks and Wildlife). We ground-truthed all sites that could be located.

Nomenclature for species referred to in this paper follows Kartesz and Meacham (1999), and authorities can be read in that work.

ANDERSON CO.: We have located *E. koernickianum* at three sites on the Gus Engeling Wildlife Management Area (Texas Parks and Wildlife Department).

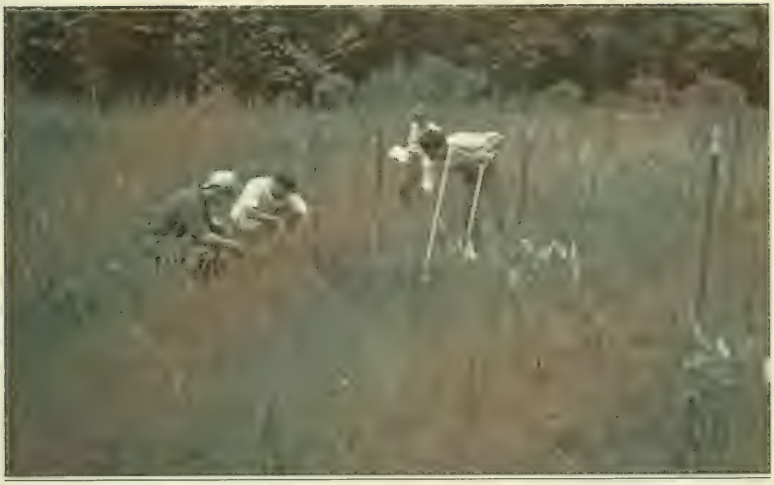

Figure 3. *Eriocaulon koernickianum* habitat at Andrew's Bog, Gus Engeling Wildlife Management Area, Anderson County.

Andrew's Bog (EOCODE PMERI01040*003*TX) (EOCODE records refer to Texas Parks and Wildlife records). Vouchers have been collected since 1990 from several locations on the northern shore of this bog (see Tables 1, 2, and 3 for further information about all sites where *E. koernickianum* is found).

This site has been described by MacRoberts and MacRoberts (1998, 2001; see also Lodwick 1975) (Figure 3). It is a deep muck/peat (quaking) bog, with a combination of hillside bog and marsh species, e.g., *Cladium mariscoides*, *Eleocharis* spp., *Eriocaulon decangulare*, *Iris virginica*, *Rhynchospora* spp., *Juncus* spp., *Sarracenia alata*, *Utricularia* spp. and *Xyris* spp. We found *E. koernickianum* at four locations. At Andrew's Bog, *E. koernickianum* occurs at the edges of the marshy/boggy community in bare wet sands on animal trails and where hogs (and other mammals) have rooted and trampled in the past and where the soils are wet but do not support high biomass and are open. The species is totally absent where biomass is high and shade occurs. It does not occur in the quaking areas of the bog where

COUNTY and site	Vouchers
ANDERSON	
Andrew's Bog	*Bridges & Kindscher 13698* [TEX]; *MacRoberts & MacRoberts 3950 [VDB at BRIT], 4099 [TEX].*
Dale's Bog	*MacRoberts & MacRoberts 4926* [TEX]
Jim's Bog	*MacRoberts & MacRoberts 4927* [TEX]
BRAZOS	
Wellborn site	*Parkes s.n.* [TAES, TAMU]
GILLESPIE	
Enchanted Rock	*O'Kennon 11677* [BRIT]; *MacRoberts, MacRoberts & O'Kennon 4105 [TEX]*
HENDERSON	
Baker Lake Bog	*MacRoberts, MacRoberts, & Cathey 4098* [TEX]
Curtis Boyd Bog	*MacRoberts & MacRoberts 4482* [TEX]
Tindel Bog	*MacRoberts & MacRoberts 4952* [TEX]
LIMESTONE	
Perino site	*Perino 4258* [SMU-BRIT]; *Singhurst 6887* [TEX]
VAN ZANDT	
Arc Ridge Ranch	*MacRoberts & MacRoberts 5018* [TEX]

Table 3. Vouchered Texas *Eriocaulon koernickianum* locations.

vegetation is dense and "soils" are predominantly organic muck but only on the sandy edges. Upslope are xeric sandhills and post-oak savanna (MacRoberts et al. 2002a). According to E.L. Bridges (undated memo to L.E. Watson), in 1990 *E. koernickianum* "was abundant after fire" indicating that removal of coarse overtopping vegetation is ideal for this species.

Species abundance in 12 one meter square plots where *E. koernickianum* was found is as follows from most common to least common: *Eleocharis tortilis, Rhynchospora* spp., *Dichanthelium scoparium, Scleria reticularis/triglomerata, Hypericum mutilum, Dichanthelium scabriusculum, Vernonia missurica, Rhexia virginica, Helianthus angustifolius, Eupatorium rotundifolium, E. perfoliatum, Iris virginica, Ludwigia* sp., *Boltonia diffusa, Juncus* sp., *Lycopus rubellus, Panicum virgatum, Xyris torta, Paspalum*

praecox/plicatulum, Sphagnum sp., *Hydrolea ovata, Linum striatum, Polygala sanguinea, Hibiscus moscheutos,* and *Lonicera japonica.* The maximum height of vegetation in these 12 plots averaged 0.75 m (range 0.5-1.2 m), with an average height of 0.30 m (range 0.2 - 0.5 m). Vegetation cover in the 12 plots averaged 80% (range 60 - 100%). Figure 3 shows typical habitat.

Jim's Bog. This bog was regularly surveyed beginning in 1998. However, it was not until 2001, after moderate hog rooting had opened it up, that *E. koernickianum* was found there and in fairly large numbers (up to 20 plants per square meter; hundreds of plants in total). By 2002, with additional severe pig rooting, only four plants were found in the entire bog.

Dale's Bog. In 2001, five *E. koernickianum* plants were found in a one square meter area of this bog where pigs had rooted. No *E. koernickianum* was found at this site in 2002.

We surveyed many other bogs and bog/marsh complexes on Gus Engeling Wildlife Management Area but found no additional *E. koernickianum* populations.

BRAZOS CO.: Wellborn site (EOCODE PMERI01040*002*TX). The exact location is not recorded on the herbarium label, but the specimens were collected near Wellborn, Texas. There are four specimens listed for the TAES and TAMU herbaria web site, with dates 12-18 May 1947. Monique Dubrule Reed (pers. comm.) has confirmed that these specimens are at TAMU, and Stephen Hatch (pers. comm.) that they are present at TAES. Due to a lack of specific site directions, this site cannot be relocated. Its fate, therefore, is unknown. The habitat is not recorded. It is (was) undoubtedly on private land.

FREESTONE CO.: Reports from this county are mistaken; see Limestone County.

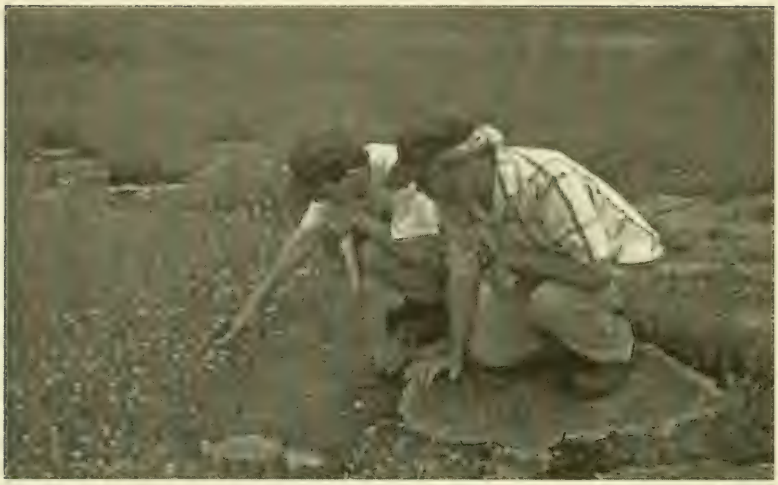

Figure 4. *Eriocaulon koernickianum* habitat at Enchanted Rock, Gillespie County. Flowers are *Utricularia cornuta.*

GILLESPIE CO.; Enchanted Rock. This site is on the south side of Enchanted Rock State Natural Area (Texas Parks and Wildlife)(Figure 4) and is the only known site for this species in the Edwards Plateau.

We visited the site with Bob O'Kennon on 22 June 1999. It is a permanent hillside seep on grus (decomposing granite gravel-sand, with bare granite outcropping within it) (Walters and Wyatt 1982). The site is small and covers only about 0.0035 - 0.0045 ha. O'Kennon has looked for other similar sites in the area but has found none. Private lands around Enchanted Rock have not been surveyed; there are other granite hills in the area. O'Kennon says the site has not changed since he first saw it in 1984; possibly it has increased slightly in size.

Surrounding and upslope habitat is desert scrub: e.g., *Aesculus arguta, Aloysia gratissima, Commelina* sp., *Echinocerus* spp., *Eriogonum annuum, E. tenellum, Froelichia gracilis, Gnaphalium* spp., *Hedeoma drummondii, Opuntia* spp., *Palafoxia* sp., *Quercus stellata, Q. fusiformis,* and *Yucca* sp.

Among associated species in the seep, dominants are *Allium* sp., *Hypericum mutilum* and *Utricularia cornuta*; also common are *Coreopsis basilis* (edge), *C. tinctoria, Cyperus haspan,* and *Scleria verticillata*. Other less common species are *Ammania coccinea, Cyperus acuminatus, C. elegans, C. squarrosa, Dichanthelium oligosanthes* var. *scribnerianum, Fuirena simplex* (?), *Hypericum reverchonii, H. gentianoides* (edge), *Juncus acuminatus, J. marginatus, Lechea sans-sabeana* (upslope-edge), *Lechea tenuifolia*, *Sabatia formosa* and Nostock algae. The *Utricularia* was dominant.

The total biomass at the site is not high. Looking down on the site, the ground can be seen clearly. *Eriocaulon koernickianum* was scattered throughout, except at the edges. We took two one meter square plot samples: 60 plants in one; 50 plants in the other. Hence, there were probably at least 1000 *E. koernickianum* in this small seep.

HARDIN CO.: (EOCODE PMEI101040*003*TX.). This report turned out to be a misidentified *Lachnocaulon anceps*. It apparently got into the literature through a Rare Plant Study Center report, University of Texas, Austin. Our information on this is from an annotated Element Occurrence Record Report-Texas Natural Heritage Program and from unpublished correspondence among Natural Heritage personnel. The original report was based apparently on a Cory specimen collected in 1947.

HENDERSON CO.: Curtis Boyd Bog (aka Mr. Black's Bog). In our previous communications (MacRoberts and MacRoberts 1999a, 1999b), we reported conflicting information about the occurrence of *E. koernickianum* at this site. However, in 2000 we located three *E. koernickianum* plants in this bog. The site is on private land and has not been burned in many years. The biomass is very high, and the *E. koernickianum* were found in disturbed areas that were open to sunlight. It is a hillside pitcher plant bog below xeric sandylands. Typical species were *Asclepias rubra, Dichanthelium* spp., *Eleocharis* sp., *Eriocaulon decangulare, E. texense*, *Eupatorium rotundifolium, E. perfoliatum, Polygala cruciata*, *Rhynchospora* spp., *Sarracenia alata, Vernonia missurica, Viburnum nudum,* and *Xyris* spp.

Baker Lake Pitcher Plant Bog, Coon Creek Club. We searched this and closely adjacent sites in May 1999. Three *E. koernickianum* were found. The site was prescribe burned in 1998 and 1999. It has typical muck bog species. The site is on private land. Associated species were: *Drosera* spp., *Eleocharis* spp., *Eriocaulon decangulare, Hypericum mutilum, Juncus* spp., *Lycopodiella appressa, Osmunda cinnamomea, O. regalis, Sarracenia alata, Utricularia cornuta, U. subulata,* and *Xyris* spp.

Tindel Bog. Three *E. koernickianum* plants were found at this site, which is on private land. It is heavily grazed by cattle and most of the bog is badly rutted and damaged. It is a pitcher plant bog with some marsh species below xeric sandylands. Associates were *Acer rubrum, Boehmeria cylindica, Carex* spp., *Dichanthelium scoparium, Drosera* sp., *Eriocaulon decangulare, Eleocharis spp., Hibiscus moscheutos, Hydrocotyle* sp., *Hypericum mutilum, Juncus* spp., *Lycopodiella appressa, Morella cerifera, Osmunda cinnamomea, O. regalis, Paspalum* sp., *Peltandra virginica, Ptilimnium* sp., *Rhynchospora* spp., *Saccarum giganteum, Sarracenia alata, Saururus cernuus, Scleria* spp., *Scutellaria integrifolia, Smilax* sp., *Sphagnum* sp., *Utricularia cornuta, U. subulata, Vernonia missurica,* and *Xyris* spp.

LEON CO.: (EOCODE PMERI01040*004*TX). A location for *E. koernickianum* reported by Geyata Ajilvsgi was searched by Steve Orzell and others but it was not found. Apparently no voucher was collected. Our information on this site is from unpublished correspondence among Texas Natural Heritage Program personnel and from our correspondence with Jason Singhurst.

LIMESTONE CO.: Perino's Site (EOCODE PMERI01040*001*TX). This site is a hillside bog from which *E. koernickianum* has been collected twice: by Perino in July 1979 and by Singhurst in June 1994. The site is on private land. There has been a lot of confusion over the Perino specimen and site location. It was originally reported to be in Freestone County but directions led to Limestone County. Some of the grey literature indicates that the Perino specimen is at TAES, not

BRIT-SMU (Watson 1989, 1992, 1995): it is at BRIT-SMU. Also, Perino's collection number is sometimes incorrectly given as 4528, instead of 4258. Singhurst (pers. comm. 18 Sept. 1998) relocated the site in 1994 and "collected only two individuals ... due to scarcity of this taxa at site." He said (pers.comm. 28 June 1999) that he saw 7 or 8 plants. Singhurst (letter 25 April 1998) revisited the site in 1995 and found the plants still "holding on." Associated taxa included *Asclepias rubra*, *Fuirena squarrosa, Sphagnum* sp., *Xyris* spp., and other bog species. *Sarracenia alata* was not found at this site.

We visited this site on 21 June 1999 but found no *E. koernickianum*. The site is a very wet seepage slope below a deep sand (Carrizo formation) hill, which is now a hay field. In the seepage area, we found almost none of the associated species listed either by Perino: e.g. *Fuirena, Xyris*, or by Singhurst: notably *E. decangulare*. The site was covered with a rank growth of grasses, including introduced grasses from the adjacent hay field, and several *Cyperus* and *Juncus* species. The seepage slope was heavily disturbed by cattle. Typical species were *Carex* sp., *Betula*, *Hibiscus, Hydrocotyle, Hypericum mutilum*, *Rhexia*, *Rhynchospora*, and *Typha*. These wetland species --- most of which are marsh or pond edge species --- were mixed with upland plants, such as *Helianthus debilis, Rudbeckia, Pycnanthemum*, and *Tradescantia. Eryngium prostratum*, a species that occurs in several habitats and which is not particularly associated with hillside bogs, occurred at the site but there was no *E. integrifolium*, a typical bog species. *Rumex* species were also present. Overall the site was highly disturbed and weedy. This description comports with Singhurst's some years earlier (letter dated 25 April 1998) in which he said that "this site is in bad shape, over grazed and needs conservation attention immediately." Singhurst (pers. comm. 28 June 1999) also stated that the site was bush hogged and attempts were made to drain it in 1995 through 1997.

Singhurst (pers. comm. Nov. 10, 2005) revisited the site on 18 September 2005 and found only "one area of sphagnum left" and "no *Eriocaulon* although *E. decangulare* was common at the site in 1994." From Singhurst's description of the site, it was in worse shape in 2005

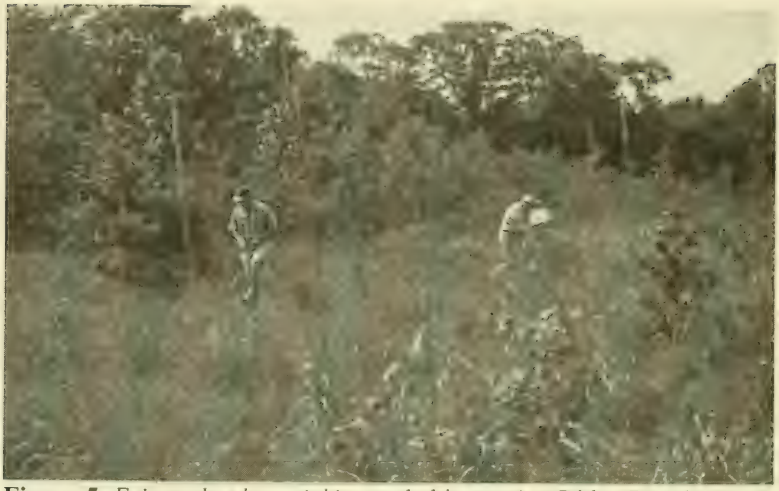

Figure 5. *Eriocaulon koernickianum* habitat at Arc Ridge Ranch, Van Zandt County.

than it was in 1999. Clearly, it was once a viable bog; it is now severely degraded.

If there are *E. koernickianum* still present at this site, they will be difficult to find. The biomass is high and it is hard to search.

POLK CO.: This county appears on some distribution dot maps for *E. koernickianum*, which certainly is an error (Kral 1966, Tucker 1983; see also Watson et al. 1994). To our knowledge, there is no report for Polk County other than these dot maps.

TYLER CO.: (EOCODE PMERI01040*005*TX). This is where the Charles Wright type specimen is supposed to have been collected (see Van Heurck 1870, Moldenke 1942, and Correll and Johnston 1970). The Wright specimen was not seen by Moldenke, Correll and Johnston, or Kral (Kral pers. comm.) and its provenance remains unknown. A note in Tucker (1983) says: "Type specimen --- Texas, apparently without locality or date, collected by Charles Wright, in Herb. DC. et Van Heurck (type not seen by author of this report; preceding

information taken from a handwritten note in the *Eriocaulon* folder at New York Botanical Garden)." But according to Tucker, nothing is said about "Tyler Co." Geraldine Watson (1982) has reported *E. koernickianum* from the Big Thicket National Preserve but did not collect a voucher. The Preserve is in both Tyler and Hardin counties. Our (and others) extensive surveys of what appears to be suitable habitat in this region (wetland pine savanna and hillside bogs) has revealed no *E. koernickianum* (MacRoberts and MacRoberts 2001; MacRoberts et al. 2002b; Brown et al. 2005).

Although we attempted to find the type specimen in appropriate herbaria in Belgium, we never received a response to any of our inqueries.

VAN ZANDT CO.: Arc Ridge Ranch. There are several beaver ponds on this private holding. We surveyed many of these and in a grassy area at the shallow end of one pond found a few *E. koernickianum* (Figure 5). The *E. koernickianum* at this site persisted through at least two years. This pond did not begin to form until about 20 years ago: before it had been largely an open bog. Plants common in the area in which *E. koernickianum* was found were *Acer rubrum, Dichanthelium* spp., *Drosera* sp., *Eleocharis* sp., *Saccarum giganteum, Eupatorium rotundifolium, Lycopodiella appressa, Morella cerifera, Nyssa biflora, Rhynchospora rariflora, Scleria* sp., *Sphagnum* sp., *Utricularia cornuta,* and *U. subulata.* The area has not burned in decades.

We have reported above on the sites where *E. koernickianum* has been reported and on sites where it has been found. Our surveys during the period 1998 to 2002 extended from Caddo Parish to Vernon Parish in Louisiana, from Bowie and Wood counties to Hardin and Gillespie counties in Texas, and into southeastern Oklahoma. Dozens of sites were thoroughly or partly searched. Some of the more important areas searched are Hilltop Estates, Leon County; Arc Ridge Ranch, Van Zandt County; and Gus Engeling Wildlife Management Area, Anderson County. Extensive surveys of bogs and wetland pine savannas (which appear to be ideal habitat for this species) have been carried out in southwest Louisiana and southeast Texas by numerous

Site	pH	P	K	Ca	Mg	OM
Ek 2	4.30	6.0	81.0	257.0	57.0	1.80
Ek 4	4.10	6.0	82.0	279.0	59.0	1.80
Ek 6	4.10	10.0	111.0	447.0	98.0	2.00
Curtis Boyd	4.40	12.0	61.0	361.0	98.0	2.00

Table 4. Soils of selected *Eriocaulon koernickianum* sites (OM = Organic matter). Ek 2, 4, 6 are from Andrew's Bog (Anderson Co.) and Curtis Boyd = Curtis Boyd Bog (Henderson Co.).

botanists for many years without discovering *E. koernickianum* (see summary in MacRoberts and MacRoberts 2001).

Access to private land was the biggest problem in this survey. Virtually all thorough searches were made on public land (e.g., Big Thicket National Preserve, Gus Engeling Wildlife Management Area) or on private lands whose owners are favorable to conservationists.

SOILS, LIFE HISTORY, AND POPULATION

At Andrew's Bog, Gus Engeling Wildlife Management Area, we made observations on soils and population dynamics of *E. kornickianum*. These are reported here.

Soils. We collected soil samples from the upper 15 cm from four sites (three from Andrew's Bog and one from Curtis Boyd Bog, Henderson County) and had them analyzed by A. & L. Laboratories, Memphis, Tennessee. Table 4 presents the results. Soils are acidic and in general nutrient poor. They are similar to those found in other West Gulf Coastal Plain bogs (Watson et al. 1994; MacRoberts and MacRoberts 2001).

Annual or Perennial. Whether or not *E. koernickianum* is an annual or perennial appears to be uncertain (Kral 2000; Watson et al. 1994). In 2000, we marked 246 individual plants in 12 one meter square plots to see if plants would come up at the identical spot the following year. In

Year/Site	Range of plants in 1 m sq. plots	Estimated plants at site
1999		
1	0-16	1000
2	0-18	500
3	0-30	1000
2000		
1	0-21	1000
2	0-10	100
3	0- 1	10
2001		
1	0-26	1000
2	0-15	500
3	0-27	1000
2002		
1	0- 9	250
2	0-13	200
3	0-33	400

Table 5. Estimated population over four years of *Eriocaulon koernickianum* at three sites at Andrews Bog.

2001, 96 plants came up in the study plots but only four were at the same spots, an indication that *E. koernickianum* is an annual. Additionally, *E. keornickianum* appeared suddenly at sites that had previously been thoroughly surveyed with no plants found, indicating a considerable seed bank at the Gus Engeling sites (see below).

Population fluctuations. Since 1999, we estimated the population for three sites at Andrew's Bog. We randomly set one meter square plots in each area, counted plants in the plots, and estimated the *E. koernickianum* population by multiplying by total area. Results are given in Table 5. Wide fluctuations in numbers occurred. For example, Site 3 had 1000 plants in 1999, 10 in 2000, 1000 in 2001, and 400 in 2002. Variables include pig rooting (always a reduction in numbers after severe pig rooting), fire (lack thereof), and possibly drought.

SITE/YEAR	Number of Plants per Plot				
	1	2	3	4	5
Transect 1.					
1999	13	15	12	16	0
2000	16	4	21	15	1
2001	17	6	26	20	3
2002	9	0	3	9	9
Transect 2					
1999	7	0	0	1	1
2000	0	1	0	0	0
2001	2	1	0	0	2
2002	0	0	0	0	0

Table 6. *Eriocaulon koernickianum* in ten one meter square plots in two transects over four years (Andrew's Bog).

Permanent plots. In 1999, we established two transects each with five one meter square plots spaced at three meter intervals in two areas of Andrews Bog where *E. koernickianum* occurred and counted the plants in each until 2002. The results are given in Table 6. Transect 2 was continuously rooted by pigs and never had many plants. It was completely destroyed by pigs in 2002. Transect 1 was in a moister area and did not get badly mauled by pigs until 2002.

Exclosures. In 2000, we established six one meter square hog exclosures and corresponding adjacent one meter square unprotected plots just outside the exclosures and counted *E. koernickianum* in each plot over three years. The plots were established in areas with significant numbers of *E. koernickianum.* Uncontrolled variables were fire, which burnt plots 5 and 6 in February 2002 (hog damage acted as a fire break for the other plots). The results are given in Table 7. Unprotected plots were largely destroyed by pigs in both 2001 and 2002 except for Plot 1 in 2001. Protected plots fared better: for two years, most plots kept numbers up but in the third year the herbaceous vegetation was so thick that *E. koernickianum* was shaded out. In Plots

5 and 6, this trend was advanced more rapildly perhaps because these plots had the most extensive vegetation growth and were shaded out in

Number 1.	Inside	Outside
2000	11	7
2001	14	8
2002	0	0
Number 2.		
2000	13	15
2001	15	0
2002	4	0
Number3.		
2000	26	26
2001	28	3
2002	5	0
Number 4		
2000	52	53
2001	27	0
2002	3	3
Number 5.		
2000	13	4
2001	1	0
2002	1	6
Number 6.		
2000	7	19
2001	0	0
2002	0	3

Table 7. *Eriocaulon koernickianum* numbers inside exclosure and outside exclosure in six plots (Andrew's Bog).

one year. The fire of February 2002, however, did not immediately reverse these trends, except for outside Plot 5.

Further observations where pigs, fire, moisture, and herbaceous growth are controlled will be necessary to piece together the importance of these factors in the life history of *E. koernickianum,* but our observations support the views expressed elsewhere: disturbance is important in *E. koernickianum* life cycle (Watson et al. 1994). Mild animal activity and fire are important: intensive pig rooting is detrimental to the species, as is fire suppression.

CONSERVATION

Watson et al. (1994, 2002) in their study of *E. koernickianum* in Oklahoma, found that many factors are contributing to the decline of this species including an annual or weak perennial life history, no vegetative reproduction, low seed set, limited seed bank contribution to population growth and maintenance --- however, our observations at the Gus Engeling sites indicate that seed bank must be quite large to drive the massive population fluctuations we observed --- genetic homogeneity, a restricted habitat, and poor competition abilities. As they said: "without intervention, western populations of *E. koernickianum* are doomed to extinction" (Watson et al. 1994:985). In our work, we have concentrated on the latter two factors, and our findings substantially concur with those of Watson et al. (1994, 2002): *E. koernickianum* is intolerant of shading, which indicates that over most of its range it benefits from disturbance (fire and *minor* animal activity). Our research with exclosures indicates that two years without appropriate disturbance is all that the species can tolerate. After two years, overtopping vegetation becomes dense and numbers plummet. Minor pig rooting opens areas, but major pig rooting leads to the destruction of the plants. The role of fire *alone* has not been explored, but anecdotal results indicate that it suffices to keep habitat open. Given its requirements (open, moist soils), *E. koernickianum* seems to be associated with areas of high biomass suggesting that it is sporadic and opportunistic and depends on specific conditions of soil, moisture, and cover. However, the species is absent from habitat that appear to be suitable which indicates that its dispersal may be limited (see Watson et al. 1994).

While Watson et al. (1994, 2002) reported a decline in populations in the western part of the species range, our surveys have doubled the known Texas sites and have increased the known counties where it occurs from four to six. We do not doubt that additional surveys (notably on private land) would uncover more sites because habitat is known to be present; a lack of access to private land prevented us from more meaningfully assessing of the status of this species in Texas. Nonetheless, mere presence on private land means little since there are no guarantees for its conservation there. Further, all known populations on private land are very small. Unless *E. koernickianum* is protected and managed, especially under the changed conditions that have followed European settlement (e.g., fire suppression, heavy cattle grazing and trampling, feral hog rooting), its fate remains very precarious. *Eriocaulon koernickianum* habitat requirements and life history characteristics make it very vulnerable.

Management would appear to be simple: 1) either remove hogs (and/or trampling livestock) or fence areas, 2) introduce fire every two to three years.

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A RECENSION OF THE MEXICAN SPECIES OF *ROLDANA* (ASTERACEAE: SENECIONEAE)

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ABSTRACT

A recension of the genus *Roldana* in Mexico is rendered. In the classically conceived Senecio (s.l.), *Roldana* belongs to the Sect. Palmatinervia, but I intend to recognize the genus in my upcoming treatment of the tribe Senecioneae for Mexico (cf. Turner 1996). In the present account, 58 species are recognized, including two newly described species from Oaxaca: *Roldana juxtlahuacana* B.L. Turner, **sp. nov.,** and *Roldana mazatecana* B.L. Turner, **sp. nov**.; and four newly transferred taxa from *Senecio* into *Roldana*: *R. floresiorum* (B.L. Turner) B.L. Turner, **comb. nov.**; *R. sinuata* (H.B.K.) B.L. Turner, **comb. nov**.; *R. tepopana* (B.L. Turner) B.L. Turner, **comb nov**.; and *R. tonii* (B.L. Turner) B.L. Turner, **comb. nov**. A key to the taxa is provided, along with a brief account of their taxonomy and a rather complete synonymy.

KEY WORDS: *Roldana, Senecio*, Mexico, Asteraceae

An on-going treatment of the Comps of Mexico has stimulated the present account, this started some 10 years ago, in anticipation of a treatment of the genus *Senecio* (s.l.) for Mexico with the late Ted Barkley (1934-2004), a conservative academic son of the late Art Cronquist. Following the death of Cronquist, Ted became suddenly less conservative (thanks to the clamour for a more rigorous phylogenetic nomenclature, and the use of DNA data in their discovery).

In any case, I have had to rework my original treatment of the *Roldana* compex, this requiring a number of new combinations in the

genus, as well as the description of two new species, as noted in the above abstract.

ROLDANA Llave & Lag.

Pericalia Cass.
Senecio sect. *Palmatinervii* Greenm.

Suffruticose perennial herbs, shrublets, or tree-like shrubs 0.5-7.0 m high. Stems mostly terete, rarely angulate, mostly pithy at maturity, rarely hollow. Leaves alternate, simple to deeply lobed, usually not peltate or somewhat subpeltate (the petiole attached close to the margin of the blade, rarely centrally peltate). Heads radiate or not, few to numerous in lax cymes or in rather congested corymbose panicles. Involucres 1-2 seriate, often bounded by bracts (the calyculus) which are sometimes larger than the involucral bracts. Ray florets pistillate, fertile, ligulate or not. Disk florets 6-numerous, the corollas yellow (white in *R. eriophylla*), the lobes usually shorter than the throat. Achenes ca. 10-ribbed, mostly glabrous, rarely pubescent, the pappus of numerous barbellate bristles. Base chromosome number, x = 30.

Type species: *Senecio roldana* DC. (= *Roldana lobata*)

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Roldana contains about 55 species, most of the taxa native to Mexico. It is primarily a shrubby group with a base chromosome number of x = 30. The genus is a segregate from *Senecio* (s.l.) and clearly relates to the cacalioid species of *Senecio*, as noted by several authors (cf. Jeffrey 1992 for an up-to-date review of the genera concerned). Gibson (1968) provided an unpublished monograph of the group, placing most of the species known to him in Sect. Palmatinervii of Greenman. Nearly all of these were accepted by Robinson and Brettell (1975) who transferred them to the resurrected genus *Roldana*, including *Pericalia*. I also accept the inclusion of *Pericalia* in *Roldana*. Pending additional study, I retain *Psacaliopsis* which, except for its subscapose habit and peltate leaves, differs but little from my concept of *Roldana*.

KEY TO THE SPECIES OF ROLDANA IN MEXICO

1. Plants acaulescent or nearly so, 20-75 cm high,
   the leaves peltate near center of blade.....genus *Psacaliopsis*
1. Plants not as described in the above.....(2a)

2a. Leaves seasonally deciduous, mostly absent at time of flowering.....*R. eriophylla*
2a. Leaves not seasonally deciduous, present at time of floweing.....(2b)

2b. Pedicels and bases of heads sparsely to densely pubescent; heads with or without rays [typical *Roldana*].....(8)
2b. Pedicels and bases of heads glabrous; heads without rays [*Pericalia* group].....(3)

3. Leaf blades peltate, fine venation of leaf not prominent.....*R. subpeltata*
3. Leaf blades not peltate, fine venation of leaf very prominent.....(4)

4. Corollas greenish or white; achenes glabrous.....(6)
4. Corollas yellow; achenes covered with short setae.....(5)

5. Phyllaries 5-8; heads without large subinvolucral bracts.....*R. mexicana*
5. Phyllaries 11-15; heads with many large subinvolucral bracts.....*R. suffulta*

6(4). Leaf blades cleft more than halfway to middle; corolla lobes separate nearly to tube.....*R. heteroidea*
6. Leaf blades only shallowly lobed; corolla lobes short.....(7)

7. Heads with 40-50 flowers; lobes of corolla as long as throat; leaf blades broadly ovate or elliptic with margins coarsely toothed or lobulate, lobules broader than long.....*R. sessilifolia*
7. Heads with 25-35 flowers; lobes of corolla less than half as long as throat; leaf blades deltoid or subcircular with 3-7 lobes, lobes longer than broad.....*R. michoacana*

8(2). Outer involucral bracts arranged in several imbricate series; herbs to 1 m high; Oax.....*R. mixtecana*
8. Outer involucral bracts not as described in the above.....(9)

9. Heads mostly with 5 or 8 phyllaries.....(35)
9. Heads mostly with 10-13 phyllaries.....(10)

10. Stems and petioles glabrous to white-villous or hirsute, not clearly lanate.....(13)
10. Stems and petioles lanate or densely tomentose.....(11)

11. Blades broadly oval, about as long as wide.....*R. lanicaulis*
11. Blades elliptical, 3-6 times as long as wide.....(12)

12. Involucral bracts 7-8 mm long; Dur.....*R. gesnerifolia*
12. Involucral bracts 5-6 mm long.....*R. neogibsonii*

13(10).Leaves pinnately dissected.....*R. ehrenbergiana*
13. Leaves variously toothed or lobed, not pinnately dissected.....(14)

14. Leaves ovate to orbicular with truncate or cordate bases.....(17)
14. Leaves lanceolate, elliptic to obovate, with bases cuneate and narrowly tapering.....(15)

15. Blades markedly denticulate; Jal.....*R. guadalajarensis*
15. Blades entire.....(16)

16. Petioles 8-15 mm long; Hid, Pue, Ver.....*R. neogibsonii*
16. Petioles 20-40 mm long; Mex.....*R. hintonii*

17(14). Achenes glabrous.....(19)
17. Achenes covered with short hairs.....(18)

18. Heads 6-5 mm high; Pacific slopes.....*R. carlomasonii*
18. Heads 10-12 mm high; Gulf slopes.....*R. marquezii*

19(17). Plants 20-25 cm high; Gue.....*R. tlacotepecana*
19. Plants 50-300 mm high.....(20)

20. Leaves broadly ovate to oblong, never peltate; veins subpalmate to nearly pinnate.....(31)
20. Leaves orbicular to broader than long, sometimes peltate; veins clearly palmate.....(21)

21. Heads with distinct ray flowers.....(24)
21. Heads without ray flowers.....(22)

22. Outermost corollas pistillate; Cps.....*R. heterogama*
22. Outermost corollas perfect; Hid, Ver.....(23)

23. Plants 45-80 cm high; disk florets 20-30.....*R. metepeca*
23. Plants 100-150 mm high; disk florets 30-50.....*R. grimesii*

24(21). Leaves mostly 7-11 lobed.....(26)
24. Leaves mostly 5-lobed.....(25)

25. Stems and phyllaries essentially glabrous; surface of rays densely papillose with projecting cells; Mex, Mex.....*R. glinophylla*
25. Stems and phyllaries markedly glandular-pubescent; Dur.....*R. tepopana*

26(24). Low herbacous plants 1-2 m tall with stems not deflected at nodes; inflorescence rather narrow and elongate.....(29)
26. Coarse shrubby plants 1-4 m tall with stems prominently deflected at nodes; inflorescence a broad corymbose panicle.....(27)

27. Phyllaries narrow with short, minute, gland-tipped hairs; tubes of ray flowers puberulous; disk flowers ca. 15; Gue.....*R. langlassei*
27. Phyllaries broad with dense, coarse nonglandular hairs; tubes of ray flowers glabrous; disk flowers 25-40.....(28)

28. Involucral bracts ca. 4 mm long; Oax.....*R. mazatecana*
28. Involucral bracts 6-10 mm long; Gue.....*R. gilgii*

29(26). Lower surface of leaves tomentose or flocculent-tomentose; heads with 20-25 disk flowers; Gue, Oax.....*R. pinetorum*
29. Lower surface of leaves hirsute, not tomentose; heads with 26-70 disk flowers.....(30)

30. Outer-most involucral bracts similar to the inner involucral bracts, or smaller.....*R. platanifolia*
30. Outer-most involucral bracts foliaceous, longer than the inner involucral bracts.....*R. nesomiorum*

31(20). Phyllaries usually 7-10 mm long with mostly flattened dorsal surfaces; disk florets 16-24.....*R. reticulata*
31. Phyllaries usually 3.5-6.0 mm long, at least inner phyllaries with a prominent central keel; disk florets 9-19, usually less than 16.....(32)

32. Stems usually deflexed at nodes, not fistulose.....(34)
32. Stems straight, usually fistulose (hollow), at least in lower parts.....(33a)

33a. Leaf blades clearly palmately veined from the very base, their margins weakly lobed if at all; Oax.....*R juxtlahuacana*
33a. Leaf blades not clearly palmately veined from the very base, their margins markedly lobed.....(33b)

33b. Phyllaries densely pubescent, glabrate with age; ray flowers often lacking.....*R. lobata*
33b. Phyllaries glabrous to sparsely pubescent; ray flowers present.....*R. kerberi*

34(32). Phyllaries glabrous to sparsely tomentose, their apices lanceolate.....*R. aschenborniana*
34. Phyllaries densely tomentose, their apices short-acute.....*R. barba-johannis*

35(9). Leaf blades palmately veined or lobed; blades truncate, cordate, or peltate at base.....(40)
35. Leaf blades pinnately lobed or veined, often elliptical or oblong-elliptical; blades cuneate or decurrent at base.....(36)

36. Achenes glabrous.....(38)
36. Achenes covered with short setae.....(37)

37. Leaves long and narrowly elliptical with only serrate margins.....*R. guadalajarensis*
37. Leaves rather ovate and deeply dissected into irregular broad lobes.....*R. heracleifolia*

38(36). Heads with 5 obtuse phyllaries; leaves irregularly serrate; stems woody; Ver, Oax, Cps.....*R. schaffneri*
38. Heads with 8 phyllaries.....(39)

39. Involucres 4-5 mm high.....*R. floresiorum*
39. Involucres 7-8 mm high.....*R. sinuata*

40(35). Heads nearly sessile in numerous small glomerules; soft-wooded shrubs.....*R. robinsoniana*
40. Heads on short to long pedicels, not in glomerules.....(41)

41. Leaves ovate or orbicular, denticulate, mostly with 5 or more lobes.....(43a)
41. Leaves mostly triangular with 3 distinct lobes.....(42)

42. Capitulescence with prominent bracts; ligules 7-9 mm long; Oax.....*R. anisophylla*
42. Capitulescence w/o prominent bracts; ligules 6 mm long or less; Mic, Mex.....*R. hederifolia*

43a(41). Leaves mostly with 5 major lobes.....*R. jurgensenii*
43a. Leaves mostly with 7-11 major lobes.....(43b)

43b. Inflorescence with prominent sessile foliaceous bracts at bases of primary and sometimes on secondary branches; phyllaries usually densely pubescent with short, often glandular, hairs.....(54)
43b. Inflorescence with only small bracts, any larger bracts narrowly petiolate; phyllaries glabrous or sparsely hirsute.....(44)

44. Lower stems lanose, the vestiture 2-3 mm high; Nue...*R. sundbergii*
44. Lower stems not as described in the above.....(45)

45. Plants herbaceous; inflorescence a flat or round-topped paniculate cyme with ascending branches .....(49)
45. Plants woody; inflorescence pyramdal-paniculate with spreading branches.....(46)

46. Leaves seasonally deciduous, densely pubescent; corollas with lobes 4-5 times as long as wide.....genus *Pittocaulon*
46. Leaves not seasonally deciduous, only slightly pubescent; corolla lobes 2-3 times as long as wide.....(47)

47. Involucre 6-7 mm high.....*R. albonervia*
47. Involucre 5-6 mm high; achenes pubescent.....(48)

48. Involucral bracts 7-9; Jal.....*R. manantlanensis*
48. Involucral bracts 5; Oax.....*R. calzadana*

49(45). Heads with 18-20 disk florets.....*R. petasites*
49. Heads with 4-16 disk florets.....(50)

50. Plants 70 cm high or less; leaves mostly basal.....*R. gonzalezi*
50. Plants to 1.5 m high; leaves not mostly basal.....(51)

51. Midstem leaves with petioles mostly 8-15 cm long.....(53)
51. Midstem leaves with petioles mostly 2-8 cm long.....(52)

52. Achenes pubescent.....*R. hartwegii*
52. Achenes glabrous.....*R. pennellii*

53(51). Lobes of blade acute; involucral bracts
8-9 mm long.....*R. acutangula*
53. Lobes of blade obtuse; involucral bracts
6-8 mm long .....*R. subcymosa*

54(43b). Stem leaves narrowly cleft to about
halfway to center.....*R. greenmanii*
54. Stem leaves shallowly lobed.....(55)

55. Involucres 5-7 mm high; corollas pubescent; Cps.....*R. tonii*
55. Involucres 7-12 mm high, corollas more or less glandular.....(56)

56. Plants from the mountains of central Mexico
and westward; outer phyllaries mostly pubescent
with short, usually glandular, hairs.....(62)
56. Plants from the eastern escarpment of Mexico
and Puebla or Oaxaca and southward;
phyllaries variously pubescent to glabrous,
usually with distinct scarious margins.....(57)

57. Lower leaf surfaces very sparsely pubescent.....*R. jurgensenii*
57. Lower leaf surfaces puberulous to tomentose.....(58)

58. Leaves densely tomentose on lower surface, their lobes regular and often sharp with numerous callus denticulations on margins.....*R. petasitis*
58. Leaves puberulous on lower surfaces, their lobes sometimes irregular or nearly entire.....(59)

59. Heads without rays.....*R. oaxacana*
59. Heads with rays (often reduced).....(60)

60. Phyllaries 7-10 mm long; Ver.....*R. sartorii*
60. Phyllaries 4-7(8) mm long.....(61)

61. Phyllaries 6-7 mm long; leaves mostly without callous denticulations.....*R. cordovensis*
61. Phyllaries 4-6 mm long; leaves with numerous callous denticulations.....*R. oaxacana*

62(56). Heads mostly with 15-40 disk flowers; leaves with lobes usually as long as wide with angulate margins; rays reduced or lacking; inflorescence bracts often very foliaceous.....*R. angulifolia*
62. Heads with less than 15 (and usually less than 10) disk flowers; leaves very shallowly lobed; rays absent or prominent; distal bracts of inflorescence not prominent.....(63)

63. Leaf blades not peltate; mature phyllaries 8-9 mm long.....*R. gentryi*
63. Leaf blades peltate; mature phyllaries usually less than 8 mm long.....*R. chapalensis*

ROLDANA ACUTANGULA (Hemsl.) H. Rob. & Brettell, Phytologia 27: 415. 1974
Cineraria acutangula Bertel.
Senecio acutangulus Hemsl.

Cps and adjacent Guatemala, montane cloud forests, 2400-2600 m; Dec-Jan.

Robust weak-stemmed suffruticose herbs or shrubs 1-4 m high; stems decidedly 4-6 angulate, loosely arachnoid-pubescent at first, but soon glabrate; mid-stem leaves 12-24 cm long, 6-16 cm wide; petioles 8-18 cm long; blades maple-like in shape, the lobes mostly 5-7 with apices acute, the margins denticulate or subserrate; heads numerous in axillary or subaxillary corymbose panicles, the ultimate peduncles 2-7 mm long; achenes sparsely, pubescent; otherwise much-resembling *R. manantlana* and *R. subcymosa*.

Roldana acutangula is readily distinguished by its angulate (not terete) stems, maple-like leaves and essentially glabrous involucral bracts. *Roldana subcymosa* of Gue is closely related and may not prove specifically distinct, although it appears to be easily separated from *R. acutangula* by its leaves, which have densely puberulent undersurfaces, broader lobes and glabrous achenes.

ROLDANA ALBONERVIA (Greenm.) H. Rob. & Brettell, Phytologia 27: 415. 1974.
Senecio albonervius Greenm.

Jal, Mic, Mex, Mor, Hid and Pue, pine-oak and fir forests, 2500-3000 m; Feb-Apr.

Shrubs, often tree-like, 3-7 m high; much-resembling *R. aschenbornia* and, except for its larger size (3-7 m vs 1-3 m), distinguished from this by its larger involucres 8-10 mm high (vs 5-8 mm) with fewer inner bracts (8 vs 10-13).

The species has been reported from Hid and Ver but I take these to be the occasional misidentification of *R. aschenborniana*, as that name is currently applied. Gibson (1968) cited a putative hybrid between *R. albonervia* and *R. aschenborniana* (Moore 23261) from Hid, noting that the leaves and general appearance are those of the former, while the heads are those of the latter. I think, however, that the specimen is but a leaf form of *R. aschenborniana*, there being considerable variation in the leaf shape and texture within both species. It is possible that the correct name for what I here call *R. albonervia* is *R. aschenborniana*, as typified by Gibson (1968), since the type of the latter is from Mex (about Toluca).

ROLDANA ANGULIFOLIA (DC.), H. Rob. & Brettell, Phytologia 27: 415. 1974.
Senecio angulifolius DC.
Cacalia berlandieri DC.
Senecio acerifolius K. Koch
Senecio angulifolius DC. var. *ingens* Greenm.
Senecio desertorum Hemsl.
Senecio prainianus Berger

San, Gua, Que, Hid, Jal, Mic, Mex, Mor, Tla, Pue, Ver and Gue, pine-oak or fir forests 1200-3400 m; Oct-Feb.

Sparingly branched shrublets to tree-like shrubs 2-7 m high; mid-stem leaves 10-20 cm long, 15-30 cm wide; petioles 4-15 cm long; blades weakly peltate, if at all, broadly ovate in outline; heads rather numerous in very leafy-bracteate cymose panicles, the ultimate peduncles 1-3 cm long; involucres mostly (9)10-12 mm long, the bracts mostly 8, rarely 9-11, densely pubescent with short glandular-trichomes; ray florets mostly absent, rarely present; disk florets mostly 15-40, the corollas yellow; achenes glabrous, the pappus 7-9 mm long; chromosome number, n = 30 pairs.

This is a widespread very variable species, as noted by McVaugh (1984), but readily recognized by its rather large heads which are usually subtended by foliaceous bracts, characters which distinguish it

from the superficially similar and widespread *R. chapalensis* and the more localized *R. sartorii*. Occasional plants have well developed rays. The var. ingens may be worthy of recognition since it appears to have larger involucres, occurring at subalpine elevations across the trans-volcanic belt from Jal to Ver; this taxon may also be the same as *Roldana langlassei*, which reportedly has 11-13 involucral bracts.

ROLDANA ANISOPHYLLA, (Klatt) Funston, Novon 11: 305. 2001
Senecio anisophyllus Klatt
Roldana cronquistii H. Rob. & Brettell
Senecio cronquistii (H. Rob. & Brettell) B.L. Turner & T. Barkley

Known only from Oax, ca. 100 km n of Cd. Oaxaca, pine-oak cloud forests, ca. 3000 m; Aug-Dec.

Suffruticose glabrous herbs or shrublets 0.5-2.0 m high; mid-stem leaves 6-10 cm long, 4-6 cm wide; petioles 4-6 cm long; blades triangular-hastate, 3-lobed, or less often merely hastate; heads radiate, numerous in terminal cymose panicles, the ultimate peduncles mostly 2-5 cm long; involucres turbo-campanulate 11-14 mm high, densely glandular-pubescent with short hairs, the bracts 8, abruptly acute apically; ray florets ca 5, the ligules yellow 11-14 mm long; disk florets 15-25, the corollas yellow; achenes glabrous, the pappus 6-8 mm long.

Funston, in his transfer of this taxon to *Roldana*, discussed the nomenclature of this species in much more detail, including his submergence of *R. cronqistii*.

ROLDANA ASCHENBORNIANA (Schauer), H. Rob. & Brettell, Phytologia 27: 415. 1974.
Senecio aschenbornianus Schauer
Roldana hirsuticaula (Greenm.) Funston
Roldana quezaltica (L. Wms.) H. Rob.
Senecio hirsuticaulus Greenm.
Senecio quezalticus L. Wms.
Senecio schumannianus Nees & Schauer

Mostly Gulf slopes, Nue, Tam, San, Que, Hid, Pue, Ver and Oax, pine-oak and fir forests, 300-2200 m; Nov-Apr.

Shrublet or shrub mostly 1-3 m high; much-resembling *R. barba-johannus* but the involucral bracts glabrous to sparsely tomentose with gradually-tapering, mostly lanceolate, apices; chromosome number, n = 30 pairs.

A widespread highly variable species, mostly occurring along the Gulf slopes from Tam to Oax, although collections have been reported from Guatemala. Gibson (1968) contends that hybrids between this species and *R. albonervia* occur (e.g., Moore 2326, GH, UC) and suggests that *R. hirsuticaula* (type: San, *Palmer 1114*) is a hybrid between *R. aschenborniana* and *R. lanicaulis*, although I think this is an erroneous interpretation. While he applies the name, *R. aschenborniana*, to the populations concerned here, it is possible, however, that the name is improperly applied, for the type of *R. aschenborniana* is from near Tolucca, Mex (GH, lectotype designated by Gibson), a region where recent collections of this Gulf slope taxon have not been made. It is possible that the name, *R. aschenborniana* applies to either *R. barba-johannis*, *R. albonervia*, or *R. lobata*, all of which are well-represented in w Mex. If this proves the case, then the Gulf-slope populations must take the earliest available name, *R. hirsuticaula*.

ROLDANA BARBA-JOHANNIS (DC.) H. Rob. & Brettell, Phytologia 27: 415. 1974.
Senecio barba-johnannis DC.
Roldana donnell-smithii (Coult.) H. Rob. & Brettell
Senecio donnell-smithii Coult.
Senecio grahamii Benth.
Senecio pullus Klatt

Sin, Nay?, Jal, Mic, Mex, Mor, Hid, Pue, Tla, Ver, Gue, Oax, Cps and Guatemala, pine-oak and fir forests, 2400-3900 m; Oct-Apr.

Shrublets or shrubs 1-4 m high; much-resembling *R. lobata* but occurring at higher elevations, the stems densely shaggy-villous and

straight and hollow at maturity, the leaves thicker, more densely tomentose beneath; heads with involucres persistently but loosely-tomentose, rarely glabrate.

In habit (the stems low, deflexed at the nodes, and pithy at maturity), *R. barba-johannis* resembles *R. aschenborniana* of northeastern Mexico (Ver to Tam) but the latter has mostly glabrous involucral bracts with gradually tapered apices. Material from Cps differ somewhat in having mostly purple-tipped involucral bracts and narrower leaf blades; such plants have been called *R. donnell-smithii*. Robinson and Brettell (1974) recognized the latter as specifically distinct; Gibson (1968) treated these as intergrading varieties, while Williams (1976) did not recognize the taxon, nor do I.

ROLDANA CALZADANA B. L. Turner, Phytologia 80: 276. 1996.

n Oax, Mpio. San Martin Perez, pine-oak woodlands; Feb.

Similar to *R. manantlanensis* but the leaves thinner with denticulate lobes (vs. lobes entire).

ROLDANA CARLOMASONII (B.L Turner & T. Barkley) C. Jeffrey, Kew Bull. 47: 54. 1992.
Senecio carlomasonii B.L. Turner & T. Barkley

Son, Chi, Sin, Nay and adjacent U.S.A., pine-oak woodlands, 1300-2100 m; Sep-Nov.

Suffruticose perennial herbs, shrublets or shrubs 1.0-2.5 m high; leaves mostly 10-20 cm, 6-12 cm wide; petioles 2-8 cm long; blades broadly oval to elliptic-ovate, sparingly pubescent beneath to glabrate; much-resembling *R. hartwegii* but the involucral bracts 10-13 in number (vs 5-8), the stems not arachnoid tomentose, and the leaves not densely and persistently puberulent beneath; chromosome number, n = 30 pairs.

Collections of this species have long gone under the name *R. hartwegii* Benth., but the taxa are readily distinguished as noted in the key. *Roldana carlomasonii* might also be confused with the more eastern, *R. pennellii*, which can be distinguished by its glabrous achenes, both *R. carlomasonii* and *R. hartwegii* having pubescent achenes.

ROLDANA CHAPALENSIS (S. Wats.), H. Rob. & Brettell, Phytologia 27: 416.1974.
Senecio chapalensis S. Wats.
Senecio adenolepis Greenm.
Senecio brachyanthus Greenm.
Senecio chapalensis var. *areolantus* Greenm.
Senecio chrismarii Greenm.

s Zac, Agu, Jal, Col, Mic, Mex, Mor, Gue and Oax, pine-oak and fir forests, 1500-2700 m; Nov-Feb.

Shrublets to tree-like shrubs 1-6 m high; mid-stem leaves asymmetrically peltate, rarely not, otherwise much-resembling *R. angulifolia* but the capitulesence with fewer leafy-bracts and the involucral bracts mostly 5-7 mm long (vs 8-12 mm), the latter not subtended by a conspicuous calyculus; ray florets present or absent; chromosome number, n = 30 pairs.

This is a highly variable species, especially as regards ray florets, these either absent or present and the ligules well-developed or much-reduced; eradiate populational forms have been given the name var. areolatus. Other than the absence of ray florets these appear to differ but little from typical populations of the species. Individuals referred to as *Senecio brachyanthus* appear to be forms of the species from Gue without short glandular-pubescent hairs on the involucre, these being replaced by totally eglandular multicellular trichomes (Mexia 9055, LL) with a mixture of both eglandular and long-glandular trichomes (Hinton et al. 11320, LL); the former collection was cited as var. chapalensis and the latter as var. areolatus by Gibson (1968). Both are said to have white flowers by the collectors concerned, whilst *R.*

chapalensis has bright yellow flowers. Such plants might ultimately prove to be specifically distinct. Gibson also refers to several collections of this species from northwestern Mexico (Chi and Sin) which appeared to differ from typical *R. chapalensis*. These were subsequently given the name *R. gentryi* by Robinson and Brettell and I follow them in this surmize. Future workers may wish to treat these as only varietally distinct.

ROLDANA EHRENBERGIANA (Klatt) H. Rob. & Brettell. Phytologia 27: 418. 1974.
Senecio ehrenbergianus Klatt
Senecio canicidus Sesse & Moc.
Senecio seperamatae T. Barkley

Mex, Mor and adjacent Pue, tropical deciduous forests, 1300-1600 m; May-Jun.

Stiffly erect, mostly unbranched herbs 0.5-1.0 m high; leaves 8-10 cm long, 4-7 cm wide; petioles 1-3 cm long; blades ovate in outline, 1-2 times as long as wide, deeply pinnately incised with 5 principal lobes, the latter often with shallow lobes; heads campanulate, 1-7 in loose cymes, the ultimate peduncles 3-20 cm long (including scale-like bracts); involucres (6)10-15 mm high, the inner bracts 11-13, the outer bracts (calyculus) filiform; ray florets 8, the ligules yellow, 2.0-3.5 cm long; disk florets numerous, the corollas yellow; achenes 6-7 mm long, glabrous, the pappus of numerous white bristles 8-10 mm long.

Roldana ehrenbergiana is a very distinct species, having vegetational features of the genus *Digitacalia*, but features of the capitulum characteristic of *Roldana* and/or *Psacaliopsis*. *Senecio semperamatae* appears to be a form of *R. ehrenberiana* with somewhat larger heads (involucre 12-15 mm high vs 6-10 mm). The type of *R. ehrenbergiana* is from the city of Puebla; that of *S. semperamatae* from near Cuautla, Mor, this amounting to a distance of some 100 km. Except for the reported difference in head size, there is little to distinguish between them.

ROLDANA ERIOPHYLLA (Greenm.) H. Rob. & Brettell, Phytologia 27: 418. 1974.
Senecio eriophyllus Greenm.
Pittocaulon calzadanum B.L. Turner

ne Oax, rocky ravines and along barrancas in oak-juniper woodlands,1000-1600 m; Mar-May

Shrubs to 2 m high, leafless at anthesis; leaves 10-20 cm long, 3-7 cm wide; petioles 3-5 cm long; blades ovate, tomentose on both surfaces, the margins irregularly lobed; heads eradiate, the florets white; achenes glabrous.

Because of its habit, a very distinct species, and perhaps deserving of generic status, as noted by Turner in his cavilier, description of the taxon as a new species of *Pittocaulon*. My misnomer was not treated in the account of *Pittocaulon* by Clark (1996), although she called attention to its erection in her appendix (p. 194). Regardless, it would seemingly key to *Pittocaulon* in her account of the Sect. *Terminales* of *Senecio*. With additional reflection on its generic position, total characters of the taxon concerned seem more those of *Roldana* than *Pittocaulon*, hence its retention here.

ROLDANA FLORESIORUM (B.L. Turner) B.L. Turner, **comb. nov.**
Senecio floresiorum B.L. Turner, Phytologia 74: 367. 1993.

Vegetatively similar to *R. gesnerifolia* but having much smaller heads (involucres 4-5 mm high vs. 7-8) with fewer inner involucral bracts (ca. 8 vs. 11-13), and shorter ligules (2-4 mm vs. 7-8).

ROLDANA GENTRYI H. Rob. & Brettell, Phytologia 27: 418. 1974.
Senecio gentryi (H. Rob. & Brettell) B.L. Turner & T. Barkley

s Son, Chi?, Sin and Dur, pine-oak forests, 1900-2700 m; Nov-Mar.

Shrubs 2-3 m high; much-resembling *R. angulifolia* but the involucres without subtending foliaceous bracts, the rays well-developed and the leaves often markedly peltate (albeit off-center).

This rather isolated taxon stands somewhat between *R. angulifolia* and *R. chapalensis*, possessing the large involucres of the former, but the habit and leaves of the latter

ROLDANA GESNERIFOLIA C. Jeffrey, Kew Bull. 47: 54. 1992.
Senecio gesnerifolius B.L. Turner, not *S. gesnerifolius* Cuatr.
Roldana mesquitlanensis (B.L. Turner) Funston, nom. superf.

Known only from Dur (Mpio. Mezquital), pine-oak forests, 2600-2700 m; Mar.

Suffruticose herbs or shrublets to ca. 2 m high; resembling *R. neogibsonii* but the leaves thicker, more venose, serrulate, and the heads larger with longer rays.

A very distinctive species, not readily confused with another and only remotely related to *R. neogibsonii*, with which it is compared in the above account.

ROLDANA GILGII (Greenm.), H. Rob. & Brettell, Phytologia 27: 419. 1974.
Senecio gilgii Greenm.

Cps and adjacent Guatemala, montane rain forests, 2000-2500 m; Jan-Mar.

Suffruticose robust herbs, shrublets or shrubs 1-4 m high; leaves nonpeltate, thick, palmately veined, subcircular in outline, the margins with 12-20 shallow denticulate lobes; petioles 10-22 cm long, densely pubescent; heads numerous in corymbose panicles, the branches not especially bracteate; involucres campanulate, 9-13 mm high, the bracts 11-13 in number; ray florets 8-9, the ligules yellow, 3-9 mm long; achenes glabrous, the pappus 7-9 mm long.

ROLDANA GLINOPHYLLA H. Rob. & Brettell, Phytologia 27: 419. 1974.
Senecio acerifolius Hemsl., not *S. acerifolius* Koch

Mic and Mex, tropical deciduous forests, 1000-1500 m; Sep-Oct.

Suffruticose herbs or shrublets to 1 m high; much-resembling *R. acutangula* but the involucres with 8 involucral bracts (vs. 11-13) and the stems terete (vs angular).

A poorly collected taxon, readily recognized by its Pericalia-type (albeit radiate) heads and nearly glabrous stems and foliage. McVaugh (1984) has noted that the type of this species is probably from near Uruapan, Mic and not Oax as indicated in the type description (based upon *Senecio acerifolius* Hemsl., a Ghiesbreght collection).

ROLDANA GONZALEZI (B.L. Turner) Funston, Novon 11: 304. 2001.
Senecio gonzalezae [sic] B.L. Turner

Known only from s Dur, pine-oak woodlands, ca 2000 m; Sep-Oct.

Suffruticose herbs 40-80 cm high, the stems simple, unbranched, arising from woolly "corms"; leaves not peltate, broadly oval to kidney-shaped in outline, the petioles with long crisped multiseptate hairs; heads numerous, borne on very elongate naked primary peduncles, the ultimate peduncles mostly 5-25 mm long; involucral bracts 8, 5-6 mm high; ray florets ca. 8, the ligules yellow; disk florets 12-20, the corollas yellow; achenes glabrous, the pappus bristles 4-5 mm long.

A very distinct, but apparently common, species in the drier pine-oak woodlands of s Dur, and probably adjacent Jal and Zac.

ROLDANA GREENMANII H. Rob. & Brettell, Phytologia 27: 419. 1974.
Senecio greenmanii (H. Rob. & Brettell) L. Wms.

Known only from Cps and adjacent Guatemala, montane evergreen cloud forests, 1800-2300 m; Feb-Apr.

Robust herbs, shrubs or small trees to 8 m high; mid-stem leaves very large, up to 40 cm long; petioles hirsutulous, 20-30 cm long, blades thin, 15-30 cm long, 25-45 cm broad, the margins with 7-11 denticulate lobes; heads numerous in large terminal cymose panicles, the ultimate peduncles mostly 2-3 cm long; involucres cylindro-turbinate, 10-12 mm long, 4-6 mm wide, the bracts 8, hirsutulous to glabrate; pistillate florets 5-8 eradiate; disk florets 12-18, the corollas yellow with moderately puberulent tubes; achenes glabrous, the pappus ca 8 mm long.

As noted by Williams (1976), a very distinct species, often tree-like and up to 8 m high.

ROLDANA GRIMESII (B.L. Turner) C. Jeffrey, Kew Bull. 47: 55. 1992.
Senecio grimesii B.L. Turner

Known only from montane regions ca. 80 km n of Zimapan, Hid; Mar.

Shrublets or shrubs to 1.5 m high; stems leafy throughout with large non-peltate leaves; blades broadly oval or subcircular in outline, ca. 18 cm long, 22 cm wide; heads 20-30, eradiate, campanulate arranged in bracteate cymose panicles; involucres 10-12 mm high, the inner bracts ca. 11, minutely glandular pubescent, these subtended by 5-8 large foliaceous ciliate bracts (the calyculus); disk florets 30-50, the corollas yellow; achenes glabrous, the pappus of 40-50 white fragile bristles 8-10 mm long.

The species closely resembles the occasional eradiate form of the more southern *R. marquezii*; the latter can be distinguished by its pubescent achenes and eglandular involucral bracts.

ROLDANA GUADALAJARENSIS (B. L. Rob.) H. Rob. & Brettell, Phytologia 27: 420. 1974.
Senecio guadalajarensis B. L. Rob.

Nay, Jal, Gua and Mic, oak woodlands, 1000-2200 m; Jul-Oct.

Robust suffruticose herbs or shrublets 1.0-2.5 m high; resembling *R. hintonii* but the stems and foliage glabrous or nearly so, the blades linear-lanceolate with markedly serrate margins and the heads larger with longer rays and more numerous disk florets, the achenes glabrous or sparsely pubescent.

The long, pinnately-veined, glabrous leaves of this species are quite distinctive, not easily confused with another.

ROLDANA HARTWEGII (Benth.) H. Rob. & Brettell, Phytologia 27: 420. 1974.
Senecio hartwegii Benth.
Cacalia tepicana M. E. Jones
Senecio seemannii Sch.-Bip.

Dur, Sin, s Zac, Nay and Jal, pine-oak forests, 1500-2700 m; Aug-Nov.

Shrublets or shrubs mostly 1-3 m high; stems leafy throughout, terete to angulate, purplish to maculate, densely puberulent or arachnoid-puberulent to glabrate; mid-stem leaves mostly 8-14 cm long, 8-16 cm wide; petioles 3-7 cm long; blades broadly ovate in outline, persistently white-pubescent beneath, the margins with 7-13 shallow obtuse lobes about as wide as long; heads numerous in rounded terminal cymose panicles, the ultimate peduncles mostly 3-10 mm long; involucral bracts 8-10

As indicated above, this taxon is superficially similar to *R. pennellii*, the latter having smaller glabrate leaves and glabrous achenes. *Roldana hartwegii* might also be compared with *R. carlomasonii*, the latter also having glabrous achenes.

ROLDANA HEDERIFOLIA (Hemsl.) H. Rob. & Brettell, Phytologia 27: 420. 1974.
Senecio hederifolius Hemsl.
Senecio alienus H. Rob. & Seaton
Senecio chrismarii Greenm.

Mic, Mex, pine-oak forests, mostly along streams, ca. 1800 m; Dec-Jan

Suffruticose herbs reportedly to 1 m high; leaves with 3 major lobes, triangular in outline, thick and fleshy, marginally peltate; petioles 6-12 cm long; blades nearly glabrous (sparsely pubescent when very young), palmately nervate from the point of petiolar attachment, the margins denticulate; heads arranged 20 or more to a branch, the uppermost flowering first; involucres cylindro-turbinate, ca. 1 cm high, the bracts 8, glandular-pubescent, at least in part, the peduncles decidely glandular; ray florets small or reportedly absent; disk florets 12-15, the corollas yellow; stamens reportedly orange, the anthers sagittate; achenes 10-ribbed, glabrous.

Much-resembling the more southern *R. anisophylla* in having marginally peltate, 3-lobed leaves, but said to differ from the latter in having more prominent bracts in the capitulescence and beneath the capitula, with longer ray florets (Funston 2001). Long known only by type material, recent collections of *R. hederifolia* have been made along Rio del Salto, Avendero, Valle de Bravo, Mex.

ROLDANA HERACLEIFOLIA (Hemsl.) H. Rob. & Brettell, Phytologia 27: 420. 1974.
Senecio heracleifolius Hemsl.

Zac, Agu, Gua, Que, Jal, Mic and Mex, oak forests and open disturbed woodlands, 1600-2100 m; Sep-Nov.

Robust suffruticose herbs or shrublets 1-3 m high, the stems densely pubescent, arising from stout rhizomes; leaves 15-30 cm long, 15-20 cm wide, deeply and irregularly incised pinnate, the sinuses often extending to near the midribs; heads numerous in terminal rounded cymose panicles, the ultimate petioles 3-15 mm long; involucres campanulate, 8-10 mm high, the bracts 8, glabrous; ray florets 5 the ligules 5-10 mm long; disk florets 15-25, the corollas yellow; achenes 3-4 mm long, pubescent, the pappus 5-6 mm long.

As noted by McVaugh (1984), an attractive common roadside plant in ne Jal and elsewhere.

ROLDANA HETEROGAMA (Hemsl.) H. Rob. & Brettell, Phytologia 27: 420. 1974.
Senecio heterogamus Hemsl.

Cps and Guatemala southwards to Panama, pine-oak forests, 3000-4100 m, mostly on upper volcanic slopes, Dec-Apr.

Suffruticose herbs or shrublets or shrubs mostly 1-5 m high; mid-stem leaves mostly peltate (rarely not); petioles 8-16 cm long; blades circular or subcircular in outline, 8-20 cm across, the margins with 5-15 relatively shallow lobes, the sinuses scarcely extending to 1/4 of the radius; heads with pistillate eradiate peripheral florets, numerous in corymbose panicles, the ultimate peduncles glandular, mostly 1-3 cm long (including the lanceolate bracts); disk florets 30-40, the corollas yellow; achenes glabrous, the pappus of fragile, sparsely barbellate, bristles 8-10 mm long

A variable species, perhaps divisible into 2 or more regional taxa.

ROLDANA HETEROIDEA (Klatt) H. Rob. & Brettell, Phytologia 27: 420. 1974.
Senecio heteroideus Klatt
Cacalia longipetiolata Rob. & Greenm.
Digitacalia heteroidea (Klatt) Pippen

Known only from central Oax, pine-oak forests, 2400-2700 m; Oct-Dec.

Suffruticose leafy herbs 1-2 m high; vegetatively resembling *R. sessilifolia* but the leaves with 5 deep lobes, the sinuses extending to about 1/2 the radius of the blade; heads eradiate, the peduncles and involucres glabrous; involucres 13-15 mm high, the involucral bracts 8 in number; florets 30-40 per head, the corollas seemingly pale yellow, but this not clear from dried materials; achenes glabrous, the pappus of numerous very delicate, sparsely barbellate bristles 7-8 mm long.

A poorly known species, most of the collections having been obtained on Sierra de San Felipe, n of Cd. Oaxaca. Pippen (1968) positioned this species in Digitacalia but like Robinson and Brettell (1974) I believe it belongs within the sect. *Palmatinervi*, sensu Barkley (1985).

ROLDANA HINTONII H. Rob. & Brettell, Phytologia 27: 420. 1974.
Senecio hintonii (H. Rob. & Brettell) J. Pruski & T. Barkley

Known only from the vicinity of Temascaltepec, Mex, where it is seemingly common in pine-fir forests, Feb-Mar; 2800-3000 m.

Suffruticose herbs or shrublets 1-2 m high; leaves 15-20 cm long, 3-6 cm wide; petioles 2-4 cm long; blades thin, ovate-elliptical to oblanceolate-elliptical, pinnately veined, loosely arachnoid beneath, glabrate with age, the margins entire, or nearly so; heads numerous in rounded terminal cymes, the ultimate peduncles arachnoid-pubescent, mostly 3-6 mm long; involucres 6-8 mm high, the bracts 10-11, glabrous; ray florets 5-8, the ligules yellow, 6-8 mm long; disk florets 10-15, the corollas yellow, the lobes 1 mm long or less; achenes glabrous, the pappus 5-6 mm long.

ROLDANA JURGENSENII (Hemsl.) H. Rob. & Brettell, Phytologia 27: 421. 1974.
Senecio jurgensenii Hemsl
Roldana breedlovei H. Rob. & Brettell
Senecio anisophyllus Klatt

Oax, Cps and Guatemala, montane evergreen cloud forests, mostly 1000-3000 m; Dec-Feb.

Suffruticose herbs, shrublets, or shrubs 1-3 m high; much-resembling *R. oaxacanus* but distinguished by its mostly larger involucres (7-10 mm high vs 4-7 mm) and relatively broad subpalmately lobed glabrous leaf blades.

A variable species, both in vegetative characters and characters of the head. Both rayed and rayless populational forms occur and occasional forms have moderately pubescent leaf blades, suggesting hybridization with *R. oaxacanus*. Since the two species are sympatric over a large area, the occasional hybrid might be anticipated. For the most part, however, *R. jurgensenii* can be distinguished from *R. oaxacanus* but is somewhat larger heads and subpalmately veined glabrous leaves. The two taxa are in need of detailed study in the field and these might ultimately be combined into a single variable species.

ROLDANA JUXTLAHUACANA B.L. Turner, **sp. nov.**

Roldanae kerberi H. Rob. & Brettell similis sed differt foliis laminis ovatis valde palmati-nervatis (vs. subpalmatis et marginibus leniter lobatis (vs. valde lobatis).

Shrub up to 2 m high. Stems straight and fistulose, sparsely pubescent to glabrate. Leaves 15-25 cm long; petioles 5-10 cm long; blades decidedly ovate, 8-14 cm long, 5-8 cm wide, markedly palmately veined, glabrous above, moderately puberulous below, mainly along the veins, their margins weakly lobate to nearly entire. Involucres 4.5-5.0 mm high, the bracts ca. 11, glabrous, or nearly so; calyculum of 3-6 short narrow bractlets. Receptacle plane to somewhat

convex, ca. 3 mm across. Ray florets absent. Disk florets ca. 20, yellow; corollas ca. 6 mm long, glabrous; tubes ca. 2.5 mm long; lobes 5, ca. 0.75 mm long. Achenes narrowly ovoid, glabrous, ca. 3 mm long, 1 mm wide, weakly 8-ribbed at maturity; pappus of numerous decidedly fragile white bristles ca. 6 mm long.

TYPE: MEXICO. OAXACA: Mpio. Santiago Juxtlahuaca, 6-7 km from El Manzana along road to Infiernillo (17° 12' N, 98° 04' W), pine-oak forests, locally abundant, 13 Feb 1996, *J.I. Calzada 20776* (Holotype: TEX).

Roldana juxtlahuacana is closely related to *R. kerberi* and *R. lobata* of the Pacific slopes of Mexico, all being robust shrubby herbs with fistulose or hollow stems. It appears closest to *R. kerberi* in possessing nearly glabrous stems and involucres, but differs markedly from the latter in leaf shape, as noted in the above diagnosis.

The novelty is named for the locality where collected (and perhaps endemic to). Its only collector, J.T. Calzada suggested the apellation, negating my desire to name it for her.

ROLDANA KERBERI (Greenm.) H. Rob. & Brettell, Phytologia 27: 421. 1974.
Roldana galiciana (McVaugh) H. Rob. & Brettell
Senecio galicianus McVaugh
Senecio kerberi Greenm.

w Jal, Col, pine-oak or pine-fir forests, 1800-2300 m; Oct-Mar.

Robust suffruticose herbs, shrublets or shrubs with stiffly erect hollow (fistulose) stems 2-4 m high; mid-stem leaves 15-30 cm long, 12-17 cm wide, but much reduced upwards; petioles 10-15 cm long; blades broadly oval in outline, sparsely pubescent to glabrate beneath, the margins with 5-9 acute lobes; heads radiate, numerous in rounded terminal cymose panicles, the ultimate peduncles mostly 5-10 mm long; involucres mostly 4-5 mm high, the inner bracts 10-13; ray florets 5, the ligules 3-5 mm long, yellow; disk florets 9-14, yellow to yellow-

orange; achenes glabrous, the pappus 5-6 mm long; chromosome number, n = 30 pairs

I cannot distinguish *R. galiciana* from *R. kerberi*; McVaugh (1984), who provided an excellent illustration, also notes that *R. galiciana* might prove synonymous with the latter, the type locality of both occurring in the same general region.

ROLDANA LANGLASSEI (Greenm.) H. Rob. & Brettell, Phytologia 27: 421. 1974.
Senecio langlassei Greenm.

Gue, Pacific slopes, pine-oak forests, 1600-2300 m; Apr- May.

Shrubs 3-4 m high, the leaves not peltate; much-resembling *R. petasitis* but the heads mostly smaller with reportedly more numerous involucral bracts (10-11) and smaller florets.

A poorly known species, originally collected in Gue, but Robinson & Brettell (1974) report another collection from Mex (Cerro de Mamatla, 2000-2300 m) by Matuda (30560, US). *Roldana langlassei* is possibly but a form of *R. angulifolia* with more numerous involucral bracts.

ROLDANA LANICAULIS (Greenm.) H. Rob. & Brettell, Phytologia 27: 421. 1974.
Senecio lanicaulis Greenm.

Tam, San, Ver, Oax, Cps and Guatemala, montane cloud forests, 1000-2000 m; Nov-Mar.

Leafy-stemmed shrubs 1-3 m high; much-resembling *R. aschenborniana* but the stems and petioles shaggy-lanose, the blades larger, 10-20 cm long, 10-25 cm wide, subcircular in outline, the margins with 10-15 shallow lobes.

The species is closely related to *S. aschenborniana*, their heads being almost identical, but having much larger subcircular leaves and markedly lanose petioles and stems. *Roldana lanicaulis* might also be confused with *R. sundbergii*, but the latter is a low shrublet with mostly basal leaves and has heads with only 8 involucral bracts.

ROLDANA LOBATA Llave, in Llave & Lex, Nov. Veg. Descr. 2: 10. 1825.
Senecio jaliscanus S. Wats.
Senecio roldana DC.
Senecio rotundifolius Sesse & Moc.
Senecio schumannianus Nees & Schauer

Jal, Gua, Mic, Mex, Tla, Mor, Gue, and Oax, pine-oak and tropical deciduous forests, 1200-2500 m; Nov-Jan.

Erect often robust herbs with stiffly erect terete hollow stems, these scarcely deflexed at the nodes, mostly 1-4 m high; leaves mostly ovate in outline, often markedly bicolored, the lower surfaces persistently tomentose; heads small, ligulate or not, arranged in corymbose panicles, the ultimate peduncles mostly 1-3 mm long; involucres mostly 4.5-6.5 mm high, usually persistently white-tomentose throughout; ray florets absent or present, when present the ligules yellow, 3-6 mm long; disk florets 13-20, the ligules yellow or yellow-orange; achenes glabrous, the pappus bristles 5-7 mm long with enlarged apices.

A variable but very distinct species, easily recognized by its tightly imbricate, relatively small, densely tomentose involucres. Occasional plants of *R. lobata* appear to approach *R. barba-johannis* in characters of the head, suggesting that hybridization may occasionally occur between these taxa.

Both Gibson (1968) and McVaugh (1984) placed *Senecio jaliscanus* within the fabric of *Roldana lobata*. Typical forms of the latter occur at higher elevations and have numerous radiate heads borne on ascending branches which form a terminal rounded corymbose

panicle, the ultimate peduncles 3-10 mm long. *Senecio jaliscanus* has smaller, often eradiate, heads on ultimate peduncles 1-3 mm long which are arranged in divaricately branched, terminal or axillary, corymbs. The taxa might ultimately be given formal recognition, but additional field work will be needed to vouchesafe such treatment.

ROLDANA MANANTLANENSIS (R.R. Kowal) B.L. Turner, Phytologia 80: 277. 1996.
Senecio galicianus var. *manantlanensis* R.R. Kowal

Jal, Sierra de Manantlan, along lumber roads, pine-oak forests in wet places, 2000-3000 m; Oct-Mar.

Kowal, in his original description, gives an exhaustive account of this taxon and its relationship to *Senecio galicianus* (= *Roldana kerberi* in the present treatment). *Roldana manantlanensis* differs from *R. kerberi* in having longer involucral bracts (4.5-6.5 mm vs. 3.0-4.5) and fewer florets to a head (7-13 vs. 14-21), among other characters.

ROLDANA MARQUEZII (B.L. Turner) C. Jeffrey, Kew Bull. 47: 55. 1992.
Senecio marquezii B.L. Turner

Hid, and central Ver, pine-oak forests, 1300-2500 m; Feb-Apr.

Shrublets or shrubs 1.0-1.5 m high; much-resembling *R. grimesii* but the achenes pubescent and the involucral bracts not densely short glandular-pubescent.

When originally described, the species was known only by radiate forms (thus readily distinguishing it from the eradiate *R. grimesii*). Recent collections of *R. marquezii* from near Tenango de Doria, Hid (Garcia 1750 TEX), reveal the species to also possess eradiate individuals. At least these can scarcely be distinguished from the typically radiate forms of the species. See additional comments under *P. grimesii*.

ROLDANA MAZATECANA B.L. Turner, **sp. nov.**

Roldanae calzadanae B. L. Turner similis sed differt laminas foliorum latioribus quam longioribus marginis vix denticulatis (vs. valde denticulatis), bracteis involucri 11 (vs 8), ca. 4 mm longis (vs 5-6 mm), et flosculis disci minoribus numerosioribus (10-15-15 vs. 5).

Shrubs 2-3 m high. Upper stems somewhat fractiflex, densely tomentose. Leaves 15-20 cm long, 10-14 cm wide; petioles 5-10 cm long; blades palmately nervate with 5-7 ribs; 8-12 cm long, 9-15 cm wide, the margins with 11-14 obtuse lobes, sparsely crinkly-pubesent below, especially along the major veins. Capitulescence terminal, 15-20 cm across, composed of 100 or more congested heads, the ultimate peduncles 2-6 mm long. Involucres ca. 4 mm high, the outer bracts 1-2 mm long, the inner bracts 11, ca. 4 mm long. Receptacles ca. 1 mm across, endowed with short hyaline scales. Ray florets 8; ligules yellow, 4-nervate, 4-5 mm long, ca. 2 mm wide. Disk florets 15-25; corollas ca. 3 mm long, 5-lobed, glabrous. Achenes (immature) ca. 2 mm long, glabrous; pappus of numerous white bristles.

TYPE: MEXICO. OAXACA: Sierra Mazateca , "Aprox. 400 m del Puerto de la Soledad, por la carretera de Huautla a Teotitlan de Flores Magon (Mex 182)," ca. 2320 m, 13 Feb 2002, *Munn-Estrada & Mendoza 1947* (Holotype: TEX; isotype MEXU).

ADDITIONAL SPECIMENS EXAMINED: Sierra Mazateca, "1 km del Puerto de la Soledad, por la carretera de Teotitlan de Flores Magon a Huatla de Jimenez (Mex 182)," ca. 2335 m, 11 Feb 2002, Munn-Estrada & Mendoza 1907 (MEXU, TEX).

Among the shrubby Roldanas of Mexico with relatively broad palmately veined leaves, *R. mazatecana* is noteworthy for its small heads and glabrous involucral bracts. It clearly relates to the Oaxacan species, *R. calzadana*, as noted in the above diagnosis.

The species is named for the Sierra Mazteca, to which it is seemingly endemic.

ROLDANA METEPECA (B.L. Turner) C. Jeffrey, Kew Bull. 47: 55. 1992.
Senecio metepecus B.L. Turner

Known only central Hid and adjacent Ver, Pinus-Alnus forests, 2000-2200 m; Aug-Oct.

Low stoloniferous herbs 40-60 cm high; leaves not peltate, mostly clustered near the base of the stem; petioles 5-6 cm long; blades 5-6 cm long, 6-8 cm wide, the margins with 5-7 lobes about as long as wide; heads eradiate, 10-20 in stiffly-branched cymes, the ultimate peduncles glandular-pubescent, mostly 3-5 cm long; involucres turbo-campanulate 10-12 mm high, the bracts 8-13 in number, densely pubescent with purple hairs; disk florets 20-30, the corollas yellow; achenes 3-4 mm long, glabrous, the pappus of numerous delicate bristles 9-10 mm long.

A very distinct taxon, with a low habit, relatively few leaves and slender rhizomes. It superficially resembles *R. platanifolia* but the latter is a larger plant with leafier stems, and radiate heads.

ROLDANA MEXICANA (McVaugh) H. Rob. & Brettell, Phytologia 27: 421. 1974.
Senecio mexicana McVaugh

Jal, Mic, Mex and Gue, pine-oak forests, 1500-2600 m; Oct-Dec.

Vegetatively much-resembling *R. suffulta* but the heads cylindrical, smaller, with fewer florets (9-15 vs 60+) and the calyculum of reduced subulate bracts.

This taxon was treated as a variety of *R. suffulta* by Gibson (1968) but McVaugh correctly notes the many characters that distinguish it from that species. Gibson noted the occasional intermediate (e.g. King 5062, 18 mi e Morelia) between the two species and it is possible that

hybrids occur, especially in Mic where their distributions overlap. McVaugh (1984) provides an excellent illustration.

ROLDANA MICHOACANA (B.L. Rob.) H. Rob. & Brettell, Phytologia 27: 421. 1974.
Cacalia michoacana B. L. Rob.
Cacalia trigonophylla Blake
Pericalia michoacana (B. L. Rob.) Rydb.
Senecio michoacanus (B. L. Rob.) B.L. Turner & T. Barkley

Jal, Mic and Mex, Pacific slopes, pine-oak and fir forests, 1500-2500 m; Nov-Jan.

Mostly suffruticose herbs 0.5-1.5 m high, the stems arising from small tubers; much-resembling *R. sessilifolia* but distinguished by its smaller heads with fewer florets and smaller leaves, the blades with mostly 3-5 lobes; chromosome number, n = 30 pairs.

A poorly marked species but readily identified by its hastate leaves and pubescent stems, as noted by McVaugh (1984). It is closely related to *R. sessilifolia*, the latter having glabrous stems and leaves cordate or reniform (in outline). McVaugh, following Pippen (1968), treated this species within the genus *Pericalia*, whereas Robinson and Brettell (1974) include these within their concept of *Roldana*. *Cacalia trigonophylla* is a form having 3-lobed leaves instead of the usual 5, superficially resembling *R. hederifolia*.

ROLDANA MIXTECANA Panero & Villasenor, Brittonia 48: 83. 1996.

Known only from nw Oax (Dist. Juxtlahuaca) in pine-oak forests, ca. 2000 m in the Mixteca region, hence its name; Oct-Nov.

Perennial herbs 0.5-1.0 m high; involucral bracts in several tightly imbricate series. A very distinct species having triangular, weakly 5-lobed leaves. The authors provided an excellent illustration with their original description.

ROLDANA NEOGIBSONII (B.L. Turner), Funstan, Novon 11: 304. 2001.
Senecio neogibsonii B.L. Turner

Hid, Pue and adjacent Ver, oak forests, 180-2000 m; Oct-Jan.

Herbaceous subshrub 2-5 dm tall; herbage velvety or felted-tomentose but glabrous or nearly so on the upper sides of the leaves; leaves petiolate, the blades narrowly elliptic to elliptic lanceolate, 10-15 cm long and 1.5-1.5 cm wide, ca. 5 times longer than wide, indistinctly trinerved with the main lateral nerves diverging from the midrib 1-2 cm from the base, margin entire or with a few minute callose denticles; inflorescence a terminal corymbiform or weakly paniculiform cyme of 20-50 heads; principal involucral bracts ca. 13, 4-5 mm long; calyculate bracts 4-8, 0.5-2.0 mm long; ray florets ca. 8, the ligules 4-5 mm long; achenes glabrous, ca. 2.5 mm long.

Vegetatively this species much resembles *R. gesnerifolia* of s Dur.

ROLDANA NESOMIORUM (B.L. Turner) C. Jeffrey, Kew Bull. 47: 55. 1992.
Senecio nesomiorum B.L. Turner

s Nue and adjacent s Tam, oak woodlands 2600-2700 m; Sep.

Suffruticose perennial herbs or shrublets 1-2 m high; leaves not peltate, palmately nerved, gradually reduced upwards into flabelliform bracts which enter the capitulescence; heads radiate, the involucre surrounded by a well-developed leafy calyculus as long as or longer than the principal bracts; ray florets 8-11, the ligules yellow, 11-13 mm long; achenes glabrous, the pappus of white barbellate bristles 7-8 mm long.

The species is closely related to *R. marquezii* but has glabrous achenes. It might also be confused with *R. grimesii*, but the latter is eradiate.

ROLDANA OAXACANA (Hemsl.) H. Rob. & Brettell, Phytologia 27: 422. 1974.
Senecio oaxacanus Hemsl.
Roldana chiapensis H. Rob. & Brettell
Roldana cordovensis (Hemsl.) H. Rob. & Brettell
Roldana cristobalensis (Greenm.) H. Rob. & Brettell
Roldana hederoides (Greenm.) H. Rob. & Brettell
Roldana petasioides (Greenm.) H. Rob.
Senecio cordovensis Hemsl.
Senecio cristobalensis Greenm.
Senecio hederoides Greenm.
Senecio hypomalacus Greenm.
Senecio macrobotrys Hemsl.
Senecio petasioides Greenm.

Ver, n Oax, Cps and Guatemala southwards, montane cloud forests, 1500-2700 m; Oct-Feb.

Suffruticose herbs, shrublets or shrubs 1-3 m high; leaves much-resembling those of *R. chapalensis* but the leaves mostly nonpeltate, or if subpeltate the petioles arising within 1 cm or less of the margin; undersurfaces of blades moderately to densely pubescent; involucres mostly 5-7 mm high, densely pubescent with very short glandular hairs; ray florets absent or present, the ligules mostly reduced (1-5 mm long when present); chromosome number, n = 30 pairs.

This is an extremely variable species, as might be suspected from the synonymy listed. Typical forms of *R. oaxacana* possess rays; rayless forms have been called *R. cristobalensis*; forms with rather densely pubescent leaves and rayless heads have been called *R. petasioides*. *Roldana oaxacana* is closely related to *R. chapalensis*, a species of western Mexico along the Pacific ranges from Jal to Gue. It is also closely related to *R. jurgensenii*, but the latter has mostly thicker glabrous leaves, somewhat larger heads and often well-developed rays. The entire complex is in need of detailed field study but I believe the treatment presented here correctly reflects relationships among the several taxa concerned.

ROLDANA PENNELLII H. Rob. & Brettell, Phytologia 27: 422. 1974.
Senecio pennellii H. Rob. & Brettell; not *S. pennellii* Greenm.
Senecio octobracteatus B.L. Turner & T. Barkley

As noted by Robinson & Brettell in their original description, this species has long been placed within the fabric of *R. hartwegii*, the latter being distinguished by its more persistently pubescent, larger leaves.

They recognized two regional varieties under the taxon, as follows:

1. Involucral bracts 8; Chi, Coa, Nue, n Dur.....var. *pennellii*
1. Involucral bracts 5; Dur.....var. *durangensis*

var. **pennellii**

Chi, Coa, Nue and n Dur, pine-oak and fir forests, 2100-3100 m; Aug-Oct.

Suffruticose herbs or shrubs 1-2 m high; much-resembling *R. hartwegii* and *R. carlomasonii* but differing from both in having involucres with ca. 8 involucral bracts (vs 10-13).

McVaugh (in his Flora Novo-Galciana), Gibson (1968), and Funston (2001) placed *R. pennellii* under tha broad fabric of *R. hartwegii*, the latter having somewhat broader more pubescent leaves. Additional field studies will be necessary to resolve its relationship to *R. pennellii*.

var. durangensis H. Rob. & Brettell
Roldana octobracteatus var. *durangensis* (H. Rob. & Brettell) B.L. Turner & T. Barkley

w Dur, sw of Cd. Durango, pine forests, 2800-3000 m; Aug-Nov.

Suffruticose herbs or shrubs 1-2 m high; differing from var. pennellii in having involucres with only 5, sparsely pubescent, involucral bracts; chromosome number, n = 30 pairs.

ROLDANA PETASITIS (Sims) H. Rob. & Brettell, Phytologia 27: 423. 1974.
Cineraria petasitis Sims
Cineraria platanifolia Schrank
Roldana reglensis (Greenm.) H. Rob. & Brettell
Roldana sartorii (Hemsl.) H. Rob. & Brettell
Senecio petasitis (Sims) DC.
Senecio reglensis Greenm.
Senecio sartorii Hemsl.

Known only from Ver and adjacent Hid, montane cloud forests, 1300-1800 m; Dec-Feb.

Suffruticose herbs or shrublets 0.5-1.5 m high; much-resembling *R. angulifolia* but the rays consistently present and well-developed and the involucral bracts purplish and not surrounded by a leafy calyculus.

This species might also be confused with the widespread, more southern *R. oaxacana* but the latter has smaller involucres (5-7 mm long vs 9-10) with fewer involucral bracts (8 vs 9-11) and rays absent, or poorly developed when present (1-6 mm long vs 7-10 mm).

I have included *R. reglensis* in synonymy here, not having seen herbarium material (the type from Ver, "Regla," Ehrenberg 454 (GH).

ROLDANA PINETORUM (Hemsl.) H. Rob. & Brettell, Phytologia 27:423. 1974.
Senecio pinetorum Hemsl.

Gue and Oax, pine-oak and fir forests, 2600-3500 m; Nov-Jan.

Small subsuffruticose rhizomatous herbs 20-50 cm high; much-resembling *R. platanifolia* and said to differ by its leaves with

tomentose or flocculent tomentose undersurfaces and by its somewhat smaller heads with 20-25 disk florets.

A poorly known taxon; as noted in the above, the species might ultimately fall within the fabric of the more widespread, highly variable, *R. platanifolia*.

ROLDANA PLATANIFOLIA (Benth.) H. Rob. & Brettell, Phytologia 27: 423. 1974.
Senecio platanifolius Benth.

s Tam, San?, Hid, Mex, Mor, Pue, Tla and Ver?, pine-oak and fir forests, 1500-3500 m; Oct-Feb.

Mostly suffruticose herbs 40-80 cm high; leaves not peltate, broader than long, the blades cordate to reniform in outline, mostly with 3 or more well-developed leaves along the mid-stem, these not much-reduced upwards and extending into the capitulescence; heads campanulate, radiate, on ultimate peduncles 1-5 cm long; involucres 9-12 mm high, the bracts 11-13 in number; ray florets 8-13, the ligules yellow, 8-14 mm long; disk florets 25-35, the corollas yellow; achenes glabrous, the pappus of white bristles 8-10 mm long.

Material from s Tam (Gomez Farias area, TEX) at lower elevations (1000-1500 m), having mostly fewer, more basal congested leaves and rather naked terete primary peduncles, may be worthy of varietal recognition.

ROLDANA RETICULATA (DC.) H. Rob. & Brettell, Phytologia 27: 423. 1974.
Senecio reticulatus DC.
Senecio dictyophyllus Benth.

Jal, Gua, Que, Hid, Mic, Mex, Mor and Gue, pine-oak and fir forests, 3000-3800 m; Sep-Dec.

Suffruticose nearly glabrous herbs or subshrubs 0.5-1.5 cm high, leaves thin, reticulately veined, 7-10 cm long, 5-7 cm wide; petioles

0.5-1.5 cm long; blades ovate to elliptic or oval in outline; heads 3-20 in erect cymes, the ultimate peduncles mostly 2-12 mm long; involucres glabrous or nearly so, the inner bracts mostly 8-12 mm long; achene glabrous, the pappus 5-7 mm long.

A widespread variable species but readily recognized by its nearly glabrous foliage, thin, reticulately-veined leaves and relatively large heads with 10-13 glabrous involucral bracts.

ROLDANA ROBINSONIANA (Greenm.) H. Rob. & Brettell, Phytologia 27: 423. 1974.
Senecio robinsonianus Greenm.

Jal, Mic?, Gue and Oax, Pacific slopes, tropical deciduous and lower pine-oak forests, 1200-1900 m; Dec-Mar.

Robust suffruticose herbs or soft-wooded shrubs 1-3 m high; much-resembling *R. barba-johannis* but the heads smaller, sessile and the involucral bracts only 8 (vs 10-13).

A poorly collected taxon but readily distinguished by its small nearly sessile heads which have only 8 involucral bracts. Specimens from Jal do not compare favorably with the material from Gue and Oax (the type area). The former is perhaps deserving of formal recognition.

ROLDANA SCHAFFNERI (Sch.-Bip.) H. Rob. & Brettell, Phytologia 27: 423. 1974
Senecio schaffneri Sch-Bip.
Senecio grandifolius var. *glabrior* Hemsl.
Senecio ghiesbreghtii var. *pauciflorus* Coulter
Senecio santarosae Greenm.

Ver, Oax, Cps and Guatemala southwards, damp wooded sites, especially rocky slopes at the edges of montane cloud forests, 1300-1800 m; Mar-May (Oct).

Soft shrub mostly 1-3 m tall or sometimes a tree to 6 m tall; herbage arachnoid-tomentose when young but unevenly glabrate in age, axils and undersides of the leaves with some scattered persistent tomentum, or glabrescent; stems evenly dark or grayish colored, especially below, without conspicuous mottling; leaves mostly on the upper quarter of the stem, petiolate, the blade oblong-lanceolate to ovate, 5-18 cm long and 2-8 cm wide, the margins shallow dentate to coarsely sinuate-dentate, cuneate at the base, the petioles 2-6(7) cm long; inflorescence a terminal corymbiform cyme or cluster of cymes, heads 40-80 or more in well developed inflorescences; principal involucral bracts typically 5, 6-9 mm long, calyculate bracts minute and inconspicuous; ray florets 1-3, the ligule 2-3(+) mm long; achenes glabrous, ca 2 mm long.

Specimens of this species are sometimes confused with those of the *Senecio grandifolius* complex, which differs in having a clearly pachycaul aspect and a structurally foreshortened stem that is abruptly contracted to the principal branches of the inflorescence.

ROLDANA SESSILIFOLIA (Hook. & Arn.) H. Rob. & Brettell, Phytologia 27: 423. 1974.
Cacalia sessilifolia Hook. & Arn.
Cacalia cordifolia H.B.K. not *C. cordifolia* L. f.
Cacalia nutans Sesse & Moc.
Pericalia ovatifolia (Sch.-Bip.) Rydb.
Pericalia sessilifolia (Hook. & Arn.) Rydb.
Senecio sessilifolia Hook. & Arn.
Senecio cardiophyllus Hemsl.
Senecio ovatifolius Sch.-Bip.

s Chi, Dur, Zac, Agu, San, Nay, Jal, Gua, Mic, Mex and Mor, pine-oak woodlands, 1200-2800 m; Aug-Feb.

Suffruticose glabrous herbs or shrublets 0.5-2.0 m high; leaves sessile or petiolate 5-20 cm long, 5-14 cm wide; petioles, when present, 1-10 cm long; blades cordate to reniform in outline, glabrous or nearly so, the margins with 5-9 shallow lobes; heads mostly 3-11,

campanulate, eradiate, the ultimate peduncles glabrous mostly 2-10 cm long; involucres mostly 10-17 mm high, the inner bracts 11-15 in number, glabrous, the outer bracts (calyculus) of 3-11 linear or merely short-subulate bracts 3-10 mm long; disk florets 40-60, the corollas yellow; achenes 3-4 mm long, glabrous, the pappus of numerous, somewhat distally thickened, bristles 8-10 mm long; chromosome number, n = 30 pairs.

This is a very variable species, both in foliage and features of the capitulum. It is seemingly divisible into two or more geographical races. Populational forms with completely sessile leaves mostly occur in Nay, n Jal, s Zac and nw Mic; populational forms with petiolate leaves mostly occur along the Central Plateau from s Chi, w Dur, Agu, San, Gua and Mex; these are perhaps worthy of varietal, if not specific rank. The name *Senecio cordifolius* has been applied to plants with petiolate leaves and somewhat larger heads with a much-reduced calyculus. Forms with petiolate leaves might be confused with the closely related *R. michoacana*, the latter being distinguished by its mostly smaller heads with fewer florets (25-35 vs 40-60) and generally more herbaceous habit and smaller leaves with only 3-5 lobes (vs 5-9).

ROLDANA SINUATA (H.B.K.) B.L. Turner, **comb. nov.,**
Senecio sinuatus H.B.K., Nov. Gen. & Sp. 4: 141. [folio] 1818.
Senecio lineolatus DC.
Roldana lineolata (DC.) H. Rob. & Brettell

Jal, Gua?, Que, Hid, Mic, Mex, Mor, Tla?, Pue?, Ver, Gue and Oax, pine-oak forests, 2000-3500 m; Oct-Jan.

Subshrub or coarse herb, 1-3 m tall; herbage variously and unevenly light-tomentose, glabrate in age but the undersides of the leaves and the axils of the upper nodes persistently hairy; stems thick, often 2 cm or more in diameter, arising singly from a felted-hairy, ligneous caudex, upper stem mottled with scattered, elongate, purplish spots 3-5 mm long; leaves about evenly distributed along the stem, only the very lowermost early deciduous, petiolate, the blade elliptic-ovate in outline, 10-25(+) cm long and 5-15 cm wide, the margin

denticulate and sinuate-subpinnate, with the lobes extending 1/4-1/3 the distance to the midrib or rarely deeper, the petiole weakly winged, 1-4 cm long; inflorescence a corymbiform cyme or group of cymes, heads 30-80(+); principal involucral bracts ca. 8, 7-8 mm long; calyculate bracts minute and inconspicuous; ray florets mostly 5 or 3, the ligule 5-7(8) mm long; achenes glabrous, 2-3 mm long.

McVaugh (1984) noted that *R. sinuata* is closely related to *R. heracleifolia* "from which it is readily distinguished by its glabrous achenes and less deeply lobed leaves." He also placed *R. lineolata* in synonymy with *R. sinuata*, this apparently overlooked by Robinson and Brettell (1974).

ROLDANA SUBCYMOSA H. Rob., Phytologia 32: 332. 1975.
Senecio subcymosus (H. Rob.) B.L. Turner & T. Barkley

Known only from Oax (ca 125 km s of Cd. Oaxaca), pine-oak-alder forests, 2400-2600 m; Nov.

Suffruticose single-stemmed herbs or shrublets 1-2 m high; much-resembling *R. acutangula* but the leaves permanently and densely white-puberulent beneath, the margins mostly with 8-12 shallow, obtuse lobes and the achenes glabrous.

According to its author, this taxon was found growing with *R. lobata*, but can be distinguished from it by habit (single-stemmed herbs to 1.5 m high vs. branched herbs or shrubs to 2.5 m high), yellow-rayed heads (vs. golden orange and rayless), among other features.

ROLDANA SUBPELTATA (Sch.-Bip.) H. Rob. & Brettell, Phytologia 27: 424.1974.
Senecio subpeltata Sch.-Bip.

Dur, and closely adjacent Sin?, pine-oak forests, moist wooded ravines, 1800-2200 m; Jan-Apr.

Suffruticose herbs with glabrous maculate stems and peltate or subpeltate leaves, the blades thin and the margins with mostly 5 acute lobes, the sinuses shallow; heads eradiate, cylindro-campanulate, on ultimate glabrous peduncles 2.5-3.5 cm long; involucres ca. 15 mm high, 6-8 mm wide, the bracts glabrous, ca. 8, the calyculus absent or poorly developed; florets 10-15, the corollas cream-colored; achenes 4-6 mm long, glabrous, the pappus of white bristles 8-10 mm long.

A poorly known, but very distinct species, as noted by McVaugh (1984). It appears to be most closely related to the *Pericalia* complex, as first suggested by Robinson and Brettell (1974).

ROLDANA SUFFULTA (Greenm.) H. Rob. & Brettell, Phytologia 27: 424. 1974.
Cacalia suffulta Greenm.

Nay, Jal, Mic and Mor, tropical deciduous and pine-oak forests, 800-3000 m; Oct-Dec.

Robust suffruticose herbs or shrublets 1-3 m high; leaves large, the blades nearly circular in outline, palmately veined, 10-20 lobed; heads eradiate few (2-10) and large with numerous florets, the corollas orange; outer bracts of the involucre (the calyculus) large and leaf-like, often much larger than the inner bracts; achenes ca 4 mm long, pubescent.

Specimens from Nay and Jal occur in tropical deciduous forests and have mostly much larger bracts (the calyculus) about the involucre, and more coarsely pubescent stems then do typical specimens from Mic and Mor which occur in pine-oak forests at higher elevations. It is likely that the disjunct populations of Nay and Jal are deserving of at least varietal rank.

ROLDANA SUNDBERGII (B.L. Turner) Funston, Novon 11: 304. 2001.
Senecio sundbergii B.L. Turner

Nue and Tam, pine-oak forests along Gulf slopes, 1000-2100 m; Sep-Oct.

Suffruticose herbs 20-50 cm high; stems mostly lanose with shaggy hairs; leaves mostly basal, the blades ovate, irregular sinuate to nearly entire; otherwise much-resembling *R. neogibsonii*.

Gibson (1968) suggested that collections of this taxon are hybrids between *R. lanicaulis* and *R. aschenborniana*, but since the former species does not occur within the range of the present taxon, such identification is unlikely. *Roldana sundbergii* is a low suffruticose perennial herb with mostly basal leaves, presumable endemic to the eastern mid-slopes of the Sierra Madre Occidental.

ROLDANA TEPOPANA (B.L. Turner) B.L. Turner, **comb. nov.**
Senecio tepopanus B.L. Turner, Phytologia 74: 383. 1993.

Son, where known only from the Rio Mayo drainage in the area of Tepopa, tropical deciduous forests, 1000 m; Mar.

Resembling the more southern *R. angulifolia*, but differing in having large, stiffly-branched capitulescences, ecalyculate involucres, and well-developed ray florets.

ROLDANA TLACOTEPECANA Funston, Novon 11: 306. 2001.

Gue, Mpio. Tlacotepec, in pine forests, 2900 m; Jan-May.

Sparsely pubescent radiate perennial herbs 20-50 cm high.

Resembling *R. metepeca* but a smaller plant with radiate heads (vs rayless), and having a lanose vestiture (vs stiptate-glandular), among other characters.

ROLDANA TONII (B.L. Turner) B.L. Turner, **comb. nov.**
Senecio tonii B. L. Turner, Phytologia 71: 304.1992.

Known only from the vicinity of San Cristobal de Las Casas, Cps, montane cloud forests, 2700 m; Nov-Dec.

Shrubs ca. 2 m high; much-resembling *R. oaxacana* and *R. chapalensis* but the peduncles and involucres tomentulose and the corollas pubescent.

In the original description of this taxon, it was suggested that it might be a hybrid between *R. oaxacana* and *R. acutangula*, both of which possess glabrous corollas, *R. tonii* having pubescent corollas.

SOIL SEED BANKS AND DISPERSAL PATTERNS OF SEA RUSH, *JUNCUS MARITIMUS* IN SPATIALLY AND TEMPORALLY DISTURBED COASTAL HABITATS

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Abstract

The present study was conducted to investigate seed banks, seed dispersal pattern and demographic role of these attributes in population maintenance of *Juncus maritimus* in spatially and temporally disturbed coastal habitats. Larger seed banks were recorded for coastal dunes as compared to salt marsh habitat. Seed dispersal varied with respect to time, directions and distance from the parent plants. The attributes investigated in this study suggested demographic adjustment of the species to disturbed coastal habitats via super abundant viable seed banks and through restricted dispersal by wind.

KEY WORDS: *Juncus maritimus*, seed bank, dispersal pattern, disturbed environments.

INTRODUCTION

Many seeds do not germinate immediately after maturation, but instead remain dormant in the soil as seed banks for many years. The ecological importance of seed banks has long been recognized, but this

study has received attention during the last two decades (Bakker et al., 1996; Thompson et al., 1997). Persistent seeds banks are usually found where environmental disturbances are unpredictable and thus probability of seedling success is low. Building up of seed banks allows plants to dispose of numerous propagules ready to germinate whenever conditions become favorable, even when adult populations are gone (Nathan and Muller-Landau, 2000). However, field studies have indicated that persistent seed banks are widespread and are found in a wide range of habitats (Nathan and Muller-Landau, 2000; Olano et al., 2002). Investigation of seed bank is important because in many habitats they may be critical in restoring both number and genetic variability of populations particularly during periods when clones fail to propagate vegetatively (Leck et al., 1989). Likewise, the establishment of a population in a new area, and distribution of a plant species over its range of habitat depend upon the dispersal of seeds, which are the only units of dispersal.

Sea rush (*Juncus maritimus* L.) is a rhizomatous perennial which occurs on the coast of Europe northwards to Scotland and south east Sweden and locally inland in the east and central Europe, around the Mediterranean and in fareast Iran (Sell and Murrel, 1996). *Juncus maritimus* has a prodigious potential for seed production. The species usually produces 40-100 flowers per inflorescence and 60-100 seeds in each capsule. Thus each inflorescence is capable of producing over 3000 seeds of size ranges 0.4-1.0 mm (Snogerup, 1993).

The main objective of this study was to investigate seed banks and seed dispersal of *J. maritimus* in spatially and temporally disturbed habitats and to report these demographic aspects for evolutionary adjustment of the species to disturbed coastal environment.

MATERIALS AND METHODS

Study areas: The study was made on three groups of population sites in Cardiganshire, U.K. (52° 55' N, 4° 06' E). This included Ynyslas dunes, Dyfi estuary and Cors Fochno or Borth Bog.

Ynyslas dunes

The sand dunes at Ynyslas, situated in the Dyfi NNR, are typical west coast examples forming very small sand dune systems. The dunes have developed on a shingle bank which have formed across 90% of the estuary and are a fine example of the way in which dunes start, develop and eventually stabilize.

Sand dune habitats are disturbed due to harsh environmental conditions such as coastal bluffs, salt spray, gales and drought. Nutrient-rich soils are a rare feature. Dune systems tend to be isolated from each other resulting in the development of many special local ecotypes, with each tending to have its own distinct genetic make up as a result of selection to a particular environmental factor. At Ynyslas dune-slacks are common and contain their own variants of typical communities depending on their topographical situation within the dune complex and the age of development.

Physio-chemical characteristics of dunes change with time and there is a gradual change in soil properties across the dunes from west to east. The main changes are decrease in calcium, magnesium, sodium and pH, and an increase in organic component and water retention properties. At Ynyslas fresh sand contains a reasonably high proportion of shell fragments which help to maintain a pH above 7.5.

Dyfi estuary

The Dyfi estuary is also a part of the Dyfi NNR. Salt marshes are dynamic habitats subject to continual environmental change. The habitat is disturbed by incoming tides and saline water. The whole marsh is periodically inundated by salt water, but the more elevated parts are submerged during the highest tides only. There are mainly two types of vegetation growing on the marsh; the first is close to the ground and the second is taller, consisting mainly of *J. maritimus* which determines the general character of the vegetation. The vegetation covering the marsh is never entirely continuous. Certain parts are bare, and there are shallow depressions, which remain filled

with water after the retreat of spring tides. The marsh is developed on deep estuarine silt of a more sandy character.

Cors Fochno or Borth Bog

Cors Fochno is the largest, intact, sea level raised bog in Britain and has a fragile surface. The bog started to form after the Boreal period. Then about 6,000 years ago the flood plain of the Dyfi started to form a huge area of forest mainly consisting of pines which were later overcome by rising water levels. The resultant peat that formed at this bog is about 8 m deep in places. The River Leri was canalised at this time, allowing estuarine water into the peripheral drainage of the mire. The natural vegetation of the bogs includes Sphagnum mosses which form the peat. Borth bog contains 14 different species of *Sphagnum* including *S. megallanicum* which is a rare one. Scattered plants of *J. maritimus* were found growing in a genuine bog habitat.

Buried seeds

Soil samples were collected from all three sites and soil cores were taken where *J. maritimus* was abundant. All the soil samples were collected at the start of the expected season of seed germination during late May, 2000. Soil was sampled to a depth of 6 cm. Using a sharp knife 5x5 cm area was marked and 6 cm deep cut was given in the soil. Then a thin section of metal was slipped under the marked square and the soil block was removed. A total of 48 samples were collected from the three sites. Soil cores were divided for upper (0-3 cm) and lower profiles (3-6 cm) and then transferred to labeled petri dishes separately. All petri dishes were kept in a growth cabinet at 21°C for 14 weeks and watered as necessary. The number of viable seeds in the cores was quantified via seedling emergence. All seedlings of *J. maritimus* were identified by the presence of an adherent seed coat on the top. All seedlings were counted and removed every day. Buried viable seeds were only estimated via seedling emergence. However, the presence of dormant but viable seeds in all soil samples was also detected at the end of the experiment using tetrazolium chloride.

	Mean number of seeds		
Soil depth	0-3 cm	3-6cm	Overall Mean
Sites			
Ynyslas dunes	366.8 + 0.47	422.2+ 0.16	394.5a
Dyfi estuary	132.68+ 0.43	63.68+ 0.31	98.18b
Borth Bog	21.0+ 0.43	14.0+ 0.23	17.50c
Overall Mean	173.26x	166.62x	

Table 1. Effect of soil profile on seedling emergence of *Juncus maritimus* in soil samples collected from three sites in Cardiganshire, UK. Overall mean values in sharing same letter do not differ significantly at $P<0.05$.

The pattern and time of dispersal in *J. maritimus* was assessed from an experimental population. The experimental protocols of Levin and Kerster (1974) were used. Twelve flowering pots were placed in an open field outside the Botanic Garden, University of Wales, Aberystwyth, U.K. This field was without any shelter breaks which could have intercepted the prevailing wind. Four solid wooden planks (100 x 7.5 x 5 cm) were laid out in four directions around flowering pots and firmly fixed to the ground level. Glass slides were fixed on the planks with drawing pins in a way that two slides were fixed together at the first end then single slides onwards in a logarithmic way. These slides were then coated with thick grease. For identification and seed count, observations were made under a dissecting microscope (Swift Stereo 10x) every week and then slides were replaced with new ones with fresh coating. This experiment was continued for 8 months until there was no further seed fall.

The data were subjected to statistical analysis. Two-factor analysis of variance was performed in order to test differences between the mean number of seed banks for habitats and soil profiles. Differences between mean seed rain were elucidated using multivariate analysis of variance. Means were compared by Duncan multiple range test at LSD $P< 0.05$ unless otherwise stated.

Direction	Distance from plants (cm)						
	0-10	10-20	20-30	30-40	40-50	50-60	Mean
North	248.3	229	312.3	132.6	133.6	94.66	191.3a
South	478.0	639.3	305	128.6	204.0	104.6	309.9b
East	193.3	302.0	551.6	235.3	80.33	68.66	238.5c
West	653.6	728.3	552.3	433.3	73.6	92	422.2d
Mean	393.3a	474.7b	430.3b	232.5c	122.9d	89.9e	

Table 2. Effect of distance and direction on number of seeds of *Juncus maritimus*. Overall mean values in sharing same letter do not differ significantly at $P<0.05$.

RESULTS

Data for germination of buried seeds from soil samples from three sites were obtained for six weeks until no further germination was observed. The results clearly showed that a small number of seedlings emerged from the soil samples from the bog site, probably due to algal growth on the peaty substrate (Table 1). More viable seeds were found from sand dune and salt marsh sites and at different depths of the soil profile. Analysis of variance revealed that the number of seedlings emerged from soil samples from these habitats differed significantly (Table 1). The number of seeds in the soil taken from the sand dune habitat was greater. However, the highest value was observed in samples from deeper soil layers within this area. Seed germination was observed in all soil samples from the salt marsh, but they had lower germination than those from sand dune samples. Differences between habitats for seedling emergence were highly significant ($P < 0.01$). No significant differences were observed between soil profiles within each habitat. However, a significant interaction was observed between habitats and soil profiles ($P < 0.01$).

The number of seeds dispersed in each compass direction is presented in Table 2. The overall number of seeds collected for eight months in all directions is also given in Table 3. Although 12 pots each having 3-4 inflorescence stems were used a sufficient number of seeds dispersed. The seed rain from *J. maritimus* plants was the maximum at a short distance from the plants in all directions (2.5-10 cm) with a decline in seed fall as distance increased. Most seeds were dispersed in

Aspect	Months								
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Mean
North	126.0	81.1	160.8	46.4	99.1	37.7	30.8	55.7	79.5a
South	52.0	183.9	241.8	167.5	186.0	142.9	49.4	59.6	135.4b
East	126.4	304.7	321.3	284.4	104.7	246.9	35.1	6.1	178.7c
West	161.1	202.8	304.9	206.1	161.3	320.4	213.7	25.7	199.5d
Mean	116.4 a	193.3 a	257.2 b	176.1 c	137.8 c	186.5 bc	82.3d	36.7e	

Table 3. Spatial and temporal effects on number of seeds of *Juncus maritimus* growing in an experimental population. Overall mean values in sharing same letter do not differ significantly at $P<0.05$.

the westerly and southerly directions (Table 2). The maximum seed rain was during the months of January and February, and the lowest during June (Table 3). The analysis of variance showed significant differences ($P<0.001$) for distance, direction and months of seed dispersal (Table 4).

DISCUSSION

The results suggest that dispersal in *J. maritimus* was asymmetrical around the parent plant and restricted to a few centimetres. The maximum number of seeds fell within 5 cm and only a few (5.41%) dispersed farther than 30 cm. The steep decline in seed number with distance is usual. The principal agency of local dispersal appeared to be wind because a greater proportion of seeds were disseminated in the direction of the local prevailing wind (Table 2). Ervin and Wetzel (2001) found similar evidence for *J. effusus*. Therefore, in species that the principal agency of dispersal is wind, seed dispersal will depend on environmental factors, particularly wind direction (Devlaeminck et al., 2005).

A high percentage (24.44%) was dispersed during January as compared to 6.61% in June when dispersal was virtually completed. One important aspect of seed dispersal is timing of seed fall and is

Sources of variation	df	Mean squares	F
Distance	5	203540.0	103.55***
Direction	3	67889.4	57.57***
Months	7	183987.7	66.86***
Distance x Direction	15	100691.1	17.08***
Distance x Months	35	95025.8	6.91***
Direction x Months	21	53145.5	6.44***
Residual	457		

Table 4. Analysis of variance for number of seeds dispersed during various months at various distances and directions in an experimental population of *Juncus maritimus*. *** indicates significance at $P < 0.001$.

important in relation to the seed banks. Seeds, which are shed during winter, remain dormant or buried in the soil until germination can occur. If seeds are on the ground for a long period of time they stand a greater chance of becoming buried thereby contributing to the seed bank.

The time of seed ripening varied in *J. maritimus* plants and shedding of seeds started from the capsules which matured early. Capsule ripening and dispersal continued for many weeks. Longer periods of seed shedding from *J. maritimus* plants seems to be a tactic both for contemporary seed germination as well as for the chances of seed burial in the soil (Devlaeminck et al., 2005; Olano et al., 2002). Restricted dispersal around the parent plant signified safe sites for germination.

Seed banks in the soils constitute a large gene pool because fresh seeds are added to the soil every year and have different longevity. It is highly likely that they are mixtures of many genotypes that have accumulated over several generations. Thus the store of hidden genetic variation in seed banks may become available to selection (Nathan and Muller-Landau, 2000). Species of unstable environments are often characterised by large buried seed populations because any environmental change may decrease the chance of survival of a

population, but differential germination and recruitment from this source initiates genetically variable populations (Nathan and Muller-Landau, 2000; Olano et al., 2002).

The number of seeds in the seed bank of *J. maritimus* was 110.27 and 27.2 seeds per cm^2 in sand dune and salt marsh habitats, respectively (Table 1). Leck and Graveline (1979) have reported large banks (64 -320 seeds per cm^2) of several dune and salt marsh species. The seed bank of the soil samples taken from the bog was almost negligible, presumably due to contamination and fungal attack on the peaty substrate. However, more buried seeds in sand dunes were presumably due to light, well-drained permeable soils and burial by local movement of surface blown sand or by the movement of invertebrates and small mammals. However, smaller seed banks found in salt marsh habitats were probably due to strong water currents and because of contemporary seeds of the species which readily germinated after dispersal that continued until early summer, the most favourable season for any seed to germinate.

Based on these life history traits, it can be contemplated that the adjustment of *J. maritimus* to disturbed coastal habitats has occurred through super abundant, small sized seeds, potentially viable buried seed component and restricted dispersal in the direction of the wind. Thus the observed strategy of the plant species explains its coastal environment preferences worldwide.

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STEVIA STROTHERANA (ASTERACEAE), A NEWLY PROPOSED NAME FOR THE HOMONYM, *STEVIA HISPIDULA*

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In the most recent issue of Phytologia (7: 53. 2005), I proposed the elevation of *Stevia lemmonii* var. *hispidula* Grashoff to specific rank, *S. hispidula* (Grashoff) B.L. Turner. I checked on the web to ascertain if that specific appellation had been used by yet other workers and was satisfied that it had not. In doing so, I checked the listing on the International Plant Name Index, unaware that there was a double alphabetical listing of *Stevia* under this assemblage of names. The first listing lacked the name *S. hispidula*; the second listing included the name *S. hispidula* DC. Unfortunately, I failed to scroll through the second alphabetical listing hence my failure to become aware that I could not, legitimately, elevate the varietal name concerned to specific level. Thus the present correction:

Stevia strotherana B.L. Turner, **nom. & stat. nov.** Based upon *Stevia lemmonii* A. Gray var. *hispidula* Grashoff, Brittonia 26: 364. 1974. Non *Stevia hispidula* DC.

The species is named for my esteemed academic son, John Strother of Berkeley, who was the first person to call this egregious error to my attention. Other workers were also quick to admonish me for the oversight; indeed, John beat out Dr. Gahndi of Harvard by but a few hours (email) for the honor concerned. Joy (or sorrow, in the case of John) in pointing out your friends errors often pays off, as exemplified by the present bestowal. Indeed, in a sardonic sort of way, I am pleased to have made the slip, this permitting John's surname in the listing of legitimate species names in *Stevia*.

INDEX TO NEW NAMES AND COMBINATIONS IN PHYTOLOGIA 87(3)

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