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NOTES ON THE SPECIES OF ERYTHRINA. IX.

B. A. Krukoff<sup>(1)</sup>

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Introduction

Eight papers covering the morphology, distribution, chromosomes, palynology, alkaloids, and amino acids of Erythrina were published in the September and December 1974 issues of Lloydia. A supplement to the symposium is planned for publication, also in Lloydia, sometime in 1977. I have written a brief paper for this supplement to the symposium, but this present paper includes information which is best published separately.

Four hundred eighty-nine new collections were examined in connection with the preparation of these two papers. For a list of species reduced to synonymy, extensions of ranges, etc., see my paper which is to be published in the supplement to the symposium.

1. Erythrina fusca Loureiro, Fl. Cochinch. 427. 1790.

I have seen the following collections from the New World: Belize: L. Dieckman 196 (MO). Panamá: Colón: R. L. Wilbur 11169 (MO). Venezuela: Mérida: Luis Ruíz Terán 493 (MO). Colombia: Chocó: Al. Gentry 9286; Cundinamarca: E. Forero et al. 417. Ecuador: Guayas: L. Holm-Nielsen et al. 7238 (AAU). Surinam: Landsbosh 136 (MO). Brazil: Amazonas: Prance et al. 23520; Bento S. Pena s.n. (March 21, 1975) (MO).

The following collections from the Old World were available: Tonga: M. Hotta 5105 (TI), 5466 (TI).

Two other collections from Guayas, Ecuador, were examined but are not cited here.

(1) Consulting Botanist of Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey, and Honorary Curator of the New York Botanical Garden.

2. Erythrina crista-galli L. Mant. 99. 1767.

Argentina: Buenos Aires: O. Boelcke et al. 14406 (MO).  
Paraguay: Jim Conrad 2191.

Two other collections, one from Brazil (Paraná) and the other from Argentina (Corrientes) were examined but are not cited here; also one from Belize, from cult. plant.

3. Erythrina falcata Benth in Mart. Fl. Bras. 15(1): 172. 1859.

Brazil: Rio de Janeiro: G. Pabst 7369; Santa Catarina: L. B. Smith et al. 12800 (MO).

One collection from Brazil (Rio de Janeiro) was examined but is not cited here.

4. Erythrina dominguezii Hassler, Physis 6: 123. 1922.

Argentina: Jujuy: A. Krapovickas et al. 26580 (MO).

5. Erythrina ulei Harms, Verh. Bot. Ver. Brand. 48: 172. 1907.

Ecuador: Zamora Chinchipe: Elbert L. Little et al. 275.  
Perú: Cuzco: C. Vargas C. 15537 (MO).

This is the first record of this species from Zamora Chinchipe.

6. Erythrina verna Velloso, Fl. Flum. 304. 1825.

One collection from Brazil (Rio de Janeiro) was examined but is not cited here.

7. Erythrina poeppigiana (Walpers) O. F. Cook, Bull. U. S. Dept. Agr. Bot. 25: 57. 1901.

Venezuela: Mérida: Luis Ruíz Terán 494 (MO). Colombia: Chocó: Rio Tolo, alt. 50 m, E. Forero et al. 1021. Ecuador: Morona Santiago: Elbert L. Little et al. 366. Perú: San Martín: Schunke 8231.

This is the first record of this species from Chocó and Morona Santiago. The collector states on the label of Chocó specimen: "árbol muy común en toda el región."

Two collections, one from Ecuador (Esmeralda) and the other from Bolivia (Bení) were examined but are not cited here.

8. Erythrina suberosa Roxburgh, Fl. Ind. 3: 253. 1832.

Four collections from NW India were examined but are not cited here.

10. Erythrina stricta Roxburgh, Fl. Ind. 3: 251. 1832.

Thailand: C. F. van Beusekom 421 (AAU).

12. Erythrina arborescens Roxburgh, Pl. Coromandel 3: 14, pl. 219. 1819.

China: Sikang: C. Y. Chiao 1772 (S). India: Darjeeling, alt. + 2200 m, H. Ohashi et al. s.n./1972.

13. Erythrina subumbrans (Hasskarl) Merrill, Philipp. Jour. Sci. Bot. 5: 113. 1910.

India: G. Thanikaimoni 1191 (PO); Mysore: C. J. Saldanha 2182 (MO), 15834 (MO), 16454 (MO). Ceylon: Kostermans 25272 (AAU), 25327 (AAU), Kokawa & Hotta 5206 (AAU). Philippines: Quezon: Justo P. Rojo 71 (MO).

Seven collections deposited at S were examined but are not cited here. They are from the Philippines, Sumatra, Java, and Celebes.

14. Erythrina breviflora Alph. DeCandolle, Prodr. 2: 413. 1825.

México: Jalisco: 12 km NW of Los Volcanos, alt. 1900 m, Breedlove 35846.

15. Erythrina edulis Triana, M. Micheli, Jour. de Bot. 6: 145. 1892.

Ecuador: Cotopaxi: L. Holm-Nielsen 1140 (AAU); Tungurahua: L. Holm-Nielsen et al. 241 (AAU), 278 (AAU); Los Rios: Al. Gentry 9650 (S); Loja: A. Paredes 108 (MO); Napo: Al. Gentry 12407; Morona Santiago: Alberto T. Ortega U. 207. Perú: Huanuco: J. Schunke 8313.

This is the first record of this species from Morona Santiago.

Four collections from Ecuador (Pichincha, Loja and Napo) were examined but are not cited here.

18. Erythrina schimpffii Diels, Bibl. Bot. 116: 96. 1937.

Ecuador: El Oro: alt. + 360 m, Plowman 3457 (ECON).

19. Erythrina montana Rose & Standley, Contr. U. S. Nat. Herb. 20: 179. 1919.  
México: Durango: alt.  $\pm$  2200 m, Davidse 10023.
- 22a. Erythrina herbacea L. subsp. herbacea. Erythrina herbacea L. Sp. Pl. 706. 1753 sens. str.  
U. S. A.: Georgia: Rick Volosen s.n. (Apr. 12, 1970) (MO); Mississippi: Fleet N. Lee 30 (MO). Texas: D. S. Correll 23431.
- 22b. Erythrina herbacea L. subsp. nigrorosea Krukoff & Barneby Phytologia 25(1): 6. 1972.  
México: Jalisco: C. Johnson 1973/325 (MO).
- 28b. Erythrina lanata Rose subsp. occidentalis (Standley) Krukoff & Barneby, Phytologia 27: 117. 1973.  
México: Jalisco: L. A. Perez 360.
29. Erythrina goldmanii Standley, Contr. U. S. Nat. Herb. 20: 181. 1919.  
México: Chiapas: D. E. Breedlove 20397 (MO), 20593 (Cintalapa, alt.  $\pm$  1000 m), 36747 (Cintalapa, alt.  $\pm$  900 m), 23492 and 30362 (Ocozocoautla de Espinosa, alt. 800-1000 m), 23561 (Tuxtla Gutiérrez, alt. 530 m), 23748 (Tonalá, alt.  $\pm$  60 m), 26917 and 36829 (Arriaga, alt.  $\pm$  250 m), 23838 (MO) (Chiapa de Corzo), 37639 (Villa Corzo, alt.  $\pm$  900 m), 38655 (Angel Albino Corzo, alt.  $\pm$  900 m).
- The above-cited and previous collections of D. E. Breedlove from the State of Chiapas cover practically all municipalities in this State.
30. Erythrina caribaea Krukoff & Barneby, Phytologia 25: 9. 1972.  
México: Chiapas: mun. Ocozocoautla, alt.  $\pm$  700 m, lower montane rain forest, Breedlove 38698; mun. Ocosingo, alt.  $\pm$  300 m, tropical rain forest, Breedlove 33907.
31. Erythrina folkersii Krukoff & Moldenke, Phytologia 1: 286. 1938.  
México: Chiapas: Las Margaritas, alt.  $\pm$  300 m, Breedlove et al. 34268. Belize: J. Dwyer et al. 88 (MO), 12121 (MO), 12507 (MO), 12714 (MO).

36. Erythrina chiapasana Krukoff, Brittonia 3: 304. 1939.

México: Chiapas: Las Margaritas, alt. + 1700 m, Breedlove 33398.

Berlin, Breedlove, and Raven (Principles of Tzeltal Plant Classification, p. 14, 1973) state that this species is common in Pine-Oak-Liquidambar Forest in mun. Tenejapa, Chiapas.

41. Erythrina chiriquensis Krukoff in Brittonia 3: 222. 1939.

Panamá: Croat 15639; Chiriquí: E. A. Lao 354 (MO) (alt. + 2000 m).

45. Erythrina steyermarkii Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2): 175. 1970.

Costa Rica: Cartago: along road from Turrialba to Moravia de Chirripo, Burger, W. et al. 10032.

49. Erythrina lanceolata Standley, Contr. U. S. Nat. Herb. 17: 432. 1914.

Costa Rica: Alajuela: alt. + 500 m, W. Burger et al. 10020.

50. Erythrina costaricensis M. Micheli, Bull. Herb. Boiss. 2:445. 1894.

Panamá: J. A. Duke 14503; Coclé: Croat 26126 (MO); Canal Zone: Croat 8667 (MO), Al. Gentry et al. 8657 (MO), Mireya D. Correa A. 484 (MO); Colón: Davidse et al. 10068 (MO); San Blas: Duke 14857. Colombia: Chocó: Rio Tolo, Forero et al. 973; Antioquia: Al. Gentry 9222 (MO).

This is the first record of this species from San Blas.

52. Erythrina americana Miller, Gard. Dict. ed. 8, No. 5. 1768.

México: Veracruz: Orizaba, M. Souza 4438; Chiapas: mun. Bochil, along road to Simojovel, alt. 1250 m.

This is the first record of this species from the State of Chiapas.

53. Erythrina berteroa Urban, Symb. Ant. 5: 370. 1908.

Panamá: Coclé: El Valle de Antón, M. Nee 9219; Canal Zone: Al. Gentry 8629 (MO), 8746 (MO); Colón: Davidse 10068 (MO).

This is the first record of this species from Colón.

54. Erythrina rubrinervia H. B. K. Nov. Gen. & Sp. 6: 434. 1824.  
Colombia: Cundinamarca: E. Forero 300 (AAU).
58. Erythrina gibbosa Cufodontis, Arch. Bot. Sist. Fitog. & Genet. 10: 34. 1934.  
Panamá: Cocle: Duke 13232; Veraguas: Mori & Kallunki 2537.
61. Erythrina peruviana Krukoff, Brittonia 3: 262. 1939.  
Ecuador: Zamora Chinchipe, alt.  $\pm$  1000 m, Elbert L. Little et al. 276.

This is the first record of this species from Zamora Chinchipe.

62. Erythrina mitis Jacquin, Hort. Schoenb. 2: 47. 1797.  
Venezuela: Gentry et al. 14823; Miranda: Davidse 4114 (MO).
- 64a. Erythrina corallodendrum L. var. corallodendrum  
Erythrina corallodendrum L. Sp. Pl. 706. 1763.  
Jamaica: St. Ann, Dulcie Powell 979 (MO).
70. Erythrina oliviae Krukoff, Phytologia 19(3): 128. 1969.  
México: Puebla: km 230-231 of the México-Oaxaca highway, bank of dry stream, J. Mejicanos 1977/1 (Feb. 16, 1977), 1977/2.

These two collections were made from the same two trees from which the type and all other collections of this species were made. The trees were leafless (the leaves fell in December) and had mature fruits.

71. Erythrina caffra Thunberg, Prodr. Pl. Cap. 121. 1800.

Eight collections from South Africa (Natal) were examined but are not cited here.

For illustration of this species, see: Palmer, E. & Pitman, N. Trees of South Africa 2: 955-957. 1972, and Killick, Fl. Pl. of Africa 43 (3--4): t. 1709, 1710. 1976.

72. Erythrina lysistemon Hutchinson, Kew Bull. 1933: 422. 1933.

Tanzania: C. F. Paget-Wilkes 211 (MO). South Africa: near Port St. John, R. D. A. Bayliss 7046 (MO).

Eleven collections from South Africa, S. Rhodesia, Tanzania, and from plants in cultivation in Australia (Brisbane) and Hong Kong were examined but are not cited here.

For illustration of this species, see: Palmer E. & Pitman, N. Trees of South Africa 2: 957-959. 1972.

73. Erythrina humeana Sprengel, syst. 3: 243. 1826.

Six specimens from South Africa (Cape Province and Transvaal) were examined but are not cited here.

For illustration of this species, see: Palmer, E. & Pitman, N. Trees of South Africa 2: 961-962. 1972.

74. Erythrina zeyheri Harvey, Fl. Cap. 2: 236. 1862.

Three collections of this species from South Africa (Transvaal) were examined but are not cited here.

75. Erythrina acanthocarpa E. Meyer, Comm. Pl. Afr. Austr. 1: 151. 1836.

Six collections from South Africa (Cape Province) were examined but are not cited here.

77. Erythrina brucei Schweinfurth, Verhand. Zoo.-Bot. Gesell. Wien 18: 653. 1868. et auct. plur., pro majore parte, leguminibus seminibusque exceptis; emend. Gillett, Kew Bull. 15: 428. 1962.

Two collections from Ethiopia, collected at altitudes of + 2250 m and 2800 m, were examined but are not cited here.

79. Erythrina senegalensis Alph. DeCandolle, Prodr. 2: 413. 1825.

Guinée: Jacques-Georges 5348. Nigeria: western state, Roy C. Brown 921 (MO).

Three collections from Senegal and Sierra Leone were examined but are not cited here.

81. Erythrina mildbraedii Harms in Mildbr. Deutsch. Zentr.-Afr. Exp. 1907/1908, 2: 264, tab. 30. 1911.

Nigeria: Ibadan Div., F. N. Hepper 2290 (S).

85. Erythrina decora Harms in Engl. Jahrb. 49: 441. 1913.

South West Africa: Hakasgabirga, E. Busch 7957 (S).

For illustration of this species, see: Palmer, E. & Pitman, N. *Trees of South Africa* 2: 952. 1972.

88. Erythrina addisoniae Hutchinson & Dalziel, *Kew Bull.* 1929: 17. 1929.

Guinée: Jacques-Georges 4745 (MO), 5523 (MO).

89. Erythrina droogmansiana DeWildeman & Th. Durand, *Bull. Soc. Roy. Bot. Belg.* 40: 19. 1901.

Zaire: Orientale: J. Louis 9464 (S).

For the occurrence of this species in Uganda, see the paper by B. Verdcourt & T. J. Synnott in *Kew Bulletin* 30(3): 471-473. 1975.

91. Erythrina sacleuxii Hua, *Bull. Soc. Linn. Paris n.s.* 1: 54. 1898.

Kenya: Kwale Dist., P. J. Greenway 9646 (S). Tanzania: Bezirk Lindi, H. J. Schlieben 5634 (S), 6193 (S).

93. Erythrina sigmoidea Hua, *Bull. Mus. Hist. Nat. Par.* 3: 327. 1897.

Nigeria: Latilo et al. 69374 (MO).

94. Erythrina latissima E. Meyer, *Comm. Pl. Afr. Austr.* 1: 151. 1836.

Four collections from Rhodesia and South Africa (Natal) were examined but are not cited here.

For illustrations of this species, see Killick, *Fl. Pl. of Africa* 43(3-4): t. 1709, 1710. 1976, also Palmer, E. & Pitman, N., *Trees of South Africa* 2: 959-961. 1972.

95. Erythrina abyssinica Lamarck, *Encycl. Bot.* 2: 392. 1788; *DC Prodr.* 2: 413. 1825.

Ruanda: P. Auquier 2652 (MO). Tanzania: G. W. Frame 529 (MO), C. F. Paget-Wilkes 210 (MO). Malawi: Jean Pawek 6347 (MO), 7748 (MO). Rhodesia: Adele Lewis Grant s.n. (July 1928) (MO).

Twenty-three collections from Ethiopia, Eritrea, Kenya, Tanzania, Mozambique, S. Rhodesia, and Angola were examined but are not cited here.

96. Erythrina variegata L. Herb. Amboin. 10. 1754; Amoen. Acad. 4: 122. 1759.

India: C. Thanikaimoni 1181 (Pondichery). Taiwan. C. Owatari s.n. (March 1, 1898) (TI), L. Sasaki s.n. (Sept. 8, 1965) (TI). Ryukyu Islands: R. J. Alvis 73 (TI). Okinawa Islands: S. Hatusima 17497 (TI). Jaluit Islands: G. Koidzumi s.n. (Jan. 1915) (TI). Palau: T. Tuyama s.n. (Aug. 28, 1939) (TI).

Seven collections from Java, Celebes, Solomon Islands, and Fiji were examined but are not cited here; also three collections from Virgin Islands (St. Croix and Tortola) which are from cultivated plants.

102. Erythrina velutina Willdenow, Gest. Nat. Freunde Berlin Neue Schr. 3: 426. 1801.

Venezuela: Anzoátegui: Luis Ruíz Terán 350 (MO). Ecuador: Manabi: C. A. Dodson & L. B. Thien 1009, Al. Gentry 12204; Guayas: Al. Gentry 10077; Galápagos Islands: F. R. Fosberg 44917 (MO), 44944 (MO). Perú: Plowman 5437 (Tumbes, alt. + 550 m).

104. Erythrina burttii Baker f., Jour. Bot. 70: 254. 1932.

Kenya: Kajiado Dist.: Greenway 9579 (S).

105. Erythrina burana R. Chiovenda, Att. R. Accad. Ital., Mem. Sc. Fis. Mat. & Nat. 11: 27. 1940.

Ethiopia: Harar: students of Imper. Ethiop. College of Agr. & Mech. Arts s.n. (S).

The collectors state that this species is very common in Harar and is planted on campus.

106. Erythrina perrieri R. Viguier, Not. Syst. 14: 175. 1952.

Mauritius: Ile aux Cerfs, D. Lorence 7 (1975) (MO).

The collector states on the label: "flowers scarlet, occasional locally."

This is the first record of this species from Mauritius.

#### Hybrids

1. Erythrina x bidwillii Lindley, Bot. Reg. 33: pl. 9. 1849.

Japan: Tokyo, Shinjiku-gyon, M. Togashi s.n. (July 6, 1968) (TI) (cult.).

7. Erythrina x sykesii Barneby & Krukoff, *Lloydia* 37: 447. 1974.

Western Australia: Perth: Univ. Campus, David Ladd s.n.  
(June 9, 1970) (MO).

The collector states on the label: "common Perth street tree."

#### Bibliography

(In order to conserve space, we are citing here only the papers which are not cited in Supplements III-VIII.)

1. Barton, Derek H. R. et al. Phenol oxidation and biosynthesis, Part XXII. The alkaloids of E. lysistemom, E. abyssinica, E. poeppigiana, E. fusca, and E. subumbrans (as "E. lithosperma Blume"). *J. Chem. Soc. (C.)* 652-654. 1971.
2. Bhakuni, D. S. & N. M. Khanna. Chemical examination of the bark of Erythrina variegata (as "indica Lam."). *J. Sci. Ind. Res. Sect. B* 18: 494. 1959.
3. Bocquet, G. & J. O. Derron. Les Erythrina de la République de Sao Tomé et Príncipe. *Ber. Schweiz. Bot. Ges.* 85(4): 298-302. 1975.
4. Chopra, R. N., S. Ghosh & B. N. Sen. Some common indigenous remedies--Erythrina variegata (as "indica"). *Indian J. Med. Res.* 22: 265. 1934.
5. Ghosal, S., S. K. Dutta & S. K. Bhattacharya. Erythrina--Chemical and pharmacological evaluation II: Alkaloids of Erythrina variegata L. *J. Pharm. Sci.* 61: 1274. 1972.
6. Krukoff, B. A. Notes on the species of Erythrina. VIII. *Phytologia* 33: 342-355. 1976.
7. Letcher, R. M. Alkaloids of Erythrina lysistemom. 11--Methoxyerythraline, a new alkaloid. *J. Chem. Soc. (C.)* 652. 1971.
8. Singh, H. & A. S. Chawla. Isolation of erysodine, eryso-trine and hypaphorine from Erythrina suberosa Roxb. seeds. *Experientia* 25: 785. 1969.
9. Singh, H., A. S. Chawla, J. W. Rowe & J. K. Toda. Waxes and sterols of Erythrina suberosa bark. *Phytochemistry* 9: 1673. 1970.

10. Singh, H. & A. S. Chawla. Chemical constituents of Erythrina suberosa Roxb. seeds. J. Pharm. Sci. 59: 1179. 1970.
11. Singh, H. & A. S. Chawla. Study of the chemical constituents of seeds of Erythrina variegata (as E. variegata var. orientalis"). Planta Med. 19: 71. 1970.
12. Singh, H. & A. S. Chawla. Study of Erythrina suberosa leaves. Planta Med. 19: 378. 1971.
13. Singh, H., A. S. Chawla, A. K. Jindal, M. R. Subbaram & K. T. Achaya. Seed oils of Erythrina arborescens and E. stricta. Indian J. Technol. 10: 115. 1972.
14. Singh, H. et al. Investigation of Erythrina spp. VII. Chemical constituents of Erythrina variegata (as "E. variegata var. orientalis"). Lloydia 38: 97-100. 1975.
15. Gustafson, R. Erythrina in Southern California. Hortulus Aliquando 1: 5-11. 1975-6.

SUPPLEMENTARY NOTES ON AMERICAN MENISPERMACEAE. XII.  
NEOTROPICAL TRICLISIEAE AND ANOMOSPERMEAE

B. A. Krukoff<sup>(1)</sup>

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Introduction

Since the latest paper in this series (Supplement XI) was published, 47 new collections were examined, adding to our knowledge of several species. Extensions of ranges were noted for four species, but no new species were described. Two new collections of poorly collected and poorly understood Anomospermum matogrossense were of particular interest.

The chemical work on neotropical Triclisieae and Anomospermeae by Prof. Michael P. Cava and his associates continues, as may be seen from the bibliography. Abuta splendida, Sciadotenia toxifera and Abuta grisebachii were studied, and four new benzylisoquinoline alkaloids (krukovine, sciadenine, grisabine, and grisabutine) were isolated and characterized.

Of the 16 known New World genera of Menispermaceae, chromosomes were studied of only four genera (Calycocarpum, Menispermum, Cocculus, and Cissampelos). Dr. William L. Theobald, director of Pacific Tropical Botanical Garden in Hawaii, is now receiving seeds, largely from the collectors of MO and NY. It is interesting that the first two batches of seeds were sent by Dr. J.-J. de Granville from French Guiana. They were of the recently described remarkable Elephantomene eburnea and Anomospermum sp.; seeds of these germinated four to five months after planting.

(1) Consulting Botanist of Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey, and Honorary Curator of the New York Botanical Garden.

I. Chondrodendron Ruiz & Pavon, Syst. Veg. 261. 1798.

1. Chondrodendron tomentosum Ruiz & Pavón, Syst. Veg. 261. 1798.

Colombia: Comisaría de Caquetá: I. Cabrera 3656. Perú: San Martín: Timothy Plowman 6032, J. Schunke 8268 (Mariscal Cáceres, Tocache Nuevo).

This is the first record of this species from Comisaría de Caquetá.

II. Curarea Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2): 7. 1971.

1. Curarea toxicofera (Weddell) Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2): 9. 1971.

Panamá: Canal Zone: tropical wet forest, S. Mori 7946.

2. Curarea candicans (L. C. Richard) Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2): 12. 1971.

Brazil: Pará: entre Acará e Mojú, R. R. Santos 402.

III. Sciadotenia Miers, Ann. Nat. Hist. II. 7: 43. 1851.

2. Sciadotenia toxifera Krukoff & A. C. Smith, Bull. Torrey Club 66: 308. 1939.

Perú: San Martín: Mariscal Cáceres, Tocache Nuevo, J. Schunke 45, 47.

9. Sciadotenia brachypoda Diels in Engler, Pflanzenreich 4(94): 84. 1910.

Brazil: Rondônia: Prance et al. P21280.

This is the first record of this species from Rondônia.

V. Telitoxicum Moldenke in Krukoff & Moldenke, Brittonia 3: 42. 1938.

1. Telitoxicum minutiflorum (Diels) Moldenke in Krukoff & Moldenke, Brittonia 3: 49. 1938.

Brazil: Acre: L. R. Marinho 133.

This is the first record of this species from the State of Acre.

VI. Abuta Barrère ex Aublet, Pl. Guian.  
1: 618. Pl. 250. 1775.

6. Abuta aristeguietae Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2): 21. 1970.

Costa Rica: Alajuela: finca Los Ensayos, Zapote de Alfaro Ruiz, H. Barquero 1977/1, 1977/2.

9. Abuta pahnii (Martius) Krukoff & Barneby, Mem. N. Y. Bot. Gard. 22(2): 43. 1971.

Venezuela: Tachira: Al. Gentry & L. Puig-Ross 14301 (MO).  
Perú: San Martín: Mariscal Cáceres, Tocache Nuevo, J. Schunke 49, 50.

14. Abuta selloana Eichler, Flora 47: 389. 1864.

Brazil: Rio de Janeiro: J. B. R. 140813.

16. Abuta solimoesensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2): 18. 1970.

Perú: San Martín: Mariscal Cáceres, Tocache Nuevo, J. Schunke 41, 51.

17. Abuta velutina Gleason, Bull. Torrey Club 58: 361. 1931.

Venezuela: Amazonas: Al. Gentry & Paul Berry 14506 (MO).  
Brazil: Rondônia: M. R. Cordeiro 634. Perú: San Martín: Mariscal Cáceres, Tocache Nuevo, J. Schunke 8143.

This is the first record of this species from Rondônia.

25. Abuta panamensis (Standley) Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2): 22. 1970.

Mexico: Chiapas: mun. Ocozocoautla, alt.  $\pm$  900 m, Breedlove 23348; mun. Berriozábal, alt.  $\pm$  900 m, lower montane rain forest, Breedlove & Thorne 30779.

27. Abuta grandifolia (Martius) Sandwith, Kew Bull. 1937: 397. 1937.

Guiana: near Pirara, Rich. Schomburgk 107/696 (L). Brazil: border of French Guiana & Surinam, region of Tumac-Humac, C. Sastre 1601, 1607, 1668a, 1785; Roraima: between Boa Vista & Caracarai, J. M. Pires & Leite 14754; Mato Grosso: D. Philcox & A. Ferreira 4571, Hatschbach 35974 (mun. Rio Verde). Colombia: Comisaría de Coquetá: Cabrera 3650. Perú: Loreto: Flowman

2521 (Río Nanay), R. Martin et al. 1760 (K) & 1752 (K) (Río Napo), 1650 (K) & 1696 (K) (Iquitos). Ecuador: Napo: Río Aguarrico, alt. 220 m, Benkt-Sparre 13082 (S).

29. Abuta dwyerana Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2): 73. 1970.

Panamá: Canal Zone: D'Arcy 9301.

VIII. Anomospermum Miers, Ann. Nat. Hist. III, 14: 101. 1864.

5a. Anomospermum reticulatum (Martius) Eichler ssp. reticulatum, Mem. N. Y. Bot. Gard. 22(2): 73. 1971.

Brazil: Pará: Estrada Transamazônica entre Estreito e Marabá, B. G. S. Ribeiro & Pinheiro 1299; Rondônia: margem do Rio Machado, M. R. Cordeiro 531.

5f. Anomospermum reticulatum (Martius) Eichler ssp. venezuelense Krukoff & Barneby, Mem. N. Y. Bot. Gard. 22(2): 76. 1971.

Venezuela: Mérida: alt. + 500 m, A. L. Bernardi 3841 (MO).

7. Anomospermum matogrossense Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20: 33. 1970.

Brazil: Pará: Alto Tapajos, Rio Cururú, 1-10 km upriver from village Prataí, várzea, edge of river at flood level, W. R. Anderson 10861 (NY, IAN); Rondônia: margem do Rio Urupá, M. R. Cordeiro 563.

Anderson's specimen was erroneously cited as "Orthomene schomburgkii" in Suppl. XI (Phytologia 33: 335. 1976), also in List of Exsiccatae (p. 337).

IX. Orthomene Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2): 79. 1971.

1. Orthomene schomburgkii (Miers) Barneby & Krukoff, Mem. N. Y. Bot. Gard. 22(2): 80. 1971.

Surinam: Maguire 55429. Brazil: Amazonas: basin of Rio Negro, L. R. Marinho 384. Perú: Loreto: Maynas, Al. Gentry et al. 15863.

X. Elephantomene Barneby & Krukoff, Lloydia 37: 27. 1974.

1. Elephantomene eburnea Barneby & Krukoff, Lloydia 37: 28. 1974.

Guyane: Cayenne: Saüi, plateau "La Douane," forêt dense (parcelle Orstom), J.-J. de Granville 2704. DeGranville reports: "liane énorme, de 25 cm de diam à la base, épanouie dans la voûte à 40-50 mètres de haut."

This is the second collection of this species.

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2. Cava, Michael P., et al. Sciadenine, a new bisbenzylisoquinoline alkaloid from Sciadotenia toxifera. Heterocycles 4: 471-474. 1976.
3. Cava, Michael P., et al. Grisabine and grisabutine, new bisbenzylisoquinoline alkaloids from Abuta grisebachii. To be published in Jour. Org. Chem. in May 1977.
4. Krukoff, B. A. Supplementary notes on American Menispermaceae XI. Neotropical Triclisiaae and Anomospermeae. Phytologia 33: 323-341. 1976.

SUPPLEMENTARY NOTES ON THE AMERICAN SPECIES

OF STRYCHNOS. XV.

B. A. Krukoff<sup>(1)</sup>

Contents

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Introduction

Since the previous paper in this series was submitted for publication in 1976, 75 new collections were examined. The newly examined collections added to our knowledge of several species, and extensions of range were noted for ten. The extensions of *S. nigricans* to the well-collected State of Paraná, Brazil, and of *S. poeppigii* to Panama, Panama, are most interesting. No new species were described. It was particularly interesting to see fruits (unfortunately, not completely mature) of *S. tabascana* for the first time. The shells of these fruits are thicker than those of the closely related *S. panamensis*. The corolla of *S. tabascana* is pubescent externally, whereas that of *S. panamensis* is glabrous.

The chemical work of Professor Marini-Bettolo and his associates is continuing, as may be seen from the bibliography.

In a previous paper, I mentioned the very timely and interesting contributions made by Dr. Gillelan T. Prance concerning the botanical ingredients of Curare as prepared by four Indian tribes. Three species of *Strychnos* were identified previously: *S. bredemeyeri* used by Mayongong and Sanama Indians of Roraima, and *S. cogens* and *S. solimoesana* used by Jamamadi Indians of the basin of the Rio Purus. Other specimens, sterile and from comparatively young plants, are still under study. Details on the preparation of Curare will be published elsewhere.

*S. peckii* is reported by Alberto T. Ortega as an ingredient of Curare in Morona Santiago, Ecuador.

(1) Consulting Botanist of Merck Sharp & Dohme Research Laboratories, Rahway, New Jersey, and Honorary Curator of New York Botanical Garden.

6. Strychnos rondelettioides Spruce ex Bentham, Jour. Linn. Soc. 1: 104. 1856.

Venezuela: Amazonas: Paul E. Berry 638. Brazil: Amazonas: basin of Rio Purus, Prance et al. P21206, P21207, P3403. Perú: Loreto: Juan Revilla 174, Al. Gentry et al. 16677, s.n. (Jan. 1976).

Specimens from the basin of the Rio Purus are from plants which are used as a fish poison by Paumari Indians. Their name for this plant is "Jadadakaikapihai."

10. Strychnos brachiata Ruiz & Pavón, Fl. Per. 2: 30. 1799.

Colombia: Boyaca: C. Sastre 766. Perú: San Martín: Mariscal Cáceres, Tocache Nuevo, J. Schunke 2310.

This is the first record of this species from Boyaca.

11. Strychnos trinervis (Velloso) Martius, Syst. Mat. Med. Bras. 121. 1843.

Brazil: Minas Gerais: Serra de Cipó, JBR 114491 (MO); Guanabara: JBR 109209; Paraná: mun. Antonina, Hatschbach 33409.

12. Strychnos panamensis Seemann, Bot. Voy. Herald, 166. 1854.

Mexico: Chiapas: Mapastepec, alt. + 180 m, Breedlove & Thorne 30708. Panama: Chiriquí: Croat 21935 (MO); Canal Zone: Croat 10097. Venezuela: Zulia: F. D. Chitti & Benkowski 3146. Colombia: Chocó: Al. Gentry 9430.

13. Strychnos tabascana Sprague & Sandwith, Kew Bull. 1927: 128. 1927.

Mexico: Chiapas: mun. La Trinitaria, alt. + 1300 m, montane rain forest, Breedlove 38882; mun. Las Margaritas, alt. + 350 m, tropical rain forest, Breedlove 33158.

Breedlove 38882 is a very valuable specimen, as it is the first specimen seen with immature fruits. The shells of these fruits are thicker than those of S. panamensis.

18. Strychnos medeola Sagot ex Progel in Mart. Fl. Bras. 6(1): 282. 1868.

Brazil: Pará: Nilo T. Silva 3352 (IAN).

19. Strychnos toxifera Robert Schomburgk ex Bentham, Jour. Bot. Hook. 3: 240. 1841.

Guyana: Kanuku Mtns., R. Goodland & Maycock 461. Colombia: Chocó: Al. Gentry & Aguirre 15196 (MO). Brazil: Manaus: Prance et al. 23569.

These are the first records of this species from Chocó as well as from the lower Rio Negro.

21. Strychnos diabolii Sandwith, Kew Bull. 1931: 486. 1931.

Venezuela: Amazonas: San Carlos de Rio Negro, Paul E. Berry 1544.

This is the first record of this species from Venezuela.

23. Strychnos sandwithiana Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(1): 36. 1969.

Perú: San Martín: Mariscal Cáceres, Tocache Nuevo, J. Schunke 43, 56.

This is the first record of this species from Peru.

24. Strychnos jobertiana Baillon, Adansonia. 12: 367. 1879.

Venezuela: Amazonas: San Carlos de Rio Negro, Paul E. Berry 1405, 1447. Brazil: Amazonas: Manaus-Itacoatiara road, km 13, W. Rodrigues & A. Loureiro 9519.

25. Strychnos pseudo-quina A. St. Hilaire, Mém. Mus. Paris 9: 340. 1822.

Brazil: Mato Grosso: Cuiabá, Hatschbach 34010, 36072; Minas Gerais: J.B.R. 130177 (MO); Sao Paulo: Oswaldo Handro 439 (S).

28. Strychnos solimoesana Krukoff, Brittonia 4: 280. 1942.

Brazil: Amazonas: basin of Rio Purus, Prance et al. P21254; Manaus-Porto Velho road, Prance et al. 22884.

Prance et al. P21254 is an ingredient of Jamamadi arrow poison and Prance 22884 is the first record of this species from the basin of the Rio Negro.

31. Strychnos peckii B. L. Robinson, Proc. Amer. Acad. 49: 504. 1913.

Perú: San Martín: Mariscal Cáceres, Tocache Nuevo, J. Schunke 39, 42. Ecuador: Morona Santiago, alt. + 300 m, Alberto T. Ortega U. 401.

Ortega's label reads: "usado para envenenar las flechas." Schunke's specimens are the first record of this species from San Martín.

32. Strychnos erichsonii Richard Schomburgk, Reisen 3: 1082. 1848. nomen: ex Progel in Mart. Fl. Bras. 6(1): 274. 1868.

Surinam: J. C. Lindeman 522 (SW plateau covered by ferrobauxite, 550-710 m alt.), LBB 15301 (dist. Para). French Guiana: Maroni River, Sastre & Moretti 4024. Brazil: Amazonas: Prance 24541 (basin of Rio Içá, + 5 km above mouth), Mori & Prance 9121, 9126 (Rio Jandiatuba, + 10 km downstream from São Paulo de Olivença). Perú: lower Anpiyacu, north of Rio Marañon, Prance 24699.

The two collections from Rio Jandiatuba are from white-water varzea forest, both collected on February 26 in flower. They are the best collections I have ever seen in flower; I refer particularly to the well-preserved creamy-yellow papillose corolla tubes.

- 32a. Strychnos croatii Krukoff & Barneby.

Panama: Panama: Croat s.n. (transect. #114).

35. Strychnos bredemeyeri (Schultes) Sprague & Sandwith, Kew Bull. 1927: 128. 1927.

Venezuela: Amazonas: Paul E. Berry 1607. Brazil: Roraima: vicinity of Auaris, Prance et al. 21502.

Prance writes on the label: "used as an ingredient of Mayongong and Sanama Curare."

"Cumuduá" or "Cumarua" (Mayongong Indian dialect), "Mogoli" (Sanama Indian dialect).

- 36a. Strychnos mitscherlichii Richard Schomburgk, Reisen 2: 451. 1848, var. mitscherlichii.

Surinam: Lely Mts., SW plateau covered by ferrobauxite, 550-710 m, Lindeman et al. 234, 734. Brazil: Amazonas: Prance et al. 23445 (near Manaus), 24426 (Rio Solimões, Ilha Jurupari and vicinity). Perú: San Martín, Mariscal Cáceres, Tocache Nuevo, J. Schunke 40.

37. Strychnos solerederi Gilg in Engler, Bot. Jahrb. 25 (Beibl. 60): 40. 1898.

Perú: San Martín: Mariscal Cáceres, Tocache Nuevo,  
J. Schunke 8144.

39. Strychnos guianensis (Aublet) Martius, Syst. Mart. Med. Bras. 121. 1843.

Brazil: Amazonas: upper Rio Solimões, Mori & Prance 9036 (Paraná de Tonantins), 2206 (Igarapé Preto, near Belem). Perú: Loreto: Al. Gentry et al. 16675, Juan Revilla 172.

43. Strychnos panurensis Sprague & Sandwith, Kew Bull. 1927: 132. 1927.

Colombia: Chocó: Duke 13331 (MO) (Rio Truando), 15800 (MO). Perú: San Martín: Mariscal Cáceres, Tocache Nuevo,  
J. Schunke 44.

47. Strychnos cogens Bentham, Jour. Bot. Hook. 3: 241. 1841.

Brazil: Amazonas: basin of Rio Purus, Prance et al. 23438.

This is the main ingredient of Jamamadi arrow poison; "Iha" (Jamamadi Indian dialect).

This is the first record of this species from the basin of the Rio Purus.

48. Strychnos melinoniana Baillon, Bull. Soc. Linn. Paris 1: 256. 1880.

Surinam: Lely Mountains, alt. + 650 m, Mori & Bolten 8493.

53. Strychnos fendleri Sprague & Sandwith, Kew Bull. 1927: 129. 1927.

Marini-Bettolo and collaborators investigated the alkaloids found in this species (Gazzetta Chimica Italiana 106: 773-777. 1976). The stem bark was found to contain seven tertiary alkaloids. The structure of four of these is reported.

56. Strychnos parvifolia DC., Prodr. 9: 16. 1845.

Brazil: Guanabara: JBR 114845.

59. Strychnos brasiliensis (Sprengel) Martius, Flora 24 (Beibl. 2): 84. 1841.

Brazil: Rio de Janeiro: JBR 141312 (MO), 141313 (MO);  
 Guanabara: JBR 55680; Paraná: Hatschbach 35135, 35625.

63. Strychnos brachistantha Standley, Field Mus. Publ. Bot. 12: 412. 1936.

Belize: Corozal: alt. + 33 m, Croat 24961.

64. Strychnos nigricans Progel in Mart. Fl. Bras. 6(1): 280. 1868.

Brazil: Paraná: Rio Putunã, Hatschbach 35591.

This is the first record of this species from the State of Paraná.

69. Strychnos poeppigii Progel in Mart. Fl. Bras. 6(1): 282. 1868.

Panama: Panama: natural bridge along Madden Lake, Croat 12403.

This is the first record of this species from Panama.

70. Strychnos tarapotensis Sprague & Sandw., Kew Bull. 1927: 131. 1927.

Perú: San Martín: T. Plowman & H. Kennedy 3812 (ECON), J. Schunke 8150 (Mariscal Cáceres, Tocache Nuevo); Madre de Dios: Plowman & Davis 5067.

This is the first record of this species from Madre de Dios.

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(In order to conserve space, I am citing here only the papers which are not cited in Suppl. VII-XIV.)

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- 109r. Marini-Bettolo, G. B., et al. XXIX. New indole alkaloids from *Strychnos fendleri* Sprague & Sandwith. *Gazzetta Chimica Italiana* 106: 773-777. 1976,
- 109s. Marini-Bettolo, G. B., et al. Sul curaro Yanoáma. Un nuovo tipo di curaro indigeno: "Curare di torrefazione e percolazione." *Lincei. Rend. Sc. fis. mat. e nat.* 38: 34-38. 1965.

A new species of Bidens (Asteraceae) from Brazil

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Field work in Brazil during 1974 with the entomologist, Dr. D. Otte of the Philadelphia Academy of Sciences, resulted in the discovery of the following species belonging to the Section Selvorngia. The section was previously thought to be monotypic with the single species B. graveolens Gard.

Bidens goiana Turner, Sp. nov. Fig. 1

Herbae erectae ad 1 m altae caulibus debilibus, B. graveolens valde similes sed foliis minoribus planissime ellipticis, capitulis floribusque minoribus, floribus perspicue flavis.

Erect weak-stemmed herb up to 1 m. tall. Much resembling B. graveolens but with smaller, more elliptic leaves, smaller heads and floral parts, and decidedly yellow flowers. Chromosome number,  $n = 22$  pairs.

HOLOTYPE (LL): Brazil. Goias. 40 km ENE of Brasilia. In burned-over, short, open forests. Sandy sterile soils. 5 Feb. 1974. B. L. Turner 9125.

The species is found as a populational unit in the same region in which B. graveolens occurs. In addition to its smaller habit and more delicate, flexuous, inflorescence, B. goiana can be recognized by the dill-like smell of its crushed foliage and decidedly yellow flowers. The crushed foliage of B. graveolens has a lemon smell and the flowers are variously purplish- to brown-yellow.

The chromosome number of Bidens goiana is tetraploid on a base of  $x = 11$ , while B. graveolens is tetraploid on a base of  $x = 12$  (Turner, et al., in press), although it is possible that tetraploid populations ancestral to the latter gave rise to B. goiana by aneuploid loss at the higher level.

I am grateful to M. C. Johnston for the Latin diagnosis. Supported, in part, by N. S. F. Grant 1013950.



Fig. 1. Habit sketch of Bidens goiana (X 1/2)

CLUSIA SECTION COCHLANATHERA - - AGAIN

Bassett Maguire  
The New York Botanical Garden

x  
Twice I have reviewed the content of the section Cochlanthera (Choisy) Engler of the genus Clusia Linnaeus of the Clusiaceae. As the last paper (1977) was about to be released from the press, there came into my hands a small collection made in 1962 on the Cambridge Calima Valley Expedition of that year. Immediately thereafter a duplicate of the same collection came to me from the U. S. National Herbarium.

It proved to represent still another, and undescribed, Clusia of the section Cochlanthera. It is necessary to place the new species on record. This is the eighth now known for the section, and the fifth apparently endemic to Colombia, having been collected there in the Pacific Department of Valle.

The new plant is placed in the subsection Cochlanthera, its closest relative being Clusia centricupula Cuatrecasas, also of Valle, Colombia. Both species, amply distinct as shown by the key, are insufficiently known, our species only by the type and that of Cuatrecasas by only two collections. It is not known whether the two species are closely sympatric.

Clusia calimae Maguire, sp nov

Frutex vel arbor mediocris; ramulis plus minusve 4-angulatis, 4-costatis, internodiis 3-4 cm longis; foliis mediocribus, laminis subcoriaceis, obovatis, (4)6-8 cm longis, (2.5)3.0-4.5 cm latis, costa prominenti, venis lateralibus, prominulis, angulo 45° adscendentibus, apice late obtuso vel rotundato, basi acutiuscula, brevi-decurrenti; petiolis crassis, 4-8 mm longis, 5-8 mm latis, subamplectantibus; inflorescentia 12-15-flore, bracteis parvis; floribus masculinis: sepalis 9, duobus inferioribus jugis decussatis, late semiorbicularibus, ca 6 mm longis, 5 mm latis, minute marginatis; superioribus imbricatis, subchartaceis, valde scarioso-marginatis, late semiorbicularibus, 10-12 mm latis, 8-10 mm longis; petalis 8, obovato-oblongeolatis, aliquantum panduriformibus, 14-16 mm latis, 22-25 mm longis; staminibus introrsis, paucis, 14-16, 2-seriatis, liberis vel minute ad basim connatis; annulo deficienti; filamentis 3-4 mm longis, ad basim 1.2-1.6 mm latis; antheris 1.2-1.5 mm longis, valde recurvatis; staminodiis in massa centrali 6-8 mm diam, 4-5 mm alta; ovario deficienti; nec floribus foemineis nec fructibus visis.

Type. Shrub 12-15 ft, in hedge, pink flowers and buds, edge of thick forest, near Las Delicias, at 5000 ft alt, NW of Restrepo, Valle, Colombia, 1 Aug 1962, J. W. Robinson 201 (holotype K).

Distribution. COLOMBIA. Valle: shrub 12-15 ft, in hedge, pink flowers and buds, edge of thick forest near Las Delicias, NW of Restrepo, 5000 ft alt, 1 Aug 1962, Robinson 201 (holotype K, isotype US, fragment NY).

Clusia calimae would be placed in the key (Maguire, 1977, p 133) immediately after C. centricupula in the following manner:

1. Receptacle of  $\sigma$  flowers shallowly discoid, forming a glutinous mass in the center of the disc (subject Cochlanthera).
  2. Stamens fewer than 50.
    3. Leaf petiole slender, not winged; coastal mountains of Venezuela. 1. Clusia cochlanthera Vesque.
    3. Leaf petiole broadly winged, 1.0-1.5 cm long; Pacific Colombia.
      4. Stamens ca 35, 3-cyclic; leaf blades broadly elliptic or elliptic-obovate, 4-7 mm broad, 10-15 cm long, the apex acute or acutish. 2. Clusia centricupula Cuatrecasas.
      4. Stamens 14-16, unicyclic; leaf blades obovate, 3.0-4.5 cm broad, 6-8 mm long, the apex broadly rounded. 3. Clusia calimae Maguire.
  2. Stamens  $\pm$  100.
    4. Clusia lunanthera Maguire.
    5. Clusia cochlitheca Maguire.
1. Receptacle of  $\sigma$  flowers provided with a prominent coroniform androphore (subject Orhoneura).
  6. Clusia orthoneura Standley.
  7. Clusia celiae Maguire.
  8. Clusia cochliiformis Maguire.

\* Maguire, B. Mem. N. Y. Bot. Gard. 10(1): 58-61. 1958.  
Maguire, B. Caldasia 11(55): 129-146. 1977.

Clusia cochlanthera Vesque

Dr. Steyermark has obtained a fine suite of flowering material from the type locality of Clusia cochlanthera, the second and apparently only specimen so obtained since the original collections made some 125 years ago. These new materials now permit confirmation of my interpretation and circumscription made in the earlier papers.

VENEZUELA. Estado Carabobo: staminate epiphytic tree, leaves coriaceous, flowers with cream-white to pale yellow petals, selva siempre verde en las laderas arriba de las cabeceras de río Gián, este de Los Tanques, al sur de Borburata, 750-1100 m alt, 31 Mar 1966, Julian A. Steyermark & Cora Steyermark 95390 (NY, U, VEN).

A FIFTH SUMMARY OF THE VERBENACEAE, AVICENNIACEAE, STILBACEAE,  
DICRASTYLIDACEAE, SYMPHOREMACEAE, NYCTANTHACEAE, AND  
ERIOCAULACEAE OF THE WORLD AS TO VALID TAXA, GEOGRAPHIC  
DISTRIBUTION, AND SYNONYMY

Supplement 7

Harold N. Moldenke

Since the publication of the 6th supplement to the above work in PHYTOLOGIA, volume 34, number 3, on October 1, 1976, 2,009 new herbarium specimens have come to me from 15 institutional and private herbaria on five continents. This new material, in addition to a vast amount of new literature which has been examined by my wife and/or myself, has brought to light numerous new taxa, new geographic records, new invalid names, spellings, and accreditations, as well as numerous additional emendations and corrections of former entries. These are presented herewith (as promised on page 974 of the original work).

Herbarium specimen or literature citations substantiating these records are presented, as usual, in my monographs of the genera involved or in their periodic supplements, mostly published in PHYTOLOGIA. Citation to place of publication of the names listed in Part II are also given in detail in these monographs or their supplements.

Addenda and errata to Part I: The known geographic distribution of the accepted taxa:

CANADA:

Québec:

Verbena hastata L. [Sternes Island]

UNITED STATES OF AMERICA:

Vermont:

Verbena hastata L. [Grand Isle County]

Virginia:

Lachnocaulon anceps (Walt.) Morong [Dinwiddie County]

Verbena urticifolia L. [Nelson County]

North Carolina:

Callicarpa americana L. [Hatteras Island]

Eriocaulon decangulare f. parviceps Moldenke [Carteret County]

Verbena bonariensis L. [Tyrrell County]

South Carolina:

Lachnocaulon anceps f. glabrescens Moldenke [Kershaw County]

Florida:

Clerodendrum kaempferi (Jacq.) Sieb. [Dade County]

Duranta repens L. [Hillsborough County; Sanibel Island]

Lachnocaulon anceps (Walt.) Morong [Calhoun & Lee Counties]

## Florida [continued]:

- Lachnocaulon anceps f. glabrescens Moldenke [Highlands County]  
Lachnocaulon beyrichianum Sporleder [Martin & Orange Counties]  
Lachnocaulon eciliatum Small [Highlands County]  
Lachnocaulon engleri f. abludens Moldenke [Pasco County]\*  
Lachnocaulon minus (Chapm.) Small [Bay & Madison Counties]  
Lantana camara var. aculeata (L.) Moldenke [Broward County;  
 [Sanibel Island]  
Lantana camara var. mista (L.) L. H. Bailey [Key Largo]  
Lantana camara var. ternata Moldenke [Highland County]  
Phyla strigulosa (Mart. & Gal.) Moldenke [Dade County]  
Stachytarpheta jamaicensis (L.) Vahl [Egmont Key]  
Verbena tenuisecta Briq. [Madison County]

## Alabama:

- Eriocaulon lineare Small [Escambia & Geneva Counties]  
Eriocaulon texense Körn. [Escambia, Mobile, & Washington Counties]  
Lachnocaulon beyrichianum Sporleder [Mobile County]  
Lachnocaulon minus (Chapm.) Small [Mobile County]  
Verbena bipinnatifida Nutt. [Pickens County]

## Mississippi:

- Lachnocaulon anceps (Walt.) Morong [Covington County]

## Ohio:

- Phyla lanceolata (Michx.) Greene [Auglaize County]

## Iowa:

- Verbena bracteata Lag. & Rodr. [Clinton, Jackson, & Jones Counties]  
 xVerbena engelmannii Moldenke [Louisa & Van Buren Counties]  
 xVerbena moechina Moldenke [Louisa County]  
 xVerbena rydbergii Moldenke [Louisa County]  
Verbena simplex Lehm. [Jones County]  
Verbena stricta Vent. [Jones County]  
Verbena urticifolia L. [Clinton & Jackson Counties]

## Michigan:

- Verbena bracteata Lag. & Rodr. [Oakland County]  
Verbena hastata L. [Leelanau County]  
Verbena stricta Vent. [Leelanau County]  
Verbena urticifolia var. leiocarpa Perry & Fernald [Oakland County]

## Kansas:

- Verbena hastata L. [Lyon County]

## Missouri:

- Phyla lanceolata (Michx.) Greene [Cass County]  
Verbena urticifolia var. leiocarpa Perry & Fernald [Shannon County]  
Verbena xutha Lehm. [Saint Louis]

## Arkansas:

Callicarpa americana L. [Independence & union Counties]Eriocaulon kornickianum Van Heurck & Muell.-Arg. [Saline County]

## Louisiana:

Lachnocaulon anceps f. glabrescens Moldenke [Vernon Parish]Lantana camara var. mista (L.) L. H. Bailey [Plaquemines & Tangipahoa Parishes]Phyla nodiflora var. reptans (Spreng.) Moldenke [Cameron & Terrebonne Parishes]

## Texas:

Lantana camara f. parvifolia Moldenke [Cameron County]Phyla nodiflora var. texensis Moldenke [Caldwell County]

## New Mexico:

Verbena bracteata Lag. & Rodr. [McKinley County]

## MEXICO:

Eriocaulon microcephalum H.B.K. [Durango]Lantana camara var. mista (L.) L. H. Bailey [Yucatán]Lantana frutilla var. obtusifolia Moldenke [Sinaloa]Lantana hirta var. pubescens Moldenke -- delete the asteriskLantana hispida H.B.K. [Tamaulipas]Lantana kingi Moldenke [Tamaulipas]Lippia alba var. globiflora (L'Hér.) Moldenke [Tamaulipas]Phyla nodiflora var. texensis Moldenke [Michoacán]Tonina fluviatilis Aubl. [Veracruz]Verbena elegans H.B.K. [Durango]

## GUATEMALA:

Aegiphila laxicipulis Moldenke [Jutiapa]Lantana hirta Grah. [Guatemala]Lantana hirta var. pubescens Moldenke [Sacatepéquez]Lippia myriocephala Schlecht. & Cham. [Huehuetenango]

## BELIZE:

Priva lappulacea f. albiflora Moldenke

## HONDURAS:

Lippia oxyphyllaria (Donn. Sm.) Standl. [Choluteca & Morazán]

## NICARAGUA:

Aegiphila laxicipulis Moldenke [Chontales]Clerodendrum ligustrinum var. nicaraguense Moldenke [Corn Island]Lantana glandulosissima Hayek [Esteli]Lantana hirta Grah. [Esteli & Matagalpa]Lantana trifolia L. [Jinotega]Phyla betulaefolia (H.B.K.) Greene [Rio San Juan]

## COSTA RICA:

Aegiphila magnifica var. pubescens Moldenke [Puntarenas]Lippia controversa Moldenke [Alajuela]Paepalanthus costaricensis Moldenke [Alajuela]Verbena parvula Hayek [Heredia]

## BAHAMA ISLANDS:

- Citharexylum fruticosum f. bahamense (Millsp.) Moldenke [Acklin]  
Lantana arida Britton [Eleuthera]  
Lantana tiliaefolia Cham. [Great Inagua]  
Phyla strigulosa var. sericea (Kuntze) Moldenke -- to be deleted

## CUBA:

- Paepalanthus seslerioides Griseb. [delete "Oriente"]  
Paepalanthus seslerioides var. wilsonii Moldenke [Pinar del Rio]

## ISLA DE PINOS:

- Lachnocaulon anceps (Walt.) Morong -- to be deleted  
Lachnocaulon anceps f. glabrescens Moldenke  
Paepalanthus seslerioides Griseb. -- to be deleted  
Paepalanthus seslerioides var. carabiae Moldenke\*  
Paepalanthus seslerioides var. wilsonii Moldenke

## CAYMAN ISLANDS:

- Lantana camara var. aculeata (L.) Moldenke [Little Cayman]

## HISPANIOLA:

- Lantana trifolia var. quadriverticillata Jiménez [Dominican Republic]\*

## VIRGIN ISLANDS:

- Lantana reticulata Pers. [St. Croix]

## WINDWARD ISLANDS:

- Avicennia germinans var. guayaquilensis (H.B.K.) Moldenke [St. Vincent]  
Lantana involucrata L. [St. Lucia]

## TRINIDAD AND TOBAGO:

- Avicennia schaueriana f. candicans Moldenke [Trinidad]

## NORTHERN SOUTH AMERICAN ISLANDS:

- Duranta repens L. [Margarita]

## COLOMBIAN CARIBBEAN ISLANDS:

- Verbena litoralis H.B.K. [San Andrés]

## LESSER ANTILLES:

- Stachytarpheta gibberosa Reichenb. -- to be deleted

## COLOMBIA:

- Aegiphila grandis Moldenke [Cauca, Huila, & Valle del Cauca]  
Aegiphila grandis var. cuatrecasasi (Moldenke) López-Palacios [Magdalena]\*  
Aegiphila grandis var. sessiliflora (Moldenke) Moldenke [Antioquia, Cauca, Cundinamarca, Huila, & Valle del Cauca]\*  
Aegiphila longifolia Turcz. -- to be deleted  
Aegiphila mollis var. longifolia (Turcz.) López-Palacios [Meta & Santander]  
Aegiphila mollis var. puberulenta (Moldenke) López-Palacios [Antioquia]  
Aegiphila novogranatensis Moldenke [Cundinamarca & Tolima] -- delete the asterisk  
Aegiphila sessiliflora Moldenke -- to be deleted

## COLOMBIA [continued]:

- Aegiphila sessiliflora var. cuatrecasasi Moldenke -- to be deleted
- Aegiphila sufflava Moldenke [Amazonas]
- Aegiphila truncata Moldenke -- to be deleted
- Bouchea boyacana Moldenke [Antioquia]
- Duranta sprucei var. breviracemosa Moldenke -- delete the asterisk
- Lantana camara L. [Antioquia]
- Lantana fiebrigii var. puberulenta Moldenke [Cundinamarca]\*
- Lantana glutinosa Poepp. [Nariño]
- Lantana maxima Hayek [Caldas]
- Lantana trifolia L. [Córdoba]
- Lippia americana f. hyptoides (Benth.) Moldenke [Antioquia]
- Lippia schlimi var. glabrescens (Moldenke) Moldenke [Quindío]
- Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios [Córdoba]
- Stachytarpheta cayennensis (L. C. Rich.) Vahl [Caldas]
- Vitex orinocensis var. multiflora (Miq.) Huber [Arauca & Córdoba]

## VENEZUELA:

- Avicennia schaueriana Stapf & Leechman [Delta Amacuro]
- Duranta coriacea Hayek [Mérida]
- Duranta repens L. [Amazonas]
- Duranta repens var. alba (Masters) L. H. Bailey [Bolívar]
- Duranta repens var. canescens Moldenke [Falcón]
- Lippia americana f. pilosa Moldenke [Lara]
- Lippia hirsuta var. moritzii (Turcz.) López-Palacios [Táchira]
- Paepalanthus meseticola Moldenke & Steyerl. [Bolívar]\*
- Petrea aspera Turcz. [Amazonas]
- Syngonanthus yapacanensis var. hirsutus Moldenke [Amazonas]\*
- Tonina fluviatilis f. obtusifolia Moldenke -- to be deleted

## GUYANA:

- Avicennia schaueriana f. candicans Moldenke
- Syngonanthus tenuis (H.B.K.) Ruhl.
- Tonina fluviatilis f. obtusifolia Moldenke -- add an asterisk

## SURINAM:

- Avicennia elliptica var. martii Moldenke -- to be deleted
- Avicennia schaueriana f. candicans Moldenke

## ECUADOR:

- Aegiphila grandis Moldenke [El Oro]
- Aegiphila integrifolia var. lopez-palacii Moldenke [Napo]\*
- Aegiphila lopez-palacii Moldenke [Pichincha]\*
- Aegiphila lopez-palacii var. pubescens Moldenke [Pichincha]\*
- Aegiphila novogranatensis Moldenke [Pichincha]
- Aegiphila rimbachii Moldenke [Pichincha]
- Aloysia scorodonioides (H.B.K.) Cham. [Guayas & Imbabura]

## ECUADOR [continued]:

- Aloysia triphylla (L'Hér.) Britton [Pichincha]  
Citharexylum gentryi Moldenke [Los Ríos]\*  
Citharexylum macrophyllum Poir. [Napo]  
Citharexylum montanum Moldenke [Imbabura]  
Duranta repens L. [El Oro]  
Duranta sprucei var. breviracemosa Moldenke [Pichincha]  
Duranta triacantha A. L. Juss. [Cotopaxi]  
Lantana camara var. moritziana (Otto & Dietr.) López-Palacios  
 [Imbabura]  
Lantana maxima Hayek [El Oro]  
Lantana reptans Hayek [Azuay]  
Lippia alba (Mill.) N. E. Br. [Napo]  
Lippia americana f. hyptoides (Benth.) Moldenke [Manabí]  
Petrea volubilis L. [Guayas]  
Phyla strigulosa var. sericea (Kuntze) Moldenke [El Oro, Guayas,  
 Loja, & Manabí]  
Priva lappulacea (L.) Pers. [Manabí]  
Priva lappulacea f. albiflora Moldenke [El Oro]  
Stachytarpheta straminea Moldenke [El Oro & Napo]  
Verbena demissa Moldenke [Loja]  
Verbena demissa f. alba Moldenke [Pichincha]\*  
Verbena hispida Ruiz & Pav. [Loja]  
Verbena litoralis H.B.K. [Carchi & Imbabura]  
Verbena litoralis f. magnifolia Moldenke [Napo]\*  
Verbena parvula var. gigas Moldenke [Loja]  
Verbena parvula var. obovata Moldenke [Pichincha]\*  
Vitex gigantea H.B.K. [Napo]

## PUNA ISLAND:

- Lippia americana L.

## GALAPAGOS ISLANDS:

- Stachytarpheta cayennensis (L. C. Rich.) Vahl [Narborough]  
Verbena litoralis H.B.K. [Narborough]  
Verbena stewartii Moldenke [Narborough]

## PERU:

- Citharexylum dentatum D. Don [Junín]  
Clerodendrum tessmanni Moldenke [San Martín]  
Hierobotana inflata (H.B.K.) Briq. [Ica]  
Junellia hayekii Moldenke [Ayacucho]  
Lantana reptans Hayek -- delete the asterisk  
Syngonanthus caulescens var. angustifolius Moldenke [Amazonas]  
Syngonanthus compactus Ruhl. [San Martín]  
Verbena fasciculata Benth. [Ica]  
Vitex excelsa var. petiolata Moldenke [Loreto]\*

## BRAZIL:

- Aegiphila candelabrum Briq. [Minas Gerais]  
Aegiphila glandulifera var. paraënsis Moldenke [Amazônas]

## BRAZIL [continued]:

- Aegiphila lanceolata Moldenke [Amazônas]  
Aegiphila longifolia Turcz. — to be deleted  
Aegiphila mollis var. longifolia (Turcz.) López-Palacios [Amazônas]  
Aegiphila sellowiana Cham. [Amazônas]  
Avicennia elliptica var. martii Moldenke [delete "Pará"], add asterisk  
Avicennia germinans var. guayaquilensis (H.B.K.) Moldenke [Ceará & Pará]  
Avicennia schaueriana Stapf & Leechman [Graguatá Island; delete Maranhão & Florianópolis Island]  
Avicennia schaueriana f. candicans Moldenke [Bahia, Ceará, Guanabara, Maranhão, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Santa Catarina, & São Paulo; Florianópolis, Governador, Pinheiros, & Santa Catarina Islands]  
Casselia confertiflora (Moldenke) Moldenke [Bahia]  
Citharexylum pernambucense Moldenke [Maranhão]  
Clerodendrum philippinum Schau. [Amazônas]  
Duranta repens L. [Espírito Santo]  
Eriocaulon megapotamicum Malme [Paraná]  
Eriocaulon sellowianum var. longifolium Moldenke [Mato Grosso]  
Eriocaulon spruceanum f. viviparum Moldenke [Roraima]  
Lantana camara L. [Bahia]  
Lantana camara var. aculeata (L.) Moldenke [Espírito Santo]  
Lantana camara var. moritziana (Otto & Diétr.) López-Palacios [Amazônas]  
Lantana canescens H.B.K. [Paraíba]  
Lantana fucata var. longipes Moldenke [Rio Grande do Sul & Santa Catarina]  
Lantana lippioides Spreng. — to be deleted  
Lantana procurrens Schau. [Minas Gerais]  
Lantana trifolia L. [Minas Gerais & Rio de Janeiro]  
Lantana trifolia f. hirsuta Moldenke [Rio de Janeiro]  
Lantana triplinervia Turcz. [Rio de Janeiro]  
Lantana triplinervia f. armata Moldenke [Guanabara & São Paulo]\*  
Lantana triplinervia var. puberulenta (Moldenke) Moldenke [Guanabara]  
Lantana viscosa Pohl [Guanabara; Fundão Island]  
Leiothrix rufula var. brevipes Moldenke [Rio de Janeiro]\*  
Lippia alba var. globiflora (L'Hér.) Moldenke [Amazônas, Bahia, & Rio de Janeiro]  
Lippia balansae Briq. [Mato Grosso]  
Lippia campestris Moldenke [Rio Grande do Sul]  
Lippia elliptica Schau. [delete "Minas Gerais"]  
Lippia gardneriana Schau. [Minas Gerais]  
Lippia gracilis Schau. [Goiás, Maranhão, & Mato Grosso]  
Lippia lepida Moldenke [Distrito Federal]

## BRAZIL [continued]:

- Lippia lorentzii Moldenke [Roraima]  
Lippia mattogrossensis Moldenke [delete "Distrito Federal"]  
Lippia nepetacea Schau. [Minas Gerais]\*  
Lippia obscura Briq. [Distrito Federal & Goiás]  
Paepalanthus argillicola Alv. Silv. [Rio de Janeiro]  
Paepalanthus ciliatus (Bong.) Kunth [Guanabara]  
Paepalanthus elongatus f. graminifolius Herzog [Minas Gerais]  
Paepalanthus erectifolius Alv. Silv. [Rondonia]  
Paepalanthus filifolius Moldenke — to be deleted  
Paepalanthus formosus Moldenke [Mato Grosso]  
Paepalanthus glabrifolius Ruhl. [Guanabara]  
Paepalanthus guaraiensis Moldenke [Goiás]\*  
Paepalanthus polytrichoides Kunth [Rondônia]  
Paepalanthus saxicola var. pilosus Moldenke [Goiás]\*  
Paepalanthus tortilis var. glaberrimus Mart. & Moldenke [Guanabara & Rio de Janeiro]\*  
Paepalanthus tortilis var. minor Moldenke [Espírito Santo]\*  
Petrea nitidula Moldenke [Mato Grosso]  
Stachytarpheta dichotoma f. albiflora Moldenke [Mato Grosso]  
Stachytarpheta sessilis Moldenke [Minas Gerais]  
Syngonanthus baldwini Moldenke [Pará]  
Syngonanthus bisumbellatus (Körn.) Ruhl. [Roraima]  
Syngonanthus caulescens var. angustifolius Moldenke [Minas Gerais, Paraná, Rio Grande do Sul, & Rondônia]  
Syngonanthus caulescens var. discretifolius Moldenke [Pará]\*  
Syngonanthus densus (Körn.) Ruhl. [Pará]  
Syngonanthus elegantulus Ruhl. [Guanabara]  
Syngonanthus elegantulus var. glaziovii Moldenke [Minas Gerais]\*  
Syngonanthus fertilis (Körn.) Ruhl. [Amazônas]  
Syngonanthus glandulosus Gleason [Mato Grosso]  
Syngonanthus humboldtii var. glandulosus Gleason [Mato Grosso & Rondônia]  
Syngonanthus longipes Gleason [Amazônas]  
Syngonanthus niveus var. rosulatus (Körn.) Moldenke [Bahia]  
Syngonanthus reclinatus (Körn.) Ruhl. [Rio de Janeiro]  
Syngonanthus reflexus Gleason [Amazônas]  
Syngonanthus ruprechtianus (Körn.) Ruhl. [Minas Gerais]\* — this is the corrected entry  
Syngonanthus umbellatus (Lam.) Ruhl. [delete "Goiás"]  
Syngonanthus widgrenianus (Körn.) Ruhl. [delete "Paraná"]  
Syngonanthus xeranthemoides var. confusus (Körn.) Moldenke [delete "Mato Grosso"]  
Syngonanthus xeranthemoides var. hirsutus Moldenke [Mato Grosso]  
Verbena balansae Briq. [Mato Grosso]  
Verbena campestris Moldenke [Paraná]  
Vitex sprucei Briq. [Roraima]  
Vitex triflora var. floribunda Huber [Rondônia]

## MARACÁ ISLAND:

Syngonanthus tenuis (H.B.K.) Ruhl. — to be deleted

## BOLIVIA:

Aegiphila saltensis Legname [Tarija]

Junellia minima (Meyen) Moldenke [Santa Cruz]

Junellia seriphioides (Gill. & Hook.) Moldenke [Oruro]

Lantana brachypoda Hayek [Tarija]

Lippia alba var. globiflora L'Hér.) Moldenke [Santa Cruz]

Lippia chacensis Moldenke — to be deleted

Lippia lorentzii Moldenke [Santa Cruz]

Vitex triflora Vahl [Pando]

## PARAGUAY:

Lantana aristata var. longipedunculata Moldenke\*

Lippia intermedia Cham.

Syngonanthus glandulosus var. epapillosus Moldenke

## ARGENTINA:

Aegiphila saltensis Legname — delete the asterisk

Citharexylum jörgensenii (Lillo) Moldenke [Salta]

Junellia digitata (R. A. Phil.) Moldenke [La Rioja]

Lantana camara var. aculeata (L.) Moldenke [Corrientes]

Lantana fucata var. longipes Moldenke [Salta]

Neosparton aphyllum (Gill. & Hook.) Kuntze [La Rioja]

Verbena minutiflora Briq. [Toledo Island]

## MACARONESIA:

Phyla nodiflora var. canescens (H.B.K.) Moldenke [Gran Canaria]

## FRANCE:

Phyla nodiflora var. canescens (H.B.K.) Moldenke

Verbena supina f. erecta Moldenke

## BALEARIC ISLANDS:

Phyla nodiflora (L.) Greene [Minorca]

## GERMANY:

Verbena urticifolia L.

## AEGEAN ISLANDS:

Vitex agnus-castus L. [Psara]

## CRETE:

Phyla nodiflora var. reptans (Spreng.) Moldenke

## ALGERIA:

Lantana camara L.

## LIBYA:

Verbena supina L.

## CENTRAL AFRICAN REPUBLIC:

Syngonanthus chevalieri H. Lecomte — to be deleted

Syngonanthus wahlbergii (Wikstr.) Ruhl.

## TANGANYIKA:

Vitex bunguensis Moldenke\*

## KENYA:

Holmskioldia n. sp. ined.

## ZAMBIA:

Kalaharia uncinata var. hirsuta (Moldenke) Moldenke

## RHODESIA:

Lantana petitiana A. Rich.

## MOZAMBIQUE:

Clerodendrum ternatum Schinz [Zambezia]

## NAMIBIA:

Lantana camara L.

Lippia javanica (Burm. f.) Spreng.

## SOUTH AFRICA:

Holmskioldia tettensis (Klotzsch) Vatke [Natal]

Lantana camara L. [Transvaal]

## SEYCHELLES ISLANDS:

Phyla nodiflora var. reptans (Spreng.) Moldenke [Praslin]

## ARABIA:

Phyla nodiflora var. reptans (Spreng.) Moldenke [Yemen]

## AFGHANISTAN:

Phyla nodiflora (L.) Greene

Phyla nodiflora var. canescens (H.B.K.) Moldenke

## PAKISTAN:

Lantana rugosa Thunb. [Kohat & Quetta]

## INDIA:

Clerodendrum glaucum Wall. -- to be deleted

Clerodendrum serratum var. wallichii C. B. Clarke [Assam, Manipur, Uttar Pradesh, & West Bengal] — delete the asterisk

Eriocaulon breviscapum Körn. [Meghalaya]

Eriocaulon brownianum var. latifolium Moldenke [Meghalaya]

Eriocaulon infirmum Steud. [Meghalaya]

Lantana camara var. angustifolia Moldenke — to be deleted

Lantana camara f. parvifolia Moldenke [Kerala]

Lantana rugosa Thunb. [West Bengal]

Lantana triplinervia Turcz. [Andhra Pradesh, Bihar, Madras, & Mysore]

Symphorema polyandrum Wight [Union Territory]

## SRI LANKA:

Citharexylum spinosum L.

Clerodendrum kaempferi (Jacq.) Sieb.

Lantana camara var. mista (L.) L. H. Bailey

Lantana tiliaefolia Cham. — to be deleted

## BANGLADESH:

Phyla nodiflora var. reptans (Spreng.) Moldenke

## CHINESE COASTAL ISLANDS:

Phyla nodiflora var. reptans (Spreng.) Moldenke [Hainan]

Sphenodesme ferruginea (W. Griff.) Briq. [Hainan]

## THAILAND:

Clerodendrum serratum var. obovatum Moldenke\*

Clerodendrum serratum var. pilosum Moldenke\*

Clerodendrum serratum var. wallichii C. B. Clarke

## THAILAND [continued]:

- Eriocaulon laosense var. maxwellii Moldenke\*  
Glossocarya mollis var. maxwellii Moldenke\*  
Gmelina arborea var. canescens Haines  
Premna macrophylla var. thailandica Moldenke\*

## INDOCHINA:

- Clerodendrum serratum var. wallichii C. B. Clarke [Cambodia & Tonkin]

## MALAYA:

- Clerodendrum serratum var. wallichii C. B. Clarke [Perak & Selangor]  
Eriocaulon australe R. Br. [Penang]  
Eriocaulon sexangulare L. [Penang]  
Geunisia pentandra (Roxb.) Merr. [Selangor]  
Sphenodesme pentandra var. wallichiana (Schau.) Merr. [Penang]  
Vitex gamosepala W. Griff [Pahang]  
Vitex gamosepala var. kunstleri King & Gamble [Penang]

## MALAYAN ISLANDS:

- Vitex siamica F. N. Will. [Bumbon Besar]  
Vitex trifolia var. bicolor (Willd.) Moldenke [Bumbon Besar]

## JAPAN:

- Callicarpa australis Koidz. [Kyushu & Shikoku] delete the asterisk

## RYUKYU ISLAND ARCHIPELAGO:

- Callicarpa australis Koidz.

## FORMOSA:

- Callicarpa longifolia Lam.

## PHILIPPINE ISLANDS:

- Tectona philippinensis Benth. [Iling]

## BONIN ISLANDS:

- Callicarpa parvifolia Hook. & Arn. [Anijima]

## MARIANAS ISLANDS:

- Premna mariannarum f. dentata Moldenke [Guguan]\*  
Vitex trifolia var. bicolor (Willd.) Moldenke [Maug & Pagan]

## GREATER SUNDA ISLANDS:

- Eriocaulon heterolepis var. nigricans Körn. [Sabah]  
Eriocaulon merrillii Ruhl. — to be deleted  
Eriocaulon sollyanum var. sumatranum Van Royen [Sumatra]\*

## PHOENIX ISLANDS:

- Lantana camara L. [Canton]

## BISMARCK ARCHIPELAGO:

- Avicennia alba Blume [Manus]

## SOLOMON ISLANDS:

- Lantana camara var. mista (L.) L. H. Bailey [Guadalcanal]  
Lantana montevidensis (Spreng.) Briq. [Guadalcanal]

## AUSTRALIA:

- Clerodendrum heterophyllum (Poir.) R. Br. [Queensland]  
Lantana camara var. aculeata (L.) Moldenke [New South Wales]

## GREAT BARRIER REEF:

- Clerodendrum heterophyllum f. angustifolium Moldenke [Stradbroke]  
Duranta repens L. [Stradbroke]  
Eriocaulon australe R. Br. [Stradbroke]  
Eriocaulon scariosum J. E. Sm. [Stradbroke]  
Verbena bonariensis L. [Stradbroke]

## NEW ZEALAND:

- Avicennia marina var. resinifera (Forst. f.) Bakh. [Pollen]

## HAWAIIAN ISLANDS:

- Holmskioldia sanguinea Retz. [Hawaii]

## SAMOAN ISLANDS:

- Premna taitensis Schau. [Upolu]  
Stachytarpheta jamaicensis (L.) Vahl [Upolu]

## CULTIVATED:

- Aegiphila elata Sw. [England]  
Aegiphila foetida Sw. [England]  
Aegiphila laevis (Aubl.) Gmel. [England]  
Aegiphila trifida Sw. [England]  
Aloysia scorodonioides (H.B.K.) Cham. [Ecuador]  
Avicennia officinalis L. [England]  
Callicarpa arborea Roxb. [England]  
Callicarpa dichotoma (Lour.) K. Koch [England]  
Callicarpa longifolia Lam. [England]  
Callicarpa macrophylla Vahl [England]  
Callicarpa reticulata Sw. [England]  
Callicarpa tomentosa (L.) Murr. [England]  
Caryopteris mongholica Bunge [Germany]  
Citharexylum caudatum L. [England]  
Citharexylum fruticosum L. [England]  
Citharexylum fruticosum var. subserratum (Sw.) Moldenke [England]  
Citharexylum fruticosum var. villosum (Jacq.) O. E. Schulz [England]  
Citharexylum sericeum Lodd. [England]\*  
Clerodendrum colebrokianum Walp. [Florida]  
Clerodendrum floribundum R. Br. [Australia]  
Clerodendrum glabrum E. Mey. [Australia]  
Clerodendrum heterophyllum f. angustifolium Moldenke [Australia & Great Barrier Reef]  
Clerodendrum serratum var. wallichii C. B. Clarke [Singapore]  
Clerodendrum umbellatum var. speciosum (Dombrain) Moldenke [Ecuador]  
Congea tomentosa Roxb. [Tobago]  
Cornutia latifolia (H.B.K.) Molliecke [England]  
Duranta repens var. alba (Masters) L. H. Bailey [Ecuador]  
Eriocaulon australe R. Br. [England]  
Eriocaulon decangulare L. [England]

## CULTIVATED [continued]:

- Eriocaulon sexangulare L. [England]  
Ghinia spicata (Aubl.) Moldenke [Germany]  
Gmelina philippensis Cham. [Tobago]  
Holmskioldia sanguinea Retz. [Germany & Jamaica]  
Lantana achyranthifolia f. grandifolia Moldenke [Germany]  
Lantana annua L. [France]  
Lantana aristata var. longipedunculata Moldenke [Germany]  
Lantana camara var. mutabilis (Hook.) L. H. Bailey [Colombia]  
Lantana camara f. parvifolia Moldenke [Germany & Italy]  
Lantana fiebrigii Hayek [Germany]  
Lantana horrida H.B.K. [Germany]  
Lantana jamaicensis Britton [Germany]  
Lantana montevidensis (Spreng.) Briq. [Michigan]  
Lippia alba var. globiflora (L'Hér.) Moldenke [India]  
Lippia callicarpaefolia H.B.K. [Germany]  
Paepalanthus lamarckii Kunth [England]  
Petrea rugosa var. casta Moldenke [Colombia]  
Phyla nodiflora var. reptans (Spreng.) Moldenke [Italy]  
Phyla scaberrima (A. L. Juss.) Moldenke [Venezuela]  
Phyla strigulosa (Mart. & Gal.) Moldenke [France]  
Syngonanthus niveus (Bong.) Ruhl. [Germany]  
xVerbena hybrida Voss [Ecuador]  
Verbena monacensis Moldenke [Venezuela]  
Verbena officinalis L. [Mexico]  
Verbena sulphurea D. Don [Germany]  
Verbena supina f. erecta Moldenke [Germany]  
Verbena tenuisecta Briq. [St. Croix]  
Vitex trifolia var. subtrisecta (Kuntze) Moldenke [Australia]

## FOSSILIZED:

- Tectona grandis L. f. [Pleistocene of India]

Additions and emendations to Part II: An alphabetic list of rejected scientific names proposed in these groups, including misspellings and variations in accreditation:

- Aegiphila arborescens ♀ breviflora Schau. = A. integrifolia (Jacq.) Jacq.  
Aegiphila arborescens ♂ longiflora Schau. = A. bracteolosa Moldenke  
Aegiphila brachiata Cham. & Schl. = A. deppeana Steud.  
Aegiphila cuatrecasatii Moldenke = A. cuatrecasasi Moldenke  
Aegiphila gloriosa var. paraensis Hock. = A. gloriosa var. paraensis Moldenke  
Aegiphila grandis var. cuatrecasatii (Moldenke) López-Palacios = A. grandis var. cuatrecasasi (Moldenke) López-Palacios

- Aegiphila longifolia Turcz. = A. mollis var. longifolia (Turcz.)  
López-Palacios
- Aegiphila sessiliflora Moldenke = A. grandis var. sessiliflora  
(Moldenke) Moldenke — this is the corrected entry
- Aegiphila sessiliflora Moldenke = A. grandis var. sessiliflora  
(Moldenke) Moldenke
- Aegiphila sessiliflora var. cuatrecasasi Moldenke = A. grandis  
var. cuatrecasasi (Moldenke) López-Palacios
- Aegiphila truncata Moldenke = A. grandis Moldenke
- Aloysia attenuata Walp. = Lippia veronioides Cham.
- Aloysia gratissima (Gill. ex Hook.) Tronc. = A. gratissima (Gill.  
& Hook.) Troncoso
- Avicennia officinalis var. lanceolata Kuntze = A. germinans var.  
guayaquilensis (H.B.K.) Moldenke
- Avicennia schaeeriana Stapf & Lehm. = A. schaueriana Stapf &  
Leechman
- Avicennia schaueriana f. glabrescens Moldenke = A. schaueriana  
Stapf & Leechman
- Bontia P. Br. ex Airy Shaw in Willis = Avicennia L.
- Bontia L. ex Loefl. = Avicennia L.
- Bouchea dichotoma Mohr [in part] = Stachytarpheta dichotoma (Ruiz  
& Pav.) Vahl — this is the corrected entry
- Bouchea Moldenke = Bouchea Cham.
- Bouchea fluminensis Moldenke = Bouchea fluminensis (Vell.) Moldenke
- Bouchea fluminensis var. pilosa Moldenke = Bouchea fluminensis var.  
pilosa Moldenke
- Burchardia Heist ex Duham. = Callicarpa L.
- Callicarpa acuminata L. = C. acuminata H.B.K.
- Callicarpa maingayi King = C. maingayi King & Gamble
- Callicarpa pendulata R. Br. = C. pedunculata R. Br.
- Calymega Poit. ex Mold. = Vitex Tourn.
- Camara lamii folio &c. Dill. = Lantana camara var. mista (L.)  
L. H. Bailey
- Camara melissae folio &c. Dill. = Lantana camara L.
- Camara trifolia &c. Plum. = Lantana trifolia L.
- Citharexylon sericeum Lodd. = Citharexylum sericeum Lodd.
- Citharexylon subflavescens Moldenke = Citharexylum subflavescens  
Blake
- Citharexylum cinereum ♀ Lam. = C. spinosum L.
- Citharexylum cyanocarpum Hook. & Arn. = Rhaphithamnus spinosus (A.  
L. Juss.) Moldenke
- Citharexylum flexuosum D. Don = C. flexuosum (Ruiz & Pav.) D. Don
- Citharexylum serrectum Griseb. = C. caudatum L.
- Clerodendron floribundum Lindl. = Clerodendrum emirnense Bojer
- Clerodendron hirsutum D. Don = Clerodendrum umbellatum Poir.
- Clerodendron obovatum Walp. = Clerodendrum obovatum (Roxb.) Walp.

- Clerodendron ovatum  $\alpha$  R. Br. = Clerodendron floribundum R. Br.  
Clerodendron ovatum  $\beta$  R. Br. = Clerodendron floribundum R. Br.  
Clerodendron speciosissimum Hort. Angl. = Clerodendron kaempferi  
 (Jacq.) Sieb.  
Clerodendron spinosum Spreng. = Clerodendron spinosum (L.) Spreng.  
Clerodendron temifolium H.B.K. = Clerodendron ternifolium H.B.K.  
Clerodendrum divaricatum Jack = C. serratum var. wallichii C. B.  
 Clarke -- this is the corrected entry  
Clerodendrum kaempferi (Jack.) Sieb. = C. kaempferi (Jacq.) Sieb.  
Clerodendrum teruatum Schinz = C. ternatum Schinz  
Clerodendrum teruatum var. lanceolatum (Guerke) Moldenke = C.  
ternatum var. lanceolatum (Gürke) Moldenke  
Congea azurea Vahl = C. tomentosa Roxb.  
Congea tomentosa var.  $\beta$  Schau. = C. tomentosa Roxb.  
Congea tomentosa  $\alpha$  latifolia Schau. = C. tomentosa Roxb.  
Congea tomentosa  $\beta$  oblongifolia Schau. = C. tomentosa Roxb.  
Cormutia microcalicina Pav. & Mold. = C. microcalycina Pavon &  
 Moldenke  
Cormutia pyramidata var. albida Anon. = C. pyramidata var. isth-  
mica Moldenke  
Cryptocaly Benth. = Phyla Lour.  
Dupatia Griseb. = Paepalanthus Mart.  
Dupatia seslerioides Griseb. = Paepalanthus seslerioides Griseb.  
Dupatya alsinoides Wr. & Sauv. = Paepalanthus alsinoides C. Wright  
Dupatya alsinoides (Wright & Sauv.) Britton = Paepalanthus alsin-  
oides C. Wright  
Dupatya ruprechtiana (Körn.) Kuntze = Syngonanthus ruprechtianus  
 (Körn.) Ruhl. -- this is the corrected entry  
Dupatya ruprechtiana Kuntze = Syngonanthus ruprechtianus (Körn.)  
 Ruhl. -- this is the corrected entry  
Duranta repens  $\gamma$  mutisii 3. acuminata a. glabrifolia Kuntze = D.  
coriacea Hayek -- this is the corrected entry  
Eriocaulon alpestre var. alpestre [Hook. f. & Thoms.] ex Van Royen  
 = E. alpestre Hook. f. & Thoms.  
Eriocaulon brevipedunculatum Suesseng. & Heine = E. kinabaluense  
 Van Royen  
Eriocaulon ovoideum var. ulei Knuth = Dioscorea amarantoides var.  
ulei Knuth, Dioscoreaceae  
Eriocaulon umbellatum Humb. = Syngonanthus umbellatus (Lam.) Ruhl.  
Eriocaulon umbellatum Kunth = Syngonanthus umbellatus (Lam.) Ruhl.  
Eriocaulon vernonioides (Kunth) D. Dietr. = Syngonanthus xeranth-  
moides var. vernonioides (Kunth) Moldenke  
Ghinia verbenacea Sw. = G. boxiana Moldenke  
Glandularia Schau. = Verbena [Dorst.] L.  
Glandularia dissecta (Willd.) Schnack & Covas = Verbena dissecta  
 Willd.  
Glossocarya mollis Wall. ex Griff. = G. mollis Wall.

- Gmelina elliptica J. C. Sm. = G. elliptica J. E. Sm.  
Goniostachyum graveolens Small = Lippia graveolens H.B.K.  
Junelia Mold. = Junellia Moldenke  
Lachnocaulon anceps (Walt.) DC. = L. anceps (Walt.) Morong  
Lachnocaulon digynum Sporl. = L. digynum Körn.  
Lantana aculeata Auct. = L. camara var. mista (L.) L. H. Bailey  
Lantana alba var. trifoliata Benth. = L. indica Roxb.  
Lantana asperata Hort. Paris. = L. camara var. nivea (Vent.) L. H. Bailey  
Lantana bellowsiana Hort. = L. montevidensis (Spreng.) Briq.  
Lantana camarra L. = L. camara L.  
Lantana capensis Thunb. = Spielmannia jasmimum Medic., Myoporaceae  
Lantana chiapensis Moldenke = L. chiapasensis Moldenke  
Lantana cinerea Otto & Dietr. = L. brasiliensis Link  
Lantana crenulata Otto & Dietr. = L. camara var. splendens (Medic.) Moldenke — this is the corrected entry  
Lantana crispa Thunb. = Spielmannia jasmimum Medic., Myoporaceae  
Lantana crocea ♂ rugosa Otto & Dietr. = L. urticaefolia Mill.  
Lantana crocea ♀ planifolia Otto & Dietr. = L. urticaefolia Mill.  
Lantana cuneifolia Mart. = L. chamissonis (D. Dietr.) Benth.  
Lantana emvolutrata Kummer = L. annua L.  
Lantana geminata (H.B.K.) Spreng. = Lippia alba var. globiflora (L'Hér.) Moldenke — this is the corrected entry  
Lantana geminata (Kunth) Spreng. = Lippia alba var. globiflora (L'Hér.) Moldenke — this is the corrected entry  
Lantana geminata Spreng. = Lippia alba var. globiflora (L'Hér.) Moldenke  
Lantana glutinosa var. albiflora Mold. = L. glutinosa f. albiflora Moldenke  
Lantana graveoleus Crutchfield & Johnston = Lippia graveolens H.B.K.  
Lantana involucrata f. candida Fosb. = L. involucrata L.  
Lantana lippioides Spreng. = L. canescens H.B.K.  
Lantana montevidensis Spreng. = L. montevidensis (Spreng.) Briq.  
Lantana nivea ♀ Vent. = L. camara var. mutabilis (Hook.) L. H. Bailey  
Lantana salviaefolia Cham. = L. fucata Lindl.  
Lantana salviaefolia L. = L. fucata Lindl.  
Lantana splendens Medic. = L. camara var. splendens (Medic.) Moldenke  
Lantana svennsonii Mold. = L. svennsonii Moldenke  
Lantana svennsonii f. albiflora Mold. = L. svennsonii f. albiflora Moldenke  
Lantana variegata Otto & Dietr. = L. purpurea Hornem.  
Lantana youngii Kummer = L. tiliaefolia Cham.  
Lippia chacensis Moldenke = L. lorentzii Moldenke  
Lippia citrata Willd. = L. alba var. globiflora (L'Hér.) Moldenke — this is the corrected entry

- Lippia citrosa (Small) = Lantana microcephala A. Rich.  
Lippia corimbosa Troncoso = L. corymbosa Cham.  
Lippia dictamnus Mart. = L. francensis Moldenke  
Lippia discolor Hort. = Phyla scaberrima (A. L. Juss.) Moldenke  
Lippia floribunda H.B.K. = L. schlimii var. glabrescens (Moldenke)  
Moldenke -- this is the corrected entry  
Lippia floribunda Humb. & Bonpl. = L. schlimii var. glabrescens  
(Moldenke) Moldenke -- this is the corrected entry  
Lippia floribunda Humb. & Kunth = L. schlimii var. glabrescens  
(Moldenke) Moldenke -- this is the corrected entry  
Lippia floribunda Kunth = L. schlimii var. glabrescens (Moldenke)  
Moldenke -- this is the corrected entry  
Lippia globiflora f. pubescens Kuntze = L. alba var. globiflora  
(L'Hér.) Moldenke -- this is the corrected entry  
Lippia globiflora albiflora Kuntze = L. alba var. globiflora  
(L'Hér.) Moldenke -- this is the corrected entry  
Lippia hatschbachi Moldenke = L. hatschbachii Moldenke  
Lippia hemisphaeria Jacq. = L. americana L.  
Lippia hispida Jacq. = Lantana achyranthifolia f. grandifolia  
Moldenke  
Lippia imundata Mart. = L. lorentzii Moldenke  
Lippia lacunosa var. ovatifolia Moldenke = L. lacunosa var. acuti-  
folia Moldenke  
Lippia latoovata Mart. = L. lupulina Cham.  
Lippia lavandulaefolia Schwaegr. = L. javanica (Burm. f.) Spreng.  
Lippia lopezii Mold. = L. lopezii Moldenke  
Lippia macrocalyx Mart. = L. microcephala Cham.  
Lippia mcvaughii Moldenke = L. mcvaughii Moldenke  
Lippia myriocephala H.B.K. = L. myriocephala Schlecht. & Cham.  
Lippia nepetacea Schau. -- to be deleted  
Lippia nodiflora var. repens (Spreng.) Ross = Phyla nodiflora (L.)  
Greene  
Lippia nodiflora ♂ sarmentosa DC. = Phyla nodiflora (L.) Greene  
Lippia pumila Cham. & Schl. = L. pumila Cham.  
Lippia pycnocephala Seem. = L. myriocephala var. hypoleia (Briq.)  
Moldenke  
Lippia rhodocnemis Mart. = L. rhodocnemis Mart. & Schau.  
Lippia rubra Hort. = Lantana achyranthifolia f. grandifolia Mol-  
denke  
Lippia saturaeaeifolia Mart. = L. satureiaefolia Mart. & Schau.  
Lippia sericea Schau. = L. sericea Cham.  
Lippia stöchas Mart. = L. sericea Cham.  
Lippia strigulosa f. parvifolia (Mold.) Fosberg = Phyla strigulosa  
var. sericea (Kuntze) Moldenke  
Lippia substrigosus Turcz. = L. substrigosa Turcz.  
Lippia tergulifera Briq. = L. tegulifera Briq.  
Lippia thymoides Mart. = L. thymoides Mart. & Schau.

Macrostegia Nees in DC. = Vitex Tourn.

Mallelou Rheede ex Adans. = Vitex Tourn.

Melasanthus triphyllus Pohl = Stachytarpheta rhomboidalis (Pohl)

Walp.

Paepalanthus alsinoides Wright & Sauvalle = P. alsinoides C.

Wright

Paepalanthus colombianus Cleef = P. columbiensis Ruhl. -- this is the corrected entry

Paepalanthus drouetii L. B. Sm. = Syngonanthus drouetii L. B. Sm.

-- this is the corrected entry

Paepalanthus filifolius Moldenke = P. capillifolius Moldenke

Paepalanthus phlepsae Moldenke = P. phelpsae Moldenke

Paepalanthus rupprechtianus Körn. = Syngonanthus ruprechtianus

(Körn.) Ruhl. -- this is the corrected entry

Paepalanthus ruprechtianus Körn. = Syngonanthus ruprechtianus

(Körn.) Ruhl. -- this is the corrected entry

Paepalanthus vernonioides var. a Kunth = Syngonanthus xeranthemoides

var. vernonioides (Kunth) Moldenke -- this is the corrected entry

Paepalanthus vernonioides var. α Kunth = Syngonanthus xeranthemoides

var. vernonioides (Kunth) Moldenke -- this is the corrected entry

Petrea mexicana Humb. & Bonpl. = P. volubilis var. pubescens Moldenke

-- this is the corrected entry

Petrea pubeseens Turcz. = P. pubescens Turcz.

Petrea pubeseens var. klugii Mold. = P. pubescens var. klugii

Moldenke

Phyla betulacea (H.B.K.) Greene = P. betulaefolia (H.B.K.) Greene

Phyla betulaefolia H.B.K. = P. betulaefolia (H.B.K.) Greene

Pitreaa cuncato-ovata (Cav.) Caso = P. cuneato-ovata (Cav.) Caro

Priva lappula Andrews = P. lappulacea (L.) Pers.

Pygmaopremna Nayar, Yogan., & Subram. = Pygmaopremna Merr.

Pygmaopremna herbacea Nayar, Yogan., & Subram. = Pygmaopremna

herbacea (Roxb.) Moldenke

Sép'halicá W. Jones = Nyctanthes L. & N. arbor-tristis L.

Siphonanthus Schau. = Clerodendrum Burm.

Stachytarpha aristata Vahl = Stachytarpheta orubica (L.) Vahl

Stachytarpha cajanensis Vahl = Stachytarpheta cayennensis (L. C.

Rich.) Vahl

Stachytarpha ciliata Kunze = Stachytarpheta indica (L.) Vahl

Stachytarpha dichotoma Vahl = Stachytarpheta dichotoma (Ruiz &

Pav.) Vahl -- this is the corrected entry

Stachytarpha gibberosa Reichenb. = Stachytarpheta dichotoma (Ruiz

& Pav.) Vahl

Stachytarpha glauca Walp. = Stachytarpheta glauca (Pohl) Schau.

Stachytarpha glauca α Schau. = Stachytarpheta glauca (Pohl) Schau.

Stachytarpha glauca ♀ subintegrifolia Schau. = Stachytarpheta

glauca var. subintegrifolia Schau.

- Stachytarpha hirsuta Jacq. f. = Stachytarpheta canescens H.B.K.  
Stachytarpha hirsutissima Link = Stachytarpheta canescens H.B.K.  
Stachytarpha hirta Kunth = Stachytarpheta dichotoma (Ruiz & Pav.)  
 Vahl  
Stachytarpha hirta H.B.K. = Stachytarpheta dichotoma (Ruiz & Pav.)  
 Vahl  
Stachytarpha jamaicensis Gardn. = Stachytarpheta dichotoma (Ruiz  
 & Pav.) Vahl  
Stachytarpha marginata Vahl = Stachytarpheta jamaicensis (L.) Vahl  
Stachytarpha maximiliani ♂ glabrata Schau. = Stachytarpheta maxi-  
milianii var. glabrata Schau.  
Stachytarpha microphylla Walp. = Stachytarpheta sanguinea Mart.  
Stachytarpha palustris Schott = Stachytarpheta angustifolia f.  
elatior (Schrad.) López-Palacios  
Stachytarpha pilosiuscula H.B.K. = Stachytarpheta jamaicensis (L.)  
 Vahl  
Stachytarpha pilosiuscula Kunth = Stachytarpheta jamaicensis (L.)  
 Vahl  
Stachytarpha quadrangula Nees & Mart. = Stachytarpheta quadrangula  
 Nees & Mart.  
Stachytarpha rhomboidalis Walp. = Stachytarpheta rhomboidalis Schau.  
Stachytarpha triphylla Walp. = Stachytarpheta rhomboidalis Schau.  
Stachytarpha umbrosa H.B.K. = Stachytarpheta dichotoma (Ruiz &  
 Pav.) Vahl  
Stachytarpha umbrosa Kunth = Stachytarpheta dichotoma (Ruiz & Pav.)  
 Vahl  
Stachytarpha urticifolia Sims = Stachytarpheta urticaefolia  
 (Salisb.) Sims  
Stachytarpha veronicaefolia Cham. = Stachytarpheta cayennensis (L.  
 C. Rich.) Vahl  
Stachytarpha villosa Schau. = Stachytarpheta villosa Cham. — this  
 is the corrected entry  
Stachytarpha zuccagni Roem. & Schult. = Stachytarpheta mutabilis  
 var. violacea Moldenke  
Stachytarpheta gibberosa Reichenb. = S. dichotoma (Ruiz & Pav.)  
 Vahl  
Stachytarpheta glauca Walp. = S. glauca (Pohl) Schau.  
Stachytarpheta hirta H.B.K. = S. dichotoma (Ruiz & Pav.) Vahl --  
 this is the corrected entry  
Stachytarpheta jamaicensis Gardn. = S. dichotoma (Ruiz & Pav.)  
 Vahl — this is the corrected entry  
Stachytarpheta microphylla Walp. = S. sanguinea Mart.  
Stachytarpheta reticulata Mart. ex Schau. = S. reticulata Mart.  
Stachytarpheta rhomboidalis Walp. = S. rhomboidalis Schau.  
Stachytarpheta triphylla Walp. = S. rhomboidalis Schau.  
Stachytarpheta umbrosa H.B.K. = S. dichotoma (Ruiz & Pav.) Vahl —  
 this is the corrected entry

- Stigmatococca Mart. ex Mold. = Aegiphila Jacq.  
Stigmatococca Willd. = Ardisia Sw., Myrsinaceae  
Syngonanthus Ruhl. = Syngonanthus Ruhl.  
Syngonanthus rufoalbus Alv. Silv. = S. rufo-albus Alv. Silv.  
Syngonanthus rupprechtianus (Körn.) Ruhl. = S. rupprechtianus  
 (Körn.) Ruhl. — this is the corrected entry  
Syngonanthus umbellatus var. brachyphylla Huber = S. umbellatus  
 f. brachyphyllus (Huber) Moldenke — this is the corrected  
 entry  
Syngonanthus vernonioides Ruhl. = S. xeranthemoides var. vernon-  
ioides (Kunth) Moldenke  
Syngonanthus wahlbergii (Koern.) Ruhl. = S. wahlbergii (Wikstr.)  
 Ruhl.  
Tomonea verbenacea Sw. = Ghinia boxiana Moldenke  
Tonina guianensis Samuels = T. fluviatilis Aubl.  
Upata Rheedee ex Adans. = Avicennia L.  
Verbena a. Stachytarpheta Endl. = Stachytarpheta Vahl  
Verbena b. Bouchea Endl. = Bouchea Cham.  
Verbena bornariensis L. = V. bonariensis L.  
Verbena carolinensis etc. Dill. = V. carolina L.  
Verbena carolinensis &c. Dill. = V. carolina L.  
Verbena dermani Mold. = xV. dermeni Moldenke  
Verbena dissecta Willd. = V. dissecta Willd.  
Verbena gobiflora Ruiz & Pav. = Lippia alba var. globiflora  
 (L'Hér.) Moldenke  
Verbena hali Small = V. halei Small  
Verbena jamaicensis St.-Hil. = Stachytarpheta dichotoma (Ruiz &  
 Pav.) Vahl  
Verbena littoralis var. albiflora Moldenke = V. littoralis var.  
albiflora Moldenke  
Verbena longifolia H.B.K. = V. longifolia Mart. & Gal.  
Verbena mexicana trachelii fol. &c. Dill. = Priva mexicana (L.)  
 Pers.  
Verbena xmoenchina Moldenke = xV. moechina Moldenke  
Verbena moranensis H.B.K. = V. elegans H.B.K.  
Verbena odorata J[uss.] = Lippia javanica (Burm. f.) Spreng.  
Verbena odorata Pers. = Lippia alba var. globiflora (L'Hér.)  
 Moldenke — this is the corrected entry  
Verbena paniculata ♀ pinnatifida Lam. = V. hastata L.  
Verbena paniculata ♀ pinnatifida Schau. = V. hastata L.  
Verbena phlogiflora ♂ vulgaris Cham. = V. phlogiflora Cham.  
Verbena phlogiflora ♂ vulgaris Schau. = V. phlogiflora Cham.  
Verbena phlogiflora ♀ macilentata Cham. = V. megapotamica Spreng.  
Verbena rigida var. glandulos Moldenke = V. rigida var. glandu-  
lifera Moldenke — this is the corrected entry  
Verbena rigida var. glandulosa Moldenke = V. rigida var. glandu-  
lifera Moldenke

Verbena stellarioides ♂ decurrens Cham. = V. stellarioides Cham.

Verbenaceae Auct. = Verbenaceae J. St.-Hil.

Verbeneae Reich. = Verbenaceae J. St.-Hil.

Verbeneae Schau. = Verbenaceae J. St.-Hil.

Verbeneae [Labiatarum sectio] ex parte Reichenb. = Verbenaceae J.

St.-Hil.

Verbena Bert. = Verbena [Dorst.] L.

Verbena diceras Bert. = Verbena sulphurea D. Don

Vitex caribaea Hook. & Arn. = Vitis californica Benth., Vitaceae

Vitex montevidensis ♀ parviflora Cham. = V. schaueriana Moldenke

Vitex montevidensis ♀ parviflora Schau. = V. schaueriana Moldenke

Vitex montevidensis multinervis Cham. = V. megapotamica (Spreng.)

Moldenke

Vitex negundo Roxb. = V. negundo L.

Vitex sellowiana ♀ parviflora Cham. = V. mexiae Moldenke

Vitex sellowiana ♀ parviflora Schau. = V. mexiae Moldenke

Vitex triflora Moldenke = V. triflora Vahl

Vitex trifolia &c. Pluk. = V. trifolia L.

Viticastrum ramosum Presl = Sphenodesme racemosa (Presl) Moldenke

Viticeae Schau. = Viticoideae Briq.

Volkameria buchananii Roxb. = Clerodendrum buchananii (Roxb.) Walp.

Volkameria foetida Hamilt. = Clerodendrum bungei Steud.

Volkameria inermis L. f. = Clerodendrum inerme (L.) Gaertn.

Volkameria inermis ♀ Ait. = Clerodendrum ligustrinum (Jacq.) R.Br.

Zapania Juss. ex Steud. = Lippia Houst.

Zapania Schau. = Lippia Houst.

Zapania geminata (H.B.K.) Gibert = Lippia alba var. globiflora

(L'Hér.) Moldenke -- this is the corrected entry

Zapania hispida Zuccagni = Priva mexicana (L.) Pers.

Zapania mexicana Lam. = Priva mexicana (L.) Pers.

Zapania odorata Pers. = Lippia alba var. globiflora (L'Hér.)

Moldenke -- this is the corrected entry

Zapania prismatica Poir. = Bouchea prismatica (L.) Kuntze

Zapania odorata Pers. = Lippia alba var. globiflora (L'Hér.) Mol-

denke

\* A few copies of the original (1971) work, 974 pp., are still available for \$25 plus postage from Mrs. Alma L. Moldenke, 303 Parkside Road, Plainfield, New Jersey 07060, U.S.A.

NOTES ON NEW AND NOTEWORTHY PLANTS. XCIX

Harold N. Moldenke

*LANTANA TRIPLINERVIA* f. *ARMATA* Moldenke, f. nov.

Haec forma a forma typica speciei ramis crasse armatis spinis duris magnis arcte recurvatis et corollis aureo-flavis vel lilacinis recedit.

This form differs from the typical form of the species in its stems and branches being very coarsely and viciously armed with stout, thick, strongly recurved thorns in great profusion and in the corollas being either golden-yellow, the throat ringed with light-orange, or the tube and limb lilac, the throat ringed with vermilion.

The type of this form was collected by George Eiten and W. D. Clayton (no. 6194) in tall grass of low secondary forest between the road and a nearby creek 1.3 km. southeast of the center of the city of Paríquera-açu on the road to Iguape, 24°43' S., 47°52 1/2' W., at 50 meters altitude, in the Município de Paríquera-açu, São Paulo, Brazil, on February 18, 1965, and is deposited in the United States National Herbarium in Washington. The collectors report the common name, "ribeirão turvo".

*LEIOTHRIX RUFULA* var. *BREVIPIES* Moldenke, var. nov.

Haec varietas a forma typica speciei pedunculis maturis ca. 3 cm. longis recedit.

This variety differs from the typical form of the species in having its mature peduncles during anthesis and fruit only about 3 cm. long.

The type of the variety was collected by Alberto Castellanos (no. 25666) at Abr. Rebouças, Itatiaia, Rio de Janeiro, Brazil, at 2350 meters altitude, on December 3, 1964, and is deposited in my personal herbarium.

*PAEPALANTHUS GUARAIENSIS* Moldenke, sp. nov.

Herba parva caulescens; caule ca. 2 cm. longo dense folioso; foliis parvis linearibus 5--8 mm. longis recurvatis dense villosulis acutis; pedunculis filiformibus 4--6 cm. longis obscure pilosulo-puberulis 3-sulcatis solitariis vel paucis; capitulis hemisphaericis vel in maturitate globosis griseis ca. 2 mm. latis.

Small herb; stems short, erect, ca. 2 cm. long, densely foliose; lower leaves densely appressed to the stems and closely imbricate, about 5 mm. long and 1 mm. wide, pilose, the upper ones spreading-recurved, linear, 5--8 mm. long, acute, densely whitish-villosulous; peduncles 1 or 2 at the apex of the stem, erect, filiform, 4--6 mm. long, pilosulous-puberulent, very obscurely so in age, 3-sulcate, twisted; heads small, at first hemispheric, later globose, grayish, about 2 mm. wide; involucrel bractlets oblanceolate-elliptic, stramineous, 0.5--0.8 mm. long, subacute apically, densely barbate at the

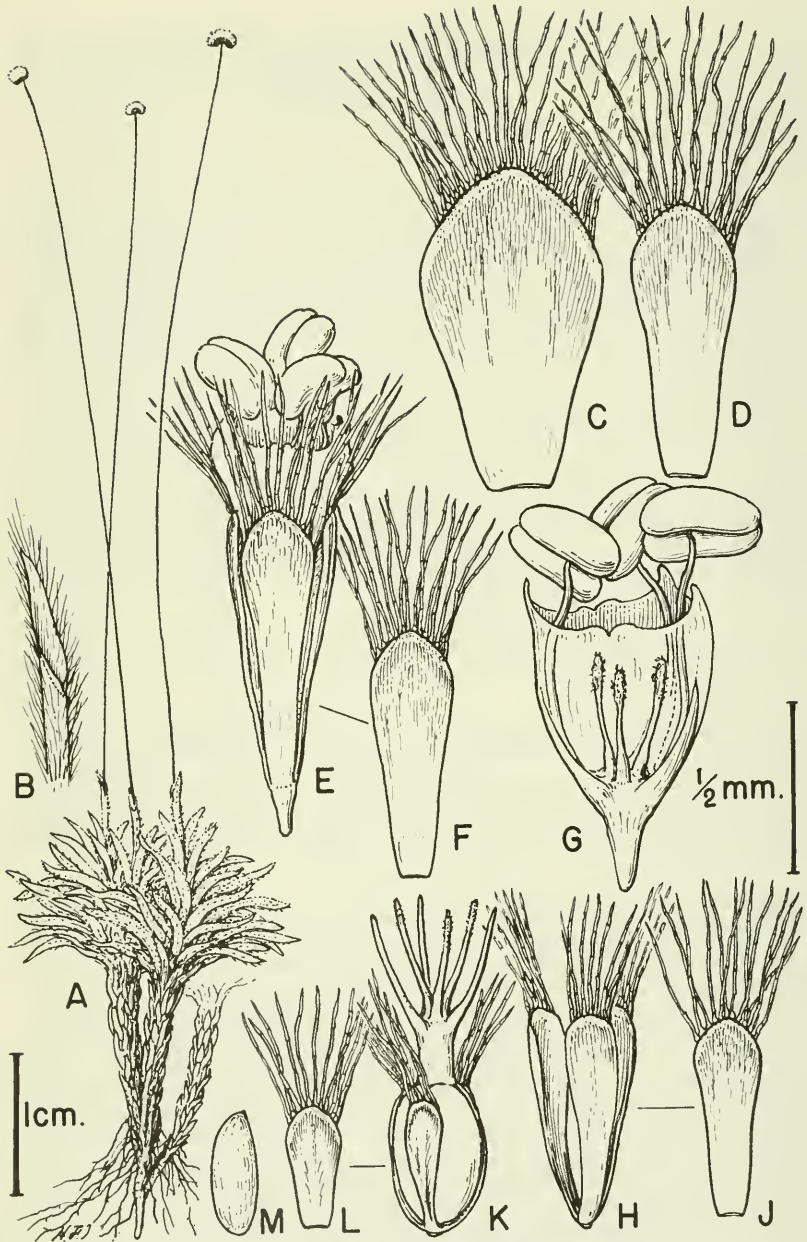


Fig. 1. *Paepalanthus guaraiensis* Moldenke

apex; receptacular bractlets blackish, rather broadly obovate or oblanceolate, ca. 1 mm. long and 0.6 mm. wide, densely white-barbate at the apex; for floral characters see illustration, Fig. 1: A - Habit; B - Sheath; C - Receptacular bractlet; D - Involucral bractlet; E - Staminate floret; F - Staminate sepal; G - Staminate floret with sepals removed; H - Pistillate calyx; J - Pistillate sepal; K - Pistillate floret with one petal removed; L - Pistillate petal; M - Ovary. Drawing by Haruto Fukuda.

The type of the species was collected by Gert Hatschbach and R. Kummrow (no. 38508) in "dos rochedões de arenito, nas anfractuosidades, Rod. Belem - Brasília, mun. Guarai", Goiás, Brazil, on March 30, 1976, and is deposited in my personal herbarium.

*PAEPALANTHUS TORTILIS* var. *GLABERRIMUS* Mart. & Moldenke, var. nov.

Haec varietas a forma typica speciei foliis vaginisque glaberrimis recedit.

This variety differs from the typical form of the species in having its leaves and sheaths completely glabrous.

The type of the variety is Herb. Martius 551 from the Serra da Brocca, Rio de Janeiro, Brazil, collected in July, 1839, and deposited in the herbarium of Columbia University. It was originally determined and distributed by Martius as Eriocaulon tortile var. glaberrimum, but this name appears to be a cheironym.

*SYNGONANTHUS YAPACANENSIS* var. *HIRSUTUS* Moldenke, var. nov.

Haec varietas a forma typica speciei pedunculis densissime longeque hirsutis recedit.

This variety differs from the typical form of the species in its peduncles during anthesis being very densely long-hirsute with ascending, shaggy, grayish hairs.

The variety is based on A. Gentry & S. Tillett 10869, collected in thickets and forest, mostly on white sand, at 110 m. altitude, on the road from San Fernando de Atabapo to Santa Barbara 12--40 km. from San Fernando, Amazonas, Venezuela, on March 24, 1974, and is deposited in my personal herbarium.

*VERBENA DEMISSA* f. *ALBA* Moldenke, f. nov.

Haec forma a forma typica speciei corollis albis recedit.

This form differs from the typical form of the species in having white corollas.

The type of the form was collected by Santiago López-Palacios (no. 4200) in the Cráter del Pululagua, La Reventazón, Pichincha, Ecuador, at 2100 meters altitude, on January 23, 1977, and is deposited in my personal herbarium. The collector notes: "Hierba rastrera. Espigas por lo general simples. Flores blancas."

*VERBENA LITORALIS* f. *MAGNIFOLIA* Moldenke, f. nov.

Haec forma a forma typica speciei foliis multo maioribus laminae usque 15 cm. longis 8 cm. latis recedit.

This form differs from the typical form of the species in its much larger leaves, which may be up to 15 cm. long and 8 cm. wide, coarsely and somewhat irregularly serrate-dentate along the margins, some of the larger teeth being bidentate.

The type of the form was collected by Santiago López-Palacios (no. 4188) at Tena, Napo, Ecuador, at 500 meters altitude, on January 11, 1977, and is deposited in my personal herbarium. The collector notes: "Hierba de 1--1.2 m. Fls. blanco-morado muy pequeñas, espigas muy delgadas y alargadas".

VERBENA PARVULA var. OBOVATA Moldenke, var. nov.

Haec varietas a forma typical speciei lamini foliorum obovatis recedit.

This variety differs from the typical form of the species in having its leaf-blades mostly more or less obovate.

The type of the variety was collected by Santiago López-Palacios (no. 4250) at Quito, Pichincha, Ecuador, at an altitude of 2800 meters, on February 6, 1977, and is deposited in my personal herbarium. The collector notes: "Hierba decumbente, espigas cilíndricas, en su mayoría de a 3, fls. moradas. Hojas algo obovadas."

AEGIPHILA LOPEZ-PALACII Moldenke, sp. nov.

Arbor ramis ramulisque crassis valde medullosis obtuse tetragonis dense pulverulento-puberulis valde lenticillatis; foliis permagnis oppositis obovatis ca. 35--40 cm. longis 14--19 cm. latis subcoriaceis in siccitate brunneis ad apicem rotundatis ad basin acutis integris utrinque minuteque pulverulento-puberulis; venis crassis perspicuis, secundariis multis rectis; inflorescentiis axillaribus glomeratis multifloris perspicue bracteolatis; bracteolis linearibus elongatis.

Tree, 4--10 m. tall or even taller; branches and branchlets very stout and medullose, obtusely tetragonal, somewhat decussately flattened, conspicuously elevated-lenticellate, densely pulverulent-puberulent; leaves decussate-opposite, very large, coriaceous, brunnescent in drying; petioles very stout, 3--4 cm. long, densely pulverulent-puberulent, flattened above; leaf-blades obovate, very large, 35--40 cm. long, 14--19 cm. wide, rounded apically, entire-margined, rather abruptly acute basally, minutely pulverulent-puberulent on both surfaces under a hand-lens, the venation coarse and conspicuous; midrib very stout, rounded-elevated beneath, densely pulverulent-puberulent; secondaries very numerous, 15 or more per side, mostly rather straight and parallel, extending almost to the margins at right angles from the midrib, prominent beneath, flattened above; veinlet reticulation rather abundant, prominulous beneath, inconspicuous above; inflorescence axillary, glomerate, sessile, many-flowered, conspicuously many-bracteolate; bractlets linear, about 2 cm. long and 1 mm. wide, twisted, pulverulent-puberulent; calyx campanulate-obconic, about 9 mm. long, 6 mm. wide at the apex, densely puberulent, the rim mostly irregularly 2-lipped; corolla not well preserved, apparently hypocateriform, the tube very slen-

der, included by the calyx, the lobes spreading, ca. 3 mm. long; stamens exerted from the corolla-tube, apparently equaling the lobes in length.

The type of this most remarkable species was collected by my good friend and colleague, Santiago López-Palacios (no. 4237) — in whose honor I am pleased to name it in small recognition of the very important and careful field work which he is conducting in this most difficult and perplexing group of plants — at Campamento San José, beyond Los Bancos, at 2200 meters altitude, Pichincha, Ecuador, on February 4, 1977, and is deposited in my personal herbarium. The collector notes: "Árbol de unos 4 m (existen ejemplares mayores de 10 m), con cálices secos en inflorescencias glomeradas sésiles."

*AEGIPHILA LOPEZ-PALACII* var. *PUBESCENS* Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum subtus dense subtomentello-pubescentibus recedit.

This variety differs from the typical form of the species in having the lower surface of the leaf-blades densely subtomentelous-pubescent.

The type of the variety was collected by Santiago López-Palacios (no. 4201) in the Cráter del Pululagua, La Reventazón, at 2100 meters altitude, Pichincha, Ecuador, on January 23, 1977, and is deposited in my personal herbarium. The collector notes: "Arbolito en crecimiento de 2--4 m. en lugares húmedos y sombreados; esteril".

*AEGIPHILA INTEGRIFOLIA* var. *LOPEZ-PALACII* Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum distincte serrulatis recedit.

This variety differs from the typical form of the species in having the margins of its leaf-blades distinctly serrulate.

The type of the variety was collected by Santiago López-Palacios (no. 4257) at Tena, Río Uglo, Napo, Ecuador, at 500 m. altitude, on February 10, 1977, and is deposited in my personal herbarium. The collector notes: "Arbolito 2-5 m. Hojas anchamente elípticas, claramente aserradas, cimas axilares multifloras. Cáliz verde, 4-lobado, de unas 7 mm. Corola blanca, tubo delgado de 1 cm. de largo, lobulos extendidos de unos 12 mm. de diámetro."

ADDITIONAL NOTES ON THE ERIOCAULACEAE. LXXI

Harold N. Moldenke

SYNGONANTHUS FLAVIDULUS (Michx.) Ruhl.

Additional bibliography: Britton & Br., *Illustr. Fl.*, ed. 2, imp. 3, 1: 455 & 680, fig. 1144. 1936; Moldenke, *N. Am. Fl.* 19: 43 & 44. 1937; Moldenke, *Phytologia* 1: 336 & 343--344. 1939; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 2, 145. 1941; Worsdell, *Ind. Lond. Suppl.* 2: 426. 1941; Britton & Br., *Illustr. Fl.*, ed. 2, imp. 4, 1: 455 & 680, fig. 1144. 1943; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 1: 878 & 879 (1946) and imp. 2, 2: 402. 1946; Moldenke, *Alph. List Cit.* 1: 17, 31, 35, 38, 42, 43, 45, 63, 90, 98, 99, 138-140, 152, 153, 164, 169, 191, 221, 234, 257, 275, 276, 283, 286, 290, & 292--295. 1946; Moldenke, *Known Geogr. Distrib. Erioc.* 2, 3, 29, 34, 40, 48, & 58. 1946; Britton & Br., *Illustr. Fl.*, ed. 2, imp. 5, 1: 455 & 680, fig. 1144. 1947; Moldenke, *Phytologia* 2: 350 (1947) and 2: 496. 1948; Moldenke, *Alph. List Cit.* 2: 377, 413, 460, 470, 480, 504, 507, 508, 511--513, 524, 545, 554, 572, 583, 617, 630, 639, & 641 (1948), 3: 660, 675, 697, 721, 725, 736, 741, 742, 756, 759, 760, 772, 774, 776--778, 787, 790, 806, 813, 822, 835, 841, 842, 850, 851, 895, 899, 917, 931, 937, 940, 943, 946, & 958 (1949), and 4: 1001, 1003, 1112, 1118, 1132, 1164, 1176, 1177, 1181, 1191, 1192, 1201, 1204, 1216, 1221, 1222, 1227, 1241, 1252, 1288, 1289, & 1292. 1949; E. D. Merr., *Ind. Rafin.* 82. 1949; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 7, 8, 10, 11, & 213. 1949; Gleason, *New Britton & Br. Illustr. Fl.*, imp. 1, 1: 372 & 481 (1952) and imp. 1, 3: 585 & 591. 1952; Moldenke, *Phytologia* 4: 313--316. 1953; Thorne, *Am. Midl. Nat.* 52: 282. 1954; Core, *Fl. Tax.* 268. 1955; Gleason, *New Britt. & Br. Illustr. Fl.*, imp. 2, 1: 372 & 418 (1958) and imp. 2, 3: 585 & 591. 1958; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 3, 145. 1959; Moldenke, *Résumé* 10, 11, 13, 14, 280, 282, 288, 292, 302, 325, 414, & 491. 1959; Moldenke, *Résumé Suppl.* 1: 2 & 16. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 1: 878 & 879 (1960) and imp. 3, 2: 402. 1960; Moldenke, *Résumé Suppl.* 3: 3, 31, & 35 (1962), 4: [1]--3 (1962), 5: 2 (1962), and 6: 10. 1963; Gleason, *New Britt. & Br. Illustr. Fl.*, imp. 3, 1: 372 & 481 (1963) and imp. 3, 3: 585 & 591. 1963; Radford, Ahles, & Bell, *Guide Vasc. Fl. Carol.* 106 & 107. 1964; Thanikaimoni, *Pollen & Spores* 7: 183 & 187, tab. 1. 1965; Kral, *Sida* 2: 327--332. 1966; Shinners, *Sida* 2: 441 & 447. 1966; Grimm, *Recog. Flow. Wild Fl.* 36. 1968; Moldenke, *Résumé Suppl.* 16: [1] & 25 (1968) and 17: [1] & 9. 1968; Rickett, *Wild Fls. U. S.* 2 (1): [85] & 135, pl. 27 (1968) and 2 (2): 674. 1968; Moldenke, *Résumé Suppl.* 18: [1] & 13. 1969; Moldenke, *Phytologia* 18: 80, 369, 370, 379, & 380 (1969) and 19: 28 & 75. 1969; Tomlinson in C. R. Metcalfe, *Anat. Monocot.* 3: 149, 156, 157, 161, 162, 168, 169, 172, 175, 182--186, 190, & 191, fig. 33 H, I, & K, 35 I, & 39 A--D. 1969; Britton & Br., *Illustr. Fl.*, ed. 2, imp. 6, 1: 455 & 680, fig. 1144. 1970; Moldenke, *Phytologia* 20: 41, 42, 52, & 424. 1970;

S. Ell., Sketch Bot., imp. 3, 2: 566—567 & 728. 1971; Long & Lakela, Fl. Trop. Fla., ed. 1, 259, 262, 930, & 958. 1971; Moldenke, Fifth Summ. 1: 23, 25, 26, 30, 32, 481, & 487 (1971) and 2: 496, 500, 513, 534, 578, 583, 593, 636, 764, & 962. 1971; Moldenke, Phytologia 25: 125 & 225 (1973), 26: 17, 27, & 179 (1973), and 29: 204. 1974; Michx., Fl. Bor.-Am., imp. 2, 2 [Ewan, Class. Bot. Am. 3]: 166. 1974; Moldenke, Phytologia 31: 375 (1975) and 34: 248, 277, & 486. 1976; Lakela, Long, Fleming, & Genelle, Fl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 39 & 180. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, 259, 262, 930, & 958. 1976; Moldenke, Phytologia 35: 304, 313, 346, 347, & 457—458. 1977.

Additional & emended illustrations: Britton & Br., Illustr. Fl., ed. 1, 1: 373, fig. 902 (1896), ed. 2, imp. 1, 1: 455, fig. 1144 (1913), and ed. 2, imp. 2, 1: 455, fig. 1144. 1923; M. F. Baker, Fla. Wild Fls. 122. 1926; J. K. Small, Man. Southeast. Fl. 257. 1933; Britton & Br., Illustr. Fl., ed. 2, imp. 3, 1: 455, fig. 1144 (1936), ed. 2, imp. 4, 1: 455, fig. 1144 (1943), and ed. 2, imp. 5, 1: 455, fig. 1144. 1947; Thanikaimoni, Pollen & Spores 7: 183, tab. 1. 1965; Kral, Sida 2: 328. 1966; Rickett, Wild Fls. U. S. 2 (1): [85] (in color). 1968; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 156, 168, & 182, fig. 32 H, I, & K, 35 I, & 39 A—D. 1969; Britton & Br., Illustr. Fl., ed. 2, imp. 6, 1: 455, fig. 1144. 1970.

Recent collectors describe this plant as a low herb, clump-forming or solitary, the leaves dense, recurved, rosette-forming, flattened against the substratum, with hairs tending to be pustulate-based, at least some of those on the upper portions of the peduncles clavate or gland-tipped, the flowers white, and the bracts straw-colored and shiny. D'Arcy refers to the heads as "bright white", but to me in the field they have usually had a yellowish cast.

Collectors have found the species growing in bogs, roadside swales, longleaf pine sandhill bogs and bog margins, clearings in longleaf pine - saw palmetto flats, and sandy arid pinelands, in open pine-palmetto forests, hillside bogs, cleared pinelands, railroad ditches, and low areas in sandhills, in sandy prairies, clearings in pine flatwoods, moist ground of pinelands, white sand scrub, roadside ditches, and moist broad shallow sandy-peaty ditches, under Taxodium in moist sedge associations, at pond edges, in wet sandy peat in bogs in longleaf pine - saw palmetto flatwoods, pine flatwoods ditches, moist areas in pineland bogs, and slash pine - saw palmetto flatwoods, in damp white sand along the borders of shallow ponds in sand barrens, in low and moist pinelands, low scrubland, sandy openings in scrub, boggy areas, and the sandy open scrub-covered edge of pinelands, at the edges of cutover pinewoods, in sandy or sandy-peaty soil, in the high pine borders of swamps, on the shores of sinkhole lakes, at the edge of cypress ponds and ponds with surrounding shrubbery, in the sandhills bordering bogs, in clearings in shrub bogs, and in sandy peat of seepage from hillside bogs, by ponds in pond cypress flatwoods, and in hammocks with Asimina, Blechnum, and Nephrolepis.

D'Arcy reports it "frequent in wet grassy ditches" in Florida, Wentz found it "common at edge of beach of 5-acre pond" and Tomlinson found it "abundant in sandy prairie and cutover pineland, forming dense tufts in drier areas" in the same state, but Myint refers to it as "occasional along streams and in grassy pinelands". It has been found in flower from March to July and in fruit in March, April, June, and July. Lakela and her associates (1976) aver that it flowers in the "summer".

Thorne (1954) refers to the species as "rare". Radford and his associates (1964) also report it as "rare" [in the Carolinas] in bogs, savannas, and low pinelands in Bladen, Brunswick, New Hanover, and Sampson Counties, North Carolina. Harper (1906) records it from Appling, Berrien, Coffee, Colquitt, Decatur, Dodge, Dooly, Emanuel, Irwin, Montgomery, Tattnall, Telfair, and Wilcox Counties, Georgia. The Masseys found it "abundant on low roadsides with Eriocaulon" in North Carolina. In some recent floras it is listed as occurring in Virginia, but as yet I have seen no material to substantiate this claim. Ruhland (1930) makes the remarkable assertion that its natural distribution is "an Flussufer von Pennsylvania bis Karolina" -- what the basis is of his Pennsylvania "record" is unknown to me. There is nothing in the Berlin herbarium of this species from Pennsylvania or Virginia. Certain species of Eriocaulon have also been reported from Pennsylvania, perhaps on the basis of unlabeled specimens in the Schweinitz herbarium.

Common names for Syngonanthus flavidulus are "bantum buttons", "bog-buttons", "dupatya", "shoe buttons", "shoe-buttons", and "yellow pipewort".

The specific initial letter is sometimes uppercased for no valid reason. The Eriocaulon caespitosum of Cabanis, listed in the synonymy, is based on a specimen in the Berlin herbarium from Ebenezer, Mississippi, inscribed "Eriocaulon caespitosum mihi, Restiaceae". The E. caespitosum of Poeppig, however, is a synonym of Paepalanthus bifidus (Schrad.) Kunth, while E. caespitosum Wikstr. is now known as Syngonanthus caespitosus (Wikstr.) Ruhl. Rafinesque (1840) described his Eriocaulon flavidulum var. cinerum from "Florida, Alabama, leaves broadly subulate 2 inches, scape 3 to 4, fls. dark gray, bracts greenish". Kunth (1841) drew up his description of S. flavidulus from a specimen in the Berlin herbarium labeled as from Palisot de Beauvois and originally from North America. He says "Descr. juxta specimen a Belvisio sub nomine Eriocauli setacei acceptum". He also asserts that his Paepalanthus nardifolius (now known as Syngonanthus fischerianus) of Brazil is "P. flavidulo proxima affinis, differt foliis angustioribus et rigidioribus, vaginis longioribus, sepalis masculis exterioribus angustato-acutatis, glabris".

Morong (1891) speaks of Körnicke's critical examination of the plants originally called Eriocaulon flavidulum by early writers on the American flora: "Körnicke (Linnaea, 27, 590) under the name Eriocaulon flavidulum, Mx., following Pursh (El. 1, 92) and Elli-

ott (Bot. ii, 566), states that two plants have been sent from North America under this name and that he regards Kunth's P. flavidulus as something distinct from the plant of Michaux. That which he describes is undoubtedly something distinct and is clearly an Eriocaulon, but, so far as I can judge, it corresponds very nearly, if not quite, to E. articulatum [now known as E. pellucidum]. The plant of Elliott is also, I think, that species. Michaux distinctly calls his species puberulent and the scapes aggregated and five striate, while his other characters correspond very well with our plant. There is not, so far as ascertained, any other in the habitat given by him, 'Carolina', that bears such characters."

The Müller (1860) work listed in the bibliography of S. flavidulus is sometimes cited as "1858", but actually was not published until 1860 — pages 1—160 were issued in 1858, pages 161—640 in 1859, and pages 641—966 in 1860. The Holm (1901) work is sometimes erroneously cited as "1904". The right-hand color illustration given by Rickett (1968) is most misleading because the flower-heads seem to be bluish-tinted when actually they are yellowish straw-color.

Grimm (1968) describes S. flavidulus: "Its straw-colored flower heads are on naked stalks to 12 inches tall and arise from a cluster of short, awl-like leaves which are woolly at the base. It grows in wet pinelands and bogs of the coastal plain from N. C. south to Fla. and Ala., blooming May to October". Kral (1966) tells us that "Characteristics which distinguish this species from other Eriocaulaceous plants of the United States and Canada are as follows: 1. Roots unbranched, spongy-thickened, non-septate....this in contrast to roots branched and slender-fibrous in Lachnocaulon and roots thickened-septate in Eriocaulon. 2. Leaves of the rosette very copious, very narrowly linear, and definitely recurved to flatten against the substratum....this in contrast to ascending-spreading leaf habit of sympatric Eriocaulaceae. 3. Trichomes of the leaves tending to be pustular based, a characteristic not found on sympatric Eriocaulaceae; at least some of the trichomes of the upper scape clavate or glandular-tipped. 4. Both sets of perianth parts present, the flowers seemingly actinomorphic....this in contrast to Lachnocaulon, in which only one set of parts is present or Eriocaulon, in which zygomorphy is apparent."

Material of Syngonanthus flavidulus has been misidentified and distributed in some herbaria as Eriocaulon sp., E. lineare Small, E. parkeri B. L. Robinson, E. septangulare With., E. setaceum L., Lachnocaulon sp., L. anceps (Walt.) Morong, L. glabrum Körn., and L. michauxii Kunth.

On the other hand, the A. Ruth s.n. [Jesup, June 1893], distributed as S. flavidulus, is actually Eriocaulon compressum Lam., while the Bernhardi s.n. [Philadelphia] is E. parkeri B. L. Robinson [as is also the "E. flavidulum Michx." recognized by Ruhland in his monograph (1903) as distinct from Syngonanthus flavidulus

Distribution of *Synonymanthus flavidulus*  
(mapping by Andrew R. Moldenke)



ATTEND TO COLUMN A  
of "CARTOGRAPHY" page 100

**CLEARTYPE**  
TRADE MARK REG. U.S. PAT. OFF.  
**COUNTY OUTLINE**  
**UNITED STATES**

Scale of Miles  
0 100 200 300

MAP NO. 125

OPERATED BY  
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(Michx.) Ruhl.], G. L. Fisher s.n. [Mobile, May 12, 1928], Herb. Umbach 10992, Lighthipe 173, and Perdue 1765 are Lachnocaulon anceps (Walt.) Morong, and J. Kohlmeyer 2034 is L. mirum (Chapm.) Small. R. M. Harper 1608 is a mixture of S. flavidulus and Eriocaulon lineare Small, Schallert 16912 is a mixture with Lachnocaulon anceps, Meebold 28099 is a mixture with Lachnocaulon glabrum, and Dress & Read 7495 is a mixture with Xyris sp.

Additional citations: NORTH CAROLINA: Brunswick Co.: Massey & Massey 3284 (Mi, N). Sampson Co.: Ahles & Laing 24651 (Hi—97139). County undetermined: W. Bennett 417/73 [Jampon Beach] (Hm). SOUTH CAROLINA: Berkeley Co.: Ravenel s.n. [Santee Canal, Auh.] (Ms—15488). GEORGIA: Berrien Co.: R. Kral 24254 (N). Brantley Co.: Kuns 99 (Ws). Brooks Co.: R. Kral 28693 (W—2673941). Clinch Co.: R. Kral 24288 (N); A. R. Moldenke 332 (Fg). Early Co.: R. F. Thorne 4963 (Ca—906387, N). Effingham Co.: R. Kral 24103 (N). Irwin Co.: R. Kral 27121 (W—2673951). Jeff Davis Co.: A. R. Moldenke 350 (Z). Lanier Co.: R. Kral 24265 (N). Liberty Co.: R. Kral 24217 (N). Lowndes Co.: R. M. Harper 1608, in part (W—431916); A. R. Moldenke 314 (Fg, S). Miller Co.: R. F. Thorne 4194 (Vi). Pierce Co.: R. Kral 24449 (N). Screven Co.: R. Kral 24028 (N), 24051 (N). Tattnall Co.: Ahles & Mueller 54172 (Hi—202837). Ware Co.: R. Kral 25307 (N); Kuns 4 (Ws, Ws); A. R. Moldenke 340 (Fg). Wayne Co.: R. Kral 24184 (N), 24198 (N); A. E. Radford 7968 (Hi—129168), 7971 (Hi—57247). FLORIDA: Baker Co.: West & Arnold s.n. [Sapp, 25 Apr. 1940] (Ca—841820). Bay Co.: Moldenke & Moldenke 26700 (Ac). Clay Co.: W. M. Canby s.n. [Hibernia, March 1869] (Ca—405217, Dt). Collier Co.: Atwater M.210 (Hi—182373); Gillis 10425 (Ld); Meebold 28105 (Mu); H. E. Moore Jr. 7116 (Ba); Tomlinson 31-3-63 B (Ft—276, Ft, Ft). Duval Co.: Clausen & Trapido 3290 (Ca—841822); Curtiss 3020 (Ms—15491, Mu, S), 4140 (Ca—58580), 4786 (Ca—115159, Mm—7948), s.n. [May 1875] (Ms—15489, N); Faxon s.n. [Jacksonville, Mch. 1873] (Ws); Moldenke & Moldenke 26434 (Ld). Franklin Co.: Hunnell 13208 (Ws); Moldenke & Moldenke 26627 (Ac), 26646 (Ld, Ws); A. Wood s.n. [Apalachicola] (Ws). Gilchrist Co.: D'Arcy 1508 (Sd—86713); A. E. Radford 8324 (Hi—129146). Gulf Co.: Godfrey & Triplett 59789 (Hi—156875). Highlands Co.: McFarlin 4340 (Mi); Small & DeWinkeler 9966 (S). Hillsborough Co.: Dress & Hansen 991 (Ba); Pollard s.n. [Tampa, March 7, 1898] (W—328233). Lake Co.: Moldenke & Moldenke 26492 (Ba); G. V. Nash 143 (Ca—115160, Mm—7947). Lee Co.: Craighead s.n. [28 April 1967] (Ft—13147); H. N. Moldenke 688 (S); Seibert 1371 (Ca—26154). Leon Co.: Godfrey 62901 (Bl—199118, Go, N). Levy Co.: Cooley, Wood, & Wilson 5984 (Hi—193977, N). Liberty Co.: A. R. Moldenke 282 (Fg), 284 (Fg). Manatee Co.: Friell s.n. [April 9, 1969] (Lc);

R. W. Hill s.n. [4/9/1969] (Lc); S. M. Tracy 6643 (Ca--181779, Mi, S). Marion Co.: Dress & Hansen 2013 (Ba). Nassau Co.: A. Ruth s.n. [March 1893] (Se--96013). Okaloosa Co.: Godfrey 56719 (Ca--112565, N). Orange Co.: F. S. Blanton 6491 (Mi, N); Moldenke & Moldenke 26548 (Ac); P. C. Schallert 6116 (Go); Wentz 624 (Mi). Osceola Co.: A. A. Eaton 1060 (Ld); Myint 964 (N); P. O. Schallert 16312 (S), 16912, in part (Ut--89890b). Palm Beach Co.: W. B. Fox s.n. [Delray Beach, April 2, 1945] (Ws). Pinellas Co.: M. S. Bebb s.n. [Clearwater, 1894] (Ok); Genelle & Fleming 143 (N). Polk Co.: Goodale s.n. [Conine, 9 April 1933] (Ms--69826); Meebold 28099, in part (Mu); Milligan s.n. [May 1890] (W--503998); P. O. Schallert 6116, in part (Ok), s.n. [May 2, 1941] (Ca--841821); Topping 2609 (Mi). Putnam Co.: Moldenke & Moldenke 29829 (Ac, Ld). Saint Johns Co.: Hunnewell 8656 (Ws); Owen s.n. [St. Augustine, May 1878] (Ca--67949); M. C. Reynolds s.n. [Mar.--July 1875] (Ca--2426). Santa Rosa Co.: A. R. Moldenke 267 (Fg). Sarasota Co.: R. Kral 2121 (Ms--44937). Seminole Co.: Cooley, Eaton, & Ray 7407 (Hi--204702); Foster, Smith, & Smith s.n. [Pl. Exsicc. Gray. 1334] (B, Ba, Bl--72361, Ca--717066, Gg--333524, Hi, N, Ok, S, St, Ut--889b, Vi, Ws); P. O. Schallert 6116, in part (Je--8761, Mu, Ws). Volusia Co.: H. C. Beardslee s.n. [New Smyrna, March 1925] (Ca--841824). Wakulla Co.: Godfrey 53293 (Hi--157562, N); N. C. Henderson 64-244 (Bl--208900); Moldenke & Moldenke 29392 (Ac, Gz, Kh, Ld, Tu). Walton Co.: A. R. Moldenke 269 (Fg). County undetermined: A. W. Chapman s.n. (Ws); Herb. Amherst Coll. s.n. [East Florida] (Ms--15490); Herb. Chapman s.n. [Fla.] (Ok). Marco Isl.: Silverstone 24 (Ws). Pine Isl.: Lakela, Long, & Broome 30560 (N); H. N. Moldenke 940 (S). ALABAMA: Baldwin Co.: Dress & Read 7495, in part (Ba, Ld, Mu); Iltis & Univ. Wisc. Pl. Geogr. Field Trip 25234 (Ws); S. B. Jones s.n. [8 May 1960] (Hi--210889); C. Mohr s.n. [July 1881] (Hi), s.n. [July 1882] (Hi); W. Wolf s.n. [Elberta, Aug. 21, 1925] (Ca--841823). Mobile Co.: F. W. Pennell 4509 [Herb. Dreisbach 1940] (Mi). MISSISSIPPI: Holmes Co.: Cabanis s.n. [Ebenezer] (B). NORTH AMERICA: Locality undetermined: Palisot de Beauvois s.n. (B). LOCALITY OF COLLECTION UNDETERMINED: Curtiss s.n. [Southern States, 1875] (Ws); Sprengel s.n. (B). MOUNTED ILLUSTRATIONS: floral diagrams by Körnicke & Kunth (B).

SYNGONANTHUS FLAVIPES Moldenke, Mem. N. Y. Bot. Gard. 8: 100--101. 1953.

Bibliography: Moldenke, Mem. N. Y. Bot. Gard. 8: 100--101. 1953; Moldenke, Phytologia 4: 316. 1963; Moldenke, Résumé 73 & 491. 1959; G. Taylor, Ind. Kew. Suppl. 12: 138. 1959; Moldenke, Fifth Summ. 1: 127 (1971) and 2: 952. 1971.

The type of this species was collected by B. Maguire, R. S. Cowan, & J. J. Wurdack (no. 30465) in wet places on Savanna No.

III, at 125 meters altitude, Cerro Yapacana on the Río Orinoco, Amazonas, Venezuela, on December 31, 1950, and is deposited in the Britton Herbarium at the New York Botanical Garden. Other collectors report it "locally frequent" or "locally abundant" at altitudes of 100--125 meters, referring to its "shining leaves", and found it in flower in December and in fruit in June.

Additional citations: VENEZUELA: Amazonas: Wurdack & Adderley 42860 (N, S). Bolívar: Wurdack & Monachino 39934 (N, S).

SYNGONANTHUS FLEXUOSUS Alv. Silv., Fl. Mont. 1: 393--395, pl. 252. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 393--395 & 417, pl. 202. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 478. 1937; Fedde in Just, Bot. Jahresber. 57 (2): 895. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 271. 1938; Worsdell, Ind. Lond. Suppl. 2: 426. 1941; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 91 & 213. 1949; Moldenke, Résumé 107 & 491. 1959; Moldenke, Fifth Summ. 1: 173 (1971) and 2: 962. 1971; Moldenke, Phytologia 35: 350. 1977.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 202. 1928.

The type of this species was collected by Dr. Joaquim Gomes Michaeli [Herb. A. Silveira 655] "In campis prope Barauna", Minas Gerais, Brazil, in April, 1918, and is deposited in the Silveira Herbarium. On page 417 of his work (1928) Silveira gives "Baraunas" as the type locality. Elsewhere he comments that the "Species S. squarrosus Ruhl. proxima, sed foliis pubescentibus facile distinguitur". It also closely resembles S. glaber Alv. Silv. in general habitat aspect.

Silveira, in his text, refers to "Tabula CCLIII" as illustrating S. flexuosus, but the actual illustration is labeled "TABULA CCLII". Thus far the species is known only from the original collection.

SYNGONANTHUS FUSCESCENS Ruhl. in Engl., Pflanzenreich 13 (4-30): 249. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 244, 249, & 293. 1903; Prain, Ind. Kew. Suppl. 3: 175. 1908; Alv. Silv., Fl. Mont. 1: 417. 1928; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 91 & 213. 1949; Moldenke, Phytologia 4: 316. 1963; Moldenke, Résumé 107 & 491. 1959; Moldenke, Fifth Summ. 1: 173 (1971) and 2: 962. 1971.

This species is based on Sena s.n. [Herb. Schwacke 14569] from the Serra do Cipó, Minas Gerais, Brazil, deposited in the Berlin herbarium where it was photographed by Macbride as his type photograph number 10685. Hatschbach encountered the species on rocky campos and in "solo arenoso do campo, junta a afloramentos rochosos", at 1200 meters altitude, flowering in August and September and fruiting in September. Silveira (1928) cites A. Silveira 517 from the Serra do Riacho do Vento, collected in 1908.

Additional citations: BRAZIL: Minas Gerais: Hatschbach 27428 (Z),

30214 (Ld); Sena s.n. [Herb. Schwacke 14569; Macbride photos 10685] (B—type, N—photo of type, W—photo of type, Z—isotype).

SYNGONANTHUS GARIMPENSIS Alv. Silv., Fl. Mont. 1: 317—319, pl. 201 & 202. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 317—319 & 417, pl. 201 & 202. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 478. 1937; Fedde in Just, Bot. Jahresber. 57 (2): 895. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 271. 1938; Worsdell, Ind. Lond. Suppl. 2: 426. 1941; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 91 & 213. 1949; Moldenke, Résumé 107 & 491. 1959; Moldenke, Fifth Summ. 1: 173 (1971) and 2: 962. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 201 & 202. 1928.

This species is based on A. Silveira 543 from "In campis arenosis in Serra do Garimpo, inter Caeté et Santa Barbara", Minas Gerais, Brazil, collected in April, 1909, and deposited in the Silveira Herbarium. Silveira (1928) notes that the species "Ab affinibus indumento foliorum facile distinguitur". Thus far it is known only from the original collection.

SYNGONANTHUS GLABER Alv. Silv., Fl. Mont. 1: 388—390, pl. 248. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 388—390 & 417, pl. 248. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 478. 1937; Fedde in Just, Bot. Jahresber. 57 (2): 895. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 271. 1938; Worsdell, Ind. Lond. Suppl. 2: 426. 1941; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 91 & 213. 1949; Moldenke, Résumé 107 & 491. 1959; Moldenke, Fifth Summ. 1: 173 (1971) and 2: 962. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 248. 1928.

This species is based on A. Silveira 788 from "In campis prope Milho Verde, inter Serro et Diamantina, in Serra Geral", Minas Gerais, Brazil, collected in 1925, and deposited in the Silveira Herbarium. Silveira (1928) comments that the "Species ob magnitudinem foliorum pedunculorumque a S. squarroso Ruhl. proximo praecipue differt". It should be noted that in his text he refers to "Tabula CCXLIX" as illustrative of this species, but the actual plate is labeled "TABULA CCXLVIII". The species also resembles S. flexuosus Alv. Silv. in general habit. Thus far it is known only from the original collection.

SYNGONANTHUS GLANDULIFER Alv. Silv., Fl. Mont. 1: 321—322, pl. 204. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 321—322, pl. 204. 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 478. 1937; Fedde in Just, Bot. Jahresber. 57 (2): 895. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 271. 1938; Worsdell, Ind. Lond. Suppl. 2: 426. 1941; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Alph. List Cit. 2: 412 (1948) and 3: 935. 1949; Moldenke, Known

Geogr. Distrib. Verbenac., [ed. 2], 91 & 213. 1949; Moldenke, Phytologia 4: 316. 1953; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 236--237. 1956; Moldenke, Résumé 107 & 491. 1959; Renón, Levant. Herb. Inst. Agron. Minas 71. 1960; Moldenke, Fifth Summ. 1: 173 (1971) and 2: 962. 1971.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 204. 1928.

This species is based on A. Silveira 549 from "In campis in Serra do Cipó, locis arenosis....Apr. 1909, in campis prope Itambé do Serro....Apr. 1918", Minas Gerais, Brazil, deposited in the Silveira Herbarium. Mendes Magalhães (1956) also reports it collected in anthesis in March. Silveira (1928) comments that the species "Ab affinibus (S. anthemidifloro et aliis) praecipue differt forma indumentoque bractearum involucrentium, foliorum, pedunculorum vaginarumque pilositate et sepalorum petalorumque colore". Thus far it is known only from these three collections.

SYNGONANTHUS GLANDULOSUS Gleason, Bull. Torrey Bot. Club 56: 394--395. 1929.

Synonymy: Syngonanthus oblongus f. abbreviata Herzog ex Lützelb., Estud. Bot. Nordést. 149 & 151. 1923. Syngonanthus oblongus f. abbreviatus Herzog ex Moldenke, Phytologia 4: 328. 1953.

Bibliography: Lützelb., Estud. Bot. Nordést. 3: 149 & 151. 1923; Gleason, Bull. Torrey Bot. Club 56: 394--395. 1929; A. W. Hill, Ind. Kew. Suppl. 8: 231. 1933; Fedde & Schust. in Just, Bot. Jahresber. 57 (2): 16. 1937; Moldenke, Known Geogr. Distrib. Erioc. 6 & 58. 1946; Moldenke, Phytologia 2: 352. 1947; Moldenke, Alph. List Cit. 3: 975. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 65, 67, & 213. 1949; Moldenke, Phytologia 4: 316 & 328. 1953; Hocking, Dict. Terms Pharmacog. 284. 1955; Moldenke, Résumé 73, 76, 77, 107, 108, & 492. 1959; Moldenke, Résumé Suppl. 1: 6 (1959) and 12: 3. 1965; Lindeman & Gürts-van Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 335 & 339. 1968; Van Donselaar, Meded. Bot. Mus. Rijksuniv. Utrecht 306: 397 & 402. 1968; Moldenke, Résumé Suppl. 18: 4. 1969; Teunissen & Wildschut, Verh. Konink. Nederl. Akad. Wet. Natuurk. 59 (2): 23. 1970; Koyama & Oldenburger, Rhodora 73: 159. 1971; Moldenke, Fifth Summ. 1: 120, 127, 131, 133, & 173 (1971) and 2: 962 & 968. 1971; Teunissen & Wildschut, Meded. Bot. Mus. Utr. 341: 23. 1971; Anon., Biol. Abstr. 56 (10): B.A.S.I.C. S.265. 1973; Moldenke, Biol. Abstr. 56: 5366. 1973; Moldenke, Phytologia 26: 177. 1973; Hocking, Excerpt. Bot. A. 23: 293. 1974; Moldenke, Phytologia 28: 437 & 440 (1974), 30: 35 & 106 (1975), 31: 386 & 408 (1975), 34: 259 (1976), and 35: 112, 291, 306--308, 354, & 359. 1977.

This puzzling species is based on G. H. H. Tate 345, collected in Philipp Swamp in the Roraima district of Guyana, at 5100--5200 feet altitude, on November 11, 1927, and deposited in the Britton Herbarium at the New York Botanical Garden. Gleason (1929) comments that "The plant consists of a number of short erect stems which are densely leafy and send out numerous peduncles from the upper axils. In general habit it resembles S. simplex, gracilis, and biformis, and differs from the first in its appendaged style,

from the second in its narrow acute bracts, from the last in its symmetrical sepals, and from all three in the rounded sinuses of its peduncular sheaths." To me, it much more closely resembles very young forms of S. caulescens (Poir.) Ruhl. Lindeman &

Görts-van Rijn key out these perplexingly similar taxa as follows:

1. Peduncles glandular-pubescent, 7—11 cm. long; leaves 1.5 mm. wide, about 1 cm. long; peduncular sheaths with rounded sinus...  
S. glandulosus Gleason.

1a. Peduncles pubescent to glabrous, their sheaths obliquely split; leaves 1—5 cm. long.

2. Stems floating, up to 3 dm. long; leaves fenestrate, 3—4.5 cm. long, 2 mm. wide; peduncles 2—4 together at the end of the stem, 3—6 cm. long; petals of the female florets slightly longer than the sepals; style without appendages.....

S. macrocaulon Ruhl.

- 2a. Stems to 8 dm. long, simple; leaves 1.5—4.5 cm. long, 1.5—4.5 mm. wide; peduncles 5—30 cm. long, in a terminal fascicle; petals of the female florets shorter than the sepals; style appendaged.....

S. caulescens (Poir.) Ruhl.  
Gleason, in his unpublished Flora of British Guiana, keys the related taxa as follows:

1. Petals of the pistillate florets shorter than the sepals.
  2. Lateral sepals of the staminate florets strongly falcate and inequilateral.
    3. Pistillate and staminate florets, including the pedicels, about equal in length.....S. simplex (Miq.) Ruhl.
  - 3a. Pistillate florets about twice as long as the staminate.  
S. biformis (N. E. Br.) Gleason
- 2a. Lateral sepals of the staminate florets not falcate, equilateral.
  4. Bracts obovate, broadly rounded at the summit.....  
S. gracilis (Bong.) Ruhl.
  - 4a. Bracts oblong, acute to obtuse at the apex.
    5. Leaves rosulate; peduncles not glandular; sinus of the sheaths, opposite the lamina, acute..S. eriophyllus (Mart.) Ruhl. [now regarded as S. gracilis (Bong.) Ruhl.]
    - 5a. Leaves crowded on a very short stem; peduncles glandular; sinus of the sheaths broadly rounded.....  
S. glandulosus Gleason

He describes S. glandulosus as having "Leaves densely cespitose, spreading or recurved, 1 cm. long, conspicuously pubescent; peduncles 7—11 cm. long, numerous, 3-costate, glandular-pubescent; sheaths twisted, about 1 cm. long, the lamina acuminate above a rounded sinus; heads about 5 mm. wide, white; bracts imbricate, scarious, lanceolate to elliptic, sharply acute, the longest 3 mm. long." He regarded it as endemic to the Mt. Roraima region.

Recent collectors refer to the flower-heads as "light-gray", "pale-gray", or "dull-white" and the flowers as white. They have encountered it in cerrado and Sphagnum bogs at altitudes of 115—2085 meters, flowering from July to April, fruiting in February,

April, and July to September. Wurdack and his associates found it "locally abundant on moist riverbanks". Goodland found it "in wet sandy open savanna grasslands with scattered trees, Curatella, Byrsonima, Trachypogon, and Fimbristylis dominant". Koyama & Oldenburger (1971) report it growing in association with Philodice hoffmannseggii, Diplacrum africanum, Syngonanthus gracilis var. koernickeanus, Bacopa monierioides, Centunculus pentander, Polygala paludosa, Utricularia adpressa, and Eleocharis nana. Donselaar encountered it "in wet valley floor with hummocks and channels ('hog-wallow structure')".

Syngonanthus oblongus f. abbreviatus of Herzog is based on Lützelburg 338 from Bahia, Brazil, in the Munich herbarium and seems to be conspecific with Gleason's plant.

Hocking (1955) reports the vernacular name, "guanak", and says that the entire plant is used in decoction form in the treatment of dentalgia in Venezuela. Lindeman & Gërts-van Rijn (1968) cite from Surinam: B.W. 7133, Rombouts 556, and Wessels Boer 800.

Material of what appears to be S. glandulosus has been misidentified and distributed in some herbaria as S. caulescens (Poir.) Ruhl., S. gracilis (Bong.) Ruhl., S. simplex var. appendiculifera Ruhl., S. xeranthemoides (Bong.) Ruhl., and Paepalanthus subtilis Miq. On the other hand, the Irwin, Grear, Souza, & Reis dos Santos 14410 and G. H. H. Tate 246, distributed as S. glandulosus actually seem to be immature S. caulescens (Poir.) Ruhl., Lützelburg 21036 is S. gracilis var. amazonicus Ruhl., and Cowan & Soderstrom is S. huberi Ruhl. Goodland 254 is a mixture of S. glandulosus and Paepalanthus lamarckii Kunth, while W. A. Egler 47650 is a mixture with Paepalanthus oyapockensis Herzog and Cordeiro 30 is a mixture with S. humboldtii var. glandulosus Gleason.

Additional citations: COLOMBIA: Santander: Barkley & Bouthillette 38C168 (Ld). VENEZUELA: Aragua: Pittier 5841 (W--601553). Bolívar: Bogner 1086 (Mu); Wurdack & Monachino 41048 (Mu, N, S). GUYANA: Goodland 254, in part (W--2546169); Irwin 501 (W--2212839); G. H. H. Tate 345 (N--type). SURINAM: Donselaar 3605 (Ut--320379); Stahel 7133 [574] (Ut--44056A); Rombouts 214 (Ut--44055A); Wildschut & Teunissen 11572 (Ld). BRAZIL: Amapá: W. A. Egler 47650, in part (N). Amazônas: Lützelburg 21036, in part (Mu); France, Maas, Atchley, Steward, Woolcott, Coêlho, Monteiro, Pinheiro, & Ramos 13822 (Ac, N). Bahia: Lützelburg 338 [N. Y. Bot. Gard. Type Photo new ser. 8832] (Mu, N--photo, Z--photo). Mato Grosso: Cordeiro 31, in part (Ld). Roraima: Ule 7929 [Herb. Mus. Goeldi 13021] (K, Z).

SYNGONANTHUS GLANDULOSUS var. EPAPILLOSUS Moldenke, Phytologia 26: 177--178. 1973.

Bibliography: Anon., Biol. Abstr. 56 (10): B.A.S.I.C. S.265. 1973; Moldenke, Biol. Abstr. 56: 5366. 1973; Moldenke, Phytologia 26: 177--178. 1973; Hocking, Excerpt. Bot. A.23: 293. 1974; Molden-

ke, *Phytologia* 28: 437 & 440 (1974) and 35: 359. 1977.

Recent collectors refer to the flower-heads of this plant as "white", "off-white", "creamish-white", or "light-gray" and the flowers as white. They have found the plant growing in very wet ground, in cerrado, on wet campos, in marshes in gallery forests, among rocks at streamsides, in swamps, and in wet sand in sedge-ericaul savannas, at altitudes of 230—1100 meters, flowering and fruiting from November to June and in September. Ratter and his associates found it "in a stream, the leaves submerged, the flower-heads held above the surface of the water". Anderson found it at the "edge of brejo in an area of gallery forest, adjacent brejo, and nearby cerrado and campo limpo"; Cowan & Soderstrom refer to it as a "locally common herb in boggy patches atop rocks in constant mist of [water]falls", while Steyermark & Wurdack found it a "locally abundant depressed form near water level on rocky edge of river". The Eitens encountered it "at water level", "in soaking soil at brookside in light shade of narrow gallery scrub", and "in lower part of a natural grassy campo at valley head next to its border with swampy gallery forest, ground soaking, with grass clumps and puddles between clumps, soil black humusy-clay; the plant rooted in soaking soil, the base in air or covered with 1 cm. of water". Dombrowski reports it frequent in "banhado".

Anderson 9564 has very much the general appearance of a variety of *S. gracilis* (Bong.) Ruhl. Material of *S. glandulosus* var. *epapillosus* has been widely misidentified and distributed in herbaria as *S. caulescens* (Poir.) Ruhl. or as typical *S. glandulosus* Gleason. Philcox, Ferreira, & Bertoldo 3431 is a mixture with *S. nitens* (Bong.) Ruhl.; Cowan & Soderstrom 2154 is *S. huberi* Ruhl., while Ratter, Santos, Souza, & Ferreira R.1723 is a mixture of *S. huberi* and *S. huberi* f. *viviparus* Moldenke.

Citations: VENEZUELA: Bolívar: Hamann 2896 (Hm); Koyama & Agostini 7285 (N); Steyermark & Wurdack 45a (N—tyoe); Vareschi & Foldats 4743 (N). SURINAM: Rombouts 556 (N, Ut—44057A). BRAZIL: Amapá: Black 49-8256 (N). Goiás: W. R. Anderson 9564 (N); Hatschbach 36947 (Ld). Mato Grosso: Eiten & Eiten 8579 (W—2757729), 8626 (W—2757731), 9145 (W—2757737); Philcox & Ferreira 3412 (K), 3431, in part (K), 3505 (K). Minas Gerais: Mello Barreto 25682 (N). Paraná: Dombrowski 6764 (Z); Hatschbach 33470 (Ld). PARAGUAY: Pedersen 9399 (N), 10095 (N).

SYNGONANTHUS GLAUCUS Alv. Silv., Fl. Mont. 1: 373—374, pl. 237. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 373—374 & 418, pl. 237, 1928; Wangerin in Just, Bot. Jahresber. 57 (1): 478. 1937; Fedde in Just, Bot. Jahresber. 57 (2): 895. 1938; A. W. Hill, Ind. Kew. Suppl. 9: 271. 1938; Worsdell, Ind. Lond. Suppl. 2: 426. 1941; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 92 & 213. 1949; Moldenke, Résumé 107 & 492. 1959; Moldenke, Fifth Summ. 1: 173

(1971) and 2: 962. 1971; Moldenke, Phytologia 35: 431. 1977.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 237. 1928.

This species is based on A. Silveira 669 from "In campis prope Diamantina", Minas Gerais, Brazil, collected in April, 1918, and deposited in the Silveira herbarium. In his text Silveira (1928) refers to "Tabula CCXXXVIII" as illustrating this species, but the plate that actually does so is labeled "TABULA CCXXXVII". Thus far the species is known only from the original collection.

SYNGONANTHUS GOYAZENSIS (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 255. 1903.

Synonymy: Paepalanthus goyazensis Körn. in Mart., Fl. Bras. 3 (1): 453. 1863. Dupatya goyazensis (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya goyazensis Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902. Syngonanthus goyazensis Ruhl. apud Prain, Ind. Kew. Suppl. 3: 175. 1908. Syngonanthus goyazensis (Bong.) Ruhl. ex Moldenke, Résumé 361, in syn. 1959.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 453 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 215, 245, 255, 290, & 293. 1903; Prain, Ind. Kew. Suppl. 3: 175. 1908; Alv. Silv., Fl. Mont. 1: 418. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 18, 30, 49, & 58. 1946; Moldenke, Phytologia 2: 498. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 92 & 213. 1949; Moldenke, Phytologia 4: 316. 1953; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 145. 1959; Moldenke, Résumé 107, 280, 325, 351, 419, & 492. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 402. 1960; Rennó, Levant. Herb. Inst. Agron. Minas 71. 1960; Moldenke, Fifth Summ. 1: 173 & 481 (1971) and 2: 583, 636, 778, & 962. 1971.

The type of this species was collected by George Gardner (no. 4384) in Goiás, Brazil, deposited in the Berlin herbarium where Macbride photographed it as his type photograph number 10696. Ruhland (1903) cites only the type collection and Glaziou 22310, both from Goiás. He suggests that S. sclerophyllus Alv. Silv. may actually only be a variety of S. goyazensis. Silveira (1928) cites A. Silveira 740, also from Goiás.

Hunt & Ramos refer to S. goyazensis as having white inflorescences and found it growing in waterlogged ground by a small stream in campo cerrado, at 600--1000 meters altitude, in flower and fruit in June. Glaziou collected it in anthesis in October.

Additional citations: BRAZIL: Goiás: G. Gardner 4384 [Macbride photos 10696] (B--type, N--isotype, N--photo of type, W--photo of type); Glaziou 22310 (B, W--1124171); Hunt & Ramos 6275 (N). Minas Gerais: Heringer 7057 (Z); Santos & Castellanos 24182 (Bd--28328). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

SYNGONANTHUS GRACILIS (Bong.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 249. 1903; Uttien & Heyn in Pulle, Fl. Surin. 1: 220. 1938 [not S. gracilis Molfino, 1945].

Synonymy: Eriocaulon gracile Bong., Mém. Acad. Imp. Sci. St. Pétersb., ser. 6, 1: 634, pl. 46. 1831 [not E. gracile Heyne, 1946, nor Mart., 1832, nor Mart. & Wall., 1852]. Eriocaulon glabrum Steud., Syn. Pl. Glum. 2: [Cyp.] 281. 1855 [not E. glabrum Pennell, 1959, nor Salzm., 1959]. Paepalanthus eriophyllus Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 463. 1863. Paepalanthus glanduliferus Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 464 & 560, in syn. 1863. Paepalanthus gracilis (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 460, pl. 59, fig. 1. 1863; Malme, Svensk. Vet. Akad. Handl. 27 (3): no. 11: 31. 1901. Paepalanthus gracilis Körn. in Mart., Fl. Bras. 3 (1): 460. 1863. Paepalanthus gracilis var.  $\alpha$  subvar.  $\phi$  Körn. in Mart., Fl. Bras. 3 (1): 460, 461, & 463. 1863. Paepalanthus gracilis var.  $c$  Körn. in Mart., Fl. Bras. 3 (1): 460, in part. 1863. Paepalanthus eriophyllus var.  $\alpha$  Körn. in Mart., Fl. Bras. 3 (1): 463-464. 1863. Paepalanthus eriophyllus var.  $\phi$  Körn. in Mart., Fl. Bras. 3 (1): 464. 1863. Dupatya eriophylla (Mart.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya gracilis ([Bong.] Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya eriophylla Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902. Dupatya gracilis Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 145. 1902. Paepalanthus glandulifer Mart. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 249, in syn. 1903. Paepalanthus pohlianus Mart. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 250, in syn. 1903. Syngonanthus eriophyllus var. calvescens Ruhl. in Engl., Pflanzenreich 13 (4-30): 249. 1903. Syngonanthus gracilis var. olivacea Ruhl. in Engl., Pflanzenreich 13 (4-30): 250. 1903. Syngonanthus eriophyllus (Mart.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 249. 1903. Syngonanthus eriophyllus Ruhl. apud Prain, Ind. Kew. Suppl. 3: 175. 1908. Syngonanthus gracilis Ruhl. apud Prain, Ind. Kew. Suppl. 3: 175. 1908. Syngonanthus gracilis var. a (Kunth) Ruhl. ex Alv. Silv., Fl. Mont. 1: 418. 1928. Syngonanthus gracilis var. microphylla Alv. Silv., Fl. Mont. 1: 418, nom. nud. 1928. Syngonanthus gracilis var. olivaceus Ruhl. ex Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946. Syngonanthus gracilis (Körn.) Ruhl. ex Reitz, Sellowia 7: 125, sphalm. 1956. Paepalanthus hirtellus Körn. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus hirtellus var.  $\alpha$  Körn. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus olivaceus Körn. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Syngonanthus gracilis (Körn.) Ruhl. ex Reitz, Sellowia 11: 31, sphalm. 1959. Syngonanthus gracilis Körn. ex Moldenke, Résumé Suppl. 1: 23, in syn. 1959. Dupatya gracilis (Körn.) Kuntze ex Moldenke, Fifth Summ. 1: 481, in syn. 1971. Syngonanthus gracilis

(Bong.) Ruhl ex J. A. Steyerm., Biotropica 6: 7 & 10, sphalm.  
 1974. Paepalanthus eriophyllus "Mart. ex Körn." apud Moldenke &  
 Sm. in Reitz, Fl. Ilust. Catar. I Erio: 101, in syn. 1976. Paepalanthus hirtellus "Körn. ex Moldenke" apud Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 101, in syn. 1976. Paepalanthus hirtellus var.  $\alpha$  "Körn. ex Moldenke" apud Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 101, in syn. 1976. Paepalanthus olivaceus "ex Moldenke" apud Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 102, in syn. 1976. Paepalanthus pohlianus "Mart. ex Ruhl." apud Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 102, in syn. 1976. Syngonanthus eriophyllus "(Mart. ex Körn.) Ruhl." apud Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 103, in syn. 1976. Syngonanthus gracilis var. a "Ruhl. ex Moldenke" apud Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 103, in syn. 1976. Syngonanthus gracilis var. microphylla Alv. Silv. ex Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 103, in syn. 1976.

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and 4: 985, 1072, 1076, & 1301. 1949; Moldenke, *Known Geogr. Distrib. Verbenac.*, [ed. 2], 61, 65, 67, 68, 92, 95, 97, 100, & 213. 1949; Moldenke, *Phytologia* 4: 316—320. 1953; Moldenke in Maguire & al., *Mem. N. Y. Bot. Gard.* 8: 101. 1953; Herter, *Revist. Sudam. Bot.* 9: 188. 1954; Mendes Magalhães, *Anais V Reun. Anual Soc. Bot. Bras.* 266—267. 1956; Reitz, *Sellowia* 7: 125. 1956; Moldenke in J. A. Steyerm., *Fieldiana Bot.* 28: 825 & 826. 1957; Cuatrecasas, *Revist. Acad. Colomb. Cienc.* 10: 254. 1958; R. C. Foster, *Contrib. Gray Herb.* 184: 39. 1958; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 3, 145. 1959; Reitz, *Sellowia* 11: 31 & 131. 1959; Moldenke, *Résumé* 69, 73, 76, 77, 107, 112, 115, 119, 280, 286, 288, 289, 310, 323—325, 327, 351, 352, & 492. 1959; Moldenke, *Résumé Suppl.* 1: 5, 6, & 20—23. 1959; Van Royen, *Nov. Guin.*, ser. 2, 10: 39 & 44. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 1: 878 (1960) and imp. 3, 2: 401 & 402. 1960; Rennó, *Levant. Herb. Inst. Agron. Minas* 71. 1960; Moldenke, *Résumé Suppl.* 2: 5 (1960), 3: 12 & 14 (1962), 4: 4 (1962), 10: 6 & 7 (1964), and 12: 3, 4, & 12. 1965; Angely, *Fl. Anal. Paran.*, ed. 1, 201. 1965; Van Donselaar, *Wentia* 14: 40. 1965; Huinink, *Wentia* 17: 140—141. 1966; J. A. Steyerm., *Act. Bot. Venez.* 1: 60, 122, 135, 148, 155, & 247. 1966; Moldenke, *Résumé Suppl.* 15: 5 (1967) and 16: 6. 1968; Aristeguieta, *Act. Bot. Venez.* 3: 25. 1968; Lindeman & Görts-van Rijn in Pulle & Lanjouw, *Fl. Surin.* 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 336 & 337. 1968; Van Donselaar, *Meded. Bot. Mus. Rijksuniv. Utrecht* 306: 402. 1968; Moldenke, *Phytologia* 18: 100, 102, 260, 261, & 388 (1969), 19: 8 (1969), 19: 339 (1970), and 20: 101. 1970; Angely, *Fl. Anal. & Fitogeogr. Est. S. Paulo*, ed. 1, 6: 1162 & Ind. 28. 1970; Reitz, *Sellowia* 22: 137. 1970; Teunissen & Wildschut, *Verh. Konink. Nederl. Akad. Wet. Natuurk.* 59 (2): 23, 36, & table 1. 1970; Koyama & Oldenburger, *Rhodora* 73: 159. 1971; Moldenke, *Fifth Summ.* 1: 120, 127, 131, 133, 134, 174, 180, 184, 189, 480, & 481 (1971) and 2: 495, 501, 502, 549, 578, 582—584, 587, 588, 591, 636—638, 962, 963, 968, & 973. 1971; Moldenke, *Phytologia* 21: 418 (1971) and 22: 6. 1971; Teunissen & Wildschut, *Meded. Bot. Mus. Utr.* 341: 23, 36, & table 1. 1971; Hocking, *Biol. Abstr. A.21:* 30. 1972; Moldenke, *Biol. Abstr.* 53: 5252 (1972) and 54: 6295. 1972; Moldenke, *Phytologia* 25: 230 (1973), 26: 27 & 45 (1973), 28: 440 (1974), and 29: 211, 311, 319, & 323. 1974; Rodriguez M., *Mem. II Congres. Venez. Bot.* 95. 1974; J. A. Steyerm., *Biotropica* 6: 7 & 10. 1974; Cárdenas de Guevara, *Act. Bot. Venez.* 10: 39. 1975; J. A. Steyerm., *Act. Bot. Venez.* 10: 232. 1975; Moldenke, *Phytologia* 30: 37, 52, & 318 (1975), 31: 383, 386, & 408 (1975), 34: 259, 260, 273, 275—277, 392, & 487 (1976), and 35: 18 & 28. 1976; Moldenke & Sm. in Reitz, *Fl. Ilust. Catar. I Erio:* 62, 63, 77—80, & 98—103, pl. 8, fig. 27—31. 1976; Moldenke, *Phytologia* 35: 112, 125, 291, 306, 308, 338, 340, 341, 427, 440, & 442. 1977.

Illustrations: Körn. in Mart., *Fl. Bras.* 3 (1): pl. 59, fig. 1. 1863; Moldenke & Sm. in Reitz, *Fl. Ilust. Catar. I Erio:* 63, pl. 8, fig. 27—31. 1976.

This is a very widespread and extremely variable species. No

less than 16 rather poorly defined subspecific taxa have been proposed. The typical form apparently is found from Colombia and Venezuela, through the Guianas, to Brazil and Uruguay. Bongard's original (1831) description is "Acaule; foliis vaginas subaequantibus, confertis, linearibus, acutis, pilosiusculis; pedunculis caespitosis, filiformibus, pubescentibus; vaginis pilosiusculis. In umbrosis siccis montis Itacolumi." It is probably based on a Riedel collection in the Leningrad herbarium. Kunth (1841) adds: "A specie homonyma Martiana longe diversum".

Recent collectors describe the plant as growing 6 inches tall, with dark-green leaves, white or gray-white flower-heads, and white flowers. Tutin says: "bracts round the flowers paleaceous", while Huinink (1966) calls it a "hemixerophyte, scleromorphic, nanophyll", with a "hemispherical-shaped root-system" and inhabiting the Xyrido-Paspaletum ecologic association. Other collectors have encountered it on savannas, wet-sand savannas, white-sand savannas, savannas with a quartzite base, and dry sandy uplands, in swamps, sandy swamps, and "swamps on open level portions of plateaus", on large mesas, in moist depressions in llanos, along railroad tracks, in sand and white sand, and swampy ground by streamlets, in damp seepage patches on white-sand campinas, and in dry sandy or gravelly places in general, at altitudes of 30--2000 meters, flowering in April, May, and July to November, and fruiting in January, July to September, and November. In southern Brazil and Uruguay it is said to flower mostly in January and February.

McKee encountered S. gracilis "in dry sand in area of sandhills with low forest or scattered shrubs". Murça Pires & Cavalcante report it "common on savannas"; Goodland & Persaud "in grassland with scattered trees, Curatella, Brysonima, Trachypogon, and Fimbristylis dominant". The Maguires aver that it is "locally frequent in moist sand among rocks", "frequent in wet places along brooks", and "locally frequent annual in marshy places along streamsides". Malme (1901) reports it from "supra saxa tempore hiemali irrigata" and "in loco aperto, arenoso, humido, parce graminoso". Ruiz-Terán & López-Palacios describe it as an "Hierba rosulada, cespitosa, a la sombra de laja, en suelo húmedo. Roseto de unos 2 cm. de alto. Hojas finas, flexibles, verde sub-intensas, no espenescentes en al ápice. Escapos de 12--15 cm. Capítulos hemisféricos. Flores blancas."

Aristeguieta (1968) records this species from Guárico, Venezuela; Herter (1954) gives its distribution as "Sudamérica cálida". Malme (1901) cites Regnell III.1266 & III.1801 from Minas Gerais and Mato Grosso, Brazil. Silveira (1928) cites A. Silveira 216 from Serra do Lenheiro, Minas Gerais, collected in 1896, as typical S. gracilis, but A. Silveira 227, from the Serra de Ibitipoca, collected in the same year, as his var. a.

Vernacular names reported for the species are "capim manso", "capipoatinga", "capipoatinga-mímosa", "gravatá manso", "semprevivas do campo", and "sempre-viva-do-campo".

Bongard's plate 46, often cited as illustrative of this species,

apparently was never actually published and probably is available only in the Leningrad herbarium or library. Bongard's discussion of the species is sometimes cited to various dates, but was actually published in 1831. The Malme (1901) work is sometimes incorrectly cited as "1903".

Paepalanthus eriophyllus Mart. and Syngonanthus eriophyllus var. calvescens Ruhl. seem to be based, in part, at least, on Kegel 231 in the Berlin herbarium. Uittien & Heyn (1938) aver that Paepalanthus eriophyllus Mart. and P. glanduliferus Mart. are typified, respectively, by Wullschlägel 763 and 762 from the "Pará distr., plant. Berlijn", Surinam. These latter workers include S. biformis (N. E. Br.) Gleason and S. simplex (Miq.) Ruhl. in the synonymy of S. gracilis. My disposition of the extraneous synonyms which they list is as follows: Paepalanthus biformis N. E. Br. is Syngonanthus biformis (N. E. Br.) Gleason, a valid species; Paepalanthus gracilis var. c Körn. is in part typical Syngonanthus gracilis (Bong.) Ruhl. and in part S. gracilis var. hirtellus Ruhl.; Eriocaulon brizoides (Kunth) Steud. is Syngonanthus gracilis var. koernickeanus Ruhl.; Paepalanthus brizoides Kunth is in part S. gracilis and in part S. gracilis var. koernickeanus; and Dupatya simplex Kuntze, Eriocaulon hostmanni Steud., E. simplex (Miq.) Steud., Paepalanthus hispidus Klotzsch, and P. simplex Miq. are all Syngonanthus simplex (Miq.) Ruhl.

The Eriocaulon gracile credited to Heyne, to Martius, and to Martius & Wallich, referred to in the synonymy of S. gracilis (above), are all synonyms of Eriocaulon infirmum Steud.; E. glabrum Pennell is E. peruvianum Ruhl.; E. glabrum Salzm. is Syngonanthus gracilis var. glabriusculus Ruhl.; and Syngonanthus gracilis Molino is a synonym of Eriocaulon argentinum Castell.

The name, Syngonanthus gracilis, as applied to the present taxon, is very widely credited to "(Körn.) Ruhl.", but Ruhland (1903) was in error when he wrote it thus because Körnicke (1863) plainly cites Eriocaulon gracile Bong. as the name-bringing synonym, even though Ruhland does so only in the discussion of his S. gracilis var. olivacea Ruhl. This so-called var. olivacea is, therefore, the actual typical variety of the species and the names given in its synonymy therefore belong in the synonymy of this typical form of S. gracilis. Ruhland cites for it only Pohl s.n. and Widgren s.n. from Minas Gerais, Brazil. Silveira (1928) cites A. Silveira 651 from Diamantina (also in Minas Gerais), collected in 1908, as this "var. olivacea".

Macbride (1936) distinguishes S. gracilis from the closely related S. nitens (Bong.) Ruhl. by stating that in the former the heads are smaller, only 3--5 mm. in diameter, while in the latter they are 5--8.5 mm. thick. This, in general, is a quite valid distinction.

Ruhland's other varieties are tentatively maintained by me and

will be discussed hereinafter separately although they are, at best, rather difficult to distinguish in all cases.

Körnicke's (1863) varieties and subvarieties are being treated by me as follows: Paepalanthus eriophyllus var.  $\alpha$  and var.  $\beta$ , P. gracilis var.  $\alpha$  subvar.  $\beta$ , and P. gracilis var. c are typical Syngonanthus gracilis (Bong.) Ruhl.; Paepalanthus gracilis var.  $\alpha$  is S. gracilis var. glabriusculus Ruhl.; P. gracilis var.  $\alpha$  subvar.  $\alpha$  is S. gracilis var. subinflatus Ruhl.; P. gracilis var.  $\beta$  and var.  $\beta$  subvar.  $\alpha$  are S. gracilis var. koernickeanus Ruhl.; and P. gracilis var.  $\beta$  subvar.  $\beta$  is S. gracilis var. setaceus Ruhl. Ruhland's (1903) Syngonanthus eriophyllus var. glanduliferus is S. gracilis var. koernickeanus Ruhl. Paepalanthus brizoides Kunth is apparently in part typical S. gracilis and in part var. koernickeanus. It is based on two Sellow collections from "Brasilia meridionalis, inter Rio Janeiro at Campos et inter Victoria et Bahia" and one by Luschnath from "Campos prope St. Joao". He describes it as "Acaulis; caespitosus; foliis setaceo-linearibus, obtusiusculis, rigidis, glabris, recurvatis; vaginis glanduloso-pilosis, folia superantibus; pedunculis subcapillaceis, trisulcatis, vix puberulis; bracteis involucrentibus ellipticis, obtusis, aridis, stramineo-albidis, glabris, flores superantibus; sepalis exterioribus masculis et femineis angustato-acutis, glabris." He comments that it is "Affinis P. tenui".

Körnicke's var.  $\alpha$  subvar.  $\beta$  is based on Clausen 68, 164, & s.n. [Cachoeira do Campo], Houillet s.n., Martius 1083 & s.n. [Itabé], and Riedel s.n. from Minas Gerais; his var. c is based on Salzmann s.n. from Bahia, Spruce s.n. from Amazonas, Pohl s.n. and Weddell 2136 from Goiás, Gardner s.n., Martius s.n., and Widgren s.n. from Minas Gerais, Martius s.n. and Vauthier s.n. from Rio de Janeiro, and Riedel 2304 from São Paulo. His Paepalanthus eriophyllus var.  $\alpha$  is based on Kegel s.n. and Wulfschlägel 762 from Surinam, while P. eriophyllus var.  $\beta$  is based on Wulfschlägel 763, also from Surinam.

Gleason, usually most conservative in his treatment of species, still maintains S. eriophyllus as distinct from S. gracilis in his unpublished "Flora of British Guiana", citing for the former only Jenman 3768 and giving its overall distribution as only Surinam and Guiana. For S. gracilis he cites Appun 1526, Gleason 652, Linder 40, Lloyd s.n., Loyed s.n., and Parker s.n., giving its overall distribution as "Venezuela to French Guiana and Uruguay". He describes S. eriophyllus as "Leaves densely rosulate, narrowly linear, recurved, densely and persistently white-lanate, 1-2 cm. long; peduncles few, slender, 4-6 cm. high, sparsely hirtellous; sheaths glandular-hirtellous, prominently striate and twisted, the lamina acuminate; heads 3-5 mm. wide, subglobose; bracts oblong, obtuse, soon glabrous." He describes S. gracilis as "Leaves densely caespitose, often more or less recurved, narrowly linear, hirsute, 10-25 mm. long; peduncles several or many, 8-15 cm. high,

glabrous or nearly so; sheaths equaling the leaves; heads hemispheric, 3—5 mm. wide, white; bracts obovate, broadly rounded, glabrous, silvery and scarious." In his key he distinguishes these and some other taxa as follows:

1. Lateral sepals of the staminate florets strongly falcate and inequilateral.
2. Pistillate and staminate florets, including the pedicels, about equal in length. . . . . S. simplex
- 2a. Pistillate florets about twice as long as the staminate. . . . . S. biformis
- 1a. Lateral sepals of the staminate florets not falcate, equilateral.
3. Bracts obovate, broadly rounded at the summit. . S. gracilis
- 3a. Bracts oblong, acute to obtuse at the apex.
4. Leaves rosulate; peduncles not glandular; sinus of the sheaths, opposite the lamina, acute. . . S. eriophyllus
- 4a. Leaves crowded on a very short stem; peduncles glandular; sinus of the sheaths broadly rounded. . . S. glandulosus

Ruhland (1903) also keeps the two taxa separate, distinguishing them as follows:

1. Folia dense rosulata, anguste linearia, rigida. Plantae in Guyana collectae. . . . . S. eriophyllus
- 1a. Folia plusminusve caespitosa, rarius rosulato-caespitosa. Species brasilienses. . . . . S. gracilis

Lindeman & Görts-van Rijn (1968) key out some of these thus:

1. Male and female flowers not very unequal in size or shape. Involucral bracts about the same length as the flowers.
2. Leaves about 5 mm. long, densely rosulate, white-villous and pilose, later glabrous. Peduncles 5—7 cm. long. Involucral bracts glabrous, the inner ones ciliate. Style without appendages. . . . . S. simplex
- 2a. Leaves 1—3 cm. long, caespitose, glabrous or slightly puberulous. Peduncles 6—30 cm. long. Involucral bracts longer than or equaling the flowers. Sepals at first puberulous in the middle, later glabrous. . . . . S. gracilis

Also quite similar in habit, at least, to S. gracilis are S. llanorum Ruhl., S. pauciflorus Alv. Silv., and S. planus Ruhl.

Material of S. gracilis has been misidentified and distributed in some herbaria as Paepalanthus exiguus (Bong.) Körn. and P. subtilis Miq. On the other hand, the Robertson & Austin 268, distributed as S. gracilis, is actually Comanthera kegeliana (Körn.) Moldenke; Alston & Lutz 33 and B. Lutz 668 are Leiothrix dielsii Ruhl.; Mexia 5882 is Leiothrix fulgida Ruhl.; Alston & Lutz 133 is Paepalanthus tortilis (Bong.) Mart.; Williams & Assis 6885 is Syngonanthus biformis (N. E. Br.) Gleason; A. R. Schultz 324 is S. chrysanthus (Bong.) Ruhl.; Donselaar 3605 is S. glandulosus Gleason; Hunt & Ramos 6140, Malme 1653, and Swallen 4912 are S. gracilis var. aureus Ruhl.; Hermann 11054 and Tutin 619 are S. gracilis

var. koernickeanus Ruhl.; B. Lutz 602 is S. gracilis var. setaceus Ruhl.; Hassler 9430 is S. nitens var. hirtulus Ruhl.; Hassler 9436, 9436a, & 9436b are S. nitens var. koernickei Ruhl.; Brade 6578 and N. A. Rosa 477 [Herb. IPEAN 149907] are S. nitens f. pilosus Moldenke; and G. A. Black 54-16734 is S. tenuis (H.B.K.) Ruhl. Lockhart s.n. [Caracas] is a mixture of S. gracilis with Comanthera kegeliana (Körn.) Moldenke; J. A. Steyermark 57804 is a mixture with Paepalanthus lamarckii Kunth; Black 48-3050 is a mixture with P. fasciculatus (Rottb.) Kunth and P. fasciculatus f. sphaerocephalus Herzog; Mexia 5756 is a mixture with P. tortilis (Bong.) Mart.; Phelps & Hitchcock s.n. [February 12, 1949] is a mixture with S. gracilis var. glabriusculus Ruhl.; Lanjouw & Lindeman 860 is a mixture with S. gracilis var. koernickeanus Ruhl.; F. Lima s.n. [Herb. Mus. Goeldi 12173] is a mixture with S. umbellatus (Lam.) Ruhl.; and Vareschi & Maegdefrau 6613 is a mixture with S. yapacanensis Moldenke.

Additional citations: COLOMBIA: Magdalena: C. Allen 527 (E—1014370, F—1391643, F—1391775). Meta: F. W. Pennell 1427 (N, W—1041737); Smith & Idrobo 1395 (Ca—1147411). Santander: Fassett 25068 (W—2166142, Ws). Vaupés: Schultes, Baker, & Cabrera 18093 (W—2172073), 18114 (Ss), 18539 (S, Ss); Schultes & Cabrera 14238 (Z), 14337 (Ss), 14376 (Ss), 18390 (Ss, W—2198900), 19178 (Ss), 19749b (Ss), 19918c (Ss). VENEZUELA: Amazonas: Maguire & Maguire 35022 (N); Phelps & Hitchcock s.n. [February 12, 1949] (N); J. A. Steyermark 105141a (Ft), 57804, in part (N); G. H. H. Tate 216 (N), 259 (N); Vareschi & Maegdefrau 6613, in part (Ve—42532). Bolívar: Bernardi 6608 (N); Merxmüller 22955 (Mu); Pannier & Schwabe s.n. [Auyantepui] (Ve); Ruiz-Terán & López-Palacios 11336 (M1); J. A. Steyermark 89672 (M1); G. H. H. Tate 813 (N); Wurdack & Guppy 9 (Mu, N). Federal District: Lockhart s.n. [Caracas] (K). Guárico: Aristeguieta 4492 (N). GUYANA: C. W. Anderson 512 (K); Carrick 973 (K1—3973); H. A. Gleason 652 (N, W—1191105); Goodland & Persaud 791 (W—2546171); Linder 40 (N); McKee 10681 (Ws); Tutin 483 (Ut—39644A, W—1743597); Whitton 213 (K). SURINAM: Donselaar 3661 (Ut—320401); Florschütz & Florschütz 616 (Ut—80218B); Kegel 231 (B); Lanjouw & Lindeman 128 (N), 860, in part (Ut—17894B), 1792 (Ut—17893B), 1855 (Ut—17895B), 3013 (N); Wullschlägel 762 (E—photo, F—photo, N—photo, Z—photo). BRAZIL: Amapá: Irwin & Westra 47259a (N); Murça Pires & Cavalcante 52274 (N). Amazônas: G. A. Black 48-3050, in part (N, W—2655155); Prance 23528 (Ld); Prance, Maas, Atchley, Steward, Woolcott, Coêlho, Monteiro, Pinheiro, & Ramos 13836 (Ac, N); Prance, Pena, Forero, Ramos, & Monteiro 4790 (N); Spruce 1502 (P). Ceará: Herb. Mus. Goeldi 49 (G1). Minas Gerais: P. Clausen 1831 (N); Martius s.n. [in udis irreguis prov. Rio de Janeiro et Minarum passim] (Mu); Mexia 5756, in part

[Herb. Leonard 7656] (B). Pará: Black & Ledoux 50-10407 (Z), 50-10631 (Ca--28245, Z); W. A. Egler 160 (Bs); F. Lima s.n. [Herb. Mus. Goeldi 12173] (Bs); E. Pereira 5022 (Bd--12468). Rio de Janeiro: Martius s.n. [in udis irreguis prov. Rio de Janeiro et Minarum passim] (Mu). Roraima: G. A. Black s.n. [Herb. Inst. Agron. Norte 77605] (Z); Maguire & Maguire 40101 (N, Sm). Santa Catarina: Reitz 4735 [Herb. Reitz 4737] (S); Smith & Klein 10679 (Ok).  
 MOUNTED ILLUSTRATIONS: Körn. in Mart., Fl. Bras. 3 (1): pl. 59, fig. 1. 1863 (B, N, Z); drawings & notes by Körnicke (B, B, B, B).

SYNGONANTHUS GRACILIS var. AMAZONICUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 250 [as "amazonica"]. 1903; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946.

Synonymy: Syngonanthus gracilis var. amazonica Ruhl. in Engl., Pflanzenreich 13 (4-30): 250. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 250 & 293. 1903; Alv. Silv., Fl. Mont. 1: 418. 1928; Herzog in Fedde, Repert. Spec. Nov. 29: 212. 1931; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Phytologia 2: 493. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 92, 95, & 213. 1949; Moldenke, Phytologia 4: 317--318. 1953; Moldenke, Résumé 107, 112, 351, & 492. 1959; Moldenke, Fifth Summ. 1: 174 & 180 (1971) and 2: 636 & 962. 1971; Moldenke, Phytologia 25: 230 (1973) and 34: 259. 1976.

This variety is based on Huber 351 from the "Mündungsgebiet des Amazonas, Marajó, in einem Campos-wäldchen" and Burchell 8911 from "zwischen Junil und São João am Tocantins", Pará, Brazil, in the Berlin herbarium.

Ruhland's original (1903) description is "Differt foliis suberecto-recurvatis, 2 cm. longis, basi vix vel non ampliatis, juventute leviter puberulis, cito glaberrimis; vaginis laxiusculis, striatis, patenti-puberulis, calvescentibus; pedunculis erectis, valde tortis, fusco-stramineis, 3-costatis, apice breviter rigido-pilosa excepta glabriusculis; capitulis pallide cinereo-stramineis, duriusculis, 15--16 cm longis; bracteis involucrantibus obovatis vel ovatis, obtusis, capitulum 3--4 mm latum vix aequantibus, glabris."

Recent collectors describe the plant as an herb, 15 cm. tall, the inflorescences grayish-white, and have found it growing on moist or marshy campos, and in coarse white sand on disturbed white-sand savannas, flowering in February, May, August, and September, and fruiting in September. Silveira (1928) cites Huber 437 from Marajó island, collected in 1896, deposited in the Silveira herbarium.

Material of this variety has been misidentified and distributed in some herbaria as Paepalanthus nitens Körn. and Syngonanthus elegans (Bong.) Ruhl. Lützelburg 21036 is a mixture with S. glandulosus Gleason.

Additional citations: BRAZIL: Amazônas: Maas & Maas 454 (Ld, N);

Ule 6177 (B). Maranhão: Murça Pires & Black 2537 (Z). Mato Grosso: Irwin & Soderstrom 6477 (N). Minas Gerais: Lützelburg 21150 (Mu). Pará: G. A. Black 55-18613 (N); Ducke 8403 (Bs), 11656 (Bs), s.n. [Herb. Mus. Goeldi 10676] (Bs); Spruce 610 (Mu). Rio de Janeiro: Jobert 1227 (P). Roraima: M. Silva 122 [Herb. Brad. 47002] (Ld). State undetermined: Lützelburg 20548a [Igarapé] (Mu), 21003 [Maruay] (Mu), 21004 [Rio Cotim Contã] (Mu), 21036, in part [Vera Cruz] (Mu), 21132 [Maruay], 21156 [Maruay], 21289 [Serra da Lua] (Mu).

*SYNGONANTHUS GRACILIS* var. *ARAXAENSIS* Alv. Silv., Fl. Mont. 1: 347. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 347 & 418. 1928; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 92 & 213. 1949; Moldenke, Résumé 107 & 492. 1959; Moldenke, Fifth Summ. 1: 174 (1971) and 2: 962. 1971.

This variety is based on an unnumbered specimen collected by Dr. J. Michaeli "In campis prope Araxá", Minas Gerais, Brazil, in April, 1919, and is no. 715 in the Silveira herbarium. Silveira's original (1928) description is "Folia glabra, rigidula, 1 cm. longa. Pedunculi glabri, 20--30 cm alti. Vaginae arctae oblique fissae, glabrae, folia duplo superantes striatae, lamina erecta instructae, 2--2,5 elatae. Capitula albido-flavida, 5 mm lata. Bracteae involucrantes obovato-rotundatae, glabrae. Bracteae flores stipantes nullae. Sepala floris masculi utrinque pilosa, cito calvescentia. Sepala floris feminei illis floris masculi similia." Thus far it is known only from the original collection.

*SYNGONANTHUS GRACILIS* var. *AUREUS* Ruhl. in Engl., Pflanzenreich 13 (4-30): 251 [as "aurea"]. 1903; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946.

Synonymy: *Syngonanthus gracilis* var. *aurea* Ruhl. in Engl., Pflanzenreich 13 (4-30): 251. 1903.

Bibliography: Chod. & Hassl., Bull. Herb. Boiss., ser. 2, 3: 1034. 1903; Chod. & Hassl., Pl. Hassler. 2: 256. 1903; Ruhl. in Engl., Pflanzenreich 13 (4-30): 251 & 293. 1903; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Alph. List Cit. 4: 1301. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 92 & 213. 1949; Moldenke, Phytologia 4: 318. 1953; Moldenke, Résumé 73, 107, 351, & 492. 1959; Moldenke, Résumé Suppl. 12: 4 (1965) and 15: 5. 1967; Moldenke, Fifth Summ. 1: 127, 174, 180, & 184 (1971) and 2: 636 & 962. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1162 & Ind. 28. 1972; Moldenke, Phytologia 31: 386 (1975), 34: 260 (1976), and 35: 456. 1977.

This variety is based on Burchell 7177 from Goiás and G. Gardner 5270, Glaziou 15680, and Sena s.n. [Herb. Schwacke 14556] from Minas Gerais, Brazil, all deposited in the Berlin herbarium. The original description is: "Differt foliis caespitosis, erecto-patentibus, rigidulis, obtusiusculis, saepe olivaceo-viridibus, puberulis, mox

calvescentibus, ad 2 cm longis, medio usque  $2/3$  mm latis; vaginis folia paullo modo superantibus, olivaceis, arctis, vix striatulis, patentissimo-puberulis; pedunculis profunde 3 sulcatis, saepe tortis, stramineo-flavidis, pilis brevibus, sparsis, vix puberulis, cito glabriusculis, 16--18 cm altis; capitulis globosis, duriusculis, majusculis, latitudine demum interdum 5 mm excedentibus; bracteis involucrantibus florum discum vix aequantibus, concavis, glabris, ovatis, aureo-flavis, exterioribus saepe subacutis. [An fortasse species distincta?]. . . . Varietas habitu S. nitenti similis, valde insignis."

Recent collectors describe this plant as to 20 cm. tall, the inflorescences 10--15 cm. tall, gray or grayish, the flower-heads white or grayish, and the flowers white. They have found it growing in sandy soil, in cerrado, at gallery margins, in moist open ground and boggy ground near streamlets, on savannas and savanna-margins, on sandy open ground, in wet sand close to streams, and on periodically flooded campos, at altitudes of 200--1700 meters, flowering in January, March to August, and October, and in fruit in January, May, June, and August. Irwin and his associates refer to it as "locally common in cerrado"; Murça Pires & Cavalcante found it "frequent in wet sandy savannas"; Argent encountered it "on open ground between grass tussocks". Ratter and his associates found it "in damp cerrado between tufts of tall grasses and sedges which shade it", while Anderson found it in grass of "gallery forest, adjacent brejo, and nearby cerrado and campo limpo" and in similar areas but the "higher drier slopes with grassy campo or rocky cerrado". Hatschbach reports it it "cerrado pequeno brejo".

The Angely (1972) work cited in the bibliography is often referred to as having been published in 1970, the title-page date, but was not actually issued until 1972.

Material of this variety has been misidentified and distributed in some herbaria as Paepalanthus hirtellus Körn., Syngonanthus fischerianus (Bong.) Ruhl., typical S. gracilis (Bong.) Ruhl. and its var. setacea Ruhl. On the other hand, the Hassler 4671, distributed as S. gracilis var. aureus, actually is S. nitens var. koernickei Ruhl.

Additional citations: BRAZIL: Alagoas: Mendes Magalhães 162 [Herb. Jard. Bot. Belo Horiz. 32594] (N). Amapá: Murça Pires & Cavalcante 52380 (N). Amazonas: Fromm 1455 [E. Santos 1477; Sacco 1712; Trinta 381] (Bd--25617). Bahia: Lützelburg 241a (Mu). Goiás: W. R. Anderson 9567 (Ld, N), 10387 (Ld, N); Fróes 30116 (Hk, Z), 30183 (Be--79194); Hunt & Ramos 6140 (N); Irwin, Souza, Grear, & Reis dos Santos 17600 (Ld, N); Macedo 3333 (S), 3355 (S); Ule 233 (P). Maranhão: Lisboa 2333 (Bs). Mato Grosso: Argent in Richards 6454 (Ld, N); M. A. Chase 11905 (W--1470136); Hatschbach 24343 (Ld), 38622 (Ld); Hunt & Ramos 5711 (N); Irwin, Grear, Souza, & Reis dos Santos 16285 (Ac, N), 16346 (Ld, N, W--2769018); Irwin, Souza, Grear, & Reis dos Santos 16976 (Ac, N, W--2759017),

16978 (Ac, N, W--2759031), 17365 (Ac, N); Kuntze s.n. [200 m., VII.92] (N); Maguire, Murça Pires, Maguire, & Silva 56231 (N); Malme 1653 (W--1483435); Ratter, Santos, Souza, & Ferreira R.1686a (K); Santos, Souza, Ferreira, & Andrelinho R.1783 (Ac, N). Minas Gerais: Glaziou 15680 (W--1124144--cotype); Occhioni 5615 [Herb. Fac. Nac. Farmac. 14309] (Ld); J. E. Oliveira 1317 [Herb. Jard. Bot. Belo Horiz. 45187] (N). Pará: Spruce s.n. [In vicinibus Santarem, Aug. 1850] (N). Piauí: Lützelburg 233 (Mu). Rondônia: Prance, Forero, Coêlho, Ramos, & Farias 5765 (Ac, N, S). Roraima: Ule 7665 [Herb. Mus. Goeldi 12774] (Bs, K, N). São Paulo: Eiten, Eiten, Felipe, & Freitas Campos 3028 (N). State undetermined: G. Gardner 2748 bis (W--936284); Glaziou s.n. (P); J. E. Pohl s.n. [in Brasilia] (Mu). MARAJÓ ISLAND: Swallen 4912 (W--1592046).

SYNGONANTHUS GRACILIS var. BOLIVIANUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 252 [as "boliviana"]. 1903; Moldenke, Known Geogr. Distrib. Erioc. 19, 29, & 58. 1946.

Synonymy: Syngonanthus gracilis var. boliviana Ruhl. in Engl., Pflanzenreich 13 (4-30): 252. 1903. Dupatya fischeriana Kuntze ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 252, in syn. 1903 [not D. fischeriana Kuntze, 1902]. Paepalanthus gracilis var. boliviana Ruhl. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Syngonanthus gracilis boliviana Ruhl. ex Moldenke, Résumé Suppl. 12: 13, in syn. 1965. Syngonanthus gracilis bolivianus Ruhl. ex Moldenke, Fifth Summ. 2: 637, in syn. 1971.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 252 & 293. 1903; Moldenke, Known Geogr. Distrib. Erioc. 19, 29, & 58. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 97 & 213. 1949; R. C. Foster, Contrib. Gray Herb. 184: 39. 1958; Moldenke, Résumé 115, 280, 351, & 492. 1959; Moldenke, Résumé Suppl. 1: 20 (1959) and 12: 12. 1965; Moldenke, Fifth Summ. 1: 184 & 480 (1971) and 2: 583, 636, 637, & 962. 1971; Moldenke, Phytologia 35: 454. 1977.

This variety is based on Otto Kuntze 455 from an altitude of 200 meters in east Velasco, Santa Cruz, Bolivia, collected in July of 1892 and deposited in the Berlin herbarium. The unnumbered specimen in the New York Botanical Garden herbarium is probably an isotype. Ruhl's original (1903) description is "Differt foliis diffuso-caespitosis, in sicco pallide stramineis, vix puberulis, obtusis, setaceo-linearibus, supra concaviusculis, subtus nervo uno valde prominente quasi bisulcatis, 1--1,5 cm longis; vaginis folia superantibus, oblique fissis, arctis, striatis, lamina paulo recurva, acuta instructis; capitulis bracteisque involucrentibus ut in varietate antecedente [var. recurvifolius Ruhl.]; pedunculis gracilibus, costatis, tortis, subflexuosis, 12 cm longis."

The variety has been encountered on "campos cienagosas" at 200--500 meters altitude, flowering in April and July. The Dupatya fischeriana Kuntze (1902), referred to in the synonymy above, is a

synonym of Syngonanthus fischerianus (Bong.) Ruhl. and is based on a misidentification by Kuntze of the type specimen in the Berlin herbarium. Steinbach describes the flowers of S. gracilis var. bolivianus as "flor paposa blanca".

Citations: BOLIVIA: Santa Cruz: Kuntze 455 (B-type), s.n. [Ost Velasco, VII.92] (N, N); Perrottet 766 (V-143602); J. Steinbach 5507 (N, W-1472861).

SYNGONANTHUS GRACILIS var. GLABRIUSCULUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 251 [as "glabriuscula"]. 1903; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946.

Synonymy: Eriocaulon glabrum Salzm. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 281 & 334. 1855. Paepalanthus gracilis var. a Körn. in Mart., Fl. Bras. 3 (1): 460-463. 1863. Eriocaulon glabrum Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 878, in syn. 1893. Limnoxeranthemum glabrum Salzm. ex Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 84. 1894. Syngonanthus gracilis var. glabriuscula Ruhl. in Engl., Pflanzenreich 13 (4-30): 241. 1903. Limnoxeranthemum (Eriocaulon) glabrum Salzm. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 251, in syn. 1903. Paepalanthus gracilis var. ♂ Körn. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 251, in syn. 1903. Paepalanthus glaber Körn. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Syngonanthus gracilis var. glabriusculis Ruhl. ex Moldenke, Fifth Summ. 2: 962, sphalm. 1971.

Bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 280, 281, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 460-463. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 878 (1893) and imp. 1, 2: 84. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 251, 285, 290, & 293. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 878 (1946) and imp. 2, 2: 84. 1946; Moldenke, Known Geogr. Distrib. Erioc. 18, 35, 44, 49, & 58. 1946; Moldenke, Phytologia 2: 352 & 374. 1947; Moldenke, Alph. List Cit. 3: 710 & 975. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 65, 92, & 213. 1949; Moldenke in Maguire, Mem. N. Y. Bot. Gard. 9: 101. 1953; Moldenke, Phytologia 4: 318. 1953; Moldenke in J. A. Steyerm., Fieldiana Bot. 28: 824. 1957; Moldenke, Résumé 73, 107, 288, 310, 325, 351, & 492. 1959; Moldenke, Résumé Suppl. 1: 20 (1959) and 2: 5. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 878 (1960) and imp. 3, 2: 84. 1960; Moldenke, Résumé Suppl. 3: 14 (1962) and 12: 3. 1965; J. A. Steyerm., Act. Bot. Venez. 1: 247. 1966; Moldenke, Résumé Suppl. 16: 6. 1968; Moldenke, Phytologia 18: 388. 1969; Moldenke, Fifth Summ. 1: 127, 133, & 174 (1971) and 2: 501, 549, 583, 636, & 962. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1162 & Ind. 28. 1972; Moldenke, Phytologia 28: 440 (1974), 30: 52 (1975), 31: 383 & 408 (1975), 34: 487 (1976), and 35: 18 & 125. 1976.

This variety is apparently based on the Paepalanthus gracilis var. a of Körnicke (1863) and that, in turn, is presumably based

on Salzmann s.n. from "auf feuchten Wiesen" in Bahia, Brazil, and P. Clausen 68 and Martius 1083 from Minas Gerais, Brazil, all deposited in the Berlin herbarium. Ruhland (1903) describes it as follows: "Differt foliis irregulariter caespitosis, fere latiuscule linearibus, chartaceo-membranaceis, pallide olivaceo-vel glaucescenti-viridibus, obtusis, glabris, vel supra dense hirtopuberulis, dein glabriusculis et albo-punctulatis, 1—1,5 cm longis, interdum  $\frac{2}{3}$  mm latis; vaginis arctis, leviter striatulis, vix puberulis vel glabriusculis; pedunculis plerumque valde tortis, erectis, 3-costatis, in sulcis arcte appresso-incanis, ceterum sparse et longiuscule pilosis, mox glabris, 20 cm saepe excedentibus; bracteis involucrentibus rotundato-obtusis, aureo-flavidis, glabris, capitulum plus minus concavo-includentibus." He cites from Bahia Salzmann s.n. and from Minas Gerais P. Clausen 68, Glaziou 11845 & 17308, Martius 1083, Sena s.n. [Herb. Schwacke 12828], and A. Silveira 1415.

Recent collectors refer to this plant as a rosette herb "bearing a single head", the inflorescences to 15 cm. tall, the flower-heads grayish, and the flowers white. They have found it growing in sandy soil, on wet campos, in moist meadows, on sandy dry or white-sand savannas, and in Vellozia associations, at altitudes of 200—1980 meters, flowering from April to August and in November, in fruit in May, August, and November. Irwin and his associates found it "locally common in wet places on creek margins"; Maguire and his associates found it "frequent on open banks" and "common on savannas"; Murça Pires & Cavalcante refer to it as "frequent on wet sandy savannas".

Ruiz-Terán and López-Palacios describe it as "Hierba rosulada. Hojas hasta 10 mm. de largo. Escapos hasta de 8 cm. de longitud, cilíndricos. Capítulos globosos [or "hemisféricos"] 2—6 mm. de diámetro. Flores blanquecinas". They have encountered it on "orillas de la carretera". Mori 829 is placed here only tentatively -- it is obviously very immature, the flower-heads are very small and too pointed to be typical. It was found growing in "open barrows of white sand with many lichens and Eriocaulaceae along ponds in open sand."

The Angely (1972) reference in the bibliography is often cited as "1970", the title-page date, but was not actually issued until 1972.

Material of this variety has been misidentified and distributed in some herbaria under the names, Eriocaulon repens Lam., Paepalanthus sp., and Syngonanthus nitens Kunth. On the other hand, Glaziou 15680, distributed as S. gracilis var. glabriusculus, is actually var. aureus Ruhl. Phelps & Hitchcock s.n. [February 12, 1949] is a mixture with typical S. gracilis (Bong.) Ruhl., while Hallé 512 is a mixture with something not eriocaulaceous.

Additional citations: VENEZUELA: Amazonas: Foldats 3545 (Ve); Phelps & Hitchcock s.n. [February 12, 1949], in part (N, N). Bolívar: Ruiz-Terán & López-Palacios 10979 (Mi), 11421 (Ld). SURINAM: Maguire, Schulz, Soderstrom, & Holmgren 54216 (N). FRENCH GUIANA:

Hallé 512, in part (P). BRAZIL: Amapá: W. A. Egler 1453 [Herb. Mus. Goeldi 24609] (Mi); Irwin & Westra 47259 (N); Murça Pires & Cavalcante 52405 (N). Amazônas: Mori 829 (Ws). Goiás: Irwin, Souza, & Reis dos Santos 9756 (N). Mato Grosso: Irwin, Grear, Souza, & Reis dos Santos 15954 (Ld, N). Minas Gerais: P. Clausen 68 (B--cotype), 164 (B), s.n. (P); Martius 1083 (B--cotype, Mu--cotype), s.n. [In uvidis altis herbaceis et turfosis prope Itambé] (Mu). Paraíba: Coêlho de Moraes 2210 (Z), 2212a (Mm). Roraima: G. A. Black 51-13126 (Be--70882); Prance, Forero, Pena, & Ramos 4490 (Ld, N, S). State undetermined: J. F. T. Müller 90 (P).  
MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

SYNGONANTHUS GRACILIS var. GRISEUS Ruhl. in Engl., Pflanzenreich 13 (4-30): 251 [as "grisea"]. 1903; Moldenke, known Geogr. Distrib. Erioc. 18 & 58. 1946.

Synonymy: Syngonanthus gracilis var. grisea Ruhl. in Engl., Pflanzenreich 13 (4-30): 251. 1903.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 251 & 293. 1903; Alv. Silv., Fl. Mont. 1: 418. 1928; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 92 & 213. 1949; Angely, Fl. Paran. 10: 12 & 15. 1957; Moldenke, Résumé 107, 352, & 492. 1959; Angely, Fl. Anal. Paran., ed. 1, 201. 1965; Moldenke, Fifth Summ. 1: 174 (1971) and 2: 636 & 962. 1971.

This variety is based on three collections in the Berlin herbarium: Herb. Bernhardi s.n. from Bahia, Burchell 5764 from Minas Gerais, and Schwacke 2483 from Santa Catarina, Brazil. The last-mentioned is cited by Ruhland (1903) as from Paraná, but according to a letter to me from Dr. Angely, dated December 3, 1957, the locality of collection was, indeed, in the state of Paraná in 1903, but in 1919 the boundaries of Paraná and Santa Catarina were officially changed and the locality in question is now definitely in Santa Catarina.

Ruhland's original (1903) description of the variety is: "Differt foliis linearibus, obtusiusculis, subtus plerumque plurinerviis, glabris vel pilis longis hinc inde conspersis deinceps glabriusculis, apice semper recurvatis; vaginis laxiusculis, folia vix vel non superantibus, glabriusculis, striatulis; pedunculis erectis, interdum acutangulo-3-costatis, pilis brevissimis sparse instructis, cito omnino glabris, tortis, brunneo-fuscis; capitulis globosis, griseis, pallidis, densifloris; bracteis involu- crantibus obovatis, obtusiusculis, glabris, concavis, pallidis." Silveira (1928) cites A. Silveira 847 from Itacambira, Minas Gerais, collected in 1926.

SYNGONANTHUS GRACILIS var. HIRTELLUS (Steud.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 249 [as "hirtella"]. 1903; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946.

Synonymy: Eriocaulon hirtellum Steud., Syn. Pl. Glum. 2: [Cyp.]

280. 1855. Limnoxeranthemum pubescens Salzm. ex Steud., Syn. Fl. Glum. 2: [Cyp.] 280, in syn. 1855. Paepalanthus gracilis var. c Körn. in Mart., Fl. Bras. 3 (1): 461, in part. 1863. Syngonanthus gracilis var. hirtella (Steud.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 249. 1903. Eriocaulon hirtellus Steud. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 249, in syn. 1903. Paepalanthus hirtellus var. ♀ Körn. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus pohlianus var. ♀ Mart. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959. Paepalanthus tristis Körn. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959.

Bibliography: Steud., Syn. Fl. Glum. 2: [Cyp.] 280 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 461. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 249--251, 286, 290, & 293. 1903; Herzog in Fedde, Repert. Spec. Nov. 29: 1931. 1931; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 18, 35, 49, & 58. 1946; Moldenke, Phytologia 2: 352 & 374. 1947; Moldenke, Alph. List Cit. 3: 975. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 65, 92, & 213. 1949; Moldenke, Phytologia 4: 318. 1953; Moldenke in J. A. Steyerm., Fieldiana Bot. 28: 824. 1957; Moldenke, Résumé 73, 107, 289, 325, 352, & 492. 1959; Moldenke, Résumé Suppl. 1: 21 & 22. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 878. 1960; J. A. Steyerm., Act. Bot. Venez. 1: 247. 1966; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1162 & Ind. 28. 1972; Moldenke, Phytologia 30: 318 (1975), 31: 383 (1975), 34: 275 (1976), and 35: 338. 1977.

Steudel's original (1855) description of this taxon is: "Caespitosum subcaerule pusillum; foliis angustissimis linearibus scabriusculis revibus (vix 1/2" longis, 1/3" latis); vaginis quam folia duplo longioribus scapisque patenti glanduloso-pilosis; scapis solitariis 1--4-pollicaribus; capitulo hemisphaerico glabro; bracteis involucrentibus ovatis obtusis (piso parum majoribus); flosculis ipsis basi nudis; receptaculo piloso. Limnoxeranthemum pubescens Salzm. Bahia." Limnoxeranthemum pubescens Salzm. is regarded by Ruhland as a synonym of Syngonanthus gracilis var. koernickeanus Ruhl., but it certainly has to go wherever the name, Eriocaulon hirtellum Steud., goes and that is the name-bringing synonym of Syngonanthus gracilis var. hirtellus (Steud.) Ruhl.

Ruhland (1903) cites no specimens for this variety, but implies that it is very widely distributed in the states of Amazonas, Bahia, Goiás, Minas Gerais, Rio de Janeiro, and São Paulo, Brazil. He comments that "Varietas latissime divulgata et habitu constante est. Sed species non habenda est, quod indumentum foliorum et vaginae valde variabilis transitum ad sequentum [vars. tenuissimus, olivaceus, subinflatus, pallidus, amazonicus, koernickeanus, glabriusculus, aureus, griseus, setaceus, recurvifolius and bolivianus Ruhl.] faciunt." He describes it as "Differt styli appendicibus nullis; bracteis involucrentibus fusciscenti-flavidis, capitulum vix includentibus; pedunculis apicem versus glandulifero-pilosis."

Recent collectors refer to the plant as having inflorescences to 8 cm. tall and the flower-heads yellow-brown. Davidse and his associates speak of it having "spikelets white", but there are no spikelets -- the flowers are in heads. Collectors have encountered it on "campo cerrado", among rocks, in large swampy savannas, "in sand along streamlet at top of waterfall", and in wet places in rocky campo, at 125--1250 meters altitude, flowering from March to May and in July, August, and December, in fruit in March and December. Wurdack & Adderley refer to it as "occasional", while Anderson found it "on grassy campo with scattered trees on crystal sand, wet in places". Ruiz-Terán & López-Palacios describe the plant as "Hierba mínima, en suelo húmedo e musgoso, a la sombra de rocas de arenítica. Roseta de 7--10 mm. de largo. Escapos erectos, 5--6 cm." and found it growing on the "orillas de la carretera".

Paepalanthus hirtellus var.  $\phi$  is based on Widgren s.n. [1845] in the Berlin herbarium. Körnigke's P. gracilis var. c was based by him on Spruce s.n. from Amazonas, Salzmann s.n. from Bahia, Pohl s.n. and Weddell 2136 from Goiás, Gardner 2748 from Piauí, Gardner s.n., Martius s.n., and Widgren s.n. from Minas Gerais, Martius s.n. and Vauthier s.n. from Rio de Janeiro, and Riedel 2304 from São Paulo.

It should be noted here again that the Angely (1972) reference in the bibliography of this taxon is often cited as "1970", the title-page date, but the work was not actually issued until 1972. On the other hand, the Steyermark (1966) reference is sometimes cited as "1967", but actually was published in 1966.

Prance, Pennington, & Murça Pires 1283 & 1284 are mixtures with Paepalanthus polytrichoides Kunth and Syngonanthus bellus Moldenke.

Additional citations: VENEZUELA: Amazonas: Wurdack & Adderley 43697 (N, S). Bolívar: Davidse, Ramia, & Montes 4846 (Ld); Merxmüller 22955 (Mu); Ruiz-Terán & López-Palacios 11288 (Mi). BRAZIL: Goiás: W. R. Anderson 8065 (Ld, N); Irwin, Grear, Souza, & Reis dos Santos 13341 (N), 13388a (N). Maranhão: Murça Pires & Black 2251 (Ss), 2266 (Z). Minas Gerais: Widgren s.n. [1845] (B). Pará: Ducke s.n. [Herb. Mus. Goeldi 16257] (Bs); Murça Pires & Silva 4204 (N), 4718 (Ca--28212, N); E. Pereira 5109 [Herb. Brad. 12471] (Lw); Prance, Pennington, & Murça Pires 1283, in part (N), 1284, in part (N, S). State undetermined: G. Gardner s.n. (B). MOUNTED ILLUSTRATIONS: drawings & notes by Körnigke (B, P, E).

SYNGONANTHUS GRACILIS var. KOERNICKEANUS Ruh. in Engl., Pflanzenreich 13 (4-30): 250--251 [as "koernickeana"]. 1903; Moldenke, Known Geogr. Distrib. Erioc. 18 & 58. 1946.

Synonymy: Paepalanthus brizoides Kunth, Enum. Pl. 3: 534, in part. 1841. Eriocaulon brizoides Kunth ex D. Dietr., Syn. Pl. 5: 262. 1852. Eriocaulon brizoides (Kunth) Steud., Syn. Pl. Glum. 2: [Cyp.] 281. 1855; Moldenke, Résumé 286, in syn. 1959. Paepalanthus gracilis var.  $\phi$  Körnigke in Mart., Fl. Bras. 3 (1): 460--463. 1863.

Paepalanthus gracilis var.  $\beta$  subvar.  $\alpha$  Körn. in Mart., Fl. Bras. 3 (1): 460, 461, & 463. 1863. Paepalanthus glandulifer Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 464, in syn. 1863. Eriocaulon brizoides Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 877, in syn. 1893. Paepalanthus glanduliferus Mart. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 402, in syn. 1894. Paepalanthus gracilis var.  $b$  subvar.  $\alpha$  Körn. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 250, in syn. 1903. Syngonanthus gracilis var. koernickeana Ruhl. in Engl., Pflanzenreich 13 (4-30): 250. 1903. Paepalanthus gracilis var.  $b$  var.  $\alpha$  Körn. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 290, sphalm. 1903. Syngonanthus eriophyllus var. glanduliferus Ruhl. ex Moldenke in Gleason & Killip, Brittonia 3: 159. 1939. Syngonanthus eriophyllus var. glandulifer Ruhl. ex Moldenke, Known Geogr. Distrib. Erioc. 57, in syn. 1946. Paepalanthus filiformis Mart. ex Moldenke, Résumé 325, in syn. 1959. Paepalanthus filiformis var. minor Mart. ex Moldenke, Résumé 325, in syn. 1959. Paepalanthus gracilis var.  $g$  Körn. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Syngonanthus gracilis var. koernickeanus Ruhl. ex Moldenke, Fifth Summ. 2: 636, in syn. 1971.

Bibliography: Kunth, Enum. Pl. 3: 534 & 624. 1841; D. Dietr., Syn. Pl. 5: 262. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 281 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 460--464. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 84, 401, & 402. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 249--251, 285, 290, & 293. 1903; Alv. Silv., Fl. Mont. 1: 418. 1928; Moldenke in Gleason & Killip, Brittonia 3: 159. 1939; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 877 (1946) and imp. 2, 2: 84, 401, & 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 7, 18, 33, 44, 45, 48, 49, 57, 58, & 61. 1946; Moldenke, Phytologia 2: 352, 373, & 377. 1947; Moldenke, Alph. List Cit. 4: 985. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 92 & 213. 1949; Moldenke, Phytologia 4: 319. 1953; Moldenke, Résumé 69, 73, 77, 107, 286, 310, 323, 325, 351, 352, & 492. 1959; Moldenke, Résumé Suppl. 1: 5 & 20. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 877 (1960) and imp. 3, 2: 84, 401, & 402. 1960; Moldenke, Résumé Suppl. 3: 12 & 14 (1962) and 4: 4. 1962; Van Donselaar, Wentia 14: 70. 1965; Kramer & Van Donselaar, Meded. Bot. Mus. Herb. Rijksuniv. Utrecht 309: opp. 500 & 509, tab. 1 & 2. 1968; Lindeman & Görtsvan Rijn in Pulle & Lanjouw, Fl. Surin. 1 [Meded. Konink. Inst. Trop. 30, Afd. Trop. Prod. 11]: 336. 1968; Koyama & Oldenburger, Rhodora 73: 159. 1971; Moldenke, Fifth Summ. 1: 120, 127, 131, 133, 134, & 174 (1971) and 2: 495, 549, 578, 582, 583, 636, & 962. 1971; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 6: 1162 & Ind. 28. 1972; Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 78 & 101. 1976; Moldenke, Phytologia 34: 276 (1976) and 35: 291. 1977.

[to be continued]

## BOOK REVIEWS

Alma L. Moldenke

"FACES OF THE WILDERNESS" by Harvey Broome, xiii & 271 pp., illus., Mountain Press Publishing Co., Missoula, Montana 59801. 1972. \$7.95.

This book carries a FOREWORD by William O. Douglas who rated Harvey Broome as a "joyous companion" in backpacking and camping, an "advocate extraordinary" for the preservation of unique wilderness areas, and "rated along with Henry Thoreau and John Muir" in outdoor literature. Harvey Broome was one of the founders of The Wilderness Society in 1935 and one of its leaders until his death in 1968. The Wilderness Society has sponsored this publication.

The council of The Wilderness Society holds its annual meetings not at its highly urbanized headquarters in Washington, D.C., but in places of wilderness concern such as the Okefinokee Swamp, Grand Tetons, Bitterroot Forest, Olympics and Olympia Beach, or the Great Smokies. The text comes from accounts of such trips in the author's journal and is well garnished by a baker's dozen of fine black/white photographs. In the Sun River country of Montana with its "magnificent beauty and peace people like these tiny figures around this campfire had fought for this beautiful range. Others, in greater numbers, had burned our forests, had demuded our plains, had extinguished noble species of game, had muddied our rivers, and were sweeping the richness of our country to the oceans and the Gulf....What the wilderness movement needs to do more than anything else is to.....bring to people generally.....reverence for the natural scene." Well worth reading!

"ECOLOGICAL CRISIS - Readings for Survival" edited by Glen A. & Rhoda M. Love, ix & 342 pp., illus., Harcourt, Brace, & Jovanovich, Inc., New York, N. Y. 10001. 1971. \$5.95 paperbound.

This thoughtfully compelling collection of 22 papers authored in direct and interesting language as contributions previously published in about as many other journals and/or books certainly should achieve the Loves' intent "to provoke discussion - and action - toward an enhanced quality of life for all people on the earth". The results of alternatively continuing to pollute our air, our water, our land and ourselves cannot be dismissed as "scare tactics" but as inexorably "eco-catastrophic".

"A FLORA OF TROPICAL FLORIDA — A Manual of the Seed Plants and Ferns of Southern Peninsular Florida", 2nd Edition, by Robert W. Long and Olga Lakela, xvii & 962 pp., illus., Banyan Books, Miami, Florida 33143. 1976. \$29.50.

Besides being a very well prepared, worthwhile and workable manual, this book must also have been a highly successful seller to need another printing within only a five year span!

In this new edition the pagination and illustrations are basically the same. On about 140 pages small text, key, nomenclature and distribution revisions have been made. There has also been a change in publishers from the University of Miami Press (itself reorganized) to Banyan Books. The same "head count" of 1647 species along with 190 subspecific taxa in 762 genera in 179 plant families has been maintained.

Botany students at area colleges and universities, many skilled technicians in ecological and agricultural programs, botanically trained tourists, and the increasing number of literate retiree-migrants from the snowbelt to the sunbelt will find this book helpful in distinguishing the individual floral members of this fascinating tropical area of "scrub forests, hammock and tree islands, freshwater swamps, dry pineland, wet or low pineland, the mangroves, salt marshes, wet prairies, dry prairies, coastal strands and dunes, pond and river margins, marine communities, and ruderal communities."

This book serves as an excellent monument to the research and teaching careers of the authors.

"PLANTS OF THE TAMPA BAY AREA, Revised Edition (3rd) by Olga Lakela, Robert W. Long, Glenn Fleming & Pierre Genelle, 198 pp., illus., Banyan Books, Miami, Florida 33143. 1976. \$7.95 paperbound.

This contribution is No. 73 from the Botanical Laboratories, University of South Florida at Tampa. The only illustration is a needed page map of the area. "The purpose of this book is to present a listing of the native, naturalized, and commonly cultivated plants of the area bordering Tampa Bay. For taxonomic descriptions and diagnostic keys reference is made to J. K. Small's "Manual" and to Long & Lakela's "Flora of Tropical Florida". In all 1306 species in 582 genera in 167 families are included.

At the end of the book are corrections and late additions. The authority for Verbena tenuisecta is Briquet; the "Vitex trifolia" L., planted and escaping, is var. subtrisetata; the "Verbena officinalis" L. in wooded lots and berms is more likely to be V. halei which is common in such areas. The European V. officinalis may be grown in some gardens or occur on ballast, but is certainly not a common escapee. Lantana aculeata is given as a synonym under L. camara, but it is better treated as a valid variety, as is done by the senior authors in their Manual. The same treatment should ap-

ply to L. odorata listed under L. involucreta. Avicennia germinans (L.) Stearn is an illegitimate name that must be relegated to synonymy under A. germinans (L.) L.

This book has been and can continue to be of considerable use in the area.

"GROWING FOOD IN SOUTH FLORIDA" by Felice Dickson, 128 pp., illus., Banyan Books, Miami, Florida 33143. 1975. \$5.95.

For 8 years the author has been the Farm and Garden Editor of "The Miami Herald" and for even a decade earlier she has been an enthusiast for tropical horticulture after having met our mutual greatly admired friend, Dr. Edwin A. Menninger, the Flowering Tree Man, of Stuart, Florida.

This easily readable, interesting, accurate, attractive, simple book offers guidance for experienced or engemue. chemical or organic, large acreage or small plot, potted or hydroponic gardeners wishing to raise appropriate temperate and newer tropical vegetable crops. She pays tribute to the valuable directions available free through trained county agents in the Cooperative Extension Service.

"WILD FLOWERS OF FLORIDA" by Glenn Fleming, Pierre Genelle & Robert W. Long, 96 pp., illus., Banyan Books, Inc., Miami, Florida. 1976. \$3.95 paperback.

This is a souvenir type book made particularly attractive by 156 fine legended color photographs taken mainly by the first two authors and made botanically valuable by checking with the last author. On page 82, however, it is Verbena tenuisecta Briq. which is pictured, not V. canadensis as there stated. In the common name and scientific name listing on p. 15 Avicennia germinans should be credited to "(L.) L." and Verbena canadensis to "(L.) Britton".

Out of the vast total of the Floridian flora those most commonly encountered in fields and along roadsides have here been selected and arranged in four color groupings — whitish, yellowish, pink-reddish, and purple-bluish.

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# PHYTOLOGIA

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PRELIMINARY TAXONOMIC STUDIES IN THE PALM GENUS ORBIGNYA MART.\*

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Martius first erected the genus Orbignya in 1837. No species were described in this article, but in 1844 he delineated O. phalerata and O. humilis as the first two taxa. At later dates, other species of Orbignya were described or transferred from other genera (mainly Attalea) by Drude (1881), Barbosa Rodrigues (1879, 1888, 1891, 1898, 1903), Burret (1929, 1930, 1932, 1940), Bondar (1954) and several other authors.

Perhaps the most detailed treatment of Orbignya was by Burret (1929). He recognized a total of 19 species and at the same time divided the genus into three sections: Distichanthus Burret, Pleiostichanthus Burret and Spirostachys Burret. In the first two sections the male flowers are arranged in two rows along the rachillae of the male spadix (and in turn they are distinguished from each other by whether the fibers in the fruit endocarp are abundant or scarce to absent), whereas in the section Spirostachys, the male flowers are spirally arranged around the rachillae. Burret also presented a partial key to the sections and species within each. Of 13 species partly keyed out in the first section, eight are listed as unknown or doubtful; of four listed in the second section, two are listed as doubtful; and in the third section the two species are not keyed out and one is listed as doubtful. In his "Palms of Brazil," Bondar (1964) listed 14 species of Orbignya, some with brief descriptions, but without keys.

As previously mentioned in Glassman (1977), Wessels Boer (1965, 1972) treated all species of Orbignya, as well as other closely related genera in Surinam and Venezuela, as part of the genus Attalea, sensu lato. Closely related genera to Orbignya (Attalea, Scheelea, Maximiliana, Parascheelea and Markleya) have been discussed and differentiated in Glassman (1977).

In preparing this study several facts became evident. In most cases, type specimens for each species of Orbignya are either fragmentary or nonexistent, very few additional collections have been made for each species, and descriptive and illustrative

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\*This research has been supported by NSF grant BMS 75 09779.

information is usually inadequate.

The following is a description of the genus Orbignya as it is presently delimited: tall trees mostly with smooth trunks and inconspicuous leaf scars, or lacking trunks (acaulescent); leaves usually very long, pinnately compound, leaf base conspicuous, petiole sometimes short, with fibrous margins; pinnae single for the most part, but clustered in several taxa; plants monoecious, flowers unisexual, both androgynous and male spathes woody and deeply sulcate, usually terminating in a fairly long umbo; androgynous spadices usually with many branches (rachillae), each branch with few to several female flowers along basal part forming triads with two male flowers, the terminal portion slender with male flowers only; female flowers relatively large (2.0 to 4.5 cm long), subtended by two bracts, with 3 subequal or equal convex imbricate sepals and 3 similar petals, pistil with a well developed staminodial ring surrounding the ovary, carpels 3-several, fused, stigmas 3-6, style short or absent; male spadices many branched, male flowers usually arranged on one side of the rachillae, sometimes spirally arranged; male flowers with 3 short sepals and 2-5 much longer flattened, curved, obovate or ovate petals which are often fused and irregularly notched, stamens 6-24 per flower, included in the petals, thecas of anthers separate and divergent, irregularly coiled and inrolled, fruits 1-several seeded, exocarp fibrous, mesocarp usually pulpy and fibrous, endocarp stony, usually more than twice as thick as exocarp and mesocarp combined, frequently dotted with clusters of fibers, persistent perianth and staminodial ring enlarged in fruit; seeds conforming to size and shape of locules, endosperm homogeneous.

A total of 30 species has been described or transferred under the name Orbignya. Of this number, 18 (including six synonyms) definitely or most probably belong to Orbignya; one species, O. dubia, is definitely not Orbignya; and the third category (doubtful or uncertain taxa) encompasses five names. Also included here are species closely related to Orbignya, but probably belonging to different genera: Attalea crassispatha, Markleya dahlgreniana and Parascheelea anchistropetala.

The following key, based on specimens examined plus descriptions and illustrations, includes 21 taxa (18 species of Orbignya and the three closely related species mentioned above). One should be reminded, however, that this is a preliminary study and that several species are based on incomplete collections or in some cases only descriptions and illustrations. Only with further collections can the full range of variability be determined; but in some cases this is not possible because the species

either has become extinct or its original habitat appears to have been destroyed. Subsequent to the species key, each of the four categories of species mentioned above are arranged alphabetically with the author and original place of publication. Sometimes, other pertinent articles are also listed. Complete citations of most of these plus other articles mentioned in the text are listed under LITERATURE CITED at the end. Pertinent synonyms are also listed. The type of each species, when known, is listed and is then followed by a list of cited specimens examined by the author. Holotypes, isotypes and lectotypes are specifically listed as such; however, when its status is uncertain it is merely called "type." For each specimen, collector's name and collecting number is followed by a symbol of the herbarium where the collection is deposited. Abbreviations of herbaria used here are those listed in "Index Herbariorum" by Holmgren and Keuken (1974).

Key to Species of Orbignya and Related Genera

1. Middle pinnae mostly in clusters of 2-4
  2. Plants acaulescent or with short trunk, middle pinnae 15-56 cm long and 2.5-3 cm wide, stamens 12-24 per flower
    3. Stamens 12-16
      4. Fruit 5 seeded, stamens 12-16 . . . . . O. eichleri
      4. Fruit 2-3 seeded, stamens 12 . . . . . O. humilis
    3. Stamens 16-24
      5. Female flowers 3-3.5 cm long, stamens 16-18, branched part of androgynous spadix 15 cm long, bracts subtending female flowers not long acuminate  
 . . . . . O. campestris
      5. Female flowers 2.5 cm long, stamens 16-24, branched part of androgynous spadix 40 cm long, bracts subtending female flowers long acuminate, 3-4 cm long . . . . . O. longibracteata
  2. Plants with trunk 2-25 m high, middle pinnae 80-130 cm long and 3.0-8.0 cm wide, stamens 6-20 per flower

6. Fruits 7-9 cm long, 3-7 seeded
7. Petals of male flowers lanceolate, broader below gradually narrowed above, stamens 7-10 per flower, fruit 7-8 cm long, 3 seeded, middle pinnae 7-8 cm wide  
 . . . . . Markleya dahlgreniana
7. Petals of male flowers narrowed below, abruptly broadened above, stamens 20 per flower, fruit 8-9 cm long, 3-7 seeded, middle pinnae 4-5 cm wide  
 . . . . . O. macrocarpa
6. Fruits 3-6 cm long, 1-3 seeded
8. Trunk creeping for several m., upright part 3-4 m high, fruit 5-6 cm long, middle pinnae 5-6 cm wide, stamens 6 or 9-12  
 . . . . . O. spectabilis
8. Trunk 20-25 m high, fruit 3-4.5 cm long, middle pinnae 3-4 cm wide, stamens 9-11  
 . . . . . Attalea crassispatha
1. Middle pinnae not clustered, more or less evenly spaced
9. Plants acaulescent or nearly so
10. Middle pinnae 4-9 cm wide and 90-140 cm long
11. Male flowers 10-13 mm long, spirally arranged around rachilla, stamens 16-24 per flower, female flowers 3-4.5 cm long . . . . . O. cuatrecasana
11. Male flowers 5-10 mm long, arranged on one side of rachilla, stamens 6-16 per flower, female flowers 1.5-2.5 cm long
12. Petals of male flowers broader below and gradually narrowed above, stamens 6-8 per flower, fruits 6-7 cm long. . . . . Parascheelea anchistropetala
12. Petals of male flowers usually narrowed below and abruptly broadened above, stamens 11-16 per flower, fruits 3.5-4.5 cm long

13. Male flowers completely encircling rachillae of male spadix, stamens 11-16 per flower, endocarp of fruit mostly without fibers  
 . . . . . O. polysticha
13. Male flowers in 3-5 rows on one side of each rachilla of male spadix, stamens about 12 per flower, fibers in fruit endocarp common  
 . . . . . O. sagotii
10. Middle pinnae 3-4 cm wide and 40-85 cm long
14. Male flowers 9-10 mm long, stamens 22 per flower . . . . . O. pixuna
14. Male flowers 11-14 mm long, stamens 9-18 per flower
15. Stamens 9-13 per flower, male rachillae 5-6.5 cm long, female flowers 1.5-2 cm long and 1 cm in diam  
 . . . . . O. sabulosa
15. Stamens 15-18 per flower, male rachillae 6-12 cm long, female flowers 3 cm long and 2 cm in diam  
 . . . . . O. urbaniana
9. Plants 2-20 m tall
16. Middle pinnae 2.5-4 cm wide and 60-90 cm long, fruit about 7.5 cm long
17. Stamens mostly 24 per flower, trees about 20 m tall when full grown  
 . . . . . O. phalerata
17. Stamens 18-20 per flower, trees up to 8 m tall . . . . . O. teixeiriana
16. Middle pinnae 4-7 cm wide and 90-150 cm long, fruit 6-12 cm long
18. Middle pinnae 4-5 cm wide, male flowers 10-12 mm long, stamens mostly 20 per flower
19. Plants about 10 m tall when full grown, fruits 6-9 cm long and 4-4.5 cm in diam., middle pinnae about

- 110 cm long; male flowers completely surround rachilla  
 . . . . . O. guacuyule
19. Plants 2-5 m tall, fruits about 9 cm long and 6.6 cm in diam, middle pinnae about 80 cm long; male flowers arranged on one side of the rachilla  
 . . . . . O. macrocarpa
18. Middle pinnae 5-7 cm wide, male flowers 13-15 mm long, stamens mostly 24 per flower
20. Trees about 20 m tall when mature, fruits 9-12 cm long with 3-6 seeds, middle pinnae about 150 cm long; male flowers arranged in two rows on one side of rachilla  
 . . . . . O. barbosiiana
20. Trees about 6 m tall when mature, fruits 7-8 cm long with one seed, middle pinnae about 120 cm long; male flowers completely surround rachilla  
 . . . . . O. cohune

ORBIGNYA Mart. ex Endlicher, Gen. Pl. 257. 1837 (Conserved name).  
Orbignya Bertero, Mercurio Chil. 16: 737. 1829 (Euphorbiaceae).  
 Type species: Orbignya phalerata Mart.

#### ORBIGNYA

#### Alphabetical List of Species

- O. barbosiiana Burret, Notizbl. 11:690. 1932; H.E. Moore, Principes 7:155. 1963.  
 Type: published as a new name for O. speciosa (Mart.) Barb. Rodr. mainly because of confusion with O. cohune (Mart.) Dahlgren. by Barbosa Rodrigues.  
Attalea speciosa Mart., Hist. Nat. Palm 2:138, t. 96, fig 3-6. 1826; Wessels Boer, Indig. Palms Suriname, 164-165. 1965.  
Orbignya speciosa (Mart.) Barb. Rodr., Pl. Nov. Cult. Jard. Bot. Rio de Jan. 1:32, t. 9, fig B1-9. 1891; Sert. Palm. Bras. 1:t. 52-53, 1903; Burret, Notizbl. 10:503-505, t. 9. 1929.  
 Type: Brazil, Maranhão and Pará (no specimens cited)  
O. lydiae Drude, Mart. Fl. Bras. 3:448, t. 102. 1881; Lindman, Bih. Sv. Vet. Akad. Handl. 26:fig 8. 1900; Dahlgren, pl. 341. 1959. Attalea lydiae (Drude) Barb. Rodr., Sert. Palm. Bras. 1:65. 1903.

Lectotype: Brazil, native to Pará, Cult. Rio de Janeiro (Glaziou 9006-C). c.f. Dahlgren 1959, pl. 341.

O. martiana Barb. Rodr., Palm, Mattogross. 68, t. 22, t. 23, fig 1-14. 1898.

Type: published as a new name for O. speciosa because of incomplete descriptions (no flowers) by Martius and uncertainty of its delimitation by subsequent authors; in 1903, however, O. martiana was transferred back to O. speciosa.

O. macropetala Burret, Notizbl. 10:507. 1929.

Holotype: British Guiana, Rupununi (Schomburgk s.n. - B).

O. oleifera Burret, Notizbl. 14:240. 1938; 15:103. 1940.

Holotype: Brazil, Minas Gerais, Pirapora (Burret 19-B).

Specimens examined: Brazil, without locality and collector (F-614714), (F-614748); Pará, Tapajos, Kuhlmann 2203 (F-611585), Capucho 537 (F); São Luiz, Dahlgren s.n. (F-615321); Mujuhy dos Campos, near Santarem, Dahlgren s.n. (F-615318); Ceara, Serra de Baturite, Dahlgren s.n. (F-613570); Pacoty, Dahlgren s.n. (F-619725); Mato Grosso, region of Rio Machado, Angustura, Krukoff 1600 (F-620732); Minas Gerais, Pirapora, Burret 19 (B, holotype of O. oleifera; Burret 19 & Brade-RB). Surinam, Palaime Kreek, 20 km. W. of Sipaliwini, Wessels Boer 806 (U); Coeroeni R., in subhydrophytic forest, Wessels Boer 1588 (U). British Guiana, Rupununi, Schomburgk s.n. (B, holotype of O. macropetala). Cultivated, Brazil, Belem, prop. Alvaro Alfredo, Dahlgren s.n. (F-615317); British Guiana, Georgetown Bot. Garden, L.H. Bailey 509 (BH), Dahlgren s.n. (F-610806); Brazil, Rio de Janeiro, Passeio Publico, Glaziou 9006 (C, lectotype of O. lydiae; NY, P).

Vernacular names: Babassu, Babaçu, Uaussu, Baguaçu, Guaguaçu.

Distribution: Brazil, Maranhão, Pará, Minas Gerais, Mato Grosso; Surinam and British Guiana.

Orbignya barbosiana was published as a new name by Burret (1932) for O. speciosa because the latter species was confused with O. cohune (a Central American palm) by Barbosa Rodrigues (p. 32, t. 9, fig 1-9. 1891; p. 16, t. 5B, 1896) and subsequent authors. Moore (1963) was one of the first authors to recognize O. barbosiana as the valid name, whereas Wessels Boer (1965) considered it to be a superfluous name. There is a fundamental difference between the two species in question: O. barbosiana has male flowers on one side of the rachilla, while male flowers surround the rachilla in O. cohune.

Barbosa Rodrigues (1898) published O. martiana as a new name for Attalea speciosa Mart. because the latter was based on inadequate

descriptions as well as incomplete collections. Neither Martius (1826, 1844, 1845, 1853), Wallace (1853), Spruce (1871), Trail (1876), nor Drude (1881) described or collected flowers from this species; but in 1898 Barbosa Rodrigues fully described and illustrated specimens he had personally collected. At the time the following distributional information was also given: "Brazil; equatorial and oriental, in silvis Rio Arinos, serra dos Parecis, Rosario, Rio Cuiyaba, S. Miguel das Areias, Tombador, in Mato Grosso. Also in woods near Rios Tapajos, Madeira, Purus, near upper Rio Amazonas; cultivated in Jardim Botânico Rio, no. 1398. Extends from the Guianas to the forests of Amazonas entering Mato Grosso (forming large forests) and continuing into Bolivia." After some deliberation, Barbosa Rodrigues (1903) decided to transfer O. martiana back to his original combination of O. speciosa.

Barbosa Rodrigues (1898) also considered O. lydiae Drude to be conspecific with O. martiana because Drude (1881) had described this species from incomplete collections as well as including incorrect information on its morphology. Furthermore, Drude could not adequately compare his material with Attalea speciosa since it was incompletely known at the time. After Drude published his article, Barbosa Rodrigues made complete collections (unfortunately none of these specimens has been located) from the original tree in Passeio Publico, Rio de Janeiro, and after studying these specimens decided that O. lydiae was synonymous with the "Bagaçu" of Mato Grosso and "Jauassu" of Amazonas. He also noted that the plant described as "acaulous" had actually grown into a large tree. In spite of his discussion in 1898, Barbosa Rodrigues (1903) apparently still recognized O. lydiae as a distinct species because he transferred it to the genus Attalea. Lindman (1900) illustrated this species in a palm forest, with the caption: "Oauassu," the largest and most beautiful palm in Mato Grosso. Moore (1963) says that this taxon is incompletely known, however, I am tentatively treating O. lydiae as a synonym of O. barbosiana because a comparison of the two species reveals many similarities.

Burret (1938) described O. oleifera as a new species to distinguish it from O. barbosiana, and further stated this was the Babassu palm from whose seed oil is extracted. He said he inadvertently included O. oleifera under his discussion of O. martiana in 1929 when he referred to t. 53, fig. 23-25 (1903) of Barbosa Rodrigues which is the same as t. 22 (1898) of the same author. The remaining parts of these plates (t. 53, fig 13-22, 1903; and t. 23A, 1898) pertain to O. barbosiana. Unfortunately, Burret did not indicate any significant differences between the two taxa in either article (1938, 1940); his description of O. oleifera is rather sketchy (e.g., size of pinnae, male and female flowers and spadices are lacking, as well as size of the

tree); and type specimens consist only of leaf material. Burret (1940) also cites Hopp 3013 (B) from Mato Grosso, but I was unable to locate this specimen. Also there is no information on the distribution range of this species except for that given in the cited specimens.

O. campestris Barb. Rodr., Palm. Mattogross. 78. t. 25. 1898; t. 50B. 1903.

Lectotype: Brazil, Mato Grosso, Capão Bonito (t. 25, 1898). c.f. Glassman 1972, p. 178.

Vernacular names: Indaya verdadeiro, Indaya redondo.

Distribution: Brazil, described from the state of Mato Grosso.

Barbosa Rodrigues (1898) lists B.R. 240 under this species, but no specimens have been located. Therefore, the above lectotype was designated. Even though authentic specimens have not been examined, this taxon seems to be distinct based on its description.

During early September, 1976, I visited Capão Bonito, presumably the type locality of this species and apparently that of O. longibracteata Barb. Rodr. and O. macrocarpa Barb. Rodr., as well. This locality is between Sidrolândia and Maracaju within the boundaries of Fazenda Santa Luzia. It is a heavily wooded area surrounded on all sides by agricultural land. Although several kinds of palms grew in the region in the past, none are found there today (with the exception of scattered specimens of a short species of Butia). This is another sad example of destruction of palm habitats by the rapid spread of agriculture in the state of Mato Grosso.

O. cohune (Mart.) Dahlgren ex Standley, Trop. Woods 30:3. 1932; Burret, Notizbl. 11:688. 1932; Standley & Steyermark, fig. 46, 1958. Attalea cohune Mart., Palmet. Orbign. 121. 1844; t. 167. 1845.

Lectotype: Honduras (Martius t. 167. 1845) c.f. Glassman 1972, p. 23.

O. Dammeriana Barb. Rodr., Sert. Palm. Bras. 1:62, t. 54. 1903.

Lectotype: Brazil, cult. Jard. Bot. Rio (Glaziou 16468-B).

Specimens examined: British Honduras, Punta Gorda, H.W. Turner s.n. (F); without locality, J.B. Kinloch s.n. (F); Stann Creek Valley, P.H. Geortle 3234 (B-photo of male spadix). Honduras, Puerto Sierra, P. Wilson 472 (F); Dept. Atlantida, Lancetilla Valley, near Tela, wet forest, Standley 53981

(F); vicinity of Lancetilla, forests, T.G. Yuncker 4970 (F). Guatemala, Dept. Izabal, between Virginia & Lago Izabal, Steyermark 38771 (F); between Bananera & La Presa, Steyermark 39182, 39210 (F); Dept. Alta Verapaz, woods S.E. of Finca Yalpemech, Steyermark 45211, 45693 (F). Cultivated, Cuba, Soledad, Atkins Gardens, Dahlgren 4619 (F); British Guiana, Georgetown Botanical Gardens, Dahlgren s.n. (F-610577, 610649, 610772, 610697). Brazil, Jard. Bot. Rio, Glaziou 16468 (B, lectotype of O. dammeriana; C. MO, P).  
 Vernacular Names: Cohune - Honduras. Manaca, Corozo - Guatemala.

Distribution: British Honduras, El Salvador, Honduras, Guatemala and? Southern Mexico (Quintana Roo & Campeche).

No specimens were cited by Martius (1844) in his original description nor could any herbarium material be found in Munich; hence, the selection of t. 167 as the lectotype.

Barbosa Rodrigues (1903) did not cite any specimens for Orbignya dammeriana, however, Burret (1929) said that Glaziou 16468 (B), erroneously cited as 16488, probably came from the "type tree" in Jardim Botânico, Rio de Janeiro. The error of citing Glaziou 16488 was perpetuated by both Dahlgren (1936) and Glassman (1972). There is no conclusive proof that Glaziou 16468 (B) actually came from the "type tree," nevertheless I have chosen it as the lectotype rather than an illustration of the plant. According to Burret (1929), O. dammeriana was originally included under O. speciosa (Mart.) Barb. Rodr. when it was transferred from Attalea to Orbignya by Barbosa Rodrigues (t. 9, fig. 1-9, 1891).

According to Moore (1960), pls. 336-338, listed as O. cohune by Dahlgren (1959), are actually O. guacuyule. Both species were previously thought to be synonymous, but were differentiated by Hernandez Xolocotzi (1949).

O. cuatrecasana Dugand, Caldasia 2:285, fig. p. 286. 1943;  
Cuatrecasas, pl. 2, fig. 2. 1947.  
 Holotype: Colombia, Dept. del Valle, Rio Naya (Cuatrecasas 13980-COL).

Specimens examined: Colombia, Dept. del Valle, Rio Naya, Puerto Merizalde, bosque, Cuatrecasas 13980 (COL, holotype; F, isotype); alrededores de Puerto Merizalde, I. Barreto & L.A. Kairuz s.n. (COL); Rio Calima (Choco region), La Trojita, Cuatrecasas 16389 (F); Rio Calima Quebrada de la Brea, R.E. Schultes & M. Villareal 7373 (GH); Aqua Dulce, Buenaventura, O.F. Cook 81 (US).

Vernacular names: Palma Corozo, Taparo Grande.

Distribution: Endemic to Colombia in forested areas along Pacific Coast.

This species is the only Orbignya known from Colombia. It is distinct in being acaulescent, with unclustered pinnae up to 9 cm wide, male flowers spirally arranged around the rachilla, and stamens 16-24 per flower. Dugand placed it in section Spirostachys of Burret (1929) characterized by having male flowers spirally arranged around the rachillae rather than on one side.

O. eichleri Drude, Mart. Fl. Bras. 3:449, t. 103. 1881.

Lectotype: Brazil, Goias, Sertão d'Amaroleite (Weddell 2705 - P); c.f. Dahlgren pl. 339. 1959 (excluding leaf).

Specimens examined: Brazil central (Goias), Sertão d'Amaroleite, Weddell 2705 (P, lectotype - excluding leaf); Maranhão, Caxias, Bondar s.n. (F, RB-80812); Maranhão, Ilha dos Botes, J. Murça Pires & G.A. Block 1575a (NY).

Vernacular names: Piassava, Piassaveira, Pindoba.

Distribution: Native to Brazil in states of Goias and Maranhão, and probably Piauhuy.

In 1881, Drude cited both Gardner 2755 from Piauhuy and Weddell 2705; however, only Weddell 2705 (P) has been located, which has the following inscription: "Original at Kew." Since Weddell 2705 (P), consisting of a male spadix and whole leaf, is the only specimen found among those cited by Drude, it has been chosen as the lectotype. The leaf should be excluded from the type, however, because it is certainly not an Orbignya, but most probably is Syagrus flexuosa (Mart.) Becc.

Burret (1929) cited Snethlage 648 (B) from Piauhuy under O. eichleri, but after examining this specimen I could not be sure of its identity because it lacks male flowers and middle pinnae.

Bondar (1954) keyed out three closely related Brazilian species of Orbignya: O. speciosa, O. teixeirana and O. eichleri. One of the characteristics he used to distinguish O. speciosa from the other two taxa was male flowers completely surrounding rachilla rather than arranged on one side of rachilla. Apparently, Bondar perpetuated the error of confusing O. speciosa (= O. barbosi) with O. cohune because, in fact, the former species has male flowers on one side of the rachilla, whereas in O. cohune they surround the rachilla.

O. guacuyule (Liebm. ex Mart.). Hernandez X, Bol. Soc. Bot. Mex. 9:17, 1949; Dahlgren, pl. 336-338, 1959. Cocos guacuyule Liebm. ex Mart., Hist. Nat. Palm. 3:323. 1853.  
Lectotype: Mexico, Oaxaca, pr. Guatulco (Liebmann 6559-C); c.f. Dahlgren, pl. 338. 1959.  
Cocos Cocoyule Mart., Hist. Nat. Palm. 3:324. 1853.  
Lectotype: Mexico, Acapulco (Karwinski s.n.-M).

Specimens examined: Mexico, Dept. Oaxaca, pr. Guatulco, Liebmann 6559 (C, lectotype of Cocos guacuyule); Oaxaca, San Benito, 50-60 m tall, B.P. Reno 3462 (US, photo); Acapulco, Karwinski s.n. (M, lectotype of C. cocoyule); Rio Verde, Pinotepa a Puerto Escondido, deciduous forest, T.D. Pennington & J. Sarukhan K. 9488 (NY); Guerrero, near El Papayo, H.E. Moore & E. Valiente 6199 (BH); State of Nayarit, rich woods outside San Blas, H.E. Moore & V. Cetto 6405 (BH); Colima, road to Manzanillo, H.E. Moore 8166 (BH).  
Vernacular names: None recorded, but the specific epithet guacuyule was probably based on a local native name.  
Distribution: Native to Mexico in the states of Oaxaca, Guerrero, Michoacan, Colima, Jalisco and Nayarit.

No specimens were cited in Martius (1853), hence lectotypes were selected for both C. guacuyule and C. cocoyule.

Many authors considered this taxon to be conspecific with O. cohune (including Dahlgren, pl. 336-338, 1959), but according to Hernandez X (1949), they are distinct species with an essentially allopatric distribution. The latter author distinguishes O. guacuyule from O. cohune mainly by the male flowers having spatulate, acuminate petals 1.2 cm long and 0.5 cm wide, rather than oblanceolate, cuspidate petals 1.5 cm long and 0.7-0.9 cm wide. In both species, however, male flowers completely surround the rachilla rather than being distributed on one side of the rachilla, characteristic of most species of Orbignya.

O. humilis Mart., Palmet. Orbign. 129, t. 10-2, t. 32. 1844; t. 169-1, 1845; t. Z16-3, 1849.  
Type: Bolivia, Prov. Chiquitos, prope Mission S. Anna de los Chiquitos, sandy soil (d'Orbigny 22-P, destroyed?).

Specimens examined: Doubtful, Bolivia, Velasco, Otto Kuntze s.n. (NY, US).

Unfortunately, no type material has been located in the herbarium at Paris. This taxon appears to be closely related to Orbignya eichleri Drude because descriptions and illustrations of the two

species are similar. Both taxa, however, are incompletely known (especially information on middle pinnae is lacking); therefore they cannot be adequately differentiated.

In the above cited specimens (Kuntze s.n.) male and female flowers seem to match those of illustrations of O. humilis, but most of the leaf material from (NY) is probably Syagrus flexuosa rather than Orbignya.

O. longibracteata Barb. Rodr., Palm. Mattogross. 79, t. 26, 1898; t. 51, 1903; Burret, Notizbl. 15:103. 1940.  
Lectotype: Brazil, Mato Grosso, Capão Bonito, fere Serra do Melgaço (t. 51, 1903).

Specimens examined: Doubtful. Brazil, Mato Grosso, Hopp 3002 (B) - leaf part and two photos.

Vernacular names: Indaya mirim, Indaya crespo, Inaja.

Distribution: Described from Brazil in the state of Mato Grosso.

Barbosa Rodrigues (1898) cited B.R. 239 for this taxon, but no specimens have been located; hence, the selection of t. 51, 1903, as lectotype.

Burret (1940) cited Hopp 3002 with the following information: 140 S. Lat., characteristic palm of the dry forest steppe of Mato Grosso. I have seen this specimen which is presently represented only by a leaf part and two photos, one of a living plant growing out of rocks, and the other photo of a herbarium specimen (probably destroyed) with a leaf part, fruit and androgynous spathe.

Apparently, this species was described as new because of its long acuminate bracts subtending female flowers; however, O. macrocarpa also has long bracts, whereas the bracts of O. campestris are described as "magna minuto." When descriptions of the three taxa mentioned above are compared, they appear to be very similar. It is therefore possible that they may be conspecific, especially since the type locality of all three is listed as Capão Bonito.

The slight differences between them may be merely due to insufficient information. So far, no authentic specimens have been seen for any of the species.

O. macrocarpa Barb. Rodr., Palm. Mattogross. 74, t. 23-24B. 1898; t. 50A. 1903.

Lectotype: Brazil, Mato Grosso, Capão Bonito prope Serra Quebra Cabeça (t. 23-24B, 1898). c.f. Glassman 1972, p. 172.

Specimens examined: Doubtful. Brazil, Mato Grosso, Flussgebiet des Amazonas, stemless, W. Hopp 3011-B, destroyed; F, photo).

Vernacular names: Indaya - assu.

Barbosa Rodrigues (1898) cited B.R. 217, but no specimens were located necessitating the selection of a lectotype from an illustration (see above).

The specimens cited above (Hopp 3011) consisted of a leaf part and an androgynous spathe, but it is difficult to determine with certainty the photograph of this specimen.

As previously mentioned, this taxon may be synonymous with O. campestris and O. longibracteata because of similar type locality and similar morphology. Although all three taxa are recorded from Capão Bonito, Serra do Melgaço is also listed for O. longibracteata and Serra Quebra Cabeça is mentioned for O. macrocarpa as well. Since the two additional locales could not be found on any maps examined, it is not certain if all three place names recorded from Capão Bonito are in the same general vicinity of each other or are actually three different, isolated localities.

O. phalerata Mart., Palmet. Orbign. 126, t. 13-2, 32A. 1844; t. 170, 1845; Karsten & Schenck, t. 35-36. 1910.

Holotype: Bolivia, 12-16° S. lat. in north. part of prov. of Chiquitos and in Moxos. Forms immense forests of pure stands in the land of the Guarayos covering about 10 square miles (d'Orbigny 20-P).

Specimens examined: Bolivia, Chiquitos, d'Orbigny 20 (P, holotype; F, M, isotypes).

Vernacular name: "Cusi."

Distribution: Bolivia, in sandy, wet but not flooded soils.

This taxon is the first one described in the genus Orbignya; hence, it is the type species.

Unfortunately, I have not seen any material referable to this species except the type collections. The specimen from Paris consists of an androgynous spadix with sterile (immature?) female

flowers closely matching t. 32 and t. 170 of Martius. The isotype from Munich contains only male flowers. No leaf material has been seen by me nor is any illustrated by Martius.

Karsten & Schenck (1910) show two photos of this palm growing in forested areas. Plate 35 was taken in Velasco. Previously, I cited a doubtful specimen, O. Kuntze s.n. (NY, US) from Velasco under O. humilis, the only other species of Orbignya described from Bolivia. According to descriptions and illustrations, the two species appear to be distinct (the type specimen of O. humilis could not be found). But since there is a paucity of herbarium specimens, especially leaf material, it would be difficult to carefully compare and contrast both taxa.

Burret (1929) referred to O. phalerata, but most of the information was repeated from Martius's original description.

Martius (1844) mentioned that the seeds yield an excellent oil for burning and for the hair, and that the leaves make a good thatch for roofs.

O. pixuna (Barb. Rodr.) Barb. Rodr., Prot. App. 49. 1879; t. 49. 1903. Attalea pixuna Barb. Rodr., Enum. Palm. Nov. 43. 1875. Lectotype: Brazil, Pará, calcareous soils of l'Igarape Bom Jardim, villa de Itaituba, basin of Rio Tapajos (t. 49, 1903). c.f. Glassman 1972, p. 26.  
Attalea spectabilis var. polyandra Drude, Mart. Fl. Bras. 3:440. 1881.  
Type: Brazil, Rio Purus (Wallis s.n. - K, destroyed?).

Specimens examined: Doubtful. Brazil, Pará, Boa Vista, Tapajoz, Capucho 523 (F); Tapajoz, Kuhlmann s.n. (F-611560).  
Vernacular names: Curua-pixuna, Palha preta.  
Distribution: Brazil, in state of Pará.

No specimens were cited by Barbosa Rodrigues in any of his articles, hence the selection of t. 49 as the lectotype.

This species appears to be distinct according to its description and illustration, however, no authentic specimens have been examined. The two specimens cited above consist of fruits only and hence cannot be determined with certainty.

O. polysticha Burret, Notizbl. 11:324. 1932.

Holotype: Peru, Dept. Loreto, Mishuyacu near Iquitos

(G. Klug 205 - US).

Specimens examined: Peru: Dept. Loreto, Mishuyacu, near Iquitos, forest, G. Klug 205 (US, holotype; F); Loreto, Santa Rosa, lower Rio Huallaga, E.P. Killip & A.C. Smith 28814 (NY, US). Venezuela, Terr. Fed. Amazonas, Rio Orinoco, San Pedro, sabanita and bosque, G.S. Bunting, L.M. Akkermans & J. van Rooden 3571 (U); Brazo Casiquiare, near Solano, tropical rainforest, on white sandy soil, Wessels Boer 2409 (U); near San Carlos de Rio Negro, white sandy soil, Wessels Boer 2273 (U).

Vernacular Names: Catirina (Peru), Mavaco (Venezuela).

Distribution: Peru and Venezuela, mostly in Amazon region in tropical rainforests.

Burret (1932) also cited Killip & Smith 28814 (see above) as probably belonging to this species. He also placed O. polysticha in group Spirostachys where the male flowers completely surrounded the rachillae of the male spadix. In this respect, O. polysticha is similar to O. cuatrecasana from Colombia.

Wessels Boer (1972) listed this species as Attalea polysticha from Venezuela, but the name is invalid because the basionym (O. polysticha) was not mentioned in the article.

O. sabulosa Barb. Rodr., Vellozia 1 ed. 1:54. 1888; t. 48. 1903; Burret, 510. 1929.

Lectotype: Brazil, Prov. Amazonas, in sandy pastures near Rio Tarumauacu, in Rio Negro (t. 48, 1903). c.f. Glassman 1972, p. 180.

Specimens examined: Doubtful. Brazil, Amazonas, Manaus, Rio Negro, Huebner s.n., Huebner 4a, Huebner 100, 100a, 100x (B); Amazonas, basin of Rio Negro - Rio Cuieras, savanna forest on sand, Prance, Coelho & Monteiro 14830 (NY).

Vernacular names: Curua, Inaya, Pindova

Distribution: Brazil, Amazon region, in savannas on sandy soil.

No specimens were cited by Barbosa Rodrigues in any of his articles, hence an illustration (t. 48) was chosen as the lectotype.

Burret (1929) cites Huebner 74, 74a (4, 4a?), 100, 100a under this taxon. I have examined some of these specimens (see above), but I cannot be certain of their identity because the collections are incomplete, for the most part. To complicate matters, Wessels Boer (1965) claims that Huebner 4 and Huebner 100 (B) are actually O. sagotii Trail, a closely related species, because there was a discrepancy between these specimens and the original

description of O. sabulosa.

Prints of two photographs of O. sabulosa taken by George Huebner in Manaos in 1935 are deposited in the Field Museum Herbarium. One photo (460061) shows a whole stand of acaulescent plants while the other is a closeup of a male spadix and an infructescence emerging between the leaves at the base of the plant.

O. sagotii Trail ex Im Thurn, Timehari 3:276. 1884. Attalea sagotii (Trail ex Im Thurn) Wessels Boer, Indig. Palms Suriname 162. 1965.

Lectotype: French Guiana, Karouany (Sagot 831 - K. Erroneously inscribed on herbarium sheet as 631). c.f. Wessels Boer 1965, p. 162.

Specimens examined: French Guiana, Karouany (Sagot 831-K, lectotype; P, isolectotype); Sagot 601 (K, P). Surinam, without locality, Wessels Boer 165, 708, 1440, 1493 (U); Lindeman 6902 (U); vicinity of Zanderij, wet forest on silt loam, Wessels Boer 276 (U); Dist. Brokopondo, high forest, Wessels Boer 392 (U); Bakhuis Mts., P.A. Florschutz & P.J.M. Maas 2960 (U).

Vernacular names: Macoupi, Bergi-Maripa, Koeroea.

Distribution: French Guiana, Surinam and British Guiana.

No specimens were cited by Trail (1884) in his original article; therefore, a lectotype was chosen by Wessels Boer (1965) in his book on Surinam palms. Both Sagot 831 (K) and Sagot 601 (K) were annotated by Trail in 1877 as "O. sagotii n. sp." In addition to this, Drude (1881) incorrectly cited the above numbers under Attalea spectabilis var. monosperma.

Wessels Boer (1965) states that this species is apparently close to O. sabulosa and O. agrestis, both much smaller palms.

O. spectabilis (Mart.) Burret, Notizbl. 10:508. 1929. Attalea spectabilis Mart. Hist. Nat. Palm. 2:136. t. 96. fig. 1-2. 1826; t. 216. 1849; Wessels Boer, 1965.

Type: Brazil, Prov. Pará, Serra de Baru, near Pará and Rio Negro (Martius s.n. - M, not seen). c.f. Burret 1929, p. 508.

Specimens examined: Doubtful. British Guiana, Cult. Georgetown Bot. Garden, Dahlgren s.n. (F-610583), Dahlgren & Millar s.n. (F-610759), L.H. Bailey 489 (BH). French Guiana, Macoupi, Gourdonville, R. Benoist 1707 (P). Surinam,

Rechter Coppename River, on riparian bank, Wessels Boer 1365 (BH,U), near Tafelburg, sandstone rocks, in submesophytic forest, Wessels Boer 1503 (BH, U). Brazil, Amazon, Spruce 32 (K); state of Amazonas, Manaus - Itacoatiara Highway, Reserva Florestal Ducke, forest, G.T. Prance et al 2155 (NY); Para, Monte Alegre, Krukoff 36 (F-614554).

Vernacular names: Curua piranga, Piuna inquirá, Pindoba das Mattas.

Distribution: Surinam, French Guiana and the Amazon region of Brazil in wet forests.

No specimens were cited by Martius in any of his articles. According to Burret (1929), however, he saw a specimen of a rachilla branch with female flowers collected by Martius and labelled A. spectabilis in the herbarium at Munich. But Burret said the collection was actually Orbignya agrestis and noted that it was not determined by Martius. Unfortunately, neither Wessels Boer (1972) nor I have been able to find this particular specimen.

Burret also discusses the incomplete and sometimes confusing description of Martius (1826). He wondered if Martius was describing two species, especially in the size - "acaulescent to several feet tall" - and in the number of stamens - "6 as well as 9-12." It was surprising that Martius did not describe the stamens in detail (i.e., if the anthers were coiled or straight), but he may have had sterile flowers and did not realize he was dealing with a different genus (Orbignya) which he later erected in 1837. Burret (1929) also mentions that Drude (1881) confused this taxon with Maximiliana attaleoides.

I am still not certain of the exact delimitation of O. spectabilis. Martius's description is not clear if the pinnae are clustered or not. Wessels Boer (1972, & unpublished ms.) describes them as being in clusters of 2-3, but in several collections examined they are not clustered (e.g., Prance et al 2155, Dahlgren & Millar s.n., L.H. Bailey 489, and R. Benoist 1707). In addition to this, the number of stamens per male flower is uncertain. Wessels Boer describes them as 6-9 stamens per flower, but in Prance et al. 2155, there are 12 stamens in most of the flowers.

O. teixeirana Bondar, Arq. Jard. Bot. Rio de Janeiro 13:58, fig. 5, 6-3, 1954.

Holotype: Brazil, Maranhão, Caxias (Bondar s.n. - RB-80813).

Specimens examined: Brazil, Maranhão, Caxias, Bondar s.n. (RB- 80813, holotype); Bondar s.n. (F-405257).

Vernacular names: Perinão, Coco de Macacao.

Distribution: Brazil, states of Maranhão and Piauí.

According to Bondar (1954), this species is also found in the state of Piauí, near Terezina, in margin of Rio Paranaíba. He also states that it is probably a hybrid between O. barbosiana (O. speciosa) and O. eichleri, which are both present in the vicinity of the type locality. More collections of this taxon should be examined before this can be verified, because O. teixeirana apparently most closely resembles O. phalerata from Bolivia, which is also poorly known.

O. urbaniana Dammer, Engl. Bot. Jahrb. 31, Beibl. 70:23. 1902; Dahlgren, pl. 344. 1959.

Holotype: Brazil, Goiás, Serra Dourada, in campis (Glaziou 22265-C).

Specimens examined: Brazil, Goiás, Glaziou 22265 (C, holotype; F, G, P, isotypes).

Distribution: Brazil, state of Goiás.

Even though Dammer did not designate the herbarium in which Glaziou 22265 was deposited, the specimen from (C) is inscribed O. urbaniana U. Dam. n. sp., det. by U. Dammer. The other specimens from (F, G and P) do not bear such information. Therefore, the collection from (C) is the holotype.

Burret (1929) cited Glaziou 22265 (B), but this specimen was probably destroyed, as it could not be found.

Dammer (1902) said that O. urbaniana is close to O. lydiae (= O. barbosiana), but like many other species of Orbignya, it is difficult to make comparisons of taxa based on few or incomplete collections.

#### Species definitely not Orbignya

Orbignya dubia Mart., Hist. Nat. Palm. 3:304, t. 169-6. 1845  
= Attalea dubia (Mart.) Burret, Notizbl. 10:537. 1929.

Male flowers of this taxon definitely belong to the genus Attalea, i.e., flattened petals with acute or acuminate tips and straight rather than coiled anthers.

## Species Incertae et Dubiae

Orbignya agrestis (Barb. Rodr.) Burret, Notizbl. 10:511. 1929.

Attalea agrestis Barb. Rodr., Enum. Palm. Nov. 42. 1875;  
Sert. Palm. Bras. 1:t. 55. 1903.

Lectotype: Brazil, Amazonas region, sandy soil, Rio Uanincha,  
affluence of Rio Yamunda (t. 55, 1903). c.f. Glassman  
1972, p. 22.

Barbosa Rodrigues (1875) cited Barb. Rodr. 324, but apparently  
this specimen has been destroyed; hence the selection of t. 55  
as the lectotype.

It is difficult to determine the genus because male flowers  
are not mentioned in the descriptions and not illustrated in  
t. 55. Burret (1929) transferred this species to Orbignya  
because of its resemblance to O. sabulosa Barb. Rodr. He also  
cites Huebner 4b (B) from Manaus, which consists of immature  
fruits and leaf parts. I have examined this specimen and do not  
consider it to be diagnostic.

O. huebneri Burret, Notizbl. 10:501. 1929.

Holotype: Brazil, Amazonas, Lago Mondurucú, Rio Manacapuru,  
Solimões (Huebner 64-B)

The holotype consists of fruit and leaf material, but no male flowers  
were collected or described. Burret suggests a resemblance to  
O. speciosa (= O. barbosiana), but says that the two species differ  
mainly in the structure of the fruit and in the period of flowering.

Burret (1929) refers to photographs of this taxon, but none were  
published in his article. Prints of three photographs of O. huebneri,  
taken by George Huebner in Manaus in 1935, are deposited in the  
Field Museum Herbarium. One photo (460060) illustrates a  
juvenile acaulescent plant with extremely long leaves, whereas  
the other two (460058-59) show mature trees about 13 m tall  
with unclustered pinnae.

Another collection possibly belonging to this species was  
determined by Burret: Mus. Goeldi Garten, Capt. H.A. Johnstone  
1038 (B). It consists of mature fruits and naked androgynous  
rachillae.

Orbignya huebneri is probably synonymous with O. barbosiana,  
but should remain a species dubia until additional material  
from the type locality, especially male flowers, can be studied.

O. macrostachya Drude nomen in Sceda ex Barb. Rodr., Sert.  
Palm. Bras. 1:60. 1903; c.f. Burret 1929, p. 513.

This entry is based on a herbarium specimen (Glaziou 16488-BR) determined by Drude as a new species, and labelled as such, but a description was never published. Burret (1929) listed this name as a synonym of O. dammeriana Barb. Rodr. and cited Glaziou 16488. The latter specimen has been erroneously cited as the type of O. dammeriana by Dahlgren (1936) and Glassman (1972), but the type of this species is actually Glaziou 16468-B (see discussion of synonymy under O. cohune). Glaziou 16488 (BR) consists of two sheets with part of a male spadix and male flowers, but the specimens are undoubtedly an undetermined species of Scheelea. Because O. macrostachya has no published description and is actually a species of Scheelea, it should be designated as nomen nudum et confusum.

O. microcarpa (Mart.) Burret, Notizbl. 10:507. 1929.  
Attalea microcarpa Mart. Palmet. Orbign. 125. 1844;  
t. 168-2, 1845; t. 216-5. 1849.  
Type: Brazil, Para' (no specimens cited).

Burret (1929) indicated that the spadix illustrated in t. 168 was in the collections at Munich. However, I have not seen any specimens from that herbarium labelled A. microcarpa.

Burret had no justification for transferring the name to Orbignya because male flowers and leaves were neither described nor illustrated. Therefore, its status is uncertain.

O. racemosa (Spruce) Drude, Mart. Fl. Bras. 3:448. 1881;  
Dahlgren, pl. 343. 1959. Attalea racemosa Spruce,  
Journ. Linn. Soc. 11:166. 1871.  
Holotype: Venezuela, between Rio Negro and Guasie  
(Spruce 54-K).

The genus to which this species belongs is uncertain because male flowers were not described by Spruce (1871) or Drude (1881). Type specimens from Kew and Paris are without male flowers, as well.

Wessels Boer (1972) equates Attalea racemosa with A. ferruginea, probably because both have pinnae with ferruginous

margins and both species come from the Rio Negro region of Venezuela. At present, there is insufficient evidence to definitely lump these two species together.

Species closely related to Orbignya, but which probably belong to distinct genera

Attalea crassispatha (Mart.) Burret, Sv. Vet. Akad. Handl. 6:23, t. 8-11. 1929b; Bailey, fig. 167-170, 1939.

Maximiliana crassispatha Mart., Palmet. Orbign. 110. 1844.

Lectotype: Haiti (Plumier, Nov. Pl. Amer. Gen. t. 1. 1703); c.f. Dahlgren, 1936, pp. 209-210.

Specimens examined: Haiti, Fond des Negres, E. Ekman 7164 (NY); O. F. Cook s.n. (BH); L. H. Bailey 299 (BH);

L. Figueiras & P. Louis 2785 (F); between Cavaillon and Aux Cayes, H. Loomis & T. Fennell s.n. (US).

Vernacular names: Carossier, Petit coco.

Distribution: Endemic to Haiti.

Since no specimens were cited by Martius, Plumier's Plate was chosen as the lectotype.

Even though this taxon is relatively rare and probably is confined to one region of Haiti, it is very distinct and well-known botanically (except for the male spathe and spadix which apparently has not been described or collected).

Male flowers (from the androgynous spadix) have coiled and twisted anthers, and fleshy, curved petals, suggesting either Orbignya or Parascheelea. Wessels Boer (1971) says that this species, with its 9-11 stamens and twisted anthers, resembles the Markleya staminate flower type. However, all of the flowers I examined from androgynous rachillae have only 6 stamens.

Cook (1939) described this taxon under a new genus, Bornoa (which is invalid, because it was published without a Latin description); and Moore (1963) thought that Cook was perhaps correct in considering it as a distinct genus (from Attalea as well as other allied genera).

MARKLEYA Bondar, Arq. Jard. Bot. Rio de Jan. 15:49-55. 1957.

Type species: Markleya dahlgreniana Bondar.

M. dahlgreniana Bondar, l.c. 50, fig. 1, foto 1-3. 1957.  
Attalea dahlgreniana (Bondar) Wessels Boer, Indig.  
 Palms Suriname 158. 1965.  
 Holotype: Brazil, Pará, Tracuateua, munic of Bragança  
 (Bondar s.n. - RB-95829).

Specimens examined: Brazil, Pará, Bragança, Bondar  
s.n. (RB-95829, Holotype; F, isotype). Surinam,  
 Palaime Creek, Wessels Boer 805 (F, U); near Coeroeni  
 airstrip, Wessels Boer 1587 (F, U).  
 Vernacular name: Perinão.  
 Distribution: Brazil (state of Pará); and Surinam.

In his original article, Bondar speculates that this taxon is probably a hybrid between Orbignya speciosa (= O. barbosi-iana) and Maximiliana regia (= M. martiana), because it grows in conjunction with these two species. Wessels Boer, however, refutes this idea, because the large uniform populations he saw in Surinam produced fertile fruits. Moore (1973) says that Markleya is a possible hybrid and does not list it as a distinct genus in his article on "Major groups of palms."

Male flowers have twisted and coiled anthers like Orbignya, but the petals are flat and curved similar to Parascheelea.

PARASCHEELEA Dugand, Caldasia 1:10. 1940.

Type species: Parascheelea anchistropetala Dugand.  
P. anchistropetala Dugand, l.c. 12, fig. 4-5. 1940.  
 Holotype: Colombia, Vaupes, Cerro de Circasia (Cuatrecasa 7172 - COL).  
P. luetzelburgii (Burret) Dugand, Caldasia 1:24. 1941.  
Orbignya luetzelburgii Burret, Notizbl. 10:1019. 1930.  
 Holotype: Brazil, Amazonas, Jutica Varadouro (Luetzelburg 21969-B).

Specimens examined: Colombia, Vaupes, Circasia, sandy savannah quartzite base, Schultes & Cabrera 19207 (US); Vaupes, Cerro de Circasia, Cuatrecasas 7172 (COL, holotype of P. anchistropetala). Brazil, Amazonas, Jutica Varadouro, Urwald, Luetzelburg 21969 (B, holotype of O. luetzelburgii; M, isotype). Venezuela, Terr. Amazonas, near Santa Rosa de Amanadona, white sandy soil, Wessels Boer 2357, 2374 (F, U).  
 Vernacular names: Curua, Yapo (Colombia); Curuaraua (Venezuela).  
 Distribution: Colombia, Brazil and Venezuela, mostly in Amazon region.

Originally described as a distinct genus from Orbignya mainly because petals of the male flowers are plano-convex and broader below and gradually narrowed above rather than flattened petals narrowed below and abruptly broadened above.

According to Wessels Boer (Palms of Venezuela - unpublished manuscript), Dugand described P. anchistropetala as having a double branched inflorescence, but the type material shows a simply branched spadix. Dugand also observed the resemblance between this species and Orbignya luetzelburgii, but he was reluctant to unite them because of his misinterpretation of the inflorescence. Wessels Boer (1972) also made a new combination, Attalea luetzelburgii (misprinted as "wetzelburgii"), but this name is invalid because the basionym was not listed. He had intended to list it in a subsequent manuscript with full taxonomic treatment of Attalea, sensu latu, but unfortunately, this paper never was published.

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NOTES ON NEW AND NOTEWORTHY PLANTS. C

Harold N. Moldenke

*LANTANA SCABIOSAEFLORA* var. *HIRSUTA* Moldenke, var. nov.

Haec varietas a forma typica speciei ramis novellis dense patenteque hirsutis recedit.

This variety differs from the typical form of the species in having its younger branches and stems densely hirsute with stiffly wide-spreading ochraceous hairs.

The type of the variety was collected by August Weberbauer (no. 7660) in deciduous bushwood in the mountains east of Hacienda Chicama, province Tumbes, Tumbes, Peru, at 700--800 meters altitude, between February 19 and 24, 1927, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collector describes the plant as a shrub, 1 meter tall, with yellow flowers.

*LANTANA SCABIOSAEFLORA* var. *LIMENSIS* (Hayek) Moldenke, stat. nov.

*Lantana limensis* Hayek in Engl., Bot. Jahrb. 42: 166--167. 1908.

*SYNGONANTHUS ELEGANTULUS* var. *GLAZIOVII* Moldenke, Phytologia 36: 35, nom. nud. (1977), var. nov.

Haec varietas a forma typica speciei vaginis dense patenteque hirtellis recedit.

This variety differs from the typical form of the species in having its sheaths densely and conspicuously spreading-hirtellous throughout.

The type of the variety was collected by Auguste François Marie Glazieu (no. 20013) somewhere in Minas Gerais, Brazil, in 1892, and is deposited in the Columbia University herbarium at present on deposit at the New York Botanical Garden.

ADDITIONAL NOTES ON THE GENUS VERBENA. XXIV

Harold N. Moldenke

VERBENA [Dorst.] L.

Additional synonymy: Verbenella Spach, Hist. Nat. Veg. Phan. 9: 237--238. 1840. Glandularia Schau. apud Buek, Gen. Spec. Syn. Candoll. 3: 199. 1858. Verbera Bert. ex Moldenke, Phytologia 36: 47, in syn. 1977.

Additional & emended bibliography: Apul. Barb., Herb., ed. 1. 1480-1483; Anon., Dialogue des Créatures, dial. 30. 1482; Apul. Barb., Herb., ed. 2. 1528; Anon., Bastiment des Receptes, fol. 59 vert. 1544; H. Bock [Tragus], Stirp. Max. Germ. 102, 210, & 211. 1552; Clus., Rar. Stirp. Obser. Hist. 2: 372--373. 1576; Dodoens [l'Ecluse], Hist. Pl. 96 & 97. 1667; P. Herm., Parad. Batav. Prodr. [ed. Warton]. 1689; Dill. in Tay, Synop. Meth. Stirp. Brit., ed. 3, 236. 1724; P. Herm., Mus. Zeyl., ed. 2, 58. 1726; L., Hort. Cliff., imp. 1, 10--11. 1737; Breyn., Prodr. Fasc. Rar. Pl., ed. 2, 2: 100 & 104. 1739; Strand in L., Amoen. Acad. 69: 449. 1756; L., Syst. Nat., ed. 10, imp. 1, 2: 851 (1759) and ed. 10, imp. 2, 2: 851. 1760; Chomel, Abrég. Hist. Pl. Usuel., ed. 6, 1: 143 (1761) and ed. 6, 2 (2): 18, 85--87, & 251. 1761; L., Sp. Pl., ed. 2, 27--29. 1762; Jacq., Obs. Bot. 4: 6--7, pl. 85 & 86. 1771; Ginanni, Istor. Civ. Nat. Pinet. Ravenn. 177. 1774; Chomel, Abrég. Hist. Pl. Usuel., ed. 6 nov., 89, 313, 527, & 637. 1782; Jacq., Select. Stirp. Amer. Hist. 8. 1788; F. Hernandez, Hist. Pl. Nuev. Españ., ed. 1, 1: 139 & 439 (1790) and ed. 1, 3: 3 & 486. 1790; Moebch, Suppl. Meth. Pl. 131 & 150--151. 1802; Chomel, Abrég. Hist. Pl. Usuel., ed. 7, 1: 175 & 495 (1803) and ed. 7, 2: 293 & 488. 1803; Stokes, Bot. Mat. Med. 1: 38--39. 1812; A. Rich., Bot. Méd. 1: 242--243. 1823; Dierbach, Arzneimit. Hippok. 85 & 270. 1824; A. Rich. [transl. G. Kunze], Med. Bot. 1: 381 (1824) and 2: 1302. 1826; Sweet, Hort. Brit., ed. 2, 418--419. 1830; G. Don in Loud., Hort. Brit., ed. 1, 246--247 (1830) and ed. 2, 246--247. 1832; G. Don in Loud., Hort. Brit. Suppl. 1, imp. 1, 602 & 680. 1832; Loud., Hort. Brit., ed. 2, 552, 553, 575, & 602. 1832; A. Dietr., Handb. Pharmaceut. Bot. 114 & 412. 1837; D. Dietr., Taschenb. Arzneigew. Deutschl. 58 & 262. 1838; Baxt. in Lour., Hort. Brit. Suppl. 2: 680. 1839; G. Don. in Loud., Hort. Brit., ed. 3, 246--247. 1839; G. Don in Loud., Hort. Brit. Suppl. 2: 704 & 741. 1839; Loud., Hort. Brit., ed. 3, 575 & 602. 1839; Sweet, Hort. Brit., ed. 3, 768. 1839; Spach, Hist. Nat. Veg. Phan. 9: 227 & 236--241. 1840; Schau. in A. DC., Prodr. 11: 524, 435--557, 614, & 736. 1847; Webb in Hook., Niger Fl. 161. 1849; Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; G. Don in Loud., Hort. Brit. Suppl. 1, imp. 2, 680 & 733. 1850; Anon., Croniqueur du Périgord 120. 1853; F. Lenormant, Bull. Soc. Bot. France 2: 315--320. 1855; Schnitzlein, Iconogr. Fam. Nat. 2: 137 Verbenac. [2], [3], & 137, fig. 4--22 & 30. 1856; Buek, Gen. Spec. Syn. Candoll.

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Swift (1974) tells us that "Verbena is an ancient Latin term for ceremonial foliage rather than a name for a specific class of plants. In post-classical times the name became applied to vervain, probably in connection with medicinal uses". Garcia and his associates (1975) inform us that the vernacular name, "verbena", in Central America is applied also to Browallia americana L. and Salvia occidentalis Sw.

The Fitter work cited in the bibliography above is dated "1974" on the title-page, but was not actually issued until February 17, 1975.

Don (1830) divides the genus into two sections based on leaf characters: Indivisae with undivided leaf-blades, and Trifidae with trifid blades.

The following two taxa described by Sloane (1739) are still puzzling and have not as yet been satisfactorily identified as far as I know:

"VERBENA Americana procumbens, Veronicae aquaticae folio subrotundo, flosculis ad foliorum alas; nobis. Teucrium Americanum procumbens Veronicae aquaticae foliis subrotundis; Hermanni, Catal. Hort."

"VERBENA nodiflora major Indica, flore niveo; nobis. In Horto Fageliano, nomine Teucris & Veronicae, legimus."

Similarly, the following taxon of P. Hermann (1726) is still

unidentified:

"TELKAPALA. Verbena Indica rotundifolia spicis comosis." No such name as "telkapala" is used in Sri Lanka today according to local botanists there now.

Roi (1946) lists a Chinese vernacular name for members of this genus, "ma pien ts'ao" -- probably actually for V. officinalis L. or xV. hybrida Voss. The Commonwealth Mycological Institute (1972) lists the fungus, Ascochyta cuneomaculata, as attacking members of the genus Verbena.

The Endlicher (1838) reference cited in the bibliography of Verbena is often cited as "1836-1856", but the pages involved with this genus were actually issued in 1838. The Sibthorpe & Smith (1809) reference, similarly, is sometimes cited as "1806", but pages 219-442 of the volume involved here were not actually published until 1809.

The genus Verbenella Spach, curiously overlooked by the editors of the "Index Kewensis" and by every previous worker on this group of plants, is based by Spach (1840) on Verbena chamaedryfolia Juss. and would therefore be congeneric with what some present-day botanists regard as the genus Glandularia (1791).

Gibbs (1974) reports verbenalin (cornin), stachyose, and tannin present in Verbena, but L-bornesitol (a cyclitol) and raffinose are absent, while saponins are by some workers reported as probably present, by others as absent or probably absent. Bennett (1974) defines "Verbena oil" or "verbenalin" as  $C_{17}H_{25}O_{10}$ ; m.w. 389.2; wh. need.; m.p. 178; s.w.; sl.s.al.; s. acet.; glucoside. d-verbenone -  $C_{10}H_{14}O$ ; m. w. 150.11; col. oil; sp. gr. 0.997<sup>20</sup>; m.p. 6.5; b.p. 227; s.w."

From a fancied resemblance, Malva alcea L., a mallow, is often called the "vervain mallow".

An additional excluded species is

Verbena microcephala López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: 51, sphalm. 1975 = Lantana trifolia f. hirsuta Moldenke

The "verbena" illustrated in color by Moser (1974) is a species of Abronia in the Nyctaginaceae. The M. E. Jones 359, distributed as a Verbena sp., is actually Lantana scorta Moldenke, while M. C. Johnston 2664 and Stuessy 1031 are Priva grandiflora (Ort.) Moldenke and Sohmer 5332 is Salvia occidentalis Sw.

The Degeners and Pekelo (1975) record "hoi" as a Hawaiian name for the genus Verbena, probably for V. litoralis H.B.K.

Andrew R. Moldenke (1976) has found that members of this genus (section Glandularia) in California have "strong mechanical or temporal barriers to inbreeding even though the flowers are genetically self-compatible" and are nearly always very heavily out-crossed, the pollination being especially effected by butterflies, but also by Bombyliidae and probably also by short-tongued groups of insects like many species of Villa, generalist feeding bees in-

cluding many genera in all families and many species of bees whose males may be common generalists even though the females are restricted to one genus of plants, including Bombus, Ceratina, Megachile, Melissodes, and Osmia but not the 'table-scraping' sometimes colonial Halictinae which are usually generalist feeders."

VERBENA ABRAMSI Moldenke

Additional bibliography: Moldenke, Phytologia 28: 344. 1974; Hocking, Excerpt. Bot. A. 26: 5 & 6. 1975.

Additional citations: CALIFORNIA: Trinity Co.: Moldenke & Moldenke 30246 (Ld).

VERBENA ALATA Sweet

Additional synonymy: Verbena allata Hort. ex Moldenke, Phytologia 34: 278, in syn. 1976.

Additional bibliography: Sweet, Hort. Brit., ed. 2, 418--419. 1830; Loud., Hort. Brit., ed. 2, 552 & 602 (1832) and ed. 3, 602. 1839; Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Moldenke, Phytologia 28: 344 (1974) and 34: 278. 1976.

Ferreira describes this plant as a subshrub and found in it flower and fruit in July. The corolla color of Ferreira 174 is said to have been "lilac", while on Hatschbach 17252 it was "violet".

The Lindeman & Haas 3010, distributed as V. alata, is actually V. minutiflora Briq.

Additional citations: BRAZIL: Minas Gerais: Widgren s.n. [1845] (Mu--1570). Paraná: L. F. Ferreira 174 (Ld); Hatschbach 17252 (Ld). CULTIVATED: France: Weinkauff s.n. [hort. Paris. 1834] (Mu--1239). Germany: Herb. Schwaegrichen s.n. [Hort. Linsiensis] (Mu--1238); Herb. Zuccarini s.n. [hort. Berol. 1827] (Mu--281).

VERBENA ALBICANS Rojas

Additional & emended bibliography: Krapovickas, Bol. Soc. Argent. Bot. 11, Supl. 261. 1970; Moldenke, Phytologia 30: 132 (1975) and 31: 388. 1975.

VERBENA ALBIFLORA Rojas

Additional & emended bibliography: Krapovickas, Bol. Soc. Argent. Bot. 11, Supl. 269. 1970; Moldenke, Phytologia 30: 132 (1975) and 31: 388. 1975.

xVERBENA ALLENI Moldenke, Phytologia 34: 153. 1976.

Bibliography: Moldenke, Phytologia 34: 153, 250, & 279. 1976.

This plant has been found growing in black calcareous soil and scattered on roadsides with Cynodon dactylon, Helenium amarum, Vernonia altissima, and Xanthium strumarium, in and after anthesis in September. The plants are described as 3--4 feet tall and the

corollas (on Montz 2485) said to have been blue when fresh. Herbarium material has hitherto been misidentified as V. neomexicana (A. Gray) Small and as V. xutha Lehm. The cited specimens exhibit many, slender, flexible spikes, some to as much as 45 cm. long, and apparently with all or almost all of the seeds aborted.

Citations: LOUISIANA: LaSalle Par.: C. A. Brown 7409 (Lv). Pointe Coupee Par.: Montz 2485 (Lv). Saint Helena Par.: C. M. Allen 1179 (Lv--type).

VERBENA AMBROSIFOLIA Rydb.

Additional bibliography: Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716. 1969; G. W. Thomas, Tex. Pl. Ecolog. Summ. 77. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 716. 1974; Moldenke, Phytologia 30: 132--133, 139, & 179. 1975; A. L. Moldenke, Phytologia 35: 173. 1977.

Higgins found this plant growing in gravelly to sandy soil in pinyon-juniper association areas, while Atwood encountered it in "pinyon-juniper-sage-ponderosa community" and distributed his collection as V. bracteata Lag. & Rodr. Reitzel found it growing in "clumps 6--7.5 dm. across, 3 dm. tall, at 7700 feet altitude with Ipomopsis, Rosa, Quercus, Pinus edulis, a few P. ponderosa, Juniperus, Mirabilis, Sphaeralcea, and Bromus". Dziekanowski and his associates report it very scattered in pinyon-juniper woodland with grassy areas of gramma grass and staghorn cactus.

Other recent collectors have encountered V. ambrosifolia in rocky washes, "scattered on open sandy-clay flats with Ephedra, Eriogonum, Lycium, Mentzelia, Psilostrophe, Yucca, etc." and "in matorral desértico inerme on alluvial flats in fine calcareous alluvium with Prosopis glandulosa, Larrea, and Flourensia cernua".

The corollas on Henrickson 5858 are said to have been "light-purple" when fresh, while those on Correll & Johnston 19136 were "magenta" and those on Reitzel 27 were "pink".

The G. L. Fisher s.n. [Nara Visa, Apr. 21, 1911], distributed as V. ambrosifolia, actually is V. ciliata var. pubera (Greene) Perry, while Meebold 24224 is V. wrightii A. Gray. The Ramirez & Cardenas 13, previously cited as V. ambrosifolia by me in this series of notes, apparently is a mixture -- the University of Texas sheet of this number definitely is V. ciliata var. longidentata Perry. The Spellenberg & Spellenberg 3062 cited by me in 1974 actually is V. gooddingii var. nepetifolia Tidestr.

Additional citations: TEXAS: Culberson Co.: Correll & Johnston 19136 (N). NEW MEXICO: Eddy Co.: Higgins 9197 (N). Harding Co.: S. Stephens 75643 (N). Otero Co.: Reitzel 27 (N). Rio Arriba Co.: Atwood 6298 (N). Torrence Co.: Dziekanowski, Dunn, & Bennett 2393 (N). MEXICO: Chihuahua: Henrickson 5858 (Ld). Nuevo León: Johnston, Wendt, & Chiang C. 10212 (Id). Tamaulipas: Kuiper & Kuiper-Lapré M.17 (Ut--328636B).

## VERBENA AMBROSIFOLIA f. EGLANDULOSA Perry

Additional bibliography: Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716 (1969) and imp. 2, 716. 1974; Moldenke, Phytologia 30: 132--133 & 139. 1975.

Howe found this plant in flower and fruit in October.

The R. Runyon 1782, distributed as this form and so cited by me in previous publications actually is V. ciliata var. longidentata Perry.

Additional citations: ARIZONA: Coconino Co.: D. Howe s.n. [1 October 1968] (Sd—69988).

## VERBENA AMOENA Paxt.

Additional bibliography: Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Moldenke, Phytologia 28: 111 (1974) and 34: 252. 1976.

Gentry & Arguelles found what appears to be this species growing along roadsides at 7700 feet altitude, flowering and fruiting in June, and describe the plant as forming large compact clumps, with secondary rooting at the stem-bases and with showy purple flowers.

Additional citations: MEXICO: Chihuahua: Gentry & Arguelles 22955 (Sd—86465).

## VERBENA ANDRIEUXII Schau.

Additional synonymy: Verbena andrieuxii DC. ex Moldenke, Phytologia 34: 278, in syn. 1976.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Moldenke, Phytologia 23: 214 (1972) and 34: 278. 1976.

Material of this species has been misidentified and distributed in some herbaria as V. aubletia Jacq.

Additional citations: MEXICO: Puebla: Andrieux 138 (Mu—2477— isotype). CULTIVATED: Germany: Herb. Bot. Staatssamml. Münch. s. n. (Mu); Herb. Hort. Monac. s.n. (Mu).

## VERBENA ARAUCANA R. A. Phil.

Additional bibliography: Moldenke, Phytologia 23: 182 (1972), 31: 387 (1975), and 34: 260. 1976.

Merxmüller found this plant in flower in December, while Schajovskoy encountered it at 1300 meters altitude.

Additional citations: CHILE: Malleco: Merxmüller 24966 (Mu). ARGENTINA: Neuquen: Schajovskoy s.n. [16.I.1967] (Mu).

## VERBENA ARISTIGERA S. Moore

Additional bibliography: Moldenke, Phytologia 30: 133 & 173. 1975.

Recent collectors describe this plant as decumbent and have found it in flower in October and November. The corollas are said to have been "purple" on Krapovickas & al. 26800 and on Schinini & Cristóbal 9864.

The Hatschbach 23884, previously cited by me as V. aristigera,

is perhaps better regarded as representing V. tenuisecta Briq.

Additional citations: ARGENTINA: Corrientes: Krapovickas, Cristóbal, Irigoyen, & Schinini 26800 (Ld); Schinini & Cristóbal 9864 (Ld). Entre Ríos: Lorentz 478 (Mu--1565).

VERBENA ATACAMENSIS Reiche

Additional bibliography: Moldenke, *Phytologia* 28: 344--345 & 441. 1974.

Zöllner encountered this plant growing near the seacoast.

Additional citations: CHILE: Antofagasta: Werdermann 789 (Mu); Zöllner 8310 (Ac). Atacama: Zöllner 9080 (Ld)

VERBENA AURANTIACA Speg.

Additional synonymy: Glandularia aurantiaca Speg. ex Moldenke, *Phytologia* 34: 274, in syn. 1976.

Additional bibliography: Moldenke, *Phytologia* 23: 214 (1972) and 34: 274. 1976.

Additional citations: ARGENTINA: Chubut: Kreitbohm 117 (Mu).

xVERBENA BAILEYANA Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 345 & 401 (1974) and 34: 270. 1976.

The Herb. Zuccarini specimens cited below are both mixtures with V. officinalis L. and were originally identified and distributed as V. hastata L. and V. scabra Vahl.

Additional citations: CULTIVATED: Germany: Herb. Zuccarini s. n. [Hort. bot. Monac.], in part (Mu, Mu).

VERBENA BAJACALIFORNICA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 214. 1972.

Moran & Reveal refer to this plant as "fairly common" at 300 meters altitude and found it in flower in February. The corollas on their no. 20047 are said to have been "lavender" when fresh.

Additional citations: MEXICO: Baja California: Moran & Reveal 20047 (W--2796936).

VERBENA BALANSAE Briq.

Additional bibliography: Moldenke, *Phytologia* 28: 345 (1974) and 36: 35. 1977.

Krapovickas and his associates describe this plant as "decumbent", the corollas "violet" in color. Hatschbach refers to it as being xylopodiferous, with lilac (on 37118) or whitish (on 38688) flowers, and found it growing on "campo brejoso de solo vermelho" and "campo limpo", in flower in May.

Additional citations: BRAZIL: Mato Grosso: Hatschbach 38688 (Ld). Paraná: Hatschbach 37118 (Ld). ARGENTINA: Corrientes: Krapovickas, Cristóbal, Schinini, Arbo, Quarín, & González 26144 (Ld).

## VERBENA BARBATA Grah.

Additional bibliography: Loud., Hort. Brit., ed. 2, 552. 1832; Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Moldenke, Phytologia 28: 112. 1974.

## VERBENA BERTERII (Meisn.) Schau.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Moldenke & Neff, Orig. & Struct. Ecosyst. Tech. Rep. 74-18: 40, 51, & 101. 1974; Moldenke, Phytologia 30: 133 (1975) and 31: 409. 1975; Soukup, Biota 11: 18. 1976.

Additional citations: CHILE: Concepción: Dessauer s.n. [Concepción, Feb. 1870] (Mu--1546); Merxmüller 24804 (Mu). Maule: Dessauer s.n. [Banos de Cauquenes, Oct. 1875] (Mu--1547), Province undetermined: Dessauer s.n. (Mu); Frömbling s.n. [Chili, 1886] (Mu--1776).

## VERBENA BERTERII f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 23: 215. 1972; Soukup, Biota 11: 18. 1976.

## VERBENA BIPINNATIFIDA Nutt.

Additional synonymy: Verbena bipinnatifida var. bipinnatifida [Nutt.] ex Thomas, Tex. Pl. Ecol. Summ. 77. 1969. V. bipinnatifida var. bipinnatifida Thomas ex Moldenke, Phytologia 34: 278, in syn. 1976

Additional & emended bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 199 & 494. 1858; Loes., Verh. Bot. Ver. Brand. 53: 75. 1912; Tharp, Mycologia 9: 120. 1917; Fedde in Just, Bot. Jahresber. 45 (1): 583. 1923; Sydow in Just, Bot. Jahresber. 45 (1): 402. 1923; Barker, Univ. Kans. Sci. Bull. 48: 571. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716. 1969; G. W. Thomas, Tex. Pl. Ecol. Summ. 77. 1969; Fong, Trojánkova, Trojánek, & Farnsworth, Lloydia 35: 147. 1972; Bolkh., Grif, Matvej., & Zakhar., Chrom. Num. Flow. Pl., imp. 2, 176. 1974; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; Stark, Am. Horticulturist 53 (5): 7. 1974; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975; Kooiman, Act. Bot. Neerl. 24: 463. 1975; Moldenke, Phytologia 30: 133--134, 172, & 179 (1975), 31: 377 & 409 (1975), and 34: 249, 250, 270, & 278. 1976; Park Seed Co., Park Seeds Fls. & Veg. 1976: 90. 1976; Van Bruggen, Vasc. Pl. S. Dak. 368 & 536. 1976; Moldenke, Phytologia 36: 29. 1977.

Additional illustrations: Park Seed Co., Park Seeds Fls. & Veg. 1976: 90 (in color). 1976.

Recent collectors have encountered this species in sandy soil, on periodically mowed roadsides, on chalk cliffs, on clay hills, and in open dry fields, on mesquite flats with Opuntia chlorotica, O. acanthocarpa, and Yucca elata, in creosotebush-Atriplex scrubland, and in heavy soil of meadows. Charette refers to it as "very common in roadside depressions in fields" and Brown calls it "common" in LaSalle Parish, Louisiana. Wright found it "in a

field densely populated with other species of flowers and grasses! Barker (1969) refers to it as "Occasional, in rocky upland prairies, along roadsides and railway right-of-ways" in Kansas, where Gates (1940) reports it from Cowley, Geary, Pottawatomie, Riley, and Wabaunsee counties.

The corollas are said to have been "purple" on Semple & Love 482, "reddish-violet" on Davidse & Davidse 10050, "maroon-pink" on Bisby G.65, and "lavender" on D. S. Correll 16247 and Schulz & Schulz 1336. Correll reports the species as "scattered infrequently". The Schultzes describe the calyx as twice as long as the fruit [seed] "and constricted above it". Stark (1974) states that the species is found usually in "open, but fine textured soils" with a preferred pH value of 6.0--7.0.

Material of this species has been misidentified and distributed in some herbaria as V. drummondii Baxt, and as V. erinoides Lam. On the other hand, the Reeves R. 1075, distributed as V. bipinnatifida, is actually var. latilobata Perry, Garland 200 and Meebold 22681 & 25248 are V. canadensis (L.) Britton, Pringle 7591 is V. elegans H.B.K., Lindheimer s.n. [Galveston, May 1843] is V. halei Small, Bougere 2235, Hester 442 & 517, Ryscroft 2574 & 2626, and Webster & Wilbur 3282 are V. tenuisecta Briq., and Bougere 1996 is V. tenuisecta var. alba Moldenke, while Higgins 8884 and Higgins, Higgins, & Higgins 9849 are V. wrightii A. Gray. Meebold 27286 is a mixture with Evolvulus sp.

Additional citations: ALABAMA: Pickens Co.: R. Kral 26422 (Lc). KANSAS: Leavenworth Co.: J. A. Churchill s.n. [14 May 1954] (Ln--230257). MISSOURI: County undetermined: Herb. Reg. Monac. 4248 (Mu). ARKANSAS: Little River Co.: Demaree 69436 (Ld). LOUISIANA: LaSalle Par.: C. A. Brown 7405 (Lv). OKLAHOMA: Beckham Co.: Clark 14280 (N). TEXAS: Bexar Co.: Meebold 27286, in part (Mu). Brazos Co.: D. Wright 23 (N). Caldwell Co.: W. M. Jones WMJ.203 (Mu), WMJ.252 (Mu). Callahan Co.: Mahler 4976 (Ln--236414). Comal Co.: Charette 820 (Mu); Lindheimer 1072 (Mu--4082), 1073 (Mu--4083). Cooke Co.: Semple & Love 482 (W--2732740). Dallas Co.: D. S. Correll 17247 (Sd--73852); J. Reverchon s.n. [Curtiss 1962\*] (Mu--1548). Tarrant Co.: Bisby G.65 (Ac). Taylor Co.: S. M. Tracy 8000 (Ln--70115). County undetermined: Lindheimer III.289 (Mu--271); Torrey & Gray s.n. (Mu--270). NEW MEXICO: Luna Co.: Shultz & Shultz 1336 (N). ARIZONA: Yavapai Co.: Reeves & Pinkava 11933 (N). MEXICO: Chihuahua: Davidse & Davidse 10050 (Ld); McCabe 2 (Ws). CULTIVATED: Sweden: Collector undetermined s.n. [H. L. 1840] (Ac).

#### VERBENA BIPINNATIFIDA var. LATILOBATA Perry

Emended synonymy: Verbena bipinnatifida var. latiloba Perry ex Moldenke, Alph. List Invalid Names Suppl. 1: 22, in syn. 1947; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975.

Additional bibliography: G. W. Thomas, *Tex. Pl. Ecolog. Summ.* 77. 1969; Moldenke, *Phytologia* 28: 114. 1974; Hinton & Rzedowski, *Anal. Esc. Nac. Cienc. Biol.* 21: 111. 1975.

Recent collectors have encountered this plant at 9100 feet altitude in Arizona.

Additional citations: ARIZONA: Cochise Co.: W. W. Jones s.n. [8 August 1967] (Sd--72884). Graham Co.: Williams & Williams 3650 (Z). Santa Cruz Co.: Reeves R.1075 (N).

#### xVERBENA BLANCHARDI Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 114 & 386. 1974.

Additional citations: ILLINOIS: Winnebago Co.: M. S. Bebb s.n. [Fountaindale] (Mu--4249).

#### VERBENA BONARIENSIS L.

Additional & emended synonymy: Verbena bonariensis altissima, Lavandulae canariensis spica multiplici Dill. in Ray, *Synop. Meth. Stirp. Brit.*, ed. 3, pl. 300, fig. 387. 1724. Verbena bonariensis Willd. ex Druce & Vines, *Dill. Herb.* 182, in syn. 1907. Verbena bornariensis L. ex Moldenke, *Phytologia* 36: 47, in syn. 1977.

Additional & emended bibliography: Dill. in Ray, *Synop. Meth. Stirp. Brit.*, ed. 3, pl. 300, fig. 387. 1724; L., *Hort. Cliff.*, imp. 1, 11. 1737; L., *Sp. Pl.*, ed. 2, 28. 1762; G. Don in Loud., *Hort. Brit.*, ed. 1, 246 (1830) and ed. 2, 246. 1832; Loud., *Hort. Brit.*, ed. 2, 552. 1832; G. Don in Loud., *Hort. Brit.*, ed. 3, 246. 1839; Buek, *Gen. Spec. Syn. Candoll.* 3: 494 & 495. 1858; Kuntze, *Rev. Gen. Pl.* 2: 510. 1891; Druce & Vines, *Dill. Herb.* 182. 1907; Krause in Just, *Bot. Jahresber.* 44: 1195. 1926; Fedde in Just, *Bot. Jahresber.* 44: 1534. 1927; M. F. Baker, *Fla. Wild Fls.*, ed. 2, imp. 1, 188. 1938; L., *Hort. Cliff.*, imp. 2, 11. 1968; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 716. 1969; G. W. Thomas, *Tex. Pl. Ecolog. Summ.* 77. 1969; R. E. Harrison, *Handb. Bulbs & Peren. S. Hemisph.*, ed. 3, 266. 1971; Fong, Trojánkova, Trojánek, & Farnsworth, *Lloydia* 35: 147. 1972; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 2, 716. 1974; El-Gazzar, *Egypt. Journ. Bot.* 17: 75 & 78. 1974; R. D. Gibbs, *Chemotax. Flow. Pl.* 3: 1752--1755 (1974) and 4: 2295. 1974; R. W. Long, *Fla. Scient.* 37: 37. 1974; D. S. & H. B. Correll, *Aquat. & Wetland Pl. SW. U. S.*, imp. 2, 2: 1396, 1397, & 1775. 1975; Kooiman, *Act. Not. Neerl.* 24: 463. 1975; Moldenke, *Phytologia* 30: 134--135, 152, & 167 (1975), 31: 375, 377, 389, & 409 (1975), 33: 374 (1976), and 34: 248, 250, 252, 259, 260, & 278. 1976; M. F. Baker, *Fla. Wild Fls.*, ed. 2, imp. 2, 188. 1976; S. R. Hill, *Sida* 6: 325. 1976; Long & Lakela, *Fl. Trop. Fla.*, ed. 2, 741--742 & 961. 1976; Soukup, *Biota* 11: 18. 1976; E. H. Walker, *Fl. Okin. & South. Ryuk.* 883 & 884. 1976; Moldenke, *Phytologia* 36: 28, 39, & 47. 1977.

Additional illustrations: Dill. in Ray, *Synop. Meth. Stirp. Brit.*, ed. 3, pl. 300, fig. 387. 1724.

The Dillen pre-Linnean designation for this species is based

on a specimen grown in the Eltham Garden from seed sent from Buenos Aires, Argentina, by Milam in 1726, according to Druce & Vines (1907), but how this can be possible when Dillen already published the designation in 1724 is not clear to me. The Eltham specimen in the Dillen herbarium was at first identified as V. bonariensis "Willd." by Klinsmann.

Recent collectors describe this plant as a large or "giant" herb, 1.3—2.5 m. tall, the stems stiff, square, with pronounced angles and concave sides, hairy, pale- or dark-green, often maroon-tinged, the leaves "sandpapery" rough, "parchmentaceous-membranous" or "thickly velvety-herbaceous", glossy dark-green above, with pale slightly sunken veins, dull light- or gray-green beneath with prominent veins, the peduncles reddish, the small flowers in spikes, the calyx green at the base, with purple or purplish tips, the corolla hairy outside, and the infructescence gray-green.

Goldsmith found V. bonariensis in scattered patches in open grassland in Rhodesia; Bos refers to it as "abundant" in the Transvaal and "locally dominant" in the Cape Province of South Africa; Moll calls it a "locally fairly common annual herb" in Natal; Scheepers says of it "locally frequent at water's edge and environs, [in] well lit but dense vegetation, widespread as ruderal, especially in moist open spots" in the Transvaal.

Other recent collectors have encountered the species at the edge of open fields in about 50 percent shade, in rather dry soil of old fields, and among Baccharis on "spoil banks". Montz reports it "abundant along railroad 'spoils'" in Louisiana, where Arceneaux asserts that it is "a very common weed along roads, ditches, etc." and Hester says it is "plentiful everywhere". Brown comments that there are "no appendages on anthers" (which is to be expected, since the species is not a member of the Section Glandularia). Wilbur reports it "common along edge of ditch between road and cornfield" in North Carolina.

Walker (1976) cites Amano 7373, Hatusima 17571, and Walker 8133 from Okinawa and records the vernacular name, "tachi-ba-bena", which he explains as "Tachi, erect, ba, leaf, bena, meaning unknown". Arenas encountered the species at the edges of an arroyo and comments that it "crece en yuyal".

The corollas are described as having been "lilac" in color when fresh on Ferreira 163, "blue" on Scheepers 93, "violet" on Arenas 949 and Cabrera 12446, "violet-blue" on Bos 1262, "purple" on O. B. Miller 5184, Moll 745, Sowell s.n., and Wilbur 3947, "rose" on Carauta 686, "purple-mauve" on Goldsmith 71/62, and with "tube purple, lobes lilac" on Bos 142.

Don (1830) called the species "Buenos Ayres vervain" and dates its introduction into English gardens as 1732. Thomas (1969) calls it the "pretty verbena", while Claycomb asserts that in Louisiana it is known as "blue vervain". Carauta records "pai-joaquim" from Rio de Janeiro. In Pahang, Malaya, it is said to be a "roadside weed" in waste places and has been collected in fruit in November.

The Herb. Mus. Bot. Landishuth s.n., cited below, has all its

leaves very narrow-oblong and bears very close resemblance to V. inamoena Briq. DeWinter 7176 is a voucher for chemical studies conducted on the species by Dr. P. R. Enslin. The Univ. Calif. Acc. No. 63.740-83, cultivated in California, was grown there from seeds collected in Teneriffe, Canary Islands. Fabris & Marchionni 2392 is a mixture with V. litoralis H.B.K.

Gibbs (1974) reports cyanogenesis and leucoanthocyanin absent from the leaves of this species and syringin absent from the stems.

Material of V. bonariensis has been misidentified and distributed in some herbaria under the designations V. bonariensis Hook. and V. littoralis Kunth, and even as "Labiatae sp.", while T. Rojas 10077 was originally identified as "V. bonariensis L. f. transiens in V. inamoenam Briq.". On the other hand, the Claycomb s.n. [June 13, 1942], Demaree 15103, Keiser 91, D. K. Lowe 31, J. A. Moore 5200, Robinette 239, and R. R. Smith 1732, distributed as V. bonariensis, actually are V. brasiliensis Vell., while Schlieben 7691 is V. litoralis H.B.K., Arceneaux 35a, Beck 453, and Horst JWH.B.281 are V. rigida Spreng., and Bayliss BS. 7344 is V. temisecta Briq.

Additional citations: NORTH CAROLINA: Robeson Co.: Moldenke & Moldenke 29992 (Ac), 29994 (Gz, Ld, Tu). Tyrrell Co.: Wilbur 3947 (Mi). SOUTH CAROLINA: Charleston Co.: Curtiss 1963\*\* (Mu-1550). GEORGIA: Spalding Co.: Sowell s.n. [4 August 1967] (Lv). FLORIDA: Polk Co.: Moldenke & Moldenke 29529 (Ac, Gz, Ld, Tu). Putnam Co.: Moldenke & Moldenke 29839 (Ld). LOUISIANA: Cameron Par.: Spindler s.n. [30 Sept. 1973] (Lv). Iberia Par.: Hester 650 (Lv). Jefferson Par.: C. A. Brown 2049 (Lv). Lafayette Par.: Claycomb s.n. [July 6, 1942] (Lv). Livingston Par.: Montz 1824 (Lv). Ouachita Par.: R. D. Thomas & Bot. Class 18637 (Lc). Pointe Coupee Par.: M. Chaney 213 (Lv). Saint Mary Par.: Montz 2289 (Lv). Saint Tammany Par.: Arsène 12534 (Lv). Tangipahoa Par.: Correll & Correll 9259 (Lv). Terrebonne Par.: Arceneaux 35a (Lv); Wurzlow s.n. [May 29, 1944] (Lv). Vermilion Par.: Hester 693 (Lv). TEXAS: Orange Co.: J. A. Churchill s.n. [1 May 1955] (Ln-204155). MEXICO: Federal District: Karwinski s.n. [Chapultepec, Aug. 1827] (Mu-279, Mu-280). State undetermined: Prince Paul of Würtemberg s.n. [1830] (Mu-1549). BRAZIL: Paraná: L. F. Ferreira 163 (Ld). Rio de Janeiro: Carauta 686 [Herb. FEE-MA 6811] (Ld). PARAGUAY: T. Rojas 10077 (Mu). URUGUAY: Herter 268 [Herb. Herter 81709] (Mu). CHILE: Arauca: Grau s.n. [31.3. 1968] (Mu). Concepción: Dessauer s.n. [Concepción, Feb. 1870] (Mu-1551). Valdivia: Buchtien s.n. [Valdivia, 7/11/1902] (Mu-3996); Lechler s.n. [Valdivia] (Mu-1568). State undetermined: Leyboldt s.n. [3/1/1860] (Mu-1569). ARGENTINA: Buenos Aires: Cabrera & Fabris 21 (Mu); Herb. Univ. Ludov. Maximil. s.n. (Mu-

277). Corrientes: Arenas 949 (Ld). Entre Rios: Cabrera 12446 (Mu). San Juan: Fabris & Marchionni 2392, in part (Mu). RHODESIA: Fries, Norlindh, & Weimarck 4003 (Mu); Goldsmith 71/62 (Mu). SWAZILAND: O. B. Miller 5184 (Mu). SOUTH AFRICA: Cape Province: Bos 142 (Mu); Ecklon 85 (Mu--285); Penther 1795 (Mu--4085). Natal: Moll 745 (Mu). Transvaal: Bos 1262 (Mu); DeWinter 7176 (Mu); Meebold 12837 (Mu); Scheepers 93 (Mu); Schlieben 7176 (Mu). MASCARENE ISLANDS: Mauritius: Sieber Fl. Maurit. 86 (Mu--286). INDIA: Khasi States: Hooker & Thomson s.n. [Mont. Khasia 1-3000 ped.] (Mu--288). State undetermined: Griffith s.n. [India orientali] (Mu--287). MALAYA: Pahang: Poore 505 (Kl--505); B. C. Stone 5619 (Kl--5220), 7236 (Kl--7747). FIJI ISLANDS: Viti Levu: Meebold 16522 (Mu). AUSTRALIA: New South Wales: Lohm s.n. [Sydney, 28.III.10] (Mu--9138); Meebold 2749 (Mu). GREAT BARRIER REEF: Stradbroke: M. S. Clemens 44242 (Mi). CULTIVATED: California: Univ. Calif. Acc. No. 63.740-83 (Mu). France: Weinkauff s.n. [Jard. des Plant. 1834] (Mu--1243). Germany: Herb. Mus. Bot. Landishuth s.n. (Mu--278); Herb. Schmiedel s.n. (Mu--272, Mu--273); Herb. Schreber s.n. (Mu--275, Mu--276); Herb. Schwaegrichen s.n. (Mu--1244); Herb. Zuccarini s.n. [Hort. bot. Monac. 1832] (Mu--282), s.n. [Hort. bot. Monac. 1887] (Mu--283); Schreber s.n. [hort. bot. Erlang. 1772] (Mu--274). India: Herb. Hort. Bot. Calcutt. s.n. (Mu--289). Sweden: Collector undetermined s.n. [H. L. 1812] (Ac); Zetterstedt s.n. [H. L., 10 Sept. 1838] (Ac).

VERBENA BONARIENSIS var. CONGLOMERATA Briq.

Additional bibliography: Moldenke, Phytologia 28: 346 & 380. 1974.

Borrmüller encountered this plant at 500 meters altitude. Lindeman & Haas describe it as an herb, growing on grassy roadsides, and the corollas on their no. 3902 are said to have been "deep purple-blue" when fresh; the corollas were "purple" on Schinini & Carnevali 10689.

Additional citations: BRAZIL: Rio Grande do Sul: Borrmüller 255 (Mu--4286); Lindeman & Haas 3902 (Ut--320412); Reineck & Czermak 69 (Mu--3793). ARGENTINA: Corrientes: Ibarrola 2053 (Ut--330563B), 2131 (Ut--330573B). Misiones: Schinini & Carnevali 10689 (Ld). CULTIVATED: California: Moldenke & Moldenke 30295 (Ac, Gz, Ld, Mu, Tu, W).

VERBENA BONARIENSIS var. HISPIDA Moldenke, Phytologia 33: 374--375. 1976.

Bibliography: Moldenke, Phytologia 33: 374--375 (1976) and 34: 259. 1976.

Citations: BRAZIL: Rio Grande do Sul: Borrmüller 647 (Mu--4302--type, Z--photo of type).

## VERBENA BRACTEATA Lag. &amp; Rodr.

Additional synonymy: Verbena bracteata (Michx.) Lag. & Rodr. ex Perkins, Estes, & Thorp, Bull. Torrey Bot. Club 102: 194, sphalm. 1975.

Additional & emended bibliography: G. Don in Loud., Hort. Brit., ed. 1, 247 (1830) and ed. 2, 247. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; G. Don in Loud., Hort. Brit., ed. 3, 247. 1839; Buek, Gen. Spec. Syn. Candoll. 3: 494, 496, & 507. 1858; Kuntze, Rev. Gen. Pl. 2: 510. 1891; Krause in Just, Bot. Jahresber. 44: 1212. 1926; Fedde in Just, Bot. Jahresber. 44: 1534. 1927; Conard, Pl. Iowa 44. 1951; R. A. Davidson, State Univ. Iowa Stud. Nat. Hist. 20 (2): 77. 1959; Hall & Thompson, Cranbrook Inst. Sci. Bull. 39: 74. 1959; Barker, Univ. Kans. Sci. Bull. 48: 571. 1969; Cooperrider, State Univ. Iowa Stud. Nat. Hist. 20 (5): 70. 1962; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716 & 717. 1969; G. W. Thomas, Tex Pl. Ecolog. Summ. 77. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 716 & 717. 1974; Welsh, Utah Pl., ed. 3, 354 & 473, 1974; [Bard], Bull. Torrey Bot. Club 102: 431. 1975; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1397, 1400, & 1775. 1975; E. H. Jordan, Checklist Organ Pipe Cact. Natl. Mon. 7. 1975; Kooiman, Act. Bot. Neerl. 24: 463. 1975; Moldenke, Phytologia 30: 135-136 (1975) and 31: 376, 377, & 415. 1975; Perkins, Estes, & Thorp, Bull. Torrey Bot. Club 102: 194-198. 1975; H. D. Wils., Vasc. Pl. Holmes Co. Cat. 54. 1975; Anon., Biol. Abstr. 61: AC1.732, 1976; L. J. Clark, Wild Fls. Pacif. Northw. 444-445 & 603. 1976; Grimé, Bot. Black Amer. 191. 1976; Moldenke, Phytologia 34: 248-251, 270, & 278. 1976; Van Bruggen, Vasc. Pl. S. Dak. 369, 529, & 536. 1976; [Voss], Mich. Bot. 15: 237. 1976; Moldenke, Phytologia 36: 29 & 30. 1977; F. H. Montgomery, Seeds & Fruits 201, fig. 5, & 230. 1977; Taylor & MacBryde, Vasc. Pl. Brit. Col. 436 & 751. 1977.

Additional illustrations: F. H. Montgomery, Seeds & Fruits 201, fig. 5. 1977.

Montgomery (1977) describes the seeds of this species as follows: "Nutlets 2.3 x 0.6 mm, oblong 13-14 in l.s., obtriangular 90 in c.s. with the dorsal surface rounded; surface 2-4-ribbed on the lower half and reticulate on the upper half, inner faces papillose".

Wilson (1975) cites Cooperrider 8069 from weedy railroad banks in Holmes County, Ohio. Stevens describes it as "from a woody caudex, branches prostrate" and reports it "common on dry rocky hillsides" in Washington. Higgins encountered it in sandy soil of shin-oak association areas, while Semple & Love found it in dry sandy soil of mesquite shrublands. Other recent collectors have found it growing in bare sandy soil with mesquite dominant, in sidewalk crannies, and "in agrupaciones de malezas (annual herbs mainly) in fine calcareous alluvium of sandy clay loam with Mach-aeranthera parva, Bouteloua barbata, Verbena spp., Marsilea sp., and Wislizenia sp." Moran, in Baja California, found it "prostrate, locally common with Lythrum hyssopifolium in shallow road-

side depressions".

Davidson (1959) refers to V. bracteata as a "Weed of roadsides, railways, pastures, barnyards, and other open places; common" in Iowa. In the same state Cooperrider (1962) speaks of it as "Frequent. Roadsides; along railroads; open, waste places" and records it from Clinton, Jackson, and Jones Counties. Hall & Thompson (1959) refer to it as occasional in fields and along open roadsides in Oakland County, Michigan. In Kansas it is said by Barker (1969) to be "Occasional along roadsides, cultivated fields and railway right-of-ways. Found throughout the area." Dziekanowski and his associates found it growing in loess of cultivated areas and very scattered in grassy areas with gramma grass and staghorn cactus in pinyon-juniper woodlands.

The corollas on Semple & Love 297 are said to have been "purple with white center" when fresh, but on Richardson 1580 and W. D. Stevens 1710 they were "blue", while on Moran 23634 it is stated that the corolla-tube was "purplish-pink, the limb white", on Duncan 12696 the corolla was "light-purple" and on Spellenberg & al. 4327 "pale-violet, paler in throat". Taylor & MacBryde (1977) classify the flowers and blue and red, flowering from April to September, and growing as a weed in British Columbia.

Higgins has found V. bracteata in sandy soil in Prosopis-juniper communities and in sandy to clayey soils in the Prosopis-Juniperus-grassland community. Thorne found it growing in association with Gnaphalium purpureum, G. palustre, Navarettia hamata, Amaranthus albus, etc. Moran refers to it as "occasional" near drying pond edges and "towards edge of dry laguna with abundant Sida hederacea" in Baja California. Blakley refers to it as an "annual, common locally, prostrate at moist edge of vernal lake in silty-clay soil", while Demaree found it (the erect form) to be "common" in open rock mountains of Utah. Fosberg encountered it at 20 meters altitude. Churchill encountered it "on eroded sandy slopes in sandy loam soil of upland prairie pasture with Andropogon, Solidago, etc."

Other recent collectors have encountered this species on dry riverbeds and banks, along roadsides, on dry slough bottoms, and in the Shortgrass-Prairie community. Don (1830) calls the plant "bracteose vervain" and dates its introduction into English gardens as 1820 from "Mexico".

Muehlenbach considered his no. 1525 to represent a natural hybrid between V. simplex Lehm. and V. bracteata, but I can see no evidence of such hybridity in the sample of this collection examined by me.

Perkins and his associates (1975) report that in V. bracteata the corollas are rapidly deciduous (caducous) following anthesis, the anthers and stigmas are about 1 mm. apart, the plants are less autogamous than V. halei Small and V. urticifolia L., seven plants studied with 310 potential seeds had a 21.9 percentage of seed-set when bagged, but nine plants with 765 potential seeds

had a 66.5 percent seed-set when insect-visited. The flowers were visited by the following insects: Diptera: Exoprosopa sp. (with pollen on head); Hymenoptera: Meusebeckidium obsoletum and Parnopes edwardsii; Lepidoptera: Everes comyntas, Hemiargus isola (with pollen on head), Nathalis iole, Pieris protodice (with pollen on head), Phyciodes phaon (with pollen on head), Pyrgus communis, and Strymon melinus (with pollen on head). The Exoprosopa, Hemiargus, Pieris, Pyrgus, and Strymon insects also visited the other Verbena species in the locality, i.e., V. halei, V. stricta, and V. urticifolia. The authors note that V. bracteata "was visited predominantly by butterflies".

It should perhaps be noted here that Edw. Palmer 3411, as least insofar as the Munich specimen is concerned, consists only of extremely young sterile seedlings.

The Atwood 6298, distributed as V. bracteata, is actually V. ambrosifolia Rydb., Drummond s.n. [Saint Louis, 1832] is V. canadensis (L.) Britton, Martens s.n. [Missouri] is xV. deamii Moldenke, Edw. Palmer 342 is V. lasiostachys var. septentrionalis Moldenke, and Meebold 25461 is V. stricta Vent. W. Schumann 1070 is in part V. gracilis Desf. and in part V. canescens H.B.K. Demaree 3571, in the herbarium of Louisiana State University, bears a label inscribed "Dioscorea villosa L." — doubtless a case of mixed labels. The C. A. Brown 20378, Brown & Lenz s.n. [April 7, 1939], M. Chaney 226, N. F. Petersen s.n. [Apr. 10, 1909], and Stotts s.n. [April 12, '11], also distributed as V. bracteata, all are actually V. canadensis (L.) Britton.

Additional citations: GEORGIA: Clarke Co.: Duncan 12696 (Lv). ILLINOIS: Winnebago Co.: M. S. Bebb s.n. [Fountaindale] (Mu). INDIANA: Jefferson Co.: Frazer s.n. [June 6, 1885] (Lc). LaPorte Co.: Moffatt 1685 (Mi). IOWA: Story Co.: Arthur s.n. [Ames, July 17, 1877] (Mu). TENNESSEE: Blount Co.: Hooker s.n. [borders of Ohio river below Louisville] (Mu—293). MICHIGAN: Grand Traverse Co.: J. A. Churchill s.n. [12 August 1955] (Ln—203420). WISCONSIN: Brown Co.: Schuetz s.n. [Fort Howard, July 22, 1887] (Mu). SOUTH DAKOTA: Lawrence Co.: N. F. Petersen s.n. [Aug. 17, 1908] (Lv). MISSOURI: Cass Co.: Meebold 24223 (Mu). Saint Louis: Muehlenbach 312 (Mu), 1525 (Mu), 3474 (Ac), ARKANSAS: Carroll Co.: H. H. Rusby 780 1/2 (Mu). Craighead Co.: Demaree 3571 (Lv). County undetermined: F. L. Harvey s.n. [Curtiss 1962] (Mu—1552). LOUISIANA: Lincoln Par.: J. A. Moore 5362 (Lv). UTAH: Utah Co.: Demaree 65401 (Ld). NEVADA: Lyon Co.: Tiehm 1812 (N). Storey Co.: Purpus 5946 (Mu—4287). COLORADO: Archuleta Co.: Weber & Livingston 6259 (Mi). Denver Co.: Cole 5687 [Herb. Kent Sci. Mus. 51385] (Mi). Elbert Co.: S. R. Hill 1277 (N). El Paso Co.: Meebold 12269 (Mu). NEBRASKA: Pierce Co.: N. F. Petersen s.n. [Aug. 11, 1910] (Lv), s.n. [Aug. 12, 1910] (Lv). Polk Co.: S. P. Churchill

6606 (N). IDAHO: Gooding Co.: R. J. Davis 1781 (N). TEXAS: Bowie Co.: Correll & Correll 12398 (Mi). Martin Co.: Semple & Love 297 (W--2732736). NEW MEXICO: Catron Co.: Pinkava, Lehto, & Reeves P.12492 (N, W--2737086). Curry Co.: Higgins 9050 (N). Dona Ana Co.: Chiang, Wendt, & Johnston 8621 (Ld). Guadalupe Co.: Higgins 8925 (N). McKinley Co.: Spellenberg, Reitzel, & McKinney 4327 (N). Roosevelt Co.: Higgins 8672 (N). San Miguel Co.: Higgins 8886 (N). Torrence Co.: Dziekanowski, Dunn, & Bennett 2390 (N). Union Co.: Higgins 8810 (N). ARIZONA: Greenlee Co.: Pinkava, Lehto, & Reeves P.12421 (N). WASHINGTON: Benton Co.: Dziekanowski, Dunn, & Bennett 2518 (N). Klickitat Co.: Doppelbauer & Doppelbauer 663 (Mu). Yakima Co.: W. D. Stevens 1710 (Ln--244892). OREGON: Malheur Co.: Doppelbauer & Doppelbauer 824 (Mu). CALIFORNIA: Los Angeles Co.: F. R. Fosberg S.4105 (Sd--72779); Parish & Parish 1596 (Mu--1553); Thorne 36516 (Sd--69553). San Luis Obispo Co.: Edw. Palmer 3411 (Mu). CHANNEL ISLANDS: Santa Catalina: Blakley 5394 (Sd--85037). MEXICO: Baja California: R. V. Moran 16110 (Sd--71446), 16627 (Sd--72969), 23634 (Ld). Coahuila: Richardson 1580 (Au--302675). CULTIVATED: Germany: Herb. Kummer s.n. [Hort. bot. Monac. 1843] (Mu--1249); Herb. Zuccarini s.n. [Hort. bot. Monac. 1836] (Mu--295); Schrank s.n. [Hort. Monac.] (Mu--290). Sweden: Collector undetermined s.n. (Ac). LOCALITY OF COLLECTION UNDETERMINED: Herb. Reg. Monac. 291 (Mu).

VERBENA BRASILIENSIS Vell.

Additional synonymy: Verbena litoralis pycnostachya Schau. ex Moldenke, Fifth Summ. 2: 680, in syn. 1971.

Additional & emended bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494 & 495. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716. 1969; G. W. Thomas, Tex. Pl. Ecolog. Summ. 77. 1979; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 716. 1974; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1396, 1397, & 1775. 1975; Moldenke, Phytologia 30: 136 (1975), 31: 375 & 377 (1975), and 34: 248--250, 257, 260, & 270. 1976; Soukup, Biota 11: 18. 1976.

Ferreira refers to this plant as a shrub, 1.2 m. tall, and found it growing in "brejo" (sedge meadow). Roivainen found it with Lupinus arboreus "en la zona humosa-arenisca" in Chile. In Ecuador it was encountered at 2850 meters altitude by Heinrichs. Other recent collectors have found it growing in pine forests, at the edges of ditches, in dry soil in sunny places, in "poorly drained stiff soil", and in shallow pools on prairies. Monz refers to it as "scarce" and as "scattered but relatively abundant on roadsides" in Louisiana, Curry found it frequent along banks and among Colocasia, Kirby reports it abundant on railroad banks, and Rockett refers to it as common in waste places. Moore calls it a roadside weed and Claycomb asserts that in Louisiana it is

"a very common roadside weed".

On Ross 66 the label asserts that the leaves and stems were dark-green, while on C. A. Brown 2393 the collector informs us that there were "thick and thin spikes on the same plant". Hebert refers to the species as "abundant in open cornfields". The corollas on Ferreira 126 are said to have been "lilac" in color when fresh, while on Athanasius 64 and Van Wyk 267 they were "blue", on C. Allen 107, C. M. Allen 381, Chandraparya 2, Rockett 125, and Ross 66 they were "purple", on Duque-Jaramillo 2734 they were "light-blue", on Bougere 14 and R. R. Smith 1732 "lavender", and on Krapovickas & al. 26799 "violet".

Additional vernacular names reported for V. brasiliensis are "kudii penkel" and "verbena morada". In addition to months previously reported, the species has been collected in fruit in March. It has been found growing at altitudes of 200 to 3700 meters in Peru. Demaree speaks of it as "common" or "very common" in wet open woods and disturbed areas in Arkansas and in rocky bottoms in Alabama. Werff comments that on Chatham Island, in the Galápagos, its flowers were "smaller and much more intense blue" than those on his no. 2181 (an as yet undetermined species).

The Claycomb s.n. [July 6, 1942] and Montz 1824, distributed as V. brasiliensis, actually are V. bonariensis L., while Hort. Parag. 10054, Romero-Castafieda 10668, and T. Rojas 1889 are actually V. litoralis H.B.K. and Muhammad 259 and Urbatsch 1938 are V. montevidensis Spreng.

Additional citations: NORTH CAROLINA: Robeson Co.: Moldenke & Moldenke 29997 (Ac). SOUTH CAROLINA: Bamberg Co.: Moldenke & Moldenke 29963 (Ac, Ld, Tu). Clarendon Co.: Moldenke & Moldenke 29977 (Tu). Dillon Co.: Moldenke & Moldenke 29989 (Ld). Greenwood Co.: Moldenke & Moldenke 29263 (Ld). Marion Co.: Moldenke & Moldenke 29987 (Kh). Orangeburg Co.: Moldenke & Moldenke 29970 (Ac), 29971 (Gz). GEORGIA: Chatham Co.: Moldenke & Moldenke 29924 (Ac, Gz, Ld). Dougherty Co.: Moldenke & Moldenke 29361 (Ac). St. Simon's Island: Moldenke & Moldenke 29900 (Ac, Ld, Tu). FLORIDA: Escambia Co.: Meebold 27240 (Mu); R. R. Smith 1732 (Sd—74167); S. M. Tracy 8706 (Ln—70125). Putnam Co.: Moldenke & Moldenke 29845 (Gz). ALABAMA: Montgomery Co.: Demaree 70060 (Ld). MISSISSIPPI: Warren Co.: C. A. Brown 18610 (Lv). ARKANSAS: Cleveland Co.: Demaree 69748a (Ld). Lincoln Co.: Demaree 70225 (Ld). Saint Francis Co.: Demaree 15103 (Lv). LOUISIANA: Acadia Par.: Chandraparya 2 (Lv). Bossier Par.: Robinette 239 (Lv). East Baton Rouge Par.: C. Allen 107 (Lv); C. A. Brown 1008 (Lv); Curry 615 (Lv), 666 (Lv); Hebert 207 (Ld); Ross 66 (Lv). Lafayette Par.: Claycomb s.n. [June 13, 1942] (Lv). Lincoln Par.: Keiser 91 (Lc); D. K. Lowe 31 (Lv); J. A. Moore 5200 (Lv). Orleans Par.: C. A. Brown 238 (Lv), 2393 (Lv); Meebold 27224 (Mu). Ouachita Par.: B. Thompson & Botany

Class 157 (Lc). Plaquemines Par.: C. A. Brown 2309 (Lv). Pointe Coupee Par.: M. Chaney 111 (Lv). Saint Charles Par.: Montz 56 (Lv), 182 (Lv), 566 (Lv), 637 (Lv, Lv, Lv), 726 (Lv), 790 (Lv). Saint Helena Par.: C. M. Allen 381 (Lv); Rockett 125 (Lv). Saint Tammany Par.: Bougere 14 (Lv), 1091 (Lv), 1099 (Lv). Tangipahoa Par.: Frederick 108 (Lv); Kirby 160 (Lv). Terrebonne Par.: Arce-neaux s.n. [July 20, '37] (Lv); Bynum, Ingram, & Jaynes s.n. [Houma, Apr. 23, 1933] (Lv). West Feliciana Par.: Curry, Martin, & Allen 38 (Lv); Seib 10 (Lv). TEXAS: Jefferson Co.: Stutzenbaker 205 (Mu). CALIFORNIA: Butte Co.: Moldenke & Moldenke 30291 (Ac, Ld, Mu, W). COLOMBIA: Cundinamarca: Duque-Jaramillo 2707 (N), 2734 (N). ECUADOR: Tunguragua: Heinrichs 65 (Mu). GALAPAGOS ISLANDS: Chatham: Werff 218 [1482] (Ld). BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 29512 (W--2759076). Paraná: L. F. Ferreira 126 (Ld). Rio Grande do Sul: Reineck & Czermak 63 (Mu). State undetermined: Martius 1033 (Mu). BOLIVIA: La Paz: M. Bang 136 (Mu--1785). CHILE: Cautin: Roivainen 3054 (Mu). Concepción: Neger s.n. [1893-96] (Mu--3984). Valdivia: Athanasius 64 (Mu). Valparaiso: Behn s.n. [Quilpué, 22 Januar 1931] (Mu). ARGENTINA: Córdoba: Lorentz 131 [Macbride photos 20316] (Mu); Pierotti s.n. [27/I/1944] (Ut--330559B, Ut--330575B). Corrientes: Krapovickas, Cristóbal, Irigoyen, & Schinini 26799 (Ld). Mendoza: Ruiz Leal 8393 (Ut--330558B). SOUTH AFRICA: Natal: Meebold 12840 (Mu). Transvaal: Van Wyk 267 (Ac).

#### VERBENA CABRERAE Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 120, 195, 197, & 440 (1974) and 31: 388. 1975.

Additional citations: ARGENTINA: Jujuy: Krapovickas, Schinini, & Quarín 26689 (Ld).

#### VERBENA CABRERAE var. ANGUSTILOBATA Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 195, 197, & 440. 1974.

#### VERBENA CALIFORNICA Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 197. 1974.

McNeal 925, a topotype, distributed as V. officinalis L., was collected in moist rocky serpentine soil in streambed crossing (the actual type locality!), flowering in May. This is apparently the exact spot where my wife and I, as well as our son, observed and collected this plant and where our son originally discovered it.

Additional citations: CALIFORNIA: Tuolumne Co.: McNeal 925 (N).

#### VERBENA CALLIANTHA Briq.

Additional bibliography: Moldenke, *Phytologia* 30: 136. 1975.

Troll encountered this species on páramos at 3400 meters alti-

tude. Porto & Oliveira describe it as stoloniferous, the "petals red (5P5/9)".

Additional citations: BRAZIL: Rio Grande do Sul: Porto & Oliveira ICN.9585 (Ut--320460). BOLIVIA: Province undetermined: Troll 281 [Altos del Escalon] (Mu).

#### VERBENA CAMERONENSIS L. I. Davis

Additional & emended bibliography: Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716. 1969; G. W. Thomas, Tex. Fl. Ecolog. Summ. 77. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 716. 1974; Moldenke, Phytologia 28: 243. 1974; Hocking, Excerpt. Bot. A.26: 5. 1975.

Martínez-Calderón found this plant growing in "acahual" secondary vegetation, at 6 meters altitude, and the corollas on his no. 1246 are said to have been "blue".

Additional citations: MEXICO: Veracruz: Martínez-Calderón 1246 (N).

#### VERBENA CAMPESTRIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 218 (1972) and 36: 35. 1977.

Kummrow found this plant growing in "orla campo das encosta de pequenos morros", flowering in September, and describes the corollas as white.

Additional citations: BRAZIL: Paraná: Kummrow 1142 (Z).

#### VERBENA CANADENSIS (L.) Britton

Additional synonymy: Verbena lamberti B. M. ex G. Don in Loud., Hort. Brit., ed. 1, 247. 1830. Glandularia aubletia  $\alpha$  Spach, Hist. Nat. Veg. Phan. 9: 240. 1840. Glandularia aubletia  $\beta$  Spach, Hist. Nat. Veg. Phan. 9: 240. 1840. Verbena pulchella erinoides Zucc. ex Moldenke, Phytologia 34: 279, in sphalm. 1976.

Additional & emended bibliography: G. Don in Loud., Hort. Brit., ed. 1, 247 (1830) and ed. 2, 247. 1832; G. Don in Loud., Hort. Brit. Suppl. 1: 680. 1832; Loud., Hort. Brit., ed. 2, 552 & 602. 1832; Loud., Hort. Brit., ed. 3, 602. 1839; Baxt. in Loud., Hort. Brit. Suppl. 2: 680. 1839; Spach, Hist. Nat. Veg. Phan. 9: 239--240. 1840; Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Schnitzlein, Iconogr. Fam. Nat. 2: 137 Verbenac. [3] & 137: fig. 3. 1856; Buek, Gen. Spec. & Syn. Candoll. 3: 199, 494, & 495. 1858; Vilm., Fl. Pleine Terr., ed. 1, 936 (1865), ed. 2, 2: 973--974 (1866), and ed. 3, 1: 1197. 1870; Kuntze, Rev. Gen. Pl. 2: 510. 1891; Voss in Vilm., Fl. Pleine Terr., ed. 4, 1065 & 1070. 1894; Loes., Verh. Bot. Ver. Brand. 53: 75. 1912; Barker, Univ. Kans. Sci. Bull. 48: 571. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 & 716. 1969; G. W. Thomas, Tex. Fl. Ecolog. Summ. 77. 1969; Healy, Gard. Guide Pl. Names 225. 1972; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 715 & 716. 1974; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; Kooiman, Act. Bot. Neerl. 24: 463. 1975; Moldenke, Phytologia 30: 136--138 (1975) and 31: 376, 377, 409, & 411. 1975; H. D. Wils., Vasc. Pl. Holmes Co. Cat. 54.

1975; Fleming, Genelle, & Long, Wild. Fls. Fla. 15 & 82. 1976; Moldenke, Phytologia 34: 249, 250, 270, 274, & 279. 1976; Vanderpoel, Natl. Wildlife 15 (1): 50. 1976; A. L. Moldenke, Phytologia 36: 88. 1977.

Additional illustrations: Voss in Vilm., Fl. Pleine Terr., ed. 3, 1: 1197 (1870) and ed. 4, 1065. 1894; Vanderpoel, Natl. Wildlife 15 (1): 50 [in color]. 1976.

It should be noted here that Spach's var.  $\alpha$  is based on the original V. aubletia L. and is characterized by him as "a fleurs pourpres", while his var.  $\beta$  is based on V. drummondii (Lindl.) Baxt. and is characterized as "a fleurs lilas". He regards Billardiera explanata Moench as a synonym of var.  $\alpha$ . Of the species he says "Cette espèce, originaire des provinces méridionales des États-Unis, se cultive fréquemment comme plante de parterre".

Tans describes the material of V. canadensis which he collected "in recently landscaped roadside gravel in partial shade" as somewhat sprawling, the corollas rose-purple, the corolla-tube 17 mm. long, its limb 12 mm. wide, and the calyx 12 mm. long. Stephens found the species "in dry rocky limestone soil on prairie pasture hillside". Waterfall encountered it in openings in oak-hickory woods on stony hillsides. The corollas on D'Arcy & Beckner 1656 are said to have been "showy blue-purple", while on LePine 5056 they were "lavender", on Guguch 92 they were "rose", and on Ware 51 they were "blue".

Healy (1972) lists the horticultural varieties: "Compacta Amethyst", "Miss Susie Double", "Olympia", and "Royal Bouquet". These are listed as though varieties of V. canadensis, but certainly the last-mentioned (and perhaps all) is a cultivar of xV. hybrida Voss. Darlington & Wylie (1956) refer to V. canadensis as native to "N. & S. Am.", but this is erroneous -- it is not known from South America! Don (1830) calls V. aubletia "Aublet's vervain" and V. lamberti "Lambert's vervain", both now usually regarded as synonyms of V. canadensis. He dates the introduction of Aublet's vervain into English gardens as 1774 from "N. Amer.", but Lambert's vervain he says was introduced from "S. Amer.", date not known. This latter statement does not seem likely.

In this connection it should be noted here that the Bahama Islands collection cited below does not indicate on its accompanying label that it originated from cultivated material, but I assume that it did, since it is most unlikely that V. canadensis should occur in the wild state on these islands.

The "V. canadensis" illustrated by Fleming, Genelle, & Long (1976) actually is V. temisecta Briq.!

Wilson (1975) cites H. D. Wilson 1860 from Holmes County, Ohio, based on "a single plant".

Recent collectors have encountered V. canadensis on dissected stream terraces, in cleared thickets on ridges, in mixed woods, open fields, and wooded areas on black calcareous soil, on "hill-

side rocks", under mixed hardwoods on dry hillsides, in clay soil of grassy fields with Trifolium, in black or black calcareous soil of prairies, and in novaculite bottoms. LePine refers to it as a common perennial, while Guguch calls it an occasional herbaceous perennial. Collectors describe it as erect, with a flat-topped inflorescence, the stems ascending, 4--5 dm. tall, and the flowers odorless. Barker (1969) reports it "Common, in rocky upland prairies, on rocky prairie slopes, on rocky roadside embankments and along railroad right-of-ways. Found throughout the area."

Other recent collectors have found the species in the red soil of dry pine flatwoods in Texas, while Demaree reports it "common in dolomite glades" in Arkansas.

The Herb. Staatssamml. Münch. s.n. and Herb. Hort. Monac. s.n., originally distributed as V. canadensis, are actually V. andrieuxii Schau., while J. A. Churchill s.n. [14 May 1954], Herb. Reg. Monac. s.n. [Missouri], and R. Kral 26422 are V. bipinnatifida Nutt., Karwinski s.n. [In imperio mexicano] is V. elegans H.B.K., Purpus 6061 is V. gooddingii Briq., Lindheimer IV. 501 is V. pumila Rydb., Kirby 116 is V. rigida Spreng., Curtiss 1963 is V. tampensis Nash, and C. A. Brown 5636 is V. tenuisecta Briq.

Copper s.n. [June 23, 1959] is anomalous in having the leaves of V. canadensis and the calyxes of V. ambrosifolia Rydb.

Additional citations: FLORIDA: Alachua Co.: D'Arcy & Beckner 1656 (Sd--85760). ALABAMA: Tuscaloosa Co.: Nevius s.n. (Lv, Lv). OHIO: County undetermined: Frank s.n. [1837] (Mu--262). TENNESSEE: Wilson Co.: J. A. Churchill s.n. [24 April 1971] (Ln--236291). WISCONSIN: Walworth Co.: Tans 1476 (Ts). KANSAS: Franklin Co.: Copper s.n. [June 23, 1959] (Lc). Lyon Co.: Sudweeks s.n. [6/13/60] (Lc). Osage Co.: Roush s.n. [6/16/59] (Lc); Stephens 30597 (Sd--74400). MISSOURI: Barry Co.: Meebold 25570 (Mu). Cooper Co.: McReynolds 750651 (Lv). Jackson Co.: Meebold 22681 (Mu), 25248 (Mu). St. Louis: Drummond s.n. [Saint Louis, 1832] (Mu--294). ARKANSAS: Carroll Co.: Demaree 53464 (Ln--236563). Drew Co.: Demaree 16566 (Lv). Hot Springs Co.: Demaree 16920 (Lv). LOUISIANA: Ascension Par.: Ware 51 (Lv). Bossier Par.: Robinette 67 (Lv). Caddo Par.: C. A. Brown 20378 (Lv); N. F. Petersen s.n. [Apr. 10, 1909] (Lv). East Baton Rouge Par.: C. A. Brown s.n. [Sept. 30, 1936] (Lv). Matchitoches Par.: C. A. Brown 7147 (Lv). Ouachita Par.: Garland 200 (Lv); Thomas & Jones 1684 (Kl--11393). Pointe Coupee Par.: M. Chaney 226 (Lv). Saint John the Baptist Par.: Guguch 92 (Lv); LePine 5056 (Lv). Saint Tammany Par.: Arsène 11982 (Lv). Winn Par.: Brown & Lenz 7607 (Lv), s.n. [April 7, 1939] (Lv); N. F. Petersen s.n. [4-12-12] (Lv). OKLAHOMA: Creek Co.: J. A. Churchill s.n. [13 April 1953] (Ln--203426), Mayes Co.: Waterfall 15292 (Mu). Tulsa Co.: Stutts s.n. [April 12,

'41] (Lv). TEXAS: Harris Co.: J. A. Churchill s.n. [1 May 1955]. (Ln--204153). LOCALITY OF COLLECTION UNDETERMINED: Prince Paul of Wurtemberg s.n. [America sept. civit. confed. 1831] (Mu--1567). CULTIVATED: Austria: Herb. Zuccarini s.n. [hort. Hügel, Vindob. 1839] (Mu--269). Bahama Islands: Herb. Schmiedel s.n. [Ins. Bahamensis] (Mu--256). Germany: Herb. Grimm s.n. [1787] (Mu--255); Herb. Reg. Monac. 263 (Mu); Herb. Schmiedel s.n. [h. Selton. '87] (Mu--257); Herb. Schreber s.n. [Hort. Erlang. 1778] (Mu--258), s. n. [Hort. Erlang. 1785] (Mu--259); Herb. Univ. Ludv. Maximil. s.n. (Mu--251); Herb. Zuccarini s.n. [Hort. bot. Monac.] (Mu--264, Mu--265); Schrank s.n. [Hort. Monac.] (Mu--250).

VERBENA CANADENSIS (L.) Britton x V. AMBROSIFOLIA Rydb.

Additional bibliography: Moldenke, Phytologia 28: 199--200 & 451. 1974.

Copper s.n. [June 23, 1959], cited under V. canadensis, has intermediate characters between that species and V. ambrosifolia and may thus represent this hybrid.

VERBENA CANADENSIS (L.) Britton x V. ELEGANS H.B.K.

Additional bibliography: Moldenke, Phytologia 28: 200 & 451. 1974.

VERBENA CANADENSIS (L.) Britton x V. MARITIMA Small

Additional bibliography: Moldenke, Phytologia 28: 200, 451, & 464. 1974.

VERBENA CANADENSIS (L.) Britton x V. PERUVIANA (L.) Britton

Additional bibliography: Moldenke, Phytologia 28: 200, 451, & 464. 1974.

VERBENA CANADENSIS (L.) Britton x V. TAMPENSIS Nash

Additional bibliography: Moldenke, Phytologia 28: 200, 451, & 465. 1974.

VERBENA CANESCENS H.B.K.

Additional synonymy: Verbena canescens var. canescens [H.B.K.] apud Thomas, Tex. Pl. Ecolog. Summ. 77. 1969.

Additional & emended bibliography: Sweet, Hort. Brit., ed. 2, 419. 1830; G. Don in Loud., Hort. Brit., ed. 1, 247 (1830), ed. 2, 247. 1832; Loud., Hort. Brit., ed. 2, 552 & 553. 1832; G. Don in Loud., Hort. Brit., ed. 3, 247. 1839; Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Loes., Verh. Bot. Ver. Brand. 53: 74. 1912; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716. 1969; G. W. Thomas, Tex. Pl. Ecolog. Summ. 77. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 716. 1974; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; Moldenke, Phytologia 30: 138, 156, & 165 (1975), 31: 377 & 378 (1975), and 34: 251, 252, & 278. 1976.

Don (1830) calls this the "canescent vervain" and dates its introduction into English gardens from Mexico as 1824, but Loudon (1832) dates its introduction as 1820. Thomas (1969) calls it the "gray verbena".

Recent collectors have encountered this plant in clayish soil of desert scrub, in calcareous loam in chaparral on steep encanoyoned conglomerate fans, in calcareous gravelly soil of "matorral desértico microfilo inerme" on limestone hills, in open hilly limestone areas, on rock and gravel in xerophytic canyons, in "matorral desértico inerme y con espinas laterales" on mostly limestone hillsides with some extrusive igneous rock on top, on limestone gravel and rocky limestone slopes, and in "matorral subdesértico inerme y con espinas laterales" on flat areas near the bottom of "bajadas", growing in association with Larrea tridentata, Parthenium incanum, Celtis pallida, Flourensia cernua, Yucca carnerosana, Agave lecheguilla, Vauquelinia corymbosa, Fouquieria splendens, Amelanchier, Acacia, Opuntia, Mortonia, Lycium, Mimosa, and Dasyliirion. Henrickson refers to it as "frequent" in some localities and as an "infrequent perennial" in others. Ellis and his associates found it on "oak scrub hills with Lupinus and Populus".

The corollas are said to have been "violet" on Henrickson 6263. Demaree asserts that there were "not many" of these plants where he made his Texan collection. Loesener (1912) cites Seler & Seler 3488 from Coahuila, Mexico.

Material of V. canescens has been misidentified and distributed in some herbaria as "Verbena halii Small". On the other hand, the W. M. Jones 7, distributed as V. canescens, actually is var. roemeriana (Scheele) Perry; W. Schumann 1070 is a mixture with V. gracilis Desf.

Additional citations: TEXAS: Bexar Co.: Meebold 27301 (Mu). Tarrant Co.: Demaree 66202 (Ld). MEXICO: Chihuahua: Ellis, Le Doux, & Watkins 964 (N). Coahuila: Henrickson 11601 (Ld); Johnston, Wendt, & Chiang C. 10276b (Ld); Johnston, Wendt, Chiang C., & Riskind 11740g (Ld); Marsh 1687 (Ld). Jalisco: Schumann 1070, in part (Mu). Nuevo León: Painter, Lucas, & Barkley 14276 (Ld). Oaxaca: Pringle 4784 (Mu--1802). Puebla: Ventura A. 1574 (Sd--78100). San Luis Potosí: Schaffner s.n. [1875-79] (Mu--1557). Tamaulipas: Painter & Barkley 15373 (Ld). Zacatecas: Chiang, Wendt, & Johnston 7901 (Ld), 7920 (Ld); Henrickson 6263 (Ld); Johnston, Chiang, & Wendt 10435 (Ld), 10440 (Ld).

VERBENA CANESCENS var. ROEMERIANA (Scheele) Perry

Additional bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 77. 1969; Moldenke, Phytologia 30: 138, 156, & 165 (1975), 31: 378 (1975), and 34: 251. 1976.

Thomas (1969) calls this the "Roemer verbena".

Additional citations: TEXAS: Brown Co.: J. Reverchon s.n. [Cur-

tiss 1961] (Mu--1556). Caldwell Co.: W. M. Jones 7 (Mu). Cameron Co.: R. Runyon 629 (Mu). Comal Co.: Lindheimer 1074 (Mu--4086). Kerr Co.: E. J. Palmer 10002 (Mu).

VERBENA CAROLINA L.

Additional & emended synonymy: Verbena carolinensis, melissae folio aspero Dill. in Ray, Synop. Meth. Stirp. Brit., ed. 3, pl. 301, fig. 388. 1724. Verbena polystachya Kunth ex G. Don in Loud., Hort. Brit., ed. 1, 246. 1830. Verbena carolinensis etc. Dill. ex Schau. in A. DC., Prodr. 11: 546, in syn. 1847. Verbena carolinensis &c. Dill. ex Buek, Gen. Spec. Syn. Candoll. 3: 494, in syn. 1858. Verbena carolineana El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974. Verbena carolina var. polystachya (H.B.K.) Schimpff ex Moldenke, Phytologia 34: 278, in syn. 1976.

Additional & emended bibliography: Dill. in Ray, Synop. Meth. Stirp. Brit., ed. 3, pl. 301, fig. 388. 1724; G. Don in Loud., Hort. Brit., ed. 1, 246 (1830) and ed. 2, 246. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; G. Don in Loud., Hort. Brit., ed. 3, 246. 1839; Buek, Gen. Spec. Syn. Candoll. 3: 494--496. 1858; Druce & Vines, Dill. Herb. 182. 1907; Loes., Verh. Bot. Ver. Brand. 53: 74. 1912; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716 (1969) and imp. 2, 716. 1974; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; Garcia, MacBryde, Molina, & Herrera-MacBryde, Malez. Preval. Cent. Am. 143 & 161. 1975; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: 92. 1975; Moldenke, Phytologia 30: 138--139 (1975) and 31: 378. 1975; Molina R., Ceiba 19: 95. 1975; Soukup, Biota 11: 18. 1976; Moldenke, Phytologia 34: 270, 278, & 281 (1976) and 36: 47. 1977.

Additional illustrations: Dill. in Ray, Synop. Meth. Stirp. Brit., ed. 3, pl. 301, fig. 388. 1724; Garcia, MacBryde, Molina, & Herrera-MacBryde, Malez. Preval. Cent. Am. 143 (in color). 1975.

According to Druce & Vines (1907) the Dillen pre-Linnean designation for this species is represented in his herbarium by a cultivated specimen from the Eltham Garden, collected in 1726, and referred to V. caroliniana Willd. by Klinsmann, to V. polystachya H.B.K. by Asa Gray, and finally to V. carolina L.

Don (1830) calls the species the "Carolina vervain" and gives 1732 as the date of its introduction from "N. Amer." into English gardens -- but it was in cultivation there as early as 1726 according to Dillen. The cospecific V. veronicaefolia he calls the "veronica-leaved vervain" and avers that it was introduced from Mexico in 1825; V. polystachya he calls the "many-spiked vervain" and dates its introduction into English gardens from Mexico as 1820.

It should be noted here that the specimen from the Bahama Islands, cited below, does not bear any indication on its accompanying label that it came from cultivated material, but I am assuming that it did because V. carolina is not known in the wild

condition on those islands.

Recent collectors have encountered V. carolina in pinelands, along streams in granitic canyons "growing with Cordia, Quercus, Phaseolus, Ipomopsis, grasses, and herbs", and "in pine forests, some parts of which were severely cutover, in basic usually thin sandy soil capped by thick basalt, but with soft bedded volcanic underneath, with caves containing well-preserved Amerind pueblos and relics in the overhang, growing with Pinus spp. and Quercus spp." Henrickson refers to it as an "infrequent annual in disturbed areas". The corollas were "blue" on Contreras 10972 and "violet-blue" on Colaris 1529.

Loesener (1912) cites Seler & Seler 1304 from Mexico. The Karwinski s.n. [in imperio mexicano], distributed as V. carolina, actually is V. ehrenbergiana Schau., while Martínez Calderón 1352 is V. longifolia f. albiflora Moldenke, H. H. Rusby 780 is V. macdougallii Heller, Spencer s.n. [1916.4.25] is V. menthaefolia Benth., Karwinski s.n. is V. recta H.B.K., C. A. Brown 3892, Parish & Parish 1043, and Wurzlow s.n. [June 20, 1912] are V. scabra Vahl, Herb. Schwaegrichen s.n., Herb. Zuccarini s.n. [h. b. Mon. 1819], and Schoepf s.n. [ad New York] are V. simplex Lehm., and Herb. Reg. Monac. 250 is Stachytarpheta angustifolia f. elatior (Schrad.) López-Palacios.

Additional citations: ARIZONA: County undetermined: Stalmach 198 (Au—122071). MEXICO: Chihuahua: McCabe 440 (Ws); Wilson, Johnston, & Johnston 8595 (Ld). Federal District: Barkley, Rowell, & Webster 2199 (Ln—189707). México: Salinas M. 85 (Ws). Oaxaca: Colaris 1529 (Ut—328615B); Pringle 4892 (Mu—1804). Zatecas: Henrickson 13492 (Ld). GUATEMALA: Baja Verapaz: Contreras 10972 (W—2795345). Guatemala: Kellerman 6540 (Ld). Santa Rosa: Heyde & Lux 3019 (Mu—1808). Sololá: Kellerman 5825 (Ac, Au). CULTIVATED: Bahama Islands: Herb. Schmiedel s.n. [Insul. Bahamens.] (Mu—297). Germany: Schreber s.n. [Hort. Bot. Erlang.] (Mu—298).

#### VERBENA CAROLINA f. ALBIFLORA Moldenke

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Moldenke, Phytologia 28: 203 & 432. 1974.

Additional citations: MEXICO: Veracruz: Gutierrez R. 342 (Ws).

#### VERBENA CATHARINAE Moldenke

Additional bibliography: Moldenke, Phytologia 28: 203. 1974.

Hatschbach encountered this plant along roadsides and the corollas are said to have been "deep-lilac" on Hatschbach 14968.

Additional citations: BRAZIL: Paraná: Hatschbach 14954 [Herb. Brad. 48008] (Mu), 14968 [Herb. Brad. 48009] (Mu).

#### VERBENA CHILENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 186 (1972)

and 34: 260. 1976.

Additional citations: CHILE: Valdivia: Neger s.n. [Villarrica, 1897] (Mu—3983).

VERBENA CILIATA Benth.

Additional & emended bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Loes., Verh. Bot. Ver. Brand. 53: 75. 1912; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716. 1969; G. W. Thomas, Tex. Pl. Ecolog. Summ. 77. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 716. 1974; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975; E. H. Jordan, Checklist Organ Pipe Cact. Natl. Mon. 7. 1975; Moldenke, Phytologia 30: 132 & 139 (1975) and 34: 252 & 270. 1976; A. L. Moldenke, Phytologia 35: 173. 1977.

Tilforth describes this plant as an "annual, branched from base and above, decumbent to ascending, common but in groups. Other recent collectors have encountered it "on mezquital and tobosa flats in alluvial bajadas in fine textured alluvial soil", "in creosote scrub of Chihuahuan Desert", "in open Chihuahuan Desert with rocky reddish clay soil", in clay soil of dry lakes, in rocky clay soil, in small ravines, "in limestone soil of rugged limestone sierra", "in matorral desértico microfilo inerme on broad alluvial flats, in calcareous adobe alluvium", "in limestone soil in areas of extensive chaparral and oaks, the lower slopes with Yucca carnerosana and Dasyllirion, the upper slopes with Pinus ponderosa and Agave macroculmis", "in chaparral with many pines on the higher slopes, in steep canyon through mountains of igneous rock, mostly intrusive basics, in gravelly, crussy and sandy soils derived from the igneous rock", "in calcareous gravelly adobe of matorral subdesértico inerme y con espinas laterales in flat areas near bottom of bajada", "in gravelly pale alluvial adobe soil of izotal of Yucca filifera in low flat valley bottoms between gentle hills", and in open pine-juniper woodland-meadow areas, growing in association with Prosopis glandulosa, Hilaria mutica, Agave lecheguilla, Yucca carnerosana, Y. filifera, Larrea tridentata, Opuntia imbricata, Celtis pallida, Flourensia cernua, Atriplex, Bahia, Conyza, Salsola, Acacia, Buddleia, Jatropha, Parthenium, Aloysia, Clematis, Sicyos, Quercus, Pinus, Pseudotsuga, Ceanothus, Cercocarpus, Salvia, Carex, Bidens, Eryngium, pinyon, juniper, various composites, and numerous annuals. Torke and his associates found it in "red soil, still heavily cultivated area with some cacti and associates", at 5750 feet altitude. Stuessy refers to it as "scarce in Prosopis-Larrea scrub". Davidse encountered it "in Bouteloua grassland with low shrubs and Opuntia".

Collectors describe the plant as a small decumbent perennial, 6 inches to 1 foot tall. Henrickson refers to it as "frequent" or "infrequent" and as "a common roadside weed".

The corollas on Henrickson 13293 and Ventura A. 1646 are said to have been "purple", while on Tilforth 562 they were "purple

with externally white lobes", on Henrickson 6345c & 11212 they were "violet", on Henrickson 5950b "light-violet", on Henrickson 3027 "red-violet", on Johnston, Chiang, & Wendt 10432 "deep-pink", on Chiang, Wendt, & Johnston 7987 "dark rose-pink", and on Stuessy 965 "pale-blue". Thomas (1969) calls it the "fringe verbenae". Mrs. Jordan (1975) records the common name, "hairy verbenae".

Loesener (1912) cites Seler & Seler 1120, 1173, 1174, 1379, & 3555 from Guanajuato, Michoacán, Tlaxcala, and Oaxaca, Mexico, and 4056 from Kinney County, Texas.

The Reeves & Pinkava 11933, distributed as V. ciliata, is actually V. bipinnatifida Nutt., while J. A. Churchill s.n. [23 April 1953] is V. ciliata var. pubera (Greene) Perry, Edw. Palmer 339, Reeves & Lehto R.1166, Reeves & Pinkava 11947, and Warren & Turner 68-87 are V. gooddingii Briq., Fugate, McLaughlin, & McManus 652 and Warren & Turner 68-33 are V. gooddingii var. nepetifolia Tidestrom., T. Reeves R.1166 is xV. perplexa Moldenke, Lindheimer 1075 is V. pumila Rydb., Croft s.n. [San Diego, 1885] is V. quadrangulata Heller, Pringle 4180 and Schaffner s.n. [San Luis Potosí, 1875-79] are V. teucrifolia Mart. & Gal., and Semple & Love 321 and Van Devender & Van Devender s.n. [23 March 1976] are V. wrightii A. Gray. Meebold 27286 is a mixture of V. bipinnatifida Nutt. and Evolvulus sp.

Additional citations: ARIZONA: Cochise Co.: Tilforth 562 (Mi, Sd--90751). Pima Co.: J. A. Churchill s.n. [29 March 1972] (Ln--235661). Pinal Co.: Thorner s.n. [May 28, 1905] (Ld). MEXICO: Chihuahua: Henrickson 5723 (Ld), 8027 (Ld), 11212 (Ld); Johnston, Wendt, & Chiang C. 10540a (Ld), 11307e (Ld); Stuessy 965 (Ws). Coahuila: Chiang C., Wendt, & Johnston 7738 (Ld); Henrickson 5950b (Ld); Johnston, Wendt, Chiang C., & Riskind 11985m (Ld). Nuevo León: Chiang C., Wendt, & Johnston 7987 (Ld). Michoacán: Torke, LeDoux, & Ellis 302 (N). Puebla: Ventura A. 1646 (Sd--78371). San Luis Potosí: Schaffner s.n. [San Luis Potosí, 1875-79] (Mu--1561). Veracruz: Kerber 255 (Mi, Mu--1777). Zacatecas: Chiang C., Wendt, & Johnston 7887 (Ld), 7900 (Ld); Davidse 9944 (Ld); Henrickson 6345c (Ld), 6667 (Ld), 13293 (Ld); Johnston, Chiang C., & Wendt 10432 (Ld); Johnston, Wendt, & Chiang C. 11566a (Ld). State undetermined: W. Schumann 1071 [Feral] (Mu--3892).

#### VERBENA CILIATA var. LONGIDENTATA Perry

Additional bibliography: G. W. Thomas, Tex Pl. Ecol. Summ. 78. 1969; Moldenke, Phytologia 28: 204--205 (1974) and 34: 252 & 270. 1976.

Ruryon reports this plant "very abundant in this region [Cameron County, Texas], covers acres of ground and is widespread in open fields, sandy soil" and describes it as an "erect branching and spreading herb". The corollas are said by him to have been "blue-purple" on R. Ruryon 1782, a collection which has been mis-

identified and erroneously cited previously by me as V. ambrosifolia f. eglandulosa Perry.

The corollas are described as "lavender-blue" on Henrickson 7630 and "light magenta and purple" on Henrickson 6239. Recent collectors in Mexico have found the plant growing in rock and gravel in xerophytic canyons, in low clay roadside ditches, and on steep limestone-shale southwest-facing slopes, growing in association with Agave, Baccharis, Conyza, Flourensia, Fouquieria, Larrea, Parthenium, Pectis, Tidestromia, Yucca, cacti, grasses, etc., at altitudes of 4500--6100 feet. Henrickson refers to it as an "infrequent annual".

Material of this variety has been misidentified and distributed in some herbaria as V. erinoides Lam. or V. multifida Ruiz & Pav. The Ramirez & Cardenas 13, cited previously and again below, is a mixture with V. ambrosifolia Rydb.

Additional & emended citations: TEXAS: Cameron Co.: R. Ruryon 1782 (Mu, Rr, Rr). Zavala Co.: Ramirez & Cardenas 13, in part (Au--245214). MEXICO: Chihuahua: Henrickson 7630 (Ld). Nuevo Leon: Painter, Lucas, & Barkley 14290 (Ld). Zacatecas: Henrickson 6239 (Ld). CULTIVATED: France: Weinkauff s.n. [Jard. des plant. 1834] (Mu--1254). Germany: Berger s.n. (Mu--310); Herb. Schwaegerichen s.n. [Hort. Lipsiensis] (Mu--1252, Mu--1253); Herb. Zuccarini s.n. (Mu--311, Mu--312).

VERBENA CILIATA var. PUBERA (Greene) Perry

Additional bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Moldenke, Phytologia 30: 139. 1975.

The Meebold 22491, distributed as V. ciliata var. pubera, is actually V. wrightii A. Gray.

Additional citations: NEW MEXICO: G. L. Fisher s.n. [Nara Visa, Apr. 21, 1911] (Mu--4247). ARIZONA: Mohave Co.: J. A. Churchill s.n. [24 April 1953] (Ln--203425).

VERBENA CLAVATA Ruiz & Pav.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Moldenke, Phytologia 28: 205. 1974; Soukup, Biota 11: 18. 1976.

The Princess Therese of Bavaria 281, distributed as V. clavata, actually is V. occulta Moldenke.

Additional citations: MOUNTED ILLUSTRATIONS: Ruiz & Pav., Fl. Peruv. & Chil. 1: pl. 33, fig. b. 1797 (N, Z).

VERBENA CLAVATA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 23: 191. 1972; Soukup, Biota 11: 18. 1976.

VERBENA CLAVATA var. CASMENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 191. 1972;

Soukup, Biota 11: 18. 1976.

xVERBENA CLEMENSORUM Moldenke

Additional bibliography: Moldenke, Phytologia 23: 192 & 435. 1972.

VERBENA CLOVERAE Moldenke

Additional & emended bibliography: G. W. Thomas, Tex. Pl. Ecology. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716 (1969) and imp. 2, 716. 1974; Moldenke, Phytologia 30: 139. 1975.

Thomas (1969) calls this the "Clover verbena".

xVERBENA COPRUPA Moldenke

Additional bibliography: Moldenke, Phytologia 30: 139--140 (1975) and 31: 411. 1975.

VERBENA CORYMBOSA Ruiz & Pav.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716 (1969) and imp. 2, 716. 1974; Kooiman, Act. Bot. Neerl. 24: 463. 1975; Moldenke, Phytologia 30: 140 (1975) and 34: 260. 1976; Soukup, Biota 11: 18. 1976.

Hollermayer describes this plant as 1 meter or more tall. The corollas are said to have been "blue" on Hollermayer 62, while Lindeman says "corola roxa 2P7/6" and encountered the plant in a "pequeño bafñado".

Additional citations: BRAZIL: Rio Grande do Sul: Lindeman ICN. 9448 (Ut--320455). Santa Catarina: Lourteig 2164 (N). CHILE: Bío-Bío: Neger s.n. [S. Juan, 1895-97] (Mu--2980). Concepción: Merrxmüller 24819 (Mu). Valdivia: Buchtien s.n. [Valdivia, 19/2/1904] (Mu--3995); Hollermayer 62 (Mu). Laja Island: Poeppig III. 157 (Mu--305). MOUNTED ILLUSTRATIONS: Ruiz & Pav., Fl. Peruv. & Chil. 1: pl. 33, fig. a. 1797 (N, Z).

VERBENA CRITHMIFOLIA Gill. & Hook.

Additional & emended synonymy: Verbena critmifolia Gill. & Hook. ex Moldenke, Lilloa 8: 429, in nota. 1942; Phytologia 9: 46, in syn. 1963. Verbena critmifolia Gill. ex Moldenke, Résumé Suppl. 3: 37, in syn. 1962.

Additional & emended bibliography: Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 494 & 507. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 & 716 (1969) and imp. 2, 715 & 716. 1974; Moldenke, Phytologia 30: 140. 1975.

The Lossen 8, distributed as V. crithmifolia, actually is V. hookeriana (Covas & Schnack) Moldenke.

Additional citations: ARGENTINA: La Pampa: Krapovickas, Cris-tóbal, Mroginski, & Fernandez 22321 (N). Neuquen: Ammann 115 (Mu).

## VERBENA CUMINGII Moldenke

Additional bibliography: Moldenke, *Phytologia* 30: 133 & 140. 1975.

## VERBENA CUNEIFOLIA Ruiz &amp; Pav.

Additional bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 494. 1858; Moldenke, *Phytologia* 28: 348--349. 1974; Soukup, *Biota* 11: 18. 1976.

The corollas on Infantes 5295 are described as having been "moradas" [purple] and this collector encountered the plant in flower in February. Ferreyra describes it as a subshrub, 40--80 cm. tall, and found it growing in puna and pajonal associations, at 3900--4000 meters altitude, flowering and fruiting in May. López-Palacios describes it as an "hierba rastrera, hojas de 1--1.5 cm, flores morado claro, pequeñas, espigas delgadas" and encountered it at 2500 meters altitude.

Additional citations: ECUADOR: Loja: López-Palacios 4162 (Z). PERU: Ancash: R. Ferreyra 14393 (W--2740336). La Libertad: Infantes 5295 (Mu).

## xVERBENA DEAMII Moldenke

Additional bibliography: Perkins, Estes, & Thorp, *Bull. Torrey Bot. Club* 102: 194, 195, & 197. 1975; Moldenke, *Phytologia* 30: 140 (1975) and 34: 250. 1976.

Perkins and his associates (1975) found a single plant of this hybrid in a mixed population of verbenas including both parents, which, when artificially pollinated with V. bracteata pollen, produced a plant with 133 potential seeds and a 17.3 percentage of actual seed-set -- V. bracteata, one parent, had 66.5 percent seed-set and V. stricta, the other parent, had 76.3--87.6 percent seed-set. The only insect observed visiting indiscriminately both parental plants and their hybrid was Systropus sp. (observed with actual Verbena pollen on the head).

Additional citations: MISSOURI: County undetermined: Martens s.n. [Missouri] (Mu--292).

## VERBENA DELICATULA Mart.

Additional bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 494. 1858; Moldenke, *Phytologia* 23: 106. 1972.

## VERBENA DELTICOLA Small

Additional & emended bibliography: G. W. Thomas, *Tex. Fl. Ecol. Summ.* 78. 1969; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl., imp.* 1, 716 (1969) and *imp.* 2, 716. 1974; Moldenke, *Phytologia* 28: 349 (1974) and 34: 251. 1976.

Additional citations: TEXAS: Cameron Co.: C. L. Lundell 10758 (N). Nueces Co.: Duncan s.n. [March 16, 1975] (Ac). MEXICO: Nuevo León: F. A. Barkley 14361 (Ld).

## VERBENA DEMISSA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 222 & 233 (1972), 34: 257 (1976), and 36: 33 & 51. 1977.

This plant has been found in flower and fruit in March (in addition to the months previously recorded by me). Material has been misidentified and distributed in some herbaria as V. carolina var. polystachya (H.B.K.) Schimpff.

Additional citations: ECUADOR: Chimborazo: Schimpff 765 (Mu).

VERBENA DEMISSA f. ALBA Moldenke, *Phytologia* 36: 51. 1977.

Bibliography: Moldenke, *Phytologia* 36: 33 & 51. 1977.

Citations: ECUADOR: Pichincha: López-Palacios 4200 (Z--type).

## xVERBENA DERMENI Moldenke

Additional synonymy: Verbena dermani Mold. ex Soukup, *Biota* 11: 18. 1976.

Additional bibliography: Moldenke, *Phytologia* 30: 140 (1975) and 31: 384. 1975; Soukup, *Biota* 11: 18. 1976.

Material of this hybrid has been misidentified and distributed in some herbaria as V. litoralis H.B.K. On the other hand, the Pedersen 9867, distributed as this hybrid, seems to be typical V. hispida Ruiz & Pav.

Additional citations: PERU: Junín: W. Hoffmann 182 (Mu). BOLIVIA: La Paz: O. Buchtien 185 (Mu).

## VERBENA DISSECTA Willd.

Additional synonymy: Verbena dissecta Willd. ex Soukup, *Biota* 11: 18. 1976. Glandularia dissecta (Willd.) Schnack & Covas ex Soukup, *Biota* 11: 18, in syn. 1976.

Additional & emended bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 494. 1858; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 715 & 716 (1969) and imp. 2, 715 & 716. 1974; Moldenke, *Phytologia* 28: 349. 1974; Troncoso, *Darwiniana* 18: 318 & 409. 1974; López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 15: 94. 1975; Soukup, *Biota* 11: 18. 1976; Moldenke, *Phytologia* 36: 42 & 47. 1977.

The corollas on Cabrera & al. 17128 are said to have been "lilac" when fresh.

The Dessauer s.n. and Frömbing s.n. [Chili 1886], distributed as V. dissecta, actually are V. berterii (Meisn.) Schau., while Araujo 1256 [Herb. FEEMA 12264] is V. tenera Spreng.

Additional citations: ARGENTINA: Buenos Aires: Cabrera, Fabris, Torres, & Tur 17128 (Mu). Santiago del Estero: Pierotti "h" [1-IV-944] (Ut-330536B), "h" [6-4-44] (Ut-330564B).

## VERBENA DOMINGENSIS Urb.

Additional bibliography: León & Alain, *Fl. Cuba*, imp. 2, 2: 281. 1974; Moldenke, *Phytologia* 30: 140, 159, & 169 (1975) and 34: 19-20 & 254. 1976.

The corollas on Liogier & Liogier 19489 are said to have been "dark-purple" when fresh.

Material of V. domingensis has been distributed in some herbaria as "Labiata sp." and as "Labiatae sp. Subaphylla". On the other hand, the Liogier 16846, distributed as typical V. domingensis, actually is the type collection of f. foliosa Moldenke, while Curtiss 677 and Rugel 212 [856] and perhaps most or all the other Cuban material cited by me in previous installments of these notes are V. officinalis L. [or, perhaps more likely, V. halei Small].

Additional citations: HISPANIOLA: Dominican Republic: Eggers 1828 (Mu--4108), 2175 (Mu--3902); Liogier & Liogier 19489 (N).

VERBENA DOMINGENSIS f. FOLIOSA Moldenke, *Phytologia* 34: 19--20. 1976.

Bibliography: Moldenke, *Phytologia* 34: 19--20 & 254. 1976.

Citations: HISPANIOLA: Dominican Republic: Liogier 16846 (N--type).

VERBENA EHREBERGIANA Schau.

Additional & emended bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 494. 1858; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 716 (1969) and imp. 2, 716. 1974; Moldenke, *Phytologia* 28: 207 (1974) and 34: 251 & 252. 1976.

Mears reports finding this species growing in association with Fuchsia, Reseda, Stillingia, Cheilanthes, and Cornus.

Material of V. ehrenbergiana has been misidentified and distributed in some herbaria as V. officinalis L. On the other hand, the Stalmach 198, previously cited by me as V. ehrenbergiana, seems, on re-examination, to be V. carolina L., thus nullifying the only "record" of V. ehrenbergiana from outside of Mexico.

Additional citations: MEXICO: Hidalgo: Mears 299b (Ln--222097); Moore & Wood 3962 (Mi). Nuevo León: Pringle 1948 (Mu--3893). Tamaulipas: Richardson 188 (Ld). State undetermined: Karwinski s.n. [Taloman, July 1827] (Mu--307, Mu--308, Mu--346), s.n. [in imperio mexicano] (Mu--419).

VERBENA ELEGANS H.B.K.

Additional synonymy: Verbena moranensis H.B.K. apud Buek, *Gen. Spec. Syn. Candoll.* 3: 495, in syn. 1858.

Additional bibliography: G. Don in Loud., *Hort. Brit.*, ed. 1, 247 (1830), ed. 2, 247 (1832), and ed. 3, 247. 1839; Buek, *Gen. Spec. Syn. Candoll.* 3: 494 & 495. 1858; G. W. Thomas, *Tex. Pl. Ecolog. Summ.* 78. 1969; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 716 (1969) and imp. 2, 716. 1974; El-Gazzar, *Egypt. Journ. Bot.* 17: 75 & 78. 1974; Moldenke, *Phytologia* 28: 349, 451, & 457. 1974; Kooiman, *Act. Bot. Neerl.* 24: 464. 1975; Moldenke, *Phytologia* 30: 134 (1975) and 31: 378. 1975.

Recent collectors have encountered this plant on bare hills and

in hillside oak forests, on northeast-facing slopes, in calcareous loam in areas of matorral-chaparral-encinar on slopes of alluvial fans, growing in association with Agave lecheguilla, Parthenium incanum, Opuntia leptocaulis, Hesperaloe, and Cercocarpus, at 550 meters altitude, flowering in May.

Don (1830) calls this species the "elegant vervain" and dates its introduction into English gardens from Mexico as 1826. Mears reports finding it growing with Cornus, Drymaria, Dudleya, Lobelia, Maurandya, Heuchera, Piqueria, and Reseda in Hidalgo. Hendricks reports it growing "from a stout shallow caudex" and "not common" at 8000 feet altitude, and on his no. 439 the corollas are said to have been "lavender, one petal notched and larger".

The Sydow s.n. [Sept. 1900], distributed as typical V. elegans, actually represents var. asperata Perry.

Additional citations: MEXICO: Coahuila: Johnston, Wendt, & Chiang C. 10161b (Ld); Keil, Meyer, Lewis, & Pinkava 6037 (Ld, Te-68562). Durango: Hendricks 439 (Ws). Hidalgo: Mears 307c (Mu); Pringle 6908 (Ln--70156, Mu--3732), 7591 (Mu--4165); Troll 448 (Mu). Sonora: Reeves & Lehto L.18689 (Te--75344). State undetermined: Karwinski s.n. [in imperio mexicano] (Mu--266, Mu--267).

VERBENA ELEGANS H.B.K. x V. PERUVIANA (L.) Britton

Additional bibliography: Moldenke, Phytologia 28: 203 & 457. 1974.

VERBENA ELEGANS H.B.K. x V. PULCHELLA Sweet

Additional bibliography: Moldenke, Phytologia 28: 208 & 457. 1974.

VERBENA ELEGANS H.B.K. x V. STELLARIOIDES Cham.

Additional bibliography: Moldenke, Phytologia 28: 208 & 457. 1974.

VERBENA ELEGANS var. ASPERATA Perry

Additional bibliography: G. W. Thomas, Tex. Pl. Ecol. Summ. 78. 1969; Moldenke, Phytologia 30: 134 & 140--141 (1975) and 31: 378. 1975.

Hendricks encountered this plant in wet mountain meadows.

Additional citations: MEXICO: Durango: Hendricks 538 (Ws). San Luis Potosí: Sanderson 262 (Ln--238191). Tamaulipas: Urbatsch 2423 (Ld). CULTIVATED: Germany: Herb. Schönau s.n. (Mu). Sweden: Sydow s.n. [Sept. 1900] (Ac).

xVERBENA ENGELMANNII Moldenke

Additional bibliography: Greller, Bull. Torrey Bot. Club 102: 416. 1975; R. A. Davidson, State Univ. Iowa Stud. Nat. Hist. 20 (a): 77. 1959; Moldenke, Phytologia 30: 141 & 174 (1975), 31: 377 (1975), 34: 247 & 248 (1976), and 36: 29. 1977.

The Wheeler collection cited below exhibits some fasciated in-

florescences. Greller (1975) reports the hybrid from Suffolk County, New York, while Davidson (1959) found it in Louisa and Van Buren Counties, Iowa.

Additional citations: ILLINOIS: Cass Co.: Geyer s.n. [Beardstown, July 1842] (Mu--363--isotype). Winnebago Co.: M. S. Ebb s.n. [Fountaindale] (Mu--4250). MICHIGAN: Ingham Co.: C. F. Wheeler s.n. [Aug. 30, 1890] (Ln--142449).

VERBENA EPHEROIDES Cham.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494. 1958; Moldenke, Phytologia 30: 141. 1975.

The Lorentz 131, distributed as V. ephedroides, is actually V. brasiliensis Vell.

VERBENA FASCICULATA Benth.

Additional bibliography: Moldenke, Phytologia 23: 230--231 (1972) and 24: 46. 1972; Soukup, Biota 11: 18 & 19. 1976; Moldenke, Phytologia 36: 33. 1977.

Additional citations: PERU: Ica: Ellenberg 4914 (Ac).

VERBENA FERREYRAE Moldenke

Additional bibliography: Moldenke, Phytologia 23: 231. 1972; Soukup, Biota 11: 18. 1976.

VERBENA FILICAULIS Schau.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494 & 495. 1958; Moldenke, Phytologia 30: 141. 1975.

Additional citations: BRAZIL: Minas Gerais: Widgren s.n. [1845] (Mu--1566). Paraná: Dusén 15679 (Mu). São Paulo: F. C. Hoehne 443 (Mu--4317).

VERBENA FLAVA Gill. & Hook.

Additional & emended bibliography: Schau. in A. DC., Prodr. 11: 555--556. 1847; Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 & 717 (1969) and imp. 2, 715 & 717. 1974; Moldenke, Phytologia 30: 141. 1975.

Additional citations: ARGENTINA: Mendoza: Ruiz Leal 8503 (Ld, Ut--330570B). Neuquen: Ammann 113 (Mu, Mu); Schajovskoy 137 (Mu), 138 (Mu).

VERBENA GALAPAGOSSENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 232. 1972; Balgooy, Pacif. Pl. Areas 3: 245. 1975.

López-Palacios describes this plant as "hierba de 70 cm. a 1 m., hojas superiores relativamente estrechas, fl. morado claro" and found it in flower and fruit in February.

Van der Werff's collection, cited below, is placed here tentatively, awaiting his publication on the Galápagos verbenas. He says of it that "The plant was shrubby, with ascending stems to 2 m. long; leaves small, only at [the] base of stems are there dis-

tinctly larger leaves". He found it growing "at crater rim in a dry area in no way comparable to the wet fern-sedge zones that are found on the summits of" Chatham and Indefatigable Islands.

Additional citations: GALÁPAGOS ISLANDS: Albemarle: López-Palacios 4298 (Z); Van der Werff 1580 (Z).

#### VERBENA GENTRYI Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 232 (1972) and 34: 252. 1976.

Henrickson has collected what appears to be this species at 7600 feet altitude, where he found it to be frequent in shaded woods in association with Carex, Bidens, Eryngium, composites, pines, oaks, etc., in an area of open pine-juniper woodland-meadow, flowering and fruiting in September.

Additional citations: MEXICO: Chihuahua: Henrickson 8035 (Ld).

#### VERBENA GLABRATA H.B.K.

Additional bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 494. 1858; Balgooy, *Pacif. Pl. Areas* 3: 245. 1975; López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 15: 92. 1975; Moldenke, *Phytologia* 30: 141. 1975; Soukup, *Biota* 11: 18. 1976.

In addition to the months previously reported by me, this species has been collected in fruit in March. Recent collectors have encountered it on valley floors and in volcanic sand and tufa on basalt rock at 11,600 feet altitude. López-Palacios & Idrobo describe the plant as "Hierba acumbente, de 1-60 cm. Espigas densas. Coronadas de flores lila intenso" or "lila claro" and as "hierba rastrera", the corollas "morado claro" or "morado muy claro", found it growing at 2450-3200 meters altitude, and record the vernacular name, "verbena blanca". The corollas are said to have been "purple" on Saunders 363.

Additional citations: COLOMBIA: Cauca: López-Palacios & Idrobo 3724 (Ac, N). Nariffo: López-Palacios & Idrobo 3769 (Ld, N). EC-UADOR: Cotopaxi: Collector undetermined VIII (Mu-1106), XIV (Mu-1107). Imbabura: López-Palacios 4064 (Ld). Pichincha: Herb. Univ. Cent. Quito 2341 (Mu), 2342 (Mu), 2344 (Mu); López-Palacios 4206 (Ld), 4227 (Ld). PERU: Lima: S. G. E. Saunders 363 (Ld).

#### VERBENA GLABRATA var. TENUISPICATA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 233. 1972; Balgooy, *Pacif. Pl. Areas* 3: 245. 1975.

Van der Werff comments that "This is the Verbena from the wet fern-sedge zone on Cerro Azul. The stems are crawling-ascending and the plants no more than 50 cm. tall."

Additional citations: GALÁPAGOS ISLANDS: Albemarle: Van der Werff 2286 [1586] (Z).

#### VERBENA GLANDULIFERA Moldenke

Additional bibliography: Moldenke, *Phytologia* 30: 141. 1975.

The corollas are said to have been "violet" in color on Lossen

72 when fresh.

Additional citations: ARGENTINA: Córdoba: Lossen 72 (Mu--4371).

VERBENA GLUTINOSA Kuntze

Additional bibliography: Moldenke, Phytologia 30: 141. 1975.

Additional citations: ARGENTINA: Neuquen: Ammann 111 (Mu), 112 (Mu).

VERBENA GOODINGII Briq.

Additional synonymy: Verbena ciliata var. alba Palmer ex Moldenke, Phytologia 34: 278, in syn. 1976.

Additional bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 & 717 (1969) and imp. 2, 715 & 717. 1974; R. D. Gibbs, Chemotax. Flow. Pl. 3: 1753--1755 (1974) and 4: 2295. 1974; E. H. Jordan, Checklist Organ Pipe Cact. Natl. Mon. 7. 1975; Moldenke, Phytologia 30: 141--142 & 179 (1975), 31: 415 (1975), and 34: 278. 1976.

Recent collectors have encountered this species in the juniper vegetational zone, in sandy soil in the juniper-pinyon-oak association, in a limestone canyon with scattered juniper and mixed shrubs, in rocky soil, on desert slopes, and by a permanent stream in grazed oak-Sonoran zone. Moran reports it "common on burns". Mrs. Jordan (1975) calls it the "Goodding vervain", while Thomas (1979) calls it the "Goodding verbena".

Palmer's V. ciliata var. alba seems to be based on Ed. Palmer 339 from the Mohave Desert of southern California.

Gibbs (1974) reports that the Ehrlich test gave positive results (bright blue-green) in the leaves of this species, but that cyanogenesis and leucoanthocyanin are absent from the leaves and syringin is absent from the stems.

Additional citations: NEVADA: Clark Co.: Purpus 6061 (Mu--4285). ARIZONA: Gila Co.: Higgins 8790 (N). Mohave Co.: Atwood 6026 (N); J. A. Churchill s.n. [18 April 1953] (Ln--204267); M. E. Jones s.n. [Hackberry, May 24, 1884] (Ln--70252); Reeves & Pinkava 11947 (N, W--2737221). Pima Co.: L. M. Andrews 259 (N); Lehto, Brown, Nash, & Pinkava 10646 (W--2736615); Warren & Turner 68-87 (Ld). Pinal Co.: Mrs. R. S. Baker s.n. [Oracle, Spring 1901] (Ln--120073); Meebold 15588 (Mu); Moroz s.n. [Schallert 22814] (Mu). Santa Cruz Co.: Reeves R.1166 (N). CALIFORNIA: San Bernardino Co.: D. Howe s.n. [24 April 1968] (Sd--70017); Edw. Palmer 339 (Mu--1563). MEXICO: Baja California: R. V. Moran 17739 (Sd--75136).

VERBENA GOODINGII var. NEPETIFOLIA Tidestr.

Additional bibliography: Moldenke, Phytologia 28: 350 (1974) and 31: 415. 1975.

Moran found this plant to be "fairly common" at 300 meters altitude in Baja California; also "occasional" and "locally common in disturbed areas", "occasional in arroyo beds", "occasional in dis-

turbed roadside soil", and on south-facing talus slopes in that state. Other collectors have found it in short-tree forests and growing in association with Washingtonia filifera.

The corollas are described as having been "lavender" on R. V. Moran 16405, 20047, 21750, & 22099, "pale-lavender" on R. V. Moran 20638 & 21883, and "pink" on Spellenberg & Spellenberg 3062.

The Spellenberg & Spellenberg 3062, cited below, was previously incorrectly listed by me as V. ambrosifolia Rydb. These two collectors describe the plants as growing in "clumps with many stems".

Additional citations: ARIZONA: Cochise Co.: Spellenberg & Spellenberg 3062 (N). Pima Co.: Fugate, McLaughlin, & McManus 652 (Ld); Warren & Turner 68-33 (Sd--78500). Yuma Co.: Phillips, Phillips, Goldberg, Fugate, & McManus 647 (Ld). MEXICO: Baja California: R. V. Moran 16405 (Sd--75481), 20047 (Sd--92459), 20638 (Sd--38939), 21750 (Sd--91255), 21883 (Sd--91260), 22099 (Sd--19477); Moran, Witham, & Hommersand 16541 (Sd--71562). Sonora: Arguelles 73 (Ld, Ld).

#### xVERBENA GOODMANI Moldenke

Additional synonymy: Verbena stricta x halei Perkins, Estes, & Thorp, Bull. Torrey Bot. Club 102: 194, in syn. 1975.

Additional bibliography: Moldenke, Phytologia 23: 237 & 436. 1972; Perkins, Estes, & Thorp, Bull. Torrey Bot. Club 102: 194, 195, & 197. 1975; Moldenke, Phytologia 34: 279. 1976.

Perkins and his associates (1975) found one plant of this hybrid among a mixed population of verbenas including both parents, which, when artificially cross-pollinated with V. halei pollen produced 149 potential seeds or a 26.8 percent seed-set, whereas 12 insect-visited V. halei plants produced 468 seeds (a 68 percent seed-set) and insect-visited V. stricta plants produced a 76.3--87.6 percent seed-set. They tell us that xV. goodmani and xV. illicita Moldenke are the two most common naturally occurring hybrids in a mixed population of the parental species; 10 plants of the former and 20 of the latter were found in the area tested.

#### VERBENA GRACILESCENS (Cham.) Herter

Additional & emended bibliography: Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: 92. 1975; Moldenke, Phytologia 30: 142 & 159. 1975.

Recent collectors have found this plant in fruit in November. The corollas are said to have been "violet" in color when fresh on Krapovickas & al. 26687 and "white" on Schinini & Cristóbal 9865. Lindeman and his associates encountered it in a "beira do rio inundada periodicamente, solo argilo duro" and describe the corolla color as "azul 10PB6/8".

Additional citations: BRAZIL: Rio Grande do Sul: Lindeman, Ir-

gang, & Valls ICN.8423 (Ut--320458). PARAGUAY: Fiebrig 4432 (Mu). URUGUAY: Herter 1058 [Herb. Herter 82656] (Mu). ARGENTINA: Córdoba: Lorentz 113 (Mu--1572). Corrientes: Cabrera 11784 (Mu); Schinini & Cristóbal 9865 (Ld). Jujuy: Krapovickas, Schinini, & Quarín 26687 (Ld). Salta: Schreiter 11466 (Ld). Santiago del Estero: Lullo 4 (Ut--330562B).

VERBENA GRACILIS Desf.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494 & 495. 1858; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975; A. L. Moldenke, Phytologia 31: 415. 1975; Moldenke, Phytologia 30: 142 (1975) and 34: 270. 1976.

Henrickson encountered this plant in clay soil of pasture land, growing with Agave, Buddleia, Ephedra, Mimosa, Opuntia, Yucca, etc., while Hendricks found it in "weedy yards" and in "sandy barren areas dominated by mesquite and Acacia".

The W. Schumann 1070 collection, cited below, is a mixture with V. canescens H.B.K., while Hendricks 332 is a mixture with a composite. The Cabrera 11784 and Herter 1058 [Herb. Herter 82656], distributed as V. gracilis, actually are V. gracilescens (Cham.) Herter, while J. A. Churchill s.n. [7 April 1972] is V. neomexicana (A. Gray) Small.

Additional citations: MEXICO: Durango: Hendricks 332, in part (Ws), 450 (Ws). Federal District: Pringle 6539 (Mu--1829). Jalisco: W. Schumann 1070, in part (Mu--3891). San Luis Potosí: Henrickson B.6381 (Ld); Schaffner s.n. [1875-79] (Mu--1559). CULTIVATED: Germany: Herb. Kummer s.n. [Hort. bot. Monac.] (Mu--1245); Herb. Zuccarini s.n. [Hort. bot. Monac. 1835] (Mu--296).

VERBENA GRISEA Robinson & Greenm.

Additional bibliography: Moldenke, Phytologia 23: 239. 1972; Balgooy, Pacif. Pl. Areas 3: 245. 1975.

VERBENA GYNOBASIS Wedd.

Additional bibliography: Moldenke, Phytologia 23: 240. 1972; Soukup, Biota 11: 18. 1976.

The Troll collection, cited below, in the Berlin herbarium bears a label indicating that it was collected in Bolivia, while in the Munich herbarium it is inscribed "Chile". It is not certain which locality is correct, but Bolivia is the more likely.

Additional citations: BOLIVIA: Santa Cruz: Troll 3312 (Mu).

VERBENA GYNOBASIS var. STRIGOSA Wedd.

Additional bibliography: Moldenke, Phytologia 23: 240. 1972; Soukup, Biota 11: 18. 1976.

[to be continued]

BOOK REVIEWS

Alma L. Moldenke

"WINTER FLOWERS IN GREENHOUSE AND SUN-HEATED PIT" Revised Edition by Kathryn S. Taylor & Edith W. Gregg, xix & 281 pp., illus., Charles Scribner's Sons, New York, N. Y. 10017. 1976. \$4.95 paperbound.

Back in 1941 this book first appeared without "Greenhouse" in the title and consideration. By 1969 this highly successful book's supply needed replenishment. It was revised with greenhouse consideration added and a few other changes made. Now this is the welcome paperbound edition with all its tested, detailed, interestingly written guidance which is even more pertinent today because of our increased interest in and need for conservation of energy and growing things for food or fun after summer days have waned. The illustrations are convincing and encouraging.

Lantana sellowiana is often so-called in the horticultural trade, but its correct name is Lantana montevidensis.

"THE COMPLETE BOOK OF TERRARIUM GARDENING" by Jack Kramer, ix & 146 pp., illus., Charles Scribner's Sons, New York, N. Y. 10017. 1976. \$5.95 paperbound.

From plastic trapezoids, leaded glass pyramids, Belljar covers on metal platters, old bottles, aquarium bowls suspended or inverted, from size ranges small enough for miniature mosses to large enough for Nerium oleander, from explanations of how and why terraria thrive when the same exposed plants well potted on the window-sill do not, from careful construction and remedial procedures, and from carefully listed and described plants for various types of living collections just about any information needed by the enthusiastic novice or the experienced horticulturist can be culled. But this does not justify the word "complete" in the title of this, or, indeed, of almost any other, book!

On page 140 two scientific names are misspelled.

"NÓMINA DESCRIPTIVA DE LAS GRAMINEAS BOLIVIANAS HASTA HOY CONOCIDAS" by Adolfo M. Jiménez f.s.c., 294 pp., illus., Herbario La Salle, Facultad de Ciencias Agrícolas 'Martin Cardenas', Universidad Mayor de San Simon, Cochabamba, Bolivia. 1976. Paperbound.

This worthwhile publication is one of the many efforts in diverse fields to commemorate the sesquicentennial of the Republic of Bolivia. The author is eminently qualified to prepare this

well keyed clearly descriptive manual, having spent his professional life in teaching and in field and herbarium studies. Species in 119 grass genera are presented. The introduction and text can be read quite facily. The printing is far freer of error than that in many South American journals and scientific publications even though the names of Eric Asplund and Boris Krukoff are misspelled.

The paper cover, not the title-page quoted above, records this work as "Flora Boliviana - GRAMINEAS (Gramineae)", and thus offers problems to cataloguers.

"THIS HUNGRY WORLD" by Ray Vickers, ix & 270 pp., Charles Scribner's Sons, New York, N. Y. 10017. 1975. \$9.95.

The author supervises the London Bureau of "The Wall Street Journal" covering Europe, the Middle East and Africa, attended as a well-informed journalist the World Food Conference in Rome in 1974, and observed firsthand the drought-famine conditions in the Sahel, among a hundred other countries visited. These experiences and the knowledge that the United States is the greatest food producer in the world and that people are being born, especially in the less developed countries far, far in excess of the food supply, provide the careful analyses of this serious inescapable situation. Politics, inefficiency and fraud in myriad forms, places and levels have hindered several constructive efforts.

"America's actions to meet the world's food crisis should be focussed upon:

- pushing food production
- offering technical assistance to the Third World, cooperating with agroindustry and the United Nations
- advancing family planning
- promoting rational environmental controls
- increasing nutritional, weather, and other research
- building food reserves and improving crop information data
- liberalizing agricultural trade"

This is an important book.

"CONIFERS FOR YOUR GARDEN" by Adrian Bloom, 147 pp., illus., Charles Scribner's Sons Inc., New York, N. Y. 10017. 1975. \$8.95.

After introductory remarks on their nature, horticultural use and care, over 200 beautifully color-illustrated garden prospects from Abies balsamea 'Hudsonia' to Tsuga heterophylla are described as to possible height and growing conditions.

The author is a member of a family of famous English horticulturists. He has specialized in dwarf conifers such as the first one that was found in the White Mountains of New Hampshire, U.S.A.

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# PHYTOLOGIA

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## Contribución a la Flora Liquenológica de Venezuela

Manuel López Figueiras  
Departamento de Botánica, Facultad de Farmacia  
Universidad de los Andes, Mérida  
Venezuela

Durante los años 1975-1976 he realizado una serie de excursiones a los páramos de los Andes Venezolanos para recolectar líquenes como parte de un proyecto que el Departamento de Botánica de la Facultad de Farmacia de la Universidad de los Andes, Mérida, Venezuela, adelanta en relación con la flora andina del país.

En ese periodo de tiempo colecté alrededor de 4700 números de macrolíquenes, de los cuales un juego casi completo de duplicados se enviaron a la Smithsonian Institution. Aprovechando el disfrute de mi año sabático que la Universidad de los Andes me concedió me trasladé a Washington y comencé inmediatamente el estudio de los mismos bajo la dirección y cooperación del Dr. Mason E. Hale.

Resultado de estos estudios preliminares es la siguiente lista de géneros y especies que no fueron citados previamente para la Flora de Venezuela en la literatura liquenológica hasta la fecha y que por lo tanto son nuevos para nuestra flora.

Antracothecium Hampe	Microphiale Zahlbr.
Blastenia Mass.	Normandina Nyl.
Buellia De Not.	Ocellularia Mey.
Cetraria Ach.	Parmeliopsis Nyl.
Chaenotheca (Th. Fr.) Th. Fr.	Phaeophyscia Moberg
Collema Web.	Phyllopsora Müll. Arg.
Corella Wain.	Protoblastenia Steiner
Erioderma Fée	Psora Hoffm.
Glossodium Nyl.	Solorina Ach.
Herpotheridium Tobler	Tylophoron Nyl.
Lopadium Körb.	Umbilicaria Hoffm.

Buellia modesta (Krmphbr.) Müll. Arg.  
Cetraria rassadiniae Karnefelt, inédita  
Chiodecton sphaerale Ach.  
Cladina lopezii Ahti, inédita  
Cladina substellata Vainio  
Collema laeve H. f. & Tayl., fma

*Corella zahlbruckneri* Schffn.  
*Glossodium aversum* Nyl.  
*Herpothallon sanguineum* (Sw.) Tobler  
*Heterodermia dendritica* (Pers.) Poelt.  
*Heterodermia galactophylla* (Tuck.) W. Culb.  
*Heterodermia japonica* (Sato) Swinsc. & Krog, fma  
*Heterodermia lepidota* Swinsc. & Krog  
*Heterodermia magellanica* (Zahlbr.) Swinsc. & Krog  
*Heterodermia microphylla* (Durok.) Swinsc. & Krog  
*Heterodermia obscurata* (Nyl.) Trev.  
*Heterodermia podocarpa* (Bel.) Awas.  
*Heterodermia speciosa* (Wulf.) Trev.  
*Heterodermia vulgaris* (Vain.) Follm. & Redon  
*Lopadium leucoxanthum* (Spreng.) Zahlbr.  
*Normandina pulchella* Nyl.  
*Ocellularia glaucula* (Nyl.) Zahlbr.  
*Ocellularia pachystoma* (Nyl.)  
*Parmelina versiformis* (Kremp.) Hale  
*Parmeliopsis aleurites* (Ach.) Nyl., fma  
*Phyllopsora corallina* Müll. Arg.  
*Phaeophyscia endococcinea* (Koerb.) Moberg  
*Psora rufonigra* Schneid.  
*Relicina subabstrusa* (Gyelnik) Hale  
*Tylophoron protudens* Nyl.  
*Umbilicaria hyperborea* (Ach.) Hoffm.

Evidentemente esta lista tiene caracter parcial debido a que muchas colecciones o se están estudiando o serán estudiadas en el porvenir preferentemente por algun especialista.

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Se agradece al Departamento de Botánica de la Smithsonian Institution y al Dr. Mason E. Hale las facilidades recibidas para este estudio y al C. D. C. H. de la Universidad de los Andes, Mérida, Venezuela, el soporte económico para las exploraciones que precedieron al mismo.

NOTES ON NEW AND NOTEWORTHY PLANTS. CI

Harold N. Moldenke

CITHAREXYLUM FRUTICOSUM f. SUBSERRATUM (Sw.) Moldenke, stat. nov.  
Citharexylum subserratum Sw., Prodr. Veg. Ind. Occ. 91. 1788.

CITHAREXYLUM FRUTICOSUM f. SUBVILLOSUM (Moldenke) Moldenke, stat. nov.  
Citharexylum fruticosum var. subvillosum Moldenke, Feddes Rept. Spec. Nov. 37: 223. 1934.

LANTANA HATSCHBACHII Moldenke, sp. nov.

Frutex 1 m. altus, ramis ramulisque gracilibus inermibus tetragonis fusco-pubescentibus; foliis decussato-oppositis parvis; petioliis gracillimis 5—8 mm. longis irregulariter pilosulis sparse resinosis; laminis foliorum firme chartaceis late ellipticis vel subrotundis 1.5 cm. latis longisque, apice rotundatis basin breviter cuneatis margine perspicue regulariterque serratis, supra rugosis nigrescentibus, subtus densiuscule pilosulis resinosis reticulo venularum prominente; inflorescentiis terminalibus capitatis parvis.

Shrub, about 1 m. tall, much branched; branches and branchlets slender, tetragonal, unarmed, rather densely pubescent with brownish-fusca hairs, the internodes apparently short; leaves decussate-opposite, small; petioles very slender, 5—8 mm. long, irregularly pilosulous and resinous; leaf-blades firmly chartaceous, broadly elliptic or subrotund, about 1.5 cm. long and wide, apically rounded, basally shortly cuneate, marginally regularly and conspicuously serrate, rugose and nigrescent above, rather densely pilosulous and resinous beneath with fuscous-brown hairs, brunnescent in drying; inflorescence terminal, capitate, small, rather few-flowered; peduncles very slender, 2—3 cm. long, rather densely pilosulous with wide-spreading hairs; heads hemispheric, about 1.5 cm. wide in anthesis; bracts lanceolate, 7—9 mm. long, apically attenuate or acute, about 1 mm. wide at the base, rather densely pilosulous and resinous on the back, the margins more or less ciliolate; corolla rose-colored, hypocrateriform, the tube very slender, 8—9 mm. long, the limb about 5 mm. wide in anthesis.

The type of this species was collected by Gert Hatschbach (no. 39651) — in whose honor it is named — at Morrão, in the municipality of Morro do Chapéu, Bahia, Brazil, on January 15, 1977, and is deposited in my personal herbarium.

VERBENA TENUISECTA f. ALBA (Benary) Moldenke, comb. nov.  
Verbena erinoides alba Benary ex Wittmack, Gartenfl. 49: 585. 1900.

VITEX LEUCOXYLON f. ZEYLANICA (Moldenke) Moldenke, stat. nov.  
Vitex leucoxyylon var. zeylanica Moldenke, Phytologia 21: 419. 1971.

GARYSMITHIA BIFURCATA  
A NEW GENUS AND SPECIES OF LESKEACEAE  
(MUSCI) FROM ALASKA AND COLORADO

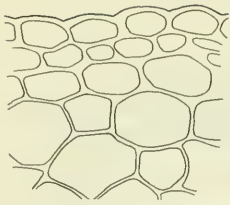
W. C. Steere<sup>1</sup>

During my identification of the bryophytes collected by Dr. Gary Smith in Arctic Alaska during the summer field season of 1966, I encountered a sterile pleurocarpous moss that was totally unfamiliar to me. Even the family to which it belonged was not readily apparent. Soon thereafter, I received an unknown moss for identification from Dr. F. J. Hermann, collected in Mt. McKinley National Park in 1967, which proved to be the same thing. Among a group of my own Arctic Alaskan collections that I had segregated out as serious puzzles for future study, I found another specimen of this unknown moss, collected in the same general area as Smith's specimen. More recently, Dr. Hermann sent me a specimen of this same moss from Colorado, which he had collected in 1976, but did not immediately recognize. Realizing that this moss had a wider geographical distribution than had seemed likely at first, I sent a sample to Barbara M. Murray, at the University of Alaska, with the request that she send me anything that matched it, and received, almost by return mail, two specimens which she had collected in 1976 in the eastern Brooks Range. If this moss has the same pattern of geographical distribution as, for example, *Oreas martiana*, it should also occur in the Canadian Rockies. However, when I sent a specimen to Dr. Dale Vitt, at the University of Alberta, for comparison with his unknowns, he replied that it was a species which he had never before seen.

GARYSMITHIA BIFURCATA Steere, gen. et sp. nov. Leskeacearum; Plantae caespitosae, paulum ramosae. Caules subturgidi vel julacei. Folia ovato-deltaidea vel cordata, acuta vel acuminata, imbricata ac appressa, homomalla vel subsecunda, praecipue ad apicem caulis substratum versus curvata, distincte decurrentia. Costa e basi valida indivisa deinde plerumque bifurcata, longitudinem folii 1/2 vel (raro) 2/3 attingens. Foliae cellulae omnes verruculosae (subtiliter papillo-sae), mediae brevi- vel elongato-rhombicae, marginales abbreviatae, centrales elongatae, et eae utriusque anguli basalis quadratae valde delineatae secus marginem per folii longitudinem 1/4 extensae. Gametangia capsulaeque desunt.

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<sup>1</sup>New York Botanical Garden, Bronx, New York 10458.



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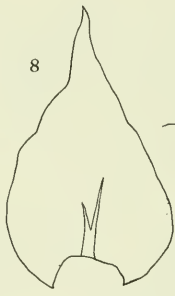
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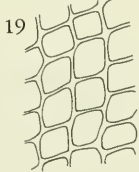
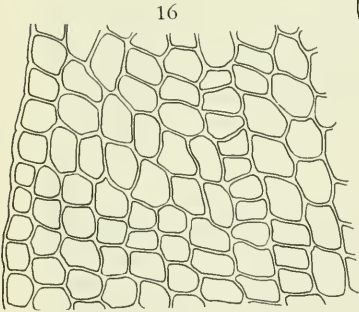
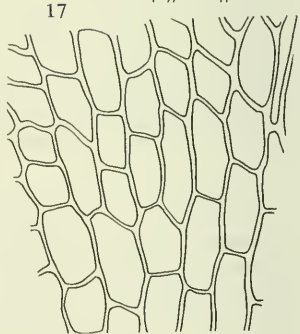
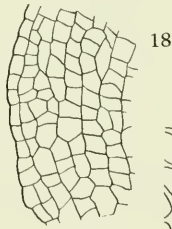
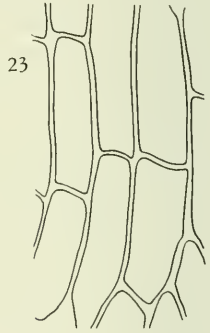
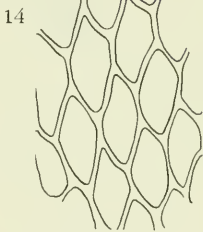
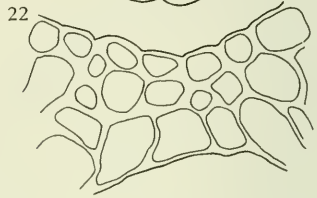
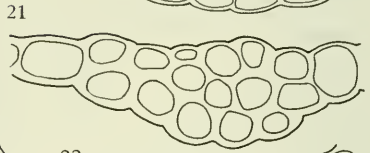
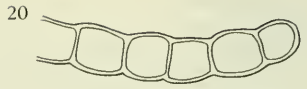
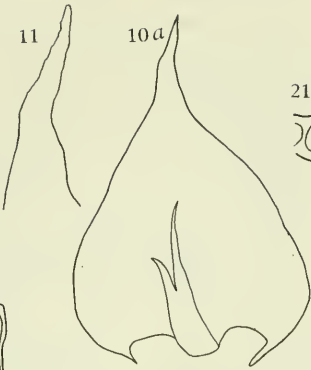


10

Plants small to medium in size, caespitose, dull yellowish to pale brown, not at all green and not shining, branching sparse and irregular, never pinnate. Leafy stems interwoven, 1-2cm long, 0.4-0.6mm in diameter, usually appearing julaceous, especially when dry, because of the imbricate-appressed leaves. Leaves convex, ovate-deltoid to cordate, acute to acuminate, somewhat homomalous to subsecund, turned toward the substratum, more conspicuously so at the stem apex, 1-1.5(-2)mm long, 0.5-0.7mm wide, distinctly decurrent at basal corners as a narrow wing 1-2 cells wide and 5-7 cells long. Costa variable from leaf to leaf on the same plant, reaching 1/2 (rarely 2/3) the length of the leaf, usually stout at base, bifurcating above into two nearly parallel to divergent, equal or nearly equal branches, which disappear at their apex into the cells of the lamina, occasionally branching from the base of the leaf, only rarely undivided, the stout basal part of the costa occasionally producing from one to many conspicuous yellowish-brown rhizoids along its length. Leaf margins plane, entire or minutely serrulate from the outward projection of cell corners, especially in the upper half and at the apex. Leaf apex short- or long-acuminate, infrequently consisting of a filiform series of 1-4 elongated single cells, the leaf tip incurved, recurved or curved to one side, depending on the orientation of the leaf on the stem with respect to the substratum. Leaf cells thick-walled, short- to elongated-rhomboidal, (20-)26(-34) microns long, (7-)10(-13) microns wide, shorter at the margins, more elongated toward, and at the center, the basal angles of the leaf filled with a large, conspicuous, and well demarcated area of crowded, rectangular cells that runs up the basal leaf margin to approximately 1/4 of the leaf length, at least some of the basal cells transversely elongated, 10-16 microns wide and 7-11 microns high, gradually becoming isodiametric, usually quadrate, eventually merging with the short-rhombic to rectangular cells above. Cells over the basal part of the costa on both sides of leaf much longer, narrower, and thicker-walled than the cells of the lamina; cells over the branches of the costa identical to the cells of the lamina in size and shape but usually more strongly colored; all leaf cells finely papillose, most con-

---

FIG. 1-10. Garysmithia bifurcata. Fig. 1-2, habit drawings of stems, showing homomalous leaves, X9. Fig. 1 in moist condition, Fig. 2 in dry condition. Fig. 3, detail of cross-section of stem, showing smaller, thicker outer cells, X390. Fig. 4, pseudoparaphyllia of stem, X99. Fig. 5-9, leaves, showing variation of costa, size and shape, X39. Fig. 6 shows rhizoids on basal stouter part of costa. Fig. 10, decurrent basal corner of leaf, X99.



spicuously so near the costa, with numerous papillae per cell. Sexual organs and sporophyte not found on any of the specimens.

On non-calcareous rock faces or in rock crevices.

TYPE: ALASKA: Ogotoruk Creek, Cape Thompson, Brooks Range, rock ledge, with Orthotrichum pylaisii Brid. (2 July 1966, G. L. Smith A304) NY (HOLOTYPE), ALA, ALTA, HIRO, MICH, NICH.

OTHER SPECIMENS EXAMINED: ALASKA: Ogotoruk Creek, near Cape Thompson, W end of Brooks Range (Point Hope Quadrangle), 68° 06'N, 165° 45'W, on thin soil over rock on mountainside (21 July 1965, W. C. Steere 650721-12) NY; Yukon River-Prudhoe Bay Haul Road just E of Galbraith Lake (Philip Smith Mountains Quadrangle), 68° 30'N, 149° 25'W, on conglomerate outcrop, 1220m alt. (20 July 1976, Barbara M. Murray 76-290B; 76-306) ALA, NY; Mt. McKinley National Park, just W of Polychrome Pass, on face of granite outcrop (Marmot Rock), 3800ft alt. (31 July 1967, F. J. Hermann 21533) NY. COLORADO: Hinsdale County, Cebolla Creek, vertical face of granite bluff, Cebolla Campground, 15mi E of Lake City, 9300ft alt. (20 July 1976, F. J. Hermann 27230) NY.

In the absence of sporophytes, it is difficult to assign this plant to any known genus, or for that matter, to any particular family of mosses. I have placed it in the Leskeaceae largely because of its minutely papillose cells. It has been assigned there more as a matter of convenience than through conviction, since the julaceous stems and

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FIG. 10A-23. Garysmithia bifurcata. Fig. 10A, entire individual leaf, X39. Fig. 11, leaf apex, X99. Fig. 12, apex of leaf, showing cellular detail, X390. Fig. 13, young rhizoids arising from dorsal side of costa, X99. Fig. 14, cellular detail of upper central part of leaf, X390. Fig. 15, cellular detail of upper part of leaf margin, X390. Fig. 16, cellular detail of upper part of specialized alar group, X375. Fig. 17, cellular detail of leaf base near costa, X375. Fig. 18, cellular detail of lower part of specialized alar group, X197. Fig. 19, enlarged drawing of same tissue as Fig. 18, X390. Fig. 20, cross-section of leaf at upper margin, X390. Fig. 21, cross-section of leaf at upper center, through one branch of costa, X390. Fig. 22, cross-section of leaf near base, through lower and stouter part of single costa, X390. Fig. 23, epidermal cells of branch, X390.

Original pencil drawings for all illustrations were made by Dr. Zennoske Iwatsuki with a camera lucida, and the inking, stippling, and composing of the plates was done by Miss N. Ando, both of the Hattori Botanical Laboratory, Nichinan, Japan.

the cellular areolation, especially the dense alar groups of quadrate cells, suggest the Leucodontaceae.

A specimen of Garysmithia was sent to Dr. H. Ando, of Hiroshima University, who has monographed the genus Homomallium, since the homomalous leaves suggest the possibility of relationship with that genus. His response is so interesting that I take the liberty of quoting from it (pers. comm., 13 April 1977): 'In microscopical observation, your specimen is quite different and is certainly a new moss which I have never seen. I do not think it is a Homomallium. As to the family position I cannot give a decisive conclusion. It is connected with the Leucodontaceae through Pterogonium; on the other hand, with the Leskeaceae through Pseudoleskeella tectorum. At any rate I don't think that it belongs in the Hypnaceae.'

All of the Alaskan specimens were collected without being recognized in the field as something of special interest, so that it would be difficult indeed to find the exact localities again. However, Dr. Hermann believes that he can relocate the Colorado station, and it is possible that sporophytes will eventually be found in populations that are kept under observation over a period of several years.

## SPHAGNUM RECURVUM<sup>1</sup>

G. L. Smith<sup>2</sup>

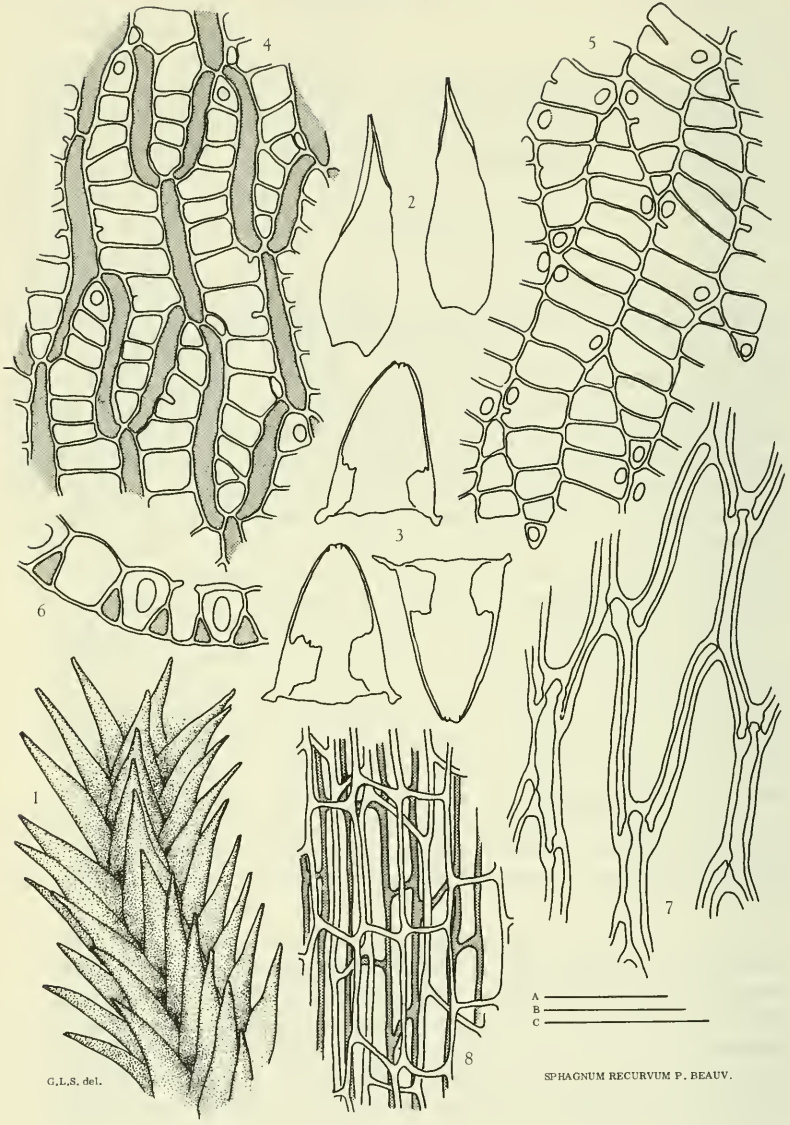
During a brief visit to Paris (PC) in the spring of 1974, I examined the Polytrichaceae and Sphagna contained in a bundle of specimens labelled "Muscinées de l'Amérique du Nord de l'herbier de L. C. Richard. Types du Flora boreali-americana." This portfolio of specimens has since been studied critically by Dr. Geneva Sayre, and authenticated as Richard's North American bryophyte herbarium, arranged by F. A. Camus (1852-1922), its last private owner (cf Sayre, 1976, for details). Richard's original labels are intact. The herbarium contains several specimens of North American mosses from Palisot de Beauvois, including one which is evidently an isotype of Sphagnum recurvum Beauv., published in his Prodrome (1805). An annotation on the specimen by Camus says that the specimen was given by Palisot to Richard shortly after the publication of the Flora boreali-americana of Michaux in 1803. The label on the specimen reads "S. acutifolium Hedw. / Carolina m. -" The type of S. recurvum was collected in South Carolina (Carolina meridionalis) by Louis A. G. Bosc, as stated in the protologue. Bosc was French vice-consul in Carolina from 1798 to 1800 (Burdet, 1972). Unfortunately, the label does not bear the name Sphagnum recurvum or the name of the collector. A branch, several stem leaves, and a fragment of the stem cortex were removed from the specimen for careful study at a later date. Permanent slides prepared from this material have since been returned to PC.

The name Sphagnum recurvum has been in common use for over a century, but it has been used in different senses, and it would be particularly useful to have a specimen that could serve as the type. After due consideration of the nomenclatural consequences, which are discussed below, I have designated this specimen as the lectotype of Sphagnum recurvum. As treated by Andrews (1913), S. recurvum includes four closely related taxa which are recognized by most other

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<sup>1</sup>Supported in part by National Science Foundation Grant GB37662.

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G.L.S. del.

SPHAGNUM RECURVUM P. BEAUV.

sphagnologists as distinct species: Sphagnum fallax (H. Klinggr.) H. Klinggr. [=S. mucronatum (Russow) Zickendr., S. apiculatum H. Lindb.]; Sphagnum angustifolium (Russow) C. Jensen [=S. parvifolium (Sendtn.) Warnst.]; Sphagnum flexuosum Dozy & Molk. [=S. amblyphyllum (Russow) Zickendr.], and Sphagnum pulchricoma C. Müll. The nomenclature is that of Isoviita (1966). Andrews recognized S. angustifolium at the varietal level as S. recurvum var. tenue. All except S. pulchricoma are widely distributed boreal taxa. Those who have treated all four as species have usually associated the name S. recurvum with the "apiculatum" form (S. fallax; e. g. Warnstorf, 1911). Crum (1973, p. 32) treats the first three as S. recurvum var. recurvum, var. tenue, and var. amblyphyllum, respectively, but includes S. pulchricoma in his concept of the var. amblyphyllum (pers. comm.).

In his nomenclatural revision of the European Sphagna, Isoviita (1966, p. 242) suggests that the name Sphagnum recurvum probably applies to the exclusively American S. pulchricoma, and not to any European species. Andrus (1974) agrees that S. pulchricoma is the only recurvum-segregate likely to be collected in South Carolina. According to Andrus, S. pulchricoma is a species of the Atlantic and Gulf coastal plain, extending from New Jersey south to Florida and Louisiana, although recorded from as far north as Nova Scotia. The type of S. pulchricoma came from Brazil (Müller, 1848).

As the accompanying illustrations show (Figs. 1-8), the lectotype of Sphagnum recurvum belongs to the taxon currently known as S. pulchricoma C. Müll., which is characterized by 1) chlorophyll cells of the branch leaves well-included on the concave surface, 2) a fairly well-differentiated, 2-3-layered stem cortex, and 3) rather narrow, distinctly 5-ranked branch leaves. An example was distributed by Andrus and Vitt as Sphagnotheca Boreali-americana 21.

At least some of the South American specimens of Sphagnum pulchricoma at NY seem to be indistinguishable from the type of S. recurvum, including an authentic specimen from Brazil. This collection, from Itajahi (Pabst, s.n.), is cited as S. pulchricoma by

Sphagnum recurvum Beauv. 1, Portion of strong branch, with distinctly 5-ranked leaves; 2, Branch leaves; 3, Stem leaves; 4, Outer (convex) surface of branch leaf; 5, Inner (concave) surface of branch leaf, with chlorophyll-cells entirely included; 6, Cross-section of branch leaf; 7, Median cells of stem leaf; 8, Stem cortex, surface view. (Figs. 1-8 from the lectotype, PC). Fig. 1: A=1mm, Figs. 2, 3: B=1mm, Figs. 4-7: C=0.05mm, Fig. 8: C=0.1mm.

Müller in the supplement to his Synopsis Muscorum (1851). The type specimen of S. pulchricoma has not been examined.

The stem leaves of Sphagnum recurvum sens. strict. are similar to those of S. flexuosum. Andrus (1974) considers S. pulchricoma to be a good species, distinguished from S. flexuosum by its geographical distribution and by the characters listed above. Judging from my own experience with this handsome plant in the Pine Barrens of New Jersey and eastern Long Island, New York, I am convinced that our southern Atlantic and Gulf coastal plain S. recurvum (S. pulchricoma) is a distinct taxon, whatever rank one wishes to give it.

The typification of the name Sphagnum recurvum leaves the former "var. recurvum" (S. fallax) without a name at the varietal level. The basionym, S. cuspidatum var. fallax H. Klinggr., of 1872, cannot be used because of the existence of an S. recurvum var. fallax Warnst., of 1884, a synonym of S. obtusum (Warnstorf, 1911); von Klinggraeff's var. fallax was not transferred to S. recurvum until 1939. Isoviita (1966) indicates that he has seen "authentic material" of S. cuspidatum var. brevifolium Lindb. ex Braithw., of 1878, and that it is S. fallax. The date of Braithwaite's Sphagnaceae is generally given as 1880, but Dr. W. C. Steere owns a copy of an earlier printing of this work, which is dated 1878 on the title page. A glance at the Index Muscorum shows that there are many varietal epithets to choose from which might be S. fallax, but that var. brevifolium, which dates from 1878, is older by several years than any of these. I have not seen any of the specimens cited in the protologue; Braithwaite's Sphagnaceae Britannicae Exsiccatae 53 is missing from the set at NY, which is otherwise complete. Warnstorf (1911, p. 215), having seen the "original" of this variety, makes it a form of S. balticum, but Isoviita was presumably dealing with material from Lindberg's own herbarium, and this should be a more reliable indication of the correct use of the name. The stem leaf of var. brevifolium illustrated by Braithwaite (1878, Pl. 27, figs. 5, 5a), does not look like S. balticum.

Sphagnum recurvum var. amblyphyllum (Russow) Warnst., which is used by Crum (1973) for S. flexuosum, dates from 1890 as a varietal epithet. Isoviita lists no varieties as possible synonyms for this species. Of all the possible varietal epithets listed in the Index Muscorum, the oldest which can be applied to S. flexuosum, to the best of my knowledge, is S. recurvum var. majus (Ångstr. ex Warnst.) Warnst. of 1883, originally published by Warnstorf in 1881 as S. var-iabile var. intermedium f. majus Ångstr. "non Russow." I have examined Gravet's Sphagnotheca Belgica, 26 and 27 (FH!), which are the only specimens mentioned in the protologue of f. majus, and they are both S. flexuosum.

The following are what seem to be the correct names for the segregates of Sphagnum recurvum sens. lat. as species, as subspecies, and as varieties. The situation at the varietal level is unsettled, and only those names discussed above are included in the synonymy. A detailed consideration of this knotty problem is beyond the scope of this paper. At least, the name of S. angustifolium at the varietal level seems to be reasonably secure: the var. tenue H. Klinggr. has no rivals, as far as I know. The nomenclature at the subspecific level presents no such difficulties and has the added appeal of familiarity, since the epithets mucronatum, angustifolium and amblyphyllum have been, until recently, in general use for these taxa.

Sphagnum recurvum Beauv., Prodr. Aethéog. 88. 1805.

LECTOTYPE. "S. acutifolium Hedw. / Carolina m. -" Herb. Richard (PC!).

Sphagnum pentastichon Brid., Musc. Recent. Suppl. 1: 16. 1806.

Sphagnum pulchricoma C. Müll., Syn. 1: 102. 1848.

Sphagnum fallax (H. Klinggr.) H. Klinggr., Topogr. Fl. Westpr. 128. 1880.

Sphagnum recurvum subsp. mucronatum Russow, Sitz.-ber. Nat.-Ges. Dorpat 9: 109. 1889.

Sphagnum cuspidatum var. brevifolium Lindb. ex Braithw., Sphag. 84. 1878.

Sphagnum recurvum var. brevifolium (Lindb. ex Braithw.) Warnst., Flora 67: 608. 1884.

Sphagnum angustifolium (C. Jensen ex Russow) C. Jensen, Bih. Sv. Vet.-Akad. Handl. III. 16: 48. 1891.

Sphagnum recurvum subsp. angustifolium C. Jensen ex Russow Sitz.-ber. Nat.-Ges. Dorpat 9: 112. 1889.

Sphagnum recurvum var. tenue H. Klinggr., Schr. Phys.-ök. Ges. Königsb. 13: 5. 1872.

Sphagnum flexuosum Dozy & Molk., Prodr. Fl. Batav. 2(1): 76. 1851.

Sphagnum recurvum subsp. amblyphyllum Russow, Sitz.-ber. Nat.-Ges. Dorpat 9: 112. 1889.

Sphagnum variabile var. intermedium f. majus Ångstr. ex Warnst., Eur. Torfm. 65. 1881.

Sphagnum variabile var. majus (Ångstr. ex Warnst.) Warnst., Flora 65: 550. 1882.

Sphagnum recurvum var. majus (Ångstr. ex Warnst.) Warnst., Flora 66: 374. 1883.

The apex of the stem leaves of Sphagnum recurvum sens. strict. varies from narrow and almost entire to broad and lacerate, as a result of the progressive resorption of the walls of the hyaline cells. This variation can often be observed along the length of a single stem. The loss of the inner and outer cell walls allows the chlorophyll-cell mesh to spread, resulting in a broadly lacerate leaf apex.

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NOTES ON THE GENUS AND SPECIES LIMITS OF

PSEUDOGYNOXYS (GREENM.) CABRERA

(SENECIONEAE, ASTERACEAE).

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The neotropical genus Pseudogynoxys was raised to generic rank by Cabrera (1950) and has been generally accepted by students of the Senecioneae since that time (Cuatrecasas, 1955; Afzelius, 1966; and Nordenstam, 1977). The genus has been sharply defined on the basis of the scandent habit, the alternate leaves, the membranaceous to subchartaceous leaf blades, the radiate heads, and the styles of the disk flowers with pointed hirsute appendages. The flowers are notably orange-colored becoming reddish with age, and some specimens have been noted as fragrant. At least two species have been cultivated and the distribution of P. chenopodioides might be partially the result of human intervention. Unfortunately, taxonomic treatments of the genus have consisted largely of transfers and synonymizations of names and descriptions of new entities without any complete survey of the diversity and limitations of all the known species. Perhaps partially for this reason a recent treatment for the Flora of Guatemala (Williams, 1976) has reduced the genus to synonymy under Senecio and has placed all the Central American species in synonymy under Senecio chenopodioides HBK. The present effort attempts to correct the primary inaccuracies and deficiencies of past studies.

The placement of Pseudogynoxys in Senecio cannot be considered truly traditional nor natural. From the time of Cassini (1827) to the time of Greenman (1902) the species were generally described under the neotropical genus Gynoxys because of the pointed tips of the styles. The placement was unsatisfactory since Gynoxys is a genus of shrubby plants with usually opposite coriaceous leaves. It was Greenman (1902) who transferred the group to Senecio and established the subgenus Pseudogynoxys. Greenman's effort did not include South American material and it included a number of confusing species names that were never validated.

Pseudogynoxys is without close relatives among the American genera of the Senecioneae and there is no obvious integration of characters. Actual relationship seems to be to the genus Gynura Cassini of the Eastern Hemisphere. A few species of Gynura possess habits similar to Pseudogynoxys and the style branches are pointed. The Old World genus is distinguished by the lack of rays in the head and by the exact shape of the style appendages which are much longer with only short hairs.

In reviewing the species of Pseudogynoxys taxonomically valid distinctions have been seen in the straightness of the stem, the pubescence, the leaf shape and venation, the position of the inflorescence, the stoutness of the pedicels, the structure of the calyculus, and the tips of the involucre bracts. Some differences in floral structure also occur, but the only ones noted in this study are the nearly glabrous ray styles and the distinctive pappus of P. cabreræ, and the anther collars of P. scabra.

A number of names have been reviewed for placement in the genus including approximately 21 that have been transferred into the genus as valid species. Only 13 species are recognized here. An additional three names described in the genus Gynoxys by Turczaninow (1851) share some described features of Pseudogynoxys. The three species were based on Jameson collections from Ecuador and isotypes have been located in the U. S. National Herbarium. The three prove to be members of the genus Senecio section Aetheolaena (Cass.) Hoffm. and are disposed as follows: Gynoxys prenanthifolia Turcz., Bull. Soc. Nat. Mosc. 24 (pt. 1): 207. 1851. Type: In Andibus Quitensibus Jameson 636; and G. auriculata Turcz. *ibid.* (pt. 2): 86. 1851. Type: In alpe Pichincha alt. 14000 ped. Jameson s.n. both prove to be Senecio patens (HBK.) DC; G. heterophylla Turcz. *ibid.* (pt. 2): 85. 1851. Type: In Andibus Quitensibus. Jameson 894-896 proves to be Senecio pindilicensis Hieron. In the latter case the Turczaninow name is older but the combination Senecio heterophyllus is preoccupied. The identity of G. prenanthifolia has already been noted by Weddell (1855-1857, p.92). The styles of the disk flowers of section Aetheolaena do not actually have pointed tips but have an apical tuft of hairs.

Pseudogynoxys (Greenm.) Cabrera, *Brittonia* 7: 54.  
1950.

Senecio subg. Pseudogynoxys Greenm., *Bot. Jahrb.*  
32: 23. 1902.

Plants suffrutescent, scandent. Stems coarsely striated, green or pale brownish. Leaves alternate; petioles slender, sometimes with stipuliform bases; lamina membranaceous to subchartaceous, ovate to oblong ovate, base broadly acute to cordate, margins minutely serrulate to coarsely dentate, apex acute to short-acuminate. Inflorescence terminal or axillary with one to many heads. Head campanulate to hemispherical; calyculus of ca. 10-30 distinct bracts; involucre uniseriate, with short-acute to long-attenuate tips, extreme tips densely pubescent; receptacle glabrous. Corollas glabrous, deep orange, becoming reddish or purplish with age, rays ca. 6-15; styles with 2 stigmatic lines, style tips acute, usually sparsely pubescent; disk corollas with long basal tube, throat narrowly funnelform, lobes narrowly oblong-lanceolate, median resin duct evident; anther collars with larger or thinner-walled cells below; anther thecae tapering or slightly cordate at base, thecal cells elongate with single minute nodular thickenings at upper and lower ends, few to many rows nearest connective also with minute thickenings along vertical walls; anther appendage lanceolate with narrow tip; style appendages short- to long-acute with numerous hairs often more prominent around base and at tip. Achenes cylindrical with ca. 10 ribs, hirtellous, surface slightly to strongly papillose with projecting small cells; carpodium short, incurved at lower margin, not sharply demarcated above, with many rows of small cells; pappus of 3-5 series of capillary bristles; bristles sometimes flattened, scabrous, distally 20-25 $\mu$  wide. Pollen mostly 30-35 $\mu$  in diameter.

Type species: Gynoxys cordifolia Cass.

The species of Pseudogynoxys can be distinguished by the following key. Further clarification can be obtained in the appended local keys for species of Guatemala and Ecuador.

Key to the species of Pseudogynoxys

1. With stipuliform expansions at bases of the petioles . . . . . 2
2. Leaves subrhombic-lanceolate and sharply dentate (Peru) . . . . . P. filicalyculata
2. Leaves rounded or slightly cordate at the base, margins denticulate (Colombia) . . P. bogotensis

1. Without stipuliform expansions at bases of the petioles . . . . . 3
3. Heads with ten or less involucre bracts (Guat., Mex.) . . . . . P. fragans
3. Heads with more than ten involucre bracts . . . . . 4
4. Leaves essentially glabrous below on veins and on undersurface, stems and involucre nearly to completely glabrous (Mexico to Colombia, West Indies) . . . . . P. chenopodioides
4. Leaves sparsely minutely appressed puberulous to tomentose on lower surface, stems or involucre glabrous to hirtellous . . . . . 5
5. Heads mostly single or in groups of 2-3 on stout pedicels 5-20 cm long . . . . . 6
6. Bracts of calyx mostly 1.5-2.0 mm wide (Ecuador) . . . . . P. sodiroi
6. Bracts of calyx less than 1 mm wide . . . . . 7
7. Leaves trinervate from at or near base of lamina, usually cordate (Argentina, Brasil, Paraguay) . . . . . P. cabreræ
7. Leaves subpinnately veined, bases usually broadly acute to truncate (Mexico to Venezuela) . . . . . P. cummingii
5. Heads clustered, pedicels mostly less than 5 cm long, slender . . . . . 8
8. Undersurface of leaf thinly tomentose . . . . . 9
9. Inflorescence terminal on leafy stems; leaf base mostly broadly acute to rounded, margins sharply serrate (Ecuador, Peru) . . . . . P. sonchoides
9. Inflorescences on short axillary branches; leaf base cordate, margins broadly and shallowly dentate (Peru) . . . . . P. cordifolia
8. Undersurface of leaf puberulous to scabrelous . . . . . 10

10. Calyculus densely pubescent (Mexico, Cent. Amer.) . . . . . P. haenkei
10. Calyculus sparsely puberulous, hairs mostly on margins of bracts (S.Amer.) . . . . . 11
11. Stems slender and obviously deflected at nodes; leaves ovate; involucre bracts acute (Ecuador) . . . . . P. engleri
11. Stems mostly stout and straight; leaves often oblong-ovate; involucre bracts attenuate . . . . . 12
12. Leaves with erect hairs on surfaces (Ecuador, Peru) . . . . . P. scabra
12. Leaves with only minute appressed hairs (Peru) . . . . . P. poeppigii

Key to species in Mexico and Central America

1. Heads with ten or less involucre bracts  
P. fragans
1. Heads with more than ten involucre bracts . . . 2
2. Plants mostly glabrous; involucre bracts glabrous, calyculus sparsely pubescent; leaves usually with remote sharp teeth . . . . . P. chenopodioides
2. Plants distinctly pubescent on stems, leaves or involucre, calyculus densely pubescent; leaves usually with crowded or blunt serrations . . . 3
3. Heads single or in groups of 2-4 on stout pedicels mostly over 5 cm long; involucre bracts attenuate and often reddish at tip  
P. cummingii
3. Heads numerous in clusters, pedicels mostly less than 3 cm long, slender; involucre bracts acute or only slightly attenuate . . . . . P. haenkei

Key to Ecuadorian species

1. Heads single or in groups of 2-4, often 2 cm wide; pedicels usually over 5 cm long, stout; bracts of

- calyculus 1.5-2.0 mm wide . . . . . P. sodiroi
1. Heads in clusters, usually 1 cm or less broad; pedicels usually less than 5 cm long, slender; bracts of calyculus less than 1 mm wide . . . . . 2
  2. Inflorescences terminal on leafy stems or branches; leaves with 3-4 pairs of prominent secondary veins congested near base . . . . . P. sonchoides
  2. Inflorescences mostly on short axillary branches; leaves with only 1 or 2 pairs of prominent secondary veins near base . . . . . 3
  3. Stems slender and obviously deflected at nodes; leaves ovate, usually gradually narrowed to a sharply acute tip; involucrel bracts acute  
P. engleri
  3. Stems stout and straight; leaves oblong-ovate, becoming short-acuminate; involucrel bracts attenuate . . . . . P. scabra

The recognized species of Pseudogynoxys and their synonyms are as follows.

Pseudogynoxys bogotensis (Spreng.) Cuatr., Brittonia 8: 156. 1955.

Senecio macrophyllus HBK., Nov. Gen. & Sp. 4: 140. 1818, ed folio. Not. S. macrophyllus Bieb.

Senecio bogotensis Spreng., Syst. 3: 556. 1826.

Senecio moritzianus Klatt, Leopoldina 24: 127. 1888.

The synonymy follows that of Cuatrecasas (1955).

The species is represented in the U.S. National Herbarium by seven specimens. COLOMBIA: Cundinamarca: Fusagasugá. André s.n.; 4 kms NW of Sasaima along highway to Villeta, banks of Río Dulce. Barclay, Juajobioy & Gama 3677; Entre Sasaima y Villeta. Dugand & Jaramillo 3933; La Vega. Pérez Arbeláez & Cuatrecasas 5341; Santander: Río Suratá valley, between El Jaboncillo and Suratá. Killip & Smith 16429; Between El Roble and Tona. Killip & Smith 19419; Tolima: Ibagué to Río Coello, New Quindó trail. Hazen 9644.

Pseudogynoxys cabreræ H. Robinson & J. Cuatrecasas, sp. nov.

Plantae suffrutescentes scandentes, laxe ramosae. Caules angulato-striati sparse vel dense puberuli. Folia alternata, petiolis 1-3 cm longis base non

auriculatis; laminae herbaceae vel membranaceae ovatae vel late ovatae ca. 6.0-11.5 cm longae et ca. 3.0-7.5 cm latae base plerumque cordatae vel subcordatae fere ad basem trinervatae margine argute serratae vel grosse dentatae apice breviter acuminatae supra sparse puberulae subtus densius puberulae, nervis secundariis principalibus plerumque remotis et parallelis, basilaribus plerumque mox ramosis. Inflorescentiae in ramis foliatis terminales 1-4 capitatae, pedicellis plerumque 5-15 cm longis raro brevioribus crassis distincte minute puberulis. Capitula 15-20 mm alta et 25-30 mm lata; bractee calyculi 20-30 lineares ca. 7-10 mm longae et 1 mm latae plerumque dense puberulae; bractee involucri 25-30 uniseriatae lineari-lanceolatae 10-13 mm longae 1.0-1.5 mm latae base gibbosae non angulatae apice longe attenuatae saepe rubro-tinctae extus plerumque puberulae; receptacula plana, interstitiis non vel breviter lobuliferis. Flores radii 12-14; corollae aurantiacae deinde rubrae; tubis ca. 7 mm longis glabris, limbis oblongis vel vix obovatis ca. 15 mm longis et ca. 6.5 mm latis glabris; appendices stylorum glabrae vel subglabrae. Flores disci ca. 100; corollae aurantiacae deinde rubrae 11-14 mm longae anguste infundibulares glabrae, tubis 7-11 mm longis, faucis 1.5-1.8 mm longis, lobis lineari-lanceolatis 2.0-2.5 mm longis sub medio equilatis ca. 0.4 mm latis. Achaenia ca. 3 mm longa et ca. 0.8 mm lata plerumque 10-costata ubique minute puberula base truncata; setae pappi 80-110 longiores ca. 12 mm longae 4-5-seriatae complanatae vel percomplanatae base subintegrae superne pertenues et scabellae.

TYPE: ARGENTINA: Corrientes: Dep. Empedrado, Estancia "Las Tres Marias", Dry woodland on the bank of the Rio Parana, soil hard clay, shrub or subshrub, growing to a height of one to a couple of metres, supported by other shrubs. 6/11 1952. Pedersen 1888 (Holotype, US). PARATYPES: ARGENTINA: Chaco: Jórgensen 2019 (US); Corrientes: Dep. Mburucuyá, Estancia "Santa María", 30/8 1962. Pedersen 6506 (US); Jujuy: Dep. Ledesma, Yuto, Vinalito. 7-VII-1937. Cabrera 4049 (US); Quinda pr. Laguna de La Brea. 1/6 1901. Fries 37 (US); Salta: Dep. Oran, Rio Pescado. 16/IX/1938. Cabrera 4584 (US); Dep. Oran, Yaguani. 3-XII-1941. Maldonado 759 (US); Dep. Oran, Embarcación. Dic. 20, 1926. Venturi 5108 (US); BRASIL: São Paulo: Campinas. 20 Nov. 1938. Carvalho & Mendes 2942 (US); Campinas. Campos Novas 139 (US); Mogi-Guaçu, Fazenda Campininha. 3/II/1955. Kuhlmann 3516 (US); Along river at Usina, 9 km west of Santa Cruz do Rio Pardo. 10-12-1936. Archer 4195 (US); PARAGUAY: 10 km north of

Porto Gibaja, banks of Arr. M-boi-ci, banks of Rio Parana. Aug. 21, 1952. Beetle 2166 (US); Villarrica. Jorgensen 7501 (US); Central Paraguay, In regione lacus Ypacaray. July 1913. Hassler 11845 (US); Pilcomayo River. 1888-1890. Morong 848 (US); Morong 842 (US); N. Paraguay. IX 1892. Kuntze (US).

Both Baker (1884) and Cabrera (1950) evidently recognized the species as distinct from the Central American P. cummingii, but all the names used are based directly on the Central American type or are derived nomenclaturally from it. Grisebach (1879) first treated material of P. cabreræ as Senecio benthami Griseb., but the latter was a nom. nov. based on Gynoxys cummingii Benth. and represented a broad concept including both species. Baker (1884) attempted to use the Grisebach name in a more restricted sense which, however, excluded the typical element. Cabrera (1950) unfortunately chose to refer to his Pseudogynoxys benthami as a nom. nov. rather than as a new species and therefore it also is tied nomenclaturally to the name used by Baker rather than to the description.

The new species resembles P. cummingii and in spite of some divergence of forms the shape of the leaves on superficial examination does seem to overlap. The totally discontinuous distribution and the extremely cordate and dentate leaf-form frequent in Argentinian material does strongly indicate a separate species is involved. Pseudogynoxys cummingii does occur in South America, but only in the northern parts of Colombia and Venezuela. The most northern P. cabreræ specimens are from southern Brasil and Paraguay. Specimens of similar habit from areas between prove to be the distinctive P. bogotensis and P. sodiroi. More critical examination of P. cabreræ shows consistent differences in two significant characters, the essentially trinervate venation of the leaves, and the 80-110 setae of the pappus in 4-5 series. The pappus setae are more flattened than in other species of the genus and often are bent or broken in the distal portions. In P. cummingii the leaves have subpinnate venation, and the pappus setae are in ca. 3 series ~~3-5~~ as is conventional for the tribe. The individual setae are less flattened though occasional isolated setae may be extremely broad and flat. Even in immature material where the bases of the setae cannot be seen properly, the less flattened condition can be noticed in comparisons. The mature specimens of P. cummingii often seem to have lost most or all of the pappus while the P. cabreræ pappus seems more persistent. The individual setae do not appear less fragile but the extra

series apparently provide more resistance.

The puberulence of P. cummingii is coarser than in P. cabreræ especially on the undersurface of the leaves, but this is only obvious in direct comparison of material. The style appendages of the ray flowers of P. cabreræ are notable for the lack or near lack of hairs. A few short hairs often form a very short apical tuft. All other species of Pseudogynoxys have more hairs on the style appendages of the rays. One specimen of P. cabreræ (Hassler 11845) has more hairs on the styles of the rays which probably represents a partial failure of the normal differentiation between the style of the ray and disk flowers.

Pseudogynoxys chenopodioides (HBK.) Cabrera, Brittonia  
7: 5. 1950.

Senecio chenopodioides HBK., Nov. Gen. & Sp. 4: 140.  
1818, ed folio.

Gynoxys berlandieri DC., Prodr. 6: 326. 1837.

Gynoxys cordifolia Neaei DC., Prodr. 6: 326. 1837.

Senecio confusus Britten, J. Bot. 36: 260. 1898.

Pseudogynoxys berlandieri (DC.) Cabrera, Brittonia  
7: 56. 1950.

The species is common in Mexico, Central America and the West Indies and has been cultivated in such places as Hawaii. There are only two specimens in the U.S. National Herbarium from South America. COLOMBIA: Valle: Cali. Planta cultivada en jardines. Patiffo 599; Magdalena: Ciénaga. Romero Castañeda 1907.

Pseudogynoxys cordifolia (Cass.) Cabrera, Brittonia  
7: 54. 1950.

Gynoxys cordifolia Cass., Dict. Sci. Nat. 48: 456.  
1827. Type in Herb. Jussieu No. 8939 under  
unpublished name Senecio scandens Juss.

Senecio volubilis Hook., Bot. Misc. 2: 226. 1831.

Senecio jussieui Klatt, Ann. K.K. Naturhist.  
Hofmuseums 9: 367. 1894.

Pseudogynoxys volubilis (Hook.) Cabrera, Brittonia  
7: 56. 1950.

The synonymy follows that of Cabrera (1959). The species is endemic to the coastal ranges of Peru and ranges from Departments of Lambayeque and Cajamarca in the north to Lima in the south.

Pseudogynoxys cummingii (Benth.) H. Robinson & J. Cuatrecasas, comb. nov.

Gynoxys cummingii Benth. ex Oerst., Kjoeb. Vidensk.  
Meddel. Dansk. Naturhist. Foren. 1852: 106.  
1852.

Senecio benthami Griseb., Goett. Abhand. 24: 206. 1879.

Senecio calocephalus Hemsl., Biol. Cent. Amer., Bot. 2: 237. 1888. Not. S. calocephalus Poepp. & Endl.

Senecio hoffmannii Klatt, Leopoldina 25: 106. 1889.

Pseudogynoxys benthami Cabrera, Brittonia 7: 56. 1950.

Pseudogynoxys hoffmannii (Klatt) Cuatr., Brittonia 8: 156. 1955.

The species is widely distributed in Central America from Panama northward to southern Mexico. Only two specimens from South America are in the U.S. National Herbarium. COLOMBIA: Magdalena: In coffee grove above Manaure, alt. about 600 m. Haught 3980; VENEZUELA: Zulia: Perija, alt. 1175 m. Gines 1384.

Pseudogynoxys engleri (Hieron.) H. Robinson & J. Cuatrecasas, comb. nov.

Senecio engleri Hieron., Bot. Jahrb. 28: 644. 1901. Syn. cited, S. jussieui Klatt sensu Hieron., Bot. Jahrb. 19: 69. 1894.

Senecio almagroi Cuatr., An. Univ. Madrid 4 (fasc. 2): 238. 1935.

The species occurs at lower elevations in west-central Ecuador. Specimens in the U.S. National Herbarium are as follows. ECUADOR: Canar: Along the road to Canar, ca. 17 kms ESE of El Triunfo, elev. ca. 300 ft. King 6995; Guayas: Manglaralto, elev. 0-50 m, low semi-arid hills back from beach. Dodson & Thien 1656; Along stream 12 km north of Pedro Carbo. Alt. prob. about 150 m. Haught 3058; Terecita, Stevens, 47, 130; Los Rios: Hacienda Clementina on Rio Pita, marsh. Asplund 5425.

Pseudogynoxys filicaliculata (Cuatr.) Cuatr., Brittonia, 8: 156. 1955.

Senecio filicaliculatus Cuatr., Collect. Bot. 3: 29. 1953.

The species is apparently still known only from the type from Peru (Weberbauer 7721).

Pseudogynoxys fragans (Hook.) H. Robinson & J. Cuatrecasas, comb. nov.

Gynoxys fragans Hook., Bot. Mag. 76, t. 1511. 1850.

Senecio skinneri Hemsl., Biol. Cent. Amer., Bot. 2: 247. 1881.

The type grown at Kew was apparently originally collected by Skinner in Guatemala. The original description is accompanied by a detailed illustration.

No specimens fitting the description have been seen, but a photograph distributed by the Field Museum of plants in the Berlin Herbarium under the name Senecio convolvuloides Greenm. shows an Ehrenberg collection from Mexico that is apparently P. fragans.

Pseudogynoxys haenkei (DC.) Cabrera, Brittonia 7: 54. 1950.

Gynoxys haenkei DC., Prodr. 6: 326. 1837.

Gynoxys oerstedii Benth. ex Oerst., Kjoeb. Vidensk. Meddel. Dansk. Naturhist. Foren. 1852: 107. 1852.

Senecio kermesinus Hemsl., Biol. Cent. Amer., Bot. 2: 242. 1881.

Senecio chinotegensis Klatt, Leopoldina 24: 125. 1888.

Senecio rothschuhianus Greenm., Bot. Jahrb. 60: 370. 1926.

Pseudogynoxys oerstedii (Benth.) Cuatr., Brittonia 8: 156. 1955.

In addition to the synonyms given, the following unvalidated names of Greenman on the basis of annotated specimens seem to apply to this species: Senecio bernoullianus, S. convolvuloides, and S. trixioides all nomen, Bot. Jahrb. 32: 22. 1902.

Pseudogynoxys poeppigii (DC.) H. Robinson & J. Cuatrecasas, comb. nov.

Gynoxys poeppigii DC., Prodr. 6: 326. 1837.

Senecio sprucei Klatt, Leopoldina 24: 128. 1888.

Pseudogynoxys sprucei (Klatt) Cabrera, Brittonia 7: 56. 1950.

All specimens seen have been from the Department of San Martin in Peru. The species is obviously closely related to P. scabra, but differs primarily by the minute appressed hairs that give the leaves a glabrous appearance. The species also seems to be restricted to comparatively low elevations on the eastern slopes of the Andes, while P. scabra is from low elevations to the west of the Andes.

Pseudogynoxys scabra (Benth.) Cuatr., Brittonia 8: 156. 1955.

Gynoxys scabra Benth., Voy. Sulphur 121. 1836.

Senecio eggersii Hieron., Bot. Jahrb. 28: 645. 1901.

Pseudogynoxys eggersii (Hieron.) Cabrera, Brittonia 7: 56. 1950.

Senecio neovolubilis Cuatr., Repert. Sp. Nov. 55: 141. 1953.

Pseudogynoxys neovolubilis (Cuatr.) Cuatr., *Brittonia* 8: 156. 1955.

Pseudogynoxys asplundii K. Afzelius, *Bot. Notis.* 119: 233. 1966.

Pseudogynoxys chongonensis K. Afzelius, *Bot. Notis.* 119: 237. 1966.

The species is characterized by the straight main stems and the densely paniculate axillary inflorescences, a habit well illustrated in the photographs of the type specimens of Afzelius (1966). The habit is particularly distinct from that of the sympatric P. engleri with its deflected stem and less dense corymbose inflorescences. The type of Gynoxys scabra has not been seen and Bentham does not describe the stem, but other described features indicate identity with Senecio eggersii Hieron. Most anther collars that have been examined show less differentiation of the basal cells than in other species of the genus. Enlarged cells are evident in the type specimen of S. neovolubilis, however. Specimens in the U.S. National Herbarium are as follows. ECUADOR: Junction of Guayas, Cañar, Chimborazo & Bolívar: Foothills of the western cordillera near the village of Bucay; 1000-1250 ft. elev. Camp E-3964; Guayas: Road from Guayaquil to Cuevedo; km 78; elev. 100 m. Dodson & Thien 1273; Guayaquil, alt. 0-50 m. Hitchcock 19966, 20126; Between Guayaquil and Salinas; near sea level. Mexia 6767; Prope Guayaquil. Mille 218; Guayaquil, along road to Aguas Piedras. Rowlee & Mixter 1108; 8 km north of Guayaquil; dry loam of hillside, alt. 5 m. Stork, Eyerdam & Beetle 8968, 8969; Guayaquil and vicinity, elev. 0-20 m. Valverde 342; Loja: Sabiango. Townsend 885 (Holotype of Senecio neovolubilis); Manabí: Roadsides near Santa Ana, alt. 100 m. Haught 3504. PERU: Piura: Canchaque upper limits of town (several km above town, rd to Huancabamba, alt. 1350 m. Hutchison & Wright 6660).

Pseudogynoxys sodiroi (Hieron.) Cuatr., *Ciencia* 23: 150. 1964.

Senecio sodiroi Hieron., *Bot. Jahrb.* 29: 73. 1900.

Senecio viridifluminis Cuatr., *Repert Sp. Nov.* 55: 152. 1953.

Pseudogynoxys viridifluminis (Cuatr.) Cuatr., *Brittonia* 8: 157. 1955.

Pseudogynoxys guarumalensis K. Afzelius, *Bot. Notis.* 119: 237. 1966.

Pseudogynoxys pastazensis K. Afzelius, *Bot. Notis.* 119: 239. 1966.

The synonymy is emended from Cuatrecasas (1964).

The specimens seen by the authors are as follows. ECUADOR: Rio Verde, Pachano 235 (US, holotype of S. viridifluminis); Cotopaxi: Cordillera Occidental; Cordillera de Angamarca y Zumbagua, above Pilaló. H. Barclay & Juajibioy 8071 (US); Pastaza: Road 3 km E of Rio Blanco, elev. 1700 m. Dodson & Thien 2006 (US); Pastaza, 1200 m alt. Rimbach 273 (F); Pichincha: About 84 km east of Quevedo, en route to Quito, alt. 2275 m. Maguire & Maguire 44259 (US); Tungurahua: Valley of Rio Pastaza, Hacienda Rio Verde Grande, alt. 1500 m. Asplund 7838 (US, isotype of P. pastazensis); Region near hot water pool at Baños, 1750 m alt. Penland & Summers 34 (F).

Pseudogynoxys sonchoides (HBK.) Cuatr., Brittonia 8: 157. 1955

Senecio sonchoides HBK., Nov. Gen. & Sp. 4: 139. 1818, ed folio.

Gynoxys sinclairi Benth., Voy. Sulphur 120. 1836.

Senecio jamesoni Spruce ex Klatt, Leopoldina 24: 127. 1888.

Senecio sinclairi (Benth.) Hieron., Bot. Jahrb. 19: 68. 1894.

Pseudogynoxys chiribogensis K. Afzelius, Bot. Notis. 119: 235. 1966.

The synonymy is emended from that of Cuatrecasas (1955). Specimens in the U.S. National Herbarium are as follows. ECUADOR: Bolivar: Balzapamba, alt. 800 m. Haught 3311; Chimborazo: Cañon of the Rio Chanchan near Huigra; 4000-4500 ft. elev. Camp E-3049; Huigra, alt. 1200 m. Hitchcock 20348; Along the road to Riobamba, ca 11 kms NE of Bucay, elev. ca. 1600 ft. King 6957; Vicinity of Huigra, mostly on the Hacienda de Licay, Rose & Rose 22188; Südwestlich Huigra, 1200 m. Schimpff 463; Cotopaxi: Road between Pilaló and Macuchi, alt. about 2400 m. Haught 2960; El Oro: Along Rio Amarillo, upstream from Portovelo, alt. 640-760 m. Steyermark 54076; Guayas: Near Bucay, alt. about 300 m. Haught 2890; Loja: Between Loja and San Lucas, alt. 2100-2600 m. Hitchcock 21492; Sabiango, elev. 3000 ft. Townsend A.96; Manabi: Road from Chone to Pichincha; km 82, elev. 450 m. Dodson & Thien 1772; Pichincha: Road from Quito to Santo Domingo de los Colorados; km 95, elev. 1000 m. Dodson & Thien 1216; s.l. Jameson 835 PERU: Lambayeque: Km 28 E of Olmos on Marañon highway, vicinity of restaurant "El Salvador", alt. 1150 m. Hutchison & Wright 3424; Piura: Prov. Paita, Talara, Haught 68; Santa Rosa (Abajao de Canchaque), alt. 800 m. Sagástegui, Cabanillas & Dios 8288.

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Figs. 1-8. Pseudogynoxys cummingii (Benth.) H. Robinson & J. Cuatrecasas, from Haught 3980, Colombia. 1. Head, X 2. 2. Involucral bracts, X  $4\frac{1}{2}$ . 3. Ray flower, X  $4\frac{1}{2}$ . 4. Disk flower, X  $4\frac{1}{2}$ . 5. Style branches of disk flower, X 27. 6. Anther, X 18. 7. Achene, X 9. 8. Leaf, X  $4/9$ .



Botanic Museum of the University, Copenhagen

Plants of Argentina

by Francis Wandel Pedersen

No.

Herbarium, Copenhagen, Denmark

Pseudogynoxys cabreræ  
 H. Robinson & J. Cuatrecasas  
 Holotype, United States National Herbarium  
 Photo by Victor E. Krantz, Staff Photographer, National Museum  
 of Natural History

UNITED STATES NATIONAL MUSEUM

*Pseudogynoxys cabreræ* H. Robinson & J. Cuatrecasas,  
 Holotype, United States National Herbarium. Photo by  
 Victor E. Krantz, Staff Photographer, National Museum  
 of Natural History.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CLXIII.

ADDITIONS TO THE GENUS FLEISCHMANNIOPSIS.

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The genus Fleischmanniopsis was originally established for three species of Critonioid Eupatorieae (King & Robinson, 1971). Continuing research both in the field and in the herbarium have yielded the following two new species and new combination presented below. The type species of Fleischmanniopsis, F. leucocephala (Benth.) K & R, is notable for the white color of the involucre bracts, a condition that is evident very early in the developing inflorescence. There has been a tendency to dismiss all such material as one species, but specimens from southern Guatemala and El Salvador prove to be distinct. A single specimen with white involucres from Chiapas proves to be a third distinct species.

Immaturity of specimens is a problem in the genus. The white involucres show from very early stages in development and many specimens are collected in the erroneous assumption they are mature. This factor obscures some of the species limits since the smaller head size and early deciduous primary leaves in F. anomalochaeta are not evident in comparisons of immature specimens. Williams' concern with immaturity in F. mendax seems unwarranted, however, since an isotype (GH) is sufficiently developed and shows larger heads than any seen in F. leucocephala. Williams was perhaps misled by the apparently characteristic greenish rather than whitish involucre in F. mendax.

The concept of the genus is expanded here to contain 5 species. The increased diversity of the species level reinforces the generic distinctions and some new characters can be added. Fleischmanniopsis is regarded as Critonioid and because of the broadened and thickened clavate tips of the style branches a relationship might be suggested to Critoniadelphus. There is some resemblance in habit between that genus and F. nubigenoides (B.L. Robinson) K. & R., a resemblance that led to the species name of the latter. Differences, however, discourage any thought of close relationship. In Fleischmanniopsis, the inner involucre bracts are usually persistent, the pollen is only 18-20 $\mu$  in diameter, the anther collars are annulated, the corolla

lobes are nearly glabrous, the pappus is in a single uncongested row of slender setae, the carpodium is pale and tapering with a sharp upper rim, the anthers are partly to completely pinkish as seen through the thin corollas, the anther appendage is less than half as long as wide, the ribs of the achene are narrow and not noticeably corticated, the leaves are trinervately rather than pinnately veined, and the corollas have veins ending below the lobes. Fleischmanniopsis was named after the resemblance of the achene and the shape of the corolla lobes to those of Fleischmannia. The latter genus does not seem particularly closely related, however, differing by the corolla lobes papillose on both surfaces with papillae on the upper ends of the cells, the veins of the corollas extending into the corolla lobes and being greatly thickened in the lower throat, the corolla having a distinct short basal tube, the anthers not being reddish, the style branches lacking nodular tips but being densely covered with elongate papillae, the head usually containing 20 or more flowers with 10 in only one species, and the anther appendage being longer than wide.

The five species of Fleischmanniopsis may be distinguished by the following key.

1. Inflorescence corymbose or pyramidally paniculate; leaves trinervate from well above base, secondary veins parallel with basal margin ----- 2
2. Involucre brownish at maturity; leaves membranous, dark when dry, acuminatum less than 1/5 of leaf length; pappus ca. 3 mm long; corolla glabrous inside F. nubigenoides
2. Involucre whitish; leaves herbaceous, green when dry; acumination  $\frac{1}{4}$  of leaf length; pappus ca. 2 mm long; corolla with hairs inside at the bases of the filaments----- F. langmaniae
1. Inflorescence thyrsoid-paniculate, elongate cylindrical; leaves trinervate from at or near the base, secondary veins diverging from basal margins--- 3
3. Heads ca. 7 mm long, involucre greenish at maturity; leaf lamina rounded at base, trinervate from base, tip abruptly acuminate--- F. mendax

3. Heads 4-6 mm long, involucre white at maturity; leaf lamina acute at base, trinervate from above base, tip gradually acuminate----- 4
4. Heads ca. 4 mm long; tips of pappus setae contorted and irregularly barbellate; achene scabrous throughout; primary leaves usually lacking at anthesis----- F. anomalochaeta
4. Heads mostly 5-6 mm long; tips of pappus setae straight and antrorsely scabrid; achene usually glabrous below; primary leaves persistent through anthesis - F. leucocephala

Fleischmanniopsis anomalochaeta R. M. King & H. Robinson, sp. nov. Plantae fruticosae 1.0-1.5 m altae multo ramosae. Caules glabri in nodis pauce minute puberuli teretes vel subtiliter hexagonales flavo-fulvescentes. Folia opposita, petiolis 0.5-2.5 cm longis; folia primaria ca. 10-11 cm longa et ca. 4 cm lata; saepe per anthesin decidua; folia ramosa plerumque 2-5 cm longa et ca. 1 cm lata; laminae ovatae vel late lanceolatae base acutae vel late cuneatae fere ad basem valde trinervatae margine utrinque argute 5-13-serratae apice sensim anguste acuminatae supra et subtus sparse puberulae. Inflorescentiae elongatae thyrsoido-paniculatae ampliatae, ramis et ramulis puberulis vel dense puberulis. Capitula in ramulis corymbosis congesta ca. 4 mm alta et 1.5-1.8 mm lata. Squamae involucri ca. 3-seriatae ca. 15 albae ovatae vel oblongae 1-3 mm longae 0.5-0.9 mm latae margine minuto fimbriatae extus glabrae vel subglabrae exteriores apice minute apiculatae interiores obtusae vel rotundatae. Flores 7-9; corollae albae 2.0-2.2 mm longae anguste infundibulares, tubis angustatis indistinctis, lobis ca. 0.3 mm longis et 0.25 mm latis; filamenta in parte superiore ca. 0.3 mm longa parietibus cellularum dense annulatis; thecae antherarum ca. 0.5 mm longae, appendices truncatae ca. 0.05 mm longae et 0.15 mm latae. Achaenia 1.1-1.5 mm longa ubique sparse setifera; setae pappi ca. 18-20 non contiguae 2.0-2.5 mm longae apice contortae saepe tenues patentiter vel retrorse spiculiferae. Grana pollinis 18-19 $\mu$  diam. minute papillosa.

TYPE: GUATEMALA: Sacatepequez: along the dirt road to Antigua, ca. 13 kms generally N of Escuintla. Elevation ca. 3,200 ft. 23 January 1977. R. M. King 7179

(Holotype US). Paratypes: GUATEMALA: Sacatepequez: along the dirt road to Antigua, ca. 11 kms generally N of Escuintla. Elevation ca. 2,500 ft. 23 January 1977, King 7177 (US). Dry secondary forest, lower slopes Volcan de Fuego, 3 km southwest of Alotenango, 1,200-1,300 m January 15, 1974, Williams & Williams 43469 (US). Dry thickets between hills Agua and Fuego Volcãoes, road to Alotenango, elevation 1,200 m Molina et al 16666 (US). Escuintla: along the road to Escuintla, ca. 16 kms generally SW of Amatitlan. Elevation ca. 2,750 ft, King 7169 (US). Amatitlan: Palin, alt. 3,560 ft. John Donnell Smith 2843 (US). EL SALVADOR Ahuachapan: Sierra de Apaneca, in the region of Finca Colima, Jan. 17-19, 1922, Standley 20160 (US). Without precise locality, all Sisto Alberto Padilla 250, 280, 281 (All US).

The new species has the general aspect of the common Fleischmanniopsis leucocephala but is most distinct in the contorted, tenuous and uniquely barbellate tips of the pappus setae. In the typical form the barbs of the setae are proliferated into papillae and bifid tips that appear almost haustorial. The character is weakly developed in only one of the collections seen. The concept is reenforced by the smaller heads and the more setiferous achenes. The heads are 4 mm long while mature heads of F. leucocephala are 5-6 mm long. The achenes are prominently scabrous to the base while those of F. leucocephala are almost glabrous. A few specimens of the latter species from central Mexico have achene pubescence as in F. anomalochaeta but apparently represent a parallel variation.

The new species can be recognized in the field by subtle differences in aspect. The smaller heads contribute to the appearance but might be confused with immature specimens of F. leucocephala. Specimens of F. anomalochaeta also are usually distinctive in the numerous lateral shoots with small leaves. Larger leaves occur on the main stems but are apparently usually lost before anthesis. In contrast, F. leucocephala has persistent primary leaves and branchlets bearing smaller leaves are usually not prominent.

Fleischmanniopsis langmaniae R. M. King & H. Robinson, sp. nov. Plantae fruticosae ca. 1 m altae laxae ramosae. Caules glabri vel subglabri teretes vel subtiliter hexagonales fulvescentes. Folia opposita, petiolis 0.5-1.5 cm longis; laminae ovatae plerumque

4.5-10.0 cm longae et 1.5-3.5 cm latae base acutae margine 5-9 argute serratae apice sensim anguste acuminatae supra et subtus sparse puberulae distincte supra basem trinervatae, nervis secundariis marginis basilariibus parallelis. Inflorescentiae pyramidaliter paniculatae ampliatae, ramis et ramulis puberulis vel dense puberulis. Capitula in ramulis subcorymbosis subcongesta ca. 5 mm alta et 3 mm lata. Squamae involucri ca. 18 albae 1-3-purpureo-lineatae orbiculatae vel oblongae 0.7-3.7 mm longae et 1.0-1.4 mm latae margine minute fimbriatae extus glabrae apice rotundatae. Flores 7-9; corollae albae in nervis purpureis ca. 2.5 mm longae anguste tubulares superne infundibularis, tubis indistinctis, faucis base intus sparse puberulis, lobis ca. 0.35 mm longis et 0.3 mm latis extus 0-2-setiferis; filamenta in parte superiore ca. 0.25 mm longa base indistincta, parietibus cellularum dense annulatis; thecae antherarum ca. 0.55 mm longae, appendices truncatae vel retusae ca. 0.05 mm longae et 0.15 mm latae. Achaenia 1.5-1.7 mm longa glabra vel apice pauce spiculifera; setae pappi 25-35 contiguae ca. 2 mm longae ubique aequicrassae et aequiscabrae. Grana pollinis ca. 17 $\mu$  diam. minute papillosa.

TYPE:MEXICO: Chiapas: between San Fernando and Plan de Ayala, 4/17/49, Ida K. Langman 3914 (Holotype US).

Fleischmanniopsis langmanae is most closely related to F. nubigenoides in the more broadly paniculate inflorescence and in the venation of the leaves. The trinervation of the leaves is farther from the base of the lamina and parallel to the basal margin as in F. nubigenoides. The two species also seem to share somewhat broader basal tubes on the corollas and pappus setae of even width and equally distributed scabrosity. The new species is more like F. leucocephala by the whitish involucre and differs from F. nubigenoides also by the shorter florets and shorter pappus. The new species is unique in the genus by the hairs inside the corolla at the bases of the filaments.

The following variety should be added to the genus.

Fleischmanniopsis leucocephala (Benth.) R.M.King & H. Robinson var. anodonta (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium leucocephala Benth. var. anodontum B.L.Robinson, Proc. Amer. Acad. 51:534. 1916. Mexico.



R&K  
7179

ASTERACEAE OF GUATEMALA

Cytological and/or Botanical Vouchers

ROBERT MERRILL KING, no. 7179 23 January, 1977

*Fleischmanniopsis anomalochaeta* R. M. King &  
H. Robinson

HOLOTYPE

occasional shrubs 1-2 m tall, flowers  
'greenish'-white.

Sacatezquez, along the dirt road to Antigua,  
ca. 13 kms generally N of Escuintla.  
Elevation ca. 3,000 ft.

UNITED STATES

2759636

NATIONAL HERBARIUM

Specimens collected for the United States National Herbarium, Smithsonian Institution, Field no. 2759636, supported by subcontracts to Robert M. King from the Instituto for Organismo Científico del Estado, San Carlos, Guatemala, P.O. Box 1, B. Guaymas, Director and the Smithsonian Institution.

*Fleischmanniopsis anomalochaeta* R. M. King & H. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



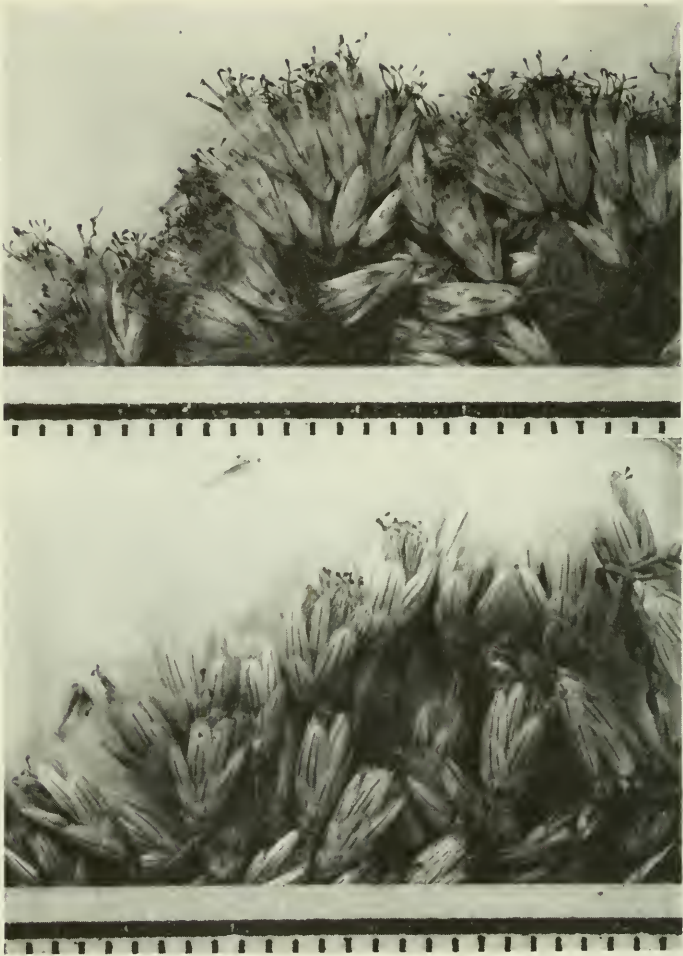
HERBARIUM NACIONAL DE MEXICO  
 Instituto de Biología U. S. A.

Estado de San Luis Potosí No. 10  
 Col. San Luis Potosí San Luis Potosí  
leucocephalum Smith  
 Lugar San Luis Potosí  
 Hab. San Luis Potosí  
 Fecha 1977 Det.  
 Nombre vulgar  
 Observaciones ...

*Fleischmanniopsis langmaniae* R. M. King & H. Robinson

Dr. R. M. King, and H. Robinson

Fleischmanniopsis langmaniae R. M. King & H. Robinson, Holotype, United States National Herbarium.



Enlargements of heads of Fleischmanniopsis. Top. F. anomalochaeta; bottom. F. langmaniae.

#### Literature Cited

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STUDIES IN THE HELIANTHEAE (ASTERACEAE). VIII.

NOTES ON GENUS AND SPECIES LIMITS

IN THE GENUS VIGUIERA.

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The genus Viguiera contains the greatest diversity of species of any genus in the subtribe Helianthinae, and both the generic and species limits have been subject to question. The genus has been studied on a classical basis by Blake (1918) and comparatively few additions have been made since that time. Of particular interest are the more herbaceous species of the genus which form the typical element and which could be included in a more narrowly circumscribed genus concept. Some immediate relatives have been placed in segregate genera and the policy is followed here that was initiated by D'Arcy (1975) in the Flora of Panama, the herbaceous species with 1-3 seriate involucre and shortly but distinctly appendaged styles of the disk flowers are placed in Viguiera regardless of the presence or absence of differentiated awns and squamellae on the achenes. In addition to the new species described below, a number of details of floral structure have been noted for other species. The group seems to have many characters in its "floral anatomy" that are useful at the species level, though such characters are comparatively rare in other Heliantheae.

Viguiera dentata (Cav.) Spreng. includes the type species of the genus, V. helianthoides HBK., and is distributed widely in the West Indies, Mexico and Central America. The involucre bracts tend to be distinctive by the base being nearly filled by a pair of prominent costae and by the distinct linear tip. The species proves far more distinctive and unique in the genus by the presence of hairs on the filaments of the anthers which usually form a dense pubescence visible in the opened corollas under the dissecting microscope. The disk corollas also have the basal tubes nearly glabrous, the throat densely scabrous below, and the throat less than twice as long as the lobes, a combination of features differing from most members of the genus.

Viguiera molinae H. Robinson, sp. nov.

Plantae herbaceae 1½-2 m altae laxae ramosae. caules brunnescentes vel rubro-tincti teretes et minute striati sparse antrorse strigosi. Folia alternata, basilaris opposita?, petiolis angustis plerumque 5-10 mm longis dense strigosis; laminae ovatae vel lanceolatae plerumque 4-8 cm longae et 1-4 cm latae base breviter acutae vel vix acuminatae margine 6-17 argute serratae sensim in foliis superioribus minoribus sub-integra et integra apice longe anguste acuminatae supra sparse appresse strigosae et dense minute scabridae subtus densius strigosae fere ad basem valde trinervatae. Inflorescentiae laxae subcymosae, pedicellis tenuibus 1.5-3.0 cm longis dense strigosis. Capitula ca. 8 mm alta et 5-6 mm lata. Squamae involucri ca. 8-10 plerumque uniseriatae erectae herbaceae lanceolatae 4-5 mm longae et 1.0-1.2 mm latae apice anguste acutae extus dense strigosae. Paleae chartaceae oblongae ca. 5 mm longae et 2 mm latae superne irregulariter breviter serratae apice breviter acutae vix erectae apiculatae extus variabiliter puberulae in nervis mediis strigosae viridivittatae. Flores radii 0-1 in capitulo steriles; corollae flavae, tubis tenuibus ca. 1.2 mm longis superne parce puberulis, limbis late ellipticis ca. 2.5 mm longis et 1.8 mm latis subtus in nervis strigosis. Flores disci ca. 20; corollae flavae 3.5-4.3 mm longae, tubis 1.0-1.3 mm longis parce spiculiferis base parce glanduliferis, glandulis non capitatis, faucis cylindricis 1.8-2.0 mm longis inferne dense et superne sparse spiculiferis intus sparse antrorse papillatis, lobis triangularibus ca. 0.6 mm longis et ca. 0.4 mm latis extus dense strigosis setis perverrucosis intus dense uniformiter breviter papillatis; filamenta glabra in partibus superioribus ca. 0.35 mm longa e thecis plerumque exerta; thecae 1.0-1.2 mm longae; appendices antherarum flavae ovatae ca. 0.4 mm longae et 0.17 mm latae base in fasciculo glanduliferae; rami stylorum breviter distincte appendiculati. Achaenia 3.0-3.3 mm longa et ca. 1.2 mm lata distincte compressa minute albo-maculata dense subsordide sericea; aristae pappi 2 ca. 3 mm longae inferne scariose alatae, squamellae pappi ca. 6 aliquantum latae 0.7-1.0 mm longae base breviter connatae distaliter valde laceratae. Grana pollinis ca. 23-25µ diam. dense hispida.

Type: NICARAGUA: Dept. Estelí: La Guava, Estelí River 22 km north of Estelí, alt. 650 m. Nov. 23-26, 1973. L.O. Williams & A. Molina R. 42374 (Holotype, US). The specimen was received as Aldama dentata var. dentata and duplicates should be sought in other herbaria under that name.

Viguiera molinae is in the group Blake (1918) referred to as sect. Diplostichis and is obviously closely related to V. gracillima Brandegees of Oaxaca and Chiapas. The new species has the same canescent-strigose lanceolate involucre bracts and combined strigose and scabrid upper surfaces of the leaves that occur in V. gracillima, and in an initial sorting was thought to be only a range extension of that species. The more robust plant with the extensive many-headed inflorescence and the narrower long-acuminate leaves was at great variance, however. Careful examination proved the species was thoroughly distinct in the rayless or nearly rayless condition of the heads. Numerous heads have been examined leaving no doubt that the heads are basically rayless. The anther collars of V. molinae are unusually long, also, and they extend far below the basal points of the anther thecae. Most members of the genus have anther collars scarcely longer than the bases of the thecae.

Other Central American species placed in the same section by Blake include V. tenuis A.Gray, V. strigosa Klatt and V. sylvatica Klatt. The first of these has involucre bracts similar to V. molinae, but it differs by the mostly opposite sessile leaves with non-acuminate tips, upper surfaces of the leaves with denser ascending strigose hairs and no spicules, the corolla having a very short basal tube, the corolla lobes being only as long as wide, and the lobe inner surface having much more elongate papillae. Both V. strigosa and V. sylvatica of Costa Rica differ by the glandular dots on the undersurfaces of the leaves and by the broader thicker involucre bracts without canescent-strigose pubescence. The two species have been confused in identifications and some notes suggest the two are synonyms. An isotype of V. strigosa and one other specimen (Standley & Valerio 44883) have been examined and prove to be notably distinct in the shorter lobes of the disk corolla that are smooth rather than papillose on the inner surface, the anthers are mostly or completely included in the mature corollas, and the anther collars are elongate, extending well below the bases of the thecae. Specimens seen of V. sylvatica all show very deeply cut disk corolla lobes with sparse papillae inside and long dense papillae forming a mass of hair inside the throat below the lobes, the anthers are exerted at maturity and the anther collars are short so as to scarcely extend below the bases of the thecae.

Haplocalymma microcephala (Greenm.) Blake is very closely related to the species of section Diplostichis having lanceolate canescent-strigose involucre bracts. The species has leaf pubescence precisely like that of V. gracillima and V. molinae. The only significant differences seem to be the coarsely dentate leaves and the smaller more densely clustered heads. The evenly spaced uniseriate 5 involucre bracts do not seem to warrant a generic distinction and the species should be known as V. microcephala Greenm. Contrary to Blake's characterization the pappus tends to have differentiated though short awns.

Viguiera woronowii (Blake) H. Robinson, comb. nov.

Haplocalymma woronowii Blake, Proc. Biol. Soc. Wash. 43: 163, 1930. The value of Blake's concept of Haplocalymma is essentially disproven by the nature of this second species described by him. While the species is in the general relationship, it would certainly not seem to be the closest relative of V. microcephala Greenm. The species is most distinctive in the high-conical receptacle which resembles Jaegeria. It is a similarity of some concern since the recognition of sterile rays in one species of Jaegeria, J. sterilis McVaugh. The place of V. woronowii is proven, however, by the presence of a single continuous stigmatic surface on each style branch as in all Helianthinae, there are two stigmatic lines in Jaegeria. Also, V. woronowii has a small style appendage as in typical Viguiera and the distinctly papillose appressed hairs common in Viguiera and many other Heliantheae, both characters differing from Jaegeria.

In the Flora of Panama, D'Arcy (1975) adopts a broad concept of Viguiera which includes Wedelia cordata Hook. & Arn. and which thus essentially synonymizes the genus Hymenostephium. A lectotype is also chosen by D'Arcy for the genus Gymnolomia (see below under Viguiera rudbeckioides). The broad concept was not explained by D'Arcy, but it is thoroughly justified. Blake (1918) in his monograph of Viguiera held Hymenostephium distinct for those members of the relationship having a pappus with squamellae but without differentiated awns. The distinction was very subtle since Blake retained in Viguiera species such as the S.E. U.S. endemic V. porteri (A. Gray) Blake and V. quitensis which have no pappus. The disk achenes of the latter had setae on their surfaces indicating the lack of a pappus was not the calvov form found erratically in individual specimens of pappose species throughout the

family Asteraceae. Blake provided no distinction between the two genera Viguiera and Hymenostephium in cases where calvous achenes lacking both pappus and lateral hairs occur. The latter condition is particularly common in Hymenostephium and not rare in Viguiera. There are also cases such as V. lepidostephana Cuatr. where the awns are scarcely different from the squamellae. The distinction between the genera must therefore be regarded as unworkable. There is also ample evidence that the distinction between Viguiera and Hymenostephium creates an unnatural division between closely related species.

Viguiera cordata (Hook. & Arn.) D'Arcy, distributed from Mexico to Panama, shows most of the basic features found in all species that have been placed in Hymenostephium, the cylindrical throats of the disk corollas twice or more as long as the lobes, the reddish tint of the lobes of older disk flowers, the short-triangular shape of the lobes with dense papillosity on the inner surface, the anther collars not or scarcely extending below the bases of the thecae, and the anther appendages being yellow. A few of the more restricted traits are the abruptly broadened base of the throat of the disk corollas, and a basal tube nearly 1 mm long that is essentially as scabrid as the base of the throat. There is variation in the species in the erect versus appressed pubescence used to distinguish H. guatemalense (B.L. Robins. & Greenm.) Blake, and in the shape of the paleae. Short-tipped paleae are predominant in Guatemala and long-tips are found in most Costa Rican specimens, but both types are found throughout the range of the species. The supposed difference of Hymenostephium microcephalum (Less.) Blake (including H. mexicanum Benth., the type of the genus; not V. microcephalum Greenm.), the cylindrical rather than campanulate shape of the heads, would seem mostly to distinguish immature specimens from mature material. The primary test of the species, however, seems to be the achene which has a high proportion of calvous forms and identical pappose forms throughout the range in specimens otherwise identifiable as H. cordatum, H. microcephalum and H. guatemalense. The pappose forms all show achenes with long-sericeous setosity on the sides and a distinctive stringy form of squamellae. Of all the material under the name Hymenostephium seen from Mexico and Central America, only the following seem to be distinct from Viguiera cordata.

Viguiera hintonii H. Robinson, sp. nov.

Plantae herbaceae vel suffrutescentes 1-2 m altae

laxe ramosae, ramis erectis valde patentibus. Caules tenues brunnescentes sparse minute puberuli vel glabrescentes. Folia plerumque opposita, petiolis tenuibus brevibus 3-13 mm longis sparse strigosis; laminae oblongo-lanceolatae vel anguste ovatae plerumque 3-8 cm longae et 1.2-2.7 cm latae base rotundatae margine 3-10 plerumque remote serratae apice anguste acuminatae supra et subtus sparse appresse scabrae fere ad basem trinervatae. Inflorescentiae laxe ramosae cymosae pauca capitatae, pedicellis tenuibus 1-10 mm longis sparse vel dense strigosis. Capitula 4.5-5.0 mm alta et 2.0-2.5 mm lata. Squamae involucri ca. 6 plerumque uniseriatae erectae herbaceae ovate lanceolatae 2-3 mm longae et ca. 0.9 mm latae apice acuminatae extus subglabrae vel dense strigosae. Paleae chartaceae oblongo-ovatae 3.0-3.5 mm longae et ca. 1.5 mm latae apice breviter acuminatae margine remote dentatae in costis resinosis numerosis aureo-striatae glabrae vel minute puberulae. Flores radii 5 in capitulo steriles; corollae flavae, tubis 0.3-0.5 mm longis puberulis, limbis late ellipticis 3-6 mm longis et 2.0-2.3 mm latis subtus in nervis minute strigosis. Flores disci 5-10; corollae flavae vel superne rubro-tinctae ca. 2.5 mm longae, tubis ca. 0.5 mm longis extus dense scabris, faucis ca. 1.5 mm longis base leniter demarcatis inferne scabris superne glabris, lobis triangularibus ca. 0.5 mm longis et 0.45 mm latis extus dense minute strigosis intus dense uniformiter breviter papillosis; filamenta glabra in partibus superioribus ca. 0.2 mm longa e basis thecarum non vel vix exerta; thecae ca. 1.2 mm longae; appendices antherarum flavae ovatae ca. 0.2 mm longae et 0.17 mm latae base in fasciculo glanduliferae; rami stylorum breviter distincte appendiculati. Achaenia 2.0-2.5 mm longa et ca. 0.8-1.0 mm lata distincte compressa ubique nigra et dense breviter setifera, setis erecto-patentibus; pappus nullus vel subnullus. Grana pollinis 23-25  $\mu$  diam.

Type: MEXICO: Michoacan: Steep hills about 25 km south of Arteaga, road to Playa Azul; forest of Quercus macrophylla; elev. 600-650 m. abundant, shrub 1-2 m high; flowers yellow. 27 Feb. 1965. McVaugh 22637 (Holotype, US). Paratypes: MEXICO: Guerrero: Vallecitos, Montes de Oca. Oak woods. Flower yellow. 7-17-37. Hinton et al. 10611 (US); Chilacayote 1675, Mina. Shady mixed forest. Flower yellow. 4-20-39. Hinton et al. 14182 (US).

The flowering heads of V. hintonii are the smallest of any seen in the genus and this combined with the general aspect has caused specimens to be placed under the name Hymenostephium microcephalum (Less.) Blake. The achenes are totally distinct in the short setae on

the lateral surfaces and the essential lack of pappus. Both the pappus and the long sericeous lateral setae are distinctive in V. cordata. The new species has achenes technically more like V. kingii McVaugh of Nayarit in Mexico, but the latter is a much more robust species with very elongate pedicels. One specimen of the new species (Hinton 10611) has been annotated apparently by Blake as Haplocalymma n.sp. with reference to H. woronowii. The involucre bracts are not strictly in a single series but usually have a single extra bract as in a few other members of Viguiera sect. Diplostichis. The shape of the leaves is somewhat distinctive by being rather oblong-lanceolate with often remote teeth.

The South American species placed in Hymenostephium and the related species of Viguiera are as follows.

Viguiera anomala Blake of Colombia was not seen in this study but is supposedly distinct among those members of the group having awns by the sordid or rufous pubescence of the inflorescence and by the glabrous lateral surfaces of the achenes.

Viguiera cabreræ H. Robinson, sp. nov.

Plantae herbaceae annuae? ca. 0.5 m altae laxae ramosae. Caules tenues brunnescentes vel rubri sparse strigosi. Folia plerumque alternata basilaria opposita, petiolis tenuibus 5-17 mm longis sparse strigosis; laminae ovatae plerumque 2-6 cm longae et 1-4 cm latae base obtusae vel acutae margine utrinque ca. 6-7 serratae apice breviter acutae supra et subtus appresse strigosae fere ad basem trinervatae. Inflorescentiae laxae ramosae pauca capitatae, pedicellis tenuibus 2.0-5.5 cm longis dense strigosis. Capitula 7-9 mm alta et 5-7 mm lata. Squamae involucri 8-9 plerumque uniseriatae erectae herbaceae lineari-lanceolatae 5-6 mm longae et 1.0-1.3 mm latae apice attenuatae extus dense strigosae. Paleae chartaceae oblongae ca. 5 mm longae et 1.5 mm latae apice obtusae vel breviter acutae margine breviter dense spiculiferae extus virides vel viridivittatae inferne puberulae superne subglabrae. Flores radii 8-9 in capitulo steriles; corollae flavae, tubis ca. 1 mm longis minute sparse puberulis, limbis late ellipticis ca. 8 mm longis et 4 mm latis subtus in nervis strigosis. Flores disci ca. 15; corollae flavae ca. 4 mm longae superne et in lobis in ductis resinosis pluribus striatis, tubis 0.5-1.0 mm longis dense spiculiferis, faucis cylindricis 2.0-2.5 mm longis inferne dense et superne sparse spiculiferis intus sparse antrorse pap-

illatis, lobis triangularibus ca. 1 mm longis et 0.8 mm latis extus dense strigosis setis verrucosis intus dense uniformiter breviter papillatis; filamenta glabra in partibus superioribus ca. 0.2 mm longa e basis thecarum vix exerta; thecae ca. 1.5 mm longae; appendices antherarum flavae ovatae ca. 0.35 mm longae et ca. 0.25 mm latae non vel pauca glanduliferae; rami stylorum breviter distincte appendiculati. Achaenia ca. 3 mm longa et ca. 1.3 mm lata distincte compressa ubique nigra et dense appresse puberula; pappus nullus. Grana pollinis 23-25 $\mu$  diam.

Type: ARGENTINA: Salta: Dep. Candelaria, Rio del Potrero, en la orilla del río, alt. 1420 m. Flor amarillo. Abril 8, 1925. S. Venturi 3675 (Holotype, US). Paratypes: ARGENTINA: Salta: Dep. Capital, Cerro San Bernardo. Capitulos amarillos. 27 V 1933. A.L. Cabrera 3017 (US); Cerro San Bernardo. 31 V 1933, A.L. Cabrera 3082 (US).

The species is the southernmost of Viguiera sect. Diplostichis. The Cabrera specimens had been annotated in the U.S. National Herbarium as Hymenostephium, but they possess the combination of setiferous achenes and no pappus that Blake was inclined to retain in Viguiera. The combination of achene characters might relate the species to V. quitensis (Benth.) Blake, but the Argentinian plants are much more delicate, being perhaps annuals, and the heads are much fewer on long slender pedicels. The leaves also differ from most members of the relationship by the fewer coarser teeth on the margins and by the acute rather than acuminate tips.

Viguiera goebelii (Klatt) H. Robinson, comb. nov.

Gymnolomia goebelii Klatt in Goebel, Pflanzenbiol. Schilderung. 2: 49. 1891. No distinction is evident between this and Hymenostephium meridense Blake which was also described from the paramos near Merida in Venezuela. The species is notable for the narrowly ovate leaves with extremely dense usually appressed pubescence that nearly covers the surfaces, and by the 2-3 headed branches of the inflorescence.

Viguiera lepidostephana Cuatr. is obviously a member of the Hymenostephium-Diplostichis series in South America. The species is distinctive by the large squamose pappus segments with the awns being only slightly larger than the squamellae. The species was described from the Depart. Tumbes, Peru (Ellenberg 1423). Ferreyra 12259 represents an additional collection from the same area collected at nearly the same time.

Viguiera leptodonta Blake is among the species described having a pappus with distinct awns, but in the calvous-achened condition the species would be indistinguishable from material called Hymenostephium guatemalensis in Venezuela. The latter specimens seem best placed in the present species in view of the less expanded throats of the disk corollas which indicate they are not the same as the Central American material.

Viguiera mucronata Blake occurs in Venezuela and adjacent northern Colombia. The species has an awned pappus and is similar to the Central American V. tenuis-V. molinae-V. microcephala series discussed above having very densely strigose involucre bracts. The species is distinct among the strongly awned species of South America by the lax herbaceous habit with long pedicels and mostly alternate upper leaves.

Viguiera quitensis (Benth.) Blake is notable for the pubescent achenes with no pappus. The species has been known primarily from Ecuador. New records from Colombia (Metcalf 30029) and Venezuela (Pittier 12662; Steyermark & Dunsterville 98837) had previously been identified as Viguiera mucronata, Hymenostephium cordatum and H. guatemalense. Viguiera quitensis tends to be more robust with larger heads and longer rays than in the related species.

Viguiera rudbeckioides (HBK.) H. Robinson, comb. nov.  
Gymnolomia rudbeckioides HBK., Nov. Gen. & Sp. 4: 172, t. 574. 1818. ed folio. A specimen (Townsend A90) from Sabiango, Ecuador has been seen and seems to match all described and illustrated features of the type specimen collected in immediately adjacent Peru (Piura: Ayavaca). The species seems distinctive in the slender habit, the very short basal tube of the disk corolla, and in the long corolla lobes nearly twice as long as wide. The pappus is a fringe of minute squamellae. In selecting the species as lectotype of Gymnolomia, D'Arcy (1975) was unaware of the transfer of the species to Hymenostephium by Blake (1924, p. 630). In the same Blake paper (p. 620) the other three original species of Gymnolomia were also transferred, G. triplinervia to Aspilia triplinervia (HBK.) Blake and both G. tenella and G. hondensis HBK. to Aspilia tenella (HBK.) Blake. In view of the consistent references by Blake (1918) and D'Arcy (1975) to the Aspilia nature of Gymnolomia it would I believe require rejection of G. rudbeckioides and selection of G. tenella HBK as the lectotype of Gymnolomia.

Viguiera serrata (Rusby) H. Robinson, comb. nov.

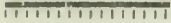
Montanoa serrata Rusby, Desc. New Sp. S. Amer. Pl. 151. 1920. The South American material under the name Hymenostephium cordatum does not seem the same as that from Central America. The corolla is not as abruptly expanded at the base of the throat, the hairs of the achene are shorter and the pappus is different. The squamellae in V. serrata are broad with lacerations distally. The squamellae of V. cordata are divided nearly to the base into slender segments that are often partly hidden by the denser covering of setae on the sides of the achene. In addition to the type (Colombia: Magdalena: Santa Marta, H.H. Smith 516) specimens with identical form of pappus have been seen from central Colombia (Cundinamarca: Guasca, Bro. Ariste-Joseph A538) and Venezuela (Trujillo: Vicinity of Escuque, Pittier 13133). Some specimens seen with calvous achenes may also represent this species.

Viguiera viridis (Steyermark) H. Robinson, comb. nov.

Hymenostephium viride Steyerm., Fieldiana: Bot. 28 (3): 641. 1953. Syn. H. angustifolium Benth., not Viguiera angustifolia (Hook. & Arn.) Blake. The Venezuelan species is distinctive in the very short blunt involucre bracts which cover only the bases of the mature paleae. The pubescence of the leaves is very sparse compared to V. goebelii.

#### Literature Cited

- Blake, S. F. 1918. A revision of the genus Viguiera. Contr. Gray Herb. n.s. 54: 1-205.
- \_\_\_\_\_. 1924. New American Asteraceae. Contr. U.S. National Herbarium 22 (8): 587-661, i-xi, pl. 54-63.
- D'Arcy, W. G. 1975. 73. Viguiera, in Flora of Panama. Annals Missouri Bot. Gard. 62: 1156-1161.



U. S. 77  
 Aldena dentata var. dentata Peddms

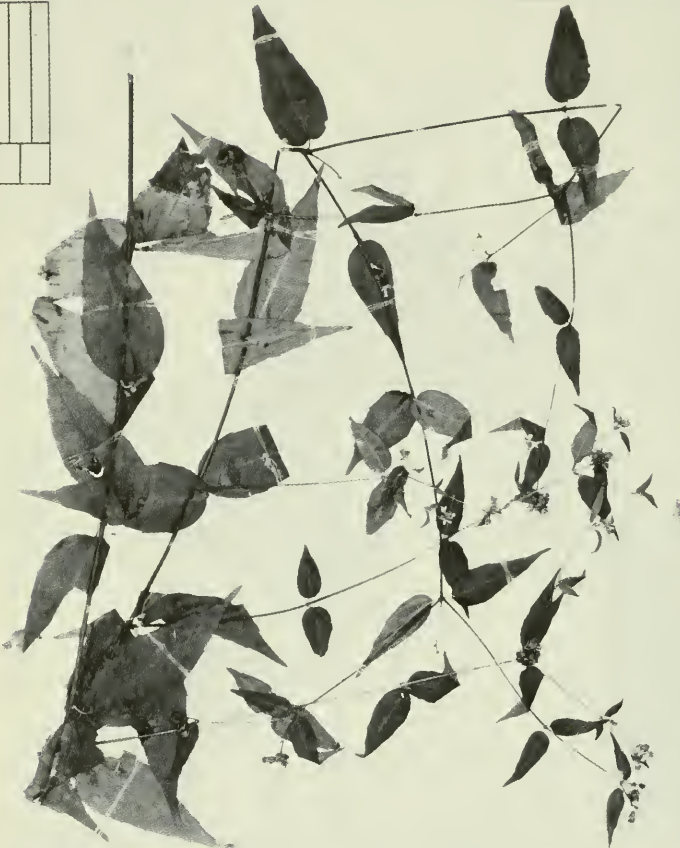
UNITED STATES

2735133

Fls. yellow, in forest along river

NATIONAL HERBARIUM

Viguiera molinae H. Robinson, Holotype, United States National Herbarium. Photo by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



PLANTS OF MICHUACAN

Abundant.

Shrub 1-2 m. high; flowers yellow.

UNITED STATES

2704878

NATIONAL HERBARIUM

22637

Viguiera hintonii H. Robinson, Holotype, United States National Herbarium.



Viguiera hintonii, enlargement of heads.



Viguiera cabreræ H. Robinson, Holotype, United States National Herbarium.



Viguiera cabreranae, enlargement of heads.

ADDITIONAL NOTES ON THE GENUS VERBENA. XXV

Harold N. Moldenke

VERBENA HALII Small

Additional synonymy: Verbena halii Small ex Moldenke, Phytologia 36: 47, in syn. 1977.

Additional & emended bibliography: Loes., Verh. Bot. Ver. Brand. 53: 74. 1912; G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; [Bard], Bull. Torrey Bot. Club 102: 431. 1975; E. H. Jordan, Checklist Organ Pipe Cact. Natl. Mon. 7. 1975; Moldenke, Phytologia 30: 142-143 & 159 (1975) and 31: 375, 377, & 378. 1975; Perkins, Estes, & Thorp, Bull. Torrey Bot. Club 102: 194-198. 1975; Anon., Biol. Abstr. 61: AC1.732. 1976; Hurd & Lindl., Smithson. Contrib. Zool. 220: 10. 1976; Ziegler & Sohmer, Contrib. Herb. Univ. Wisc. LaCrosse 13: 16. 1976; Moldenke, Phytologia 34: 20, 250, 251, 270, & 279 (1976) and 36: 47, 128, 134, 135, 143, 152, & 157. 1977; A. L. Moldenke, Phytologia 36: 87. 1977.

Lewis and his associates encountered this plant along a streamside in Coahuila. Demaree reports it as "common" on low ridges, at 670 feet altitude, in Texas. The Ellisons assert that it was "abundant in local population in full sun in sandy soil with V. brasiliensis, no hybridization evident", the corolla "bluish-lavender".

Other recent collectors refer to this plant as an upright perennial herb, 2 feet tall, and have encountered it in old rice fields, in sandy soil along roadsides, in open dry gravelly soils on railroad embankments, in "nearly level stiff or buckshot soils", on the river side of levees, in sandy dry open areas, and in "nearly level to gently sloping front lands", at 375 meters altitude. Brown refers to it as common on road shoulders in marshes; Allen found it abundant in open areas with V. tenuisecta and Cynodon; Montz reports it infrequent on levee spillways with Ambrosia; and Bougere found it "not abundant, in small compact patches on roadsides". Ajour found it "abundant in very dry soil in shade with a lot of sedges and grasses".

The corollas are said to have been "deep-blue" on Ajour 11, "lavender" on Bougere 1087, Correll & Johnston 22127, and Luke s.n., "blue" on Allen 675 & 990, and Correll & Correll 12421, "purple" on Curry, Martin, & Allen 437, and "purple to lavender" on Killmer 35. Wendt and his associates found it growing "in saline and probably gypsiferous fine alluvial soil in matorral desértico inerme y con espinos laterales with fine mineralized alluvial soil in bajada", growing with Prosopis glandulosa, Koeberlinia spinosa, Condalia, Lycium, and Selinocarpus. Eger reports it common "in full sun in sandy soil of pine woods with Oxalis, Aster, and Lobelia". Higgins found it among "mixed grassland

shrubs with mesquite and oak predominating".

Brown & McFarlin note that there are "no appendages on the anthers". Mrs. Jordan (1975) calls the species "Hale's vervain". Perkins and his associates (1975) inform us that V. halei is highly autogamous (like V. urticifolia), the number, frequency, and pollen-carrying ability of insect vectors favor crosses of V. stricta Vent. with V. urticifolia L. and V. halei. They found that 12 plants of V. halei which were insect-visited and with 462 potential seeds had a 68 percent seed-set, while 15 bagged plants with only 391 potential seeds had a 54.5 percent seed-set. They found that the anthers and stigmas in V. halei are less than 1 mm. apart and the corolla-tube is straight, the plants are short (25--70 cm. tall) with an inflorescence of 10--58 branches (mean 26.4), each with only 2 flowers about 3.4 mm. apart at anthesis, and observed the following insects visiting the flowers: Diptera: Allograpta sp., Baccha sp. (with Verbena pollen on head), Systropus sp. (with pollen on head), and Villa sp.; Hymenoptera: Calliopsis andreniformis, Ceratina sp. (with pollen on head), Augochlorella striata, and Megachile sp. (with pollen on head); and Lepidoptera: Hemiargus isola, Phycoides phaon (with pollen on head), and Strymon melinus.

Loesener (1912) cites Saler 3460 as "V. officinalis L. forma?" from Atascosa County, Texas. The C. M. Allen 1179, distributed as V. halei, is the type collection of xV. alleni Moldenke, while Ellis, LeDoux, & Watkins 964 is V. canescens H.B.K.

Additional citations: SOUTH CAROLINA: Aiken Co.: Ellison & Ellison 1010 (Sd--77488). GEORGIA: Sumter Co.: Moldenke & Moldenke 29341 (Ld). FLORIDA: Levy Co.: Moldenke & Moldenke 29444 (Ld). LOUISIANA: Acadia Par.: D. E. Ellis 58 (Lv). Allen Par.: Eger 141 (Ld). Bossier Par.: Robinette 147 (Lv), 203 (Lv). Calcasieu Par.: J. A. Churchill s.n. [2 May 1955] (Ln--204089); Wurzlow s.n. [Sept. 15, 1917] (Lv). Cameron Par.: C. A. Brown 9271 (Lv). East Baton Rouge Par.: C. A. Brown 1156 (Lv), s.n. [April 20, 1935] (Lv); Brown & McFarlin 2118 (M1); N. F. Petersen s.n. [May 7, 1909] (Lv, Lv). Jefferson Davis Par.: D. Dickinson s.n. [June 8, 1918] (Lv). Lafayette Par.: Claycomb s.n. [April 15, 1943] (Lv). Lincoln Par.: Thomas & Gremillion 2487 (K1--10265). Ouachita Par.: Pickett & Bot. Class 50 (Lo). Plaquemines Par.: V. Keller s.n. [Aug. 24, 1917] (Lv, Lv). Pointe Coupee Par.: M. Chaney 399 (Lv). Saint Charles Par.: Montz 3089 (Lv). Saint Helena Par.: C. M. Allen 675 (Lv), 990 (Lv). Saint Mary Par.: Bymun, Ingram, & Jaynes s.n. [Apr. 18, 1933] (Lv). Saint Tammany Par.: Arsene 12242 (Lv); Bougere 1087 (Lv), 1096 (Lv). Tangipahoa Par.: Correll & Correll 9254 (Lv). Terrebonne Par.: Wurzlow s.n. [May 1, 1912] (Lv). Vermilion Par.: C. A. Brown 18279 (Lv), 21409 (Lv); Killmer 35 (Lv). Vernon Par.: Turba s.n. [April 22, 1935] (Lv). West Feliciana Par.: Curry, Martin, & Allen 437 (Lv). TEXAS: Austin Co.: Wurzlow

s.n. [1905] (Lv). Bowie Co.: Correll & Correll 12421 (M1). Brazos Co.: Ajour 11 (N). Cameron Co.: R. Runyon 4857 (Mu). Comal Co.: Charette 814 (Mu); Lindheimer 1076 (Mu--4089). Galveston Co.: Lindheimer s.n. [Galveston, May 1843] (Mu--354). Harris Co.: Luke s.n. [2 April 1972] (Lv). Orange Co.: J. A. Churchill s.n. [1 May 1955] (Ln--204154). San Patricio Co.: R. Runyon 4720 (Mu). Tarrant Co.: Demaree 68284 (Ld). Wichita Co.: L. C. Higgins 10022 (N). Young Co.: Correll & Johnston 22127 (N). MEXICO: Coahuila: Lewis, Lehto, Keil, Meyer, LeBounty, & Pinkava 5876 (Te--68563); Wendt, Chiang C., & Johnston 10147 (Ld). CULTIVATED: Missouri: Prince Paul of Wurttemberg s.n. [Hort. Mergentheim] (Mu--1573).

VERBENA HALEI f. PARVIFLORA Moldenke, *Phytologia* 34: 20. 1976.

Bibliography: Moldenke, *Phytologia* 34: 20 & 251. 1976.

Citations: TEXAS: Galveston Island: Johnston, Johnston, Sautrup, Darr, & Darr 12436a (Ac--isotype, Z--type).

VERBENA HALEI f. ROSEIFLORA (Benke) Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 213 & 362. 1974.

VERBENA HASSLERANA Briq.

Additional bibliography: Moldenke, *Phytologia* 30: 143. 1975.

Pedersen comments that this species is found in moist meadows, on the banks of small streams, and elsewhere in Corrientes. He found it in flower and fruit in January, and the corollas on Pedersen 988 are described as having been "lilac" in color when fresh.

Additional citations: ARGENTINA: Corrientes: Pedersen 988 (N).

VERBENA HASSLERANA var. GLANDULOSA Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 351 & 464. 1974.

VERBENA HASTATA L.

Additional synonymy: Verbena pinnatifida Ph. ex G. Don in Loud., Hort. Brit., ed. 1, 247. 1830. Verbena laciniosa Schwaegr. ex Moldenke, *Phytologia* 34: 279, in syn. 1976. Verbena paniculata L. ex Moldenke, *Phytologia* 34: 279, in syn. 1976. Verbena hastata var. paniculata Lam. ex Moldenke, *Phytologia* 34: 279, in syn. 1976.

Additional & emended bibliography: G. Don in Loud., Hort. Brit., ed. 1, 246 & 247 (1830) and ed. 2, 246 & 247. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; G. Don in Loud., Hort. Brit., ed. 3, 246 & 247. 1839; Buek, Gen. Spec. Syn. Candol. 3: 495. 1858; Paine, Ann. Rep. Univ. N. Y. 18: [Pl. Oneida Co.] 109. 1865; Kuntze, Rev. Gen. Pl. 2: 510. 1891; Conard, Pl. Iowa 44. 1951; R. A. Davidson, State Univ. Iowa Stud. Nat. Hist. 20 (2): 77. 1959; Hall & Thompson, Cranbrook Inst. Sci. Bull. 39: 74. 1959; Cooper-

rider, State Univ. Iowa Stud. Nat. Hist. 20 (5): 70. 1962; P. W. Thompson, Cranbrook Inst. Sci. Bull. 52: 37. 1967; Barker, Univ. Kans. Sci. Bull. 48: 571. 1969; G. W. Thomas, Tex. Pl. Ecol. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717. 1969; Rimpler, Lloydia 33: 491. 1970; Scully, Treas. Am. Ind. Herbs 283. 1970; Anon., Bioresarch Ind. 7: 1061. 1971; Ellison, Kingsbury, & Hyypio, Comm. Wild Fls. N. Y. [Cornell Ext. Bull. 990:] 19. 1973; Hathaway & Ramsey, Castanea 38: 77. 1973; A. & C. Krochmal, Guide Medic. Pl. U. S. 229--230, 246, 257, & 258, fig. 259. 1973; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 717. 1974; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; R. D. Gibbs, Chemotax. Flow. Pl. 3: 1753--1755 (1974) and 4: 2295. 1974; Mrs. P. Martin, Am. Horticulturist 53 (5): 33. 1974; Rousseau, Géogr. Florist. Qué. [Trav. Doc. Cent. Étud. Nord 7:] 376, 473, 502, 550, 643, & 788, map 826. 1974; Stark, Am. Horticulturist 53 (5): 11. 1974; Welsh, Utah Pl., ed. 3, 354 & 473. 1974; Whitney in Foley, Herbs Use & Delight [198]. 1974; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1396, [1398], 1399, & 1775, fig. 654 g--k. 1975; Kociiman, Act. Bot. Neerl. 24: 464. 1975; Moldenke, Phytologia 30: 143-148 & 174 (1975) and 31: 374, 376--378, & 409. 1975; A. L. Moldenke, Phytologia 31: 415. 1975; United Communications (Woodmere, N. Y.), Herbal Visual & Study Chart n.p. 1975; H. D. Wils., Vasc. Pl. Holmes Co. Cat. 54. 1975; Grimé, Bot. Elack Amer. 191. 1976; Lacoursière, Pontbriand, & Dumas, Naturl. Canad. 103: 174. 1976; Moldenke, Phytologia 34: 247--251, 270, & 279. 1976; Van Bruggen, Vasc. Pl. S. Dak. 369 & 536. 1976; [Voss], Mich. Bot. 15: 237. 1976; Moldenke, Phytologia 36: 28, 29, 47, & 126. 1977; F. H. Montgomery, Seeds & Fruits 201, fig. 6, & 230. 1977; Taylor & Mac Bryde, Vasc. Pl. Brit. Col. 436 & 751. 1977.

Additional illustrations: Ellison, Kingsbury, & Hyypio, Comm. Wild Fls. N. Y. [Cornell Ext. Bull. 990:] 19. 1973; A. & C. Krochmal, Guide Medic. Pl. U. S. 230, fig. 259. 1973; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: [1398], fig. 654 g--k. 1975; F. H. Montgomery, Seeds & Fruits 201, fig. 6. 1977.

Montgomery (1977) describes the seeds of this species as "Nuts 2.0 x 0.6 x 0.5 mm, similar to the previous species [V. bracteata], margins ridged, dorsal surface longitudinally 3--5-ribbed on the lower half and reticulate near the apex, inner faces papillose".

Wilson (1975) reports V. hastata frequent on streambanks and in low pastures and marshes in Holmes County, Ohio. Other recent collectors have found it on the shingle shores of lakes, in muck soil along drainage ditches, on prairies, by lakes with peat bogs along the shores, in meadows and ditches, on floodplains and open pond banks, in marshy land, and on gravel bars and rocky ground along creeks.

The corolla is said to have been "deep-purple" on W. D. Stevens 1633 and this collection also exhibits perfectly hastate leaves. On Correll & Correll 30034 the corolla was "lavender" and on Blake

11178 it was "violet-purple".

Hathaway & Ramsey (1973) record V. hastata from Pittsylvania County, Virginia. Churchill & Sutherland encountered it "in marshy banks of small pond depressions in cultivated fields with Salix, Cormus, Scirpus, and Asclepias in Otoe County, Nebraska. Thompson (1967) records it from Leelenau County, Michigan, noting that it grows there "along roadsides and in meadows. Common"; Hall & Thompson (1959) found it in Oakland County in the same state. Cooperrider (1962) reports it "frequent....Marshy places; stream banks; wet ditches" in Clinton and Jones Counties, Iowa. Davidson (1959) says that it is common "Usually in wet to moist open places, occasionally in upland woods and openings....Plants of dry soil, not recognizable as hybrids, differ considerably from those found in moist situations, those from the dry places being smaller with less incised leaves and more sparingly branched inflorescences." This is a very valid comment and I have frequently observed these differences, too, among others, in the field. I think that the dryland plants showing these characters deserve a form name.

Barker (1969) refers to V. hastata as "Occasional, along prairie drainage areas, in low prairie canyons, along margins of impoundments and streams. Occurs throughout the area [Kansas]." Stark (1974) asserts that it is usually found in "rich soils with high humus levels" and a pH level of 6.0, while Martin (1974) recommends it for "most open garden in sun with pH of 5-6.5". Taylor & MacBryde (1977) classify the corolla-color as "blue and violet" and gives its normal blooming period as June to September in British Columbia, where it is certainly var. scabra to which they are referring.

Don (1830) calls V. paniculata the "panicled vervain" and says that it was introduced into English gardens from "N. Amer." in 1800; he calls V. hastata, which he keeps as a separate species, the "halberd-leaved vervain" and gives its date of introduction from "Canada" as 1710, while he says that what he calls V. pinnatifida, the "pinnatifid vervain", came from "N. Amer." in 1810. Curiously, he places V. paniculata in his section Indivisae and the other two in section Trifidae.

Verbena laciniosa is based on an unnumbered collection from the Schwaesgrichen herbarium now deposited in the herbarium of the Staatssammlung at Munich. The plant was originally cultivated in the Leipzig botanical garden and exhibits remarkably laciniate-lobed leaves. Probably it is deserving of form rank. It should also be noted here that very plainly hastate leaves are seen on the Herb. Schreber s.n. [Hort. Erl. 1770] & s.n. [Insul. Bahamensis] specimens cited below, clearly showing why Linnaeus applied the epithet "hastata" to this species and also showing Farwell's reason for separating the commonly found form of the species as var. paniculata. Personally, I feel that form rank would be more justified.

Rimpler (1970) reports the isolation of a new iridoid, hastatocide, from V. hastata. Gibbs (1974) reports that cyanogenesis

is absent in the shoots of this species, leucoanthocyanin is absent from the leaves, and syringin is absent from the stems, while the Ehrlich test gives negative results in the leaves and the Juglone test is negative in the stems and leaves but produces a blue fluorescence.

Scully (1970) reports that the Amerinds of North America used "vervain" in the treatment of colds and quite commonly against dropsy, with or without milkweed and decocted cottonwood leaves. Against jaundice they used it as a decoction alone or with any of the following where available: cinquefoil, parsley, oregon-grape, nettle-root, or columbine. Mixed with fat, it was used in treating swelling or hardening of the testicles, especially if accompanied by pain. As an infusion for quieting the nerves, a sponge bath and tea of verbena leaves is still used today among some tribes; for scurvy an infusion alone or mixed with wormwood or birch leaves is used. It is drunk as a tea in cases of smallpox to mitigate the suffering; as a tea also for sore throat and intestinal worms, especially in children. But Scully points out that in almost all cases vervain was not the first choice of possible medications. It is probable that several species of the genus are involved here.

Material of V. hastata has been misidentified and distributed in various herbaria as "V. hasta L." On the other hand, the Bresinsky s.n. [Lafayette, 12.7.1967], Correll & Correll 39844, Gilkey s.n. [July 31, 1945], Higgins 9712, MacDougal 566, A. R. Moldenke 1297, E. L. Reed 4034, Tharp 4504, Woodcox 55, and York & Rodgers 363, distributed as typical V. hastata, actually represent var. scabra Moldenke, Herb. Zuccarini s.n. [Hort. bot. Monac.] is a mixture of xv. baileyana Moldenke and V. officinalis L.; Chandrapanya 2 and Kirby 160 are V. brasiliensis Vell.; C. A. Brown s.n. [Sept. 30, 1936] is V. canadensis (L.) Britton; Engelmann s.n. [Banks of the Mississippi, July 1842] and Herb. Staatsherb. Münch. s.n. [Hort. Bot. Monac. 28.7.53] are xv. engelmannii Moldenke; Itis, Bell, Melchert, Patman, & Witt 12361 is xv. perriana Moldenke; Hillebrand 1863 is V. robusta Greene; Meebold 19175 is V. simplex Lehm.; Herb. Kummer s.n. [Mississippi] is V. urticifolia L.; and Schroer 71 is V. xutha Lehm.

Additional citations: MAINE: York Co.: F. T. Hubbard s.n. [VIII/15/1901] (Ld). VERMONT: Grand Isle Co.: Moldenke & Moldenke 31103 (Ac, Ld). Lamoille Co.: Moldenke & Moldenke 31100 (Gz). MASSACHUSETTS: Hampshire Co.: Ahles 77872 (Mu). Norfolk Co.: Blake 11178 (Ld). NEW YORK: Monroe Co.: H. Ernst 1102 (Mu). Oswego Co.: Moldenke & Moldenke 31132 (Ld). Schuyler Co.: J. A. Churchill s.n. [23 August 1937] (Ln—213612); Moldenke & Moldenke 31135 (Tu). Yates Co.: Moldenke & Moldenke 31133 (Lv). NEW JERSEY: Morris Co.: Moldenke & Moldenke 25633 (Ld, Ld). County undetermined: Hillebrand s.n. (Mu). PENNSYLVANIA: Berks Co.: Herb. Zuccarini s.n. [Reading] (Mu—321). Bucks Co.: Mayer s.n. [Qua-

kertown, Aug. '76] (Mu). LYCOMING Co.: Moldenke & Moldenke 31149 (Mu, Ut). MONROE Co.: Swinerton s.n. [Pocono Mts., Aug. 1896] (Mu). NORTHAMPTON Co.: Herb. Schreber s.n. [Bethlehem] (Mu—316), s.n. [Nazareth] (Mu—317). TIOGA Co.: Moldenke & Moldenke 31139 (W). UNION Co.: Moldenke & Moldenke 31150 (Lv, Tu, W, Ws). COUNTY undetermined: Schweinitz s.n. (Mu—1257). ILLINOIS: Cass Co.: Geyer s.n. [Beardstown, July 1842] (Mu—324, Mu—362, Mu—1676). Cook Co.: Solereder s.n. [Chicago, Aug. 1893] (Mu—4140). OHIO: Auglaize Co.: Purpus 242 (Mu). MICHIGAN: Alger Co.: J. A. Churchill s.n. [9 July 1964] (Ln—204262). Branch Co.: W. D. Stevens 1633 (Ln—237063). Ingham Co.: R. D. Bradbury 32 (Ln—161013). Macomb Co.: J. A. Churchill s.n. [24 July 1954] (Ln—203431). Otsego Co.: Bresinsky s.n. [Hardwood Lake] (Mu). Wayne Co.: Farwell 8461 1/2 (Mu); G. Stewart s.n. [Aug. 1898] (Ln—142428, Ln—142430). WISCONSIN: LaCrosse Co.: Demaske 2220 (Ld). MINNESOTA: Hennepin Co.: Sandberg 152 [36] (Mu). KANSAS: Lyon Co.: J. L. Watson 7 (Lc). MISSOURI: Clark Co.: E. J. Palmer 43737 (Ld). Saint Louis: Eggert 7558 (Mu); Muhlenbach 1035 (Mu). County undetermined: Martens s.n. (Mu—322). NEBRASKA: Otoe Co.: Churchill & Sutherland 3945 (N). OKLAHOMA: Muskogee Co.: Wallis 7728 (Au—170667). Sequoyah Co.: Wallis 5557 (Au—169341). TEXAS: Hemphill Co.: Correll & Correll 30034 (Ld). CULTIVATED: Bahama Islands: Herb. Schreber s.n. [Insul. Bahamensis] (Mu—315). England: Herb. Grimm s.n. [H. Kew.] (Mu—314). France: Thouin s.n. [Hort. Paris.] (Mu—355, Mu—356). Germany: Herb. Schreber s.n. [Hort. Erl. 1770] (Mu—319); Herb. Schwaegrichen s.n. [Hort. Lipsiensis] (Mu—1365); Herb. Zuccarini s.n. [h. b. E.] (Mu—359), s.n. [Hort. bot. Monac.] (Mu—357, Mu—358). LOCALITY OF COLLECTION UNDETERMINED: Herb. Grimm s.n. (Mu—1255); Herb. Mus. Bot. Landismuth. s.n. (Mu—320); Herb. Reg. Monac. s.n. (Mu—313); Herb. Schreber 17 (Mu—318); Herb. Schwaegrichen s.n. (Mu—1256); Hooker s.n. [United States] (Mu—320).

VERBENA HASTATA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 217 (1974) and 30: 176. 1975.

VERBENA HASTATA f. CAERULEA Moldenke

Additional synonymy: Verbena americana, urticae foliis angustioribus, flore caeruleo P. Herm., Hort. Acad. Lugd.-Bat. Cat. 699. 1687. Verbena americana urticae foliis angustioribus, spica multiplici flore caeruleo P. Herm., Fl. Lugd.-Bat. 54—55. 1690. Verbena urticae fol. angustiore flore caeruleo Herb. ex Rivin., Introd. Gen. Rem Herb. Ord. Pl. Irreg. Monop. [24], pl. [57]. 1690. Verbena altissima americana spica multiplici, urticae foliis angustis, floribus caeruleis P. Herm., Parad. Bat.,

ed. 1, 242. 1698. Verbena americana urticae foliis angustioribus, flore caeruleo Moris., Pl. Hist. Univ. Oxon. 3: "408" [=418]. 1699. Verbena altissima americana, spica multiplici, urticae foliis angustis, floribus coeruleis Herm. apud Ray, Hist. Plant. 3: Suppl. 286. 1704. Verbena altissima americana spica multiplici, urticae foliis angustis, floribus coeruleis P. Herm., Parad. Bat., ed. 2, 242. 1705. Verbena; americana; altissima; urticae foliis angustioribus; spicis brevioribus; floribus caeruleis Herm. apud Boerh., Ind. Alt. Plant. Hort. Acad. Lugd., ed. 2, 1: 186. 1720. Verbena americana altissima, urticae foliis angustioribus, spicis brevibus, floribus caeruleis Boerh. apud L., Hort. Cliff., imp. 1, 11, in syn. 1737. Verbena americana altissima, urticae foliis angustioribus, spicis brevioribus, floris caeruleis Boerh. apud A. van Toeyen, Fl. Leyd. Prod. 327, in syn. 1740. Verbena americana altissima, spica multiplici, urticae foliis angustis, floribus caeruleis Ray apud L., Hort. Ups. 8, in syn. 1748. Verbena americana altissima, spici multiplici, urticaefoliis angustis, floribus caeruleis Herm. ex L., Sp. Pl., ed. 1, imp. 1, 1: 20, in syn. 1753. Verbena americana altissima, spica multiplici, urticae foliis angustis, floribus coeruleis Ray apud J. F. Gronov., Fl. Virg., ed. 2, 4, in syn. 1762. Verbena americana, altissima, spica multiplici, urticaefoliis angustis, floribus caeruleis Herm. apud Poir. in Lam., Encycl. Méth. Bot. 8: 546, in syn. 1808. Verbena americana altiss., spica multipl., urticae fol. angustis, fl. coeruleis Herm. apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Verbena amer. urticae fol. angustiorib., fl. caeruleo Moris apud H. E. Richter, Cod. Bot. Linn. 35, in syn. 1835. Verbena americana, spica multiplici, foliis urticae angustissimis, floribus caeruleis Herm. ex Moldenke, Résumé Suppl. 4: 14, in syn. 1962.

Additional bibliography: L., Hort. Cliff., imp. 1, 11 (1737) and imp. 2, 11. 1968; Moldenke, Phytologia 28: 217, 426, & 427 (1974) and 31: 409. 1975.

#### VERBENA HASTATA f. ROSEA Cheney

Additional bibliography: Moldenke, Phytologia 28: 352, 451, 464, & 465. 1974.

#### VERBENA HASTATA var. SCAERRA Moldenke

Additional bibliography: D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1396, 1399, & 1775. 1975; A. L. Moldenke, Phytologia 31: 415. 1975; Moldenke, Phytologia 30: 146-148 (1975), 31: 374 & 376-378 (1975), and 34: 248-251. 1976.

Recent collectors have encountered this plant in moist soil, moist sandy loam, and moist loam at seeping springs in open grassland, at the edge of ponds, in Populus-Prosopis-Tamarix communities, and in the drier areas of bogs (as the typical form),

but also in "badly overgrazed pastures" (as the field form) — in fact, it has been described by some as a "weed in horse pastures", a typical field form habitat.

In addition to the months previously reported, it has been found in flower in October and at 4600 feet altitude (in Utah). Crutchfield reports it attaining a height of 6 feet (like the typical form and unlike the usual "field form". Material has sometimes been misidentified and distributed in herbaria as V. stricta Vent. and as "V. hasta L."

The corollas are said to have been "purple" on Crutchfield 3525 and "deep-purple" on Crutchfield 3551 when fresh, as in the typical form.

The Spellenberg & Spellenberg 2082, distributed as V. hastata var. scabra, actually is V. macdougalii Heller.

Additional citations: INDIANA: Tippecanoe Co.: Bresinsky s.n. [Lafayette, 12.7.1967] (Mu). KANSAS: Duckinson Co.: A. R. Moldenke 1297 (Ld). UTAH: Utah Co.: Woodcox 55 (Au—122283). NEBRASKA: Pierce Co.: N. F. Petersen s.n. [Aug. 10, 1910] (Lv, Lv). OKLAHOMA: Ottawa Co.: Correll & Correll 3984h (Ld). TEXAS: Hemphill Co.: Crutchfield 3525 (Ld); E. L. Reed 4034 (Au—122282); Tharp 4504 (Au—122281). Hutchinson Co.: Crutchfield 3551 (Ld). Oldham Co.: York & Rodgers 363 (Au—201798). Potter Co.: Higgins 9712 (N). ARIZONA: Coconino Co.: MacDougal 566 (Au—122291). WASHINGTON: Yakima Co.: Moldenke & Moldenke 2123 (Ld). OREGON: Multnomah Co.: Gilkey s.n. [July 31, 1945] (Au—122290).

#### VERBENA HATSCHBACHI Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 352. 1974.

The corollas are said to have been "violet" in color when fresh on Hatschbach 8558.

Additional citations: BRAZIL: Paraná: Hatschbach 8558 [Herb. Brad. 15182] (Mu).

#### VERBENA HAYEKII Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 218 & 252. 1974; Soukup, *Biota* 11: 18. 1976.

Richardson refers to this as a scattered prostrate plant in the rocky soil of roadsides, and the corollas on Richardson 2066 are said to have been "blue".

Additional citations: PERU: Junín: Richardson 2066 (Ld).

#### VERBENA HERTERI Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 352. 1974.

Additional citations: URUGUAY: Herter 979 [Herb. Herter 82378] (Mu—*isotype*).

#### VERBENA HIRTA Spreng.

Additional bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 495. 1858; Moldenke, *Phytologia* 28: 352 (1974), 33: 480 (1976) and 34: 259. 1976.

Recent collectors have encountered this plant in secondary forests on laterite soil, on campos, in open scrub, in ruderal grasslands, and among ruderal vegetation on hills, flowering and fruiting in May, October, and November. Araujo refers to it as a heliophilous herb "crescendo em pasto a beira do precipício". The Tryons describe it as "woody at base, 0.5 m. tall". The corollas are said to have been "lilac" on Dziewa 3, Ferreira 97, and Kummrow 646 & 1049, "blue-purple" on Tryon & Tryon 6713, "blue-purple (5P5/8)" on Lindeman & Haas 5137, "purple" on Lindeman & Haas 300 "purple (2 1/2 P6/6)" on Lindeman & Haas 4008, "purple (2 1/2 P6/8)" on Lindeman & Haas 18, "purple (2 1/2 P7/6)" on Lindeman & Haas 2444, "purple, tube slightly paler (2 1/2 P5/8-6/4)" on Lindeman & Haas 2460, and "red" on Araujo 1262.

On Lindeman & Haas 2460 the entire plant is pronouncedly cinnamon-colored, but this is probably an effect produced by a layer of dust from its roadside habitat.

The Dusén s.n. [11.12.903] and Smith & Klein 13885, distributed as and previously cited by me as typical V. hirta, are better regarded as representing var. dusenii Moldenke, of which the former is the type collection.

Additional citations: BRAZIL: Paraná: Dziewa 3 (Ld); L. F. Ferreira 97 (Ld); Kummrow 646 (Ac), 1049 (Ld), 1123 (Ld); Lindeman & Haas 18 (Ws), 300 (Ac), 2444 (Ut-320417), 2460 (Ut-320416), 4008 (Ld). Rio de Janeiro: Angeli 107 [Herb. FEEMA 345] (Ld); A. Castellanos s.n. [3.XII.1964; Herb. FEEMA 7165] (Ld); Dusén s.n. [Oct. 1903] (Mu-4251); Lindeman & Haas 5137 (Ut-320428); Tryon & Tryon 6713 (N). Rio Grande do Sul: Araujo 1262 [Herb. FEEMA 12280] (Pf). Santa Catarina: A. Castellanos 24675 [Herb. Cent. Pesq. Florest. 3417] (Fe). State undetermined: J. E. Pohl s.n. (Mu-571).

VERBENA HIRTA var. DUSENII Moldenke, *Phytologia* 33: 480. 1976.

Bibliography: Moldenke, *Phytologia* 33: 480 (1976) and 34: 259. 1976.

Collectors have found this plant growing on campos, on campos near the borders of planaltos, and in low woods, at 900-1000 m. altitude, flowering in November and December. Hitherto it has been confused with, and material has been distributed as, typical V. hirta Spreng.

Citations: BRAZIL: Paraná: Dusén s.n. [11.12.903] (N-type); Lindeman & Haas 3251d (Ut-320415). Santa Catarina: Smith & Klein 13885 (Ac, N).

VERBENA HIRTA var. GRACILIS Dusén

Additional bibliography: Moldenke, *Phytologia* 28: 352. 1974.

In addition to the months previously reported, this plant has been found in fruit in October. The corollas are said to have been "dark-lilac" on Hatschbach 35191.

The Reitz & Klein 17616 previously cited by me and distributed

as this variety actually is V. strigosa Cham.

Additional citations: BRAZIL: Paraná: Hatschbach 35191 (Ld).

VERBENA HISPIDA Ruiz & Pav.

Additional & emended bibliography: G. Don in Loud., Hort. Brit., ed. 1, 247 (1830) and ed. 2, 247. 1832; G. Don in Loud., Hort. Brit. Suppl. 1: 680. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; Baxt. in Loud., Hort. Brit. Suppl. 2: 680. 1839; G. Don in Loud., Hort. Brit., ed. 3, 247. 1839; Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 494 & 495. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; R. D. Gibbs, Chemotax. Flow. Pl. 3: 1753—1755 (1974) and 4: 2295. 1974; Kooiman, Act. Bot. Neerl. 24: 464. 1975; Moldenke, Phytologia 30: 148. 1975; Soukup, Biota 11: 18. 1976; Moldenke, Phytologia 36: 33 & 151. 1977.

Don (1830) calls this the "hispid vervain" and says that it was introduced into English gardens from Peru in 1816. The corollas are described as having been "violet" in color when fresh on Krapovickas, Schinini, & Quarín 26557. López-Palacios describes the plant as "hierba rastrera de hojas sésiles y muy pilosas, espigas cilíndricas y relativamente engrosadas".

Gibbs (1974) reports that cyanogenesis and leucoanthocyanin are absent from the leaves of this species and syringin is absent from the stems, while the Juglone test gives negative results in the leaves and bark.

The Pedersen 9867, cited below, collected in clay soil along roadsides in the Chaco, is said by Troncoso perhaps to be xV. dermeni Moldenke, but I fail to discern the hybrid characters in the specimen cited. The Pavon collection cited below may be part of the type collection. The Herb. Kummer s.n. [Hort. bot. Monac.] is a mixture with V. rigida Spreng.

The Buchtien s.n. [Valdivia, 7/11/1902], distributed as V. hispida, actually is V. bonariensis L., while W. Forster s.n. [8.I. 1954] is V. parvula Hayek.

Additional citations: ECUADOR: Loja: López-Palacios 4163 (Ld). PERU: Province undetermined: Pavon s.n. (Mu—1257). BOLIVIA: La Paz: O. Buchtien 8426 (Mu). CHILE: Valpariso: Zöllner 8100 (Gz). ARGENTINA: Chaco: Pedersen 9867 (N). Jujuy: Cabrera, Ancibor, Ré, Tello, & Torres 15080 (Mu); Krapovickas, Schinini, & Quarín 26557 (Ld). Mendoza: Semper s.n. [12-18/III/944] (Ut—330561B). CULTIVATED: Germany: Herb. Kummer s.n. [Hort. bot. Monac.] (Mu—1276); Herb. Zuccarini s.n. [Hort. bot. Monac. 1836] (Mu—326), s.n. [Hort. bot. Monac. 1837] (Mu—284), s.n. [Hort. bot. Monac.] (Mu—325).

VERBENA HOOKERIANA (Covas & Schnack) Moldenke

Additional & emended bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 & 717 (1969) and imp. 2, 715 & 717. 1974;

Moldenke, *Phytologia* 30: 148 (1975) and 36: 149. 1977.

The corollas on Lossen 8 are said to have been "violet" in color when fresh.

Additional citations: ARGENTINA: Córdoba: Lossen 8 (Mu—4370). Río Negro: O'Donell 1553 (Ut—330530B, Ut—33071B).

VERBENA HUMIFUSA Cham.

Additional bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 495. 1858; Moldenke, *Phytologia* 28: 353. 1974.

Reineck & Czermak 21 is a mixture with V. marrubioides Cham.

Additional & emended citations: BRAZIL: Rio Grande do Sul: Reineck & Czermak 21, in part [Herb. Osten 4160] (Mu, N, N—photo, Po—63874, Po—63876, S, Ug).

xVERBENA HYBRIDA Voss in Vilm., *Fl. Pleine Terr.*, ed. 1, 936. 1865 [not V. hybrida Bicknell, 1941].

Additional & emended synonymy: Verbena hybrida Vossler apud López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 15: 89. 1975; Moldenke, *Phytologia* 30: 149, in syn. 1975. Glandularia hybrida (Vossl.) López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 15: 89. 1975. Verbena genii Hort. ex Moldenke, *Phytologia* 34: 279, in syn. 1976.

Additional & emended bibliography: Vilm., *Fl. Pleine Terr.*, ed. 1, 939—942 (1865), ed. 2, 976—979 (1866), and ed. 3, 1: 1200—1203. 1870; Vilm., *Fl. Pleine Terr. Suppl.* 195. 1884; Cooke, *Fl. Presid. Bombay*, ed. 1, 3: 437. 1906; Knoche, *Fl. Balear.*, imp. 1, 1: 59. 1921; Wangerin in *Just, Bot. Jahresber.* 46 (1): 717. 1926; A. W. Anderson, *How We Got Fls.*, imp. 1, 90 & 283. 1951; Conard, *Fl. Iowa* 44. 1951; Cooke, *Fl. Presid. Bombay*, ed. 2, imp. 1, 517—518. 1958; A. W. Anderson, *How We Got Fls.*, imp. 2, 90 & 283. 1966; Cooke, *Fl. Presid. Bombay*, ed. 2, imp. 2, 2: 517—518. 1967; Bolkh., *Grif, Matvej.*, & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 717. 1969; G. W. Thomas, *Tex. Pl. Ecolog. Summ.* 78. 1969; R. E. Harrison, *Handb. Bulbs & Peren. S. Hemisph.*, ed. 3, 266—267. 1971; Healy, *Gard. Guide Pl. Names* 225. 1972; Williamson, *Sunset West. Gard. Book*, imp. 11, 437. 1973; Bolkh., *Grif, Matvej.*, & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 2, 717. 1974; Knoche, *Fl. Balear.*, imp. 2, 1: 59. 1974; Hocking, *Excerpt. Bot. A.* 26: 5. 1975; Kociman, *Act. Bot. Neerl.* 24: 464. 1975; López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 15: 89. 1975; Moldenke, *Phytologia* 30: 148—151 & 163 (1975), 31: 398 & 410—412 (1975), and 34: 263, 270, & 279. 1976; Park Seed Co., *Park Seeds Fls. & Veg.* 1976: 63 & 90. 1976; Soukup, *Biota* 11: 18. 1976; Moldenke, *Phytologia* 36: 40 & 140. 1977.

Additional illustrations: Voss in Vilm., *Fl. Pleine Terr.*, ed. 3, 1: 1200 & 1201. 1870; R. E. Harrison, *Handb. Bulbs & Peren. S. Hemisph.*, ed. 3, 267. 1971; Park Seed Co., *Park Seeds Fls. & Veg.* 1976: 90 (in color). 1976.

Misra (1970) makes the remarkable statement that xv. hybrida is a "Weed in shade" in Bihar, India, but Mukherjee also says of

it: "annual herb of waste places" in West Bengal. It would be interesting to know what cultivars are involved here and if they are breeding true or reverting to one of the several ancestral species. Blakeslee (1926) discusses the observed unlike reactions of different human individuals to the fragrance in *Verbena* flowers.

López-Palacios (1975), who found the red-flowered cultivar in cultivation at 1600 m. altitude in Ecuador and who credits the name to Vossler instead of to Voss, comments that "Esta hermosa planta jardánica está extendida por todo el territorio nacional [Venezuela]. Schauer, al hablar de la *V. peruviana*, de la que proceden las razas de flores rojas de la *V. hybrida*, dice: 'Planta floribus magnis splendide scarlatines maxime spectabilis, hortorum europeorum nunc tamen eximium decus....eleganti colorum et foliorum varietate excelentes,' Apud DC. Prodromus 9: 537, sub *V. chamaedrifolia*. Lo que puede decirse no sólo de los jardines europeos, sino de todas las partes del mundo." Actually, of course, *V. peruviana* is NOT widely cultivated in gardens any more and has been replaced by the very common *xV. hybrida*, among whose multitudinous color forms I have never yet seen anything to match the brilliant splendor of the true wild *V. peruviana*!

Stewart (1972) cites the accepted binomial for this species as "*V. hybrida* Hort. ex Vilm. Fl. Pl. Terre Suppl. 195. 1865", but the only Supplement to this work existing either in the New York or Washington libraries is a supplement to edition 3 of 1884.

Knoche (1921) reports that in the Balearic Islands this plant is called "carmelita" and is there cultivated. Duque-Jaramillo found it in flower and fruit in March at 2620 meters altitude in Colombian gardens. Thomas (1969) calls it the "hybrid verbena". Williamson (1973) lists the very modern horticultural varieties "Amethyst" and "Miss Susie".

The *Ardoin 21*, distributed as *xV. hybrida*, actually is *V. rigida* Spreng.

Additional citations: COLOMBIA: Cauca: López-Palacios & Idrobo 3832 (Ac). INDIA: West Bengal: Mukherjee s.n. [12.9.74] (Ld). CULTIVATED: Colombia: Duque-Jaramillo 2990 (N); López-Palacios 3616 (Ld, N). Czechoslovakia: Presl s.n. (Mu-4372). Ecuador: López-Palacios h177 (Ld). Germany: Olin s.n. [June 1893] (Ac).

#### *x*VERBENA ILLICITA Moldenke

Additional bibliography: Perkins, Estes, & Thorp, Bull. Torrey Bot. Club 102: 194, 195, & 197. 1975; Moldenke, Phytologia 30: 151 (1975), 34: 250 (1976), and 36: 157. 1977.

Perkins and his associates (1975) report finding this hybrid to be the most abundant of four natural hybrids occurring in a single area in Oklahoma, there having been about 20 individuals of it as compared to 10 of *xV. goodmani* Moldenke, 1 of *xV. deamii* Moldenke, and 1 of *xV. perriana* Moldenke. A single artificially cross-pollinated plant (using *V. urticifolia* L. pollen) with 168 potential seeds had a 12.5 percent seed-set, while the parental

species, V. urticifolia, had 47.3—66.5 percent seed-set and V. stricta Vent. (when insect-pollinated) had 76.3—87.6 percent.

Additional citations: ILLINOIS: Cass Co.: Geyer s.n. [Beardstown, July 1842] (Mu—411). MISSOURI: Saint Louis: Engelmann s.n. [St. Louis] (Mu—412).

#### VERBENA INAMOENA Briq.

Additional bibliography: Moldenke, *Phytologia* 30: 151 (1975), 34: 279 (1976), and 36: 131. 1977.

T. Rojas 10077, cited herein under V. bonariensis L., has been annotated by an unknown hand as "Verbena bonariensis L. f. transiens in V. inamomam Briq." The Herb. Mus. Bot. Landishuth s.n., also cited by me as V. bonariensis, has all its leaves very narrow-oblong in shape and may represent V. inamoena instead.

#### VERBENA INCISA Hook.

Additional synonymy: Verbena arenaria Hügel ex Moldenke, *Phytologia* 34: 278, in syn. 1976 [not V. arenaria Moldenke, 1961]. Verbena arenariana Kummer ex Moldenke, *Phytologia* 34: 278, in syn. 1976.

Additional bibliography: G. Don in Loud., *Hort. Brit. Suppl.* 1: 680. 1832; Loud., *Hort. Brit.*, ed. 2, 552. 1832; Baxt. in Loud., *Hort. Brit. Suppl.* 2: 680. 1839; G. Don in Loud., *Hort. Brit. Suppl.* 2: 704. 1839; Baxt. in Loud., *Hort. Brit. Suppl.* [3]: 655. 1850; Vilm., *Fl. Pleine Terre*, ed. 1, 939 (1865), ed. 2, 2: 976 & 977 (1866), ed. 3, 1: 1200 (1870), and ed. 4, 1067. 1894; Moldenke, *Phytologia* 30: 150—152, 163, & 172 (1975), 31: 392 & 412 (1975), and 34: 270 & 278. 1976.

The corollas on Cristóbal 1210, Fabris 4688, and Krapovickas & al. 25759 & 27068 are described as having been "red", while on Herzog 1217 they were "cinnabar-red" and on Pflanz 951 "scarlet-red".

The cheironymous V. arenaria and V. arenariana listed in the synonymy above are based on specimens in the Munich herbarium collected, respectively, by Hügel in the Vienna and by Kummer in the Munich botanical garden. Don (1839) calls this species "Lady Arran's verbena".

Material of this species has been misidentified and distributed in some herbaria as V. phlogiflora Cham.

Additional citations: BRAZIL: Rio de Janeiro: Cabral s.n. [28. I. 1963; *Herb. FEEMA* 5192] (Fe). Rio Grande do Sul: Bormüller 143 (Mu—4290). BOLIVIA: Santa Cruz: Herzog 1217 (Mu). Tarija: Pflanz 951 (Mu). PARAGUAY: T. Rojas 3406 [*Hort. Parag.* 11793] (Mu). URUGUAY: Herb. Herter 84884 (Mu); Herter 1057 [*Herb. Herter* 82941] (Mu). ARGENTINA: Catamarca: Rodriguez Vaquero 349 (Ut-330568B). Corrientes: Cristóbal 1210 (Ld); Krapovickas, Cristóbal, Irigoyen, & Schinini 27068 (Ld); Krapovickas, Cristóbal, Schinini, Arbo, Quarín, & González 25759 (Ld). Jujuy: Fabris 4688

(Mu). Misiones: Bertoni s.n. [Herb. Inst. M. Lillo 98412] (Ld); Montes 14662 (N). CULTIVATED: Austria: Hügel s.n. [hort. Hügel Vindob. 1839] (Mu--303). Germany: Herb. Kummer s.n. [Hort. bot. Monac. 1840.IX.13] (Mu--1260, Mu--1261), s.n. [Hort. bot. Monac.] (Mu--1259). Sweden: Zetterstedt s.n. [H. L. 10 Oct. 1839] (Ac).

VERBENA INTEGRIFOLIA Sessé & Moc.

Additional & emended bibliography: Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke, Phytologia 28: 246. 1974.

xVERBENA INTERCEDENS Briq.

Additional bibliography: Moldenke, Phytologia 28: 246 & 440. 1974.

VERBENA INTERMEDIA Gill. & Hook.

Additional & emended bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494--496. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke, Phytologia 30: 152 (1975) and 31: 387 & 409. 1975.

Pedersen encountered this plant on "black earth" grasslands in Corrientes and Job found it on dunes in Buenos Aires. The corollas on Herter 1155 are said to have been "lilac-blue" when fresh.

Additional citations: URUGUAY: Herter 1155 [Herb. Herter 83295] (Mu). ARGENTINA: Buenos Aires: Job 1597 (Ut--330533B). Corrientes: Pedersen 4660 (N).

VERBENA JORDANENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 28: 354 (1974) and 30: 192. 1975.

VERBENA KUHLMANNII Moldenke, Phytologia 31: 29. 1975.

Bibliography: Moldenke, Phytologia 31: 29 & 387. 1975; Anon., Biol. Abstr. 61: ACl.732. 1976.

Citations: BRAZIL: São Paulo: M. Kuhlmann 3717 [Herb. Inst. Bot. S. Paulo 79535] (W--2748267--type, Z--photo of type, Z--photo of type).

VERBENA LACINIATA (L.) Briq.

Additional bibliography: Sweet, Hort. Brit., ed. 2, 419. 1830; G. Don in Loud., Hort. Brit., ed. 1, 247 (1830) and ed. 2, 247. 1832; G. Don in Loud., Hort. Brit. Suppl. 1: 680. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; Baxt. in Loud., Hort. Brit. Suppl. 2: 680. 1839; G. Don in Loud., Hort. Brit., ed. 3, 247. 1839; Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 494 & 495. 1858; Vilm., Fl. Pleine Terr., ed. 1, 937 (1865), ed. 2, 2: 974 (1866), ed. 3, 1: 1197--1198 (1870), and ed. 4, 1066 & 1070. 1894; A. W. Anderson, How We Got Fls., imp. 1, 168 & 283 (1951) and imp. 2, 168 & 283. 1966; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1,

715--717 (1969) and imp. 2, 715--717. 1974; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975; Kociman, Act. Bot. Neerl. 24: 464. 1975; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: 94. 1975; Moldenke, Phytologia 30: 152--153 & 172 (1975), 31: 383, 410, & 411 (1975), and 34: 259 & 260. 1976; Soukup, Biota 11: 19. 1976; E. H. Walker, Fl. Okin. & South. Ryuk. 884. 1976; Moldenke, Phytologia 36: 128, 139, & 148. 1977.

Additional illustrations: Voss in Vilm., Fl. Pleine Terr., ed. 4, 1066. 1894.

Fosberg encountered this plant in grassy places grazed by goats on the top of a low hill and the corollas on no. 27645 are said to have been "lavender" when fresh, while on Grandjot s.n. [XI.32] they were "rose-violet" in color.

Don (1830) lists V. multifida Ruiz & Pav. as a synonym of V. erinoides Willd. and implies that it, like V. erinoides, was introduced into English gardens from Peru in 1818. Tawada (1967) reports "V. erinoides Lamarck" as cultivated in Okinawa, but probably this is an error in identification for V. tenuisecta Briq. It should be noted here that Walker (1976) gives "1968" as the correct publication date for Tawada's work.

The Lorentz 478, distributed as V. laciniata, actually is V. aristigera S. Moore, while Merxmüller 24804 is V. berterii (Meisn.) Schau., Collector undetermined s.n. [H. L. 1840], is V. bipinnatifida Nutt., Lossen 72 is V. glandulifera Moldenke, Herter 1805 and Herb. Herter 96556 are V. pulchella Sweet, Martius s.n. [ad S. Joaõ d'El Rey, Febr.] is V. regnelliana Moldenke, Herter 181 and Herb. Herter 79174 are V. selloi Spreng., and Brizle s.n., Herb. Hort. Monac. s.n., and Herb. Merxmüller 14336, as well as Kupper s.n. [cult. h. b. M.] are V. tenuisecta Briq.

Additional citations: ECUADOR: Cañar: Herb. Univ. Cent. Quito 2350 (Mu). Chimborazo: F. R. Fosberg 27645 (N). BOLIVIA: La Paz: O. E. White s.n. [2-18-1963] (W-2774548). CHILE: Concepcion: Neger s.n. [1893-96] (Mu-3981). Malleco: Baeza s.n. [19.XII. 1913] (Mu-4330). Santiago: Grandjot s.n. [XI.32] (Mu, Mu). Valparaíso: Behn s.n. [Quilpué, 2.X.1932] (Mu), s.n. [Valparaíso, 1 Okt. 1922] (Mu); O. Buchtien s.n. [8.IX.1895] (Mu-1837); Kausel s.n. [Limache, 16.X.27] (Mu). Province undetermined: Dusén s.n. [Chili australis 1896-97] (Mu-2982); Reuca s.n. [1889] (Mu-4322). MOUNTED ILLUSTRATIONS: Ruiz & Pav., Fl. Peruv. & Chil. 1: pl. 33, fig. 2. 1797 (N, Z).

#### VERBENA LACINIATA var. CONTRACTA (Lindl.) Moldenke

Additional bibliography: G. Don in Loud., Hort. Brit., ed. 1, 247 (1830), ed. 2, 247 (1832), and ed. 3, 247. 1839; Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 494 & 495. 1858; Moldenke, Phytologia 30: 153 (1975) and 31: 410 & 411. 1975.

Don (1830) calls V. erinoides the "Erimus-like vervain" and

claims that it was introduced into English gardens from Peru in 1818 probably in this contracted form.

#### VERBENA LASIOSTACHYS Link

Additional bibliography: Sweet, Hort. Brit., ed. 2, 418 & 419. 1830; G. Don in Loud., Hort. Brit., ed. 1, 246 & 247 (1830) and ed. 2, 246 & 247. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; G. Don in Loud., Hort. Brit., ed. 3, 246 & 247. 1839; Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Kooiman, Act. Bot. Neerl. 24: 464. 1975; Moldenke, Phytologia 30: 153 (1975), 34: 251 (1976), and 36: 135. 1977.

Don (1830) places *V. lasiostachys* in his Section *Indivisae* (with undivided leaves), calls it the "hairy-spiked vervain", and says that it was introduced into English gardens from California in 1826, while *V. prostrata* is placed in his Section *Trifidae*, calls it the "prostrate vervain", and gives the date of its introduction from "N. Amer." as 1794.

The Herb. Schwaegrichen s.n. [1837], Herb. Zuccarini s.n. [Hort. Bot. Monac. 1835, 1836], Raven 2951, and Thorne & Tilforth 39918, distributed as typical *V. lasiostachys*, actually seem to represent var. *septentrionalis* Moldenke, while Meebold 20234 is *V. robusta* Greene.

Additional citations: CALIFORNIA: Humboldt Co.: Moldenke & Moldenke 30232 (Ac, Gz, Kh, Ld, Ln, Mu, Tu, Ut, W). Santa Barbara Co.: Meebold 22111 (Mu). Santa Cruz Co.: M. E. Jones 2215 (Mu—1575).

#### VERBENA LASIOSTACHYS var. SEPTENTRIONALIS Moldenke

Additional bibliography: Moldenke, Phytologia 30: 153 (1975) and 36: 135. 1977.

Recent collectors have encountered this plant in dry places and "a few feet above high-tide line on coastal cliffs", at altitudes of 2—30 meters, and describe it as a widely branching herb, 6 dm. tall. The corollas are said to have been "blue" on Witham 508, "purplish" on Thorne & Tilforth 39918, and "purple" on Beauchamp 2523.

Material of this variety has been misidentified and distributed in some herbaria as *V. bracteata* Lag. & Rodr.

Additional citations: OREGON: Josephine Co.: Baker & Ruhle 434 (N). CALIFORNIA: Alameda Co.: Meebold 19930 (Mu); Michener & Biolletti s.n. [Oakland, June 1891] (Ml). Butte Co.: Moldenke & Moldenke 30339 (Gz, Mu, Tu, Ut). Los Angeles Co.: Gallup s.n. [8/13/1949] (Sd—72252); Meebold 20050 (Mu); Thorne & Tilforth 39918 (Kl—16018). Nevada Co.: M. E. Jones 2598 (Ln—70251, Mu—1576). San Diego Co.: Beauchamp 2523 (Sd—85664); M. F. Spencer 1037 (Mu—4319); Witham 1454 (Sd—80427). San Luis Obispo Co.: Edw. Palmer 342 (Mu—1555); Raven 2951 (Ac); Witham 508 (Sd—75714). Shasta Co.: Moldenke & Moldenke 30260 (Ac, Ld, W). CULTIVATED: Germany:

Herb. Schwaegrichen s.n. [1837] (Mu—1267); Herb. Zuccarini s.n. [Hort. Bot. Monac. 1835] (Mu—367), s.n. [Hort. Bot. Monac. 1836] (Mu—368), s.n. [Hort. Bot. Monac.] (Mu—369).

**VERBENA LILACINA** Greene

Additional bibliography: Moldenke, *Phytologia* 30: 153. 1975.

Recent collectors describe this species as a dense bush or subshrub, 2—5 feet tall, growing in the steep north slopes of canyons, along the sides of large granite boulders, at altitudes of 5—50 meters, flowering and fruiting in March, April, and July. Moran reports it as "common in arroyos". The corollas are said to have been "lavender" in color on Moran 17123, 17127, & 17185.

Additional citations: MEXICO: Baja California: Bostic s.n. [2 July 1969] (Sd—70839); R. V. Moran 17123 (Sd—76988), 17127 (Sd—76989), 17185 (Sd—76987).

**VERBENA LINDBERGI** Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 288 (1972) and 31: 387. 1975.

Merxmüller encountered this species at 2350 meters altitude, flowering in December.

Additional citations: BRAZIL: Rio de Janeiro: Merxmüller 25555 (Mu).

**VERBENA LIPOZYGIOIDES** Walp.

Additional bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 495. 1858; Moldenke, *Phytologia* 28: 354. 1974.

**VERBENA LITORALIS** H.B.K.

Additional synonymy: Verbena atriota Pabst ex Moldenke, *Phytologia* 34: 278, in syn. 1976.

Additional & emended bibliography: G. Don in Loud., *Hort. Brit. Suppl.* 1: 680. 1832; Bart. in Loud., *Hort. Brit. Suppl.* 2: 680 (1839) and [3]: 655. 1850; Buek, *Gen. Spec. Syn. Candoll.* 3: 494 & 495. 1858; Robledo, *Bot. Med.* 392. 1924; Barriga-Bonilla, Hernández-Camacho, Jaramillo-T., Jaramillo-Mejía, Mora-Osejo, Pinto-Escobar, & Ruiz-Carranza, *Isla San Andrés* 59. 1969; G. W. Thomas, *Tex. Pl. Ecolog. Summ.* 78. 1969; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 717. 1969; Hartwell, *Lloydia* 34: 387. 1971; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 2, 717. 1974; Gibbs, *Chemotax. Flow. Pl.* 3: 1753 & 1754. 1974; Balgooy, *Pacif. Pl. Areas* 3: 245. 1975; O. & I. Degener & Pekelo, *Hawaii. Pl. Names* x.4, x.21, & x.22. 1975; Hinton & Rzedowski, *Ann. Esc. Nac. Cienc. Biol.* 21: 31 & 111. 1975; Kooiman, *Act. Bot. Neerl.* 24: 464. 1975; López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 15: 51 & 90—93, fig. [17]. 1975; Molina R., *Ceiba* 19: 95. 1975; Tovar Serpa, *Biota* 10: 286 & 298. 1975; Moldenke, *Phytologia* 30: 136 & 153—154 (1975), 31: 378, 379, 383, & 392 (1975), and 34: 256, 260, 267, 270, & 278. 1976; López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 17: 50. 1976; Soukup, *Biota* 11:

19. 1976; E. H. Walker, Fl. Okin. & South. Ryuk. 883 & 884. 1976; Moldenke, Phytologia 36: 31, 33, 47, 51, 52, 122, 131, 136, 137, & 151. 1977.

Additional illustrations: López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: fig. [17]. 1975.

Molina R. refers to this species as a "weed common in sugarcane plantations" in Nicaragua. Walker (1976) calls it "A weed of roadsides and waste places" on Okinawa, while Schlieben reports it "very abundant" on bush savannas in the Transvaal. On Saipan island Stone found it to be a "common weed with Asclepias curassavica, Conyza, Cardiospermum, etc." Herbst speaks of it as "uncommon" on Hawaii island. Werff found it in the moist zone on Chatham island in the Galápagos and comments that there its flowers were "not as intensely colored as those of 2182 [V. brasiliensis Vell.]". Bianco describes it as 0.8-1.3 meters tall and "medicinal" in Venezuela; Taylor found it on steep roadside banks in Costa Rica.

The inflorescence tips on Molina R. 27244 are much congested because they are insect-galled; the corollas are said to have been "lilac" in color when fresh, as they were also on his no. 11508, on Hatschbach & Kummrow 35764, Romero-Castañeda 10668, and Schlieben 7691. They are said to have been "violet" on Pabst 7372 and Schinini & al. 10259, "blue" on Behn s.n. [14 Decbr. 1930], "blue-violet" on Flowman & Davis 4889, "bluish-violet" on Stone 5233, "pretty purple" on Clemens 42170, and "pale-blue" on Herbst 2296. On López-Palacios 4220 & 4332 they are described as "moradas", on 4196 "morado lila", on 4100 "lila", and on 4040 "azul morado hasta morado muy claro".

Hatschbach & Kummrow report V. litoralis being used medicinally in Brazil, while in Peru, according to Flowman & Davis, the dried ground-up leaves are placed on wounds.

It is not certain to what species Gibbs (1974) is referring when he uses the name "Verbena arborea", but such a binomial has been used for V. litoralis in the horticultural trade.

López-Palacios (1975) comments that "En París, en el Herbario HB, existe el N. 658 [of Bonpland], determinado como V. caracasana, que bien puede ser el tipo o, cuando menos, el esótipo" [of var. caracasana]. He continues: "Yo he examinado el material de Willdenow y no encuentro diferencia alguna con la V. litoralis HBK. El espécimen 11134 Willd., Verbena lanceolata, corresponde al 638 de Humboldt (P), rotulado quizás por él mismo, o por Bonpland, V. caracasana, pero en mi concepto, no creo que alcance ni siquiera a una diferencia de variedad de la V. litoralis. También las poblaciones son iguales, y no se observa diferencia entre las de Caracas y las de Mérida, p. e. De la V. glabrata no hay constancia segura de que exista en el territorio venezolano. El ejemplar de Mocquerys, Duaea 893 ? No o fecha?), determinado por Doña N. Troncoso como V. glabrata es, simplemente, V. litoralis."

Muchos las consideran como coespecíficas.....Para mí es difícil establecer la diferencia entre las dos especies. [actually V. glabrata H.B.K. as seen so abundantly in Ecuador is very easily distinguished in general aspect from V. litoralis!]. De existir en Venezuela, sería probablemente en Táchira y Zulia, hasta donde pueden extenderse las poblaciones colombianas del Norte de Santander, en donde la V. glabrata ha sido registrada."

López-Palacios 3638 is a close match for the type illustration of V. litoralis, but his 3948 is the very widespread loosely fruited form, while his 3623 is the very dense-flowered and -fruited form now passing as var. caracasana. He reports that the plants growing in his own garden and represented by his no. 3974 were 80-100 cm. tall. In a letter to me, dated January 16, 1976, he says: "Por correo le envés 5 ejemplares de Verbena litoralis colectados de una misma planta que yo tengo cultivada. Este taxon es polimórfico y variable no sólo en la población sino en la misma planta, como Ud. podrá observar; en hojas y en espigas la variación es grande. Yo ví en Herb. Willdenow el tipo de la var. caracasana, pero en mí concepto todo ello es simplemente V. litoralis. Naturalmente esto es una cosa subjetiva y se deba a mi formación, influida por las escuelas europeas (Holandesa y Alemana) que tienen un criterio muy amplio de la especie. Naturalmente el dibujo de HBK sólo muestra un estadio de crecimiento y por tanto no puede registrar todas las variaciones de la especie." He suggests that his 4161 may be a form of V. brasiliensis Vell., and this is, indeed, very possible. It is also most probable that these two species hybridize when growing in close proximity, as they often do. His no. 4302, from the Galápagos islands, is described as "hierba de hojas medianas, espigas congestas luego alargadas".

Walker (1976) reports for V. litoralis the vernacular name, "hime-kuma-tsusura" [=small delicate V. officinalis] on Okinawa. Witham collected the species at 1000 m. altitude in Hawaii, describing it as a "tough perennial" with blue flowers. Tovar Serpa (1975) records the vernacular name, "wirwena", for it in Peru. The Degeners & Pekelo (1975) list the names, "ha'uōwī", "oi", and "ōwī", in Hawaii; Thomas (1969) calls it the "coast verbena".

Gibbs (1974) reports that in what he calls "Verbena arborea" cyanogenesis is absent from the leaves and syringin is absent from the stems. It is not definitely known if he refers here to V. litoralis or to Petrea arborea, for both of which taxa the name "Verbena arborea" has in the past been used in literature. Hartwell (1971) reports that in Mexico V. litoralis is called "verbena del campo" and that the twigs are used to make a decoction drunk in the treatment of internal tumors. Krapovickas and his associates report its use in Salta, Argentina, "para golpe, paea sangre". Krapovickas, Schinini, & González 28440 represents the dense-spiked form of the species.

The Widgren s.n. [1845], distributed as V. litoralis, actually

is V. alata Sweet, while Lechler s.n. [Valdivia], Leyboldt s.n., and Montz 2289 are V. bonariensis L., Fabris & Marchionni 2392 is a mixture of V. litoralis and V. bonariensis, Behn s.n. [Quilpué, 22 January 1931], Bougere 14, 1091, & 1099, C. A. Brown 1008, 2309, 2381, & 18610, Bynum, Ingram, & Jaynes s.n. [Houma, Apr. 23, 1933], M. Chaney 111, Claycomb s.n. [June 13, 1942], Heinrichs 65, Kirby 160, D. K. Lowe 31, Meebold 27224 & 27240, Montz 637, J. A. Moore 5200, Neger s.n. [1893—96], Robinette 239, Rockett 125, Roivainen 3054, and Stutzenbaker 205 are V. brasiliensis Vell., Heyde & Lux 3019 is V. carolina L., O. Buchtien 185 is xv. dermendi Moldenke, Claycomb s.n. [April 15, 1943] is V. halei Small, C. A. Brown 18767, Herb. Herter 81713, Herter 269, and Thibodeaux 236, 260, 284, 297, 321, & 417 are V. montevidensis Spreng., J. Taylor 17625 is V. parvula Hayek, and Schimpff 132 is V. sedula Moldenke.

Additional citations: LOUISIANA: Terrebonne Par.: Wurzlow s.n. [May 5, 1914] (Lv, Lv). MEXICO: Oaxaca: Pringle 4877 (Mu—1803). Veracruz: Kerber 311 (Mi, Mu—1791). GUATEMALA: Guatemala: L. M. Andrews 507 (N). Santa Rosa: Heyde & Lux 4370 (Mu—1790). HONDURAS: Cortes: Molina R. 11508 (W—2735773). NICARAGUA: Estelí: Molina R. 27244 (N, W—2735237). COSTA RICA: San José: J. Taylor 17446 (N). COLOMBIA: Arauca: López-Palacios 3948 (Ld, N). Cundinamarca: López-Palacios 3623 (Ld, N), 3638 (Ld, N); López-Palacios & Jaramillo Mejía 3674 (Ld, N). Magdalena: Romero-Castañeda 10668 (N). VENEZUELA: Aragua: Vogl 938 (Mu, Mu, Mu). Mérida: Oberwinkler & Oberwinkler 12196 (Mu). Miranda: Pittier 442 (Mu). ECUADOR: Carchi: López-Palacios 4040 (Ld). Chimborazo: Collector undetermined s.n. [September 1858] (Mu—1105). El Oro: López-Palacios 4100 (Ld). Guayas: Eggers 14372 (Mu—3882). Imbabura: López-Palacios 4072 (Ld). Loja: López-Palacios 4161 (Ld). Pichincha: López-Palacios 4196 (Ld), 4220 (Ld), 4332 (Ld). GALÁPAGOS ISLANDS: Chatham: Schimpff 142 (Mu); Werff 2183 [1483] (Ld), 2186 [1486] (Ld). Narborough: López-Palacios 4302 (Ld). PERU: Cuzco: Plowman & Davis 4889 (Oa). BRAZIL: Minas Gerais: Irwin, Harley, & Onishi 28721 (W—2759077). Rio de Janeiro: Pabst 7372 (Mu). BOLIVIA: La Paz: M. Bang 204 (Mu—1788). PARAGUAY: Pedersen 8625 (N); T. Rojas 1889 (Mu). CHILE: Valparaíso: Behn s.n. [14 Decbr. 1930] (Mu); O. Buchtien s.n. [18.I.1895] (Mu—1838). Province undetermined: Dessauer s.n. [Chile, VI—IX—87] (Mu); Frömbing s.n. [Chile, 1886] (Mu—1789). ARGENTINA: Jujuy: Schinini, Quarín, Arbo, & Pire 10259 (Ld). Salta: Krapovickas, Schinini, & González 28440 (Ld). San Juan: Fabris & Marchionni 2392, in part (Mu). Santiago del Estero: Lullo 4 (Ut—220576B); Pierotti "h" [6—II—1944] (Ut—330535B). SOUTH AFRICA: Transvaal: Meebold 12839 (Mu); Scheepers 334 (Mu); Schlie-

ben 7691 (Mu). MARIANAS ISLANDS: Saipan: B. C. Stone 5233 (Kl)..  
 AUSTRALIA: Queensland: M. S. Clemens 42170 (M1); Meebold 7818 (Mu).  
 HAWAIIAN ISLANDS: Hawaii: Witham 1713 (Sd-83745). Kauai: Herbst 2296 (N). Oahu: Meebold 8304 (Mu); Schmer s.n. [9/13/69] (Lc).  
 CULTIVATED: Brazil: Hatschbach & Kummrow 35764 (Ld). Germany:  
Herb. Kummer s.n. [Hort. bot. Monac. 1839] (Mu-1248). Venezuela:  
Bianco 110 (N); López-Palacios 3974 (Ac, Gz, Mu, Tu).

VERBENA LITORALIS var. ALBIFLORA Moldenke

Synonymy: Verbena littoralis var. albiflora Moldenke ex Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975.

Additional bibliography: Moldenke, Phytologia 28: 252, 432, & 438. 1974; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 31 & 111. 1975; Soukup, Biota 11: 19. 1976; Moldenke, Phytologia 36: 47. 1977.

VERBENA LITORALIS var. CARACASANA (H.B.K.) Moldenke

After extensive field and herbarium studies, including an examination of the type collection, López-Palacios has shown that this taxon cannot be distinguished from typical V. littoralis H.B.K. All my previous notes in this series under this heading should therefore be transferred to typical V. littoralis.

VERBENA LITORALIS f. MAGNIFOLIA Moldenke, Phytologia 36: 51-52. 1977.

Bibliography: Moldenke, Phytologia 36: 33 & 51-52. 1977.

Citations: ECUADOR: Napo: López-Palacios 4188 (Z-type).

VERBENA LOBATA Vell.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 494 & 495. 1858; Moldenke, Phytologia 30: 154. 1975.

The Hatschbach HH.14883 and Herb. Brad. 48010, distributed as V. lobata, actually represent var. sessilis Moldenke.

Additional citations: BRAZIL: Minas Gerais: Dusén 242 (Mu-3998). Rio de Janeiro: A. Castellanos 25682 [Herb. FEEMA 4520] (Ld). Rio Grande do Sul: Bornmüller 602 (Mu-4295).

VERBENA LOBATA var. HIRSUTA Moldenke

Additional bibliography: Moldenke, Phytologia 28: 253. 1974.

The corollas are said to have been "lilac" in color when fresh on Hatschbach 35664.

Additional citations: BRAZIL: Paraná: Hatschbach 35664 (Ld).

VERBENA LOBATA var. SESSILIS Moldenke

Additional bibliography: Moldenke, Phytologia 28: 355. 1974.

The corollas on Hatschbach HH.14883 are said to have been "dark-lilac" in color when fresh, and this collector encountered the plant in "brejo" (sedge meadow), flowering in October. It was distributed in some herbaria as typical V. lobata Vell.

Additional citations: BRAZIL: Paraná: Hatschbach HH.14883 [Herb.

Brad. 48010] (Mu).

VERBENA LONGIFOLIA Mart. & Gal.

Additional synonymy: Verbena longifolia H.B.K. ex Moldenke, Phytologia 36: 47, in syn. 1977.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Moldenke, Phytologia 23: 296 (1972), 34: 252 (1976), and 36: 47 & 145. 1977.

The corollas are said to have been "white to pale-pink" on Ernst 2355a.

Additional citations: MEXICO: Oaxaca: Ernst 2355a (Mi).

VERBENA LONGIFOLIA f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 28: 253 (1974), 34: 252 (1976), and 36: 145. 1977.

Martínez Calderón refers to this plant as an annual herb which he encountered at 5 m. altitude in "suelo arcilloso-arenoso in acahual" and which he misidentified and distributed as V. carolina L. The Ernst 2355a, cited under typical V. longifolia (above), is said to have come from a population with white to light-pink flowers so it may, in part, at least, also represent this form.

Additional citations: MEXICO: Veracruz: Martínez Calderón 1352 (N).

VERBENA LUCANENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 23: 297. 1972; Soukup, Biota 11: 19. 1976.

VERBENA MACDOUGALII Heller

Additional & emended bibliography: Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717. 1969; G. W. Thomas, Tex. Pl. Ecol. Summ. 78. 1969; Fong, Trojánkova, Trojánek, & Farnsworth, Lloydia 35: 147. 1972; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 717. 1974; R. D. Gibbs, Chemotax. Flow. Pl. 3: 1753 & 1754 (1974) and 4: 2295. 1974; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1397, 1399--1400, & 1775. 1975; Kociman, Act. Bot. Neerl. 24: 464. 1975; A. L. Moldenke, Phytologia 31: 415. 1975; Moldenke, Phytologia 30: 154 (1975) and 36: 145. 1977.

The Spellenbergs encountered this plant "along dirt road with grasses, in Douglas fir, Pinus, Quercus, and Holodiscus" association. Pinkava and his associates found it along roadsides in ponderosa pine forests — a habitat apparently identical to that in which my wife, my son, and I saw it in great abundance and which seems to be its favorite habitat. Higgins reports finding it in sandy soil of "short-grass prairie community", in sandy soil of "spruce-fir-pine community", and in "coarse sandy to gravelly soil in mountain brush and mixed evergreen community and aspen scattered in patches". Dziekanowski and his associates observed it in "very rocky yellow pine forests".

The corollas are said to have been "violet, fading to blue" on

Spellenberg & Spellenberg 2082. Thomas (1969) calls the species the "Macdougal verbena".

Gibbs (1974) reports cyanogenesis absent in the leaves of V. macdougalii and the Ehrlich test negative, but syringin is doubtfully present in the stems.

Material has been misidentified and distributed in some herbaria as V. hastata var. scabra Moldenke.

Additional citations: COLORADO: Archuleta Co.: C. F. Baker s.n. (Arboles, 7-10-99) (Mu—3912). NEW MEXICO: Otero Co.: Spellenberg & Spellenberg 2082 (N). Lincoln Co.: Higgins 8604 (N). San Miguel Co.: Higgins 8881 (N). Taos Co.: Higgins, Higgins, & Rook 10040 (N); Waterfall 12250 (M1). Yavapai Co.: H. H. Rusby 780, in part (Mu). ARIZONA: Apache Co.: Lehto, McGill, Nash, & Pinkava 11506 (W—2734642); Pinkava, Lehto, & Reeves P.12352 (N). Coconino Co.: Dzieskanowski, Dunn, & Bennett 2395 (N).

#### VERBENA MACDOUGALII f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 253, 254, & 431. 1974.

#### VERBENA MALMII Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 298. 1972; Troncoso, *Darwiniana* 18: 311 & 412. 1974.

Hatschbach describes this species as growing from a xylopodium. He found it on dry campos, flowering in December, and the corollas on his no. 35553 are said to have been "lilac" in color when fresh.

Additional citations: BRAZIL: Paraná: Hatschbach 35553 (Ld).

#### VERBENA MARITIMA Small

Additional synonymy: Verbena maritima Sm. ex Norman, *Fla. Scientist* 39: 30. 1976.

Additional bibliography: M. F. Baker, *Fla. Wild Fls.*, ed. 2, imp. 1, 188. 1938; Ayensu, *Rep. Endang. & Threat. Pl. Spec.* 98 & 129. 1974; Moldenke, *Phytologia* 28: 254, 451. & 464 (1974) and 34: 248 & 279. 1976; M. F. Baker, *Fla. Wild Fls.*, ed. 2, imp. 2, 188. 1976; Long & Lakela, *Fl. Trop. Fla.*, ed. 2, 741 & 961. 1976; Norman, *Fla. Scientist* 39: 30. 1976; Moldenke, *Phytologia* 36: 142. 1977.

Ayensu (1974) has officially listed this as an endangered or threatened species. With the rapidity of the commercialization of the Florida beaches, the survival of this species, limited to that specialized habitat, is certainly in great doubt.

Churchill has encountered V. maritima in pine flatwoods on oolitic limestone and on the lee side of dunes, as well as in dune hollows, in flower and fruit in March and June. Norman (1976) calls it the "seaside verbena" and justifiably refers to it as already "rare".

Additional citations: FLORIDA: Brevard Co.: Curtiss 1963\* (Mu—1545). Broward Co.: Meebold 27688 (Mu). Dade Co.: J. A. Church-

111 s.n. [12 March 1956] (Ln--204149). Martin Co.: J. A. Church-111 s.n. [18 June 1968] (Ln--225090). Long Key: J. K. Small 8123 (Mu).

VERBENA MARRUBIODES Cham.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Moldenke, Phytologia 30: 154. 1975; Soukup, Biota 11: 19. 1976.

Recent collectors have encountered this plant along roadsides on campos and in "campo com pequeno banhado". The corollas are said to have been "red (5P6/8)" on Lindeman, Irgang, & Valls ICN. 8805 and "blue-purple (10PB5/8)" on Lindeman & Haas 2459.

Reineck & Czermak 21 is a mixture of V. marrubioides and V. humifusa Cham.

Additional citations: BRAZIL: Paraná: Lindeman & Haas 2459 (Id). Rio Grande do Sul: Lindeman, Irgang, & Valls ICN.8805 (Ut--320456); Reineck & Czermak 21, in part (Mu).

VERBENA MEDICINALIS Rojas

Additional & emended bibliography: Krapovickas, Bol. Soc. Argent. Bot. 11, Supl. 269. 1970; Moldenke, Phytologia 30: 154--155 (1975) and 31: 388. 1975.

VERBENA MEGAPOTAMICA Spreng.

Additional synonymy: Verbena phlogiflora  $\text{\textcircled{P}}$  macilentia Cham. ex Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858.

Additional & emended bibliography: Loud., Hort. Brit., ed. 2, 552. 1832; Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 (1969) and imp. 2, 715. 1974; Moldenke, Phytologia 30: 155 & 178 (1975) and 36: 47. 1977.

The label on Krapovickas & Cristóbal 28956 bears the statement "en campos pantanosos, erecta, flores amarillas" -- if the corolla color given here is correct this represents a remarkable undescribed color-form, but it seems more probable to me that it represents a mistake in memory or transcription.

The Hort. Parag. 11793 and T. Rojas 3406, distributed as V. megapotamica, actually are V. incisa Hook., while Duarte 6309, Herb. Brad. 16885 & 22512, Pabst 6093, and E. Pereira 6266 are V. phlogiflora Cham.

Additional citations: ARGENTINA: Corrientes: Krapovickas & Cristóbal 28956 (Id).

VERBENA MEGAPOTAMICA Spreng. x V. PULCHELLA Sweet

Additional bibliography: Moldenke, Phytologia 28: 255, 451, & 464. 1974.

VERBENA MENDOCINA R. A. Phil.

Additional & emended bibliography: Bolkh., Grif, Matvej., & Zak-

har., Chrom. Numb. Flow. Pl., imp. 1, 715 & 717 (1969) and imp. 2, 715 & 717. 1974; Moldenke, Phytologia 30: 155. 1975.

VERBENA MENTHAEFOLIA Benth.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 495 & 496. 1858; G. W. Thomas, Tex. Fl. Ecolog. Summ. 78. 1969; Moldenke, Phytologia 28: 355 & 362 (1974) and 30: 159. 1975; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 31 & 111. 1975; Moldenke, Phytologia 36: 145. 1977.

Recent collectors have encountered this plant on rocky hills with thin gravelly soil and oak-pine grassland cover. Mears found it growing in association with Cassia, Mimosa, Juniperus, Solanum, Cuphea, Quercus, Indigofera, and Phoradendron. In Baja California it is reported by Moran as "occasional", "abundant in roadside depressions", "common in roadside ditches", and "locally common in several places on dry open southeast slopes", at 10 to 200 meters altitude, describing it as a "decumbent bush" or "prostrate". The corollas are described as having been "blue" on Moran 16643 & 18675, "blue-violet" on Moran 16098, 18563, & 21824, "purple" on Witham 783, and "light-blue, with white center" on Moran 22459. Thomas (1969) calls it the "mintleaf ver-bena", a singularly inappropriate name since its leaves do not resemble those of any typical mint with which I am familiar. The Baja California material ascribed to this species needs to be more carefully compared to V. comoduensis Moldenke, a closely related taxon.

Additional citations: CALIFORNIA: San Diego Co.: R. V. Moran 16098 (Sd-71707); Spencer s.n. [4.25.1916] (Mu-4318); Witham 783 (Sd-79855). MEXICO: Baja California: R. V. Moran 16643 (Sd-73069), 18563 (Sd-80229), 18675 (Sd-80255), 21824 (Sd-91272), 22459 (Sd-91088). Federal District: Barkley & Rowell 7464 (Ln-166003). Hidalgo: Mears 259d (Ln-222126), 326d (Ln-222197). México: Pringle 8534 (Mu-3989). Zacatecas: Taylor & Taylor 6230 (W-2734032).

VERBENA MICROPHYLLA H.B.K.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Moldenke, Phytologia 30: 155. 1975; Soukup, Biota 11: 19. 1976.

Schultes has placed an interesting note on the M. Wagner s.n. [Sept. 1858] sheet at Munich: "Verbena erinoidi Lam. proxima sed ipse vix videtur. An V. multifida R. & Pavon quae a Schauero Verbenae erinoidi subjungitur".

Legname & Vervoerst refer to V. microphylla as a "prostrate hemicyptophyte" and encountered it in "terreno arenoso-arcilloso" -- the corollas on their no. 101 were "pale-lilac" when fresh.

Additional citations: ECUADOR: Chimborazo: Schimpff 720 (Mu); M. Wagner s.n. [Sept. 1858] (Mu-1104). Cotopaxi: M. Wagner s.n. [October 1858] (Mu-1262). Province undetermined: M. Wagner s.n.

[Tacunga, Octob.--Nov. 1858] (Mu--1263). PERU: Cuzco: W. Hoffmann 307 (Mu). BOLIVIA: La Paz: O. Buchtien 1102 (Mu); K. Graf 453 (N). Oruro: Troll 2919 (Mu). Potosí: Fiebrig 2613 (Mu--4088). Province undetermined: K. Graf 599 [Taurichambi] (N). ARGENTINA: Catamarca: Legname & Vervoort 101 (N). Jujuy: Cabrera, Ancibor, Ré, Tello, & Torres 15474 (Mu); Ellenberg 4259 (Ld), 4261 (Ac). Province undetermined: Princess Therese of Bavaria 282 (Mu).

VERBENA MINUTIFLORA Briq.

Additional bibliography: Moldenke, *Phytologia* 28: 356 & 383 (1974) and 36: 36 & 123. 1977.

In addition to the months previously reported by me, this plant has been collected in fruit in March and October. It has been described by Lindeman & Haas as an almost leafless shrub, 1.5 m. tall, and the corollas on their no. 3010 are said to have been "purple" when fresh. On Lindeman ICN.9446 the collector notes "arbusto de 1.70 m., 1.5 cm. diam., corola roxa 10PB7/6", and it was encountered by him in a "pequeño banhado quase seco".

Davidse and his associates report that in Santa Catarina it is used in the treatment of stomach and digestive ailments.

Material of *V. minutiflora* has been misidentified and distributed in some herbaria as *V. alata* Sweet.

Additional citations: BRAZIL: Paraná: Hatschbach 37374 (Ld); Lindeman & Haas 3010 (Ws). Rio Grande do Sul: Lindeman ICN.9446 (Ut--320459). Santa Catarina: Davidse, Ramamoorthy, & Vital 11089 (Ld). ARGENTINA: Toledo Island: Ibarrola 739 (Ut--330572B).

xVERBENA MOECHINA Moldenke

Additional synonymy: *Verbena moenchina* Moldenke ex R. A. Davidson, *State Univ. Iowa Stud. Nat. Hist.* 20 (2): 77, sphalm. 1959.

Additional bibliography: R. A. Davidson, *State Univ. Iowa Stud. Nat. Hist.* 20 (2): 77. 1959; Cooperrider, *State Univ. Iowa Stud. Nat. Hist.* 20 (5): 70. 1962; Moldenke, *Phytologia* 28: 356, 386, 387, 429, & 465 (194), 34: 249 (1976), and 36: 29 & 47. 1977.

Tans encountered this hybrid along roadsides and in an abandoned quarry on limestone gravel in association with native prairie plants such as Asclepias verticillata, Andropogon gerardi, Eragrostis spectabilis, Kuhnia eupatorioides, Ratibida pinnata, Solidago nemoralis, and Verbena stricta, with Verbascum and Ambrosia invading. Davidson (1959) records the hybrid from Louisa and Muscatine Counties, Iowa, where he found it to be "infrequent" in dry sandy soil.

The Herb. Zuccarini s.n. [Hort. bot. Monac.] collection, cited below, is a mixture with *V. stricta* Vent.

Additional citations: WISCONSIN: Rock Co.: Tens 1431 (Ts, Ts,

ts). MISSOURI: Reynolds Co.: Mesbold 25420 (Mu). CULTIVATED: Germany: Herb. Zuccarini s.n. [Hort. bot. Monac.] (Mu—375, Mu—376).

VERBENA MONACENSIS Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 356, 394, & 451 (1974), 30: 133 (1975), and 34: 270. 1976; López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 17: 50. 1976; Moldenke, *Phytologia* 36: 40. 1977.

López-Palacios refers to this plant as an "hierba rastrera de unos 30 cms. Flores rosadas" and found it being cultivated at 1650 meters altitude, flowering in August.

Additional citations: CULTIVATED: Colombia: López-Palacios 3618 (Ld, N), 3862 (Tu); López-Palacios & Idrobo 3833 (Ac).

VERBENA MONTEVIDENSIS Spreng.

Additional & amended bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 495. 1858; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke, *Phytologia* 30: 155 (1975), 31: 377 (1975), and 36: 137. 1977.

The corollas on Ferreira 98, Hatschbach 35653, and Kummrow 764 are said to have been "lilac" in color when fresh, on Schinini & Carnevali 10471 they were "purple", and on Fiebrig 4635, Herb. Brad. 22518, Pabst 6146, and E. Pereira 6319 they were "violet".

Ferreira found the plant growing in "orla de brejo". Others have encountered it on high or marshy campos, in rough grassland, along roadsides, on headlands of ricefields and sugarcane fields, in bottomland soil, and in "brejo" (sedge meadows). Muhammad refers to it as "an erect perennial herb, infrequent in open fields maintained by fire", while Urbatsch found it "in roadside and railway right-of-way, aquatic marsh, and dryland habitats".

The corollas on Schinini & Cristóbal 9707 were "violet" in color when fresh, those on Quarín, Schinini, & González 2460 were "purple", those on Krapovickas, Cristóbal, & Schinini 26513 were "white-lilac", and those on Pedersen 9816 were "white".

Lindeman and his associates encountered this plant on a "campo estilo pomar com árvores baixas de espinilo Acacia caven" and say on the label of their no. 8468 "corola 5RP8/4, calice em botaõ 5RP5/4". The vernacular name, "quina", is reported by Kummrow. Pedersen found the plant in flower and fruit in April.

Additional citations: LOUISIANA: Calcasieu Par.: Thibodeaux 260 (Lv). Cameron Par.: Thibodeaux 236 (Lv). East Baton Rouge Par.: C. A. Brown 18767 (Lv). Jefferson Davis Par.: Thibodeaux 417 (Lv). Lafayette Par.: Thibodeaux 297 (Lv), 321 (Lv). Saint Landry Par.: Thibodeaux 428 (Lv). Tangipahoa Par.: Muhammad 259 (Lv); Urbatsch 1938 (Lv). Vermilion Par.: Thibodeaux 284 (Lv). BRAZIL: Paraná: Dusén 10856 (Mu); L. F. Ferreira 98 (Ld); Hatschbach 35653 (Ld); Kummrow 764 (Tu). Rio Grande do Sul: Lindeman, Irgang, & Valls ICN.8468 (Ut—320457). Santa Catarina: Pabst 6146

[E. Pereira 6319; Herb. Brad. 22518] (Mu). PARAGUAY: Fiebrig 4635 (Mu—4114). URUGUAY: Herter 269 [Herb. Herter 81713] (Mu). ARGENTINA: Corrientes: Krapovickas, Cristóbal, & Schinini 26513 (Ld); Pedersen 9816 (N); Quarín, Schinini, & González 2460 (Ld); Schinini & al. 11864 (Ld); Schinini & Carnevali 10471 (Ld); Schinini & Cristóbal 9707 (Ld). Misiones: Montes 14719 (N), 27576 (N).

VERBENA MONTICOLA Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.26: 6. 1975; Moldenke, Phytologia 30: 155 (1975) and 31: 384. 1975.

VERBENA MULTICAULIS Raf.

This taxon is probably the same as V. simplex var. eggerti Moldenke. All previously published notes in this series under this heading should be transferred to that variety.

VERBENA NANA Moldenke

Additional bibliography: Moldenke, Phytologia 30: 155. 1975.

The corollas on Fiebrig 4371 are said to have been "violet-rose" when fresh.

Additional citations: PARAGUAY: Fiebrig 4371 (Mu).

VERBENA NEOMEXICANA (A. Gray) Small

Additional synonymy: Verbena neomexicana var. neomexicana [A. Gray] apud Thomas, Tex. Pl. Ecolog. Summ. 78. 1969.

Additional & amended bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; E. H. Jordan, Checklist Organ Pipe Cact. Natl. Mon. 7. 1975; Moldenke, Phytologia 30: 138, 155-156, & 180 (1975), 31: 378 (1975), 34: 252 & 279 (1976), and 36: 124 & 158. 1977.

Sample refers to this plant as "rare, in small clumps in dry stream bed". Mrs. Jordan (1975) calls it the "New Mexican vervain" and Thomas (1969) names it the "New Mexico verbena". Urbatsch and his associates aver that it is "uncommon in sandy soil" in Baja California.

Material of this species has been misidentified and distributed in some herbaria as V. gracilis Desf. or V. plicata Greene. On the other hand, the Spellenberg & Spellenberg 3984, distributed as typical V. neomexicana, seems better placed as var. hirtella Perry, while Reeves R.1131 and Wentworth 1061 are var. xylopoda Perry, C. A. Brown 7409 and Montz 2485 are xV. alleni Moldenke, Taylor & Taylor 6230 is V. menthaefolia Benth., Hess & Stickney 3406 and Higgins 9228 are V. perennis Wooton, S. Walker 76H37 is V. pinetorum Moldenke, and Meebold 26696 is V. racemosa Eggert.

Additional citations: TEXAS: Brewster Co.: Sample 357 (W—2732729). ARIZONA: Pima Co.: J. A. Churchill s.n. [7 April 1972] (Ln—235702). Santa Cruz Co.: Reeves R.1198 (N). MEXICO: Baja

California: Urbatsch, Clark, & Betkouski 1136 (Ld). Coahuila: Barkley, Webster, & Rowell 7189 (Ln—189725).

VERBENA NEOMEXICANA var. HIRTELLA Perry

Additional bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Moldenke, Phytologia 30: 138 & 156 (1975) and 34: 252. 1976.

Arnold found this plant growing on "steep gravelly hills and creek beds" in Coahuila. In Chihuahua the Spellenberg's encountered the plant "on grassy knolls with mostly ocotillo, creosotebush, Yucca torreyi, sotol, and Hedyotis rubra". In Baja California Moran found it "occasional in disturbed roadside soil" and "occasional on sandy flats", at altitudes of 575—1600 meters. Correll & Rollins encountered it "on gravel knolls along roadsides" in Texas.

The corollas are said to have been "deep-blue" on Moran 21749, "blue" on Correll & Rollins 23652 and Moran 20727, "blue-violet" on Moran 20748 and Spellenberg & Spellenberg 3984, and "lavender" on Moran 16893; they were also "blue" on Henrickson 5944.

Other recent collectors have found V. neomexicana var. hirtella growing in "calcareous gravel in chaparral on very steep slopes of limestone sierra", "in calcareous gravelly soil in matorral desértico microfilo on limestone slopes and limestone-conglomerate fan", "in rocky calcareous soil in crasirosulifolio espinosos izotal on steep slopes of metamorphosed shaly limestone", "in dark, sandy, grassy, gravelly loam on gentle slopes of extrusive igneous rock", "in sandy alluvium in matorral desértico inerme on gravel fans", in "calcareous gravelly soil in matorral con espinas laterales in canyons through limestone", "on rocky northeast-facing slopes", in "rocky soil of matorral on steep slopes of igneous rocks with chaparral and encinares (oak woods) higher up", in "rocky reddish clay soil of deserts", and in "limestone outcroppings in open Chihuahuan Desert", in association with Yucca carnerosana, Agave parrasana, A. lecheguilla, Condalia warnockii, Berberis trifoliolata, Mammillaria meiacantha, Opuntia rufida, O. lindheimeri, Acacia rigidula, Viguiera stenoloba, Sagaretia wrightii, Dasyliiron, Quercus, Lindleya, Krameria, Mimosa, Muhlenbergia, Pinus, Larrea, Jatropha, Parthenium, Leucophyllum, Ptelea, Garrya, Juglans, Flourensia, Buddleia, Fouquieria, Nama, grasses, and numerous animals. Henrickson found it "infrequent along highways".

Additional citations: TEXAS: Presidio Co.: Correll & Rollins 23652 (N). MEXICO: Baja California: R. V. Moran 16893 (Sd—76990), 20727 (Sd—88938), 20748 (Sd—88937), 21749 (Sd—91271). Chihuahua: A. A. Heller s.n. [April 6, 1897] (Ln—93653); Henrickson 7617 (Ld); Johnston, Wendt, & Chiang C. 10773b (Ld); Spellenberg & Spellenberg 3984 (N); Wilson, Wilson, Johnston, & Johnston 8510 (Ld). Coahuila: E. T. Arnold 32 (Te—68564); Henrickson 5944 (Ld), 6132 (Ld); Johnston, Wendt, & Chiang C. 10284d (Ld), 10500c (Ld), 11687

(Ld). Nuevo León: Johnston, Wendt, & Chiang C. 10235b (Ld). Zacatecas: Johnston, Wendt, & Chiang C. 10489 (Ld).

VERBENA NEOMEXICANA var. XYLOPODA Perry

Additional bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Moldenke, Phytologia 30: 156 & 180. 1975.

Recent collectors have encountered this variety on north-facing slopes with rock outcrops, calcareous stones and soils with scattered oaks, on rocky outcrops with Fouquieria, and in Cercocarpus breviflorus scrub on limestone bedrock.

Other collectors have found it growing in rocky limestone soil, in "sandy, grussy, gravelly loam in small creek canyons through extensive igneous rock", in "rocky soil in pastizal, badly degraded and in places invaded by shrubs", on "hill of igneous extrusives with partly volcanic ash red of red color", and in "grussy, gravelly, thin soil on rather steep hills of extrusive igneous rocks", growing in association with Parthenium incanum, Lippia graveolens, Jatropha dioica, Acacia neovernicosa, Bouteloua gracilis, Larrea, Quercus, Pinus, and Pseudotsuga.

In Baja California Moran reports this variety "locally common on open upper south slopes", "scarce on ridges", "occasional in granitic soil on rocky hillsides", and "a small colony on dry rocky slope", at altitudes of 1025-1240 meters. The corollas were "blue" on Moran 20983 & 22170, "blue-violet" on Moran 18264, "light-blue, paler in the center" on Moran 17658, and "purple" on Powell, Turner, & Sikes 2479.

The Wentworth collection cited below is a voucher for ecologic studies.

Additional citations: ARIZONA: Cochise Co.: Wentworth 1061 (N). Pinal Co.: Lehto, Hensel, & Pinkava 11033 (W--2736741). Santa Cruz Co.: Reeves R. 1131 (N). MEXICO: Baja California: R. V. Moran 17658 (Sd--75054), 18264 (Sd--77109), 20983 (Sd--83866), 22170 (Sd--91462). Chihuahua: Chiang C., Wendt, & Johnston 8311a (Ld); Johnston, Wendt, & Chiang C. 10524 (Ld); Powell, Turner, & Sikes 2479 (Ld); Wilson, Wilson, Johnston, & Johnston 8483 (Ld). Tamaulipas: Kuiper & Kuiper-Lapré M. 15 (Ut--328637B).

VERBENA NIGRICANS Rojas

Additional & emended bibliography: Krapovickas, Bol. Soc. Argent. Bot. 11, Supl. 269. 1970; Moldenke, Phytologia 30: 156 (1975) and 31: 388. 1975.

VERBENA NIVEA Moldenke

Additional synonymy: Glandularia nivea Mold. ex Moldenke, Phytologia 34: 274, in syn. 1976.

Additional bibliography: Moldenke, Phytologia 28: 357 (1974) and 34: 274. 1976.

In addition to the months previously reported by me, this plant has been collected in fruit in February.

The Legname & Vervoorst 101, distributed as V. nivea, actually is V. microphylla H.B.K.

VERBENA OCCULTA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 376—377 (1972) and 34: 258. 1976; Soukup, *Biota* 11: 19. 1976; Moldenke, *Phytologia* 36: 148. 1977.

Material of this species has been misidentified and distributed in some herbaria as V. calcicola Walp. and V. clavata Ruiz & Pav.

Additional citations: PERU: Arequipa: Princess Therese of Bavaria 281 (Mu).

VERBENA OCCULTA f. ALBA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 377. 1972; Soukup, *Biota* 11: 19. 1976.

VERBENA OCCULTA f. AURANTIACA Moldenke

Additional bibliography: Moldenke, *Phytologia* 23: 377. 1972; Soukup, *Biota* 11: 19. 1976.

VERBENA OFFICINALIS L.

Additional synonymy: Verbena vulgaris folio variegato Breyn., *Prodr. Fasc. Rar. Pl.*, ed. 2, 2: 104. 1739.

Additional & emended bibliography: *Apul. Barb.*, *Herb.*, ed. 1. 1480—1483; Anon., *Dialogue des Créatures*, 30th dial. 1482; *Apul. Barb.*, *Herb.*, ed. 2. 1528; Anon., *Bastiment des Receptes fol.* 59 vert. 1544; H. Bock [Tragus], *Stirp. Max. Germ.* 102. 1552; *Dill.* in Ray, *Synop. Meth. Stirp. Brit.*, ed. 3, 236. 1724; L., *Hort. Cliff.*, imp. 1, 11. 1737; Breyn., *Prodr. Fasc. Rar. Pl.*, ed. 2, 2: 104. 1739; Strand in L., *Amoen. Acad.* 69: 449. 1756; Chomel, *Abrég. Hist. Pl. Usuel.*, ed. 6, 2 (2): 85—87 & 251. 1761; Ginanni, *Istor. Civ. Nat. Pinet. Ravenn.* 177. 1774; Chomel, *Abrég. Hist. Pl. Usuel.*, ed. 6 nov., 313 & 637. 1782; F. Hernandez, *Hist. Pl. Nuev. Españ.*, ed. 1, 1: 139 & 439 (1790) and ed. 1, 3: 3 & 486. 1790; R. A. Salisb., *Prodr. Fl.* 1796; Chomel, *Abrég. Hist. Pl. Usuel.*, ed. 7, 1: 495 (1803) and ed. 7, 2: 488. 1803; Stokes, *Bot. Mat. Med.* 40—41. 1812; A. Rich., *Bot. Méd.* 1: 242—243. 1823; Dierbach, *Arzneimit. Hippok.* 85 & 270. 1824; A. Rich. [transl. G. Kunze], *Med. Bot.* 1: 381 (1824) and 2: 1302. 1826; G. Don in Loud., *Hort. Brit.*, ed. 1, 247 (1830) and ed. 2, 247. 1832; Loud., *Hort. Brit.*, ed. 2, 552. 1832; A. Dietr., *Handb. Pharmaceut. Bot.* 114 & 412. 1837; D. Dietr., *Taschenb. Arzneigew. Deutschl.* 58 & 262. 1838; G. Don in Loud., *Hort. Brit.*, ed. 3, 247. 1839; Spach, *Hist. Nat. Veg. Phan.* 9: 237. 1840; Webb in Hook., *Niger Fl.* 161. 1849; Anon., *Chroniqueur du Périgord* 120. 1853; F. Lenormant, *Bull. Sic. Bot. France* 2: 315—320. 1855; Schnitzlein, *Iconofr. Fam. Nat.* 2: 137 *Verbenac.* [2] & 137, fig. 4—22 & 30. 1856; Buek, *Gen. Spec. Syn. Candoll.* 3: 495 & 496. 1858; Symphor Vaudoré, *Lettr. Vieux Laboureur* 88. 1867; J. Cousin, *Secr. Mag.* 1868: 7, 37, & 45. 1868; Chenux, *Le Diable & Ses*

Cornes 53 & 54. 1876; Anon., Rev. du Tarn 1877: 39. 1877; Franch., Nouv. Arch. Mus. Hist. Nat. Paris, ser. 2, 6: 112 [Fl. David. 1: 232]. 1883; Strobl, Oesterr. Bot. Zeitschr. 33: 406. 1883; Kuntze, Rev. Gen. Pl. 2: 510. 1891; J. Camus, Récept. Franç. in Bull. Soc. Syndic. Pharmac. Côte-d'Or. 10. 1892; J. Feller, Bull. Folklore 2: 105--109. 1893; Nairne, Flow. Pl. West. India 249. 1894; Van Tieghem, Élémt. Bot., ed. 3, 2: 373. 1898; Bidault, Superst. Méd. Morvan 36. 1899; Diels, Fl. Cent.-China 547. 1902; Anon., Rev. Tradit. Populaires 1904: 162 (1904) and 1905: 160 & 296. 1905; Druce & Vines, Dill. Herb. 78. 1907; Rolland, Fl. Populaire 8: 38--43. 1910; Gilg in Engl., Syllab. Pflanzenfam., ed. 7, 314, fig. 413C. 1912; Loes., Verh. Bot. Ver. Brand. 53: 74. 1912; Gilg in Engl., Syllab. Pflanzenfam., ed. 8, 318, fig. 413C (1919) and ed. 9 & 10, 339, fig. 418C. 1924; Robledo, Bot. Med. 267. 1924; Krause in Just, Bot. Jahresber. 44: 1172. 1926; Fedde in Just, Bot. Jahresber. 44: 1534. 1927; Freise, Bol. Agric. São Paulo 34: 480 & 494. 1933; Gunther, Herb. Apul. Barb. [16v], [35v], 106, 128, 129, & 133. 1935; E. D. Merr., Trans. Am. Phil. Soc., ser. 2, 24 (2): [Comm. Lour.] 331 & 444. 1935; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 339, fig. 432C. 1936; F. Hernandez, Hist. Pl. Nuev. Españ., ed. 2, 653 & 674. 1943; Roi, Atl. Pl. Méd. Chin. [Mus. Heude Bot. Bot. Chin. 8:] 96. 1946; Hatta, Kubo, & Watanabe, List Med. Pl. 14. 1952; Sonohara, Tawada, & Amano [ed. E. H. Walker], Fl. Okin. 132. 1952; Pételot, Arch. Recherch. Agron. & Past. Viet. 18: [253]. 1953; Pételot, Pl. Méd. Camb. Laos & Viet. 2: 243 (1954) and 4: 21, 39, 70, 170, 184, 193, 208, & 300. 1954; L., Hort. Cliff., imp. 2, 11. 1968; J. Hutchinson, Evol. & Phylog. Flow. Pl. Dicot. 470, fig. 444. 1969; Rimpler, Lloydia 33: 491. 1970; Saxena, Bull. Bot. Surv. India 12: 56. 1970; Scully, Treas. Am. Ind. Herbs 283. 1970; Anon., Bioresearch Ind. 7: 1061. 1971; Kachroo, Singh, & Malik, Bull. Bot. Surv. India 13: 52. 1971; Kaul, Bull. Bot. Surv. India 13: 240. 1971; Gilmour, Thom. Johnson 31, 50, 78, 106, 107, & 122. 1972; Healy, Gard. Guide Pl. Names 37 & 225. 1972; Frohne & Jensen, System. Pflanzenr. 203, 261, & 305. 1973; Hilbig, Wiss. Zeitschr. Mart. Luth. Univ. Halle 22: 56 & 102. 1973; Law, Concise Herb. Encycl. 85 & 263. 1973; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; Ellenberg, Script. Geobot. 9: 80. 1974; Farnsworth, Pharmacog. Titles 9 (4): x. 1974; R. D. Gibbs, Chemotax. Flow. Pl. 3: 1752--1755 (1974) and 4: 2295. 1974; León & Alain, Fl. Cuba, imp. 2, 2: 281. 1974; Loewenfeld & Back, Complete Book Herbs & Spices 261--264. 1974; A. & D. Löve, Cytotax. Atl. Slov. Fl. 601 & 1241. 1974; Portères, Journ. Agric. Trop. & Bot. Appl. 21: 6. 1974; Stanley & Linskens, Pollen 47, 95, & 306. 1974; Sunding, Garcia de Ort. Bot. 2: 20. 1974; Täckholm, Stud. Fl. Egypt, ed. 2, 454. 1974; Whitney in Foley, Herbs Use & Delight [207]. 1974; R. & A. Fitter, Wild Fls. Brit. & N. Eu. 192, 193, & 336. 1975; Kooiman, Act. Bot. Neerl. 24: 464. 1975; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: 88, 90, & 93. 1975; Weberling & Schwantes, Pflanzen syst., ed. 2 [Ulmer, Uni-Taschenb. 62:] 144. 1975; Moldenke, Phytologia 30: 156--161 (1975), 31: 410 & 412 (1975), and 34: 249, 254, 260--262, 266, & 279. 1976; Anon., Biol. Abstr. 61: AC1.732. 1976; Gal-

iano & Cabezudo, Lagascalia 6: 150. 1976; Keys, Chinese Herbs 283—284 & 387. 1976; Lakela, Long, Fleming, & Genelle, Pl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 116 & 182. 1976; Lousley, Fl. Surrey 282, map 288. 1976; Soukup, Biota 11: 19. 1976; E. H. Walker, Fl. Okin. & South. Ryuk. 883—884. 1976; Moldenke, Phytologia 36: 40, 126, 138, & 152. 1977; A. L. Moldenke, Phytologia 36: 87. 1977.

Additional illustrations: H. Bock [Tragus], Stirp. Max. Germ. 102. 1552; Schnitzlein, Iconogr. Fam. Nat. 2: 137 Verbenac. fig. 4-22 [partly in color] & 30. 1856; Van Tieghem, Élém. Bot., ed. 3, 2: 373. 1898; Gilg in Engl., Syllab. Pflanzenfam., ed. 7, 314, fig. 413 C (1912), ed. 8, 318, fig. 413 C (1919), and ed. 9 & 10, 339, fig. 418 C. 1924; Gunther, Herb. Apul. Barb. [16v]. 1935; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 339, fig. 432 C. 1936; Roi, Atl. Pl. Méd. Chin. [Mus. Heude Not. Bot. Chin. 8:] 96. 1946; J. Hutchinson, Evol. & Phylog. Flow. Pl. Dicot. 470, fig. 414. 1969; Loewenfeld & Back, Complete Book Herbs & Spices [262]. 1974; R. & A. Fitter, Wild Fls. Brit. & N. Eu. 193, fig. 7 (in color). 1975; Keys, Chinese Herbs 283. 1976.

Recent collectors have encountered this plant "along water channels", in irrigated wheat fields, and "on granite substrate".

Lakela and her associates (1976) aver that in the Tampa Bay [Florida] area V. officinalis inhabits "trails, wooded lots, [and] burns", flowering from spring to fall, but it is most probable that the reference here is to V. halei Small.

Mrs. Clemens refers to V. officinalis as a "common weed" in Queensland. Hendricks 590, cited below, was "purchased in market place" in Durango, Mexico, and is questionably referred here — it may, instead, actually represent the top portion of a native Mexican species.

Hutchinson (1969) regards the Verbenaceae (of which Verbena officinalis is the type species of the type genus) as the culmination of the "fundamentally woody phylum, Lignosae" and therefore "at the end of the author's system" of classification of flowering plants (dicotyledons).

Sunding (1974) records V. officinalis from Santiago Island in the Cape Verde Islands, citing Sunding 2849, while Webb (1849) cites Hooker f. 120 from Santo Jacobi island. Saxena (1970) reports it as "Rare in open places" in India, citing Indorkar 11146. Kaul (1971) refers to it as an "Annual herb. Flowers pinkish white" and found it to be "rare" in Kashmir, India, flowering and fruiting there from June to August, citing Kaul 4624S. Strand (1756) records it from Palestine. Sonohara and his associates (1952) refer to it as "A perennial herb, common on plains; used for drugs" in Okinawa and records the common name, "kumatsuzura". Walker (1976) cites Hatusima 24199 from Yonaguni island. Lousley (1976) reports that in Surrey (England) it is "locally frequent" in "Chalk downs, quarries, waste places and roadsides, in dry places on chalk or gravel soils. Most common on the chalk."

The illustration given by Loewenfeld & Back (1974), purporting to depict V. officinalis, is horribly poor and most unrepresentative of that taxon. The illustration given by Schnitzlein (1856), purporting to be of V. supina L., seems to represent V. officinalis instead.

Friese (1933) comments that "A familia das Verbenaceas conta no Estado do Espirito Santo [Brazil] uma representante não descrita ainda, pertencente ao genero Verbena, bem affim á especie V. officinalis L., em fôrma de subarbusto escandente, parcamente armado de espinhos; folhas oppostas e denteadas; inflorescencia em fôrma de espiga com flôres amarellas ou brancas; fruto drupaceo". This he follows with a description of the medicinal uses for the leaves, but it is most uncertain to what plant he is here referring: possibly a Lantana, but most certainly not Verbena officinalis!

Petólot (1953) affirms that V. officinalis "Répandue dans toutes les régions tempérées et même tropicales" [in Indochina]. "C'est une plante amère légèrement tonique. Au Centre-Vietnam, la plante est considérée comme amère et aromatique et Loureiro... signale qu'elle est employée en décoction contre l'hydropisie et en cataplasmes sur les tumeurs du scrotum. D'après le R. P. Robert, elle passe pour régulariser les menstrues et pour guérir la 'boule hystérique'. Pour cela, on en prépare une purée que l'on fait cuire et qui se prend avec de l'alcool de riz." The Chinese name for the plant there is "ma pien ts'ao", the Vietnamese name is "cò roi ngà", and in Mexico the Mayan name is "chichi-antic".

Linnaeus (1737) says of this species "Crescit juxta areas & vias inque locis ruderatis per Belgium, Angliam, Galliam, &c." Breyne (1739) says of it "VERBENA vulgaris folio variegato; nobis in Horto Honestissimae Sapientissimaeque Matronae, Domine de Flines, collegimus. Verbenae Notae: 1) Flores tubulosi, in extremo vdx galeati & labiati, in caulium nec non ramorum summo, vel etiam in virgulis longis e foliorum sede exsuntibus spicatum ut plurimum dispositi; 2) Calix foliolis constructus; 3) Semina quaterna oblonga."

In addition to the several hundred vernacular names recorded by me in previous installments of this series of notes, Rolland (1910) lists the following: "aelius", "auricula vervicina", "ayàn nouthay", "barbântano", "barbénega", "barbáno", "barbèra", "barlenn", "benerea", "beneria", "berbeana", "bèrbég", "bèrbèn", "berbenaca", "bèrbéno", "bèrbiéno", "bèrmây'no", "bèrmèno", "biscopwurtil", "bona herba Veneris", "bonion", "bordèno", "botanica", "bouono barbéno", "brébouane", "centrum galli", "cincinalis", "clumbeina", "columbaine", "columbaria", "columbaris", "columbina recta", "columbyne", "créy'jéta", "créy'séta", "crijéta", "crista gallinacia", "crous", "dametra", "darbèno", "demedria", "demetina", "demetria", "diosatin", "diosatin", "eisebrich", "emagallis", "erba colombina", "erba de san-Gioan", "erba milzea", "erba minsaea", "erbo crousado", "erbo crusado", "erbo dé la mèrbêlho", "erbo dé la rato", "erbo dé lo bèrbèno".

[to be continued]

HELICONIA IN NICARAGUA

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The flora of Nicaragua is presently being studied by Mr. Frank C. Seymour of The Herbarium, University of Florida. Mr. Seymour and companions have made six expeditions to Nicaragua between 1968 and 1975. Several collections of Heliconia were made on these expeditions. With the encouragement of Mr. Seymour, the author, utilizing the Seymour collection and information accumulated in a thesis on the genus Heliconia of Middle America, decided to contribute to the flora of Nicaragua by writing the "Heliconia in Nicaragua".

The format of this paper is similar to "Cassia in Nicaragua" by Mr. Seymour. It consists of an introduction, generic description, artificial key to the species of Heliconia in Nicaragua, an annotated systematic list. Since there are a new species and two new varieties whose ranges include Nicaragua, a section on new names and combinations follows the annotated systematic list.

The genus Heliconia is included in the family Musaceae. It is characterized in the following manner: perennial, herbaceous, erect plants of various heights (1-5 m., occasionally taller); musoid or cannoid habit. Leaves frequently large, distichous or appear as such. Inflorescence terminal, erect or pendulous, consisting of few to many, usually bright colored, boat-shaped branch-bracts, either distichous or spirally arranged. Branch-bracts enclose clusters of flowers. Each flower subtended by a floral-bract. Flowers perfect. Perianth consists of two whorls; calyx with connate abaxial sepals, free adaxial sepals; corolla with connate petals except for free margins opposite adaxial sepal. Stamens 6, 5 functional and one staminode. Anthers linear. Stigma lobed, clavate or subclavate. Style filiform, straight or geniculate. Ovary inferior; fruit 3-loculed, berry-like (fleshy schizocarp). Seed stony.

ARTIFICIAL KEY TO THE SPECIES

- A. Branch-bracts overlapping forming close-knit spike, rachis covered..... B
- B. Inflorescence pendent..... H. mariae
- B. Inflorescence erect..... H. imbricata

- A. Branch-bracts separated (distant on rachis) with rachis showing, or partially overlapping with thick branch-bracts 12-18 cm. long ..... C
- C. Mature inflorescence pendent..... D  
 D. Branch-bracts spiralled..... H. collinsiana  
 D. Branch-bracts distichous..... H. longa
- C. Mature inflorescence erect..... E
- E. Inflorescence sessile or subsessile, branch-bracts thick, deep boat-shaped, may be partially overlapping with rachis diameter 1 cm. or more..... H. wagneriana
- E. Inflorescence usually peduncled, branch-bracts not thick, moderate to shallow boat-shaped with rachis diameter less than 1 cm. thick..... F
- F. Plants with cannoid habit; leaves sessile or nearly so; leaf-blade not more than 55 cm. long..... G
- G. Branch-bracts orange, flowers white or cream-white ..... H
- H. Flowers shorter than or as long as branch-bracts; perianth less than 5 cm. long.....  
 ..... H. aurantiaca
- H. Flowers longer than branch-bracts; perianth more than 5 cm. long..... H. longiflora
- G. Branch-bracts red, flowers red or yellow..... I
- I. Flowers red, perianth puberulent to hirsute...  
 ..... H. hirsuta var. rubiflora
- I. Flowers yellow, often with green apices, perianth glabrous..... H. vaginalis
- F. Plants with musoid habit; leaves petioled; if cannoid habit, lower leaf-blades more than 55 cm. long..... J
- J. Branch-bracts spiralled..... K
- K. Branch-bracts yellow with red apices or yellow-orange; rachis glabrous... H. latispatha
- K. Branch-bracts red; rachis tomentose.....  
 ..... H. tortuosa
- J. Branch-bracts distichous..... L
- L. Branch-bracts 12-22, close together, strongly curved upward..... H. librata
- L. Branch-bracts 4-11, widely spaced, extend out horizontally or reflexed..... M
- M. Branch-bracts deep red to orange scarlet, perianth 4.0-4.5 cm. long, slightly pubescent; petioles short..... H. osaensis
- M. Branch-bracts yellow to orange, perianth 2.5-3 cm. long, villous; petioles long....  
 ..... H. schiedeana var. spissa

## ANNOTATED SYSTEMATIC LIST

1. H. aurantiaca Ghiesbr. in Lemaire's L'Illustr. Hort. Pl. 332. 1862. Synonyms: Bihai aurantiaca (Ghiesbr.) Griggs, Bull. Torr. Bot. Club 31: 445. 1904. H. brevispatha Hook. in Curtis's Bot. Mag. t. 5416. 1864. H. choconiana S. Wats. in Proc. Amer. Acad. 23: 284. 1888. Bihai choconiana (S. Wats.) Griggs, Bull. Torr. Bot. Club 31: 445. 1904. H. crassa Griggs, Bull. Torr. Bot. Club 30: 646. 1903. Bihai crassa (Griggs) Griggs, Bull. Torr. Bot. Club 31: 445. 1904. Range: s. Mexico to Costa Rica. NICARAGUA: DEPT. ZELAYA: Comarca del Cabo, San Mateo (circa de Rio Wawa), A. Molina 15065 (F); El Recreo, L. E. Long 54 (F).
2. H. collinsiana Griggs, Bull. Torr. Bot. Club 30: 648. 1903. Synonym: Bihai collinsiana (Griggs) Griggs, Bull. Torr. Bot. Club 31: 445. 1904. Range: s. Mexico to Costa Rica. NICARAGUA: DEPT. MANAGUA: between El Curcero and house of Finca Santa Julia, P. C. Standley 8380 (F).
3. H. hirsuta L. f. var. rubiflora R. R. Smith var. nov. See section on treatment of new names and combinations.
4. H. imbricata (O. Ktze.) Baker, Ann. Bot. 7: 191. 1893. Synonym: Bihai imbricata O. Ktze., Rev. Gen. Pl. 2: 684. 1891. Range: Nicaragua to Panama. NICARAGUA: DEPT. ZELAYA: Comarca del Cabo, Miguel Bikon, S. B. Robbins 5863a (MO, SEY).
5. H. latispatha Benth., Voy. Sulph. 170-171. 1844. Synonyms: Bihai latispatha (Benth.) Griggs, Bull. Torr. Bot. Club 31: 445. 1904. H. meridensis Kl. in Linnaea 20: 463. 1847. Bihai meridensis (Kl.) O. Ktze., Rev. Gen. Pl. 2: 685. 1891. Range: s. Mexico to n. S.A. NICARAGUA: DEPT. CHINANDEGA: Chinandega, C. F. Baker 2016 (GH, MO, UC, US); Ameya, W. R. Maxon, A. D. Harvey, and A. T. Valentine 7188 (US). DEPT. GRANADA: Mombacho Volcano, L. O. Williams and A. Molina 20027 (F). DEPT. MANAGUA: Managua, Garnier 862 (MICH, US); Los Nubes, s. of Managua, W. R. Maxon, A. D. Harvey and A. T. Valentine 7500 (US); Tipitapa, F. C. Seymour and J. T. Atwood 2827 (BM, ENAG, F, GH, MICH, MO, NY, SEY, SMU, UC, WDP). DEPT. RIVAS: Penas Blancas, J. T. Atwood 1809 (BM, ENAG, F, GH, NO, NY, SEY, SMU, UC, WDP). DEPT. ZELAYA: El Recreo, R. B. Hamblett 328 (GH, SEY); Rama, S. A. Marshall and D. A. Neill 6460 (SEY); Comarca del Cabo, San Mateo, A. Molina 15096 (F); Corn Island, F. C. Seymour and J. T. Atwood 4266 (BM, ENAG, GH, SMU).
6. H. librata Griggs, Bull. Torr. Bot. Club 30: 649. 1903. Synonym: Bihai librata (Griggs) Griggs, Bull. Torr. Bot. Club 31. 1904.

Range: s. Mexico to Nicaragua.

NICARAGUA: DEPT. ZELAYA: Comarca del Cabo, Slima Sia, A. Molina 1470 (F); Comarca del Cabo, Miguel Bikon, S. B. Robbins 5863 (SEY).

7. H. longa (Griggs) Winkl. in Eng. and Prantl. Nat. Pflanzenf. 2 Aufl. 15A: 536. 1930. Synonym: Bihai longa Griggs, Bull. Torr. Bot. Club 31: 446. 1904. Range: Nicaragua to Panama.  
NICARAGUA: DEPT. ZELAYA: 5 mi. w. of Bonanza, J. T. Atwood and D. A. Neill 6995 (MO, SEY); El Recreo, P. C. Standley 19407 (F).
8. H. longiflora R. R. Smith sp. nov.  
See section on treatment of new names and combinations.
9. H. mariae Hook. f., Jour. Linn. Soc. Bot. 7: 68-69. 1864.  
Synonyms: Bihai mariae (Hook. f.) O. Ktze., Rev. Gen. Pl. 2: 684. 1891. H. elegans Peters. in Mart. Fl. Bras. 33: 12. 1890. Bihai elegans (Peters.) O. Ktze., Rev. Gen. Pl. 2: 684. 1891. H. punicea (Griggs) L. B. Smith, Contr. Gray Herb. 124: 6. 1939. Bihai punicea Griggs, Bull. Torr. Bot. Club 42: 321. 1915.  
Range: Guatemala and Belize to S. A.  
NICARAGUA: To date there are no recorded specimens of this species for Nicaragua. The range of the species indicates it should be present.
10. H. osaensis Cuf., Archivio Bot. 9: 189. 1933. Range: Nicaragua to Panama.  
NICARAGUA: DEPT. ZELAYA: San Antonio de Susun, region of Braggman's Bluff, F. C. Englesing 138 (F, US); El Recreo, L. E. Long 45 (F); Area Del Ocotal, Rio Grande, A. Molina 2332 (F, GH); El Recreo, P. C. Standley 19363 (F).
11. H. schiedeana Kl. var. spissa (Griggs) R. R. Smith var. nov.  
See section on treatment of new names and combinations.
12. H. tortuosa Griggs, Bull. Torr. Bot. Club 30: 650. 1903.  
Synonym: Bihai tortuosa (Griggs) Griggs, Bull. Torr. Bot. Club 31: 445. 1904. Range: Guatemala to Costa Rica.  
NICARAGUA: DEPT. JINOTEGA: Las Mercedes, e. of Jinotega, P. C. Standley 10724 (F). DEPT. MADRIZ: Volcan Somoto, s. of Somoto, L. O. Williams and A. Molina 20274 (F). DEPT. MATAGALPA: along road to La Fundadora, L. O. Williams, A. Molina and T. P. Williams 24827 (F).
13. H. vaginalis Benth., Bot. Voy. Sulph. 171. 1844. Range: s. Mexico to n. S. A.  
NICARAGUA: DEPT. MATAGALPA: about 6-10 km. n. e. of Matagalpa, L. O. Williams, A. Molina and T. P. Williams 23823 (F).

DEPT. ZELAYA: Braggman's Bluff, F. C. Englesing 254 (F, US); El Recreo, L. E. Long 65 (F); Montana Esquipulas, P. J. Shank and A. Molina 4728 (F); Comarca del Cabo, Miguel Bikon, B. W. Taylor 4554 (F).

14. H. wagneriana O. G. Peters. in Mart. Fl. Bras. 3 pt. 3: 12. 1890. Synonyms: Bihai wagneriana (Peters.) O. Ktze., Rev. Gen. Pl. 2: 685. 1891. H. elongata Griggs. Bull. Torr. Bot. Club 30: 653. 1903. Bihai elongata (Griggs) Griggs, Bull. Torr. Bot. Club 31: 445. 1904.  
NICARAGUA: DEPT. ZELAYA: Comarca del Cabo, San Mateo, cerca de Rio Wawa, A. Molina 15077 (F).

#### TREATMENT OF NEW NAMES AND COMBINATIONS

The following new names and combinations are those belonging to Central American species of Heliconia. The new taxa discussed here are H. longiflora, H. hirsuta var. rubiflora and H. schiedeana var. spissa. Their ranges include Nicaragua. A brief treatment of the species H. schiedeana and H. hirsuta, are included with the discussion of each variety.

Heliconia longiflora R. R. Smith, sp. nov.

Planta cannoidis, 2-5 m. alta. Lamina lanceolato-elliptica, 17-29 cm. longa, 5-7 cm. lata; apice acuminata. basi obtusa. utriusque viridis. Inflorescentia erecta, 10-15 cm. longa, glabra, breviter pedunculata, rhachi leviter flexuoso. Bractae 4-9, aurantiacae, glabrae, lanceolatae, non profunde cymbiformes, 4.5-9 cm. longae. Bractae internae florales 4 cm. longae, deciduae, lanceolatae, membranaceae, glabrae. Flores in bractearum axillis 3-8, albi ad cremei, 1-1.5 cm. longe pedicellati; perianthium 5.5-6.0 cm longum, glabrum. Fructus caeruleus, ca. 1 cm. diametro.

Slender plants 2-5 m. tall, cannoid habit. Leaf-blade lanceolate-elliptic, 17-29 cm. long, 5-7 cm. wide, long acuminate apex, obtuse base; upper and lower surfaces green; petiole nearly absent or leaf-blade sessile. Inflorescence erect, 10-15 cm. long, glabrous; peduncle short, if present 0.3 cm. diameter; rachis slightly flexuose, 0.2 cm. diameter. Branch-bracts 4-9, orange, glabrous, lanceolate, shallow boat-shaped; lower branch-bracts 9 cm. long; upper branch-bracts 4.5-7.0 cm. long; all branch-bracts 0.6 cm. side width; internode between branch-bracts ca. 1 cm. Floral-bracts few, deciduous, lanceolate, membranous, 4 cm. long, ca. 0.5 cm. wide, glabrous. Flowers 3-8, white to cream, glabrous, 7 cm. long; perianth 5.5-6.0 cm. long; pedicel 1.0-1.5 cm. long. Fruit blue, subglobose to 3-sided, 0.8-1.0 cm. diameter. Seeds not seen.

Type: PANAMA. PROV. COLON: vicinity of Camp Pina, alt. 25 m., 11 July 1946, P. H. Allen 3590 (Holotype: US; Isotypes F, NY, UC) (Fig. 1).

Distribution: Edge of moist forest and along river margins, low altitudes. It appears to be restricted to Central America in the countries of Nicaragua, Costa Rica and Panama.

This species was previously included with H. aurantiaca, since it also possesses the orange branch-bracts. The flowers in H. aurantiaca are cream to yellow colored. In H. longiflora the flowers are white, and then change to cream color when they mature. The flowers of H. longiflora are nearly 2 cm. longer than those of H. aurantiaca. As noted in the key, H. aurantiaca possesses flowers which are normally shorter than or as long as the bracts. The flowers of H. longiflora are normally longer than the bracts.

Representative Specimens:

COSTA RICA: PROV. ALAJUELA: lowland rain forest between Los Chiles and Venecia, Llanura de San Carlos, alt. 100 m., 20 Feb. 1966, A. Molina R., L. O. Williams, W. Burger, B. Wallenta 17574 (F). PROV. PUNTARENAS: edge of forest between Golfo Dulce and Rio Terraba, alt. 30 m., Dec. 1947, A. F. Skutch 5397 (US); in forest, basin of El General, alt. 675-900 m., March 1940, A. F. Skutch 4761 (GH, NY).

NICARAGUA: DEPT. ZELAYA: open bush, vicinity of El Recreo, 12 Aug. 1947, L. E. Long 59 (F).

PANAMA: CANAL ZONE: n.w. part of Canal Zone, area w. of Limon Bay, Gatun Locks and Gatun Lake, 8 Nov. 1955, I. M. Johnston 1625 (GH); forests around Puerto Obaldia, San Blas coast, alt. 0-50 m., Aug. 1911, H. Pittier 4285 (GH). PROV. COCLE: La Mesa, 31 Aug. 1941, P. H. Allen 2692 (GH, MO). PROV. COLON: vicinity of Camp Pina, alt. 25 m., 11 July 1946, P. H. Allen 3590 (F). PROV. DARIEN: Rio Chico across from Boca de Tesca along the top of a ridge, 18 July 1962, J. A. Duke 5209 (MO); ascent of Cerro Pirre from Rio Pirre s. of El Real, 600-750 m., 11 Aug. 1962, J. A. Duke 5304 (MO); along Pam Am Highway between Pucro and Rio Punusa, 3 Aug. 1962, J. A. Duke 5303 (MO) Cana-Cuasi Trail (Camp 2) Chepigana district, alt. 2000 ft., 9 March 1940, M. E. Terry and R. A. Terry 1423 (F). PROV. PANAMA: ca. 7 mi. n. Cerro Azu on road to Cerro Jefe, elev. ca. 2600 ft., 13 Nov. 1965, K. E. Blum, R. K. Godfrey, and E. Tyson 1843 (FSU); on trail to Cerro Campana, 23 Aug. 1967, J. H. Kirkbride, Jr. and Sister Hayden 297 (MO).

Heliconia hirsuta L. f., Suppl. Syst. Veg. 158. 1781. Synonyms: Bihai hirsuta (L. f.) O. Ktze., Rev. Gen. Pl. 2:684. 1891. H. straminea (Griggs) Standley, Jour. Wash. Acad. Sci. 17:162. 1927.



Fig. 1. Holotype of H. longiflora (US).

Bihai straminea Griggs, Bull. Torr. Bot. Club 42:327. 1915.

Slender plant, 1-3 m. tall; cannoïd habit. Inflorescence erect, nearly glabrous to pubescent, 6-9 cm. long. Branch-bracts 4-9, dark, brick-red or straw-yellow with greenish tinge, shallow boat-shaped. Floral-bracts deciduous, ca. 1.5-1.8 cm. long. Flowers 4-12 per branch-bract, yellow with green apices or completely red, ca. 3.5-4.5 cm. long; perianth 2.2-3.0 cm. long; pedicel 0.4-1.8 cm. long, slightly pubescent to hirsute.

Distribution: Moist thickets and woods, along banks of rivers and edges of forest swamps. Heliconia hirsuta is common in the northern part of South America, and extends up into Panama. The variety is found farther north in the Central American countries of Belize and Nicaragua.

Heliconia hirsuta is not easily confused with other species of Heliconia, since it is of smaller stature and possesses hirsute inflorescences. Heliconia hirsuta var. hirsuta has a very pubescent perianth, and the var. rubiflora possesses a slightly to moderately pubescent perianth. The two varieties are similar in habit, and in occupying similar habitats.

#### Key to Varieties of Heliconia hirsuta

Plant 1-3 m. tall; perianth yellow with green tip, hirsute.....  
var. hirsuta

Plant ca. 1 m. tall, perianth brick-red; slightly to moderately hirsute.....  
var. rubiflora

#### Heliconia hirsuta L. f. var. hirsuta

Branch-bracts 5-9, red to yellow, lower branch-bracts 9-11 cm. long. Upper branch-bracts 3-4 cm. long. Flowers 4-10 per branch-bract, pale yellow with greenish tips, hirsute, 3.5-4.5 cm. long; perianth 2.5-2.8 cm. long, hirsute; pedicel 1.0-1.8 cm. long, hirsute-tomentose.

Distribution: Extends throughout northern South America into Panama.

#### Heliconia hirsuta L. f. var. rubiflora R. R. Smith var. nov.

Planta ca. 1 m. alta. Lamina 15-25 cm. longa, 5-6 cm. lata. Bracteae 4-5, rubrae; bracteae infernae 6-11 cm. longae. Flores in bractearum axillis 4-8, rubri; perianthium 2.5-3.0 cm. longum, puberulum ad sparse hirsutum.

Plant ca. 1 m. tall. Leaf-blades 15-25 cm. long, 5-6 cm. wide. Branch-bracts 4-5, red; lowest branch-bracts 6-11 cm. long, uppermost branch-bracts 2.5-4.0 cm. long; all branch-bracts 0.4-0.7 cm. side width. Flowers 4-8 per branch-bract, red, 3.5-4.0 cm. long; perianth 2.5-3.0 cm. long, puberulent to slightly hirsute with short whitish hairs.

Type: BELIZE. DIST. STANN CREEK: swamp places, Stann Creek, alt. 20 ft., 19 Sept. 1967, W. A. Schipp 357 (Holotype: MO; Isotypes F, MICH, NY, UC).

Distribution: Has been found in only two Central American countries, Belize and Nicaragua.

Representative Specimens:

BELIZE: DIST. STANN CREEK: growing in open flats, Stann Creek, 6 Dec. 1931, W. A. Schipp 835 (F, MICH, MO, NY, UC).

NICARAGUA: DEPT. ZELAYA: Comarca del Cabo, Francis Sirpi, between Waspan and Puerto Cabezas, elev. 0-100 m., 15 Mar. 1971, J. T. Atwood 4793 (MO, SEY); near Esperanza, Rio Grande, alt. 0-15 m., 10 April 1949, A. Molina R. 2127 (F); Comarca del Cabo, rain forest, Miguel Bikon, 13 July 1972, S. B. Robbins 5863 b (MO, SEY); Comarca del Cabo, Cororia Bush, 40-45 km. s.w. of Waspan, rain forest, elev. 10-100 m., 21 Jan. 1970, F. C. Seymour and J. T. Atwood 3725 (GH, MO, SEY); Comarca del Cabo, swamp near Bilwaskarma, elev. 0-100 m., 14 Mar. 1971, F. C. Seymour 4702 (SEY).

Heliconia schiedeana K., Linnaea 20:463. 1847. Synonyms: Bihai schiedeana (Kl.) O. Ktze., Rev. Gen. Pl. 2:685. 1891. H. hirsuta Cham. and Schlect. in Linnaea 6:57. 1831. (non H. hirsuta L. f.). H. pochutlensis Conzatti, Fl. Tanon Mex. 3:129. 1947.

Moderately stout plant, 1.5-3.0 m. tall, musoid habit. Inflorescence erect, pubescent, 25-30 cm. long. peduncled; rachis slightly flexuous to straight, densely tomentose pubescent, spiralled. Branch-bracts 6-12, dark-red, red-green yellow to orange, shallow boat-shaped, may become strongly reflexed while maturing. Floral-bracts 4-8, long ovate to wide lanceolate, 3-4 cm. long, 0.5-1.0 cm. wide, often pubescent on outer surface. Flowers 6-21 per branch-bract, yellow densely villous; perianth 2.5-5.0 cm. long, villous; pedicel 1.0-1.5 cm. long, villous-pilose. Fruit dark, subglobose to 3-sided, villous, ca. 1 cm. diameter.

Heliconia schiedeana is not closely related to other species

of Heliconia. The outstanding characteristics of the species are the pubescence of the inflorescence and the showy floral-bracts extending out over the long thin branch-bracts. The fruits are exposed on long, hairy pedicels, and not hidden within the branch-bracts.

Key to the varieties of H. schiedeana

Branch-bracts red or red-green; perianth 3.5-5.0 cm. long.....  
var. schiedeana

Branch-bracts yellow or yellow-green; perianth 2.5-3.0 cm. long..  
var. spissa

Heliconia schiedeana Kl. var. schiedeana

Inflorescence erect, pubescent, 15-45 cm. long, rachis slightly to moderately flexuose. Branch-bracts 6-15, dull-red to red-green. Flowers 6-21, pale yellow 3.0-6.5 cm. long; perianth villous.

Distribution: Steep, moist slopes of ravines and mountains. Endemic to Mexico.

Heliconia schiedeana Kl. var. spissa (Griggs) R. R. Smith, var nov.

Synonyms: Heliconia spissa Griggs, Bull. Torr. Bot. Club 30: 652. 1903. Bihai spissa (Griggs) Griggs, Bull. Torr. Bot. Club 31: 445. 1904.

Lamina oblongo-ovata, 60-75 cm. longa, 20 cm. lata, apice acuta, basi roundata; petiolus longus. Inflorescentia erecta, 15-35 cm. longa, pubescenti. Bractae 9-12, luteae ad aurantiacae. Flores in bractearum axillis 10-17, lutei, 4 cm. longi; perianthium 2.5-3.0 cm. longum, villosum.

Leaf-blade oblong-ovate, 60-75 cm. long, 20 cm. wide acute apex, rounded base; petiole long. Inflorescence erect, pubescent, 15-35 cm. long; rachis red, nearly straight. Branch-bracts 9-12, bright yellow to orange; middle branch-bracts 5-7 cm. long. Flowers 10-17 per branch-bract, yellow, 4 cm. long; perianth 2.5-3.0 cm. long, villous. Fruit dark-yellowish color, subglobose to 3-sided, 1 cm. diameter; seed 0.8 cm. long, 0.7 cm. wide; seedcoat sclerified, rough somewhat wrinkled.

Type: GUATEMALA: DEPT. ALTA VERAPAZ: near finca Sepacuite, 30 March 1902, O. F. Cook and R. R. Griggs 359 (US).

Distribution: Rain forest, thickets near river. s. Mexico to Nicaragua.

Representative Specimens:

BELIZE: DIST. BELIZE: in high forest, churchyard on Sibum River, Jan.-June 1936, C. L. Lundell 6950 (MICH, NY). DIST. EL CAYO: between El Cayo and Benque Viejo, 15 Feb. 1931, H. H. Bartlett 11511 (MICH).

GUATEMALA: DEPT. VERAPAZ: thicket along river Pantin, below Tamahu, alt. ca. 600 m., 5 April 1939, P. C. Standley 70571 (F); damp forested slopes, along road between San Crestobal Verapaz and Chexoy, alt. 1200-1300 m., 19 Feb. 1942, J. A. Steyermark 43899 (F). DEPT. PETEN: Tikal, 12-15 April 1931, H. H. Bartlett 12638 (GH, MICH); Santa Teresa, Subin River, 13 April 1933, C. L. Lundell 2890 (F, GH, MICH); Cerro Ceibal, alt. 75-150 m., 30 April 1942, J. A. Steyermark 46089 (F).

HONDURAS: DEPT. COMAYAGUA: Quebrada Montanuelas, alt. 1400 m., 18 July 1962, A. Molina R. 10873 (F); Palm Grove, San Louis, alt. 2500 ft., 5 May 1933, J. B. Edwards 598 (F, GH). DEPT. EL PARISO: Montana Cifuentes, 15 March 1963, A. Molina R. 11404 (F).

MEXICO: STATE CHIAPAS: near Laguna Ocotol Grande, elev. ca. 950 m., 20 July - 20 Aug. 1954, R. L. Dressler 1584 (GH).

NICARAGUA: DEPT. NEUVA SEGOVIA: vicinity of Jalapa, 23 Dec. 1973, J. T. Atwood, S. A. Marshall, and D. A. Neill 6773 (SEY).

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The author wishes to thank Mr. Frank Seymour and Dr. Gilbert Daniels for reading the manuscript and offering valuable comments. Additional gratitude is extended to Dr. Daniels for providing the photograph of the holotype of Heliconia longiflora.

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- Seymour, Frank C. 1973. Cassia in Nicaragua. Phytologia Vol. 27, No. 5:330-348.

## BOOK REVIEWS

Alma L. Moldenke

"FOOD AND AGRICULTURE" edited by Dennis Flanagan and the Board of Editors of "Scientific American Books", iv & 154 pp., illus., W. H. Freeman & Company, San Francisco, California 94104. 1976. \$9.00 hardcover, \$4.95 softcover.

The 12 chapters in this valuable, timely book originally appeared as articles in the September 1976 issue of "Scientific American". It is the 27th issue published annually and separately on a single focus. As in all of these excellent works, the illustrations are of very great value. In this one there are 102 impressive diagrams and special computer-enhanced, multispectral scanning LANDSAT earth-resources satellite photographs.

The chapters are written by different authors with scientific and practical experience. Jean Mayer indicates that about 1/3rd of mankind, mainly in Asia and Africa, is undernourished. Agriculture in the United States, which is really technological agribusiness so advanced that one farmer's efforts feeds 50 others, offers some realistic prospects for feeding some of the 3 billion additional people who will probably join the earth's population by the end of the 20th century. Important!

"THINKING LIKE A MOUNTAIN: Aldo Leopold and the Evolution of an Ecological Attitude Toward Deer, Wolves, and Forests" by Susan L. Flader, xxv & 284 pp., illus., University of Missouri Press, Columbia, Missouri 65201. 1974. \$12.50.

When young, Leopold "thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise" until he watched that first old wolf he had shot die. Years later he was able to conclude "Only the mountain has lived long enough to listen objectively to the howl of a wolf." Leopold used the expression "thinking like a mountain to characterize objective or ecological thinking: it should not be viewed as a personification".

Aldo Leopold (1887-1948) has endeared himself to the many naturalist-oriented readers with "A Sand Country Almanac" (1949) and will continue to do so. He has been a professional conservationist, wildlife manager, etc. in our southwestern national forests and in Wisconsin. He "insisted that the evolution of a 'land ethic' was an intellectual as well as emotional process" involving the ecological leaders and the general public in a philosophy of a natural self-regulating system.

The author has carefully studied available source material to produce this interestingly oriented professional biography.

"LE CONTRÔLE DE L'ALIMENTATION DES PLANTES CULTIVÉES" Volumes I and II, edited by Pál Kozma with the collaboration of D. Polyák & E. Hervay, 1014 pp., illus., Akadémiai Kiadó, Budapest V, Hungary. 1975. \$60.00.

In the fall of 1972 the Third European and Mediterranean Colloquium on this topic met in Budapest with 44 specialists from seven socialist countries, 31 from eleven western countries and 63 from the host country. About 100 basically well documented papers in Russian, German, French, Spanish, Italian, and English, each with its own language summary and one in at least one of the other languages, are grouped in the following sections: (1) general problems and methods, (2) grain, forage and industrial crops, (3) vegetable, ornamental and forest plants, (4) mediterranean subtropical cultivation, (5) viticulture, and (6) fruit culture. Throughout the role of macro- and micro-minerals in plant nutrition, their absorption rhythms, dilution, migration, accumulation, effects and symptoms of excessive or of insufficient amounts, in photosynthesis, in enzyme and in protein synthesis are considered analytically and experimentally.

Much valuable information is contained within the covers of these two fine volumes.

"MALAYAN WILD FLOWERS — DICOTYLEDONS" by Murray Ross Henderson, 11 & 478 pp., illus., Malayan Nature Society, Kuala Lumpur, Malaysia. Reprint 1974.

"MALAYAN WILD FLOWERS — MONOCOTYLEDONS" by Murray Ross Henderson, 357 pp., illus., Malayan Nature Society, Kuala Lumpur, Malaysia. Reprint 1974. The 2-volume set is available outside of Asia through Otto Koeltz Science Publishers, D-624 Koenigstein/Taunus, West Germany. 86 DM.

Much of this material was first published serially in 1949, 1950 and 1951 in the Malayan Nature Journal. Since the first non-technical work on the local flora was Corner's "Wayside Trees of Malaya", the author of these volumes instead concentrates upon the "majority of the smaller plants to be found not only in the forest, but by the roadsides, on the seashores and in the waste spaces of Malaya." There are 625 figures of line drawings, often multiparted, that illustrate accurately. The keys are readily workable and the text well written by a highly competent author. Since this work was prepared over 25 years ago, it could not record recent nomenclatural changes.

"FAUNA AND FLORA OF THE BIBLE - Helps for Translators" Volume XI by the Committee on Translations of the United Bible Societies, xv & 207 pp., illus., United Bible Societies, London EChV 4BX, England. 1972 paperbound.

After an explanatory introduction and giving a standard set of

abbreviations the biblical animals and then the biblical plants are arranged alphabetically by their English names, their scientific names, transliterations of the textual Hebrew and Greek names, problems of specific identifications, features of behavior and appearance especially in regard to symbolic and figurative usage, and the corresponding scriptural references.

There are several "Difficult Passages" discussed, as in case of the identity of the "behemoth". Ficus sycomorus L. has long been known from the Bible land area and it has been realized for a couple of centuries that the King James translation as "sycamore" is incorrect as the authors of this work carefully explain. It would have been helpful if they would have recommended "sycamore" or "sycamore fig" as the common name. The book is well indexed. This study should prove of real value to many more folks than just biblical translators.

"A GARDEN OF PLEASANT FLOWERS" or "PARADISI IN SOLE: PARADISUS TERRESTRIS" by John Parkinson, x & 626 pp., illus., Facsimile Edition of Dover Publications, Inc., New York, N. Y. 10014. 1976. \$25.00 oversize.

This is an unabridged republication of the 1629 first edition of which there can be only a few precious copies extant. A single page Publisher's Note has been added giving pertinent data about this famous book, including the parody on the author's name shown at the bottom of the Garden of Eden\* cartouche. PARADISI IN SOLE = Park in Sun = Parkinson.

The text in readable English even today discusses about 1000 plants from all over the then-known world that could be grown in English gardens and has 108 full-page plates illustrating 812 of these plants. The bulk of the book comprises a 'Garden of Pleasure' with fragrant herbs, attractively flowering herbaceous plants and shrubs. There is a 'Kitchen Garden' of culinary herbs and vegetables. There is also an 'orchard' with its trees, shrubs and vines producing edible fruit.

There is an index of Latin plant names (pre-Linnean, of course), one of English plant names, and a table of adjunct medicinal uses.

How fortunate it is that many, many people can now join the English Queen Henrietta Maria (to whom this work is dedicated) in perusing at leisure in many private and public libraries this historically and horticulturally significant book.

\*The publishers have used much of this drawing as a cover for their recent reprint of "Bible Plants for American Gardens".

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UNA NUEVA ESPECIE DE  
CROTALARIA (LEGUMINOSAE) DEL VALLE DE MEXICO

Judith Espinosa G.

Laboratorio de Botánica Fanerogámica  
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Instituto Politécnico Nacional  
México 17, D.F.

Al hacer la revisión del género Crotalaria de la familia Leguminosae para la Flora del Valle de México, se encontró un ejemplar determinado como Crotalaria angulata Mill., cuyas características no corresponden a las de esta especie, actualmente considerada como sinónimo de C. rotundifolia var. vulgaris Windler.

Después de revisar el trabajo de Windler\*, llegamos a la conclusión de que dicho ejemplar no corresponde a ninguna de las especies ahí descritas, por lo que pensamos que se trata de una nueva especie.

Crotalaria rzedowskii Espinosa sp. n.

Planta herbacea, annua, erecta, 20-40 cm alta; radix palaris, 1.5-3 mm diametro in parte crassissima; caulis cylindricus, 2 mm diametro, e basi ramosus, pubescens, trichomatibus patentibus, 1-1.5 mm longis; stipulae una vel duae per plantam, aliquod nullae, foliaceae, decurrentes, lobis nullo modo acutis nec patentibus sed brevibus et rotundatis; folia simplicia, elliptico-oblonga, 1.5-4.5 cm longa, 1-2 cm lata, apice rotundato, marginibus integris, basi cuneata, utrinque pubescentia, trichomatibus 1-1.5 mm longis, petiolo 2 mm longo; inflorescentiae oppositifoliae, pedunculo 2-8 cm longo, floribus 4-5 per racemum; bracteae lineari-lanceolatae, 3-5 mm longae, 0.5 mm latae; pedicellus 3-4 mm longus, pilosus; bracteolae lineares, 3-5 mm longae, 0.5 mm latae; calyx 10-14 mm longus, pilosus, trichomatibus adpressis 1 mm longis, tubo 3-4 mm longo;

\* Windler, D. R. Systematic studies in Crotalaria sagittalis L. and related species in North America (Leguminosae). Phil. D. Thesis. Dept. of Botany. University of North Carolina. Chapel Hill. 1970.



Fig. 1.- Crotalaria rzedowskii Espinosa sp. n.

corolla lutea, vexillum vittis vinosis, 10 mm longum, parte superiore 5 mm latum; stamina 10, 5 antheris 1 mm longis, cetera 5 antheris 0.5 mm vel minus longis; stylus 7 mm longus; legumen 2-3 mm longum, 1 cm diametro, glabrum, juventute viride-flavidum, demum nigrum.

Planta herbácea, anual, erguida, de 20 a 40 cm de altura; raíz pivotante de 1.5 a 3 mm de diámetro en su parte más gruesa; tallo cilíndrico, de 2 mm de diámetro, ramificado desde la base, pubescente, con los tricomas extendidos, de 1 a 1.5 mm de largo; estípulas una o dos en toda la planta, a veces ausentes, foliáceas, decurrentes y sin lóbulos agudos extendidos, sino breves y redondeados, hojas simples, elíptico-oblongas, de 1.5 a 4.5 cm de largo por 1 a 2 cm de ancho, ápice redondeado, borde entero, base cuneada, haz y envés pubescente con tricomas de 1 a 1.5 mm de largo, pecíolo de 2 mm de largo; inflorescencias opositifolias con el pedúnculo de 2 a 8 cm de largo, flores 4 a 5 en cada racimo; bracteas linear-lanceoladas, de 3 a 5 mm de largo por 0.5 mm de ancho; pedicelo de 3 a 4 mm de largo, piloso; bracteolas lineares de 3 a 5 mm de largo por 0.5 mm de ancho; cáliz de 10 a 14 mm de largo, piloso, con los tricomas adpresos de 1 mm de largo, tubo de 3 a 4 mm de largo; corola amarilla, estandarte listado de rojo-guinda, de 10 mm de largo por 5 mm de ancho en la parte superior; estambres 10, 5 de ellos con las anteras de 1 mm de largo y los otros 5 con las anteras de 0.5 mm de largo o menos; estilo de 7 mm de largo; legumbre de 2 a 3 cm de largo por 1 cm de diámetro, glabra, de color verde-amarillento cuando no está madura y negra después. Semillas de color verde amarillento, brillantes, de 2 mm de largo. Florece de septiembre a diciembre y fructifica de noviembre a febrero.

Habitat: Es una planta escasa en laderas húmedas del sur del Valle de México con vegetación de encinar, en las que se ha colectado entre 2400 y 2700 m de altitud.

Tipo: MEXICO: DISTRITO FEDERAL: DELEGACION DE TLALPAN: Cerca de Xicalco, sobre la carretera México-Cuernavaca; alt. 2700 m; en ladera andesítica con vegetación de encinar; 25 IX 1966; J. Rzedowski 23205 (ENCB).

Otros ejemplares examinados y tomados en cuenta para la descripción: MEXICO: DISTRITO FEDERAL: DELEGACION DE TLALPAN: Cerca del Mirador, a un lado de la carretera vieja México-Cuernavaca; alt. 2700 m; encinar perturbado; 4 VIII 1972; J. Espinosa 1041 (ENCB). DELEGACION DE XOCHIMILCO: Santa Cecilia; alt. 2550 m; bosque de encinos; 3 X 1976; A. Ventura 2226 (ENCB). Cerro de Santa Cecilia; alt. 2500 m; en ladera con bosque de encino; 6 XI 1976; A. Ventura 2372 (ENCB). Rancho del Conejo; alt. 2400 m; en bosque de encino; 30 I 1977; A. Ventura 2552 (ENCB).

Esta especie pertenece a la subsección Iocaulon de la sección Calycinae del género Crotalaria (Windler op. cit.). La presencia de inflorescencias opositifolias y de pubescencia formada de tricomas extendidos, la aproximan a C. sagittalis L., pero sobre todo a C. rotundifolia var. vulgaris Windler. De la primera difiere en la escasez de estípulas y la forma de las mismas. De la segunda, por ser una planta anual erguida y no perenne y debumbente.

MANCOA ROLLINSIANA, UNA ESPECIE NUEVA DE CRUCÍFERAS ENCONTRADA EN EL VALLE DE MEXICO

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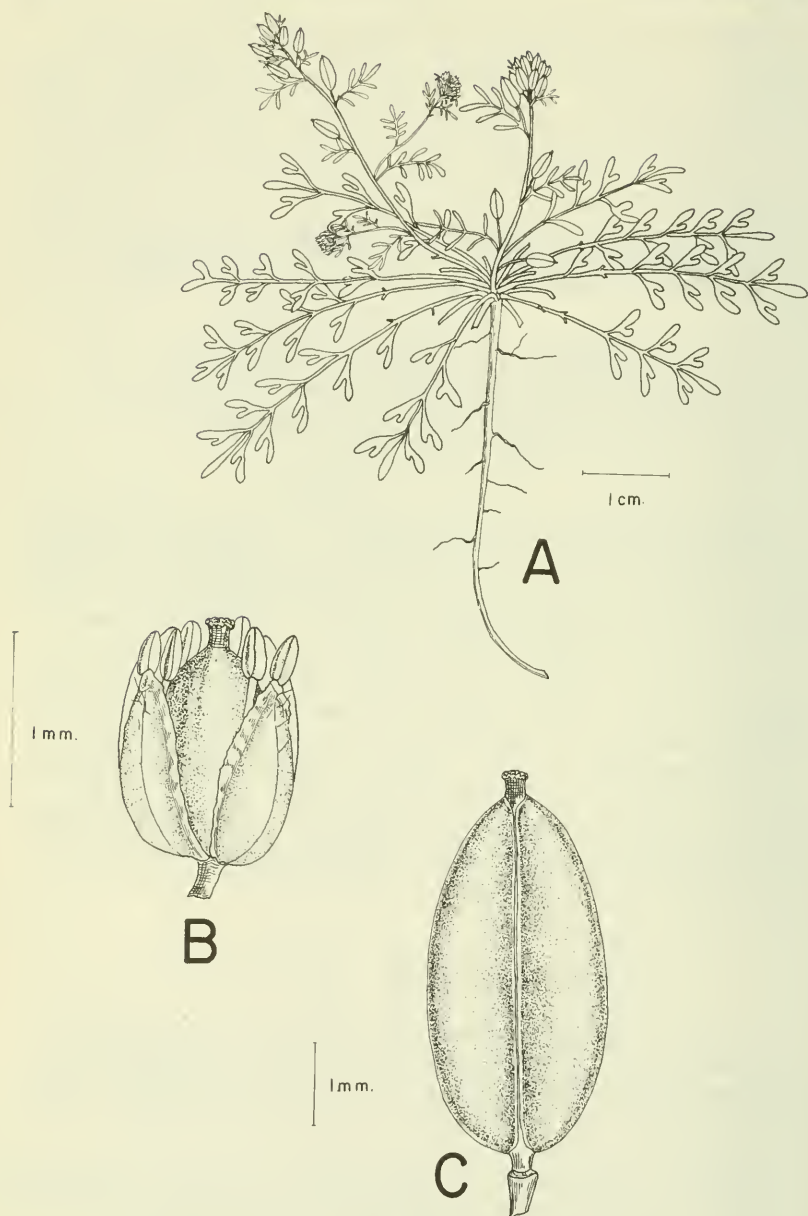
En junio de 1975 colectamos, en los alrededores de la Presa Jaramillo, municipio de Pachuca, Hidalgo, una pequeña planta semi-rastrera, perteneciente a la familia de las Crucíferas y que no habíamos encontrado con anterioridad. Al estudiarla con detenimiento, se llegó a la conclusión de que corresponde al género Mancoa, pero, al no coincidir con las descripciones de ninguna de las especies conocidas, se sospechó que podría tratarse de una nueva entidad. Posteriormente se envió una muestra de la planta al Dr. R. C. Rollins, director del Gray Herbarium de la Universidad de Harvard, quien tuvo la amabilidad de examinar el material y coincidió con esta opinión.

Mancoa rollinsiana Calderón sp. n.

Herba perennis, semirastrera, 5-20 cm diámetro, caules fructiferi usque ad 15 cm alti, pubescentia trichomatibus stellatis et simplicibus sparsioribus; caules plures e basi oriundi; foliorum laminae ambito

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+Trabajo parcialmente subvencionado por el Consejo Nacional de Ciencia y Tecnología, en el marco del proyecto "Flora y vegetación del Valle de México".



Mancoa rollinsiana Calderón. A. Aspecto general de la planta; B. Flor; C. Fruto.

generalis oblongae, pinnatisectae usque ad bipinnatisectae, lobulis ovatis usque ad linearibus, folia basalia usque ad 3.5 cm longa petiolo incluso, usque ad 1 cm lata, caulina similia sed minora, sessilia et plerumque auriculata; inflorescentiae densae, corimbiformes; flores albidii; sepala oblonga, 1.2 mm longa, viridula vel rubella, margine scariosa, decidua; petala nulla vel lineari-oblongata, usque ad 1.2 mm longa, alba, inconspicua et decidua; infrutescentiae elongatae, racemosae, 3-8 cm longae; siliquae ascendentes, glabrae, oblongae, 5 mm longae, 1.5-2 mm latae; semina 35-40 per loculum, 0.5 mm longa, funiculi filamentosi, cum septo post dehiscenciam persistentes.

Hierba baja, perenne, más bien semi-rastrera, extendiéndose radialmente (de 5 a 20 cm de diámetro), aunque las inflorescencias con tendencia a elevarse del suelo hasta unos 15 cm de alto, con pubescencia principalmente de tricomas estrellados, combinados con escasos pelos simples; raíz pivotante larga y delgada; tallos varios, saliendo de la base, de entre las hojas basales; láminas de contorno oblongo en general, las hojas basales pinnatisectas a bipinnatisectas con los lóbulos por lo general ovados a lineares, hasta de 3.5 cm de largo (inclusive el peciolo que mide alrededor de la mitad del largo total), por un máximo de 1 cm de ancho, semejantes a las caulinas, pero estas últimas son sésiles, con frecuencia auriculadas y de dimensiones menores (1.5 cm de largo por 0.8 cm de ancho); inflorescencias, densas, corimbiformes; flores blanquecinas, frecuentemente con una bráctea foliácea en la base; sépalos oblongos, con el ápice algo agudo, inflexo en el botón, poco pubescentes, de 1.2 mm de largo, verdosos o algo rojizos, con el borde escarioso, deciduos; pétalos ausentes o linear-oblongos, inconspicuos y deciduos (a veces hasta de 1.2 mm de largo), blancos; infrutescencias alargadas, en racimos de 3 a 8 cm de largo, más bien ascendentes, siliquas glabras, oblongas, angostándose hacia el ápice, de unos 5 mm de largo por 1.5 a 2 mm de ancho, infladas pero a la vez algo comprimidas en el senti-

do contrario al septo, estilo de 0.3 mm de largo por 0.3 mm de ancho; semillas 35 a 40 en cada lóculo, ovadas a anchamente elípticas, de color café claro, de 0.5 mm de largo por 0.3 mm de ancho, insertas sobre un funículo filamentososo, tortuoso, más largo que la propia semilla y que persiste al igual que el septo después de la dehiscencia.

Tipo: MEXICO: HIDALGO: Alrededores de la Presa Jaramillo, cerca de Cerezo, municipio de Pachuca; en suelo húmedo en pradera de la cola de la presa; alt. 2800 m; 22-VI-1975; Rzedowski 33312 (ENCB; isotipo en GH). Ejemplares en flor y fruto.

Mancoa es un grupo afín a Capsella y algunas de sus especies fueron inicialmente descritas bajo este último nombre genérico. La distribución conocida de Mancoa se restringe al Nuevo Mundo y Rollins (Contr. Dudley Herb. Vol. 3, No. 6: 191-196. 1941) reconoce 4 especies sudamericanas y 3 norteamericanas. De las últimas, todas existen en México y la que se describe aquí extiende más al sur el área conocida del género en Norteamérica.

Evidentemente M. rollinsiana está más relacionada con M. mexicana Gilg & Muschler, de San Luis Potosí, que con cualquier otra especie. Estos dos taxa se distinguen entre sí principalmente en que:

1.- Mancoa mexicana es planta más densamente pubescente y con los tricomas mayores que los propios de M. rollinsiana.

2.- Los frutos de M. mexicana son densamente pubescentes y más anchos que los de M. rollinsiana, cuyas silicuas son totalmente glabras.

3.- El estilo en el fruto de M. mexicana se aprecia más angosto y largo que en el de M. rollinsiana.

Tales características se resumen en el siguiente cuadro:

	Pubescencia de la planta	Diámetro de los tricomas (mm)	Fruto		Estilo Largo y ancho (mm)
			Ancho (mm)	Pubescencia	
<u>M. mexicana</u>	densa	± 0.4	2-3	densa	0.4x0.2
<u>M. rollinsiana</u>	mediana-mente densa	± 0.2	1.5-2	nula	0.3x0.3

El nombre de la especie está dedicado al Dr. Reed C. Rollins, quien por años se ha ocupado del estudio de la familia Cruciferae incluyendo muchos elementos de la flora mexicana y con quien estamos en deuda por su ayuda en la resolución de varios problemas que se han presentado al preparar las Crucíferas para la Flora del Valle de México.

ADDITIONAL NOTES ON THE GENUS VERBENA. XXVI

Harold N. Moldenke

VERBENA OFFICINALIS L.

Additional bibliography: Sweet, Hort. Brit., ed. 1, 1: 325 (1826) and ed. 3, 553, 1839; Moldenke, Phytologia 36: 221, 235, & 247--250. 1977.

Additional vernacular names reported for this species are "ërbo dé mèrvèyo", "ërbo dé Nouéstro-Damo", "erculania", "erva de la mivuzà" [-jaundice-herb], "escalaurus", "eseberus", "exuperans", "exupra matricalis", "eyenchrawl", "ferria", "flegwurt", "fleur de madame", "gerabotannum", "gerobotanis", "grünkraut", "hardiizer", "herba sagminalis", "herba sancti Johannis", "herba sanguinalis", "herba verminata", "herbe à la croix", "herbe à tous maux", "herbe au chat", "herbe de l'effort", "herbena", "herculana", "hiera", "hierobotannum", "hraetelwyr", "iiserhard", "iiserkruid", "isanina", "isarna", "iserenhard", "isinina", "isnwurze", "Juno's teares", "kerckkruid", "kroazik", "lanzaouem ar groaz [-herb of the cross], "lerepontrina", "lirobotannum", "lustago", "menthe de chat", Mercurie's moistblood", "militaris", "morènò", "nymphaea", "palumbaris", "peltoclotis", "peltodotes", "pijounièro", "qanna-biyyé", "recia", "riz' el hhamân" [=pigeon's food], "sabiarella", "sacra frondis", "sacralis", "sacratimen", "sagmen"m "sagmina", "sanguinaria", "thiabsenti", "trixago", "varlenn", "varvan-na", "varvègne", "varvéna", "varvéns", "varvéno", "vèlvène", "vènééré", "vèrbèna", "verbana columbina", "verbena mascula", "verbena recta", "vèr bèn ày", "verbene", "verbien", "verbigena", "vèrlène", "vèrlin-ne", "vermaine", "vèrmèno", "vermina", "verminaca", "verminacia", "verminatio", "verpidion", "vertipedium", "vertipodium", "vertiroedum", "verveine droicte", "vèrvéle", "vèrvèlo", "vervenn", "vervine", "vèrvin-ne", "vèrvouin-ne", "virvoni", "vorouéne", "vouorvéno", "vratour", "vrèvin-na", "werbinádj", "ysendeck", and "yzerne". Quite a few of these names go back to classical times and to the Middle Ages. This brings to 421 the number of vernacular names thus far listed by me for this plant.

Don (1830) calls V. officinalis the "official vervain", V. sororia the "sister vervain", and V. spuria the "spurious vervain" — the first of these he admits as native to England, the second he says was introduced into English gardens from Nepal in 1824, and the third as introduced from "N. Amer." in 1731. Sweet calls the same three taxa the "common", "sister", and "jagged-leaved" vervain and gives 1823 as the date of introduction of the second.

Rolland (1910) also tells us, quoting various (mostly old) authors, that "cette herbe sacrée était cueillie à Rome, sur le Capitole par les Féciaux. Celui qui la portait était appelé 'verbenarius'." Of the name, "fleur de madame", he notes that this is in contradistinction to "fleur de monsieur", which is applied to Sisymbrium officinale. He continues: "L'ërbo de la vérmèno Fo coulá lou sanc

séns doubri la véno - la verveine fait couler le sang sans qu'on ouvre la veine....La verveine passe pour guérir nombre de maladies et en biens des endroits pour garantir des sorciers celui qui la porte sur soi. On emploie cette plante comme détersive, on dit qu'elle mang le sang....Prenez chaque matin, pendant neuf jours, un morceau de pain et une gousse d'ail; puis allez les déposer devant un pied de verveine. Cela fait vous aures soin d'uriner sur le tout; c'est un remède infailible contre les fièvres quartes.... Pisser sur la verveine porte bonheur....Pour morsure de serpent, ardez la vervainne et en faites poudresi la metez sur la morsure, si garira. Et qui portera la vervainne suz soy jamais serpent ne le grevera.....Les vieilles femmes vont chercher la verveine dont elles se serviront comme remède, au clair de la lune et en marchant à reculons....

"Le sorcier, qui veut savoir quelle maladie a celui qui vient le consulter, cueille, en décours de la lune, trois branches de verveine qu'il laisse macérer pendant trois jours et troi mits dans du vinaigre. Au lever de la lune, il reconnaît, à la manière dont les feuilles sont antrelacées, de quelle maladie son client est atteint....Sur les vertus médicinales de la verveine, voyez encore: 'Dialogue des créatures' (1482)....Pour n'estre point las en allant, prens verveine cueillie la veille de la Saint-Jehan et la porte sur toy....Pour qu'un cheval ne se lasse pas en courant attachez lui la grosse dent du loup en marchant et pendez lui au cou des racines de verveine et d'armoise....Pour escalader facilement les montagnes, les armaillis et surtout les garçons de chalet mettent à leur jarretière un rameau de verveine qu'ils appellent 'vérvéna à corre' - verveine à courir....Pour faire dix lieues à l'heure vous appliquez sur la rate un emplâtre composé de divers ingrédients parmi lesquels sept feuille de verveine.....

"La verveine donne de la force aux lutteurs....Au Sabbat les diabolins se font des jarretières de verveine pour marcher sans fatigue....Pour que les pommiers produisent beaucoup, on met un brin de verveine dans les branches....Si on fromme les poules avec de la verveine sauvage, on est assuré de les vendre un bon prix... La femme qui a perdu son lait, doit, pour le recouvrer, cueillir trois soumités de branches de verveine, en récitant le 'Pater noster' et l'Ave Marie' et les porter sur soi....."un brin de verveine porté constamment sur soi, rend chaste....Cueillie et brûlée le jour de la Saint-Jean la v.guérît les gornies. Nos paysans disent ironiquement que, dans sa cendre, se trouve le 'gekkensteen' (=pierre des fous).....

"Les femmes blanches, apparitions nocturnes, présentent aux personnes qu'elles rencontrent une branche de chêne ou d'herbe de la croix (verveine). Si l'on accepte ce talisman, on sera doué d'autant d'années de puissance et de joie que la branche a de feuilles; mais au bout de ce temps, votre âme appartiendra au démon...Quand on veut acquérir l'affection d'une personne, on lui présente de la verveine.....

"Conjuration pour se faire aimer. Il faut par trois vendredis à huit heures du matin faire autour d'une verveine trois tours à rebours et bénédiction de la main gauche; et le dernier vendredi

l'arracher de la main gauche et en la cueillant il faut dire ces mots: 'o pega vervena, o pega, o pega, Lucia vervena, Lucia vervena, Lucia, o Luna, Luna'. Puis il faut faire poudre de cette verveine, en disant: 'Je te conjure aux noms de Vénus et de Cupidon, du Soleil et de la Lune que celle de toi je toucherai ne puisse nul autre aimer que moi et m'aime comme toi même'. Puis en touchant la fille, dites: 'Audi filia (ici le nom de la fille) et inclina aurem tuam et obliviscere populum tuum et domum patris tui et sequere me'.....

"Autre incantation pour se faire aimer: Le premier vendredi de la nouvelle lune, il faut avoir un couteau neuf et aller cueillir une verveine. Il faut se mettre à genoux, la face tournée vers le soleil levant et, coupant la date herbe avec le couteau, dire: 'Sara isquina safos; je te cueille, herbe puissante, afin que tu me serves à ce que je voudray'. Puis vous vous léverez sans regarder derrière vous. Étant dans votre chambre vous la ferez sécher et pulvériser et vous ferez avaler cette poudre à la personne.....

"Autre incantation pour se aimer: Prenez de la verveine que vous pilerez et en frotterez le talon de votre main gauche, puis avec cette main, vous formerez un signe de croix à votre front, ensuite à celui de la fille, en disant: 'Cathos, que ton désir seconde au mien comme celui de Saint-Joseph avec Marie!'.....

"Le verveine prise le soleil étant en Aries, avec de la graine de pivoine d'un an, mises en poudre, si la poudre est mise entre deux amants, aussitôt ils auront querelle.....

"Language des fleurs. — La verveine signifie: ne me laissez pas pour une autre...Un brin de verveine sauvage, offert à une fille, équivant à une déclaration....La verveine symbolise les enchantements....La verveine symbolise l'inspiration, la poésie."

Gibbs (1974) reports cyanogenesis absent from the leaves and seeds of this species, leucoanthocyanin absent from the leaves, and syringin absent from the stems; in addition, the Ehrlich test gave negative results in the leaves.

Keys (1976) says that in China the leaves are used medicinally. The taste is bitter. The "Plant contains an essential oil (comprising citral, geraniol, limonene, verbenone), invertin, a bitter principle, verbenalol ( $C_{11}H_{14}O_5$ ; long prismatic needles; m.p. 133°; soluble in ether, acetic acid; poorly soluble in water) and the glycoside verbenalin ( $C_{17}H_{25}O_{10}$ ; bitter needles; m.p. 178°; freely soluble in water; slightly soluble in alcohol, acetone; insoluble in chloroform, ether). Verbenalin in frogs produces mucosal ex-coriation. Prescribed as emmenagogue. Dose, 19—18 gm."

Sutherland refers to *V. officinalis* as "frequent" on steep slopes in Ethiopia; the corollas are described as having been "purple" on his no. 309, "bluish-violet" on Westra & Rooden 189, and "blue" on Beach 5110. Beach describes the plant as "a vigorous much-branched weed". On Sebald 381 the corollas were "lilac" in color when fresh.

The Fitter work cited in the bibliography of this species is dated "1974", but was not actually issued until February 17, 1975.

It is also worth noting here that although Bock (1522) uses the name, Verbena foamina, in his text, his accompanying illustration very plainly is meant to depict V. officinalis.

Stokes (1812) gives some interesting sidelights about this species, telling us that Linnaeus believed the species "to have been wafted by the sea to Sweden". He quotes Miller as saying that it is "Never found above a quarter of a mile from a house". He states that Curtis, Lightfoot, and Scopoli classified it "after Mentha at the end of the order Gymnospermia of the class Didynamia, considering as a genus connecting the Personatae to the Verticillatae", while Hudson placed it "between Nepeta and Mentha, apparently regarding it with Ray as really belonging to the Verticillatae, in which disposition he has been followed by Walcott, Sibthorpe, and Smith....where it is acknowledged to be erroneously placed in the order Gymnospermia of the class Didynamia." He affirms that Ray described the corollas as pale-blue, while Bauhin called them pale-purplish. He goes on to say: "Root perennial according to Ray and Curtis, Sibth. Salisb. W. and Smith; biennial according to Huds. Hort. kew. and Donn; annual according to Boerh. Linn. and Lightf. Are we hence to conclude that it is sometimes perennial, sometimes biennial and sometimes annual, or to learn how little dependence in investigating plants is to be placed on the marks even of cultivating botanists, when we observe Curtis, Auton and Boerhaave holding opposite opinions?"

Loesener (1912) cites Seler 3460 from Atascosa County, Texas, as "V. officinalis L. forma?", but the plant represented is almost certainly V. halei. The Curtiss 677 and Rugel 121, cited below, were previously regarded by me as V. domingensis Urb., but I feel now that they are probably a form of V. officinalis (or even perhaps V. halei Small). This may prove true of most, if not all, of the Cuban material previously cited under V. domingensis, a species very likely endemic to Hispaniola.

The Herb. Zuccarini s.n. [Hort. bot. Monac.], cited below, is a mixture with xv. baileyana Moldenke. The Meebold 12840, distributed as V. officinalis, actually is V. brasiliensis Vell., McNeal 925 is V. californica Moldenke, Eggers 2175 is V. domingensis Urb., Karwinski s.n. is V. ehrenbergiana Schau., D. Dickinson s.n. [June 8, 1918], Lindheimer 1076 & s.n. [Galveston, May 1843], Pickett & Bot. Class 60, Thomas & Grenillion 2487, and Wurzlów s.n. [Sept. 15, 1917] are V. halei Small, Mukherjee s.n. [12.9.74] is xv. hybrida Voss, M. E. Jones 2215 is V. lasiostachys Link, Clemens 42170, Meebold 7818, 8304, & 12839, and Schlieben 7691 are V. litoralis H.B.K., Pringle 8534 is V. menthaefolia Benth., Repton 1298 is V. officinalis var. natalensis Hochst., J. Z. Weber 2294 is V. supina f. erecta Moldenke, and Robertson s.n. [June 5, 1899] is V. xutha Lehm.

Additional citations: CUBA: Havana: Curtiss 677 (Ca, Es, Es, Mu,

N, Vt, W--522300). Matanzas: Rugel 121 [856] (C). CHILE: Valdivia: Hollermayer 607 (Mu). MACARONESIA: Gran Canaria: Kunkel 11247 (Mu), 11429 (Mu). GREAT BRITAIN: England: Harz 183 (Mu). SPAIN: J. Kraft JK.39 (Mu). GERMANY: Berger s.n. [München] (Mu--335); Brixle s.n. [Herb. Merxmüller 14339] (Mu); Herb. Mus. Bot. Landshuth s.n. (Mu--333); Herb. Schmiedel 93 (Mu--329), s.n. (Mu--328); Herb. Schreber s.n. [Marlofstein, 1784] (Mu--330); Herb. Univ. Maximil. s.n. (Mu--331); Herb. Zuccarini s.n. (Mu--338, Mu--339). ITALY: Gröbner s.n. [3.6.1968] (Mu); Zollitsch 4626 (Mu). MALTA: Westra & Rooden 189 (Ld). YUGOSLAVIA: Micevski 57110 (Mu). MOROCCO: Rauh 426 (Mu). ALGERIA: Doppelbauer 107 (Mu). EGYPT: Sisi s.n. [El Giza, 24.5.1973] (Mu). ETHIOPIA: Sebald 381 (Mu); Sutherland 309 (Ws). UNION OF SOCIALIST SOVIET REPUBLICS: Karachayeva-Cherkesskaya: Vekhor s.n. [Teberda, VII.1863] (Mu). Republic undetermined: Herb. Grimm s.n. [Novogorod] (Mu--344). IRAN: Redding 4 (M1). AFGHANISTAN: Beach 5110 (Ln--192056); Podlech 11391 (Mu), 18248 (Mu), 18654 (Mu), 19914 (Mu); K. H. Rechinger 19229 (Mu). PAKISTAN: Baluchistan: K. H. Rechinger 30270 (Mu). Northwestern Provinces: Brandis 1608 (Mu--1120). SIKKIM: J. D. Hooker s.n. [alt. 6000 ped.] (Mu--349). INDIA: Assam: Jenkins s.n. [Assam] (Mu--350); Watt 10362 (Mu). East Punjab: T. Thomson s.n. [alt. 1-4000 ped.] (Mu--348). Uttar Pradesh: Wallich 1825/4 (Mu--1264). State undetermined: Hügel s.n. [Mapuri, Ind. sup.] (Mu--353). BURMA: Upper Burma: Huk s.n. [Chin hills, June 1892] (Mu--3802); Luxburg s.n. [24.2.1903] (Mu). CHINA: Fukien: En 2022 (Mu), 2689 (Mu). FORMOSA: Tanaka & Shimada 11032 (Mu). THAILAND: Larsen & Larsen s.n. (Ac). JAPAN: Kyushu: Oldham 619 (Mu). AUSTRALIA: Queensland: M. S. Clemens 42796 (M1). CULTIVATED: Germany: Herb. Schreber s.n. [1789] (Mu--345); Herb. Zuccarini s.n. [Hort. bot. Monac.], in part (Mu). Mexico: Hendricks 590 (Ws). Sweden: Collector undetermined s.n. [20 Aug. 1835] (Ac).

VERBENA OFFICINALIS var. GAUDICHAUDII Briq.

Additional bibliography: Moldenke, *Phytologia* 28: 364 & 443 (1974) and 34: 602. 1976.

The Burke 55, previously cited by me as this variety, actually proves better regarded as representing var. natalensis Hochst.

Additional citations: AUSTRALIA: State undetermined: F. v. Mueller s.n. (Mu--1574).

VERBENA OFFICINALIS var. MACROSTACHYA (F. Muell.) Benth.

Additional bibliography: Moldenke, *Phytologia* 24: 27. 1972.

Additional citations: AUSTRALIA: Queensland: F. v. Mueller s.n. [Peake Downs] (Mu--1571--isotype, Z--photo of type).

VERBENA OFFICINALIS var. NATALENSIS Hochst. ex F. Krauss, Flora 28: 68, hyponym. 1845.

Bibliography: F. Krauss, Flora 28: 68. 1845; Moldenke, Résumé Suppl. 4: 17. 1962; Moldenke, Phytologia 10: 198 & 213. 1964; Moldenke, Fifth Summ. 2: 687. 1971; Moldenke, Phytologia 28: 364 (1974) and 34: 261, 262, & 279. 1976.

Although unaccompanied by a formal description, this variety is clearly based on Krauss 151 from "ad fluv. Umlaas, Natal, Dec." The unnumbered Krauss collection in the Munich herbarium is probably a part of the type collection.

Recent collectors speak of this plant as an erect perennial herb, 3 feet tall, and have found it growing in waste ground and "locally frequent" along old roads, at altitudes of 1300—1580 m., flowering in August, October, and December, and fruiting in August. The corollas are said to have been "purple" on Repton 1298, "mauve" on E. A. Robinson 5596, and "pale mauve" on Acocks 20990.

Material of this taxon has most generally been identified and distributed in herbaria as typical V. officinalis L. and many of the southern African specimens cited by me in previous installments of these notes may prove, on re-examination, to represent this variety. The Burke 55, cited below, was incorrectly cited by me in my 1974 work as var. gaudichaudii Briq.

Citations: ZAMBIA: E. A. Robinson 5596 (Mu). RHODESIA: Fries, Norlindh, & Weimarck 4002 (Mu); Morris 355 (Mu). SOUTH AFRICA: Cape Province: Krauss s.n. [-151?] (Mu—352—isotype?). Orange Free State: Acocks 20990 (Mu). Transvaal: Burke 55 (Pd); Repton 1298 (Z).

VERBENA OFFICINALIS var. PROSTRATA Gren. & Godr.

Additional bibliography: Moldenke, Phytologia 28: 362, 364, 392, & 427 (1974) and 34: 260. 1976.

Additional citations: GERMANY: Schultes s.n. (Mu—332). ETHIOPIA: Schimper 145 (Mu—347).

VERBENA OFFICINALI-VENOSA Paxt.

Additional bibliography: Moldenke, Phytologia 28: 364—365 & 464. 1974.

xVERBENA OKLAHOMENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 28: 365 & 457. 1974.

VERBENA ORCUTTIANA Perry

Additional bibliography: Moldenke, Phytologia 28: 365. 1974.

Moran encountered this plant at 1500—1680 meters altitude, flowering and fruiting in July and August, referring to it as "common", "common in meadows and common for miles in open pine forests", and "common with Artemisia tridentata in openings in Jeffrey pine forests. He describes the corollas as "blue" on his nos. 16439 & 16479.

Additional citations: MEXICO: Baja California: R. V. Moran 16439 (Sd--71882), 16479 (Sd--71870), 18135 (Sd--76425).

VERBENA ORIGENES R. A. Phil.

Additional bibliography: Moldenke, *Phytologia* 30: 161. 1975.

Additional citations: CHILE: Coquimbo: Werdermann 225 (Mu).

VERBENA ORIGENES var. GLABRIFLORA Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 29. 1972.

Zöllner has found this plant growing at 4000 meters altitude, flowering and fruiting in January.

Additional citations: CHILE: Antofagasta: Zöllner 8309 (Ac).

xVERBENA OSTENI Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 365. 1974.

Recent collectors have encountered this plant "em afloramento rochoso", flowering in October and November. The corollas are described as having been "white" on both of the Brazilian collections cited below.

Additional citations: BRAZIL: Rio Grande do Sul: Lima, Vianna, Ferreira, & Irgang ICN.20982 (Ut--320453); Lindeman, Irgang, & Valls ICN.8484 (Ut--320454). URUGUAY: Herter 1000 [Herb. Herter 82763] (Mu).

VERBENA OVATA Cham.

Additional & emended bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 495. 1858; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke, *Phytologia* 30: 161. 1975.

The corollas are said to have been "violet" on Schinini & Carnevali 10297 and the plant was found growing "en pantanos".

Additional citations: PARAGUAY: Fiebrig 502 (Mu--4040). ARGENTINA: Corrientes: Schinini & Carnevali 10297 (Ld).

VERBENA PARODII (Covas & Schnack) Moldenke

Additional & emended bibliography: Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 715 (1969) and imp. 2, 715. 1974; Moldenke, *Phytologia* 30: 162 (1975) and 31: 388. 1975.

Recent collectors have found this plant in fruit in November (in addition to the months previously reported by me). The corollas on Fabris & Schwabe 5022 are said to have been "lilac" in color when fresh.

Additional citations: ARGENTINA: Buenos Aires: Fabris & Schwabe 5022 (Mu). Mendoza: G. Dawson 3252 (Mu).

VERBENA PARVULA Hayek

Additional bibliography: López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 14: 23 (1974) and 15: 90 & 93. 1975; Moldenke, *Phytologia* 30: 162 (1975) and 34: 257 & 258. 1976; Soukup, *Biota* 11: 19. 1976; Moldenke, *Phytologia* 36: 30, 33, 52, 226, & 236. 1977.

Taylor has encountered this plant "in low forest and wet up-land pastures on mountain slopes" in Costa Rica. López-Palacios (1974) cites López-Palacios 2552 from Mérida, Venezuela, deposited in the Universidad de Los Andes herbarium. In his 1975 work he comments that "En los pocos ejemplares venezolanos (López-Palacios 2552 y Ruiz-Terán & López-Figueiros 2377), fuera de su hábito reducido no le encuentre diferencia alguna con la V. litoralis, y a mi modo de ver creo que esta especie no pasa de ser una forma anana de aquella, debida a las condiciones ecológicas desfavorables de clima y altura." He then quotes Macbride (1960) and concludes "En el primer párrafo simplemente he expuesto mi opinión para si algún día llega a tenerse en cuenta por quien se enfrente con la revisión del género."

Additional citations: COSTA RICA: Heredia: J. Taylor 17625 (N).

VERBENA PARVULA var. GIGAS Moldenke

Additional bibliography: Moldenke, Phytologia 24: 31. 1972; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: 93. 1975; Soukup, Biota 11: 19. 1976; Moldenke, Phytologia 34: 257 & 258 (1976) and 36: 33. 1977.

Recent collectors have encountered this plant at altitudes of 2100—3600 meters. In addition to the months previously reported by me, it has been found in anthesis in May and in fruit in May and June.

López-Palacios describes it as "hierba erecta de ca. 60 cm. de aspecto similar a la V. litoralis, ca. de la cual crece, pero de hojas más pequeñas y más pilosas" and "hierba más o menos postrada, espigas algo cilíndricas, fl. violado-lilas". He found it flowering and fruiting in December and January.

Additional citations: ECUADOR: Chimborazo: Herb. Univ. Cent. Quito 2345 (Mu). Loja: López-Palacios 4164 (Ld). Pichincha: Herb. Univ. Cent. Quito 2340 (Mu), 2343 (Mu), 2346 (Mu); López-Palacios 4198 (Z). BOLIVIA: La Paz: W. Forster s.n. [8.I.1954] (Mu).

VERBENA PARVULA var. OBOVATA Moldenke, Phytologia 36: 52. 1977.

Bibliography: Moldenke, Phytologia 36: 52. 1977.

Citations: ECUADOR: Pichincha: López-Palacios 4250 (Z—type).

VERBENA PERAKII (Covas & Schnack) Moldenke

Additional & emended bibliography: Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 & 717 (1969) and imp. 2, 715 & 717. 1974; Moldenke, Phytologia 30: 162. 1975.

VERBENA PERENNIS Wootton

Additional & emended bibliography: G. W. Thomas, Tex. Pl. Ecol. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke, Phytologia 30: 162 (1975) and 36: 244. 1977.

Higgins encountered this plant in gravelly to sandy or sandy

clay-loam soils in pinyon-juniper association, while the Corrells encountered it in "rocky soil in small mountains". Chiang and his associates found it growing in calcareous gravel in "isotal o matorral" on limestone hills, associated with Dasyllirion, Quercus, and Rhus. Hess & Stickney refer to it as a "common perennial, 60 cm. tall", with "blue-violet" corollas, and found it on slopes of low limestone hills in pinyon-juniper-grassland with Agave, Dasyllirion, Opuntia, Nolina, Rhus, Berberis, etc. The corollas are said to have been "purple" on Correll & Correll 30882. Thomas (1969) calls it "perennial verberna".

Additional citations: TEXAS: Brewster Co.: Hess & Stickney 3406 (N). Culberson Co.: Correll & Rollins 23897 (N). Pecos Co.: Correll & Correll 30882 (N). NEW MEXICO: Eddy Co.: Higgins 9228 (N). Guadalupe Co.: Higgins 8996 (N). MEXICO: Coahuila: Chiang C., Wendt, & Johnston 9178 (Ld).

#### VERBENA PERENNIS var. JOHNSTONI Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 367. 1974.

Henrickson found this plant to be "frequent perennial on rocky limestone slopes", at 4500 feet altitude, growing in association with Acacia, Dalea, Dasyllirion, Hilaria, Mimosa, and Yucca, flowering and fruiting in July. The corollas on his no. 11366 are said to have been "purple-blue" when fresh.

Additional citations: MEXICO: Coahuila: Henrickson 11366 (Ld).

#### xVERBENA PERPLEXA Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 33 (1972) and 36: 147. 1977.

Reeves encountered what appears to be this hybrid at an altitude of 3500 feet, flowering and fruiting in August, but misidentified it as V. ciliata Benth.

Additional citations: ARIZONA: Santa Cruz Co.: T. Reeves R. 1166 (W--2737258).

#### xVERBENA PERRIANA Moldenke

Additional synonymy: Verbena x perianna Perkins, Estes, & Thorp, *Bull. Torrey Bot. Club* 102: 197, in textu. 1975.

Additional bibliography: Perkins, Estes, & Thorp, *Bull. Torrey Bot. Club* 102: 194 & 197. 1975; Moldenke, *Phytologia* 30: 162 (1975), 34: 249, 250, & 279 (1976), and 36: 221. 1977.

The Iltis, Bell, Melchert, Patman, & Witt 12361, cited below, was previously incorrectly cited by me as V. hastata L. It was collected in flower and fruit in October.

Additional citations: ILLINOIS: Cass Co.: Geyer s.n. [Beardstown, July 1842] (Mu-416-cotype). WISCONSIN: Marquette Co.: Iltis, Bell, Melchert, Patman, & Witt 12361 (Ws). MISSOURI: Saint Louis: Engelmann s.n. [St. Louis] (Mu-417-cotype, Mu-1678-cotype).

VERBENA PERUVIANA (L.) Britton

Additional synonymy: Verbenella chamaedryfolia Juss. ex Spach, Hist. Nat. Veg. Phan. 9: 238. 1840. Verbena chamasedrufolia Robledo, Bot. Med. 392, sphalm. 1924. Verbena lindleyi Part., in herb.

Additional & emended bibliography: Loud., Hort. Brit., ed. 2, 552. 1832; Sweet, Hort. Brit., ed. 3, 553. 1839; Spach, Hist. Nat. Veg. Phan. 9: 238—239. 1840; Bart. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 494—496. 1858; Vilm., Fl. Pleine Terr., ed. 1, 939 (1865), ed. 2, 2: 976 (1866), ed. 3, 1: 1200 (1870), and ed. 4, 1067. 1894; Gilg in Engl., Syllab. Pflanzenfam., ed. 7, 314, fig. 413 D—F (1912) and ed. 8, 318, fig. 413 D—F. 1919; Knoche, Fl. Balear., imp. 1, 1: 59. 1921; Gilg in Engl., Syllab. Pflanzenfam., ed. 9 & 10, 339, fig. 418 D—F. 1924; Robledo, Bot. Med. 382. 1924; Pittier, Man. Pl. Usual. Venez. 395 & 450. 1926; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 339, fig. 432 D—F & L. 1936; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715—717. 1969; R. E. Harrison, Handb. Bulbs & Perenn. S. Hemisph., ed. 3, 266. 1971; Knoche, Fl. Balear., imp. 2, 1: 59. 1974; Kooiman, Act. Bot. Neerl. 24: 464. 1975; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: 89. 1975; Moldenke, Phytologia 30: 139, 150, & 162—164 (1975), 31: 409—411 (1975), 34: 270 & 279 (1976), and 36: 122, 142, 153, & 228. 1977.

Additional & emended illustrations: Gilg in Engl., Syllab. Pflanzenfam., ed. 7, fig. 413 D—F (1912), ed. 8, 318, fig. 413 D—F (1919), and ed. 9 & 10, 339, fig. 418 D—F. 1924; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 339, fig. 432 D—F. 1936; Melchior in Engl., Syllab. Pflanzenfam., ed. 12, 436, fig. 184 E & L (in part). 1964.

The corollas of this plant are described as "red" on Cristóbal & al. 1141 and on Schinini & Miranda 9576 and "very red" on Turner 9176. Gillanders and his associates (1973) recommend this plant for "sunny places and walls". Sweet (1830) says that this species was introduced into English gardens from Buenos Aires, Argentina, in 1827; he calls it the "scarlet-flowered vervain". Spach calls it the "verbénelle a feuilles de germandrée". Knoche (1921) reports it cultivated in the Balearic Islands, where it is called "carmelitana", a name also used for xv. hybrida Voss.

The Herb. Herter 82941, Herter 1057, Herzog 1217, and Pflanz 951, distributed as V. peruviana, are actually V. incisa Hook., while Hort. Parag. 11782 and T. Rojas 3395 are V. phlogiflora Cham., Block s.n. is V. rigida Spreng., and Torgo s.n. [Herb. Brad. 21257] is V. selloi Spreng.

Additional citations: URUGUAY: Herter 19 [Herb. Herter 71313] (Mu—4369). ARGENTINA: Buenos Aires: Cabrera & Fabris 14743 (Mu); Fabris 2707 (Mu). Córdoba: Lorentz 13 (Mu—1560); Lossen 10 (Mu—4368). Corrientes: Cristóbal, Quarín, Schinini, & Mirandi 1141 (Ld); Schinini & Mirandi 9576 (Ld). La Pampa: Fortuna s.

n. [15.XII.43] (Ut--330574B). Santa Fé: Turner 9176 (Ld). Tucumán: Meyer, Vaca, & Gómez 22305c (N). CULTIVATED: Belgium: Martens s.n. [h. b. lov.] (Mu--390). California: Germer s.n. [Los Angeles, 1876] (Mu--1279, Mu--1280). France: Weinkauff s.n. [Jard. des plant.] (Mu--1250). Germany: Herb. Kummer s.n. [Hort. bot. Monac.] (Mu--1249); Herb. Schwaegrichen s.n. [Hort. Lipsiensis] (Mu--1266); Herb. Staatsherb. München s.n. [18.I.1957] (Mu); Herb. Zuccarini s.n. [Hort. bot. Monac. 1834] (Mu--301), s. n. [Hort. Monac. 1846] (Mu--302). India: Herb. Hort. Bot. Calcutt. s.n. (Mu--1119).

VERBENA PERUVIANA f. ROSEA Moldenke

Additional bibliography: Anon., N. Y. Times D.41, April 6, 1975; Moldenke, Phytologia 30: 163--164, 1975.

Additional illustrations: Anon., N. Y. Times D.41, April 6, 1975.

It seems probable, from the illustration and description, that Stern's "Pink Princess" Trailing Verbena may well represent this form. In the advertisement cited in the bibliography above (1975) the plant is described as a "full-flowering Trailing Verbena", giving "a refreshing flowerfall of exquisite two-toned pink blooms all summer long" when grown in a hanging basket. It is said to bloom "continuously from spring 'til frost. Just fill flowerpots, planters, boxes or baskets with our brilliantly blooming 'Pink Princess (T)[-Trade name] Trailing Verbena and hang in full or part sun in your windows, but preferably outdoors on porch or patio. With a little loving care and plenty of watering, you can enjoy magnificent two-toned pink sprays all summer and fall! Pinch back stems for continual heavy blooming and lovely symmetrically shaped plants. Keep indoors over the winter and next spring enjoy another fantastic flowerfall"...."If you plant our Trailing Verbena 6" to 12" apart soon delicate pink blooms cover the ground in closely clustered waves of color to cover bare spots [as a groundcover]....create beautiful borders.. form a spectacular sea of pink under gladioli, lilies and other tall plants. And they keep producing flowers right up to the heavy frost! Not hardy -- so treat as Geraniums or Petunias".

VERBENA PHLOGIFLORA Cham.

Additional synonymy: Verbenella tweediana Hook. ex Spach, Hist. Nat. Veg. Phan. 9: 239. 1840. Verbena phlogiflora  $\alpha$  vulgaris Schau. in A. DC., Prodr. 11: 537. 1847. Verbena phlogiflora  $\alpha$  vulgaris [Cham.] ex Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858. Verbena decemloba Mart. ex Moldenke, Phytologia 34: 278, in syn. 1976.

Additional & emended bibliography: G. Don in Loud, Hort. Brit. Suppl. 1: 680. 1832; Baxt. in Loud., Hort. Brit. Suppl. 2: 680. 1839; Sweet, Hort. Brit., ed. 3, 553. 1839; Spach, Hist. Nat. Veg. Phan. 9: 239. 1840; Baxt. in Loud., Hort. Brit. Suppl. [3]: 655.

1850; Buek, Gen. Spec. Syn. Candoll. 3: 494—496. 1858; Vilm., Fl. Fleine Terr., ed. 1, 939 (1865), ed. 2, 2: 976 (1866), ed. 3, 1: 1200 (1870), and ed. 4, 1067. 1894; Sonohara, Tawada, & Amano, Fl. Okin. 132. 1952; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 & 717 (1969) and imp. 2, 715 & 717. 1974; León & Alain, Fl. Cuba, imp. 2, 2: 282. 1974; Moldenke, Phytologia 30: 139, 140, 150, & 164 (1975), 31: 411 (1975), 34: 278 & 279 (1976), and 36: 47, 229, & 240. 1977.

Hatschbach has encountered this plant repent on dry rocky campos and in abandoned cultivated ground, while Schinini & Carnevali found it "en bajo pantanoso entre matas de gramíneas y ciperáceas". Others have encountered it "in wet drainage zone of campo at margin of capão or wood island" and in a "small campo on flat hilltop, an herb to 1 m. tall, living in forest margin". Bornmüller reports it from 400 m. altitude in Brazil; Quarín found it "en pantano" in Argentina.

The corollas on Hatschbach 35201 and on Schinini & Carnevali 10300 are said to have been "purple", those on Hatschbach 35172 & 35640 were "violet", those on Pabst 6093 and E. Pereira 6266 were "light-violet", and those on Quarín 2863 were lilac-violet". Lindeman & Haas describe the corollas on their no. 3998 as "purple (1/2P3/8)" and on their no. 1120 as "purple 10P7/6, above 10P5/10, center 10PB6-7/6".

Spach (1840) calls the species "verbénelle de Tweedie", while Sonohara and his associates (1952) call it "bijozakura". Sweet (1839) tells us that it was introduced into English gardens from South America before 1839.

Material of V. phlogiflora has been misidentified and distributed in some herbaria as V. chamaedryfolia Juss. On the other hand, the Rodriguez 530 [Herb. Inst. Miguel Lillo 31561], previously reported by me and distributed as V. phlogiflora, actually is V. spectabilis Moldenke, while Bornmüller 143 is V. incisa Hook.

Additional citations: BRAZIL: Minas Gerais: Duarte 6309 [Herb. Brad. 16885] (Mu); Widgren s.n. [1845] (Mu—1577). Paraná: Hatschbach 35172 (Ld), 35201 (Ld), 35640 (Ld), 39150 (Ld); Lindeman & Haas 1120 (Ut—320418), 3998 (Ld). Rio Grande do Sul: Bornmüller 160 (Mu—4294). Santa Catarina: Pabst 6093 [E. Pereira 6266; Herb. Brad. 22512] (Mu). São Paulo: Martius s.n. [Ypanema, Jan. 1818] (Mu—365), s.n. [Prov. St. Pauli] (Mu—366). PARAGUAY: T. Rojas 3395 [Herb. Parag. 11782] (Mu), 4736 (Mu). ARGENTINA: Corrientes: Quarín 2863 (Ld); Schinini & Carnevali 10300 (Ld).

#### VERBENA PINETORUM Moldenke

Additional bibliography: Moldenke, Phytologia 28: 372 (1974) and 36: 244. 1977.

The Walker collection cited below matches the type of the species very well, although the bracts are relatively longer than they are in some other collections referred here.

Additional citations: MEXICO: Chihuahua: S. Walker 76037 (N).

## VERBENA PINNATILOBA (Kuntze) Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 40—41. 1972.

The corollas are said to have been "blue" on Ibarrola 542.

Additional citations: ARGENTINA: Corrientes: Ibarrola 542 (Ut—3305818).

## VERBENA PLATENSIS Spreng.

Additional bibliography: Loud., *Hort. Brit.*, ed. 2, 552. 1832; G. Don in Loud., *Hort. Brit. Suppl.* 2: 704. 1839; Sweet, *Hort. Brit.*, ed. 3, 553. 1839; Bart. in Loud., *Hort. Brit. Suppl.* [3]: 655. 1850; Busk, *Gen. Spec. Syn. Candoll.* 3: 495 & 496. 1858; Vilm., *Fl. Pleine Terr.*, ed. 1, 938—939 (1865), ed. 2, 2: 976 (1866), ed. 3, 1: 1199—1200 (1870), and ed. 4, 1066—1067 & 1070. 1894; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 715 & 717 (1969) and imp. 2, 715 & 717. 1974; El-Gazzar, *Egypt. Journ. Bot.* 17: 75 & 78. 1974; Molina R., *Ceiba* 19: 96. 1975; Moldenke, *Phytologia* 30: 150 & 164—165 (1975), 31: 392 & 412 (1975), and 34: 270. 1976.

Additional illustrations: Voss in Vilm., *Fl. Pleine Terr.*, ed. 4, 1066. 1894.

Molina R. (1975) records this species as cultivated in Honduras, but I suspect that he may actually be referring to white-flowered forms of *v. hybrida* Voss which would be far more likely to be found there.

Sweet (1839), calling *V. platensis* the "germander-like vervain", asserts that it was introduced into English gardens from Buenos Aires, Argentina, in 1837. The corollas on the Cabrera & al. collections and on Lossen 117, cited below, are said to have been "white" when fresh.

Additional citations: URUGUAY: Herter 750a [*Herb. Herter* 85298] (Mu). ARGENTINA: Buenos Aires: Cabrera & Fabris 16531 (Mu). Córdoba: Lossen 117 (Mu—4376). Jujuy: Cabrera, Arambarri, Cabrera, & Malacalza 17276 (Mu). CULTIVATED: Germany: Herb. Reg. Monac. s.n. [*Hort. Monac.* 1849.16.VIII] (Mu—393); Herb. Zuccarini s.n. [*hort. Monac.* 1840] (Mu—394), s.n. [*hort. Monac.* 1846] (Mu—395); Prince Paul of Wurtemberg s.n. [*Hort. Mergentheim* 1840] (Mu—1583).

## VERBENA PLATENSIS f. IVERIANA (Bosse) Moldenke

Additional bibliography: Moldenke, *Phytologia* 30: 164—165 (1975) and 31: 392 & 412. 1975.

## VERBENA PLICATA Greene

Additional & emended bibliography: G. W. Thomas, *Tex. Pl. Ecol. Summ.* 78. 1969; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 717 (1969) and imp. 2, 717. 1974; E. H. Jordan, *Checklist Organ Pipe Cactus Natl. Mon.* 7. 1975; Moldenke, *Phytologia* 30: 156 & 165 (1975) and 36: 244. 1977.

The Spellenbergs found this plant growing "in large open grassy areas with mesquite and Ephedra in a low swale, densely grassy and

weedy, with much tobosa and desert-willow". Other recent collectors have encountered it in calcareous gravel in "matorral desértico inerme on limestone hills and north-facing fans", growing in association with Agave lecheguilla, Cordia parvifolia, Larrea tridentata, and Grusonia. Higgins encountered it "on gravelly exposed limestone outcrops in Acacia-Prosopis-Sophora association" and "in sandy to gravelly limestone soils in Larrea-Acacia-Prosopis association".

The corollas on Chiang, Wendt, & Johnston 9137 are said to have been "lavender" in color when fresh, while those on Spellenberg & Spellenberg 3823 were "pale blue-lavender". Mrs. Jordan (1975) calls this the "ribbed vervain".

The Reeves R.1198, distributed as V. plicata, actually is V. neomexicana (A. Gray) Small, while R. V. Moran 16893, 20727, 20748, & 21749 are V. neomexicana var. hirtella Perry.

Additional citations: OKLAHOMA: Jackson Co.: Waterfall 11980 (M). TEXAS: Presidio Co.: Higgins, Higgins, & Higgins 9867 (N), Val Verde Co.: Higgins, Higgins, & Higgins 9964 (N). NEW MEXICO: Hidalgo Co.: Spellenberg & Spellenberg 2823 (Ld, N). MEXICO: Coahuila: Chiang, Wendt, & Johnston 9137 (Ld).

#### VERBENA PLICATA var. DEGENERI Moldenke

Additional bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Moldenke, Phytologia 24: 46. 1972.

Thomas (1969) calls this the "Degener verbena". It seems most likely to me now that this taxon is not worthy of more than form rank.

#### VERBENA POGOSTOMA Klotzsch

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Moldenke, Phytologia 24: 46. 1972; Soukup, Biota 11: 19. 1976.

#### VERBENA PORRIGENS R. A. Phil.

Additional bibliography: Moldenke, Phytologia 30: 165. 1975.

The Werdermann 789, distributed as V. porrigens, actually is V. atacamenensis Reiche.

#### VERBENA PULCHELLA Sweet

Emended synonymy: Glandularia pulchella Sweet ex Spach, Hist. Nat. Veg. Phan. 9: 240. 1840; Troncoso & Cabrera, Fl. Prov. Buenos Aires 137. 1965.

Additional & emended bibliography: Sweet, Hort. Brit., ed. 2, 419. 1830; G. Don in Loud., Hort. Brit. Suppl. 1: 680. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; Baxt. in Loud., Hort. Brit. Suppl. 2: 680. 1839; Sweet, Hort. Brit., ed. 3, 553. 1839; Spach, Hist. Nat. Veg. Phan. 9: 240—241. 1840; Schau. in A. DC., Prodr. 11: 552. 1847; Baxt. in Loud., Hort. Brit. Suppl. [3]: 655. 1850; Buek,

Gen. Spec. Syn. Candoll. 3: 495. 1858; Vilm., Fl. Pleine Terr., ed. 1, 937—938 (1865), ed. 2, 2: 975 (1866), ed. 3, 1: 1198 (1870), and ed. 4, 1066. 1894; Moldenke, Phytologia 30: 166 & 172 (1975), 34: 279 (1976), and 36: 139, 153, 231, & 240. 1977.

Additional illustrations: Voss in Vilm., Fl. Pleine Terr., ed. 4, 1066. 1894.

Vilmorin (1863) calls this species "verveine délicate", while Spach (1840) calls it "glandularia élégant". Sweet (1830) calls it the "pretty vervain" and avers that it was introduced into English gardens from Buenos Aires, Argentina, in 1827.

The Hiendlmayr s.n. [Hort. Lipsiensis], Herb. Zuccarini s.n. [h. Monac. 1836], and Herb. Kummer s.n. [h. Paris.], distributed as V. pulchella, actually are V. tenuisecta Briq.

Additional citations: URUGUAY: Herter 1805 [Herb. Herter 96556] (Mu).

#### VERBENA PULCHELLA f. COROLLA-ALBIDA Bart.

Additional bibliography: G. Don in Loud., Hort. Brit. Suppl. 1: 680. 1832; Bart. in Loud., Hort. Brit. Suppl. 2: 680. 1839; Sweet, Hort. Brit., ed. 3, 556. 1839; Moldenke, Phytologia 28: 375. 1974.

#### VERBENA PUMILA Rydb.

Additional synonymy: Verbena pumila "Rydb. in Small" ex G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969.

Additional & emended bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975; Moldenke, Phytologia 30: 166 (1975), 31: 392 (1975), 34: 279 (1976), and 36: 141 & 147. 1977.

The D. Wright 23, distributed as V. pumila, actually is V. bipinnatifida Nutt.

Additional citations: OKLAHOMA: Comanche Co.: Waterfall 11938 (M1). TEXAS: Comal Co.: Lindheimer 1075 (Mu—4087). Young Co.: Correll & Johnston 22126 (N). County undetermined: Lindheimer IV.501 (Mu—268).

#### VERBENA PUMILA f. ALBIDA Moldenke

Additional bibliography: Moldenke, Phytologia 30: 166 (1975) and 31: 392. 1975.

#### VERBENA QUADRANGULATA Heller

Additional & emended bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke, Phytologia 30: 166 (1975), 34: 252 (1976), and 36: 147. 1977.

Thomas (1969) calls this the "four-angle verbena". Recent collectors have encountered it in calcareous gravelly loam "in izotal in canyon through limestone plateau", in calcareous rocky loam "in

crasirosulifolio espinosos on limestone hills", in sandy alluvium in "materral desértico inerme on sandy fans", and in gypsiferous clay-loam on limestone ridges in association with Agave lecheguilla, A. falcata, A. asperrima, Fouquieria splendens, Yucca filifera, Acacia rigidula, Opuntia leptocaulis, O. rufida, Hechtia, Larrea, Dasyliirion, Nolina, Quercus, and Prosopis.

Additional citations: TEXAS: Duval Co.: Croft s.n. [San Diego, 1885] (Mu). Nueces Co.: A. A. Heller 1388 (Ln--70254--isotype). MEXICO: Coahuila: Johnston, Wendt, & Chiang C. 10602a (Ld). Nuevo León: Johnston, Wendt, & Chiang C. 10209a (Ld), 10226e (Ld), 10248h (Ld).

#### VERBENA RACEMOSA Eggert

Additional & emended bibliography: G. W. Thomas, Tex. Pl. Ecol. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke, Phytologia 30: 167 (1975) and 36: 244. 1977.

Strohmeyer describes this plant as having "stems several from taproot, apparently annual base, without old stems, the taproot only 3 mm. across at thickest point", and encountered it on a river floodplain, flowering and fruiting in April. The corollas on Meebold 26696 are described as having been "white" when fresh.

Additional citations: TEXAS: Brewster Co.: Strohmeyer s.n. [4 April 1975] (Ld, Z). NEW MEXICO: Dona Ana Co.: Meebold 26696 (Mu).

#### VERBENA RADICATA Moldenke

Additional & emended bibliography: G. Don in Loud., Hort. Brit. Suppl. 1: 680. 1832; Sweet, Hort. Brit., ed. 3, 768. 1839; Bart. in Loud., Hort. Brit. Suppl. 2: 680 (1839) and [3]: 655. 1850; Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 & 717 (1969) and imp. 2, 715 & 717. 1974; Hocking, Excerpt. Bot. A. 23: 290 & 291. 1974; Moldenke, Phytologia 28: 372 & 377. 1974.

Sweet (1839), calling this the "rooting vervain", avers that it was introduced into English gardens from Chile in 1832.

#### VERBENA RADICATA var. GLABRA (Hicken) Moldenke

Additional & emended bibliography: Hocking, Excerpt. Bot. A. 23: 290 & 291. 1974; Moldenke, Phytologia 28: 377. 1974.

#### VERBENA RECTA H.B.K.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Moldenke, Phytologia 28: 377--378. 1974; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975; Moldenke, Phytologia 36: 145. 1977.

Beaman encountered this species in small open grassy meadows surrounded by Abies forest.

Additional citations: MEXICO: Michoacán: Beaman 4353 (Ln--171723). Oaxaca: Pringle 4769 (Ln--70253, Mu). State undetermined: Karwin-

ski s.n. (Mu--300).

**VERBENA RECTILOBA** Moldenke

Additional bibliography: Moldenke, *Phytologia* 28: 378 & 440. 1974; Hoeking, *Excerpt. Bot. A.* 26: 4. 1975.

**VERBENA REGNELLIANA** Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 127 (1972) and 36: 231. 1977.

Martius s.n., cited below, was collected in anthesis in February and the corollas are said to have been "lilac" in color when fresh. It was misidentified and distributed as V. erinoides Lam.

Additional citations: BRAZIL: Minas Gerais: Martius s.n. [ad S. João d'El Rey, Febr.] (Mu--309).

**VERBENA RIBIFOLIA** Walp.

Additional bibliography: Buek, *Gen. Spec. Syn. Candoll.* 3: 495. 1858; Moldenke, *Phytologia* 28: 378. 1974.

**VERBENA RIBIFOLIA** var. **LONGAVINA** (R. A. Phil.) Acevedo de Vargas

Additional bibliography: Moldenke, *Phytologia* 24: 127--128. 1972.

Additional citations: CHILE: Province undetermined: Philippi s. n. [Hacienda de Cauquenes] (Mu--1579).

**VERBENA RIGIDA** Spreng.

Additional synonymy: Verbena venosa var. aspera Lorenz ex Moldenke, *Phytologia* 34: 279, in syn. 1976.

Additional & amended bibliography: G. Don in Loud., *Hort. Brit. Suppl.* 1: 602 & 680. 1832; Loud., *Hort. Brit.*, ed. 2, 552 & 602 (1832) and ed. 3, 602. 1839; Sweet, *Hort. Brit.*, ed. 3, 553. 1839; Bart. in Loud., *Hort. Brit. Suppl.* 2: 680 (1839) and [3]: 655. 1850; Buek, *Gen. Spec. Syn. Candoll.* 3: 494--496. 1858; Vilm., *Fl. Fleine Terr.*, ed. 1, 937 (1865), ed. 2, 2: 974 (1866), ed. 3, 1: 1198 (1870), and ed. 4, 1065. 1894; Pittier, *Man. Pl. Usual. Venes.* 398 & 450. 1926; Ewan in Thieret, *Southwest. La. Journ.* 7: 11 & 42. 1967; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 717. 1969; G. W. Thomas, *Tex. Pl. Ecolog. Summ.* 78. 1969; R. E. Harrison, *Handb. Bulbs & Peren. S. Hemisph.*, ed. 3, 266. 1971; Healy, *Gard. Guide Pl. Names* 225. 1972; Williamson, *Sunset West. Gard. Book*, imp. 11, 437. 1973; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 2, 717. 1974; R. D. Gibbs, *Chemotax. Flow. Pl.* 3: 1752--1755 (1974) and 4: 2295. 1974; S. B. Jones, *Castanea* 39: 137. 1974; León & Alain, *Fl. Cub.*, imp. 2, 281 & 282, fig. 121 B. 1974; Duncan & Foote, *Wildfls. SE. U. S.* 150, [151], & 295. 1975; Kooiman, *Act. Bot. Neerl.* 24: 464. 1975; Lopez-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 15: 93. 1975; Moldenke, *Phytologia* 30: 134 & 167--168 (1975), 31: 374--376, 387, 392, & 409 (1975), and 34: 20, 250, 260, & 279. 1976; Park Seed Co., *Park Seeds Fls. & Veg.* 1976: 90. 1976; Moldenke, *Phytologia* 36: 47, 131, 141, 226, & 228. 1977.

Additional illustrations: Voss in Vilm., Fl. Fleine Terr., ed. 3, 1: 1198 (1870) and ed. 4, 1065. 1894; León & Alain, Fl. Cuba, imp. 2, 281, fig. 121 B. 1974; Duncan & Foote, Wildfls. SE. U. S. [151] (in color). 1975.

Pittier (1926) records the popular name, "virginia", for this species in Venezuela, while Thomas (1969) calls it "veiny verbena" and Walker (1976) records "bijo-zakura" [bijo, a beautiful woman, zakhura, flowering cherry]. The corollas on Correll & Rollins 21061 are said to have been "deep reddish-purple".

López-Palacios (1975) comments that this species "Es originaria del sur del Continente, pero ha sido difundida ampliamente en cultivos de jardines botánicos y particulares, aunque en Venezuela aún no es muy abundante. Desde el punto de vista taxonómico, es inconfundido con las restantes especies venezolanas y fácilmente distinguible por sus hojas de ancha base semiabrazadoras o subcordadas."

Balakrishnan refers to this plant as a "0.5 m. tall shrub with mauve flowers", but this is certainly either an error in observation [since the plant is not a shrub] or a case of mixed labels. If the label accompanying the collection is correct in other details, he encountered the species in open places along railroad tracks [a very typical habitat], at 2400 meters altitude, flowering in December. Griffiths refers to it as a "fleshy rhizomatous perennial, 6--15 inches tall, single- to multi-stemmed; stems green, basally and apically flushed purplish-red, square, well-foliaged; leaves semi-erect, decussate, dark-green; inflorescence dense, near-capitate, compound, those on major peduncles more or less well separated; flowers deep bluish-purple, richly colorful".

Other recent collectors describe the stems as scabrous, 4 mm. in diameter, and the corolla slightly longer than the calyx. They have encountered it in well-drained soil in association with Baptisia and in sandy clay in oak-pine flatwoods. Spindler refers to it as "infrequent in pastures or sandy soil". Godfrey speaks of the plant as "locally abundant" in old fields. Mrs. Clemens found it on the "margin of grasslands" in Queensland, while Codd refers to it as "occasional patches on roadsides" in the Transvaal. Ghazal found it to be "widespread" in Louisiana. My wife and I found it locally and sporadically very abundant on grassy road shoulders and along fencerows in North and South Carolina, Georgia, and Florida, although not as widespread as V. temisecta in those states. Thomas reports it naturalized in a Louisiana cemetery.

Sweet (1839) calls this species the "strong-veined" and "wrinkled" vervain, introduced into English gardens from Buenos Aires, Argentina, in 1837.

The corollas on Ardoin 21, Hatschbach HH.10300, Herb. Brad. 30320, Kummrow 775, and E. Pereira 7683 are described as having been "violet" in color when fresh, while those on Codd 10208 were "dark-purple", those on C. M. Allen 658, Curry, Martin, & Allen 273, Darus 124, and Lemmon 1100 were "purple", those on Augustin

37 and Horst JWH.B.281 were "deep-purple", on Vann 22 "bright-purple", on Bougere 2113 "lavender-purple", on Gonella 24 "purple to violet", on Webster & Wilbur 3352 "lavender", and those on E. Pereira 5187 "roxo-claro".

Gibbs (1974) reports leucoanthocyanin absent from the leaves of this species, cyanogenesis absent from the stems and leaves, syringin absent from the stems, and the Ehrlich test giving negative results in the leaves.

The Herb. Kummer s.n. [Hort. bot. Monac.] collection, cited below, is a mixture with V. hispida Ruiz & Pav., while Hatschbach HH.10300, Herb. Brad. 30320, and E. Pereira 7682 are mixtures with V. rigida var. obovata (Hayek) Moldenke rather than var. glandulifera Moldenke as distributed by the collectors.

Additional citations: NORTH CAROLINA: Harnett Co.: Moldenke & Moldenke 30003 (Gz). SOUTH CAROLINA: Allendale Co.: Moldenke & Moldenke 29961 (Ac, Gz, Ld, Tu). Clarendon Co.: Moldenke & Moldenke 29974 (Ac, Ld, Tu). GEORGIA: Carlton Co.: Moldenke & Moldenke 29279 (Ld). Coweta Co.: Moldenke & Moldenke 29304 (Ac). Lee Co.: Moldenke & Moldenke 29344 (Kh), 29360 (Gz). Meriwether Co.: Moldenke & Moldenke 29305 (Gz). Schley Co.: Moldenke & Moldenke 29330 (Kh). Sumter Co.: Moldenke & Moldenke 29339 (Ld). Talbot Co.: Moldenke & Moldenke 29317 (Tu). FLORIDA: Hernando Co.: Moldenke & Moldenke 29495 (Tu). Leon Co.: Godfrey 72332 (W—2734291). ALABAMA: Sumter Co.: J. A. Churchill s.n. [10 May 1955] (Ln—204151); R. Kral 26416 (Lc). MISSISSIPPI: Rankin Co.: Webster & Wilbur 3352 (Mi). LOUISIANA: East Baton Rouge Par.: Beck 453 (Lv); E. A. Bessey s.n. [VII.14.09] (Lv, Lv, Lv); Block s.n. (Lv); C. A. Brown 1054 (Lv), 17096 (Lv); Correll & Correll 10449 (Lv); Gonella 24 (Lv); Horst JWH.B.281 (Lv); Lawrence & Crawford s.n. [Oct. 4, 1916] (Lv); N. E. Petersen s.n. [March 17, 1909] (Lv), s.n. [May 7, 1909] (Lv); W. D. Phillips s.n. [March 1904] (Lv); Ross 67 (Lv). East Feliciana Par.: C. A. Brown 18587 (Lv); Darus 124 (Lv); Ghazali s.n. [Idlewild Exp. Sta.] (Ld). Lafayette Par.: B. E. Lemmon 1100 (Lv). Livingston Par.: Beck 166 (Lv); Montz 1895 (Lv); Vann 22 (Lv). Ouachita Par.: Thomas & Reid 24091 (K1—21812). Pointe Coupee Par.: M. Chaney 393 (Lv). Saint Helena Par.: C. M. Allen 658 (Lv). Saint Landry Par.: Ardoin 21 (Lv). Saint Mary Par.: C. A. Brown 6569 (Lv); Bynum, Ingram, & Jaynes s.n. [Apr. 13, 1933] (Lv); J. A. Churchill s.n. [2 May 1955] (Ln—204157); Correll & Correll 9346 (Lv). Saint Tammany Par.: Arsène 11080 (Lv); Bougere 2113 (Lv); C. A. Brown 17736 (Lv); N. F. Petersen s.n. [Oct. 9, 1909] (Lv). Tangipahoa Par.: Kirby 116 (Lv); H. R. Wilson 82 (Lv). Terrebonne Par.: Arceneaux 35a (Lv). Union Par.: R. D. Thomas 23465 (K1—21955). Washington Par.: C. A. Brown 18429 (Lv). West Feliciana Par.:

Augustin 37 (Lv); Curry, Martin, & Allen 273 (Lv); Spindler 82 (Lv). TEXAS: Waller Co.: Correll & Rollins 21061 (N). BRAZIL: Paraná: Kummrow 775 (Ld); E. Pereira 5187 [Herb. Brad. 13596] (Mu), 7683, in part [Hatschbach HH.10300; Herb. Brad. 30320] (Mu). ARGENTINA: Buenos Aires: Lorenz 2289 (Mu—1833). Province undetermined: Freiland s.n. [Aug. 1902] (Mu). SOUTH AFRICA: Transvaal: Codd 10208 (Mu). State undetermined: Penther 1764 [Komgha] (Mu). SRI LANKA: Balakrishnan NBK.413 (W—2721204). AUSTRALIA: New South Wales: Meebold 3187 (Mu). Queensland: M. S. Clemens 42111 (Mi), 42206 (Mi). CULTIVATED: California: A. Griffiths 4515 [LASCA 55-E-935] (Sd—90062). Germany: Herb. Kummer s.n. [Hort. Nymphenbergensis 1840] (Mu—1677), s.n. [Hort. bot. Monac.] (Mu); Herb. Schwaegrichen s.n. (Mu—1275); Herb. Von Schönau s.n. (Mu); Herb. Zuccarini s.n. [Hort. bot. Monac. 1836] (Mu—4118).

VERBENA RIGIDA var. GLANDULIFERA Moldenke

Additional synonymy: Verbena rigida var. glandulos Moldenke, Phytologia 34: 279, in syn. 1976. Verbena rigida var. glandulosa Moldenke, Phytologia 34: 279, 1976.

Additional bibliography: Moldenke, Phytologia 24: 132 (1972), 34: 279 (1976), and 36: 47, 1977.

Hatschbach refers to this plant as ruderal and found it in flower and fruit in December. The corollas on his no. 37899 are said to have been "lilac" in color when fresh.

The Hatschbach HH.10368, Herb. Brad. 30089 & 30956, Pabst 7898, and E. Pereira 7752 & 8623, distributed as V. rigida var. glandulifera, actually are var. obovata (Hayek) Moldenke, while Hatschbach HH.10300, Herb. Brad. 30320, and E. Pereira 7683 are mixtures of V. rigida Spreng. and V. rigida var. obovata.

Additional citations: BRAZIL: Paraná: Hatschbach 37899 (Ld).

VERBENA RIGIDA var. LILACINA (Benary & Bodger) Moldenke

Additional synonymy: Verbena lilacina Harrison, Handb. Bulbs & Peren. S. Hemisph., ed. 3, 266, 1971.

Additional bibliography: R. E. Harrison, Handb. Bulbs & Peren. S. Hemisph., ed. 3, 266, 1971; Moldenke, Phytologia 28: 381 (1974), 31: 387 & 392 (1975), and 34: 279, 1976.

Ferreira encountered this plant growing at the edge of railroad tracks, flowering and fruiting in October, describing the corolla color as "lilac". It is very probable that some of the collections cited under typical V. rigida, whose flowers are described by their collectors as "lila" may belong here, but until it is definitely ascertained what collectors mean by "lila" it is, perhaps, best to leave them under the typical form.

Additional citations: BRAZIL: Paraná: L. F. Ferreira 117 (Ld).

VERBENA RIGIDA var. OBOVATA (Hayek) Moldenke

Additional bibliography: Moldenke, Phytologia 24: 220, 1972.

Porto & Oliveira describe this plant as an herb to 50 cm. tall and the corolla color as "roxas 5Pl/11", while Lindeman and his associates refer to the corolla color as "roxas 4P5/8" and found the plant growing in "terrena baldio". The corollas on Herb. Brad. 30956, Pabst 7898, and E. Pereira 8623 were "roxas", while those on Bornmüller 204 are said to have been "hellrosa" [=light pink] when fresh.

Hatschbach HH.10300, Herb. Brad. 30320, and E. Pereira 7683, cited below, are mixtures of this variety and typical V. rigida Spreng.

Material of this variety has been misidentified and distributed in some herbaria as V. rigida var. glandulifera Moldenke.

Additional citations: BRAZIL: Paraná: E. Pereira 7683, in part [Hatschbach HH.10300; Herb. Brad. 30320] (Mu), 7752 [Hatschbach HH.10368; Herb. Brad. 30089] (Mu). Rio Grande do Sul: Bornmüller 162 (Mu-4292), 204 (Mu-4293); Lindeman, Irgang, & Valls ICN. 8775 (Ut-320450); E. Pereira 8623 [Pabst 7898; Herb. Brad. 30956] (Mu); Porto & Oliveira ICN.9584 (Ut-320449). ARGENTINA: Corrientes: Krapovickas, Cristóbal, Schinini, & González 25650 (Ld).

VERBENA RIGIDA f. PARAGUAYENSIS Moldenke, Phytologia 34: 20. 1976.

Bibliography: Moldenke, Phytologia 34: 20 & 260. 1976.

Citations: PARAGUAY: T. Rojas 3407 [Hort. Parag. 11794] (Mu-type, Z-isotype, Z-photo of type).

VERBENA RIGIDA var. REINECKII (Briq.) Moldenke

Additional bibliography: Moldenke, Phytologia 24: 133. 1972.

Additional citations: BRAZIL: Rio Grande do Sul: Reineck & Czermak 68 (Mu-3492).

VERBENA RINCONENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 24: 133 (1972) and 34: 252. 1976.

Henrickson reports this plant "infrequent in open desert" and "infrequent annual among Larrea on rocky limestone hillside with Chihuahuan Desert vegetation", associated with Berberis, Bouvardia, Dasylyrin, Dyssodia, Fouquieria, Opuntia, Psatrophe, Yucca, grasses, etc., at 2200-2365 m. altitude, flowering and fruiting in August and September.

Additional citations: MEXICO: Zacatecas: Henrickson 6295 (Ld), 6698 (Ld).

VERBENA RIPARIA Raf.

Additional bibliography: Moldenke, Phytologia 28: 381, 399, & 464 (1974) and 30: 159. 1975.

The Montz 2294, distributed as V. riparia, actually is V. nutha Lehm.

Additional citations: VIRGINIA: Smyth Co.: J. K. Small s.n. [July 1, 1892] (Lv).

## VERBENA ROBUSTA Greene

Additional synonymy: Verbena prostrata var. glandulosa Dunkle, in herb.

Additional bibliography: R. D. Gibbs, Chemotax. Flow. Pl. 3: 1752 & 1755 (1974) and 4: 2295. 1974; Moldenke, Phytologia 30: 168 (1975) and 36: 221 & 232. 1977.

Moran reports this plant "occasional by streams" in Baja California, while Thorne found it growing in association with Baccharis glutinosa, Ambrosia psilostachya, etc., along streams on Santa Catalina island.

Dunkle's V. prostrata var. glandulosa seems to be based on his no. 8548 from a dry stream bed on Santa Cruz island in the Channel Islands of California, where he collected it in flower and fruit in August.

Gibbs (1974) reports leucoanthocyanin absent from the leaves of V. robusta, saponin also absent, but tannin probably present.

The Blakley 5394, distributed as V. robusta, is actually V. bracteata Lag. & Rodr.

Additional citations: CALIFORNIA: Alameda Co.: Hillebrand 1863 (Mu). CHANNEL ISLANDS: Santa Catalina: Thorne 36670 (Sd—69572). Santa Cruz: Dunkle 8548 (N). MEXICO: Baja California: Meebold 20234 (Mu); R. V. Moran 16655 (Sd—73068).

## VERBENA RUFIFLORA Rojas

Additional & emended bibliography: Krapovickas, Bol. Soc. Argent. Bot. 11: Supl. 269. 1970; Moldenke, Phytologia 30: 168 (1975) and 31: 388. 1975.

## VERBENA RUNYONI Moldenke

Additional bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Moldenke, Phytologia 28: 382. 1974; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1397, 1400, & 1775. 1975; Moldenke, Phytologia 34: 153. 1976.

Thomas (1969) calls this the "Runyon verbena".

## VERBENA RUNYONI f. ROSIFLORA L. I. Davis

Additional bibliography: Moldenke, Phytologia 28: 382. 1974; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1397, 1400, & 1775. 1975.

## xVERBENA RYDBERGII Moldenke

Additional bibliography: R. A. Davidson, State Univ. Iowa Stud. Nat. Hist. 20 (2): 77. 1959; Moldenke, Phytologia 30: 145 & 168 (1975), 31: 377 (1975), 34: 270 (1976), and 36: 29. 1977.

Davidson (1959) records this hybrid from Louisa and Muscatine Counties, Iowa, where he found it in a swamp and on sandy slopes above a bog.

Additional citations: MISSOURI: Saint Louis: Engelmann s.n. [Banks of the Mississippi, July 1842] (Mu—361). CULTIVATED: Germany: Herb. Staatsherb. Münch. s.n. [Hort. bot. Monac. 28.7.53] (Mu).

## VERBENA SAGITTALIS Cham.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; Moldenke, Phytologia 28: 383. 1974.

## VERBENA SANTIAGUENSIS (Covas &amp; Schnack) Moldenke

Emended synonymy: Glandularia santiaguensis Covas & Schnack ex Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715, sphalm. 1969.

Additional & emended bibliography: Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 (1969) and imp. 2, 715. 1974; Moldenke, Phytologia 28: 383 & 457--458 (1974) and 30: 178. 1975.

Recent collectors refer to this as a decumbent plant and have found it growing on low campos, flowering in November and December. The corollas are described as having been "purple" on Quarín, Schinini, & González 2437 and as "violet" in color on Krapovickas, Schinini, & Quarín 26701.

Additional citations: ARGENTINA: Corrientes: Quarín, Schinini, & González 2437 (Ld). Salta: Krapovickas, Schinini, & Quarín 26701 (Z).

## VERBENA SANTIAGUENSIS (Covas &amp; Schnack) Moldenke x V. PERUVIANA (L.) Britton

Additional bibliography: Moldenke, Phytologia 28: 383, 457, & 458. 1974.

## VERBENA SANTIAGUENSIS f. ALBIFLORA Moldenke

Additional bibliography: Moldenke, Phytologia 24: 138. 1972.

Troncoso states that in her opinion the type sheet of this form is what she calls Glandularia pulchella var. gracilior Troncoso.

## VERBENA SCABRA Vahl

Additional bibliography: Sweet, Hort. Brit., ed. 1, 1: 325. 1826; G. Don in Loud., Hort. Brit., ed. 1, 247 (1830) and ed. 2, 247. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; G. Don in Loud., Hort. Brit., ed. 3, 247. 1839; Sweet, Hort. Brit., ed. 3, 553. 1839; Buek, Gen. Spec. Syn. Candoll. 3: 495. 1858; G. W. Thomas, Tec. Pl. Ecolog. Summ. 78. 1969; Fong, Trojánkova, Trojáněk, & Farnsworth, Lloydia 35: 147. 1972; León & Alain, Fl. Cuba, imp. 2, 2: 281, fig. 121A. 1974; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1396--[1398] & 1775, fig. 654 a--f. 1975; Moldenke, Biol. Abstr. 59: 6926. 1975; Moldenke, Phytologia 30: 140, 168--169, & 176 (1975), 31: 410 (1975), and 34: 250. 1976; Lakela, Long, Fleming, & Genelle, Fl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 116 & 182. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, 741, 742, & 961. 1976; Moldenke, Phytologia 36: 126 & 145. 1977.

Additional illustrations: León & Alain, Fl. Cuba, imp. 2, 2: 281, fig. 121A. 1974; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, [1398], fig. 654 a--f. 1975.

Curiously, Don (1830) places this species in his section Trifidae (with leaves trifid) even though its leaves certainly are not normally trifid. He calls it the "scabrous vervain" and says that it was introduced into English gardens from Mexico in 1825. Sweet (1830) calls it the "rough vervain" and gives its introduction date as 1822. Thomas (1969) calls it "harsh verbena" and reports that it is also known locally as "white vervain". Churchill found it growing in sloughs in Florida; Adams found it at the edges of pastures. Brumbach encountered it in disturbed ground and reports the corolla color as "lavender-purple". Other recent collectors describe the plant as having fibrous roots, stems 1--2.5 m. tall, and "corollas as long as the calyx", and have found it growing in sandy soil, marshy land, and on spoil-banks of bayous in cypress-tupelo swamps. Lakela and her associates (1976) assert that in the Tampa Bay area [Florida] it inhabits "woods, margins, glades, [and] waste places", flowering in spring and fall.

The corollas are said to have been "purple" on Curry, Martin, & Allen 449, "lavender" on C. A. Brown 3892, "pale mauve-pink with darker eye" on C. D. Adams 11408, "whitish" on C. A. Brown 4084a, and "white" on Stam 60.

Material of V. scabra has been misidentified and distributed in some herbaria as "V. polystachia H.B.K." On the other hand, the Arceneaux 383, distributed as V. scabra, actually is V. urticifolia L., while J. A. Churchill s.n. [22 August 1970] is V. urticifolia var. leiocarpa Perry & Fernald and Herb. Zuccarini s.n. [Hort. bot. Monac.] is a mixture of V. officinalis L. and xv. baileyana Moldenke.

Additional citations: FLORIDA: Collier Co.: J. A. Churchill s.n. [7 May 1969] (Ln--230044); Moldenke & Moldenke 29608 (Ac, Gz, Ld, Tu). Levy Co.: Meebold 26897 (Mu). Monroe Co.: Meebold 27567 (Mu). Sanibel Island: Brumbach 8786 (N, W--2773210). LOUISIANA: Catahoula Par.: Thomas & al. 10859 (Kl--11561). Pointe Coupee Par.: C. A. Brown 3892 (Lv). Saint James Par.: Stam 60 (Lv). Saint Tammany Par.: C. A. Brown 4084a (Lv). Tangipahoa Par.: Correll & Correll 9239 (Lv). Terrebonne Par.: Wurzlow s.n. [June 20, 1912] (Lv). West Feliciana Par.: Curry, Martin, & Allen 449 (Lv). Grand Isle: Cangemi & Andrus 80 (Lv). TEXAS: Comal Co.: Lindheimer 1077 (Mu--4090). CALIFORNIA: San Bernardino Co.: Parish & Parish 1043 (Mu--1578). JAMAICA: C. D. Adams 11408 (Mu, Mu); Wullschlägel 968 (Mu--299). HISPANIOLA: Dominican Republic: Bertero s.n. [St. Domingo] (Mu--415). PUERTO RICO: Eggers 996 (Mu--3894); Sintenis 767 (Mu--1584).

VERBENA SCABRA f. ANGUSTIFOLIA Moldenke

Additional bibliography: Moldenke, Phytologia 28: 384. 1974; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2,

2: 1396, 1397, & 1775. 1975.

*VERBENA SCABRA* var. *TERNIFOLIA* Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 59: 6926. 1975; Moldenke, Phytologia 30: 169 (1975) and 31: 378. 1975.

*xVERBENA SCHNACKII* Moldenke

Additional bibliography: Moldenke, Phytologia 28: 384 & 457. 1974.

*VERBENA SCROBICULATA* Griseb.

Additional bibliography: Moldenke, Phytologia 30: 169. 1975.

The corollas on Legname & Cueszo 10450c are said to have been "purple" when fresh.

Additional citations: ARGENTINA: Jujuy: Legname & Cueszo 10450c (N).

*VERBENA SEDULA* Moldenke

Additional bibliography: Balgooy, Pacif. Fl. Areas 3: 245. 1975; Moldenke, Phytologia 28: 384 (1974) and 36: 236. 1977.

López-Palacios describes this species as "hierba de 0.6—1.5 m., hojas anchas, superiores relativamente estrachas, espigas largas y delgadas", the corollas on his no. 4294 as "lila", on no. 4297 as "morado lila", and on no. 4296 as "rosado morada claro", and found it in flower and fruit in February.

Additional citations: GALAPAGOS ISLANDS: Indefatigable: López-Palacios 4294 (Ld), 4296 (Ld), 4297 (Ld).

*VERBENA SEDULA* var. *FOURNIERI* Moldenke

Additional bibliography: Moldenke, Phytologia 24: 141. 1972.

Schimpff encountered this plant at 180 meters altitude and distributed it as *V. litoralis* H.B.K. Werff states that it is "a common plant in the fern-sedge zone" on Chatham island and that "the plant is somewhat spreading and the flowers are pale-blue". He found it in flower in October. His nos. 1481 & 1508 are placed here tentatively, awaiting the publication of his full study of Galápagos vervains; of no. 1481 he notes "leaves close together; flowers pale-blue, almost white".

Additional citations: GALAPAGOS ISLANDS: Chatham: Schimpff 132 (Mu); Werff 1481 (Z), 1508 (Z), 2205 [1505] (Ld).

*VERBENA SELLOI* Spreng.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 496. 1858; Moldenke, Phytologia 30: 152 & 169 (1975) and 36: 231. 1977.

Troncoso feels that *A. santiaguensis* f. *albiflora* Moldenke is synonymous with what she calls *Glandularia pulchella* var. *gracilior* Troncoso and which I regard as *V. selloi*. Araujo refers to *V. selloi* as a very frequent heliophilous herb with "red" flowers.

Material of *V. selloi* has been misidentified and distributed

in some herbaria as V. chamaedrifolia Juss.

Additional citations: BRAZIL: Rio Grande do Sul: Araujo 1312 [Herb. FKEMA 12258] (Pf); Torgo s.n. [Herb. Brad. 21258] (Mu). URUGUAY: Herter 181 [Herb. Herter 79174] (Mu).

VERBENA SESSILIS (Cham.) Kuntze

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 496. 1858; Moldenke, Phytologia 28: 385 & 464 (1974), 34: 260 (1976), and 36: 237. 1977.

Pedersen refers to this plant as having weak, leaning stems, and encountered it on campos, fruiting in November. The corollas on Pedersen 7171 are said to have been "purple" when fresh.

Additional citations: PARAGUAY: Fiebrig 4031 (Mu—4441). ARGENTINA: Entre Ríos: Pedersen 7171 (N).

VERBENA SIMPLEX Lehm.

Additional & emended bibliography: Sweet, Hort. Brit., ed. 1, 1: 325. 1826; G. Don in Loud., Hort. Brit., ed. 1, 246 (1830) and ed. 2, 246. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; G. Don in Loud., Hort. Brit., ed. 3, 246. 1839; Sweet, Hort. Brit., ed. 3, 553. 1839; Buek, Gen. Spec. Syn. Candoll. 3: 494—496. 1858; Co-nard, Fl. Iowa 44. 1951; R. A. Davidson, State Univ. Iowa Stud. Nat. Hist. 20 (2): 77. 1959; Cooperrider, State Univ. Iowa Stud. Nat. Hist. 20 (5): 70. 1962; Barker, Univ. Kans. Sci. Bull. 48: 571. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 716 & 717 (1969) and imp. 2, 716 & 717. 1974; E. T. Browne, Castanea 39: 183. 1974; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; Rousseau, Géogr. Florist. Qué. [Trav. Doc. Cent. Étud. Nord 7:] 376—377, 480, 505, 643, & 788, map 827. 1974; Duncan & Foote, Wildfls. SE. U. S. 150, [151], & 295. 1975; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: 90. 1975; Moldenke, Phytologia 30: 169—170 (1975), 31: 376 & 377 (1975), and 34: 247—249 & 279. 1976; Grimé, Bot. Black Amer. 191. 1976; Moldenke, Phytologia 36: 29, 134, 145, 221, & 244. 1977; F. H. Montgomery, Seeds & Fruits 202, fig. 1, & 230. 1977.

Additional illustrations: Duncan & Foote, Wildfls. SE. U. S. [151] (in color). 1975; F. H. Montgomery, Seeds & Fruitz 202, fig. 1. 1977.

Don (1830) calls this the "narrow-leaved vervain" and says that it was introduced into English gardens from "N. Amer." in 1802. Montgomery (1977) describes the seeds as "Nutlets as in V. bracteata, 2.5 x 0.8 x 0.6 mm." Browne (1974) records this species from Stone County, Arkansas. Churchill found it growing on road embankments; Harold encountered it in grassy woodlands. Demaree records it as "common on clay banks" at 275 feet altitude in Arkansas. Cooperrider (1962) found it to be frequent in low sandy ground along rivers in Clinton and Jones Counties, Iowa, while Davidson (1959) refers to it as infrequent in dry sandy soil in Louisa and Muscatine Counties in the same state. Barker (1969) records it from Butler, Chase, Cowley, Lyon, and

Wabaunsee Counties in Kansas, where, he says, it is "Occasional in rocky upland prairie, on rocky prairie slopes, [and] along roadsides and right-of-ways".

Muehlenbach considered his no. 1525 to represent a natural hybrid of this species with V. bracteata Lag. & Rodr., but I see no evidence of this supposed hybridity. I regard his collection as merely representing the edaphically erect form of V. bracteata.

The corollas on F. R. Fosberg 35716 are said to have been "blue-lavender" when fresh.

Material of V. simplex has been misidentified and distributed in some herbaria as V. carolina L. The Curtiss 1955 collection is a mixture with var. eggerti Moldenke. The Gattinger s.n. [Nashville, June-August] and Tans 1360, distributed as typical V. simplex, are better regarded as var. eggerti, while V. Keller s.n. [Aug. 24, 1917] is V. halei Small and J. A. Churchill s.n. [25 May 1954] is V. stricta Vent.

Additional citations: NEW YORK: County undetermined: Schoepf s.n. [Ad New York] (Mu--249). NEW JERSEY: Atlantic Co.: J. A. Churchill s.n. [19 June 1957] (Ln--230284). County undetermined: Hillebrand s.n. (Mu); Herb. Zuccarini s.n. (Mu--254). VIRGINIA: Fauquier Co.: F. R. Fosberg 35916 (N). ILLINOIS: Will Co.: Meebold 19175 (Mu). Winnebago Co.: Bebb s.n. [Fountaindale] (Mu). INDIANA: Jefferson Co.: Frazer s.n. [June 30, 1885] (Lc). KENTUCKY: County undetermined: Herb. Kummer s.n. (Mu--1241). TENNESSEE: Blount Co.: Curtiss 1955, in part (Mu--1278). Morgan Co.: J. A. Churchill s.n. [8 May 1955] (Ln--204158). KANSAS: Lyon Co.: Harold s.n. [6/22/60] (Lc). Miami Co.: Hauser & Brooks 2887 (N, N). MISSOURI: Cass Co.: Meebold 24221 (Mu). Dent. Co.: Meebold 25368 (Mu). Jackson Co.: Meebold 25199 (Mu), 26766 (Mu). Ripley Co.: Morizot & Whatley s.n. [30 June 1968] (Kl--11866). Saint Louis: Muehlenbeck 1208 (Mu). ARKANSAS: Izard Co.: R. D. Thomas 15366 (Kl--11812). Randolph Co.: Demaree 69646 (Ld). UNITED STATES: State undetermined: Hooker s.n. [S. States] (Mu--253). NORTH AMERICA: Locality undetermined: Harz s.n. [N. Am.] (Mu). CULTIVATED: Germany: Herb. Mus. Bot. Landishuth s.n. (Mu--248); Herb. Schwaegrichen s.n. [Hort. Lipsiensis] (Mu--1260), s. n. (Mu--1247); Herb. Zuccarini s.n. [H. b. M. 1819] (Mu--251), s.n. [Hort. bot. Monac. 1830] (Mu--252).

#### VERBENA SIMPLEX var. EGGERTI Moldenke

Additional synonymy: Verbena multicaulis Raf., Herb. Raf. 65, nom. nud. 1833.

Additional & emended bibliography: Raf., Herb. Raf. 65. 1833; E. D. Merr., Ind. Raf. 205 & 295. 1944; Moldenke, Résumé Suppl. 7: 2, 3, & 10. 1963; Moldenke, Phytologia 11: 473 & 480. 1965; Moldenke, Fifth Summ. 1: 18, 38, 44, 46, & 66 (1971) and 2: 695,

793, 917, & 920. 1971; Moldenke, Phytologia 23: 373 (1972), 24: 147 (1972), 34: 248, 249, & 279 (1976), and 36: 244. 1977.

Tans encountered this variety in roadside gravel on a sunny moraine ridge, growing with Ambrosia psilostachya, Andropogon gerardi, Asclepias verticillata, Carduus nutans, Euphorbia corollata, Desmodium canadense, and D. illinoense, and describes the corollas as light-blue.

Curtiss 1955 is a mixture of this variety and typical V. simplex Lehm. Material of the variety has been found growing along roadsides and has generally been distributed in herbaria as V. angustifolia Michx.

Additional citations: TENNESSEE: Blount Co.: Curtiss 1955, in part (Mu-1278). Davidson Co.: Gattinger s.n. [Nashville, June-Aug.] (Mu). WISCONSIN: Walworth Co.: Tans 1360 (Ts).

#### VERBENA SPECTABILIS Moldenke

Additional bibliography: Moldenke, Phytologia 24: 147 (1972) and 34: 259 & 260. 1976.

The corollas on Porto & Oliveira ICN.9586 are described as having been "vermelhas 5R2/12", while those on Rodriguez 530 were "violet". The latter collection was in flower in August and has previously been incorrectly cited by me as V. phlogiflora Cham.

Additional citations: BRAZIL: Rio Grande do Sul: Porto & Oliveira ICN.9586 (Ut-320461). ARGENTINA: Misiones: D. Rodriguez 530 [Herb. Inst. Miguel Lillo 31561] (N).

#### VERBENA SPHAEROCARPA Perry

Additional bibliography: Moldenke, Phytologia 28: 387. 1974.

Felger encountered this plant on sunny slopes and the slopes of volcanic cones, at 600-1000 meters altitude, flowering and fruiting in March. The corollas are said to have been "bluish" on his no. 15758 and "lavender" on no. 15822.

Additional citations: MEXICAN OCEANIC ISLANDS: Socorro: Felger 15758 (Sd-83127), 15822 (Sd-83196).

#### VERBENA STACHYS Raimondi

Additional bibliography: Moldenke, Phytologia 24: 147-148. 1972; Soukup, Biota 11: 19. 1976.

#### VERBENA STELLARIOIDES Cham.

Additional & emended synonymy: Verbena stellaroides  $\alpha$  decurrens Cham. ex Schau. in A. DC., Prodr. 11: 541. 1847. Glandularia stellatioides (Cham.) Covas & Schnack ex Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715, sphalm. 1969.

Additional & emended bibliography: Buek, Gen. Spec. Syn. Cardoll. 3: 496. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 (1969) and imp. 2, 715. 1974; Moldenke, Phytologia 28: 368, 387, 457, & 464 (1974) and 36: 48 & 153. 1977.

The Flebrig 4031, distributed as V. stellaroides, seems better regarded as representing V. sessilis (Cham.) Kuntze, a very closely related taxon.

#### VERBENA STEWARTII Moldenke

Additional bibliography: Moldenke, *Phytologia* 24: 148--149. 1972; Balgooy, *Pacif. Pl. Areas* 3: 245. 1975; Moldenke, *Phytologia* 36: 33. 1977; Van der Werff, *Bot. Notiser* 130: 96--97. 1977.

López-Palacios describes this plant as "hierba de hojas y espigas delgadas, fl. morado claro" and found it in flower and fruit in February.

Van der Werff (1977) is of the opinion that this taxon is conspecific with a very variable V. townsendii Svenson.

Additional citations: GALAPAGOS ISLANDS: Narborough: López-Palacios 4300 (Z).

#### VERBENA STOREOCLADA Briq.

Additional bibliography: Moldenke, *Phytologia* 28: 388 & 465. 1974.

#### VERBENA STRICTA Vent.

Additional & emended bibliography: Sweet, *Hort. Brit.*, ed. 1, 1: 325. 1826; G. Don in Loud., *Hort. Brit.*, ed. 1, 246 (1830) and ed. 2, 246, 1832; Loud., *Hort. Brit.*, ed. 2, 552. 1832; G. Don in Loud., *Hort. Brit.*, ed. 3, 246. 1839; Sweet, *Hort. Brit.*, ed. 3, 553. 1839; Buek, *Gen. Spec. Syn. Candoll.* 3: 494--496. 1858; Kuntze, *Rev. Gen. Pl.* 2: 510. 1891; Conard, *Pl. Iowa* 44. 1951; E. R. Spencer, *Just Weeds*, ed. 2, 201--204 & 332, fig. 65. 1957; R. A. Davidson, *State Univ. Iowa Stud. Nat. Hist.* 20 (2): 77. 1959; Hall & Thompson, *Cranbrook Inst. Sci. Bull.* 39: 74. 1959; Cooper-rider, *State Univ. Iowa Stud. Nat. Hist.* 20 (5): 70. 1962; P. W. Thompson, *Cranbrook Inst. Sci. Bull.* 52: 37. 1967; Barker, *Univ. Kans. Sci. Bull.* 48: 571. 1969; E. R. Spencer, *All About Weeds* 201--204 & 332, fig. 65. 1968; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 717. 1969; G. W. Thomas, *Tex. Pl. Ecol. Summ.* 78. 1969; Scully, *Treas. Am. Ind. Herbs* 283. 1970; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 2, 717. 1974; El-Gazzar, *Egypt. Journ. Bot.* 17: 75 & 78. 1974; Rousseau, *Géogr. Florist. Qué.* [Trav. Doc. Cent. Étud. Nord 7:] 377, 465, 643, & 785, map 828. 1974; [Bard], *Bull. Torrey Bot. Club* 102: 431. 1975; Perkins, Estes, & Thorp, *Bull. Torrey Bot. Club* 102: 194--198. 1975; Moldenke, *Phytologia* 30: 170 (1975), 31: 415 (1975), and 34: 249 & 279. 1976; Anon., *Biol. Abstr.* 61: ACL.732. 1976; Grisé, *Bot. Black Amer.* 191. 1976; Van Bruggen, *Vasc. Pl. S. Dak.* 369, 520, & 536. 1976; Ziegler & Sohmer, *Contrib. Herb. Univ. Wisc. LaCrosse* 13: 16. 1976; Moldenke, *Phytologia* 36: 29, 135, 150, 157, 217, 224, & 229. 1977; F. H. Montgomery, *Seeds & Fruits* 202, fig. 2, & 230. 1977.

Additional illustrations: E. R. Spencer, *Just Weeds*, ed. 2, [203], fig. 65. 1957; E. R. Spencer, *All About Weeds* [203], fig.

65. 1968; F. H. Montgomery, Seeds & Fruits 202, fig. 2. 1977.

Don (1830) calls this species the "strict vervain" and says that it was introduced into English gardens from North America in 1802. Sweet (1826) calls it the "upright vervain". Thomas (1969) lists the name "mullenleaf verbain" (sic).

Churchill has found this species growing in dry open fields, on dry sandy knolls, and in gravelly disturbed soil around gravel pits in Michigan. Stephens & Brooks refer to it as "abundant with f. albiflora in dry, sandy, rocky, clay soil on prairie pasture hillsides. Montgomery (1977) describes the seeds as "Nutlets 2.8 x 0.7 x 0.6 mm., form as in V. bracteata, most of the dorsal surface coarsely reticulate, inner surfaces with a white pubescence or papillose".

Scully (1970) lists some Amerind uses for this plant, for which see under V. hastata L. in the present series of notes.

Perkins and his associates (1975) have studied "an association of V. stricta, V. bracteata Lag. & Rodr., V. halei Small, V. urticifolia L., and derived interspecific hybrids in southern Oklahoma. All hybrids but one involved V. stricta parentage. Of the four species, V. stricta produces the largest and most aggregated blossoms, the most accessible pollen, and the greatest quantity of nectar. The species is visited by the broadest spectrum of insects, including the following: Coleoptera: Anomala sp., Diptera: Atomosia melanopogon, Bacca sp. (with Verbena pollen on head), Exoprosopa sp. (with pollen on head), Neorhynchocephalus sp. (with pollen on head), Systropus sp. (with pollen on head), Homoptera: Cuerna sp., Hymenoptera: Apis mellifera (with pollen on head), Stictiella formosa, Bombus americanorum (with pollen on head), Ceratina shinersi (with pollen on head), Dialictus sp. (with pollen on head), Megachile spp. (with pollen on head), Svastra atripes, Triepeolus sp., Xylocopa virginica, and Lepidoptera: Agraulis vanillae, Atalopedes campestris, Danaus plexippus, Euphytes vestris, Eurema lisa, E. mexicana, Grais stigmaticus, Hemiargus isola, Hylephila phyleus, Leptotes marina, Pieris protodice, Pholisora cattulus, Strymon melinus, Thorabes bathyllus, T. phylades, Vanessa virginiensis. Nine of these insects were also found visiting each of the other 3 species. Insect exclusion and artificial pollination experiments indicated that V. stricta is an outcrossing species with low seed-set through self-fertilization; V. halei and V. urticifolia are highly autogamous and V. bracteata less so. The likelihood that V. stricta will enter into interspecific hybridization is greater than that for the other 3 species. Number, frequency, and pollen-carrying ability of the interspecific pollen vectors favor crosses with V. stricta involving V. urticifolia and V. halei."

These authors note that V. stricta "occupies disturbed sites throughout the Central United States. In southern Oklahoma, it occurs within the ranges of V. bracteata.....V. halei..... and V.

urticifolia....and hybrids frequently occur where the species are sympatric...All four species and a series of putative hybrids were found growing, almost to the exclusion of other species, on a highly disturbed area, a hog lot....Approximately 500--700 plants of V. halei and V. bracteata were present in the study area. Verbena stricta and V. urticifolia were represented by only 50--60 individuals. Pure stands of V. stricta, V. urticifolia, and V. bracteata occurred within the larger area, but in many sections at least three of the species, and at times all four, were located within a 5 m. radius. All but one of the hybrids exhibited morphological affinities with V. stricta."

They found that 5 male fertile insect-visited plants of V. stricta with 623 potential seeds had an 87.6 percent seed-set, 5 male sterile insect-visited plants with 747 potential seeds had 76.3 percent seed-set. Nine bagged plants yielded 1263 seeds and a 7.5 percent seed-set; 3 geitonogamous artificially cross-pollinated plants yielded 695 seeds and a 14.3 percent seed-set, and 2 xenogamous artificially cross-pollinated plants yielded 433 seeds and a 78.5 percentage seed-set.

"All four species have two sterile styler lobes, one or occasionally both of which extend as elongate lobes beyond the glandular stigmatic surface. Stigmatic receptivity appears to develop first near these lobes and then to spread across the stigmatic zone. Quantities of pollen were found in the axils of the lobes, which may function as passive scrapers of pollen off the mouthparts of probing insects. In Verbena stricta dehiscence commences the day before unfolding of the corolla lobes and continues until the corolla falls away, a total of three days. Thus, self-pollination could occur prior to exposure of the stigma; however, autodeposition of pollen is unlikely: The anthers are borne ca 2 mm above the stigma, and the pollen remains at this level. The corolla tube is inclined so that the distal third of the tube which contains the anthers is nearly horizontal. Hairs in the corolla also restrict the free fall of pollen to the stigma. Additionally, the stigma is not receptive until the flower has opened. Pollen was not observed on the stigma of bagged flowers. Spatial separation of the anthers and stigma in the other three species is less than in Verbena stricta."

They report the corolla color in V. stricta to be light-purple and the corolla 9 mm. in diameter -- the other species have less showy and smaller flowers with the corolla-tube straight (in V. stricta it is strongly curved below the anther level).

"Of the four species, Verbena stricta is probably the most attractive to insects. It is perhaps the tallest plant of the group (mostly over 100 cm) and has 4--21 upright flowering branches bearing dense aggregates of flowers....The nectar...contains 38±2 percent dissolved solids. Assuming these solids to be sugars, this percentage is approximately at the mid-range of a series of sugar concentrations of nectar for 43 species of flowering plants reported by Percival (1961). Although nectar exists in the

other three species, the amount was too slight for extraction.

"Several characteristics.....of the inflorescences and flowers of Verbena stricta indicate its probable attractiveness for a variety of anthophilous insects: (1) several dense, elongate spikes, each with a mass of light purple flowers forming a showy unit; (2) tubular corolla with a horizontal throat; (3) protected nectar source with a relatively high percentage of dissolved solids and the nectar sources massed.....; (4) a landing platform; and (5) a supply of easily accessible pollen at the throat of each corolla tube.....Verbena stricta was visited by the greatest diversity and number of potential pollinators.....

"All insect visitors appeared to probe the flowers of Verbena stricta for nectar with the exception of a small solitary bee (not captured), which gathered pollen only. The butterflies methodically probed several flowers on each dense branch and then flew to another branch on the same plant or an adjacent plant. Longer flights were infrequent. Foraging patterns of flies resembled those of butterflies, but the flies spent less time probing each flower and moved more rapidly from plant to plant. Bees tended to visit fewer flowers on each plant and to forage over greater distances, especially those which were gathering pollen.

"Most individual visitors were typically species specific. The only insect observed visiting indiscriminately both parental plants and their hybrid (V. stricta, V. urticifolia, and V. x deamii) was Systropus. A single Hemiargus isola was observed to visit V. bracteata and V. stricta successively....visitors to Verbena stricta and V. halei were fairly equally divided among the three major orders of specialized insect pollinators, Diptera, Hymenoptera, and Lepidoptera....it is obvious that pollen from the other three species is viable on the stigmas of Verbena stricta, but that interspecific crosses may produce fewer seeds than intraspecific, allogamous crosses.....Nevertheless, cross-pollination among these species involving V. stricta as the carpellate parent is likely and cross-fertilization feasible."

They point out that V. stricta sets significantly fewer seeds when bagged than when open-pollinated. "Although V. stricta and V. bracteata are capable of autogamous reproduction, each shows a tendency for cross-fertilization. This tendency is most pronounced in V. stricta. Artificial pollen transfer within a single plant of V. stricta also demonstrates considerably lower seed set. This species, then, is partially self-incompatible.

"Pollen fertility in Verbena stricta varies considerably with complete sterility evidence in 3 plants, about 14 percent fertility in 4 plants, under 50 percent in 8 other plants, and the remaining 17 plants sampled exhibiting 63—98.3 percent fertility. The 15 plants of V. stricta which exhibited less than 50 percent fertility also had indehiscent anthers. Yet even in the 3 completely sterile individuals seed set was 76 percent. A bagged, pollen sterile plant set no seed while bagged, but set full seed

when exposed to pollinators. Seed set in pollen-sterile individuals approaches normalcy, and therefore such plants are ovule-fertile....pollen-sterile plants set seed only when pollen-fertile forms grow in close proximity and pollinators are readily available. Although the majority of the plants of V. stricta are capable of either outcrossing or selfing, a limited number in this locality function only as pistillate parents.

"On the basis of its reproductive biology and pollination system, Verbena stricta seems more likely to enter into interspecific hybridization than the other three species...for the following reasons: (1) V. stricta is primarily allogamous, whereas in V. halei and V. urticifolia, approximately 50 percent of the gametes are committed to autogamy; (2) V. stricta shares taxa of pollinators with each of the other three species; (3) pollen washings also indicate that interspecific crosses should occur most frequently among the triad V. stricta, V. halei and V. urticifolia. Visitors shared among V. stricta, V. halei and V. urticifolia were primarily bees and flies. The most common visitors shared by V. stricta and V. urticifolia were butterflies, which may be less dependable pollinators.

"Only one hybrid plant of V. stricta x V. bracteata parentage was found. The two outcrossing species are the least likely to hybridize. The hybrids most frequently found involved Verbena stricta as one of the parental species. Interspecific cross-pollinations, therefore, appear to be skewed in favor of V. stricta, the most attractive to the greatest number and variety of insects. In conditions where the four species are sympatric, hybrids would be expected to include V. stricta as one of the parental types, with crosses involving V. halei and V. urticifolia the most likely to occur and V. bracteata the least likely to do so."

These workers have done a tremendously important piece of research and deserve the highest praise! Many more such studies are urgently needed in this genus (and in other genera of this family) to help us to understand the taxonomic and systematic position of the many groups of puzzlingly variable or puzzlingly similar taxa.

Hall & Thompson (1959) record V. stricta from Oakland County, Michigan, where they say it is occasional in fields, especially in sandy soil; Thompson (1967) lists it for Leelanau County. In Iowa Davidson (1959) records it as a common "Weed of roadsides, railways, pastures, and other open, often sandy, places", while Cooperrider (1962) also refers to it as common in sandy roadsides and other open sandy places in that state. In Kansas Barrell notes that it is "Common, in upland prairies, on prairie slopes, along roadsides and railroad right-of-ways. Occurs throughout the area." Barber also found it "occasional in grassy lightly grazed uplands with Chrysopsis villosa" in Kansas.

Grimé (1976) says "Vervain [is] a cure for rheumatism. The following notes from Cameron Mann, a well known botanist of Kansas

City, are worth recording: 'The following remedy for rheumatism was recently communicated to me by a respectable lady, who had found it quite successful in her own case, and also with several of her friends. It was given her by an old negress who claimed many years ago to have been told of it by an Indian. The medicine is made by boiling the root and part of the stalk of one of the blue vervains in vinegar for twelve hours, and then rubbing the decoction upon the afflicted parts. Which of the species was used I could not tell from the species [specimens] shown me, as they consisted merely of root and stalk, with, fortunately one stalk bearing withered flowers. The latter identified the plant as a Verbena, but there being no leaves, I could not tell whether it was Verbena angustifolia, Verbena hastata, Verbena stricta, [or] Verbena bracteosa, all four being native here."

The Herb. Zuccarini s.n. [Hort. bot. Monac.] collection, cited below, is a mixture with V. moechina Moldenke.

Material of V. stricta has been misidentified and distributed in some herbaria as V. bracteosa Michx. and as V. simplex Lehm. On the other hand, the Bynum, Ingram, & Jaynes s.n. [Apr. 13, 1933], distributed as V. stricta, actually is V. rigida Spreng.

Additional citations: NEW YORK: Suffolk Co.: Kandler s.n. [Upton, 5.8.1956] (Mu). ILLINOIS: Adams Co.: Purpus 117 (Mu—4289). Winnebago Co.: Bebb s.n. [Fountaindale] (Mu—4252). County undetermined: Herb. Zuccarini s.n. (Mu—373). INDIANA: Tippecanoe Co.: Bresinsky s.n. [2.7.1967] (Mu). IOWA: County undetermined: Hillebrand s.n. [Iowa, 1871] (Mu). MICHIGAN: Antrim Co.: T. H. P. Marshall 1738 (Ln—127640). Macomb Co.: J. A. Churchill s.n. [18 July 1954] (Ln—204161). Oakland Co.: J. A. Churchill s.n. [25 May 1954] (Ln—203432). WISCONSIN: La Crosse Co.: Doppelbaur & Doppelbaur 963 (Mu). MINNESOTA: Clay Co.: O. A. Stevens 1271 (M1). SOUTH DAKOTA: Lawrence Co.: N. F. Petersen s.n. [Spearfish] (Lv). Pennington Co.: O. M. Clark 6044 (Mu). Stanley Co.: Stephens & Brooks 33954 (Sd—74497). KANSAS: Barber Co.: Barrell 38-72 (W—2802774). Lyon Co.: Hauser & Brooks 3058 (N); F. L. Nelson s.n. [June 29, 1960] (Lc); A. V. Weber s.n. [June 28, 1959] (Lv). MISSOURI: Cass Co.: Meebold 24220 (Mu). Cole Co.: Meebold 25461 (Mu). Ralls Co.: J. Davis 4488 (Mu). Saint Louis: Engelmann s.n. [St. Louis] (Mu); Mühlenbeck 145 (Mu, Mu). County undetermined: Martens s.n. (Mu—574). ARKANSAS: IZARD Co.: R. D. Thomas 15346 (K1—11810). Phillips Co.: Demaree 15224 (Lv). NEBRASKA: Pierce Co.: N. F. Petersen s.n. [Aug. 11, 1910] (Lv). CULTIVATED: France: Herb. Schreber s.n. [Ex horto Parisii] (Mu—370). Germany: Herb. Schreber s.n. [Hortus Erlangensis 1805] (Mu—371); Herb. Zuccarini s.n. [Hort. bot. Monac.] (Mu—375, Mu—376).

#### VERBENA STRIGOSA Cham.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 496.

1858; Moldenke, *Phytologia* 30: 170 (1975) and 36: 226. 1977.

Recent collectors describe this plant as a decumbent herb, 50 cm. tall, found it growing along roadsides, and report that the flowers "attract many bees". They have found it in flower in September and both in flower and fruit in December.

The corollas on Lindeman & Haas 2475 are described as having been "blue-purple (10PB6/6)", while on Lourteig 2143 they were "lilac". Handro says of the plant "planta do campo, formando grandes touceiras; flores roxo-azuis".

The Reitz & Klein 17616, cited below, was previously erroneously cited by me as *V. hirta* var. *gracilis* Dusén. The Dusén 242, distributed as *V. strigosa*, actually is *V. lobata* Vell.

Additional citations: BRAZIL: Paraná: Hatschbach 4216 (Mu); Lindeman & Haas 2475 (Id); Reitz & Klein 17616 (Ac, N, W-2548333). Santa Catarina: Lourteig 2143 (N). São Paulo: Handro 607 [Herb. Inst. Bot. S. Paulo 55438] (W-2748270).

#### VERBENA SULPHUREA D. Don

Additional synonymy: *Glandularia sulphurea* D. Don ex Spach, *Hist. Nat. Veg. Phan.* 9: 241. 1840. *Verbena dicerus* Bert. ex Moldenke, *Phytologia* 36: 48, in syn. 1977.

Additional & amended bibliography: G. Don in Loud., *Hort. Brit. Suppl.* 1: 680. 1832; Loud., *Hort. Brit.*, ed. 2, 553. 1832; Baxt. in Loud., *Hort. Brit. Suppl.* 2: 680. 1839; Sweet, *Hort. Brit.*, ed. 3, 553. 1839; Spach, *Hist. Nat. Veg. Phan.* 9: 241. 1840; Baxt. in Loud., *Hort. Brit. Suppl.* [3]: 655. 1850; Buek, *Gen. Spec. Syn. Candoll.* 3: 494 & 496. 1858; Bolkh., *Grif, Matvej., & Zakhar.*, *Chrom. Numb. Flow. Pl.*, imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke & Neff, *Orig. & Struct. Ecosyst. Techn. Rep.* 74-18: 57, 75, 116, & 118. 1974; Moldenke, *Phytologia* 30: 171 (1975), 34: 274 (1976), and 36: 40 & 48. 1977.

Spach (1840) calls this species the "*glandularia jaune*", while Loudon (1832) calls it the "sulphur-coloured vervain" and says that it was introduced into English gardens from Chile in 1834.

Additional citations: CHILE: Aconcagua: Deesauer s.n. [Aconcagua '97] (Mu). Coquimbo: Grau & Grau 1663 (Mu). Valparaíso: Behn s.n. [16 Oktobr. 1929] (Mu); Bertero 1392 (Mu-377), 1809 (Mu-377); Buchtien s.n. [21.IX.1895] (Mu-1839). Province undetermined: Deesauer s.n. [Fishermans] (Mu); Frömbing s.n. [1886] (Mu-1787). CULTIVATED: Germany: Herb. Kummer s.n. [Hort. bot. Monac. 1846] (Mu-1268).

#### VERBENA SULPHUREA var. FUSCORUBRA Skottsberg

Additional bibliography: Moldenke & Neff, *Orig. & Struct. Ecosyst. Techn. Rep.* 74-18: 118. 1974; Moldenke, *Phytologia* 24: 227. 1972.

[to be continued]

Keys to the Flora of Florida -- 3, Boraginaceae<sup>1</sup>

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ABSTRACT: A key is provided to the 10 genera of Boraginaceae native and naturalized in the state of Florida, U.S.A. The genera, with the number of included species, are: *Bourreria*, 3; *Buglossoides*, 1; *Cordia*, 2; *Cynoglossum*, 2; *Heliotropium*, 7; *Lithospermum*, 3; *Mallotonia*, 1; *Myosotis*, 1; *Onosmodium*, 1; and *Tournefortia*, 2. Amplified keys are presented to the species within each genus. The keys are supplemented with discussion of nomenclature and justification of generic placement and specific delimitation in *Bourreria*, *Buglossoides*, *Heliotropium*, and *Mallotonia*. *Buglossoides arvensis*, *Cynoglossum furcatum*, *Heliotropium procumbens*, and *Myosotis macrosperma* are newly reported for Florida. *Heliotropium europaeum*, *Myosotis virginica*, and *Borago officinalis* are excluded.

BORAGINACEAE Juss.

Borage Family

The Boraginaceae well typify the southeastern family as treated by J. K. Small. He placed its species also in two segregate families, Ehretiaceae and Heliotropiaceae, which are not now generally recognized. The numerous papers of I. M. Johnston are most important in determining generic alignments and the nomenclature of many species.

1. Shrubs, small trees, or woody vines.
2. Leaves linear-spatulate, succulent, with dense silky-gray pubescence. Mallotonia
2. Leaves broad, membranous, variously pubescent to glabrous but not silky-gray.
3. Shrubs or small trees; styles divided toward apex.
4. Styles once forked; flowers small, white, in open cymes. Bourreria

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<sup>1</sup>This paper is Florida Agricultural Experiment Station Journal Series No. 398.

4. Styles twice forked; flowers large and orange *or* small and in dense heads.
3. Woody vines or rarely low shrubs; styles wholly united. Tournefortia
1. Annual or perennial herbs.
5. Flowers in condensed terminal cymes.
6. Annual; corolla white to bluish. Buglossoides
6. Perennial; corolla pale yellow to orange-yellow. Lithospermum
5. Flowers in elongate cymes usually showing pronounced scorpioid curvature.
7. Style long-exserted from corolla. Onosmodium
7. Style short, included in corolla.
8. Nutlets with stout hooked (grapnel-like) bristles; cauline leaves clasping. Cynoglossum
8. Nutlets without hooked bristles; cauline leaves cuneate to petiolate.
9. Flowers sessile; style at apex of ovary. Heliotropium
9. Flowers short-pedicellate; style arising between ovary lobes. Myosotis

## BOURRERIA

The Strongbacks have not been given sufficient attention by previous workers to permit confident naming of all Florida plants. Johnston almost wholly omitted study of *Bourreria*, leaving a revision by Schulz (in Urban, *Symbolae Antillanae* 7:45-70. 1911) the only comprehensive analysis of the genus. The Rough Strongback, a shrub or small tree of the lower Florida Keys, has from an early date been distinguished by its strigose leaves from the much more common smooth-leaved Bahama Strongback, *B. ovata* Miers, yet doubt remains as to its correct scientific name.

The Rough Strongback was well described from Florida materials at least as early as 1860 by Chapman (Flora of the Southern United States, ed. 1) under the name *Ehretia radula* Poir. Small (Flora of the Southeastern United States, ed. 1. 1903) and others soon named the plant *Bourreria radula*, in recognition of its correct generic placement. The epithet "radula," or *rasp*, seemed a felicitous term for the distinctive abrasive leaves of this plant.

Loss of this mnemonic word was a consequence of the 1911 revision by Schulz. He saw the rough-leaved Florida plant as falling within *Bourreria revoluta* HBK. and made that in turn a variety (var. *revoluta* (HBK.) O. E. Schulz) of the generic type, *B. succulenta* Jacq. (1760). Assignment of the Florida plant to *revoluta* (although at the specific level) was accepted by Britton & Wilson (Sci. Survey of Porto Rico and the Virgin Islands, 1930) and by Small (Manual of the Southeastern Flora, 1933), and more recently has been employed by Little (Checklist of Native and Naturalized Trees, 1953). Long & Lakela (Flora of Tropical Florida, 1971) conformed more closely to Schulz, treating *revoluta* as a variety of *B. succulenta* (although incorrectly attributing this last species to C. E. Stahl, a twelve year old boy on the centennial of Jacquin's actual description).

The epithet *revoluta*, however, whether used at the level of species or variety, cannot refer to the Florida plant. *Bourreria revoluta* was based by Kunth (Nov. Gen. 3:67. 1818) on materials from Regla, Hidalgo, Mexico, at an elevation above 2000 m., and was described as glabrous. In habitat and form it is unlikely to be the rough-leaved Florida plant, and in date it is preceded by more probable Antillean names.

The name that most certainly applies to the Florida rough-leaved plant, although not necessarily the earliest, is *Bourreria radula* (Poir. in Lam.) G. Don, based upon *Ehretia radula* Poir. (in Lamarck, Encyc. suppl. 2:2. 1811). Although typified by materials from Hispaniola, it was described by Poiret in terms that were both detailed and apt for the plants of the Florida Keys; the leaves, in part, were seen as "toutes couvertes en dessus de points blancs tres-rudes," an unmistakable reference to the distinctive stout white-based hairs of the upper leaf surface. Although Schulz considered *B. radula* to be synonymous with a second Hispaniolan species, *B. tomentosa* (Lam.) G. Don, that name has not previously been applied to Florida materials, and the tomentose lower leaf surface of *B. tomentosa* may preclude such application. Until the much needed further study of this genus is undertaken, it seems both prudent and satisfying to return to the epithet long ago employed by Chapman, with the Rough Strongback again known as *Bourreria radula*.

In recent literature regarding the Florida species of *Bourreria*, the common name often employed has been "Strongbark," surely a corruption of the Bahamian "Strongback," in reference to the practice (still continued, as observed by George Avery) of using the leaves in a tea which will give one "strength to work all day."

Bourreria P. Browne

## Strongbacks

1. Leaves narrowly obovate to spatulate, hispidulous above, small (blade to 2.5 cm. long, 0.8 - 1.2 cm. wide; petiole to 3 mm. long); flowers white; drupes orange, 7 - 8 mm. broad; small twiggy shrub, under favorable conditions to 2.5 m. tall but usually much lower; very local and now nearing extinction through habitat destruction, pinelands of Big Pine Key, Monroe County, and Long Pine Key of the Everglades National Park, Dade County. July - September.

LITTLE STRONGBACK.

B. cassinifolia (A. Rich.) Griseb.

1. Leaves broadly obovate, of medium size (blade 2.5 - 6 cm. long, 1.4 - 4 cm. wide; petiole 3 - 18 mm. long); drupes 8 - 11 mm. broad.

2. Leaves strigose above, the individual hairs stout and at length white-based; petioles 3 - 7 mm. long; cymes usually few (5 - 30) - flowered; flowers white; drupes orange; small tree; originally in dry hammocks of Key West, now precariously persisting in yards, with a few individuals on adjacent keys. Nearly all year. [*B. revoluta* HBK., misapplied]

ROUGH STRONGBACK.

B. radula (Poir. in Lam.) G. Don

2. Leaves smooth above; petioles 10 - 18 mm. long, rarely less; cymes often many (20 - 80) - flowered; flowers white; drupes yellow to orange-red with increasing maturity; small to occasionally fair-sized tree; frequent in hammocks, at times somewhat adventive in cut-over areas, throughout the Keys, sparingly at Bear Lake and elsewhere near the edge of Florida Bay. June - October.

BAHAMA STRONGBACK.

B. ovata Miers

## BUGLOSSOIDES

This genus has been segregated by I. M. Johnston (Jour. Arnold Arb. 35:38-46. 1954) from *Lithospermum* primarily on the basis of its well developed insect guide lines in the corolla throat, with a number of its other floral features (apiculate anthers, lobed sterile tip of style, small cylindrical pollen, and blue as a common corolla color) occurring only sporadically else-

where in *Lithospermum* or allied genera and never with the same degree of uniformity as in *Buglossoides*. The desirability of adopting this ineuphonious name has not impressed itself upon most recent floristic writers (cf. Hommersand in Radford et al., Manual of the Vascular Plants of the Carolinas, 1968), but Johnston's rationale for its separation from *Lithospermum* is clearly expressed and seems well founded and has been concurred in by such modern writers as Correll & M. C. Johnston (Manual of the Vascular Plants of Texas, 1970) and Fernandes (in Tutin et al., Flora Europaea, 1972).

The one Florida species, *Buglossoides arvensis*, is based on two remote collections which appear to be the first legitimate records of this plant for the state. Fernald (Gray's Manual of Botany, 1950) reported for the species (as *Lithospermum arvense*) to extend "s. to Fla." However, no documenting specimen presently exists at the Gray Herbarium, nor is there other indication of the basis for Fernald's statement.

Buglossoides Moench

## Gromwells

1. Flowers small, corolla scarcely exceeding calyx, white with tube purplish-blue below; nutlets gray with the surface elaborately wrinkled and pitted; leaves oblong-lanceolate, small; annual herb; weedy elsewhere, known in Florida only from two collections: open pineland, Tampa, Hillsborough County [*S. C. Hood* 4147, 26 Apr 1951, FLAS]; vacant lot, Pensacola, Escambia County [*J. R. Burkhalter* 3473, 6 Mar 1976, FLAS]. March - April. [*Lithospermum arvense* L.]  
CORN GROMWELL. B. arvensis (L.) I. M. Johnst.

## CORDIA

The two Florida species of *Cordia* have very similar ranges but greatly different structure, a fact recognized by Small (Manual of the Southeastern Flora, 1933) who placed them in different genera. Studies by Johnston (Jour. Arnold Arb. 30:85-104. 1949; 30:111-127. 1949) are helpful in placing these species in proper relation to each other and to their allies.

Cordia L.

## Cordias

1. Corolla orange, 3 - 4 cm. long; fruit tightly enclosed by fleshy white calyx, 2 - 2.5 cm. long at maturity; leaves entire, broadly ovate, the blade 15 - 20 cm. long, on a 3 - 5 cm. petiole, occasionally much smaller; shrub or small tree; infrequent but conspicuous in flower, hammocks, rocky areas,

roadsides, often in cultivation; Florida Keys and (more rarely) southern Dade County. June - October. [*Sebestena Sebestena* (L.) Britt.]

GEIGER-TREE

C. sebestena L.

1. Corolla white, about 0.7 cm. long; fruit a red naked one-seeded drupe, 0.3 - 0.5 cm. long; leaves coarsely serrate, ovate, 2 - 3 cm. long; weak-stemmed shrub; occasional, in hammocks on Florida Keys, rarely on north shore of Florida Bay. [All Florida materials have been determined as var. *humilis* (Jacq.) I. M. Johnston.] May - August (December). [*Varronia globosa* Jacq.]

VARRONIA.

C. globosa (Jacq.) Kunth

#### CYNOGLOSSUM

*Cynoglossum furcatum* Wall. in Roxb., an Indian species not previously reported for continental North America, has been collected near the south shore of Lake Okeechobee (see key, below). Its occurrence elsewhere in the New World has been noted only by Liogier (*Rhodora* 67:349. 1965) who records it for Maricao, Puerto Rico. In 1932 it was grown as a cultivated ornamental in Gainesville (*Watkins*, FLAS), but at the present time it does not seem to be known in Florida horticulture. It is not known whether the Okeechobee plants were derived from this or other intentional introductions, or were truly adventive. Recent collection activities in the Okeechobee area have not encountered the species.

The second species of this genus, *Cynoglossum virginianum* L., although an unquestioned native, is a northern plant that has only been recognized in recent years to extend southward into Florida. Neither Chapman nor Small appear to have been aware of its presence on the Apalachicola River bluffs. This may have been a consequence of its occurrence only on the geologically older portions of the bluffs (now in Torreya State Park) away from the meanders of the river; the steamboat landings and early road connections were only at points where the bluffs and river were in proximity so that construction would not be swept away by the yearly floods.

Cynoglossum L.

Wild Comfrees

1. Leaves large (to 30 cm. long, 8 cm. wide), basal ones long-petiolate, cauline ones clasping; pubescence coarsely hirsute; flowers white (in ours; often light blue elsewhere); style in fruit shriveled and very inconspicuous; nutlets 6 - 8 mm. long; coarse perennial herb; a single Florida station: wooded

ravines and slopes, Torreya State Park, Liberty County.  
 March - April. [*Cynoglossum "virginicum,"* Chapman, Small, in error.]

WILD COMFREY.

C. virginianum L.

1. Leaves small (4 - 6 cm. long, 1 - 1.5 cm. wide), cauline ones clasping; pubescence appressed-silky; flowers blue; style in fruit prominent, 2 mm. long; nutlets 3 mm. long; perennial?; a native of India, collected once in Florida: South Bay, s. of Lake Okeechobee, Palm Beach County [W. M. Buswell, 1 May 1942, FLAS]. April - May.

C. furcatum Wall. in Roxb.

#### HELIOTROPIUM

The only significant studies of the Florida Heliotropes are those of Johnston (Cont. Gray Herb. 81:21-23. 1928; Jour. Arnold Arb. 30:133-138. 1949), and even those are only incidentally applicable to Florida plants. A recent short note by Long (Rhodora 72:32-33. 1970) has proposed a new varietal combination that these earlier papers would suggest is unneeded.

Long, as others have been, was impressed with the great similarity among three supposed Florida species -- *Heliotropium polyphyllum* Lehm., *H. leavenworthii* Torr., and *H. horizontale* Small -- similarities that Small (Manual of the Southeastern Flora, 1933) managed very largely to obscure. Outside of the literature influenced by Small, this grouping has long been known by the first of these three names. Long saw these names as representing two varieties: var. *polyphyllum* (including *H. leavenworthii*) was erect, often strictly so, while var. *horizontale* (Small) Long, his new combination, included plants that were spreading-decumbent to prostrate. He found these two varieties to be readily distinguishable. In contrast, he found plants with white or with yellow corollas to be unworthy of taxonomic distinction; *H. leavenworthii* had been separated from *H. polyphyllum* primarily on its yellow flowers.

Johnston's papers were not cited by Long and in part compel a different interpretation. The type for Lehmann's *H. polyphyllum* was from coastal northern South America, an area in which Johnston (1928) made particular study of *Heliotropium*. It thus becomes untenable to treat the type of the species as erect, as does Long, in the face of Johnston's observation that "all South American materials referable to *H. polyphyllum* appears to be prostrate-spreading...."

Johnston does express qualifications as to the Florida plants so to make the reciprocal of his statement not necessarily true: the prostrate Florida plants may themselves not be

identical with the South American type. Resolution of this will come only with further study. But if varietal distinction is desired for the upright plants that predominate in Florida, *H. polyphyllum* var. *leavenworthii* Gray (1874) is available and unambiguous. (It is a curious circumstance that "*Heliotropium leavenworthii* Torr.," so widely used on specimens of the distinctive yellow-flowered Florida plant, appears not to be properly recorded as to authorship. This epithet was published by Gray in varietal status, with only indirect attribution to Torrey. Seemingly Small (Flora of the Southeastern States, 1903) was the first to give it legitimate specific status; as such it becomes *H. leavenworthii* (Gray) Small.)

The color variations must not be too lightly dismissed. Collectors in Dade County and on the Florida Keys have repeatedly observed that plants growing in close proximity may differ only in the white or yellow colors of their corollas. Yet in most areas of Florida one color or the other predominates or, more commonly, is exclusive. This distribution is approximately given in the accompanying key. The significance of this pattern is unknown, although a reasonable interpretation might be that Florida plants are descended from relatively few introductions of different genic systems further south in the Caribbean. In conformity with both Johnston and Long, these color forms are not here given formal designations.

Equal uncertainty accompanies the level of distinction to be accorded the prostrate to decumbent Florida plants. Small named these *Heliotropium horizontale* (Bull. New York Bot. Gard. 3: 435-436. 1905) on the basis of yellow-flowered collections obtained in the rocky pinelands north and west of Homestead, Dade County. He continued with this habit and range in his later publications. Long, although including Small's types under the new var. *horizontale*, termed the plant a "maritime ecotype," expanded the range northward to Palm Beach on the east coast and Pinellas County on the west coast, included white-flowered specimens (Perkins, GH), and increased the permissible height to 2 feet (Rehder 853, GH). Defined in this fashion, var. *horizontale* cannot be distinguished from the preponderant Florida form. Yet *H. horizontale*, in the original restricted usage of Small, is worthy of some degree of recognition, at least in its most extreme prostrate form. Since it is surely close to, if not identical with, the typical *H. polyphyllum* of northern South America, it is here tentatively termed var. *polyphyllum*, with var. *leavenworthii* reserved for the much more common upright specimens.

Heliotropium L.

Heliotropes

1. Plant completely glabrous, very succulent, usually somewhat glaucous; leaves linear-spatulate, fleshy; stems prostrate

with ascending shoots; corollas white with yellow eye; perennial herb; a frequent plant of coastal shores, usually just above high tide, or on spoil banks or waste areas; Florida Keys north Tampa Bay and to Cape Canaveral, occasionally inland (Putnam, Seminole counties), but there only on brackish soils. March - August.

SEASIDE HELIOTROPE.

H. curassavicum L.

1. Plant hairy, not decidedly succulent, never with a waxy bloom.

2. Delicate annual, not above 2 dm. tall; some flowers subtended by foliaceous bracts 2 - 3 times length of flower; corolla minute, white; rare, open hammock, Key West (formerly), Sugarloaf Key. August. [*H. phyllostachyum* Lehm.]

H. fruticosum L.

2. Perennial or annual, if annual, lacking foliaceous bracts.

3. Perennial; leaves sessile, linear to narrowly ovate; stems prostrate to erect.

4. Flowers purple with yellow eye; inflorescence a cluster of 2 - 5 prominently scorpioid cymes; leaves to 7 cm. long, 1.5 cm. wide; carpels 2, remaining intact at maturity, each with 2 seeds; plants sprawling to erect; sporadic, but often abundant locally, dry soil of roadsides and waste area, occasionally a lawn weed, north and central peninsular Florida, less often in the Panhandle. March - August. [*H. anchusaefolium* Poir. in Lam.; *Cochranea anchusaefolia* (Poir.) Guerke]

WILD HELIOTROPE.

H. amplexicaule Vahl

4. Flowers white, white with yellow eye, or yellow; inflorescence largely unbranched, straight or apically gently curving; leaves to 2 cm. long, 0.2 - 0.3 cm. wide; carpels 2, each splitting at maturity, to form 4 separate nutlets; stems prostrate to erect; frequent, marl prairies, moist pinelands, savannas, brackish shores, and roadbanks; south Florida, north along coasts to Taylor County on west and Volusia County on the east. [This species exhibits complex and as-yet unexplained variations of flower color and habit. In Dade County and on the Florida Keys both white and yellow flowers occur. White predominates from Collier County northward to beyond Tampa Bay, and inland to Highlands County. Only yellow occurs north of Hernando County, in the Pinecrest area of Monroe County, and along the east coast north of Dade County. Particularly near Homestead, Dade County, but occasionally elsewhere, prostrate plants occur;

these may be termed var. *polyphyllum*. They intergrade with much more widespread ascending to erect plants, which may be distinguished as var. *leavenworthii* Gray.] All year. [incl. *H. Leavenworthii* Torr.; *H. horizontale* Small; *H. polyphyllum* var. *horizontale* (Small) Long]

H. polyphyllum Lehm.

3. Annual; leaves petiolate, variously broad, not linear; stems erect.
5. Flowers light purple with white or yellow eye; fruits 2 - 2.5 mm. long, with sharp longitudinal ridges, separating into two 2-seeded nutlets; leaves broadly ovate, the blades 3 - 5 cm. across; weedy herb; uncommon and sporadic, floodplains of Choctawhatchee River and Apalachicola River (Washington, Jackson, Calhoun, Gadsden and Liberty counties). August - September. [*Tiaridium indicum* (L.) Lehm.]
- H. indicum L.
5. Flowers white or with yellow eye; fruits 1 - 1.5 mm. long (excluding persistent style base if present), without prominent ridges; leaves narrowly ovate, elliptic, to spatulate, 1.5 - 2.5 (- 3.5) cm. across.
6. Fruits very much broader than long, separating into two 2-seeded nutlets; style lacking on mature fruits; leaves becoming blackened upon drying; common, hammocks, waste areas, shell mounds, citrus groves (where often weedy), roadsides, and saline shores; south Florida, north in coastal counties to Tampa Bay on the west and Volusia County (Turtle Mound) on the east. All year. [*H. parviflorum* L.; *Schobera angiosperma* (Murr.) Britt.]
- SCORPION-TAIL H. angiospermum Murr.
6. Fruits scarcely broader than long, separating into four 1-seeded nutlets; style persisting on mature fruits as a sharp dark beak; leaves remaining green upon drying; rare, an erratic introduction on the wooded floodplain of the Apalachicola River, Calhoun County. August - September. [This species, although newly discovered in Florida (R. K. Godfrey 75520, 14 Sept 1976, FLAS, FSU) is familiar along the Gulf Coast westward, where it has been erroneously known as *Heliotropium europaeum* L. (see Excluded Species).]

H. procumbens Mill.

## Excluded Species

Heliotropium europaeum L. This species was collected on "waste ground, Pensacola, Florida," in August 1901 [A. H. Curtiss 6864 (GH), fide C. E. Wood]. Recent active collectors in the Pensacola area have not encountered it, and it is assumed not to have persisted in the state. Its white to bluish flowers, minutely pubescent verrucose nutlets to 3 mm. long, and hirsute stems permit separation from the white (drying yellowish) flowers, strigose but otherwise smooth nutlets to 1.5 mm. long, and appressed-pubescent stems of the closely related *H. procumbens* Mill.

## LITHOSPERMUM

This genus has been well treated by Johnston (Jour. Arnold Arb. 33:299-363. 1952) except for his near-total omission of detailed distributional data. *Lithospermum incisum* is more extensively adventive than has been previously recognized. This species is also characterized by the presence of numerous very small cleistogamous flowers, from which most of the nutlets are produced, following withering of the conspicuous and large chasmogamous flowers.

The authorship of *Lithospermum caroliniense* has by now been fully argued (Wilbur, Jour. Elisha Mitchell Sci. Soc. 78:125-132. 1962; Ward, Rhodora 64:87-92. 1962).

Lithospermum L.

## Puccoons

1. Stems arising from a cluster of basal leaves very much larger than the cauline ones; leaves obovate to elliptic; corollas small (to 6 mm. long), yellow or infrequently cream; roots non-purpling, fusiform and fascicled; perennial herb; local, on moist hardwood slopes and calcareous bluffs, north Florida, disjunct in area of upper Apalachicola drainage (Jackson to Liberty counties) and east of Suwannee River (Suwannee to Alachua counties). March - April.

L. tuberosum Regel ex DC.

1. Stems without basal leaves or basal leaves not appreciably larger than the cauline ones; leaves lanceolate to linear (or if ovate, reduced toward base); corollas of chasmogamous flowers large (15 - 35 mm. long); root often causing purpling of pressing and mounting papers.
2. Stems arising from a stout vertical root which is almost always broken in collecting; root strongly purpling collecting papers, the stain characteristically penetrating

sheets upon which plant is mounted; corollas bright orange-yellow, the lobes entire; stout perennial herb; frequent, dry pinelands, western panhandle Florida, east to Apalachicola River drainage. March - May (August). [*Batschia caroliniensis* (Walt.) Gmel.]

PUCCOON. L. caroliniense (J. F. Gmel.) MacMill.

2. Stems arising from slender taproot, often fully collected; root lightly purpling contiguous papers; corollas bright yellow, the lobes erose; perennial herb; infrequent and sporadic, adventive along sandy roadsides and railroads, occasionally on limestone ledges, north Florida, south to Hernando and Seminole counties. March - April. [*Batschia linearifolia* (Goldie) Small]

L. incisum Lehm.

## MALLOTONIA

Florida has one species of this genus, *Mallotonia gnaphalodes*, the Sea-lavender. It is often placed within *Tournefortia*, although its maritime habitat and linear-spatulate gray-pubescent leaves at least superficially set it sharply apart from the species allied to *T. hirsutissima*, the type of that genus.

Johnston, the foremost recent student of this group, has not been consistent in its assignment. Initially (Cont. Gray Herb. 92:66-89. 1930) he saw the Sea-lavender as within *Tournefortia*, then he segregated it with two closely related Old World species to form *Messerschmidia* (Jour. Arnold Arb. 16:161-166. 1935), and still later returned it to *Tournefortia* (Jour. Arnold Arb. 30:129-133. 1949).

*Messerschmidia* had been described originally by Linnaeus (Mantissa 42, 1767; as "*Messersmidia*") as applying to one of the Old World species (*M. sibirica*, of Asia) included by Johnston. The name has undergone various interpretations by later authors, as well as several spellings. Johnston (1930) discussed these aspects rather fully, concluding, "...the confusion that has attended the history of the name is quite sufficient to warrant its rejection as a nomen confusum, at least as far as our American plants are concerned." Later Johnston (1935) reversed field, finding that *Messerschmidia* was indeed an acceptable generic name.

Britton (Ann. Missouri Bot. Gard. 2:47. 1915) transferred the Sea-lavender without comment to form the monotypic *Mallotonia*, and has been followed by Small (Manual of the Southeastern Flora, 1933), Gooding et al. (Flora of Barbados, 1965), Adams (Flowering Plants of Jamaica, 1972), Gillis (Rhodora 76:111. 1974), and others. The rationale for this placement seems never to have been fully discussed, although Johnston (1935), in recognizing

*Messerschmidia*, called attention not only to its species' wide departure in general appearance from the species of *Tournefortia*, sensu stricto, but to anatomical differences in their corky bark and pubescence structure.

Nor has there been adequate discussion -- or perhaps not adequate realization -- that *Messerschmidia* was used by Linnaeus so many years earlier for a plant that is surely congeneric. It is only by acceptance (by implication, if not by overt intent) of Johnston's argument, which he later abandoned, of the invalidity of *Messerschmidia*, that *Mallotonia* can be seen as the correct segregate name. Perhaps ultimately, if the consensus remains firm that the Sea-lavender (with its two Old World allies) merits generic segregation from *Tournefortia*, conservation of *Mallotonia* via the International Code will provide more certain stability.

Mallotonia Britt.

Sea-lavender

1. Leaves densely clustered at ends of twigs, linear-spatulate, 4 - 9 cm. long, covered with silky gray pubescence; inflorescence a long-peduncled very congested one-sided cyme; flowers white with pink tinge in throat, small (4 - 5 mm. long); fruit a dry brown 2-seeded drupe; small erect shrub, to 2 m. tall; infrequent, on front line of dunes, outer edge of salt flats, always fronting on ocean; not found on quiet bays or other low-energy coasts; Florida Keys, northward only along east coast, to Gape Canaveral. December - March. [*Tournefortia gnaphalodes* (L.) R. Br. ex R. & S.]  
SEA-LAVENDER

M. gnaphalodes (L.) Britt.

MYOSOTIS

The specific separation of *Myosotis macrosperma* from *M. virginica* is adequately supported on the basis of available materials. The merits of such a separation have been discussed by Fernald (*Rhodora* 41:558. 1939; 43:637. 1941), while the contrary view has been presented by Steyermark (*Flora of Missouri*, 1963).

*Myosotis virginica* (L.) BSP. (= *M. verna* Nutt.) has not been collected in Florida. The basis of its report for this state by Fernald (*Gray's Manual of Botany*, 1950) is a collection from Chattahoochee (*A. H. Curtiss*, GH). The collection has been examined by C. E. Wood who believes it to be *M. macrosperma*. Since the alluvial river edge at Chattahoochee is one of the Florida stations for *M. macrosperma*, there is no hesitancy in accepting Dr. Wood's determination.

Myosotis L.

Forget-me-nots

1. Corolla small, white; calyx covered with hooked hairs, the two lower lobes appreciably longer than the three upper ones; leaves oblong to spatulate; annual soft-pubescent herb; very local, alluvial deposits along bank of Apalachicola River, Gadsden and Liberty counties. March. [*M. virginica* (L.) BSP. var. *macrosperma* (Engelm.) Fern.]

M. macrosperma Engelm.

## ONOSMODIUM

This small genus has been discussed in considerable detail by Johnston (Contr. Gray Herb. 70:17-18. 1924; Jour. Arnold Arb. 35:18-24. 1954).

Onosmodium Michx.

False Gromwells

1. Corolla 8 - 12 mm. long, exceeding calyx, cream at base with the lobes yellow-green; style undivided, long-exserted (to twice length of corolla), persisting on young fruits; nutlets light gray, smooth and shining, only one maturing per flower; leaves elliptic to obovate, harshly pubescent; perennial herb; frequent, dry open sandy woods and roadsides, north Florida, south to Hillsborough and Highlands counties. March - April.  
FALSE GROMWELL. O. virginianum (L.) A. DC.

## TOURNEFORTIA

*Tournefortia volubilis* has long been recognized as a member of the Florida flora. Small (Manual of the Southeastern Flora, 1933) admitted a second very closely allied species, *T. poliochros* (under his segregate name, *Myriopus poliochros*). Although recent West Indian treatments recognize these two as specifically distinct, the differences are almost inconsequential as exemplified by Florida collections, and are not here maintained.

All Florida plants of this complex are more or less pubescent. In southern Florida all collections are very lightly appressed sericeous on the lower leaf surface, only occasionally developing a gray cast. A single series of collections from Green Mound, south of Daytona Beach (*Small, Small, DeWinkeler 10726*, 7 Sept 1922; FLAS) appears to be the only basis for the white-canescens form that has been called *T. poliochros*.

Tournefortia L.

## Tournefortias

1. Leaf blade 3 - 5 cm. long, ovate to elliptic lanceolate; pubescence fine, closely appressed, scant to hoary gray on lower leaf surface; drupe white with small black spots, 1 - 4 seeded, each seed forming a separate lobe under the tightly stretched flesh; corolla dark yellow to greenish white, the lobes subulate; climbing and scrambling woody vine, occasionally free-standing as a low shrub; hammocks, thickets, shell mounds; frequent in Florida Keys and southern Dade County, disjunct on west to Hillsborough County (Cockroach Bay), rare along east coast (Merritt Island, Brevard County) and north to now-extirpated station at Green Mound, Volusia County (this station is the basis for *T. poliochros* in Florida, a variant with leaves hoary gray below). (December) March - August. [*Myriopus volubilis* (L.) Small; *T. poliochros* Spreng. in L.; *Myriopus poliochros* (Spreng.) Small] SOLDIER-BUSH. T. volubilis L.
1. Leaf blade 7 - 18 cm. long, elliptic; pubescence coarse, spreading, particularly abundant on young stems; drupe uniformly white, spherical, usually 4-seeded; corolla white, the lobes ovate; robust scrambling vine; occasional, tropical hammocks; southern Dade County, Monroe County (but absent from the Florida Keys), north to the Fahkahatchee Slough of Collier County. March - May. HAIRY TOURNEFORTIA. T. hirsutissima L.

## EXCLUDED GENERA

Borago officinalis L. Borage. Two Florida collections of this Mediterranean species have been made (FLAS) -- both in Alachua County. Both are believed to represent cultivated plants. Borage in Europe has long been cultivated as a flavoring for beverages; although introduced and sparingly escaped in eastern North America it seems scarcely adapted to independent survival here.

INDEX TO THE RUBIACEAE BY JULIAN A. STEYERMARK

IN THE BOTANY OF THE GUAYANA HIGHLAND

BY B. MAGUIRE AND COLLABORATORS

Compiled by Joseph H. Kirkbride, Jr.<sup>1</sup>.

Julian A. Steyermark has now completed his treatment of the Rubiaceae for the Botany of the Guayana Highland. It appeared as four installments in the Memoirs of The New York Botanical Garden: 10(5): 186-278, 17 Feb 1964; 12(3): 178-285, 10 Sep 1965; 17(1): 230-436, 22 Dec 1967; 23: 227-832, 30 Nov 1972. The importance of this work and its structure make it imperative that a complete index to it be available.

This index includes all taxa that appear in the foregoing papers. New taxa, new combinations, new names, new statuses, and emendations are underlined. Names in synonymy are indicated by underlined page numbers. Illustrations are indicated by the letter 't' preceding the page number.

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1. Smithsonian Institution, U. S. National Museum, Washington, D. C. 20560.

Errors or omissions in this index are the responsibility of the compiler.

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Additions to the Flora of Futuna Island,  
Horne Islands  
Pacific Plant Studies 33

Harold St. John  
B. P. Bishop Museum, Honolulu, Hawaii

In 1971 the first account of the flora of Futuna Island was printed by St. John and Smith (1971). At that time the known flora was 152 species. This total can be segregated into 2 endemics; 91 indigenous species, including the 22 ferns; 14 adventives; and 45 cultivated ornamentals and crop plants.

Now, there has come to hand a new collection from the island, made in June and July 1974, by the anthropologist Patrick V. Kirch, of the Bishop Museum. It consists of 168 specimens. Besides the species already known on the island, the Kirch collection adds 1 new endemic; 12 indigenous; 9 adventives; and 26 ornamentals or crops.

The additional and significant species are here listed. The native species are printed in *italic*.

Pteridophyta

Adiantaceae

Antrophyum reticulatum (Forst. f.) Kaulf. Nuku  
Singave, on vertical rock face in humid forest,  
30-40 m alt., Kirch 150.

Phanerogamae

Monocotyledones

Gramineae

*Bambusa vulgaris* Schrad. ex Wendl. "kofe fiti."  
Matutufu, Singave, stream bank, 10 m alt.,  
Kirch 52.

*Echinochloa colonum* (L.) Link. Nuku, Singave,  
pondfield borders, common, weed, Kirch 114.

*Ischaemum rugosum* Salisb. "vao papalangi."  
Nuku, Singave, weed, border of pondfields,  
Kirch 113.

*Miscanthus floridulus* (Labill.) Warb. "u."  
Maunga, Nuku, Singave, 2nd growth, 175 m alt.,  
Kirch 100.

*Oplismenus compositus* (L.) Beauv. "mutie." Aloalo, Nuku, Singave, weed, dry garden zone, 20 m alt., Kirch 71.

*Paspalum conjugatum* Bergius. "mutie." Aloalo, Nuku, Singave, dry garden zone, weed, 20 m alt., Kirch 66.

*Schizostachyum glaucifolium* (Rupr.) Munro.

"kofe Futuna." Leava Valley, Singave, cookhouse zone, Kirch 63.

#### Cyperaceae

*Cyperus odoratus* L. Nuku, Singave, pondfield embankment, weed, 25 m alt., Kirch 136.

*Eleocharis geniculata* (L.) R. & S. "kutu," Kirch 109.

*E. orostachys* Steud. "kutu." Nuku, Singave, abundant in pondfield, 10 m alt., Kirch 110.

#### Araceae

*Caladium bicolor* (Ait.) Vent. "kape faka teuteu." ornamental, cookhouse zone, Kirch 49.

*Colocasia esculenta* (L.) Schott, var. *antiquorum* (Schott.) Hubb. & Rehd. "talo uli," a new name, Singave, Kirch 54.

*Cyrtosperma Chamissonis* (Schott) Merr. "pulaka." Aloalo, Nuku, Singave, dry garden zone, Kirch 11.

*Epipremnum pinnatum* (L.) Engl. Aloalo, Nuku, Singave, on trees, dry garden zone, Kirch 69.

*Xanthosoma atrovirens* C. Koch & Bouché, "talo fiti uli." Aloalo, Nuku, Singave, cult., dry garden zone, Kirch 2.

#### Dioscoreaceae

*Dioscorea alata* L. "ufi fakasoa." abandoned hill garden, 50 m alt., Kirch 124.

*D. esculenta* (Lour.) Burkill, with three cultivars: "ufi lei," Aloalo, Nuku, Singave, dry garden zone, 20 m alt., Kirch 5.

"ufi lei vai," Aroa-Vele uplands, Alo Dist., 75-100 m alt., Kirch 17.

"ufi lei lotuma," ditto, Kirch 18.

#### Cannaceae

*Canna indica* L. "fanagana." Nuku, Singave, cookhouse zone, 10 m alt., Kirch 57.

#### Piperaceae

*Peperomia pallida* (Forst. f.) A. Dietr., var. *tuamotensis* (F. Br.) Yuncker, on rock face of irrigation ditch, 10 m alt., Kirch 168.

## Moraceae

*Artocarpus altilis* (Parkins. ex Z) Fosb. "mei aveave." Nuku, Singave, cookhouse zone, cult., Kirch 62.

## Urticaceae

*Elatostema Yenii* St. John. "lole." Nuku, Singave, irrigation ditch embankment, 20 m alt., Kirch 137. New island record.

*Maoutia australis* Wedd. Maunga, Nuku, Singave, 2nd growth, 150-175 m alt., Kirch 82; ditto 83.

## Amaranthaceae

*Alternanthera sessilis* (L.) R. Br. "vao." Aloalo, Nuku, Singave, dry garden zone, weed, Kirch 70; ditto, 111.

## Leguminosae

*Caesalpinia pulcherrima* (L.) Sw. "oai." Nuku, Singave, cookhouse zone, 10 m alt., Kirch 58.

*Pueraria lobata* (Willd.) Ohwi. "aka." Asoa-Vele uplands, Alo Dist., in swidden garden, Kirch 22; 23; 41.

*Vigna marina* (Burm.) Merr. "fue." fallow pondfield, 10 m alt., Kirch 117.

## Rutaceae

*Citrus sinensis* (L.) Osbeck. "moli." Nuku, Singave, 2nd growth, 50 m alt., Kirch 162.

## Euphorbiaceae

*Codiaeum variegatum* (L.) Bl. "la'akau kula." Nuku, Singave, cookhouse zone, ornamental, Kirch 36.

## Tiliaceae

*Grewia crenata* (J. R. & G. Forst.) Schinz & Guillem. "iti." Maunga, Nuku, Singave, 2nd growth, 150-175 m alt., Kirch 87.

## Malvaceae

*Hibiscus tiliaceus* L. "fau fatu." New vernacular name. Fata-asau, Nuku, Singave, 2nd growth, 100 m alt., Kirch 97.

## Sterculiaceae

*Melochia vitiensis* Gray. "ito." Asoa-Vele uplands, Alo Dist., 2nd growth, 75-100 m alt., Kirch 24.

## Passifloraceae

*Passiflora maliformis* L. "pasio." Aloalo, Nuku, Singave, dry garden zone, cult. Kirch 74.

## Melastomataceae

Medinilla racemosa sp. nov.

M. samoensis sensu St. John & A. C. Smith,  
Pacif. Sci. 25: 335, 1971, non (Hochr.)  
Christophersen, Bishop Mus., Bull. 154:  
30, 1938. Fig. 1.

Diagnosis Holotypi: Liana lignosa in arboribus scandens est, ramulis 3-7 mm diametro subcarnosis, cortice stramineo laevi sed in sicco cun fugis longitudinalibus, internodis 1.5-3.3 cm longis, foliis oppositis glabris, cicatricibus foliorum 5 mm latis lunatis, cicatricibus fascicularum 7 in ordinicirculari, petiolis 5-30 mm longis, laminis 4-12 cm longis 3-8.5 cm latis late ellipticis basi cuneata 5-plinervatis supra obscure viridibus infra viridibus et cum nervis elevatis, racemis 3-5 cm longis fere 9-13-floriferis puberulentis cum pilis badiis scabris, bracteis ex axilibus 5-7 mm longis spatulatis, pedicellis 7 mm longis 1-floriferis et proxima calycem cum 2 bracteis 2.7 mm longis anguste lanci-ellipticis foliaceis, calycibus cum tubo 6.2 mm longo hemisphaerico firmo pallido sed lobis nullis, 5 petalis 11 mm longis albis sed roseitinctis obovatis nigri-apiculatis, staminibus 8, filamentis 6 mm longis ligulatis membranaceis, antheris 5 mm longis 1.8 mm latis cum 2 lobis basilibus tomaculiformatis divergentibus obscuris firmis, sacis fertilibus 1.8 mm longis erectis cylindraceutis obtusis et a foramini terminali dehiscentibus, ovario 2.5 mm diametro subgloboso, stylo 6 mm longo filiformi, stigmate vadose convexo, (fructibus incognitis).

Diagnosis of Holotype: Woody vine, climbing on trees; branchlets 3-7 mm in diameter, somewhat fleshy, with smooth stramineous bark, when dried with longitudinal ridges; internodes 1.5-3.3 cm long; leaves<sup>s</sup> opposite, glabrous; leaf scars 5 mm wide, lunate; bundle scars 7, in a circular pattern; petioles 5-30 mm long; blades 4-12 cm long, 3-8.5 cm wide, broadly elliptic, the base cuneate, 5-plinerved, above dark green, below green with outstanding nerves; racemes 3-5 cm long, about 9-13-flowered, puberulent with brown scabrous hairs; axillary bracts 5-7 mm long, spatulate;

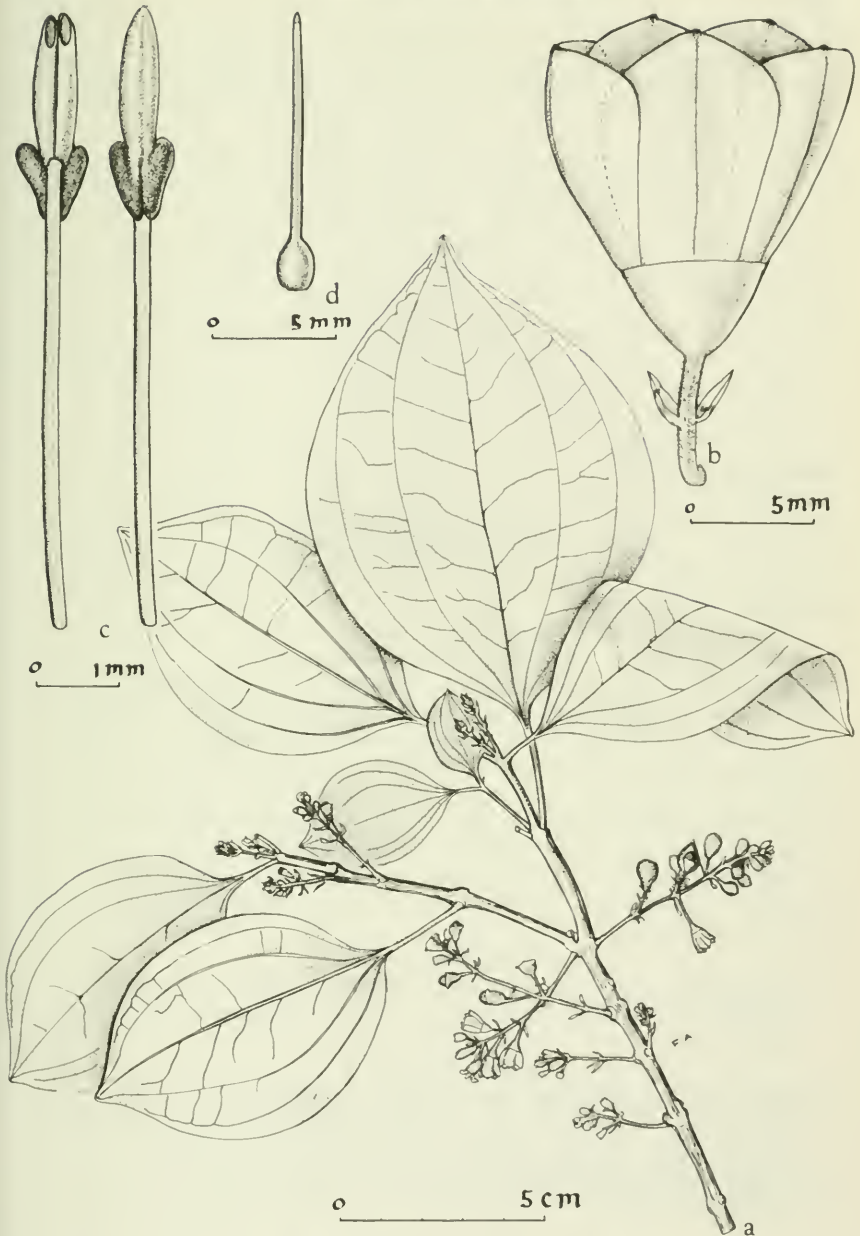


Fig. 1. Medinilla racemosa

pedicels 7 mm long, 1-flowered, and just below the calyx with 2 bracts 2.7 mm long, narrowly lance-elliptic, foliaceous; calyx tube 6.2 mm long, hemispheric, firm, pale, without distinct lobes; petals 5 and 11 mm long, white, tinged with pink, obovate, darkly apiculate; stamens 8; filaments 6 mm long, ligulate, membranous; anthers 5 mm long, 1.8 mm wide, the 2 basal lobes 0.4 mm long, sausage-shaped, dark, firm, divergent, the fertile sacs 1.8 mm long, erect, cylindrical, obtuse, dehiscent by a terminal pore; ovary 2.5 mm in diameter, subglobose; style 6 mm long, filiform; stigma low convex, (fruit unknown).

Holotypus: Polynesia, Horne Islands, Futuna Island, Nuku, Singave, humid forest, climbing on trees, 100 m alt., July 12, 1974, Patrick V. Kirch 130 (BISH).

Specimens Examined: Polynesia, Horne Islands, Futuna Island, ditto, Kirch 129 (BISH); pentes sud de Mt. Puke, restes de forêt humide sur terrain volcanique, 500-600 m alt., 27.X.1968, Mackee 19,852 (BISH).

Discussion: M. racemosa is most closely related to M. samoensis (Hochr.) Christophersen, of Upolu, Tutuila, and Savai'i in Samoa, a species with the young shoots brown hirsutulous with scabrous hairs, these more or less persistent; inflorescences umbellate, hirsutulous; petals 5 mm long. M. racemosa has the leaves glabrous, and the young stems nearly so; inflorescences racemose, puberulent; and the petals 11 mm long.

The new epithet is the Latin adjective racemosa, with a raceme, and it refers to the inflorescence of the species.

#### Onagraceae

Ludwigia octivalvis (Jacq.) Raven, subsp octivalvis. "ta'ekana." Nuku, Singave, taro terraces, weed, Kirch 115.

#### Convolvulaceae

Ipomoea brasiliensis (L.) Sweet. "fue kau kula."

Matatufu, Nuku, Singave, second growth, abandoned swidden garden, 20 m alt., Kirch 53.

Merremia peltata (L.) Merr. "pulupulou." New vernacular name. Kirch 88.

## Apocynaceae

Alyxia bracteolosa Gray. "maile kulu." New vernacular name. Fata-asau, Nuku, Singave, 2nd growth, 100 m alt., Kirch 93.

## Labiatae

Coleus scutellarioides (L.) Benth. Matufu, Nuku, Singave, houseyard, weed, Kirch 43.

## Solanaceae

Capsicum annuum L. "polo." Matufu, Nuku, Singave, cookhouse zone, Kirch 45.

## Rubiaceae

Canthium Merrillii (Setchell) Christophersen. "funa." Nuku, Singave, humid forest, 30-40 m alt., Kirch 160.

## Cucurbitaceae

Luffa cylindrica (L.) Roem. "timo vao." Nuku, Singave, 2nd growth, feral vine, 25 m alt., Kirch 138.

## Compositae

Synedrella nodiflora (L.) Gaertn. "petelo." Aloalo, Nuku, Singave, dry garden zone, weed, Kirch 73.

## Literature Cited

St. John, Harold and Albert C. Smith, 1971.

The Vascular Plants of the Horne and Wallis Islands. *Pacif. Sci.* 25: 313-348.

The Flora of Niuatoputapu Island, Tonga  
Pacific Plant Studies 32

Harold St. John  
Bishop Museum, Honolulu, Hawaii, 96818

Geography

Niuatoputapu Island is almost at the northern end of the Tongan chain and is very close to Samoa (140 miles to Upolu Island). Its closest neighbors are the volcanic ash cone of Tafahi, only 5 miles to the north, and Niuafu'ou (Tin Can) Island, some 120 miles to the west.

Niuatoputapu is of volcanic origin, with a central ridge of bedded tuff, breccia, and lavas which rises to a maximum height of 165 meters. Surrounding this central ridge is a terrace, probably wave-cut in origin and Pleistocene in age, now covered with a thick and fertile deposit of clay soils. Falling away in a relatively steep bluff, this terrace is in turn surrounded by an apron-like plain of uplifted recent marine sediments: sand, coral cobbles, and other reef detritus. This apron of low-lying terrain has been uplifted as a result of tectonic activity within the period of Polynesian occupation of Niutoputapu. The island is 6.8 kilometers long and 4.5 kilometers wide.

The vegetation of Niuatoputapu has been extensively modified as a result of some 3,000 years of Polynesian occupation. The present Tongan-speaking population practices a form of shifting cultivation (or bush-fallow rotation) in which the principal garden type is the mixed yam-aroid swidden (refer to P. V. Kirch, "Indigenous agriculture in Uvea" in press, Economic Botany) for a description of a highly similar West Polynesian agricultural system. The principal cultivated yams are Dioscorea alata and D. esculenta; among the cultivated aroids are Colocasia esculenta, Alocasia macrorrhiza, and Xanthosoma sagittifolium. Bananas, particularly diploid hybrids of the Musa section, are extensively planted in swiddens following the harvest of yams and aroids. Arboriculture also is a sig-

nificant part of the indigenous agricultural system, with Artocarpus altilis being the dominant crop. Inocarpus fagifer is also widely cultivated.

#### Exploration

The first plant collection on Niuaotoputapu was made by Dr. H. Hürlimann, of Basel, between Dec. 5, 1951, and Jan. 2, 1952. He collected 79 species, and the specimens are deposited in the herbaria of the University of Zürich, and of DePauw University.

A recent collection was made by the anthropologist Dr. Patrick V. Kirch, of the Bishop Museum. He collected between July and December, 1976, and gathered 138 species of vascular plants, many of which duplicated and confirmed those of Hürlimann, but 59 others were new locality records.

#### Flora

The flora as now known total 10 ferns and fern allies and 201 phanerogams. These are classed as:

Indigenous	91
Endemic	1
Ornamentals	19
Crops	53
Weeds	<u>37</u>

201 total flora

Comparisons have been made with the published flora of Tonga by Yuncker (1959).

Many of the Pacific Islands have notable endemism in their floras, but it is not so with Niuaotoputapu. Although politically placed in Tonga, the island is closest to Samoa, which is 140 miles to the northeast. Futuna is 290 miles to the northwest. Taveuni in Fiji is 400 miles to the west. Niue is 320 miles to the southeast; and Rarotonga is 1,020 miles to the southeast. Of the larger islands of Tonga which lie to the south, Vavau is 160 miles distant.

When the flora is compared with that of these adjacent islands, it is found that all of the indigenous species are also found in Samoa, except 10. These are: Pandanus Mbalawa, P. odoratissimus, var. Setchellii, Ficus Storckii, Santalum Yasi,

Canavalia sericea, Dysocylum Forsteri, Eugenia dealata, Burckella Richii, Ipomoea macrantha, and Solanum amicolorum.

When compared with the flora of Fiji, it is found that all of the indigenous species also occur there, except 11. They are: Pandanus odoratissimus, var. Setchellii, Rhus taitensis, Melochia aristata, Eugenia clusiaefolia, Eugenia dealata, Burckella Richii, Planchonella torricellensis, Hoya chlorantha, Solanum amicolorum, and Psychotria insularum.

When compared to Vavau, the nearest high Tongan Island to the south, all of the indigenous species are also there except: Psilotum nudum, Nephrolepis biserrata, N. exaltata, Pandanus angulosus, P. Mbalawa, P. turritus, Fimbristylis pycnocephala, Taeniophyllum fasciola, Trema orientalis, var. viridis, Ficus scabra, Sesuvium Portulacastrum, Canavalia sericea, Vigna marina, Suriana maritima, Securinega samoana, Terminalia Catappa, Eugenia dealata, E. neurocalyx, Burckella Richii, Planchonella torricellensis, Diospyros elliptica, Geniostoma insulare, forma insulare, Hoya chlorantha, and Ipomoea macrantha.

Likewise, less affinity is shown to the flora or other islands. Niue Island lacks 24 of the species; and Rarotonga lacks 44.

Hence, it is evident that the flora of Niua-topotapu is very closely, and almost equally, related to that of Samoa and of Fiji, and much less so to the large islands of southern Tonga.

The following species are additions to the known flora of Tonga: Amorphophallus campanulatus (Roxb.) Bl., "lena," a cultivated food plant; Planchonella torricellensis (K. Schum.) H. J. Lam, "kalaka," an indigenous tree, common in Samoa; Hoya chlorantha Rech., a native vine, also known in Samoa; and Gardenia rotumaensis St. John, a cultivated ornamental tree, called "siale lotuma," (= Gardenia from Rotuma). It is a native to Rotuma Island, to the north of Fiji.

## List of the Vascular Flora

The indigenous species are distinguished by italic type.

## PTERIDOPHYTA

## Psilotaceae

Psilotum nudum (L.) Griseb. On tree trunks, Kirch 240; on limestone, Hr limann 205.

## Lycopodiaceae

Lycopodium sp. An epiphyte similar to L. phyllanthum, observed by Kirch.

## Pteridaceae

Pteris tripartita Sw. "hulufe." Climax forest, Kirch 287.

## Davalliaceae

Davallia solida (Forst. f.) Sw. "lau fare," and "lau fale." On tree trunk, Kirch 176; in shade, Kirch 182.

Nephrolepis biserrata (Sw.) Schott. "hulufe." In shade, Kirch 181.

Nephrolepis exaltata (L.) Schott. "lau fale." Coastal strand, Kirch 245.

## Aspidiaceae

Cyclosorus invisus (Forst. f.) Copel. "hulufe." Mesophilous forest, Hr limann 342.

## Aspleniaceae

Asplenium nidus L. "katafa." Second growth on ridge, Kirch 224.

## Polypodiaceae

Phymatodes scolopendria (Burm.) Ching. In shade, Kirch 183. Like the Malayan plants, it has the sori in double rows on each side of the midrib.

Pyrrhosia adnascens (Sw.) Ching. On Cocos trunks, Kirch 310.

## SPERMATOPHYTA

## MONOCOTYLEDONES

## Cycadaceae

Cycas circinalis L. Cultivated. Hr limann 616.

## Pandaneaceae

Pandanus angulosus St. John. "fa." Regenerated forest near ridge summit, Kirch 188.

Pandanus Mbalawa St. John. "fafa," and "fa tea." Offshore islet, Kirch 279. New for Tonga, growing also on Fulanga Island, Fiji.

Pandanus odoratissimus L. f., var. Setchellii

Humid alkaline sands, Hürlimann 388.

*Pandanus turritus* Martelli. "fala hola." Only one tree, cultivated by a house, Kirch 266.

Fruit used for "kahora." Native to Samoa.

*Pandanus* spp.

"kie." Kirch 300. Leaves used for plaiting.

"tofua tapahina." Kirch 301. Leaves used for plaiting.

----- Kirch 328. Leaves used for plaiting.

#### Gramineae

*Bambusa vulgaris* Schrad. "pitu." Second growth forest, Kirch 345.

*Cenchrus echinatus* L. "hefa." Coastal strand, Kirch 252.

*Centotheca latifolia* (L.) Trin.

*C. lappacea* (L.) Desv. Forest clearing, Hürlimann, 377; edge of plantation, Hürlimann 635; grassland, Kirch 211. r

*Cynodon Dactylon* (L.) Pers. Roadside, Hürlimann 634.

*Eragrostis tenella* (L.) Beauv. ex R. & S.

"musie." Roadside on sandy soil, Hürlimann 378; coastal strand, Kirch 253.

*Miscanthus floridulus* (Labill.) Warb. "kaho." Dry forest on volcanic soil, Hürlimann 349.

*Paspalum conjugatum* Berg. "mohuku." Roadside, Hürlimann 633

*Paspalum distichum* L. (*P. vaginatum* Sw.).

Alkaline mud, Hürlimann 641.

*Saccharum officinarum* L. "to." Second growth swidden, Kirch 315.

*Sporobolus elongatus* R. Br. "musie." Coastal strand, Kirch 249.

*Sporobolus indicus* (L.) R. Br. Grass lawn, Hürlimann 327; roadside, Hürlimann 647.

*Urochloa ambigua* (Trin.) Pilger. Roadside, Hürlimann 620.

*Zea Mays* L. Observed by Kirch.

#### Cyperaceae

*Cyperus brevifolius* (Rottb.) Hassk. "musie." Grassland, Kirch 184.

*Cyperus compressus* L. "pakopako." Roadside, Hürlimann 394.

*Cyperus javanicus* Houtt. "mahelehele." and "musie." Wet sandy muddy soil, Hürlimann 384;

swampy pond edge, Kirch 341.

*Cyperus rotundus* L. "pakepake.: Grassland, Hürlimann 326.

*Fimbristylis autumnalis* (L.) R. & S., var. *complanata* (Retz.) Kuekenth. "takataka." Wet sandy muddy soil, Hürlimann 383.

*Fimbristylis pycnocephala* Hbd. "pakopako," and "pako fae lolo."

*F. cymosa* R. Br., var. *pycnocephala* (Hbd.)

Kuekenth., f. *pycnocephala*, and f.

*paupera* Hürlimann, *Bauhinia* 3: 193, 1967.

Wet soil, Hürlimann 387; sandy soil, Hürlimann 671; tidal swamp, Kirch 308.

*Scleria lithosperma* (L.) Sw. "musie." Grassland, Kirch 185.

*Scleria polycarpa* Boeck. "mahelehele," and "musie."

*S. margaritifera* sensu Hürlimann, non Gaertn.

Dry forest, Hürlimann 356; grassland, Kirch 185.

#### Palmae

*Cocos nucifera* L. "niu." Secondary forest, Hürlimann 632; observed by Kirch.

*Pritchardia pacifica* Seem. & Wendl., var. *pacifica*. Second growth forest, Kirch 239. Fruit edible; leaves used for umbrellas. "piu."

#### Araceae

*Alocasia macrorrhiza* (L.) Schott. "kape." Swidden garden, Kirch 321.

*Amorphophallus campanulatus* (Roxb.) Bl. "lena." In second year swidden, Kirch 191.

*Colocasis esculenta* (L.) Schott, var. *antiquorum* (Schott) Hubb. & Rehd. "talo Tonga." The cultivars are:

"talo Niue." Second year swidden, Kirch 194.

"talo uli." Second year swidden, Kirch 200.

"talo vahe." Second year swidden, Kirch 199.

"lau ila." Second year swidden, Kirch 193.

*Cyrtosperma Chamissonis* (Schott) Merr. "via." Observed by Kirch.

*Epipremnum pinnatum* (L.) Engler. Vine on coconut tree, Kirch 220.

*Xanthosoma sagittifolium* (L.) Schott. "talo Futuna." Second year swidden, Kirch 196; and

"talo tea." Kirch 195.

## Bromeliaceae

*Ananas comosus* (Stickm.) Merr. "fainā." Second year swidden, Kirch 314.

## Commelinaceae

*Rhoeo spathacea* (Sw.) Stearn. "faina faitoka." Coastal strand, Kirch 250.

## Liliaceae

*Cordyline terminalis* (L.) Kunth, var. *terminalis*.

"si." In second growth, Kirch 186. Formerly roots eaten; leaves used as ornaments, Kirch 186.

## Amaryllidaceae

*Crinum asiaticum* L. Escaped, Hürlimann 399

*Zephyranthes candida* (Lindl.) Herb. Grassland, Hürlimann 398.

## Taccaceae

*Tacca leontopetaloides* (L.) Ktze. "mahoa'a." Secondary forest, Hürlimann 363; coastal strand, Kirch 241.

## Dioscoreaceae

*Dioscorea alata* L. "ufi." The cultivars are:

"kahokaho." Second year swidden, Kirch 187.

"kaumeile." Second year swidden, Kirch 203.

"kulo." First year swidden, Kirch 198.

"tuaata." Second year swidden, Kirch 197.

*Dioscorea bulbifera* L. "hoi." Mesophilous coastal forest, Hürlimann 650; third year swidden, Kirch 205; in second growth, said to be poisonous, Kirch 347.

*Dioscorea esculenta* (Lour.) Burkill. "ufi lei lotuma" (=Rotuma). Second year swidden, Kirch 201; Kirch 202.

*Dioscorea nummularia* Lam. "palai." Observed by Kirch.

*Dioscorea pentaphylla* L. "lena." In garden complex, Kirch 333.

## Musaceae

*Musa*, hybrids. "hopa." Observed by Kirch.

## Zingiberaceae

*Hedychium coronarium* Koenig in Retz.

Cultivated, Kirch 325.

*Zingiber zerumbet* (L.) Roscoe in Sm. Around garden house, Kirch 324.

## Cannaceae

*Canna indica* L. Abandoned garden, Kirch 216.

Orchidaceae

*Dendrobium Tokai* Rchb. f. "pipini." On tree trunk in tidal swamp, Kirch 313.

*Taeniophyllum fasciola* (Forst. f.) Rchb. f. On trunks of *Cocos* at edge of tidal swamp, Kirch 309.

*Vanilla planifolia* Andrews. "vanilla." Cultivated, Observed by Kirch.

DICOTYLEDONES

Casuarinaceae

*Casuarina litorea* Stickm. (*C. equisetifolia* L.) "toa." Dry forest on ridge, volcanic soil, Hürlimann 355; and observed by Kirch.

Piperaceae

*Piper methysticum* Forst. f. "kava." Second growth swidden, Kirch 232. Roots used to make a beverage.

Ulmaceae

*Trema orientalis* (L.) Bl., var. *viridis* Lauterb. "mangele." Secondary forest on ridge, volcanic soil, Hürlimann 637.

Moraceae

*Broussonetia papyrifera* (L.) Vent. "hiapo." Observed by Kirch.

*Artocarpus altilis* (Parkins. ex Z) Fosb. "mei." Cultivated tree in garden, Kirch 327.

*Ficus obliqua* Forst. f. "ovava." Mesophilous forest, Hürlimann 372; coastal strand, Kirch 337.

*Ficus scabra* Forst. f. "masi." Mesophilous forest on volcanic soil, Hürlimann 338; second growth on ridge, Kirch 222.

*Ficus storckii* Seem. "masi." Second growth, Kirch 294.

*Ficus tinctoria* Forst. f. "masi." Coastal tidal swamp, Kirch 307.

Urticaceae

*Pipturus argenteus* (Forst. f.) Wedd., var. *lanosus* Skotts. Dry forest on volcanic soil, Hürlimann 364; second growth on ridge, Kirch 230.

Santalaceae

*Santalum Yasi* Seem. "ahi." Forest on ridge, volcanic soil, Hürlimann 350; second growth forest with Myrtaceae, Kirch 339.

## Amaranthaceae

*Achyranthes aspera* L. "tamatama." Third year swidden, Kirch 206; clearing in climax forest, Kirch 299.

## Nyctaginaceae

*Boerhavia diffusa* L. Weed, Hürlimann 630.

*Pisonia grandis* R. Br. "pukavai." Large tree in climax forest, Kirch 295.

## Aizoaceae

*Sesuvium Portulacastrum* (L.) L. On coral apron, Kirch 269.

## Annonaceae

*Cananga odorata* (Lam.) Hook. f. & Thoms. "honolulu." "mohokoi." Cultivated shrub, Kirch 312; 342.

## Lauraceae

*Cassytha filiformis* L. "fatai." Parasitic on *Tarena*, Hürlimann 390; coastal strand, Kirch 304.

## Hernandiaceae

*Hernandia nymphaeifolia* (Presl) Kubitzki. "fotulona;" "puko vili." *H. ovigera* Stickm. *H. peltata* Meissn. Mesophilous forest, Hürlimann 373; coastal strand, Kirch 264; 305.

## Cruciferae

*Lepidium virginicum* L. Ruderal, Hürlimann 645.

## Crassulaceae

*Kalanchoe pinnata* (Lam.) Pers. "te'e kosi." coastal strand, Kirch 243.

## Rosaceae

*Parinarium glaberrimum* Hassk. "pipi." Second growth forest, Kirch 331. Timber used for building.

## Leguminosae

*Abrus precatorius* L. "matamoho." Forest on mountain ridge, Hürlimann 353.

*Acacia simplex* (Sparrm.) Pedley. "tatangia."

*A. simplicifolia* (L. f.) Druce

Coastal forest, Hürlimann 370; coastal strand, Kirch 256.

*Adenanthera pavonina* L. "lopa." Second growth on ridge, Kirch 231. Fruit edible.

*Caesalpinia major* (Medic.) Dandy & Exell.

*C. crista* sensu Hürlimann, non L. "talatala

'amoā." Forest on ridge, volcanic soil,

Hürlimann 351.

- Canavalia sericea Gray. "fue kula." Offshore coral islet, Kirch 271.
- Crotalaria retusa L. Coastal bush, calcareous soil, Hürlimann 375.
- Delonix regia (Boj.) Raf. " 'ohai." Cultivated, Hürlimann 379.
- Dendrolobium umbellatum (L.) Benth., f. hirsutum (DC.) Ohashi. "lala."
- Desmodium umbellatum (L.) DC.  
Edge of dry forest on ridge, volcanic soil, Hürlimann 358; second growth, Kirch 285.
- Derris elliptica (Roxb.) Benth. "kava." Second growth forest, Kirch 238.
- Erythrina variegata L., var. orientalis (L.) Merr. "ngatae." Second growth forest, Kirch 233.
- Indigofera suffruticosa Mill. " 'akau veli." Second growth forest, Kirch 284.
- Inocarpus fagifer (Parkins. ex Z) Fosb. "ifi." Secondary forest on mountain ridge, volcanic soil, Hürlimann 357; cultivated or protected near village, Kirch 283.
- Mimosa pudica L., var. unijuga (Duchass. & Walp.) Griseb. Second growth, Kirch 318.
- Pueraria lobata (Willd.) Ohwi. "aka," "hakataha."  
P. Thunbergiana (Sieb. & Zucc.) Benth.  
Dry forest on ridge, volcanic soil, Hürlimann 354; mesophilous forest on coastal plain, calcareous soil, Hürlimann 640; second growth, Kirch 235. Tuber edible.
- Tephrosia purpurea (L.) Pers. "kavahuhu." Grassy edge of ridge, volcanic soil, Hürlimann 344; exposed locality, Kirch 180.
- Uraria lagopodioides (L.) Desv. "iku'ipuai." Roadside, Hürlimann 367.
- Vigna marina (Burm.) Merr. "fue lau tolu." Shore, on coral sand, Hürlimann 617; offshore islet. Kirch 270.

## Rutaceae

- Citrus Aurantium L. "moli," "moli kai." By road in forest, Hürlimann 631; around garden house, Kirch 322.

Citrus limonia Osbeck. Observed by Kirch.

## Simaroubaceae

- Suriana maritima L. "ngengie." Coral shore, Hürlimann 628.

## Meliaceae

- Aglaia saltatorum* A.C. Sm. "langakali." Cultivated, Hür limann 649.
- Dysoxylum Forsteri* (Juss.) C. DC. "mo'ota." Forest, Kirch 223; offshore islet, Kirch 282; climax forest, Kirch 291.
- Melia Azedarach* L. "sita." Second growth, Kirch 340.

## Euphorbiaceae

- Acalypha boehmerioides* Miq. "hongohongo." Roadside, Hür limann 396.
- Aleurites moluccana* (L.) Willd. "tuitui." Cultivated, Kirch 268.
- Bischofia javanica* Bl. "koka." Second growth forest, Kirch 237. Bark used for a brown dye.
- Breynia disticha* Forst. f., forma *nivosa* (W. G. Sm.) Croizat. Cultivated, and escaped, Hür limann 400.
- Euphorbia Atoto* Forst. f. On sand at shore, Hür limann 497.
- Euphorbia hirta* L. "sakisi." Grassland, Hür limann 328. *E. pilulifera* L.
- Glochidion ramiflorum* Forst f. "malolo," and "mahame." Secondary forest, volcanic soil, Hür limann 333.
- Homalanthus nutans* (Forst. f.) Pax. "fenua malala." Mesophilous forest, Hür limann 332; coastal forest, Hür limann 651; second growth forest on steep ridge, Kirch 219; 348.
- Jatropha Curcas* L. "fiki." Roadside, Hür limann 644.
- Macaranga Harveyana* (Muell.-Arg.) Muell.-Arg. "loupata." Kirch 229; coastal strand, Kirch 251; second growth forest, Kirch 289.
- Manihot esculenta* Crantz. "manioka," and "mata ki eua," and "falaoa." Cultivated, Kirch 213; 215.
- Phyllanthus Niruri*, sensu Hür limann, non L. Weed, Hür limann 329.
- Phyllanthus simplex* Retz. Roadside, Hür limann 397.
- Securinega samoana* Croizat. "poumuli." Mesophilous forest, volcanic soil, Hür limann 339; second growth on ridge, Kirch 228. Best timber for house posts.

## Anacardiaceae

- Mangifera indica* L. "mango." Cultivated, Kirch 316.
- Pleigynium timoriense* (DC.) Leenhouts. Regenerated forest near ridge summit, Kirch 187.

Rhus taitensis Guillem. "tavahi." Dry forest on ridge, volcanic soil, Hürlimann 346; regenerated forest near ridge summit, Kirch 175.

Wood used in construction.

Spondias dulcis Parkins. ex Z. "vi." Observed by Kirch.

#### Sapindaceae

Cardiospermum Halicacabum L. Weed, Hürlimann 626.

Elatostachys falcata (Seem.) Radlk. "ngatata."

Climax forest, Kirch 297.

Pometia pinnata J. R. & G. Forst. "tava."

Cultivated, Hürlimann 377; Kirch 349.

#### Rhamnaceae

Alphitonia zizyphoides (Soland.) Gray. Ridge summit, Kirch 173.

Colubrina asiatica (L.) Brongn. "fiho'a."

Coastal forest, Hürlimann 382; second growth forest, Kirch 234; coastal strand, Kirch 254; offshore islet, Kirch 278.

#### Tiliaceae

Triumfetta Bartramia L. "mo'osipo." Coastal strand, Kirch 248; weed, Kirch 207.

Triumfetta procumbens Forst f. "mo'osipo."

coastal strand, Kirch 303.

#### Malvaceae

Hibiscus Manihot L. "pele." Second year swidden, Kirch 192. Leaves eaten as greens. The blades are broadly cordate, and only shallowly lobed, instead of being deeply cleft. This variety is also in cultivation in Fiji and on Niue (Sykes: 113).

Hibiscus rosa-sinensis L. "kaute." Cultivated, Kirch 267.

Sida acuta Burm. f. "te'chosi." Weed, Hürlimann 643.

Sida rhombifolia L. "te'hoosi." Weed, Kirch 208.

Thespesia populnea (L.) Soland. ex Correa. "milo."

Offshore coral islet, Kirch 277. Wood used for house construction, and spear handles.

#### Sterculiaceae

Melochia aristata Gray. "mako." Secondary forest on ridge, volcanic soil, Hürlimann 362; mesophilous coastal forest, Hürlimann 627; second growth forest, Kirch 217.

## Guttiferae

Calophyllum Inophyllum L. "feta'u." Coastal strand,  
Kirch 260. Wood used for bowls.

## Flacourtiaceae

Flacourtia Rukam Zoll. & Mor. in Mor. "filimoto."  
Mesophilous forest at base of ridge, volcanic  
soil, H rlimann 336; second growth forest,  
Kirch 343.

## Passifloraceae

Passiflora maliformis L. "vaini." Second growth  
forest, Kirch 330. Fruit eaten.

## Thymeliaceae

Phaleria acuminata (Gray) Gilg. "huni." Coastal  
strand, Kirch 242.

## Caricaceae

Carica Papaya L. "lesi." Observed by Kirch.

## Lythraceae

Pemphis acidula J. R. & G. Forst. "ngingi'e."  
Sandy coast, H rlimann 386; offshore islet,  
Kirch 273. Trunks used for posts and firewood.

## Barringtoniaceae

Barringtonia asiatica (L.) Kurz. "futu." Mesophil-  
ous forest, H rlimann 374; coastal strand,  
Kirch 336. Fruits used as fish poison.

## Combretaceae

Terminalia Catappa L. "telie." Forest on ridge  
top, volcanic soil, H rlimann 393; coastal strand,  
Kirch 334; 335.

Terminalia litoralis Seem., var. tomentella  
Hemsl. "telie." Offshore islet, Kirch 281.

## Myrtaceae

Eugenia clusiaefolia Gray. "mafua."

Syzygium clusiaefolium (Gray) C. Mueller.  
Mesophilous forest on ridge, volcanic soil,  
H rlimann 340; ridge summit, Kirch 171. Wood  
used for house posts.

Eugenia corynocarpa Gray. "heahea."

Syzygium corynocarpum (Gray) C. Mueller.  
Second growth forest, Kirch 346. Fruit edible.

Eugenia dealata Burkill. "mafua ai lulu."

Syzygium dealatum (Burkill) A. C. Sm.  
Climax forest, Kirch 298. Fruit eaten.

Eugenia malaccensis L. "fekika."

Syzygium malaccense (L.) Merr. & Perry  
Cultivated, Kirch 329.

Eugenia neurocalyx Gray. "fekika vao."

Syzygium neurocalyx (Gray) Christoph.

Mesophilous coastal forest, Hürlimann 648.

Psidium Guajava L. Second growth forest, Kirch 317.

Sapotaceae

Burckella Richii (Gray) H. J. Lam. "kau." In village, Kirch 338.

Planchonella torricellensis (K. Schum.) H. J. Lam.

"kalaka." Climax forest, Kirch 292.

Ebenaceae

Diospyros elliptica (J. R. & G. Forst.) P. S.

Green, var. elliptica. "mapa." Mesophilous coastal forest, Hürlimann 345; climax forest on ridge top, Kirch 169. Fruit edible.

Diospyros samoensis Gray. "koka uli." Dry forest

on ridge, volcanic soil, Hürlimann 352; 361; second growth forest on ridge summit, Kirch 172.

Oleaceae

Jasminum didymum Forst. f. "tutu'ila." Forest on mountain ridge, volcanic soil, Hürlimann 365.

Loganiaceae

Geniostoma insulare A. C. Sm. & Stone, f. insulare.

"te'e pilo a Maui." Dry forest on mountain ridge, volcanic soil, Hürlimann 366; offshore islet, Kirch 275.

Apocynaceae

Alyxia stellata (Forst. f.) R. & S. "maile."

Forest on mountain ridge, volcanic soil, Hürlimann 347; 368; Kirch 174. Used for personal adornment.

Cerbera manghas L. Calcareous sandy coastal

forest, Hürlimann 624; second growth forest, Kirch 320.

Neiosperma oppositifolia (Lam.) Fosb. & Sacht.

"fao." Ochosia oppositifolia (Lam.) K. Schum. Coastal sandy forest, Hürlimann 391; coastal strand, Kirch 262; offshore islet, Kirch 280. Wood for house construction.

Asclepiadaceae

Hoya chlorantha Rech. Vine on rocks, Kirch 177.

Convolvulaceae

Ipomoea Batatas (L.) Poir. "kumala." Observed by Kirch.

Ipomoea indica (Burm.) Merr. Second growth on ridge, 100 m. alt., Kirch 226.

Ipomoea macrantha R. & S. "pula."

Ipomoea tuba (Schlecht.) G. Don  
Clearing in climax forest, Kirch 290.

Boraginaceae

Cordia subcordata Lam. "milo." Coastal  
strand, Kirch 258; 259.

Messerschmidia argentea (L. f.) Johnston. "tohuni."  
Offshore islet, Kirch 276.

Verbenaceae

Clerodendrum inerme (L.) Gaertn. Dry forest on  
ridge, volcanic soil, Hürlimann 359; second  
growth forest, Kirch 306.

Lantana Camara L. "talatala." In clearing,  
Hürlimann 369; on rocks, Kirch 179.

Premna taitensis Schauer, var. rimatarensis  
F. Br. "volovalo." Forest on ridge, volcanic  
soil, Hürlimann 360; second growth forest,  
Kirch 236; coastal strand, Kirch 247; second  
growth, Kirch 319.

Stachytarpheta urticaefolia (Salisb.) Sims.  
Roadside, Kirch 293.

Labiatae

Coleus sp. "kaloni." cultivated, Hürlimann 623.  
Pogostemon Cablin (Blanco) Benth. Near garden  
house, Kirch 326.

Solanaceae

Lycopersicon esculentum Mill. "temata." Observed  
by Kirch.

Nicotiana Tabacum L. "tapaka Tonga." Observed  
by Kirch.

Physalis minima L. "ku'uai." Roadside, Hürlimann  
395.

Solanum amjcorum Benth. "polo Tonga." Strand,  
Kirch 302.

Solanum nigrum L. "polo kai." In garden, Kirch  
190; in clearing, Kirch 296. Eaten like pepper.

Scrophulariaceae

Lindernia crustacea (L.) F. Muell. Weed by path,  
Hürlimann 393.

Rubiaceae

Borreria laevis (Lam.) Griseb. "mohuku." Weed,  
Kirch 244.

Gardenia rotumaensis St. John. "siale Lotuma."  
cultivated, Kirch 344.

Geophila herbacea (Jacq.) Ktze. In shade of Cocos,

Kirch 212.

Guettarda speciosa L. "puapua." Coastal strand,  
Kirch 261.

Morinda citrifolia L. "nonu." Mesophilous coastal  
forest, Hürlimann 392; coastal strand, Kirch  
218; 257.

Psychotria insularum Gray. "ola vai." Mesophilous  
secondary forest, volcanic soil, Hürlimann 331;  
climax forest, Kirch 221; 227; 286.

Randia cochinchinensis (Lour.) Merr. "ola."  
Mesophilous forest on ridge, volcanic soil,  
Hürlimann 330; climax forest on summit, Kirch  
170; 209; coastal strand, Kirch 255.

Tarenna sambucina (Forst. f.) Durand. "manonu."  
Saline coast, Hürlimann 389; Kirch 225; climax  
forst, Kirch 288.

#### Cucurbitaceae

Momordica Charantia L. "vaini ai kumā." Weed in  
third year swidden, Kirch 204.

#### Goodeniaceae

Scaevola Taccada (Gaertn.) Roxb., var. Taccada.  
"ngahu." Coastal strand, Kirch 263.

Scaevola Taccada (Gaertn.) Roxb., var. sericea  
(Vahl) St. John. "ngahu." Offshore islet,  
Kirch 274.

#### Compositae

Ageratum conyzoides L. Garden weed, Kirch 214.

Vernonia cinerea (L.) Less., var. parviflora  
(Reinw. in Bl.) DC. Weed, third year swidden,  
Kirch 210.

Wedelia biflora (L.) DC. " 'ate." Offshore islet,  
Kirch 272.

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## ADDENDA

## Pandaceae

*Pandanus Whitmeeanus* Martelli. "paongo." Grove by roadside between Hihifo and Matavai, Kirch 265. Leaves used for mats; fruit reddish orange, fragrant, used for garlands.

## Malvaceae

*Hibiscus tiliaceus* L. "fau." Common, observed by Kirch

## Bombacaceae

*Ceiba pentandra* (L.) Gaertn. "vavae." In Hihifo village, semi-cultivated, Kirch 350.

NOTES ON THE CLUSIACEAE - CHIEFLY OF PANAMA. I.

Bassett Maguire<sup>1</sup>

The preparators of the Flora of Panama have been good enough to give me the privilege of examining the large series of Clusiaceae more recently collected in Panama in the field survey of the interesting and complex flora of that country, which bridges those of Central America to the north and continental South America to the south. Besides yielding many endemic taxa of its own, the flora partakes to a great extent of much of that of the two neighboring regions.

Therefore, any phytotaxonomic or phytogeographic study of Panama requires an examination of affinities northward into Mexico, southward through the Andean countries to Bolivia, and eastward into Venezuela. Such geographic connections will be abundantly demonstrated in this projected short series of papers which will make names and nomenclatural changes available for the Flora of Panama.

There is no intended significance in the order of presentation of taxa. Comments on the genus Clusia, being the largest of the family and the most difficult, would be offered last.

The genera Symphonia and Mammea are both generally treated as monospecific in America. Two species of the first, including the American S. globulifera, are commonly recognized in tropical Africa, while perhaps 20 species are variously recognized for Madagascar.

Mammea americana L., the type of that genus, is indigenous in the Antilles, Central America, and northern South America, and is commonly cultivated throughout the tropical world because of the large delicious fruit which it produces in abundance. There appear to be two species native to tropical Africa, and, if transfers from Ochrocarpos are correctly made, then numerous species in Madagascar, Malesia, and Pacifica. Further comment is offered under Mammea.

These observations are made because of the historic and geographical significance of such distributions, a pattern for which is found among other genera of the Clusiaceae.

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<sup>1</sup>

The New York Botanical Garden.

Symphonia globulifera L. f. Suppl. 302. 1781.

Symphonia fasciculata (Pl. & Tr.) Vesque, DC. Monogr. Phan. 8: 232. 1893.

S. coccinea (Aubl.) Oken. Allg. Naturgesch. 3<sup>2</sup>: 431. 1841,  
= Moronobea coccinea Aubl. Hist. Pl. Guiane Fr. 2:  
789 (excl. Fig. a-j which are of Symphonia globulifera  
L. f.). 1775.

Type. Linnaean Herbarium No. 853. Linnaean Society.  
London.

In America as well as in Madagascar Symphonia is variable and has been responsive to ecologic gradient. High mountain forms, for instance, tend to have larger flowers and reduced cymes. Vegetative modification may be parallel. These modifications have not seemed, possibly in large part because of inadequacy of materials, to be correlatable with geography. For these reasons I have made no attempt to initiate any systematic review of such infraspecific variation within Symphonia globulifera, and have not attempted to assess the two recent propositions of R. E. Schultes, viz., S. microphylla<sup>2</sup> and S. utilisima<sup>2</sup>.

Now, because of the excellent and convincing series of collections of Symphonia globulifera centered around Cerro Santa Rita, Colón, Panama, an area known for a selective narrow endemism, I am required to recognize the local narrow-leaved form as the var. angustifolia. This action will stimulate inquiry into the composition of the remainder of the species.

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Schultes, R. E. Bot. Mus. Leaflet. Harvard Univ. 17: 20-22.  
1955.

Symphonia globulifera L. f. var angustifolia Maguire, var nov

Folia peranguste lanceolata, 8-12(18) mm lata, 4-6(8) cm longa; sepalis submembranaceis, minute fimbriatis, jugis exterioribus acutiusculis; arboribus parvis.

Type. Santa Rita Ridge east of transisthmian highway, alt 300-400 meters, tropical wet forest, tree 4 meters, flowers red, Prov. Colón, Panama, 16 Dec 1972, Alwyn Gentry 6557 (holotype MO, isotype NY).

Distribution. Apparently a narrow endemic confined to the Santa Rita Ridge as indicated by the following citations:

PANAMA. Prov. Colón, summit of Cerro Santa Rita: shrub 5 ft, latex yellow, flowers pink, 1200-1500 ft alt, 13 Sept 1947, Paul H. Allen and Dorothy O. Allen 5101 (NY, MO); shrub to 15 ft, fruit red, 19 km from main highway, Jan 1968, J. D. Dwyer 8580 (MO, sheet 1); shrub to 10 ft, buds rose colored, 19 km from transisthmian highway, 28 Jan 1968, Dwyer 8580 (MO, sheet 2); arbol delgado de 7 m, flores rojas, látex amarillo, zona maderera de Santa Rita, 10 Oct 1968, M. D. Correa y R. L. Dressler 1085 (MO, 2 sheets); arbolito de 7 m, flores coral, frutos chocolates, látex amarillo, camino maderero de Santa Rita, 20 Mar 1969, Correa y Dressler 1205 (MO); shrub 3 m, flowers red, ovary yellowish, fruit pink, plants in vegetative condition appear to be abundant in the area, near Agua Clara rainfall station, 23 Apr 1970, Robin Foster 1738 (MO); slender tree ca 4 m high, buds rose-colored, along road ca 1 mi from Boyd-Roosevelt Highway, 9 Jul 1971, Croat 15337 (MO, NY); tree 4 m, flowers red, east of transisthmian highway, 300-500 m alt, tropical wet forest, 16 Dec 1972, Gentry 6557 (holotype MO, isotype NY); tree 3 m, petals rose-red, sap yellow, 15 km from Boyd-Roosevelt Highway, 450 m alt, in wet forest, 14 Mar 1975, Mori & Kallunki 5057 (MO). Prov. Panama: 5-6 mi north of El Llano, near San Blas border, 1300 ft alt, tree 10 meters, flowers red, 8 Sept 1972, Gentry 5814 (MO).

Mammea L.

As indicated here above, the genus Mammea is represented historically by a single American species, M. americana L., and a single African species, M. africana D. Don. Should Mammea, especially the American species, be treated as conspecific with Ochrocarpos (Ochrocarpos africana Oliver), the broader genus then would consist of some 50 species. I attempt no generic evaluation here.

Our attention to the genus Mammea, in the restricted sense, is occasioned by a recent collection, Mori, Kallunki & Gentry 4699, made in interior Panama, which I immediately associated with M. africana, in the assumption that its occurrence in Panama is the result of introduction.

However, Doctor Mori (personal communication) is of the very strong opinion that this tree in question is established as a well defined population in primary woodland and does not bear evidence of introduction. Mori has offered the view that the tree is indigenous.

Should this be the case, then, as for Symphonia globulifera, we should be confronted with a second amphi-Atlantic species representing the two indicated species, or that we have here a narrow endemic American species (the second for the Western Hemisphere), but one closely allied to Mammea africana D. Don.

The Mori-Kallunki-Gentry collection is in mature fruiting condition. To resolve the problem here presented, it will be necessary to reexamine the population in the field so as to reach a further considered opinion as to its possible indigenous character, and more especially to collect an adequate series of specimens in flowering, young fruiting, and mature fruiting condition. Fluid-preserved specimens should be obtained for cytological and morphological examination.

PANAMA. Prov. Panama: tree 30 m tall, fruit brown, warty, 4-locular, 4-seeded, wet forest at 350 m alt, El Llano-Carti Road, 12.7 km from Inter-American Highway, 15 Feb 1975, Mori, Kallunki & Gentry 4699 (MO).

Chrysochlamys Poeppig

The separation of the four genera, Tovomita, Tovomitopsis, Chrysochlamys, and possibly Balboa, is at best maintained on tenuous morphologic grounds. It may at some date of more advanced knowledge of them be required to bring these names together under a single generic designation. To do so, however, if even-handed application of criteria is applied, would also require a larger sweeping performance among other clusioid genera. This I would be loathe to make.

Chrysochlamys clusiaefolia Maguire, Bol. Soc. Venez. Cien.  
Nat. 25: 225. 1964.

To the present time Chrysochlamys clusiaefolia had been known only from the region of the coastal Andes of Venezuela. Now a collection of undoubted assignment to the species has been made in the considerably disjunct Serranía del Darien, along the Panamanian-Colombian frontier. Other comparable geographical disjuncts are well known.

The Panamanian collection is faithful to the facies and form of the Venezuelan plants except that its flowers (male) lack the closely subtending outer pair of sepals (? bracts) which are characteristic of all of the original specimens. The subspecies offered here is based upon that distinction.

Chrysochlamys clusiaefolia Maguire subsp. clusiaefolia

Small or median-sized trees of wet primary forests above 1000 m altitude, Venezuelan coastal Cordillera: Estados Aragua, Yaracuy, Falcon, and Dist. Federal.

Chrysochlamys clusiaefolia Maguire, subsp. panamaensis Maguire,  
subsp. nov

Subspeciei clusiaefoliae similis, jugis parvis sepalis exterioribus deficientibus exceptis.

Type. Tree 10 m, buds green, lower montane wet forest, 1400 m alt, base camp, Cerro Mali, Serranía del Darien, Panama, Colombian frontier, 21 Jan 1975, A. Gentry & S. Mori 13769 (holotype MO).

Known only by the type collection.

Chrysochlamys sp nov, aff Ch. clusiaefolia Maguire

The specimen cited below is not determinable.

PANAMA. Prov. Coclé: small tree, fruits green in axillary and extra-axillary clusters, latex scanty, greenish-white, elfin forest, Cerro Caracoral, 1000 m alt, 19 Jan 1968, Duke & Dwyer 15102 (MO).

Obviously more of this entity should be sought.

Standley and Williams have described three species of Chrysochlamys from Panama, viz Ch. pauciflora Standley, Ceiba 3: 214. 1953, and Ch. eclipses L. Wms. and Ch. standleyana L. Wms., Trop. Woods 111: 15-16. 1959. I have not had opportunity to form judgment on these three proposals.

Tovomitopsis Planchon & Triana

As indicated earlier in this paper, the significant morphologic qualities of the genera Tovomita, Tovomitopsis, and Chrysochlamys are inadequately investigated. L. O. Williams<sup>3</sup>, careful student of Central American botany, while admitting the inadequacy of morphologic, anatomic, and biologic evidences, has nonetheless brought Tovomita and Tovomitopsis together under the former name.

This action, while understandable, I feel is somewhat premature. More detailed study should give sounder basis for such taxonomic and nomenclatural adjustment.

Repeatedly the question has been put to me as to the distinction of the three generic groupings. I am unable to give matured judgment on the matter at this time, as said above, because of the inadequacy of information of structural flowering and fruiting details. I thus offer here below a tentative generalized table which purports to separate the three entities, and with which my own work must suffice until further detailed study is accomplished.

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Williams, L. O. Guttiferae from Middle America.  
Tropical Woods 111: 15. 1959.

	Sepals	Petals	Stamens	Ovary	Aril	Inflorescence
<u>Tovomita</u>	Sepals 2-4, the outer valvate, exceeding and enclosing other flower parts.	Petals 4-(5-8), decussate to somewhat imbricate.	Stamens numerous, free or united at the base.	Ovary 4-(5) locular, locules 1-ovulate.	Exarillate, outer integument cartilaginous, ariliform.	Inflorescence axillary and/or terminal.
<u>Tovomitopsis</u>	Sepals 4, decussate, outer smaller and shorter than inner, not exceeding or enclosing other flower parts.	Petals 4-5, decussate.	Stamens numerous, free or united at base.	Ovary 4-5-locular, locules 1-2-ovulate.	Exarillate, integuments (1 or both) cartilaginous, sacciform.	Inflorescence axillary and/or terminal.
<u>Chrysochlamys</u>	Sepals 5, imbricate.	Petals 5, imbricate.	Stamens numerous, free or congested in center.	Ovary 5-locular, locules 1-ovulate.	Exarillate, integuments (? 1 or both) cartilaginous, sacciform.	Inflorescence cauliflorous.

Tovomitopsis angustifolia Maguire, sp nov

Frutex parvus, dioecius, 2 m maximus; ramulis tenuibus, teretibus; latice albedo; foliis appositis, anguste elliptico-lanceolatis, laminis vulgo 8-11 cm longis, 1.0-1.5 cm latis, apicibus basibusque anguste acuminatis; venis lateralibus paucis, vulgo 4-5, non-binatis, valde sursum arcuatis; petiolo 8-10 mm longo, tenui, anguste alato; inflorescentiis terminalibus, cymosis; masculinis: inflorescentiis ad 5 cm longis, vulgo 8-18-floribus; alabastris maturis globosis, 5-8 mm longis; sepalis decussatis, jugis exterioribus ovatis, obtusis, 3-4 mm longis; interioribus floribus includentibus; staminibus numerosis sed paucioribus quam 50, filamentis crassis, 3-4 mm longis; antheris oblongis, ca 0.5 mm longis, lateraliter dehiscentibus, 4-locularibus; granis pollinis tricolporatis, sphaeroideis, poris prominentibus, sulcis non-prominentibus, 22-24  $\mu$  diam, sporodermate reticulato; foemineis: floribus mihi non visis; fructibus pyriformibus, stipitatis, ca 2 cm longis, 5-locularibus, loculo dispermis; placentatione axiali elongata; seminibus 5-6 mm longis, ca 1.5-2.0 mm latis, embryone non-differentationi, semine omnino in membrana involuta; gynobasi angusta, ca 5-6 mm longa; stylis 5, cornutis, ad bases connatis, ca 2 mm longis, stigmatibus sessilibus, anguste obovatis, ca 1 mm longis, distaliter introrsis.

Type. Shrub 2 m tall, petals white, filaments yellow, on road to Calovebora, along stream, NW of Santa Fe, 2.7 km from Escuela Agricola Alto de Piedra, Veraguas, Panama, 30 Mar 1975, S. Mori & J. Kallunki 5357  $\sigma$  (holotype MO, isotype NY).

Distribution. Known certainly only from the Province of Veraguas above Santa Fe.

PANAMA. Prov. Veraguas: shrub 0.5-1.2 m tall, fruits green tinged with red, flowers white, Río Primero Braso, 2.5 km beyond Agriculture School Alto Piedra near Santa Fe, elev 700-750 m, 24 Jul 1974, Croat 25437 (MO, NY); much-branched shrub 1-2 m tall, forming clumps along stream edge, cut twigs exude milky sap, tropical wet forest, Atlantic Slope, 16 Nov 1974, Mori & Kallunki 3179 (MO, NY); 2.7 km from Escuela Agricola Alto de Piedra, 30 Mar 1975, Mori & Kallunki 5357 (holotype MO, isotype NY); streamside shrub to 2 m tall, very common, petals white, stamens yellow, NW of Santa Fe, 11 km from Escuela Agricola de Piedra, in valley of Río Dos Bocas, Atlantic slope, 450-550 m alt, 17 May 1975, Mori & Kallunki 6125 (NY). Gentry 8764, Río Guanache, 1-4 km upstream from Portobelo Road, 0-100 m alt, tropical wet forest, Colón, Panama, 10 Dec 1973, is doubtfully referred here. The specimen is inadequate for determination.

Tovomita Aublet

The genus Tovomita is the second largest of the American clusioid genera and, second to the largest genus, Clusia, possessive of the greatest range. Any consolidation of satellite genera with Tovomita would require that the Aublet name be retained.

Within these brief notes only two species will be given reference: Tovomita weddelliana, a long established and much fragmented species, and T. croatii, herein offered as new.

Because of its great range, extensive nomenclatural history, and diversified morphology, I here offer a rather full description of the species to include all here indicated segregates, some of which may indeed prove to represent geographic variants.

Tovomita weddelliana Planchon & Triana, An. Sc. Nat. Ser. 4.  
Bot. 14: 277. 1860.

Clusia oblanceolata Rusby, Desc. S. Am. Pl. 58. 1920.

Type. Valparaiso, Santa Marta, Colombia, 20 Mar 1899, H. H. Smith 1880 (NY).

Clusia pithecobia Standl. & L. Wms. Ceiba 1: 244. 1951.

Rio Piedras Blancas, Prov. Puntarenas, Costa Rica, 3 Aug 1950, Allen 5592 (F).

Tovomita longicuneata Engl., Bot. Jahrb. 58. Beibl. 130:

7. 1923. Type. Manzon, Huanuco, Peru, 900--1000 m, ♂, Apr 1904, Weberbauer 3446 (B).

?Tovomita sphenophylla Diels, Notizblatt 14: 32. 1938.

Tovomita rhizophoroides Cuatr., An. Inst. Biol. Mex. 20:

101. 1949. Type. Rio Naya, Valle, Colombia, Cuatrecasas 14280 (F).

Tovomita ligulata Cuatr., An. Inst. Biol. Mex. 20: 99.

1949. Type. Rio Digua, Valle, Colombia, 27 Aug 1943, Cuatrecasas 14949 (F).

Tovomita lanceolata Cuatr., An. Inst. Biol. Mex. 20: 102.

1949. Type. Rio Calima, Valle, Colombia, Cuatrecasas 21278 (F).

Tovomita glossophylla Cuatr., Rev. Acad. Col. Cien. 8:

62. 1950. Type. Quebrada del Caquetá, Caquetá, Colombia, 6 Apr 1940, Cuatrecasas 9194 (US, F).

Tovomita angustata Steyererm., Fieldiana Bot. 88: 399, fig.

82. 1952. Type. Kavanayén, Bolívar, Venezuela, 23 Nov 1944, Steyermark 60475 (holotype F, isotype NY).

Dioecious tree or often the flowers hermaphrodite, to 15 m high, branchlets terete, latex moderate milky or cream-colored; leaves opposite, subcoriaceous, narrowly oblanceolate, (6)10-25(28) cm long, 2-5 cm broad, the apex acute or short acuminate, gradually drawn to a narrow abrupt base; petiole 3-5 mm long; midrib prominent, especially on the lower surface; primary veins prominulous, 1.0-1.5 mm apart, rising at a 10° angle; inflorescence cymose, terminal or axillary; staminate inflorescence open, seldom conferred, multiflorous, to 20(25) cm long, primary branches to 8 cm long; flower buds globose, when mature commonly 6 mm long, pistillate buds larger than the staminate; sepals 2 pairs, decussate, suborbicular, concave, the external pair in the bud longer than and enclosing the interior pair and the other flower parts, the margins subconnivent or the first somewhat overlapping the second; petals 4, decussate, oblong to obovate, commonly 6-8 mm long; male flowers: buds commonly 4 mm long; stamens numerous, filaments free, ca 2 mm long, thickened at the base, borne on a corona ca 0.5 mm high, anthers 2-lobed, ovoid, ca 0.5 mm long, connective narrow; pollen tricolporate, broadly oblong-elliptic, to 45 u in equatorial view, rounded, 25-30 u in polar view, exine minutely granular; stamens or stamodia numerous, when fertile similar to those of ♂ flowers; ovary 5-6-locular, ovule solitary in each loculus, gynobase prominent; placenta axillary, linear, ca 10 mm long, central; embryo erect, little differentiated; stigmas 5-6, sessile; fruit strongly pyriform, commonly 4-5 cm long, the base narrowed forming a gynobase to 2 cm long, above the middle enlarged, obovate, stigmas sessile, obovate, 2.5-3.0 mm long; seed solitary in each loculus, seed linear, 15-16 mm long, 5-6 mm thick, somewhat 3-angled; seed coat 0.2-0.3 mm thick, indurated; seed enveloped in a fleshy mass possibly arillar in nature.

Type. Bolivie septentrionale, vallée de Tipuani, province de Iarecaja, Weddell ann. 1851 (holotype B).

Distribution. Tovomita weddelliana becomes a tree to 15 m tall, is a forest dweller or may occur in more open ecotone habitats. It ranges from Costa Rica to Peru and Bolivia along the Andean axis; in the Venezuelan Andes to the Federal District, and in the eastern Guayana Highland.

It is difficult to assign a center of distribution. Leaves are greatly variable in size and form (the chief basis of segregation), as noted in the description. Evaluation of any of the several varietal designations must await more adequate collection.

Some 72 collections have been examined in this review of Tovomita weddelliana. Only those of Panama, numbering 22, are cited herein:

PANAMA. Prov. Colón: shrub 2 m (tree at maturity), Santa Rita Ridge, 1 Mar 1971, Croat 13896 (MO); 7 meter tree, 10 mi SW of Puertobelo, 2-4 mi from coast, 10-200 m alt, 24 Mar 1973, Liesner 1058 (MO); tree 8 m tall, Río Guanache, near Portobelo, tropical wet forest, 25 m alt, 24 Mar 1975, Mori & Kallunki 5216 (MO). Darien: stilted tree, 8" dbh, fairly common in elfin forest, latex not obvious, fruits green, Cerro Pirre, 2500-4500 ft, 9-10 Aug 1967, Duke & Elias 13733 (NY). Panamá: tree 15 ft tall, fruits green, Cerro Jefe, 14 Feb 1968, Correa & Dressler 721 (MO); árbol 10 m alto, látex, fruto rojo-verde, camino de Llano a Cartí, altura ± 400 m, 20 Feb 1973, Correa, Dressler et al 1855 (MO); small tree to 4 m, leaves leathery, sap white, 200-500 m alt, 19 km above Pan-American Highway on road from El Llano to Carti-Tupile, 20-21 Feb 1973, Kennedy 2516 (MO); tree 10 m tall, 15 cm dbh, premontane wet forest along El Llano-Carti road, 16-18-1/2 km by road N of Pan American Highway at El Llano, alt 400-450 m, 28 Mar 1974, Nee & Tyson 10973 (MO); tree 7 m tall, 10 cm dbh, wet forest, 350 m alt, El Llano-Carti Road, 17.5 km from Inter-American Highway, 14 Feb 1975, Gentry, Mori & Kallunki 4597 (MO). San Blas: primary forest, along newly cut road from El Llano to Carti-Tupile, Continental Divide to 1 mi from Divide, 300-500 m alt, 30 Mar 1973, Liesner 1269 (MO). Veraguas: tree, stilt roots, 60 ft, milky latex, flowers white with yellow stamens, vicinity of Santa Fe, forested slopes of Cerro Tute, 3000 ft alt, 24 Mar 1947, P. H. Allen 4352 (MO, NY); tree 4 m, flowers in bud, white, fruits green tinged with purple, along Río Dos Bocas, ca 12 km beyond Santa Fe, 450 m alt, 25 Jul 1974, ♂, Croat 25781 (MO); tree 6 m, flowers white, stamens and style yellow, fruits purplish, along road between Escuela Agricola and Alto Piedra (above Santa Fe) and Río Dos Bocas ca 5-8 km from Escuela, 730-770 m elev, 26 Jul 1974, Croat 25961 (MO, 2 sheets); tree 10 m, flowers white, Valley of Río Dos Bocas, 11 km from Escuela Agricola Alto Piedra (Above

Santa Fe) on the road to Calovebora; primary forest along river, 450 m alt, 30 Aug 1974, Croat 27492 (MO); tree 4 m, Valley of Río Dos Bocas along road between Escuela Agrícola Alto Piedra and Calovebora, 15.6 km northwest of Santa Fe, primary forest, along trail to Santa Fe, steep forested hill east of river, 450-550 m alt, 31 Aug 1974, Croat 27664 (MO); shrub 4 m tall, fruit red, along stream, NW of Santa Fe, 2.6 km from Escuela Agrícola Alto de Piedra, 23 Feb 1975, Mori & Kallunki 4761 (MO).

Panama specimens with more obtuse or rounded apexes are: Prov. Panamá: tree 25 m, flowers white, in forest about 1 mi upstream from Frizzel's Vinca Indio, on slopes of Cerro Jefe, 9 Sept 1970, Foster & Kennedy 1832 (MO); epiphytic shrub, top of Cerro Jefe, 1 Apr 1972, Gentry 4877 (MO, NY); tree 15 m, old fruit reddish, Cerro Jefe, 22 Sept 1972, Gentry 6146 (MO).

Panama specimens with smaller shorter leaves in the manner of Tovomita rhizophoroides: Prov. Coclé: shrub 3 m, La Messa above El Valle, in forest on both sides of junction with road to Cerro Pilon, elev ca 800 m, 21 Jul 1974, Croat 25422 (MO, NY). Prov. Panamá: arbol, altura de 10 m, con raíces fulreas y leche color crema, Cerro Azul, 600 m alt, 15 Abr 1971, E. A. Lao & L. A. Holdridge 31 (MO).

Tovomita croatii Maguire, sp nov

Frutex ad 5 m altus; ramis teretibus; foliis sessilibus, subamplecticaulibus, chartaceis, ellipticis vel late oblanceolatis, acuminatis, vulgo 7-10 cm latis, 17-28 cm longis, integris, pinnivenatis, venis primariis in nervo marginale collectis, glabris, subtus valde vittatis, conspicue squamoso-punctatis; inflorescentiis terminalibus cymosis, multifloribus, ramulis ad 10 cm longis, bracteis conspicuis oblanceolatis vel lanceolatis vel lineari-lanceolatis, ad 15 mm longis; floribus masculinis: sepalis 4, decussatis, 2 exterioribus valvatis, 2 interioribus involventibus et excedentibus, ad 12 mm longis, convexis, vittatis; staminibus plus minusve 20-30, filamentis teretibus, 3-4 mm longis, liberis, antheris bilobatis, ca 0.6 mm latis, 0.4 mm longis, hippocrepiformibus, lobis lateralibus; polline parvo, tricolpis, ca 22-25  $\mu$  diam; floribus foemineis: non visis; fructibus elliptico-ovalibus, ca 18-20 mm longis, 5-locularibus, loculis dispermis, stylis partibus liberis, ca 0.5 mm longis, stigmatibus terminalibus, orbicularibus; seminibus linearibus, in membranis (tegumentorum?) longis, subcarnosis, involutis, axe subbasi affixis; endospermio relative magno, embryone erecto, tenuiter lineari involuto.

Type. El Valle, behind Club Campestre, shrub 2 m, flowers white, sap viscid, cloudy, Prov. Coclé, Panama, 12 Apr 1971, Thomas B. Croat 14268A (holotype MO).

Distribution. PANAMA. Prov. Bocas del Toro: shrub 1-2 m tall, bracts mauve and maroon, between Q. Gutierrez and east slope of La Zorra, headwaters of Río Mali, Chiriqui Trail, 18 Apr 1968, Kirkbride & Duke 732 (MO, 2 sheets). Prov. Coclé: shrub 1.5 m, buds pinkish, Cerro Caracoral, in the rain forest below the elfin forest, 24 Apr 1968, Kirkbride 1122 (MO, 2 sheets); shrub to 15 ft, fruits cream flushed with red, seeds 7 (as seen in X-sect), elongate, testa red, pulp of fruit colorless, sticky, 25 Jul 1968, Dwyer & Correa 8913 (MO); shrub to 10 ft, leaves not glandular-punctate, bracts and axes of infl. rose-red, as are fruits, 25 Jul 1968, Dwyer & Correa 8855 (MO); shrub to 2 m high, buds dull pink, Cerro Pilón, hill below summit, above El Valle de Antón, 2000-2700 ft alt, in rain forest, 28 Mar 1969, Dwyer, Durkee, Croat & Castillon 4556 (MO); shrub 2 m, flowers white, sap viscid, cloudy, El Valle, behind Club Campestre, 12 Apr 1971, Croat 14268A (holotype MO); shrub 2 m, flowers white, sap viscid, cloudy, Cerro Pilón (above El Valle de Antón), 13 Apr 1971, Croat 14338 (MO); 1.5 m tall, terrestrial, in tropical wet forest, Cerro Pilón, 900-1173 m, 16 Mar 1973, Liesner 783 (MO).

Tovomita croatii bears the most visibly conspicuous character of the genus, that of the external pairs of essentially connivent sepals exceeding and enclosing the remaining organs of the flower, i e, inner pair of sepals, petals, androecium and/or gynoecium, as they may be present.

The morphologic distinction among the three closely related genera, Chrysochlamys, Tovomita and Tovomitopsis, of the arillar structure is yet to be systematically investigated. The locules of the ovary in the three genera are said to be uniovulate. Yet, at least in Tovomitopsis some of the locules may produce two ovules, and therefore become bispermic. In the present species all locules seem constantly to bear two ovules and, hence, become two-seeded.

In our species, the carnose envelopes of the twin seeds appear to be of chalazal attachment. Which, or what parts of the teguments are involved, is not here determined. However, the envelopes are complete and seem to be separate for each seed.

Tovomita coriacea Maguire, sp nov

*Tovomita weddellianae* affine.

Arbor 10-20 m alta, latice albida; foliis appositis, confertis, coriaceis, anguste oblanceolatis, apicibus obtusis vel rotundatis, basibus angustis, petiolo ca 5 mm longo; venis lateralibus, 1.0-2.0 mm apartis, adscendentibus a 10°-20° angulo; floribus et staminibus non visis; floribus pistillatis: alabastris ovato-globosis, ca 5 mm longis, sepalis 4, decussatis, concavis, marginibus non-marginatis, jugis exterioribus in alabastro connatis; petalis 4; staminodiis destitutis; ovario 5-loculari, sessili, loculis uniovulatis; ovulis axe lateraliter affixis; fructu globoso ca 2 cm lato, sine gynobasi; stigmatibus 5, sessilibus.

Type. Common, pistillate tree 10-20 m, leaves at summit of branches, erect, latex creamy-white, flower buds white, fruit maroon, obovoid-ovoid, rounded at the summit, Cerro de Humo, bosque nublado virgen, 12 km norte del pueblo de Río Grande arriba, 1273 m alt, Peninsula de Paría, Estado Sucre, Venezuela, 2 Mar 1966, Julian A. Steyermark 94884 (holotype NY, isotype VEN).

Known only by the type collection, but ascribed by the collector to be common.

Tovomita coriacea is clearly related to Tovomita weddelliana Pl. & Tr., as is demonstrated by the very similar leaves, but differs from that species in the coriaceous quality of the leaves and the rotund non-stipitate fruit, the prominent gynobase being lacking.

The species is published here, although of Venezuelan origin, because of its affinity to the widespread Tovomita weddelliana. I wish to acknowledge the kindness of Doctor Steyermark, collector, for permitting me to do so.

Clusiella elegans Pl. & Tr., An. Sc. Nat. Ser. 4. Bot. 14: 254. 1860.

These apparently are initial records for Panama. The center of distribution of the species lies in Colombia. Its range extends into South American Panama, Venezuela and Ecuador.

PANAMA. Prov. Darien: epiphytic shrub, the stems rooting at nodes and becoming fastened at several points; flowers white, fruits green, vicinity of upper gold mining camp of Tyler Kirtledge on headwaters of Río Tuquesa, ca 2 air km from Continental Divide, in recently cleared primary forest, 26 Aug 1974, Croat 27213 (MO). Prov. Panamá: tree fallen, unknown height estimated over 4 m, leaves leathery, calyx green, petals white, glandular area around ovary yellow, stigma white, in tropical wet forest, 16 km above Pan-American Highway on road from El Llano to Carti-Tupile, 13 Feb 1973, Helen Kennedy, R. L. Dressler & Anne Mahler 2394 (MO); same data, 13 Feb 1973, Kennedy, Dressler & Mahler 2397A (MO); 13 Mar 1973, Croat 22894 (MO). Prov. San Blas: 13 Mar 1973, Liesner 658 (MO); 26-27 Mar 1973, Liesner 1208 (MO); 12.7 km Llano-Carti Road, 15 Feb 1975, Mori, Kallunki & Gentry 4701 (MO); same, Mori, Kallunki & Gentry 4705 (MO). Prov. Veraguas: Santa Fe, 20 Dec 1974, Mori, Kallunki et al 3875 (MO).

ADDITIONAL NOTES ON THE GENUS AVICENNIA. I

Harold N. Moldenke

AVICENNIA L.

Additional synonymy: Bontia "L. ex Loefl." apud Soukup, Biota 11: 6, in syn. 1976. Bontia "P. Br. ex Airy Shaw in Willis" apud Soukup, Biota 11: 6, in syn. 1976. Upata "Rheede ex Adans." apud Soukup, Biota 11: 6, in syn. 1976.

Additional & emended bibliography: Jacq., Select. Stirp. Amer., imp. 1, 177—178, pl. 112, fig. 1 & 2. 1763; Sweet, Hort. Brit., ed. 2, 419. 1830; G. Don in Loud., Hort. Brit., ed. 1, 247 (1830) and ed. 2, 247. 1832; Loud., Hort. Brit., ed. 2, 554. 1832; G. Don in Loud., Hort. Brit., ed. 3, 247. 1839; Sweet, Hort. Brit., ed. 3, 554. 1839; A. DC., Prodr. 11: 701. 1847; Buek, Gen. Spec. Syn. Candoll. 3: 46. 1858; Crozet, Voy. Tasmania [transl. Ling Roth] 5: 36. 1891; Estores Anzaldo, Marañon, & Ancheta, Philip. Journ. Sci. 86: 236 & 239. 1958; Puri, Indian Forest Ecol. 1: 31 (1960) and 2: 223—227 & 229—232. 1960; Golley, Odum, & Wilson, Ecology 43: 9—19. 1962; Gaussen, Viart, Legris, & Labroue, Trav. Sect. Scient. Techn. Inst. Franç. Pond., Hors Ser. 5: 25 & 26. 1965; Burns & Rotherham, Austral. Butterflies 104. 1969; Gill, Forest Sci. 17: 462—465. 1971; Jacq., Select. Stirp. Amer., imp. 2, 177—178. 1971; Moore, Miller, Albright, & Tieszen, Photosynthetic 6: 393. 1972; Ewel & Whitmore, U. S. Dept. Agr. Forest. Serv. Res. Pap. ITF-18: 16. 1973; Tomlinson & Gill in Meggers, Ayensu, & Duckworth, Trop. Forest Ecosyst. Afr. & S. Am. 129—133, & 142. 1973; Chai, Malays. Forest. 38: 188, 204—205, & 207. 1975; Lugo, Evink, Brinson, Broce, & Snedaker in Golley & Medina, Ecolog. Stud. 11: 336, 338, 339, 344, & 345. 1975; Occhioni Martins, Leandra 5: 138. 1975; Anon., Biol. Abstr. 61: AC1.559. 1976; Anon., Biores. Index 12 (11): B.75. 1976; M. F. Baker, Wild Fls., ed. 2, imp. 2, 190. 1976; Bultman & Southwell, Biotropica 8 (2): 76 & 92. 1976; Cambie, Journ. Roy. Soc. N. Zeal. 6 (3): 333. 1976; Corner, Seeds Dicot. 1: 276. 1976; Felger & Lowe, Nat. Hist. Mus. Los Angeles Co. Contrib. Sci. 285: 5 & 50. 1976; Fleming, Ganelle, & Long, Wild Fls. Fla. 15 & 41. 1976; Follmann-Schrag, Excerpt. Bot. A.26: 503. 1976; F. R. Fosberg, Biol. & Geol. Coral Reefs 3, Biol. 2: 272. 1976; F. R. Fosberg, Rhodora 78: 112. 1976; Hocking, Excerpt. Bot. A.26: 422 (1976) and 28: 259 & 260. 1976; Lakela, Long, Fleming, & Genelle, Fl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 115, 149, & 150. 1976; Laurence & Mohammed, Journ. Agr. Soc. Trin. & Tob. 76: 345. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, 17, 732, & 930. 1976; Lugo, Inst. Forest. Latinoam. Invest. Bull. 50: 49 & 54. 1976; Moldenke, Phytologia 34: 18, 70—94, 167—203, 247, 248, 252—256, 261—263, 265—269, 271, 278, 485, 499, 504, 507, & 509 (1976) and 35: 13. 1976; Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erioc: 97. 1976; Raven, Evert, & Curtis, Biol. Pl., ed. 2, 427 &

670, fig. 20-12. 1976; Rehm, Environ. Conserv. 3: 47-57. 1976; Rogerson & Becker, Bull. Torrey Bot. Club 103: 145 & 277. 1976; Soukup, Biota 11: [1], 6, 21, & 22. 1976; Jiménez & Liogier, Moscosoa 1 (2): 17. 1977; Moldenke, Biol. Abstr. 63: 2451-2452. 1977; Moldenke, Phytologia 35: 507 (1977) and 36: 31, 32, 34, 38, 39, 46, & 47. 1977; A. L. Moldenke, Phytologia 36: 88. 1977; Rogerson, Becker, & Prince, Bull. Torrey Bot. Club 104: 82. 1977; Ward, Phytologia 35: 409. 1977.

Golley and his associates (1962) aver that mangroves cover about 1/3 of the coastlines of tropical America. Sweet (1830, 1839) places the genus Avicennia in the Myoporinae [Myoporaceae]. Burns & Rotherham (1969) report that the larvae of the Copper Jewel butterfly (Hypochrysops apelles), attended by small black ants, live in the dead or folded leaves of Avicennia in Australia. When feeding, the larvae eat the epidermis of the leaves, leaving a network of veins which become dry and assume a scorched appearance.

It is perhaps worth noting here that Cambie (1976), Lakela, Long, Fleming, & Genelle (1976), Fleming, Genelle, & Long (1976), and Lakela & Long (1976) also accept the family Avicenniaceae as a separate family from the Verbenaceae and Myoporaceae.

#### AVICENNIA AFRICANA P. Beauv.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 46. 1858; Anon., Biol. Abstr. 61: AC1.559. 1976; Hocking, Excerpt. Bot. A.28: 259 & 260. 1976; Moldenke, Phytologia 33: 239, 250, 252, 259, 261, & 262 (1976) and 34: 74, 202, & 203. 1976.

#### AVICENNIA ALBA Blume

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 46. 1858; Fedde & Schust. in Just, Bot. Jahresber. 44: 253. 1922; Lambert, Univ. São Paulo Fac. Filos. Bol. 317 [Bot. 23]: 120, 150, 155, 160, & 165. 1969; Chai, Malays. Forest. 38: 188, 205, & 207. 1975; Anon., Biol. Abstr. 61: AC1.559, 1976; Moldenke, Phytologia 34: 70-72, 75, 76, 80, 84, 85, 90, 91, 93, 94, 167, 170, 172, 179, 180, 185-188, 190, 194, 195, 197, 198, 200-203, 262, 265, 267, 268, & 271 (1976) and 36: 38. 1977.

Recent collectors describe this species as a large tree or a small shrub-like tree, 2-30 m. tall, often divided at the base into 2 main stems, the trunks to 20 cm. in diameter at breast height, with many pneumatophores, 10-30 cm. tall, in a radius of 4 m. from the base of the tree, the trunk and branches black, the bark dark-brown, more or less smooth, the leaves dark-green above, grayish-green or whitish beneath, and the fruit light-green. They have found it growing in "open muddy mangrove forests" and "very common on seashores and on mud flats in moderately firm soils or soft mud". Van der Kevie describes the corollas as "yellow to orange", while Foreman & Katik refer to them as simply "yellow". They have found it in anthesis in June and in fruit in August. McCusker describes the corollas as "bright-yellow" and encountered the species "on both seaward and landward edges of mangrove swamps".

Chai (1975) has studied this tree extensively in Malaysia and describes it there as follows: "Small to huge tree to 70 feet tall, 7 ft. girth. Bark dark brown to black. No buttresses but may develop slender, soft stilt roots. Leaves lanceolate or elliptic-obovate with tapering base, lower leaf surfaces whitish, salt being excreted from this surface. Fruit glaucous green, leech-shaped. Another pioneer species colonising newly formed mud flats as Sonneratia alba. Often gregarious along low convex banks of the rivers near the sea but later replaced by Rhizophora apiculata and Bruguiera parviflora. Rare inland." In his key he distinguishes it from the two other species of the genus known there [A. marina and A. officinalis] as follows: "Medium to large tree to 70 ft. tall; bark dark gray to black, often with white patches, not flaky; leaves oblong-elliptic, whitish below; soft mud." He calls it "api-api hitam".

Additional citations: THAILAND: Maxwell 75-918 (Ac); Van der Kevie 1 (Ac). MALAYA: Selangor: McCusker 303 (Ld). BISMARCK ARCHIPELAGO: Mams: Foreman & Katik LAE.59275 (Mu).

#### AVICENNIA ALBA var. LATIFOLIA Moldenke

Additional bibliography: Anon., Biol. Abstr. 61: AC1.559. 1976; Moldenke, Phytologia 34: 71, 91, 198, & 265. 1976.

#### AVICENNIA BICOLOR Standl.

Additional bibliography: Anon., Biol. Abstr. 61: AC1.559. 1976; Hocking, Excerpt. Bot. A.26: 422. 1976; Moldenke, Phytologia 33: 240. 1976.

Pohl and Davidse, identifying this as A. germinans (L.) L., refer to it as "one of the dominants in mangrove swamps". They found it in fruit in June.

The H. Kennedy 2281, distributed in some herbaria as A. bicolor, actually represents A. germinans var. guayaquilensis (H.B.K.) Moldenke.

Additional citations: COSTA RICA: Guanacaste: Pohl & Davidse 10588a (W-2774496).

#### AVICENNIA ELLIPTICA Holm

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 46. 1858; Anon., Biol. Abstr. 61: AC1.559. 1976; Moldenke, Phytologia 34: 71, 202, & 278 (1976) and 36: 32 & 34. 1977.

The Dias da Rocha 108, F. C. Hoehne s.n. [Herb. Inst. Bot. S. Paulo 24908], Löfgren s.n. [Herb. Inst. Bot. S. Paulo 15596], Usteri s.n. [Herb. Inst. Bot. S. Paulo 15598], and Herb. Com. Geogr. & Geol. 3062, distributed as A. elliptica, actually represent A. schaueriana f. candicans instead.

Additional citations: BRAZIL: Bahia: Lanna 716 [Castellanos 25468; Herb. FEEMA 4562] (Ld), 747 [Castellanos 25497; Herb. FEEMA 4561] (Z).

AVICENNIA ELLIPTICA var. MARTII Moldenke

Additional bibliography: Moldenke, Phytologia 32: 438, 454, & 455 (1975) and 33: 255, 262, & 269. 1976; Anon., Biol. Abstr. 61: AC1.559. 1976; Moldenke, Phytologia 36: 32 & 34. 1977.

The Drouet 2442, previously cited by me as A. elliptica var. martii, now seems to me to be only one of the many forms of A. germinans var. guayaquilensis (H.B.K.) Moldenke; the same is true of Ducks 5407, Lanjouw & Lindeman 301, and Smith & Smith 546.

AVICENNIA EOCENICA Berry

Additional bibliography: Moldenke, Phytologia 32: 455. 1975; Anon., Biol. Abstr. 61: AC1.559. 1976.

AVICENNIA EUCALYPTIFOLIA Zipp.

Additional synonymy: Avicennia marina var. australasica (Walp.) Moldenke, Phytologia 34: 72, in syn. 1976.

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 44: 253. 1922; Anon., Biol. Abstr. 61: AC1.559. 1976; Hocking, Excerpt. Bot. A. 28: 259. 1976; Moldenke, Phytologia 34: 71—72, 84, 85, 91, 93, 94, 177, 188, 268, & 271. 1976.

Stoddart and Thom refer to this species as it occurs on the Great Barrier Reef as a shrub or tree, 1—3 meters tall, with vertical pneumatophores (and "roots"), the leaves often with prominent leaf-galls, and found it "occasional" on the seaward side of Rhizophora colonies and on shingles, shingle ramparts, and shingle or mangrove cays, flowering and fruiting already (although apparently very sparingly) at 1—3 meters height.

Additional citations: GREAT BARRIER REEF ISLANDS: Hampton: Thom 4211 (W—2744309). Howick: Thom 4203 (W—2744287). Low: Stoddart 4336 (W—2744301). Lowrie: Stoddart 4998 (W—2744204). Low Wooded: Stoddart 4524 (W—2744316). Sand: Stoddart 4210 (W—2744311). Three: Stoddart 4499 (W—2744321). West Hope: Stoddart 4405 (W—2744299).

AVICENNIA GERMINANS (L.) L.

Additional & emended bibliography: Jacq., Select. Stirp. Amer., imp. 1, 177—178, pl. 112, fig. 1 & 2. 1763; Sweet, Hort. Brit., ed. 2, 419. 1830; G. Don in Loud., Hort. Brit., ed. 1, 247 (1830), ed. 2, 247 (1832), and ed. 3, 247. 1839; Schau. in A. DC., Prodr. 11: 699—700. 1847; Buek, Gen. Spec. Syn. Candoll. 3: 46. 1858; Pat., Ill. Biol. Monog., ser. 2, 4: 482. 1916; Sydow in Just, Bot. Jahresber. 44: 595. 1923; Fedde in Just, Bot. Jahresber. 44: 1377. 1927; M. F. Baker, Fla. Wild Fls., ed. 2, imp. 1, 190. 1938; Lamberti, Univ. São Paulo Fac. Filos. Bol. 317 [Bot. 23]: 40, 41, 45, 46, 120, 149, & 165. 1969; Jacq., Select. Stirp. Amer., imp. 2, 177—178, pl. 112, fig. 1 & 2. 1971; Ewel & Whitmore, U. S. Dept. Agr. Forest Serv. Res. Pap. LTF-18: 16. 1973; Tomlinson & Gill in Meggers, Ayensu, & Duckworth, Trop. Forest Ecosyst. Afr. & S. Am. 129—133 & 141—142. 1973; Lugo, Evink, Brinson, Broce, & Snedaker in Golley & Medina, Ecolog. Stud. [Jacobs, Lange, Ol-

son, & Wieser, Ecol. Stud. 11:] 335—339, 344, & 345. 1975; Anon., Biol. Abstr. 61: AC1.559. 1976; Anon., Biores. Index 12 (11): B. 75. 1976; M. F. Baker, Fla. Wild Fls., ed. 2, imp. 2, 190. 1976; Felger & Lowe, Nat. Hist. Mus. Los Angeles Co. Contrib. Sci. 285: 5 & 50. 1976; Fleming, Genelle, & Long, Wild Fls. Fla. 15 & 41. 1976; F. R. Fosberg, Rhodora 78: 112. 1976; Lakela, Long, Fleming, & Genelle, Pl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 115 & 149. 1976; Laurence & Mohammed, Journ. Agr. Soc. Trin. & Tob. 76: 345. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, 17, 732, & 930. 1976; Lugo, Inst. Forest. Latinoam. Invest. Bull. 50: 49 & 54. 1976; Moldenke, Phytologia 34: 72—76, 84—86, 91, 93, 94, 170, 172, 177, 180, 199—203, 248, 252—256, & 271. 1976; Raven, Evert, & Curtis, Biol. Pl., ed. 2, 427 & 670, fig. 20-12. 1976; Rehm, Environ. Conserv. 3: 47—57. 1976; Soukup, Biota 11: 6. 1976; Jiménez & Liogier, Moscosoa 1 (2): 17. 1977; Moldenke, Phytologia 36: 31, 34, & 41. 1977; A. L. Moldenke, Phytologia 36: 88. 1977; Ward, Phytologia 35: 409. 1977.

Additional & amended illustrations: Jacq., Select. Stirp. Amer., imp. 1, pl. 112, fig. 1 & 2 (1763) and imp. 2, pl. 112, fig. 1 & 2. 1971; Fleming, Genelle, & Long, Wild Fls. Fla. 41 (in color). 1976; Lugo, Inst. Forest. Latinoam. Invest. Bull. 50: 54. 1976; Raven, Evert, & Curtis, Biol. Pl., ed. 2, 427, fig. 20-12. 1976.

Some of the leaves on Sachet 459, from the Cayman Islands, resemble those seen on typical var. guayaquilensis; still, it seems rather plain that such leaves are far more common in populations of northern South America. Possibly both the typical form and var. guayaquilensis occur in that southern West Indies - northern South American area, a condition not at all unusual; certainly some specimens of Asplund 16588, Budowski 25, Chapin 1129, Fournier 81, Hagen 8 & 809, Haught 4855, Pittier 11011, Romero-Castafieda 7275, D. H. Knight 1032, H. H. Smith 1937, Snodgrass & Heller 368, Stewart 3267, T. W. J. Taylor TT.91, Wiggins 18310, and Wiggins & Porter 517 seem to indicate this. Possibly var. guayaquilensis would better be regarded as a form rather than a variety.

The corollas are said to have been "whitish" on Ventura A. 5226 and the label accompanying this collection makes the remarkable claim that the specimen was collected at "40 m." altitude — doubtless an error.

Ewel & Whitmore (1973) say that "Some of the low alluvial areas on the south coast of Puerto Rico contain saline soils, such as the Santa Isabel series, and the vegetation on these sites is dominated by Prosopis juliflora.....Mangrove forests....form parts of the coastal associations in this life zone, but the development of tall, luxuriant mangrove forests may, in some locations, be limited by the scarce surface runoff, which can result in higher salinities and lower nutrient inputs than would be the case along coasts with more rainfall." Lugo and his associates (1975) have compared the net daytime photosynthesis, nighttime respiration, and their ration in Rhizophora, Avicennia, Laguncularia, and Conocarpus, noting that only Avicennia among these genera comprises salt-excreting plants.

[to be continued]

## BOOK REVIEWS

Alma L. Moldenke

"FLORIDA WILD FLOWERS — An Introduction to the Florida Flora" by Mary Francis Baker, xiii & 269 pp., illus., Reprint Edition by Horticultural Books, Inc., Stuart, Florida 33494. 1976. \$5.95 paperbound.

This work was first published by the Macmillan Company in 1926 which also released the New Edition of 1938. The "Flowering Tree Man of Florida", the indefatigable Dr. Edwin Menninger, has used the latter for his Horticultural Books replication. "Eight hundred of our more common and more interesting herbs, shrubs, and trees" are described and keyed. There are 49 black/white plates of the author's plant photographs.

It is nice to have this old time favorite available again.

"ARK II Social Response to Environmental Imperatives" by Dennis C. Pirages & Paul R. Ehrlich, x & 344 pp., illus., W. H. Freeman & Company, San Francisco, California 94104. 1974. \$3.95 paperbound.

"Prologue: Noah had ample warning from a respected authority to build his ark and he used his time to good advantage. Skeptics laughed, ridiculed, and drowned — but Noah, the original prophet of doom, survived. We too have been warned that a flood of problems now threatens the persistence of industrial society, but this time the [new institutional]...ark must ensure our survival by re-designing the political, economic and social institutions of industrial society".

Dr. Pirages, a social scientist, prepared this text while serving as a research associate with Prof. Ehrlich at Stanford University 1970—1973. The analyses and suggestions offered are logical, honest, and radical (in the literal sense), but implementing them or other valid substitutes (not palliative gestures) will be so very difficult to achieve in time. More thoughtful reading of this book could help.

"DNA SYNTHESIS" by Arthur Kornberg, ii & 399 pp., illus., W. H. Freeman & Company, San Francisco, California 94104. 1974. \$18.

In 1972 this Nobel-laureate biochemical authority in this intriguing complicated field presented the Robbins lectures at Pomona College. His preparations have since been developed into this outstanding graduate level text for courses in molecular genetics, biophysics, biochemistry, etc., for the student with a beginning

interest in DNA synthesis and for those working directly or indirectly in this field.

The main topics are: structure, functions and precursors of DNA, — DNA polymerases, of Escherichia coli, of phage induction into bacteria and of eukaryotic cells, — replication of DNA viruses, repair, recombination and restriction, — RNA polymerases, transcription, and synthesis of genes. The book closes with an intelligent analysis of social concerns about genetic chemistry or what is suspiciously labeled as "genetic engineering" by some.

The text is written in direct, clear language. The 194 excellent illustrations consist mainly of interpretive diagrams (149 in color) and electron micrographs and 69 tables.

"WATER — A Primer" by Luna B. Leopold, xvi & 172 pp., illus., W. H. Freeman & Company, San Francisco, California 94104. 1974. \$4.95 clothbound, \$2.95 paperbound.

This publication is part of the Series of Books in Geology edited by James Gilluly and A. O. Woodford and it covers very clearly and logically the general principles of hydrology for beginning students interested in a variety of environmental problems. Those readers seeking further explanations or applications are referred to the Professional Papers and the Water Supply Papers of the United States Geological Survey prepared by assorted hydrological specialists. Since the principles of hydrology are non-controversial this excellent brief introduction to them could (on reading, of course) only result in a better informed citizenry capable of wiser choices about the nation's development of its water resources involving flood controls, irrigation, pollution control, etc.

Did you know that "In some of the arid parts of western United States water is being pumped that fell as rain during the ice age, at least 10,000 years ago"?

"CHEMISTRY FOR THE LIFE SCIENCES" by J. G. Dawber & A. T. Moore, xiii & 426 pp., illus., McGraw-Hill Book Company, New York, N. Y. 10020. 1973. \$11.95 paperbound.

This text, published in England, presumes an introductory course in chemistry and is "designed for students taking courses in Applied Biology and Medical Laboratory Sciences.....[and] as a text for ancillary chemistry courses required in degree courses in biological sciences and medicine." The chapter headings are: Atomic structure and chemical bounding; Structural theory of organic chemistry; Physical aspects of chemical reactions including thermodynamics and kinetics of chemical reactions; Reactions of organic molecules by making and breaking covalent bonds mainly; Physical chemistry of liquids and solutions including surface and membrane phenomena and electrolytic solutions; Chromatography and

spectroscopy including magnetic resonance methods; Structure and properties of such natural organic compounds as amino acids, lipids, carbohydrates, nucleosides, vitamins and steroids; Structure and properties of biopolymers and enzymic catalysis; and Chemical reactions in living organisms.

This book makes an excellent ancillary text in the United States for courses in biochemistry, molecular biology, and related topics and for personal study and review.

"ANNUAL REVIEW OF ECOLOGY AND SYSTEMATICS" Volume 5 edited by Richard F. Johnston with Peter W. Frank and Charles D. Michener, 11 & 448 pp., illus., Annual Reviews, Inc., Palo Alto, California 94306. 1974. \$15.00 U.S.A., \$15.50 foreign.

Herein are 18 carefully presented, currently interesting articles provided with detailed bibliographies and often with tables and diagrams starting with H. J. Baker's "Evolution of Weeds" and ending with J. L. Harper's and J. White's "Demography of Plants". Between these excellent papers there are others on the ecology of mangroves, of macroscopic marine algae, of secondary successions, of island biogeography re equilibrium theory, etc. Many readers will be interested in J. Cracraft's "Continental Drift and Vertebrate Distribution" as well as I. Noy-Meir's "Desert Ecosystems: Higher Trophic Levels" and R. D. Alexander's "Evolution of Social Behavior".

"LECTURES ON THE PHENOMENA OF LIFE COMMON TO ANIMALS AND PLANTS" by Claude Bernard, Volume I, translation by Hebbel E. Hoff, Roger Guillemin & Lucienne Guillemin, xxv & 288 pp., illus., Charles C. Thomas, Publishers, Springfield, Illinois 62717. 1974. \$12.95.

This famous work first appeared in 1878 within months after the author had corrected the final proofs on his deathbed in Paris. It was intended as the initial segment of a Cours de Physiologie Général du Muséum d'Histoire Naturelle. The translators' introduction is followed by the original foreword and two funeral orations emphasizing not only Claude Bernard's principal discoveries and great influence on experimental physiology and experimental medicine, but also those personal traits that endeared him to his confrères and students.

The ten lectures follow, each preceded by a topical outline, and conclude that "Determinism remains the great principle of the science of physiology.....with no difference between the sciences of inanimate objects and the science of living bodies".

The translated English at times is stilted, but no original meaning is altered.

"TREES OF THE BERKELEY CAMPUS" Revised Edition by Robert A. Cockrell & assisted by Frederick F. Warmke, vi & 97 pp., illus., Division of Agricultural Sciences, University of California, Richmond, California 94804 or Berkeley, California 94720. 1976. \$5.90 paperbound oversize.

Campus trees and larger shrubs are listed alphabetically by scientific names, then common names, descriptions and locations. Appendix I lists most of the species surrounding the buildings and landmarks on the campus. Since Quercus agrifolia, the coast live oak, is the most common native tree growing in the Berkeley Hills with one or more visible from almost any point on campus, it is not listed under each of these sites. Appendix II indexes the common names and is followed by a glossary and selected references. The illustrations include a keyed diagram of the Berkeley campus, some plantings as the redwood grove and a photograph of Woodbridge Metcalf. "Woody", to whom this publication deservedly is dedicated, was a "friendly man, and ardent conservationist, and an outstanding teacher".

"CHINESE HERBS — Their Botany, Chemistry and Pharmacodynamics" by John D. Keys, 388 pp., illus., Charles E. Tuttle Company, Inc., Bunkyo-ku, Tokyo, & Rutland, Vermont 05701. 1976. \$15.00.

Just as surely as this is a 'work of abiding love', it is also a thorough study botanically, historically, culturally and pharmaceutically, requiring the past 20 years in preparation. As a lad, the author became intrigued with the many herb-shops in San Francisco's Chinatown. This continuing interest led to the study of Chinese, the translation of over 20 books (mostly pharmaceutical or culinary) into English, and the study of Japanese and French.

For over 250 Chinese character labeled and illustrated herbs are given the scientific name and family, common English name, botanical description, habitat, synonymy, pharmacodynamic investigations, Chinese therapeutic usage, dosage, incompatible drugs, and related plants used for the same purpose. Appendices include tables of (I) Supplementary Botanical Drugs, (II) Mineral Drugs, (III) Drugs of Animal Origin, (IV) Collection of Chinese Prescriptions, (V) Table of Toxic Herbs, and a glossary and list of references.

It is interesting to find that Laminaria japonica Aresch. was prescribed by ancient Chinese for goiter control. Eriocaulon sieboldianum is now usually reduced to the synonymy of the wide-ranging E. cinereum R. Br. or classified as a variety of it.

This is a fascinating fine study which should interest many different folks.

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# PHYTOLOGIA

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HISTORY and DISTRIBUTION of EURASIAN WATERMILFOIL  
in UNITED STATES and CANADA

Clyde F. Reed

Reed Library and Herbarium  
Baltimore, Maryland

Watermilfoils have frequently been problems in ponds, lakes and canals throughout North America in the past, but in the late 1950's and 1960's, they became serious ecological problems in much larger bodies of water, as in the Potomac River, Chesapeake Bay and TVA reservoir. From the early 1800's Myriophyllum spicatum L. had been listed as the species causing the problem. In 1919 Fernald separated all North American plant-specimens from the Eurasian specimens, calling them M. exalbescens Fern. Since 1919 most authors of floras, including Fernald, have used M. exalbescens for all American material, ignoring M. spicatum completely. However, both do exist in North America, typical M. spicatum being the species which caused the recent problem.

The purposes of this paper are to establish the fact that both Myriophyllum spicatum L. and M. exalbescens Fern. exist in United States and Canada, to review the literature for usage of M. spicatum L. in North America in the past, to account for the recent explosive growth of M. spicatum L. in Eastern United States in the 1950's and 1960's, and to cite the herbarium specimens collected from that time up to date (mainly in the Reed Herbarium), showing the extent of the spread of M. spicatum L. as an economically important and ecologically dangerous waterweed.

Taxonomic considerations

Eurasian watermilfoil (Myriophyllum spicatum L.) was described by Linnaeus (Sp. Pl. 2: 992. 1753), based on specimens from Europe, from quiet waters, as a perennial.

In North America, Asa Gray (1848, p. 140) listed M. spicatum L. from northern United States. Tatnall (1860, p. 98) suggested M. spicatum L. probably could be found in New Castle Co., Dela., without any definite record of specimens. Again, Gray (1867, 1880 and 1887) and Robinson & Fernald (1908, p. 604) give M. spicatum L. from northeastern United States, this time stating it as being introduced from Europe. Probably all these references should be considered the plant now called M. exalbescens Fern. However, some of these early specimens have turned out to be M. spicatum L.

Ward (1881, pp. 24, 80, 160) was the first to cite definite specimens (No. 303) of M. spicatum L. from the Potomac River (below Alexandria and opposite Ft. Foote), presumably from the Virginia side of the river. Ricker (1906, p. 84) also cited specimen No. 303 as M. spicatum L. from Potomac River. Hitchcock and Standley (1919) added Hunting Creek (Va.) for this species, noting "widely distributed in North America, Europe and Asia", thus placing typical M. spicatum with all other North American material, most of which was later to be placed in M. exalbescens.

Fernald (1919) clearly indicated that American plants differed in several aspects from Eurasian specimens, and named the American material M. exalbescens Fern., without indicating that some of the material could be typical M. spicatum L. Hulten (1947) regarded M. exalbescens as a subspecies, namely M. spicatum subsp. exalbescens (Fern.) Hult. Löve (1961) discussed the situation and found that both had  $2n=42$  (hexaploid) chromosomes, but suggested the two names be retained for the different populations. (Löve originally (1948) recorded from Icelandic specimens  $2n=$  ca. 36 for M. spicatum L.; later (1954) he corrected it to  $2n=$  28; and finally 'with better fixed material from Iceland' decided  $2n=42$ , which is the same number as M. exalbescens : Fern. from Lake Manitoba, Canada).

In giving the details of morphological differences between the two species, Löve says nothing about the plants of the Chesapeake Bay region, Potomac River or Tennessee Valley region. Plants from these areas do fit his description of M. spicatum L. and not for M. exalbescens Fern. This is important since Fernald (1950), Gleason (1952), Love (1961) and many others since then have assumed that all plants in North America, except some from Alaska and the Aleutian Islands, are M. exalbescens, noting 'M. spicatum of Amer. auth., not L.'.

Gleason (1952) added, 'perhaps better subordinated to the Eurasian M. spicatum as var. exalbescens (Fern.) Jeps. Patten (1950) noted 'there exists a possibility that M. exalbescens Fern. and M. spicatum var. capillaceum Lange are the same, since both of these description were based, in part only in the former instance, upon material from Greenland. This would invalidate Fernald's name in the varietal category through precedence'. Therefore, M. spicatum subsp. exalbescens (Fern.) Hult. has been suggested.

Reed (1970) was the first to treat both species as being in North America. The annotated list of specimens below indicates those plants definitely identified as M. spicatum L. in North America, most of which have been collected since the Eurasian Watermilfoil explosion in the Chesapeake Bay, Potomac River and Tennessee River Valley regions.

Myriophyllum spicatum L.

Perennial, aquatic-rooted herb, reproducing by seeds, but very commonly and most efficiently spreading by rhizomes, fragmented stems, and axillary buds that occur throughout the year; stems long and branching, often from a depth of 5 m., most frequently to 1.6 m.), often forming extensive mats at the surface of the water, brick-red or olive-green in dried specimens; leaves whorled in 3's or 4's, to 35 mm. long, the principal leaves of the primary stems with 14-21 pairs of rigid slenderly linear divisions; bracts rhombic-obovate to elongate, the bractlets nearly round or kidney-shaped, broader than long, 0.5-0.8 mm. long; spikes terminal, 2.5-10 cm. long, often standing above the water level, after pollination then resubmerging; flowers (after emergence) with the stigmas ripening well in advance of the stamens (favoring cross-pollination); petals deciduous before ripening of the stamens; anthers linear, 1.8-2.2 mm. long; floral bracts longer than the fruits; schizocarp 4-locular, with 4 seeds; mericarps spherical, 4-angled, 2.5-3 mm. in diameter. Late July - September.

In fresh and saline waters, on muck to hard-packed sand; most common and a nuisance, especially to sportsmen. Native of Eurasia and parts of Africa. In many distinct areas of Eastern and Central United States, as far west as Wisconsin and Texas; distinct area in west-central California.

Myriophyllum exalbescens Fern.

Perennial aquatic herb, reproducing by seeds, running rhizomes and fragments of the stems; stems simple or forking, purplish, when dry becoming white, up to 1 m. in length; leaves whorled, in 3's and 4's, 1.2-3 cm. long, with 6-11 (-14) pairs of capillary flaccid or slightly stiffish divisions, the primary leaves submersed, 1-5 cm. long, 1.4 cm. broad; spikes almost naked, terminal, with the flowers in whorls, the lower flowers pistillate, the upper staminate; bracts persistent, rarely equaling the fruit, spatulate-obovate or oblong-shell-shaped, 0.8-1.8 mm. long, the lower serrate, the upper entire; bracteoles ovate, entire, 0.7-1 mm. long; petals oblong-obovate, concave, 2.5 mm. long; anthers 1.2-1.8 mm. long; schizocarp nearly globose, very slenderly 4-sulcate, 2.3 mm. long; mericarp rounded on the back, smooth or roughened. July - September.

Lakes, ponds, pools, and quiet waters, often brackish or calcareous; especially troublesome around edges of lakes. Native, throughout the northern part of the United States, south to Delaware on the east coast and to the Mexican border on the west; south into northwestern Mexico and north into Canada, from Newfoundland and Labrador to Alaska; Greenland.



*Myriophyllum spicatum* L. Eurasian watermilfoil. 1 Habit— $\times 0.5$ ; B, Whorl of leaves— $\times 2$ ; C, part of flower spike, with pistillate flowers below and staminate flowers above— $\times 4$ ; D, immature fruits— $\times 4$ ; E, mature fruit— $\times 4$ .

Patten (1954) made a comprehensive study of the floral characters for several populations of the M. spicatum-complex from lakes in New Jersey, and suggested that, in addition to the variations already known in Eurasian representative specimens noted by Hegl (1926), there were considerable intergradings between North American specimens of M. spicatum and M. exalbescens. Leaves of both vary from soft to stiff, the leaflets from straight to curved, either slumping together, as a feather, or remaining separate when taken from the water; stems of both vary from light green to pinkish or reddish, those of M. spicatum tending to be brighter green, and only occasionally whitened.

#### Introduction, Ecology and Spread of M. spicatum

Many aquatic plants have been and are still grown as aquarium plants. Eurasian Watermilfoil (M. spicatum L.), Parrotfeather (M. aquaticum (Vell.) Verdc. -- syn. M. brasiliense Cambess. and M. proserpinacoides Hook. & Arn.) and Anacharis canadensis (Michx.) Rich. (Elodea canadensis Michx.), are a few of the more common species used in aquaria. Over the years people wishing to dispose of unwanted aquarium contents, have dumped fish, snails and plants into various water sources, as old quarries, reservoirs, ponds, lakes, streams and rivers. For example, before they were filled in and built over, the author collected all of these plants in the 1930's and 1940's from the limestone quarries near Cockeysville, Padonia and Texas, Baltimore County, Maryland. By the way, all these quarries drain into tributaries of the Big Gunpowder Falls which ultimately forms the Gunpowder River south of Joppatowne.

Barnes (1960) noted Eurasian Watermilfoil in the Chesapeake and Ohio Canal, near Cabin John and the Seven Locks area as early as 1945. Bertholdt (1958) wrote an article, stating "Your aquarium needs Myriophyllum -- plant of delicate beauty". Many aquarium magazines list Myriophyllum for sale. And, it is well-known that the vast growth in the TVA area in Tennessee was the result of plants introduced for the aquarium business.

The spotty distribution (see map) of authentic specimens of Eurasian Watermilfoil, in the past, would indicate independent introductions, probably from aquarium sources, from Canada to Florida, and occasionally westward.

The earliest published record for M. spicatum L. in the Potomac River is that of Lester Ward (1881), who wrote "Found in former years below Alexandria by Mr. Anton Zumbach. Probably still there" (p. 80). On p. 24, "Opposite Ft. Foote". Then in the Checklist following the Guide, on p. 116, "No. 303. Myriophyllum spicatum", a cited specimen. This reference would indicate the plant was in the Potomac River below Washington, D.C. previous to 1881.

Early Annotated Herbarium Specimens and Records  
(1881 - 1953)

1881. Below Alexandria, Virginia. Anton Zumbach; opposite Ft. Foote. (Potomac River). (Ward, 1881).
1902. In lake-like expanse of Sundrake's Creek, Gunpowder River (Chesapeake Bay). Sept. 6, 1902. Geo. H. Shull 327. (US).
1915. Hunting Creek, Virginia. (Potomac River). Sept. 4, 1915. W.L. McAtee 2340. (Patuxent Refuge Coll.).
1933. Creeks in Upper Potomac River. Francis M. Uhler. (U.S. Fish & Wildlife Service (Unpubl. data), cited by Springer, Beaven & Stotts (1961) and D. Haven (1962).
1937. Cecil Co., Maryland. (Chesapeake Bay, shore of Turkey Point, Susquehanna Flats). June 18, 1937. J.B. Egerton & C.F. Reed. (Reed).
1949. Montgomery Co., Maryland. C. & O. Canal. Well-established. Oct. 1, 1949. F.H. Sargent. (Cath. U. -- annotated by C.F. Reed in 1962). (M. aquaticum also well-established at this time and collected).
1951. Montgomery Co., Maryland. C. & O. Canal between Locks 10 and 12, abundant. Aug. 10, 1951. E.P. Killip 41366. (US).
1952. Charles Co., Maryland. In Potomac River, along shore, Chapel Point. Mar. 29, 1952. Reed 28087.

### Ecology

Most Myriophyllum species have definite affinities for alkaline situations, and under high calcareous conditions in ponds, lakes and quarries, they precipitate encrustations of marl on their surfaces of the stems and leaves giving a white appearance. This condition is found quite frequently on specimens of M. exalbescens throughout North America, as well as on many of the specimens of M. spicatum from lakes and ponds in both North America and Europe.

Patton (1956) noted that "M. spicatum (var. exalbescens) was instrumental in maintaining a high pH, and that the daily pH cycle was so closely related to the physiological activities of the plant that only a 3.8 unit fluctuation occurred, the minimal and maximal of pH corresponding directly to photosynthetic activities. During the period of highest pH and maximum photosynthesis bicarbonate alkalinity dropped concomitant with the appearance of several ppm. of carbonate, indicating photosynthetic utilization of half-bound carbon dioxide".



*Myriophyllum exalbescens* Fern. Northern watermilfoil. A, Habit— $\times 0.5$ ; B, whorl of leaves— $\times 1.5$ ; C, flower spike, with male and female flowers— $\times 5$ ; D, schizocarp— $\times 5$ ; E, mericarps— $\times 5$ ; F, bracts— $\times 5$ .

Although Eurasian Watermilfoil tolerates a broad range of ecological conditions, it is absent from acid waters. Maximum density of growth occurs in areas of fine organic ooze with a muck or sandy-muck base, diminishing to near total absence on pure sand. In grows in inland alkaline waters with a pH of about 8, and can tolerate tidal waters with salinity up to 16 ppt, or about 46 percent of sea salinity; plants can retain growing tips at 93 percent of sea salinity. Plants root best (experimentally) at salinity of 3.5 ppt. (10 percent of sea salinity), and will make good growth at 15 ppt. (43 percent of sea salinity).

Eurasian Watermilfoil is adaptable to rooting at varying depths of water to 3 m. (rarely to 5 m.), with its long branching stems reaching the surface of the water level, but never extending beyond the water level, as they do in M. aquaticum. Most plants are found attached in water 65-150 cm. in depth. Stems and leaves are usually dark to medium bright green in deep water, and both may become encrusted with algae and diatomaceous scum. In winter the upper portions of the stems break up and float about with the tides, each segment being capable to root and start a new colony. By May or June free floating rooted segments are common in the water. Being perennial, the lower portions of the plants remain green throughout the winter and send up new shoots in the spring and summer. In mild winters and in more southerly regions, floating stems can be seen year round (note dates on annotated specimens). Summer growth is very rapid, measured growth being 5-7 cm. per day. New Plants form readily by fragmentation and long stems may take root anywhere along their length. Special buds at the stem-tips are formed to produce new plants after the natural breakup of the beds in winter. Plants also produce seeds during the summer and early fall.

#### Explosive Growth and Distribution in Late 1950's

In 1962, in the Summary of the 1962 Interagency Research Meeting on Eurasian Watermilfoil, Reed 'pointed out that in Maryland all heavily infested waters receive their runoff from limestone areas. This also is true of the TVA and other areas where the plant is abundant. He felt that the presence of calcium ions may be an important factor in milfoil abundance. He also noted that the great reduction of coal-mining in Pennsylvania had removed quantities of acid waters from the Susquehanna and that contributions of calcium ions from that stream may have been sharply increased during recent years, thus favoring milfoil growth in the Upper Chesapeake".

When Eurasian Watermilfoil reached Chesapeake Bay and the Potomac River region, ideal conditions were present -- calcareous waters (Shenandoah River drains off the limestone areas of north-central Virginia into the Potomac, Hagerstown Limestone Valley and along the Potomac and areas of Loudoun County, Virginia; large areas of Pennsylvania and New York drain limestone waters into Susquehanna River, and then to Susquehanna Flats at the head of Chesapeake Bay; Gunpowder River drain the rich limestone areas of Cockeyville and Texas, Baltimore County, Maryland; Tennessee Valley drains large calcareous areas of Virginia, Kentucky and Tennessee) and calcareous beds (oyster beds along the Potomac River and various areas along Chesapeake Bay), deep organic ooze over the oyster beds, favorable pH ranges, warmer water temperatures of the lower Potomac River drainage and Chesapeake Bay, and the adaptability to the salinity of these regions. This combination of conditions led to the explosion in growth of M. spicatum in these regions in the 1950's and early 1960's.

Most of these conditions had been present to some degree in the Chesapeake Bay and lower Potomac River for many years, and M. spicatum in one or another of its forms had been known and collected there since 1881.

It is interesting to note here that rivers draining from non-calcareous areas into Chesapeake Bay (as Patapsco, Patuxent, Elk, Bohemia, Sassafras, Choptank and Wicomico (Wicomico Co.) Rivers) do not have M. spicatum, even though each is tidal for a portion of its distance. The acidity of these rivers, all draining over acid rock or sand, probably prevents survival of segments which may have been brought by tidal action.

After 1960, M. spicatum spread down Chesapeake Bay into Virginia as far as Princess Anne County (Virginia Beach) and North Carolina (Currituck Sound), being found in areas with both salinity and calcareous conditions similar to those further north.

In a survey of Susquehanna Flats in 1957 by Robert E. Stewart and Paul F. Springer, no plants of M. spicatum were reported; in 1958, only one; but in 1959, it was found at 47 percent of the hundred stations examined. Dense stands were seen along the west side of Chesapeake Bay, some a mile long and one-eighth mile wide.

Preceding the growth explosion of M. spicatum in Chesapeake Bay and the Potomac River, there had been a prolonged period of natural ecological events -- hurricanes and tropical storms -- pushing more saline water up both more frequently and to greater distances than normal tides would do, and then bringing downstream higher concentrations of calcium ions as the result of the floods. The hurricanes, by raising the pH and the salinity at

the same time, especially in the upper reaches of the tidal portions of Chesapeake Bay (as Susquehanna Flats, mouth of Gunpowder River and most of the estuaries of tidal rivers in the Upper Chesapeake Bay) and the Potomac River up to Washington, D.C., and by pushing warmer waters into these areas (since most of the hurricanes occurred from Juen to October), provided ideal conditions for *M. spicatum* to grow vigorously, and it did from about 1957. Additional incentives for milfoil to spread were the whipping action of the hurricanes, the higher tides than normal, thus keeping maximum growth of milfoil at maximum ecological conditions, and man's intervention to control or irradiate it with mowing and cutting devices.

Recently, the National Hurricane Center, Coral Gables, Florida, provided the author with a list of the hurricanes from 1945-1967 which directly affected the Chesapeake Bay-Potomac River areas. They are listed below. Also many tropical storms, not listed as hurricanes, occurred during this time. For example, the Guinness Book of World Records cites as a world record 1.23 inches of rainfall in 1 minute at Unionville, Maryland at 3:23 P.M. on July 4, 1956, the most intense recorded in modern times. This area drains into the Potomac River.

Year	Date	Year	Date
1945	Sept. 18-19	1954	Oct. 15
1949	Aug. 28-29	1955	Aug. 12-13
1952	Aug. 31-Sept.1	1955	Aug. 17-19
1953	Aug. 13-14	1960	Sept. 12
1954	Aug. 30-31	1967	Sept. 16

Hurricane Hazel (Oct. 1954), tropical storms Connie and Diane (Aug. 1955) and several flood-producing storms in 1956 probably set up ideal conditions on Susquehanna Flats and along the Potomac River for *M. spicatum* to thrive and spread rapidly throughout the area from 1957 to 1959.

Previous to this period of hurricanes and tropical storms there had been several such flood-producing conditions in the late 1920's, up to the last big flood in 1936 (Hill, 1977). In the 1970's the most devastating hurricane and tropical storm in this area were Hurricane Agnes (June 21, 1972) and Tropical Storm Eloise (1975). Agnes wound up in Chesapeake Bay, and the declining salinity played havoc with the commercial seafood crops. Some say that the bay has yet to return to pre-Agnes days. (Hill, 1977).

Springer & Stewart (1960) made a study of the relation of precipitation and chlorine content of surface water at Conowingo (above tidal effects) and Turkey Point (near Susquehanna Flats), and found that where the chlorine content was lower than 0.04-0.07 percent of sea salinity, growth of milfoil was more abundant, as at Carpenter Point, Perry Point and Fishing Battery.

Beaven (1960) indicated that at times temporary relief from the plant could be provided by cutting. Various modifications of power-driven sicklebars, rotary cutters, chain saws and sharp V-shaped drags were devised and used by local interests. However, since the sut-off portions continued to grow and take root, much like the normal after-winter fragmentation of plants, control by cutting tended to spread the plant to new areas.

Milfoil can be spread by entanglement on boat proleppors, anchors, nets and other gear moved from one body of water to another.

Following physical means to eradicate milfoil, chemical techniques were considered. In 1960 and 1961, Springer, Beaven and Stotts reported that formulations of three esters of 2,4-D, applied in dosages of 20 lbs. a.e. per acre, gave almost complete control of milfoil, especially at temperatures of 18°C during the period from mid-May through the first week of June, or until flowering was initiated.

Decline in growth of milfoil in the Upper Chesapeake Bay after 1962 was attributed to various pathogenic agents by Bayley et al. (1968 and 1970) and Bean et al. (1973).

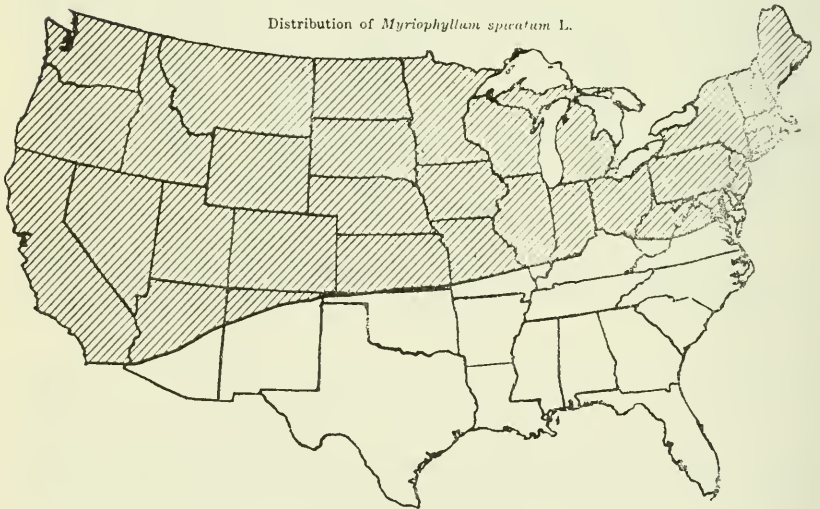
Since Agnes and Eloise, growth has been becoming gradually increasing. This spring in May and June, the author has been able to collect Eurasian Watermilfoil in all the old familiar places where it had been collected 15-20 years ago, and in some places it is rather frequent.

At present it seems that M. spicatum is at a static or low rate of growth, only awaiting the next cycle of ideal ecological conditions to start another explosive growth cycle. The plants are there, the conditions are not quite optimal.

Illustrations and maps from Selected Weeds of the United States, U.S.D.A., Agric. Handb. No. 366. 1970.



Distribution of *Myriophyllum spicatum* L.



Distribution of *Myriophyllum exalbescent* Fern.

## Annotated Herbarium Specimens

(1954-1977)

## MARYLAND

Hirzel (1962) stated 'more than 100,000 acres of water in Maryland have been affected by milfoil. The plant has infested the Susquehanna".

Anne Arundel Co. -- Holly Beach at Rt. 50, Chesapeake Bay Bridge.

June 15, 1970. Reed 88381 and 88383; shores of Little Magothy River at Cape St. Clair. June 15, 1970. Reed 88402. Covell (1961) stated "it has been found in the Magothy River, and in the Chesapeake Bay down to the Bay Bridge area".

Baltimore Co. -- Dundee Creek in very slightly brackish water.

Aug. 10, 1960. F.M.Uhler et al. (US, F & WL); just E of Battery Point on west side of Gunpowder River. Aug. 25, 1960. N. Hotchkiss & G.H.Townsend 7670 (F. & WL); Galloway Cove, in 7 ft. of water. Aug. 15, 1960. G.H.Townsend. (F. & WL); Bird River near White Marsh. June 26, 1961. Reed 51126; Bird River Beach along Bird River. July 22, 1961. Reed 51410; along shores of Brown's Cove, branch of Middle River near Rocky Point and Cedar Point. Mar. 10, 1962. Reed 54154; along shore, Back River at Rocky Point. Mar. 10, 1962. Reed 54153; in shallow water at Rocky Point Cove, Back River. Mar. 10, 1962. Reed 54152; along Dundee Creek near Chase. Apr. 19, 1962. Reed 55784; Rocky Point on shore of Back River. July 8, 1963. Reed 64235; shores of Middle River at end of Kingston Road. July 8, 1963. Reed 64237; along Middle River at Wilson Point. July 8, 1963. Reed 64212 and 64213; along shore of Chesapeake Bay at Brown's Cove, near Breezy Point Park. Nov. 1, 1968. Reed; Dundee Creek near Chase. Oct. 24, 1970. Reed 87242; Dundee Creek, E of Chase, frequent. May 2, 1977. Reed 100560. Covell (1961) reported "it has flourished in Dundee and Saltpeter Creeks and is rapidly invading Middle River and other upper bay tributaries".

Calvert Co. -- Shore of Chesapeake Bay at Scientists Cliffs. Mar. 4, 1967. Reed 74496.Cecil Co. -- Shores of Chesapeake Bay on Elk Neck at Hance Point.

Aug. 23, 1962. Reed 58255; along beach at Charlestown. Nov. 23, 1962. Reed 59607; along shore of Elk River, Lewis Shore. May 25, 1963. Reed 62098; along Bohemia River at Rt. 213. May 25, 1963. Reed 62088; mouth of Northeast River at Charlestown, Susquehanna Flats. July 8, 1963. Reed 64335 and 64337; along Elk River off Elk Forest Road. May 25, 1963. Reed 62089; along Susquehanna River at Aiken, N of Perryville. July 8, 1963. Reed

64315; marsh along Bohemia River at Rt. 213 near Hanks Point. Aug. 28, 1968. Reed 95406; shores, Susquehanna Flats, Charlestown. June 15, 1968. Reed 77053; shallow water along shore, White Crystal, mouth of Elk River. Aug. 28, 1968. Reed 79603; White Crystal Beach, 6 mi W of Cecilton. June 18, 1977. Reed 100547; shore of Chesapeake Bay, Susquehanna Flats, Charlestown. June 18, 1977. Reed 100549; frequent along shore of Susquehanna River, head of Chesapeake Bay, Perryville. June 18, 1977. Reed 100550.

Charles Co. -- Covell (1961) reported " it forms dense beds in Nanjemoy, Picowaxen and St. Patrick's Creeks, and in Port Tobacco and Wicomico Rivers, and in Neale and St. Catherine Sounds". In Potomac River along shore, Chapel Point. Mar. 29, 1952. Reed 28087; West Hatton Point, Wicomico River. Oct. 22, 1957. R.E. Stewart. (F. & WL); in Mattawoman Creek near Mason Springs Swamp at Rts. 224-225. Oct. 27, 1963. Reed 64915; same area. May 18, 1969. F.M.Uhler. (Reed); exposed at low tide, Port Tobacco River, cove at Brentland Wharf. May 30, 1969. F.M.Uhler (Reed).

Harford Co. -- Abington Beach on Bush River. July 8, 1963. Reed 64314; Otter Point on Bush River. July 8, 1963. Reed 64304; shore of Chesapeake Bay, S of Harve de Grace. Dec. 11, 1965. Reed 72271; Otter Point on Bush River. May 2, 1977. Reed 100561; Spesutia Creek, attached to bottom, at Rt. US 40. May 14, 1977. Reed 100532; shore of Chesapeake Bay, Harve de Grave. June 18, 1977. Reed 100550. Springer & Stewart (1959-1961) made an extensive study of Susquehanna Flats off Harve de Grace to Spesutia Island.

Kent Co. -- Turner Creek off Sassafras River near Kennedyville. Aug. 2, 1965. J.Stennis & Ted Stiles (Reed); frequent along shore of Chesapeake Bay, mainly rooted fragments, Betterton. June 18, 1977. Reed 100546.

Montgomery Co. -- Abundant in C. & O. Canal, 1 mi W of Cabin John. Nov. 2, 1957. N. Hotchkiss 7594. (F. & WL.).

Queen Anne's Co. -- Flats in Northern Maryland, Maryland's Eastern Shore as far south as Kent Island near the Chesapeake Bay Bridge, and much of the western shore of Maryland from the Upper Bay to the Potomac River.

St. Marys Co. -- Piney Point. 1959. Reported by Springer & Stewart (1960).

## VIRGINIA

Dexter Haven (1962) found M. spicatum in nearly every tributary of the Virginia shore of the Potomac River, being most abundant in Hack, Lower Machodoc, Nomini, Popes, Mattox and Rossier's Creeks.

Westmoreland Co. -- In 5-6 ft. of water, Cabin Point Cove, Lower Machodoc Creek. May 23, 1960. John Steenis, J. Callagher & Jerry Townsend. (US); same locality. June 5, 1959. Dexter Haven; shore of Potomac River at Colonial Beach. Jan. 27, 1963. Reed 60176; same locality. April 18, 1970. Reed 85653;

Princess Anne Co. -- (Virginia Beach). In marsh and ditches. Middle Creek Road, N of Back Bay. June 28, 1970. Reed 94127, 94142, 94134; sandy waste, Back Bay Wildlife Refuge. June 30, 1970. Reed 94146.

## NORTH CAROLINA

Currituck Co. -- Edge of water, sound, Rt. 34 at Currituck. Aug. 7, 1968. Reed 77484; Currituck Sound. Sept. 21, 1974. James A. Duke 17310 (Reed). John Steenis (1962) reported it in Pea Island Refuge on the outer banks.

Annotated Specimens of M. spicatum

## Other localities of interest

California: Mountain Lake, San Francisco Co. June 1891. Michener & Bioletti. (Cath. U., Langlois).

Vermont: Franklin Co. Lake Champlain at St. Albans Bay, common here. July 9, 1965. Wm. D. Countryman 1281. (F. & WL.).

Massachusetts: Fresh Pond, Cambridge. Aug. 11, 1879. Ex Herb. Thomas Morong. (Cath. U., Langlois).

Minnesota: Lake Collegeville. June 22, 1909. Jas. Hansen 281. (Cath. U., Langlois).

New Jersey: Hunterdon-Somerset Co., in flowing water a long Three Bridges Creek near Woodfern. July 12, 1962. Reed 57716 and 57723.

Pennsylvania: Common in shallow water along south shore of Lehigh River, opposite the foot of Jeter Island, Allentown. June 27, 1963. N. Hotchkiss 7857. (US, F. & WL.).

- New York: Paddy's Lake near Oswego. Sept. 1882. J. Herman Wibbe. (Cath. U., Langlois).
- Monroe Co.: Riley's Pond, Cobb Hill Park, Rochester. July 11, 1960. Ronald A. Ulrich. (F. & WL.).
- Seneca Co.: Seneca River at Waterloo. July 25, 1960. Ronald A. Ulrich. (F. & WL.); north end of Seneca Lake, Rt. 5. Aug. 18, 1962. Reed 58277.
- Jefferson Co.: Westcott Beach, Lake Ontario, Thousand Island State Park. July 17, 1963. Reed 65823.
- Cayuga Co.: Along bay of Lake Ontario, Fairhaven. July 16, 1963. Reed 65809.
- Schuyler Co.: Along canal between Weneta and Lamoka Lakes, near Weston. Sept. 7, 1963. Reed 64019; Waneta Lake, S of Wayne. Sept. 7, 1963. Reed 64002 and 64006.
- Wayne Co.: Occasional small plants, flowering on muck among scattered other plants, Sawmill Cove, SW side of Sodus Bay, Lake Ontario. Sept. 12, 1960. N. Hotchkiss 7684. (F. & WL.); abundant on east side of Sidus Bay, just N of US Rt. 104 bridge, Lake Ontario. Sept. 12, 1960. N. Hotchkiss 7675 (F. & WL.); in Lake Bluff on Lake Ontario. July 16, 1963. Reed 65801 and 65803; swamp, Bay Bridge, Rt. 104, W of Alton. July 16, 1963. Reed 65819.
- Ohio: Trumbull Co., in pond along N side of Ohio Turnpike, 1.5 mile SW of Lordstown. Sept. 4, 1962. P.F. Springer. (US, F. & WL.); Ottawa-Sandusky Co. line, abundant in gray silt in dike burrow pit on N side of Muddy Creek, SW of Port Clinton. Aug. 4, 1965. F.M. Uhler. (F. & WL.).
- Tennessee: Rhea Co., Watts Bar Reservoir, Spring City. Nov. 1960. J.L. Frizzell. (US, F. & WL.).
- Louisiana: Pointe Coupee Parish, False River near New Roads. July 1966. John W. Thieret. (F. & WL.).
- Texas: Hays Co., occasional with dense other underwater vegetation in Aquarena Pond, San Marcos Spring, San Marcos. June 6, 1966. F.M. Uhler & N. Hotchkiss 8194. (F. & WL.); Burnet Co., common in hard-bottomed cove on E side of Inks Lake, Inks Lake State Park. June 8, 1966. Uhler & Hotchkiss 8204. (F. & WL.); Colorado-Fayette Co. line, filling a half-acre farm pond along Rt. 71, 12 mi. NW of Columbus. June 10, 1966. Uhler & Hotchkiss 8208. (F. & WL.).

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NOTES ON NEW AND NOTEWORTHY PLANTS. CII

Harold N. Moldenke

ALOYSIA SCORODONIOIDES var. HYPOLEUCA (Briq.) Moldenke, comb. nov.

Lippia scorodonioides var. hypoleuca Briq., Bull. Herb. Boiss. 4: 338. 1896.

ALOYSIA SCORODONIOIDES var. LOPEZ-PALACII Moldenke, var. nov.

Hæc varietas a forma typica speciei laminis foliorum subtus dense puberulentibus vel brevissime pubescentibus et configura anguste ellipticis acutis parvis recedit.

This variety differs from the typical form of the species in leaves being very much smaller, the blades narrowly elliptic, acute at both ends, only 2—2.5 cm. long and less than 1 cm. wide, merely densely puberulent or only very shortly pubescent beneath.

The type of the variety was collected by Santiago López-Palacios (no. 4249) -- in whose honor it is named -- in cultivation in Quito, Pichincha, Ecuador, at 2800 meters altitude, on February 4, 1977, and is deposited in my personal herbarium. The collector describes the plant as a small tree, 3—5 m. tall, cultivated from Ibarra to Tungurahua, with fragrant white flowers. He notes that Acosta Solis (Recur. 2 (1): 76) refers to this plant as Lippia ligustrina, with the vernacular name "verbena persa", while Dr. Francisco Latorre has collected it as Aloysia virgata. It bears no great resemblance to either of these taxa, but its leaves, except in their pubescence, are almost identical to those of var. parvifolia Moldenke.

ALOYSIA SCORODONIOIDES var. PARVIFOLIA Moldenke, var. nov.

Hæc varietas a forma typica speciei foliis multoties parvioribus, laminis adultis anguste ellipticis plerumque 1—2.5 cm. longis 5—14 mm. latis acutis subtus densissime tomentellis recedit.

This variety differs from the typical form of the species chiefly in its very much smaller leaves, the blades of which when adult are only 1—2.5 cm. long and 5—14 mm. wide, acute at both ends. They differ from those of the previous variety in being densely pubescent or tomentellous on the lower surface.

The type of the variety was collected by Henry Hurd Rusby (no. 920) near La Paz, La Paz, Bolivia, at 10,000 feet altitude, in October of 1885, and is deposited in the Princeton University herbarium now on deposit at the New York Botanical Garden.

GLOSSOCARYA SCANDENS var. PUBESCENS Moldenke, var. nov.

Hæc varietas a forma typica speciei laminis foliorum subtus dense pubescentibus differt.

This variety differs from the typical form of the species in having the lower surface of the leaf-blades densely pubescent.

The type of the variety was collected by A. H. M. Jayasuriya (no. 2038) in the jungle beside a rock outcrop south of Komari bridge, north of Pottuvil, Amaparai District, Sri Lanka, at low altitude, on May 4, 1975, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collector describes the plant as a very scandent shrub, the branches reaching to 6 meters in length, and the corollas pure white.

PREMNA OBTUSIFOLIA f. SERRATIFOLIA (L.) Moldenke, stat. nov.

Premna serratifolia L., Mant. 253. 1771.

STACHYTARPHETA ANGUSTIFOLIA var. BRITTONIAE Moldenke, var. nov.

Haec varietas a forma typica speciei foliis anguste linearibus valde differt.

This distinct variety differs from the typical form of the species in its leaves being uniformly narrow-linear.

The type of the variety was collected by Nathaniel Lord Britton, Elizabeth Gertrude Britton, and Percy Wilson (no. 15709) in pine-lands on the Isle of Pines, Cuba, between March 19 and 21, 1916, and is deposited in the Britton Herbarium at the New York Botanical Garden. It is dedicated to the two Brittons who, separately and together, contributed so very much to the advancement of systematic botany in the New World.

ADDITIONAL NOTES ON THE GENUS AVICENNIA. XI

Harold N. Moldenke

AVICENNIA L.

Additional bibliography: Engl., Syllab. Pflanzenfam., ed. 2, 189 (1898), ed. 3, 188 (1903), ed. 5, 193 (1907), and ed. 6, 198. 1909; Gilg in Engl., Syllab. Pflanzenfam., ed. 7, 314 & 315. 1912; R. T. Baker, Journ. Proceed. Roy. Soc. N. S. Wales 49: 257—281. 1916; Gilg. in Engl., Syllab. Pflanzenfam., ed. 8, 319. 1919; Fedde & Schust. in Just, Bot. Jahresber. 44: 253. 1922; Gilg in Engl., Syllab. Pflanzenfam., ed. 9 & 10, 340. 1924; Kräusel in Just, Bot. Jahresber. 44: 759—760. 1924; Fedde in Just, Bot. Jahresber. 44: 1377. 1927; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 339. 1936; M. F. Baker, Fla. Wild Fls., ed. 2, imp. 1, 190. 1938; Lugo & Snedaker in R. F. Johnston, Ann. Rev. Ecol. Syst. 5: 40, 43, 45, 50, & 54. 1974; Gaussen, Legris, Meher-Homji, Fontale, Pascal, Chandrahassan, Delacourt, & Troy, Trav. Sect. Scient. Techn. Inst. Franç. Pond. Hors Ser. 14: 37 & 82. 1975; Von Erffa & Geister, Mitt. Inst. Colombo-Aleman. Invest. Cient. Punta de Betin 8: 176—179, pl. 7. 1976; Anon., Biol. Abstr. 63: 6131. 1977; Moldenke, Phytologia 36: 408—412. 1977.

AVICENNIA GERMINANS (L.) L.

Additional bibliography: Lugo & Snedaker in R. F. Johnston, Ann. Rev. Ecol. Syst. 5: 40 & 45. 1974; Von Erffa & Geister, Mitt. Inst. Colombo-Aleman. Invest. Cient. Punta de Betin 8: 176—179, pl. 7. 1976; Anon., Biol. Abstr. 63: 6131. 1977; Moldenke, Phytologia 36: 410—412. 1977.

Additional illustrations: Von Erffa & Geister, Mitt. Inst. Colombo-Aleman. Invest. Cient. Punta de Betin 8: 178, pl. 7. 1976.

Von Erffa & Geister (1976) refer to remains of this species having been found in the Holocene formations in Florida and in Mexico. However, the remains found by them in Colombia are more likely those of Rhizophora mangle.

The corollas on Dwyer & Pippin 10030 are said to have been "white", taken from trees only "to 4 ft." tall, the leaves rather more elongate than usual, on Correll 47404 they were "cream-color", and on Correll & Correll 42342 "creamy-white".

Lakela and her associates (1976) assert that A. germinans in Florida inhabits coastal lagoons in the mangrove belt, flowering all year there. Laurence & Mohammed (1876) refer to the species as a "prolific nectar yielder.....whose honey shows the two locally uncommon features of clarity and a tendency to crystallize" in Trinidad & Tobago.

The Pohl & Davidse 10588a, distributed as A. germinans, actually is A. bicolor Standl., H. M. Curran 140 is A. germinans var. cumanensis (H.B.K.) Moldenke, Budowski 98A-18, Curran 2032 &

2032-19, Fournier 81, Holm-Nielsen, Jeppesen, Løjtnant, & Øllgaard 7261, D. H. Knight 1032, Kennedy 2281, Kuntze s.n. [Trinidad, IV. 74], Romero-Castafeda 7275, and Simpson & Schunke V. 601 are A. germinans var. guayaquilensis (H.B.K.) Moldenke, Britton & Britton 2595, Britton, Hazen, & Mendelson 541, Hahn 759, R. C. Marshall s. n. [Herb. Trin. Bot. Gard. 12651], Nadeaud s.n. [Marais salé de Victhersby, XI.1862], and Othmer s.n. are A. schaueriana Stapf & Leechman, Killip & Cuatrecasas 38660 is A. tonduzii Moldenke, L. M. Andrews 911 is Licania michauxii Prance, and Norris & Taranto 13327 is Laguncularia racemosa Gaertn.

Avicennia officinalis ♂ lanceolata Kuntze and A. officinalis var. lanceolata Kuntze, previously included by me in the synonymy of typical A. germinans, definitely belongs to that of var. guayaquilensis instead.

Additional citations: FLORIDA: Hillsborough Co.: Lakela 24616 (Ld, Ld). Monroe Co.: Perdue & Blum 4471a (Ld). Sanibel Island: Brumbach 7904 (N). TEXAS: Cameron Co.: Webster & Wilbur 3035 (Ml). Brazos Santiago Island: R. Runyon 2812 (Au—268808). Clark Island: Lundell & Lundell 8760 (Ld). MEXICO: Sinaloa: Hernandez X. 676 (Ld). Veracruz: Ventura A. 5226 (Ld). Yucatán: Lundell & Lundell 8140 (Ld). BELIZE: Dwyer & Pippin 10030 (Ac). BAHAMA ISLANDS: Great Exuma: Correll & Correll 42342 (N). Inagua: D. S. Correll 47404 (N). Long: S. R. Hill 2139 (N). CAYMAN ISLANDS: Grand Cayman: Sachet 459 (W—2774762); Stoddart 7013 (W—2773944). HISPANIOLA: Haiti: Ekman 8054 (Ld). PUERTO RICO: Stimson 3036 (Ld). COLOMBIA: Goajira: Romero-Castafeda 4496 (Ac). VENEZUELA: Zulia: Budowski 25 (Ac); H. M. Curran 254 (N).

AVICENNIA GERMINANS var. CUMANENSIS (H.B.K.) Moldenke

Additional bibliography: Moldenke, Phytologia 33: 255, 261, 262, 265—267, & 269 (1976) and 34: 256. 1976.

AVICENNIA GERMINANS var. GUAYAQUILENSIS (H.B.K.) Moldenke

Additional synonymy: Avicennia officinalis ♂ lanceolata Kuntze, Rev. Gen. Pl. 2: 502. 1891. Avicennia officinalis var. lanceolata Kuntze ex Moldenke, Prelim. Alph. List Invalid Names 6, in syn. 1940.

Additional bibliography: Moldenke, Phytologia 34: 74, 75, 202, 203, 255, 256, & 271 (1976) and 36: 31, 34, 41, & 410—412. 1977.

Recent collectors describe this plant as sometimes a bush or shrub, flowering when only 0.5 m. tall, and at other times a low or even tall tree, 2—25 m. tall, symmetrical in outline, with a trunk diameter of 30 cm., the bark "nondescript gray-brown" or gray, the leaves dark-green or very dark-green above, light-green beneath, coriaceous, shiny above, dull beneath, the flowers faintly fragrant, irregular, the calyx green, the corolla very weakly zygomorphic, with 4 lobes, the fruit green or light yellow-

green, and the "seeds germinating in fruit".

They have found it growing in shallow water, at the margins of salt ponds, in saltwater estuaries, close to tideline, in small ponds back of beaches, in the mud at the head of lagoons, "in open areas where sand is only slightly above tideline and where subsand is moist", on mud banks, and in wet alluvial clay immediately above the high-tide zone, from sealevel to 2 m. altitude.

The corollas are said to have been "white" on Asplund 16588, Haught 4855, and Von Hagen 8, "pale-lemon" on Kramer & Hekking 2092, "light-cream, the throat rich yellow-gold" on Simpson & Schunke V. 601, "creamish-white" on Lasseigne 4409, and "yellowish-white" on Holm-Nielsen & al. 7261.

Additional vernacular names reported for this plant are "black mangrove", "jelly", "mangle negro", "negrita", and "parwa". Stewart reports it "common on beaches and around salt lakes" on Charles Island; Haught reports it "very abundant in sandy soil near sea" in Antioquia; Pittier found it "common in mangrove formation" in Miranda. On Indefatigable Island Taylor says "This is the less frequent of the mangroves which are almost all Rhizophora; this forms tall trees, 40—50 feet tall, which show up above the shrub vegetation of the adjacent dry belt -- the only other trees of any size are Opuntia and a few Piscidia and Erythrina." Kramer & Hekking found it "very common in saline silt forming extensive woods" in Surinam.

The Smith & Smith 546 collection, from St. Vincent island, is most interesting because of its geographic location. The collectors assert that the tree was "locally common on the windward side [of the island], rare on leeward side, near the coast in forest or secondgrowth".

Some leaves of Sachet 459, from the Cayman Islands, closely resemble those of typical A. germinans. The Breteler collections are especially interesting -- no. 4673 has typical quayaquilensis leaves; on 5178 they are blunt but narrow; on 5174 they are very long-pointed and very much like those of A. africana B. Beauv; those of 4677 are broad and very much like those of A. elliptica var. martii. Probably these collections were made deliberately because of the obvious differences in foliage characters. They are cited here tentatively. On Asplund 16588, Fournier 31, D. H. Knight 1032, Romero-Castafeda 7275, and some sheets of H. H. Smith 1937 they are much like those of typical A. germinans and probably should be so cited. The Drouet 2442 and Lanjouw & Lindeman 301 collections were previously cited by me as A. elliptica var. martii, but I now feel that they are better regarded as one of the many forms of A. germinans var. guayaquilensis; the same holds true for Ducke 9818.

Additional citations: WINDWARD ISLANDS: St. Vincent: Smith & Smith 546 (B, C). PEARL ISLANDS: San José: H. Kennedy 2281 (N). TRINIDAD AND TOBAGO: Trinidad: Kuntze s.n. [Trinidad, IV.74] (N).

COLOMBIA: Antioquia: Haught 4855 (N). Magdalena: Romero-Castafeda 7275 (Ac). VENEZUELA: Delta Amacuro: Budowski 98A-18 (Gz, N); H. M. Curran 2032 (N), 2032-19 (Kh, N). State undetermined: Robertson & Austin 213 [Alcaballo] (Ld). GUYANA: Irwin 542 (Au--178000). SURINAM: Kramer & Hekking 2092 (Ld); Lanjouw & Lindeman 301 (N, Ut--17661b); Lasseigne 4409 (N). ECUADOR: Guayas: Asplund 18188 (Ld, N, W--2652442); Fagerlind & Wibom 114 (Ld); Holm-Nielsen, Jeppesen, Løjtnant, & Øllgaard 7261 (N). Manabi: Asplund 16588 (Ld, N, S, W--2652442). GALAPAGOS ISLANDS: Charles: A. Stewart 3267 (N); Wiggins & Duncan 517 (Ld). Indefatigable: Chapin 1120 (N); Fournier 81 (Ac); D. H. Knight 1032 (Ac); T. W. J. Taylor T.T.91 (Gg--461253, N). James: Wiggins & Porter 287 (Ld). Narborough: F. R. Fosberg 44703 (Ld); Wiggins & Porter 201 (Ld). Santa Cruz: Von Hagen 8 (N, N, N), 809 (N); Wiggins 18310 (Ld). PERU: Tumbes: Simpson & Schunke Vigo 601 (N, W--2799283). BRAZIL: Bahia: Belém & Pinheiro 3039 (Ld). Ceará: Drouet 2442 (E--1110546, F--857471, F--949342, I, N, N, S, Sp--37514, W--1594848). Pará: Ducke 9818 [Herb. Mus. Rio Jan. 5407] (N).

#### AVICENNIA LANATA Ridl.

Additional bibliography: Hocking, Excerpt. Bot. A.28: 260. 1976; Moldenke, Phytologia 34: 75, 179, 201, 202, & 271. 1976.

#### AVICENNIA MARINA (Forsk.) Vierh.

Additional synonymy: Avicennia marina (Forsk.) Vierh. ex Bultman & Southwell, Biotropica 8 (2): 76, sphalm. 1976.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 46. 1858; Crozet, Voy. Tasmania [transl. Ling Roth] 5: 36. 1891; Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 746. 1934; Gausson, Viart, Legris, & Labroue, Trav. Sect. Scient. Techn. Inst. Franç. Pond. Hors Ser. 5: 25. 1965; Lamberti, Univ. São Paulo Fac. Filos. Bol. 317 [Bot. 23]: 120, 155, 159, & 160. 1969; Chai, Malays. Forest. 38: 188, 205, & 207. 1975; Bultman & Southwell, Biotropica 8 (2): 76 & 92. 1976; Moldenke, Phytologia 34: 70--72, 75--94, 167--170, 172--174, 176, 177, 179, 180, 185--189, 193--195, 197--203, 261--263, 265, 266, 268, & 271 (1976) and 36: 39, 410, & 411. 1977.

Recent collectors in Thailand refer to this plant as a tree, 7 m. tall, or a small shrub-like tree, 2--5 m. tall, the trunk gray, 30 cm. in diameter at breast height, the branches gray, the leaves green above, gray- or grayish-green beneath, the pneumatophores to 15 cm. tall, the calyxes green, and the fruit light-green. The corollas on Maxwell 75-917 are said to have been "orange" in color when fresh, on Sumithraarachchi DBS.696 "yellow", and on Van der Kevie 2 "yellow to orange". Maxwell refers to the plant as growing in the "muddy mangrove zone along rivers" and Van der Kevie reports it "very common on moderately firm soils of seashore".

Chai (1975) has studied this mangrove intensively in Malaysia and describes it as a "Shrublet (2 ft. tall) to medium-sized tree to

60 ft. tall. No buttresses, but slender, soft stilt roots may develop. Bark reddish-brown, flaking off in irregular, thin papery flakes revealing green new bark surface. Leaves more or less elliptic with blunt apices, lower surface glaucous, excreting salt. Fruit glaucous-green, more or less heart-shaped, slightly flattened. A pioneer species on new mud with a high proportion of sand but does not seem to colonise pure mud. At the mouth of the Bako river, it is slowly being replaced by *A. alba*. Found also along sandy shores where it is seen to be in poor form and never gregarious. Absent inland." In his key he distinguishes it from *A. alba* and *A. officinalis* as follows: "Small shrub (3 ft. tall) to big tree to 60 ft. tall; old bark grey pink or pinkish brown, coming off in patches of irregular thin flakes revealing green new bark; leaves elliptic, slightly whitish below; sandy soil". He calls it "api-api merah".

Collectors in Tanzania describe the species there as a branched tree, 9 meters tall, growing on the intertidal seashores at sea-level, the leaves about 12 cm. long and 7 cm. wide, the flowers axillary, the corollas yellow or orange-yellow, the petals 4 (or 5), and the stamens 4. They found it in flower there in December.

The Budowski 118-18, distributed as *A. marina*, seems to be *A. schaueriana* Stapf & Leechman rather than *A. germinans* (L.) L. as previously reported in this series of notes.

Additional citations: TANZANIA: Tanganyika: McCusker 221 (W-2727153); Mwasumbi LBM.10438 (W-2727154). SRI LANKA: Bernardi 15299 (Mu); Davidse 7561 (Ld); Faden s.n. [Jayasuriya 2413] (Ld); Sumithraarachchi DBS.696 (N, W-2804782). THAILAND: Larsen & Larsen 33784 (Ld); Maxwell 75-917 (Ac); Van der Kevie 2 (Ac).

*AVICENNIA MARINA* var. *ACUTISSIMA* Stapf & Moldenke

Additional bibliography: Moldenke, *Phytologia* 34: 167-169, 185, 194, 195, 201, & 262. 1976.

*AVICENNIA MARINA* var. *RESINIFERA* (Forst. f.) Bakh.

Additional bibliography: A. DC., *Prodr.* 11: 716. 1847; Buek, *Gen. Spec. Syn. Candoll.* 3: 46. 1858; Crozet, *Voy. Tasmania* [transl. Ling Roth] 5: 36. 1891; R. T. Baker, *Journ. Proceed. Roy. Soc. N. S. Wales* 49: 257-281. 1916; Kräusel in Just, *Bot. Jahresber.* 44: 759-760. 1924; Cambie, *Journ. Roy. Soc. N. Zeal.* 6 (3): 333. 1976; Moldenke, *Phytologia* 34: 169-180, 185, 195, 199-203, & 271 (1976) and 36: 39. 1977.

Dickson encountered this plant in salt marshes. Cambie (1976), quoting an unpublished thesis by Cheeseman (1964) in the University of Auckland library, reports the bark of this plant as containing "taraxerol, taraxerone, tripterene hydrocarbons, taraxanthin, ferulic acid, caffeic acid, p-coumaric acid, [and] triacontane".

Additional citations: AUSTRALIA: Queensland: M. S. Clemens 42536a (M1). NEW ZEALAND: Pollen Island: Dickson s.n. [10.3.71] (Ac).

*AVICENNIA MARINA* var. *RUMPHIANA* (H. Hallier) Bakh.

Additional bibliography: Moldenke, *Phytologia* 34: 170, 172, 178--180, 185, 200, 203, 266, & 271. 1976.

*AVICENNIA OFFICINALIS* L.

Additional bibliography: Sweet, *Hort. Brit.*, ed. 2, 419. 1830; Loud., *Hort. Brit.*, ed. 2, 554. 1832; Sweet, *Hort. Brit.*, ed. 3, 554. 1839; Buek, *Gen. Spec. Syn. Candoll.* 3: 46. 1858; R. T. Baker, *Journ. Proceed. Roy. Soc. N. S. Wales* 49: 257--281. 1916; Kräusel in *Just, Bot. Jahresber.* 44: 759--760. 1924; Fedde in *Just, Bot. Jahresber.* 44: 1377. 1927; Chai, *Malays. Forest.* 38: 188, 205, & 207. 1975; Moldenke, *Phytologia* 34: 167--172, 177, 179--203, 262, 267, 269, & 271 (1976) and 36: 410. 1977.

Don (1830), Sweet (1830), and Loudon (1832) all list what is probably this species (as "*A. tomentosa*") as cultivated in British gardens in their day [in greenhouses?], introduced from India in 1793. They call it the "downy-leaved *avicennia*".

Chai (1975) has studied this species intensively in Malaysia and describe it there as a "Small to medium-sized tree to 55 ft. tall. No buttresses but slender stilt roots may be present. Bark surface brownish-grey to chocolate-brown, lenticellate, may be narrowly cracked. Leaves spatulate or spoon-shaped, lower surfaces very light brown; salt excretion from upper surface. Fruits more or less heart-shaped, slightly flattened, beaked, covered in soft, brown tomentum. Commonly inland but not gregarious, along river or creek banks on stiff heavy soils, absent or very rare on the sea face. Associated with low and light crowned species like *Nypa* and young *Rhizophora* and *Bruguiera*." In his key he distinguishes it from *A. alba* and *A. marina* as follows: "Small tree to 55 ft. tall; bark grey to chocolate-brown, often lenticellate, leaves spatulate or oblong obovate, not whitish below; inland or on firm clay river banks." He calls it the "api-api sudu". Of particular interest is his observation that salt is excreted from the upper leaf-surface of this species, but from the lower surface in *A. marina*.

In Sri Lanka collectors describe *A. officinalis* as a shrub or small tree, 3--7 meters tall, with scaly bark, the corollas yellow or orange, and the petals and exerted stamens 4 in number. They have found it growing at the borders of or in mangrove forests.

The Fournier 81, distributed as *A. officinalis* and so filed in some herbaria, actually is *A. germinans* var. *guayaquilensis* (H.B.K.) Moldenke, while Sumithraarachchi DBS.696 is *A. marina* (Forsk.) Vierh.

Additional citations: SRI LANKA: Jayasuriya 1356 (W--2802165); Tirvengadam & Waas 465 (W--2768090). MALAYA: Singapore: McCusker 308 (Ld).

*AVICENNIA SCHAUERIANA* Stapf & Leechman

Additional synonymy: *Avicennia tomentosa* Schar ex Wangerin in *Just, Bot. Jahresber.* 50 (1): 44. 1929 [not *A. tomentosa* Blanco,

1845, nor Blume, 1918, nor R. Br., 1851, nor Jack, 1945, nor Jacq., 1760, nor L., 1821, nor L. & Jacq., 1783, nor Lam., 1918, nor G. F. W. Mey., 1818, nor Millsp., 1930, nor Nutt., 1947, nor Nutt. & Br., 1832, nor Roxb., 1835, nor Sieber, 1844, nor Sw., 1864, nor Vahl, 1921, nor Wall., 1851, nor Weigelt, 1851, nor Willd., 1800]. Avicennia schauerana "Stapf et Leechman ex Moldenke" apud Townsend, Excerpt. Bot. A.4: 242 & 243. 1962. Avicennia schaueriana "Stapf & Leechman ex Moldenke" apud Angely, Fl. Anal. Paran., ed. 1, 581. 1965. Avicennia schaueriana Lambertii, Univ. São Paulo Fac. Filos. Bol. 317 [Bot. 23]: 40, sphalm. 1969. Avicennia tomentosa sensu Marc. ex Moldenke, Fifth Summ. 1: 394, in syn. 1971. Avicennia schaueriana "Stapf et Leechmann ex Moldenke" apud Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 4: 841. 1971. Avicennia tomentosa Duarte ex Moldenke, Phytologia 28: 453, in syn. 1974. Avicennia schaueriana f. glabrescens Moldenke, Phytologia 34: 485, 1976. Avicennia schaueriana Stapf & Lehm. ex Moldenke, Phytologia 36: 41, in syn. 1977.

Additional & emended bibliography: Schenck, Flora 72 [ser. 2, 44]: [83]—[89]. 1889; H. Hallier, Meded. Rijks Herb. Leid. 37: 87. 1918; Wangerin in Just, Bot. Jahresber. 50 (1): 44. 1929; Dansereau, Biogeogr. 132—134. 1957; Bascope, Bernardi, Jorgensen, Hueck, & Lamprecht, Inst. Forest. Latinoam. Invest. Capac. Descrip. Arb. Forest. 5, imp. 1, 13, 16, & 51. 1959; Braga, Pl. Nordest., ed. 2, 348. 1960; Reitz, Sellowia 13: 44/46 & 109. 1961; Townsend, Excerpt. Bot. A.41: 242 & 243. 1962; Melchior in Engl., Syllab. Pflanzenfam., ed. 12, 2: 438. 1964; Angely, Fl. Anal. Paran., ed. 1, 581. 1965; Hocking, Excerpt. Bot. A.13: 570. 1968; Moldenke, Phytologia 15: 478. 1968; Moldenke, Résumé Suppl. 16: 15 (1968) and 17: 8. 1968; Lambertii, Univ. São Paulo Fac. Filos. Bol. 317 [Bot. 23]: 40—46, 49—52, 55, 58—60, 76, 89, 102—104, 118, 121—124, 126—128, 136, 137, 143, 145, 147—149, 151, 153, 157—160, 167—175, 206, & 207, fig. 10—14, 17, 18, & 78—88. 1969; Bascope, Bernardi, Jorgensen, Hueck, & Lamprecht, Inst. Forest. Latinoam. Invest. Capac. Descrip. Arb. Forest. 5, imp. 2, 13, 16, & 51. 1970; Gibson, Fieldiana Bot. 24 (9): 177. 1970; Reitz, Sellowia 22: 17. 1970; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 841 & ii, map 1396. 1971; Moldenke, Fifth Summ. 1: 109, 111, 112, 129, 131, 147, 188, 393, & 394 (1971) and 2: 774 & 839. 1971; Odum, Fundament. Ecol., ed. 3, 347. 1971; V. J. Chapm., Trop. Ecol. 11: 5, 7, & 8, fig. 3. 1972; Moldenke, Phytologia 28: 453 (1974), 33: 255, 256, 258, 262, & 266 (1976), 34: 72, 75, 84, 170, 172, 180, 193, 200, 271, & 485 (1976), 35: 13 (1976), and 36: 31, 32, 34, 41, & 410. 1977; Moldenke, Biol. Abstr. 63: 2452. 1977.

Additional illustrations: Dansereau, Biogeogr. 134. 1957; Lambertii, Univ. São Paulo Fac. Filos. Bol. 317 [Bot. 23]: 49—52, 59, 60, & 168—175, fig. 10—14, 17, 18, & 78—88. 1969; Odum, Fundament. Ecol., ed. 3, 347. 1971.

This typical form of the species differs from the following one in having its leaf-blades completely glabrous on both surfaces.

Recent collectors describe the plant as a tree, 5—18 meters tall, the fragrant "flowers visited by flies", record the additional vernacular names, "black parwa", "mangle negro", and "siriuva", and have found it growing "in mangrove", on coastal banks, around lagoons, on salt flats, and "na areia", flowering from February to April and from June to October, fruiting in October. Many of the flowering specimens exhibit remarkably elongated floral axes with scattered flowers. Cowan & Forster report it a "locally frequent tree" in Trinidad.

The corollas are said to have been "white" on Araujo 1245, 1316a, & 1320 and on Cowan & Forster 1252, "whitish" or "alvacente" on Hatschbach 1920, 29144, & 38583, and "white with yellow interior" on France 21149.

The Angely (1971) work cited in the bibliography above is sometimes cited as "1970", the title-page date, but the work was not actually published until 1971.

Gooding (1965) cites Gooding 553 from Barbados, deposited in the British Museum herbarium. Broadway found the species on Grenada, while both Hahn and Plée found it on Martinique, so it seems apparent that it is not confined to northern and eastern South American coasts. This fact supports the possibility of A. germinans var. guayaquilensis having a similar distribution, since the methods of dispersal for both taxa are obviously identical.

Angely (1971) cites A. schaueriana from Maranhão, Ceará, Paraíba, Rio Grande do Norte, Pernambuco, Goiás, Bahia, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, and Santa Catarina. Braga (1960) also lists it from Ceará.

Gibson (1970) makes the remarkable statement that A. bicolor Standl., of Central America, "closely resembles A. schaueriana Stapf & Leechman of the West Indies and South America, which differs only in having fewer, more congested, less complex inflorescences. If they should prove synonymous, the name A. bicolor Standley takes precedence". Actually, these two taxa are very distinct and almost impossible to confuse.

Schenck (1889) describes the plant now known as A. schaueriana as "A. tomentosa", referring to it only middle and south Brazilian specimens. His figures 1—6 on plate 3 of his work are sometimes cited as illustrative of this taxon, but actually (as he plainly states) they illustrate the unrelated Laguncularia racemosa.

Melchior (1964) erroneously implies that A. tomentosa Jacq. is a synonym of A. schaueriana. However, it seems most probable to me now that, in view of Stapf and Leechman's copious and careful field and herbarium notes (cfr. *Phytologia* 7: 283—286. 1960), Jacquin's A. tomentosa (1760) may actually be a synonym of what is now known as A. germinans var. cumanensis (H.B.K.) Moldenke, rather than of typical A. germinans (L.) L. as hitherto regarded by me and by many other authors.

It should be noted here that when I first proposed the name, A. schaueriana, based on the work of Stapf and Leechman, I gave as

synonyms "A. tomentosa Jacq.' as used by Schauer in A. DC., Prodr. 11: 699—700 (1847) and many subsequent authors; A. nitida var. trinitensis Moldenke". I cited Britton 2595 in part, Broadway 5817 in part, and Trin. Bot. Gard. Herb. 2402, 5221, 5405 in part, 7988, 8695, 9516, 10461, 12651, & 12656, all from Trinidad, but none cited as the type.

Schauer (1847) describes what he calls A. tomentosa Jacq. as having "foliis obovate-ellipticis obtusissimis in petiolum attenuatis supra demum subnitidis subtus candicantibus aetate interdum glabrescentibus....Folia 3 poll. longa, 15—18 lin. lata, facie demum glabrata neque admodum nitida, subtus indumento demum abolescente induta, siccando decolorescentia neque vero nigrescentia." He cites from Rio de Janeiro: Gaudichaud s.n., Pohl s.n., Riedel s.n., from Bahia: Blanchet 1427, Martius 108, Salzmann 430, from Colombia: Humboldt & Bonpland s.n. [Cumana], from the West Indies: Jacquin s.n., Perrottet s.n., from Mexico: Humboldt & Bonpland s.n., and from Ecuador: Gaudichaud s.n., Humboldt & Bonpland s.n. Obviously, both his description and his cited material include representatives of several taxa. No type was designated, but it is to be assumed that Jacquin's collection from the West Indies is the type of the true A. tomentosa Jacq. and this is usually regarded as conspecific with typical A. germinans (L.) L. Schauer's description does not apply to Jacquin's plant but apparently applies to a mixture of the pubescent- and glabrous-leaved forms of A. schaueriana.

My A. nitida var. trinitensis is validated by a designated type: R. L. Brooks s.n. [Herb. Trin. Bot. Gard. 12656] from the Caroni Swamp, Trinidad, collected on May 29, 1932, and deposited in the Britton Herbarium at the New York Botanical Garden. This collection can, therefore, also be regarded as the type of typical A. schaueriana.

Avicennia schaueriana f. glabrescens, based on R. C. Marshall s.n. [Herb. Trin. Bot. Gard. Herb. 12651], was described before it was realized that the actual type of this species is the glabrous-leaved form. It is a straight and unequivocal synonym of typical A. schaueriana. All material previously cited by me in this series of notes as f. glabrescens should be shifted back to typical A. schaueriana.

Material of A. schaueriana has been widely misidentified and distributed in herbaria as A. germinans (L.) L., A. nitida Jacq., and A. tomentosa Jacq. Some of the collections cited below (e.g., N. L. Britton 2595, Hahn 759, and Othmer s.n. [17/XI/03] were previously erroneously cited by me as A. germinans. Araujo 1316, Dusén 202, and Riedel & Luschnath 1007, as originally distributed, are mixtures of typical A. schaueriana and f. candicans, so it seems probable that, at least in Rio de Janeiro, the two forms grow in very close proximity to each other. Hatschbach 14076, dis-

tributed as typical A. schaueriana, seems better placed as f. candicans. The Sellow s.n. [Brasilia] in the Britton Herbarium actually is Vitex schaueriana Moldenke.

Additional & amended citations: TRINIDAD AND TOBAGO: Trinidad: N. L. Britton 2595 (W--119444); Cowan & Forster 1252 (N, W--2287738, Z); R. C. Marshall s.n. [Herb. Trin. Bot. Gard. 12651] (N, R); Othmer 157 (Mu). TRINIDAD OFFSHORE ISLANDS: Patos: Britton, Hazen, & Mendelson 541 (N, W--1047019). VENEZUELA: Delta Amacuro: Budowski 118-18 (Gz, Kh, N). BRAZIL: Guanabara: Duarte 5017 [Herb. Brad. 12117; Herb. Jard. Bot. Rio Jan. 110275] (Mu, N, W--2650229). Pará: France 21149 (Ld). Paraná: Hatschbach 1920 (N), 29144 (N, S), 38583 (Mu). Rio de Janeiro: Araujo 1207 [Herb. FEEMA 12144] (Ld), 1245 [Herb. FEEMA 12285] (Ld), 1316a (Ac), 1320 [Herb. FEEMA 12330] (Pf); Nadeaud s.n. [Vickersby, XI.1862] (N, W--2547120); Riedel & Luschnath 1007b (N). Gobernador Island: G. Pabat 7385 [Herb. Brad. 27668] (Mu, N, N). Havarata Island: J. Vidal s.n. [Herb. Rio Jan. 31546] (N).

AVICENNIA SCHAUERIANA f. CANDICANS Moldenke, Phytologia 35: 15. 1976.

Bibliography: Moldenke, Phytologia 35: 15 (1976) and 36: 31, 32, 34, & 410. 1977.

This form differs from the typical form of the species in having the lower surface of its leaf-blades more or less very densely canescent-puberulent or farinaceous in the manner of A. germinans (L.) L. and its varieties.

Collectors describe this plant as a shrub or small tree, 1--17 meters tall, the trunk to 12.5 cm. in diameter at breast height, with pneumatophores. The corollas are said to have been "white" on Araujo 1244 & 1316, Pabat 5421, Pickel 3210, and Reitz 5525 and merely "whitish" on Hatschbach 14096 and Hatschbach & Guimarães 21397. It has been found growing in the mangrove formation in coastal regions, in salt water, in litoral and mangrove swamps, restinga, coastal ridges and muddy beaches, on "ground sometimes covered by high tide", along creeks of partially salt water, and in "banhado salgado", at altitudes of 1--5 m., flowering from February to April and June to December, fruiting in May. Froes reports that it furnishes "good lumber and fuel". Vasconcelos Sobrinho 251 includes a photograph of the collection locality. Araujo reports the tree as frequent and the flowers as fragrant, noting that the "folhas cobertas de um indumento acinzentado na superficie inferior".

Vernacular names reported for this form are "blaka parwa", "ciriba preta", "ciriuba", "fromarina", "mangue", "mangue canoé", "mangue seriva", "mangue siriba", "siriuba", and "siriuva".

Araujo 1316, Dusén 202, Lützelburg 401, and Riedel & Luschnath 1007, as originally distributed, are mixtures of this and the typical form of the species.

Material of A. schaueriana f. candicans has been misidentified and distributed in many herbaria as A. elliptica Thunb., A. nitida Jacq., typical A. schaueriana Stapf & Leechman, "A. schaueriana Stapf & Lehm.", and A. tomentosa Jacq.

It would appear that this form is a highly inconstant one. The underside of the leaves on Lützelburg 16059 and s.n. [Caji, XII. 1910] exhibit very obscure puberulence, a condition also seen on Martius s.n. [in litt. oceani ad Soteropolisi et Ilheos, Jan. 1819]. On Lützelburg 12521 and s.n. [VIII.1912], Martius s.n. [inter Rhizophoras ad litt. oceani prope Rio], and Othmer s.n. [17. XI.03] some of the (mostly smaller) leaves are subglabrous, glabrate, or practically glabrous.

In a previous publication (1960) I erroneously cited specimens of Blanchet 1427, Gaudichaud s.n. [Rio Janeiro], and Luschnath s.n. [Martius 108] as "cotypes" of A. schaueriana merely because they were cited by Schauer (1847) in his mis-application of Jacquin's "A. tomentosa". However, as pointed out under A. schaueriana in the present installment of these notes, A. schaueriana should be typified by the same collection which typifies A. nitida var. trinitensis and not by any of the many collections cited by Schauer which actually represent several different taxa.

Citations: TRINIDAD AND TOBAGO: Trinidad: Othmer s.n. [17/XI/03] (Mu—4054). GUYANA: Leechman s.n. [near Georgetown, 1917] (N, N). SURINAM: Geijskes s.n. [5-II-1943] (N). BRAZIL: Bahia: Lützelburg 401 in part (Mu, Mu), s.n. [VIII.1912] (Mu, N—photo, Z—photo); Martius s.n. [in maritimis prov. Bahiensis, 1819] (Mu—1590), s.n. [in litt. oceani ad Soteropolisi et Ilheos, Jan. 1819] (Mu—1082). Ceará: Dias da Rocha 108 [Herb. Inst. Bot. S. Paulo 7933] (N, Sp—7933); Drouet 2548 (E—1110545, F—857467, F—949348, N, S, W—1594887). Guanabara: Moldenke & Moldenke 19606 (F—isotype, Mg— isotype, Mr— isotype, N—type, No— isotype, Ot— isotype, S— isotype, Sm— isotype, Ss— isotype). Maranhão: Fröes 1812 (B, Bm, Cb, Cb, E—1042134, F—707083, I, K, M1, N, P, S, Ut, W—1660151). Paraíba: Lützelburg 12521 (Mu). Paraná: Dusén s.n. [Herb. Mus. Nac. Rio Jan. 5004] (N); Hatschbach 14096 (Ac, Mu, N, W—2564872, Ws); Hatschbach & Guimarães 21397 (M1, N); Stellfeld 799 [Herb. Mus. Paran. 1799] (N). Pernambuco: Vasconcelos Sobrinho 251 [photo 136] (It, N, Ug). Rio de Janeiro: Araujo 1141 [Herb. Inst. Conserv. Nat. 11687] (Fe), 1244 [Herb. FEEMA 12286] (Ld), 1310 [Herb. FEEMA 12329] (Ac), 1316 (Ld); Dusén 202 in part (W—1055656); Gaudichaud 464 (B, Br, Cb, Dc, N); Glaziou 1362 (Br, Br, Br, Br, Cp, Cp, F—667195, It, K, N, P); Herb. Mus. Nac. 6 (C), s.n. [Sebastianopolis] (C); Herb. Mus. Nac. Rio Jan. 31572 (N), 31775 (N); F. C. Hoehne s.n. [Herb. Inst. Bot. S. Paulo 24908] (N, Sp—24908); Luschnath s.n. [Herb. Martius 108] (Br, Dc, K, M, Mu—1081, P, V); Lützelburg 16059 (Mu), s.n. [Caji, XII.1910] (Mu,

N--photo, Z--photo); Martius s.n. [inter Rhizophoras ad litt. oceani prope Rio] (Mu--1084); Riedel & Luschnath 1007a (N); Sellow 304 (N); Wilkes U. S. Expl. Exped. s.n. (T, W--59278, W--59279). Santa Catarina: Reitz 5525 (N); Reitz & Klein 683 [Herb. Barb. Rodr. 6961] (N, S, W--2123175, W--2281838), 1414 (W--2142574). São Paulo: F. C. Hoehne s.n. [Herb. Inst. Bot. S. Paulo 30854] (It, K, N, Sp); Löfgren s.n. [Herb. Com. Geogr. & Geol. 3062; Herb. Inst. Bot. S. Paulo 15596] (N, Sp); Pickel 3210 (It, N, Sf); A. Saint-Hilaire C2.7665 [1665] (N, P); Usteri s.n. [Herb. Inst. Bot. S. Paulo 15598] (N, Sp). Florianopolis Island: Rambo 50320 (Lm, N, S). Governador Island: Lanna Sobrinho 1905 [Herb. FEEMA 8469] (Z); G. Pabst 5421 [Herb. Erad. 21211] (Mu, N). Pinheiros Island: Azevedo 3 [Herb. Inst. Conserv. Nat. 10329] (Fe). Santa Catarina Island: Reitz 5088 [Herb. Barb. Rodr. 6363] (N).

#### AVICENNIA TONDUZII Moldenke

Additional bibliography: Bascope, Bernardi, Jorgensen, Hueck, & Lamprecht, Inst. Forest. Latinoam. Invest. Capac. Descrip. Arb. Forest. 5, imp. 1, 13, 17, & 51. 1959; Hocking, Excerpt. Bot. A. 12: 425. 1967; Moldenke, Biol. Abstr. 49: 4199. 1968; Bascope, Bernardi, Jorgensen, Hueck, & Lamprecht, Inst. Forest. Latinoam. Invest. Capac. Descrip. Arb. Forest. 5, imp. 2, 13, 17, & 51. 1970; V. J. Chapm., Trop. Ecol. 11: 5, fig. 3. 1970; Moldenke, Fifth Summ. 1: 87, 115, & 394 (1971) and 2: 839. 1971; Moldenke in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 150, 153, & 154. 1973; "H. R.", Biol. Abstr. 57: 1904. 1974; Moldenke, Phytologia 32: 438 (1975), 33: 269 (1976), and 34: 74. 1976; Hocking, Excerpt. Bot. A. 26: 422. 1976.

The Killip & Cuatrecasas 38660 collection, cited below, was previously incorrectly cited as A. germinans (L.) L.

Collectors report that A. tonduzii is "a tree sometimes 20 m. tall", the corollas white, and have found it growing in swamps, flowering in March and June. The Kupper 1552, distributed as A. tonduzii, actually is A. germinans var. guayaquilensis (H.B.K.) Moldenke, a very closely related taxon. It is probable that some, if not all, of the very long- and narrow-leaved collections cited as the latter are, in fact, better placed as A. tonduzii. The two taxa require much more intensive study, especially in the field.

ADDITIONAL NOTES ON THE GENUS VERBENA. XXVII

Harold N. Moldenke

VERBENA SUPINA L.

Emended synonymy: Verbena supina ♂ hirsuta Ehrenb. ex Sweet, Hort. Brit., ed. 2, 419. 1830.

Additional & emended bibliography: H. Bock [Tragus], Stirp. Max. Germ. 102 & 211. 1552; Dodoens [L'Ecluse], Hist. Pl. 96 & 97. 1557; L., Hort. Cliff., imp. 1, ll. 1737; Strand in L., Amoen. Acad. 69: 449. 1756; R. A. Salisb., Prodr. 71. 1796; Sweet, Hort. Brit., ed. 1, 1: 325 (1826) and ed. 2, 419. 1830; G. Don in Loud., Hort. Brit., ed. 1, 247 (1830) and ed. 2, 247. 1832; Loud., Hort. Brit., ed. 2, 553. 1832; G. Don in Loud., Hort. Brit., ed. 3, 247. 1839; Sweet, Hort. Brit., ed. 3, 553. 1839; Schnitzlein, Iconogr. Fam. Nat. 2: 137 Verbenac. [3] & 137, fig. 4--22. 1856; Buek, Gen. Spec. Syn. Candoll. 3: 495 & 496. 1858; Strobl, Oesterr. Bot. Zeitschr. 33: 406. 1883; Dur. & Barr., Fl. Lib. Prodr. 193. 1910; Rolland, Fl. Populaire 8: 43. 1910; L., Hort. Cliff., imp. 2, ll. 1968; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717. 1969; Scully, Treas. Am. Ind. Herbs 283. 1970; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 717. 1974; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; Gilmour, Thom. Johnson 122. 1972; Täckholm, Stud. Fl. Egypt, ed. 2, [453], 454, 817, 830, & 876, pl. 156, fig. A. 1974; Kooiman, Act. Bot. Neerl. 24: 464. 1975; Moldenke, Phytologia 30: 159 & 191 (1975), 34: 268 (1976), and 36: 36, 40, 250, & 277. 1977.

Additional illustrations: Scully, Treas. Am. Ind. Herbs 283. 1970; Täckholm, Stud. Fl. Egypt, ed. 2, pl. 156, fig. A. 1974.

Linnaeus (1737) says of this species "Crescit in agro Salmanticensi". Rolland (1910) records the following additional vernacular names: "chamaedrys" ("par confusion, chez les apothicaires"), "columba supina", "licinia", "verbenaca supinaca", and "verveine basse". Don (1830) calls it the "supine vervain" and says that it was introduced into English gardens from Spain in 1640. Loudon (1832) calls it the "trailing vervain"; the var. hirsuta he calls "hairy vervain" and says that it was introduced from Egypt in 1829.

Täckholm (1974) comments that in Egypt "Sterile specimens" of this plant are "very similar to Ambrosia maritima in general appearance.

Scully (1970) reproduces what is obviously a pre-linnean herbal illustration of V. supina in her discussion of Amerind uses of V. hastata L. and V. stricta Vent., but fails to label it or state that it could not possibly have been involved in any Amerind usage since it does not occur in the New World.

It should also be recorded here that the Verbena supina mas of Dodoens is actually Veronica chamaedrys L. in the Scrophulariaceae.

The figure given by Schnitzlein (1856), previously cited as representing V. supina (as it is labeled), seems, rather, to be V. officinalis. Similarly, Bock (1552), although using the name, Verbena foemina, in his text, illustrates it with a woodcut which very obviously depicts V. officinalis.

The Sibthorpe & Smith (1809) reference is often dated "1806", but actually pages 219—442 of volume 1 were not issued until 1809.

Some specimens of V. supina (e.g., Sieber s.n. at Munich and Herb. Zuccarini s.n. [Hort. bot. Erlangensis circa 1819]) have leaves greatly resembling those of the North American V. bracteata Lag. & Rodr. Rauh 156 & 603 and Fischer s.n. [Argyptus] represent very much stunted plants with very small, deeply dissected, canescent leaves. It is very possible that this species consists of several more or less distinct forms which may be deserving of nomenclatural recognition, like the forms and varieties of V. officinalis. Ehrenberg's var. hirsuta, from the deserts of northern Africa, may well be one of these. Much more study in the field is required to determine these matters. The Kunkel 10256, cited below, may represent f. erecta Moldenke, a form which is very difficult to be sure of from herbarium specimens alone.

The corollas are said to have been "pinkish-blue" on Kunkel 10256 when fresh.

The Kotschy s.n. [Aegyptus inferior], distributed as V. supina, is not verbenaceous — probably represents something in the Scrophulariaceae.

Additional citations: MACARONESIA: Gran Canaria: Kunkel 10256 (Mu). EIRE: Wiest 90 (Mu—384, Mu—388). FRANCE: Herb. Kummer s.n. (Mu—1270). SPAIN: Reverchon 81 (Mu). HUNGARY: Borbás 934 (Mu), s.n. [28/8/1879] (Mu—1581); Herb. Zuccarini s.n. (Mu—386); Janka 1853 (Mu), s.n. (Mu); Kovács 460 (Mu—4329). GREECE: Guicciardi s.n. [in m. Parnassi reg. 1855] (Mu); Herb. Zuccarini s.n. (Mu). MOROCCO: Rauh 156 (Mu), 603 (Mu). LIBYA: Laing s.n. [ad Tibisium rara] (Mu—387). EGYPT: Fischer s.n. [Aegyptus] (Mu—1269); Sieber s.n. (Mu—382). SUDAN: Nubia: Kotschy 323 (Mu—383, Mu—1580). IRAQ: Kotschy s.n. [pr. Mossul, D. 8 Sept. 1841] (Mu—385). CULTIVATED: Germany: Herb. Zuccarini s.n. [Hort. bot. Erlangensis circa 1819] (Mu—390). LOCALITY OF COLLECTION UNDETERMINED: Herb. Schmedelian s.n. (Mu—378); Herb. Schreber s.n. (Mu—379, Mu—380); Schrank s.n. (Mu—381).

#### VERBENA SUPINA f. ERECTA Moldenke

Additional bibliography: Moldenke, Phytologia 28: 362, 392, 393, & 441 (1974), 34: 268 (1976), and 36: 36, 40, & 277. 1977.

Weber encountered this plant on sand dunes.

Additional citations: AUSTRALIA: South Australia: J. Z. Weber 2294 (Ac).

## VERBENA TAMPENSIS Nash

Additional bibliography: M. F. Baker, Fla. Wild Fls., ed. 2, imp. 1, 188. 1938; Ayensu, Rep. Endang. & Threat. Pl. Spp. 67 & 126. 1974; Moldenke, Phytologia 28: 393-394, 451, & 465. 1974; M. F. Baker, Fla. Wild Fls., ed. 2, imp. 2, 188. 1976; Fleming, Genelle, & Long, Wild Fls. Fla. 15 & 67. 1976; Lakela, Long, Fleming, & Genelle, Pl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 116 & 182. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, 741 & 961. 1976; Moldenke, Phytologia 36: 141 & 142. 1977.

Illustrations: Fleming, Genelle, & Long, Wild Fls. Fla. 67 (in color). 1976.

Ayensu (1974) lists V. tampensis as one of the endangered or threatened species of plants in the United States which need conservation measures to ensure their survival. Lakela and her associates (1976) assert that in the Tampa Bay [Florida] area it grows in "hammocks, low ground, [and] coastal areas", flowering in spring and fall. Fleming and his associates (1976) record "vervain" as a common name for it.

The J. A. Churchill s.n. [12 March 1956], distributed as V. tampensis, actually is V. maritima Small.

Additional citations: FLORIDA: Brevard Co.: Curtiss 1963 in part (Mu-1544).

## VERBENA TENERA Spreng.

Additional & emended bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 496. 1858; Voss in Vilm., Fl. Pleine Terr., ed. 1, 937 (1865), ed. 2, 2: 975 (1866), ed. 3, 1: 1198 (1870), and ed. 4, 1066. 1894; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717. 1969; Williamson, Sunset West. Gard. Book, imp. 11, 437. 1973; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 717. 1974; Kooiman, Act. Bot. Neerl. 24: 464. 1975; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 15: 89 & 94. 1975; Moldenke, Phytologia 30: 150, 152, 153, 166, & 171-172 (1975), 31: 412 (1975), and 36: 151. 1977.

López-Palacios (1975) comments that "La V. tenera en Venezuela aún no está muy difundida y hasta la fecha sólo existe una colección mía: (López-Palacios 2565 bis)". Araujo describes it as a heliophilous herb very common along roadsides in Rio Grande do Sul, Brazil, and refers to the flowers [corollas] as "red".

The Princess Therese of Bavaria 282, distributed as V. tenera, actually is V. microphylla H.B.K., while Hieronymus s.n. [14/XI/1876] & s.n. [Montevideo], Kummer s.n. [Hort. Monac. 16.VIII. 1849], and Meebold 12838, 26825, & 27318 are V. tenuisecta Briq.

Additional citations: BRAZIL: Rio Grande do Sul: Araujo 1256 [Herb. FEEMA 12264] (Pf).

## VERBENA TENERA var. MAONETTI Regel

Additional bibliography: Vilm., Fl. Pleine Terr., ed. 1, 938 (1865), ed. 2, 2: 975 (1866), ed. 3, 1: 1198-1199 (1870), and ed. 4, 1066. 1894; Williamson, Sunset West. Gard. Book, imp. 11, 437.

1973; Moldenke, *Phytologia* 30: 172 (1975) and 31: 412. 1975.

Additional illustrations: Voss in *Vilm., Fl. Pleine Terr.*, ed. 4, 1066. 1894.

Vilmorin (1863) describes this variety as having "Fleurs d'un rose purpurin, à lobes alternativement marqués de raies blanches disposées en étoile.....La variété Mahoneti, introduit depuis quelques années seulement dans les jardines, est remarquable par ses nombreuses fleurs étoilées de blanc, d'un très joli effet; elle paraît plus rustique et résiste mieux à la sécheresse que l'espèce; aussi sa culture se généralise-t-elle de plus en plus. On en forme des tapis d'une très grande élégance et de très jolies potées. Il en existe aujourd'hui plusieurs sous-variétés obtenues récemment de semis.....La variété Mahoneti et les sous-variétés qui en sont issues produisent fort peu de graines, aussi les multiplie-t-on d'ordinaire de boutures, faites à l'autome en terrines et hivernées sous châssis, ou bien au printemps sur couche avec des rameaux pris sur des pieds conservés sous verre pendant l'hiver."

#### VERBENA TENUISECTA Briq.

Additional synonymy: Glandularia tenuisecta (Sprong.) López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 15: 89. 1975.

Verbena utenisecta Briq. ex Molina R., *Ceiba* 19: 96, sphalm. 1975.

Verbena tenuisectum McReynolds ex Moldenke, *Phytologia* 34: 279, in syn. 1976.

Additional & emended bibliography: M. F. Baker, *Fla. Wild Fls.*, ed. 2, imp. 1, 188. 1938; A. W. Anderson, *How We Got Fls.*, imp. 1, 168 & 283 (1951) and imp. 2, 168 & 283. 1966; Ewan in Thieret, *Southwest. La. Journ.* 7: 11. 1967; G. W. Thomas, *Tex. Pl. Ecolog. Summ.* 78. 1969; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 717 (1969) and imp. 2, 717. 1974; S. B. Jones, *Castanea* 39: 137. 1974; Duncan & Foote, *Wildfls. SE. U. S.* 150, [151], & 295. 1975; Kooiman, *Act. Bot. Neerl.* 24: 464. 1975; López-Palacios, *Revist. Fac. Farm. Univ. Los Andes* 15: 89 & 93-94. 1975; Molina R., *Ceiba* 19: 96. 1975; Moldenke, *Phytologia* 30: 172-173 (1975), 31: 374-376, 392, & 398 (1975), and 34: 250, 252, 260, 270, & 279. 1976; M. F. Baker, *Fla. Wild Fls.*, ed. 2, imp. 2, 188. 1976; Fleming, Genelle, & Long, *Wild Fls. Fla.* 82. 1976; F. R. Fosberg, *Rhodora* 38: 113. 1976; Lakela, Long, Fleming, & Genelle, *Fl. Tampa Bay*, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 116, 168, & 182. 1976; Long & Lakela, *Fl. Trop. Fla.*, ed. 2, 741 & 961. 1976; Soukup, *Biota* 11: 19. 1976; E. H. Walker, *Fl. Okin. & South. Ryuk.* 884. 1976; A. L. Moldenke, *Phytologia* 36: 87 & 88. 1977; Moldenke, *Phytologia* 36: 29, 40, 126, 128, 131, 140, 141, 164, 216, 231, 288, & 291. 1977.

Additional illustrations: Duncan & Foote, *Wildfls. SE. U. S.* [151] (in color). 1975; Fleming, Genelle, & Long, *Wild Fls. Fla.* 8 [as "canadensis"] (in color). 1976.

Molina (1975) records this species as cultivated in Honduras, while Fosberg (1976) found it in gardens on St. Croix. Ryscroft reports it "fairly common in patches along roadsides in Natal. Bay-

liss refers to it as semiprostrate on sandy roadsides, "introduced, now widespread", at 2000 feet altitude, in the Cape Province of South Africa, misidentifying it as V. bonariensis L. Thomas found it growing in sandy pinewoods in Louisiana. Lakela and her associates (1976) aver that in the Tampa Bay [Florida] area it inhabits "sandhills, lawns, [and] berms", flowering all year; they call it the "moss verbena" and mistakenly accredit the scientific name to "Briz."

The corollas on Ryscroft 2574 are said to have been "mauve" in color when fresh.

Recent collectors refer to V. tenuisecta as a plant "with no distinctive odor" and have encountered it on pine hills, along roadsides at the edges of swamps, and in "sandy soil on neutral ground with common grasses predominant". Hester says that it is scarce in dry soil in Louisiana, but Brown, in the same state, refers to it as a "weed in vacant lots", a "common weed in longleaf pineland", and "very abundant on prairie area roadsides". He notes that the anthers are appendaged (which is to be expected since the species is a member of the section Glandularia). Moore reports it "very frequent in dry sandy soil".

The corollas are said to have been "violet" in color on Schinini 11600 and Schinini & Martinez Crovetto 12753, "purple" on B. Moore s.n., "dark-purple" on Jenevein s.n. and Killmer 25, "blue" on C. M. Allen 453, "pink, but many pure white clumps" on Bougere 2235, and "lavender-purple" on Webster & Wilbur 3282.

The Moldenke & Moldenke 26437, 26580, 26690, & 26724 specimens cited below are transfers from the L. H. Bailey Hortorium herbarium. Hatschbach 23884 was previously erroneously cited as V. aristigera S. Moore.

Material of V. tenuisecta has been misidentified and distributed in some herbaria as V. elegans H.B.K.

Additional & emended citations: NORTH CAROLINA: Cumberland Co.: Moldenke & Moldenke 30000 (Ac). Harnett Co.: Moldenke & Moldenke 30002 (Tu). Johnston Co.: Moldenke & Moldenke 30004 (Ld). Robeson Co.: Moldenke & Moldenke 29991 (Gz). SOUTH CAROLINA: Allendale Co.: Moldenke & Moldenke 29960 (Ld). Bamber Co.: Moldenke & Moldenke 29964 (Ld). Clarendon Co.: Moldenke & Moldenke 29973 (Kh). Dillon Co.: Moldenke & Moldenke 29990 (Ac). Florence Co.: Moldenke & Moldenke 29982 (Gz), 29985 (Tu). Orangeburg Co.: Moldenke & Moldenke 29969 (Ld). GEORGIA: Bryan Co.: Moldenke & Moldenke 29942 (Tu). Bulloch Co.: Moldenke & Moldenke 29947 (Ld). Camden Co.: Moldenke & Moldenke 29872 (Gz). Clinch Co.: Spindler 170 (Lv). Dougherty Co.: Moldenke & Moldenke 29362 (Ld). Glynn Co.: Moldenke & Moldenke 29876 (Tu). Grady Co.: Moldenke & Moldenke 29365 (Gz). Lee Co.: Moldenke & Moldenke 29344 (Kh), 29350 (Gz). Marion Co.: Moldenke & Moldenke 29324 (Ac). McIntosh Co.: Moldenke & Moldenke 29907 (Gz). Mitchell Co.: Moldenke & Moldenke 29364 (Ac). Schley Co.: Moldenke & Moldenke

29329 (Gz). Screven Co.: Moldenke & Moldenke 29951 (Ac). Sumter Co.: Moldenke & Moldenke 29338 (Tu). Talbot Co.: Moldenke & Moldenke 29318 (Ld). Jekyll Island: Moldenke & Moldenke 29880 (Ld), 29890 (Ac). FLORIDA: Bay Co.: Moldenke & Moldenke 26690 (Gz). Dixie Co.: Moldenke & Moldenke 29437 (Tu). Duval Co.: Moldenke & Moldenke 26437 (Ln, Ws). Lafayette Co.: Moldenke & Moldenke 26580 (Ws). Levy Co.: Moldenke & Moldenke 29440 (Kh). Madison Co.: B. Moore s.n. [8 Apr. 1961] (N). Taylor Co.: Moldenke & Moldenke 29423 (Ac). Wakulla Co.: Moldenke & Moldenke 29388 (Ld). ALABAMA: Baldwin Co.: Moldenke & Moldenke 26724 (Sl). MISSISSIPPI: Harrison Co.: Jenevein s.n. [13 Oct. 1973] (Lv). Lincoln Co.: Webster & Wilbur 3282 (Mi). Pearl River Co.: J. A. Churchill s.n. [10 May 1955] (Ln--204152). LOUISIANA: Acadia Par.: Killmer 25 (Lv). Beauregard Par.: Hester 517 (Lv). Bossier Par.: Robinette 148 (Lv). Jefferson Davis Par.: C. A. Brown 17829 (Lv). Ouachita Par.: R. D. Thomas 3912 (Kl--11437). Rapides Par.: C. A. Brown 17094 (Lv). Saint Helena Par.: C. M. Allen 453 (Lv). Saint Tammany Par.: Bougere 2235 (Lv). Vernon Par.: Hester 442 (Lv). Washington Par.: C. A. Brown 5636 (Lv), 17749 (Lv), 18408 (Lv). TEXAS: Jefferson Co.: C. A. Brown 18806 (Lv). Orange Co.: McReynolds 750353 (Lv). CALIFORNIA: Los Angeles Co.: Mesbold 26825 (Mu), 27319 (Mu). BRAZIL: Mato Grosso: Hatschbach 23884 (W--2705822). BOLIVIA: Sucre: Zöllner 8098 (Gz). URUGUAY: Hieronymus s.n. [Montevideo] (Mu). ARGENTINA: Córdoba: Hieronymus s.n. [14.XI.1876] (Mu). Corrientes: Schinini 11600 (Ld); Schinini & Martinez Crovetto 12753 (Ld). Misiones: Montes 14663 (N). GERMANY: Brixle s.n. [Herb. Merxmüller 14336] (Mu). SOUTH AFRICA: Cape Province: Bayliss BS.7344 (Mu); Ryscroft 2626 (Mu). Natal: Mesbold 12838 (Mu); Ryscroft 2574 (Mu). CULTIVATED: France: Herb. Kummer s.n. [h. Paris.] (Mu--1272). Germany: Herb. Hort. Monac. s.n. (Mu); Herb. Schwaegrichen s.n. [Hort. Lips.] (Mu--1251); Herb. Zuccarini s.n. [h. Monac. 1836] (Mu--392); Hiendlmayr s.n. [Hort. Lipsiensis] (Mu--1271); Kummer s.n. [Hort. Monac. 16.VIII.1849] (Mu--391); Kupper s.n. [cult. h.b.M.] (Mu).

VERBENA TENUISECTA f. ALBA (Benary) Moldenke, Phytologia 36: 164. 1977.

Additional bibliography: Duncan & Foote, Wildfls. SE. U. S. 150 & [151]. 1975; Moldenke, Phytologia 30: 173 (1975), 31: 374--376 (1975), 34: 250 (1976), and 36: 128. 1977.

Additional illustrations: Duncan & Foote, Wildfls. SE. U. S. [151] (in color). 1975.

In line with current thinking in taxonomic circles, the status of this taxon, a mere color form, is reduced from the varietal rank under which I have hitherto considered it to form rank.

Bougere has misidentified this plant as V. bipinnatifida Nutt.

and notes that the corollas were "white when fresh, but press lavender"; his no. 2235, cited herein under typical V. tenuisecta. may represent a mixture because its label states "flowers pink, but many pure white clumps", collected in Saint Tammany Parish, Louisiana.

Additional citations: SOUTH CAROLINA: Clarendon Co.: Moldenke & Moldenke 29979 (Ac, Gz, Kh, Ld). GEORGIA: Grady Co.: Moldenke & Moldenke 29369 (Gz). Lee Co.: Moldenke & Moldenke 29357 (Ld, Tu). Marion Co.: Moldenke & Moldenke 29328 (Ac). FLORIDA: Dixie Co.: Moldenke & Moldenke 29438 (Tu). LOUISIANA: Saint Tammany Par.: Bougere 1996 (Lv).

VERBENA TENUISECTA f. RUBELLA Moldenke

Additional bibliography: Moldenke, Phytologia 24: 239 & 241. 1972.

Bougere 2235, cited herein under typical V. tenuisecta Briq., may actually represent this form because its accompanying label says "flowers pink".

VERBENA TESSMANNII Moldenke

Additional bibliography: Moldenke, Phytologia 24: 241. 1972; Soukup, Biota 11: 19. 1976.

VERBENA TEUCRIIFOLIA Mart. & Gal.

Additional & emended bibliography: Schau. in A. DC., Prodr. 11: 553--555. 1847; Buek, Gen. Spec. Syn. Candoll. 3: 494 & 496. 1858; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke, Phytologia 28: 398--399 & 432. 1974; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 111. 1975; Moldenke, Phytologia 36: 149. 1977.

Additional citations: MEXICO: México: Pringle 4180 (Mu--1778). Nuevo León: Beaman 2667 (Ln--170700), 4460 (Ln--171523). San Luis Potosí: Schaffner s.n. [San Luis Potosí, 1875-79] (Mu--1562). Veracruz: Dodds 99 (Ln--199254); Troll 129 (Mu).

VERBENA TEUCRIIFOLIA var. COROLLULATA Perry

Additional bibliography: Moldenke, Phytologia 28: 398--399 & 432. 1974.

VERBENA THYMOIDES Cham.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 496. 1858; Moldenke, Phytologia 28: 399. 1974.

Lindeman reports finding this plant along roadsides and the corollas on his no. ICN.20891 are said by him to have been "blue" when fresh, while those on Valls & al. 2127 were "red".

Additional citations: BRAZIL: Rio Grande do Sul: Lindeman ICN. 20891 (Ut--320463); Valls & al. 2127 [Herb. ICN.10131] (Ut--320462). State undetermined: Sellow s.n. [Brasilia] (Mu--397--cotype).

## VERBENA TOWNSENDII Svenson

Additional synonymy: Verbena townsendii Svenson ex Balgooy, Pacif. Pl. Areas 3: 245, sphalm. 1975.

Additional bibliography: Moldenke, Phytologia 24: 243. 1972; Balgooy, Pacif. Pl. Areas 3: 245. 1975; Moldenke, Phytologia 36: 302. 1977; Van der Werff, Bot. Notiser 130: 96. 1977.

Van der Werff (1977) reduces V. galapagosensis Moldenke, V. stewartii Moldenke, and V. glabrata var. temuispicata Moldenke to synonymy under what he refers to as a very variable V. townsendii, citing his nos. 1172, 1192, 1218, 1897, 2124, 2152, 2280, & 2286 as well as Adersen 486, 512, 543, 572, 913, 920, 944, 969, 1148, & 1189, Hendrix s.n., Howell 9007, Stewart 3317, 3318, 3319, & 3320, and Vagvolgri s.n.

## VERBENA TRIFIDA H.B.K.

Additional bibliography: G. Don in Loud., Hort. Brit., ed. 1, 247 (1830) and ed. 2, 247. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; G. Don in Loud., Hort. Brit., ed. 3, 247. 1839; Sweet, Hort. Brit., ed. 3, 553. 1839; Buek, Gen. Spec. Syn. Candoll. 3: 496. 1858; Moldenke, Phytologia 28: 399. 1974; Soukup, Biota 11: 19. 1976.

Duque-Jaramillo describes this plant as a subshrub, 70 cm. tall, with the corollas "blanco-rosadas", and found it growing at 2625 m. altitude.

Don (1830) calls this the "trifid vervain" and claims that it was introduced into cultivation in English gardens from Mexico in 1818.

Additional citations: COLOMBIA: Cundinamarca: Duque-Jaramillo 2667 (N).

## xVERBENA TRINITENSIS Moldenke

Additional bibliography: Moldenke, Phytologia 24: 237 & 244. 1972.

## VERBENA TRISTACHYA Troncoso &amp; Burkart

Additional & emended bibliography: Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 715 (1969) and imp. 2, 715. 1974; Moldenke, Phytologia 30: 173. 1975.

## VERBENA TUMIDULA Perry

Additional bibliography: G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Moldenke, Phytologia 28: 399. 1974.

Chiang and his associates encountered this rare plant in "calcareous soil of izotal or encinar (almost chaparral) on steep limestone slopes and canyons", associated with Yucca carnerosana, Dasy-lirion, Nolina, and Quercus spp., at 1750--1775 m. altitude, flowering and fruiting in September.

Additional citations: MEXICO: Coahuila: Chiang C., Wendt, & Johnston 9223b (Id).

## VERBENA URTICIFOLIA L.

Additional & emended bibliography: L., Hort. Cliff., imp. 1, 11. 1737; R. A. Salisb., Prodr. 71. 1796; Stokes, Bot. Mat. Med. 1: 40.

1812; Sweet, Hort. Brit., ed. 1, 1: 325. 1826; G. Don in Loud., Hort. Brit., ed. 1, 246 (1830) and ed. 2, 246. 1832; Loud., Hort. Brit., ed. 2, 552. 1832; G. Don in Loud., Hort. Brit., ed. 3, 246. 1839; Sweet, Hort. Brit., ed. 3, 553. 1839; Buek, Gen. Spec. Syn. Candoll. 3: 494 & 496. 1858; Paine, Ann. Rep. Univ. N. Y. 18: [Pl. Oneida Co.] 109. 1865; Kuntze, Rev. Gen. Pl. 2: 510. 1891; Conard, Pl. Iowa 44. 1951; E. R. Spencer, Just Weeds, ed. 2, xii, 199—201, & 332, fig. 64. 1957; R. A. Davidson, State Univ. Iowa Stud. Nat. Hist. 20 (2): 77. 1959; Hall & Thompson, Cranbrook Inst. Sci. Bull. 39: 74. 1959; Cooperrider, State Univ. Iowa Stud. Nat. Hist. 20 (5): 70. 1962; L., Hort. Cliff., imp. 2, 11. 1968; E. R. Spencer, All About Weeds xii, 199—201, & 332, fig. 64. 1968; Barker, Univ. Kans. Sci. Bull. 48: 571. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717. 1969; G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Hathaway & Ramsey, Castanea 38: 77. 1973; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 2, 717. 1974; E. T. Browne, Castanea 39: 183. 1974; R. D. Gibbs, Chemotax. Flow. Pl. 3: 1753—1755 (1974) and 4: 2295. 1974; S. B. Jones, Castanea 39: 137. 1974; León & Alain, Fl. Cuba, imp. 2, 2: 281. 1974; Rouseeau, Géogr. Florist. Qué. [Trav. Doc. Cent. Étud. Nord 7:] 377, 467, 479, 504, 516, 644, & 788, map 829. 1974; Van Saun & Kemp, Bull. Torrey Bot. Club 101: 371. 1974; [Bard], Bull. Torrey Bot. Club 102: 431. 1975; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1396, 1399, & 1775. 1975; Hocking, Excerpt. Bot. A.26: 6. 1975; Kooiman, Act. Bot. Neerl. 24: 464. 1975; A. L. Moldenke, Phytologia 32: 375. 1975; Perkins, Estes, & Thorp, Bull. Torrey Bot. Club 102: 194—198. 1975; H. D. Wils., Vasc. Pl. Holmes Co. Cat. 54. 1975; Moldenke, Phytologia 30: 146, 168, 169, & 173—178 (1975), 31: 412 (1975), and 34: 247, 249, & 250. 1976; Anon., Biol. Abstr. 61: AC1.732. 1976; Van Bruggen, Vasc. Pl. S. Dak. 369, 536, & 537. 1976; [Voss], Mich. Bot. 15: 237. 1976; Ziegler & Sohmer, Contrib. Herb. Univ. Wisc. LaCrosse 13: 16. 1976; Greller, Bull. Torrey Bot. Club 104: 176. 1977; Moldenke, Phytologia 36: 28, 29, 36, 134, 135, 217, 221, 228, 229, 297, & 303—306. 1977; F. H. Montgomery, Seeds & Fruits 202, fig. 3, & 230. 1977.

Additional illustrations: E. R. Spencer, Just Weeds [200], fig. 64. 1957; E. R. Spencer, All About Weeds [200], fig. 64. 1968; F. H. Montgomery, Seeds & Fruits 202, fig. 3. 1977.

Don (1830) calls this species the "nettle-leaved vervain" and says that it was introduced into cultivation in English gardens from North America in 1683, while what he calls V. diffusa, the "diffuse vervain", was introduced from North America in 1818.

Wilson (1975) encountered V. urticifolia in alluvial woods and low fields in Ohio. Hathaway & Ramsey (1973) found it in Pittsylvania County, Virginia, and Browne (1974) in Stone County, Arkansas. Spencer (1957, 1968) avers that the species is native to "Tropical America", but this is erroneous: it is a purely east-temperate North American plant. Tans reports it "common in heavily grazed pastures in sunny sites on upland soil" and growing with Cirsium canadense, C. vulgare, Ambrosia trifida, and A. artemisii-

folia in Wisconsin. Davidson (1959) declares that in Iowa it occurs "Usually in alluvial thickets and open places; frequent", while Cooperrider (1962) refers to it as "Common. Alluvial thickets and woods; roadside thickets". In Kansas Barker (1969) reports it as "Common, in floodplain woods and on wooded slopes...throughout the area". Merxmüller found it "verwildert" in Germany.

Other recent collectors refer to this plant as "upright, with small white flowers" and have encountered it in shaded waste places, swamps, ditches in open pastures, and open fields, in sandy soil, along roadsides, in open areas around fields, in open grassy sandy soil along rivers, and in "low semi-wet spots in Pinus taeda forests", associated with Rubus, Ambrosia, Cassia, and Sesbania. Claycomb avers that it is "rare" in Lafayette Parish, Louisiana, but in other parts of that state Allen records it as "locally frequent in open areas associated with Polygonum" and Wurzlów says "common in waste places and roadsides".

The corollas are said to have been "white", as usual, on C. A. Allen 1161, C. A. Brown 3893, Curry, Martin, & Allen 305 & 390, and H. R. Wilson 302.

Gibbs (1974) reports cyanogenesis and leucoanthocyanin absent from the leaves of V. urticifolia, syringin absent from the stems, and the Ehrlich test giving negative results in the leaves.

Perkins and his associates (1975) report that V. urticifolia is highly autogamous, nectar is present in the flowers but not in sufficient quantity for measurement, "Wilting of the persistent corolla.....brings the pollen into contact with the stigma, as evidenced by pollen tube growth on stigmas of bagged inflorescences", the corollas are the smallest (2 mm.) of the 4 species studied. "Verbena urticifolia produces relatively taller plants (45--135 cm.) and an inflorescence pattern similar to V. halei, but because it has more branches (5--114, mean = 40.4), and the distance between the flowers is only about 2.1 mm, the inflorescences appear denser!" They found the following insects visiting the flowers: Diptera: Allograpta sp., Baccha sp. (with Verbena pollen on head), Dolichopodidae sp., Paragus sp., Systropus sp. (with pollen on head), Hymenoptera: Dialictus sp. (with pollen on head), Sphecodes sp., and Lepidoptera: Leptotes marinus. They found 4 plants with 6219 potential seeds had a 66.5 percent seed-set when insect-visited, while 8 bagged plants, with 10,653 potential seeds, had a 47.3 percent seed-set.

Montgomery (1977) describes the seeds as "Nutlets 1.8 x 0.7 x 0.6 mm, rounded dorsal surface obscurely veined and finely reticulate".

Material has been misidentified and distributed in some herbaria as V. scabra Vahl. On the other hand, the J. A. Churchill s.n. and Tans 1454-3, distributed as V. urticifolia, actually represent its var. leiocarpa Perry & Fernald, M. F. Spencer 994 is V. lasiostachys Link, Robinette 203 is V. halei Small, and C. A. Brown 4084a, Eggers 996, Lindheimer 1077, Sintenís 767, Stam 60, and Thomas & al. 10859

are V. scabra Vahl.

Additional citations: NEW JERSEY: Union Co.: Moldenke & Moldenke 30154 (W). PENNSYLVANIA: Dauphin Co.: Moldenke & Moldenke 31156 (Ut). Northampton Co.: Herb. Schreber s.n. [Bethlehem] (Mu--403), s.n. [Nazareth, 1787] (Mu--402). Schuylkill Co.: Moldenke & Moldenke 31160 (Ac, Ld, Mu). County undetermined: Herb. Zuccarini s.n. [e Pennsylvania] (Mu--407). VIRGINIA: Nelson Co.: Freer, Ramsey, & Ramsey 17334 (Lc). MISSISSIPPI: County undetermined: Herb. Kummer s.n. [Mississippi] (Mu--1270). OHIO: Hamilton Co.: Frank s.n. [1837] (Mu). ILLINOIS: Adams Co.: Purpus 132 (Mu--4291). INDIANA: Marion Co.: Frazer s.n. [July 8, 1885] (Lc). Tippecanoe Co.: Bresinsky s.n. [2.9.1967] (Mu). MICHIGAN: Ingham Co.: Flanders 110 (Ln--226391); W. D. Stevens 1599 (Ln--237018). Wayne Co.: G. Stewart s.n. [Aug. 1898] (Ln--142429). WISCONSIN: Dane Co.: Tans 1478-20 (Ts). Jefferson Co.: Tans 1475-1 (Ts). MISSOURI: Marion Co.: J. Davis s.n. [25-7-18] (Mu). Pulaski Co.: Meebold 25489 (Mu). Saint Louis: Goehring 427 (Lv); Mühlenbeck 1293 (Mu). County undetermined: Martens s.n. (Mu). LOUISIANA: Bossier Par.: Correll & Correll 10057 (Lv). East Baton Rouge Par.: C. A. Brown 1071 (Lv); Hunt 6 (Lv). Lafayette Par.: Claycomb s.n. [June 25, 1942] (Lv). Lincoln Par.: J. A. Moore 5370 (Lv). Pointe Coupee Par.: C. A. Brown 3893 (Lv); M. Chaney 42 (Lv). Saint Helena Par.: C. M. Allen 349 (Lv), 1161 (Lv); Kirkpatrick 16 (Lv). Saint Tammany Par.: Arsène 11083 (Lv), 12069 (Lv). Tangipahoa Par.: H. R. Wilson 302 (Lv), 419 (Lv). Terrebonne Par.: Arceneaux 383 (Lv); Wurzlow s.n. [June 12, 1912] (Lv, Lv). West Feliciana Par.: Curry, Martin, & Allen 305 (Lv), 390 (Lv). GERMANY: Merxmüller 14338 (Mu). CULTIVATED: Germany: Herb. Hort. Monac. s.n. [20.IX.04] (Mu); Herb. Zuccarini s.n. [Hort. Bot. Monac.] (Mu--408, Mu--410); Prince Paul of Wurtemberg s.n. [Hort. Mergentheim 1840] (Mu--1586). LOCALITY OF COLLECTION UNDETERMINED: Herb. Mus. Bot. Landshuth s.n. (Mu--400); Herb. Reg. Monac s.n. (Mu--398); Herb. Schreber 279 [e Carolina] (Mu--401), s.n. [ex America boreali] (Mu--404), s.n. (Mu--405); Herb. Schmiedelian s.n. (Mu--400); Herb. Zuccarini s.n. (Mu--409); Hiendlmayr s.n. (Mu--1274); Hooker s.n. [Un. States] (Mu--414); Prince Paul of Wurtemberg s.n. [Verein. St. 1832] (Mu--1585).

VERBENA URTICIFOLIA var. LEIOCARPA Perry & Fernald

Additional bibliography: Hall & Thompson, Cranbrook Inst. Sci. Bull. 39: 74. 1959; G. W. Thomas, Tex. Pl. Ecol. Summ. 78. 1969; D. S. & H. B. Correll, Aquat. & Wetland Pl. SW. U. S., imp. 2, 2: 1396, 1399, & 175. 1975; Moldenke, Phytologia 30: 176 & 177 (1975), 34: 247 (1976), and 36: 29 & 297. 1977.

Tans found this variety "common in heavily grazed pastures on nearly level upland ground", growing in association with Carduus nutans, Verbena stricta, V. hastata, and Verbascum thapsus, in Wis-

consin, flowering as early as May, the corollas white. Churchill encountered it in pastures and on shaley lake shores. Hall & Thompson (1959) report it from Oakland County, Michigan, where it grows "In open woods, along roadsides, and in meadows. Occasional."

Additional citations: NEW YORK: Schuyler Co.: J. A. Churchill s.n. [23 August 1937] (Ln—203427). NEW JERSEY: Union Co.: Moldenke & Moldenke 30953 (Ac, Ld, Tu). VIRGINIA: Surrey Co.: J. A. Churchill s.n. [22 August 1970] (Ln—230920). WISCONSIN: Walworth Co.: Hansen & Tans 1422 (Ts); Tans 1454-3 (Ts). MISSOURI: Shannon Co.: Meebold 25328 (Mu). LOCALITY OF COLLECTION UNDETERMINED: Herb. Schmieidelian s.n. [America borealis] (Mu—399).

#### VERBENA VALERIANOIDES H.B.K.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 496. 1858; Robledo, Bot. Med. 392. 1924; Moldenke, Phytologia 30: 178. 1975; López-Palacios, Revist. Fac. Farm. Univ. Los Andes 17: 50. 1976.

Robledo (1924) records the popular name, "verbena", for this plant. López-Palacios refers to it as "hierba de unos 60—80 cms. Hojas mas o menos lineales. Cabezuelas reducidas y congestas" and found it growing at 2650 m. altitude, flowering in August. He is of the opinion that his no. 3639 represents a natural hybrid with V. litoralis H.B.K. because the "Hojas basales con las de V. litoralis y las superiores como las de V. valerianoides; cabezuelas como las de ésta última." In a letter to me, dated January 16, 1976, he says "3639 queda definitivamente en Verbena valerianoides HBK. Habrá que completar la descripción de HBK haciendo notar la variación de las hojas inferiores según sus observaciones. No vale la pena hacer una separación, ni siquiera de forma." In his 1976 publication he says: "Schauer la separa de la V. litoralis por sus hojas enteras y lineales, y de esa manera la describe Bonpland; pero ello no es absolutamente cierto. encontrándose algunas hojas basales anchas y de borde dentado, muy similares de las de V. litoralis; López-Palacios 3639 (COL), Bogotá."

Additional citations: COLOMBIA: Cundinamarca: López-Palacios 3637 (N, Z), 3639 (N, Z).

#### VERBENA VARIABILIS Moldenke

Additional bibliography: Moldenke, Phytologia 24: 252. 1972; Soukup, Biota 11: 19. 1976.

#### VERBENA VILLIFOLIA Hayek

Additional bibliography: Moldenke, Phytologia 24: 252. 1972; Soukup, Biota 11: 19. 1976.

#### VERBENA VIOLATA Rojas

Additional & emended bibliography: Krapovickas, Bol. Soc. Argent. Bot. 11, Supl. 269. 1970; Moldenke, Phytologia 30: 178 (1975)

and 31: 388. 1975.

VERBENA WEBERBAUERI Hayek

Additional bibliography: Moldenke, *Phytologia* 24: 252—253. 1972; Soukup, *Biota* 11: 19. 1976.

VERBENA WRIGHTII A. Gray

Additional & emended bibliography: G. W. Thomas, *Tex. Pl. Ecol. Summ.* 78. 1969; Bolkh., Grif, Matvej., & Zakhar., *Chrom. Numb. Flow. Pl.*, imp. 1, 717 (1969) and imp. 2, 717. 1974; E. H. Jordan, *Checklist Organ Pipe Natl. Mon.* 7. 1975; Moldenke, *Phytologia* 30: 178—179 (1975), 34: 251 (1976), and 36: 124, 128, 147, & 148. 1977.

The corollas are described as having been "blue" on Semple & Love 321 and these collectors encountered the plant in dry sandy soil near roadsides. On Van Deventer & Van Deventer s.n. [28 March 1976] the corollas are said to have been "light-purple".

Higgins has found V. wrightii in limestone soil of oak-juniper communities and in sandy soil in short-grass prairie communities, as well as in "rocky or gravelly limestone with sotol-Acacia association", while Lehto and his associates encountered it among volcanic rocks. Weber & Livingston found it growing on steep shale hillsides; Sperry refers to it as "frequent" in Pecos County, Texas. Wendt and his associates report it from calcareous gravel "in matorral subdesértico con espinosas laterales y inerme on steep-walled narrow limestone canyons", associated with Acacia berlandieri and Eupatorium solidaginifolium. Stotz found it to be "fairly common in rocky wash lined with Prosopis and Acacia". Thomas (1969) calls it the "Wright verbena".

The Dziekanowski, Dunn, & Bennett 2393 and S. Stephens 75643, distributed as V. wrightii, actually are V. ambrosifolia Rydb., while D. Howe s.n. [1 October 1968] is V. ambrosifolia f. eglandulosa Perry, and Higgins 8790 and L. M. Andrews 259 are V. gooddingii Briq.

Additional citations: COLORADO: Archuleta Co.: Weber & Livingston 6258 (Mi). TEXAS: El Paso Co.: Meebold 24224 (Mu). Hudspeth Co.: Higgins 8552 (N). Pecos Co.: Semple & Love 321 (W—2732739); Sperry 3081 (Sd—70647). NEW MEXICO: Bernalillo Co.: Meebold 22491 (Mu). Dona Ana Co.: Meebold 26694 (Mu). Eddy Co.: Higgins, Higgins, & Higgins 9849 (N). Grant Co.: O. E. Metcalfe 126 (Mu—4104). San Miguel Co.: Higgins 8884 (N). ARIZONA: Apache Co.: Lehto, McGill, Nash, & Pinkava 11566 (W—2734658). Graham Co.: Stotz 16 (N). Santa Cruz Co.: Van Deventer & Van Deventer s.n. [28 March 1976] (Ld). MEXICO: Coahuila: Wendt, Chiang, & Johnston 9279a (Ld).

VERBENA XUTHA Lehm.

Additional synonymy: Verbena xatha Lehm. ex Moldenke, *Phytolo-*

gia 34: 279, in syn. 1976. Verbena virginianum L. ex Moldenke, Phytologia 34: 279, in syn. 1976.

Additional & emended bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 495 & 496. 1858; G. W. Thomas, Tex. Pl. Ecolog. Summ. 78. 1969; Bolkh., Grif, Matvej., & Zakhar., Chrom. Numb. Flow. Pl., imp. 1, 717 (1969) and imp. 2, 717. 1974; Moldenke, Phytologia 30: 179--180 (1975), 34: 250, 251, & 279 (1976), and 36: 29, 124, 277, & 294. 1977.

Recent collectors refer to this plant as upright, with pubescent "flowers" and no fragrance. They have encountered it in sandy soil, fallow fields, open dry roadsides, on the river side of levees, and on "spoils" with Bermuda and Dallas grass. In addition to the months previously reported, it has been collected in fruit in April. Piehl refers to it as infrequent in pastures in Louisiana, where, however, Spindler reports it as a "frequent perennial in vacant lots" and Hester found it plentiful in woods and also plentiful along roadsides. Demaree found it "common in bottoms" at 320 feet altitude in Arkansas.

Thomas (1969) calls this species the "coarse verbena", while Claycomb calls it "blue vervain".

The corollas are said to have been "lavender" on Piehl s.n., "violet" on Schroer 71, "light-purple" on Spindler 71, and "purple" on Curry, Martin, & Allen 594.

The Montz 2485, distributed as V. xutha, actually is xV. alleni Moldenke, while Meebold 27301 is V. canescens H.B.K. and D. E. Ellis 58 is V. halei Small.

Additional citations: MISSOURI: Saint Louis: Prince Paul of Württemberg s.n. [St. Louis, 1832] (Mu--1587). ARKANSAS: Sevier Co.: Demaree 70559 (Ld). LOUISIANA: Assumption Par.: Maisonneaux s.n. [June 1917] (Lv). Cameron Par.: C. A. Brown 9272 (Lv); Schroer 71 (Lv); Spindler 71 (Lv). East Baton Rouge Par.: C. A. Brown 1063 (Lv), 1381 (Lv); T. S. Jones s.n. [May 18th 1899] (Lv); Robertson s.n. [June 5, 1899] (Lv); Simon 688 (Lv). Iberia Par.: Hester 642 (Lv). Lafayette Par.: Claycomb s.n. [July 2, 1942] (Lv). Madison Par.: Piehl s.n. [1 Oct. 1972] (Lv). Natchitoches Par.: Hester 158 (Lv). Pointe Coupee Par.: M. Chaney 402 (Lv, Lv). Red River Par.: Hester 355 (Lv). Saint Martin Par.: Correll & Correll 9447 (Lv); Hester 657 (Lv). Saint Mary Par.: Hester 796 (Lv). Terrebonne Par.: Bynum, Ingram, & Jaynes s.n. [Apr. 22, 1933] (Lv); Wurzlow s.n. [May 18, 1912] (Lv). Choupique Island: Montz 2294 (Lv). Grand Isle: C. A. Brown 1980 (Lv); Cangemi & Andrus 85 (Lv). Turnbull Island: Curry, Martin, & Allen 594 (Lv). TEXAS: Orange Co.: J. A. Churchill s.n. [1 May 1955] (Ln--204156). CULTIVATED: Germany: Prince Paul of Württemberg s.n. [Hort. Mergentheim] (Mu--1588). [to be continued]

Observations on Hawaiian Panicum and Sapindus  
Hawaiian Plant Studies 61

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Gramineae

*Panicum conjugens* Skottsbg., Göteb. Bot. Trädg.,  
Meddel. 15: 298, figs. 106, 125-135, 1944.

Lectotype: Hawaiian Islands, Kauai Island,  
Alakai, bog along trail from Lehua makanoe toward  
Kilohana, 13/8/1938, O. H. Selling 2,886 (BISH),  
here designated.

The species was based on three collections,  
without a positive designation of a holotype.  
One specimen was mentioned as a smaller form,  
a second one was said to be possibly the same.  
The third, Selling 2,886, agrees with the  
diagnosis, so it is here chosen as lectotype.

*Panicum gracilius* (Skottsbg.) comb. nov.

*P. hillebrandianum* Hitchc., var. *gracilius*  
Skottsbg., Göteb. Bot. Trädg., Meddel. 15:  
296, figs. 118-124, 1944.

*P. hillebrandianum* is native to the bogs of  
west Maui. It has the spikelets 2.7-3.3 mm long;  
first glume 0.8-2.1 mm long; second glume 2.5-3.3  
mm long; sterile lemma 2.5-3 mm long; and the  
sterile palea 1.1-1.5 mm long. *P. gracilius* of  
the Alakai bogs, Kauai, has the spikelets 2.3-2.8  
mm long; first glume 1-1.7 mm long; second glume  
2.4-2.6 mm long; sterile lemma 2.3-2.5 mm long;  
and the sterile palea 1.5-1.6 mm long.

It seems to be a clearly distinct species.

Sapindaceae

*Sapindus Thurstonii* Rock, Hawaii Board Agric. &  
For., Bull. 1: 6, fig. 2, pl. 3, 1911; Fedde,  
Repert. 10: 368, 1912.

*S. saponaria* L., var. *Thurstonii* (Rock) Skottsbg.,  
Göteb. Bot. Trädg., Meddel. 2: 244, 1926.

*S. Saponaria* L., forma *inaequalis* sensu Radlk.,  
as to Hawaiian tree, Engler's Pflanzenreich  
IV, 165(3): 646, 650, 1932; Fagerlund &  
Mitchell, Hawaii Natl. Park, Nat. Hist. Bull.

9: 45, 1944; St. John, Pacif. Trop. Bot. Gard., Mem. 1: 225, 1973; non (DC.) Radlk., in Engler's Pflanzenreich IV, 165(3): 646, 1932.

S. Saponaria L., forma microcarpus sensu Radlk. as to Hawaiian tree, Engler's Pflanzenreich IV, 165(3): 646, 651, 1932, non (Jardin) Radlk., l. c. 646, 1932.

S. Saponaria, as to Hawaiian tree, Rock, Ind. Trees Hawaii, 271-273, pl. 104-106, 1913; Degener, Ferns Fl. Pl. Hawaii Natl. Park 202, 204, pl. 55, (1930); Lamoureux, Trailside Pl. Hawaii Natl. Park, 47, color fig., (1977); non L., Sp. Pl. 367, 1753.

The Hawaiian native Sapindus tree, called "mānele" or "a'e," occurring on Hawaii and Maui, in botanical classification has fluctuated from species, to forma, to variety, to a synonym of the tropical American S. Saponaria, or to two of its formae. J. F. Rock first described it in 1911 as a new species, S. Thurstonii, but in 1913, after reexamination of the material, he reduced it and made it a synonym of the American S. Saponaria. The monographer Radlkofer placed it in two of his formae under S. Saponaria. Skottsberg in 1926, on review of the problem, noted that the Hawaiian trees had leaves with a narrower leaf rachis and smaller fruit. He then published it as S. Saponaria L., var Thurstonii (Rock) Skottsberg.

During several visits to large herbaria, the writer has studied extensive collections of the tropical American S. Saponaria L. He found that it had the petioles winged or wingless; rachis winged; leaflets (6) 8-14; sepals glabrous without, or sparsely remotely puberulent at base, but the margins ciliate; petals with a 1 mm claw, white pilose, the limb 1.3-1.5 mm long, broadly elliptic, minutely ciliate, but otherwise glabrous; filaments to 3 mm in length, the lower 2/3 villous. The Hawaiian S. Thurstonii has the petioles wingless; rachis wingless; leaflets 6-10 (-12); sepals densely pilosulous without, except in the upper part covered in bud; the margins ciliate;

petals with a 0.7 mm pilose claw and a limb 2.8 mm long, 1.5 mm wide, elliptic, pilose within and without, except near the ciliate upper margin; filaments to 2.5 mm long, the lower 2/3 densely pilose.

In conclusion, the differences tabulate<sup>d</sup> above seem adequate for the recognition of the Hawaiian trees as an endemic species, properly named Sapinus Thurstonii Rock.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. LXXII

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional & emended bibliography: Rottb., Act. Lit. Univ. Hafn. 1: 272, pl. 1, fig. 1. 1778; Sweet, Hort. Brit., ed. 1, 1: 435 (1826) and ed. 2, 546 & 597. 1830; G. Don in Loud., Hort. Brit. Suppl. 1: 633. 1832; Loud., Hort. Brit., ed. 2, 719. 1832; Sweet, Hort. Brit., ed. 3, 719. 1839; G. Don in Loud., Hort. Brit. Suppl. 2: 547. 1850; Engl., Syllab. Pflanzenfam., ed. 2, 86 (1898), ed. 3, 92 (1903), ed. 5, 94 (1907), and ed. 6, 99. 1909; E. D. Merr. in Merr. & Merritt, Philip. Journ. Sci. Bot. 5: 301. 1910; Praeger, Journ. Roy. Hortic. Soc. Lond. 36: 302-303, fig. 107. 1910; Praeger, Irish Natur. 21: 26. 1912; Gilg in Engl., Syllab. Pflanzenfam., ed. 7, 138 & 139, fig. 140 (1912) and ed. 8, 140 & 141, fig. 140. 1919; Fedde in Just, Bot. Jahresber. 44: 19 (1922) and 45 (1): 517, 520, & 549. 1923; Fedde & Schust. in Just, Bot. Jahresber. 45 (1): 20. 1923; Gilg in Engl., Syllab. Pflanzenfam., ed. 9 & 10, 152, fig. 144. 1924; Kräusel in Just, Bot. Jahresber. 44: 1161 & 1163. 1926; Fedde in Just, Bot. Jahresber. 44: 1415. 1927; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 154, fig. 144. 1936; León, Fl. Cuba, imp. 1, 1: 278-284, 423, 426, 428, 435, & 436, fig. 112 & 113. 1946; M. R. Henderson, Malay. Nat. Journ. 6: 212. 1950; Gaussen, Viart, Legris, & Labroue, Trav. Sect. Scient. Techn. Inst. Franç. Pond. Hors Ser. 5: 61. 1965; Boivin & Cayouette, Naturaliste Canad. 94: 524. 1967; Naik, Journ. Indian Bot. Soc. 52: 108-113. 1973; Lepage, Naturaliste Canad. 101: 928. 1974; Rousseau, Géogr. Florist. Qué. [Trav. Doc. Cent. Étud. Nord 7:] 120-121, 382, 470, 480, 498, 550, 586, 625, 705, & 762, map 221 & 222. 1974; Satake, Journ. Jap. Bot. 49: 180-183, 237-240, & 313-314. 1974; Bole, Excerpt. Bot. A.26: 302. 1975; Cárdenas de Guevara, Act. Bot. Venez. 10: 23, 35, 39, & [69]. 1975; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 61. 1975; Hocking, Excerpt. Bot. A.26: 6, 89, & 90. 1975; Hurusawa, Excerpt. Bot. A. 26: 99. 1975; J. A. Steyerl., Act. Bot. Venez. 10: 220, 225, 226, & 232. 1975; R. D. Wood, Hydrobot. Meth. 15. 1975; Anon., Biol. Abstr. 61: AC1.298, AC1.667, & AC1.718. 1976; Duke, Phytologia 34: 24. 1976; Fleming, Genelle, & Long, Wild Fls. Fla. 25. 1976; Follmann-Schrag, Excerpt. Bot. A.26: 508 & 513. 1976; Hocking, Excerpt. Bot. A.28: 259. 1976; Keys, Chinese Herbs 290 & 374. 1976; Krug, Excerpt. Bot. A.26: 415. 1976; Lakela, Long, Fleming, & Genelle, Pl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 38-39, 159, & 172. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, x, 17, 259-262, 938, 944, & 958. 1976; A. L. Moldenke, Phytologia 35: 62. 1976; Moldenke & Sm. in Reitz, Fl. Illus. Catar. I Erio. [1]-103. 1976; Monteiro-Scanavacca & Mazzoni, Bol. Bot. Univ. S. Paulo 4: 23-30 & [105]-111, fig. 1-6. 1976; Monteiro-Scanavacca, Mazzoni, & Giulietti, Bol. Bot. Univ. S. Paulo 4: [61]-72, fig. 1-15. 1976; Rogerson & Becker, Bull. Torrey Bot.

Club 103: 145. 1976; Soukup, Biota 11: 22. 1976; J. L. Thomas, Bull. Ala. Mus. Nat. Hist. 2: 9. 1976; Moldenke, Phytologia 34: 247--249, 252--254, 256--260, 262--268, 271--278, 281, 390--406, 485--497, 499--503, 505--509, & 511 (1976), 35: 14--36 (1976), 35: 109--131, 252--264, 277--322, 332--364, 420--458, & 507--511 (1977), and 36: 28--32, 34--40, 42, 43, 45, 47, 49--51, 54--85, & 116. 1977; Moldenke, Biol. Abstr. 63: 2452 & 2461. 1977; A. L. Moldenke, Phytologia 36: 416. 1977; F. H. Montgomery, Seeds & Fruits 108 & 219, fig. 4. 1977; Rogerson, Becker, & Prince, Bull. Torrey Bot. Club 104: 82. 1977.

#### BLASTOCAULON Ruhl.

Additional bibliography: Rousseau, Géogr. Florist. Qué. [Trav. Doc. Cent. Étud. Nord 7:] 120--121, 382, 470, 480, 498, 550, 625, 705, & 762, maps 221 & 222. 1974; Follmann-Schrag, Excerpt. Bot. A.26: 503. 1976; Moldenke, Phytologia 34: 390--391 & 499 (1976), 35: 14 (1976), and 35: 287, 288, 309, & 407. 1977; F. H. Montgomery, Seeds & Fruits 108 & 219, fig. 4. 1977.

#### CARPTOTEPALIA Moldenke

Additional bibliography: Cárdenas de Guevara, Act. Bot. Venez. 10: 36 & [69]. 1975; Follmann-Schrag, Excerpt. Bot. A.26: 504. 1976; Moldenke, Phytologia 34: 272, 391, & 500 (1976), 35: 31 (1976), and 35: 507. 1977.

#### COMANTHERA L. B. Sm.

Additional bibliography: Cárdenas de Guevara, Act. Bot. Venez. 10: 36 & [69]. 1975; Follmann-Schrag, Excerpt. Bot. A.26: 508. 1976; Moldenke, Phytologia 34: 391--392 & 501 (1976), 35: 306, 359, & 507 (1977), and 36: 74 & 75. 1977.

#### COMANTHERA KEGELIANA (Körn.) Moldenke

Additional bibliography: Moldenke, Phytologia 34: 391--392 (1976), 35: 306 & 359 (1977), and 36: 74 & 75. 1977.

#### ERIOCAULON Gron.

Additional & emended bibliography: Sweet, Hort. Brit., ed. 1, 1: 435 (1826) and ed. 2, 546 & 597. 1830; Loud., Hort. Brit., ed. 2, 719. 1832; G. Don in Loud., Hort. Brit. Suppl. 1: 633. 1832; Sweet, Hort. Brit., ed. 3, 719. 1839; G. Don in Loud., Hort. Brit. Suppl. 2: 547. 1850; Engl., Syllab. Pflanzenfam., ed. 2, 86 (1898), ed. 3, 92 (1903), ed. 5, 94 (1907), and ed. 6, 99. 1909; Praeger, Journ. Roy. Hort. Soc. Lond. 36: 302--303, fig. 107. 1910; Praeger, Irish Natur. 21: 26. 1912; Gilg in Engl., Syllab. Pflanzenfam., ed. 7, 138 (1912) and ed. 8, 140. 1919; Fedde & Schust. in Just, Bot. Jahresber. 44: 19. 1922; Fedde in Just, Bot. Jahresber. 45 (1): 520. 1923; Fedde & Schust. in Just, Bot. Jahresber. 45 (1): 20. 1923; Gilg in Engl., Syllab. Pflanzenfam., ed. 9 & 10, 152. 1924; Kräusel in Just, Bot. Jahresber. 44: 1161 & 1163. 1924; Fedde in Just, Bot. Jahresber. 44: 1415. 1927; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 154. 1936; León, Fl. Cuba, imp. 1, 1: 278--

284 & 423, fig. 112. 1946; M. R. Henderson, Malay. Nat. Journ. 6: 202. 1950; K. Jones, Taxon 9: 183. 1960; Lam & Leenhouts, Blumea 10 (2): xvi. 1960; Gaussen, Viart, Legris, & Labroue, Trav. Sect. Scient. Techn. Inst. Franç. Pond. Hors Ser. 5: 61. 1965; Boivin & Cayouette, Naturaliste Canad. 94: 524. 1967; Naik, Journ. Indian Bot. Soc. 52: 108--113, fig. 1--3. 1973; Lepage, Naturaliste Canad. 101: 928. 1974; Rousseau, Géogr. Florist. Qué. [Trav. Doc. Cent. Étud. Nord 7:] 120, 382, 470, 480, 498, 509, 550, 625, 705, & 762, maps 221 & 222. 1974; Satake, Journ. Jap. Bot. 49: 180--183, 237--240, & 313--314. 1974; Cárdenas de Guevara, Act. Bot. Venez. 10: 36--37 & [69]. 1975; Hinton & Rzedowski, Anal. Esc. Nac. Cienc. Biol. 21: 61. 1975; Bole, Excerpt. Bot. A.26: 302. 1975; Hocking, Excerpt. Bot. A.26: 89 & 90. 1975; Hurusawa, Excerpt. Bot. A.26: 99. 1975; J. A. Steyerl., Act. Bot. Venez. 10: 220, 225, 226, & 232. 1975; R. D. Wood, Hydrobot. Meth. 15. 1975; Duke, Phytologia 34: 24. 1976; Fleming, Genelle, & Long, Wild Fls. Fla. 24. 1976; Follmann-Schrag, Excerpt. Bot. A.26: 508. 1976; Keys, Chinese Herbs 290 & 374. 1976; Hinton, Excerpt. Bot. A.26: 415. 1976; Lakela, Long, Fleming, & Genelle, Fl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 38 & 159. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, x, 17, 259--261, & 938. 1976; A. L. Moldenke, Phytologia 35: 62. 1976; Moldenke & Sm. in Reitz, Fl. Illus. Catar. I Erio: 4--40, 43, 49, 55, 58, 67, 73, 89, 94, 95, & 98--100, pl. 1--5. 1976; Monteiro-Scanavacca & Mazzoni, Bol. Bot. Univ. S. Paulo 4: [23], 24, & 27. 1976; Monteiro-Scanavacca, Mazzoni, & Giulietti, Bol. Bot. Univ. S. Paulo 4: 65 & 66. 1976; J. L. Thomas, Bull. Ala. Mus. Nat. Hist. 2: 9. 1976; Moldenke, Phytologia 34: 248, 249, 252, 254, 256, 260, 262--268, 273, 274, 277, 278, 392--406, 485--497, 502, & 503 (1976), 35: 35, 36, & 62 (1976), 35: 116, 117, 121--124, 128, 129, 131, 254, 256, 286, 288, 289, 292, 295, 303, 309, 310, 317, 318, 320--322, 341, 347, 350, 354, 359, 421--423, 425--427, 429, 454, 455, 457, & 508 (1977), and 36: 28, 30, 34, 37--40, 42, 56, 57, 68, 72, 80--82, & 84. 1977; Moldenke, Biol. Abstr. 63: 2461. 1977; A. L. Moldenke, Phytologia 36: 416. 1977.

Sweet (1839) classifies this genus in the Restiaceae, as was done also by many other early authors.

The J. Kohlmeyer 2039, distributed as Eriocaulon sp., actually is Lachnocaulon anceps (Walt.) Morong, while Kohlmeyer 2358 [Herb. Hamann 1243] is Mesanthemum radicans (Benth.) Körn., Hamann 2895 is Syngonanthus huberi Ruhl., and Hamann 2894 is Syngonanthus longipes Gleason.

#### ERIOCAULON ACHITON Körn.

Additional bibliography: Moldenke, Phytologia 34: 264, 392, & 399. 1976.

#### ERIOCAULON ALPESTRE Hook. f. & Thoms.

Additional synonymy: Eriocaulon alpestre var. alpestre [Hook. f. & Thoms.] apud Van Royen, Blumea 10: 127. 1960.

Additional bibliography: Van Koyen, *Blumea* 10: 127. 1960; Moldenke, *Phytologia* 34: 393, 488, & 491 (1976) and 36: 42. 1977.

ERIOCAULON ALTOGIBBOSUM Ruhl.

Additional bibliography: Moldenke, *Phytologia* 29: 88. 1974.  
Hatschbach encountered this plant on "margens arenosas de corrego, zona de cerrado", flowering and fruiting in October.  
Additional citations: BRAZIL: Goiás: Hatschbach 38920 (Z).

ERIOCAULON AQUATICUM (J. Hill) Druce

Additional synonymy: Eriocaulon septangulare var. septangulare [With.] apud Rousseau, *Géogr. Florist. Qué.* [Trav. Doc. Cent. Etud. Nord 7:] 120. 1974.

Additional bibliography: Sweet, *Hort. Brit.*, ed. 1, 1: 435 (1826) and ed. 2, 546. 1830; Loud., *Hort. Brit.*, ed. 2, 719. 1832; Sweet, *Hort. Brit.*, ed. 3, 719. 1839; Engl., *Syllab. Pflanzenfam.*, ed. 2, 86 (1898), ed. 3, 92 (1903), ed. 5, 94 (1907), and ed. 6, 99. 1909; Praeger, *Journ. Hort. Soc. Lond.* 36: 302—303, fig. 107, 1910; Praeger, *Irish Natur.* 21: 26. 1912; Gilg in Engl., *Syllab. Pflanzenfam.*, ed. 7, 138 (1912), ed. 8, 140 (1919), and ed. 9 & 10, 152. 1924; Kräusel in *Just, Bot. Jahresber.* 44: 1161 & 1163. 1926; Fedde in *Just, Bot. Jahresber.* 44: 1415. 1927; Diels in Engl., *Syllab. Pflanzenfam.*, ed. 11, 154. 1936; Monteiro-Scanavacca, Mazzoni, & Giuliotti, *Bol. Bot. Univ. S. Paulo* 4: 65 & 66. 1976; Moldenke, *Phytologia* 34: 393 (1976) and 36: 57. 1977.

Additional & emended illustrations: Praeger, *Journ. Hort. Soc. Lond.* 36: fig. 107. 1910; Melchior in Engl., *Syllab. Pflanzenfam.*, ed. 12, 2: 556, fig. 230 A—C. 1964.

Loudon (1832) lists this species as a garden plant in Great Britain, introduced from Scotland (where it is native), but it is not certain that he actually means that it is (or was) in cultivation in England. He calls it the "jointed pipewort".

ERIOCAULON ARECHAVALETAE Herter

Additional bibliography: Moldenke, *Phytologia* 24: 342—343 (1972) and 33: 153 & 183. 1976.

ERIOCAULON ARENICOLA Britton & Small

Additional & emended bibliography: Fedde & Schust. in *Just, Bot. Jahresber.* 45 (1): 20. 1923; León, *Fl. Cuba*, imp. 1, 1: 280 & 423. 1946; Moldenke, *Phytologia* 32: 464. 1975.

ERIOCAULON ARGENTINUM Castell.

Additional bibliography: Moldenke, *Phytologia* 29: 90. 1974; Moldenke & Sm. in Reitz, *Fl. Ilus. Catar.* I Erio: 7, 25—28, & 98, pl. 5, fig. 8 & 9. 1976; Moldenke, *Phytologia* 36: 72. 1977.

Additional illustrations: Moldenke & Sm. in Reitz, *Fl. Ilus. Catar.* I Erio: 25, pl. 5, fig. 8 & 9. 1976.

Pedersen encountered this species in wet ground, flowering and fruiting in October.

Additional citations: ARGENTINA: Corrientes: Pedersen 9266 (N).

## ERIOCAULON ATABAPENSE Moldenke

Additional bibliography: Moldenke, *Phytologia* 29: 91. 1974; Cárdenas de Guevara, *Act. Bot. Venez.* 10: 37. 1975.

## ERIOCAULON ATRATUM Körn.

Additional bibliography: Moldenke, *Phytologia* 34: 393—394 (1976) and 35: 354. 1977.

Recent collectors describe this plant as having the inflorescence-heads "white" or "white and fluffy" or "fluffy and grayish" and have encountered it in wet places along roadsides in muddy patana grasslands, "in tussock grass and on mountain tops", and along the shady banks of streams near teafields, as well as in small areas of marshy grassland in forest openings, at 1500—2250 meters altitude, flowering in November, and both flowering and fruiting in February, March, and October. Jayasuriya & Sumithraarachchi refer to it as "common on rocky-sandy island in river".

Material has been misidentified and distributed in some herbaria as E. longicuspe Hook. f.

Additional citations: SRI LANKA: Davidse & Sumithraarachchi 8002 (W—2784452), 8035 (W—2784394); Jayasuriya & Sumithraarachchi 1567 (W—2768303); Sohmer & Waas 8722 (Lc, W—2784444); Sumithraarachchi DBS.114 (W—2767926); Sumithraarachchi & Jayasuriya DBS.178 (W—2784402).

## ERIOCAULON ATRATUM var. MAJOR Thwaites

Additional bibliography: Moldenke, *Phytologia* 34: 394 (1976) and 35: 350 & 354. 1977.

Recent collectors describe the flower-heads of this plant as "white" and have found it growing in open grass in marshy clearings of montane forests, at 2250 m. altitude, flowering in October.

Additional citations: SRI LANKA: Davidse & Sumithraarachchi 7952 (W—2784398), 8003 (W—2784453).

## ERIOCAULON AUSTRALE R. Br.

Additional bibliography: Sweet, *Hort. Brit.*, ed. 1, 1: 435 (1826) and ed. 2, 546. 1830; Loud., *Hort. Brit.*, ed. 2, 719. 1832; Sweet, *Hort. Brit.*, ed. 3, 719. 1839; Moldenke, *Phytologia* 34: 264, 265, 267, 394—395, 494, & 495 (1976) and 36: 38 & 39. 1977.

Mrs. Clemens has collected what may be this species or E. willdenovianum in highway ditches with bush margins, in swamps near the sea, and in swamps with Restio and Pimelea. Her nos. 42258, 42404, & 44153, all cited below, exhibit the very narrow and elongated basal leaves overtopping the inflorescences so characteristic of E. willdenovianum, rather than the shorter narrow ones characterizing most of the Asiatic plants referred here. These two taxa, along with the very similar E. sexangulare L., require more careful study. Balgooy's collection, also cited below, has the typical short narrow leaves and he describes

the plant as an herb with the flower-heads "gray-brown" and the anthers white. He found it growing in sandy places along streams in a water-catchment area in rainforest, at 250 m. altitude.

Both Sweet (1830) and Loudon (1832) list this plant as cultivated in England, introduced from New South Wales in 1822. They call it the "New Holland pipewort".

Additional citations: MALAYA: Penang: Balgooy 2406 (Ac). AUSTRALIA: Queensland: M. S. Clemens 42258 (Mi), 42361 (Mi), 42404 (Mi). GREAT BARRIER REEF: Stradbroke: M. S. Clemens 44153 (Mi).

ERIOCAULON AUSTRALE f. PROLIFERUM Moldenke

Additional bibliography: Moldenke, *Phytologia* 34: 265, 267, 395, & 494. 1976.

Additional citations: MALAYA: Johore: Khatijah & Bastiah KLU. 18541 (Ac--photo of type, N--photo of type, Z--photo of type).

ERIOCAULON BENTHAMII Kunth

Additional bibliography: Hinton & Rzedowski, *Anal. Esc. Nac. Cienc. Biol.* 21: 61. 1975; Moldenke, *Phytologia* 32: 465. 1975.

ERIOCAULON BREVIPEDUNCULATUM Merr., *Philip. Journ. Sci. Bot.* 2: 265. 1907 [not E. brevipedunculatum Suesseng. & Heine, 1960].

Additional bibliography: Moldenke, *Phytologia* 29: 95 (1974) and 36: 42. 1977.

ERIOCAULON BREVISCAPUM Körn.

Additional bibliography: Moldenke, *Phytologia* 32: 466 (1975) and 36: 37. 1977.

Additional citations: INDIA: Meghalaya: Myrthong 1496 (N).

ERIOCAULON BROWNIANUM Mart.

Additional bibliography: Moldenke, *Phytologia* 32: 466 & 468 (1975), 34: 395 (1976), and 36: 37. 1977.

Waas refers to this plant as an herb with "white" flower-heads and found it growing at the edge of a stream in secondary montane forest at 4400 feet altitude, flowering and fruiting in January. Bernardi refers to the leaves as "plicate" [probably meaning concuplicate] and the heads as "white". He encountered the plant at 1700 meters altitude, flowering in December.

The Comanor 980, R. W. Read 2040 & 2270, and Waas 840, distributed as E. brownianum actually are E. nilagirensis Steud. Bernardi 16094 is a mixture with var. latifolium Moldenke.

Additional citations: INDIA: Meghalaya: Myrthong 1022 (N). SRI LANKA: Bernardi 15945 (N, W--2807708), 16094 in part (W--2807707); Waas 998 (N).

ERIOCAULON BROWNIANUM var. LATIFOLIUM Moldenke

Additional bibliography: Moldenke, *Phytologia* 34: 395 (1976) and 36: 37. 1977.

Recent collectors describe the flower-heads of this plant as

"white" or "white and fluffy" and encountered it along trails and streams and in open marshy grassy areas at edges of streams, at 1700--1800 m. altitude, although Sohmer and his associates refer to it as "rare" along roads, flowering in October. Bernardi describes the plant as "herba caespitosa, caule crasso in humo, folia aequitantia sat lata!"

Additional citations: INDIA: Meghalaya: Myrthong 1325 (N). SRI LANKA: Bernardi 16093 (Mu, N); Davidse & Sumithraarachchi 7993 (W--2784400); Sohmer, Jayasuriya, & Eliezer 8347 (Lc, W--2767934); Sohmer & Waas 8699 (Lc); Sumithraarachchi & Jayasuriya DBS.190 (W--2767929).

#### ERIOCAULON CEYLANICUM Körn.

Additional bibliography: Moldenke, *Phytologia* 34: 277 & 396. 1976.

Waas refers to this plant as an herb with a "blue flower" (apparently an error in observation) and found it growing by streams, flowering and fruiting in October. Davidse refers to the flower-heads as "white" and encountered the plant "in compact patches in grassland and forest" at 7000 feet altitude.

The Read & Desautels 2272, distributed as *E. ceylanicum*, seems, rather, to be *E. dalzellii* Körn.

Additional citations: SRI LANKA: Davidse 7607 (W--2784456); Waas 117 (W--2767932).

#### ERIOCAULON CINEREUM R. Br.

Additional bibliography: Satake, *Journ. Jap. Bot.* 49: 237. 1974; Hurusawa, *Excerpt. Bot. A.* 26: 99. 1975; Keys, *Chinese Herbs* 290 & 374. 1976; Moldenke, *Phytologia* 34: 396--398, 403, 488, & 491. 1976; A. L. Moldenke, *Phytologia* 36: 416. 1977.

Additional illustrations: Keys, *Chinese Herbs* 290. 1976.

Waas refers to this plant as an herb, to 15 cm. tall, and encountered it growing at the edge of a water-hole in "secondary scrub near stream edge". Davidse & Sumithraarachchi found it "in full rain-fed pool, the plants mostly submerged, on rock outcrops with bare rocks, small grassy soil pockets, and scattered low trees, at 100 m. altitude, and describe it as having "white" flowers.

Keys (1976) reports that in China the entire plant is "Pungent, sweet" and is used as an antiphlogistic and ophthalmic, the "Dose, 5--10 gm." Bernardi refers to the flower-heads as "fuscous".

Additional citations: INDIA: Meghalaya: Myrthong 1211 (N). SRI LANKA: Bernardi 15946 (W--2807706); Davidse & Sumithraarachchi 8948 (Ld); R. W. Read 2176 (Ld); Waas 751 (W--2784493).

#### ERIOCAULON COLLETTII Hook. f.

Additional bibliography: Naik, *Journ. Indian Bot. Soc.* 52: 109--111, fig. 1. 1973; Moldenke, *Phytologia* 29: 101. 1974.

Illustrations: Naik, *Journ. Indian Bot. Soc.* 52: 109, fig. 1. 1973.

ERIOCAULON COLLINUM Hook. f.

Additional bibliography: Moldenke, Phytologia 34: 263 & 398. 1976.

Recent collectors refer to the heads of this species as "black" or "gray" and have encountered it in boggy ground, along streams, and in roadside wet places among muddy patana grasses, flowering and fruiting from February to April and in September.

The Waas 1000, distributed as E. collinum, actually is E. thwaitesii Körn. instead.

Additional citations: SRI LANKA: Jayasuriya 2393 (Ld); Read & Desautels 2274 (Ld); Sumithraarachchi DBS.113 (W-2767927); Sumithraarachchi & Jayasuriya DBS.187 (W-2767928), DBS.205 (W-2768319); Sumithraarachchi & Waas DBS.261 (W-2768302), DBS.300 (W-276923).

ERIOCAULON COMPRESSUM Lam.

Additional bibliography: Lakela, Long, Fleming, & Genelle, Fl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 38. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, 259, 260, & 938. 1976; Moldenke, Phytologia 34: 398 (1976) and 36: 57. 1977.

LeBlanc encountered this plant in open pine woodlands and cut-over marsh areas. Correll & Popenoe refer to it as growing in the mud of savanna marshes, the heads "white".

Additional citations: FLORIDA: Martin Co.: Correll & Popenoe 48037 (N). ALABAMA: Mobile Co.: LeBlanc 270 (Ac).

ERIOCAULON CRASSISCAPUM Bong.

Additional synonymy: Eriocaulon molle "Mart. ex Körn." apud Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 99, in syn. 1976.

Additional bibliography: Moldenke, Phytologia 32: 470. 1975; Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 7, 25, 32--33, & 99, pl. 5, fig. 18--23. 1976.

Additional illustrations: Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 25, pl. 5, fig. 18--23. 1976.

This species is listed by Moldenke & Smith (1976) as probably occurring in Santa Catarina, Brazil, although no actual specimens of it from that state have as yet been seen by me. The vernacular names, "capipoatinga" and "sempre-viva-do-campo", are recorded for it and it is said to flower from June to January.

ERIOCAULON CRISTATUM Mart.

Additional bibliography: Moldenke, Phytologia 32: 470 (1975), 33: 14 (1976), and 34: 400. 1976.

Additional citations: INDIA: Meghalaya: Myrthong 1021 (N), 1203 (N).

ERIOCAULON CUBENSE Ruhl.

Additional & amended bibliography: León, Fl. Cuba, imp. 1, 1: 280 & 423. 1946; Moldenke, Phytologia 32: 470. 1975.

## ERIOCAULON CUSPIDATUM Dalz.

Additional bibliography: Moldenke, *Phytologia* 32: 470. 1975.

Additional citations: INDIA: Union Territory: Vartak RD.3 (Ac).

## ERIOCAULON DALZELLII Körn.

Additional bibliography: Moldenke, *Phytologia* 32: 484. 1976.

Recent collectors have found this plant growing in boggy ground, flowering and fruiting in September, and have misidentified it as E. ceylanicum Körn.

Additional citations: SRI LANKA: Read & Desautels 2272 (Ld).

## ERIOCAULON DECANGULARE L.

Additional bibliography: Sweet, *Hort. Brit.*, ed. 2, 597. 1830; Loud., *Hort. Brit.*, ed. 2, 719. 1832; Sweet, *Hort. Brit.*, ed. 3, 719. 1839; G. Don in Loud., *Hort. Brit. Suppl.* 2: 547. 1850;

Fleming, Genelle, & Long, *Wild Fls. Fla.* 25. 1976; Lakela, Long, Fleming, & Genelle, *Fl. Tampa Bay*, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 38. 1976; Long & Lakela, *Fl. Trop. Fla.*, ed. 2, 17, 259, 260, & 938. 1976; Moldenke & Sm. in Reitz, *Fl. Ilus. Catar.* I Erio: 6 & 99. 1976; Monteiro-Scanavacca, Mazzoni, & Giulietti, *Bol. Bot. Univ. S. Paulo* 4: 65. 1976; Moldenke, *Phytologia* 34: 249, 273, 274, 277, & 398 (1976) and 36: 28 & 39. 1977.

Additional illustrations: Fleming, Genelle, & Long, *Wild Fls. Fla.* 25 (in color). 1976.

Lakela and her associates (1976) call this the "giant pipewort" and state that in the Tampa Bay area of Florida it grows in wet soil and swamps, flowering in summer. Correll & Popenoe refer to it as growing in the mud of savanna marshes and describe the flower-heads as "white".

On July 7, 1977, I personally observed this species in cultivation (very successfully!) in a greenhouse at the New York Botanical Garden. Sweet (1830), Loudon (1832), and Don (1850) all list it as among the plants cultivated in England, introduced from North America in 1826. Fleming and his associates (1976) call it by the vernacular name of "hatpins": a very appropriate name if one is old enough to remember the hatpins of ladies' millinery.

The Webster & Wilbur 3199, distributed as typical E. decangulare, is better regarded as f. parviceps Moldenke.

Additional citations: SOUTH CAROLINA: Georgetown Co.: Kohlmeyer & Kohlmeyer 324 (Hm). FLORIDA: Martin Co.: Correll & Popenoe 48038 (N).

## ERIOCAULON DECANGULARE f. PARVICEPS Moldenke

Additional bibliography: Moldenke, *Phytologia* 32: 489. 1976.

Additional citations: NORTH CAROLINA: J. Kohlmeyer 2036 (Hm). Onslow Co.: J. Kohlmeyer 2033 (Hm). County undetermined: J. Kohlmeyer 2035 [Hofmann National Forest] (Hm). TEXAS: Tyler Co.: Webster & Wilbur 3199 (Mi).

## ERIOCAULON DECEMFLOSUM Maxim.

Additional bibliography: Moldenke, *Phytologia* 29: 113. 1974; Sa-

take, Journ. Jap. Bot. 49: 314. 1974.

ERIOCAULON DEPAUPERATUM Merr. in Merr. & Merritt, Philip. Journ. Sci. Bot. 5: 336—337. 1910.

Additional & emended bibliography: E. D. Merr. in Merr. & Merritt, Philip. Journ. Sci. Bot. 5: 336—337. 1910; Moldenke, Phytologia 34: 399. 1976.

ERIOCAULON DIANAE var. LONGIBRACTEATUM Ftson

Additional bibliography: Moldenke, Phytologia 34: 392 & 399. 1976.

Maxwell describes the bracts of this plant as "gray-tan" and encountered it "in open wet sandy marsh zone near a savanna", at 75 m. altitude.

Additional citations: THAILAND: Maxwell 75-1067 (Ac).

ERIOCAULON DICTYOPHYLLUM Körn.

Additional synonymy: Eriocaulon dictyophyllum "Mart. ex Moldenke" apud Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 99, in syn. 1976. Eriocaulon fluviatile "Bong. ex Moldenke" apud Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 99, in syn. 1976. Paepalanthus dictyophyllus "Mart. ex Moldenke" apud Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 101, in syn. 1976.

Additional bibliography: Moldenke, Phytologia 29: 194 (1974), 34: 399 (1976), and 35: 121. 1976; Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 7, 25, 38—40, 99, & 101, pl. 5, fig. 32. 1976.

Illustrations: Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 25, pl. 5, fig. 32. 1976.

The vernacular names, "capim-manso", "capipoatinga", "gravatá-manso", and "sempre-viva-dos-campos", have been recorded for this species (and many others) and it is said to flower in December and January.

ERIOCAULON DIMORPHOPETALUM Moldenke

Additional bibliography: Cárdenas de Guevara, Act. Bot. Venez. 10: 37. 1975; Moldenke, Phytologia 34: 399. 1976.

ERIOCAULON DIOECUM Ruhl.

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 280 & 423. 1946; Moldenke, Phytologia 32: 490. 1976.

ERIOCAULON ECHINOSPERMOIDEUM Ruhl.

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 281 & 423. 1946; Moldenke, Phytologia 32: 490. 1976.

ERIOCAULON ECHINOSPERMUM C. Wright

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 279—280 & 423. 1946; Moldenke, Phytologia 32: 490. 1976.

## ERIOCAULON ECHINULATUM Mart.

Additional bibliography: Moldenke, *Phytologia* 32: 263 & 399—400. 1976.

The Charoenphol, Larsen, & Warncke 4684 collection, cited below, is a mixture of this species with (mostly) E. luzulaefolium Mart. It was found growing in open wet grassland at 1100 m. altitude.

Additional citations: THAILAND: Charoenphol, Larsen, & Warncke 4684 in part (Mu).

## ERIOCAULON EHRENBERGIANUM Klotzsch

Additional bibliography: Moldenke, *Phytologia* 32: 490—491 & 499 (1976) and 34: 273. 1976.

The Schaffner 31, cited below, is a mixture with E. microcephalum H.B.K.

Additional citations: MEXICO: México: Schaffner 31 in part (Ut—3286108).

## ERIOCAULON EKMANNII Ruhl.

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 280—281 & 423. 1946; Moldenke, *Phytologia* 32: 491. 1976.

## ERIOCAULON ELICHRYSOIDES Bong.

Additional bibliography: Moldenke, *Phytologia* 34: 400. 1976; Monteiro-Scanavacca & Mazzoni, *Bol. Bot. Univ. S. Paulo* 4: [23], 24, & 27. 1976.

Monteiro-Scanavacca & Mazzoni (1976) report that there is no vegetative reproduction from the apex of the inflorescence in this species (as there is in so many other species of the genus). They cite Semit 4449 from Minas Gerais, Brazil.

## ERIOCAULON FULIGINOSUM C. Wright

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 280 & 423. 1946; Moldenke, *Phytologia* 32: 492—493 & 505 (1976) ans 33: 11 & 184. 1976.

Liesner & Dwyer describe this plant as "with leaves submerged in water and heads above water of pond" and found it growing at sealevel, flowering and fruiting in January.

Additional citations: BELIZE: Liesner & Dwyer 1665 (Bm, Id).

## ERIOCAULON FUSIFORME Britton &amp; Small

Additional & emended bibliography: Fedde & Schust. in *Just, Bot. Jahrsber.* 45 (1): 20. 1923; León, Fl. Cuba, imp. 1, 1: 280 & 423. 1946; Moldenke, *Phytologia* 32: 493. 1976.

## ERIOCAULON GOMPHRENOIDES Kunth

Additional bibliography: Moldenke, *Phytologia* 29: 198. 1974; Moldenke & Sm. in Reitz, *Fl. Ilus. Catar. I Erio*: 6, 13, 15--19, & 99, pl. 2, fig. 7—12, & pl. 3 & 4. 1976.

Illustrations: Moldenke & Sm. in Reitz, *Fl. Ilus. Catar. I Erio*: 13, 16, & 17, pl. 2, fig. 7—12, & pl. 3 & 4. 1976.

The vernacular names, "capim-manso", "capipoatinga", "gravatá-

manso", and "sempre-viva-do-campo" are recorded for this species (and many others) and it is said to flower from October to December. Hatschbach encountered it on "campo locais brejosos junta a afloramentos de arenito".

It seems most unlikely to me now that the Smith, Reitz, & Klein 7683, previously cited by me as E. gomphrenoides, actually represents this taxon. On at least some plants of this collection, the sheath-apex is very plainly bilobed, which is not as it should be in E. gomphrenoides according to the original description. It seems likely to me now that this collection represents the closely related E. megapotamicum Malme which is supposed to have such sheaths.

Additional citations: BRAZIL: Paraná: Hatschbach 39220 (Ld).

#### ERIOCAULON GRAPHITINUM F. Muell. & Tate

Additional bibliography: Fedde & Schust. in Just, Bot. Jahresber. 45 (1): 20. 1923; Moldenke, Phytologia 32: 493. 1976.

#### ERIOCAULON GREGATUM Körn.

Additional bibliography: Moldenke, Phytologia 29: 198. 1974.

Additional citations: INDIA: Meghalaya: Myrthong 1051 (N).

#### ERIOCAULON HETEROLEPIS var. NIGRICANS Körn.

Additional bibliography: Moldenke, Phytologia 32: 494—495 (1976) and 36: 38. 1977.

Sinclair and his associates refer to this plant as "rare" and found it "sparingly in flower in damp places by springs" at 10,580 feet altitude, flowering in June. Material has been misidentified and distributed in some herbaria as E. beccarii Sueseng. & Heine and E. hookerianum Stapf.

Additional citations: GREATER SUNDA ISLANDS: Sabah: Sinclair, Kadim b. Tassim, & Kapis b. Sisiron 9137 (Mu).

#### ERIOCAULON HETEROPETALUM Ruhl.

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 281 & 423. 1946; Moldenke, Phytologia 32: 495. 1976.

#### ERIOCAULON HONDOENSE Satake

Additional bibliography: Moldenke, Phytologia 34: 400—401 & 404. 1976.

Additional citations: JAPAN: Honshu: Togashi MT.6849 [Fl. Jap. Exsic. 67] (N), MT.6857 [Fl. Jap. Exsic. 68] (N).

#### ERIOCAULON HUMBOLDTII Kunth

Additional bibliography: Cárdenas de Guevara, Act. Bot. Venez. 10: 36. 1975; J. A. Steyerl., Act. Bot. Venez. 10: 220, 226, & 232. 1975; Moldenke, Phytologia 34: 401. 1976.

Hatschbach has encountered this plant "nas agua razas de corre-go".

Additional citations: VENEZUELA: Bolívar: Hamann 2890 (Hm), 2891 (Hm); Hertel s.n. [Canaima, 3.4.1969] (Hm). BRAZIL: Bahia:

Hatschbach 39465 (Ld).

ERIOCAULON INFIRMUM Steud.

Additional bibliography: Moldenke, *Phytologia* 32: 495--496 (1976), 33: 9 (1976), 34: 266, 267, 401, & 494 (1976), and 36: 37 & 72. 1977.

Additional citations: INDIA: Meghalaya: Myrthong 1056 (N).

ERIOCAULON INSULARE Ruhl.

Additional & emended bibliography: León, *Fl. Cuba, imp. 1, 1*: 281 & 423. 1946; Moldenke, *Phytologia* 32: 496. 1976.

ERIOCAULON JAUENSE Moldenke

Additional bibliography: Moldenke, *Phytologia* 32: 496. 1976.

Additional citations: MOUNTED ILLUSTRATIONS: *Mem. N. Y. Bot. Gard.* 23: 849, fig. 4. 1972 (N--photo).

ERIOCAULON KLOTZSCHII Moldenke

Additional bibliography: Moldenke, *Phytologia* 29: 201. 1974.

Additional citations: GUYANA: R. Schomburgk 107 (Ut--325369B--isotype).

ERIOCAULON LACUSTRE Ruhl.

Additional & emended bibliography: León, *Fl. Cuba, imp. 1, 1*: 281 & 423. 1946; Moldenke, *Phytologia* 32: 497. 1976.

ERIOCAULON LANIGERUM H. Lecomte

Additional bibliography: Moldenke, *Phytologia* 26: 27. 1973; Satake, *Journ. Jap. Bot.* 49: 240. 1974.

ERIOCAULON LAOENSE var. MAXWELLII Moldenke, *Phytologia* 35: 109--111. 1977.

Bibliography: Moldenke, *Phytologia* 35: 109--111 (1977) and 36: 38. 1977.

Illustrations: Moldenke, *Phytologia* 35: 110. 1977.

Citations: THAILAND: Maxwell 74-376 (Ac--type, Z--isotype, Z--drawings of type).

ERIOCAULON LEPTOPHYLLUM Kunth

Additional bibliography: Moldenke, *Phytologia* 26: 460. 1973; Moldenke & Sm. in Reitz, *Fl. Ilus. Catar I Erio*: 6, 23--26, & 99, pl. 5, fig. 1--7. 1976.

Additional illustrations: Moldenke & Sm. in Reitz, *Fl. Ilus. Catar. I Erio*: 25, pl. 5, fig. 1--7. 1976.

The Pedersen 9266, distributed as E. leptophyllum and so filed in some herbaria, actually is E. argentinum Castell.

ERIOCAULON LEUCOGENES Ridl.

Additional bibliography: Fedde & Schust. in Just, *Bot. Jahresber.* 44: 19. 1922; Moldenke, *Phytologia* 26: 27. 1973.

ERIOCAULON LIGULATUM (Vell.) L. B. Sm.

Additional synonymy: Eriocaulon elichrysoides "sensu Kunth" apud Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 99, in syn. 1976. Eriocaulon kunthii var. j "Körn. ex Alv. Silv." apud Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 99, in syn. 1976.

Additional bibliography: Moldenke, Phytologia 34: 402. 1976; Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 6-11, 18, & 98-100, pl. 1. 1976.

Additional illustrations: Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 9, pl. 1. 1976.

Dombrowski refers to this plant as "abundant in brejo" (sedge meadow). The vernacular names, "capim-manso", "capipoatinga", "gravatá-manso", and "sempre-viva-do-campo", have been recorded for this (and many other) species and it is said to flower from September to November.

Additional citations: BRAZIL: Paraná: Dombrowski 6446 (Ld).

ERIOCAULON LINEARE Small

Additional bibliography: J. L. Thomas, Bull. Ala. Mus. Nat. Hist. 2: 9. 1976; Moldenke, Phytologia 34: 402 (1976) and 36: 29 & 57. 1977.

Thomas (1976) lists this species as a "Species of special concern" from the conservation standpoint in Alabama, recording it from only Escambia, Geneva, and Houston counties in that state; it is, however, also known from Covington and Baldwin counties.

ERIOCAULON LINEARIFOLIUM Körn.

Additional bibliography: Moldenke, Phytologia 32: 498. 1976.

The Anderson, Stieber, & Kirkbride "36510" cited by me in a previous installment of these notes (1973) is a typographic error for no. 36810.

ERIOCAULON LONGICUSPE Hook. f.

Additional bibliography: Moldenke, Phytologia 32: 498 (1976), 33: 10 & 14 (1976), and 34: 263. 1976.

The Jayasuriya & Sumithraarachchi 1567, distributed as E. longicuspe, actually is E. atratum Körn.

ERIOCAULON LUZULAEFOLIUM Mart.

Additional bibliography: Naik, Journ. Indian Bot. Soc. 52: 111-113, fig. 3. 1973; Bole, Excerpt. Bot. A.26: 302. 1975; Moldenke, Phytologia 32: 498. 1976.

Additional illustrations: Naik, Journ. Indian Bot. Soc. 52: 112, fig. 3. 1973.

Recent collectors have encountered this plant in open wet grasslands, at 1100-1700 m. altitude, flowering in September.

The Charoenphol, Larsen, & Warncke 4684 collection, cited below, is a mixture with (a little) E. echinulatum Mart.

Additional citations: THAILAND: Charoenphol, Larsen, & Warncke 4684 in part (Mu); Larsen & Larsen 34463 (Ac).

ERIOCAULON MAGNIFICUM Ruhl.

Additional bibliography: Moldenke, *Phytologia* 34: 403. 1976; Moldenke & Sm. in Reitz, *Fl. Ilus. Catar. I Erio*: 6, 13, 20—21, & 99, pl. 2, fig. 13—18. 1976.

Additional illustrations: Moldenke & Sm. in Reitz, *Fl. Ilus. Catar. I Erio*: 13, pl. 2, fig. 13—18. 1976.

The vernacular names, "capim-manso", "capipoatinga", "gravatá-manso", and "sempre-viva-do-campo", have been recorded for this (and many other) species and it is said to flower from September to February.

ERIOCAULON MAGNUM Abbiatti

Additional bibliography: Moldenke, *Phytologia* 34: 403. 1976. Schinini and his associates have encountered this plant "en embalsado".

Additional citations: ARGENTINA: Corrientes: Schinini & al. 12085 (Ac).

ERIOCAULON MAJUSCULUM Ruhl.

Additional bibliography: Moldenke, *Phytologia* 24: 475. 1972.

Bogner found what appears to be this species growing in a marsh, at 2200 meters altitude, flowering in March, but distributed it erroneously as Paepalanthus sp.

Additional citations: BRAZIL: Minas Gerais: Bogner 1166 (Mu).

ERIOCAULON MEGAPOTAMICUM Malme

Additional bibliography: Moldenke, *Phytologia* 34: 403 (1976) and 36: 34. 1977.

Dombrowski reports this plant "frequent" on sandy campos, flowering and fruiting in October.

Smith, Reitz, & Klein 7683, cited below, was previously cited by me as E. gomphrenoides Kunth, but seems (at least in some specimens) to have its peduncular sheath-apices definitely bilobed -- in E. gomphrenoides they are said in the original description to be truncate. It was found growing in bogs at 1650 m. altitude, flowering in November.

Additional citations: BRAZIL: Paraná: Dombrowski 6546 (Z). Santa Catarina: Smith, Reitz, & Klein 7683 (N, Z).

ERIOCAULON MELANOCEPHALUM Kunth

Additional & emended bibliography: León, *Fl. Cuba, imp. 1*, 1: 281 & 423. 1946; Moldenke, *Phytologia* 34: 256 & 403. 1976.

ERIOCAULON MICROCEPHALUM H.B.K.

Additional bibliography: Moldenke, *Phytologia* 32: 491 & 499—500 (1976), 33: 47 (1976), 35: 117, 128, 129, & 347 (1977), and 36: 30. 1977.

Weber and his associates encountered this species in a páramo bog with Azorella, Plantago rigida, Valeriana, and Ciminalis at 3310 m. altitude. Other recent collectors in Ecuador found it

"submersed in [a] small pond in areas of dry scrub 1—3 m. tall, in "xerophytic scrub 2—3 m. tall intermingled with meadows and drier grasslands", and "by small wet spring in humid páramo vegetation with an abundance of Espeletia hartwegiana", at altitudes of 2900—4350 m., flowering and fruiting in May. Humbles found it "with Espeletia". In Mexico, McGill and his associates encountered it in meadow bogs in pine forests on rocky slopes, at 8450 feet altitude.

The Schaffner 31, cited below, is a mixture with E. ehrenbergianum Klotzsch.

Additional citations: MEXICO: Durango: McGill, Reeves, Nash, & Pinkava P.13392 (N). México: Schaffner 31 in part (Ut—328610B). ECUADOR: Azuay: Holm-Nielsen, Jeppesen, Løjtnant, & Øllgaard 4991 (N), 5054 (N). Carchi: Holm-Nielsen, Jeppesen, Løjtnant, & Øllgaard 5277 (N); Humbles 6086 (Ld); Weber, Gradstein, & Lanier s. n. [3, 4 April 1976] (Ld).

#### ERIOCAULON MINIMUM Lam.

Additional bibliography: Moldenke, *Phytologia* 32: 500. 1976.

Jayasuriya & Faden collected what may be this species in shallow soil near a stream, at 760 meters altitude, where they note that it was "common", the heads "gray". It is classified here tentatively because it differs strikingly from other material so determined.

Additional citations: SRI LANKA: Jayasuriya & Faden 2410 (Z).

#### ERIOCAULON MISERRIMUM Ruhl.

Additional & emended bibliography: León, *Fl. Cuba*, imp. 1, 1: 280 & 423. 1946; Moldenke, *Phytologia* 32: 501. 1976.

#### ERIOCAULON MISERUM Körn.

Additional bibliography: Moldenke, *Phytologia* 29: 209. 1974.

Additional citations: INDIA: Meghalaya: Myrthong 1379 (Z), 1476 (N).

#### ERIOCAULON MITOPHYLUM Hook. f.

Additional bibliography: Moldenke, *Phytologia* 29: 209. 1974.

Additional citations: INDIA: Meghalaya: Myrthong 1191 (N).

#### ERIOCAULON MODESTUM Kunth

Additional synonymy: Eriocaulon hygropilus Mart. ex Moldenke & Sm. in Reitz, *Fl. Ilus. Catar. I Erio*: 99, in syn. 1976. Eriocaulon modestum "Auct. ex Herter" apud Moldenke & Sm. in Reitz, *Fl. Ilus. Catar. I Erio*: 99, in syn. 1976. Eriocaulon modestum f. elatior "Ruhl. ex Moldenke" apud Moldenke & Sm. in Reitz, *Fl. Ilus. Catar. I Erio*: 99, in syn. 1976. Eriocaulon modestum f. modestum [Kunth] apud Moldenke & Sm. in Reitz, *Fl. Ilus. Catar. I Erio*: 28. 1976.

Additional bibliography: Moldenke, *Phytologia* 34: 404. 1976;

Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 7, 25, 28--31, 99, & 100, pl. 5, fig. 10--17. 1976.

Additional illustrations: Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 25, pl. 5, fig. 10--17. 1976.

Vernacular names recorded for this species are "capim-manso", "capipoatinga", "gravatá-manso", and "sempre-viva-do-campo" (also applied to many other species) and it is said to flower from December to April.

*ERIOCAULON MODESTUM* var. *BREVIFOLIUM* Moldenke

Additional bibliography: Moldenke, *Phytologia* 32: 501. 1976.

The Irwin, Harley, & Smith "32195" cited by me in a previous (1972) installment of these notes is a typographic error for no. 32175.

*ERIOCAULON MODESTUM* f. *VIVIPARUM* Herzog

Additional synonymy: *Eriocaulon dusenii* "Diógo ex Moldenke & Sm." apud Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 31 & 99, in syn. 1976. *Eriocaulon modestum* f. *viviparum* "Herzog ex Moldenke & Smith" apud Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 99, in syn. 1976.

Additional bibliography: Moldenke, *Phytologia* 29: 209. 1974; Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 31 & 99. 1976.

The vernacular names, "capim-manso", "capipoatinga-de-broto", "gravatá-manso", and "sempre-viva-do-campo", are recorded for this plant (most of which are applied to many other taxa in this genus) and it is said to flower in December.

*ERIOCAULON NANELLUM* Ohwi

Additional bibliography: Moldenke, *Phytologia* 26: 31. 1973; Satake, *Journ. Jap. Bot.* 49: 313--314. 1974; Hurusawa, *Excerpt. Bot. A.26*: 99. 1975.

*ERIOCAULON NANELLUM* var. *PILIFERUM* Satake, *Journ. Jap. Bot.* 49: 313--314. 1974.

Bibliography: Satake, *Journ. Jap. Bot.* 49: 313--314. 1974; Hurusawa, *Excerpt. Bot. A.26*: 99. 1975.

This variety is distinguished by the pilose petals on the pistillate florets, the longer leaves and peduncles (10--20 cm.), and the whitish acute involucre bracts. It is based on B. Kawamura 316852 from Konuma moor, at an altitude of about 970 meters, near Shiobara-machi, Tochigi prefecture, Honshu, Japan, collected on August 7, 1973, and deposited in the herbarium of the National Science Museum in Tokyo. The leaves are 5 cm. long.

*ERIOCAULON NEO-CALEDONICUM* Schlecht.

Additional bibliography: Moldenke, *Phytologia* 34: 405. 1976.

Additional citations: NEW CALEDONIA: Franc 266 in part (W--1112352--cotype).

## ERIOCAULON NEPALENSE Prescott

Additional bibliography: Satake, Journ. Jap. Bot. 49: 237—239. 1974; Hurusawa, Excerpt. Bot. A.26: 99. 1975; Moldenke, Phytologia 34: 405. 1976.

Additional citations: INDIA: Meghalaya: Myrthong 1561 (N).

ERIOCAULON NEPALENSE var. LAOSENSE Satake, Journ. Jap. Bot. 49: 237—239, fig. 1 & 2. 1974.

Bibliography: Satake, Journ. Jap. Bot. 49: 237—239, fig. 1 & 2. 1974; Hurusawa, Excerpt. Bot. A.26: 99. 1975.

Illustrations: Satake, Journ. Jap. Bot. 49: 238, fig. 1 & 2. 1974.

This variety is based on T. Tuyama L.57379 from 2 km. south of Ban Phu Phao, about 23 km. northeast of Phangsavanh, Laos, collected on January 2, 1958, and deposited in the Botanical Institute herbarium in Tokyo. It differs in its broader leaves and in other respects.

## ERIOCAULON NILAGIRENSE Steud.

Additional bibliography: Moldenke, Phytologia 34: 405—406. 1976.

Recent collectors describe this plant as large, herbaceous, fleshy, 75 cm. tall, not deep-rooted, the leaves elongate, linear-oblong, the flower-heads "snowy-white, semiglobose, to 1.4 cm. in diameter", and the flowers white, although Waas comments that the "flower-cone [is] blackish when mature". They have found it growing in boggy ground and along footpaths by streams in secondary montane forests, at 1700—2500 m. altitude. Comanor refers to it as "frequent in running water", while Cramer found it to be quite "common".

The Bernardi 16094 is a mixture with E. brownianum Mart.

Additional citations: SRI LANKA: Bernardi 16094 in part (W—2807707); Comanor 980 (W); Cramer 3259 (W—2615826); R. W. Read 2040 (Ld), 2270 (Ld); Waas 840 (W, W—2784502).

## ERIOCAULON NILAGIRENSE f. PARVIFOLIUM Moldenke

Additional bibliography: Moldenke, Phytologia 34: 406. 1976.

Read & Desautels found this plant growing in boggy ground. Davidse refers to it as caespitose, with white flower-heads, and encountered it in marshy montane tussock grassland along streamlets, at 7000 feet altitude.

Additional citations: SRI LANKA: Davidse 7604 (W—2784405); Read & Desautels 2271 (Ld).

## ERIOCAULON NOVOGUINEENSE Van Royen

Additional bibliography: Moldenke, Phytologia 32: 503. 1976.

Croft & Leland describe what appears to be this species as a "very hard cushion herb, the leaves semi-glossy dark-green, the flowers light-brown, the roots white".

Additional citations: PAPUA NEW GUINEA: Croft & Leland LAE. 65874 (Mu, Z).

## ERIOCAULON ODORATUM Dalz.

Additional synonymy: Eriocaulon odoratum Moldenke, Biol. Abstr. 63: 2461, sphalm. 1977.

Additional bibliography: Moldenke, Phytologia 34: 485--486. 1976; Moldenke, Biol. Abstr. 63: 2461. 1977.

## ERIOCAULON OLIVACEUM Moldenke

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 280 & 423. 1946; Moldenke, Phytologia 32: 503. 1976.

## ERIOCAULON ORYZETORUM Mart.

Additional bibliography: Moldenke, Phytologia 32: 503--504. 1976.

The Larsens encountered this plant in wet grassland at 600--700 meters altitude, flowering and fruiting in September.

Additional citations: INDIA: Meghalaya: Myrthong 1491 (N). THAILAND: Larsen & Larsen 34135 (Ac).

## ERIOCAULON OVOIDEUM Britton &amp; Small

Additional & emended bibliography: Fedde & Schust. in Just, Bot. Jahresber. 45 (1): 20. 1923; León, Fl. Cuba, imp. 1, 1: 280 & 423. 1946; Moldenke, Phytologia 34: 486 (1976) and 36: 42. 1977.

The Eriocaulon ovoideum var. ulei Knuth listed by Fedde & Schuster (1923) is Dioscorea amarantoides var. ulei Knuth in the Dioscoreaceae.

## ERIOCAULON PARAGUAYENSE Körn.

Additional bibliography: Moldenke, Phytologia 34: 486. 1976.

Prance and his associates encountered this plant in buriti-grass swamps at 720 m. altitude, flowering in October.

Additional citations: BRAZIL: Mato Grosso: Prance, Lleras, & Coêlho 13982 (Z).

## ERIOCAULON PARKERI B. L. Robinson

Additional synonymy: Eriocaulon septangulare var. parkeri

(Robins.) Boivin & Cayouette, Naturaliste Canad. 94: 524. 1967.

Additional & emended bibliography: Boivin & Cayouette, Naturaliste Canad. 94: 524. 1967; Rousseau, Géogr. Florist. Qué. [Trav. Doc. Cent. Étud. Nord 7:] 120--121, 382, 480, 550, 625, & 762, map 222. 1974; Moldenke, Phytologia 34: 486 (1976) and 36: 57. 1977.

## ERIOCAULON PELLUCIDUM Michx.

Additional & emended bibliography: Lepage, Naturaliste Canad. 101: 928. 1974; Krug, Excerpt. Bot. A, 26: 415. 1976; Rousseau, Géogr. Florist. Qué. [Trav. Doc. Cent. Étud. Nord. 7:] 120--121, 470, 498, 625, 705, & 762, maps 221 & 222. 1974; A. L. Moldenke, Phytologia 35: 62. 1976; Monteiro-Scanavacca, Mazzoni, & Giuliotti, Bol. Bot. Univ. S. Paulo 4: 66. 1976; Moldenke, Phytologia 34: 486--487 (1976) and 36: 57. 1977; F. H. Montgomery, Seeds & Fruits 108 & 219, fig. 4. 1977.

Additional illustrations: F. H. Montgomery, Seeds & Fruits 108,

fig. 4. 1977.

Montgomery (1977) describes the seeds of this plant as "0.7 x 0.5 x 0.5 mm, elliptic 4--5 in l.s., elliptic 6 in c.s.; surface obscurely rugulose, light brown".

The J. P. Standley 33, distributed as what is now called E. pellucidum, actually is Lachnocaulon glabrum Körn., while W. Bennett 417/73 is Syngonanthus flavidulus (Michx.) Ruhl.

#### ERIOCAULON PINARENSE Ruhl.

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 281 & 423. 1946; Moldenke, Phytologia 32: 492 & 505. 1976.

#### ERIOCAULON PSEUDOCOMPRESSUM Ruhl.

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 279 & 423, fig. 112. 1946; León & Alain, Fl. Cuba, imp. 2, 1: 279 & 423, fig. 112. 1974; Moldenke, Phytologia 34: 437. 1976.

Additional & emended illustrations: León, Fl. Cuba, imp. 1, 1: 279, fig. 112. 1946; León & Alain, Fl. Cuba, imp. 2, 1: 279, fig. 112. 1974.

#### ERIOCAULON QUINQUANGULARE L.

Additional bibliography: Moldenke, Phytologia 34: 487--488. 1976; Monteiro-Scanavacca, Mazzoni, & Giullietti, Bol. Bot. Univ. S. Paulo 4: 65. 1976.

Read reports finding this plant growing "above water level when that is very low" in Sri Lanka.

The Comanor 880, distributed as E. quinquangulare, seems better placed as E. walkeri Hook. f.

Additional citations: SRI LANKA: R. W. Read 2177 (Ld); Sumithraarachchi DBS.666 (W--2806327).

#### ERIOCAULON RAVENELII Chapm.

Additional bibliography: Moldenke, Phytologia 29: 222. 1974; Lakela, Long, Fleming, & Genelle, Fl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 38. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, x, 259--[261], & 938. 1976.

Additional illustrations: Long & Lakela, Fl. Trop. Fla., ed. 2, [261]. 1976.

Lakela and her associates (1976) calls this species the "southern pipewort" and state that in the Tampa Bay area of Florida it inhabits pinelands and low ground, flowering in summer.

Additional citations: FLORIDA: Hillsborough Co.: A. P. Garber 37 (W--936873), s.n. [Tampa, Sept. 1877] (W--45320). Levy Co.: A. P. Garber s.n. [Levy Co., Nov. 1877] (W--45320).

#### ERIOCAULON REITZII Moldenke & Smith

Additional bibliography: Moldenke, Phytologia 29: 222. 1974; Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 6, 13, 22--24, & 100, pl. 2, fig. 19--24. 1976.

Illustrations: Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 13, pl. 2, fig. 19--24. 1976.

Although this binomial is marked as "spec. nov." in Moldenke & Smith (1976) by editorial error, it was first actually validly published in 1973 while the paper referred to was in press.

Vernacular names recorded for this species are "capim-manso", "capipoatinga-de-reitz", "gravatá-manso", and "sempre-viva-do-campo" and the plant is said to flower in October.

ERIOCAULON ROBUSTIUS (Maxim.) Mak.

Additional bibliography: Moldenke, *Phytologia* 34: 488 & 491. 1976; Moldenke, *Biol. Abstr.* 63: 2461. 1977.

ERIOCAULON ROBUSTO-BROWNIANUM Ruhl.

Additional bibliography: Naik, *Journ. Indian Bot. Soc.* 52: 109-111, fig. 2. 1973; Bole, *Excerpt. Bot. A.* 26: 302. 1975; Moldenke, *Phytologia* 34: 488. 1976.

Additional illustrations: Naik, *Journ. Indian Bot. Soc.* 52: 110, fig. 2. 1973.

ERIOCAULON ROLLANDII Rousseau

Synonymy: Eriocaulon septangulare f. rollandii (Rousseau) Lepage, *Naturaliste Canad.* 101: 928. 1974.

Additional bibliography: Moldenke, *Phytologia* 25: 69. 1972; Lepage, *Naturaliste Canad.* 101: 928. 1974; Krug, *Excerpt. Bot. A.* 26: 415. 1976.

This is a terrestrial species, not seen anywhere in water in its range in the Rimouski and Témiscouata regions of Québec.

ERIOCAULON SATAKEANUM Tatew. & Itô

Additional bibliography: Moldenke, *Phytologia* 25: 70. 1972; Satake, *Journ. Jap. Bot.* 49: 180. 1974.

ERIOCAULON SCARIOSUM J. E. Sm.

Additional bibliography: Moldenke, *Phytologia* 34: 489 (1976) and 36: 39. 1977.

The Clemens collections cited below exhibit a remarkable diversity in size of plant and length of peduncle. On her no. 42443 some plants are only 1.5--2.5 cm. tall and are apparently in full anthesis, while on no. 42099 some peduncles are up to 22 cm. in length. The small plants closely resemble E. nanum R. Br., but the heads are distinctly hairy under a handlens, while in E. nanum they are smooth. Mrs. Clemens encountered these plants along highway ditches, in swamps with Stylidium, and grassy places in boglets, flowering in April, June, October, and November, fruiting in April.

Additional citations: AUSTRALIA: Queensland: M. S. Clemens 42099 (Mi), 42360 (Mi), 42370 (Mi), 42443 (Mi), 44371 (Mi). GREAT BARRIER REEF: Bribie: M. S. Clemens 44113 (Mi).

ERIOCAULON SCLEROCEPHALUM Ruhl.

Additional & emended bibliography: León, *Fl. Cuba*, imp. 1, 1: 281

& 423. 1946; Moldenke, Phytologia 33: 12 & 15. 1976.

ERIOCAULON SEEMANNII Moldenke

Additional bibliography: Moldenke, Phytologia 34: 489. 1976.

Seymour has encountered this plant in pinebarrens.

Additional citations: NICARAGUA: Cabo Gracias a Dios: F. C. Seymour 3611 (Ft).

ERIOCAULON SELLOWIANUM Kunth

Additional synonymy: Eriocaulon sellowiana "Kunth ex Moldenke" apud Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 100, in syn. 1976. Eriocaulon sellowianus [Kunth apud Angely" ex Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 100, in syn. 1976. Eriocaulon sellowianum var. sellowianum [Kunth] apud Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 34. 1976.

Additional bibliography: Moldenke, Phytologia 34: 489 (1976), 35: 121 (1976), and 36: 34. 1977; Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 7, 25, 33--38, 98, & 100, pl. 5, fig. 30 & 31. 1976.

Additional illustrations: Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 25, pl. 5, fig. 30 & 31. 1976.

Hatschbach encountered this plant in "brejo, base de chapada", flowering and fruiting in October. Dombrowski reports it "frequente em beira de banhado". Vernacular names recorded for it are "caá-guaço", "capim-manso", "capipoatinga-de-sellow", "gravatá-manso", and "sempre-viva-do-campo" and it is said to flower from December to February.

Additional citations: BRAZIL: Goiás: Hatschbach 39022 (Ld). Paraná: Dombrowski 5848 (Ld), 6712 (Ld).

ERIOCAULON SELLOWIANUM var. LONGIFOLIUM Moldenke

Additional bibliography: Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 34 & 36--37. 1976; Moldenke, Phytologia 34: 489 (1976) and 36: 34. 1977.

Hatschbach encountered this plant in "brejo" (sedge meadow), flowering in October, and refers to the flowers as "white".

Vernacular names recorded for this variety are "capim-manso", "capipoatinga-de-sellow-de-folha-grande", "gravatá-manso", and "sempre-viva-do-campo" and it is said to flower in January and February. It is included in the Santa Catarina (Brazil) flora on the supposition that it occurs there, although no material from that state has yet been seen by me.

Additional citations: BRAZIL: Mato Grosso: Hatschbach 25254 (Ld).

ERIOCAULON SELLOWIANUM var. PARAENSE (Moldenke) Moldenke & Smith

Additional bibliography: Moldenke, Phytologia 34: 489--490 (1976) and 35: 121. 1976; Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 25, 34, 37--38, 99, & 100, pl. 5, fig. 24--29. 1976.

Illustrations: Moldenke & Sm. in Reitz, Fl. Ilust. Catar. I Erio: 25, pl. 5, fig. 24--29. 1976.

Dombrowski reports this plant as "abundant" or "frequent" in "banhado" and found it in flower there in October and November. The inflorescence-heads on her no. 6256 are globose and very hard and firm, not at all compressed in drying, much like those of typical E. decangulare L. It may well be incorrectly placed here.

Vernacular names recorded for this variety are "capim-manso", "capipoatinga-de-sellow-do-parana", "gravatá-manso", and "sempreviva-do-campo" and it is said to flower in December in Santa Catarina.

Additional citations: BRAZIL: Paraná: Dombrowski 6256 (Ia), 6549 (Ld), 6678 (Ld).

#### ERIOCAULON SETACEUM L.

Additional bibliography: Moldenke, *Phytologia* 34: 490 & 494 (1976) and 36: 57. 1977; Moldenke, *Biol. Abstr.* 63: 2461. 1977.

Additional citations: INDIA: Meghalaya: Myrthong 1091 (N).

#### ERIOCAULON SETACEUM var. CAPILLUS-NAIADIS (Hook. f.) Moldenke

Additional bibliography: Moldenke, *Phytologia* 34: 490. 1976.

Fosberg describes this plant as having its flower-heads "grayish, emergent, lower filiform submerged leaves green" and refers to it as "very common in fallow rice field, growing in 10--20 cm. of water". Sumithraarachchi reports the "surface roots green", while Waas comments "not very deep-rooted in the mud in waterhole near paddy field" and found it in both flower and fruit in August.

Additional citations: SRI LANKA: F. R. Fosberg 51799 (W); Sumithraarachchi DBS.670 (N), 678 (W--2806328); Waas 735 (W--2784485).

#### ERIOCAULON SEXANGULARE L.

Additional bibliography: G. Don in Loud., *Hort. Brit. Suppl.* 1: 633 (1832) and 2: 547. 1850; M. R. Henderson, *Malay. Nat. Journ.* 6: 212. 1950; Moldenke, *Phytologia* 34: 490--496 (1976) and 36: 38 & 40. 1977; Moldenke, *Biol. Abstr.* 63: 2461. 1977.

Waas describes this species as an "herb to 30 cm., flower buds white" and found it growing in secondary forest close to a stream; Balakrishnan encountered it in "paddy marsh, growing with Xyris", flowering and fruiting in January. Sumithraarachchi reports finding it "bordering paddy fields". Balgooy encountered it in sandy places "along a stream in rainforest" and refers to it as an herb with gray-brown flower-heads and white anthers.

The Waas 923, distributed as E. sexangulare, actually is E. willdenovianum Moldenke.

Additional citations: SRI LANKA: Balakrishnan NBK.1157 (W); Davidse 7826 (W--2784425); Sumithraarachchi DBS.669 (N, W--2806326); Waas 887 (W--2784431). MALAYA: Penang: Balgooy 2406 (N).

#### ERIOCAULON SIGMOIDEUM C. Wright

Additional & emended bibliography: León, *Fl. Cuba, imp.* 1, 1: 280 & 423. 1946; Moldenke, *Phytologia* 33: 12 & 15. 1976.

ERIOCAULON SOLLYANUM Royle

Additional bibliography: Moldenke, *Phytologia* 34: 492—493 (1976) and 36: 38. 1977.

Additional citations: INDIA: Meghalaya: Myrthong 1239 (N).

ERIOCAULON SPRUCEANUM f. VIVIPARUM Moldenke

Additional bibliography: Moldenke, *Phytologia* 33: 15—16 (1976) and 36: 34. 1977.

Recent collectors have found this plant growing "in dry catin-ga" vegetation.

Additional citations: BRAZIL: Roraima: Murça Pires, Cavalcante, Magnago, & Silva 13980 (Ld).

ERIOCAULON STANTONII Satake, *Journ. Jap. Bot.* 49: 314—317. 1974.

Bibliography: Satake, *Journ. Jap. Bot.* 49: 314—317. 1974; Hurusawa, *Excerpt. Bot. A.* 26: 99. 1975.

This new species is described from Nepal.

ERIOCAULON STEYERMARKII Moldenke

Additional bibliography: Cárdenas de Guevara, *Act. Bot. Venez.* 10: 36. 1975; Moldenke, *Phytologia* 33: 16. 1976.

ERIOCAULON STRICTUM Milne-Redhead

Additional bibliography: Moldenke, *Phytologia* 26: 464. 1973.

A letter from Robert Wingfield to me, dated April 19, 1977, lists this species from Mafia island and cites Vesey-Fitzgerald 5213/3 at Kew and at the East Africa Herbarium in Nairobi.

ERIOCAULON TENUIFOLIUM Klotzsch

Additional bibliography: Moldenke, *Phytologia* 34: 493. 1976.

Recent collectors speak of this plant as "common", describe the flowering-heads as white, and found it in anthesis in June.

Additional citations: GUYANA: Goodland 515 (N). BRAZIL: Roraima: Murça Pires & Leite 273 [*Herb. IPEAN 14797*] (Ld).

ERIOCAULON TENUISSIMUM Nakai

Additional bibliography: Fedde & Schust. in Just, *Bot. Jahresber.* 45 (1): 20. 1923; Moldenke, *Phytologia* 29: 233. 1974.

ERIOCAULON TEXENSE Körn.

Additional bibliography: J. L. Thomas, *Bull. Ala. Mus. Nat. Hist.* 2: 9. 1976; Moldenke, *Phytologia* 34: 493 (1976) and 36: 29. 1977.

Correll and his associates have encountered this plant "in seepage in scrub oak pinelands", flowering in May. Thomas (1976) includes it among his "Species of special concern" from the conservation standpoint in Alabama and records it from pitcherplant bogs in only Escambia, Mobile, and Washington counties in that state. As yet I have seen no material confirming these records for that state.

Additional citations: TEXAS: Tyler Co.: Correll, Johnston, & Edwin 22333 (N).

## ERIOCAULON THWAITESII Körn.

Additional bibliography: Moldenke, *Phytologia* 34: 494 & 495. 1976.

Waas refers to this plant as an herb, to 15 cm. tall, the "flower-heads white" [but they are virtually black on his dried specimens], and found the plant "in secondary forest edge near [a] stream". Others have found it in grassy roadside ditches through tea plantations.

Material of this species has been misidentified and distributed in some herbaria as *E. collinum* Hook. f.

Additional citations: SRI LANKA: Davidse 7822 (W--2784424); Davidse & Sumithraarachchi 7923 (W--2784393); Waas 1000 (W).

## ERIOCAULON TRUNCATUM Hamilt.

Additional bibliography: M. R. Henderson, *Malay. Nat. Journ.* 6: 212. 1950; Moldenke, *Phytologia* 34: 491 & 493--495. 1976; Moldenke, *Biol. Abstr.* 63: 2461. 1977.

The Bernardi 15946, distributed as *E. truncatum*, actually is *E. cinereum* R. Br.

Additional citations: INDIA: Meghalaya: Myrthong 1466 (N).

ERIOCAULON TUTIDAE Satake, *Journ. Jap. Bot.* 49: 180--183, fig. 1 & 2. 1974.

Bibliography: Satake, *Journ. Jap. Bot.* 49: 180--183, fig. 1 & 2. 1974; Hurusawa, *Excerpt. Bot. A.* 26: 99. 1975.

Illustrations: Satake, *Journ. Jap. Bot.* 49: 181 & 182, fig. 1 & 2. 1974.

This species is based on *Z. Tutida s.n.* from the Garimegi moor near Tashiro, Ugo-machi, Akita prefecture, Honshu, Japan, collected on September 14, 1973, and deposited in the herbarium of the National Science Museum in Tokyo. It is named in honor of the collector.

ERIOCAULON TUYAMAE Satake, *Journ. Jap. Bot.* 49: 237, 239, & 240, fig. 3 & 4. 1974.

Bibliography: Satake, *Journ. Jap. Bot.* 49: 237, 239, & 240, fig. 3 & 4. 1974.

Illustrations: Satake, *Journ. Jap. Bot.* 49: 239, fig. 3 & 4. 1974.

The type of this species was collected by T. Tuyama (no. L.57378) -- in whose honor it is named -- 2 km. south of Ban Phu Phao, about 23 km. northeast of Phangsavanh, Laos, on January 2, 1958, and is deposited in the herbarium of the Botanical Institute in Tokyo. Satake (1974) claims that "This species is near to *E. lanigerum* Lecomte in having ciliolate leaves, peduncles, vaginas, involucrel and floral bracts, however the female sepals are glabrous and carinate or narrowly alate on the back side".

## ERIOCAULON ULAEI Ruhl.

Additional synonymy: *Eriocaulon ulaei* var. *ulaei* [Ruhl.] apud

Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 12. 1976.

Additional bibliography: Moldenke, Phytologia 29: 285. 1974;  
Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 6, 11-15, &  
100, pl. 2, fig. 1-6. 1976.

Illustrations: Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 13, pl. 2, fig. 1-6. 1976.

Vernacular names recorded for this species are "capim-manso", "capipoatinga-de-ule", "gravatá-manso", and "sempre-viva-do-campo" and it is said to flower in January in Santa Catarina, Brazil.

ERIOCAULON ULAEI var. RADIOSUM Ruhl.

Additional bibliography: Moldenke, Phytologia 29: 236. 1974;  
Moldenke & Sm. in Reitz, Fl. Ilus. Catar. I Erio: 12, 14, 15, &  
100. 1976.

ERIOCAULON WALKERI Hook. f.

Additional bibliography: Moldenke, Phytologia 34: 495. 1976.  
Comanor encountered this plant "in open scrub community on sand,  
in herbaceous community".

Additional citations: SRI LANKA: Comanor 880 (W).

ERIOCAULON WILLDENOVIANUM Moldenke

Additional bibliography: Moldenke, Phytologia 34: 491 & 495-  
496. 1976.

Read and Jayaweera encountered this plant in swampy ground  
"under Hevea trees". It has been found in flower and fruit in  
December. Material has been misidentified and distributed in some  
herbaria as E. brownianum Mart. Poilane 8068 was previously er-  
roneously reported as E. sexangulare L.

Additional citations: SRI LANKA: Read & Jayaweera 2319 (W);  
Waas 923 (W). INDOCHINA: Tonkin: Poilane 8068 (N).

LACHNOCAULON Kunth

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1:  
279, 284, & 426. 1946; Follmann-Schrag, Excerpt. Bot. A.26: 510.  
1976; Lakela, Long, Fleming, & Genelle, Fl. Tampa Bay, ed. 3 [Bot.  
Lab. Univ. S. Fla. Contrib. 73:] 38-39, 151, & 165. 1976; Long &  
Lakela, Fl. Trop. Fla., ed. 2, 259, 260, 262, & 944. 1976; Molden-  
ke, Phytologia 34: 497 (1976), 35: 14 (1976), 35: 111, 288, 309, &  
509 (1977), and 36: 28-31, 43, & 57. 1977; Moldenke, Biol. Abstr.  
63: 2461. 1977.

Lakela and her associates (1976) gives "bog buttons" as the  
common name for members of this genus.

The Pollard s.n. [Tampa, March 7, 1898], distributed as Lachno-  
caulon, actually is Syngonanthus flavidulus (Michx.) Ruhl.

LACHNOCAULON ANCEPS (Walt.) Morong

Additional synonymy: Lachnocaulon anceps (Walt.) DC. ex Molden-  
ke, Phytologia 36: 43, in syn. 1977.

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1:  
284 & 426. 1946; Long & Lakela, Fl. Trop. Fla., ed. 2, 260, 944, &

962. 1976; Moldenke, *Phytologia* 35: 14 (1976) and 36: 28--31, 43, & 57. 1977.

Hebert found this plant growing on open wooded hillsides and wooded marshes.

Long & Lakela (1976) regard *L. floridanum* Small and *L. glabrum* Körn. as synonyms of *L. anceps*. It seems to me that the latter, at least, is abundantly distinct, while the former is much more closely allied to *L. engleri* Ruhl. or *L. minus* (Chapm.) Small. Specimens intermediate between *L. anceps* and *L. glabrum* probably represent *L. anceps* f. *glabrescens* Moldenke.

Recent collectors have encountered *L. anceps* on moist slopes of sand hills. Arsène refers to it as "rare" in Saint Tammany Parish, Louisiana, while Mohr reports it "very common" in Mobile County, Alabama. Kral describes it as "forming large circular clumps in moist sandy peat of sedge bogs" and forming "large clumps, not as large nor as narrow-leaved as nearby *L. beyrichianum* in rather dry sand of longleaf pine - saw-palmetto forests".

L. C. Anderson, in a personal communication to me, lists this species (sens. lat.?) from the following counties of Florida: Bay, Bradford, Brevard, Broward, Charlotte, Dixie, Franklin, Gulf, Hillsboro, Holmes, Indian River, Jackson, Lee, Levy, Liberty, Madison, Manatee, Martin, Nassau, Okaloosa, Okeechobee, Orange, Osceola, Pinellas, St. Johns, St. Lucie, Santa Rosa, Seminole, Sumter, Taylor, Union, Volusia, and Wakulla.

Material of this species has been misidentified and distributed in some herbaria as *Eriocaulon* sp. On the other hand, the Brass 15148, Ekman 12410, and R. Kral 20039 & 20420, distributed as (and in the case of the Ekman collection previously cited by me as) typical *L. anceps*, are better placed as f. *glabrescens* Moldenke, while Combs & Baker 1113, Coville 70 & 101, Fox & Boyce 3780, McCarthy s.n. [Julio 1885] & s.n. [N. Carolina 1885], C. Mohr s.n. [Aug. 18, 1879], and Reynolds s.n. [St. Augustine, June '75] are *L. beyrichianum* Sporleder, R. Kral 18012, 18048, 18288, & 20424, J. P. Standley 33, and P. C. Standley 52589 are *L. glabrum* Körn., Drushel 9642, E. S. Ford 4644, R. Kral 15637, Meislahn 158a, C. Mohr s.n. [April 20, 1868], and O'Neill 7786 (in part) are *L. minus* (Chapm.) Small, and Milligan s.n. [May 1890] is *Syngonanthus flavidulus* (Michx.) Ruhl. Kral & Ricks 16991, at least in the United States National Herbarium, is a mixture with fragments of *Panicum* sp.

Additional citations: VIRGINIA: Dinwiddie Co.: Fernald & Long 6120 (W--1682737). Greensville Co.: Smith & Hodgdon Pl. Exsicc. Gray. 1028 (W--1828401). Nansemond Co.: Fernald, Long, & Clement 15239 (W--2003605). Prince George Co.: Fernald, Long, & Smart 5698 (W--1682490). NORTH CAROLINA: Beaufort Co.: Godfrey 4403 (W--1767462). Bladen Co.: Biltmore Herb. 2755 (W--331153). Brunswick Co.: Godfrey & Shunk 4118 (W--1767244). Columbus Co.: Godfrey &

Shunk 4190 (W-1767299). Craven Co.: Kearney 1940 (W-356593).  
 Greene Co.: Godfrey 4316 (W-1767396). Harnett Co.: Godfrey 4253  
 (W-1767344). Martin Co.: Drushel 10141 (W-1688981). New Hanover  
 Co.: M. A. Chase 3153 (W-594230); Coville 201 (W-45321).  
 Onslow Co.: Godfrey 4488 (W-1767535). Pender Co.: Hyams s.n.  
 [Burgaw, Aug. 1879] (W-152112). Sampson Co.: Godfrey 4511 (W-  
 1767552). SOUTH CAROLINA: Charleston Co.: Stewart s.n. [Charleston]  
 (W-202807). Darlington Co.: Norton s.n. [Hartsville, July  
 8, 1920] (W-1070504). Georgetown Co.: Godfrey & Tryon 51 (W-  
 1836996); J. Kohlmeier 2038 (Hm). Kershaw Co.: House 2644 (W-  
 514155). Lexington Co.: Godfrey & Tryon 1210 (W-1837924).  
 GEORGIA: Calhoun Co.: Thorne 3589 (W-2005898). Clinch Co.: R.  
Kral 24289 (W-2470347). Douglas Co.: Cronquist 5424 (W-1928743).  
 Emanuel Co.: R. M. Harper 804 (W-400280). Macon Co.: Pyron & Mc-  
Vaugh 498 (W-1811260). Miller Co.: Thorne 4426 (W-2005929).  
 Pierce Co.: R. Kral 24150 (W-2470416). Screven Co.: R. Kral  
24052 (W-2470432). Sumter Co.: R. M. Harper 443 (W-384447).  
 Worth Co.: Pollard & Maxon 562 (W-443076). FLORIDA: Alachua Co.:  
O'Neill 633 (W-1241628), 746 (W-1241627). Calhoun Co.: Canby s.  
n. [Magnolia] (W-202501). Clay Co.: Canby s.n. [Hibernia, 1869]  
 (W-45323, W-204860). Duval Co.: Curtiss 3021 (W-45324, W--  
 936868), 4139 (W-218358), 4861 (W-224477), s.n. [Jacksonville]  
 (W-152110); Fredholm 104 (W-264444). Lake Co.: Nash 1942 (W-  
 252693, W--309072). Lee Co.: Francis 61 (W-1036539). Levy Co.:  
Kral & Kral 6593 (W-2308330). Nassau Co.: Godfrey & Lindsey  
56895 (W-2329838). Okeechobee Co.: R. Kral 20478 (W-2470304).  
 Orange Co.: O'Neill s.n. [Bithlo, June 17, 1929] (W-1488705).  
 Osceola Co.: R. Kral 20468 (W-2470368); Swallen 300 (W-1631128).  
 Volusia Co.: R. Kral 20443 (W-2470337), 20453 (W-2470404). County  
 undetermined: Biltmore Herb. 2755a (W-335142); Chapman s.n.  
 [Florida] (W-45326); Herb. Chapman 554 (W-936769), s.n. [Flor-  
 ida] (W-957067). ALABAMA: DeKalb Co.: A. Ruth 125 (W-345309).  
 Mobile Co.: Hebert 238 (Ac); Mackenzie 4059 (W-618847); Mohr s.n.  
 [June 1879] (W-784497), s.n. [June-Aug.] (W--784498), s.n. [July]  
 (W-152111). MISSISSIPPI: Covington Co.: Webster & Wilbur 3337  
 (M, W-2068060). Jackson Co.: Skehan s.n. [Ocean Springs, 5/7/  
 1895] (W--309071); Tracy 5031 (W-341108). Pearl River Co.: R.  
Kral 17332 (W-2470308). LOUISIANA: Beauregard Par.: R. Kral  
20156 (W-2470389), 20197 (W-2460390); Kral & Ricks 16991 (W-  
 2470367). Rapides Par.: R. Kral 20069 (W-2470369). Saint Tam-  
 many Par.: Arsène 12142 (W-1033047), 12315 (W-1033056). TEXAS:  
 Newton Co.: Correll, Johnston, & Edwin 22288 (N).

LACHNOCAULON ANCEPS f. GLABRESCENS Moldenke

Additional bibliography: Moldenke, Phytologia 33: 20 & 21 (1976)

and 36: 28--31. 1977.

Brass describes this plant as having "whitish" flower-heads and forming cushions 20--35 cm. in diameter in dry low pinelands and on low sand-scrub ridges where he found it "abundant". Kral found it "usually at upper edge of bog with Pinguicula pumila on sandy clay peat of bog in longleaf pine country". On the Isla de Pinos, Cuba, where it has previously been regarded (incorrectly) as typical L. anceps (Walt.) Morong, it inhabits moist sandy pinelands.

It is worth pointing out that even the type collection of this form exhibits the variability ascribed to it -- some of the peduncles are densely pilose with more or less appressed antrorse hairs, others partially or completely glabrous, apparently not always connected with age. It has been found in flower in May and November and both in flower and fruit in July.

Material of this form has usually been identified and distributed in herbaria as typical L. anceps (Walt.) Morong or as L. minus (Chapm.) Small.

Additional citations: SOUTH CAROLINA: Kershaw Co.: House 2685 (W--514159). FLORIDA: Highlands Co.: Brass 15148 (W--2065381). Manatee Co.: S. M. Tracy 7585 (W--4422332--isotype). Martin Co.: R. Kral 20420 (W--2470305). LOUISIANA: Vernon Par.: R. Kral 20039 (W--2470388). ISLA DE PINOS: Ekman 12410 (N, S, W--1302554).

#### LACHNOCAULON BEYRICHIANUM Sporleder

Additional bibliography: Moldenke, *Phytologia* 33: 21 (1976) and 36: 29. 1977.

Combs and Baker describe this plant as a "common perennial in bunches in open sandy scrub"; Fox and Boyce found it "in turkey oak community on lakeshores"; Harper encountered it "in rather dry pine barrens in Neocene geologic formation overlaid by Lafayette and Columbia". It has been found in flower and fruit in June, July, and September. Coville encountered it on savannas in North Carolina.

Usually the flowering- and fruiting-heads of this species are rather soft, flattening out under pressure in drying [e.g., R. M. Harper 1491], but in Godfrey 4680 they are quite round and hard as in L. minus (Chapm.) Small; the leaves, however, are narrow and thin as in typical L. beyrichianum. Perhaps it represents a hybrid. Kral 20378 exhibits leaves that are somewhat broader than usual and similar to those of L. minus.

McCarthy s.n. [N. Carolina], Reynolds s.n. [St. Augustine, June '75], and Coville 101 comprise exceptionally small 1- or 2-peduncled plants with especially small heads, perhaps because of immaturity and poor growing conditions. The United States National Herbarium specimen of Mohr s.n. [Aug. 18, 1879] from Alabama includes 2 small scapes of L. engleri Ruhl., possibly accidentally included during mounting and actually belonging to Herb. Chapman s.n. [St. Andrew's Bay] from Florida.

Material of L. beyrichianum has been misidentified and distributed in some herbaria as L. digyllum Körn. On the other hand, the Curtiss 3022, distributed as L. beyrichianum, actually is the type collection of L. eciliatum Small, while Nash 1184 is the type collection of L. engleri Ruhl. and R. M. Harper 1607, Mohr s.n. [April 20, 1868], and Nash 1148, 1295, & 1855 are L. minus (Chapm.) Small. R. Kral 20418 appears to be a mixture with L. glabrum Körn.

Additional citations: NORTH CAROLINA: Bladen Co.: Fox & Boyce 3780 (W--2265510). New Hanover Co.: Coville 70 (W--45322), 101 (W--45318); Godfrey 4680 (W--1767654). County undetermined: McCarthy s.n. [Julio 1885] (W--152109), s.n. [N. Carolina] (W--45325). GEORGIA: Charlton Co.: R. M. Harper 1491 (W--431796). FLORIDA: Martin Co.: R. Kral 20418 in part (W--2470379). Orange Co.: Combs & Baker 1113 (W--592685). Saint Johns Co.: Reynolds s.n. [St. Augustine, June '75] (W--936867). Saint Lucie Co.: R. Kral 20378 (W--2470381). Volusia Co.: R. Kral 20441 (W--2470338). ALABAMA: Mobile Co.: Mohr s.n. [Aug. 18, 1879] (W--784496).

#### LACHNOCAULON CUBENSE Ruhl.

Additional & emended bibliography: León, Fl. Cuba, imp. 1, 1: 284 & 426. 1946; Moldenke, Phytologia 33: 21. 1976.

#### LACHNOCAULON DIGYLLUM Körn.

Additional synonymy: Lachnocaulon digyllum Sporl. ex Moldenke, Phytologia 36: 43, in syn. 1977.

Additional bibliography: Moldenke, Phytologia 33: 21 (1976) and 36: 43. 1977.

Additional citations: FLORIDA: Bay Co.: R. Kral 15667 (W--2470435). Escambia Co.: R. Kral 17634 (W--2470436), 23169 (W--2470424).

#### LACHNOCAULON ECILIATUM Small

Additional bibliography: Moldenke, Phytologia 26: 184. 1973; Lakela, Long, Fleming, & Genelle, Pl. Tampa Bay, ed. 3 [Bot. Lab. Univ. S. Fla. Contrib. 73:] 39 & 165. 1976; Long & Lakela, Fl. Trop. Fla., ed. 2, 262 & 944. 1976; Moldenke, Phytologia 36: 29. 1977.

Lakela and her associates (1976) reduce L. eciliatum to the synonymy of L. minus (Chapm.) Small. It seems to me, however, that the flowering- and fruiting-heads of L. eciliatum are usually softer and more apt to crush and become flattened under the pressure of the plant-press.

Brass describes L. eciliatum as gregarious and very abundant on open sandy lakeshores, flowering and fruiting in January. Material has been misidentified and distributed in some herbaria as L. beyrichianum Sporleder, L. engleri Ruhl., and L. minus (Chapm.) Small. In L. minus the flowering- and fruiting-heads are normally quite hard, and do not flatten out in pressing unless very immature.

## BOOK REVIEWS

Alma L. Moldenke

"ANNUAL REVIEW OF PLANT PHYSIOLOGY" Volume 26 edited by Winslow R. Briggs with Paul B. Green & Russell L. Jones, 531 pp., illus., Annual Reviews Inc., Palo Alto, California 94306. 1975. \$15.00 in U.S.A., \$15.50 foreign.

The prefatory chapter in this volume recognizes Dr. Robert Hill, whose survey article is entitled "Days of Visual Spectroscopy and records the "scientific developments....emanating from the colors of blood and grass". The following 23 papers cover recent work and ideas such as: Plasmodesmata as channels for symplastic transport even for viral size; Biochemistry of pathogenesis with the hypothesis that gene-for-gene pathogens have on their surfaces molecules that differ from race to race by one glycosyl and prove virulent to a host if not "recognized" by it; Tree photosynthesis reporting that all trees except mangroves (what genera?) so far classify as C<sub>3</sub> plants; Chlorophyll-proteins; Stomatal action with an excellent operative diagram; and Incompatibility and pollen-stigma interaction especially in Oenothera, Lilium, Brassica, Petunia and Ambrosia in which the principal hay fever allergin -- antigen E -- has been located in the interbacular cavities of the exine and also in the intine.

These and other pertinent topics are well presented. On p. 103 a species name of Acer and on p. 110 one of Tilia are misspelled. Each paper is provided, as is characteristic of all "Annual Reviews", with important bibliographic material.

"ANNUAL REVIEW OF ECOLOGY AND SYSTEMATICS" Volume 6 edited by Richard F. Johnston with Peter W. Frank & Charles D. Michener, viii & 422 pp., illus., Annual Reviews Inc., Palo Alto, California 94306. 1975. \$15.00 U.S.A. & \$15.50 foreign.

This volume continues in the fine tradition of this series with 15 timely, well documented papers. Among others, they include Fretwell's appreciation of Robert MacArthur's impact on ecology through methodology and his enthusiasm, rumen microbial ecosystems whose total products tend to be "remarkably constant", tropical rain forests whose productivity varies seasonally with the transpiration rate, cannibalism in certain insects, rotifers, etc. as a "normal response to many environmental factors", demographic consequences of human infanticide, energetics of pollination affecting divergent and convergent evolution of flowers, late Quaternary climatic change in Africa, the first survey of butterfly ecology by Lawrence Gilbert and Michael Singer, and Paul Ehrlich's population

biology of coral reef fishes with comparisons and contrasts with butterfly populations.

"KNOW YOUR LILIES" by Richmond E. Harrison, 84 pp., illus., A. H. & A. W. Reed, Wellington, Auckland, Sydney & Melbourne, in U.S.A. imported for sale by Charles E. Tuttle Co., Inc., Rutland, Vermont 05701. 1971. \$17.50.

My consternation at the fat price for this thin book — even though the author is a world-famous horticulturist and lily specialist — was completely obliterated by my wonder at its many glorious color plates — produced mostly by the author's photographer son Charles and also by Herman v. Wall. From Agapanthus to Zantedeschia there are 32 sketches and descriptions of over 100 plants bearing the common name "lily" but which are not members of the genus Lilium.

The cultivated species of Lilium are described as well as their horticultural history and growing conditions. Asiatic, Martagon, Candidum, American, Longiflorum, Trumpet, Oriental and other new hybrids are similarly treated. Pollen can be refrigerated and often kept viable for about two months, increasing breeding possibilities.

"THE INDIGENOUS TREES OF THE HAWAIIAN ISLANDS" by Joseph F. Rock, 2nd edition introduced by Sherwin Carlquist, xx & 548 pp., illus., Pacific Tropical Botanical Garden, Lawai on Kauai & Hana on Maui, Hawaii. Charles H. Tuttle Company Inc., Publishers, Tokyo, Japan, & Rutland, Vermont 05701. 1974. \$22.50 slip-cased.

For several reasons this new edition is and will be welcomed: first and foremost, for the needed increased availability of this long recognized botanical classic; secondly for the neat and complete copy of the original 1913 privately published text with its regional descriptions, keys, plant descriptions, common names and uses; thirdly for the fine reproduction of the 215 photographic plates of great technical excellence (Rock was originally trained as a professional photographer); fourth for its enrichment by Sherwin Carlquist's introduction to this new edition tracing the probable origin of and need to protect the remnants of the original forests; and fifth for the helpful addenda to this new edition supplied by Derral Herbst listing all text names with any revisions in modern nomenclature and geographic distribution among these islands.

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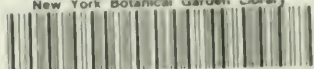








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