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PHYTOLOGIA

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Vol. 68

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THE VASCULAR FLORA OF THREE WILDLIFE REFUGES IN
CAMERON PARISH, LOUISIANA

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ABSTRACT

Lacassine National Wildlife Refuge and Sabine National Wildlife Refuge are located in Cameron Parish while Rockefeller Wildlife Refuge and Game Preserve is situated in the southeast corner of Cameron Parish and the southwest corner of Vermilion Parish. The vascular flora of these three refuges (or portions which occur in Cameron Parish) was surveyed and collections were made from September 1983 to April 1985. Voucher specimens of these collections are housed in the Northeast Louisiana University Herbarium. Specimens previously collected and housed in the herbarium at Northeast Louisiana University were examined and have been included in this survey. Records from pertinent literature are also included. Names of the 586 species representing 119 families found on at least one of the three refuges have been compiled into an annotated list. The list includes the number of species in each refuge for each category and a voucher or reference for each refuge citation.

KEY WORDS: Floristics, wildlife refuges, Cameron Parish, Louisiana.

INTRODUCTION

Cameron Parish, in the southwesternmost corner of Louisiana, includes Lacassine National Wildlife Refuge, a large portion of Rockefeller Wildlife

Refuge and Game Preserve and Sabine National Wildlife Refuge (Figure 1). Lacassine is located in the northeast part of the parish, Rockefeller in the southeast, and Sabine in the west and central portion. The authors have restricted the present survey of Rockefeller Wildlife Refuge to those portions occurring in Cameron Parish, primarily as a result of incomplete sampling of the Vermilion Parish portion. A fourth refuge, Cameron Prairie National Wildlife Refuge located in the central portion of the parish, was established December 29, 1988 and was therefore not included in this survey (Figure 1). The authors are hopeful that the floristic composition of Cameron Prairie (9,621 acres; Yakupzack, pers. comm., letter 1989) can be documented in the future.

With the exception of potentially destructive hurricanes, the weather in Cameron Parish is generally mild (Cameron Parish Rural Development Committee 1970; Howe, *et al.* 1935). The physiography of the parish is characterized by a geologically recent seamarsh which is situated above a Pleistocene Mississippi River Delta complex (Howe, *et al.* 1935). Other notable features of the parish are the numerous shallow lakes and the wide river valleys of the Calcasieu, Mermentau and Sabine Rivers (Howe, *et al.* 1935).

This survey represents a subset of the data obtained while conducting research on the vascular flora of Cameron Parish in its entirety (Dutton 1985; Dutton & Thomas 1990). The results of this survey are presented in a comparative format and are intended to serve as a guide to the respective flora of each refuge. Included are the results of surveys reported by Fruge (1974) on the Lacassine pool on the Lacassine National Wildlife Refuge, Spindler & Noble (1974) on the spoil banks of Superior Canal on Rockefeller Wildlife Refuge and Game Preserve, and Valentine & Rudolph (1979) on the Sabine National Wildlife Refuge. Notable individual collectors include Amy Ouchley who made significant additions to the flora of Lacassine Refuge.

METHODS

Plant collections were made from Lacassine National Wildlife Refuge, Rockefeller Wildlife Refuge and Game Preserve and Sabine National Wildlife Refuge by the first author between September, 1983 and April, 1985. The second author has also made collections from these refuges beginning in 1968. Collections were prepared following standard herbarium procedures and voucher specimens are housed in the Northeast Louisiana University Herbarium. Allen (1980), Bailey (1949), Correll & Johnston (1970), Cronquist (1980), Godfrey & Wooten (1979; 1981), Gould (1975), Hitchcock (1950), Lasseigne (1973), Radford, *et al.* (1968), Rehder (1940), Small (1933), Thieret (1980) and Wherry (1972) were the primary references consulted for identifying specimens. Recent monographs were also consulted whenever possible. In addition, numerous problematic taxa were sent to appropriate experts for annotation.

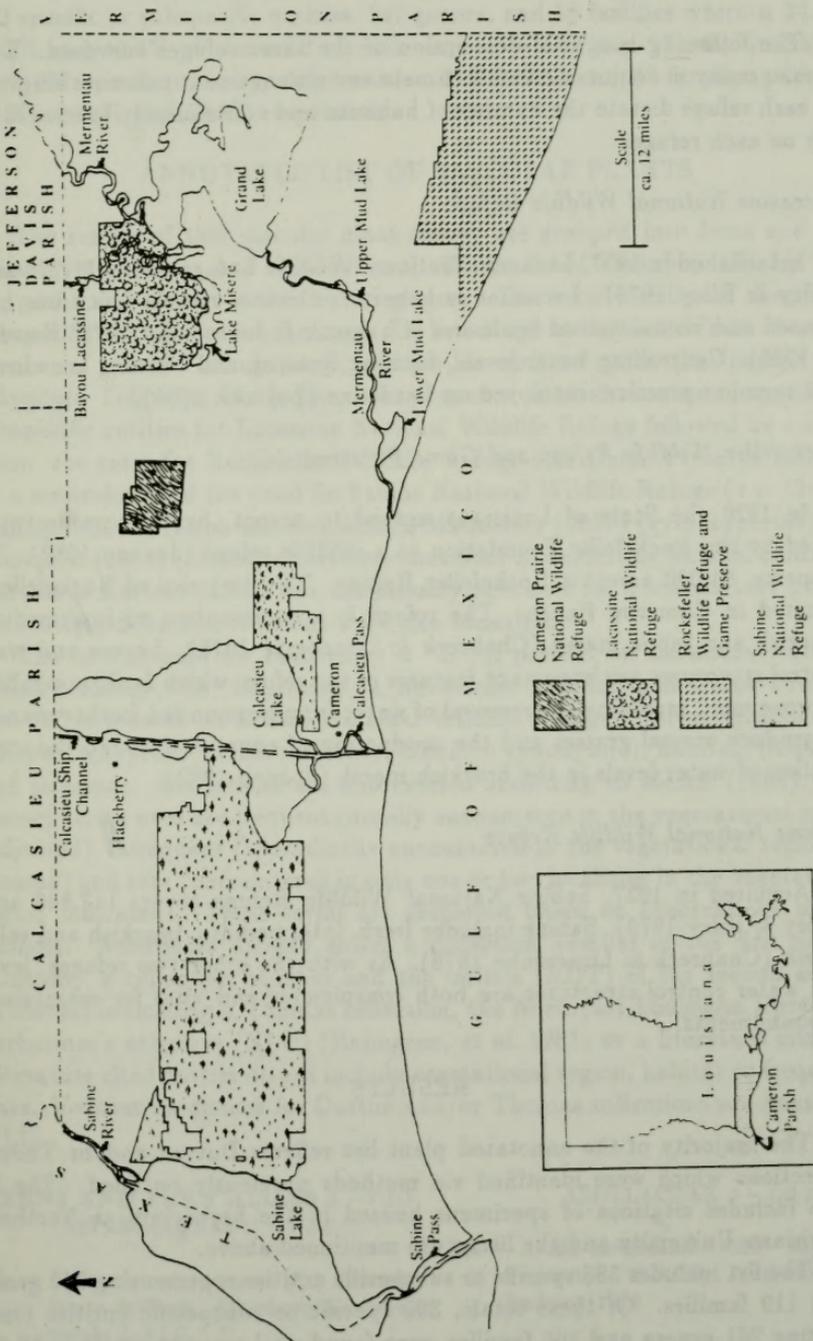


Figure 1. The wildlife refuges of Cameron Parish, Louisiana.

WILDLIFE REFUGES

The following is a brief description of the three refuges surveyed. Local physiography in conjunction with climate and management practices employed on each refuge dictate the number of habitats and consequently species diversity on each refuge.

Lacassine National Wildlife Refuge

Established in 1937, Lacassine National Wildlife Refuge covers 31,776 acres (Riley & Riley 1979). Lacassine is largely freshwater marsh which has been created and is maintained by levees (Chabreck & Linscombe 1978; Howe, *et al.* 1935). Controlling water levels, farming, grazing and burning are current management practices employed on Lacassine (Laycock 1965).

Rockefeller Wildlife Refuge and Game Preserve

In 1920 the State of Louisiana agreed to accept, by law, property donated by the Rockefeller Foundation as a wildlife refuge (Joanen 1982). The property, 84,000 acres, is Rockefeller Refuge. The majority of Rockefeller is situated in Cameron Parish. The refuge is a combination of intermediate, brackish and saline marsh (Chabreck & Linscombe 1978). Levees and water control structures are important features of the refuge which facilitate habitat improvement, including the removal of water from impounded fresher marshes to produce annual grasses and the production of aquatics through the stabilization of water levels in the brackish marsh (Joanen 1982).

Sabine National Wildlife Refuge

Acquired in 1937, Sabine National Wildlife Refuge covers 142,846 acres (Riley & Riley 1979). Sabine includes fresh, intermediate, brackish and saline marsh (Chabreck & Linscombe 1978). As with the other two refuges, levees and water control structures are both conspicuous and vital for maintaining impoundments.

RESULTS

The majority of the annotated plant list reflects Dutton and/or Thomas collections which were identified via methods previously outlined. The list also includes citations of specimens housed in the herbarium at Northeast Louisiana University and the literature mentioned above.

The list includes 586 specific or subspecific entities representing 340 genera and 119 families. Of these totals, 390 specific or subspecific entities representing 261 genera and 105 families were found on Lacassine which is 66.6%,

76.8% and 88.2% of the total of each respective category. Rockefeller includes 202 specific or subspecific entities, 147 genera, and 59 families which is 34.5%, 43.2% and 49.6% of the total of each respective category. Totals for Sabine were 335 specific or subspecific entities, 219 genera and 92 families which is 57.2%, 64.4% and 77.3% respectively.

ANNOTATED LIST OF VASCULAR PLANTS

The results of this vascular plant survey are grouped into ferns and fern allies, gymnosperms and angiosperms, and are listed alphabetically by family, genus and species within each category. The total number of specific or subspecific entities for each category is listed and is separated from the total number of specific or subspecific entities for each refuge in that category by a hyphen. Following the hyphen, the sequence is total number of specific or subspecific entities for Lacassine National Wildlife Refuge followed by a semicolon, the total for Rockefeller Wildlife Refuge and Game Preserve followed by a semicolon, and the total for Sabine National Wildlife Refuge (*e.g.* 12:6:5). Lellinger (1985) (ferns and fern allies), Mabberley (1987) (gymnosperms) and Cronquist (1981) (angiosperms) were consulted in delimiting familial concepts. Kartesz & Kartesz (1980) was the primary reference for nomenclature but recent monographs and revisions were also consulted.

The format used for each entry is "L", if present on Lacassine National Wildlife Refuge, "R" if present on Rockefeller Wildlife and Game Preserve and "S" if present on Sabine National Wildlife Refuge. Refuge citations are followed by species name, authority, common synonym(s), habitat, frequency and reference. Authorities are abbreviated according to Meikle (1984). Frequency terms used are frequent (usually encountered in the vegetational region indicated), infrequent (sporadically encountered in the vegetational region indicated) and rare (encountered in only one or two localities in the vegetational region indicated). These terms are employed based on observations by the authors. References include either a collection number of the first author (Dutton), a collection number and the initials (RDT) of the second author (Thomas) indicating a Thomas collection, the Northeast Louisiana University herbarium's acronym (NLU) (Holmgren, *et al.* 1981) or a literature citation. Literature cited entries do not include vegetational region, habitat or frequency data. Voucher specimens for Dutton and/or Thomas collections are housed at NLU.

FERNS AND FERN ALLIES 8 - 7:1:1

ASPLENIACEAE 1 - 1:0:0

- L - *Asplenium platyneuron* (L.) Britton, Sterns & Pogg. Mixed woods, infrequent. L-NLU.

AZOLLACEAE 1 - 1:0:1

- L,S - *Azolla caroliniana* Willd. Aquatic, frequent. L-NLU; S-Valentine & Rudolph 1979.

EQUISETACEAE 1 - 1:0:0

- L - *Equisetum hyemale* L. var. *affine* (Engelm.) A.A. Eaton. Sandy waste area on marsh margin, rare. L-3481.

OPHIOGLOSSACEAE 2 - 1:1:0

- L - *Ophioglossum crotalophoroides* Walter. Sandy lawns, rare. L-NLU.
R - *Ophioglossum petiolatum* Hook. Lawns, infrequent. R-847.

PARKERiaceae 1 - 1:0:0

- L - *Ceratopteris pteridoides* (Hook.) Hieron. Aquatic, rare. L-NLU.

SALVINIACEAE 1 - 1:0:0

- L - *Salvinia minima* Baker. [*S. rotundifolia* Willd.]. At the edge of a river and pond, infrequent. L-RDT 105756.

THELYPTERIDACEAE 1 - 1:0:0

- L - *Thelypteris kunthii* (Desv.) C. Morton. [*T. normalis* (C. Chr.) Moxley]. Mixed woods, rare. L-RDT 84716.

GYMNOSPERMS 3 - 2:0:3

CUPRESSACEAE 1 - 0:0:1

- S - *Juniperus virginiana* L. Woods, infrequent. S-4228.

PINACEAE 1 - 1:0:1

- L,S - *Pinus taeda* L. Mixed woods, infrequent. L-NLU; S-3935.

TAXODIACEAE 1 - 1:0:1

- L,S - *Taxodium distichum* (L.) Rich. Marsh margins, frequent. L-2459; S-Valentine & Rudolph 1979.

ANGIOSPERMS 575 -

381:201:331

ACANTHACEAE 1 - 1:0:0

- L - *Justicia ovata* (Walter) Lindau var. *lanceolata* (Chapman) R. Long. [*J. lanceolata* (Chapman) Small]. Moist areas, rare. L-403.

ACERACEAE 1 - 1:0:1

- L,S - *Acer rubrum* L. var. *drummondii* (Nutt.) Sarg. Marshy areas, infrequent. L-NLU; S-3936.

AIZOACEAE 1 - 0:1:0

- R - *Sesuvium maritimum* (Walter) Britton, Sterns & Pogg. Marsh margins, frequent. R-2356.

ALISMATACEAE 6 - 5:0:5

- L - *Echinodorus cordifolius* (L.) Griseb. L-Fruege 1974.

- S - *Sagittaria calycina* Engelm. var. *calycina*. [*S. montevidensis* Cham. & Schldl. ssp. *calycina* (Engelm.) Bognin]. Marsh margins, rare. S-208.

- L,S - *Sagittaria graminea* Michaux. Marsh margins, infrequent. L-NLU; S-Valentine & Rudolph 1979.

- L,S - *Sagittaria lancifolia* L. Marsh margins, frequent. L-2395; S-4041.

- L,S - *Sagittaria latifolia* Willd. Marsh margin, rare. L-3490; S-Valentine & Rudolph 1979.

- L,S - *Sagittaria platyphylla* (Engelm.) J.G. Smith. Ditches bordering marsh, frequent. L-Fruege 1974; S-3930. (Reported as *S. platyphylla* Engelm. by Fruege).

AMARANTHACEAE 5 - 3:4:2

- R - *Alternanthera paronychioides* A. St. Hil. Fields, rare. R-975.

- L,R,S - *Alternanthera philoxeroides* (C. Martius) Griseb. Moist waste areas, frequent. L-NLU; R-2366; S-NLU.

- R,S - *Amaranthus australis* (A. Gray) J. Sauer. [*Acnida cuspidata* Bertol. ex Sprengel]. Moist waste areas and mixed woods, frequent. R-2587; S-3909.

- L - *Amaranthus gracilis* Desf. [*A. viridis* sensu auct., non L.]. Waste areas, frequent. L-RDT 83834.

L,R - *Amaranthus rudis* J. Sauer. [*Acnida tamariscina* (Nutt.) Alph. Wood] Damp waste areas, infrequent. L-183; R-3282.

ANACARDIACEAE 3 - 1:1:2

L - *Rhus copallina* L. Mixed woods, rare. L-1566.

R,S - *Toxicodendron radicans* (L.) Kuntze. [*Rhus radicans* L.]. Mixed woods, infrequent. R-4079; S-Valentine & Rudolph 1979. (Reported as *Rhus radicans* by Valentine & Rudolph).

S - *Toxicodendron toxicarium* (Salisb.) Gillis. [*Rhus toxicodendron* L.]. S-Valentine & Rudolph 1979. (Reported as *Rhus toxicodendron* by Valentine & Rudolph).

APIACEAE 14 - 13:6:5

L,S - *Centella asiatica* (L.) Urban. L-Fruge 1974; S-Valentine & Rudolph 1979.

L,R,S - *Chaerophyllum tainturieri* Hook. var. *tainturieri*. Waste areas, frequent. L-NLU; R-4123; S-NLU.

L,R,S - *Ciclospermum leptophyllum* (Pers.) Sprague. [*Apium leptophyllum* (Pers.) F. Muell. ex Benth.]. Waste areas, frequent. L-NLU; R-2270; S-4254.

L,R - *Daucus pusillus* Michaux. Roadsides, rare. L-RDT 83769; R-2310.

L,R,S - *Hydrocotyle ranunculoides* L. f. Aquatic or semi-aquatic, infrequent. L-2448; R-2364; S-4238.

L - *Hydrocotyle umbellata* L. Moist pastures and waste areas, frequent. L-2451.

R - *Hydrocotyle verticillata* Thunb. var. *verticillata*. Moist waste areas, infrequent. R-RDT 48274.

L - *Lilaeopsis carolinensis* J. Coulter & Rose. Disturbed area, rare. L-1549.

L - *Limnoscadium pinnatum* (DC.) Mathias & Constance. Pastures and waste areas, infrequent. L-NLU.

L - *Limnoscadium pumilum* (Engelm. & A. Gray) Mathias & Constance. Moist waste areas, frequent. L-NLU.

L,R,S - *Ptilimnium capillaceum* (Michaux) Raf. Pastures and waste areas, frequent. L-NLU; R-2369; S-Valentine & Rudolph 1979.

L - *Ptilimnium nuttallii* (DC.) Britton. L-Fruge 1974.

L - *Sanicula canadensis* L. Fields and mixed woods, infrequent. L-1543.

L - *Trepocarpus aethusae* Nutt. ex DC. Mixed woods, infrequent. L-NLU.

APOCYNACEAE 2 - 2:0:0

L - *Amsonia tabernaemontana* Walter. Moist waste areas, infrequent. L-NLU.

L - *Nerium oleander* L. Escape from cultivation, infrequent. L-NLU.

AQUIFOLIACEAE 2 - 1:0:2

L,S - *Ilex decidua* Walter. Mixed woods, frequent. L-408; S-3997.

S - *Ilex vomitoria* Sol. in Aiton. Mixed woods, infrequent. S-3879.

ARACEAE 4 - 4:1:2

L,R - *Colocasia antiquorum* Schott. Escape from cultivation, infrequent. L-NLU; R-2340.

L - *Orontium aquaticum* L. L-Fruge 1974.

L,S - *Peltandra virginica* (L.) Schott. Ditches and disturbed areas, frequent. L-1531, S-3966.

L,S - *Pistia stratiotes* L. Aquatic in ditches and canals, infrequent. L-RDT 83744; S-Valentine & Rudolph 1979.

ARECACEAE 1 - 0:0:1

S - *Sabal minor* (Jacq.) Pers. Mixed woods, frequent. S-4049.

ASCLEPIADACEAE 1 - 1:0:0

L - *Asclepias lanceolata* Walter. Marsh margins, rare. L-RDT 83757.

ASTERACEAE 57 - 31:31:36

- L,S - *Acmella oppositifolia* (Lam.) Jansen var. *repens* (Walter) Jansen. [*Spilanthes americana* (Mutis) Hieron]. Pastured wetlands, infrequent. L-401; S-4029.]
- L,R,S - *Ambrosia artemisiifolia* L. Disturbed areas, frequent. L-1551; R-722; S-3979.
- R - *Ambrosia psilostachya* DC. Disturbed areas, frequent. R-2351.
- R,S - *Ambrosia trifida* L. Disturbed areas, infrequent. R-2372; S-Valentine & Rudolph 1979.
- L,R,S - *Aster subulatus* Michaux var. *ligulatus* Shinn. Waste areas, frequent. L-NLU; R-732; S-4050.
- L,R,S - *Baccharis halimifolia* L. Marsh margins, frequent. L-2461, R-724; S-3901.
- L,S - *Bidens laevis* (L.) Britton, Sterns & Pogg. Disturbed areas, rare. L-RDT 84713; S-3913.
- L,S - *Boltonia asteroides* (L.) L'Hér. Disturbed areas, infrequent. L-Fruge 1974; S-3934.
- R,S - *Borrchia frutescens* (L.) DC. Marsh margins, frequent. R-2317; S-3876.
- L,R - *Cirsium horridulum* Michaux. [*Carduus spinosissimus* Walter]. Disturbed areas, frequent. L-Fruge 1974; R-2371.
- L,R - *Conyza bonariensis* (L.) Cronq. [*Erigeron bonariensis* L., *E. linifolius* Willd.]. Moist disturbed areas, frequent. L-RDT 84717; R-3277.
- S - *Conyza canadensis* (L.) Cronq. var. *pusilla* (Nutt.) Cronq. [*Erigeron canadensis* L. var. *pusillus* (Nutt.) J. Boivin, non H.E. Ahles, *E. pusillus* Nutt.]. Moist waste areas, infrequent. S-3988.
- L,R,S - *Eclipta prostrata* (L.) L. [*E. alba* (L.) Hassk.]. Marsh margins, frequent. L-3480; R-2363; S-3956.
- L - *Elephantopus carolinianus* Rausch. Moist pastures and roadsides, infrequent. L-NLU.
- R,S - *Erechtites hieracifolia* (L.) Raf. ex DC. Moist areas, frequent. R-2359; S-4003.
- L,R - *Erigeron philadelphicus* L. Fields and mixed woods, infrequent. L-NLU; R-1198.
- L - *Erigeron tenuis* Torrey & A. Gray. Moist roadsides, infrequent. L-NLU.
- L,R,S - *Eupatorium capillifolium* (Lam.) Small. Moist disturbed areas, frequent. L-Fruge 1974; R-4075; S-3907.
- L,R,S - *Eupatorium coelestinum* L. [*Conoclinium coelestinum* (L.) DC.]. Moist disturbed areas, frequent. L-3489; R-4078; S-3981.
- S - *Eupatorium compositifolium* Walter. Disturbed areas, infrequent. S-4035.
- L,R,S - *Eupatorium serotinum* Michaux. Disturbed areas, frequent. L-2430; R-3281; S-3888.
- L - *Euthamia gymnospermoides* E. Greene. Moist disturbed areas, infrequent. L-2432.
- S - *Euthamia leptcephala* (Torrey & A. Gray) E. Greene. [*Solidago leptcephala* Torrey & A. Gray]. Moist waste areas, infrequent. S-4010.
- R - *Euthamia tenuifolia* (Pursh) E. Greene. [*Solidago tenuifolia* Pursh]. R-Spindler & Noble 1974. (Reported as *S. tenuifolia* by Spindler & Noble).
- R - *Gaillardia pulchella* Foug. var. *pulchella*. Sandy areas, frequent. R-3328.
- S - *Gnaphalium obtusifolium* L. Disturbed areas, infrequent. S-4012.
- L,S - *Gnaphalium pensilvanicum* Willd. Waste areas, frequent. L-2948; S-4222.
- L - *Gnaphalium purpureum* L. var. *falcatum* (Lam.) Torrey & A. Gray. [*G. falcatum* Lam.]. Waste areas, frequent. L-NLU.

- L - *Gnaphalium purpureum* L. var. *purpureum*. [*G. spathulatum* Lam.]. Waste areas, frequent. L-1362.
- R - *Haplopappus phyllocephalus* DC. [*Machaeranthera phyllocephala* (DC.) Shinn.]. Sandy areas, frequent. R-3272.
- L,R,S - *Helenium amarum* (Raf.) H. Rock. Marsh margins, frequent. L-2414; R-2595; S-3940.
- L - *Helianthus angustifolius* L. Wooded pasture, rare. L-3522.
- R,S - *Heterotheca subzillaris* (Lam.) Britton & Rusby var. *subzillaris*. Sandy areas, frequent. R-3311; S-4246.
- L,S - *Iva angustifolia* DC. var. *angustifolia*. Moist waste areas, frequent. L-NLU; S-3996.
- R,S - *Iva annua* L. Marshy areas, frequent. R-3330; S-Valentine & Rudolph 1979.
- R,S - *Iva frutescens* L. Disturbed areas on marsh borders, frequent. R-2290; S-3877.
- L,S - *Krigia cespitosa* (Raf.) Chambers. [*K. oppositifolia* Raf.]. Waste areas, frequent. L-1530; S-4269.
- S - *Krigia dandelion* (L.) Nutt. Lawns and waste areas, infrequent. S-4265.
- R - *Lactuca serriola* L. Roadside, rare. R-3047.
- R - *Leucosyris spinosa* (Benth.) E. Greene. [*Aster spinosa* Benth.]. Waste areas, frequent. R-3313.
- L,R,S - *Mikania scandens* (L.) Willd. Marsh margins, frequent. L-2440; R-NLU; S-3919.
- R - *Parthenium hysterophorus* L. Disturbed areas, frequent. R-2590.
- S - *Pluchea camphorata* (L.) DC. S-Valentine & Rudolph 1979.
- S - *Pluchea foetida* (L.) DC. S-Valentine & Rudolph 1979.
- R,S - *Pluchea odorata* (L.) Cass. [*P. purpurascens* (Sw.) DC.]. Marsh margins, frequent. R-746; S-3887.
- S - *Pterocaulon virgatum* (L.) DC. S-Valentine & Rudolph 1979.
- L - *Pyrrhoppappus carolinianus* (Walter) DC. Disturbed areas, frequent. L-2406.
- S - *Rudbeckia hirta* L. var. *puicherrima* Farw. Waste areas, frequent. S-4002.
- L,R - *Senecio glabellus* Poir. Roadsides, frequent. L-NLU; R-Spindler & Noble 1974.
- L,R,S - *Solidago canadensis* L. var. *scabra* (Muhlenb.) Torrey & A. Gray. Waste areas, frequent. L-NLU; R-4074; S-4038.
- L,R,S - *Solidago sempervirens* L. var. *mezicana* (L.) Fern. Marsh margins, frequent. L-2413; R-NLU; S-3890.
- L - *Soliva mutisii* Kunth. Moist waste areas, infrequent. L-1562.
- L,S - *Soliva pterosperma* (A.L. Juss.) Less. Moist waste areas, infrequent. L-1561; S-4252.
- L,R,S - *Scnchus asper* (L.) Hill. Marsh margins, frequent. L-3483; R-NLU; S-NLU.
- R - *Sonchus oleraceus* L. Margins of marshy areas, frequent. R-735.
- S - *Vernonia missurica* Raf. Disturbed areas, infrequent. S-3999.
- R - *Youngia japonica* (L.) DC. [*Crepis japonica* (L.) Benth.]. Lawns, infrequent. R-849.

BATACEAE 1 - 0:1:0

- R - *Batis maritima* L. Marsh margins, frequent. R-2347.

BIGNONIACEAE 1 - 0:1:1

- R,S - *Campsis radicans* (L.) Seemann ex Bureau. Mixed woods, frequent. R-2305; S-Valentine & Rudolph 1979.

BORAGINACEAE 4 - 3:1:1

- R,S - *Heliotropium curassavicum* L. var. *curassavicum*. Marsh margins, frequent. R-3265; S-3929.

L - *Heliotropium indicum* L. Moist waste areas, infrequent. L-399.

L - *Heliotropium procumbens* Miller. Waste area, rare. L-RDT 84714.

L - *Myosotis macrosperma* Engelm. Waste areas, frequent. L-NLU.

BRASSICACEAE 12 - 7:6:3

R - *Brassica juncea* (L.) Czernj. var. *crispifolia* L. Bailey. Escape from cultivation, rare. R-4122.

R - *Brassica juncea* (L.) Czernj. var. *longidens* L. Bailey. Escape from cultivation, rare. R-3318.

L - *Brassica kaber* (DC.) Wheeler. [*Sinapis arvensis* L.]. Disturbed areas, infrequent. L-NLU.

L - *Brassica rapa* L. var. *rapa*. Escape from cultivation, rare. L-NLU.

R - *Cakile geniculata* (Robinson) Millsp. Marsh margins, rare. R-2342.

L,R,S - *Cardamine hirsuta* L. Lawns, infrequent. L-NLU; R-NLU; S-4266.

L,R - *Cardamine pensylvanica* Muhlenb. ex Willd. Lawns and roadsides, frequent. L-NLU; R-846.

L,S - *Coronopus didymus* (L.) Smith. Lawns and roadsides, infrequent. L-1552; S-4257.

R - *Lepidium ruderales* L. Waste areas, rare. R-4127.

L,R,S - *Lepidium virginicum* L. var. *virginicum*. Waste areas, frequent. L-NLU; R-4281; S-4250.

R - *Rorippa sessiliflora* (Nutt.) A. Hitchc. Waste areas, infrequent. R-848.

L - *Rorippa teres* (Michaux) Stuckey. Moist fields, frequent. L-NLU.

BROMELIACEAE 1 - 1:0:1

L,S - *Tillandsia usneoides* (L.) L. Epiphyte on trees, frequent. L-404; S-Valentine & Rudolph 1979.

CABOMBACEAE 1 - 1:0:1

L,S - *Cabomba caroliniana* A. Gray. Aquatic, frequent. L-2456; S-Valentine & Rudolph 1979.

CAESALPINIACEAE 5 - 3:3:1

L - *Cercis canadensis* L. var. *canadensis*. Escape from cultivation, rare. L-NLU.

S - *Chamaecrista fasciculata* (Michaux) E. Greene. [*Cassia fasciculata* Michaux var. *puberula* (E. Greene) J.F. Macbr., *Chamaecrista littoralis* Pollard, *Chamaecrista mississippiensis* (Pollard) Pollard ex A.A. Heller]. Disturbed areas, infrequent. S-3990.

L,R - *Gleditsia triacanthos* L. Mixed woods, infrequent. L-RDT 82961; R-2370.

R - *Senna marilandica* (L.) Link. [*Cassia marilandica* L.]. Waste areas, infrequent. R-RDT 48265.

L,R - *Senna obtusifolia* (L.) H. Irwin & Barneby. [*Cassia obtusifolia* L.]. Disturbed areas, infrequent. L-3497; R-4081.

CALLITRICHACEAE 2 - 1:1:0

L - *Callitriche heterophylla* Pursh emend. Darby. Moist waste areas, infrequent. L-NLU.

R - *Callitriche peploides* Nutt. Moist waste areas, infrequent. R-4130.

CAMPANULACEAE 2 - 2:0:1

L - *Triodanis biflora* (Ruiz Lopez & Pavón) E. Greene. [*T. perfoliata* (L.) Nieuwl. var. *biflora* (Ruiz Lopez & Pavón) Bradley, *Spergularia biflora* (Ruiz Lopez & Pavón) Fischer & G. Meyerj.]. Moist disturbed areas, infrequent. L-NLU.

L,S - *Triodanis perfoliata* (L.) Nieuwl. [*Spergularia perfoliata* (L.) A. DC.]. Moist disturbed areas, frequent. L-1533; S-4237.

CANNACEAE 1 - 0:1:0

R - *Canna flaccida* Salisb. Roadside ditches on marsh margins, infrequent. R-379.

CAPRIFOLIACEAE 3 - 2:1:2

L - *Lonicera japonica* Thunb. Moist waste areas, frequent. L-416.

L,R,S - *Sambucus canadensis* L. var. *canadensis*. Margins of wet or marshy areas, infrequent. L-2411; R-2315; S-4020.

S - *Viburnum dentatum* L. var. *dentatum*. Mixed woods, infrequent. S-3982.

CARYOPHYLLACEAE 4 - 3:0:3

L - *Cerastium glomeratum* Thuill. Lawns and roadsides, frequent. L-RDT 82943.

L,S - *Sagina decumbens* (Elliot) Torrey & A. Gray. Lawns and roadsides, frequent. L-RDT 82904; S-4253.

L,S - *Stellaria media* (L.) Cirillo. Moist disturbed areas, frequent. L-NLU; S-4263.

S - *Stellaria prostrata* Baldwin. Marsh margins, rare. S-4243.

CERATOPHYLLACEAE 2 - 2:1:1

L,R,S - *Ceratophyllum demersum* L. Aquatic, frequent. L-2467; R-RDT 48256; S-3914.

L - *Ceratophyllum muricatum* Cham. [*C. echinatum* A. Gray]. Aquatic, infrequent. L-NLU.

CHENOPODIACEAE 7 - 2:5:4

R,S - *Atriplex arenaria* Nutt. Waste areas, frequent. R-2333; S-3869.

R - *Atriplex patula* L. var. *hastata* (L.) A. Gray. [*A. patula* L. ssp. *hastata* (L.) H.M. Hall & Clements. Moist waste areas, infrequent. R-751.

S - *Chenopodium album* L. Disturbed areas, infrequent. S-3878.

L,R - *Chenopodium ambrosioides* L. Waste areas, frequent. L-RDT 84766; R-3049.

L,R,S - *Chenopodium berlandieri* Moq. Waste areas, frequent. L-3501; R-2331; S-3908.

R - *Salicornia bigelovii* Torrey. Waste areas, frequent. R-2353.

S - *Suaeda linearis* (Elliot) Moq. Waste areas, frequent. S-3872.

CLUSIACEAE 4 - 4:0:2

L,S - *Ascyrum hypericoides* L. [*Hypericum hypericoides* (L.) Crantz]. Margins of mixed woods, infrequent. L-2408; S-3968.

L - *Hypericum drummondii* (Grev. & Hook.) Torrey & A. Gray. Margins of mixed woods, infrequent. L-2434.

L - *Hypericum mutilum* L. Pond margin, rare. L-RDT 105768.

L,S - *Triandenum virginicum* (L.) Raf. [*Hypericum virginicum* (L.) Raf.]. Marsh margin, rare. L-RDT 84727; S-Valentine & Rudolph 1979. (Reported as *Hypericum virginicum* by Valentine & Rudolph).

COMMELINACEAE 2 - 2:0:1

L,S - *Commelina caroliniana* Walter. Marsh margin, rare. L-3486; S-3944.

L - *Tradescantia hirsutiflora* Bush. Pastures and mixed woods, infrequent. L-NLU.

CONVOLVULACEAE 6 - 4:4:4

L,R - *Calystegia sepium* (L.) R. Br. [*Convolvulus sepium* L.]. Marsh margins, frequent. L-RDT 83839; R-1402.

S - *Convolvulus arvensis* L. S-Valentine & Rudolph 1979.

L,S - *Dichondra carolinensis* Michaux. Moist disturbed areas, infrequent. L-NLU; S-4270.

L,R,S - *Ipomoea sagittata* Poir. Waste areas, frequent. L-NLU; R-2285; S-3922.

R,S - *Ipomoea trichocarpa* Elliot var. *trichocarpa*. Disturbed areas, frequent. R-727; S-RDT 81619.

L,R - *Jacquemontia tamnifolia* (L.) Griseb. Moist waste areas, infrequent. L-185; R-RDT 48281.

CORNACEAE 2 - 2:0:0

L - *Cornus drummondii* C. Meyer. Mixed woods, infrequent. L-NLU.

L - *Cornus foemina* Miller ssp. *foemina*. [*C. stricta* Lam.]. Mixed woods, infrequent. L-402.

CRASSULACEAE 1 - 1:0:0

L - *Crassula aquatica* (L.) Schoenl. [*Tillaea aquatica* L.]. Moist fields, rare. L-RDT 82901.

CUCURBITACEAE 2 - 1:2:1

R - *Cucumis melo* L. var. *dudaim* Naudin. Waste areas on marsh margins, frequent. R-RDT 48486.

L,R,S - *Melothria pendula* L. Waste areas on marsh margins, frequent. L-Fruge 1974; R-2287; S-3893.

CUSCUTACEAE 3 - 1:3:0

R - *Cuscuta cuspidata* Engelm. R-Spindler & Noble 1974.

L,R - *Cuscuta indecora* Choisy var. *indecora*. Parasite, infrequent. L-3499; R-734.

R - *Cuscuta pentagona* Engelm. var. *pentagona*. [*C. campestris* Yuncker]. Parasite, frequent. R-980.

CYPERACEAE 61 - 49:10:33

L - *Carex albolutescens* Schwein. Roadsides and pastures, frequent. L-RDT 83866.

L - *Carex cephalophora* Willd. Moist mixed woods, infrequent. L-1373.

L - *Carex complanata* Torrey & Hook. Mixed woods, infrequent. L-NLU.

L - *Carex flaccosperma* Dewey. Mixed woods, infrequent. L-1367.

L,S - *Carex glaucescens* Elliot. Disturbed marshy areas, infrequent. L-1547; S-Valentine & Rudolph 1979.

L - *Carex hyalinolepis* Steudel. Disturbed area on marsh margin, rare. L-1532.

L - *Carex reniformis* (L. Bailey) Small. Disturbed areas, frequent. L-1555.

L - *Carex retrofleza* Willd. var. *retrofleza*. Mixed woods, infrequent. L-RDT 82951.

L,R,S - *Cladium jamaicense* Crantz. Marsh margins, frequent. L-2418; R-3286; S-3912.

L,S - *Cyperus articulatus* L. Marshy areas, frequent. L-NLU; S-3925.

S - *Cyperus digitatus* Roxb. Disturbed areas, infrequent. S-3916.

L - *Cyperus elegans* L. Waste areas, infrequent. L-RDT 84746.

L,R,S - *Cyperus erythrorhizos* Muhlenb. Marsh margins, frequent. L-RDT 84781; R-Spindler & Noble 1974; S-Valentine & Rudolph 1979.

L - *Cyperus esculentus* L. Marshy areas, frequent. L-NLU.

L,R - *Cyperus globulosus* Aublet. Mixed woods, frequent. L-RDT 84772; R-3324.

L,S - *Cyperus haspan* L. Moist disturbed areas, infrequent. L-RDT 84759; S-Valentine & Rudolph 1979.

L - *Cyperus hermaphroditus* (Jacq.) Standley. Mixed woods, infrequent. L-NLU.

L - *Cyperus iria* L. Roadsides and pastures, frequent. L-NLU.

R,S - *Cyperus odoratus* L. Marsh margins, frequent. R-733; S-3917.

- L - *Cyperus ozylepis* Nees ex Steudel. Marshy areas, frequent. L-RDT 84773.
- S - *Cyperus polystachyos* Rottb. var. *filicinus* M. Vahl. [*C. filicinus* M. Vahl]. S-Valentine & Rudolph 1979. (Reported as *C. filicinus* by Valentine & Rudolph).
- L,S - *Cyperus pseudovegetus* Steudel. Disturbed fields and woods, frequent. L-RDT 83822; S-Valentine & Rudolph 1979.
- L,S - *Cyperus retrosus* Chapman. [*C. ovalaris* (Michaux) Torrey var. *cylindricus* (Elliot) Torrey]. Moist areas, frequent. L-RDT 84771; S-3939.
- L,R,S - *Cyperus rotundus* L. Moist waste areas, frequent. L-NLU; R-3290; S-Valentine & Rudolph 1979.
- L,S - *Cyperus virens* Michaux. Moist fields and mixed woods, frequent. L-RDT 83805; S-NLU.
- L,S - *Dichromena colorata* (L.) A. Hitchc. [*Rhynchospora colorata* (L.) Pfeifer]. Moist roadsides and fields, frequent. L-1529; S-Valentine & Rudolph 1979.
- L - *Eleocharis acicularis* (L.) Roemer & Schultes. Moist areas, infrequent. L-NLU.
- L - *Eleocharis atropurpurea* (Retz.) J.S. Presl & C. Presl. L-Fruge 1974.
- L,S - *Eleocharis baldwinii* (Torrey) Chapman. Moist waste area, rare. L-Fruge 1974; S-2763.
- L - *Eleocharis caribaea* (Rottb.) Blake. L-Fruge 1974.
- S - *Eleocharis cellulosa* Torrey. S-Valentine & Rudolph 1979.
- L - *Eleocharis elongata* Chapman. Emergent aquatic, rare. L-2427.
- L,S - *Eleocharis equisetoides* (Elliot) Torrey. Emergent aquatic, infrequent. L-2460; S-4015.
- L - *Eleocharis fallax* Weath. Moist areas, rare. L-RDT 83763.
- L,S - *Eleocharis flavescens* (Poiret) Urban. Moist areas, rare. L-2457; S-Valentine & Rudolph 1979.
- S - *Eleocharis macrostachya* Britton. S-Valentine & Rudolph 1979.
- L - *Eleocharis montana* (Kunth in Humb. Bonpl. & Kunth) Roemer & Schultes. Disturbed areas, infrequent. L-RDT 83865.
- L,S - *Eleocharis montevidensis* Kunth. Moist waste areas, frequent. L-RDT 83862; S-RDT 81615.
- L,S - *Eleocharis obtusa* (Willd.) Schultes var. *obtusa*. Moist disturbed areas, frequent. L-RDT 84767; S-Valentine & Rudolph 1979.
- L - *Eleocharis olivacea* Torrey. Moist waste areas, infrequent. L-1559.
- R,S - *Eleocharis parvula* (Roemer & Schultes) Link ex Bluff & Fingerh. Waste areas, infrequent. R-3278; S-3920.
- L,S - *Eleocharis quadrangulata* (Michaux) Roemer & Schultes. Marshy areas, frequent. L-1541; S-Valentine & Rudolph 1979.
- S - *Fimbristylis castanea* (Michaux) M. Vahl. Disturbed areas, frequent. S-4046.
- L - *Fimbristylis miliacea* (L.) M. Vahl. Moist areas, infrequent. L-409.
- S - *Fimbristylis spadicea* (L.) M. Vahl. S-Valentine & Rudolph 1979.
- L - *Fuirena breviseta* (Coville) Coville. Moist disturbed areas, rare. L-3498.
- L,S - *Fuirena squarrosa* Michaux. Marsh margins, infrequent. L-RDT 105792; S-Valentine & Rudolph 1979.
- L,S - *Psilocarya nitens* (M. Vahl) Alph. Wood. Moist disturbed areas, infrequent. L-RDT 84753; S-Valentine & Rudolph 1974.
- L - *Rhynchospora caduca* Elliot. Moist areas, frequent. L-RDT 83867.

S - *Rhynchospora corniculata* (Lam.) A. Gray. Moist waste areas, infrequent. S-4018.

L - *Rhynchospora globularis* (Chapman) Small. Moist disturbed areas, frequent. L-2424.

L,S - *Rhynchospora microcarpa* Baldwin ex A. Gray. Moist disturbed areas, infrequent. L-2433; S-Valentine & Rudolph 1979.

L,S - *Rhynchospora perpleza* Britton. Moist areas, infrequent. L-2439; S-Valentine & Rudolph 1979.

R - *Rhynchospora pusilla* Chapman ex M. Curtis. Sandy waste area, rare. R-2339.

L,R,S - *Scirpus americanus* Pers. [*S. olneyi* A. Gray]. Disturbed areas, frequent. L-RDT 82918; R-Spindler & Noble 1974; S-3921.

L,R,S - *Scirpus californicus* (C. Meyer) Steudel. Disturbed areas, frequent. L-Fruge 1974; R-RDT 48280; S-3931.

L - *Scirpus confervoides* Poir. [*Websteria confervoides* (Poir.) Hooper]. Aquatic, rare. L-2468.

L - *Scirpus etuberculatus* (Steudel) Kuntze. L-Fruge 1974.

L - *Scirpus koilolepis* (Steudel) Gleason. Moist fields, frequent. L-NLU.

R,S - *Scirpus robustus* Pursh. [*S. maritimus* L. var. *macrostachyus* Michaux]. Waste areas, frequent. R-RDT 48268; S-3951.

S - *Scirpus tabernaemontanii* C. Gmelin. [*S. validus* M. Vahl]. S-Valentine & Rudolph 1979. (Reported as *S. validus* by Valentine & Rudolph).

EBENACEAE 1 - 1:0:1

L,S - *Diospyros virginiana* L. Mixed woods, infrequent. L-420; S-Valentine & Rudolph 1979.

EUPHORBIACEAE 13 - 5:9:7

S - *Acalypha gracilens* A. Gray var. *gracilens*. Disturbed areas, infrequent. S-4004.

R - *Acalypha ostryifolia* Riddell. Moist waste areas, frequent. R-RDT 48257.

R - *Caperonia palustris* (L.) A. St. Hil. Disturbed areas, infrequent. R-RDT 48255.

L,R,S - *Chamaesyce glyptosperma* (Engelm.) Small. [*Euphorbia glyptosperma* Engelm.]. Waste areas, frequent. L-RDT 84718; R-747; S-4011.

L,R,S - *Chamaesyce maculata* (L.) Small. [*Euphorbia maculata* L.]. Disturbed areas, frequent. L-1557; R-3315; S-3880.

R - *Chamaesyce nutans* (Lagasca) Small. [*Euphorbia nutans* Lagasca]. Mixed woods, infrequent. R-437.

S - *Chamaesyce serpens* (Kunth in Humb., Bonpl. & Kunth) Small. [*Euphorbia serpens* Kunth in Humb., Bonpl. & Kunth]. Waste areas on marsh margins, frequent. S-3933.

L - *Croton capitatus* Michaux var. *capitatus*. Waste areas, frequent. L-2407.

R,S - *Croton glandulosus* L. Waste areas, infrequent. R-3302; S-3397.

L,R - *Croton monanthogynus* Michaux. Roadsides, infrequent. L-RDT 84720; R-3303.

S - *Croton punctatus* Jacq. Sandy areas on marsh margins, frequent. S-RDT 81626.

R - *Poinsettia dentata* (Michaux) Klotzsch & Garcke. [*Euphorbia dentata* Michaux]. Roadsides and mixed woods. R-2283.

L,R,S - *Sapium sebiferum* (L.) Roxb. Various habitats, frequent. L-2412; R-2314; S-3889.

FABACEAE 22 - 13:10:10

- L,S - *Aeschynomene indica* L. [*A. virginica* (L.) Britton. Sterns & Pogg.]. Moist waste areas, frequent. L-186; S-Valentine & Rudolph 1979. (Reported as *A. virginica* by Valentine & Rudolph).
- L - *Amorpha fruticosa* L. var. *fruticosa*. Mixed woods, infrequent. L-3545.
- L - *Apios americana* Medikus. Disturbed area on marsh margin, rare. L-3500.
- S - *Centrosema virginianum* (L.) Benth. Sandy areas on marsh margins, frequent. S-4039.
- S - *Desmodium perplezum* B.G. Schubert. Waste areas, infrequent. S-3977.
- R - *Indigofera suffruticosa* Miller. Disturbed areas on marsh margins, infrequent. R-2293.
- R,S - *Medicago lupulina* L. Sandy disturbed areas, frequent. R-4080; S-4249.
- L,R,S - *Medicago polymorpha* L. Roadsides, frequent. L-NLU; R-4286; S-NLU.
- L,R - *Melilotus indicus* (L.) All. Roadsides, frequent. L-NLU; R-2292.
- S - *Melilotus officinalis* (L.) Lam. S-Valentine & Rudolph 1979.
- R - *Pediomelum rhombifolium* (Torrey & A. Gray) Rydb. [*Psoralea rhombifolia* Torrey & A. Gray]. Sandy waste areas, infrequent. R-2296.
- R - *Rhynchosia minima* (L.) DC. var. *minima*. Sandy areas, infrequent. R-725.
- L,R,S - *Sesbania drummondii* (Rydb.) Cory. [*Daubentonia drummondii* Rydb.]. Waste areas on marsh margins, frequent. L-4006; R-2357; S-4006.
- R,S - *Sesbania macrocarpa* Muhlenb. [*S. exaltata* (Raf.) Cory]. Waste areas on marsh margins, infrequent. R-Spindler & Noble 1974; S-3962.

- L,S - *Sesbania vesicaria* (Jacq.) Elliot. [*Glottidium vesicarium* (Jacq.) Harper]. Moist pastures and roadsides, infrequent. L-3479; S-Valentine & Rudolph 1979.
- L - *Strophostyles helvola* (L.) Elliot. Sandy areas, frequent. L-3495.
- L,S - *Strophostyles leiosperma* (Torrey & A. Gray) Piper. Moist waste areas, frequent. L-RDT 84776; S-3976.
- L - *Trifolium pratense* L. Disturbed area, rare. L-1550.
- L - *Trifolium repens* L. Roadsides and lawns, frequent. L-NLU.
- R - *Trifolium resupinatum* L. Roadsides and pastures, infrequent. R-NLU.
- L - *Vicia ludoviciana* Nutt. var. *ludoviciana*. Roadsides and fencerows, frequent. L-NLU.
- L,R,S - *Vigna luteola* (Jacq.) Benth. [*V. repens* (L.) Kuntze]. Disturbed areas, frequent. L-RDT 84762; R-RDT 48251; S-3923.

FAGACEAE 3 - 3:0:2

- L,S - *Quercus nigra* L. Mixed woods, infrequent. L-412; S-Valentine & Rudolph 1979.
- L - *Quercus obtusa* (Willd.) Pursh. Mixed woods, infrequent. L-417.
- L,S - *Quercus virginiana* Miller var. *virginiana*. Mixed woods, frequent. L-RDT 82966; S-3892.

FUMARIACEAE 1 - 0:0:1

- S - *Corydalis micrantha* (Engelm.) A. Gray var. *australis* (Chapman) Shinn. [*C. micrantha* (Engelm.) A. Gray ssp. *australis* (Chapman) Ownbey]. Sandy areas, infrequent. S-4256.

GENTIANACEAE 2 - 0:0:2

- S - *Eustoma exaltatum* (L.) Salisb. ex G. Don. Disturbed areas on marsh margins, frequent. S-4022.

S - *Sabatia campestris* Nutt. S-Valentine & Rudolph 1979.

GERANIACEAE 1 - 1:0:1

L,S - *Geranium carolinianum* L. Roadsides, frequent. L-RDT 82905; S-NLU.

HALORAGACEAE 5 - 4:0:3

L - *Myriophyllum aquaticum* (Vell. Conc.) Verdc. [*M. brasiliense* Cambess.]. Aquatic, infrequent. L-RDT 82977.

L,S - *Myriophyllum heterophyllum* Michaux. Aquatic, infrequent. L-RDT 83848; S-4224.

L,S - *Myriophyllum pinnatum* (Walter) Britton, Sterns & Pogg. Aquatic, infrequent. L-RDT 84750; S-3991.

S - *Myriophyllum spicatum* L. Aquatic, infrequent. S-3926.

L - *Proserpinaca palustris* L. L-Fruge 1974.

HAMAMELIDACEAE 1 - 1:0:1

L,S - *Liquidambar styraciflua* L. Mixed woods, infrequent. L-RDT 82950; S-Valentine & Rudolph 1979.

HYDROCHARITACEAE 6 - 6:0:2

L - *Blyza aubertii* Rich. L-Fruge 1974.

L - *Egeria densa* Planchon. [*Elodea densa* (Planchon) Caspary]. Aquatic, rare. L-RDT 84744.

L - *Hydrilla verticillata* (L.f.) Royle. Aquatic, infrequent. L-3547.

L,S - *Limnobium spongia* (Bosc) Steudel. Aquatic, frequent. L-2400; S-4223.

L - *Ottelia alismoides* (L.) Pers. Aquatic, infrequent. L-RDT 84721.

L,S - *Vallisneria americana* Michaux. Aquatic, infrequent. L-2455; S-Valentine & Rudolph 1979.

HYDROPHYLLACEAE 4 - 3:0:1

L - *Hydrolea ovata* Nutt. ex Choisy. L-Fruge 1974. (Reported as *H. ovata* Choisy by Fruge).

S - *Hydrolea quadrivalvis* Walter. S-Valentine & Rudolph 1979.

L - *Nemophila aphylla* (L.) Brummitt. [*N. triloba* (Raf.) Thieret]. Mixed woods, rare. L-RDT 82938.

L - *Phacelia hirsuta* Nutt. Mixed woods, rare. L-RDT 82947.

IRIDACEAE 6 - 4:0:3

L - *Iris brevicaulis* Raf. L-Fruge 1974.

L,S - *Iris giganteaerulea* Small. Marsh margins, infrequent. L-NLU; S-4042.

S - *Iris virginica* L. S-Valentine & Rudolph 1979.

L - *Sisyrinchium angustifolium* Miller. Disturbed area, rare. L-NLU.

S - *Sisyrinchium atlanticum* E. Bickn. S-Valentine & Rudolph 1979.

L - *Sisyrinchium ezile* E. Bickn. Disturbed sandy areas, infrequent. L-NLU.

JUGLANDACEAE 2 - 1:0:1

L - *Carya aquatica* (Michaux f.) Nutt. Moist mixed woods, infrequent. L-NLU.

S - *Carya illinoensis* (Wangenh.) K. Koch. S-Valentine & Rudolph 1979.

JUNCACEAE 13 - 10:1:9

L,S - *Juncus acuminatus* Michaux. Disturbed fields, frequent. L-NLU; S-Valentine & Rudolph 1979.

L,S - *Juncus brachycarpus* Engelm. Fields, frequent. L-RDT 83787; S-Valentine & Rudolph 1979.

R,S - *Juncus bufonius* L. Waste areas, frequent. R-4126; S-Valentine & Rudolph 1979.

L,S - *Juncus dichotomus* Elliot. Roadsides and fields. L-RDT 83794; S-Valentine & Rudolph 1979.

L - *Juncus dudleyi* Wieg. Disturbed areas, rare. L-1565.

L,S - *Juncus effusus* L. Disturbed areas, infrequent. L-RDT 83747; S-Valentine & Rudolph 1979.

L - *Juncus interior* Wieg. Mixed woods, infrequent. L-RDT 83785.

L - *Juncus marginatus* Rostkov. [*J. biflorus* Elliot]. L-Fruge 1974.

L,S - *Juncus nodatus* Coville. Marsh margins, frequent. L-1545; S-Valentine & Rudolph 1979.

L,S - *Juncus polycephalus* Michaux. L-Fruge 1974; S-Valentine & Rudolph 1979.

S - *Juncus repens* Michaux. S-Valentine & Rudolph 1979.

S - *Juncus roemerianus* Scheele. S-Valentine & Rudolph 1979.

L - *Juncus tenuis* Willd. Disturbed areas, frequent. L-1539.

LAMIACEAE 10 - 7:4:0

L - *Lamium amplexicaule* L. Lawns and roadsides, infrequent. L-NLU.

L - *Lycopus rubellus* Moench var. *rubellus*. Disturbed area, rare. L-3487.

L,R - *Monarda punctata* L. Disturbed areas, frequent. L-3502; R-2295.

L - *Salvia lyrata* L. Disturbed areas, infrequent. L-NLU.

R - *Scutellaria drummondii* Benth. Sandy areas, infrequent. R-2805.

L - *Scutellaria ovata* Hill ssp. *bracteata* (Benth.) Epling. Waste area on marsh margin, rare. L-1546.

L - *Scutellaria parvula* Michaux var. *parvula*. Moist fields and roadsides, infrequent. L-NLU.

R - *Stachys crenata* Raf. Roadsides and mixed woods, frequent. R-4124.

L - *Stachys tenuifolia* Willd. Mixed woods, infrequent. L-411.

R - *Teucrium canadense* L. var. *canadense*. Roadsides and mixed woods, frequent. R-2272.

LAURACEAE 2 - 1:0:2

S - *Cinnamomum camphora* (L.) J.S. Presl. Moist mixed woods, infrequent. S-4229.

L,S - *Sassafras albidum* (Nutt.) Nees. Mixed woods, infrequent. L-406; S-Valentine & Rudolph 1979.

LEMNACEAE 7 - 7:0:4

L,S - *Lemna minor* L. Aquatic, frequent. L-Fruge 1974; S-3967.

L,S - *Lemna perpusilla* Torrey. L-Fruge 1974; S-Valentine & Rudolph 1979.

L - *Lemna valdiviana* Philippi. Aquatic, rare. L-423.

L,S - *Spirodela polyrhiza* (L.) Schleidn. L-Fruge 1974; S-Valentine & Rudolph 1979.

L - *Spirodela punctata* (G. Meyer) C. Thompson. Aquatic, rare. L-422.

L - *Wolffiella gladiata* (Hegelm.) Hegelm. [*W. floridana* (J.D. Smith ex Hegelm.) C. Thompson]. Aquatic, infrequent. L-NLU.

L,S - *Wolffiella lingulata* (Hegelm.) Hegelm. L-Fruge 1974; S-Valentine & Rudolph 1979.

LENTIBULARIACEAE 7 - 7:0:3

L - *Utricularia biflora* Lam. Aquatic, infrequent. L-RDT 64736.

L,S - *Utricularia foliosa* L. Aquatic, infrequent. L-2443; S-Valentine & Rudolph 1979.

L - *Utricularia gibba* L. Aquatic, infrequent. L-2446.

L,S - *Utricularia inflata* Walter. Aquatic, frequent. L-RDT 83742; S-4225.

L,S - *Utricularia purpurea* Walter. Aquatic, rare. L-RDT 64734; S-Valentine & Rudolph 1979.

L - *Utricularia radiata* Small. L-Fruge 1974.

- L - *Utricularia vulgaris* L. Aquatic. infrequent. *L-RDT* 84735.

LILIACEAE 6 - 6:0:3

- L,S - *Crinum americanum* L. Marsh margins, infrequent. *L-2420*; *S-4016*.
- L,S - *Hymenocallis caroliniana* (L.) Herbert. [*H. occidentalis* (Le Conte) Kunth]. *L-Frue* 1974; *S-Valentine* & *Rudolph* 1979. (Reported as *H. occidentalis* by Valentine & Rudolph).
- L - *Hymenocallis eulae* Shinn. *L-Frue* 1974.
- L - *Hymenocallis liriosome* (Raf.) Shinn. *L-Frue* 1974.
- L,S - *Nothoscordum bivalve* (L.) Britton. [*Allium bivalve* (L.) Kuntze]. Disturbed areas, frequent. *L-NLU*; *S-4251*.
- L - *Zephranthes candida* (Lindley) Herbert. Local escape from cultivation. rare. *L-NLU*.

LINACEAE 1 - 1:0:0

- L - *Linum medium* (Planchon) Britton var. *tezanum* (Planchon) Fern. Moist disturbed areas, infrequent. *L-2426*.

LOGANIACEAE 1 - 1:0:0

- L - *Mitreola petiolata* (Gmelin) Torrey & A. Gray. [*Cynoctonum mitreola* (L.) Britton]. *L-Frue* 1974. (Reported as *Cynoctonum mitreola* by Frue).

LYTHRACEAE 3 - 2:1:2

- R,S - *Ammannia coccinea* Rottb. *R-Spindler* & *Noble* 1974; *S-Valentine* & *Rudolph* 1979.
- L,S - *Decodon verticillatus* (L.) Elliot. Disturbed areas, infrequent. *L-3503*; *S-Valentine* & *Rudolph* 1979.
- L - *Lythrum alatum* Pursh var. *lanceolatum* (Elliot) Torrey & A. Gray ex Roth. [*L. lanceolatum* Elliot]. Moist disturbed areas, frequent. *L-3484*.

MAGNOLIACEAE 1 - 0:0:1

- S - *Magnolia grandiflora* L. *S-Valentine* & *Rudolph* 1979.

MALVACEAE 6 - 4:4:5

- S - *Hibiscus grandiflorus* Michaux. On a levee, rare. *S-3902*.
- L,S - *Hibiscus lasiocarpus* Cav. Marsh margins, infrequent. *L-2464*; *S-Valentine* & *Rudolph* 1979.
- L,R,S - *Kosteletzkya virginica* (L.) C. Presl ex A. Gray var. *althiifolia* Chapman. Marsh margins, frequent. *L-2463*; *R-2596*; *S-3891*.
- R - *Malvastrum coromandelianum* (L.) Garcke. Fields and lawns, frequent. *R-976*.
- L,R,S - *Modiola caroliniana* (L.) G. Don. Disturbed areas, frequent. *L-1358*; *R-3288*; *S-3927*.
- L,R,S - *Sida rhombifolia* L. Disturbed areas, frequent. *L-180*; *R-2302*; *S-3942*.

MARANTACEAE 1 - 1:0:0

- L - *Thalia dealbata* Roscoe. Margins of a pond, rare. *L-396*.

MELASTOMATACEAE 1 - 1:0:0

- L - *Rhezia mariana* L. *L-Frue* 1974.

MELIACEAE 1 - 1:1:1

- L,R,S - *Melia azedarach* L. Mixed woods, infrequent. *L-2417*; *R-2315*; *S-3959*.

MENISPERMACEAE 1 - 1:1:1

- L,R,S - *Cocculus carolinus* (L.) DC. Mixed woods, infrequent. *L-407*; *R-3306*; *S-3662*

MENYANTHACEAE 1 - 1:0:1

- L,S - *Nymphoides aquatica* (Gmelin) Kuntze. Aquatic, frequent. *L-2399*; *S-Valentine* & *Rudolph* 1979.

MIMOSACEAE 2 - 2:0:2

- L,S - *Mimosa strigillosa* Torrey & A. Gray.
Moist waste areas, infrequent. L-
Fruge 1974; S-4001.
- L,S - *Neptunia pubescens* Benth. var.
pubescens. Sandy waste areas, infre-
quent. L-NLU; S-4040.

MORACEAE 3 - 1:0:3

- S - *Ficus carica* L. S-Valentine & Rudolph
1979.
- S - *Morus alba* L. Mixed woods, infrequent.
S-3937.
- L,S - *Morus rubra* L. Mixed woods, infre-
quent. L-419; S-Valentine & Rudolph
1979.

MYRICACEAE 1 - 1:0:1

- L,S - *Myrica cerifera* L. Fencerows and dis-
turbed areas, infrequent. L-1526; S-
4014.

NAJADACEAE 1 - 1:1:1

- L,R,S - *Najas guadalupensis* (Sprengel)
Magnus. Aquatic, frequent. L-425;
R-RDT 48279; S-3953.

NELUMBONACEAE 1 - 1:1:1

- L,R,S - *Nelumbo lutea* (Willd.) Pers.
Aquatic in shallow water, frequent. L-
2397; R-3300; S-4013.

NYCTAGINACEAE 1 - 0:1:0

- R - *Boerhaavia diffusa* L. [*B. coccinea*
Miller]. Roadsides and mixed woods,
infrequent. R-RDT 48276.

NYMPHAEACEAE 5 - 3:0:5

- L,S - *Brasenia schreberi* J. Gmelin.
Aquatic, frequent. L-2469; S-
Valentine & Rudolph 1979.
- L,S - *Nuphar luteum* (L.) Sibth. & Smith
ssp. *macrophyllum* (Small) E. Beal.
Aquatic in shallow water, infrequent.
L-2396; S-Valentine & Rudolph 1979.

S - *Nymphaea elegans* Hook. S-Valentine &
Rudolph 1979.

S - *Nymphaea mezicana* Zucc. S-Valentine
& Rudolph 1979.

L,S - *Nymphaea odorata* Sol. in Aiton.
Aquatic, frequent. L-2398; S-3949.

OLEACEAE 2 - 1:1:0

R - *Frazinus pensylvanica* Marshall. Mixed
woods, rare. R-3046.

L - *Jasminum mesnyi* Hance. Persistent
along roadside, cultivated, rare. L-
NLU.

ONAGRACEAE 13 - 11:6:6

S - *Gaura lindheimeri* Engelm. & A. Gray.
Roadsides and fields, frequent. S-
3972.

L,R - *Gaura longiflora* Spach. Disturbed
areas, frequent. L-RDT 83864; R-
738.

L,S - *Ludwigia decurrens* Walter. L-Fruge
1974; S-Valentine & Rudolph 1979.

L - *Ludwigia glandulosa* Walter. Fields and
margin of mixed woods, infrequent.
L-3491.

L,R,S - *Ludwigia leptocarpa* (Lutt.) H.
Hara. L-Fruge 1974; R-Spindler &
Noble 1974; S-Valentine & Rudolph
1979.

L - *Ludwigia linearis* Walter. Roadsides
and pastures, infrequent. L-RDT
84724.

L - *Ludwigia palustris* (L.) Elliot. Moist
fields, frequent. L-1556.

L,S - *Ludwigia peploides* (Kunth) Raven.
Margins of mixed woods, frequent. L-
2454; S-3992.

L - *Ludwigia sphaerocarpa* Elliot. L-Fruge
1974.

L,R,S - *Ludwigia uruguayensis* (Cambess.)
H. Hara. Disturbed areas, frequent.
L-2466; R-2365; S-3897.

R - *Oenothera drummondii* Hook. Sandy
areas, frequent. R-RDT 48277.

L,R,S - *Oenothera laciniata* Hill. Sandy areas, frequent. *L-RDT 83868; R-2334; S-4248.*

L,R - *Oenothera speciosa* Nutt. Disturbed areas, infrequent. *L-NLU; R-3287.*

ORCHIDACEAE 2 - 2:0:1

L,S - *Habenaria repens* Nutt. Disturbed areas, infrequent. *L-RDT 84725; S-NLU.*

L - *Spiranthes vernalis* Engelm. & A. Gray. Moist pastured woods, infrequent. *L-NLU.*

OXALIDACEAE 3 - 3:1:2

L,R,S - *Ozalis dillenii* Jacq. Lawns and roadsides, frequent. *L-NLU; R-731; S-4231.*

L,S - *Ozalis rubra* A. St. Hil. Lawns, infrequent. *L-NLU; S-4259.*

L - *Ozalis violacea* L. Lawn, rare. *L-NLU.*

PASSIFLORACEAE 1 - 1:1:1

L,R,S - *Passiflora incarnata* L. Waste areas, frequent. *L-2415; R-3319; S-3960.*

PHYTOLACCACEAE 2 - 1:2:2

L,R,S - *Phytolacca americana* L. Waste areas, infrequent. *L-NLU; R-2301; S-3898.*

R,S - *Rivinia humilis* L. Mixed woods, infrequent. *R-3284; S-3958.*

PLANTAGINACEAE 2 - 2:0:1

L - *Plantago heterophylla* Nutt. Roadsides and fields, infrequent. *L-RDT 82902.*

L,S - *Plantago virginica* L. Disturbed areas, infrequent. *L-1538; S-Valentine & Rudolph 1979.*

POACEAE 86 - 42:30:60

L - *Agrostis hiemalis* (Walter) Britton, Sterns & Pogg. Fields, infrequent. *L-RDT 83791.*

L - *Alopecurus carolinianus* Walter. Roadsides and fields, infrequent. *L-NLU.*

L,R,S - *Andropogon glomeratus* (Walter) Britton, Sterns & Pogg. Disturbed areas, infrequent. *L-Fruge 1974; R-3275; S-4034.*

R,S - *Andropogon virginicus* L. Moist areas, rare. *R-Spindler & Noble 1974; S-4019.*

S - *Aristida longespica* Poiret var. *longespica*. *S-Valentine & Rudolph 1979.* (Reported as *A. longespica* by Valentine & Rudolph).

R - *Arthraxon hispidus* (Thunb.) Makino. Ditches and fields, rare. *R-3317.*

L,S - *Azonopus affinis* Chase. Fields and mixed woods, frequent. *L-Fruge 1974; S-3957.*

S - *Bothriochloa longipaniculata* (Gould) Allred & Gould. [*B. saccharoides* (Sw.) Rydb. *Andropogon saccharoides* Sw.]. *S-Valentine & Rudolph 1979.* (Reported as *Andropogon saccharoides* by Valentine & Rudolph).

S - *Brachiaria platyphylla* (Griseb.) Nash. *S-Valentine & Rudolph 1979.*

L - *Briza minor* L. Roadsides and field margins, infrequent. *L-NLU.*

L,R - *Bromus unioloides* Kunth in Humb., Bonpl. & Kunth. Roadsides, infrequent. *L-NLU; R-2278.*

R - *Cenchrus echinatus* L. Roadsides, frequent. *R-729.*

R - *Cenchrus incertus* M. Curtis. [*C. pauciflorus* Benth.]. Roadsides, frequent. *R-2282.*

R - *Cenchrus tribuloides* L. Sandy waste area, rare. *R-3305.*

L,R,S - *Cynodon dactylon* (L.) Pers. Disturbed areas, frequent. *L-1371; R-2284; S-Valentine & Rudolph 1979.*

R - *Dactyloctenium aegyptium* (L.) P. Beauv. Roadsides and fields, infrequent. *R-4082.*

- R - *Digitaria ciliaris* (Retz.) Koeler. [*D. adscendens* (Kunth in Humb. Bonpl. & Kunth) Henrard]. Roadside ditches and fields, infrequent. R-739.
- L,R,S - *Digitaria sanguinalis* (L.) Scop. Roadsides, frequent. L-3494; R-3304; S-Valentine & Rudolph 1979.
- R,S - *Distichlis spicata* (L.) E. Greene var. *spicata*. Disturbed areas, frequent. R-2320; S-3873.
- S - *Echinochloa colona* (L.) Link. S-Valentine & Rudolph 1979.
- R,S - *Echinochloa crusgalli* (L.) P. Beauv. var. *crusgalli*. Disturbed areas on marsh margin, infrequent. R-RDT 48288; S-Valentine & Rudolph 1979.
- L,R,S - *Echinochloa walteri* (Pursh) A.A. Heller. Marsh margins, infrequent. L-RDT 84778; R-Spindler & Noble 1974; S-3870.
- R - *Eleusine indica* (L.) Gaertner. Roadsides and waste areas, frequent. R-3294.
- S - *Elymus virginicus* L. S-Valentine & Rudolph 1979.
- L - *Eragrostis elliottii* S. Watson. L-Fruge 1974.
- L - *Eragrostis hypnoides* (Lam.) Britton, Sterns & Pogg. Moist disturbed areas, rare. L-RDT 84754.
- L,S - *Erianthus giganteus* (Walter) Hubb. non Muhlenb. L-Fruge 1974; S-Valentine & Rudolph 1979.
- R,S - *Eriochloa punctata* (L.) Desv. ex Ham. Disturbed areas, infrequent. R-977; S-Valentine & Rudolph 1979.
- S - *Eustachys petraea* (Sw.) Desv. [*Chloris petraea* Sw.]. S-Valentine & Rudolph 1979. (Reported as *Chloris petraea* by Valentine & Rudolph).
- S - *Hemarthria altissima* (Poiret) Stapf & C.E. Hubb. [*Manisuris altissima* (Poiret) A. Hitchc.]. S-Valentine & Rudolph 1979. (Reported as *Manisuris altissima* by Valentine & Rudolph).
- L,S - *Hordeum pusillum* Nutt. Roadsides, infrequent. L-NLU; S-Valentine & Rudolph 1979.
- L,S - *Hydrochloa caroliniensis* P. Beauv. [*Luziola frutians* (Michaux) Terrell & H. Robinson]. Aquatic or semi-aquatic, infrequent. L-2444; S-Valentine & Rudolph 1979.
- L,S - *Leersia hexandra* Sw. L-Fruge 1974; S-Valentine & Rudolph 1979.
- S - *Leersia oryzoides* (L.) Sw. S-Valentine & Rudolph 1979.
- S - *Leptochloa fascicularis* (Lam.) A. Gray. [*Diplachne fascicularis* (Lam.) P. Beauv.]. Disturbed areas, infrequent. S-3945.
- S - *Leptochloa nealleyi* Vasey. S-Valentine & Rudolph 1979.
- S - *Leptochloa uninervia* (C. Presl) A. Hitchc. & Chase. [*Diplachne uninervia* (C. Presl) L. Parodi]. S-Valentine & Rudolph 1979.
- L - *Limnodea arkansana* (Nutt.) L. Dewey. Disturbed areas, infrequent. L-1525.
- L - *Lolium perenne* L. Roadsides, frequent. L-1360.
- L - *Panicum* *commutatum* Schultes. [*Dichantherium commutatum* (Schultes) Gould]. Sandy soil, infrequent. L-NLU.
- S - *Panicum dichotomiflorum* Michaux. Roadside ditches, infrequent. S-3871.
- L,S - *Panicum dichotomum* L. [*Dichantherium dichotomum* (L.) Gould]. Mixed woods, infrequent. L-2403; S-3965.
- L - *Panicum gymnocarpon* Elliot. Mixed woods, rare. L-NLU.
- L,R,S - *Panicum hemitomon* Schultes. Roadside ditches and moist pastures, frequent. L-2429; R-Spindler & Noble 1974; S-Valentine & Rudolph 1979.
- L,S - *Panicum hians* Elliot. Roadside ditches and pastures, frequent. L-RDT 83761; S-Valentine & Rudolph 1979.

- L - *Panicum leucothriz* Nash. [*Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark var. *implicatum* (Scribner) Gould & C.A. Clark]. Mixed woods, infrequent. L-1535.
- L - *Panicum lindheimeri* Nash. [*Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark var. *lindheimeri* (Nash) Gould & C.A. Clark]. Disturbed fields, infrequent. L-1564.
- S - *Panicum repens* L. S-Valentine & Rudolph 1979.
- L - *Panicum rigidulum* Bosc ex Nees. Mixed woods, infrequent. L-395.
- L,S - *Panicum scoparium* Lam. [*Dichanthelium scoparium* (Lam.) Gould]. Moist roadsides and pastured wetlands, infrequent. L-RDT 83780; S-3978.
- L - *Panicum sphaerocarpon* Elliot. [*Dichanthelium sphaerocarpon* (Elliot) Gould]. Fields and waste areas, infrequent. L-NLU.
- S - *Panicum spretum* Schultes. [*Dichanthelium acuminatum* (Sw.) Gould & C.A. Clark var. *densiflorum* (Rand & Redf.) Gould & C.A. Clark]. S-Valentine & Rudolph 1979.
- S - *Panicum virgatum* L. Roadside ditches and levees, infrequent. S-4008.
- S - *Paspalidium geminatum* (Forsskal) Stapf var. *geminatum*. [*Panicum geminatum* Forsskal]. S-Valentine & Rudolph 1979. (Reported as *Panicum geminatum* by Valentine & Rudolph).
- R - *Paspalum dilatatum* Poir. Moist waste areas, infrequent. R-3293.
- S - *Paspalum dissectum* (L.) L. S-Valentine & Rudolph 1979.
- R,S - *Paspalum distichum* L. [*Paspalum paspalodes* (Michaux) Scribner]. Marsh margins, infrequent. R-3283; S-Valentine & Rudolph 1979.
- S - *Paspalum laeve* Michaux. S-Valentine & Rudolph 1979.
- L,R - *Paspalum langei* (Fourn.) Nash. Disturbed areas, infrequent. L-RDT 83829; R-736.
- R,S - *Paspalum lividum* Trin. Mixed woods, frequent. R-2271; S-Valentine & Rudolph 1979.
- L,S - *Paspalum plicatulum* Michaux. Waste areas, frequent. L-2428; S-Valentine & Rudolph 1979.
- S - *Paspalum praecox* Walter. S-Valentine & Rudolph 1979.
- L,R,S - *Paspalum urvillei* Steudel. Disturbed areas, frequent. L-2405; R-3289; S-4021.
- R,S - *Paspalum vaginatum* Sw. Disturbed areas on marsh margins, frequent. R-741; S-3875.
- S - *Phalaris angusta* Nees ex Trin. S-Valentine & Rudolph 1979.
- L,S - *Phalaris caroliniana* Walter. Roadsides and fields, infrequent. L-NLU; S-4264.
- L,R,S - *Phragmites australis* (Cav.) Trin. ex Steudel. [*P. communis* (L.) Trin.]. Marsh margins, frequent. L-RDT 82900; R-718; S-3915.
- L,S - *Poa annua* L. Moist disturbed areas, frequent. L-1369; S-4236.
- S - *Polypogon monspeliensis* (L.) Desf. S-Valentine & Rudolph 1979.
- L,S - *Sacciolepis striata* (L.) Nash. Marsh margins, frequent. L-2402; S-3896.
- L-Schizachyrium
scoparium (Michaux) Nash. [*Andropogon scoparius* Michaux.]. L-Fruge 1974.
- L,R,S - *Setaria geniculata* (Lam.) P. Beauv. Disturbed areas, frequent. L-2416; R-2276; S-3943.
- L,R,S - *Setaria magna* Griseb. Marsh margins, infrequent. L-RDT 84779; R-749; S-3899.
- R,S - *Sorghum halapense* (L.) Pers. Roadside waste areas, infrequent. R-2299; S-Valentine & Rudolph 1979.

- S - *Spartina alterniflora* Lois. S-Valentine & Rudolph 1979.
- R,S - *Spartina cynosuroides* (L.) Roth. Marsh margins, frequent. R-719; S-3868.
- L,R,S - *Spartina patens* (Aiton) Muhlenb. Marsh margins, frequent. L-Fruge 1974; R-2324; S-3874.
- S - *Spartina spartinae* (Trin.) A. Hitchc. S-Valentine & Rudolph 1979.
- L - *Sphenopholis obtusata* (Michaux) Scribner. L-Fruge 1974.
- L,R,S - *Sporobolus indicus* (L.) R.Br. [*S. poiretii* (Roemer & Schultes) A. Hitchc.]. Pastures and fields, frequent. L-RDT 83813; R-3323; S-Valentine & Rudolph 1979.
- S - *Sporobolus virginicus* (L.) Kunth. S-Valentine & Rudolph 1979.
- S - *Stenotaphrum secundatum* (Walter) Kuntze. S-Valentine & Rudolph 1979.
- S - *Tridens strictus* (Nutt.) Nash. S-Valentine & Rudolph 1979.
- S - *Tripsacum dactyloides* (L.) L. Marshy areas, infrequent. S-4007.
- L - *Vulpia octoflora* (Walter) Rydb. var. *octoflora*. [*Festuca octoflora* Walter]. Sandy areas, infrequent. L-1536.
- L,S - *Zizaniopsis miliacea* (Michaux) Doell & Asch. Marsh margins, frequent. L-RDT 82911; S-4239.
- POLYGONACEAE 11 - 7:5:6
- L - *Brunnichia ovata* (Walter) Shinn. [*B. cirrhosa* Gaertner]. Mixed woods, infrequent. L-182.
- L - *Polygonum cespitosum* Blume var. *longisetum* (Brujin) Steward. Mixed woods, rare. L-NLU.
- R,S - *Polygonum densiflorum* Meinh. [*Persicaria portoricensis* (Bertero) Small]. Pastured wetlands, infrequent. R-3309; S-3910.
- L,S - *Polygonum hydropiperoides* Michaux var. *hydropiperoides*. [*Persicaria hydropiperoides* (Michaux) Small]. Roadside ditches and mixed woods, frequent. L-3493; S-Valentine & Rudolph 1979.
- L - *Polygonum lapathifolium* L. var. *lapathifolium*. [*Persicaria lapathifolia* (L.) Gray]. Pastures, frequent. L-1527.
- L,R,S - *Polygonum punctatum* Elliot. [*Persicaria punctata* (Elliot) Small]. Ditches and mixed woods, frequent. L-398; R-RDT 48291; S-3950.
- S - *Polygonum striatulum* Robinson. [*P. camporum* Meinh.]. S-Valentine & Rudolph 1979. (Reported as *P. camporum* by Valentine & Rudolph).
- L,R - *Rumex chrysocarpus* Moris. [*R. berlandieri* Meinh.]. Disturbed areas, frequent. L-RDT 84775; R-3260.
- L,S - *Rumex crispus* L. Waste areas, frequent. L-NLU; S-4245.
- R - *Rumex paraguayensis* L. Parodi. Moist waste areas, infrequent. R-2354.
- R,S - *Rumex triangulivalvis* (Danser) Rech. f. [*R. mexicanus* Meinh.]. Roadside and ditches, rare. R-3298, S-3882.
- PONTEDERIACEAE 3 - 3:2:2
- L,R,S - *Eichhornia crassipes* (C. Martius) Solms-Laub. Aquatic, frequent. L-NLU; R-NLU; S-Valentine & Rudolph 1979.
- L,R,S - *Pontederia cordata* L. var. *cordata*. Disturbed areas, frequent. L-RDT 83748; R-NLU; S-3995.
- L - *Pontederia cordata* L. var. *lanceifolia* (Muhlenb. ex Elliot) Torrey ex Lowden. Aquatic, infrequent. L-2465.
- PORTULACACEAE 3 - 2:1:1
- L - *Claytonia virginica* L. In a lawn, infrequent. L-1368.
- S - *Portulaca mundula* I.M. Johnston. Margins of mixed woods, infrequent. S-3883.

L,R - *Portulaca oleracea* L. Moist waste areas, infrequent. L-3672; R-740.

POTAMOGETONACEAE 4 - 3:2:3

L,S - *Potamogeton diversifolius* Raf. Aquatic, rare. L-RDT 83752; S-Valentine & Rudolph 1979.

S - *Potamogeton foliosus* Raf. S-Valentine & Rudolph 1979.

L,R - *Potamogeton nodosus* Poir. Aquatic, infrequent. L-RDT 84723; R-2337.

L,R,S - *Potamogeton pusillus* L. var. *pusillus*. Aquatic, frequent. L-Fruge 1974; R-2336; S-Valentine & Rudolph 1979. (Reported as *Potamogeton pusillus* by Fruge and Valentine & Rudolph).

PRIMULACEAE 3 - 3:1:1

L - *Anagallis arvensis* L. Roadsides, infrequent. L-NLU.

L,S - *Centunculus minimus* L. [*Anagallis minima* (L.) E.H. Krause]. Lawns and waste areas, infrequent. L-Fruge 1974; S-4267.

L,R - *Samolus parviflorus* Raf. [*S. valerandi* L. ssp. *parviflorus* (Raf.) Hultén]. Marshy areas, infrequent. L-1556; R-NLU.

RANUNCULACEAE 8 - 7:5:3

L - *Anemone caroliniana* Walter. Mixed woods, rare. L-NLU.

L,R - *Clematis crispa* L. Mixed woods, infrequent. L-1364; R-NLU.

L,R,S - *Ranunculus muricatus* L. Roadsides and waste areas, frequent. L-1363; R-NLU; S-4260.

L,R - *Ranunculus platensis* Sprengel. Roadsides, rare. L-RDT 82952; R-4283.

L,S - *Ranunculus pusillus* Poir. [*R. lindheimeri* Engelm.]. Moist roadsides and fields, infrequent. L-RDT 82906; S-Valentine & Rudolph 1979.

L - *Ranunculus sardous* Crantz. Moist waste areas, infrequent. L-NLU.

L,R,S - *Ranunculus sceleratus* L. Marshy areas, frequent. L-NLU; R-4128; S-4242.

R - *Ranunculus trilobus* Desf. Roadside ditches and waste areas, infrequent. R-4284.

RHAMNACEAE 1 - 0:0:1

S - *Rhamnus caroliniana* Walter. Mixed woods, infrequent. S-4227.

ROSACEAE 7 - 5:0:5

L - *Crataegus viridis* L. Mixed woods, frequent. L-421.

L - *Geum canadense* Jacq. Mixed woods, rare. L-NLU.

L,S - *Prunus serotina* Ehrh. var. *serotina*. Mixed woods, frequent. L-413; S-3989.

S - *Rosa bracteata* Wendl. Disturbed areas on marsh margins, frequent. S-3975.

S - *Rosa laevigata* Michaux. S-Valentine & Rudolph 1979.

L,S - *Rubus louisianus* A. Berger. Wooded areas, infrequent. L-RDT 82909; S-4030.

L,S - *Rubus trivialis* Michaux var. *trivialis*. Disturbed areas, infrequent. L-2410; S-3900.

RUBIACEAE 6 - 5:2:4

L,S - *Cephalanthus occidentalis* L. Marsh margins, infrequent. L-397; S-Valentine & Rudolph 1979.

L - *Diodia teres* Walter. Moist waste areas, infrequent. L-2437.

L,R,S - *Diodia virginiana* L. var. *virginiana*. Disturbed areas, frequent. L-NLU; R-798; S-4028.

L - *Galium aparine* L. Roadside ditches, infrequent. L-NLU.

R,S - *Galium tinctorium* L. Overgrown roadside areas, frequent. R-NLU; S-4036.

L,S - *Houstonia pusilla* Schoepf. [*Hedyotis crassifolia* Raf.]: Lawns and fields, infrequent. L-NLU; S-4268.

RUPPIACEAE 1 - 0:1:1

R,S - *Ruppia maritima* L. Aquatic in ditches, frequent. R-3270; S-Valentine & Rudolph 1979.

RUTACEAE 2 - 1:1:1

R - *Citrus reticulata* Blanco. Persistent, cultivated, rare. R-845.

L,S - *Zanthoxylum clava-herculis* L. Fencerows and mixed woods, frequent. L-NLU; S-3885.

SALICACEAE 1 - 1:1:1

L,R,S - *Salix nigra* Marshall. Moist areas, frequent. L-2409; R-2307; S-3998.

SAPINDACEAE 1 - 0:1:1

R,S - *Cardiospermum halicacabum* L. Overgrown waste areas, infrequent. R-723; S-3928.

SAPOTAÇEAE 1 - 0:0:1

S - *Bumelia lanuginosa* (Michaux) Pers. Levees, frequent. S-3987.

SAURURACEAE 1 - 1:0:1

L,S - *Saururus cernuus* L. Marshy areas in mixed woods, infrequent. L-1553; S-Valentine & Rudolph 1979.

SCROPHULARIACEAE 13 - 8:2:7

S - *Agalinis fasciculata* (Elliot) Raf. [*Gerardia fasciculata* Elliot]. Margins of mixed woods, infrequent. S-3973.

S - *Agalinis maritima* (Raf.) Raf. [*Gerardia maritima* Raf.]. Spoilbank, rare. S-RDT 82546.

L,S - *Bacopa caroliniana* (Walter) Robinson. Aquatic or semi-aquatic, infrequent. L-2456; S-4226.

L,R,S - *Bacopa monnieri* (L.) Wettst. Aquatic or semi-aquatic, frequent. L-Fruge 1974; R-2281; S-3886.

S - *Bacopa rotundifolia* (Michaux) Wettst. Aquatic waste areas, infrequent. S-3952.

L - *Gratiola virginiana* L. [*G. sphaerocarpa* Elliot]. Moist fields, infrequent. L-2447.

S - *Linaria canadensis* (L.) Dum.-Cours. Levee adjacent to marsh, rare. S-4233.

L - *Linaria tezana* Scheele. L-Fruge 1974.

L - *Linaria*: forms intermediate between *L. canadensis* (L.) Dum.-Cours. and *L. tezana* Scheele. Moist areas, infrequent. L-1370.

L - *Lindernia dubia* (L.) Pennell var. *anagallidea* (Michaux) Cooperr. Marsh margins, rare. L-2452.

L - *Mazus pumilus* (Burman f.) Steenis. [*M. japonicus* (Thunb.) Kuntze]. Lawns and ditches, infrequent. L-NLU.

S - *Scoparia dulcis* L. Mixed woods, infrequent. S-3881.

L,R - *Veronica peregrina* L. var. *peregrina*. Moist waste areas, frequent. L-NLU; R-4129.

SMILACACEAE 3 - 2:1:1

L - *Smilax bona-nox* L. Mixed woods, frequent. L-414.

R - *Smilax hispida* Muhlenb. ex Torrey. Mixed woods, infrequent. R-3332.

L,S - *Smilax smallii* Morong. Mixed woods, infrequent. L-415; S-4230.

SOLANACEAE 9 - 4:4:6

R,S - *Lycium carolinianum* Walter. Waste areas, frequent. R-2327; S-Valentine & Rudolph 1979.

S - *Petunia parviflora* A.L. Juss. Lawn on marsh margin, rare. S-4262.

R,S - *Physalis angulata* L. var. *angulata*.
Moist waste areas, frequent. R-743;
S-3884.

S - *Physalis cinerascens* (Dunal) Hitchc.
var. *spathulaefolia* (Torrey) Sullivan.
Sandy waste areas, frequent. S-4000.

L,R - *Physalis pubescens* L. var. *pubescens*.
Disturbed areas, frequent. L-3485; R-
RDT 48252.

L - *Solanum carolinense* L. Mixed woods,
infrequent. L-RDT 83766.

L - *Solanum nigrum* L. L-Fruge 1974.

S - *Solanum pseudocapsicum* L. S-Valentine
& Rudolph 1979.

L,R,S - *Solanum ptycanthum* Dunal. Dis-
turbed areas, frequent. L-1560; R-
2288; S-4255.

SPHENOCLEACEAE 1 - 1:0:1

L,S - *Sphenoclea zeylandica* Gaertner.
Moist disturbed areas, rare. L-RDT
84715; S-Valentine & Rudolph 1979.

STERCULIACEAE 1 - 1:0:0

L - *Melochia corchorifolia* L. Margins of
mixed woods, infrequent. L-184.

STYRACACEAE 1 - 1:0:0

L - *Styrax americana* Lam. var. *pulveru-
lenta* (Michaux) Rehder. Marsh mar-
gin, rare. L-NLU.

TAMARICACEAE 1 - 1:1:1

L,R,S - *Tamarix gallica* L. On levees, infre-
quent. L-1540; R-2330; S-3983.

TYPHACEAE 2 - 2:1:2

L,S - *Typha domingensis* Pers. Ditches bor-
dering marshy areas, infrequent. L-
1544; S-Valentine & Rudolph 1979.

L,R,S - *Typha latifolia* L. Marsh margins,
frequent. L-2401; R-2362; S-3924.

ULMACEAE 2 - 2:1:1

L,R,S - *Celtis laevigata* Willd. Mixed
woods and levees, frequent. L-RDT
82932; R-2313; S-3985.

L - *Planera aquatica* (Walter) J. Gmelin.
Moist mixed woods, rare. L-RDT
82962.

URTICACEAE 3 - 1:1:2

L - *Boehmeria cylindrica* (L.) Sw. Mixed
woods, infrequent. L-3488.

R,S - *Parietaria pensylvanica* Muhlenb. ex
Willd. Lawns and fields, frequent. R-
4125; S-4241.

S - *Urtica chamidryoides* Pursh. Moist
fields and mixed woods, infrequent. S-
4221.

VALERIANACEAE 1 - 1:0:1

L,S - *Valerianella radiata* (L.) Dufr. Road-
sides, frequent. L-NLU; S-4258.

VERBENACEAE 10 - 6:5:7

L,S - *Callicarpa americana* L. var. *amer-
icana*. Mixed woods, infrequent. L-
418; S-3961.

L,R - *Lantana camara* L. var. *mista* (L.) L.
Bailey. Fencerows and mixed woods,
frequent. L-3482; R-RDT 48258.

S - *Phyla x intermedia* Mold. Waste areas,
frequent. S-3986.

L,R,S - *Phyla nodiflora* (L.) E. Greene
var. *nodiflora*. [*Lippia nodiflora* (L.)
Michaux]. Waste areas, frequent. L-
RDT 84749; R-2280; S-RDT 81621.

S - *Phyla nodiflora* (L.) E. Greene var. *tez-
ensis* Mold. Waste areas on marsh
margins, frequent. S-4005.

R,S - *Verbena bonariensis* L. Marsh, waste
areas on marsh margins, infrequent.
R-Spindler & Noble 1974; S-3903.

L,R,S - *Verbena brasiliensis* Vell. Conc.
Disturbed areas, frequent. L-2462; R-
730; S-NLU.

- L,R - *Verbena halei* Small. Disturbed areas, frequent. L-NLU; R-2291.
- L - *Verbena scabra* M. Vahl. Mixed woods, infrequent. L-3492.
- S - *Verbena zutha* Lehm. Marsh margins, infrequent. S-RDT 81620.
- S - *Parthenocissus quinquefolia* (L.) Planchon. Wooded areas, infrequent. S-3974.
- L,S - *Vitis mustangensis* Buckley. Sandy areas, frequent. L-RDT 82949; S-3980.

VIOLACEAE 1 - 1:0:0

- L - *Viola langloisii* E. Greene. Roadsides and lawns, rare. L-NLU.

VITACEAE 3 - 1:1:3

- R,S - *Ampelopsis arborea* (L.) Koehne. Waste areas and mixed woods, infrequent. R-3326; S-3984.

XYRIDACEAE 2 - 2:0:0

- L - *Xyris jupicai* Rich. Wet sandy areas, infrequent. L-2393.
- L - *Xyris lazifolia* C. Martius var. *iridifolia* (Chapman) Kral. [*X. ifolia* Chapman]. Moist areas, frequent. L-2394.

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TWO NEW SPECIES OF *ACHYROCLINE* (ASTERACEAE: INULEAE)
FROM MÉXICO

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ABSTRACT

Two new species of *Achyrocline* are described from México, *A. guerreroana* and *A. oaxacana*. Additional distributional records are reported for *A. turneri*, including one from Chiapas, México, bringing to five the number of species of *Achyrocline* in México.

KEY WORDS: *Achyrocline*, Inuleae, Asteraceae, México.

The taxonomy of *Achyrocline* in México and Central America has very recently been summarized (Nesom 1990). Since the completion of that paper, however, study of specimens identified as *Gnaphalium* has uncovered additional and significant distributional records for one of the species treated earlier and brought to light two more previously undescribed species.

Achyrocline guerreroana Nesom. *spec. nov.* TYPE: México. Guerrero: Atoyac/Tlacotepec. 37.9 km NE of El Paraiso, 100.8 km NE of Atoyac, woods of pine and alder. 2200 m, 19 Dec 1984, C.P. Cowan 4964 (HOLOTYPE: TEX!; Isotype: MEXU).

Achyrocline turneri Nesom similis foliis anguste elliptici lanceolatis epetiolatis et lobis corollis glandulosis sed vestimento eglanduloso trichomatibus basibus tenuibus, phyllariis opaci-albidis eglandulosis, et corollis ad bases bulbiformibus differt.

Erect herbs. Stems ca. 5 dm tall, densely villous-tomentose with tawny hairs. Leaves narrowly elliptic-lanceolate, 9-11 cm long, 12-17 mm wide, relatively even sized upwards, long attenuate at both ends, sessile, not clasping or decurrent, strongly discolourous, the upper surface green and thinly villous, the lower surface densely and persistently villous-tomentose with tawny hairs. Heads in dense apical clusters: phyllaries 9-11, white opaque with acute to obtuse apices, not strongly apiculate, the middle and inner with a lower medial, narrowly elliptic-lanceolate, sparsely villous, eglandular, herbaceous portion. Pistillate flowers 1-3, filiform, basally inflated. Hermaphroditic flowers

2-3, narrowly tubular, 3.0 mm long, bulbous inflated at the base, the lobes minutely sessile glandular. Achenes less than 1 mm long, glabrous; pappus of numerous, separate, basally caducous bristles.

Known only from the type collection.

Achyrocline guerreroana is similar to *A. turneri* Nesom in its narrowly elliptic-lanceolate, petiolate leaves and glandular corolla lobes, but different in its eglandular vestiture of thin based hairs, opaque white, eglandular phyllaries and basally inflated corollas.

Achyrocline oaxacana Nesom, *spec. nov.* TYPE: México. Oaxaca: Macuilianguis, pine woods in yellow, sandy soil. 2050 m, 13 Jan 1981, *R. Ortega O. & M. Ortiz T. 1706* (HOLOTYPE: TEX!).

Achyrocline turneri Nesom similis pubescentia fulva, foliis ellipticis epetiolatis, phyllariis glandulosis fulvis, et corollis glandulosis ad apices sed foliis eglandulosis tomentosus basibus trichomatum filiformibus, et corollis brevioribus differt.

Erect, annual herbs. Stems up to 1 m tall, densely tomentose, eglandular. Leaves narrowly elliptic-lanceolate to elliptic-oblancheolate, 4-6 cm long, 8-13 mm wide, gradually attenuate to a sessile base, not clasping or decurrent, eglandular, densely and persistently matted tomentose beneath, glabrescent above with very thin trichomes no thicker at the base than above. Heads in dense, sessile clusters; phyllaries 9, tawny yellowish, hyaline, ovate-lanceolate, slightly apically apiculate, in 2-3 series of subequal length, the inner 4 mm long, the middle sessile glandular at the stereome apex. Pistillate flowers 4, the hermaphroditic (0-); corollas narrowly tubular, densely sessile glandular at the apex, the pistillate corollas 2.5 mm long, the hermaphroditic 2.5-2.8 mm long, not basally swollen. Achenes ca. 0.5 mm long, minutely papillate.

Known only from the type collection.

Achyrocline oaxacana is similar to *A. turneri* in its tawny pubescence, elliptic, petiolate leaves, yellowish, glandular phyllaries, and gland tipped corollas without a prominently swollen base. It is different in its eglandular leaves with a tomentum of thin based trichomes and shorter corollas. Of 5 dissected heads from the type specimen, 4 had 1 hermaphroditic flower and 4 pistillate ones; one head had no hermaphroditic flowers. Each head had 9 phyllaries.

Achyrocline turneri.

Since the publication of *Achyrocline turneri* Nesom, additional records for it have been discovered in a recent loan, all of the specimens previously having been identified as *Gnaphalium attenuatum* DC. They are cited here because they greatly increase the known range of this species in Guatemala and add México to its distribution.

Guatemala. Dept. Quiche: San Miguel Uspantán. Apr 1892. *Heyde & Lux 3431* (F); between Los Encuentros and Chichicastenango. 22-23 Dec 1972, *Williams, et al. 41680* (F). Dept. Solola: Volcán San Pedro, above village of San Pedro. 7 Jun 1942. *Steyermark 47186* (F). Dept. Solola/Chimaltenango: near Río Molino. 21 Dec 1972. *Williams, et al. 41555* (F). Dept. Alta Verapaz: vicinity of San Juan Chamelco. Feb 1969, *Wilson 41033* (F).

México. Chiapas: Cascada, Siltepec, 1600 m. 3 Mar 1945. *Matuda 5078* (F).

There are now five species of *Achyrocline* known from México and Central America: *A. deflexa* Robinson & Greenm., *A. turneri*, *A. guerreroana*, *A. oaxacana* and *A. ventosa* Klatt. The last three are known only from México.

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LITERATURE CITED

- Nesom, G.L. 1990. Taxonomy of *Achyrocline* (Asteraceae: Inuleae) in México and Central America. *Phytologia* 68:181-185.

TAXONOMY OF *GNAPHALIOTHAMNUS* (ASTERACEAE: INULEAE)

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ABSTRACT

Nine species of *Gnaphalium* sect. *Rhodognaphalium* are segregated as the genus *Gnaphaliothamnus* Kirpichn. Three new species are proposed: *G. cryptocephalus* Nesom, *G. costaricensis* Nesom and *G. macdonaldii*; the remainder are *G. aecidiocephalus* (Grierson) Nesom, *comb. nov.*, *G. concinnus* (A. Gray) Nesom, *comb. nov.*, *G. eleagnoides* (Klatt) Nesom, *comb. nov.*, *G. lavandulaefolius* (Kunth) Nesom, *comb. nov.*, *G. salicifolius* (Bertol.) Nesom *comb. nov.* and *G. sartorii* (Klatt) Nesom, *comb. nov.* *Gnaphaliothamnus* is characterized by its strongly woody habit, revolute leaves, phyllaries with spreading, white tips, reddish corollas, central hermaphroditic flowers with sterile ovaries, apically swollen pappus bristles and narrowly lanceolate style branches, and ellipsoid to obovoid achenes 1.2-2.0 mm long with minute, myxogenic (in some), slightly elongated, twin hairs. Two of the species are partly to wholly dioecious. The genus is restricted to México and Central America and appears to be most closely similar to other woody genera of South America with "pseudohermaphroditic" central flowers, particularly *Chionolaena* (sensu stricto), to which some of the species have been referred.

KEY WORDS: *Gnaphaliothamnus*, *Gnaphalium*, *Chionolaena*, Asteraceae, Inuleae, México.

In a taxonomic investigation of Mexican *Gnaphalium* L., it quickly became apparent that a group of species was strongly set apart from the rest. These species are characterized by a strongly woody habit, revolute leaves, phyllaries with white opaque, spreading tips, mostly heterogamous heads, reddish corollas, ellipsoid to obovoid achenes 1.2-2.0 mm long with minute, slightly elongated, duplex hairs, and central hermaphroditic flowers with sterile ovaries, apically swollen pappus bristles and narrowly lanceolate style branches with collecting hairs along their whole length. They appear to be confined primarily to peaks of the highest mountains of southcentral México to Costa Rica in Central America. Two of them have been placed in the Old World *Anaphalis*

DC. (Grierson 1972) and five have been formally regarded as species of the otherwise South American genus *Chionolaena* DC. (see Anderberg & Freire 1989). The group was named by Schultz-Bipontinus in 1856 as *Gnaphalium* sect. *Rhodognaphalium* (typified by *G. salicifolium*). Klatt (1887) later recognized the close relationship between the two Mexican species he named as *Chionolaena* and yet two other Mexican species, *Gnaphalium concinnum* and *G. salicifolium*. Finally, *G. salicifolium* also serves as the type of a more recently described genus (Kirpichnikov & Kuprianova 1950) that was considered monotypic at its inception: *Gnaphaliothamnus*.

Grierson (1972) considered two of the Mexican species treated here to be species of *Anaphalis*. That genus is also characterized by revolute leaves, white opaque phyllaries and dimorphic pappus bristles. According to Grierson, it comprises species that range from dioecious to polygamodioecious to others with only heterogamous heads and with no approach to dioecy. The two Mexican species are partly to wholly dioecious. In one of them (*A. aecidiocephala*), heads of staminate plants produce only hermaphroditic flowers with fertile anthers but sterile ovaries, while pistillate plants have heads with pistillate flowers and with completely sterile "hermaphroditic" flowers. The second Mexican species treated by Grierson (*A. concinna*) is polygamodioecious. In his decision regarding the generic placement of these species, Grierson emphasized their sexual condition. He eliminated *Gnaphaliothamnus* (apparently as he understood it to be monotypic) as a member of *Anaphalis*, because it was not dioecious.

The species of *Anaphalis*, in contrast to the Mexican ones treated here, have phyllaries with divided stereomes and their corollas are yellowish to cream in color with glandular apices. Although at least one species of the genus [*A. margaritacea* (L.) Benth. & Hook. f.] is naturalized in the New World, *Anaphalis* appears to be essentially confined in its native range to the Old World. One poorly understood species, *A. chilensis* Reiche, has been recognized as native to South America (Cabrera 1961). Anderberg & Freire (1989) excluded *A. aecidiocephala* from the genus, and I agree with this. While the evidence is suggestive of a relationship between *Anaphalis* and the species of México and Central America treated here, they do not appear to be congeneric and the development of polygamodioecy and dioecy apparently has occurred independently in each.

In view of its strikingly different morphology, it is clear that the relationship of *Gnaphaliothamnus* lies outside of the other traditionally regarded "gnaphalioid" species from México or Central America. *Gnaphalium stolonatum* S.F. Blake, an endemic of Guatemala, produces white tipped bracts and clavate bristle tips and may become woody, but it has fertile central flowers and yellow corollas, and it is more closely related to, if not a member of, *Gnaphalium* sensu stricto rather than of *Gnaphaliothamnus*. The closest relatives of *Gnaphaliothamnus* appear to be among the taxa of South America.

In their overview of the tribe, Merxmüller, *et al.* (1977) listed *Gnaphaliothamnus* as monotypic with the observation that the genus needed to be reconsidered in an overall investigation of *Gnaphalium*. They suggested (p. 594) that a relationship may exist between *Gnaphaliothamnus* and "the central-sterile, subdioecious or dioecious genera *Chionolaena*, *Luciliopsis* [Wedd.], *Mnioides* [(A. Gray) Benth. & Hook.] and *Oligandra* [Less.]." Their listing of *Chionolaena* noted that some of its species were from México.

Anderberg (1989) placed *Chionolaena* in the "Anaxeton clade" apart from the "*Lucilia-Oligandra* clade." but in his analysis both of these groups are part of a broader lineage characterized by "shrubs or small trees" and "female florets violet to whitish." *Gnaphaliothamnus* also may belong in the "Anaxeton clade" on the basis of character distributions outlined in Anderberg's study, although the occurrence of myxogenic achenial trichomes would be anomalous. Indeed, in an even more recent paper (Anderberg & Freire 1989), *Gnaphaliothamnus* has been considered the sister group of *Chionolaena*.

Anderberg & Freire (1989) distinguished *Gnaphaliothamnus* from *Chionolaena* by its "basally free instead of fused pappus bristles, lacking clavate apical pappus cells" and by an unspecified difference in branching pattern. They transferred the Mexican "*Anaphalis*" *aecidiocephala* to *Chionolaena* on the basis of its "dichotomous branching, deflexed leaves, clavate apical pappus cells etc." and also included *A. concinna* because they saw a close relationship between it and *A. aecidiocephala*. Further, they recognized as *Chionolaena* two of the other four Mexican species named in that genus, although they did not specify which ones. In their view, *Gnaphaliothamnus* remains as a monotypic genus.

In contrast to the view of Anderberg & Freire (1989), I find it difficult to support the recognition of two separate genera among these woody, "central sterile" Mexican and Central American species. Among these taxa, the pappus bristles have strongly to weakly developed clavate tips and the bristle bases vary from weakly adherent by a few cells to completely separate. The degree of basal fusion of bristles of "*Chionolaena*" *aecidiocephala* is exaggerated in the line drawing provided by Anderberg & Freire. The bristles of *Gnaphaliothamnus salicifolius* sometimes are weakly connate and they show a weak but definite development of apical clavate thickening. Further, *C. eleagnoides* Klatt from Oaxaca, México, which has strongly clavate bristles partially connate at the base, is clearly the species most closely related to *G. salicifolius*. The strict dioecism found in "*C.*" *aecidiocephala* is atypical of *Gnaphaliothamnus* and apparently *Chionolaena* as well, but the similarity of that species to the polygamodioecious "*C.*" *concinna* supports the hypothesis that the sexual extreme developed autochthonously in México. Further, although these two species have somewhat more noticeably deflexed leaves than the others of México/Central America, at least the lower leaves in all the species tend to be deflexed and the Brazilian *C. arbuscula* DC. has spreading, only slightly

deflexed leaves, nearly identical in orientation to those of *G. salicifolius*.

Variability similar to that within *Gnaphaliothamnus* also can be seen within other genera of Gnaphaliinae. For example, variation in the degree of basal fusion of pappus bristles occurs in *Gnaphalium* sensu stricto (Hilliard & Burt 1981) and *Omalotheca* (Nesom 1990), and pappus bristles with clavate tips are variably present among species of *Anaphalis* (Grierson 1971). In my opinion, the Mexican/Central American species form a single lineage. Their complete merger, however, with *Chionolaena* cannot be justified because the two groups differ in significant features not discussed by Anderberg & Freire.

Outside of the Mexican species that have been placed in *Chionolaena*, that genus is restricted to southern Brazil in South America. Two species of the Colombian Andes apparently are referred to *Chionolaena* by Anderberg & Freire (1989), *Oligandra chrysocoma* Wedd. and *Chionolaena colombiana* S.F. Blake. Each of these, however, is considered to be a member of a different genus by Dillon & Sagastegui (in press; submitted). Each has glabrous achenes and other features divergent from species of Brazilian *Chionolaena* as well as those from México and Central America. The two latter groups may be more similar between themselves than either is to the Colombian species.

Baker (1882), as did Anderberg & Freire (1989), recognized two sections within *Chionolaena*: sect. *Chionolaena* and sect. *Leucopholis*. Anderberg (1989) himself, however, recently implied that *Leucopholis* is a separate genus and it also has been regarded as separate by Cabrera (1961) and Merxmuller, *et al.* (1977). Baker's division of the genus appears to have been artificial, based only on the number of flowers per head (15-60 per head in sect. *Chionolaena* vs. 8-10 in sect. *Leucopholis*). A more natural division probably will distinguish *Chionolaena* sensu stricto with solitary heads and central flowers with sterile ovaries, from *Leucopholis*, with heads in glomerate to corymboid clusters and the central flowers fully hermaphroditic. In this view, *Chionolaena* sensu stricto apparently would include only three species: *C. arbuscula* DC. (the type), *C. lychnophoroides* Schultz-Bip. and *C. jeffreyi* H. Robinson (see Robinson 1984).

Gnaphaliothamnus will not fit in either *Chionolaena* sensu stricto or *Leucopholis*, because it produces numerous heads at the tip of each stem, each head with 12 or more flowers and the central flowers have sterile ovaries. It differs further in features of its leaves and achenes. Except for "*C.*" *aecidiocephala*, which has broadly obovate leaves, the leaf margins of all of the species of México and Central America are fused slightly below the apex and produce a distinctive, teretish, indurated mucro 1-3 mm long. Such is not seen in the Brazilian species.

The achenial trichomes of all the Mexican/Central American species except one are relatively uniform in morphology. They are sparsely represented and about 0.05 mm long. Each is composed of 3 or rarely 4 cells, the basal one short and at least partially sclerified, the two terminal ones longer, thin walled

and joined terminally to form a rounded tip. I have observed these trichomes in two species. *Gnaphaliothamnus salicifolius* and *G. lavandulaefolius*, to open at the tip and release mucilage. The achenial trichomes of "*Chionolaena*" *aecidiocephala* are identical in morphology to these. In "*C.*" *concinna*, however, the hairs are longer (up to 0.3 mm), thinner and the terminal cells have acute, slightly divergent tips and each trichome is longitudinally twisted once or twice. Such a peculiarity makes it improbable that this species has been ancestral to any of the other Mexican/Central American ones, although it certainly must be included in the same lineage as them. In contrast to all of the Mexican/Central American achenial trichomes, those of Brazilian *Chionolaena* and *Leucopholis* are mostly 0.4-0.5 mm long and form a "densely strigose" vestiture.

In conclusion, the relationship between *Chionolaena*, *Leucopholis* and *Gnaphaliothamnus* is not clear, but the Mexican/Central American species appear to represent a monophyletic lineage that can be distinguished from both of the Brazilian groups. *Gnaphaliothamnus* is most closely similar to *Chionolaena* sensu stricto but separated from it by its polycephalous stems, apically mucronate leaves, and sparsely and minutely pubescent achenes. The geographic situation, as well, supports separation of *Gnaphaliothamnus* from the Brazilian taxa. In my opinion, the most reasonable taxonomic solution lies in the recognition of *Gnaphaliothamnus* as a separate genus endemic to México and Central America and the restriction of *Chionolaena* to South America.

Gnaphaliothamnus Kirpichn., Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sist. Vyss. Rast. 9:33. 1950. Type species: *Gnaphaliothamnus* (*Gnaphalium*) *rhodanthus* (Schultz-Bip.) Kirpichn. (\equiv *Gnaphaliothamnus salicifolius*). *Gnaphalium* subg. *Rhodognaphalium* Schultz-Bip. in Seem., Bot. Voy. Herald 310. 1856. Type species: *Gnaphalium rhodanthum* Schultz-Bip. (\equiv *Gnaphaliothamnus salicifolius*). *Gnaphalium* sect. *Rhodognaphalium* [as "*Eurhodognaphalium*"]; Schultz-Bip. in Seem., Bot. Voy. Herald 310. 1856. Type species: *Gnaphalium rhodanthum* (\equiv *Gnaphaliothamnus salicifolius*). *Gnaphalium* sect. *Metalasiopsis* Schultz-Bip. in Seem., Bot. Voy. Herald 310. 1856. Type species: *Gnaphalium seemanii* Schultz-Bip. (\equiv *Gnaphaliothamnus salicifolius*).

Perennial subshrubs 1-3 dm tall, woody at least at the base, from woody roots or often with elongated, slender, caudexlike rhizomes. Stems and leaves densely woolly-tomentose, sometimes with an understory of stipitate glandular hairs as well. Leaves linear to narrowly oblong or elliptic, with revolute, entire margins and indurated mucronulate tips, sometimes slightly decurrent but not clasping, crowded on the stems, ascending or spreading, the lower commonly withering persistent. Heads sessile to subsessile in compact, terminal glomerules of 2-5 or less commonly in corymbs of up to 40 heads; phyllaries usually easily caducous, the apices elongated, spreading and distinctly

white opaque in contrast to the brown-green or stramineous lower portions. 1 species without prominently white tipped bracts: receptacles naked, shallowly to deeply alveolate. Total minimum number of flowers per head 12-31; pistillate flowers 5-46(-70), the corollas tubular, narrowing upwards from the base, eligulate, purplish-red on the upper half, with minute, appressed, elongate, viscid hairs at the apex; central flowers 3-19, hermaphroditic but the ovaries sterile, the corollas tubular, purplish-red on the upper portions, 2.8-5.0 mm long, eglandular but with minute, appressed, elongate, viscid hairs at the apex; anthers tailed; style branches narrowly lanceolate, with collecting hairs from tips to point of divergence of the branches. Achenes obovoid to ellipsoid, slightly flattened, 1.2-2.0 mm long, the epidermis smooth, sparsely invested with minute, slightly elongated, 3-4 celled, twin hairs (Zwillingshaare) with rounded apices, more elongated with sharp apices in 1 species. clearly myxogenic in 2 species, achenes glabrous in 1 species; carpodium minute but well differentiated; pappus bristles scabrous, basally eciliate, separate or very slightly connate at the very base, persistent, or in 2 species basally caducous, usually dimorphic, with the apex of those of the hermaphroditic flowers with cells swollen clavellate at their apices, those of the pistillate flowers thin and sharp pointed, the bristles monomorphic or nearly so in 2 species. Base chromosome $x=14$ pairs.

KEY TO THE SPECIES

1. Inner phyllaries without prominent, white tips *G. cryptocephalus*
- 1' Inner phyllaries with prominent, white, spreading tips (2)
 2. Upper leaf surfaces tomentose to glabrate, eglandular (5)
 - 2' Upper leaf surfaces with stipitate glandular hairs beneath the eglandular tomentum (3)
3. Pistillate flowers 5-10; achenes glabrous; pappus bristles strongly dimorphic, basally caducous *G. costaricensis*
- 3' Pistillate flowers 12-24; achenes pubescent; pappus bristles monomorphic to weakly or strongly dimorphic, basally persistent (4)
 4. Pistillate flowers 12-18, usually about equal the number of hermaphroditic; pappus bristles strongly dimorphic *G. macdonaldii*
 - 4' Pistillate flowers 21-24, usually about twice as many as the hermaphroditic; pappus bristles monomorphic to very weakly dimorphic *G. lavandulaefolius*
5. Leaves 7-8 mm long; phyllaries subequal in length *G. sartorii*

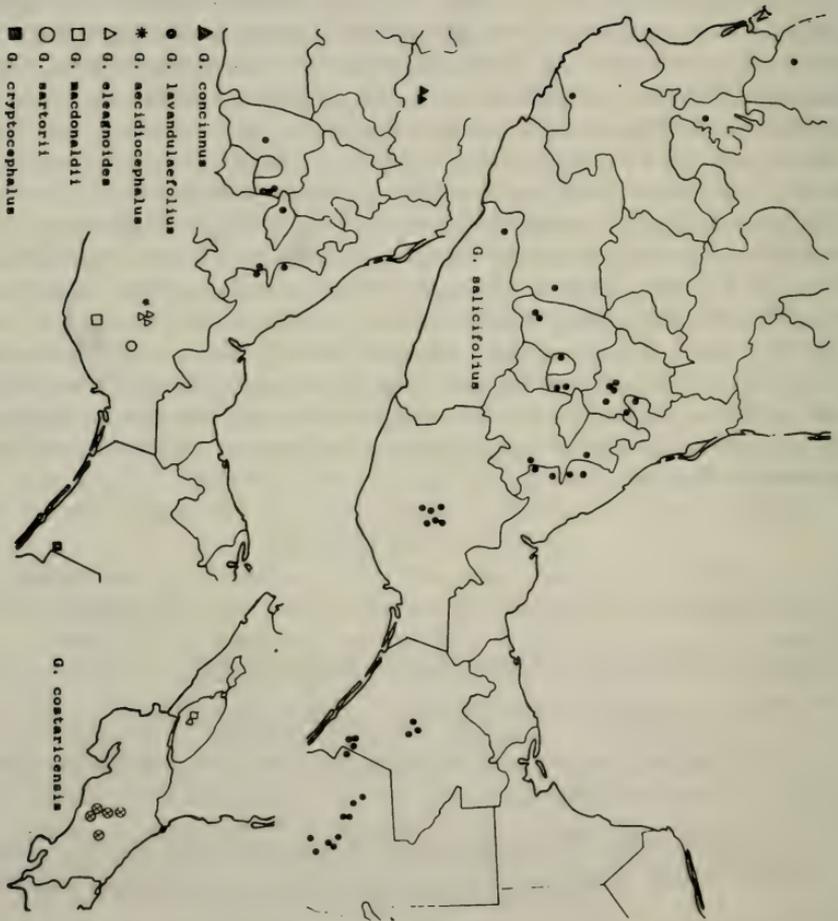


Figure 1. Geographic distribution of the species of *Gnaphaliothamnus*.

- 5' Leaves longer than 15 mm: phyllaries strongly graduated in length ... (6)
6. Leaves weakly bicolored: heads few in tight clusters at tips of leafy stems (8)
- 6' Leaves strongly bicolored: heads numerous in corymbs above the leaves (7)
7. Leaves linear to narrowly oblanceolate: pistillate flowers (22-)34-55, the hermaphroditic 3-4(-7); pappus bristles weakly dimorphic, basally caducous *G. salicifolius*
- 7' Leaves elliptic to elliptic-oblanceolate: pistillate flowers 16-20, the hermaphroditic 7-18; pappus bristles strongly dimorphic, basally persistent *G. eleagnoides*
8. Plants dioecious; leaves 3-5 mm long; phyllaries with a red midregion *G. aecidiocephalus*
- 8' Plants polygamodioecious: leaves 1-2 cm long; phyllaries without a red midregion *G. concinnus*
1. ***Gnaphaliothamnus aecidiocephalus*** (Grierson) Nesom, *comb. nov.*
 BASIONYM: *Anaphalis aecidiocephala* Grierson, Notes Roy. Bot. Gard. Edinburgh 31:389. 1972. TYPE: MÉXICO. Oaxaca: Cerro del Humo Chico, Comaltepec. Ixtlan. 3050 m, 2 Mar 1968, *T. MacDougall 4128* (E-photo! in Notes Roy. Bot. Gard. Edinburgh 31:pl. 8. 1972). *Gnaphalium aecidiocephalum* (Grierson) L.O. Wms., Phytologia 25:459. 1973. *Chionolaena aecidiocephala* Anderb. & Freire, Notes Roy. Bot. Gard. Edinburgh 46:40. 1989.

Subshrubs. the stems white matted tomentose, woody, 10-16 cm tall, erect, crowded caespitose, forming dense mounds. Leaves elliptic-obovate to obovate, not mucronate. 2.5-4.5 mm long, 2.0-2.5 mm wide, deflexed and slightly falcate, densely crowded and imbricate, densely and closely grayish villous-puberulent above and beneath, when glabrescent, revealing the eglandular, shiny surface. Heads campanulate, 3-5 mm wide, sessile in terminal clusters of 2-3; phyllaries 29-34, lightly woolly on the lower half, red-purple in the midportion, with spreading, white tips. Pistillate heads: pistillate flowers 12-25, fertile, the corollas 3.0-3.2 mm long; hermaphroditic flowers 5-9, ovaries and stamens sterile, the corollas 3.2-3.4 mm long. Staminate heads: hermaphroditic flowers 30-35, the ovaries sterile, pistillate flowers absent. Achenes sparsely pubescent, ca. 1 mm long; pappus bristles 17-27(-32), separate, persistent, strongly dimorphic. Chromosome number, $n=14$ pairs (Grierson 1972).

Oaxaca, in the Cerro del Humo and Sierra Juárez; subalpine pine woodland and heath; 2850-3050 m; flowering February-April.

MacDougall 4129, collected at the same locality on the same day as the type (4128, not "412S," apparently a transcriptional error on the holotype sheet. *fide* annotation by L.O. Williams). has been distributed as the type of an unpublished name by Williams. *Gnaphaliothamnus aecidiocephalus* is distinguished by its small habit, small, deflexed-imbricated leaves, red phyllaries with long, spreading, white tips and dioecious sexual condition.

2. *Gnaphaliothamnus concinnus* (A. Gray) Nesom, *comb. nov.* BASIONYM: *Gnaphalium concinnum* A. Gray, Proc. Amer. Acad. Arts 15:34. 1879. TYPE: MÉXICO. San Luis Potosí: in the highest mountains southeast of San Luis, Sep 1876, *Parry & Palmer 423* (HOLOTYPE: GH!; Isotypes: F!, PH!). *Anaphalis concinna* (A. Gray) Grierson, Notes Roy. Bot. Gard. Edinburgh 31:392. 1972. *Chionolaena concinna* Anderb. & Freire, Notes Roy. Bot. Gard. Edinburgh 46:40. 1989. Anderberg & Freire (1989, by annotation) have regarded the GH specimen as the lectotype.

Subshrubs 15-30 cm tall, densely woolly tomentose. Leaves elliptic-obovate to obovate with a terminal mucro, 1-2 cm long, 4-7 mm wide, sharply reduced in size near the heads, mostly strongly deflexed, crowded but not obscuring the stem, densely tawny villous-tomentose beneath, darker and glabrescent above, with eglandular surfaces. Heads campanulate, 3.5-5.0 mm wide, short pedicellate (2-4 mm long) in a compact cluster of 4-9; phyllaries 26-27, densely and persistently woolly. Pistillate flowers 20-27, the corollas 3.0-3.5 mm long. Hermaphroditic flowers 11-27, the corollas 3.2-3.8 mm long. Achenes sparsely pubescent with elongated hairs once or twice longitudinally twisted, mature morphology not observed; pappus bristles dimorphic, separate or slightly connate basally and separating in groups, persistent.

The specimens cited by Espinosa (1985) as *Gnaphaliothamnus concinnus* from Hidalgo and México apparently are *G. salicifolius*. I have seen only two collections of *G. concinnus*: the type and another apparently from near the type locality (*Schaffner 222* - CM,F,GH).

This species is distinctive in its tawny, obovate, deflexed leaves, prominently pedicellate heads and persistently woolly phyllaries. The leaves are larger but their shape is similar to those of *Gnaphaliothamnus aecidiocephalus*. Grierson (1972) noted that in some heads the hermaphroditic flowers are completely sterile and surmised that the species is polygamodioecious and thus related to *G. aecidiocephalus* on the basis of its sexual condition. I have seen no specimens of *G. concinnus* that produce heads strictly of hermaphroditic flowers. The sexual condition of *G. concinnus* appears to be an intermediate step in the direction of the more strict dioecy attained by *G. aecidiocephalus*.

3. *Gnaphaliothamnus costaricensis* Nesom, *spec. nov.* TYPE: COSTA RICA. Prov. San José: Cerro Asunción, common on rocky peak, 1 Sep

1987, *L.J. Pareda A. & J. F. Ciccio 4180* (HOLOTYPE: TEX!: Isotype: WIS!).

Elychrysum lavandulaefolio Kunth similis sed capitulis multo minoribus phyllariis et floribus paucioribus. phyllariis ordinatione pigmenti diversa, acheniis glabris, et setis pappo dimorphis differt.

Subshrubs 3-4 dm tall. Leaves ascending or commonly spreading at right angles to the stem, narrowly elliptic-oblongate, 5-8 mm long, 1.0-1.5 mm wide, with a prominent, indurated apiculum protruding from the tomentum, sparsely glandular beneath the tomentum. Heads campanulate-cylindric, 2.0-2.5 mm wide; phyllaries 24-28, lightly woolly at the base, the inner 5.0-6.5 mm long, with white tips 2-3 mm long. Pistillate flowers 5-10, 2.8-3.5 mm long. Hermaphroditic flowers 7-13, 2.8-4.0 mm long. Achenes glabrous, obovoid to cylindric, 1.2-1.6 mm long, flattened; pappus bristles 23-25, separate, very easily basally caducous, dimorphic. Costa Rica, rocky, barren hills or cliffs, páramo; 3000-3550 m; flowering August-February(-March).

Additional collections examined: COSTA RICA, summit of Volcán Irazú, April 1880, *Biolley 90* (F); Cerro de la Muerte, Talamanca range, 19 Feb 1957, *Carlson 3531* (GH); páramo on Cerro de las Vueltas, along the Pan American hwy ca. 90 km S of Cartago, 10 Nov 1960, *Cronquist & Jiménez M. 8852* (GH,TEX); Prov. Limón, Cordillera de Talamanca, peak of Cerro Kamuk, páramo, 25 Mar 1984, *Davidse, et al. 26003* (TEX); Cordillera de Talamanca, "Cerro de la Muerte" region, near summit of Cerro Sakira, 8 Jan 1985, *Horn 38* (WIS); cuspide del Cerro Asunción, carretera Panamericana Sur, 25 Feb 1965, *Jiménez M. 2967* (F); Irasu, *Orsted 278* (GH); in summo monte Irasu, Jan 1847, *Orsted 10570* (F,GH-2 sheets); Cerro de Buena Vista, 14 Jan 1891, *Pittier 3430* (GH); Km 88 S of San José on Interamerican Hwy, barren hills along Cuesta del Muerte, 8 Aug 1981, *Turner 15038* (TEX).

These plants have been previously identified as *Gnaphalium lavandulaceum* DC., but that species (\equiv *Gnaphaliothamnus lavandulaefolius*) is now known to be endemic to southcentral México. The Costa Rican plants differ in their much smaller heads with fewer phyllaries and pistillate flowers, the pattern of coloration in the phyllaries, and their glabrous achenes with dimorphic pappus bristles. The leaves are stiffer and usually project strongly at right angles to the stems.

4. *Gnaphaliothamnus cryptocephalus* Nesom, *spec. nov.* TYPE: MÉXICO. Chiapas: Mpio. Unión Juárez, small meadow with scattered dwarfed *Pinus* near the summit of Volcán Tacana, 3800 m, 3 Mar 1972, *D.E. Breedlove 24347* (HOLOTYPE: TEX!).

Elychrysum lavandulaefolio Kunth similis sed foliis apiculatis, phyllariis brevioribus sine extensione apicali albida prominenti,

floribus hermaphroditicis paucioribus corollis brevioribus. et setis pappo paucioribus differt.

Perennials with long, sinuous, apparently decumbent, slender but woody, mostly glabrous branches. Leaves clustered near the branch tips, linear to narrowly oblong, 8-13 mm long, 1-2 mm wide, densely white tomentose beneath, glabrescent above, minutely glandular beneath the pubescence, with a glabrous apiculum. Heads sessile, in terminal glomerules of 3-8; phyllaries ca. 17, narrowly ovate-triangular, yellowish-green with brown hyaline apices, densely woolly on the lower half, strongly graduated in 4-5 series, the inner 4-5 mm long, with an erect, whitish apical portion no more than 1 mm long. Pistillate flowers 18-20. Hermaphroditic flowers 4-5, the corollas 2.2-2.4 mm long. Achenes sparsely pubescent, mature size not observed; pappus bristles 12-14, separate, apparently basally caducous, monomorphic, those of the hermaphroditic flowers barely or not at all apically thickened. Known only from the type collection.

Gnaphaliothamnus cryptocephalus is similar to *G. lavandulaefolius*, *G. macdonaldii* and *G. costaricensis* in its short, narrow leaves with glandular upper surfaces. Among these three, it resembles the first in its nearly monomorphic pappus bristles. It differs from them all in its shorter phyllaries without long and prominent, white tips, fewer hermaphroditic flowers with much shorter corollas, and fewer pappus bristles. Numerous collections of *G. salicifolius* also have been made from the area of Volcán Tacana.

5. *Gnaphaliothamnus eleagnoides* (Klatt) Nesom, *comb. nov.* BASIO-NYM: *Chionolaena eleagnoides* Klatt, Leopoldina 23:88. 1887. TYPE: MÉXICO. Oaxaca: Pelado. *Liebmann 316* (GH *ex herb.* Klatt, drawing and fragment!). *Gnaphalium eleagnoides* (Klatt) S.F. Blake, *Contr. U.S. Natl. Herb.* 23:1511. 1926.

Gnaphalium hypochionaeum Schultz-Bip. *ex Klatt, nom. nud.*, Leopoldina 23:88. 1887.

Leaves elliptic to elliptic-oblong, 15-42 mm long, 4-8 mm wide, glandular, strongly bicolored with the upper surface glabrous and green, the margins revolute but sometimes only very narrowly so, the apex with a dark, indurated, terete apiculum. Heads distinctly pedicellate, in dense, corymboid cluster of 15-40, held mostly above the leaves; phyllaries glabrous to glabrate, 31-38. Pistillate flowers 16-19, the corollas 2.0-2.2 mm long. Hermaphroditic flowers 7-18, the corollas 2.9-3.0 mm long. Achenes ellipsoid, 1.2-1.4 mm long, sparsely pubescent; pappus bristles 21-29, slightly united basally, not caducous, strongly dimorphic. Central Oaxaca; open oak or pine woods, sometimes on steep, gravelly slopes; 2700-2900 m; flowering October-May.

This species is similar to and almost certainly most closely related to *Gnaphaliothamnus salicifolius* in its eglandular, glabrate, upper leaf surfaces and densely corymboid capitulescences above the leaves. *Gnaphaliothamnus eleagnoides* is clearly distinguished by its shorter, broader leaves, shorter corollas, greater number of hermaphroditic flowers and fewer pistillate flowers, and much thicker tipped, noncaducous pappus bristles. In the same area of Oaxaca where *G. eleagnoides* occurs, numerous collections of *G. salicifolius* have been made. I have seen no intermediates between the two taxa.

In the original description, Klatt counted 5 hermaphroditic flowers per heads on the type specimen, but an annotation by S.F. Blake on the GH sheet notes that there were 18.

6. *Gnaphaliothamnus lavandulaefolius* (Kunth) Nesom, *comb. nov.* BAsIONYM: *Elychrysum lavandulaefolium* Kunth, *Nov. Gen. & Sp.* 4 [folio]:68. 1818: 4 [quarto]:86. 1820. TYPE: MEXICO. Veracruz: "in frigidis Andium Mexicanorum in nobilissimo monte Nauhcampatepetle juxta urbem Perote, alt. 1720 hex. Floret Martio," *Humboldt & Bonpland s.n.* (HOLOTYPE: P fide!, F photo and fragment!, GH fragment!). *Gnaphalium lavandulaefolium* (Kunth) S.F. Blake, *Contr. Gray Herb.* 52:21. 1917; not *Gnaphalium lavandulaefolium* Willd., 1804 (\equiv *Helichrysum lavandulaefolium* [Willd.] D. Don).

Gnaphalium lavandulaceum DC., *nom. nov.*, *Prodr.* 6:227. 1837. *Chionolaena lavandulaceum* (DC.) Benth. & Hook. *ex Hemsley, Biol. Centr.-Amer.* 2:134. 1881.

Erect subshrubs from woody bases, 1-2(-3) cm tall. Stems and leaves densely tawny-white woolly-tomentose: stipitate glandular beneath, but this completely obscured by the tomentum. Leaves narrowly oblong, 7-12 mm long, 1.5-2.5 mm wide, the apex blunt, not apiculate. Heads sessile to subsessile in terminal glomerules of 2-5; phyllaries 34-56, strongly graduated in 6-7 series, the inner 8-10 mm long, ovate-lanceolate, the outer broadly obovate, all sparsely to moderately villous-tomentose below the apical portion. Pistillate flowers 21-24. Hermaphroditic flowers 9-19, the corollas 4-5 mm long. Achenes obovoid, 1.5-1.6 mm long, sparsely pubescent; pappus bristles 25-27, monomorphic or nearly so.

Veracruz, Puebla, Tlaxcala, Morelos, México, on the volcanic peaks of Perote, Orizaba, Malinche, Ixtaccihuatl, Popocatepetl, Tlaloc and Nevado de Toluca; cliffs or slopes of bare rock and talus, gravelly or sandy soil among boulders, rock outcrops in alpine meadows, sometimes with scattered junipers, at or above timberline; 4000-4300 m; (May-)June-October.

The plants from Perote and Orizaba are slightly differentiated from the rest of the species. The leaves have an indurated, thick, terete apiculum prominently protruding 0.2-0.5 mm from the tomentum (vs. leaf apex with a shorter

apiculum not protruding from the tomentum), a looser vestiture with the underlying stipitate glandular hairs visible (vs. a close tomentum completely obscuring the glandular understory) and hermaphroditic flowers ranging only 9-10 in number (vs. 10-23). There is some intergradation, however, and compared to differences between other species in the genus, these do not appear significant enough to warrant formal taxonomic recognition.

7. *Gnaphaliothamnus macdonaldii* Nesom, *spec. nov.* TYPE: MÉXICO. Oaxaca: Cerro Quiexobra and vicinity, 35 km ESE of Miahuatlán, 5 km NE of Santo Domingo Ozolotepec, 16° 10' N, 96° 15' W; timberline vegetation in open glades along ridges and in mountain "saddles," dominated below by pine forest. 3650-3800 m, rare, on the driest and most exposed rock outcrops, 10 Dec 1989, A. McDonald 2943 (HOLOTYPE: TEX!; Isotypes: F!, MEXU!, NY!, US!).

Gnaphaliothamnus lavandulaefolio (Kunth) Nesom similis sed phyllariis glabris et floribus pistillatis et hermaphroditicis 12-18, in numero circa equalibus in capitulo unico, acheniis longioribus, et setis pappo dimorphis differt.

Subshrubs 1-2(-3) dm tall. Leaves equally pubescent above and beneath, with an understory of short, stipitate glandular hairs, but this obscured by the tomentum. Leaves narrowly elliptic-ob lanceolate, 10-12 mm long, 1.5-2.0 mm wide, the apex with an indurated apiculum prominently protruding through the tomentum. Heads campanulate-hemispheric, 6-7 mm wide; phyllaries 27-41, not at all woolly, glabrous or usually with numerous, minute, appressed, viscid, elongate hairs, in 5-7 strongly graduated series, the outer ovate, the inner lanceolate, 7-8 mm long, the apices strongly spreading to slightly reflexed; receptacles shallowly alveolate. Pistillate flowers 12-18, the corollas 4.0-4.5 mm long. Hermaphroditic flowers 12-18, equal within 1-2 to the number of pistillate flowers, the corollas 4.2-4.5 mm long. Achenes ellipsoid, 1.8-2.0 mm long, sparsely pubescent; pappus bristles 19-27, dimorphic.

Known only from the type collection.

Gnaphaliothamnus macdonaldii is similar to *G. lavandulaefolius*, *G. costaricensis* and *G. cryptocephalus* in its short leaves tomentose-glabrescent above with an understory of stipitate glandular hairs. Other distinctive features are its phyllaries pubescent with viscid, appressed hairs, pistillate and hermaphroditic flowers in nearly equal numbers (both ranging 12-18 per head), relatively long achenes, and dimorphic pappus bristles.

8. *Gnaphaliothamnus salicifolius* (Bertol.) Nesom, *comb. nov.* BASIONYM: *Helichrysum salicifolium* Bertol., Nov. Comm. Acad. Sci. Bonon. 4:433. 1840. TYPE: Guatemala. "Vulcan d'acqua" (US fragment, *fide* Blake 1926). *Gnaphalium salicifolium* (Bertol.) Schultz-Bip., Bot. Zeit. 3:172. 1845.

Gnaphalium seemannii Schultz-Bip. in Seem., *Bot. Voy. Herald* 309. 1856. TYPE: MÉXICO. [Durango?]: Sierra Madre. *Seemann 1994* (K).

Gnaphalium rhodanthum Schultz-Bip. in Seem., *Bot. Voy. Herald* 310. 1856. SYNTYPES (not seen): MÉXICO. Chiapas: Jitotole, pine forests, 6900 ft. Feb 1840, *Linden 437*; Hidalgo: near El Sumate, 11,000 ft, *Ehrenberg 332*. As synonym *vide* McVaugh (1984).

Chionolaena corymbosa Hemsl., *Diagn. Pl. Nov.* 32. 1879. TYPE: MÉXICO. [Durango?]: Sierra Madre, *Seemann 1994* (K).

Subshrubs 1-10 dm tall. Leaves linear to narrowly oblanceolate, 2-8 cm long, 1-3(-5) mm wide, the narrower with prominently revolute margins, e-glandular, strongly bicolored with the upper surfaces greenish and glabrescent. Heads numerous, in dense, corymboid clusters above the leaves; phyllaries 24-37, lightly woolly basally, in 4-7 strongly graduated series, the inner 6-7 mm long, white or pinkish apically. Pistillate flowers (22-)34-55. Hermaphroditic flowers 3-4(-7), the corollas (3.6-)4.0-4.5 mm long. Achenes ellipsoid, 1.0-1.3 mm long, sparsely pubescent; pappus bristles 15-22, slightly dimorphic, basally caducous, slightly connate basally and often released in groups.

Durango, Jalisco, Michoacán, Guerrero, México, Morelos, Hidalgo, Veracruz, Puebla, Oaxaca and Chiapas, Guatemala: steep, rocky slopes, ledges, ridges, openings in oak, pine or fir woods, evergreen cloud forests in Chiapas and Guatemala: (2150-)2500-3500(-4100) m; mostly flowering October-March.

Gnaphaliothamnus salicifolius is recognized by its linear, eglandular, bicolored leaves, heads in dense corymbs above the leaves, large number of pistillate flowers and basally caducous, slightly dimorphic pappus bristles. The leaf shape is highly variable in this species, which also is the most widespread and ecologically variable species of the genus. It commonly occurs at high elevations but also in a lower range of elevations than most of the other species.

This species apparently grows in close proximity to several others of the genus without forming hybrids. One sheet from Volcán Ixtaccihuatl ("Rocks above timberline," *Purpus 1523* [GH]) bears plants of *Gnaphaliothamnus salicifolius* and *G. lavandulaefolius*. The leaves of the former are atypically small and pubescent, but it seems to be completely distinct in its diagnostic characters. See additional comments following *G. eleagnoides* and *G. cryptocephalus*.

9. *Gnaphaliothamnus sartorii* (Klatt) Nesom, *comb. nov.* BASIONYM: *Chionolaena sartorii* Klatt, *Leopoldina* 23:89. 1887. TYPE: MÉXICO. [Oaxaca]: "Sempoaltepec" *Liebmann 308* (HOLOTYPE: GH *ex herb.* Klatt drawing and fragment!). *Gnaphalium sartorii* Schultz-Bip. *ex Klatt, nom. nud.* *Leopoldina* 23:89. 1887. *Gnaphalium sartorii* (Klatt) F.J. Espinosa, *Bol. Soc. Bot. Mex.* 45:21. 1983.

Stems apparently less than 10 cm tall, densely tomentose. Leaves crowded, ascending above, deflexed below, narrowly oblong, 7-8 mm long, 1 mm wide, tomentose-glabrescent above, eglandular, the margins revolute. Heads few, pedicellate, in loose clusters slightly above the leaves: phyllaries 20-25, in ca. 3-5 subequal series, all lanceolate, the inner 5-6 mm long, with white, spreading-ascending tips 1-2 mm long. Pistillate flowers 15. Hermaphroditic flowers 6. Achenes not seen.

Known to me only from the type drawing and fragments (small stem portion with leaves and three heads-phyllaries only, no flowers). The small size of the receptacles with few bundle scars roughly confirms Klatt's count of few flowers (21 total, 6 hermaphroditic, 15 pistillate). The combination of its small stature, narrow, eglandular leaves, few flowers and narrow, subequal phyllaries eliminates *Gnaphaliothamnus sartorii* from consideration as any other known species of the genus. It is maintained here as a valid species despite the fragmentary information regarding its morphology. At least one of the specimens cited by Espinosa (1985) as *G. sartorii* is a plant of *G. salicifolius* (Lyonnet 791, from Edo, México).

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XYRIS CHAPMANII, A NEW SPECIES FROM THE GULF COASTAL PLAIN
OF THE SOUTHERN UNITED STATES

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ABSTRACT

Xyris chapmanii is described as a new species restricted to deep muck seepage bogs in the Gulf Coastal Plain of the southern United States, in Texas, Mississippi, Alabama and Florida. A key is provided to distinguish it from the similar *X. platylepis* and *X. scabrifolia*. The microhabitat factors and ecological relationships to other *Xyris* species are described based on field data from all eleven known sites for *X. chapmanii*.

KEY WORDS: *Xyris*, Xyridaceae, bogs, Gulf Coastal Plain, United States.

In a continuing field study of the distribution and ecological relationships of the genus *Xyris* in the Gulf Coastal Plain of the southeastern United States. In August 1988 we collected an unusual specimen in Wood County, Texas. In the field we tentatively identified this specimen as *Xyris torta*, a common species of seepage bogs and general wetland habitats in northeastern Texas. However, examination under magnification revealed that this collection lacked the strongly curvate and ciliate lateral sepal keel, and ciliate bract apex characteristics of *X. torta*. Further inspection revealed several additional differences in the plant base and seed characters. We revisited the site two months later and found the population to be quite uniform and distinct from the other *Xyris* species at the site, and made the type collection and preliminary description. Meanwhile, in September 1988 we had collected a large series of *Xyris* from sapric (having a deep organic soil surface horizon composed primarily of well decomposed plant material with little fibrous content) or deep muck bogs in the outer Coastal Plain of Mississippi. One of these, field identified as close to *X. scabrifolia* but lacking its characteristic scabrousness, was identical with our Wood County plant.

Not finding similar material in the literature or in herbaria consulted during our *Xyris* studies, and refusing to believe an undescribed species of the

southern United States could have persisted at only two isolated sites 620 km apart. we delayed publication pending further fieldwork. In September 1989 we sought this entity at numerous seepage and sapric bog sites in Florida, Alabama and Mississippi, and were rewarded with additional localities from all of these states. Although many apparently suitable sites in Florida and Alabama lacked this species, it occurred at every sapric bog we searched in Mississippi, often in large numbers. Repeated observations of fresh floral characteristics, general morphological consistency and lack of intermediates with other *Xyris* species at these sites provided much more evidence of its taxonomic distinctness.

The name honors Dr. A.W. Chapman (1809-1899), a long time resident of Apalachicola, Florida and the greatest of the 19th century contributors to our knowledge of North American *Xyris*. His 1860 *Flora of the Southern United States* included descriptions of nine new *Xyris* species, all based on his Apalachicola area collections. Seven of these are still recognized as distinct taxa and represent 28% of the 25 taxa now known from the United States and Canada. It seems appropriate to finally honor this early contributor to southern field botany with an epithet in the genus *Xyris*.

Xyris chapmanii Bridges & Orzell, *spec. nov.* TYPE: UNITED STATES.

Texas: Wood County. Deep muck seepage bog in small streamhead 0.2 mi N of Co Rd 3245 at a point 0.6 mi E of intersection of Co Rd 3235, ca. 0.5 mi upstream from end of SE arm of Lake Lydia, ca. 5 air mi SE of Quitman; Quitman 7.5' Quad., 32° 46' 27" N, 95° 22' 57" W, Elev. 400 ft., 8 Oct 1988, Orzell & Bridges 8714 (HOLOTYPE: TEX; Isotypes: FSU, GA, GH, NCU, NY, SMU, VDB).

Herba perennis, unicaulis vel laxe cespitosa, 4.5-9.5 dm alta, radicibus gracilibus fibrosis, per gemmas laterales squamatas luteolas basi plantae perennans; basis plantae saepe vestigiis fibrosis basium foliorum veterum vestita, in substrato (1-)4-5(-7) cm infossa. Folia erecta, linearia, (15-)47-58(-74) cm longa, spiraliter torta; vaginae integrae lamina 3-5-plo breviores, nitide spadiceae vel fusco-purpureae vel subroseo-purpureae, in laminam gradatim contractae, multicostatae, carinatae, margine pallidae; laminae compressae, lineares, multicostatae, perspiraliter tortae, virides. (1.5-)2-4(-5) mm latae, pagina et margine laevibus. Vaginae scaporum arctae, nitide brunneolae vel ferrugineae, (10-)15-19 cm longae, lamina anguste lanceolata (5-)7-8(-15) mm longa, foliis principalibus multo breviori. Scapi lineari-filiformes, 48-92 cm longi, ad apicem 1.5-2 mm lati, spiraliter torti, inferne subteretes, distaliter subcompressae et bicostatae, costis 2-3 tenuioribus adjectis; costae majores distincte scabro-papillosae, costae minores laeves

vel scabro-papillosae. Spicae late ovoideae, acutae, (6-)10-11 (-13) mm longae. (5-)7-8 mm latae, pluriflorae; bracteae arcte spiraleriter imbricatae. suborbiculatae, 6 mm longae, 5-6 mm latae, nitide brunneolae. areis dorsalibus distincte ovatis viridibus (in vivo). Sepala lateralia inclusa, leviter curvata. 5-6 mm longa, carina alis paullo angustiori, integra vel lacera. Laminae petalorum obovatae, luteolae. 3 mm longae, ex apice 3 mm lata ad basin 2 mm latam contractae, apice truncato-obtusae, erosulae. Staminodia bibrachiata, brachiis sparse penicillatis. Capsula ellipsoidea, ca. 4 mm longa, 2.5-3 mm lata, placenta parietali. Semina anguste ellipsoidea (3:1), 0.6-0.8 mm longa, translucida vel opaca cremea, utrinque fusco-caudata, basi dilute flexa; striae longitudinales distinctae, brunneae, regulariter vel irregulariter dispositae, transversae irregulares, translucidae, tenuissimae.

Perennial herb, solitary or loosely cespitose, 4.5-9.5 dm high, the roots slender fibrous, perennating by means of scaly yellow lateral buds from base of plant; base of plant often clothed with fibrous remains of old leaf bases, the bases set (1-)4-5(-7) cm deep in the substrate. Leaves erect, linear, (15-)47-58(-74) cm long, spirally twisted; sheaths 1/5-1/3 as long as blade, entire, a lustrous brown to purplish brown or pinkish purple, tapering gradually to blade, multicostate, carinate, with a paler marginal zone; blades flattened, linear, multicostate, strongly spirally twisted, green, (1.5-)2-4(-5) mm wide, surfaces and margins smooth. Sheaths of scape tight, lustrous brown to red brown, (10-)15-19 cm long, with narrowly lanceolate blunt blade (5-)7-8(-15) mm long, much shorter than the principal leaves. Scapes linear-filiform, 48-92 cm long, 1.5-2 mm wide at apex, spirally twisted, basally subterete, becoming slightly flattened and bicostate above, with 2-3 additional, less prominent costae, the major costae distinctly scabro-papillose, the minor costae smooth or scabro-papillose. Spikes broadly ovoid, acute, (6-)10-11(-13) mm long, (5-)7-8 mm wide. several flowered, the bracts tightly spirally imbricate, orbicular, 6 mm long, 5-6 mm wide, lustrous brown with distinct ovate green (when fresh) dorsal areas. Lateral sepals included, slightly curvate, 5-6 mm long, keel slightly narrower than wings, entire to lacerate. Petal blades obovate, yellow, 3 mm long, tapering from 3 mm wide at apex to 2 mm wide at base, the truncate-rounded tip slightly erose. Staminodia bibrachiata, the branches densely penicillate. Capsule ellipsoid, ca. 4 mm long, 2.5-3 mm wide, the placentation parietal. Seeds narrowly ellipsoidal (3:1), 0.6-0.8 mm long, translucent to opaque creamy yellowish white, darkened caudate at both ends, the base slightly bent, with distinct, brownish, regularly to irregularly spaced longitudinal striations and irregular, translucent, very faint cross partitions.

Flowering from August to September, with mature seeds from September to October. Flowers opening in late morning (petal blades unfolding from 2-3

hours after sunrise), closing near midday.

Additional collections examined (Paratypes): UNITED STATES. Alabama: Baldwin Co.: Gently sloping streamhead seepage bog along small side road on N side US 90. 2.0 mi W of Seminole. 3.7 mi W of Perdido River and Florida state line. ca. 0.2 mi SE of Seminole Church: NEQ, Sec. 18. T6S. R6E; Elsanor 7.5' Quad.. 30° 31' 40" N, 87° 30' 18" W. Elev. 65 ft., 18 Sep 1989, *Orzell & Bridges 12358* (TEX). Mobile Co.: Hillside seepage shrub-herb bog on S side of Co Rd 96 (Beverly-Jefferies Rd). 7.1 mi W of int. US 45 in Citronelle, 1.3 mi W of Ramey Rd and 1.6 mi E of Escatawpa River bridge; NWQ, SWQ, NEQ, NEQ, Sec. 2. T1N, R4W; Citronelle West 7.5' Quad.. 31° 04' 49" N, 88° 21' 04" W, Elev. 160 ft., 18 Sep 1989, *Orzell & Bridges 12372* (FSU,GA,MO,NCU,SMU,TEX,VDB).

Florida: Santa Rosa Co.: Quaking sapric muck bog ca. 3 air mi S of FL 4 at a point ca. 3.4 mi E of Munson. at head of S-draining tributary of Middle Creek; NEQ, SWQ, NWQ, Sec. 35, T4N, R26W; Munson 7.5' Quad., 30° 48' 40" N, 86° 49' 12" W. Elev. 130 ft., 20 Sep 1989, *Orzell & Bridges 12450* (FLAS,FSU,GA,NCU,TEX,VDB).

Mississippi: Harrison Co.: Frequently burned quaking sapric peat streamhead bog on S side of MS 53. 6.1 mi NW of US 49 at Lyman, just W of CC Camp Rd.; NWQ, SWQ, Sec. 16, T6S. R12W; Wortham 7.5' Quad., 30° 31' 17" N, 89° 12' 08" W. Elev. 90 ft., 23 Sep 1989, *Orzell & Bridges 12597* (IBE,TEX,VDB); Quaking deep muck low hillside bog on lower slope above Bayou Bernard, on W side of Co Rd, 0.3 mi N of New Hope, 1.3 mi N of int. I-10 at a point 2.3 mi W of US 49 N of Gulfport; NEQ, Sec. 13 & SEQ, Sec. 12. T7S. R12W; Gulfport NW 7.5' Quad.. 30° 26' 30" N, 89° 08' 25" W. Elev. 45 ft., 23 Sep 1989, *Orzell & Bridges 12598* (FSU,NCU,SMU,TEX); Sapric deep muck bog on W side of paved rd. 0.7 mi S of Stone Co. line, ca. 1.5 mi N of Riceville and 10 air miles W of Saucier; Center of SWQ, Sec. 4, T5S, R13W; Silver Run 7.5' Quad.. 30° 38' 13" N, 89° 18' 14" W, Elev. 180 ft., 23 Sep 1989, *Orzell & Bridges 12594* (FSU,GA,NCU,TEX,VDB). Jackson Co.: Sapric deep muck streamhead bog in ravine to E of Daisy-Vestry Rd. ca. 0.8 mi S of Indian Fork Rd., ca. 4 mi N of Latimer; SH, SWQ, SWQ, Sec. 23, T5S. R9W; Latimer 7.5' Quad., 30° 35' 24" N, 88° 51' 54" W. Elev. 70 ft., 23 Sep 1989, *Orzell & Bridges 12584* (FSU,GA,IBE,MO,NCU,NY,TEX,VDB); Quaking sapric deep muck streamhead bog in ravine to E of Daisy-Vestry Rd. ca. 0.3 mi S of Indian Fork Rd, ca. 4.5 mi N of Latimer and 2 mi S of Larue; SH, SEQ, NWQ, Sec. 23, T5S, R9W; Latimer 7.5' Quad., 30° 35' 43" N, 88° 51' 40" W. Elev. 70 ft., 23 Sep 1989, *Orzell & Bridges 12587* (FSU,NCU,TEX,VDB). Stone Co.: Sapric deep muck streamhead saddle bog W of FS Rd 420. ca. 0.2 mi S of East McHenry Rd (FS Rd 401), ca. 0.5 mi N of Broadus Cem., ca. 8.5 mi E of McHenry; NH, SEQ, SWQ, Sec. 16, T4S, R10W; Beatrice 7.5' Quad., 30° 41' 40" N, 88° 59' 46" W. Elev. 130 ft., 24 Sep 1988, *Orzell & Bridges 8522* (TEX,VDB), 23 Sep 1989, *Orzell &*

Bridges 12590 (FLAS,FSU.GA.IBE.NCU,NY.SMU.TEX): Sapric deep muck hillside/streamhead bog along slope to N of FS Rd 420-E. ca. 0.3 mi W of FS Rd 417, ca. 0.6 mi S of East McHenry Rd (FS Rd 401). ca. 11 mi E of McHenry, along tributary of Bigfoot Creek; NH. SEQ. NEQ. Sec. 22, T4S, R10W; Beatrice 7.5' Quad., 30° 41' 16" N. 88° 58' 08" W. Elev. 110 ft., 23 Sep 1989, *Orzell & Bridges 12589* (FSU,NCU.SMU.TEX,VDB).

Texas: Wood Co.: Same as type locality (Topotypes). 18 Aug 1988, *Orzell & Bridges 8047* (TEX,VDB), 3 Aug 1989, *Orzell & Bridges 11353* (NCU,TEX, VDB).

Xyris chapmanii is restricted to constantly saturated, organic soils in deep muck seepage bogs and the muckiest areas of some hillside seepage bogs. It is most commonly found on soft, unstable, springy, spongy, peaty substrates of quaking vegetation mats and in seep spring runs within the bogs. Dominant species of this habitat often include the early summer flowering *Rhynchospora stenophylla* and the fall flowering *R. macra*. The wetter habitats of the species can have dense cover of *Mayaca fluviatilis* or *Orontium aquaticum*.

The only species which were strongly associated with *Xyris chapmanii* at every site surveyed were *Eriocaulon decangulare*, *Rhynchospora macra* and *Scleria reticularis*. Several additional species were associated at almost all sites within their known ranges, including *Aristida virgata*, *Coreopsis linifolia*, *Eryngium integrifolium*, *Fuirena squarrosa*, *Lachnocaulon digynum*, *Liatris spicata*, *Lophiola americana*, *Myrica heterophylla*, *Oxypolis filiformis*, *Sarracenia alata*, *Xyris fimbriata* and *X. scabrifolia*. Other frequent associates include *Arnoglossum ovatum*, *Baldunia uniflora*, *Bartonia paniculata*, *Bidens mitis*, *Burmannia capitata*, *Dichromena latifolia*, *Drosera tracyi*, *Eriocaulon compressum*, *Hypericum brachyphyllum*, *Ilex coriacea*, *Juncus trigonocarpus*, *Rhynchospora chalarocephala*, *R. oligantha*, *R. stenophylla*, *Sabatia macrophylla*, *Sarracenia psitticina*, *Tofieldia racemosa*, *Xyris baldwiniana*, *X. smalliana* and *Sphagnum* sp. Vascular plant nomenclature follows Godfrey & Wooten (1979, 1981) except where indicated.

The floristic composition of *Xyris chapmanii* habitats is remarkably consistent, with the exception of the long disjunct Texas site. The 239 observations of associates included 74 species, with only 47 of these recorded at more than one site. Thirtyfive species were recorded as associates at least three times, from an average of 21 (range = 9-31) close associates per site. At the Wood County, Texas site, the associates *Burmannia capitata*, *Rhynchospora chalarocephala*, *R. macra*, *R. oligantha*, *R. stenophylla*, *Sarracenia alata*, *Scleria reticularis* and *Xyris baldwiniana* are found at either their only or one of their very few northeast Texas localities. The microhabitat at the Mississippi sites overlaps the drier end of the habitat of *Carex exilis*, a long disjunct from northern wetlands to these sapric bog sites (Bryson, *et al.* 1988). *Syngonanthus flavidulus* was associated at only one Mississippi site, although it occurs at other sites in areas of shallower peat, more groundwater seepage and less standing water

(Bridges & Orzell 1989b)

Xyris chapmanii occurs in habitats noted for their abundance and diversity of *Xyris* species. Other species of *Xyris* present at the type locality are *X. baldwiniana*, *X. jupicai* and *X. torta*. Most other sites have from seven to nine *Xyris* species, with seven of these strongly associated with *X. chapmanii* at at least one site and the four others present within the macrohabitats (*X. caroliniana*, *X. jupicai*, *X. louisianica* [Bridges & Orzell 1987], and *X. torta*) never found in close association with *X. chapmanii*. *Xyris chapmanii* most often occurs where the microhabitats of *X. scabrifolia* and *X. fimbriata* overlap within a site. In terms of numbers of plants, *X. chapmanii* is usually one of the rarest species of these habitats, being generally far outnumbered by *X. scabrifolia*, *X. baldwiniana* and *X. ambigua*, and less conspicuous than the taller and larger spiked *X. fimbriata* and *X. smalliana*. The occasionally associated *X. drummondii* and *X. difformis* var. *curtissii* are much more common in the more oligotrophic to weakly minerotrophic hillside seepage bogs and in areas where seepage emerges on slopes above the more ombrotrophic microhabitats of *X. chapmanii*. *Xyris chapmanii* is yet to be found in the typical matrix of the hillside seepage bogs that commonly occur in the longleaf pine hills of the coastal plain, although it does occur in close proximity to these microhabitats when lower, peaty areas occur downslope. The more typical matrix of hillside seepage bogs tend to have a *Xyris* complement that includes *X. ambigua*, *X. baldwiniana*, *X. difformis* var. *curtissii*, *X. drummondii* and *X. scabrifolia* (Bridges & Orzell 1989a).

In general habit, *X. chapmanii* resembles *X. torta*, but lacks the bulbous brown base of this species formed by the outermost scale leaves. In addition, *X. torta* has a strongly curvate, thick, ciliate lateral sepal keel, apical tufts of hairs on the fertile bracts and seeds only 0.4-0.5 mm long. *Xyris chapmanii* bears some similarity to solitary specimens of *X. baldwiniana* from very wet sites; however, the leaves lack the abruptly expanded, hard bases of this species, the scapes and leaves are much longer, and the staminodia are bearded. Using the keys in Kral (1966), *X. chapmanii* would pose problems at the couplet (#17) distinguishing *X. platylepis* and *X. scabrifolia* from the remaining species. It has the flexuous, twisted scapes and leaf blades of *X. platylepis* and *X. scabrifolia*, but lacks their distinct outer scale leaves and bulbous base. The leaves are much narrower than those of *X. platylepis* (5-10 mm) and at the narrow end of the range of leaf width of our collections of *X. scabrifolia* (3-10 mm). However, the leaf and scape surfaces and margins are strongly papillose-scabrid in *X. scabrifolia*, in contrast to the essentially glabrous *X. chapmanii*. The petal blades of *X. chapmanii* are also smaller and a different shape than those of *X. platylepis* and *X. scabrifolia*, and the spikes tend to be shorter and more acute.

The following key substituted for couplet #17 in Kral (1966) or couplet #14 in Godfrey & Wooten (1979) should effectively distinguish *X. chapmanii*

from other southeastern United States *Xyris* species.

17. Scapes flexuous, usually spirally twisted: upper portion of leaf blade conspicuously twisted; plant bases pinkish, purplish, or dark brown . A
17. Scapes usually not flexuous, the scapes and leaf blades not conspicuously twisted; plant base color various (leads to *X. difformis*, *X. iridifolia*, *X. montana*, *X. serotina* and *X. jupicai*)
- A. Base of plant deeply set in the substrate, without distinct outer scale leaves; leaf bases not noticeably expanded, thus the plant base not bulbous; leaves smooth, 2-4 mm wide; petal blades ca. 3 mm long *X. chapmanii* Bridges & Orzell
- A' Base of plant shallowly set on the substrate, often with short, black outer scale leaves, leaf bases noticeably expanded to form short bulbous bases; leaves scabrous, 310 mm wide, or when smooth, then 5-10 mm wide; petal blades ca. 5 mm long 18
18. Leaf and scape surfaces smooth or scabrous only along the margins and ridges; petal blades obovate; seeds ovoid, 0.5-0.6 mm long *X. platylepis* Chapm.
18. Leaf and scape surfaces prominently papillose or tuberculate-scabrid; petal blades suborbicular; seeds narrowly ovoid or narrowly ellipsoidal, ca. 1 mm long *X. scabrifolia* Harper

We found no previous collections of *Xyris chapmanii* at FSU, SMU or TEX-LL. It is possible that additional collections of this species may exist under other names in other herbaria; however, considering its rarity and the paucity of collections of the associated and much more frequent *X. scabrifolia* (Kral 1966; Bridges & Orzell 1989a), it probably was very rarely, if at all, collected before our 1988 discovery.

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TWO NEW SPECIES OF *CHAMAEDOREA* (ARECACEAE) FROM
GUATEMALA

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ABSTRACT

Two species of *Chamaedorea* Willd. (Arecaceae) from Guatemala are described as new and compared to related taxa.

KEY WORDS: *Chamaedorea*, Arecaceae, new species, Guatemala.

Recent field work in Guatemala has yielded two interesting and undescribed species of *Chamaedorea*, one from the Pacific slope and the other from the Atlantic slope.

Chamaedorea verapazensis D.R. Hodel & J.J. Castillo Mont, *spec. nov.*
Figure 1. TYPUS: Guatemala. *D.R. Hodel & J.J. Castillo Mont 898A*
(HOLOTYPUS: BH; Isotypus: AGUAT).

Subgeneris *Chamaedoreae* Mart. ex H.A. Wendl. *Chamaedorea concolori* Mart., *C. micranthae* Burret, et *C. aguilarianae* Standl. & Steyerm. affinis sed laminis apicalibus quam ceteris segmentis combinatis latoribus, inflorescentia feminea pauciramosa differt; *C. rojasianae* Standl. & Steyerm. affinis sed habitu grandiore, rachillis masculis numerosis differt.

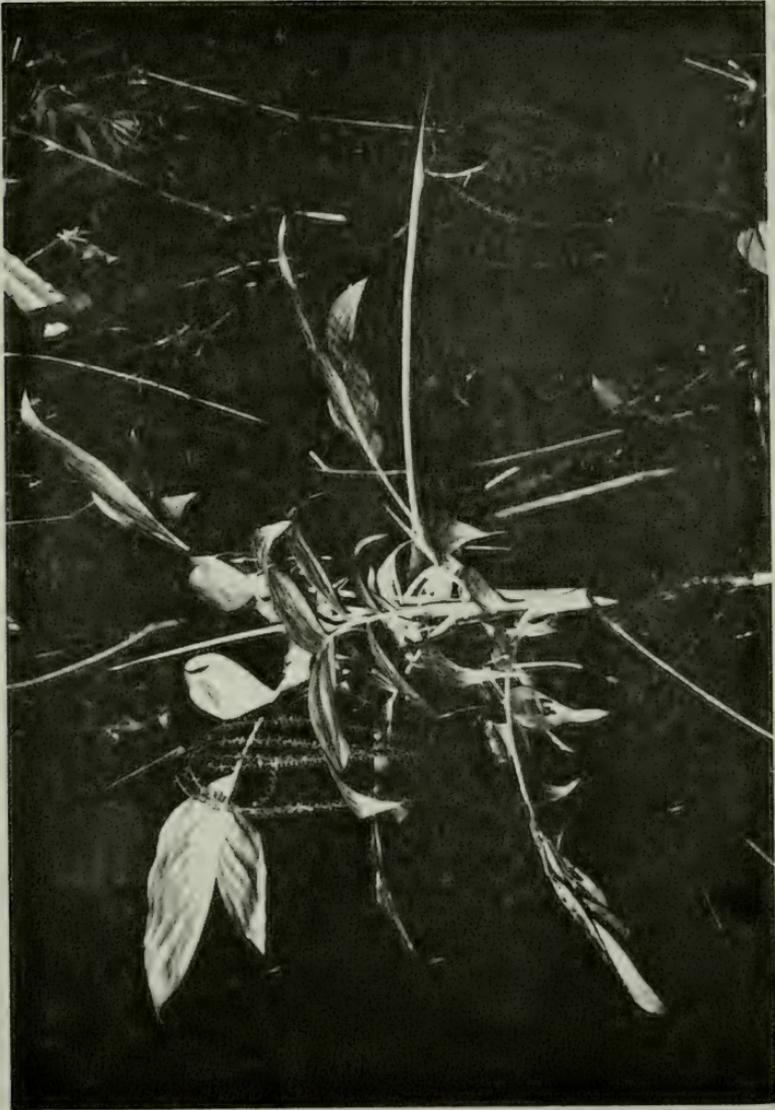


Figure 1. Plant from which type specimen of *C. verapazensis* was collected, Baja Verapaz, Guatemala. Note long peduncle and pendulous, staminate rachillae.

Stem solitary, procumbent then briefly erect, to 3 m long with adventitious roots along its length. 1 m tall, 8-10 mm diam., green, annulate, internodes 2-5 cm long. Leaves 5-6, erect-spreading, pinnate, bright green; sheath to 15 x 1.3-1.5 cm, tubular, tightly clasping, obliquely open apically, green, longitudinally striate nerved; petiole 5-18 cm long, green and flattened adaxially, green and rounded abaxially with a pale green or yellowish band extending from rachis onto sheath; rachis 12-22 cm long, green and angled adaxially, pale and rounded abaxially; blade in outline to 40 x 28 cm; pinnae 2-5 on each side of the rachis, basal ones lanceolate, to 17 x 4.5 cm, strongly sigmoid, acuminate, 4-6 prominent nerves adaxially, central one slightly more prominent, 1 secondary between each pair of primaries, tertiaries faint, inconspicuous, apical pinnae the largest, to 15-22 x 5-9 cm, sigmoid, acuminate, exterior margin toothed toward the apex, 7-10 prominent primary nerves adaxially, 2 secondaries between each pair of primaries.

Inflorescences interfoliar; peduncles to 55 cm long, erect, 3-4 mm wide at the base and flattened, 1-3 mm diam. at the apex and rounded, pale or light greenish at anthesis, orange in fruit where exposed; bracts 4-5, closely sheathing, acuminate and obliquely open apically, greenish at anthesis, greenish or brown in fruit, longitudinally striate nerved, prophyll to 6 cm long, 2nd bract to 18 cm long, 3rd to 35 cm long, 4th to 30 cm long and extending onto the rachis and concealing rudimentary 5th bract. Staminate inflorescence exceeding the leaves; rachis to 7 cm long, greenish at anthesis; rachillae 7-10, to 17 cm long, slender, 1 mm diam., pendulous, greenish yellow at anthesis. Pistillate inflorescence shorter than or equaling the leaves; rachis to 3 cm long, pale green or greenish yellow at anthesis, orange in fruit; rachillae 2-5, to 10 cm long, rigid, pale green or greenish yellow at anthesis, orange in fruit.

Staminate flowers globose, 2.5-3 mm diam., borne in four rows, moderately dense, 1-2 mm apart, only slightly immersed in superficial elliptic depressions 2-2.5 mm long; calyx ringlike, 1.5-2 x 2.5 mm, shallowly 3 lobed, sepals fleshy, connate, distinctly nerved when dry; corolla with petals connate at the base and apex, and there adnate to the pistillode and opening by lateral apertures, petals broadly ovate, 2.5-3 x 2.5 mm, acute, thick, fleshy, distinctly nerved when dry; stamens 1.5-2 mm long, filaments 1.0 mm long, adnate to base of petals, anthers elongate, 0.75-1 x 0.5 mm, dehiscence latrorse; pistillode broadly columnar, 2.5 x 1 mm, tip flat. Pistillate flowers = globose, 2.5 mm diam., borne spirally in four loose, irregular rows, 2-4 mm apart, immersed in elliptic depressions 2-2.5 mm long; calyx cuplike, 1.5 x 2.5 mm, 3 lobed, lobes rounded, sepals 1.5 x 3 mm fleshy, strongly ribbed when dry, connate along basal half; petals imbricate, briefly connate basally, 2-2.5 x 2.5-3 mm, tips rounded, fleshy, strongly ribbed when dry; staminodes absent; gynoeceum globose, 1.5-2 mm high, 3 angled, style short or lacking, stigma lobes recurved, pointed, brownish. Fruits black, = globose, to 11 x 9 mm diam.

Distribution: Guatemala. Baja Verapaz. Alta Verapaz. Infrequent in

dense, wet montane forest. 1700-2100 m elev.

Specimens Examined: Guatemala. Baja Verapaz: eastern slope of Sierra Chuacas. D.R. Hodel & J.J. Castillo Mont 898A (HOLOTYPE: BH; Isotype: AGUAT); 898B, 885 (BH.AGUAT). Alta Verapaz: northeastern slope of Sierra de las Minas, D.R. Hodel & J.J. Castillo Mont 890, 893 (BH.AGUAT).

Chamaedorea verapazensis is close to *C. concolor*, *C. micrantha*, *C. aguilariana* and *C. rojasiana*. It can be distinguished from the first three by its apical pair of pinnae nearly as large as or larger than the others combined and the few branched pistillate inflorescence. From the latter, it is distinguished by its much larger size and staminate inflorescence with numerous (10) rachillae.

Chamaedorea volcanensis D.R. Hodel & J.J. Castillo Mont, *spec. nov.*

Figure 2. TYPUS: Guatemala. D.R. Hodel & J.J. Castillo Mont 913A (HOLOTYPUS: BH; Isotypus: AGUAT).

Subgeneris *Chamaedoropsis* Oersted. *Chamaedorea adscendeni* (Dammer) Burret affinis sed foliis segmentis grandioribus nervis prominentibus pluribus, calycibus prominentibus, rachillis masculis pluribus, rachillis femineis floribus immersis non remotis differt: *C. castillo-montii* D.R. Hodel affinis sed foliis pinnatis, inflorescentiis masculis ramosis differt.

Stem solitary, appearing acaulescent but actually short, curved, to 15 cm long, subterranean or buried in the leaf litter, rooting along its length, overall height of plant including leaves to 1 m, nodes very congested, internodes to 5 mm long, above ground stem eventually developing to 30 cm tall, 2-3 cm diam., erect. Leaves spreading, bright green, regularly pinnate to 1.8 m long or flowering when variously and unevenly pinnate or simple and bifid, and then substantially smaller; sheath to 30 cm long, splitting deeply opposite the petiole, obliquely long open, cylindrical but clasping completely in a tubular manner only in the basal half, green, thick, longitudinally striate nerved; petiole to 70 cm long, green and flat adaxially and slightly grooved near the base, pale and rounded abaxially with yellowish band extending from rachis onto sheath, green and longitudinally striate nerved laterally; rachis to 75 cm long, green and angled adaxially, pale and rounded abaxially; blade to 80 cm long; pinnae 8-12 on each side of the rachis, thin, long lanceolate, the middle ones the longest, to 35 x 7 cm, slightly sigmoid, falcately acuminate, contracted at the base, 5 prominent primary nerves adaxially, apical pair usually the widest, to 25 x 7.5 cm, 7-8 prominent primary nerves adaxially, 1 secondary between each pair of primaries, basal pinnae to 25 x 4 cm, all pinnae with conspicuous primary and secondary nerves drying a distinct pale yellow abaxially; or, if blade simple and bifid then to 30 x 25 cm, incised apically more than half its



Figure 2. Plant from which type specimen of *C. volcanensis* was collected, Volcán Zunil, Quetzaltenango, Guatemala. Note staminate inflorescence ascending from the base with densely flowered rachillae.

length: rachis to 10 cm long; 7-9 primary nerves on each side of the rachis. 2 secondaries between each pair of primaries.

Inflorescences infrafoliar, erect from the base at or below the leaf litter, long pedunculate: peduncles to 65 cm long, 5-7 mm wide at the base and flattened, 3-5 mm diam. at the apex, green where exposed at anthesis, orange in fruit and nodding slightly when heavily laden with fruits; bracts 6-7, closely sheathing, acute-acuminate, green to brown at anthesis, brownish in fruit, papery, longitudinally striate nerved, prophyll 2.5 cm long, 2nd bract 2.5-3 cm long, 3rd 4-5 cm long, 4th 7-8 cm long, 5th 15 cm long, 6th 20 cm long, 7th 20-25 cm long and extending onto the rachis and concealing a rudimentary 8th bract. Staminate inflorescence with rachis 5 cm long, simple or the basal portion branched with up to 5 rachillae per branch, green at anthesis: rachillae 2-13, 10-15 cm long, 1 mm diam., briefly erect basally then drooping, pale green at anthesis, densely flowered nearly to the base. Pistillate inflorescence usually few branched with up to 5 rachillae, or spicate or furcate, especially when young; rachis to 6 cm long, greenish at anthesis, orange in fruit, slightly longitudinally angled; rachillae or flower bearing portion to 15 cm long, erect, rigid and whitish or very pale green at anthesis, slightly swollen and orange in mature fruit.

Staminate flowers subglobose in bud, 1.5 x 1.5-2 mm, borne spirally in very dense rows but not contiguous, 0.5-1 mm apart, older flowers = globose, 4 mm diam., only slightly immersed in superficial elliptic depressions 2.5 mm long; calyx well developed and prominent in bud, 1 x 2 mm, deeply but irregularly 3 lobed, lobes broadly rounded-acute, sepals united in a cupule to 1 mm high, conspicuously brown margined, thin, membranous, free nearly to the base: petals valvate, connate basally, fleshy, deltoid, 1.5 x 2-2.5 mm, spreading apically at anthesis to give corolla vasselike shape, white or cream aging to brown, thin when dry; stamens equaling or exceeding petals, filaments large, terete, flared basally, fleshy, antisealous ones longer, to 2.5 mm long, antipetalous ones 2.0 mm long, anthers short, 1 x 0.75-1 mm = didymous, oval, widely divergent and flattened at the base, thin, attached briefly to filament distally, dehiscence latrorse; pistillode 1-1.5 mm tall, columnar, flared and flattened basally, tip flat, 3 lobed. Pistillate flowers borne spirally and densely in five rows but not contiguous, 0.5-1 mm apart, globose, 2 mm diam., whitish or cream, only slightly immersed in shallow elliptic depressions 2.5 mm long; calyx well developed and prominent in bud, cuplike with triangular central opening, 0.75-1 x 2-2.5 mm, 3 lobed, lobes broadly rounded, sepals connate basally, thin, membranous, brown margined; corolla with petals tightly imbricate nearly to apex and there briefly open, petals connate basally only briefly, 2 x 1.5-2 mm, straight or rounded apically; staminodes absent; gynoecium ovoid, 1.5 x 1.5 mm, style lacking, stigma lobes short, pointed, recurved. Fruits black, oblong or ovoid, 12 x 8 mm, narrowed at apical end.

Distribution: Guatemala. San Marcos. Quetzaltenango. Suchitépéquez.

Dense, wet, montane forest on the Pacific slope, 1200-2000 m elev.

Specimens Examined: Guatemala. Quetzaltenango: southwestern slope of Volcán Zunil. *D.R. Hodel & J.J. Castillo Mont 913A* (HOLOTYPE: BH; Isotype: AGUAT); *913B* (BH.AGUAT); southeastern slope of Volcán Santa María. *D.R. Hodel & J.J. Castillo Mont 907A; 907B* (BH.AGUAT). Suchitepéquez: southwestern slope of Volcán Zunil, *J.A. Steyermark 35247* (F).

Chamaedorea volcanensis appears restricted to the vast and diverse forests of the wet, Pacific slopes of Volcán Tajumulco, Volcán Santa María, Volcán Zunil and Volcán Santo Tomás in western Guatemala, hence the specific epithet.

Although resembling *Chamaedorea adscendens* in its densely flowered staminate rachillae, *C. volcanensis* is sufficiently distinct in its larger pinnae with several prominent nerves, flowers with a prominent and well developed calyx, staminate inflorescence with more rachillae, and the pistillate rachillae with immersed, densely crowded flowers. Flowers of *C. volcanensis* are similar to those of *C. castillo-montii* from eastern Guatemala. However, the latter taxon has spicate staminate inflorescences and leaves usually simple and bifid (or, if pinnate, then the pinnae linear with a prominent midrib and less conspicuous secondary nerves).

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CHAMAEDOREA CASTILLO-MONTII (ARECACEAE), A NEW SPECIES
FROM GUATEMALA

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ABSTRACT

A species of *Chamaedorea* Willd. (Arecaceae) from Guatemala is described as new and compared with related taxa.

KEY WORDS: *Chamaedorea*, Arecaceae, new species, Guatemala.

Recent field work in Guatemala in support of a project on *Chamaedorea* that will be published by the International Palm Society in 1990, has yielded an undescribed species from Izabal.

Chamaedorea castillo-montii D.R. Hodel, *spec. nov.* Figure 1. TYPUS: Guatemala. D.R. Hodel & J.J. Castillo Mont 868A (HOLOTYPUS: BH; Isotypus: AGUAT).

Subgeneris *Chamaedoropsis* Oersted. *Chamaedorea adscendeni* (Dammer) Burret et *C. volcanensi* D.R. Hodel & J.J. Castillo Mont affinis sed laminis simplicibus bifidis vel segmentis linearibus, inflorescentiis spicatis differt; *C. robertii* D.R. Hodel & N.W. Uhl affinis sed calycibus prominentibus, floribus masculis albidis, staminibus aequanibus corollam non exsertis multum.

Stem solitary, briefly procumbent with adventitious roots along its length, then erect to 1 m tall, 1.5-2.5 cm diam., green, conspicuously annulate, basal portion often covered with persistent leaf bases, internodes 1.5-2 cm long, often flowering when young and then lacking a well developed caudex and appearing acaulescent. Leaves 12-15, erect-spreading, bright green adaxially, paler abaxially, simple and bifid, less often variously pinnate; sheath 10-15 cm long, obliquely long open apically, clasping completely in a tubular manner only in basal fourth, green, minutely white spotted, longitudinally striate nerved. margins becoming rough, brown; petiole to 30 cm long, green and channeled



Figure 1. Plant from which type specimen of *C. castillo-montii* was collected, Izabal, Guatemala. Note pendulous staminate inflorescence (just left of center).

or flattened adaxially, green and rounded abaxially, minutely white spotted; rachis to 20 cm long, green and angled adaxially, lighter green abaxially; blade simple, to 38 x 27 cm, incised apically to more than half its length, interior margins to 22 cm long, entire, exterior margins to 38 cm long, toothed, lobes acute-acuminate, 30 x 10 cm, diverging at ca. 65 degrees, 11-13 prominent primary nerves on each side of the rachis, 2 less prominent secondaries between each pair of primaries, tertiaries numerous, or blade variously pinnate with 2-5 pinnae on each side of the rachis, all except the apical pair linear-lanceolate, 20 x 1.5 cm, falcately acuminate, a prominent midrib flanked by less prominent secondary nerves, apical pair of pinnae very broad, more than twice as broad as other pinnae combined, 9-10 nerved.

Inflorescences interfoliar, spicate; peduncles erect, to 25 cm long, 5 mm wide at the base and \pm flattened, 2 mm wide at the apex and rounded, very pale green where exposed or whitish where concealed at anthesis, orange where exposed or pale green where concealed in fruit; bracts 5, closely sheathing, acute-acuminate, bifid, green and minutely white spotted at anthesis, brownish in fruit, longitudinally striate nerved, prophyll 2-2.5 cm long, 2nd bract 7-10 cm long, 3rd 10-12 cm long, 4th 14-18 cm long and extending onto the rachis and concealing the rudimentary 5th bract. Staminate inflorescence with rachis to 30 cm long, flaccid, pendulous, pale greenish yellow at anthesis. Pistillate inflorescence with rachis to 10 cm long, rigid, erect to horizontal, pale greenish yellow at anthesis, orange in fruit.

Staminate flowers subglobose, 1.5-1.75 x 2 mm, whitish, borne in six alternating rows and very closely appressed but not contiguous, 0.5 mm apart, attaining anthesis first at the apex of the rachis then progressing toward the base, superficial, leaving elliptic scars 2.5 mm long; calyx well developed and prominent in bud, shallowly 3 lobed, lobes broadly rounded, sepals briefly connate basally, 1.25-1.5 x 2.5 mm, united in a thin tight cupule, membranous, tips truncate and inflexed, forming a flat rim; petals valvate apically, free nearly to the base and there briefly connate, 2.5-3 x 2.5 mm, ovate, rounded apically, fleshy; stamens equaling or slightly exceeding petals at anthesis, 1.75-2 mm long, filaments large, 1.5-2 x 0.5 mm, broadly columnar, \pm terete, flared basally, fleshy, anthers short, 0.5-0.75 mm long, thin, exerted and crowded in a cluster above the open petal tips, dorsifixed near middle, elliptic, versatile, sagittate basally; pistillode broadly columnar, 1.5-1.75 x 0.75 mm, flared basally, only slightly so apically, tip flat. Pistillate flowers borne in four loose rows, moderately dense but not contiguous, 0.5-2.0 mm apart, depressed globose, 1 x 1.75 mm, whitish, immersed for ca. half their height in prominent elliptic depressions 2.5 mm long; calyx 0.5 x 2 mm, thin, membranous, shallowly 3 lobed, lobes broadly rounded, sepals united in a short rim; petals tightly imbricate along basal half, valvate distally, deltoid, 1 x 1.75 mm, rounded or slightly acute, thin, membranous; staminodes absent; gynoeceium ovoid-pyramidal, 0.75-1 x 0.75-1.5 mm, style lacking, stigma lobes large, fleshy,

= triangular with a distal longitudinal groove in each. Fruits black, oblong, narrowed at both ends. 13 x 7 mm.

Distribution: Guatemala. Izabal: dense, wet forest. 600-900 m elev., highly localized.

Specimens Examined: Guatemala. Izabal: summit of Cerro San Gil, *D.R. Hodel & J.J. Castillo Mont 868A* (HOLOTYPE: BH; Isotype: AGUAT): *868B* (BH,AGUAT).

Chamaedorea castillo-montii is named for Juan José Castillo Mont, collector of the type and Curator of the Herbarium, Facultad de Agronomía, Universidad de San Carlos, Guatemala. The species is apparently restricted to the summit of Cerro San Gil overlooking the Atlantic Ocean on the coast of Izabal. It is not uncommon in the forest there, occurring from about 600 m elevation up to the summit at 900 m. Most individuals have simple and bifid leaves; about ten percent of the population, however, have a mixture of simple, bifid and variously pinnate leaves.

Chamaedorea castillo-montii is unique among Guatemalan members of the genus by its simple and bifid leaves with prominently raised nerves, spicate inflorescences and densely crowded but not contiguous staminate flowers with spreading petals. It appears close to *C. robertii* from Panamá and Costa Rica, with which it shares these features. However, *C. castillo-montii* can be distinguished by the broader and shorter blade, bifid to more than half its length, the more widely divergent lobes, the staminate flowers whitish, and the well developed and prominent calyxes. Among Guatemalan members of subgenus *Chamaedoropsis*, *C. castillo-montii* is closest to *C. adscendens* from which it can be distinguished by its simple and bifid leaves (if pinnate, then pinnae linear) and spicate staminate inflorescences. *Chamaedorea castillo-montii* has flowers remarkably similar to those of *C. volcanensis* from western Guatemala. However, the former can be distinguished by its spicate inflorescences, and simple and bifid leaves (or, if pinnate, then pinnae linear with a prominent midrib and less conspicuous secondary nerves).

ACKNOWLEDGMENTS

I thank Richard W. Palmer, Pauleen Sullivan, Lynn Muir, Inge Hoffmann and Philip Keeler who supported my field work in Guatemala and Natalie W. Uhl who contributed to the floral descriptions. Scott Zona, Michael Grayum and James Bauml critically reviewed the manuscript.

THREE NEW SPECIES OF *CHAMAEDOREA* (ARECACEAE) FROM
OAXACA, MÉXICO

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ABSTRACT

Three species of *Chamaedorea* Willd. (Arecaceae) from Oaxaca, México are described as new and compared with related taxa.

KEY WORDS: *Chamaedorea*. Arecaceae, new species, México.

Recent field work in México in support of a project on *Chamaedorea* to be published in 1990 by the International Palm Society, has yielded three undescribed species, all from Oaxaca.

Chamaedorea rhizomatosa D.R. Hodel, *spec. nov.* Figure 1. TYPUS: México. *D.R. & R.J. Hodel 936* (HOLOTYPUS: BH; Isotypus: MEXU).

Subgeneris *Chamaedoropsis* Oersted. Species egregia caulibus caespitosis rhizomatibus, foliis pinnatis; species notata et bene distincta.

Stems cespitose by means of long rhizomes, forming well separated loose clusters of 6-12 erect or procumbent stems in area of ca. 4 square m, to 2.5 m tall, 7-9 mm diam., green, annulate, internodes 2-10 cm long. Leaves 3-6, erect-spreading, pinnate; sheath to 16 cm long, tubular, green, obliquely open apically, longitudinally striate nerved petiole 10-20 cm long, green and flat adaxially, light green and rounded abaxially with a light yellow band extending from rachis onto the sheath, longitudinally striate nerved; rachis 25-35 cm long, green and angled adaxially, pale and rounded abaxially, blade in outline 40-50 x 30-35 cm; pinnae 6-8 on each side of the rachis, lanceolate, slightly sigmoid, acuminate, contracted at the base, middle ones the longest, these to 25 x 5 cm, basal ones 14 x 2 cm, a prominently raised midrib and two slightly less prominent submarginal nerves adaxially, these yellowish abaxially, 3-5 secondaries between the midrib and each submarginal nerve, tertiaries



Figure 1. A clump of *Chamaedorea rhizomatosa* (D.R. & R.J. Hodel 936) grows on a steep, rocky hillside on the Pacific slope of Oaxaca.

numerous, faint apical pair of pinnae 13-17 x 5 cm with 5-7 primary nerves. 2-3 secondaries between each pair of primaries.

Staminate inflorescences straight, erect or horizontal; peduncle to 15 cm long, 4 mm wide at the base and there flattened, 2.5 mm diam. at the apex and there rounded; bracts 4, tubular, obliquely open apically, acute-acuminate, bifid, finely longitudinally striate nerved, prophyll 2-3 cm long, 2nd bract 6 cm long, 3rd 7 cm long, 4th 5 cm long, exceeding the peduncle and extending onto the rachis; rachis 5 cm long; rachillae 12, to 10 cm long, drooping. Staminate flowers borne spirally in moderately dense rows, 2 mm apart, globose in bud, 2 x 2.5 mm, = superficial but leaving elliptic scars 2.5 mm long; calyx cuplike, 1-1.25 x 2 mm, 3 lobed, lobes rounded, sepals imbricate basally; petals valvate, 2 x 2.5 mm, broadly ovate, acute, free apically; stamens in a fairly tight ring around and shorter than the pistillode, 1.25 to 1.5 mm long, filaments 1 mm long, anthers 0.75-1 mm long; pistillode columnar, 1.75-2 mm high, ± equaling the petals, flared apically. Pistillate flowers and fruits not known.

Distribution: México. Oaxaca: moist pine-oak forest on steep and rocky substrate on the Pacific slope, 1400 m elev.

Specimens Examined: México. Oaxaca: beyond San Gabriel Mixtepec along the road from Puerto Escondido to Oaxaca, D.R. & R.J. Hodel 936 (HOLOTYPE: BH; Isotype: MEXU).

Normally I would be hesitant about erecting a species without seeing pistillate flowers or fruits. However, *Chamaedorea rhizomatosa* is sufficiently distinct from all other known taxa of *Chamaedorea* in its rhizomatous habit and pinnate leaves. Only *C. brachypoda* Standl. & Steyerl. and *C. stolonifera* H.A. Wendl. ex Hook. f. resemble the habit of *C. rhizomatosa* in their stems spreading by rhizomes and stolons respectively. However, both have simple and bifid leaves. *Chamaedorea rhizomatosa* is probably closest to *C. aequalis* Standl. & Steyerl. from the Pacific slope of Guatemala, from which it can be distinguished by its smaller and rhizomatous habit, fewer pinnae (8 versus 17) with more nerves and much smaller and fewer branched inflorescences.

Chamaedorea foveata D.R. Hodel, *spec. nov.* Figure 2. TYPUS: México. D.R. & R.J. Hodel 939A (HOLOTYPE: BH; Isotype: MEXU).

Subgeneris *Chamaedoropsis* Oersted. *Chamaedorea vulgatae* Standl. & Steyerl. affinis sed petiolis foveis confertis irregularibus notatis, segmentis nervis secundariis inconspicuis, floribus masculis immersis, calycibus humilibus differt.

Stem solitary, erect, to 1.5 m tall above a short curving subterranean portion. 3 cm diam., green, annulate, internodes 2-4 cm long. Leaves 3-5, spreading, pinnate, to 1.25 m long; sheath to 30 cm long, 2.5-4 cm diam., splitting deeply opposite the petiole to ca. half its length, tightly clasping completely



Figure 2. A pistillate plant of *Chamaedorea foveata* D.R. & R.J. Hodel 939B grows on the Pacific slope of Oaxaca. Note erect inflorescence.

in a tubular manner only in the lower half, dark green, minutely but conspicuously white spotted, thick, durable, longitudinally striate nerved when dry; petiole 20-40 cm long, robust, 1 cm diam., densely covered with minute irregular pits giving living material a rough texture and drying to narrow nearly elliptic contiguous fissures, green and very slightly flattened adaxially and only faintly grooved near the base, paler and rounded abaxially with a yellow-green band extending from rachis onto the sheath; rachis to 60 cm long, green and angled adaxially, pale and rounded abaxially; blade to 75 cm long; pinnae 12-16 on each side of the rachis, nearly straight, only slightly sigmoid, falcately acuminate, lanceolate, middle one the longest, these to 35 x 4-5 cm, 5 prominent primary nerves adaxially, 1 secondary between each pair of primaries in living material, secondaries inconspicuous adaxially when dry, tertiaries numerous, all nerves drying distinctly pale yellow abaxially, apical pair of pinnae 20 x 3.5-4.5 cm, basal pair 27 x 3.5-4.5 cm.

Inflorescences interfoliar but occasionally infrafoliar in fruit, erect, long pedunculate; peduncles to 85 cm long, 1.5 cm wide at the base and there flattened, 5-7 mm wide at the apex, light green and remotely white spotted where exposed at anthesis, orange in fruit; bracts 6, cylindrical, tightly sheathing, acuminate, obliquely long open, green to brown at anthesis and minutely white spotted, longitudinally striate nerved, prophyll 8 cm long, 2nd bract 20 cm long, 3rd 30 cm long, 4th 38 cm long, 5th 35 cm long, 6th very short and rudimentary or to 15 cm long, equaled or exceeded by the 5th one. Staminate inflorescence with rachis 3 cm long, greenish yellow at anthesis; rachillae 8, to 25 cm long, spreading, greenish yellow at anthesis. Pistillate inflorescence with rachis 4-6 cm long, green or yellow-green at anthesis, orange in fruit; rachillae 3-7 or perhaps more, to 25 cm long, 5 mm diam. at base, 1-1.5 mm diam. at apex, stiffly erect, greenish at anthesis, orange in fruit. Staminate flowers borne spirally in four rows, 1-3.5 mm apart, dome shaped in bud, 2 x 2.5 mm, at anthesis globose, 2.5 mm diam., slightly immersed in elliptic depressions 3 mm long; calyx cuplike, 1 x 3 mm, not adnate to sides of pit, 3 lobed, sepals connate basally, thin, split to 0.5 mm, brown margined; petals valvate, ovate, free to the base, spreading slightly apically, acute, 2 x 2 mm, fleshy but thin and membranous when dry, not nerved or only obscurely so, margins thickened; stamens 1-1.25 mm long, filaments pale, slender, terete, 0.5-1 mm long, wider at base, awl shapes distally, anthers 1.5-2 x 0.5 mm, dorsifixed near the middle, sacs free and divergent at base; pistillode pale, columnar, 1.5-2 x 0.5 mm, exceeding stamens, shorter than petals, enlarged in middle, definitely barrel shaped, tip 3 lobed, flat. Pistillate flowers borne spirally in four rows, 2-4 mm apart, \pm globose, 3.5 mm diam., superficial or only slightly immersed in elliptic depressions 2.5-3 mm long; calyx cuplike, 0.5 x 3 mm, sepals as in staminate flowers: petals free nearly to the base and there briefly imbricate, broadly ovate, 2 x 2.5 mm, acute, yellow, very fleshy, thicker distally, faintly nerved when dry; 1-3 staminodes present; gynoeceium globose-ovoid,

2.5 x 2.5 mm, whitish, exceeding the petals, style short or lacking, stigma lobes recurved, blunt, fleshy, whitish.

Distribution: México. Oaxaca: moist pine-oak forest on a steep and rocky substrate on the Pacific slope, 1400-1900 m elev.

Specimens Examined: México. Oaxaca: N of San Gabriel Mixtepec along road from Puerto Escondido to Oaxaca, D.R. & R.J Hodel 939A (HOLOTYPE: BH; Isotype: MEXU); 939B, 937 (BH, MEXU).

The epithet is taken from the Latin *fovea* meaning pit, in reference to the petioles being densely covered with minute but conspicuous, irregularly shaped depressions giving living material a rough texture. *Chamaedorea foveata* shares this unusual feature with *C. vistae* D.R. Hodel & N.W. Uhl from the Atlantic slope of Oaxaca. *Chamaedorea foveata* is easily distinguished, however, by being smaller in size and in all its parts, interfoliar inflorescences with fewer than 20 rather than up to 100 staminate rachillae, and yellow rather than orange flowers. *Chamaedorea foveata* appears closest to *C. vulgata* from the Pacific slope of Guatemala. It can be distinguished from that species by its pitted petioles, smaller but more numerous pinnae, with faint, nearly inconspicuous secondary nerves, and the staminate flowers immersed in the axis and with the calyx low, only about one-fourth that of the corolla.

Chamaedorea queroana D.R. Hodel. *spec. nov.* Figure 3. TYPUS: México. D.R. & R.J. Hodel 943B (HOLOTYPUS: BH; Isotypus: MEXU).

Subgeneris *Chamaedoropsis* Oersted. *Chamaedorea pumilae* H.

A. Wendl. *ex* Dammer affinis sed laminis tenuibus non coriaceis et corrugatis, foliis pinnatis, rachillis masculis erectis, floribus masculis viridibus differt.

Stem solitary, erect, appearing acaulescent but actually short, to 10 cm long, 2-3 cm diam., partially or wholly buried in leaf litter, covered with persistent leaf bases, internodes very short, 5 mm long, overall height of plant including leaves to 1 m but often flowering when 30 cm tall. Leaves 4-5, erect-spreading, 0.3-1.3 m long, regularly or variously and unevenly pinnate but occasionally flowering when simple and bifid, green, slightly mottled; sheath 7-14 cm long, obliquely long open, clasping completely in a tubular manner only near the base, green but pale along the apical margins, longitudinally striate nerved; petiole 15-70 cm long, dark green, minutely but conspicuously white spotted, flattened adaxially and grooved near the base, rounded abaxially; rachis 10-40 cm long if blade pinnate, to 10 cm long if simple and bifid, green and angled adaxially, green and rounded abaxially; blade thin, in outline to 50 x 25 cm if pinnate, to 25 x 18 cm if simple, bifid and incised apically to more than half its length with exterior margins slightly toothed toward the apex; pinnae to 10 on each side of the rachis, lanceolate, sigmoid, acuminate,

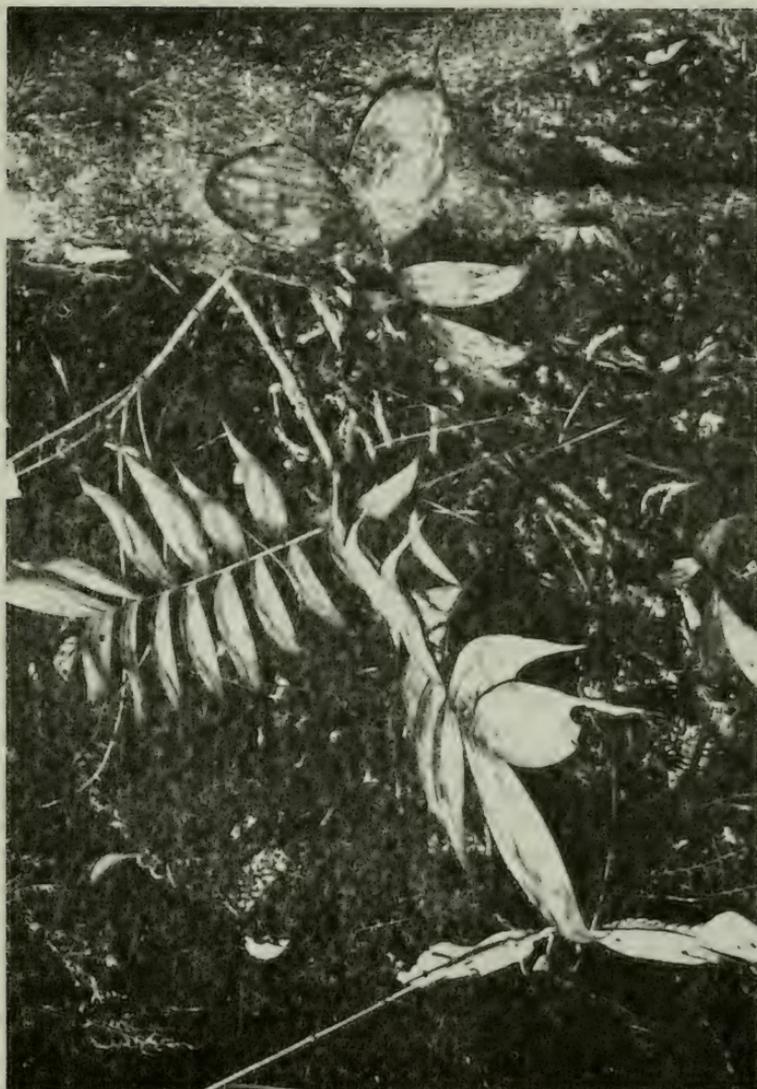


Figure 3. The plant from which the type specimen of *Chamaedorea queroana* was collected grows in wet forest on the Atlantic slope of Oaxaca. Note short inflorescences ascending from the base (lower center right).

the middle ones the longest, to 16 x 3-4 cm, contracted at the base. a prominent midrib flanked by two submarginal primary nerves. 1 secondary between each of these. tertiaries numerous. faint. apical pair of pinnae with 3 primary nerves. secondaries and tertiaries numerous. faint: if simple and bifid with 8-10 primary nerves on each side of the rachis. 2 faint secondaries between each pair of primaries. tertiaries numerous. inconspicuous.

Inflorescences infrafoliar, erect-arcuate, long pedunculate, peduncles to 50 cm long, stiff, straight, 5-7 mm wide at the base, 2-4 mm wide at the apex, greenish at anthesis where exposed, bright orange in fruit; bracts 6-9, tightly sheathing, acute-acuminate, bifid, longitudinally striate nerved, green to brown at anthesis, brown or fallen in fruit, prophyll 1-3 cm long, 2nd bract 1.5-5 cm long, 3rd 2.5-8 cm long, 4th 3.5-15 cm long, 5th 6-20 cm long, 6th 8-12 cm long, 7th 8-10 cm long, 8th 7-10 cm long and concealing rudimentary 9th that is 1 cm long. Staminate inflorescence with rachis to 10 cm long; rachillae 6-13, upright, basal ones the longest, to 18 cm long, apical ones to 15 cm long, all 1-1.5 mm diam.. pale green at anthesis. Pistillate inflorescence spicate or furcate, rachillae or flower bearing portion to 7 cm long, stiff, erect, white to pale green at anthesis and 1-1.5 mm diam., bright orange in fruit and 2.5-4 mm diam., longitudinally and finely striate angled when dry.

Staminate flowers 2.5-3 x 1.5 mm; calyx with sepals borne in a low thin cupule, lobes rounded. 0.5 mm high, split between sepals one-half their length; petals 3 x 1.5 mm, connate along basal two-thirds, white, tips free, open, green; stamens with filaments short, \pm triangular, fleshy basally, anthers 1 mm long; pistillode 2 mm long, slender, grooved. Pistillate flowers borne spirally and \pm densely in six rows, 2-3 mm apart, \pm ovoid, 2.5-3 x 2.5 mm. leaving superficial and rounded scars 1 mm wide; calyx when dry raised 0.25 mm above axis on a stalk 0.75 mm diam., explanate. 2 mm wide, shallowly 3 lobed, lobes 0.75-1 mm high, broadly rounded, membranous, sepals connate briefly at the base, = fleshy when fresh; corolla raised 0.5 mm above calyx on the central stalk, petals thick, fleshy, tough, apical half free, basal half imbricate, broadly ovate, 2.5-3 x 3 mm, acute, apex erect or slightly recurved. pale green tinged with dark green tips, tips brown adaxially, obscurely nerved when dry; one staminode present, toothlike; gynoeceium globose-ovoid. pale green, 1-1.25 x 0.75-1 mm, style short, 0.25 mm long, stigma lobes recurved, darkened. Fruits black, ovoid, 14 x 7.5 mm, tip pointed, fruiting perianth persistent with petals bright shining orange, conspicuous, fleshy, to 3 mm long with a prominent midrib and nerves abaxially.

Distribution: México. Oaxaca: dense, wet montane forest and cloud forest on the Atlantic slope, 1300 m elev.

Specimens Examined: México. Oaxaca: along México Hwy 175 from Valle Nacional to Oaxaca, D.R. & R.J. Hodel 943B (HOLOTYPE: BH; Isotype: MEXU); 943A (BH, MEXU); H.E. Moore, Jr. & G.S. Bunting 8914 (BH); T.B. Croat 48049 (MO).

CULTIVATION. United States. New York: Ithaca, in conservatory of L.H. Bailey Hortorium, Cornell University, grown from seeds from type locality, *H.E. Moore, Jr. & G.S. Bunting 8914 bis* (BH); *M.H. Stone 243* (BH); *R.B. Clark s.n.* (BH).

Chamaedorea queroana is named for Hermilo Quero-Rico, coordinator of the Arecaceae for the Flora Mesoamérica project and former Director of the Jardín Botánico, Universidad Nacional Autónoma de México. *Chamaedorea queroana* is quite distinct among Mexican members of the genus and actually appears closest to *C. pumila* from the wet Atlantic slope of Costa Rica. However, it is easily distinguished from that species in its generally much larger size, thin leaf blades not leathery or corrugated, pinnate leaves, rigid and erect staminate rachillae, and green staminate flowers.

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A NEW SPECIES OF *STEVIOPSIS* (ASTERACEAE: EUPATORIEAE) FROM
NUEVO LEÓN, MÉXICO

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ABSTRACT

A new species of *Steviopsis* from Cerro Peña Nevada, Nuevo León, México belonging to the Asteraceae, tribe Eupatorieae, is described and illustrated.

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

Routine identification of composites from northern México obtained by Dr. Guy Nesom during 1988 has revealed the following, previously uncollected, novelty. It is positioned in the genus *Steviopsis* (sensu Turner 1988) because it possesses mostly alternate leaves, 4-5 seriate, strongly graduate involucre bracts that are not readily deciduous, tubular corollas with glandular lobes, ampliate smooth style branches and glabrous achenes with 6-9 ribs, the pappus of 25 readily deciduous bristles. Nevertheless it is not especially close to any previously described species and may ultimately be recognized by some workers as a distinct genus.

Steviopsis nesomii B. Turner, *spec. nov.*, Figure 1. TYPE: México. Nuevo León: Mpio. Doctor Arroyo, ca. 35 km NE of Doctor Arroyo, N side of peak known as Picacho Onofre, just north of Cerro Peña Nevada (ca. 23° 46' N, 99° 52' W), area of rock outcrops along logging trail up from road at "El Puerto," 15 Oct 1988, *Guy Nesom [with David Morgan] 6782* (HOLOTYPE: TEX; Xerotype: MEXU).

Steviopsis dryophilae (B.L. Robins.) B. Turner leviter similis sed foliis infra medium plerumque alternatis manifeste petiolatis supra medium multum redactis sessilibus, capitulis minoribus flosculis paucioribus, et acheniis glabris setis ca. 25 albis 4-5 mm longis.

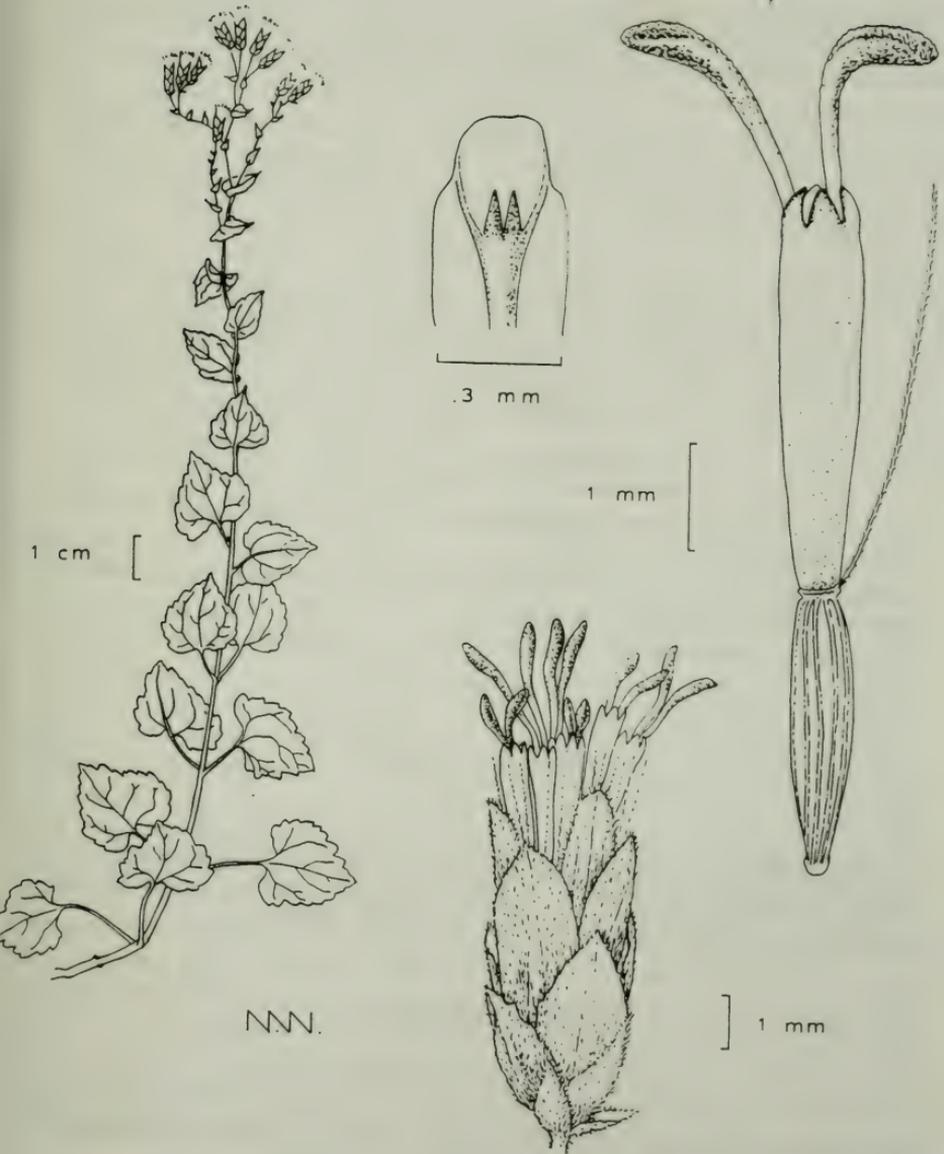


Fig. 1. *Steviopsis nesomii*, from holotype

Small suffruticose herb ca. 25 cm high. Stems terete, purplish, densely puberulous. Leaves mostly alternate, seemingly opposite at the lowermost nodes: petioles ca. 2 cm long at the lowermost nodes, gradually shortened upwards, the blades becoming sessile and clasping at 4-5 nodes below the capitulescence: blades cordate to subcordate, 1.5-2.0 cm long, 1.5-2.5 cm wide, 3 nervate from the base, puberulent and atomiferous glandular or glandular punctate above and below, the margins crenulodentate. Heads ca. 20, arranged in a terminal lax cyme, the ultimate peduncles 3-8 mm long. Involucre cylindroturbinate, 6-7 mm high, 2-3 mm wide, the bracts 4-5 seriate, evenly graduate, seemingly persistent, purplish and puberulent dorsally, ca. 1.5 mm wide, the apices decidedly obtuse or rounded. Receptacle plane, epaleate, glabrous. Florets ca. 6 per head, the corollas tubular, glabrous, ca. 5 mm long, greenish yellow below, purplish above, the lobes 4 or 5, ca. 0.50 mm long, ca. 0.25 mm wide, atomiferous glandular dorsally. Anther appendages rounded apically, somewhat broader than long. Styler shafts glabrous, without basal nodes, the styler branches with purple, clavate, smooth appendages. Achenes glabrous, ca. 2.5 mm long, the ribs 7-9, the carpodium somewhat asymmetric, stopperlike, not grading into the ribs; pappus of ca. 25 minutely barbellate, readily deciduous white bristles 4-5 mm long.

Only a single plant on a rock outcrop in an area of oak woods was collected, in spite of efforts to find additional plants.

The species is named for its only known collector, Dr. Guy Nesom, Curator at TEX.

ACKNOWLEDGMENTS

I am grateful to Dr. Guy Nesom who has provided the Latin diagnosis and who first recognized the taxon as probably new, relinquishing its description to me. He also reviewed the manuscript, as did Dr. T. Wendt.

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TWO NEW SPECIES OF *GNAPHALIUM* (ASTERACEAE: INULEAE) FROM
THE HIGH PEAKS OF NORTHEASTERN MÉXICO

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ABSTRACT

Two new species of *Gnaphalium* from the high peaks of northeastern México are described: *G. flavocephalum* and *G. hintoniorum*. The first is most closely related to the species centered around *G. oxyphyllum* DC., the second to species of the *G. elegans* group.

KEY WORDS: *Gnaphalium*, Asteraceae, Inuleae, México.

The Mexican species of Inuleae-Gnaphaliinae are numerous, and despite seminal regional studies of Mexican taxa by McVaugh (1972; 1984) and Espinosa (1985), the taxonomy remains difficult, with portions of the variability unaccounted for. The forthcoming treatment of Compositae for México (Turner & Nesom, in prep.) will be the first to include all the species from that country. The species of *Gamochoaeta*, *Mezerion* and *Gnaphaliothamnus* have been treated as separate genera (Nesom 1990a; 1990b; 1990c), segregated from what has traditionally been referred to as *Gnaphalium* sensu lato. Remaining in *Gnaphalium* in México, are a few species of *Gnaphalium* sensu stricto and a much larger group that includes most of the North and Central American species, as traditionally construed. At least the majority of the latter belong with the group that has been segregated as *Pseudognaphalium* Kirpichn. (Hilliard & Burt 1981). A number of new species closely related to *Gnaphalium elegans* Kunth and *G. chartaceum* Greenm. are being described in a separate paper (Nesom, in prep.) and other studies of other species complexes from México are nearly completed. The whole group of Mexican taxa apart from *Gnaphalium* sensu stricto, however, is complex in both its nomenclature and patterns of variation and is presently under study by Dr. Michael Dillon and myself. Until our study is complete, we will treat these species as *Gnaphalium*.

Gnaphalium flavocephalum Nesom, *spec. nov.* TYPE: México. Coahuila: Mpio. Arteaga, Sierra del Coahuilon, open limestone hillsides, 3200 m, 28 Jul 1985, *Hinton, et al. 18902* (HOLOTYPE: TEX!).

Ex affinitate *Gnaphalium oxyphylli* DC. et specierum affinium sed inter illis caulibus foliisque dense glandulosis, foliis superis inferisque leniter vel non bicoloribus triangulis-lanceolatis longi-decurrentibusque, phyllariis flavis, floribus pistillatis 60-74, et floribus hermaphroditicis 9-14 dignoscenda.

Perennial or biennial herbs from a woody taproot. Stems 3-5 dm tall, unbranched until the capitulescence, glandular and thinly villous. Leaves weakly or not at all bicolored, densely short stipitate or sessile glandular, thinly villous, narrowly triangular-lanceolate. 4-6 cm long, 3-5 mm wide, not basally ampliate, the upper and lower decurrent 7-20 mm. Heads in a dense, terminal glomerule; phyllaries ovate, distinctly yellowish, hyaline-translucent, weakly graduated to subequal, the inner 5.0-5.5 mm long, the outer with a dark, basomedial spot, the middle and inner with distally glandular stereomes. Pistillate flowers 60-74. Hermaphroditic flowers 9-14, the corollas 2.5-2.8 mm long, the lobes sessile-glandular. Achenes 0.8 mm long, papillate; pappus bristles basally caducous.

Coahuila (Sierras La Viga and Coahuilon) and Nuevo León (Cerro Potosí); pine to pine-fir woods; 2600-3600 m; July-October.

Additional collections examined: México. Coahuila: Mpio. Arteaga, Las Vigas, Cañon de la Carbonera, 15 Sep 1988, *Villarreal, et al. 4573* (TEX). Nuevo León: Mpio. Galeana, Cerro Potosí, Las Canoas, 17 Jul 1935, *Mueller 2193* (F, mixed with *G. hintoniorum* Nesom, GH); near microwave station on Cerro Potosí, Sep 1970, *Norris 17652* (LL).

Gnaphalium flavocephalum is recognized by its glandular stems and leaves, weakly or nonbicolored, long decurrent leaves, prominently yellow hyaline phyllaries, and high elevation habitats. It occurs in the same geographical area and habitats as *G. hintoniorum* Nesom and is similar to it in its primarily unbranched stems, glandular, sharply ascending leaves and outer phyllaries with a dark basal spot. *Gnaphalium flavocephalum*, however, has nondecurrent leaves, larger heads with white opaque phyllaries, a larger number of hermaphroditic flowers and ridged achenes with smooth epidermal surfaces. The evolutionary relationship of *G. flavocephalum* is with those species centered around *G. oxyphyllum* DC.

***Gnaphalium hintoniorum* Nesom, spec. nov.** TYPE: México. Nuevo León: Mpio. Galeana, Cerro Potosí, pine forest, 3350 m, 15 Oct 1969, *Hinton, et al. 17263* (HOLOTYPE: TEX!).

Ex affinitate *Gnaphalium chartacei* Greenm. et specierum affinium, sed duratione perenni, vestimento caulium et foliorum dense stipitati-glandulosi, foliis ad bases amplectentibus non decurrentibusque, phyllariis distincte signatis, floribus pistillatus 54-73, et habitationibus ad altitudines altas dignoscenda.

Perennial herbs from a woody taproot. Stems densely stipitate glandular, (0.2-)0.4-1.5 m tall, unbranched until the capitulescence. Leaves mostly lanceolate, strictly ascending, clasping, ampliate but not strongly so, not decurrent or the lower decurrent 1-3 mm, green on both surfaces or slightly bicolored, densely stipitate glandular above and beneath, sometimes with a slight amount of tomentum, the margins often prominently sinuate. Heads in one a few, dense, terminal clusters; phyllaries creamy white to tawny, strongly to weakly graduated, the inner 7.0-7.5 mm long, the outer with a distinct, brownish black, stipitate glandular, mediobasal spot, stereome of the middle and inner obovate-lanceolate, distally glandular with a distinctive, brown, lateral band at the apex. Pistillate flowers 54-73. Hermaphroditic flowers 16-28(-36), the corollas 3.5-3.8 mm long, with glandular lobes. Achenes 1.2-1.5 mm long, shallowly ridged, the epidermis smooth; pappus bristles basally caducous.

Coahuila, Nuevo León, Tamaulipas; rocky outcrops or talus of limestone, grassy, subalpine meadows, commonly near timberline at 3350-3650 m, rarely lower (to 2400 m) in pine forests of surrounding valleys; July-November. Known primarily from the ranges of La Marta, La Viga, Coahuilon, Cerro Potosí and Cerro Peña Nevada. One collection of typical plants is apparently long disjunct in the Sierra Jimulco of southwestern Coahuila, where it occurs at 2800 m on steep limestone slopes in vegetation of matorral.

Additional collections examined: México. Coahuila. Mpio. Torreón or Matamoros: Sierra de Jimulco and up to 3 km N of Mina San José, 8 km NE of Estación "OTTO", 1800-3138 m, 27 Sep 1972, *Chiang, et al. 9551o* (LL). Mpio. Arteaga: Sierra La Marta, 4 Aug 1980, *Hinton, et al. 17917* (GH,TEX) and 5 Jul 1981, *Hinton, et al. 18312* (GH,TEX); Sierra La Marta, 1st peak E of Cerro Morro, 21 Jul 1985, *McDonald 1702* (TEX); Sierra La Viga, 24 Oct 1984, *McDonald & Gomez 1150* (TEX); Sierra Coahuilon, 22 Jul 1985, *McDonald 1732* (TEX); Sierra Madre, 12 leagues S of Saltillo, Jul 1880, *Palmer 551* (GH).

Nuevo León. Mpio. Dr. Arroyo: area of Peña Nevada, NW of Picacho Onofre, 25 Jul 1977, *Wells & Nesom 403* (LL); Peña Nevada, W side of Picacho Onofre, 4 Jul 1959, *Beaman 2696* (GH). Mpio. Galeana: just below NE summit of Cerro Potosí, 19 Sep 1961, *Beaman 4508* (GH,TEX); subalpine forest on Cerro Potosí, 27 Aug 1987, *Bogler & Atkins 180* (TEX); 8 mi on microwave road from 18 de Marzo up Cerro Potosí, at pine/oak transition, 24 Aug 1984, *Lavin 4829* (TEX); below microwave station on Cerro Potosí, 2 Aug 1975, *Lewis 162* (LL); top of Cerro Potosí, treeline on S side, 26 Oct 1984, *McDonald & Gomez 1278* (TEX); subalpine zone at top of Cerro Potosí, 26 Jul 1985, *McDonald & Gomez 1803* (TEX); Cerro Potosí, at timberline and above, 21 Jul 1935, *Mueller 2265* (F,GH); Cerro Potosí, Las Canoas, 17 Jul 1935, *Mueller 2193* (F, mixed with *G. flavocephalum* Nesom); Cerro Potosí, open, rocky slopes below timberline, 20 Jul 1938, *Schneider 1035* (F); 15 mi E of San

Rafael, 23 Jul 1977, *Wells & Nesom 74* (LL) and *164* (LL).

Tamaulipas. Mpio. Miquihuana: E and S slopes and summit of Peña Nevada, 19 Jul 1949, *Stanford, et al. 2583* (TEX).

Gnaphalium hintoniorum is distinguished by its perennial duration, densely stipitate glandular stems and leaves, basally clasping amplexate but mostly nondecurrent leaves, distinctively marked phyllaries, large number of pistillate flowers, and high elevation habitats in northeastern México. *Lavin 4829*, at the lower limit of elevation for *G. hintoniorum*, is atypical in its more densely tomentose vestiture mostly obscuring the glands and its only slightly amplexate leaves. *Gnaphalium hintoniorum* is superficially similar to *G. flavocephalum*, which occurs in the same habitats, but the latter has decurrent upper and lower leaves, yellow hyaline phyllaries, fewer flowers, and papillate achenes.

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BOOK REVIEWS

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Native Shrubs and Woody Vines of the Southeast, Landscaping Uses and Identification. Leonard E. Foote & Samuel B. Jones, Jr. Timber Press, 9999 SW Wilshire, Portland, OR 97225, USA. 1989, 199 pp., \$32.95, hardcover. ISBN 0-88192-128-9.

This book is apparently intended to be used by persons wishing to locate, identify and propagate native woody shrubs and vines from the southeastern United States. However, because of the manner in which the book is organized and the types of information that it contains, it may actually be more useful to practicing field collectors than to horticulturalists, for identifying the smaller woody plants from this region. While the book contains some introductory material on garden design and lists of various species that may prosper in certain soils, will grow to a certain size and flower at a particular time of year, etc., these materials are brief and somewhat haphazardly organized (*e.g.*, the list of native vines is surrounded by lists of shrubs for various uses). On the positive side, the information on planting for wildlife is something not normally found in these types of books. The descriptions of the included taxa are good, including summaries of the range and habitats of the plants. However, most of these have little to offer a horticulturalist interested in propagating the plants. While the title specifies "Native . . .," several nonnative plants (*e.g.*, *Buddleia*, *Cytisus*, *Pueraria* and *Sapium*) are included. Species descriptions are organized under a putative phylogenetic system and the keys do not reference page numbers.

On the other hand, none of the negatives cited above would interfere with identification of the woody plants included in this book. The keys are workable and stress vegetative characters where possible, making them useful during a greater part of the season and to larger numbers of people. The glossary adequately explains the technical terms used, and the photographs to illustrate many of the species are excellent. The book contains an abundance of information and could be quite useful, but it seems to be targeted at the wrong audience.

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A Field Guide to Wildflowers of the Southern Interior of British Columbia and Adjacent Parts of Washington, Idaho and Montana. Joan Burbridge. University of British Columbia Press, 303-6344 Memorial Road, Vancouver, BC, Canada V6T 1W5. 1989, 398 pp., price unknown, hardcover. ISBN 0-7748-0320-7.

While this book is not a technical treatment on the flora of the region, it is well designed and should be a handy guide for novices interested in the plants of the area covered by the book. The book is of an appropriate size for a field guide, being compact enough to fit into a pocket. The most common and likely encountered flowering plants from the region are included in the work. Herbaceous species with showy flowers form the bulk of the taxa discussed by the author. Grasses, sedges, rushes and woody plants are not included. Plants are arranged in the book by flower color (with the tops of each page colored to match the color of flowers discussed on those pages), within color alphabetically by family and within family alphabetically by genus. Treatments of each plant include a photograph, common and Latin names (no authorities), family, duration of growth and a description. The descriptions are largely non technical, emphasizing the easily seen features of the plants and economic uses, if any. A brief glossary is included to explain some of the botanical terms not used in everyday speech by non botanists.

This field guide seems appropriate for beginners interested in the plants of south central and southeastern British Columbia. Only two problems were apparent in my perusal of the book. 1) Several of the pictures are so dark as to be nearly unusable to recognize the plants (*i.e.*, pp. 82,91,115,121,131) and 2) the page numbers in the table of contents do not match the pages in the text where the listed items are found.

BOOKS RECEIVED

- A Physical Theory of Focus Development in Plant Disease.** M.W. Zawolek & J.C. Zadoks. Agricultural University Wageningen Papers 89(3), distributed in North America by UNIPUB, Lanham, MD, 1989. 231 pp. \$54.00 (paper).
- Adventures with Hardy Bulbs.** Louise Beebe Wilder. Collier Books, New York, NY, 1990. xv. 363 pp. \$12.95 (paper).
- An Annotated List of the Ferns, Fern Allies, Gymnosperms and Flowering Plants of Oklahoma.** R. John Taylor & Constance E.S. Taylor. Southeastern Oklahoma State University, Durant, OK, 1989. vi. 110 pp. Price unknown (paper).
- Forest Stand Dynamics.** Chadwick D. Oliver & Bruce C. Larson. McGraw-Hill Publishing Co., New York, NY, 1990. xvii. 467 pp. \$79.95 (hardcover); \$29.95 (paper).
- Herbs: Their Culture and Uses.** Rosetta E. Clarkson. Collier Books, New York, NY, 1990. xi. 226 pp. \$11.95 (paper).
- Isozymes in Plant Biology.** Douglas E. Soltis & Pamela S. Soltis (eds.). Vol. 4 in Advances in Plant Science Series. Dioscorides Press, Portland, OR, 1990. 268 pp. \$35.95 (hardcover).
- Manual of the Flowering Plants of Hawai'i, Vol. 1.** Warren L. Wagner, Derral R. Herbst & S.H. Sohmer. University of Hawaii Press, Honolulu, HI, 1990. xviii. 988 pp. \$85.00 (hardcover—price includes vol. 2).
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- Studies in Cyperaceae 8.** A revision of *Lipocarpa*, including *Hemicarpa* and *Rikiella*. Paul Goetghebeur & An Van den Borre. Agricultural University Wageningen Papers 89(1), distributed in North America by UNIPUB, Lanham, MD, 1989. 87 pp. \$23.00 (paper).
- The Merck Index, 11th ed., Centennial Ed.** Susan Budavari, ed. Merck & Co., Inc., Rahway, NJ, 1989. \$35.00 (hardcover).
- The Parasite-host relationship between *Encarsia formosa* (Hymenoptera: Aphelinidae) and *Trialeurodes vaporariorum* (Homoptera: Aleyrodidae).** Papers XXX-XXXII. (Population Growth of Greenhouse Whitefly). Agricultural University Wageningen Papers 89(2), distributed in North America by UNIPUB, Lanham, MD, 1989. 99 pp. \$23.00 (paper).
- The Potpourri Gardener.** Theodore James, Jr. MacMillan Publishing Co., New York, NY, 1990. xi. 148 pp. \$22.95 (hardcover).
- The WPA Guide to the Monterey Peninsula.** Page Stegner. University of Arizona Press, Tucson, AZ, 1990. xvi. 207 pp. \$13.95 (paper).
- Wildflowers of the Texas Hill Country.** Marshall Enquist. Lone Star Botanical, Austin, TX, 1987. xi. 275 pp. Price unknown (paper).



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