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TWO NEW SPECIES OF HELIOPSIS (ASTERACEAE) FROM NORTHWESTERN MEXICO

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A taxonomic treatment of the Mexican Asteraceae (Turner and Nesom, in prep.) necessitates description of the following novelties in Heliopsis.

HELIOPSIS NOVOGALICIANA B. L. Turner, sp. nov.

Differt a H. procumbens foliis sessilibus ovalis prominenter hispido-ciliatis et antheris appendicibus luteis.

Much resembling H. procumbens Hemsl. but readily distinguished by its epetiolate mostly ovate leaves with markedly hispid-ciliate margins. In addition the anther appendages are predominantly yellow and, as noted by McVaugh (1984, p. 502) "Most of the plants from Nuevo Galicia appear more robust, with larger and more pointed leaves and larger heads, than those from the higher elevations near Mexico City".

The characters which I enumerate below appear to be consistently found in one or the other taxon and, what with their distinctive distributions, appear to be good taxa, albeit closely related.

Heliopsis procumbens	Heliopsis novogaliciana
1. Leaves	1. Leaves
a) broadest at the middle or nearly so	a) broadest well below the middle
b) margins weakly hispid-ciliate, if at all	b) margins strongly hispid-ciliate
c) petioles clearly distinct, 2-6(10) mm long	c) sessile, petioles not clearly defined
2. Anther appendages purplish	2. Anther appendages yellowish
3. DISTRIBUTION: Trans-volcanic belt of Mexico State and closely surrounding areas	3. DISTRIBUTION: Pacific Coastal Ranges of Jalisco, Nayarit, Sinaloa and Durango

TYPE: MEXICO. JALISCO: Hills near Guadalajara, 22 Jul 1902, C. G. Pringle 9924 (holotype GH).

Additional Specimens Examined: DURANGO. 12 km E of El Salto (23°50' x 105°18'), 2350 m, 23 Jun 1973, Johnston et al. 11443B (TEX). SW of Coyotes Hacienda, 25 Aug 1980, Warnock et al. 2154 (MEXU, TEX). JALISCO: Cerro de Tequila, 2000 m, 13 Jul 1971, Gonzalez T. 215 (TEX); Rio Blanco, Jun 1886, Palmer 36 (GH). NAYARIT: ca 2.5 mi N of Campostela, 2900 ft, 27 Jun 1972, Webster & Lynch 17136 (GH). SINALOA: between Rosario and Colomas, 13 Jul 1897, Rose 1633 (GH).

HELIOPSIS SINALOENSIS B. L. Turner

Differt a H. parviceps corollis luteis radii et discis et acheniis columnaribus tuberculatis 2-3plo longioribus quam latioribus.

Weak-stemmed annual 30-60 cm high. Stems erect, glabrescent or hairs arranged in thin lines along the axis. Leaves opposite, 5-8 cm long, 2-4 cm wide; petioles 1.5-3.5 cm long; blades broadly ovate to deltoid, sparsely to moderately hispid above and beneath, the margins irregularly serrate. Heads single on peduncles 4-12 cm long. Involucres ca 4 mm high, ca 8 mm across, 2-3 seriate, eximbricate; bracts obovate, trinervate, sparsely hispidulous. Receptacle conical; pales 3-4 mm long, purplish. Ray florets pistillate, fertile, 5-8; corollas yellow the ligules 4-7 mm long, weakly nervate, sessile and persistent. Disk florets numerous; corollas yellow, ca 3 mm long, glabrous, the throat ca 0.5 mm long. Achenes columnar, warty, ca 3 mm long, ca 1.5 mm wide, sparsely hispid-puberulent; pappus absent.

TYPE: MEXICO. SINALOA: Ymala, 16-25 Aug 1891, E. Palmer 1471 (holotype GH). Ymala, is also spelled Imala and is located at 24°52' N, 107°15' W according to McVaugh (1956).

Additional collection examined: MEXICO. SINALOA: ca Culiacan, 22 Aug 1904, Brandegee s.n. (GH).

Fisher (1957) annotated both of the above specimens as Heliopsis brachactis Standl. ex Fisher but strangely did not cite these in his treatment of the genus. That this was an oversight might be inferred from his dot map which shows the species to have 3 localities: 2 in Sinaloa and 1 in Michoacan. Nevertheless his text states that H. brachactis "is known only from the type locality".

McVaugh (1984) reduced H. brachactis to synonymy under H. parviceps but noted that he had seen only a few collections of the species, three of these from Sinaloa. He further commented that "All the specimens from Sinaloa have yellow disk-corollas, and may

represent a different taxon. This turns out to be so, for not only are the disk (and ray!) florets yellow, they possess markedly different achenes as indicated in Fig. 1.

ACKNOWLEDGEMENTS

I am grateful to the Gray Herbarium for the loan of pertinent material and to Dr. Guy Nesom for the Latin diagnoses.

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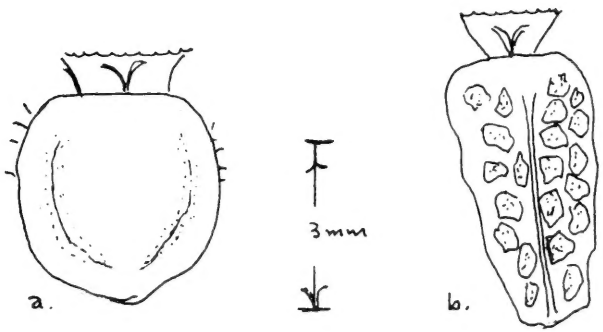

Fig. 1. Ray floret achenes of a) H. brachactis and b) H. sinaloensis.

NEW SPECIES AND COMBINATIONS IN AGERATINA FROM NORTHCENTRAL MEXICO

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In connection with a treatment of the Asteraceae of Mexico (Turner & Nesom, in prep.) the following novelties, new combinations and nomenclatural comments seem appropriate.

AGERATINA SELERI B. L. Turner, sp. nov.

A. liebmannii affinis sed corollis roseis foliis erectis vel ascendentibus et pappo setis persistentibus numerodioribus differt.

Much-branched, broad shrublet to 1 m high. Stems terete, tan, brittle, puberulo-hirsute. Leaves opposite, or opposite below and alternate above, the upper branches sometimes alternate throughout; petioles absent or nearly so, the blades thickened, mostly oblanceolate to elliptic-oblanceolate, borne erect or ascending on the stem, bicolored, the upper surface green and rugulose the lower surfaces whitish with a loose or densely matted tomentum which covers a multitude of amber-colored atomiferous glands, the margins crenulate. Heads rather densely clustered in terminal rounded corymbs, the individual units 3-4 cm across, 2-5 cm high. Involucre campanulate, 2-3 seriate, eximbricate; bracts lanceolate to linear-lanceolate, 3-5 mm long, 1.0-1.5 mm wide, densely puberulent: Receptacle plane, somewhat alveolate, ca 1.5 mm across. Florets 9-20, much exceeding the involucre; corollas decidedly pink to pink-lavender, 5-6 mm long, glabrous, the tube ca 2 mm long, the lobes atomiferous-glandular, ca 0.5 mm long. Anthers ca 2 mm long. Style branches abundantly atomiferous glandular along the length of its abaxial surface, this seemingly causing the branches to adhere retarding their early separation. Achenes ca 3 mm long, moderately hispid; pappus 1-2 seriate of 30-40 flattened, ciliate, bristles 4-5 mm long, often purplish-flecked below.

TYPE: MEXICO. OAXACA: S slopes of Sierra San Felipe, overlooking Diax Ordaz, ca 17 km NE of Tlacolula, ca 2200 m, 12 Nov 1970, A. Cronquist & J. Fay 10905 (holotype TEX; isotypes GH, NY).

Additional collections examined: MEXICO. OAXACA: ca 20 mi NE of Oaxaca, ca 8000 ft, 6 Dec 1967, Gentry 22520 (A); "oberhalb Tillansongo", 4 Dec 1898, Ed Seler 1450 (GH).

Ageratina seleri is obviously very closely related to A. liebmannii (Sch.-Bip. ex Klatt) King & H. Rob., but is readily distinguished by its dark pink corollas and bicolored pappus, erect or ascending leaves and achenes with 40-60 rather persistent pappus bristles (vs. 20-40 fragile bristles in V. liebmannii). Both taxa occur in the same general region of Oaxaca, A. liebmannii at somewhat lower drier sites about Sierra de San Felipe (1100-1950 m) while A. seleri occurs at higher elevations (2000-2400 m) which is described as "open Chaparral-scrub" on the type sheet, while the Gentry collection (cited above) notes the habitat as oak woodland. They do not

appear to occur together however, at least from my examination of material of both species at A, GH, LL, TEX and US.

The holotype of Ageratina seleri has mounted upon it 3 separate shoots, two of which have leaves which are strictly opposite, but the remaining has leaves opposite below and strongly alternate above. The additional specimens cited above show the leaves as alternate.

The species is named for its first collector Edward Seler (1849-1922, cf. McVaugh, 1972), who obtained material in 1898 from some unrecognized locality in Oaxaca (cited above).

AGERATINA VERNICOSA (Sch.-Bip. ex Greenm.) King & H. Rob., Phytologia 19: 227. 1970.

Unfortunately I have given the superfluous name, Ageratina hintoniorum B. Turner (1984; MICHOACAN: Zitacuaro-Cacique, 3350 m, Hinton 13498; holotype TEX, isotype GH) to this taxon. Examination of type material at GH (lectotype here selected: MEXICO STATE: Mt Ixtaccihuatl, 3350-3650 m, 1903, C. A. Purpus 180) and UC show my error. A collection of A. vernicosa from the state of Hidalgo has also been noted (road from Real del Monte to El Chico, ca 3000 m, on rock crests, 1 Aug 1948, Moore et al. 4242, GH).

AGERATINA OPPOSITIFOLIA (A. Gray) B. L. Turner, comb. nov. - based upon Bigelovia oppositifolia A. Gray, Proc. Amer. Acad. Arts 15: 32. 1880.

In his description of Eupatorium vernicosum (noted above) Greenman related the latter to E. mygindaefolium B. Rob., E. chapalense Wats. and E. campylocladium A. Gray, observations with which I concur. Eupatorium mygindaefolium, however, as noted by both Robinson (1904) and Hall (1928) is predated by Bigelovia oppositifolia A. Gray (1880 vs. 1881).

AGERATINA ASTELLERA (B. L. Turner) B. L. Turner, comb. nov., - based upon Eupatorium astellerum B. L. Turner, Wrightia 5: 353. 1977.

King and Robinson (1981) felt that A. astellera was synonymous with A. miquihuana (B. L. Turner) King & H. Rob. I naturally disagree and take opportunity to make the appropriate transfer here. Distinctions between the two are noted below.

Ageratina campylocladia, A. oppositifolia and A. vernicosa, along with the recently described A. astellera and A. miquihuana, are closely related taxa and presumably relate to A. viburnoides, a more mesic species endemic to the immediate region of Monterrey, Nuevo Leon. These taxa are readily identified (with age) by their short persistent petiolar bases, relatively few large heads and usually vernicose leaves. A key to this group of species is provided below.

1. Leaves thick and leathery, not at all vernicose; blades elliptic to oval, 4-10 cm long ..... A. viburnoides

1. Leaves thick and shiney, vernicose; blades ovate, flabellate to deltoid, mostly 1-3 cm long (2).
   2. Heads few per flowering stem, borne singly on ultimate peduncles 2-4 cm long ..... A. vernicosa
   2. Heads 5-100 per flowering stem, borne in terminal or axillary, usually congested corymbs on ultimate peduncles mostly 1-2 cm long [3].

3. Heads numerous in leafy, terminal and axillary corymbose clusters; leaf blades deltoid or broadly ovate, widest at or near the base; heads 1.0-1.5 cm high ..... A. campylocladia
3. Heads relatively few in terminal corymbs; leaf blades ovate, obovate or flabellate, widest at or near the middle; heads 0.8-1.2 cm high (4).

   4. Achenes hispid, not glandular; leaf blades ovate, the apices acute ..... A. oppositifolia
   4. Achenes glandular; leaf blades flabellate or obovate, the apices rounded (5).

5. Leaf blades flabellate, the margins rather evenly coarsely crenate or dentate; involucres 6-8 mm high, the bracts w/o scarious margins; Zacatecas ..... A. astellera
5. Leaf blades mostly obovate, the margins closely denticulate only at or along the rounded apices; involucres 8-9 mm long, the inner bracts scarious, Tamaulipas ..... A. miquihuana

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I am grateful to the Gray Herbarium for the loan of pertinent materials and to Dr. Guy Nesom for the Latin diagnosis.

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NEW SPECIES, NEW COMBINATIONS AND COMMENTS ON MEXICAN VERBESINA (ASTERACEAE)

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In connection with a forthcoming treatment of the Asteraceae of Mexico (Turner and Nesom, in prep.) the following new species and combinations are deemed appropriate.

VERBESINA GUERREROANA B. L. Turner, sp. nov.

V. angustifoliae affinis sed capitulis multo parvioribus et foliis parvioribus venis manifeste elevatis differt.

Shrub 2.5 m high. Stems hispid-hirsutulous, brown, wingless. Leaves alternate, 5-8 cm long, 1-2 cm wide; petioles 1-3 mm long; blades oblanceolate to lanceolate-elliptic, tapering upon the petiole, hispidulous above and below, rough to the touch, markedly pinnately venose below with raised veins, the margins remotely serratulose. Heads small, subglobose, arranged apically in rather congested leafy corymbs, 5-8 cm across, 3-5 cm high. Involucre 2-3 mm high, imbricate, 2-3 seriate; bracts broadly ovate to oval,the inner series cuspidate with recurved apices. Receptacle broadly conical, ca 1.2 mm high, 1.5 mm across; chaff shorter than the florets, decidedly clavate, with broad, dark "shoulders" which bear an abrupt, sharply recurved, terminal cusp. Ray florets minute, 1-3, pistillate, fertile; corollas yellow, the ligules ca 1.5 mm long, 0.5 mm wide, the tube ca 0.75 mm long, coarsely hispidulous. Disk florets numerous; corollas yellow, 3-4 mm long, the tube ca 0.5 mm long. Achenes ca 3 mm long (including the minute pappus), ca 2 mm wide, with prominent membranous wings along the upper 1/3; pappus of 2 awns ca 0.5 mm long.

TYPE: MEXICO. GUERRERO: Petlacala, streamlet below house of Reyes, 1780 m, 16 Dec 1937, Ynes Mexia 8975 (holotype LL; isotypes GH, LL, US).

The species is known only from the type material and is noteworthy for its much-reduced, 2-3 seriate involucre, small heads and leaves with prominently raised reticulate venation. Because of its alternate leaves, wingless stems, reduced ligules, and pales with recurved cusps, it clearly relates to V. angustifolia Benth. (Blake) and will key to that species in Blake's (1961) treatment.

VERBESINA MACVAUGHII B. L. Turner, sp. nov.

V. angustifoliae affinis sed laminis abrupte petiolatis et capitulis multo parvioribus flosculis radii et disci numerosioribus differt.

Shrubs or robust perennial herbs 1-4 m high. Stems appressed hispid to glabrate, seemingly wingless or variously narrow winged, or merely auriculate at the base of petioles. Leaves opposite below, alternate above (rarely opposite throughout on secondary branches); petioles 1-3 mm long; blades 8-25 cm long, 1.5-4.5 cm wide, sparsely appressed hispid along the veins, otherwise glabrous, the margins irregularly finely serrulate. Heads 10-60 arranged in somewhat congested terminal corymbs, in flower mostly over-topped by the leaves, at anthesis the ultimate peduncles 3-10 mm long. Involucre small, 2-3 mm high, 2-4 mm wide; bracts 9-15, imbricate, glabrous or nearly so, grading into the chaff which are abruptly apiculate and scarsely recurved. Ray florets pistillate, yellow, mostly 1-3, rarely 4; liqules 3-4 mm long, ca 2 mm wide. Disk florets 15-30; corollas yellow, 2-3 mm long, the tube ca 0.6 mm long, pubescent, the lobes ca 0.5 mm long, glabrous. Anthers brown. Achene body ca 2.5 mm long, ca 1.3 mm wide, narrowly ciliate-winged; pappus of 2, readily deciduous, awns, 1.0-1.7 mm long.

TYPE: MEXICO. OAXACA: Steep mountainsides ca 80 km SSW of Sola de Vega on the seaward side of the pass 25 km above S. Gabriel Mixtepec, Mpio. de Juguila, in "transition from pine to deciduous forest with Pinus strobus", 1450-1700 m, 11 Feb 1965, R. McVaugh 22400 (holotype LL).

Additional Collections Examined: MEXICO. OAXACA: San Juan Luachao, 80.5 km N of Puerto Escondido, ca 1670 m, 22 Dec 1984, Cowan 4995 (MEXU, TEX); 3 km NW of San Jose del Pacifico, along the road to Puerto Angel, ca 2400 m, 8 Nov 1970, Cronquist & Fay 10891 (GH, TEX, US); 17 km NE of Piedra Larga, Mpio. de Juquila, ca 1260 m, 22 Nov 1982, E. Martinez S. et al. 2772 (MEXU, TEX).

According to label data (McVaugh 22400; Cowan 4995), Verbesina mcvaughii is a perennial herb 1-1.5 m high. Cronquist and Fay, however, describe it as a shrub 1-4 m high with leaves alternate to occasionally almost opposite. Indeed, Martinez describes the plant as an "arbusto", the specimen at my hand possessing opposite leaves throughout, these appearing on very slender secondary branches with unusually small heads.

Verbesina macvaughii clearly relates to V. angustifolia (Benth.) Blake, which also occurs in Oaxaca, but the latter has much larger heads with longer more numerous rays and the blades taper onto the petiole. The former is perhaps closer to V. culminicola McVaugh of Jaliso which is readily distinguished by its

peculiar spatulate outer involucral bracts which exceed those of the inner.

It is a pleasure to name this species for its first collector, Roger McVaugh, a truly monumental worker on Mexico Compositae and upon whose broad "shoulders" I have stood more than once.

VERBESINA MEXIAE B. L. Turner, sp. nov.

V. hypoglaucae affinis sed flosculis radii pistillatis fertilibus, antheris fuscis, et involucello bracteis externis appressis brevioribus.

Shrub or small tree 1-3(6) m tall. Stems wingless, densely appressed white-pubescent, appearing ashy-white when young, tannish with age. Leaves opposite throughout, 5-16 cm long, 1-3 cm wide; petioles 1-3 mm long; blades narrowly oval to ovate-oval, pinnately veined, bicolored, densely canescent (ashy-white) below, moderately canescent and dark-green above, the margins entire to weakly serrulate. Heads narrowly campanulate, 15-50, in terminal rounded corymbs 5-15 cm across, 3-7 cm high, the ultimate peduncles mostly 3-15 mm long. Involucre imbricate, 2-3(4) seriate, the outer series appressed and much shorter than the inner; bracts 1-6 mm long, the inner usually dark (rarely yellowish) and somewhat viscid, acute. Receptacle hemispheric, pubescent, about 1.5 mm high and 1.5 mm across, the bracts linear with yellowish, erect apices. Ray florets (3)5-8, pistillate, fertile; ligules yellow, 6-10(12) mm long, 3-5 mm wide. Disk florets (15)20-45; corollas yellow, yellow-orange or pale orange (according to label data), pubescent, 4.5-5.5 mm long, the tubes ca 2 mm long, the lobes ca 0.5 mm long, pubescent. Anthers brown. Achenes 2.5-3.5 mm long, appressed hispid on both faces and along the margins, the wings very narrow (0.1-0.2 mm) or seemingly absent; pappus of of 2, readily deciduous, ciliate awns, 2-3 mm long.

TYPE: MEXICO. GUERRERO: Distrito Mina, Las Lumbreras, understory in pine forest, 2050 m, 3 Jan 1938, Ynes Mexia 9069 (holotype LL; isotypes LL, US).

Additional Specimens Examined: MEXICO. GUERRERO: Tlacotepec, 66.6 mi NE Atoyac, 2580 m, 19 Dec 1984, Cowan 4972 (MEXU, TEX); ca 10 km W Camotla, 2500 m, 1 Dec 1963, Feddema 2810 (TEX); Galeana, Teotepec, 330 m, 25 Dec 1937, Hinton et al. 11126 (GH, LL, US). MEXICO STATE: San Jose Xoconusco, 9 Feb 1978, Calvert 1032 (LL); Los Macheros, 19 Feb 1978, Calvert 1045 (LL). MICHOACAN: 6-7 mi N of San Pedro Aguaro, 21 Mar 1949, McVaugh 9981 (LL, US). OAXACA: 29 mi SW Tlaxiaco, 26 Oct 1965, 8000 ft, Cronquist & Sousa 10415 (GH, TEX).

Verbesina mexiae is obviously closely related to the widespread V. hypoglauca Sch.-Bip. ex Klatt of eastern Mexico but

can be consistently recognized by its brown anthers and pistillate rays. In addition the involucre of V. hypoglauca is much looser, the outer series being often quite bract-like and longer than the inner series.

Verbesina hypoglauca is distributed from Nuevo Leon, Mexico, to Guatemala. Blake (1961) in his treatment of the Asteraceae for the Trees and Shrubs of Mexico, also recognized V. intermissa Blake (a nomina nova for Coreopsis liebmannii Sch.-Bip. ex Klatt 1887; not Verbesina liebmannii Sch.-Bip. ex Klatt 1887) which he positioned next to V. hypoglauca (as species 17 and 18). My examination of the phototype (GH) indicates that V. intermissa is a synonym of V. hypoglauca.

The species is named for Ynes Mexia who collected the types within a fortnight or so of its first collector, G. B. Hinton (cited above). Both collectors worked in the Mina District of Guerrero at about the same time and both are rightly honored for their collecting zeal in remote regions at a time when travel was difficult.

VERBESINA NAYARITENSIS B. L. Turner sp. nov., Fig. 1.

V. serratae affinis sed foliis fere ellipticis, vestimento hispido, et capitulis eradiatis flosculis 30-50 differt.

Suffruticose herb or shrub to 1 m high. Stems terete, pale green, densely rough-hispid throughout. Leaves pale green, opposite, ovate to elliptical, 4-8 cm long, 2-4 cm wide; sessile or nearly so, moderately hispid above and below, pinnately veined, the margins denticulate to nearly entire. Heads eradiate, 40-50 in apically clustered, rounded, glomerules just barely exceeding the leaves. Involucre hemispheric, 2-3 seriate; bracts lanceolate, ca 30, subequal, the outer series ca 4 mm long, the iner series ca 6 mm long, appressed pubescent, the apices acute. Disk florets 30-50, yellow; corollas ca 4.5 mm long, pubescent, the throat ca 1 mm long, the lobes ca 0.5 mm long. Anthers brown, ca 2 mm long. Achenes ca 5 mm long, the body pubescent, obovate, ca 4 mm long, ca 1.5 mm wide, bounded by broad scarious wings, 1.0-1.5 mm wide, near the apex; pappus of 2 hispid awns, 1-2 mm long.

TYPE: MEXICO. NAYARIT: Mpio. de Huajcori, 2 km del Rancho de Los Sauces, 8 Nov 1985, I. Solis 560 (holotype TEX; isotypes to be distributed).

In McVaugh (1984), because of its eradiate heads, this species will key to V. curatella McVauth, which is a plant with much larger tapering leaves (12-20 cm long, 5-8 cm wide). It is possible that V. navaritensis is an aberrant discoid individual of an otherwise rayed taxon, or perhaps the rays have fallen from the late-flowering specimen at my disposal. If so, it would more-or-less

key to V. serrata, a very different species with coarsely veined leaves, soft vestiture and few-flowered heads.

VERBESINA NEOTENORIENSIS B. L. Turner, sp. nov.

V. oreopolae affinis sed capigulis grandioribus plerumque solitariis in pedunculis elongatis differt.

Shrubs 1-2 m tall. Stems unwinged, tan to grey, moderately short pubescent, decidedly woody below. Leaves alternate, 4-7 cm long, 0.8-2.0 cm wide, softly puberulent on both surfaces; petioles 2-5 mm long; blades ovate, tapering onto the petioles, markedly pinnately veined below, the margins irregularly denticulate. Heads 1 or 2, terminal on peduncles 2-8 cm long. Involucre hemispheric, subimbricate, 3-4 seriate, 5-6 mm high, 10-12 mm wide; bracts green, linear-oblanceolate to somewhat spatulate, 3-6 mm long, 2-3 nerved. Receptacle hemispheric, ca 3 mm high, ca 4 mm across; phyllaries glabrous, the apices acute, yellowish, erect or nearly so. Ray florets 13-23, pistillate, fertile; ligules yellow, 3-5 mm long, 1-2 mm wide. Disk florets numerous (90-150); corollas yellow 3-4 mm long, glabous, the tubes ca 0.5 mm long, the throats ca 2 mm long. Anthers brown. Achene body 2.5-3.5 mm long, bordered by prominent thick wings 0.3-1.0 mm wide; pappus of 2, readily deciduous awns 2-3 mm long.

TYPE: MEXICO. PUEBLA: 16 mi SW of Tehuacan, ca 5200 ft, 23 Oct 1965, Cronquist & Sousa 10389 (holotype TEX; isotypes GH, MEXU, NY, US).

Additional Specimens Examined: MEXICO. PUEBLA: San Juan de la Raya, ca 20-24 mi SW of Tehuacan, 5600 ft, "Arid Thorn Forest over limestone hills", 3 Aug 1963, Gentry et al. 20232 (US); 8 mi NE of border with Oaxaca along highway 125, 7 Oct 1984, Sundberg & Lavin 3054 (MEXU, TEX).

The types were distributed under the name Verbesina cf. oreopola Rob. & Greenm., a superficially similar taxon of San Luis Potosi and Hidalgo which has more numerous heads on much shorter peduncles and mostly linear-lanceolate leaves.

I have coined the name neotenoriensis to atone for my careless erection of V. tenoriensis B. Turner (1986) which, after examination of appropriate types, turns out to be an outright synonym of the poorly collected V. petrophylla Brandg., a species also collected from the region of Tehuacan, Puebla. The latter has much longer ray ligules, shortly pedunculate, albeit single, heads, and nearly oval, harshly hispid leaves.

VERBESINA VIRGATA var. OREOPOLA (Rob. & Greenm.) B. Turner, comb. nov.

Based upon Verbesina oreopola Rob. & Greenm., Proc. Amer. Acad. Arts 34: 550. 1899.

Type material from GH was examined. The authors cite two collections, Schaffner 344 and Parry & Palmer 457. Both were annotated by Robinson as "n. sp". I have selected the Schaffner collection as lectotype since it appears to be composed of material from a single plant and, in general, fits the published description. The Parry & Palmer collection, however, appears to be mixed, one of the sprigs much resembling that of the Schaffner collection, while the other has much larger leaves with more auriculate blades and the heads have nearly black involucral bracts (as opposed to the greenish-yellow bracts of the lectotype). The broader, more auriculate leaves approach those found in the var. virgata, otherwise the collection is typical of what I recognize as var. oreopola.

Verbesina virgata var. oreopola grades southward (especially in Hidalgo) into the var. virgata which can be recognized by its usually winged stems or, less often, auriculate petioles and less pubescent blades. Blake (1961) recognized both taxa (as numbers 26 and 32 in his list of species) but these are separated in his key by the presence of winged-stems in V. virgata and their absence in V. oreopola. As noted in the discussion of V. angustifolia (below), both winged and/or unwinged stems may occur in many Verbesina species, although in some species one of the two character states may be fixed.

VERBESINA ANGUSTIFOLIA (Benth.) Blake.

McVaugh (1984) while recognizing this taxon, also recognized V. cinerascens Rob. & Greenm. He noted, however, that the latter" might equally well be regarded as a local population of V. angustifolia". The only distinction between the two (as noted by McVaugh in his key to species) is the wingless stems of V. cinerascens vs. the winged stem of V. angustifolia. The latter taxon, while mostly possessing wings, or partially winged, stems, often is totally wingless. Thus the holotype of V. cinerascens (Pringle 1806, GH!) is lacking wings while nearly identical, but wingless, specimens from near the type locality (e.g., Pringle 11602) and elsewhere possess winged stems. A similar phenomenon holds in a number of so-called winged-stemmed species of Verbesina: wingless branches often occur on secondary shoots and sometimes on those of the primary.

ACKNOWLEDGEMENTS

I am grateful to GH and US for the loan of pertinent material, to Dr. Guy Nesom for the Latin diagnoses and to Dr. Linda Vorobik for the illustration of V. navaritensis.

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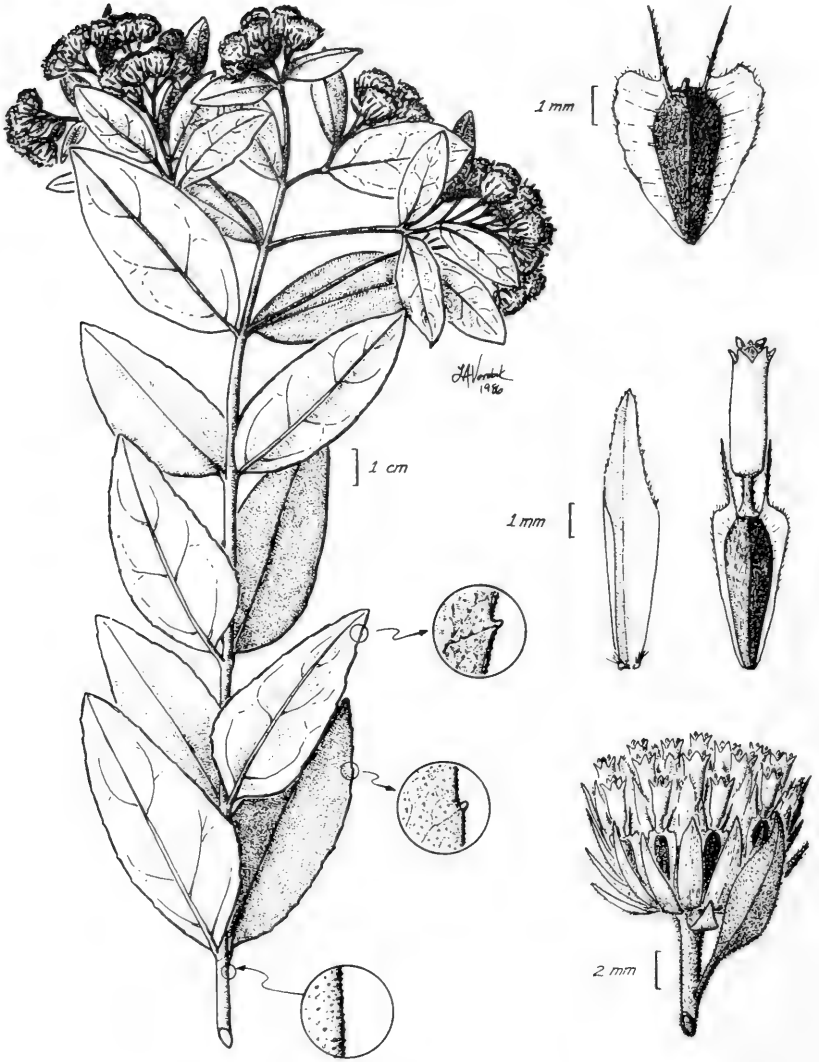

Fig. 1. Verbesina nayaritensis, from holotype.

NORTH AMERICAN COLLECTIONS OF LEPUROPETALON SPATHULATUM (SAXIFRAGACEAE) [1]

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ABSTRACT: Label data are provided for 381 specimens of Lepuropetalon spathulatum (Saxifragaceae) held by the herbaria of 30 North American institutions.

Lepuropetalon spathulatum (Muhl.) Ell. is a diminutive, morphologically isolated member of the loose aggregation of flowering plants known as the Saxifragaceae. Its minute size -- mature plants being readily covered with a small coin -- and its protovernal season of flowering have left it little known even among active field botanists. Misrepresentations of its floral structure (Small 1933; Rickett 1967), in which the sepals and petals are incorrectly figured or described as varying in size, have given it an even greater image of aberrancy.

The known range of Lepuropetalon extends through the southeastern United States, from North Carolina to eastern Texas and along the Gulf Coast into Mexico, with apparently isolated stations in central Chile and in Uruguay (Spongberg 1972). Its recent discovery in central panhandle Florida, a state in which the plant had not previously been reported, has led the writer, in collaboration with Angus K. Gholson, Chattahoochee, Florida, to compile an inventory of label data from all collections found in the major North American and significant regional institutional herbaria. These data have been employed in the preparation of a map of Lepuropetalon in the Southeast and in a discussion of the history of discovery of the species and its Florida habitat that has been presented elsewhere (Ward & Gholson 1987).

The purpose of the present offering is to encourage further investigation of the distributional biology of Lepuropetalon by placing on record full documentation of the data obtained of the 381 known specimens representing 270 collections found in the 30 cooperating herbaria. These data include the collector, his collection number, date of collection, and information as to habitat,

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associated species, and location, as well as a record of the institutions now holding the collection or its duplicates (Stafleu 1981).

The cooperation of several curators in providing the author with xerox or other facsimile copies of original labels has permitted the determination of collectors or origin of certain early specimens by matching the handwriting or other data from one label with that of specimens in other herbaria whose labels were incomplete. In most cases this additional information has been provided in the listing of specimens.

The author is grateful to Anita F. Cholewa, Florence Montgomery Givens, Patricia K. Holmgren, Nancy R. Morin, Alfred E. Schuyler, Stephen A. Spongberg, R. Dale Thomas, and those other persons who provided him with data regarding the specimens of Lepuropetalon in their custody, and to Angus K. Gholson and Robert K. Godfrey for their companionship and sharp eyes while in the field.

LIST OF SPECIMENS:

ALABAMA:

Baldwin Co.

R. D. Thomas #37735 2 Feb 1974 NLU, TENN
"Cemetery and church yard of Mt. Aid Baptist Church, US 90, e. of jct. with US 98."

Choctaw Co.

R. D. Thomas #33887 28 Feb 1973 NLU
"Concord Baptist Church yard, beside Ala. 10, 3 mi. s. of Mississippi, nw. of Pushmataha."

F. M. Givens #1723 12 Apr 1980 LSU
"Wet roadside, with Ophioglossum crotalophoroides, about 3.8 mi. n. of Toxey."

Lee Co.

S. B. Jones s.n. 14 Apr 1960 GH
"Sandy soil under pines and sweetgums, pasture, Smith's Station, 6 mi. n. of Phenix City."

Marengo Co.

R. D. Thomas #33892 28 Feb 1973 NLU
"Nanafalia Baptist Church cemetery, beside Ala. 10, Nanafalia."

F. M. Givens s.n. 11 Apr 1980 LSU
"Roadside, hwy. 10, about 8.7 mi. w. of the Choctaw Co. line."

F. M. Givens #1737 12 Apr 1980 LSU
"Flat roadside, on crest of hill, with Botrychium lunarioides, s. side of hwy.

10, about 2.9 mi. e. of Dixon's Mill."

Mobile Co.

C. Mohr s.n. 4 Apr 1879 UNA
"Exposed grassy banks, loose sandy soil. Mobile."

C. E. Faxon s.n. 10 Mar 1883 GH
"Mobile."

C. Mohr s.n. Apr 1887 US
"Grassy banks, Mobile."

[C. Mohr s.n.] 17 Mar 1896 MO
"Damp grassy banks, Mobile." [in same hand as C.M. 1887, above]

C. F. Baker s.n. 17 Mar 1897 MO, NY
"Citronelle."

K. E. Rogers #7941 8 Apr 1972 NCU, TENN
"With Ophioglossum crotalophoroides. Shady Grove Cemetery, Airport Blvd., w. of Mobile."

J. Taylor #12711 25 Mar 1973 NLU, SMU, OKL
"Dry sandy field, s. of radar station, e. end of Dauphin Id."

R. D. Thomas #62847 30 Mar 1979 NLU
"Sandy wet lawn, beside Battleship Alabama, s. of Int. 10, Mobile."

Monroe Co.

F. M. Givens #1727 10 Apr 1980 LSU
"In gravely soil, roadside, on US 84, about 3.2 mi. to e. side of Alabama River."

Wilcox Co.

F. M. Givens #1723 12 Apr 1980 LSU
"In gravelly sand, Kelly Cemetery."

ARKANSAS:

Ashley Co.

[collector unknown, probably R. D. Thomas] NLU
[mapped by Smith (1978) and based on a spm. seen at NLU (E. B. Smith, in litt.); spm. not now available]

Bradley Co.

[collector unknown, probably R. D. Thomas] NLU
[as Ashley Co., above]

Drew Co.

D. M. Moore #72 2 May 1942 UARK
"Low, silty-clay soil, flat open spaces, at Bradley County line."

R. D. Thomas #17955 11 Apr 1970 GH, MO, NLU, NY, SMU, TENN
"With Geocarpon minimum. Openings in pine woods n. of county road, sw. corner of S18, T13S, R8W."

Cleveland Co.

W. M. Shepherd #190 7 Apr 1984 UARK
"Several plants; with Schoenolirion

wrightii, Kingsland Prairie, S9, T10S, R11W."

Faulkner Co.

F. A. Haas s.n. 9 May 1933 US
"Moist sandstone ledges, along North Cadron Creek, 17 mi. n. of Conway."

Hempstead Co.

D. M. Moore #159 5 Apr 1953 UARK
"Wet marsh and pasture on slope, 7 mi. w. of Hope."

R. D. Thomas #27950 24 Mar 1972 NLU, TENN
"Shaver Springs Baptist Cemetery, beside La. 865, 4 mi. w. of Ark. 4, Shaver Springs."

Little River Co.

R. D. Thomas #27956 24 Mar 1972 NLU, TENN
"Pasture behind Hudson Cemetery, Ashdown."

Miller Co.

R. D. Thomas #34016 17 Mar 1973 NLU
"Cemetery of Shiloh Baptist Church, beside US 82, 6 mi. e. of Texarkana, S15, T15S, R27W."

Nevada Co.

B. F. Bush #72 14 Apr 1907 MO
"Common on prairie. Prescott."

R. D. Thomas #27949 24 Mar 1972 NLU
"Whites Chapel Baptist Church, 3.5 mi. e. of Ark. 53, Bodcaw."

Sevier Co.

R. D. Thomas #28138 26 Mar 1972 NLU
"Country Club golf course, beside US 59, e. of DeQueen."

R. D. Thomas #28146 26 Mar 1972 NLU
"Coulter Memorial Garden, at US 59, n. edge of Lockesburg."

Union Co.

R. D. Thomas #27408 6 Feb 1972 NLU
"Strong Cemetery, jct. of Ark. 275 and Ark. 129, 1 mi. e. of Strong."

R. D. Thomas #27923 24 Mar 1972 NLU
"Cemetery of Olive Branch Methodist Church, 0.5 mi. sw. of Ark. 7, se. of El Dorado."

R. D. Thomas #42804 25 Mar 1975 NLU
"Cemetery at church, beside Ark. 175, n. of Oakland, La.,about 100 yds. n. of Louisiana line."

R. D. Thomas #75139 4 Apr 1981 NLU
"Cemetery of Good Hope Primitive Baptist Church, just n. of Oakland."

FLORIDA:

Gadsden Co.

D. B. Ward #9963 16 Apr 1985 FLAS

"Lvs. spatulate, alternate; sepals 5, deltoid; no petals; carpels 3; very infrequent; openings among grasses and forbs; seasonally wet calcareous glade, atop Apalachicola Bluffs, 1/3 mi. w. of Brickyard Rd., 1.5 mi. s. of US 90 bridge at Chattahoochee, S5-8, T3N, R6W."

A. K. Gholson #11275 19 Apr 1985 FSU
"Open calcareous soil on slope of limestone glade; s.w. of River Junction, w. of Fla. 269, n.e. corner of S8, T3N, R6W."

D. B. Ward #10017 11 Mar 1986 FLAS, FSU
"Plants yellow-green, 2-8 mm wide; flowers fully symmetrical (contra Small 1933, Rickett 1967); petals deltoid, 1/2 length of sepals, white-translucent, ephemeral; locally frequent (ca 1000 plants); open calcareous glade." [as in Ward #9963, above]

GEORGIA:

Baldwin Co.

F. Montgomery #286 25 Mar 1966 GA
"Pasture, 7 mi. sw. of Milledgeville."

Camden Co.

R. D. Thomas #37891 9 Feb 1974 NLU
"Wet sandy soil in flat pine woods. Roadbank of US 17, 0.25 mi. n. of Florida line."

Chatham Co.

W. R. Faircloth #7497 11 Apr 1974 NCU
"Slough bridge, 1.2 mi. n. of the Ogeechee River bridge, US 17, n. of Richmond Hill."

Coffee Co.

W. R. Faircloth #7211 28 Mar 1973 NCU
"Grassy slope of roadfill, US 441 at Satilla River bridge, 0.7 mi. n. of Atkinson Co. line."

D. Blake s.n. 20 Mar 1984 FLAS
"Patchy; with Arenaria brevifolia, Riccia, mosses, leafy liverworts; seasonally wet area, sandstone outcrop near Brockton."

Columbia Co.

J. R. Massey #4545 6 Apr 1975 NCU
"Small annual, flowers green; plants infrequent. Heggies Rock (granite outcrop), 2.8 mi. s. on Tubman Rd. and 1.8 mi. e. on unnumbered dirt road, 4 mi. e. of jct. of of US 221 and Ga. 104."

Greene Co.

F. Montgomery #106 25 Apr 1965 GA, MICH
"Five sepals, petals white & much smaller. Wet shallow mineral soil over granite, Greensboro outcrop."

F. Montgomery #306 2 Apr 1966 GA

"Sandy soil in pasture, 2 mi. n. of Siloam."

Hancock Co.

F. Montgomery #113 25 Apr 1965 GA
"Wet shallow mineral soil at granite quarry, 5 mi. e. of Sparta."

F. Montgomery s.n. 25 Apr 1965 GA
"Wet shallow mineral soil over granite, hwy. 15, s. of Sparta."

Oglethorpe Co.

F. Montgomery #103 28 Apr 1965 DUKE, FLAS, IBE, NCSC, NCU, NLU, PH, UNA, VDB
"Five sepals, five much smaller petals. Wet shallow mineral soil over granite outcrop, Echol's Mill, 9.7 mi. ne. of Lexington."

R. E. Weaver #1875 12 Apr 1969 DUKE
"Scattered among plants of Lindernia monticola in wetter areas at edges of vegetation mats. Echol's Mill, a granite flatrock about 2 mi. e. of Point Peter."

Rockdale Co.

H. L. Blomquist #10251 16 Apr 1938 DUKE
"On thin moist soil, edge of stone outcrop. The Rocks, 5 km. n. of Conyers."

J. H. Pyron #2547 16 Apr 1938 GA
"Wet shallow soil on granite outcrop, 3.5 mi. nne. of Conyers."

Walton Co.

F. Montgomery #298 30 Mar 1966 GA
"Moist road on granite outcrop, w. of Monroe."

Washington Co.

F. Montgomery #308 2 Apr 1966 GA
"Pasture, on Ga. 102, 1 mi. n. of Warthen."

[county unknown]

[W. Baldwin s. n.] [1811 - 1817] PH
"(herb Schw) / sub nom / Pyxidanthera / spathulata / Baldw / Geor"

LOUISIANA:

Acadia Pa.

D. E. Ellis #44 13 Apr 1933 LSU
"Old rice field. Crowley."

R. D. Thomas #27563 4 Mar 1972 NLU
"Very wet; cemetery, beside La. 3116, 1/2 mi. s. of St. Landry Parish line, Eunice."

Allen Pa.

J. Parker #531 14 Feb 1972 NLU
"Roadbank of US 165, 6.4 mi. s. of Oakdale."

R. D. Thomas #27571 4 Mar 1972 NLU
"Green Oak Cemetery, 3 mi. s. of Kender, S13, T6S, R5W."

Avoyelles Pa.
C. A. Brown #7520 6 Apr 1939 LSU
"Marais Pond, Marksville."
Beauregard Pa.
R. D. Thomas #17700 21 Mar 1970 NLU
"Beauregard Cemetery, beside US 171, DeRidder."
R. D. Thomas #38134 15 Mar 1974 NLU
"Cemetery of Smyrna Baptist Church, just s. of jct. of La. 399 and La. 122, ne. corner of S28, T2S, R4W."
Bienville Pa.
R. D. Thomas #27215 20 Dec 1971 NLU
"Arcadia Cemetery, beside La. 9, Arcadia."
R. D. Thomas #22756 13 Apr 1971 NLU
"Arcadia Cemetery, beside La. 9, Arcadia."
R. D. Thomas #42584 17 Feb 1975 NLU
"Lawn of New Hebron Baptist Church, beside La. 9, just s. of La. 147, s. edge of Arcadia, S19, T18N, R6W."
R. D. Thomas #43386 21 Apr 1975 NLU
"Under edge of building of Mt. Olive Baptist Church, beside La. 147, at jct. with La. 155, S32, T16N, R4W."
R. D. Thomas #43428 21 Apr 1975 NLU
"Lawn of St. Paul Baptist Church, beside La. 508, just n. of La. 155, 2 mi. s. of Liberty Hill, T15N, R5W."
R. D. Thomas #82864 19 Mar 1983 NLU
"Cemetery of Mill Creek Methodist Church, beside La. 9, n. of Saline, S28, T14N, R6W."
Bossier Pa.
R. D. Thomas #27380 5 Feb 1972 NLU
"Cemetery s. of US 80, w. of Fillmore, S17, T18N, R11W."
R. D. Thomas #42552 3 Feb 1975 NLU
"Cemetery of Red River Baptist Church, just w. of Linton, S31, T29N, R12W."
R. D. Thomas #51940 2 May 1977 NLU
"Plain Dealing Cemetery, beside La. 157, n. of Plain Dealing, S2, T22N, R13W."
Caddo Pa.
R. D. Thomas #33821 10 Feb 1973 NLU
"Cemetery off US 171, s. of Shreveport, S32, T16N, R14W."
R. D. Thomas #34464 8 Apr 1973 NLU
"Pasture beside La. 525, 4.5 mi. w. of US 171, S18, T16N, R14W."
R. D. Thomas #34505 8 Apr 1973 NLU
"Open area in bottomland woods, beside La. 525, 1/2 mi. e. of Grawood, S24-13, T16N, R14W."

R. D. Thomas #34527 8 Apr 1973 NLU
"Roadbank beside La. 169 and edge of Mt. Zion Cemetery, just n. of Shipp, S34, T19N, R16W."
R. D. Thomas #43521 24 Apr 1975 NLU
"Cemetery e. of US 171, at Kiethville, S32, T16N, R14W."
R. D. Thomas #43527 24 Apr 1975 NLU
"Cemetery and roadbank of Fluornoy-Lucas Road at jct. with US 171, Shreveport."
R. D. Thomas #83134 17 Apr 1983 NLU
"Cemetery on top of hill, jct. of La. 168 and State Line Road just w. of Ida, S10, T23N, R15W."

Calcasieu Pa.
R. D. Thomas #27579 4 Mar 1972 NLU
"Dry hilltop; Perkins Cemetery, 1 mi. se. of DeQuincy, S20, T7S, R10W."

Caldwell Pa.
C. A. Brown #7584 8 Apr 1939 LSU
"Frequent, in small patches over the prairie. Copenhagen Prairie, se. of Columbia."
R. D. Thomas #17721 23 Mar 1970 NLU
"Pasture beside Horseshoe Lake, S25, T14N, R3E."
R. D. Thomas #17943 5 Apr 1970 FLAS, LAF, MO, NCU, NLU, SMU, TENN, VDB
"Field beside Horseshoe Lake, 8 mi. nnw. of Columbia."
R. D. Thomas #18102 19 Apr 1970 NLU
"Old house site beside gravel road, off La. 849, ca. 3/4 mi. e. of Copenhagen, S14, T12S, R4E."
R. D. Thomas #22540 9 Mar 1971 NLU
"Pastured area beside Horseshoe Lake, 6 mi. nnw. of Columbia, S23, T14N, R3E."
R. D. Thomas #22544 9 Mar 1971 NLU
"Fellowship Baptist Church cemetery, beside La. 846, S17, T14N, R3E."
B. Good s.n. May 1971 NLU
"Fellowship Cemetery, beside La. 846, s. of Luna."
R. D. Thomas #27536 29 Feb 1972 NLU
"Fellowship Baptist Church cemetery, beside La. 846, s. of Luna, S17, T14N, R3E."
R. D. Thomas #33942 5 Mar 1973 NLU
"Palestine Baptist Church cemetery, beside La. 4, w. of Vixen, S33, T15N, R2E."
P. Marx #377 10 Mar 1973 NLU
"Pasture in clay, pine hill, 1.5 mi. e. of Copenhagen, S13, T12N, R4E."

P. Marx #395 16 Mar 1973 NLU
"Cemetery of Fellowship Baptist Church, e. of La. 846, 5.6 mi. s. of Parish line, S17, T14N, R3E."
P. Marx #517 31 Mar 1973 NLU
"Old Union Baptist Cemetery, 1.5 mi. n. of Cotton Plant, S10, T13N, R2E."
R. D. Thomas 43193 8 Apr 1975 NLU
"Cemetery and adjoining grassy area of Mount Pleasant Baptist Church, n. of La. 4 at La. 846, S5, T13N, R3E."

Cameron Pa.
R. D. Thomas #89211 5 Feb 1982 NLU
"Lawn of Grand Lake Faith Temple, n. of La. 384, e. of Boones Corner, S17, T12S, R8W."
R. D. Thomas #91685 25 Mar 1985 NLU
"Eastern margin of baseball fields, beside Ball Park Road at Dennis Road, 0.3 mi. n. of La. 384, e. of Boone's Corner, S7, T12S, R7W."

Catahoula Pa.
R. D. Thomas #42742 3 Mar 1975 NLU
"Cemetery of New Pine Hill Church, at jct. of La. 914 and La. 913, n. of Leland, S37, T10N, R7E."

Claiborne Pa.
R. D. Thomas #22519 4 Mar 1971 NLU
"Cemetery atop a sandy hill, e. of Hurricane, S21, T19N, R5W."
R. D. Thomas #27619 7 Mar 1972 NLU, TENN
"Macedonia Baptist Church cemetery, e. of La. 533 and Hurricane, S21, T19N, R5W."
R. D. Thomas #51236 14 Mar 1977 NLU
"Pasture between dirt road and Gee Cemetery, e. of La. 518 and Marsalis, S32, T20N, R5W."
L. G. Lewis #1965 24 Mar 1979 NLU
"Summerfield Cemetery, behind Summerfield High School, S12, T22N, R5W."
R. D. Thomas #64163 5 May 1979 NLU
"Macedonia Baptist Church cemetery, e. of Hurricane, S21, T19N, R5W."
R. D. Thomas #70571 10 Apr 1980 NLU
"Summerfield Cemetery, n. side of La. 9, Summerfield, S12, T22N, R5W."

DeSoto Pa.
R. D. Thomas #27260 11 Jan 1972 NLU
"Wallace Cemetery, beside La. 177, S36, T10N, R11W."
R. D. Thomas #27696 14 Mar 1972 NLU
"Wallace Baptist Cemetery, beside La. 177, 2 mi. s. of La. 346, S36, T10N, R22W."

D. Dixon #752 10 Mar 1979 NLU
"Old Pleasant Hill battlefield and cemetery, n. of jct. of La. 177 and La. 175, 13.6 mi. s. of Evelyn, S17, T10N, R11W."

East Baton Rouge Pa.

W. R. Griffing s.n. 20 Mar 1915 LSU
"Murill Springs, Baton Rouge."

W. R. Griffing s.n. 12 Apr 1915 NY
"Near Baton Rouge."

[C. A. Brown s.n.?] spring 1932 LSU
"Open fields. Plains." [possibly coll. by C.A.B. since typed in his style]

R. D. Thomas #27807 17 Mar 1972 NLU
"Moist meadow, beside La. 3113, at jct. with US 61, S31, T4S, R1S."

East Feliciana Pa.

[W. M.] Carpenter s.n. [ca 1840] GH
"Old fields, Feliciana." [W.M.C. moved from E.F.Pa. to New Orleans ca 1841 (Cocks 1914)]

[W. M. Carpenter s.n.] Feb [ca 1840] MO
"Jackson." [in same hand as above coll.; W.M.C. was resident of Jackson until ca 1840; from S. B. Buckley herb. to G. Engelmann, ca 1841 (S.B.B. in litt., MO; Cocks 1914)]

R. D. Thomas #27313 24 Jan 1972 NLU
"Jackson City cemetery, beside La. 10, Jackson."

Evangeline Pa.

R. D. Thomas #17714 21 Mar 1970 NLU
"Beside La. 10, at Beaurer and jct. with La. 106."

R. D. Thomas #27558 4 Mar 1972 NLU
"Wet area in pine woods; cemetery beside US 167, 1 mi. s. of Bayou Cocodrie, S8, T1S, R1E."

R. D. Thomas #62575 8 Mar 1979 NLU
"Cemetery beside parish road, in Turkey Creek, just w. of US 167, S13, T2S, R1W."

Grant Pa.

R. D. Thomas #27280 20 Jan 1972 NLU
"Big Creek Baptist Church graveyard, nw. of Pollock, S27, T7N, R1W."

Iberia Pa.

F. M. Givens #2919 10 Apr 1983 LSU
"Dirt road, oak-pine woods, along La. 113, off La. 167, about 2.6 mi. s. of Dry Prong."

Jackson Pa.

R. Reid #2003 20 Mar 1970 NLU
"Henson Cemetery, 2 mi. n. of La. 548,

ca. 5 mi. e. of La. 34, S33, T16N, R1E."
R. D. Thomas #38283 4 Apr 1974 NLU
"Cemetery of Mt. Pleasant Methodist Church, beside La. 499, 1 mi. s. of Hoods Mill, S6, T14N, T1E."

Jefferson Davis Pa.
J. W. Thieret #22470 20 Apr 1966 LAF
"Plants past flowering, forming a rounded mound, pale green, dense, to about 1.5 in. across. Roadside clay, Int. 10, just n. of Elton."
R. D. Thomas #27568 4 Mar 1972 NLU
"Wet cemetery in flat pine woods, s. of US 190, 2 mi. se. of Elton, S2, T7S, R2W."
K. Cormier #1982 10 Mar 1979 NLU
"Lawn of Greenwood Cemetery, on La. 97, Jennings."

LaSalle Pa.
E. R. Barrett s.n. 27 Mar 1970 NLU
"Old house site, 2 mi. e. of jct. of US 84 and US 165."
P. Laird #175 23 Mar 1974 NLU
"Summerville Baptist Church at Summerville, se. 1/4 of S15, T9N, R3E."
R. D. Thomas #38387 7 Apr 1974 NLU
"Chickasaw Cemetery, e. of La. 127, 6 mi. s. of Olla, S29, T10N, R3E."
R. D. Thomas #42670 23 Feb 1975 NLU
"Chalk Hills Cemetery, n. of La. 500, nw. of Little Creek, S30, T9N, R2E."

Lincoln Pa.
R. D. Thomas #82870 19 Mar 1983 NLU
"Cemetery of Alabama Baptist Church, beside La. 151, n. of Arcadia, on Bienville Parish line, S3, T18N, R5W."

Livingston Pa.
R. D. Thomas #62506 27 Feb 1979 NLU
"Springfield Cemetery, beside La. 42 and La. 43, Springfield, S13, T7S, R6E."

Morehouse Pa.
R. D. Thomas #18319 30 Apr 1970 NLU
"Gas line, beside La. 590, 2 mi. w. of La. 139, S14, T23N, R6E."
R. D. Thomas #56994 14 Feb 1978 NLU
"Cemetery of Beekman Methodist Church, La. 142 at Beekman, S6, T22N, R6E."

Natchitoches Pa.
R. D. Thomas #17619 16 Mar 1970 NLU
"Pasture, beside La. 9, 2 mi. ne. of Campti."
R. D. Thomas #17637 21 Mar 1970 GH, NCU, NLU

"Pasture and edge of pine woods, beside La. 9, 2 mi. ne. of Campti."

R. D. Thomas #38038 14 Mar 1974 NLU
"Cemetery e. of paved road s. of Goldonna, S31, T12N, R5E."

R. D. Thomas #38058 15 Mar 1974 NLU
"Kisatchie Cemetery, beside La. 118, just e. of La. 117, Kisatchie, S15, T5N, R8W."

Ouachita Pa.

R. D. Thomas #17725 23 Mar 1970 NLU
"Mt. Olive Baptist Church cemetery, w. of La. 557, S6, T16N, R3E."

R. D. Thomas #27659 11 Mar 1972 NLU
"Carlton Cemetery, beside La. 151, at jct. with La. 837, n. of Carlton, S22, T18N, R1E."

Rapides Pa.

R. D. Thomas #57141 29 Mar 1978 NLU
"Cemetery off US 165, 0.1 mi. n. of La. 3144, Pineville, S36, T5N, R1E."

Red River Pa.

R. D. Thomas #27731 14 Mar 1972 NLU
"Clear Springs Baptist Church cemetery, nw. of Martin and La. 155, S25, T13N, R9W."

Sabine Pa.

M. C. Leavenworth s.n. [ca 1837] GH
[Camp Sabine? (McVaugh 1947)]

R. D. Thomas #70200 15 Mar 1980 NLU
"Union Springs Baptist Church cemetery, beside La. 174, 1 mi. s. of DeSoto Parish line, S22, T10N, R14W."

N. Carroll #2482 21 Mar 1981 NLU
"In churchyard and cemetery, on La. 1217, 3 mi. n. of Many, S2, T7N, R11W."

St. Helena Pa.

C. M. Allen #556 20 Mar 1971 LAF, LSU
"Small rosette plant with spathulate leaves and small green flowers with minute petals. On bare soil in open field, about 4 mi. ne. of Chipola, S78, T1S, R4E."

St. Landry Pa.

R. D. Thomas #27561 4 Mar 1972 NLU
"St. Augustine grass cover; Mt. Calvary Cemetery, beside US 190, 2 mi. e. of Eunice, S28, T6S, R1E."

St. Tammany Pa.

R. D. Thomas #57304 8 Apr 1978 NLU
"Lawn of headquarters building of Pearl River Game Management area, n. of Int. 10 and e. of La. 1090, S32, T8S, R15E."

Union Pa.

R. D. Thomas #17729 24 Mar 1970 NLU

"Rocky Branch Community Cemetery, beside La. 143."

R. D. Thomas #17748 24 Mar 1970 NLU, TENN
"Antioch Cemetery, beside La. 848, 1 mi. n. of La. 2."

C. Smith #1596 12 Mar 1971 NLU
"Ward Chapel cemetery, S24, T21N, R1E."

C. Smith #1627 2 Apr 1971 NLU
"On power line, 2.5 mi. nne. of Spencer, S25, T21N, R3E."

R. D. Thomas #27479 13 Feb 1972 NLU
"Bird Chapel Methodist Church cemetery, e. of La. 549, Truxno, S39, T23N, R1E."

R. D. Thomas #27916 24 Mar 1972 NLU
"Canaan Baptist Church cemetery, off La. 558, 2 mi. se. of Lockhart, S10."

R. D. Thomas #42593 18 Feb 1975 NLU
"Cemetery beside La. 828, 4 mi. e. of Farmerville, S24, T21N, R1E."

Vernon Pa.

R. D. Thomas #17690 21 Mar 1970 NLU
"Beside US 171, 4.5 mi. n. of Anacoco."

R. D. Thomas #38121 15 Mar 1974 NLU
"Cemetery, beside La. 117, 3 mi. n. of Leesville, S36, T3N, R9W."

Webster Pa.

R. D. Thomas #27378 5 Feb 1972 NLU
"Cemetery, beside US 80, 1 mi. w. of Int. 20, 4.5 mi. w. of Dixie Inn, S4, T18N, R10W."

West Feliciana Pa.

R. D. Thomas #27310 24 Jan 1972 NLU
"Dry hill; lawn of Hickory Creek Baptist Church, s. of La. 421, e. of Spillman, S59, 29, or 32, T1S, R1W."

F. M. Givens #2418 9 Mar 1982 LSU, NLU
"Dry grassy area behind sand terrace, Thompson Creek at US 61 bridge."

Winn Pa.

J. Parker s.n. 9 May 1970 NLU
"Zion Memorial Cemetery, jct. of La. 472 and La. 1230, 13 mi. se. of Winnfield."

R. D. Thomas #37988 14 Mar 1974 NLU
"Cemetery and churchyard of Harmony Grove Baptist Church, beside La. 34, ne. of Gaars Mill, S15, T13N, R2W."

K. H. Kessler #1060 14 Mar 1981 NLU
"Gardens of Memories Cemetery, along US 84, e. edge of Winnfield, S21, T11N, R3W."

K. H. Kessler #1776 16 Apr 1981 NLU
"Magnolia Cemetery, near LaSalle Parish line, 1 mi. s. of US 84, S26, T10N, R1E."

[parish unknown]
W. M. Carpenter s.n. [ca 1840] PA
"Wet prairies & old fields." [possibly East Feliciana Pa., home of W.M.C. until ca 1841 (Cocks 1914)]
[J.] Hale s.n. ____ F
[no data; possibly from East Feliciana Pa. and coll. by W. M. Carpenter ca 1840 (Cocks 1914)]
J. Hale s. n. PH
[printed address: "Alexandria, Louisiana," but perhaps obtained from W. M. Carpenter (see above)]
[collector uncertain] NY
"Torrey." [Possibly from M. C. Leavenworth, Sabine Pa., ca 1837, to J. Torrey. (McVaugh 1947)]

MISSISSIPPI:

Amite Co.
R. D. Thomas #27467 13 Feb 1972 NLU
"Two plants only. Mt. Olive Baptist Church cemetery, beside Miss. 570, 1 mi. s. of US 98."

Clarke Co.
K. E. Rogers #7787 28 Feb 1972 NCU
"Sandy loam among low shrubs, scattered, not frequent. Cemetery, Shubuta."

Forrest Co.
K. E. Rogers #7743 10 Feb 1972 NCU
"Among grasses of moist sandy loam; abundant but restricted to a rather small area. Univ. of Miss. golf course."
R. D. Thomas #27456 13 Feb 1972 NLU
"Univ. of Southern Miss. golf course, near hole 10, Hattiesburg."
K. E. Rogers #7829 28 Feb 1972 NCU, TENN
"Sandy loam, full sun, with low grass turf; rather abundant. Cemetery, Glendale Community."
K. E. Rogers #7774 29 Feb 1972 NCU
"Sandy loam, in open areas of low grasses, scattered throughout. Cemetery, McLaurin."

George Co.
S. McDaniel #10346 10 Mar 1968 FLAS, IBE, VDB
"Fls. green; locally common; grassy edge of quaking bog, 5.5 mi. s. of Agricola."
R. D. Thomas #43138 28 Mar 1975 NLU
"Rocky Creek Cemetery, 2 mi. n. of US 98, e. of Lucedale."

Hancock Co.
R. D. Thomas #42907 27 Mar 1975 NLU

"Roadbank of Miss. 43, 1 mi. w. of Kiln."

Harrison Co.

S. M. Tracy s.n. 27 Mar 1892 F
"Biloxi."

S. M. Tracy s.n. 2 Jun 1892 MISSA
"Biloxi."

S. M. Tracy #4991 25 Feb 1898 NY
"Biloxi."

Jones Co.

K. E. Rogers #7789(=#7795) 28 Feb 1972 GH, MO, NCU, NY
"Dry sandy loam, full sun, among low grasses. Hwy. 84 at Eastview Baptist Church, ca. 2 mi. e. of Laurel."

Lauderdale Co.

R. D. Thomas #33884 28 Feb 1973 NLU
"Carmel Baptist Church cemetery, beside Miss. 19, 0.5 mi. se. of Miss. 496, near Vimville."

Perry Co.

S. L. Glowenke #10594 2 Apr 1948 GH, PH
"On soil, along hwy. 24, 6 mi. wnw. of New Augusta."

Pike Co.

R. D. Thomas #27462 13 Feb 1972 NLU
"Lawn of church, 3 mi. w. of Int. 55, Summit."

Simpson Co.

R. D. Thomas #27431 11 Feb 1972 NLU
"Union Cemetery, beside Miss. 28, Union."

Walthall Co.

F. M. Givens #1702 8 Apr 1979 LSU
"Among grasses, cemetery, hwy. 27, s. of Tylertown."

Wayne Co.

K. E. Rogers #7861 28 Feb 1972 NCU
"Cemetery, Pleasant Grove Baptist Church, 0.4 mi. n. of hwy. 84, just e. of Jones Co. line."

NORTH CAROLINA:

New Hanover Co.

R. B. Channell #2739 29 Mar 1954 DUKE
"Gregarious on road shoulder, about 7 mi. e. of Wilmington, off hwy. 17 on connecting road with hwy. 74 & 76."

OKLAHOMA:

Atoka Co.

J. Taylor #4810 15 Mar 1968 OKL, SMU
"Overgrazed field on Antlers sand, about 5 mi. ne. of Coleman."

Bryan Co.

J. Taylor #4803 14 Mar 1968 OKL, SMU, VDB

"Sandy overgrazed field adjacent to Taylor residence, nw. edge of Durant."

Choctaw Co.

J. Taylor #4863 25 Feb 1968 OKL
"Overgrazed field, Woodbine sand outcrop, 2 mi. w. of Boswell."

R. D. Thomas #28138 25 Mar 1972 NLU
"Mount Olivet Cemetery, East Trice St., Hugo."

Johnston Co.

J. Taylor #4813 16 Mar 1968 OKL, SMU
"Overgrazed field, abundant in one location only. Antlers sand formation. About 3 mi. e. and 1 mi. s. of Fillmore."

Marshall Co.

J. Taylor #4856 30 Mar 1968 OKL, SMU
"Common in only one small location, n. side of recently cut trees, some plants under leaf litter. Overgrazed field on Trinity sand, 2 mi. w. and 4.5 mi. s. of Kingston."

McCurtain Co.

J. Taylor #4886 7 Apr 1968 OKL, SMU
"Infrequent, along drier portion of very seepy roadside ditch, US 70, 2 mi. n. of the Little River."

R. D. Thomas #28130 26 Mar 1972 NLU
"Lawn and cemetery of Hochatown Union Church, beside US 259, just n. of Beaver Bend State Park."

R. D. Thomas #24944 17 Mar 1973 NLU
"Cemetery beside Ok. 3, 2.5 mi. e. of Haworth."

R. D. Thomas #75226 10 Apr 1981 NLU
"Cemetery s. of Ok. 3, 1.5 mi. se. of Haworth, S36, T8S, R25E."

Pushmataha Co.

J. Taylor #4880 6 Apr 1968 OKL, SMU
"Rare, in sandy overgrazed field, about 2.5 mi. e. of Oleta."

SOUTH CAROLINA:

[Aiken Co.?]

H. W. Ravenel s.n. [before 1887] GH
[Aiken? H.W.R. was resident of Aiken from 1853 until his death in 1887 (Taxonomic Lit. 4:597)]

Charleston Co.

[B. D.] Greene s.n. ____ NY
"Charleston." [label bears "Dr. Greene" in same hand as "B. D. Greene" (Benjamin Daniel Greene, 1793-1862) on PH label, below]

[collector unknown] ____ GH

"Charleston." [spm. from Boston Soc. Nat. Hist. to GH in 1941; label not in hand of S. Elliott (S. Spongberg, in litt.)]

B. D. Greene s.n. PH
[data uncertain: appears to read "Ch n S C"]

Colleton Co.

R. D. Thomas #37929 10 Feb 1974 NLU
"Lawn of National Guard Armory, US 17A, e. of Walterboro."

Darlington Co.

M. A. Curtis s.n. Apr 1853 GH, NY
"Soc. [Society] Hill."

Hampton Co.

C. R. Bell #1761 4 Apr 1956 NCU, USF
"Roadside ditch, along S.C. 28, 1.8 mi. nw. of Yemassee."

Jasper Co.

H. E. Ahles #10312 2 Apr 1956 NCU
"Sandy roadside ditch, on hwy. 92, 7 mi. se. of US 17, about 10 mi. sse. of Hardeeville."

S. W. Leonard #1243 6 Apr 1968 FLAS, GA, LAF, MICH, NCU, NO, PAC, SMU, TENN, UNA, VDB
"Roadside ditch, along US 17A, 0.4 mi. s. of County 45."

R. D. Thomas #37933 10 Feb 1974 NLU
"Roadbank of US 17, just n. of Coosawhatchie River and Coosawhatchie."

R. D. Thomas #48427 3 Mar 1976 NLU
"Roadbank of old US 17, just n. of Coosawhatchie River, n. of Coosawhatchie."

Lancaster Co.

N. G. Miller #6789 23 Apr 1972 NCU
"Sparse. Thin wet soil over bedrock, 40 Acre Rock, 1.75 mi. ssw. of Taxahaw."

[county unknown]

J. Backman s.n. PH
[no data; printed address: "Charleston, S. Carolina."]

M. A. Curtis s.n. NY
[no data; possibly Darlington Co., q.v.]

TEXAS:

Austin Co.

C. Wright #229 [May?] 1849 GH, MO, NY, US
"Wet places, western Texas." [data from MO spm.; probably Austin Co. (McKelvey 1955, p. 1059)]

B. C. Tharp s.n. 16 Mar 1946 GH
"Austin Co."

Bastrop Co.

B. C. Tharp s.n. 19 Mar 1920 TEX

"Bastrop."
G. Webster #4009 11 Mar 1944 TEX
"Sandy soil near temporary 'sink'; not abundant."
B. C. Tharp s.n. 10 Mar 1946 TEX
"Compact sand in bottom by Alum Creek, s. of Bastrop State Park."
B. C. Tharp #47029 9 Mar 1947 TEX
"Moist sandy soil."

Bowie Co.
J. Taylor #4843 24 Mar 1968 OKL, SMU
"Only very small plants. Infrequent along roadside, mostly growing under clumps of grass, south-facing slope; US 82, about 1/8 mi. w. of US 259, 1-1/4 mi. w. of DeKalb."
R. D. Thomas #27961 25 Mar 1972 NLU
"Cemetery, e. of Tex. 8 at jct. of US 82, s. of Int. 30, New Boston."
R. D. Thomas #34021 17 Mar 1973 NLU
"Roadbank of Int. 30, at Texas Tourist Office, Texarkana."
R. D. Thomas #34923 17 Mar 1973 NLU
"Cemetery, beside Tex. 8, just n. of Int. 30, New Boston."

Brazoria Co.
[T. Drummond s.n.] [May] 1833 GH, NY
"Rio Brazos." (S. McKelvey 1955, p. 496)
B. F. Bush #462 28 Mar 1900 MO, NY, US
"Common on prairie. Columbia, Brazos River."
R. J. Fleetwood #9998 24 Feb 1971 TEX
"The largest clumps were about the size of a dime. Along the Gulf of Mexico at the mouth of the Bernard River."

Brazos Co.
J. N. Weaver #449 10 Apr 1942 MICH
"In bog."
B. C. Tharp #47121 28 Mar 1947 SMU, TEX
"Moist sandy oak woodland, 7 mi. s. of College Station."
J. R. Massey #784 22 Mar 1965 NCU, SMU
"Flowers inconspicuous in the field; plants appearing as clumps similar to common liverworts or young seedlings; abundant between clumps of little bluestem in prairie; range area, Texas A & M Univ."
J. R. Massey #812 5 Apr 1965 NCU
"Flowers inconspicuous; plants less than 3 cm tall; abundant; sand, ditch, saturated soil, full sun, with spring annuals; Minter Springs, Wellborn."
P. Fryxell #2478 5 Apr 1975 MICH

"Plants small, light green; damp sandy soil; disturbed ground in clearing in oak woods; College Station."

Cass Co.
R. D. Thomas #75178 10 Apr 1981 NLU
"Douglassville Cemetery, e. of Tex. 8, just n. of Douglassville."

Chambers Co.
B. C. Tharp s.n. Apr 1936 TEX
[no data]

Colorado Co.
E. J. Palmer #4927 12 Mar 1914 F
"Sandy prairie, Eagle Lake."

Fannin Co.
J. Taylor #4831 23 Mar 1968 OKL, SMU
"Very moist area, sandy soil, overgrazed field, 2 mi. ne. of Ivanhoe."

Gonzales Co.
B. C. Tharp #47167 22 Mar 1947 DUKE, GH, LSU MICH, MO, NCSC, NCU, NO, OKL, PH, TENN, TEX, US, VDB
"Wet sand."

Grayson Co.
J. Taylor #4835 23 Mar 1968 OKL, SMU
"Infrequent in sandy overgrazed field, along farm rd. 1753, 0.5 mi. s. of jct. with farm rd. 120, 2.5 mi. e. of Denison."

Gregg Co.
R. D. Thomas #27510 18 Feb 1972 NLU
"Very common; lawn of Christ Gospel Church, 6 mi. s. of White Oak, jct. of farm road 1252 and Tex. 42."

Hardin Co.
R. D. Thomas #27588 5 Mar 1972 NLU
"Old Hardin Cemetery, w. of Tex. 326, 1 mi. s. of Kountze."
R. D. Thomas #27591 5 Mar 1972 NLU
"Sandy soil at entrance to Felps Cemetery, e. of Tex. 105, between Saratoga and Votaw."

Harris Co.
E. Hall #238 16 Mar 1872 F, GH, MO, NY, US
"Wet soil. Houston."
J. F. Joor s.n. 16 Mar 1876 US
"Wet prairie, Harrisburg."
W. F. Thurrow s.n. 1890 F
"Hockley."
M. S. Young s.n. 26 Feb 1914 TEX
"Woods e. of Waller Cr."
B. C. Tharp s.n. 29 Mar 1947 TEX
"Sandy swampy soil, drained woodland,

near Linndale, n. of Houston."

Harrison Co.
R. D. Thomas #22490 21 Feb 1971 NLU
"Beside Int. 20, 4 mi. w. of Marshall."

Hopkins Co.
R. D. Thomas #27525 20 Feb 1972 NLU
"Ridgeway Cemetery, beside farm road 2653, at Tex. 11, Ridgeway."

Hunt Co.
R. D. Thomas #27523 20 Feb 1972 NLU
"Abundant; sandy; Brigham Cemetery, beside Tex. 50, 7 mi. s. of Commerce."

Jasper Co.
E. Whitehouse #22990 24 Mar 1950 SMU
"10 mi. s. of Jasper."

Kaufman Co.
R. McVaugh #7625 22 Mar 1947 GH, MICH, NCSC, SMU, TEX
"Plants yellow-green; anthers pale yellow. Blackland prairie pasture, 4 mi. sse. of Kaufman."

Lamar Co.
J. Taylor #4834 23 Mar 1968 OKL, SMU
"Infrequent, under clumps of grass, sandy roadside, farm rd. 197, 2 mi. e. of jct. with farm rd. 79, 4 mi. ne. of Direct."

Lee Co.
R. McVaugh #7632 23 Mar 1947 GH, MICH, SMU, TEX
"Plants yellow-green. Low wet spot in pasture, sandy soil, 1.5 mi. n. of Giddings."

Leon Co.
J. R. Massey #780 21 Mar 1965 NCU, SMU, TEX
"Flowers inconspicuous; plants less than 5 cm tall, appearing as clumps of seedlings; saturated soil, near standing water, roadside ditch, sand; 8 mi. n. of Flynn."

Liberty Co.
R. D. Thomas #27596 5 Mar 1972 NLU
"Stencil Memorial Park cemetery, beside Tex. 105, e. edge of Cleveland."

Marion Co.
L. H. Shinners #27707 5 Apr 1959 SMU
"Damp sandy ground near small road bridge, 3 mi. s. of Jefferson."

Mason Co.
J. M. Hawkins #23 4 Apr 1981 NLU
"8 mi. nw. of Mason."
F. M. Givens #2526 9 July 1981 LSU
"Prominent granitic exfoliant domes, n. side of Tex. 1222, 2.5 mi. w. of Tex. 386, Katemcy."

Milam Co.
R. McVaugh #7631 23 Mar 1947 GH, MICH, SMU, TEX
"Plants yellow-green. Moist sandy roadside banks, 14 mi. ne. of Milano, 3.5 mi. ne. of Gause."
Nacogdoches Co.
E. Whitehouse #32330 12 Apr 1958 SMU
"National Forest, 12 mi. s. of Nacogdoches."
Newton Co.
R. C. Gough s.n. 1 Apr 1980 NLU
"Near cattle gap on Tex. 642, 1/4 mi. s. of Toledo Bend Dam."
Polk Co.
B. C. Tharp #47208 4 Apr 1947 TEX
"Old field, about 3 mi. e. of Corrigan."
R. D. Thomas #27504 16 Feb 1972 NLU
"Moist sandy soil. Roadbank of farm road 357, Wakefield Baptist Church, 2.8 mi. w. of US 59."
Red River Co.
J. Taylor #4841 24 Mar 1968 OKL, SMU
"Common, under bulrush clumps, along very wet roadside ditch, 1.5 mi. e. of Woodland."
R. D. Thomas #27965 24 Mar 1972 NLU
"Avery Cemetery, hilltop, s. of US 82, Avery."
R. D. Thomas #27977 25 Mar 1972 NLU
"Wartham Cemetery, beside US 82, 3 mi. e. of Annona and Tex. 44."
San Augustine Co.
R. D. Thomas #27497 16 Feb 1972 NLU
"Liberty Hill Baptist Church cemetery, Tex. 147, 2.3 mi. n. of Tex. 21."
Shelby Co.
D. S. Correll #36880 24 Mar 1969 GH, TEX
"Prostrate on wet soil. Pastureland, along hwy. 96, 8.5 mi. s. of Tenaha."
Travis Co.
B. C. Tharp s.n. 1 Apr 1937 GH
"Wet flat, Country Club golf links, Austin."
Trinity Co.
L. H. Shinners #31116 27 Mar 1966 SMU
"Flowers light green. Sandy loam, road shoulder, 10 mi. nw. of Groveton."
Upshur Co.
R. D. Thomas #27514A 18 Feb 1972 NLU
"Very dry soil. Chilton Cemetery, n. of US 80, Big Sandy."
Van Zandt Co.
J. R. Crutchfield #2433 31 Mar 1967 TEX
"Moist sand on bank of stock pond, 2 mi.

sw. of Mytle Springs."
R. D. Thomas #22392 21 Feb 1971 F, GH, MO,
"Roadbank of service road beside Int. 20, NLU, NY, SMU,
at jct. of farm road 1255, e. of Canton." TENN, VDB
R. D. Thomas #27519 18 Feb 1972 NLU
"Woodside Cemetery, beside farm road 17,
n. side of Grand Saline."
Wharton Co.
B. C. Tharp #47087 31 Mar 1947 TEX
"Sandy prairie, 8 mi. e. of Eagle Lake."
Wilson Co.
H. B. Parks s.n. 1943 GH
"Probably in Carrozo Sands. Bogs,
northern Wilson Co."

NOTES:

1. Material "quoted" in above entries is at times recomposed or reordered for consistent presentation. Undesignated roads are termed "hwy" throughout. Compass directions are abbreviated.

2. Not more than one person is listed as the collector. When more than one person appears on the label, the name is used that is associated with a collection number.

3. Herbarium materials of the Academy of Natural Sciences, Philadelphia (PH), as recorded here, were not available for consideration during the preparation of the companion article in Castanea. Among the PH specimens of interest is one by William Baldwin from Georgia where he traveled and collected from 1811 to 1817 (Darlington 1843). The collection is thus among the earliest known, perhaps second only to those of Stephen Elliott from near Beaufort, South Carolina (Ward & Gholson 1987). It is unlikely however to have been the type specimen used by Henry Muhlenberg, the author of the species (as Pyxidanthera spatulata, 1813), since Muhlenberg noted that his catalog had been compiled by 1809 and since he attributed his new species to what is now eastern South Carolina. The faded label accompanying the specimen bears the phrase, "herb Schw," an indication that it was transmitted by Baldwin to L. D. von Schweinitz in Germany, and thence to Muhlenberg (Mears 1978). The PH collections of Muhlenberg do not include a specimen that may be considered a type.

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NEW RECORDS FOR CENTRAL AMERICAN GRASSES

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1. The genus Dichanthium

This old world andropogonoid genus has been introduced in warm climates of the western hemisphere for forage. Some of the species escape and become established in the wild (Gould 1975). Two adventive species have been collected in Mesoamerica.

Dichanthium annulatum (Forsk.) Stapf

Mexico: Campeche: Champoton: Davidse et al. 20579, ISC.
Nicaragua: Depto. Granada: Stevens & Montiel 20618, ISC.
Costa Rica: Prov. Guanacaste: Pohl & Davidse 10683, ISC. This species has persisted after cultivation at the above site on Hda. la Pacifica. A recent collection (1986) from the Parque Nacional Palo Verde (Oldham 5989, DAO) indicates that the species may be spreading.
Panama: Canal Zone: Resley s.n., ISC

Dichanthium caricosum (L.) A. Camus

Honduras: Depto. F. Morazon: El Zamarano: Pohl 12536, ISC. This species has apparently escaped from former cultivation in a grass garden.

2. Pennisetum tempisquense Pohl

This species was formerly known only from the type collection, taken from Palo Verde in 1968. A second collection from the same general area, listed below, indicates that the species was still extant here 1986.

Costa Rica: Prov. Guanacaste: Parque Nacional Palo Verde: Oldham 5990, DAO, ISC.

3. Ischaemum indicum (Houtt.) Merr.

This weedy species was collected from Golfito, Costa Rica in 1968. Two collections from 1986 indicate that the species is spreading widely to middle elevations.

Costa Rica: Prov. San Jose: Parque Nacional Braulio Carillo: Oldham 6063, DAO, ISC.
Costa Rica: Prov. Puntarenas: Monteverde: Oldham & Sutherland 5961, DAO, ISC.

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DISTRIBUCION DE SAPONINAS ESTEROIDALES EN SEMILLAS DE *YUCCA FILIFERA* (AGAVACEAE)*

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ABSTRACT. It is demonstrated that in *Yucca filifera* seeds the steroidal saponins (filiferins) are concentrated in the seed-coat epidermis and in the seed-coat parenchyma. The perisperm and embryo did not contain saponins. Inmature seeds mainly contained filiferins C,D and the mature ones mainly contained A,B. The possible adaptative role of this distribution is discussed.

INTRODUCCION

Las plantas del género *Yucca* (Agavaceae) han sido muy estudiadas desde el punto de vista químico. Las semillas de 17 de las 40 especies que componen el género se han explorado en cuanto a su contenido de saponinas esteroidales. Esta información ha sido revisada por diversos autores (Domínguez 1979, Gentry 1979, Wall 1979). Las semillas maduras de *Y. filifera* , contienen una mezcla de 4 saponinas esteroidales llamadas colectivamente filiferinas, A,B,C y D (Romo de Vivar et al 1974, Lemieux et al 1977). Conviene señalar que todos los resultados obtenidos a la fecha se han basado en la determinación y cuantificación de compuestos esteroidales obtenidos de extractos de semillas completas. En contraste, el objetivo de este reporte es presentar datos sobre la distribución de saponinas esteroidales en algunos de los diferentes componentes y tejidos que constituyen a la semilla de *Y. filifera* y los cambios que presentan estos compuestos durante la maduración.

METODOS

Semillas de *Y. filifera* .- Se utilizaron 2 tipos de semillas, inmaduras con los tejidos totalmente blancos y maduras que concuerdan con la descripción general hecha por Arnott 1962, es decir externamente negras, ovado-aplanadas e internamente, en un corte transversal, con el embrión rodeado por el perispermo blanco y éste a su vez rodeado por la cubierta negra la cual se introduce en forma de trabéculas entre el perispermo. El material fue colectado en el Municipio de Zempoala, Estado de Hidalgo, México.

Distribución de las filiferinas.- Esta, se comprobó mediante la tinción de cortes transversales de las semillas y por cromatografía en capa fina de extractos del embrión y de algunos de los tejidos.

Tinción.- Con el objeto de tener una imagen completa de la

distribución de las saponinas esteroidales en los diferentes tejidos de la semilla, incluyendo al embrión, se hicieron cortes transversales con un microtomo de mano y se tiñeron con reactivo de Schiff, previa oxidación con ácido peryódico.

Cromatografía en capa fina.- De los tejidos más accesibles (epidermis, parénquima de la cubierta, perispermo) y del embrión se obtuvieron muestras, las cuales fueron extraídas separadamente con etanol. Cada extracto fue cromatografiado en capa fina de gel de sílice eluyendo con acetato de etilo:metanol:agua 80:20:5 (Lemieux et al 1977). Como testigo se empleó una mezcla de filiferinas A,B,C,D. Con esto se identificaron las filiferinas presentes en cada tipo de semilla, en cada tejido y en el embrión.

Cuantificación.- De cada tipo de semilla se obtuvieron entre 10 y 15 mg del embrión y de cada uno de los tejidos mencionados, éstos, se extrajeron con etanol y del extracto se tomó una alícuota conteniendo de 10 a 40 µg de saponinas las cuales se cuantificaron por el método de Baccou et al 1977 ligeramente modificado. A la alícuota disuelta en 2 ml de acetato de etilo, se añadió 1 ml de anisaldehído 0.5 % en acetato de etilo y luego 1 ml de ácido sulfúrico concentrado. Después de 10 minutos se añadió 1 ml de agua para estabilizar el color. La lectura se hizo a 430 nm.

RESULTADOS

Tinción de Schiff.- En los cortes de ambos tipos de semillas, el reactivo de Schiff tiñó a las paredes y espacios intracelulares de la epidermis y parénquima de la cubierta. Del perispermo y del embrión únicamente tiñó las paredes celulares. Se considera que la tinción de los espacios intracelulares se debe a la presencia de las filiferinas ya que el reactivo de Schiff reaccionó con los aldehídos formados por la oxidación que el ácido peryódico llevó a cabo en los azúcares que conforman a los glicósidos esteroidales, por lo tanto, estos compuestos se encuentran en los dos primeros tejidos mencionados. La tinción de las paredes celulares se debe solamente a la reacción con los polisacáridos que las integran. Así, se deduce que el perispermo y el embrión crecen de saponinas (Fig. 1).

Cromatograma.- El cromatograma obtenido de la separación de los extractos comprobó la distribución de las filiferinas y permitió la identificación de los componentes presentes. Así, se encontró que en semillas inmaduras la epidermis y el parénquima contienen principalmente filiferinas C y D, el perispermo y el embrión carecen de saponinas esteroidales. En las semillas maduras la epidermis y el parénquima contienen principalmente filiferinas A y B, el perispermo y el embrión también carecen de componentes esteroidales.

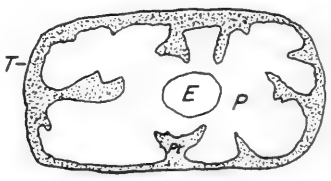

Fig. 1.- Corte transversal de semillas de *Y. filifera*. La epidermis (T) y el parénquima (Pr) de la cubierta contienen filiferinas (tinción de Schiff, positiva). El perispermo (P) y el embrión (E) carecen de estos compuestos (tinción negativa). ⎯⎯ 1 mm.

Cuantificación.- Esta se hizo tomando en cuenta el extracto total del embrión y de cada uno de los tejidos tratados; los resultados obtenidos se presentan en la Tabla I.

Tabla I.- Contenido de filiferinas en el embrión y en algunos tejidos de semillas de *Y. filifera* .

Semillas	Filiferinas (%)			
	Epidermis	Parénquima	Perispermo	Embrión
Inmaduras	8.4	6.4	0	0
Maduras	9.7	11.6	0	0

DISCUSION

Este es el primer estudio en que se comprueba que las saponinas esteroidales o filiferinas limitan su distribución a la cubierta de la semilla de una de las especies del género *Yucca*, *Y. filifera*. La ubicación de estos compuestos, en el tejido más externo y su concentración, muy alta para tratarse de compuestos secundarios (Harborne 1982), sugiere que su papel adaptativo quizá esté en función de las relaciones que la planta mantiene, a través de sus semillas, con algunas especies de insectos que se alimentan exclusivamente de ellas. Tal es el caso de *Enoclerus sp.* (Coleoptera:Cleridae) cuyas larvas, al alimentarse, consumen preferentemente perispermo (Villavicencio

et al observación personal). Preliminarmente hemos observado que las larvas de *Enoclerus sp.* tienen un desarrollo significativamente mayor al ser alimentadas con perispermo sin filiferinas que con perispermo al que se le añaden experimentalmente estos compuestos (resultados no publicados). Lo anterior, sugiere que en la naturaleza el comportamiento alimenticio de estas larvas puede estar guiado por la distribución de las saponinas esteroidales descrita en el reporte. En relación a los cambios cualitativos que se observan, filiferinas C,D en semillas inmaduras y A,B en semillas maduras, no tenemos elementos de juicio para discutir el hecho y es evidente que faltan más estudios al respecto. Finalmente, conviene extender esta clase de estudios a otras especies de *Yucca* incluyendo especies con fruto dehiscente, lo cual contribuirá a ampliar el conocimiento del género desde el punto de vista químico y ecológico.

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NEW SPECIES OF DEPPEA (RUBIACEAE) FROM CHIAPAS, MEXICO

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Deppea Cham. & Schlecht. is a Neotropical genus of about 25 species of shrubs, treelets or rarely small trees whose greatest center of diversity lies in the mountains of southern Mexico and Guatemala. (Lorence & Dwyer, in preparation). Recent collecting efforts for the ongoing project Flora of Chiapas by D. E. Breedlove have brought to light the following undescribed species of Deppea.

Deppea splendens Breedlove & Lorence, sp. nov. Type: MEXICO. Chiapas: Municipio of Motozintla de Mendoza, SW side of Cerro Mozotal, 11 km NW of junction of the road to Motozintla along road to El Porvenir and Siltepec, 2,100 m, 18 Sept 1976 (fl, fr), D.E. Breedlove 40258 (Holotype: CAS; Isotype: MEXU).

Species foliis verticillatis, inflorescentia grandi pendula 10-25 floribus, pedunculo 3.5-6.5 cm longo, pedicellis 1-3 cm longis, calycis lobis foliaceis subaequalibus 1.5-2.5 cm longis 3-7 mm latis in sicco rubescentibus, corolla longa hypocrateriformi tubo 5-5.5 cm longo lobis 8-14 mm longis, et capsula grandi 6-8 mm longa 5-7 mm lata distinguenda.

Shrub or small tree 5-8 m tall with major stems up to 10 cm in diameter, the twigs glabrous, 2-3 mm diam., minutely lenticellate, longitudinally wrinkled, the nodes crowded, annular, 3-20 mm distant; stipules thick, brown, deltoid-subulate, 2-4 mm long, 0.8-1.6 mm wide, deciduous, externally sparsely hirsutulous especially along the margins, internally villosulous and with 6-8 brown digitate colleters 0.1 mm long. Leaves ternate or opposite in the terminal portion of present year's growth, those of a whorl subequal to unequal, petiolate; petioles (0.3) 0.8-3.8 cm long, 0.6-1 mm diam., adaxially sulcate, when young hirsutulous along the margins, the trichomes simple, septate; lamina elliptic to ovate-elliptic, 4.5-15 cm long, 0.8-6 cm wide, the apex acuminate, the acumen 0.5-1.5 cm long, ± falcate, the base narrowly cuneate to attenuate, the secondary veins 7-10 pairs festooned brochidodromous, the veins and costa abaxially prominent, yellowish to purplish, the lamina membranaceous to thinly chartaceous, drying olive green, slightly

discolorous, adaxially sparsely strigillose when young, glabrate, abaxially sparsely villosulous along the costa and secondary veins, the vein axils slightly barbate, the margin sparsely ciliolate, Inflorescence terminal, pendulous, cymose-corymbiform 16-25 flowered, 17-21 cm long, 12-14 cm wide including the corollas, the slender peduncle 3.5-8.5 cm long, 0.8-1 mm diam., the axes glabrate, subtended by linear-subulate ciliolate bracteoles 3-8 mm long, the primary branches 2-4, these 1-7 cm long, often branching again once, the ultimate branches with 4-10 flowers. Flowers on pedicels 1-3 cm long, 0.3-0.4 mm diam., the hypanthium glabrous, turbinate, 2-3 mm long, 2-2.5 mm wide, drying reddish, the calyx cup 0.5 mm deep, the lobes 4, subequal, ± erect, foliaceous, venose, drying reddish, narrowly ovate-elliptic to lanceolate, 1.5-2.5 cm long, 3-7 mm wide, acute, the margins sparsely ciliolate; corolla yellow to orange when fresh, salverform, glabrous externally and internally, the tube 5-5.5 cm long, flared to 5-7 mm wide in the distal 2/3, the lobes 4, contorted in bud, at anthesis spreading to 90 or recurved, ovate-deltoid, 0.8-1.4 cm long, 3-4 mm wide, acute to acuminate; stamens 4, glabrous, the filaments 1.5-2 cm long, affixed 1.5-2 cm below the faux, the anthers linear, 7-8 mm long, the base saggitate, the apex obtuse, about half exserted; style 5-6.5 cm long including the ovoid stigma 1.5-2 mm long, equalling or slightly exceeding the stamens, villosulous in the basal half; ovary 2-locular, the placentas bar-like, peltate, with numerous ovules per locule. Capsule ellipsoid, compressed perpendicular to the septum, 6-8 mm long, 5-7 mm wide, bisulcate, greenish brown, weakly 6-costate, loculicidally dehiscent above the calyx ring, the persistent calyx lobes greenish, spreading at maturity; fruiting pedicels recurved and the fruits erect; seeds numerous, dark brown, angulate, 0.6-1 mm long, the testa shallowly reticulate, the inner walls papillose-reticulate, not pitted.

Distribution. Known only from the type locality in Chiapas, Mexico.

Habitat. It occurs in a steep canyon in montane rain forest with Pinus, Quercus, Oecopetalum, Clethra, and Symplocos at about 2,100 m elevation. It is an occasional shrub on steep slopes occuring in the understory with Phyllanthus, Omiltemia, Kohleria, Miconia and Cestrum. Along small streams it becomes subdominant. The locality has been cleared of forest by local corn farmers in 1986 and only small remnants remain. No individuals of D. splendens were observed in the fall of 1986.

Material studied. MEXICO, Chiapas, type locality: 27 Jun 1972 (fl), Breedlove 25705 (CAS), Breedlove 25758 (CAS, MEXU); 29 Dec 1972 (fr), Breedlove & Thorne 31119 (CAS, MEXU); 23 Nov 1981 (fr), Breedlove & Bartholomew 55758 (CAS, MEXU).

Discussion. Because of its long tubular corolla large foliaceous calyx lobes and capsular fruits Deppea splendens resembles a number of other small or monospecific Rubiaceae genera that occur in Guatemala and southern Mexico, i.e. Eizia Standley, Omiltemia Standley, and Stylosiphonia T.S. Brandegee. Consequently, our first inclination was to refer it to one of these genera, which have traditionally been placed in the tribe Rondeletieae DC. of the subfamily Cinchonoideae Rafinesque (Standley 1916, 1921). However, raphides are present in Deppea, Eizia, and Omiltemia, which are therefore referable to the subfamily Rubioideae sensu Verdcourt (Lorence & Dwyer, in preparation). In addition, the flowers are tetramerous in the former three genera as opposed to pentamereous in Stylosiphonia. Therefore Stylosiphonia must be excluded from consideration and from the Rubioideae. Kirkbride (1984a) created the tribe Deppeeae to accomodate Deppea, Omiltemia and Schenckia. Eizia should probably also be placed there.

Deppea splendens corresponds well with the genus Omiltemia in terms of floral and vegetative morphology, including the whorled leaves (see Kirkbride 1984b). In Omiltemia, however, (here interpreted to include only O. filisepala (Standl.) Morton and O. longipes Standl.) the capsules at first split loculicidally and then septicidally almost to the base. On the other hand, in Eizia and Deppea (including D. splendens), dehiscence is loculicidal and restricted to the apical portion of the capsule above the calyx where the vascular bundles are united into a ring that prevents the fruit from opening any further. Omiltemia is thus excluded from consideration, leaving Eizia and Deppea. In Deppea splendens aestivation of the corolla in bud is contorted and does not correspond with that of Eizia, described by Standley (1940) as "imbricate (or convolute?)". In addition, Eizia differs by its sessile stamens, thickened stipules, and seeds with a cristate (not reticulate) testa.

In spite of its extreme floral morphology, Deppea splendens corresponds with the genus Deppea in all essential characters, notably its tricolpate pollen, tetramerous flowers with contorted corolla aestivation in bud, reticulate seeds, and loculicidal capsule dehiscence. The whorled leaves, although not common in the genus, do occur in one other Deppea species (Lorence & Dwyer, in preparation). Finally, the pendulous inflorescence and flowers with a large red calyx and long tubular corolla with partially included stamens appear to represent adaptations to hummingbird pollination in D. splendens. In contrast, the majority of Deppea species have small, erect or inclined flowers with yellow or white corollas, short corolla tubes, and exserted stamens characteristic of entomophily.

In 1981 seeds from Breedlove & Bartholomew 55758 were introduced by Bruce Bartholomew into the University of California Botanical Garden where they grew and flowered. Duplicate plants and cuttings were distributed to other Botanic Gardens and finally horticultural nurseries began growing the plant. In 1986 it was being offered for sale in coastal California nurseries under a variety of misapplied names.

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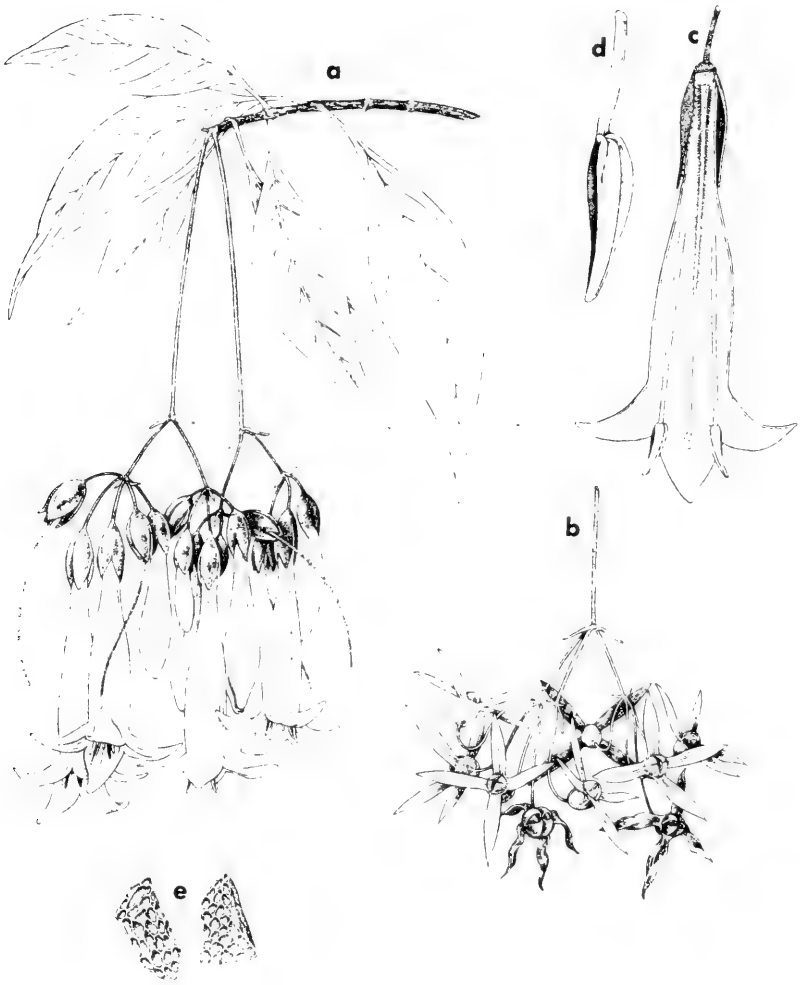

Fig. 1 Illustration of Deppea splendens Breedlove & Lorence a) habit with inflorescence x .5; b) fruiting inflorencence x .5; c) cut open flower x 1; d) anther x 3.5; e) seeds x 15

NOTES ON THE GENUS *CLERODENDRUM* (*VERBENACEAE*). XXXVI

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CLERODENDRUM Burm.

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CLERODENDRUM OHWII Kanehira & Hatusima

Additional bibliography: Mold., Phytologia 62: 486. 1987.

Leafblades basally cuneate or obtuse, fuscous-tomentellous on both surfaces; midrib hardly elevated above, prominent beneath; secondaries 4 or 5 per side, issuing at an angle of 50° from the midrib, arcuately joined at the margins; inflorescence cymose, terminal or subterminal, 8 cm. long, 5--7 cm. wide, ramose, fuscous-tomentose, the ramifications dichotomously furcate; bracts linear, 4--8 mm. long; primary peduncles 3--4.5 cm. long, 1--1.2 mm. in diameter; cyme ramifications 1.5 cm. long, 1 mm. in diameter; pedicels 1--1.2 cm. long; calyx obconic-campanulate, 13--15 mm. long, externally pubescent, internally glabrescent, apically 5-lobed, the lobes triangular, 5--6 mm. long, 4 mm. wide; corolla tubular-campanulate, 2.5 cm. long, very sparsely pilose above, the tube very slender, 2 cm. long, 1.5 mm. wide, the limb campanulate, 5-lobed, the lobes ovate-elliptic or ovate-oblong, 7--9 mm. long, 4--5 mm. wide, apically obtuse, marginally entire and ciliolate; stamens 4, inserted in the corolla-tube; filaments 3--4 cm. long, filiform, glabrous, long-exserted; anthers oblong, 2 mm. long, 1 mm. wide; style 4 cm. long; stigma very shortly 2-lobulate; ovary oblong-globose, 1.5 mm. long.

This species is based on *J. Ohwi 1307* from Taroko, Karenkotyô, Taiwan, collected in April of 1933. The authors claim that "This is near *Clerodendron vanoverberghii* Merrill from Luzon, but differs from it in having much narrower leaves with shorter petioles, smaller inflorescences, much longer calyx and the about twice longer stamens. This also somewhat resembles [the] densely pubescent form of *C. trichotomum*, but is easily distinguishable from it by its smaller flowers with more patent calyx lobes and much stouter pedicels." A vernacular name is "birôdo-kusagi".

Hsiao (1978) comments that "The type, from Hualien, *Ohwi 1307*

was not seen [by me]. According to the description this resembles the densely pubescent form of *C. trichotomum* but has smaller flowers, more patent calyx-lobes, and stouter pedicels. As no such plant has been collected since [on Taiwan], its actual existence remains to be proved."

Citations: MOUNTED ILLUSTRATIONS: Kanehira & Hatusima, Journ. Jap. Bot. 13: 678, fig. 2. 1937 (Ld--photo of type).

CLERODENDRUM OREADUM S. Moore, Journ. Bot. Brit. 45: 93 [as "*Clerodendron*"]. 1907; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 69 & 95. 1936.

Synonymy: *Clerodendron oreadum* S. Moore, Journ. Bot. Brit. 45: 93. 1907.

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A climbing shrub; branches wide-spreading, quite foliose, at first minutely pubescent, later glabrous, decidedly sulcate; leaves whorled in 3 or 4's;petioles slender, 5--12 mm. long, puberulent; leafblades small, ovate-oblong, 3--7 cm. long, 2--3 cm. wide, apically cuspidate-acuminate, marginally entire, basally obtuse or subrotundate, membranous, glabrous on both surfaces, green in drying; midrib and 2 basal secondaries very conspicuous and giving the leaf a trinerved appearance, the remaining secondaries about 5 on each side, ascending, more or less conspicuous, wide-spreading; inflorescence laxly paniculate, short-pedunculate, terminal, subequaling the leaves, 4--6 cm. long, 4--5 cm. wide; peduncles 1.5--2 cm. long; cyme ramifications wide-spreading, slender, pubescent; bracts small, filiform, 2--3 mm. long, pubescent; pedicels shorter than the calyx; calyx rather small, turbinate-campanulate, 3 mm. long, pubescent, the lobes narrowly linear-lanceolate, 1 mm. long, apically acute; corolla white, externally puberulent, the tube slender, 6.5 mm. long, 1 mm. wide, twice as long as the calyx, the lobes short, oblong-obovate, 2 mm. long, 1.2 mm. wide, apically very obtuse; exserted portion of the stamens equaling the corolla-tube; anthers oblong, 1.5 mm. long; style slightly exserted, 8 mm. long; ovary globose, 1.25 mm. long.

This species is based on *Bagshawe 1075* & *1123* from Toro, in the forest near Mpanga and on the Bigera River, Uganda, deposited in the herbarium of the British Museum. Of these two collections, Thomas (1936) has chosen the latter as the type.

Moore (1907) says that the species "Differs from *C. nuxioides* (*Siphonanthus nuxioides* S. Moore) in the small leaves obtuse or rounded at the base, the short inflorescences, much smaller calyx and corolla, the former pubescent, &c. It is nearer still to the plant named by Baker (Fl. Trop. Afr. v. p. 290) *Premna macrosiphon*, but which is, I venture to think, a *Clerodendron*; this, however, has

rusty stems, much larger leaves with rusty petioles, and larger lobes to calyx and corolla among other features."

Thomas (1936) comments that "Diese Art ist mir nur aus der Beschreibung bekannt; danach lehnt sie sich eng an die vorige [*C. buchholzii* Gürke] sowie an Nr. 57 [*C. nuxioides* (S. Moore) Thomas] an." He cites only the same two Bagshawe collections.

Citations: UGANDA: *Bagshawe 1123* [Mo. Bot. Gard. Type Photo A. 852] (Gz--photo of type, N--photo of type).

CLERODENDRUM PALMATOLOBATUM Dop in Lecomte, Fl. Gén. Indo-chine 4: 866 [as "*Clerodendron*"]. 1935; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 59. 1942.

Synonymy: *Clerodendron palmatolobatum* Dop in Lecomte, Fl. Gén. Indo-chine 4: 866. 1935. *Clerodendrum palmatolobum* Dop ex Mold., Known Geogr. Distrib. Verbenac., ed. 1, 91 sphalm. 1942. *Clerodendrum palmatilobatum* Dop ex Mold., Phytologia 60: 141 sphalm. 1986.

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A shrub, about 3 m. tall; branches tetragonal, canaliculate, glabrous or puberulent; nodes annulate with a line of brown, woolly, interpetiolar hairs; leaves decussate-opposite; petioles elongate, to 30 cm. long, glabrous, canaliculate above; leafblades membranous, 15--25 cm. long, 15--20 cm. wide, palmately lobed, basally deeply cordate or hastate, with a narrow sinus, the lobes 5--7, linear-oblong, apically acuminate, marginally entire, with the basal sinus acute, sparsely hispidulous or subglabrous above, covered with very numerous, small, peltate glands or scales beneath, the middle lobe 12--18 cm. long and 5--6 cm. wide, the lateral ones decreasing in size regularly toward the leaf base; secondaries 5--7, palmate, prominent, arising from the leaf base, ascending to the center of the apex of each lobe; tertiaries numerous, perpendicular to the secondaries, recurved toward the margins; inflorescence paniculate, terminal, pyramidal, spreading, 15--20 cm. long, 10--15 cm. wide, dichotomously branched, the individual cymes racemiform; bracts foliaceous, the basal ones palmately lobed, the upper ones small and linear; pedicels slender, 3--4 mm. long; calyx campanulate, 3 mm. long, puberulent, the tube very short, the 5 lobes oval-lanceolate, 2.5 mm. long, apically acute; corolla hypocrateriform, vermillion-red, 1.5 cm. long, the tube slender-cylindric, 1 cm. long, the lobes obovate, 5 mm. long, spreading, ciliolate; stamens long-exserted, inserted in the throat of the corolla-tube; filaments glabrous; anthers oblong, with 2 parallel thecae; style slender, equaling the stamens; stigma shortly bifid; ovary glabrous.

This species is based on an unnumbered Poilane collection (probably *no. 15302*) from between La-khang-cheeung and Po-bang, in the province of Sre-Imbel, Cambodia. The vernacular name for the plant in Cambodia is "cam".

Collectors describe this plant as a shrub, 1--4 m. tall, the whole inflorescence red, the flowers with a slight odor, and have found it growing in evergreen forests or in sandy soil of open forests, at 400 m. altitude, in flower in March, April, and August. The corollas are said to have been "crimson" on *Squires 828*. The leaves are strikingly like those of *C. hastatum* (Roxb.) Wall., but differ in being conspicuously glandular-squamose beneath.

A key to help distinguish *C. palmatolobatum* from other Indochinese species of the genus will be found under *C. hahnianum* Dop in the present series of notes [60: 141--143].

Material of *C. palmatolobatum* has been misidentified and distributed in some herbaria as *C. paniculatum* L.

Citations: THAILAND: *Larsen, Santisuk, & Warncke 3306* (Ld). CAMBODIA: *Poilane 15302* (B--isotype). VIETNAM: Annam: *Squires 828* (Bz--20159, Mu, N, N, S, W--1702741).

CLERODENDRUM PANICULATUM L., Mant. Pl., imp. 1, 1: 90. 1767 [not *Clerodendron paniculatum* Perr., 1824].

Synonymy: *Clerodendrum paniculatum* Retz., Nom. Bot. 155. 1772. *Volkameria angulata* Lour., Fl. Cochinch., ed. 1, imp. 1, 2: 389. 1790. *Caprifolium paniculatum* Noronha, Verh. Batav. Genootsch. Kunsten 5: 9. 1790. *Clerodendrum foliis quinquelobis, denticulatis, glabris; paniculâ brachiatâ, axillis lanatis* Wahl. ex Poir. in Lam., Encycl. Méth. Bot. 5: 167 in syn. 1804. *Clerodendrum foliis lobatis, serratis; paniculâ amplissimâ* L. ex Poir. in Lam., Encycl. Méth. Bot. 5: 167 in syn. 1804. *Clerodendrum pyramidale* Andr., Bot. Repos. 10: pl. 628. 1810. *Clerodendrum paniculatum* Willd. ex R. Br. in Ait., Hort. Kew., ed. 2, 4: 63. 1812. *Clerodendron paniculatum* L. ex Edwards, Bot. Reg. 5: pl. 406. 1819. *Clerodendron pyramidale* Andr. apud Ker-Gawl in Edwards, Bot. Reg. 5: pl. 406 in syn. 1819. *Clerodendron paniculatum, foliis cordatis, quinquelobatis subdenticulatis glabris; summis saepius indivisis, panicula brachiata, corollae tubo calycem multoties superante* Brown ex Ker-Gawl in Edwards, Bot. Reg. 5: pl. 406 in syn. 1819. *Clerodendron splendidum* Wall., Numer. List [49], no. 1803 hyponym. 1829; Schau. in A. DC., Prodr. 11: 668 in syn. 1847. *Clerodendrum splendidum* Wall. in Griff., Notul. 4: 169. 1854. *Clerodendrum pyramidale* Wall. ex Maxim., Bull. Acad. Imp. Sci. St.-Petersb. 31: 86 in syn. 1886. *Cleianthus coccineus* Lour. ex Gomes, Mem. Acad. Sci. Lisbon Cl. Sci. Mor. Pol. Bel.-Let., ser. 2, 4 (1): 28. 1888. *Clerodendron paniculata* L. ex Matsum., Ind. Pl. Jap. 2 (2): 532. 1912. *Clerodendrom paniculatum* Menninger, 1960 Price List Flow. Trees [3] sphalm. 1960. *Clerodendrum splendedum* Wall. ex Liu, Illustr. Nat. Introd. Lign. Pl. Taiwan 2: 1217 sphalm. 1962. *Clerodendrum paniculata* Perry, Fls. World 304 & 313. 1972. *Clerodendron paniculatus* L. ex Mold., Phytologia 26: 371 in syn. 1973. *Clerodendrum kaempferi* sensu Moldenke ex Hsiao, Fl. Taiwan 4: 423 in syn. 1978 [not *Clerodendron kaempferi* (Jacq.) Sieb., 1830]. *Clerodendron panniculatum* L., in herb. *Cleriodendron paniculatum* L., in herb.

Bibliography: L., Mant. Pl., imp. 1, 1: 90 (1767) and imp. 1, 2: 515. 1771; Retz., Nom. Bot. 155. 1772; Reichard in L., Syst.

Pl. 3: 198. 1780; J. A. Murray in L., Syst. Veg., ed. 14, 2: 578. 1784; J. F. Gmel. in L., Syst. Nat., ed. 13, imp. 1, 2: 962. 1789; Lour., Fl. Cochinch., ed. 1, imp. 1, 2: 389. 1790; Noronha, Verh. Batav. Genootsch. Kunsten 5: 9. 1790; Nemnich, Allgem. Polyglott. Lex. 1: 1066. 1791; Vahl, Symb. Bot. 2: 74. 1791; Lour., Fl. Cochinch., ed. 2, 2: 473. 1793; J. F. Gmel. in L., Syst. Nat., ed. 13, imp. 2, 2: 962. 1796; P. Mill., Gard. Dict., ed. 9, 1: *Clerodendrum* 5. 1797; Raeusch., Nom. Bot., ed. 3, 182. 1797; Willd. in L., Sp. Pl., ed. 4 [5], 3 (1): 388. 1800; Poir in Lam., Encycl. Méth. Bot. 5: 167--168. 1804; Andr., Bot. Repos. 10: pl. 628. 1810; R. Br. in Ait., Hort. Kew., ed. 2, 4: 63 & 64. 1812; Ker-Gawl in Edwards, Bot. Reg. 5: pl. 406. 1819; Pers., Sp. Pl. 3: 366. 1819; Jack, Malay. Misc. [Descrip. Malay. Pl.]. imp. 1, 1: 16--17 & 39. 1820; Steud., Nom. Bot. Phan., ed. 1, 207. 1821; Link, Enum. Hort. Berol. 2: 127. 1822; Blume, Cat. Gewass., imp. 1, 82. 1823; Perr., Mem. Soc. Linn. Paris 3: 110. 1824; Blume, Bijdr. Fl. Ned. Ind. 9: 811--812. 1825; Spreng. in L., Syst. Veg., ed. 16, 2: 760. 1825; Blume, Bijdr. Fl. Ned. Ind. 14: 811--812. 1826; Sweet, Hort. Brit., ed. 1, 2: 322. 1827; W. Hook., Bot. Misc. 1: 284. 1829; Loud., Encycl. Pl. 522, fig. 8699. 1829; Wall., Numer. List [49]. nos. 1802 & 1803. 1829; Loud., Hort. Brit., ed. 1, 247. 1830; Sweet, Hort. Brit., ed. 2, 416. 1830; Cham., Linnaea 7: 106. 1832; Géel, Sert. Bot. Cl. 2: 14. 1832; Loud., Hort. Brit., ed. 2, 247. 1832; Mohl, Ann. Sci. Nat., ser. 2, 3: 225 & 319. 1835; Reichenb., Fl. Exot. 3: pl. 208. 1835; Hook. & Arn., Bot. Beech. Voy. 268. 1838; G. Don in Loud., Hort. Brit., ed. 3, 247. 1839; G. Don in Sweet, Hort. Brit., ed. 3, 550. 1839; Steud., Nom. Bot. Phan., ed. 2, 1: 383. 1840; D. Dietr., Syn. Pl. 3: 618. 1842; Jack in Griff., Calcut. Journ. Nat. Hist. 4: 16--17 & 39. 1843; Hassk., Cat. Pl. Hort. Bot. Bogor. Cult. Alt. 136. 1844; Lindl., Gard. Chron., ser. 1, 5: 435 & [viii]. 1845; Morr., Ann. Soc. Roy. Agr. Bot. Gand. 1: [17]. 1845; Voigt, Hort. Suburb. Calc. 466. 1845; Walp., Repert. Bot. Syst. 4: 100 & 102. 1845; Schau. in A. DC., Prodr. 11: 657 & 668. 1847; Hassk., Pl. Jav. Rar. 488--489. 1848; Griff., Notul. 4: 169. 1854; Buek, Gen. Spec. Syn. Candoll. 3: 106 & 502. 1858; Miq., Fl. Ned. Ind. 2: 879--880. 1858; Miq., Fl. Ind. Bat. Suppl. 1: 243 & 568. 1860; A. Wood, Class-book, [ed. 42]. imp. 1, 539. 1861; Anon., Journ. Hort. 28 [ser. 2, 3]: 514. 1862; Bocq., Adansonia, ser. 1 [Baill., Rec. Observ. Bot.], 2: [Rév. Verbenac.] 14, 94, & 127, pl. 8, fig. 29 (1862) and 3: 214, pl. 7. 1863; A. Wood, Class-book, [ed. 42], imp. 2, 539 (1863), [ed. 42]. imp. 3, 539 (1865), [ed. 42], imp. 4, 539 (1867), and [ed. 42], imp. 5, 539. 1868; Gomes, Mem. Acad. Sci. Lisb. Cl. Sci. Mor. Pol. Bel.-Let., ser. 2, 4 (1): 28. 1868; A. Wood, Class-book, [ed. 42], imp. 6, 539 (1869), [ed. 42], imp. 7, 539 (1870), and [ed. 42], imp. 8, 539. 1872; Firminger, Man. Gard. India, ed. 3, 529. 1874; A. Wood, Class-book, [ed. 42], imp. 9, 539. 1876; Jack, Malay. Misc. [Descrip. Malay. Pl.], imp. 2, 1: 16--17. 1877; A. Wood, Class-book, [ed. 42], imp. 10, 539. 1881; C. B. Clarke in Hook. f., Fl. Brit. India 4: 593. 1885; Maxim., Bull. Acad. Imp. Sci. St.-Pétersb. 31: 83 & 86. 1886; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26 [Ind. Fl. Sin. 2]: 261--262. 1890; W. Hook., Curtis Bot. Mag. 116

[ser. 3, 46]: pl. 7141. 1890; Engl., Bot. Jahrb. 13: Übers. 93. 1891; Kuntze, Rev. Gen. Pl. 2: 506. 1891; "W. W.". Garden Lond. 42: 562/563, pl. 889. 1892; Bois, Dict. Hort. 1: 334. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561 & 562 (1893) and imp. 1, 2: 1219. 1895; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 175. 1895; Voss in Vilm., Blumengärt. 1: 829 & 831--832. 1895; Koord. & Valet., Meded. Lands Plant. 42: [Beijdr. Boomsart. Java 7]: 164 & 212. 1900; Skeat, Malay. Misc. 79 & 236. 1900; F. N. Williams, Bull. Herb. Boiss., ser. 2, 5: 432. 1905; Brandis, Indian Trees, imp. 1 & 2, 508. 1906; Maxwell, Journ. Roy. Asiat. Soc. Straits 45: 32, 37, & 51. 1906; Brandis, Indian Trees, imp. 2a, 508. 1907; Gamble in King & Gamble, Journ. Asiat. Soc. Beng. 74 (2 extra): 826, 838, & 839. 1908; C. B. Robinson, Philip. Journ. Sci. Bot. 3: 305. 1908; Kawakami, List Pl. Formos. 84. 1910; Woodrow, Gard. Trop., ed. 6, imp. 8, 438. 1910; Brandis, Indian Trees, imp. 3, 508. 1911; Craib, Kew Bull Misc. Inf. 9: 444. 1911; Ridl., Journ. Roy. Asiat. Soc. Straits 59: 156. 1911; Koord., Exkursionsfl. 3: 138. 1912; Matsumura, Ind. Pl. Jap. 2 (2): 532. 1912; Ridl., Journ. Fed. Malay States Mus. 5: 165. 1915; Backer, Tropische Natuur 5: 89 & 94. 1916; E. D. Merr., Interpret. Rumph. Herb. Amb. 455. 1917; Firminger, Man. Gard. India, ed. 6, 2: 386. 1918; H. Hallier, Meded. Rijks Herb. Leid. 37: 81. 1918; A. Chev., Cat. Pl. Jard. Bot. Saigon 35. 1919; H. J. Lam, Verbenac. Malay. Arch. 295 & 364. 1919; Bakh. in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 76, 92, 110, iii, & ix. 1921; Bartlett, Papers Mich. Acad. Sci. 6: 34. 1921; Brandis, Indian Trees, imp. 4, 508. 1921; E. D. Merr., Philip. Journ. Sci. 21: 533 & 601. 1922; Rodger in Lace, List Trees Shrubs Burma, ed. 2, 133. 1922; Ridl., Fl. Malay Penins. 2: 624 & 628. 1923;H. F. MacMillan, Trop. Gard. Plant., ed. 3, 110. 1925; Sasaki, List Pl. Formos. 351. 1928; Stapf, Ind. Lond. 2: 239. 1930; Wangerin, Justs Bot. Jahresber. 50 (1): 247. 1930; Alston in Trimen, Handb. Fl. Ceyl. 6: Suppl. 1: 232 & 233. 1931; P'ei, Mem. Sci. Soc. China 1 (3): 124 & 144--145. 1932; Rehnelt, Pareys Blumengärtn., ed. 1, 280--281. 1932; Crevost & Pételot, Bull. Econom. Indo-chine 37: 1295 & 1296. 1934; Burkill, Dict. Econ. Prod. Malay Penins., imp. 1, 1: 589 & 590. 1935; Dop in Lecomte, Fl. Gén. Indo-chine 4: 851, 864, & 866. 1935; H. F. MacMillan, Trop. Plant. Gard., ed. 4, 104, 105, & 514. 1935; E. D. Merr., Trans. Amer. Philos. Soc., ser. 2, 24 (2): 15, 337, & 420. 1935; Kanehira, Formos. Trees, ed. 2, 651 & 718. 1936; B. Thomas, Engl. Bot. Jahrb. 68: [Gatt. Clerod.] 10. 1936; Alston, Kandy Fl. 64. 1938; Fletcher, Kew Bull. Misc. Inf. 1938: 404, 425, & 429. 1938; Mold., Geogr. Distrib. Avicenn. 38. 1939; Mold., Prelim. Alph. List Inv. Names 14, 19, 21, 22, & 53. 1940; Mold., Suppl. List Comm. Vern. Names 6. 1941; Worsdell, Ind. Lond. Suppl. 1: 238. 1941; Mold., Alph. List Inv. Names 12, 15, 17, 19, 20, & 56. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 55, 57-64, 66, 72, & 91. 1942; H. F. MacMillan, Trop. Plant. Gard., ed. 5, imp. 1, 104, 105, & 514. 1943; Mold., Phytologia 2: 100. 1945; Savage, Cat. Linn. Herb. 110. 1945; Blume, Cat. Gewass., imp. 2, 82. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 561 (1946) and imp. 2, 2: 1219. 1946; H. F. MacMillan, Trop. Plant.

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Illustrations: Andr., Bot. Repos. 10: pl. 628 (in color). 1810; Ker-Gawl in Edwards, Bot. Reg. 5: pl. 406 (in color). 1819; Loud., Encycl. Pl. 522, fig. 8699. 1829; Geel, Serr. Bot. Cl. 2: 14 (in color). 1832; Reichenb., Fl. Exot. 3: pl. 208 (in color). 1835; Lindl., Gard. Chron., ser. 1, 5: 535. 1845; Bocq., Adansonia, ser. 1 [Baill., Rec. Observ. Bot.] 2: [Rév. Verbenac.] pl. 3, fig. 29 (1862) and 3: pl. 7. 1863; W. Hook., Curtis Bot. Mag. 116 [ser. 2, 46]: pl. 7141 (in color). 1890; "W. W.", Garden Lond. 42: 562/563, pl. 889 [as "*kaempferi*"] (in color). 1892; H. F. MacMillan, Trop. Gard. Plant., ed. 3, 110 (1925), ed. 4, 105 (1935), ed. 5, imp. 1, 105 (1943), ed. 5, imp. 2, 105 (1946), ed. 5, imp. 3, 105 (1948), ed. 5, imp. 4, 105 (1949), and ed. 5, imp. 5, 105, 1952; G. W. Long, Natl. Geogr. Mag. 103: 205 (in color). 1953; H. F. MacMillan, Trop. Plant. Gard., ed. 5, imp. 6, 105 (1954), ed. 5, imp. 7, 105 (1956), and ed. 5, imp. 8, 105. 1962; Liu, Illustr. Nat. Introd. Lign. Pl. Taiwan 2: 1217. 1962; Graf, Exotica 3: 1481 [as "*C. buchanani*" & "*C. paniculatum*"]. 1963; Corner & Watanabe, Illust. Guide Trop. Pl. 756. 1969; J. F. Morton, Exot. Pl. 120 (in color). 1971; Mold. in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 140, fig. 15. 1973; J. F. Morton, 500 Pl. S. Fla. 55. 1974.

A bushy perennial herb or erect bushy shrub or subshrub, often simple or subsimple, to 3 m. tall, often woody only at the base;

stems and branches to 3 cm. in diameter, stout, medullose or hollow, obtusely tetragonal, usually deeply sulcate in drying, minutely pulverulent-puberulent or glabrate; nodes with a broad band of tomentose hairs; leaves decussate-opposite, gradually smaller upwards; petioles 12--35 cm. long, minutely pulverulent-puberulent or glabrate; leafblades thin-chartaceous or membranous, roundish to ovate or broadly ovate, 6--40 cm. long, 7--38 cm. wide, usually nearly as wide as long, basally subrotund to cordate, deeply 3--7 [mostly 5] -lobed or the uppermost often unlobed, basally palmately veined, the lobes triangular-ovate, apically acute or apiculate to acuminate, spreading, variable in size, wilting rapidly, marginally remotely apiculate-denticulate to shallowly crenate-dentate or entire and with conspicuous glands 3--8 mm. apart, bright- or dark-green and usually shiny above, lighter and dull beneath, pulverulent and minutely strigillose above or glabrate, densely squamulose with small, whitish, orbicular, peltate scales and punctate beneath, glabrous between the scales or pubescent only on the venation, the central lobe mostly large and ovate, the others much smaller and triangular; inflorescence axillary and terminal, the axillary cymes mostly confined to the uppermost leaf-axils, the cymes long-pedunculate, 9--13 cm. long and 3--7 cm. wide, many-flowered, building up often large and thyrsoid, much-branched, terminal panicles to 45 cm. long and wide, 1--4 times dichotomous, composed of 4--16 pairs of cymes, the ultimate divisions often racemiform, the ramifications divaricate-ascending, conspicuously bracteate, rose-red, minutely pulverulent-puberulent or glabrate throughout but often tomentose at the sympodial nodes; peduncles 1.5--12 cm. long, mostly red or reddish, exactly similar to the adjacent stems in shape and texture; pedicels rose-color, subfiliform, 4--15 mm. long; foliaceous bracts large, a pair subtending each of the larger pairs in inflorescence ramifications, ovate-elliptic, unlobed or obscurely 3-lobed, similar to the leaves in other respects but smaller; bractlets and prophylla linear, 1--10 mm. long, puberulent; flowers slightly odorous, red and glandulose in bud; calyx red or orange-red, campanulate, about 13 mm. long, short-pubescent, divided nearly to the base, the tube 3--5 mm. long, the segments erect or spreading, triangular, apically acute, dorsally punctate; corolla hypocrateriform, orange-red to scarlet, externally short-hairy, the tube slender-cylindric, 1--2 cm. long, the limb spreading, 5-lobed, the lobes oblong, 6--8 [or 12] mm. long, spreading, paler, separated in the throat by white streaks, the posterior pair shorter and narrower than the others; stamens 4, orange-red or red, exserted 2.5--3.5 cm. during anthesis, curved; filaments very slender; style red, 4 times as long as the corolla-tube, exserted about 2/3 as far as the stamens; stigma minutely bilobed; ovary glabrous; fruit drupaceous, small, at first green, then greenish-blue or bluish to black, globose, externally glabrous, more or less enclosed by the persistent fruiting-calyx.

This is a spectacularly showy plant native to southeastern Asia from India, Bangladesh, and the Andaman & Nicobar Islands eastward through Burma, Thailand, and Indochina to Malaya and Indonesia, north into China and Taiwan. It is very widely cultivated in all

warm regions, where it often escapes and becomes naturalized, in greenhouses as specimen plants elsewhere.

Linnaeus, in the original description of the species (1767) states merely, in lieu of designation of a type: "Habitat in India" and gives no earlier author or collector citations, so the specimen in his herbarium in London should be regarded as the type. I examined this specimen many years ago -- it is in genus 810, *Clerodendron* [spelled thus on the outside cover, but *Clerodendrum* on the inside cover], sheet no..5, inscribed "*paniculatum*" in Linnaeus' own handwriting and also "Juan bonge" in his hand [perhaps a vernacular name?]. The species is a member of the Section *Squamata* Schau.

Merrill (1935) states that "Loureiro's description [of *Volkameria angulata*] is an excellent one and it conforms to the characters of the Linnaean species [*Clerodendrum paniculatum*]. His type is preserved in the herbarium of the Paris Museum and it has been identified by Desvaux as *Clerodendrum paniculatum* Linn." Loureiro (1790) notes: "Habitat ubique in collibus, & in hortis minus cultis in Cochinchina". It may be noted, in passing, that *Clemens & Clemens 3203* is a topotype of the Loureiro species, having been re-collected at the type locality. Morren (1845) places *Volkameria angulata* Lour. in the synonymy of *Clerodendrum squamatum* Vahl [now known as *C. kaempferi* (Jacq.) Sieb.] with a question, but I agree with Desvaux and Merrill that it definitely belongs in the synonymy of *C. paniculatum* L. instead.

The *Volkameria diversifolia* Vahl and *Clerodendron diversifolium* Vahl, sometimes included in the synonymy of the typical form of this species, are now regarded as *C. paniculatum* var. *diversifolium* (Vahl) C. B. Clarke, which see. The *C. paniculatum* of Perrotet, referred to above, is a synonym of *C. intermedium* Cham.

It should also be noted here that Nemnich (1791) reduced what he called *Volkamaria* [sic] *multiflora* Burm. to the synonymy of *Clerodendrum paniculatum* L., but, actually, Burman's binomial belongs in the synonymy of *C. phlomidis* L. f.

Among bibliographic errors in the literature may be mentioned that Hallier (1918) dates the Miquel (1858) reference as "1856". Hsiao (1978) dates the Linnaeus (1767) reference as "1768", but pages 1 to 142 of the work in question were actually published in October of 1767.

Collectors have encountered *Clerodendrum paniculatum* in deciduous and dry evergreen forests, bamboo forests and swamp forests, in open places in evergreen forests, on grassy slopes shaded by tropical forests, in old clearings and waste ground, along roadsides and fencerows, in scrub jungles, at forest margins, along streams, in hedges, in open fields and marshland, on granitic hills and hillslopes, in village thickets, on railroad embankments, in betel-nut groves and rubber plantations, in open places along rivers, in "cascade forests on limestone", in shaded bamboo-deciduous forests and thickets, and in moist or wet places in general in either shade or bright sun, at altitudes of sealevel to 1200 m., in anthesis from January to November, and in fruit in July, September, and October.

Sinclair reports the species rare along roadsides in Singapore; Clemens found it frequent or fairly frequent in thickets in Annam [Vietnam]. In Thailand it is said by Bunnak to be common in evergreen jungles. Squires refers to it as "a widely distributed ornamental" in Annam; Saldanha says that it is "a locally common undershrub" in Mysore (India). In Sri Lanka it has been reported by Koyama as "locally abundant in forest among rubber plantings", Gould found it "frequent on stream banks at forest margins", and Amaratunga refers to it as "an escape, now a bad weed in moist or wet low country"; Mueller-Dombois describes it as "a commonly cultivated shrub, growing wild in large groups along roadsides".

As to flowering, Chevalier (1919) says that in Vietnam it blossoms from April to September; Dournes (1973) says that it flowers in the "dry season", but in Panama Coats (1978) avers that it blooms "principally in the rainy season". Backer (1916) reports that in Java it blooms from September to April, while Blume (1826) gives "toto anno" as its blooming season. In England, according to Synge (1956), it blooms from July to October.

Moninger, on Hainan Island, says of this plant: "especially fond of hedges, an herb 1--2 m. tall, the flowers bright-red, the fruit [a] greenish-blue berry, plant red for a long time from beginning of flowering to end of fruiting." Its vernacular name there, "baën zitang", means "100 days red". The fruit, of course, is a drupe, not a berry.

The color of the corollas is described as "red" on *Beusekom & al. 1922, Bunnak 161, Charoenphil & al. 4116, Gould 13588, Gressitt 45, Køie & Olsen 1440, Larsen & al. 105 & 1356, Ream 543, Saldanha 13461 & 13681, Sinclair 4999, Sumithraarachchi DBS.422,* and *Wood 743,* as "dark-red" on *Boonchuai 1129,* as "brick-red"on *Amaratunga 1848, Liogier & al. 32355,* and *Moninger 79,* "orange-red" on *Amaratunga 2138, Maxwell 75-444,* and *Moldenke & al. 28335,* "bright-red" on *Cunniff 47, Stevens 453,* and *Sumithraarachchi DBS.509,* "scarlet-red" on *Moldenke & al. 28120,* "deep-red" on *Moldenke & al. 28257,* "orange" on *Geesink & Santisuk 5297* and *Shimizu & al. T.7838,* "pale to red-orange" on *Tyson 4207,* "dark-orange" on *Ebinger 40,* "scarlet" on *Moldenke & al. 28333* and *Ream s.n.,* "bright-scarlet" on *Squires 150,* "deep-orange or deep orange-red" on *Koyama 13553,* "somewhat washed-out red" on *Gillis 11035,* "orange-red, deeper orange-red toward the center" on *Amaratunga 712,* "tube red-orange, lobes light-orange" on *Blum & Kimmel 2281,* "tube orange-red, lobes incarnately orange, throat white inside" on *Geesink & al. 6619,* and "base of tube reddish-orange, rest orange, throat reddish-orange" on *Amaratunga 2291.* Peale describes the plant as "An erect unbranched herb 42 inches tall, the sepals approximately RHS [Royal Horticultural Society Color Chart] Capsicum Red 715, corolla-tube Indian Orange 713, corolla-lobes Carrot Red 612/1 distally, but same as the tube proximally".

Dietrich (1842) gives the native land of *C. paniculatum* as "Java et Cochinchina"; Miquel (1860) lists it from Banka and western Sumatra; Voss (1895) gives its distribution, as known to him, as the East Indies, Cochinchina, and Java; Briquet (1895) claims that it

is distributed "in Vorder- und Hinterindien, sowie in Archipel weit verbreiten". Brandis (1906) gives the distribution as "Pegu, Tenasserim, Malay Peninsula, Thailand, Cochinchina, China, and Taiwan. Woodrow (1910), amazingly and incorrectly, gives its original home as "East Persia". Ridley (1911) gives the distribution as "Siam and Malaya"; Hallier (1918) apparently knew it from Taiwan, Hainan, Thailand, Cochinchina, Lower Burma, Malacca, Penang, Singapore, Sumatra, eastern and western Java, and Ternate, citing *Raap 617* from Java and *Reinwardt 1594* from Ternate.

Merrill (1922) cites *Castillo 598* from level land near the seashore in Sabah, asserting that this constitutes a new record for Borneo, and giving the species' overall distribution, as known to him at that time, as Burma, Thailand, Cochinchina, and southward to the Malaya Peninsula, Java, and Ternate. Ridley (1923) remarks that it is difficult to determine now where the plant is actually native in Malaya because "pieces are carried about by Sakai girls, who wear them in their hair, and apparently plant them in their camps".

Fletcher (1938) gives the distribution, as known to him, as Burma, Laos, Annam, Malay Peninsula, Sumatra, Hainan, Java, and Taiwan, citing from Thailand the following collections: *Collins 210, 1475,* & *2831, Garrett 1010, Keith s.n., Kerr 513, 762, 4436, 9072, 10739,* & *15616, Lakshnakara 439* & *875, Marcan 414* & *2383, Put 31, Schomburgk 249,* and *Winit 485*. He also records it as cultivated in Thailand.

Ruíz-Terán, in Venezuela, says of it: "Arbusto erecto, ramificado, 1,5 m., introducido y cultivado como ornamental. Tallo verde intenso, las caras virtualmente reducidas al surco medial, las aristas gruesas, obtusas o redondeadas. Hojas cartáceas, más o menos lobadas, verde intensas por la haz, más claras por el envés. Panículas de cimas, terminales, muy vistosas, 30--40 cm. de largo; ejes amarillo verdosos a verde amarillentos. Cáliz rojo intenso. Corola con tubo rojo intenso y limbo rojo anaranjado a rojo escarlata. Filamentos + estilo rojo escarlatas a morado rojizos."

Long (1953) records (and pictures) the species from Kuala Lumpur, Selangor (Malaya) and avers that it occurs "from south China to the Moluccas", noting that the Malays "use its essence as an elixir". Synge (1956) gives its original home as eastern tropical Asia; Ker-Gawl (1819), Sweet (1827), MacMillan (1943), and Hundley & Ko (1961) claim that its origin was in Java, but Backer & Bakhuizen (1965) report that in Java its pollen is always "badly developed" and no fruit has yet been observed there although it grows there in shaded places and forests in the western, central, and eastern portions of the island and is also cultivated there as an ornamental.

Burkill (1966) gives the species' known distribution as from Burma and southern China, throughout the Malay Peninsula, to Java and Ternate. The Baileys (1976) regard it as native to Southeast Asia; Raeuschel (1797) and Linnaeus (1767) regarded it as only from India; Poiret (1804) said it was from "les Indes orientales". Griffith (1854) lists the species [as *C. splendidum* Wall.] from Mergui, citing *Mergui Herb. 78*, growing there "in ruderatis". Wallich's original collection of what he called *C. splendidum* was from Tavoy in Burma.

Hsiao (1975) tells us that in Taiwan *Clerodendrum paniculatum* is "common in thickets and waste places at low altitudes throughout the island", citing *Fauri 300, Furukawa s.n., Gressitt 45, Sasaki 31416,* and *Wilson 9901* and comments that the species is "Widely distributed from China to Malaysia".

López-Palacios (1976) cites *López-Palacios & Idrobo 3708* as cultivated in El Valle, Colombia; in his 1974 work he cites *Ruiz-Terán & al. 10864* as cultivated in Venezuela. Chin (1977) reports the species cultivated in Singapore, while Croat (1978) found it cultivated on Barro Colorado Island, Panama, citing *Croat 7000,* giving its nativity as "Asia" but "cultivated in Europe and in the American tropics and subtropics. In Panama known only from tropical moist forest in the Canal Zone", where, he states, "no fruits have been seen". Fosberg & al. (1979) record it from Guam, Palau, Kotor, and Ponape in the Marianna and Caroline Islands.

Ker-Gawl (1819) asserts that the species was introduced into cultivation in England in 1809 from "Pulo Pinang (Prince of Wales Island" [=Penang, Malaya]. An author in The Garden (London) in 1892 notes that "*C. paniculatum* was in cultivation [in England] fifty years ago, and after a long absence was again introduced to Kew from China in 1889, and flowered in the stove in November.....The plant flowers freely, and is in every way a useful stove shrub. It is a native of various parts of India as well as China."

Bailey, in a personal communication to me in 1935, stated that it was at that time handled for the horticultural trade only by "Singapore" and "Taihoku". Menninger offered it to the gardeners in Florida in 1960 and for some time thereafter; Voigt (1845) found it in cultivation in the suburbs of Calcutta, India; Gledhill (1962) records it as cultivated in Sierra Leone.

Nair & Rehman (1962) describe the pollen (on the basis of *Natl. Bot. Gard. 4164, slide 2630,* from Calcutta) as "Spheroidal, size 70 mu. Apocolpium diameter 42 mu. Exine 9 mu thick. Ectine surface spinulate. interspinal area faintly granulate." Huang (1972) describes the grains as 6-colpate (pericolpate), 53--57 mu wide, the colpi 22--28 x 2 mu, on the basis of *Huang 5507* from Taiwan.

Malaviya (1963) reports the presence of stone-cells in this species. Gibbs (1974) reports syringin doubtfully present in the stems and the HCl/methanol test negative. Fasciated inflorescences can be seen on *Backer 18851* and on *Koorders 29812b.*

Hansford (1961) records the fungus, *Meliola clerodendri,* on this host in Sierra Leone, based on *Deighton 1062.* Hirata (1966) found the species infested by *Erysiphe cichoracearum* in Mauritius, while Batista & al. (1969) report the leaves attacked by *Didymella sphaerelloides* Sacc. & Syd. in Brazil.

Corner (1952) tells us that, as in most members of this genus, the flowers of *Clerodendrum paniculatum* "are pollinated by butterflies and bees which suck the honey [nectar] from the base of the corolla-tube. In most species the stamens and style project from the lower side of the flower so that the pollen is carried on the underside of the insect. The flowers last more than one day: the stamens project first then curl back under the flower and leave the

style in position."

As to other economic uses of *C. paniculatum*, besides cultivation for ornament, Crevost & Pételot (1934) report it is "Utilisée contre les pertes blanches" [=leucorrhea]. Bartlett (1921) implies that it is the chief "summoner of spirits" in magic ceremonies in north-central Sumatra and asserts that its vernacular names in Malaya indicate that it is also so employed there. According to Skeat (1900) it is one of the plants used in making the leafy brush used for sprinkling the consecrated rice-gruel (tĕpong tawar) in wedding ceremonies, in the blessing of fishing-stakes, and in the "taking of the rice-soul". Burkill (1935) reports that the Malays "infuse it and drink the infusion as a purgative, and apply it externally upon distended stomachs". Maxwell (1906) states that it is employed as an elephant medicine which is supposed to render elephants more "confident, brave, and protected from harm".

Harler (1962) asserts that this species will thrive in poor soil and that in India it is used for cut flowers and for background planting in rock gardens. Greensill (1966) recommends that it be grown in clumps in full sun exposure or in partial shade, remarking also that it "cuts easily", i.e., can be used as cut flowers. Mac Millan (1943) asserts that it is usually propagated by cuttings. Apparently this is the method of its propagation in regions where it fails to produce fruit or set seed.

Firminger (1918) avers that the corollas of what he calls *C. pyramidale* are "of rather a pallid crimson, not so brilliant" as in the true *C. paniculatum*. He notes that it, also, "is most easily propagated by cuttings of the young shoots, which soon become handsome plants." Ridley (1915), in speaking of *C. citrinum* Ridl., says that his species is "Allied to *C. paniculatum*, Linn. differing in the colour of the flowers, which are pubescent and the cuneate leaf base".

P'ei (1932) comments that "The fragmentary material of *Clerodendron darranii* Lévl. and of *C. Leveillei* Fedde which I have examined in the Herbarium of the Arnold Arboretum, indicates their close alliance to or identity with *Clerodendron paniculatum* L." These Léveillé names are now regarded, however, as representing *C. japonicum* (Thunb.) Sweet, which see.

Vivekananthan (1968) asserts that, in his opinion, *C. paniculatum* "Comes near to *C. petasites* (Lour.) A. Meeuse (*C. viscosum* Vent.) but differs in having its leaves ovate, 3--5 lobed, with prominent round glands beneath; petioles connected by a dense ring of hairs and in having red flowers; distributed on Andaman & Nicobar Is., Burma, China, Cochin China, Formosa, Java, Malaya & Siam... In India it has not been reported so far in any of the floras" -- however, a collection by J. W. Helfer (*no. 217*) made in 1836--1838 in Bengal around the city of Calcutta is deposited in the Central National Herbarium in Calcutta. A recent collection has been made near plantations in the Peermade Hills and cited are *Vandiperiyar s.n., Vivekananthan 20380 & 23970,* and *Naithani 24684* from Kerala.

Common and vernacular names reported for *Clerodendrum paniculatum* are: "bach dông nữ", "baeh zitâng", "bhang be:n". "bunga mara" [=

danger flower], "bunga tinggal", "cây vây", "danger flower", "gefiederte Losbaum", "gepluimde lotboom", "higiri", "hoa mô trắng", "juan bonge", "kambang boegang", "kambang bugang", "leñg-chûn-hoe", "malang beranjam", "nom sawan", "nom swan", "nom-zwan", "pagoda flower", "pagoda-flower", "pangil-pangil", "panicled clerodendron", "pan-letwah", "panyin", "péh-léng-chún-hoe", "pemanggil", "pengkilai", "pepangil", "peragu paniculé", "pingdang", "red pagoda", "red pagoda flower", "rispenblütiger Losbaum", "ryûsenkwa", "ryûsenkwa", "sarang banoea", "scarlet glorybower", "sĕpangil" [=the summonermoner of spirits], "sapanggil", "sima-higiri". "si panggil", "si panggil eme", "tabut", "vây", and "warudogong".

Keys to help distinguish *C. paniculatum* from other Chinese species will be found under *C. canescens* Wall. and *C. henryi* P'ei in the present series of notes [58: 416 and 60: 180--181], from other Taiwan species under *C. intermedium* Cham. [60: 276], from other Indian species under *C. griffithianum* C. B. Clarke [60: 135--136], from other Indian & Hawaiian species under *C. indicum* (L.) Kuntze [61: 23--25], from other Indochinese species under *C. hahnianum* Dop [60: 141--143]. from other Indonesian species under *C. klemmei* Elm. [61: 410--415], from other Thailand species under *C. inerme* (L.) Gaertn. [61: 88--95], and from other cultivated taxa under *C. bethunianum* Low [58: 195--198].

Maximowicz (1886) cites *Hooker & Arnott s.n.* from the Ryukyu Islands, *Oldham 395* from Taiwan, and *Wallich s.n.* from Penang, giving an additional distribution as "India trans Gangem et insulae..Java". He comments that "Planta formosana florere incipiens huc ducenda videtur, quamvis folia floralia indivisa, quae in iconibus et spec. malo Wallichii lobata sunt, et corollae tubus calyce duplo tantum longior, neque, ut a Schauero descriptus, calycem 4-plo superans, sed hoc sane ob corollam juvenilem."

Williams (1905) cites *Schomburgk 249* from Thailand. Li (1963) cites from Taiwan: *Faurie 300 & 403, Ford s.n., Furukawa s.n., Gressitt 45, Hancock 49 & s.n., Ito s.n., Makino s.n., Maries s.n., Nagasawa 103, Oldham 395, Owatari s.n., Raam 543, Sasaki 21416, Suzuki s.n., Swinhoe s.n., Tanaka 106, Tanaka & Shimada 10974, Wilford 544,* and *Wilson 9901.*

The *Herb. Houlluyn s.n.*, cited below, does not bear any indication on its accompanying label that it represents cultivated material, but I am assuming that it does.

Material of *C. paniculatum* has been misidentified and distributed in some herbaria as *C. bethunianum* Low, *C. bungei* Steud., *C. citrinum* Ridl., *C. fallax* Lindl., *C. fragrans* Vent., *C. intermedium* Cham., *C. japonicum* (Thunb.) Mak., *C. kaempferi*(Jacq.) Sieb., *C. koshunense* Hayata, and *C. squamatum* Vahl. On the other hand, the *Huang 1537*, distributed as *C. paniculatum*, actually is *C. canescens* Wall., while *Burkill 13949* and *Furtado s.n.* [Lawn M, Nov. 18, 1927] are *C. citrinum* Ridl.; *Steward & Cheo 816* is *C. colebrokianum* Walp.; *Bünnemeijer 3110, Tsang & al. 7674,* and *Walker 7450* are *C. intermedium* Cham,; *Chiao 1495* and *Herb. Univ. Nanking 14694* are *C. japonicum* (Thunb.) Sweet; *Bünnemeijer 3756, Chung 1672, Herb. Canton Chr. Coll. 7284, Herb. Ling. Univ. 15524 & 16847, Katsumada 21952,* Mc

Clure 771, Sumithraarachchi DBS.509, Tak 25 & 98, Tanaka & Shimada 10974, Tsang 25 & 98, Wu 1089, Yates 2525, and *Ying 853* are C. *kaempferi* (Jacq.) Sieb.; *Squires 828* is C. *palmatolobatum* Dop; *Clemens & Clemens 3203* and *Squires 363* are C. *paniculatum* f. *albiflorum* Mold.; *Thomson & Hooker s.n.* [cult., Plan. Ganget. Inf.] is C. *phlomidis* L. f.; *Phengklai & al. 4225* is C. *urticifolium* (Roxb.) Wall.; and *Saldanha 13681* is not verbenaceous.

Citations: PANAMA: Barro Colorado Island: *Ebinger 40* (E--1772864, Mi, Mi, W--2560637, W--2560638); *Tyson 4207* [ETC Label 1001 8 Feb. 55 (Teat)] (E--1836337). INDIA: Karnataka: *Saldanha 13461* (W--2794821), *13681* (W--2653636). West Bengal: *Helfer s.n.* [Calcutta, 1836-38] (Go, S). State undetermined: *Herb. Linnaeus G.810, S.5* (Ld--photo of type, Ls--type, N--photo of type). SRI LANKA: *Amaratunga 712* (Pd), *1848* (Pd), *2138* (Pd), *2291* (Pd); *Gould 13588* (W--2574814A); *Koyama 13553* (N, N, Pd); *Moldenke, Moldenke, Dassanayake, & Jayasuriya 28333* (Gz, Ld, Pd, Tu, W--2764551), *28335* (Ac, E, Pd, W--2764549); *Moldenke, Moldenke, & Jayasuriya 28257* (Ac, Gz, Kh, Ld, Pd, Tu, W--2764524); *Moldenke, Moldenke, Jayasuriya, & Sumithraarachchi 28120*(Ac, E, Gz, Kh, Ld, Pd, Tu, W--2764562); *Mueller-Dombois 67052802* (W--2586011A); *Sumithraarachchi DBS.422* (Ac, Gz, Lc, Ld, Lv, Tu, W--280832, Ws). BURMA: Tenasserim: *Helfer 6050* (T). Upper Burma: *Kingdon-Ward 9038* (N), *22573* (Go). CHINESE COASTAL ISLANDS: Hainan: *Moninger 79* (Ph). THAILAND: *Beusekom & Charoenpol 1922* (Ac); *Boonchuai 1129* [Herb. Roy. For. Dept. 26393] (S); *Bunnak 161* [Herb. Roy. For. Dept. 11523] (Ld); *Charoenphol, Larsen, & Warncke 4116* (Ac), *4439* (Ac); *Collins 2381* (W--1701706); *Cunniff 47* (N); *Geesink, Hattink, & Phengklai 6619* (Ac); *Geesink & Santisuk 5297* (Ac); *Iwatsuki, Koyama, Hutch, & Chintayungkun T.14515* (Ac); *Larsen, Larsen, Nielsen, & Santisuk 31176* (Ac); *Larsen, Smitinand, & Warncke 105* (Ac, Ld), *1356* (Ac, Ld); *Maxwell 75-444* (Ac); *Shimizu, Fukuoka, & Nalampoon T.7751* (Ac), *T.7838* (Ac). VIETNAM: Annam: *Clemens & Clemens 4383* (Ca--340344, Mi, N); *Jacquet 595* (Ca--54814); *Kuntze s.n.* [III/75] (N); *Squires 363* (La). Cochinchina: *Docters van Leeuwen 4787* (Bz--20157); *Squires 150* (Bz--20158, Ca--305925, N, Pd, W--1425726); *Talmy s.n.* [1868] (B); *Thorel 726* (S). Tonkin: *Pierre s.n.* (B, Ca--54644). State undetermined: *Groff, Herb. Canton Chr. Coll. 5672* (Ca--300168, Gg--32025). MALAYA: Pahang: *Holttum 11485* (Bz--20153); *Moysey 31054* (Bz--20152); *Nur 32731* (Mi, W--2157497). Penang: *Burkill 6102* (Bz--20154, Bz--20155), *6132* (Bz--20156); *Wallich 1802* (L). Singapore: *Sinclair 4999* (W--2912696). TAIWAN: *Beattie & Kurihara 10196* (W--1665504); *W. Hancock 49* (Ca--288770); *A. Henry 159* (W--455261), *s.n.* [Apr. 20] (N), *s.n.* [May 31] (N); *H. W. Ream s.n.* [May 14, 1958] (Ws, Ws); *Sasaki 272* (Mi), *s.n.* [Herb. Govt. Formosa 21416] (Ca--344570, La), *s.n.* [Oct. 10, 1922] (Mi); *Tanaka 106* (W--1528112), *s.n.* [1929] (S); *E. H. Wilson 11134* (W--1052401). GREATER SUNDA ISLANDS: Batu: *Raup 598* (Bz--20149). Java: *Backer 3135* (Bz--20129), *4860* (Bz--20123), *12169* (Bz--20134, Bz--20135), *18851* (Bz--20124, Bz--20125, Bz--20126); *Bijhouwer 211* (Bz--20136); *Blume s.n.* (N); *Collector undetermined s.n.* (Bz--20137, Ut--43900); *Hallier s.n.* [22-2-1896] (Bz--20127, Bz--20128); *Hellendoorn 12* (Bz--20122); *Kollmann s.n.* [Java] (Mu--836. M).

[to be continued]

ARNOPHYTON, A NEW NAME FOR ARNOLDIA ASH AND TIDWELL, 1986

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Dr. Sergius Mamay has gratuitously advised us that Arnoldia Ash and Tidwell, 1986, p. 240 is a homonym, being preoccupied by Arnoldia Blume (Saxifragaceae) and Arnoldia Cassini (Compositae). We therefore propose Arnophyton as the new name for Arnoldia Ash and Tidwell. Thus the name of the holotype becomes Arnophyton kuesii (Ash and Tidwell).

LITERATURE CITED

Ash, Sidney R. and William D. Tidwell. 1986. Arnoldia kuesii, a new juvenile fernlike plant from the Lower Permian of New Mexico: Botanical Gazette 147: 236-242.

Blume, C. L. 1826. Bijdragen Flora Nederlandsche Indies, 868.

Cassini, A. H. G. de. 1824. Dictionaire des Sciences Naturelles 30: 330.

NOVITATES ANTILLANAE. XIII

Alain H. Liogier

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Several new records for some islands in the West Indies, together with two new species for the island of Hispaniola and new combinations; as the studies in the floras of Puerto Rico and Hispaniola are progressing, these novelties are noteworthy.

LEGUMINOSAE- MIMOSOIDEAE.

Acacia laeta R. Br.

CUBA; Guantanamo Bay, Aug. 1-5, 1986, A. & P. Liogier 36117, det. R. Barneby. This plant, obviously an introduction from East Tropical Africa, is very abundant in the Base area. First record for the New World.

CONVOLVULACEAE

Jacquemontia solanifolia (L.) Hall. f.

DOMINICAN REPUBLIC: Saona Island, Nov. 30-Dec. 1, 1977, A. & P. Liogier, J.J.Jiménez & I. García 27173. New record for the island of Hispaniola, the westernmost record for this plant.

EBENACEAE

Diospyros crassinervis ssp. urbaniana (Leonard) Alain, comb. nov.

Maba urbaniana Leonard, Journ. Wash. Acad. Sci. 14: 414. 1924.

Diospyros crassinervis is found in the Bahamas, Cuba and Hispaniola; our plants differ from the typical subspecies in its leaves mostly retuse or emarginate at apex, truncate, subcordate or rounded at base, the corolla-lobes much shorter than in ssp. crassinervis. This subspecies grows on serpentine soil both in the Dominican Republic and in Haiti.

DOM. REPUBLIC: Monción, Ekman 12618; Puerto Plata: Arroyo Francés, Ekman 14405, A. Liogier 16138, 16578, Cafemba, Jiménez 5551; S. José de las Matas: Inoa, A. Liogier 11171; Dajabón: Partido, A. Liogier 16264; Los Haitises: Bahía de S. Lorenzo, Abbott 2235, type collect. Boca del Infierno, Ekman 15387; HAITI: Massif des Matheux: Morne à Cabrits, Ekman 8562, 7135, Eyerdam 2.

MYRSINACEAE

Wallenia hughsonii Alain, spec. nov.

Frutex 2-3 m altus, ramosus, hornotini tereti vel subangulosi, grisei glabri; folia plerumque ad apicem ramulorum conferta, 3-5 mm longe petiolata anguste lanceolata vel oblanceolata plerumque in dimidio distalis latiora, 2-5 cm longa, 0.5-1 cm lata, apice acuta, basi sensim angustata in petiolum protracta, coriacea, glabra, nervo medio supra parum impresso, subtus bene prominente, lateralibus numerosis supra vix prominulis, subtus prominentibus, ad marginem antrorse cur-

vatis non anastomosantibus, supra nitida viridia, subtus brunnea, minute nigro-punctata, margine integra leviter recurva; inflorescentiae axillares racemosae, pistillatae tantum visae, usque 16-florae, cum pedunculo (5-7 mm longo) 1-1.5 cm longae, glabrae; pedicelli 1-1.5 mm longi; flores 5-meri, 1.5 mm longi; bracteae non visae; sepala suborbicularia vix 1 mm longa, glabra, apice rotundata leviter erosa, valde imbricata; petala flavo-viridia, obovata, apice subtruncata leviter emarginata, 1.3-1.5 mm longa, imbricata; stamina ad basim petalorum adnata, filamenta nulla, antherae sagittiformae ca. 1 mm longae basi divaricatae; ovarium oblongum, glabrum; stylus 0.5 mm longus, stigma capitatum; fructi globosi, 4 mm diam., stylo 1 mm longo apiculati, brunnei glandulosi.

HISPANIOLA, DOMINICAN REPUBLIC: On limestone rocks, Hoyo de Pelempito, Bahoruco Mts., alt. 1,000 m, 26 Feb. 1971, Alain H. Liogier 17891 (Holotypus: NY, Isotypi: US, G); id. Feb. 26, 1971, A. Liogier 17905, NY; id., Feb. 11, 1981, T. Zanoni, R.P.Adams, C. Ramírez 10919 (NY, SD); Pedernales: from Las Mercedes to Aceitillar, 800 m alt., 11 Feb., 1969, A. Liogier 13780 (NY).

There is some variation in the leaf shape and measurements; in some specimens, the leaves reach 8 cm long and 1.5 cm broad; the pistillate inflorescence may be pulverulent, the peduncle up to 1 cm long, and the sepals may be oblong and acute. I have not seen the staminate flowers.

This species belongs to the Homowallenia group; it resembles W. apiculata Urb., whose leaves are strongly reticulate, 8-14 cm long, and lepidote; W. urbaniana Mez has oblong leaves, rounded at apex, reticulate, up to 13 cm long.

I name this species after the late Mr. Patrick Hughson, former Administrator of the Alcoa Company at Cabo Rojo, Pedernales; his kind hospitality and his interest in botanical exploration of that region made possible the discovery of this plant among many other.

The species of Wallenia are not well known, due to the difficulty of collecting both the staminate and pistillate flowers, the plants being dioecious; as in this case, we have either pistillate or fruiting plants, and quite often the staminate flowers are missing, or the other way around. More collections are needed to complete our knowledge of this genus in Hispaniola.

OLEACEAE

Chionanthus bumelioides var. lanceolata (Knobl.) Alain, comb. nov.

Linociera lanceolata Knobl., Repert. Spec. Nov. 33: 177. 1933.

DOMINICAN REPUBLIC: Los Haitises: Cueva de los Cueros, Ekman 15504, type; Samana Peninsula, Abbott 2296.

This plant differs from var. bumelioides in its leaves lanceolate to obovate-lanceolate, its shorter corolla ; the fruit of this subspecies is not known.

ASCLEPIADACEAE

Marsdenia nubicola Alain, sp. nov.

Volubilis, lignescens , 2-3 m alta; rami multistriati, bifarie pi-

losuli pilis recurvatis, demum glabri, obscure rubri; petioli usque 5 mm longi, supra canaliculati et pilosuli; folia subcoriacea, elliptica vel oblonga, 3-4.2 cm longa, 1.5-3 cm lata, apice rotundata, obtusa vel apiculata, basi obtusa vel acuta, nervo medio supra impresso, lateralibus utroque latere 5-6 supra impressis, subtus manifestis sed vix prominulis, supra grisei subtus flavo-viridia et venis laxe reticulatis, glabra, margine integra recurva; inflorescentiae racemosae interpetiolares, usque 3 cm longae, rachis pilosulus, pedunculi usque 1 cm longi, pedicelli 1-3 mm longi; bracteae ovato-oblongae, vel subulatae, 1-1.5 mm longae; calycis lobi ovati, rotundati, 1.5 mm longi, glabri, minute et sparse ciliati; corolla rubra anguste campanulata, 3 mm longa, extus glabra, lobi 1 mm longi oblongi rotundati, apice glabri, basi sparse barbati; coronae foliola oblonga, rotundata, quam antherae breviora. Caetera ignota.

DOMINICAN REPUBLIC: On exposed crest, in wet area, in cloud forest Alto Casabito, Bonao, alt. 1,300 m, 13 April 1969, A. H. Liogier 14763 (NY, holotypus); id., A. H. Liogier 18248 (NY), 6 Nov. 1971.

This taxon is quite similar to M. dictyophylla Urb., described from Haiti and collected also at Sierra de Neiba in the Dominican Republic; this last species has leaves obovate-elliptic to oblong or ovate, acute to obtuse at base, closely reticulate-veined and pubescent beneath; the flowers are white, 5 mm long, the corolla with white retrorse hairs within.

COMPOSITAE

Spiracantha cornifolia HBK.

PUERTO RICO: On road from Rincón to Aguada, A. H. Liogier 35875 Jan. 27, 1986, coll. P. Vives.

This weedy species is common in the Dominican Republic, in the San Cristóbal Province, extending to the Distrito Nacional; this is the first record for Puerto Rico. It grows in Central America, Venezuela and Colombia.

COMMELINACEAE

Commelina benghalensis L.

PUERTO RICO: Cayey, on Route 1, alt. 520 m, 1 Feb. 1987, F. Axelrod 730, with J. Ackerman & A. Montalvo.

This weedy species native of tropical Asia, is found in Cuba, Jamaica and the Lesser Antilles. New record for Puerto Rico.

BURMANNIACEAE

Cymbocarpa refracta Miers

PUERTO RICO: In wet forest, Luquillo Mts., March, 1987, A. Liogier 36251, coll. P. Vives (UPR).

New record for Puerto Rico. This species is found in the Greater Antilles, Central America and from Colombia, Venezuela Peru and Brasil.

BOOK REVIEWS

Alma L. Moldenke

"ENCYCLOPAEDIA OF FERNS: An Introduction to Ferns, Their Structure, Biology, Economic Importance, Cultivation and Propagation" by David L. Jones, xvii & 443 pp., 250 color pl, & 150+ b/w photo., 12 tab., 104 b/w draw. & 10 tab. Timber Press, Portland, Oregon 97225. 1987. $50.00.

The author is centered "down under" where he has worked prodigiously on all phases of fern life, identity, growth patterns and introduction to horticulture. This thorough and copiously illustrated book has worldwide appeal to those who wish to raise ferns personally or professionally guided by the many excellent photographs and drawings and carefully prepared text. It is organized into 7 parts: (1) appeal, economic importance, morphology, life cycles, allies, classification and cultivars; (2) cultural requirements; (3) pest and disease control, pesticides and fungicides; (4) vegetative and spore propagations and hybridization; (5) specialized culturing; (6) worldwide survey of more than 700 species and cultivars of "ferns to grow"; and (7) appendices with choices of ferns from all over the world for various uses and situations, glossary, fern societies and study groups worldwide and, of course, bibliography.

"INSECTS ON PLANTS -- Community Patterns and Mechanisms" by D. R. Strong, J. H. Lawton & Sir Richard Southwood, vi & 313 pp., 85 fig. incl. 3 photo. & 6 maps, & 19 tab. incl. 1 geol. tab. Harvard University Press, Cambridge, Massachusetts 02138-9983. 1984. $18.95 paperbound.

The hardcover edition, for $35, now out of stock, may have a few copies still available in book stores of universities or of those with specialized, educated clientele. The book addresses itself to 3 major questions and many of their logical subsidiaries: (1) predictability of natural communities, (2) importance of competition between component species in determining community structure, and (3) proportion of coexisting species in contemporary communities coevolved. Field observations are only on phytophagous insects and their host plants and checking experiments are mainly British in setting, but the literature cited is worldwide in scope. The text is carefully and interestingly prepared, logically presented and effectively illustrated. Taxonomically-inclined botanists may wonder about *Buddleia* and the *Buddlejaceae* on p. 98, *Leguminaceae* on p. 202, but will be very grateful for the entomological taxonomy given in the appendices. The authors chose to limit the extent of coevolution between insects and their host plants as presented by Ehrlich and Raven.

"THE ENCYCLOPEDIA OF CACTI" by Willy Cullman, Erich Götz & Gerhard Gröner, 340 pp., 400+ color pl., 12 SEM photo., 40 line draw., 1 map & 5 charts. Alphabooks, Sherborne, Dorset D79 SLIV, U. K. & Interbook Inc, San Leandro, California 94577. 1986. $45.00.

This excellent and beautiful book has its origin in the also outstanding "Kakteen" of 1963. "In this new edition Gerhard Gröner was chiefly responsible for the sections on cactus culture and the new photographs, while Erich Götz contributed the sections on cactus systematics and the information on the genera and species of cacti." The book is made delightful for even the casual browser by its copious and beautiful color photographs. The instructive text on cactus structure covers all anatomical parts from pollen grains to leaf cross-sections, growing, hybridizing, pollination, seed and vegetative propagation, diseases and pests, climate, soils, indoor and outdoor cultivation, habitats and geographic distribution. The taxonomic part includes the key to genera based on both flowering and non-flowering parts and the description of genera and species coordinated with their pictures. Additionally this book supplies spelled-out authors' names, cactus suppliers and associations and their publications, glossary, scientific name index, besides the expected bibliography and general index. I appreciated the authors' explanation for the presence of the "advanced" genus *Rhipsalis* (Sect. *Lepismium*) in Africa, Madagascar and Ceylon (now Sri Lanka) as the sole original cactus with its species so similar to South American ones as dating from the Cretaceous when these two southern continents separated, but from wind-blown off-course migratory bird-borne sticky seeds or on-course ones who acquired the seeds in England after early sailors introduced this orchid as a substitute for native mistletoe in Yuletide celebrations.

"CONTEMPORARY CLASSICS IN PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES" compiled by James T. Barrett, xvi & 371 pp. ISI Press, Philadelphia, Pennsylvania 19104. 1986. $39.95.

In 1977 Eugene Garfield, as editor-in-chief, and his staff "began publishing in CURRENT CONTENTS 'The Week's Citation Classic' -- an invited 500-word commentary by the author describing the 'research, its genesis and circumstances that affected its progress and publication.....including the type of personal details that are rarely found in formal scientific publication.....contributions of co-authors, any awards or honors they received.....[and] to speculate on the reasons for their paper or book having been cited so often." Garfield states that "I have always believed that these commentaries contribute to future historiography by preserving important biographical and behind-the-scenes information, otherwise generally unavailable." From such topics as photosynthesis, plant growth, entomology, analytical procedures, 348 page-long interesting accounts are given. This book makes particularly good reading for all kinds

of biology teachers, biologists generally and biology students wondering about doing graduate research studies.

"FAMILIAR BIRDS OF NORTH AMERICA -- Western Region" edited by Ann H. Whitman, 192 pp., 80 full-color photo. 80 U.S. & Canada geog. distrib. maps, & 1 b/w external bird anat. diag.
"FAMILIAR FLOWERS OF NORTH AMERICA -- Western Region" by Richard Spellenberg. edited by Ann H. Whitman, 192 pp., 80 fullpage color photo., 80 b/w sketches of plant forms, 8 pp. of b/w fl. structures, 2 pp. glossary & 2 pp. pl. families & members shown.
"FAMILIAR TREES OF NORTH AMERICA -- Western Region" edited by Ann H. Whitman, 192 pp, 80 fullpage color photo., 80 in.sq. color photo. of tree bark, 80 b/w draw. of tree silhouettes & 6 pp. b/w tree structure draw.

These 4" x 6" pocket guides and the three corresponding ones for the eastern region of North America are the new Audubon Society Pocket Guides, all dated 1987 and each priced at $4.95. The color photograph illustrations are truly beautiful for their colors, designs, and instructional details. They are the work of the Chanticleer Press in New York City with publication by Alfred A. Knopf, Inc., also of New York City, and distribution by Random House of the same city. These lovely little gems would probably also be available at Audubon Society centers.

"THE FORGOTTEN PENINSULA -- A Naturalist in Baja California" by Joseph Wood Krutch, xvii & 277 pp., 1 2-pp. map, & with a new foreword by Ann Zwinger. University of Arizona Press, Tucson, Arizona 85719. 1986. $9.95 paperbound.

This book was first published back in 1961 after the famous naturalist-writer had visited the deserts of the southwestern U.S. (and there made his home) and northern Mexico several times until his death in 1970. Our one family visit to northern and central Baja dated back to Krutch's time there. We missed the present-day industrialization, increased human population and consequently the hidden or obliterated native plant and animal life that was so interesting to us and so well described in this book.

"THE TRAVELLING NATURALISTS" by Clare Lloyd, 156 pp., 21 color pl., 52 b/w illus. & 8 maps. University of Washington Press, Seattle, Washington 98105. 1985. $25.00.

The above-mentioned source is for North American purchasers only; Croom Helm Ltd, Beckenham, Kent BR3 IAT, U. K., serves the rest of the world. This book reads interestingly and informatively about the 19th century travels and "catches" of a few of the many

naturalists who traveled afar to see what was there and to report their findings and to substantiate them with specimens which are still preserved in British museums. They were adventuresome amateurs when they left England; they returned as highly skilled professional collectors: J. Walton Hall, Sir John Franklin, Sir Joseph McClintock, Henry W. Bates, John H. Speke, Richard Burton, Howard Saunders, Henry Seebohm, William Spotswood Green and Mary Kingsley. "Many more generations of naturalists will be needed both at home and abroad if we are to understand and conserve what we have for our own time and for times to come."

"LEAF PROTEIN and Its By-Products in Human and Animal Nutrition", 2nd Edition, by N. W. Pirie, xiii & 209 pp., 13 fig. incl. 3 b/w photo. & 10 tab. Cambridge University Press, Cambridge & London, U. K. & New York, N. Y. 10022. 1987. $37.50.

The first edition of this work appeared in 1978 under the slightly different title, "Leaf Protein and Other Aspects of Fodder Fractionation" wherein the main emphasis was on additional sources of prepared, protein-rich animal food. This new edition devotes considerable space to the conversion of leaf protein into people food with emphasis on famine and "undeveloped" areas of the world. There are suggestions also for the various uses of the by-products of fractionation. An English translation is given for H. M. Rouelle's "Observations on the Fecules or green parts of Plants, and on glutinous or vegeto-animal matter" of 1773. Students, instructors and research workers in agriculture, as well as animal and human nutrition will find this book valuable.

"HERBALS - Their ORIGIN AND EVOLUTION - A Chapter in the History of Botany 1470--1670" by Agnes Arber, Third Edition with an Introduction and Annotations by William T. Stearn, xxxii & 388 pp., 131 b/w fig. & 26 photo pl. Cambridge University Press, Cambridge & London, U. K. & New York, N. Y. 10022. 1986. $24.95 paperbound.

With the well probed and well written 1st and 2nd editions of this work the late Agnes Arber certainly has enriched our knowledge of the history of botany as well as medicine and medieval art re printing illustrations. The text of this third edition keeps the format and contents of the 2nd but is much enriched by Appendix I with the author's chronological list of 151 principal herbals from 1470 to 1670, Appendix II with reference sources up to 1938 and many asterisked additions from Stearn, Appendix III which is a subject index to the previous one, Appendix IV with Stearn's interesting and important annotations, and Appendix V with a couple of pertinent Arber articles. Stearn is a wonderful choice as editor of this new edition not only because of his rich background in the history of botany, knowledgeable access to sources, but also because of his longtime personal friendship with the author.

"THE PHYSIOLOGICAL ECOLOGY OF SEAWEEDS" by Christopher S. Lobban, Paul J. Harrison & Mary Jo Duncan, viii & 240 pp., 146 b/w fig. incl. 25 photo., 32 tab. & 1 map. Cambridge University Press, Cambridge & London, U. K. & New York, N. Y. 10022. 1985. $44.50.

The authors' "object in writing this book has been to provide a discussion of the physiology and ecology of seaweeds that is short enough and written in an appropriate style to be a textbook, yet covers the subject matter in sufficient depth to be of use for a one-semester course at both upper undergraduate and postgraduate levels." Several of the tables and figures are particularly helpful instructional items for such topics as photosynthesis, temperature, salinity, water motion, nutrients, pollution, morphogenesis and mariculture. This book should be available to botany students of our colleges, universities and mariculture institutions.

"PLANT HUNTING ON THE EDGE OF THE WORLD" by F. Kingdon Ward, new edition by Geoffrey Smith, 383 pp., 1 color pl. & 2 b/w maps. Cadogan Books Ltd., London SE1 7RJ, U.K. & Timber Press, Inc., Portland, Oregon 97225. 1985. $12.50 paperbound.

Back in 1930 this most interesting and scientifically valuable book was first published in England and made available also in the U.S.A. It made fascinating reading then: it made a lasting impression on me. It still makes fascinating reading a half century later: it provided me with a wonderful recall as I found myself reading once again all in languid detail. The author was one of the few outstanding adventurer-collectors of plants for English gardens and herbaria from different edges of the world -- "remotest frontier of northern Burma" and Assam. So many kinds of beautiful rhododendrons! An appendix has a list of these mountain slope pickings that are now in cultivation. The Royal Botanic Garden at Kew has the herbarium, with duplicates in other institutions.

"THE TRICHOMYCETES -- Fungal Associates of Arthropods" by Robert W. Lichtwardt, xi & 343 pp., 85 b/w multi-fig. incl. 108 b/w photo. & 7 tab. Springer-Verlag, Heidelberg & Berlin, Germany, & New York, N. Y. 10010. 1986. $67.00.

This book deals with "the specialized dependence of a unique group of fungi, the trichomycetes, upon certain arthropods" as their gut inhabitants. The first part covers the various known biological aspects of the trichomycetes both historically and methodologically. The second part develops the biological aspects of these intimate relationships through their possible origins, geographic distributions, nutrition, effects on host development, sporulation and serology, etc. The third part is the systematic treatment of the fungi with keys, phylogeny and exclusions.

Inasmuch as we do no editing, papers accepted for publication *must* be submitted in *exactly* the form that the author wants to have them published. They will then be photographed and printed by photo-offset in exactly the form as submitted except that we will add page numbers and running-heads.

Typescripts should be prepared single-spaced on clean white heavy bond smooth and opaque paper. Elite type is probably the most space-economical. Typescript text must not exceed a rectangle 5⅝ inches wide (horizontal) by 8⅝ inches high (vertical), not including the running-head and page number.

The title of the paper should be typed in all uppercase (capital) letters with 2 blank lines above the title and one beneath; then the name of the author in ordinary upper- and lower-case letters, along with his address (if so desired); followed by 2 blank lines; then the first line of text. It is usually best to leave a blank line between paragraphs.

All scientific plant and animal names and group names should be typed either in italic type (if available) or underscored. Any corrections in the text made by the author must be complete and neat as they will be photographed as they are.

The finished typescript as submitted by the author will be reduced from the 8⅝ x 5⅝ inch size as submitted to 6⅜ x 4 inches by the printer. It is therefore advisable to place a centimeter or millimeter scale on all text figures and plates included.

Use a *new* heavily inked black typewriter ribbon and be sure to *clean* the type on the typewriter after each several pages of typing.

Cost of publication at present is $12.00 US per page, with no subsequent rebates, but this rate may vary depending on inflation and costs, so it is best to inquire as to current rates. The page charges are due *with* the typescript and no paper will be published before payment is received in full. Each author will receive gratis a proportionate share of the printed copies remaining after paid subscriptions are filled, but if separates (reprints or offprints) are desired, these will be charged extra in accord with the current rate for offprints provided by the printer. The cost of all such separates ordered must also be paid for in advance at the time the typescript is sent. No orders for separates will be accepted later, nor can additions or corrections be accepted.

Authors are asked to indicate in light pencil on the *reverse* side of each page of their typescript the page number so that no mistakes in sequence occur.

All manuscripts accepted will be published in the next issue, so that the size of the numbers may vary greatly. A volume will contain 512 pages. The plan insures prompt publication of all accepted manuscript.

Illustrations will be published according to the desires of the authors. No extra charge is made for line drawings, such as are ordinarily reproduced in zinc, or for diagrams, tables, or charts, provided they conform to certain limitations of size and proportion. An extra charge will be made for halftones, depending on their size, as fixed by the engraver.

Articles dealing with research in all lines of botany and plant ecology, in any reasonable length, biographical sketches, and critical reviews and summaries of literature will be considered for publication.