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NOVITATES ANTILLANAE. XV.

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TWO NEW SPECIES OF SOLANACEAE IN HISPANIOLA.

Cestrum jimenezii Alain, sp. nov.

Frutex 1 m altus; rami teretes pilis pauciramosis et pilis simplicibus dense furfuracei; petioli 5-7 mm longi, furfuracei; folia in paria valde inaequalia majora ovata vel ovato-lanceolata, 3-5 cm longa, 0.5-1 cm lata, omnia apice acuminata vel obtusa, basi acuta vel obtusa, saepe inaequilatera, subchartacea, margine integra, supra viridia pilis simplicibus obsita, nervo medio impresso, lateralibus obsoletis, subtus pallidiora, pilis simplicibus obsita nervo medio prominente, lateralibus utroque latere 3-4; inflorescentiae ad ramos ramulosque terminales pauciflorae, saepe ad ramulos laterales 2-florae, pilis simplicibus obsitae, pedunculi usque 1 cm longi; bracteae inferiores euphyllloideae lanceolatae usque 1.5 cm longae, superiores lineares 4-5 mm longae; flores sessiles vel subsessiles; calyx tubulosus vel anguste campanulatus, tubus 4-5 mm longus, 5-nervis, pilosus, lobi 5 triangulari-subulati, 2.5-3 mm longi utrinque pilosuli; corollae non visae; baccae (plane maturae?) oblongae, virides, 7 mm longae, 5 mm latae, glabrae, minute rugosae.

DOMINICAN REPUBLIC: On the Haitian border, in thickets, at approx. 200 m alt., Elías Piña, 10 Sept. 1968, Alain H. Liogier 12630, holotype (NY, GH, US, P), distributed as Cestrum hotteanum Urb. & Ekm.

This species may be considered near to C. azuense Urb. & Ekm.; this last species has oblanceolate to oblong leaves, usually longer (up to 9 cm long), the indumentum of dendroid hairs throughout, the calyx lobes much shorter (1 mm long); C. acutifolium Alain has branched hairs throughout, the peduncles up to 6 cm long, the pedicels 1-2 mm long.

I name this species after the late José J. Jiménez, eminent Dominican Botanist.

Witheringia filipes Alain, sp. nov.

Suffrutex, sarmentosus, usque 1.5 m longus; rami compressi in sicco bisulcati, pilis simplicibus antrorse curvatis obtecti, 1.5-2 mm diametro, internodiis usque 4 cm longis; folia in nodis inaequalia, majora elliptica ad elliptico-lanceolata, 5-8 cm longa, 1.5-3.5 cm lata, apice attenuata usque acuminata, basi angustata

et in petiolum contracta inaequilatera, petiolis usque 1 cm longis; folia minora elliptica, usque 3 cm longa, 2 cm lata, apice et basi obtusa, folia omnia nervo medio supra tenuissimo leviter impresso, subtus applanato, nervis lateralibus utroque latere 3-8 supra vix, subtus prominulis, venis laxe reticulatis curvatis et ascendentibus, ad marginem anastomosantibus, utroque facie pilis multicellularibus sparse obsita, laminis viridibus, membranosis; flores axillares 2; pedicelli filiformes, 1-3 cm longi, pilosuli, apice leviter incrassati; calyx cupulatus, 1.5 mm longus, in statu compresso 3.5 mm latus, glaber, apice subtruncatus ciliatus, nervis apice 0.2 mm longe mucronatis; corolla alba 12 mm longa, anguste campanulata, glabra, lobi elliptici apice rotundati 5-6 mm longi, apice cucullati, glabri, uninervi; stamina 4, filamenta glabra aequilonga, libera; antherae ellipsoideae 1.5 mm longae, longitudinaliter dehiscentes; stylus rectus, 1 cm longus, basi sparse pilosus, stigma capitatus; fructus non visus.

DOMINICAN REPUBLIC: Barahona province, Loma Travesía, 800 m alt., Dec. 29, 1982, T. Zanoni, M. Mejía & J. Pimentel 25181 (Holotypus: NY, Isotypus: SD); id. Alain & Perfa Liogier 26190 (NY, SD).

This is the first record of the genus in the West Indies. This species is outstanding for its 4 stamens and its pubescence of simple hairs.

A. & P. Liogier 26190 presents the smaller leaves in each pair smaller than in the type specimen, and are acute at apex.

The island of Hispaniola has a series of plants belonging to Central and South American genera not found in other Caribbean islands; examples are Fuchsia (2 species in Hispaniola), Pellaea (2 species in Hispaniola), Aspidosperma cuspa (also found in northern South America), Lepechinia (L. urbanii endemic to Hispaniola), Jacquemontia sphaerostigma also found in Central America, Adenaria floribunda, Sicyos lanatus, Talisia (T. jimenezii, endemic to Hispaniola) Chamaesyce dioica, also found in Central America, Chaetocarpus scandens, a South American species, to name only a few. All these plants seem to indicate a very old link between the West Indies and the continent, mainly the Greater Antilles, either through Cuba and/or Jamaica, or directly from Hispaniola to South America.

Rio Piedras, P.R.  
August 1988.



*Witheringia filipes* Alain (Zanoni & al. 25181)



*Cestrum jimenezii* Alain (A. Liogier 12630)

SEVEN NEW GENERA IN POTTIACEAE (MUSCI)  
AND A LECTOTYPE FOR SYNTRICHIA

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A revisionary study of the moss family Pottiaceae at the generic level has progressed to the point that certain new genera, all belonging to the tribe Pottiaceae, can be published forthwith. A more complete discussion of each genus will be given when the full study is finally produced, probably as a volume of the Bulletin of the Buffalo Society of Natural Sciences. These new genera are considered distinctive through various combinations of unique or otherwise presumably advanced characteristics for the family, such as presence of laminal border, inflated upper laminal cells, thin and subpercurrent costae, absence of a dorsal costal epidermis, specialized photosynthetic organs, papillose red brood bodies and other perennating organs, pleurocarpy, plicate thecae, and red color response of the upper laminal cell walls to two percent KOH solution.

**Chenia** Zand., gen. nov.

Folia ligulata vel spatulata, margine superiore irregulatim dentata projectionibus medicellularibus acutis in papillam lateralem simplicem tenuem terminantibus armata; costa tenuis; stratum costale stereidarum pertenuae interdum absens; epidermis costalis dorsalis praesens; cellulae laminales superiores magnae, hexagonale protuberantes, parietibus tenuibus praeditae, tenuiter trigonae, epapillosae; color laminalis in hydroxido kalii rubescens.

Plants forming turf, occasionally rosulate, green above, brownish below. Stems seldom branching, 0.2-1.0 cm in length, transverse section rounded, central strand weak to strong, sclerodermis present, hyalodermis absent; rhizoids usually few. Leaves appressed and somewhat contorted when dry, spreading when moist, ligulate to spatulate, 1.5-2.5 mm in length, upper lamina occasionally grooved along costa, plane or broadly channeled, margins plane above, weakly recurved below, irregularly dentate above with sharp mid-cell projections ending in a weak simple papilla, marginal cells often smaller than the medial; apex rounded to broadly acute, occasionally sharply apiculate; costa weak, ending several (6-9) cells before the apex or percurrent, ventral and dorsal superficial cells short-rectangular, narrower than laminal cells, costal transverse section rounded to elliptical, stereid band very weak or occasionally absent, rounded in shape, ventral and dorsal epidermis present, guide cells 2 in 1 layer, hydroid strand present, small to large; upper laminal cells large, bulging-hexagonal, 15-18  $\mu\text{m}$  in width, 1:1, walls thin, weakly trigonous, superficially convex on both sides; papillae absent (upper marginal teeth may be interpreted as ending in sharp, simple papillae); basal cells differentiated across the leaf base (except for one row of marginal cells similar to the upper cells), rectangular, ca. 20-25  $\mu\text{m}$  in width, 2-4:1, walls thin, weakly trigonous. Propagula when present borne on rhizoids in soil, irregularly rounded to clavate, ca. 100-130  $\mu\text{m}$  in longest dimension. Dioicous.

Perichaetia terminal, inner leaves little different from the cauline, slightly larger. Seta ca. 1.2 cm in length, reddish brown, twisted clockwise; theca ca. 2 mm in length, brown, cylindrical, exothecial cells rectangular, 20-25  $\mu$ m in width, 2-4:1, thin-walled, stomates at base of theca, phaneropore, annulus of 2-3 layers of strongly vesiculose cells, persistent; peristome teeth 16, filamentous, somewhat anastomosing, densely branching-spiculose, ca. 400  $\mu$ m in length, with ca. 5 articulations, nearly straight or weakly twisted counterclockwise, basal membrane 25-35  $\mu$ m in height, low spiculose. Operculum short- to long-conic, 500-650  $\mu$ m in length, cells twisted weakly counterclockwise. Calyptra cucullate, smooth, 1.5-2.0 mm in length. Spores ca. 10  $\mu$ m in diameter, light brown, essentially smooth. Laminal KOH color reaction red.

Type: Tortula subobliqua Williams.

Named as a tribute to Pan-chieh Chen, whose 1941 "Studien über die ostasiatischen Arten der Pottiaceae" remains a superb treatment of the Chinese representation of the family.

Chenia is a genus of two species found on soil from sea level to nearly 3000 meters elevation in North and South America, Europe, eastern Asia and Australia. This genus is easily distinguished from other Tortula-like species by the combination of the dentate upper leaf margins, large, epapillose upper laminal cells, a thin costa, and red coloration in KOH. The last may have to be determined by examination of the upper laminal cell walls under high magnification because of the dense yellow-green of the chlorophyll overwhelming the coloration of the very thin cell walls. The leaf teeth are each tipped with a single simple papilla. The Andean C. obliqua, unlike the weedy species C. rhizophylla, bears sporophytes. The relationships of Chenia are possibly closest with Gymnostomiella.

New combinations: Chenia rhizophylla (Sak.) Zand. (Physcomitrium rhizophyllum Sak., Bot. Mag. Tokyo 52: 469, 1938; Tortula rhizophylla (Sak.) Iwats. & Saito); BU!, PAC!; illustration in Bull. Nat. Sci. Mus. Tokyo 16: 78, 1973 and elsewhere. Chenia subobliqua (Williams) Zand. (Tortula subobliqua Williams, Field Mus. Nat. Hist. Bot. 4(5): 128, 1927, type: Peru, Huariaca, Bryan 353, NY!); illustration: Field Mus. Nat. Hist. Bot. 5: 128, 1927.

#### **Dolotortula Zand., gen. nov.**

Folia spatulata, margine angusta cartilaginea e cellulis stereidarum composita, usque in crassitudine 4 cellulas, in vel sub apicem terminanti; epidermis costae dorsalis praesens; cellulae laminales supernae hexagonae vel brevirectangulares, parietibus magnis tenuibus, saepe tenuiter trigonis, epapillosis praeditae; color laminalis in hydroxido kalii rubescens.

Plants in a loose turf, green above, brownish green below. Stems seldom branching, to 1.5 cm in length, transverse section round, central strand present, distinct, sclerodermis and hyalodermis absent; weakly rhizoidiferous. Leaves contorted, appressed when dry, widely spreading and somewhat rosulate when moist, spatulate, 2.5-4.0 mm in length, upper lamina flat, very weakly channeled along the costa, margins weakly recurved below midleaf, entire, with a narrow cartilaginous border of stereid cells, to 4 cells in thickness, ending at or just before apex; apex rounded or emarginate, often bluntly apiculate; costa thin, percurrent or ending up to 4 cells below apex, superficial cells ventrally long-rectangular, dorsally narrowly elongate, costal transverse section round, stereid band weak and round in shape, ventral and dorsal epidermis present, guide cells 2 in 1 layer, hydroid strand present, small; upper laminal cells hexagonal to short-rectangular, large, ca. 22-28  $\mu$ m in width, 1-2:1, walls thin, often weakly trigonous, superficially weakly convex

on both sides; papillae absent; basal cells scarcely differentiated, short-rectangular, ca. 30  $\mu$ m in width, 2-3:1, walls thin. Dioicous. Perichaetia terminal, inner leaves slightly larger than the cauline. Seta 1.0-1.3 cm in length, red-brown, twisted clockwise; theca ca. 1.7-2.0 mm in length, red- or yellow-brown, cylindrical, exothecial cells thin-walled, hexagonal to short-rectangular, 25-35  $\mu$ m in width, stomates at base of theca, phaneropore, annulus of 3-4 rows of vesiculose cells, persistent; peristome teeth ca. 32, filamentous, anastomosing at base, densely spiculose, ca. 1000  $\mu$ m in length, with many articulations, weakly twisted counterclockwise, basal membrane ca. 70  $\mu$ m in height, densely spiculose-papillose. Operculum not seen (blunt-conic e descr.) Calyptra not seen. Spores 10-13  $\mu$ m in diameter, yellowish, weakly papillose. Laminal KOH color reaction red.

Type: Barbula mniifolia Sull.

A rare monotypic genus of scattered distribution, found on soil (often calcareous), at moderate elevations in Mexico, West Indies, Central America and the Andes of South America. Among the three genera with epapillose, very large upper laminal cells (Chenia, Dolotortula and Sagenotortula), Dolotortula is unusual in its strong, multistratose border of stereid cells. Species of Tortula with bordered leaves and large upper laminal cells have somewhat the same appearance as Dolotortula, but these have (broadly) acute leaf apices, uni- to bistratose borders of substereid cells, at least weakly papillose upper laminal cells, and have a yellow laminal KOH reaction. It appears unrelated to Sagenotortula because of the Syntrichia-like costal section of the latter genus, while Chenia is probably derived from borderless, serrate-margined species of Tortula or from ancestors of Gymnostomiella. Tortula dominicensis, which Crum and Steere indicated was "doubtfully distinct" from D. mniifolia (as Tortula), is actually a Brachymenium (isotype, US!).

New combination: Dolotortula mniifolia (Sull.) Zand. (Barbula mniifolia Sull., Proc. Amer. Acad. 5: 277, 1861, type: Cuba, Wright, Musc. Cub. 33, BM!; Tortula mniifolia (Sull.) Mitt.; also BUF, FH!, TENN; illustration in Nat. Pfl. ed. 2, 10: 298, 1924.

#### Ganguleea Zand., gen. nov.

Plantae rosulatae; caules filo centrali carentes; folia in sicco incurva tubulosaque spathulata vel oblongo-elliptica; lamina superna marginam incurvam formans; basis folii perangusta supra insertionem constricta; cellulae laminales supernae ventraliter valde protuberantes, dorsaliter subplanae; papillae absentes; pleurocarpae, perichaetia in ramulo laterali brevi ferentes; theca 8-plicata, dentibus peristomialibus carens; color laminalis in hydroxido kalii lutescens.

Plants in a loose turf, green above, brown to blackish brown below, rosulate. Stems branching rather often, to 0.3 cm in length, transverse section rounded elliptical to triangular, central strand absent, sclerodermis absent or present (variable in same stem), hyalodermis absent; rhizoids sparse. Leaves incurved and tubulose when dry, spreading when moist, spathulate to oblong-elliptical, 1.5-2.0 mm in length, upper lamina broadly channeled, margins incurved, entire; apex broadly rounded and apiculate; base very narrow, constricted above the insertion; costa subpercurrent to short-excurrent as a sharp mucro, costa with lamina inserted ventrally but divergent at 180 degrees, superficial cells rounded quadrate, bulging ventrally, dorsally elongate, 2-4 rows of cells across costa ventrally at midleaf, costal transverse section circular, stereid band strong and circular in shape, ventral and dorsal epidermis present, cells flattened, guide cells 2, flattened-elliptical, in 1 layer, hydroid strand absent; upper laminal cells rounded-quadrate to hexagon-

al, 8-12  $\mu\text{m}$  in width, 1:1, lumens usually rounded, walls usually evenly thickened, superficially strongly bulging ventrally, nearly flat dorsally; papillae absent; basal cells differentiated only in a small, triangular, juxtacostal area near the insertion, bulging rectangular, ca. 18  $\mu\text{m}$  in width, 2-3:1, walls thin to thickened and trigonous. Autoicous, paricous, occasionally apparently rhizautoicous. Pleurocarpous. Perichaetia borne on a short lateral branch, inner perichaetiate leaves lanceolate, entire to weakly serrulate, short, to 0.8 mm in length, not sheathing, lower cells short-rectangular to rhomboidal, walls thin. Perigonia borne in clusters just below perichaetia, occasionally terminal on a separate plant. Seta 2.5-5.5 mm in length, brown, twisted clockwise; theca 0.5-0.8 mm in length, brown, often glistening, ovate, macrostomous, with 8 plicae, exothecial cells thin-walled, quadrate to short-rectangular, ca. 18  $\mu\text{m}$  in width, 8 rows of thick-walled cells in two ranks each along ridges of plicae, stomates phaneropore, at base of capsule, annulus of 2 rows of thin-walled, weakly vesiculose cells; peristome teeth absent. Operculum long-conic to rostrate, erect, ca. 0.7 mm in length, cells straight. Calyptra long-conic, not cleft, inserted on operculum, smooth to somewhat rough apically with projecting cell walls, ca. 1 mm in length. Spores 10-13  $\mu\text{m}$  in diameter, light yellow, essentially smooth. Laminar KOH color reaction yellow.

Type: Merceyopsis angulosa Broth. & Dix.

Named in honor of H. C. Gangulee, whose "Mosses of Eastern India and Adjacent Regions," finished in 1980, is an important and valuable treatment for the mosses of this bryologically rich area.

A rarely collected monotypic genus found on soil over rock in the Himalayas of India and Nepal, and recently collected in a mountainous region of southeastern Brazil (Schäfer-Verwimp 8403, BUF). Like Anoetangium, Molenoa and Pleurochaete, this genus bears its sporophytes laterally on the main stem axis, at the ends of very short branches bearing rather highly modified perichaetial leaves. It is, however, monoicous. There is considerable resemblance to Weisiopsis, reflected in the combination Weisiopsis angulosa (Broth. & Dix.) Hilp., especially in the leaves with narrowed base, colliculate ventral surface, margin incurved, and costal section with a usually very strong and rounded stereid band. Ganguleea may be derived from that genus through loss of the stem central strand, further narrowing of the leaf base, loss of peristome, and development of pleurocarpy.

New combination: Ganguleea angulosa (Broth. & Dix.) Zand. (Merceyopsis angulosa Broth. & Dix., J. Bot. 48: 302, 1910, type: India, Sikkim, Decoly & Schaul 1899, H!; Weisiopsis angulosa (Broth. & Dix.) Hilp.); also BM!, BUF; illustration in Gangulee, Mosses East. India Adj. Reg. 3: 769, 1972.

#### Hilpertia Zander, gen. nov

Folia ovata vel orbicularia; lamina superna plerumque concava, margine valde revoluta, apice hyalino in area distincta apicali praedita; costa angusta sed apicem versus sensim latior, in aristam excurrans, epidermide dorsaliter carens; cellulae laminales supernae parietibus dorsalibus superficialibus perincrassatis praeditae, apicales rhomboidales vel fusiformes, laeves, marginales amplificatae valde chlorophyllosae; papillae cellulares in folii mediano absentes, plerumque in margine revoluta cavae; color laminalis in hydroxido kalii rubescens.

Plants forming loose cushions, greenish brown above, light brown below. Stems branching irregularly, to 1.0 cm in length, transverse section rounded-pentagonal, central strand distinct, sclerodermis not or weakly differentiated,

hyalodermis absent; rhizoids rare. Leaves crowded, larger above, appressed and tightly spiralled when dry, weakly spreading when moist, ovate to orbicular, 1.3-2.0 mm in length (including awn), upper lamina flat to more usually quite concave, margins strongly revolute (to 2 times), entire or broadly toothed at or near the base of the awn; apex broadly acute, hyaline in an apical patch or triangle; costa narrow but broader above, excurrent as a hyaline awn, superficial cells long-rectangular and smooth on both sides, costal transverse section rounded, stereid band rounded in shape, ventral epidermis present but dorsally absent, guide cells 2 in 1 layer, hydroid strand present; upper laminal cells hexagonal to short-rectangular or rhomboidal, 14-25  $\mu$ m in width, 2-4:1, internal walls thin to thickened and porose, dorsal superficial walls much thickened, weakly convex superficially on both sides, cells of leaf apex rhomboidal to fusiform, smooth, cells of revolute margin enlarged, strongly chlorophyllose; papillae absent on medial cells, usually hollow-papillose on cells of revolute margins; basal cells weakly differentiated, rectangular, ca. 16-18  $\mu$ m in width, 2-3:1, walls thin. Propagula when present (1-3-4 celled, brown, spherical to elliptical, mostly 30-50  $\mu$ m in length, borne on basal rhizoids. Synoicous, paroicous, autoicous or apparently dioicous but probably rhizautoicous. Perichaetia terminal, inner leaves usually differentiated, long-oval, margins usually little differentiated, to 1.7 mm in length, sheathing, lower cells rectangular, very thin-walled. Perigonia lateral or occasionally terminal on a separate plant. Seta 3.5-4.0 mm in length, yellow-brown, twisted counterclockwise above, clockwise below; theca 1.2-1.5 mm in length, yellow-brown, elliptical, occasionally weakly ventricose, exothecial cells ca. 16-23  $\mu$ m in width, 2-3:1, thin-walled, stomates phaneropore, on capsule neck, annulus of 3 rows of smaller, quadrate, highly vesiculose cells; peristome teeth 32, linear, densely branching-spiculose, 300-700  $\mu$ m in length, with many articulations, twisted counterclockwise about 1/2 turn, basal membrane short, to 45  $\mu$ m in height, papillose-spiculose. Operculum broadly short- to long-conic, 0.4-1.0 mm in length, cells twisted 1/2 turn counterclockwise. Calyptra cucullate, smooth, ca. 2.8 mm in length. Spores 13-16  $\mu$ m in diameter, light brown, indistinctly papillose. Laminal KOH color reaction red.

Type: Tortula scotteri Zand. & Steere.

Named for Friedrich Hilpert, a student of T. Herzog. Hilpert's 1933 publication of his doctoral dissertation "Studien zur Systematik der Trichostomaceen" provided a detailed overview of the genera of Pottiaceae exclusive of Pottioidae.

This is a genus of two species found on soil in the Northwest Territories of Canada and several countries of eastern Europe. The modification of the upper laminal margins of Hilpertia into tubes of photosynthetic tissue is paralleled in species of Pseudocrossidium and to a lesser extent in Tortula revolvens (Schimp.) Roth. Hilpertia has many of the features of species of Acaulon including the ovate (rather concave) leaf shape, thin costa, upper laminal cells often hyaline apically and dorsally thick-walled (as easily seen in section), a hyaline awn, and red KOH color reaction. Hilpertia is easily distinguished from Acaulon by its revolute leaf margins, elongate stems, elongate setae, and peristomate, cylindrical capsules. On the other hand, the leaves of Stegonia latifolia (Schwaegr.) Vent. ex Broth., are in most respects identical morphologically with those of Hilpertia. Hilpertia differs by the elaboration of the leaf margins and development of a red KOH reaction.

New combinations: Hilpertia scotteri (Zand. & Steere) Zand. (Tortula scotteri Zand. & Steere, Bryologist 81: 463, 1978, type: Canada, Northwest Territories, Nahanni Natl. Park, Scotter 24114, BUF); illustration in Bryologist

81: 464, 1978. Hilpertia velenovskyi (Schiffn.) Zand. (Tortula velenovskyi Schiffn., Nov. Act. Ac. Leop. Car. 58(7): 480, 1893); FH!; illustration with orig. descr.

**Sagenotortula** Zand., gen. nov.

Filum caulis centralis praesens, saepe valdum, caulisque centraliter fistulosus; folia in sicco subtorta, late ligulata vel spathulata, marginem planam integram formantia; costa sub 4 cellulas apicis terminales terminans vel percurrans, strato stereidarum subevoluto praedita, tenuiter substereida et reniformis; cellulae supernae laminales hexagonae, permagnae, parietibus tenuibus praeditae, saepe subtrigonae, papillis carentes; propagula e corporibus generationis rubris projectiones superficiales breves dispersos ferentibus composita, in tomento plantarum perigonigenarum prodientia; color laminalis in hydroxido kalii rubescens.

Plants loosely caespitose or turf-forming, green above, greenish brown below. Stems branching occasionally, especially from just below perichaetia, to 2.0 cm in length, transverse section round to elliptical, central strand present, often strong, or stem centrally hollow, sclerodermis absent, hyalodermis absent; stem thickly matted with rhizoids. Leaves appressed, incurved and little contorted when dry, erect to weakly spreading when moist, broadly ligulate to spathulate, 3-5 mm in length, upper lamina flat or very broadly and shallowly channeled, margins plane, occasionally broadly incurved above, entire (occasionally distantly bluntly toothed, especially evident in young leaves); apex broadly acute, occasionally with a broad, blunt apiculus; costa ending ca 4 cells below apex to percurrent, superficial cells quadrate to hexagonal or short-rectangular ventrally, dorsally rectangular, costal transverse section somewhat rounded, stereid band little developed, weakly sub-stereid and reniform in shape, ventral epidermis present, dorsal epidermis absent, guide cells 2 in 1 layer, hydroid strand present, often large; upper laminal cells hexagonal, occasionally quadrate or short-rectangular, very large, (25-40-60(-75) in width, 1(-2):1, walls thin, occasionally evenly somewhat thickened, often weakly trigonous, superficially convex on both sides; papillae absent; basal cells differentiated in lower 1/4 of leaf either completely across leaf or just medially, rectangular, ca. 35-60 um in width, 2-4:1, walls thin to somewhat thickened. Red brood bodies borne on tomentum of perigoniate plants, elliptical to spherical, 50-65 um in longest dimension, bearing superficially scattered short peg-like projections. Dioicous. Perichaetia terminal, inner leaves slightly larger than the cauline, to 6 mm in length. Perigonia terminal, comparatively large, inner leaves ovate. Seta ca. 2.5 cm in length, red-brown, twisted counterclockwise above, occasionally clockwise below; theca 3-4 mm in length, red-brown, cylindrical, exothecial cells long-rectangular, thin-walled, 20-25 um in width, 3:5-1, stomates at base of theca, phaneropore, annulus of 2-3 rows of vesiculose cells, apparently deciduous in pieces; peristome teeth 32, filamentous, low-spiculose, ca. 1000 um, with many articulations, twisted counterclockwise once, basal membrane to 200 um in height, low-spiculose to crazed. Operculum conic, 1.5-1.7 mm in length, cells twisted counterclockwise. Calyptra cucullate, smooth, ca. 4.5 mm in length. Spores 10-12 um in diameter, tan, essentially smooth. Laminal KOH color reaction red

Type: Tortula quitoensis Tayl. in Hook.

A monotypic genus found on rocks and soil at rather high elevations in Mexico and the Andes of South America. Sagenotortula is distinguished from other genera of Pottiaceae by the unique red brood bodies that have numer-

ous short, narrow, blunt papilla-like projections, and from other genera of Pottiaceae that have large, epipillose upper laminal cells by the entire, unbordered margins and the extremely large upper laminal cells. The brood bodies were found only on perigoniote plants, being uncolored and transparent when young, and were distributed in the tomentum along the entire length of the stem; rhizoids are occasionally produced apically from the longer superficial projections. The lack of a dorsal costal epidermis indicates that this genus could have been derived from *Syntrichia* (see key below) through loss of papillae, inflation of the laminal cells, and elaboration of the unique brood body.

New combination: ***Sagenotortula quitoensis* (Tayl. in Hook.) Zand.** (*Tortula quitoensis* Tayl. in Hook., London J. Bot. 6: 332, 1847, type: Ecuador, Jameson s.n., NY!); additional specimen at TENN!; illustration in Nat. Pfl. ed. 2, 10: 299, 1924.

***Saitoa* Zand., gen. nov.**

Folia late oblongo-ovata, elliptica vel suborbicularia, lamina superna concava formantia, margine e cellulis crasso-muralibus luminibus subrotundis ornatis in seriebus 15-18 dispositis composita; costa sub 2-3 cellulas apicis terminales terminans, distaliter crassissima, in superficie costali folii distali regionem incrassatam ventraliter protuberantem, eandem regionem dorsaliter planam, cellulis ducum carens; papillae laminales in area parva laminali juxta costam restrictae; color laminalis in hydroxido kalii saturatim rubescens.

Small terete plants growing in dense turf, deep reddish brown above, reddish tan below. Stems pseudodichotomously branching occasionally, to 4 mm in length, transverse section rounded pentagonal, central strand distinct, sclerodermis absent, hyalodermis absent; sparsely radiculose. Leaves closely appressed when dry, weakly spreading when moist, broadly oblong-obovate, elliptic or suborbicular, 0.5-0.6 mm in length, upper lamina concave and apex therefore somewhat cucullate, margins usually recurved at midleaf and below, crenulate in upper half by projecting cell walls, bordered by ca. 15-18 rows of smooth rhomboidal thick-walled cells with somewhat rounded lumina; apex broadly rounded to weakly emarginate; leaf widest above middle; costa ending 2-3 cells below apex, thickest distally, superficial cells ventrally quadrate to short-rectangular, papillose, dorsally elongate, smooth or papillose, 4-5 rows of cells across costa ventrally at midleaf, ventral surface of upper costa forming a bulging pad of 1 layer of papillose cells, costal transverse section reversed semicircular (dorsally flattened), stereid band present dorsally, strong, ventral epidermis strongly differentiated, of thin-walled, papillose cells, dorsal epidermis absent or of thick-walled bulging cells with larger lumens, guide cells absent, hydroid strand absent; upper laminal cells subquadrate to short-rectangular, 6-10  $\mu$ m in width, 1-2:1, walls thin to thickened, superficially weakly and equally bulging on both sides of lamina; papillae restricted to a small area of the lamina near the costa, small, mostly bifid, hollow or solid, about 4-6 per lumen; basal cells differentiated across the leaf base, quadrate to short-rectangular, ca. 16-18  $\mu$ m in width, 1-2:1, walls thin. Sexual structures and sporophyte unknown. Laminal KOH color reaction deep red.

Type: *Globulina peruviana* Williams.

Named for Kamezo Saito in recognition of his important contributions to the study of the Pottiaceae, especially his 1975 "Monograph of the Japanese Pottiaceae."

A monotypic genus found on soil over volcanic rock at high elevations

in Peru, Ecuador and Mexico. This genus is set up to contain *S. peruviana*, which has been recognized in *Globulinella* for some time, being similar in the concave, ovate to rounded leaf shape and rather thick costa ending before the apex. *Saitoa* considerably differs, however, in the upper lamina bordered by many rows of rhomboidal, thick-walled cells, upper laminal cells papillose in a medial patch, costa lacking guide cells, and red KOH reaction. There are no immediately apparent close relatives to *Saitoa*. The presence of a clearly differentiated dorsal costal epidermis in at least some leaves is indication of a lack of relationship with *Syntrichia*.

New combination: *Saitoa peruviana* (Williams) Zand. (*Globulina peruviana* Williams, Bull. Torrey Bot. Club 43: 325, 1916, type: Peru, Araranca, Cook & Gilbert 177a, NY!; *Globulinella peruviana* (Williams) Steere ex Steere & Chapman, l; also BUF!, FH! MICH!, TENN!; illustration in Bull. Torrey Bot. Cl. 43: 325, 1916.

### *Stonea* Zander, gen. nov.

Caules perbreves; folia obovata vel brevi-lingulata, plerumque latiora quam longa, laminas supernas late profundeque concavas et margines planas, apices saepe cucullatos facientes; costa percurrans, cellulas superficiales plerumque ventraliter protuberanti-capitulatas, dorsaliter acutim apicem versus papillosas, stratum stereidarum tenuem et in ambitu rotundatum, epidermidem ventralem plerumque valde protuberantem, dorsalem praesentem vel non faciens, saepe in excrescentia magna ventraliter protuberanti rotundata oleacea expansa; papillae laminales dorsaliter juxta costa in apice folii solo praesentes; color laminalis in hydroxido kalii rubescens.

Plants gregarious, mostly buried in soil, green above, reddish-brown below. Stems seldom branching, very short, to 0.3 mm in length, transverse section rounded, central strand absent, sclerodermis absent, hyalodermis absent; lower stem clothed with fine rhizoids. Leaves incurved when dry, weakly spreading when moist, obovate or short-lingulate, occasionally wider than long, short, ca. 0.4-0.5 mm in length, upper lamina broadly and deeply concave, margins plane, entire or dentate at apex; apex usually broadly and often also sharply apiculate, usually cucullate; costa percurrent or occasionally ending 1-2 cells below apex, superficial cells quadrate, papillose, usually bulging-capitulate ventrally, dorsally elongate, sharply papillose near apex dorsally, ca. 3 rows of cells across costa ventrally at midleaf, costal transverse section semicircular to circular, stereid band weak and rounded in shape, ventral epidermis present, often strongly bulging, dorsal epidermis usually present, guide cells 2 in one layer or absent, hydroid strand absent, costa often expanded as a large, ventrally bulging, rounded, oil-rich excrescence nearly as wide as the leaf but this present in only the easily detached uppermost leaves; upper laminal cells quadrate, ca. 13  $\mu$ m in width, 1:1, walls thin, superficially weakly convex on both sides of lamina; laminal papillae present only dorsally at leaf apex near costa, 1-3 per lumen, simple, hollow to solid; basal cells only weakly differentiated, quadrate to short-rectangular, ca. 15  $\mu$ m in width, 1-2:1, walls thin. Apparently dioicous (naked axillary archeogonia reported in original description). Sporophytes and androgametophytes unknown. Laminal KOH color reaction red.

Named for Ilma G. Stone, whose treatments of Australian aridland mosses are important contributions to the study of Pottiaceae.

Type: *Tortula oleaginosae* Stone.

A monotypic genus found on soil or thin soil over limestone in dry areas of southern Australia. *Stonea* has a swollen, oil-rich lenticular knob on

the ventral surface of the upper costa of the very uppermost leaves on the stem. Leaves farther down on the stem lack this excrescence, but instead have protruding, bottle-shaped, papillose cells much like those on the costa of Crossidium aberrans Holz. & Bartr.; the new genus is entirely red in KOH and has plane margins, characters absent in Crossidium. Stonea has some of the characteristics of Syntrichia; S. caninervis Mitt. has a similar spinose-papillose dorsal surface of the costa, a very small immature habit, and similar oil globules in its upper laminal cells, but Stonea differs by its obovate leaves with plane margins, upper laminal cells smooth except for the extreme upper marginal cells and the tip of the costa, and a dorsal epidermis present in the costa.

New combination: Stonea oleaginosa (Stone) Zand. (Tortula oleaginosa Stone, J. Bryol. 10: 117, 1978, type: Australia, Victoria, Murray Vally Hwy, Stone 1552, MELU!); illustration with orig. descr.

### Lectotypification of Syntrichia

Study to date supports recognition of the genus Syntrichia Brid., the correct name at the genus level for Tortula sect. Rurales De Not. (Mem. R. Acc. Sc. Torino 40: 286, 1838. Type: Tortula ruralis (Hedw.) Gaetrn., Meyer & Scherb.) as conceived by W. Kramer (Bryoph. Biblioth. 21, 1980). Kramer justifiably emphasized the taxonomic importance of the dorsally exposed stereid band, it being not covered by parenchymatous or otherwise differentiated epidermal cells. Bridel's genus Syntrichia lacked indication of a type and has not to date been lectotyped. It was meant by Bridel to contain species with a high basal membrane that were previously recognized in Barbula; the actual combinations were made later. Syntrichia originally included as syntypes S. ruralis (Hedw.) Web. & Mohr, S. agraria (Hedw.) Web. & Mohr and S. ericetorum (With) Brid. Of these, Syntrichia ruralis most appropriately fits Bridel's generic description, and I here designate it the lectotype of Syntrichia Brid.: Syntrichia Brid., J. Bot. (Schrader) 1(2): 299, 19 April 1801 (fide Sayre, Dates of Publications Describing Musci, 1801-1821, Troy, New York, 1959). Type: Barbula ruralis Hedw. (Syntrichia ruralis (Hedw.) Web. & Mohr), lectotypus nov.

### Key to Pottieae

This key distinguishes the seven new genera from other genera with one stereid band (except Neohyophila which occasionally has two) and broad, usually obovate leaves. The key summarizes my studies to date and reflects a strong emphasis on characters of the gametophyte. Thus, recognition of sporophyte reduction series in several genera of the Pottieae provides an acceptable way to group taxa by many, distinctive, shared, mostly presumably advanced characters of the gametophyte. For this reason, species with very similar gametophytes but reduced sporophytes may be placed together: e.g. Tortula Hedw. must include the generitypes of Desmatodon Brid., Pottia (Reichenb.) Ehrh. ex Fuernr. and Phascum Hedw. Laminal color reaction refers to color of the upper cell walls (examination at high magnification is sometimes necessary) in two percent KOH solution. Formal lists of synonymy and new combinations at the species level appropriate for these species concepts will be made anon with the full generic revision. The key requires sectioning of the leaves; the reader is referred to Taxon 28: 643-644, 1979 and Bryologist 88: 215-220, 1985 for a review of appropriate techniques.

- 1 Upper laminal cells epapillose; stem lacking a central strand 2
- 2 Upper laminal cells rectangular to rhombic, occasionally fusiform in apex of leaf, 15-20  $\mu$ m in width, 2(-3):1; propagula often present on leaves; laminal color reaction usually KOH red, rarely yellow Streptopogon
- 2 Upper laminal cells rounded quadrate to hexagonal or short-rectangular, ca. 8-14  $\mu$ m in width; propagula rare, borne on stalks in leaf axils; laminal color reaction KOH yellow Scopelophila
- 1 Upper laminal papillae or stem central strand present, or, more usually, both present at once 3
- 3 Small (to 0.6 cm in height) plants with obovate leaves, upper margins closely crenulate or serrulate; costa thin, ending several cells below the apex; upper laminal cells thin-walled, rhomboidal to short-rectangular, with one or two simple papillae per lumen; propagula often present and relatively large, usually longer than the leaves; lamina K yellow, pink or black Gymnostomiella
- 3 Not the above combination of characters; propagula much shorter than leaves 4
- 4 Upper lamina KOH yellow (occasionally brick red locally at leaf base or medially in upper leaf associated with local wall thickening) or rarely orange throughout (if so then hydroid strand absent or smooth hyaline awn present); stereid band rounded, or if semicircular, then consisting of only a few stereid cells; dorsal costal epidermis usually present, usually completely covering the dorsal costal surface 5
- 5 Cauline leaves lanceolate or ligulate, grooved narrowly and deeply along the costa; perichaetia lateral on main stem, dioicous Anoetangium
- 5 Not this combination of characters (cauline leaves usually ovate to spatulate, usually shallowly grooved along costa; perichaetia seldom lateral on main stem, or if so then monoicous) 6
- 6 Upper laminal cells bulging ventrally and nearly flat dorsally (Globulinella may be sought here) 7
- 7 Stem central strand absent; leaves very strongly constricted at base, 1/3 to 1/4 the leaf width; perichaetia lateral on main axis Ganguleea
- 7 Stem central strand present; leaves not strongly narrowing basally; perichaetia terminal on main axis 8
- 8 Leaf basal cells usually sharply differentiated, inflated; costa never with two stereid bands; peristome when present consisting of 16 widely spaced, mostly entire filaments Weisiopsis
- 8 Leaf basal cells gradually and only somewhat differentiated in size from upper cells; costa occasionally with two stereid bands; peristome of 16 closely spaced teeth cleft in two Neohyophila
- 6 Upper laminal cells about equally convex on both free sides 9
- 9 Upper lamina KOH orange; leaf hydroid strand absent; upper laminal marginal cells swollen (ca. 4 rows having larger lumens than the medial cells as seen in section) Crumia
- 9 Upper lamina KOH yellow; leaf hydroid strand usually present; upper laminal marginal cells not or scarcely different from the medial, or their lumens generally narrowly rectangular and smaller in section than those of the medial cells 10
- 10 Upper margins broadly incurved; leaf apex cucullate, often deeply so 9

- 11 Costa with a ventral pad of filaments Aloinella  
 11 Costa ventral cells merely bulging Globulinella  
 10 Upper margins usually plane or recurved; leaf apex occasionally somewhat cucullate 12  
 12 Specialized photosynthetic tissue elaborated as ventral costal filaments or lamellae 13  
 13 Costa with ventral longitudinal lamellae of 2 or more cells in height Pterygoneurum  
 13 Costa with a ventral pad of filaments (these occasionally only one cell in height) Crossidium  
 12 Specialized photosynthetic tissue absent or represented by a ventral costal bulging pad of fused cells 14  
 14 Leaves very broadly ovate or nearly circular (usually as broad as long, dorsal superficial cell walls thicker (as seen in section) than those of the ventral; costa thin, ending before the apex or excurrent as a smooth hyaline awn from a triangular hyaline leaf apex Stegonia  
 14 Leaves usually ovate to elliptical or spatulate, superficial cell walls equally thick; costa usually excurrent as a short, greenish yellow, weakly serrulate mucro or a hyaline awn; apex not of differentiated hyaline laminal cells Tortula  
 4 Upper lamina KOH brick red, rarely nearly colorless or orange (if orange then with a strong laminal border); stereid band crescent-shaped, semicircular or less commonly rounded; dorsal costal epidermis variously present or absent 15  
 15 Upper laminal cells large (most at least 18  $\mu\text{m}$  in width, in one species to 50  $\mu\text{m}$  in diameter), not papillose, weakly trigonous; costa very weak and often ending below the apex, stereid band much reduced or absent 16  
 16 Leaves with a multistratose border of stereid cells Dolotortula  
 16 Leaves unbordered 17  
 17 Leaves entire, upper laminal cells 35-50  $\mu\text{m}$  in diameter Sagenotortula  
 17 Leaves sharply dentate above, upper laminal cells 18-22  $\mu\text{m}$  in diameter Chenia  
 15 Upper laminal cells usually small or moderately enlarged (9-18  $\mu\text{m}$  in width), papillose with bi- to multifid papillae, not trigonous or if so then costa strong; costa usually well developed, often percurrent or excurrent, stereid band distinct, consisting of several stereid cells (or if costa thin then costa excurrent or upper leaf margins recurved) 18  
 18 Upper ventral costal surface of some upper leaves bearing a large, oil-rich excrescence (but cf. Phascopsis brood leaves) nearly the width of the leaf Stonea  
 18 Upper ventral costal surface lacking outgrowths or these consisting of chlorophyll-rich filaments 19  
 19 Upper laminal cells consisting of mostly a very broad border of smooth, thick-walled and rhomboidal cells, with a small triangular region (1-4 rows) of hollow-papillose, relatively thin-walled and subquadrate cells found medially next to the costa Saitoa  
 19 Upper laminal cells relatively homogeneous except occasionally with a narrow border of differentiated cells 20

- 20 Leaves plane throughout; upper laminal cells laxly rectangular, often 2:1 thin-walled, usually with many (ca. 6) small bifid papillae, superficial walls flat to very weakly convex (best viewed in section); dorsal costal epidermis often not clearly differentiated 21
- 21 Leaves without a differentiated border; stereid band "wrapping around" the hydroid strand in some leaves, guide cells often apparently absent Phascopsis
- 21 Leaves with a distinct marginal or intramarginal border of short-rectangular to elongate cells; stereid band dorsal to hydroid strand when present, guide cells present Hennediella
- 20 Leaf margins plane or more often recurved below, if bordered then usually by thicker walled isodiametric cells; upper laminal cells subquadrate to hexagonal, mostly 1:1, walls firm, thin to somewhat thickened or collenchymatous, usually with 1-4 bifid or multiplex papillae, superficial walls usually strongly convex; dorsal costal epidermis often clearly differentiated 22
- 22 Dorsal costal epidermis (best viewed in section) of enlarged cells or thin-walled cells present, usually completely covering the stereid band 23
- 23 Photosynthetic filaments present on the broad costa and the medially bistratose lamina Aloina
- 23 Photosynthetic filaments absent, lamina unistratose 24
- 24 Upper laminal margins deeply revolute, marginal cells enlarged, thin-walled and highly chlorophyllose Hilpertia
- 24 Upper laminal margins plane to recurved, marginal cells similar to the medial cells or modified as a border of rectangular, rhomboidal or thick-walled cells 25
- 25 Stems very short, leaves deeply concave and short-ovate, capsule spherical or very short-ovoid, cleistocarpous and lacking an apiculus, seta usually very short and very thin, calyptra smooth Acaulon
- 25 Stems elongate, leaves ovate-lanceolate, elliptical or lanceolate, capsule ovate to cylindrical, cleistocarpous and apiculate or stegocarpous, seta short and stout or elongate, calyptra often roughened with simple, hemispherical papillae Microbryum
- 22 Dorsal epidermis absent, dorsal superficial cells of costa (best viewed in section) not being distinctly different from the internal stereid cells 26
- 26 Upper laminal papillae one over each lumen, simple or forking; upper laminal cells collenchymatous; clavate to raspberry-like propagula often present on lamina or costa Calyptopogon
- 26 Upper laminal papillae bi- to multifid; upper laminal cells with thin or evenly thickened cell walls or occasionally collenchymatous; propagula seldom present 27
- 27 Stereid band usually semicircular; seta short (less than 3 mm in length); annulus bulging-reflexed; propagula when present borne on leaves; perichaetial leaves sometimes very strongly differentiated Willia

- 27 Stereoid band usually crescent-shaped; seta elongate (more than 3.5 mm in length); annular cells generally vesiculose, not bulging-reflexed; propagula rare, axillary and leaf-like, consisting of fragile leaf apices or very rarely borne on lamina; perichaetial leaves usually not or only weakly differentiated Syntrichia

The research on which this report is based was supported in part by grant BSR-8314843 from the National Science Foundation. I thank H. Robinson for valuable comments on a draft of the manuscript. A. J. Fife indicated to me (in litt.) that Henediella might prove a distinct genus; the larger concept above, however, is my own. P. M. Eckel provided the Latin descriptions.

## ADDITIONS TO THE DICOTYLEDONS OF LOUISIANA

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Several lists of the plants of Louisiana have been published. Thomas and Allen published checklists of the dicotyledons (1982) and the monocotyledons, pteridophytes, and gymnosperms (1984) in which they attempted to list all the vascular plants known from literature and from herbarium specimens. Several of these were left off from the published list because of errors made by Thomas during the typing of the manuscripts. A list of these omitted plants occurs at the end of this article. MacRoberts published an annotated checklist of the vascular plants of Louisiana in 1984. He made extensive use of the two lists by Thomas and Allen and used all of the M.S. thesis projects of Thomas' students to date. He alternated in his praise and harsh criticism of both. The lists by Thomas and Allen purposely did not attempt to justify each taxon listed by citing a particular specimen. The presence or absence of a taxon in Louisiana at a particular time depends both on its being documented by a herbarium specimen and on its being correctly identified. At present there are no published keys that can be used to identify some of our most difficult groups of plants. The two lists served their purpose; they listed the plants known to the state at the time to the best of the authors' abilities. MacRoberts (1988) recently has published "A Documented Checklist and Atlas of the Vascular Flora of Louisiana" in three parts and 756 pages plus bibliography. This work attempts to account for all the names of vascular plants that have been found in the above three checklists and in various other publications, including unpublished theses and dissertations. After spending several months working with this atlas, I have decided that I should publish the names of some of the plants in the NLU herbarium that are not included in the atlas.

One of the plants that I have collected new to Louisiana but have not yet published is Ceanothus herbaceus Raf. This species is included in MacRobert's atlas although he has not visited the NLU Herbarium since it was collected and it has not been published. Since it was not in literature, it does not meet the criteria to be included in his checklist. This was first collected by R. Dale Thomas and John Pyzner in Caddo Parish along Wallace Lake Road south of Shreveport; Sec. 30, T16N, R13W. It was in a clay soil in a prairie-type habitat. My numbers 93612 (22 Aug. 1985) and 96088 (29 May 1986) were identified by Nancy C. Coile (GA).

A comprehensive study of the Asteraceae of Louisiana is in press in Sida Monographs and changes in this family will be cited there. Helenium campestre Small was collected from Bossier Parish along roadside ditch beside La. 157 and La. 160 at Ivan; Sec. 19, T21N, R11W, RDT 43,892, 22 May 1975. This was first pointed out to me by Dr. E. B. Smith (UARK).

Macroptilum lathyroides (L.) Urban FABACEAE  
OUACHITA: Roadbank of La. 553 at dirt road north-west of U.S. 165 north of Monroe; Sec. 32, T19N, R3E. RDT and Pat Pias, 55,858; 3 October 1977. Specimen determined by Dr. Duane Isely (ISC).

Stylosanthes biflora (L.) B.S.P. FABACEAE  
var. hispidissima (Michx.) Poll. & Ball  
CAMERON: Pasture west of ranch house of F-R Ranch (formerly Moore Ranch) in Gum Cove southwest of Vinton; Sec. 25, T21S, R12W. RDT, B. E. Dutton, J. Bruce, & R. Pousson; 89,336; 9 June 1984. This and several new taxa will be included in an upcoming publication by Dutton and Thomas on the Cameron Parish flora.

Trifolium subterraneum L. FABACEAE  
OUACHITA: NLU Richwood Farm, Monroe. Tim Talbot, s.n., 14 April 1977.  
WINN: Planted with Lolium perenne on newly constructed U.S.F.S. road 5974 south of La. 126 just west of La. 1233 at Pine Ridge west of Dodson; Sec. 17, T13N, R5W.; RDT, 96,265, 3 June 1986. Widely used in the area for deer food and erosion control.  
ST. MARY: Along beach in Cypremort Point State Part west of the end of La. 319 southwest of Louisa; Sec. 30, T15S, R6E, RDT, J. McCoy, & T. Jackson; 103,350; 8 November 1987.  
The Louisiana Wildlife and Fisheries offices recommend this species for both erosion control and deer food.

Vicia hirsuta (L.) S. F. Gray FABACEAE  
ST. TAMMANY: Along east side of old U. S. 11 through Pearl River Wildlife Management Area south of I-59 and west of East Pearl River; Secs. 31, 32, & 34, T7S, R15E. RDT, Pat Pias, et. al.; 57,403, 8 April 1978. This taxon was previously reported by Taylor and Thomas (1985) but was included because of the way it was handled by MacRoberts (1988). Under V. hirsuta he says "Riddell (1852) reported this as an introduction. It was placed in the 'Questionable' category in MacRoberts (1984) because no later report had been found. It has been rediscovered by Thomas in St. Tammany Parish, but see V. tetrasperma." Under V. tetrasperma he says "this species resembles V. hirsuta. It was excluded from Lasseigne (1973); he saw no

specimens. All reported collections are at NLU and have presumably been properly segregated from V. hirsuta." As I read these comments, I think that MacRoberts is saying that he does not trust Thomas to be able to tell two vetches apart. I resent this -- if he wanted to see if they were correctly identified he should have visited the NLU Herbarium or he could have borrowed the specimens. Instead he chose to cite specimens from the thesis projects without looking at the plants. The first plants of V. tetrasperma from Richland and Ouachita parishes were annotated by J. Stuart Lassiter who was at Eastern Kentucky University at the time. I have collections from Caddo, DeSoto, Franklin, Jackson, Madison, Ouachita, Richland, St. Tammany, Tangipahoa, Washington, West Carroll, and Winn parishes. I also have it from the following counties: Alabama -- Dale, Lee, Mobile, Sumter, Tuscaloosa; Arkansas -- Drew, Union; Georgia -- Clark; Massachusetts -- Hampshire; Mississippi -- Copiah, Jackson, Lamar; New York -- Dutchess, Walter; North Carolina -- New Hanover, Wake; South Carolina -- Barnwell; and Texas -- Greg, Rusk. I have V. hirsuta only from St. Tammany parish and Connecticut, North Carolina, California, and Virginia; and a 1988 collection from Union County, Arkansas. Provided that one can count to four, these two species can be differentiated. There are 2 seeds per pod in V. hirsuta and four per pod in V. tetrasperma. The fruits are shorter and there are more fruits in each inflorescence in V. hirsuta than in V. tetrasperma. The latter species is very common along the roadsides in the state.

Two Asiatic woody species of Lespedeza occur in Louisiana at the present time. L. thunbergii was included in MacRoberts, stating "in Thomas and Allen (1981). Introduced from Asia, as an ornamental (?) but no record of collection has been found." This illustrates the differences in the checklists -- Thomas and Allen included it based on collections from Webster parish but MacRoberts did not include it because it was not in any of the thesis lists he had at hand.. The Thomas and Allen checklists indicate what was thought to occur in the state when they were written but because of space restrictions no attempt was made to tell where each specimen was deposited or what literature was included. Although the MacRoberts atlas does tell what parishes a plant has been reported from in literature, one still can not tell what publication a lot of his data comes from, especially if it is from a parish not studied by a M.S. student.

Lespedeza thunbergii (DC.) Nakai FABACEAE  
WEBSTER: Along U.S.F.S. road 824 in pine woods west of La. 159 and Pine Grove Church; in Kisatchie National Forest;

Sec. 11, T20N, R9W; RDT, 72,174, 23 July 1980.

BOSSIER: Beside road in edge of Bodcau Wildlife Management Area northeast of Bellevue; Sec. 24, T20N, R11W; RDT, 93,910, 10 October 1985. This perennial is spreading at both locations and is a desirable food for deer and quail.

Lespedeza bicolor Turcz

FABACEAE

OUACHITA: 604 53rd Street, Monroe; Carlos Smith, #1071, 25 May 1971. 301 Arlington Place, West Monroe; Carlos Smith, #1506, 22 June 1971. Long persisting and spreading.

Pisum sativum L.

FABACEAE

MOREHOUSE: Field south of La. 134 just west of Oak Ridge, Sec. 19, T19N, R7E; RDT, 88,860; 23 May 1984. This legume is currently commonly planted as a winter cover crop and it also is frequently planted along recently constructed roads. It is common with various species of Vicia, Lathyrus, and Trifolium. I also have collections from Evangeline, Franklin, Ouachita, Richland, Tensas, and West Carroll parishes.

Capsicum annum L.

SOLANACEAE

var. minimum (Miller) Heiser

CAMERON: Hackberry woods just back from the Gulf of Mexico off La. 82, 9 miles west of Holly Beach, La. RDT, et. al., 23,959, 27 June 1971. Seven other collections were made during Dutton's survey of the plants of Cameron Parish.

Physalis angulata L.

SOLANACEAE

var. pendula (Rydb.) Waterfall

OUACHITA: Bottomland hardwoods forest southeast of I-20 and La. 594 east of Monroe in Russell Sage Wildlife Management Area; RDT, E. R. Barrett, & K. E. Gremillion, #3813, 3 August 1967. Specimen was determined by Dr. U. T. Waterfall in 1971 and verified by Janet R. Sullivan in 1983.

Physalis acutifolia (Miers emend. Sudwith) Sudwith

SOLANACEAE

WEBSTER: Weedy spot beside La. 7 exit on I-20W at Dixie Inn west of Minden; Sec. 31, T19N, R9W. One large sprawling plant in a clump of Amaranthus. RDT, 94,015, 10 October 1985. Determined by Janet R. Sullivan.

Physalis hederifolia Gray

SOLANACEAE

SABINE: Very dry longleaf pine woods beside La. 473 at Hornbeck Fire Tower west of Hornbeck, Sec. 30, T4N, R10W. RDT, Neil Carroll, and Scott Thomas, 71,612, 7 June 1980. CADDO: Very dry sandy soil on east side of U.S. 71 two miles south of Ida and north of Mira; Sec. 26, T23N, R15W. RDT and Mrs. W. G. Dorris, 80,845, 7 May 1982. I also

have specimens from a sandy area north of Vivian on Kendrick Road (89,017; 88,704; 88,346). Specimens were determined by Janet R. Sullivan.

Physalis longifolia Nutt.

SOLANACEAE

var. longifolia

AVOYELLES: Edge of field and disturbed roadbank west of La. 361 and Goudeau; Sec. 24, T2S, R4E; RDT, et. al, 94,085, 11 October 1985.

Physalis longifolia Nutt.

var. subglabrata (Mack. & Bush) Cronq.

AVOYELLES: Swampy area at edge of Old River near Marksville Prehistoric Indian Park, Marksville; RDT & C. E. DePoe, #421, 11 September 1966.

I also have specimens from Bossier, DeSoto, East Carroll, Madison, Morehouse, and Tensas parishes. These determinations were made by Janet R. Sullivan who separated these two varieties from P. virginiana for which they were considered synonyms by Thomas and Allen (1982).

Physalis pruniosa L.

SOLANACEAE

AVOYELLES: Along south bank of Red River beside La. 107 and La. 115 south of Effie and north of Marksville; Sec. 61, T3N, R3E; RDT, et. al, 94,136, 11 October 1986. This species was included in MacRoberts (1988) but not in Thomas and Allen (1982). Specimen determined by Janet R. Sullivan.

Boehmeria cylindrica (L.) Sw.

URTICACEAE

var. drummondii (Weddell) Weddell

JACKSON: Beside Chatham Lake near a road between La. 34 and La. 146 at Chatham; RDT & C. E. DePoe, #140, 10 September 1966. I also have specimens from Catahoula, Lafayette, LaFourche, Morehouse, Ouachita, Orleans, Richland, and Winn parishes. This variety was separated out by Dr. D. E. Boufford of Harvard Herbaria; other specimens were included in the typical variety.

Boehmeria nivea (L.) Gaudichaud-Beaupie

URTICACEAE

PLAQUEMINES: Beside La. 23, 3.8 miles south of Belle Chase; Sec. 18, T14S, R24E; Nelson Rich, Larry Lewis, & John McCoy, #482, 30 July 1977. Determined by D. E. Boufford.

Bumelia reclinata (Michx.) Ventenat

SAPOTACEAE

CAMERON: Around camp buildings and in adjacent marsh at duck hunting camp on right prong of Black Bayou southwest of Vinton; Sec. 39, T13S, R13W; RDT, B. E. Dutton, & J. Bruce; 89,496 & 2184, 10 June 1984. This was extracted from Dutton's thesis and included in MacRoberts. It was determined by Dr. R. D. Whetstone of Jacksonville State University. He also included most of the specimens of

Bumelia lanuginosa in var. oblongifolia (Nutt.) R. B. Clark.

Several taxa should be added in Salicaceae. Dr. George W. Argus of the National Museum of Natural Sciences in Canada has annotated NLU's specimens and he includes the following taxa in Louisiana: Salix babylonica L., S. caroliniana Michx., S. cinerea L. var. cinerea, S. exigua Nutt. (S. interior Rowlee), S. humilis Marsh var. humilis and var. microphylla (Anders.) Fern. (formerly det. as S. tristis Ait.), S. nigra Marsh., and S. x sepulchralis Simonk (S. alba x S. babylonica). To these taxa can be added Salix fragilis L. FRANKLIN Parish: Dock Smith's house east of La. 578 five miles south of Crowville; Sec. 27, T14N, R8E; RDT, G. Joye, and James Clark, 77,808, 2 August 1981. This is the common round-topped willow along the Mississippi delta between Memphis and Natchez.

Populus tomentosa Vent.

SALICACEAE

OUACHITA: Large population beside U.S. 80 east of Sicard and La. 139 east of Monroe; RDT, et. al., 100,996, 21 July 1987.

FRANKLIN: Beside La. 15 at Elam south of Wisner at Catahoula Parish Line; Sec. 9, T11N, R8E; RDT, et. al., 107,153, 17 September 1988.

Earlier collections of this taxon are on loan. This taxon forms extensive colonies by root sprouts.

Clematis jackmanii Moore.

RANUNCULACEAE

CLAIBORNE: In area beside and under torn warehouse south of La. 615 and west of U.S. 79 beside railroad in Haynesville; Sec. 24, T23N, R8W; RDT, L. Lewis, & Pat Pias, 59,661, 2 August 1978.

This cultivated species escapes and is quite common in waste areas. I also have it from East Carroll, Franklin, LaSalle, Madison, Orleans, Ouachita, Sabine, and Tensas parishes.

Pyrus calleryana Dcne.

ROSACEAE

FRANKLIN: Roadside of La. 135 one mile south of La. 618 five miles north of Liddieville; Sec. 25, T14N, R6E; RDT & G. Joye, 78,434, 17 September 1981. This is a Bradford Pear that is planted for its beautiful leaves and flowers. It is also used as rootstock for grafting several commercial varieties of Pyrus communis L. The fruits are spread by birds and it is a definite escape in several locations. I have it from Jackson, Lafayette, Lincoln, Ouachita, St. Tammany, and Winn parishes.

Dr. J. B. Phipps of UWO is currently studying the Crataegus species for the Southeastern Flora. He has collected in Louisiana and has most of the NLU specimens

on loan. Three additions can be made to the Louisiana flora based on his work.

Crataegus gattingeri Sarg. ROSACEAE  
CALDWELL: Common in mixed oak-pine woods along Horseshoe Lake Road about 1.4 miles NW of La. 846, NW of Columbia; Sec. 26, T14N, R3E; RDT & Dendrology Class, 101,136, 4 August 1987. The area was clearcut in 1988. OUACHITA: Edge of woods at clearcut area on hill west of La. 557 near Caldwell Parish Line, south of Luna; Clay soil. D. D. Taylor, et. al., 5571, 7 September 1983.

Crataegus macrosperma Ashe ROSACEAE  
OUACHITA: Edge of mixed hardwood-pine woods beside Cooney Barnette Road near Walnut Grove Methodist Church off Lapine Road southwest of West Monroe; Sec. 19, T16N, R2E; RDT, 95,851, 5 May 1986.

Crataegus triflora Chapm. ROSACEAE  
CALDWELL: Gorges east of Copenhagen and La. 849 and west of Ouachita River; Sec. 13, T12N, R4E. Clay soils. RDT & Botany 314 Class, 48,829, 5 April 1976.  
This taxon was listed as C. mollis (Torr. & Gray) Scheele on the Thomas and Allen checklist so C. mollis should be removed from catalog of our flora. C. triflora is abundant in the open calcareous soils near Copenhagen with C. spathulata, C. marshallii, C. crus-galli, C. berberifolia, and C. viridis.

Lysimachia nummularia L. PRIMULACEAE  
OUACHITA: Weed beside greenhouses at Roach's nursery west of West Monroe beside U.S. 80; RDT, et. al., 17,622, 19 March 1970; and from flower bed at 706 Camellia Drive in Monroe; RDT, 22,005, 21 October 1970.  
These specimens were verified by Robert D. Sutter.

The Ludwigia uruguayensis (Camb.) Hara complex has been studied by Elsa Zardini of Missouri Botanical Garden. She annotated NLU's material to two other taxa.  
Ludwigia hexapetala (Hook. & Arn.) Zardini & Peng. from Caldwell, Claiborne, Morehouse, Rapides, Richland, and Tangipahoa parishes.  
Ludwigia grandiflora (Michx.) Zardini & Peng from Cameron, St. Charles, St. Mary, St. Tammany, Tensas, Terrebonne, and Vermilion parishes.

Morus nigra L. MORACEAE  
CAMERON: Along a levee in a marsh at north end of Little Pecan Canal on Little Pecan Management Area east of Grand Chenier, Sec. 32, T14S, R4W, RDT, B. E. Dutton, et. al., 90,007, 21 July 1984.  
LAFAYETTE: Beside U.S. 90 and railroad tracks at La. 343

in Duson; Secs. 28 & 29, T9S, R3E, RDT and C. M. Allen, 98,410, 4 October 1986. A large tree of this species is also present in the lawn of the residence of Trudie Dorris of West Monroe (Ouachita Parish) and is distinguished by its fruit and its heart-shaped leaf bases.

Nymphaea x thiona Ward (N. mexicana x N. odorata)

NYMPHAEACEAE

ST. TAMMANY: La. 40, 0.4 miles NW of La. 437 north of Covington; Sec. 23, T15S, R11E. Small farm pond. C. E. DePoe, 6217, 10 August 1966. Determined by John Wiersema of University of Alabama, 1982.

Monarda bradburyana Beck.

LAMIACEAE

JEFFERSON DAVIS: Roadbank of U.S. 90 two miles east of Calcasieu Parish, edge of rice field; Sec. 34, T9N, R6W. RDT and family, 30,135, 10 June 1972. Determined by Robert Kral of Vanderbilt.

Carya laciniosa (Michx. f.) Loud.

JUGLANDACEAE

MADISON: Along edge of Judd Bayou south of Quebec in Tensas River National Wildlife Refuge; Sec. 16, T16N, R11E. Grafted tree on wild pecan stump; surrounded by woods about 35 years old; 12" d.b.h.; several nuts found. RDT and Kelby Ouchley, 85,950; 27 September 1983. See MacRoberts (1988) for comments on previous specimens from Louisiana.

Carya ovalis (Wang.) Sarg.

JUGLANDACEAE

LIVINGSTON: Woods along Spring Branch Road south of I-12 at Satsuma Exit southeast of Walker; Sec. 3, T7S, R4E, RDT, 78,755, 6 October 1981. This taxon is sometimes included within C. glabra (P. Mill.) Sweet. However I feel that the differences in fruit shapes and color of heartwood justify the separation of these two species of pignut hickories.

The delimiting of the taxa included in Quercus will probably always be a point of dispute among dendrologists and taxonomists. I think the three following taxa warrant distinction.

Quercus prinoides Michx.

FAGACEAE

CALDWELL: Slope at top of hill south of Ouachita River north of Copenhagen and La. 849 SE of Columbia; NW corner of Sec. 11, T12N, R4E; RDT, 107,130; 6 September 1988. The leaves of this taxon are much narrower than those of Q. muhlenbergii which occurs in the same area.

Quercus shumardii Buckley var. schneckii (Britt.) Sarg. FAGACEAE  
 CALDWELL: Gorges east of Copenhagen and La. 849 and west of Ouachita River; Sec. 13, T12N, R4E; RDT & Bill Hess, 83,424, 10 May 1983. This taxon has longer leaves in proportion to their width than the typical variety of Shumard oak. It is common in the area with Q. oglethorpensis, Q. durandii, Q. muhlenbergii, Q. stellata, and Carya myristicaeformis.

Quercus maritima (Michx.) Willd. FAGACEAE  
 TANGIPAHOA: Longleaf pine woods 0.4 miles west of junction of La. 40 and La. 1062 beside La. 40; RDT, et. al., 12,354, 28 September 1968. Duplicate determined by Robert Kral, 1976.

Corydalis micrantha (Engelm.) Gray FUMARIACEAE  
 ssp. micrantha  
 FRANKLIN: Woods east of La. 15 south of Gilbert and north of Wisner; Secs. 9 & 10, T12N, R8E; RDT & Bot. 103 Class, 103,582, 26 March 1988. Most of the material in the state is in ssp. australis (Chapm.) G. B. Ownbey. Most taxonomists place this genus in Papaveraceae.

Manihot grahamii Hook. EUPHORBIACEAE  
 BIENVILLE: Edge of dirt road in longleaf pine forest west of Edwards Mill Creek and west of Bienville; Sec. 28, T16N, R6W. RDT & Bot. 313 Class, 45,840, 4 August 1975. This taxon is definitely a self-reproducing escape; I have it from Ouachita, Natchitoches, and West Feliciana parishes as established populations.

Euphorbia albomarginata Torr. & Gray EUPHORBIACEAE  
 (Chamaesyce albomarginata (Torr. & Gray) Small)  
 SABINE: Dry open area and pine woods north of La. 392 and west of Bayou Toro east of Toledo Bend Dam; Sec. 25, T3N, R12W. Sandy soil. RDT, C. M. Allen, et. al., 105,177, 4 June 1988. This is the small prostrate spurge with small round- to heart-shaped leaves common in open, sandy areas of longleaf pine woods. A similar species on gumbo soils is Euphorbia cordifolia Ell. (Chamaesyce cordifolia (Ell.) Small).

Rhododendron coryi Shinnery ERICACEAE  
 VERNON: Sedimented baygall just north of airport off California Avenue on Fort Polk about 5 miles SE of Leesville. C. M. Allen, 14,500, 2 May 1987. This is a dwarf, late-flowering, white-flowered azalea of the sandy baygalls of Vernon Parish. It flowers later than our other white-flowered species (Rhododendron oblongifolium).

Cucumis sativus L. var. sativus CUCURBITACEAE  
 MOREHOUSE: Along railroad tracks beside La. 138 in Mer Rouge, Sec. 31, T21N, R7E. RDT & Pat Pias, 57,527, 1 August 1978. Cucumbers occur as waifs much as does watermelon. I also have specimens of cucumber from Claiborne, DeSoto, Ouachita, and West Carroll parishes.

Dr. Hugh D. Wilson of TAMU has annotated many of NLU's Chenopodium specimens for his work on the Southeastern Flora Project. The following taxa are verified by him.

Chenopodium pratericola Rydb. CHENOPODIACEAE  
 CADDO: Along tracks in northern part of Kansas City Southern railroad yard west of La. 173 SE of Blanchard; Sec. 19, T18N, R14W; RDT, 65,055, 29 May 1979. Also from DeSoto (64,391) and Morehouse (58,141) along railroad tracks.

Chenopodium giganteum D. Don. CHENOPODIACEAE  
 JACKSON: Beside Chatham Lake, Chatham. RDT & Robin Reid, 21,133, 31 August 1970. Also Claiborne (Lewis, 2004).

Chenopodium berlandieri Moq. CHENOPODIACEAE  
 var. berlandieri  
 CADDO: Kansas City Southern Railroad yard southeast of Blanchard. RDT, et. al, 66,452, 28 June 1978.

Chenopodium berlandieri Moq. CHENOPODIACEAE  
 var. boacianum (Moq.) Wahl  
 TENSAS: Sandy field near entrance to Lake Bruin State Park from west side of La. 604; Sec. 2, T12N, R12E. RDT & Tim Briley, 78,581, 20 Sept. 1981. Also from Rapides (Schutz 753) and Terrebonne (14,315).

Chenopodium berlandieri Moq. CHENOPODIACEAE  
 var. zschackei (Murr) Murr  
 CLAIBORNE: Roadbank of La. 9, 1.4 miles north of Athens, Sec. 36, T20N, R7W. RDT & L. G. Lewis, 16 October 1980. Also from Caddo (65,029), Madison (Rich 123), Tensas (69,734), and West Baton Rouge (65,627).

Chenopodium bosceanum Aellen CHENOPODIACEAE  
 TENSAS: On sandbar along west bank of the Mississippi River south of the end of La. 3078 at abandoned Port Gibson Ferry north of St. Joseph; T11N, R12E. RDT, 86,819-86,823 (each number representing a different plant), 8 November 1983.

Stellaria alsine Grimm CARYOPHYLLACEAE  
 LASALLE: Run-off seepage area from a sulfur spring beside Trout Creek NW of La. 8 and White Sulfur Springs, Sec. 5, T7N, R2E. RDT & P. Laird, 42,599, 23 February 1975.

This specimen was determined by Richard K. Rabeler. It had been previously listed as Stellaria graminea L. The only other specimen with the name S. graminea is from Ouachita Parish and is actually Arenaria patula Michx. (Minuartia patula (Michx.) Mattf. in Kartez and Kartez). This correction was pointed out to me by Eugene Wofford of the University of Tennessee.

Dr. Richard K. Rabeler annotated the following Cerastium species: Cerastium brachypodium (Engelm. ex Gray) Robinson Bossier (48,701) and East Carroll (75,044).

Cerastium fontanum Baumg.

Avoyelles (49,068), Bienville (42,562), Bossier (51,960), Caddo (83,116), Claiborne (70,604), DeSoto (71,325), East Carroll (76,557), and Morehouse (51,816).

Cerastium semidecandrum L.

Claiborne (52,154), DeSoto (70,284), and East Carroll (76,988).

The most common species was annotated to C. glomeratum Thuill.

Arenaria benthamii Fenzl. ex Torr. & Gray CARYOPHYLLACEAE  
CADDO: Along railroad tracks in Kansas City Southern Railway Yard southeast of Blanchard and west of La. 173; RDT, 65,108, 29 May 1979.

Arenaria leptoclados (Reichb.) Guss. CARYOPHYLLACEAE  
BOSSIER: Along a two mile section of I-20 between U.S. 80 overpass and La. 157 exit at Haughton; RDT & V. Leggett, 48,612, 25 March 1976. Also Caddo (83,152) and Claiborne (52,294). This species closely resembles A. serpyllifolia L. and these specimens were annotated by J. McNeill and M. Dube.

Polanisia dodecandra (L.) DC. CAPPARIDACEAE  
ssp. dodecandra

CADDO: Kansas City Southern Railway Yard southeast of Blanchard and west of La. 173; Sec. 19, T18N, R14W. RDT, 65,089, 29 May 1979. Also along railroad in Washington Parish (64,990).

Polanisia dodecandra (L.) DC. CAPPARIDACEAE  
ssp. trachysperma (Torr. & Gray) Iltis

WEST BATON ROUGE: Railroad tracks between La. 1 and Mississippi River at Port of Baton Rouge south of I-10; Sec. 70, T7S, R12E. RDT, 76,260, 13 May 1981.

Both of these taxa were determined by Sue Keller (NY).

Lepidium campestre (L.) R. Br. BRASSICACEAE

OUACHITA: Weed in garden of L. W. Hutchinson, Richardson Road, Calhoun; N. Carroll, s. n., 4 April 1981. A waif. Dr. Kenneth R. Robertson of Illinois Natural History

Survey has looked at many of our specimens of Amaranthaceae. He has changed the Acnida species to those of Amaranthus. He has annotated one of our specimens to Amaranthus powellii S. Watson (WEBSTER: Along railroad tracks north and south of U.S. 80 and U.S. 79 west of Minden; RDT & L. Lewis, 62,215, 2 November 1978). The specimens of Alternanthera other than A. philoxeroides that are annotated by Dr. Robertson include the following species of chaffweeds:

Alternanthera caracasana H.B.K. (Richland, 56,236)

A. paronychoides St. Hil. var. amazonica Huber (Winn, 73,148)

A. paronychoides St. Hil var. paronychoides (Ouachita 16,999; Cameron, 87,028; Catahoula, 49,611; East Carroll, 74,272; Franklin, 78,501; Morehouse, 55,833; and Tensas, Briley 2067)

A. sessilis (L.) DC. (Allen, 79,402; Catahoula, 41,221; Evangeline, 407; Richland, 59,094)

Dr. Dieter C. Wasshausen of U.S. National Herbarium has studied many of NLU's Ruellia (Acanthaceae). He has separated out R. malacosperma Greenm. (OUACHITA: Lawn of Mrs. Dorris' home on Jewel Street in West Monroe; RDT & T. Dorris; 24,846, 29 August 1971) from the more common R. brittoniana Leonard ex Fern. He also considered R. pinetorum Fern. to be R. pedunculata Torr. ex Gray ssp. pinetorum (Fern.) R. W. Long. R. purshiana Fern. from Madison Parish (in pasture on G. Crider's Farm in Ward 8; I. Parker, #3, 2 May 1963) was considered a distinct species. He also included two subspecies of R. caroliniensis (J. F. Gmel.) Steud -- ssp. caroliniensis and ssp. ciliosa (Pursh) R. W. Long.

Ardisia crenata Sims

MYRSINACEAE

ST. TAMMANY: Woods between Green Springs Motel and Little Bogue Falaya River west of La. 21 north of Covington; RDT, 64,862, 24 May 1979. Widely spread throughout area. IBERIA: Jungle Botanical Gardens on McIlhenny Estate on Avery Island at end of La. 329 south of New Iberia. Established and spreading throughout woods. RDT & J. McCoy, 84,469, 22 June 1983. This species was identified by Dr. Bill Hess of Morton Arboretum and represents a new family of vascular plants for the state.



distinct ability to do bibliographic work and his access to various literature sources have added significantly to the current and future understanding of our flora. His dedication in the listing of the vascular plants of Caddo Parish represents one of the best such works that has been done to date. We are not competitors. We have simply approached a project (The Flora of Louisiana) from different directions and with different points of view. I have felt very restricted in the total amount of time that I have been able to spend directly on the flora project due to a full-time teaching load and the large amounts of time required to function as the sole staff member of a large herbarium and to direct masters thesis projects. My claim is that I am a plant collector and a field botanist and not that I am an expert in any particular group of plants. I always have and still do feel indebted to the numerous individuals that have contributed to my current knowledge of the flora of Louisiana. Thanks are due to each one. A plea is made for future cooperation and help with the production of an atlas that reflects the specimens on deposit in our herbaria and then, if time permits, with the production of a manual of our flora.

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COMMENTS ON SOME OF THE MONOCOTYLEDONS OF LOUISIANA

R. Dale Thomas, Director of the Herbarium, Department of Biology, Northeast Louisiana University, Monroe; 71209.

When one compares the two most recent checklists of the monocotyledons of Louisiana (MacRoberts, 1988 and Thomas and Allen, 1984), the presence or absence of some of the species in the state is not clear. Some of these can be clarified by the following citations.

Rheo Spathacea (Sw.) Stearn (R. discolor (L'Her.) Hance ex Walp. COMMELINACEAE. CAMERON; Lawn and waste areas at South Cameron High School beside La. 82 about 0.4 miles east of Oak Grove; Sec. 32, T14S, R7W. R.D.T. & B. E. Dutton; 88522 & 1755, 12 May 1984. This taxon is commonly cultivated and becomes established and spreading in waste areas in the southern part of the state.

Carex fissa Mack. var. aristata Hermann. CYPERACEAE. Det. by J. W. Kessler. SABINE: Clearcut area beside access road to Holly Point Marina on Toledo Bend Lake two miles south of La. 191 south of Zwolle; Sec. 14, T18N, R14W. R.D.T. & Neil Carroll; 76493 & 2965, 20 May 1981.

Cyperus echinatus (L.) Wood. CYPERACEAE. Det. by C. T. Bryson, 1988. FRANKLIN: Along Boeuf River north of Forest Lake four miles west of Fort Necessity and south of La. 4; Sec. 7, T12N, R6E. R.D.T. & Gary Joye, 78507 & 1962, 17 September 1981.

Cyperus grayioides Mohl. CYPERACEAE. Det. by Brian G. Marks. Very close to Cyperus filiculmis Vahl. WINN: Very dry sandy soil beside La. 156 and railroad just east of Saline Bayou east of Goldonna, Sec. 29, T12N, R5W. R.D.T., 60597, 7 September 1978.

Cyperus lancastrimensis Porter in Gray. CYPERACEAE. Det. by R. Carter of Valdosta State College. Previously identified as Cyperus retrofractus (L.) Torr. OUACHITA: Swampy area north of I-20 just west of U.S. 80 exit at Calhoun near Curry Creek, Sec. 26, T18N, R1E. R.D.T., et. al., 49443, 16 June 1976. CLAIBORNE: Around Claiborne Lake at La. 2, along highline right-of-way, Sec. 20, T21N, R6W. L. Lewis, 2634, 9 October 1979.

Fuirena simplex Vahl. var. simplex. CYPERACEAE. Det. by J. W. Kessler. ST. TAMMANY: La. 21, 0.1 mile south of La. 16 south of Sun in old gravel pit pond. C. E. DePoe, 6223, 8 October 1966. This collection is before the collection of var. aristulata (Torr.) Kral from East Carroll Parish.

Dioscorea batatas Dcne. DIOSCOREACEAE. WASHINGTON: Beside La. 38 at a branch of Little Silver Creek about one mile east of Tangipahoa Parish Line; Sec. 19, T1S, R9E, R.D.T., 68797, 18 October 1979. I also have collections from IBERIA (R.D.T. & John McCoy, 84,488, 22 June, 1983), RICHLAND (R.D.T., et. al., 76891, 11 June 1981), and UNION (D. C. Moore, 2710, 27 September 1983). This species was accidentally left off the list by Thomas and Allen (1984). Its smaller aerial corms and hastate leaves distinguish it from the larger corms and roundish cordate leaves of D. bulbifera L. which also occurs in waste areas in the southern part of the state.

Iris hexagona Walt. IRIDACEAE. This species was left off the Thomas and Allen list although specimens at NLU were previously annotated by Scott MacReynolds to this taxon. BOSSIER (Leggett, 1467); OUACHITA (Carey Smith, 98); WINN (R.D.T. 14019). A later specimen from ST. CHARLES was collected by Glen Montz (4967).

K. L. Horberger studied Sisyrinchium for her PhD dissertation at the University of Arkansas. She has annotated NLU specimens for two new species to the checklists. Sisyrinchium fuscatum Bickn. IRIDACEAE. ST. TAMMANY: Woods north of La. 1090 and I-10 east of I-59 and Slidell, Sec. 38, T8S, R15E, R.D.T., et. al., 57460, 8 April 1978. WASHINGTON; west side of La. 21 just north of La. 435 north of Bogalouza, Sec. 36, T2S, R11E. R.D.T. 63,742, 29 April 1979. Sisyrinchium nashii Bickn. WASHINGTON: Woods at northeast edge of LSU Forestry Camp NE of Sheridan and La. 10; Secs. 10 & 15, T2S, R12E, R.D.T., et. al., 56,263, 8 April 1978.

Alstroemeria psittacina Lehm. LILIACEAE. OUACHITA: 1505 South 3rd Street, Monroe, Carlos Smith, 1075, 25 May 1971. This lily is escaped and spreading throughout a lot on Jewel Street in West Monroe (Ouachita Parish) and has been collected in a similiar condition in Red River Parish.

Muscari armeniacum Leichtl. ex. Baker. LILIACEAE. MOREHOUSE: Edge of cotton field beside La. 2, 0.2 miles west of the West Carroll Parish Line, Sec. 25, T21N, R8E; R.D.T. & Pat Pias, 57260 & 3061, 7 April 1978. This specimen and one from UNION Parish (Ouchley, 2) were annotated from M. racemosum to M. armeniacum by Scott MacReynolds. More work needs to be done to see which of three taxa (M. armeniacum, M. botryoides, and M. racemosum) occur in the state and how the three taxa are differentiated.

Spiranthes magnicamporum Sheviak. ORCHIDACEAE. Annotated by C. J. Sheviak, 1985). OUACHITA: Along south side of Red Cut Road at L. Blackenup Road intersection NE of Luna; Sec. 10, T16N, R3E. N. Rich & T. Briley, 1726, 13 November 1979.

Panicum flexile (Gattinger) Scribner. Det. by Ken E. Rogers and verified by C. M. Allen. OUACHITA: Old field near junction of Bayou Shore Drive and La. 139, Monroe; R.D.T. et. al, 1470, 30 October 1966.

Paspalum alnum Chase. POACEAE. Det. by C. M. Allen. CAMERON: Pasture (former rice field) east of headquarters of F-R Ranch SE of Vinton in Gum Cove, Sec. 29, T12S, R11E. R.D.T., B. E. Dutton, J. Bruce, & R. Poussen, 98406 & 2094, 9 June 1984.

Microstegium vimineum (Trin.) A. Camas. POACEAE. MADISON: Woods and old road along Judd Brake in Tensas River National Wildlife Refuge south of Quebec, Secs. 7 & 17, T16N, R11E. R.D.T. & K. Ouchley, 86001, 27 September 1983.

Sorghum alnum Parodi. POACEAE. Det. by C. M. Allen. CAMERON: In fencerows on both sides of Precht Road about 0.3 miles south of La. 384 east of Boone's Corner, Sec.s 13 & 14, T12S, R8W., R.D.T. & B. E. Dutton, 90626, 16 August 1984.

Sporobolus ozarkanus Fern. POACEAE. Det. by R. L. McGregor. ALLEN: Along railroad tracks east of U.S. 165 and north of U.S. 190E in Kinder; Sec. 35, T6S, R5W, R.D.T., 79260, 24 October 1981. Also from WINN (R.D.T., 74340).

Appreciation is expressed to all those botanists whose identifications and/or verifications have helped make these additions possible. These include: C. M. Allen, C. T. Bryson, R. Carter, J. W. Kessler, S. MacReynolds, R. L. McGregor, B. G. Marks, K. E. Rogers, and C. J. Sheviak.

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EFFECTS OF ILLUMINATION AND DARKNESS  
ON ANTHOCYANIN FORMATION IN BEET  
SEEDLINGS TREATED WITH OR WITHOUT N-PROPANOL

T. HATHOUT<sup>1</sup> AND M. KORD<sup>2</sup>

ABSTRACT

Physiological studies on the biosynthesis of anthocyanin in beet seedlings have been carried out. A limited amount of anthocyanin occurs in dark-grown seedlings, when compared with that of illuminated ones. After four days there is a rapid synthesis of anthocyanin in both cotyledons and hypocotyls. The hypocotyl produces more pigment than the cotyledons. Seedlings treated with different concentrations of propanol, under continuous illumination and in the dark affects their content of anthocyanin pigment and total sugars differently. Increased propanol concentration inhibited pigment formation. Total sugars, also, decreased by increasing propanol concentration and the most effective concentration was 0.2%.

INTRODUCTION

It is well known that anthocyanin synthesis in a wide range of tissues is promoted by light. In apple skin (Siegelman, 1964) turnip seedlings (Siegelman and Hendricks, 1957) Celosia seedlings (Malaviya and Laloraya, 1966) and buckwheat hypocotyl (Troyer, 1964) anthocyanin synthesis is light dependent. These tissues fail to form anthocyanin if they are grown in darkness. The case of red cabbage (Pecket and Hathout, 1974) is somewhat different, since there is a significant dark synthesis of anthocyanin. Nevertheless, these authors also reported stimulatory effect of light on pigment synthesis. Oelmuller and Mohr (1985) found that anthocyanin formation in Milo seedlings occurs only in white light and blue, while red light and far-red light are totally ineffective.

The biosynthesis of anthocyanin pigment in intact seedlings or excised parts is recognised to be affected by many factors, particularly light and carbohydrate supply.

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In order to investigate the capacity of pigment formation in the cotyledons and hypocotyl, Grill and Vince (1964) severed the cotyledons from two-days old seedlings before exposure to 48hr light. Such severing increased the formation of anthocyanin in the cotyledons, the hypocotyl on the other hand, formed almost no anthocyanin when the cotyledons were removed.

It became clear to them that anthocyanin synthesis in the hypocotyl depends on the movement of substance(s) and that severing of the cotyledons increased the amount of anthocyanin in the cotyledons themselves. If light-dependent synthesis of anthocyanin in the hypocotyl was dependent on the amount of stored precursor moving from the cotyledons, it would be expected that the longer the cotyledons and hypocotyl remained in contact before severing, the greater the amount of anthocyanin would be formed in the hypocotyl (Gill and Vince, 1964). In other words, decrease in anthocyanin in the cotyledons would be accompanied by an increase in hypocotyl pigment. In fact they observed that the amount of anthocyanin synthesized in the hypocotyl was the same at all ages and almost negligible. They assumed that translocated storage material may be rapidly utilized by the growing hypocotyl in the dark and that none is available for anthocyanin synthesis when light is given. In the cotyledons the amount of pigment fell as the duration of illumination before severing was increased from 6 to 48hrs. Up to 6 hrs. of illumination before severing did not decrease the amount of anthocyanin in the cotyledons indicating that there is a lag-phase of few hrs. before appreciable amounts of precursor are synthesized and translocated. Malaviya and Laloraya (1966) came to a similar conclusion working on *Celosia* seedlings.

More recently, Pecket and Small (1980) studied the site of anthocyanin synthesis in red cabbage seedlings and reached the conclusion that the organelles responsible for anthocyanin formation (anthocyanoplasts) are found in the vacuoles of the plant cells and are the sites of anthocyanin biosynthesis.

Beet seedlings are chosen as experimental material in the present study because of our interest in increasing our knowledge about anthocyanin biosynthesis and because of its importance as a crop plant which can accumulate a high concentration of sucrose in the roots. The work also reports an investigation dealing with the physiological effects of n-propanol on anthocyanin synthesis.

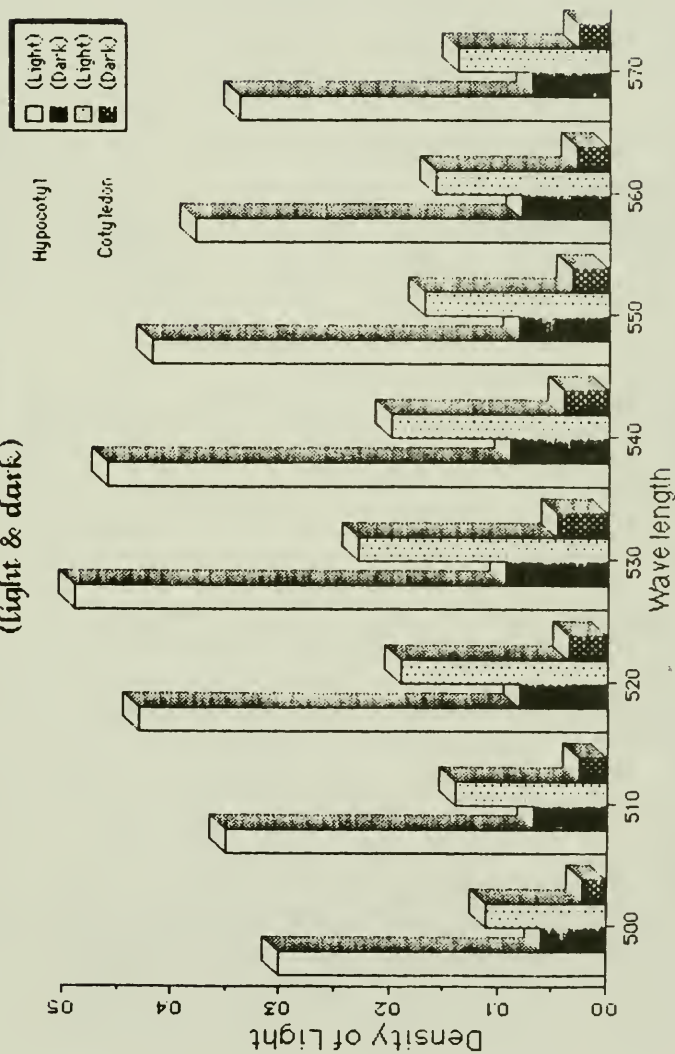
## MATERIAL AND METHODS

Seed balls of Beta vulgaris cultivar "Bettrave" imported from France were found to be suitable for the present study. The small and big seed balls were sieved out and those retained by 3mm mesh were used as experimental material. Owing to the fact that the coats of these seed balls accumulate germination inhibiting substances, it was necessary to get rid of such inhibitors before germinating the seeds. This was easily achieved by washing and leaching with water, since these inhibitors are known to be water soluble as cited by El-Shishiny and Thoday (1953).

Seven lots of beet seed balls, each lot composed of 50 seeds, were washed and leached with running distilled water for 8hrs which appears to be quite sufficient to eliminate the germination inhibitory substances in the coats of beet seed balls. After washing, seed balls were removed and rinsed in 70% ethyl alcohol for surface sterilization (Hatata and Shehata, 1979) washed several times with sterile distilled water, then distributed in large sterilized Petri-dishes containing two filter papers moistened with 20ml sterile distilled water. In experiments using n-propanol two days old seedlings were transferred to Petri-dishes containing 20ml of different concentrations of n-propanol. It was found that with the age of seedlings employed no significant damage was done to the material during this operation. The dishes were transferred to a lightened thermostatically-controlled incubator at constant temperature of 25°C and constant light intensity of 6,000 lux.

After 4 days of incubation, the beet seedlings were ready to be used as experimental material to study the effect continuous illumination and different concentration of n-propanol on anthocyanin formation. The same technique in germination, incubation and concentrations of propanol was used under continuous darkness and the Petri-dishes were wrapped with black polythene to prevent any exposure to light during the experiment. Hypocotyls and cotyledons were separated and anthocyanin intensity was determined daily from the 4<sup>th</sup> to the 12<sup>th</sup> day of growth. Anthocyanin pigment was extracted using 1% HCl (Muraveva et al. 1987). Anthocyanin assay was carried out by selecting daily samples starting from the 4<sup>th</sup> day of germination of the seeds till the 12<sup>th</sup> day of growth under continuous light or continuous darkness. Each sample was composed of comparable 10 seedlings from the dishes.

Fig. (1) Anthocyanin density of beet seedlings  
at different wave lengths  
(light & dark)



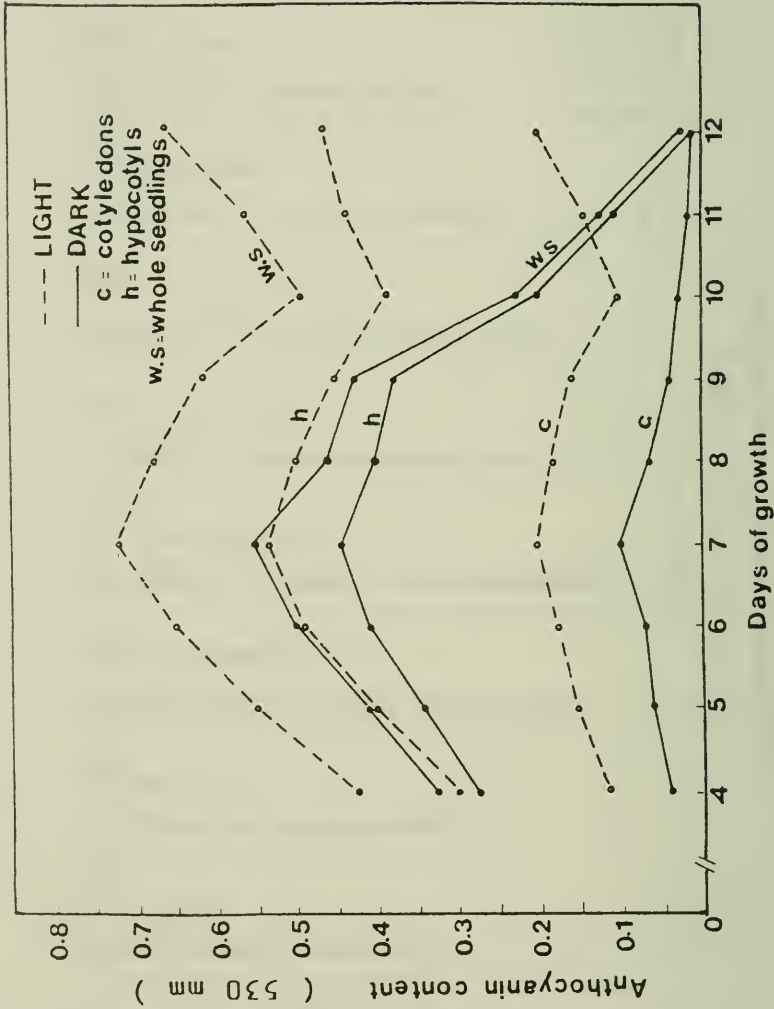


Fig. (2) Specific density of anthocyanin content of beet seedlings

For every sample, the hypocotyls of the 10 seedlings were separated from the cotyledons, then 10ml of 1% aqueous HCl was added to each lot in three successive aliquots of 5,3,2 ml for anthocyanin extraction (Pecket and Hathout, 1974).

However in dark-exposed seedlings anthocyanin assay was carried out under green safe light which has no effect on anthocyanin content during assay period (Grill and Vince, 1964).

Moreover, the technic of extraction, separation and determination of total sugars (using the anthrone method) in either the cotyledons or the hypocotyls of beet seedlings under different treatments were the same as adopted by Nosseir (1968) where the total sugar contents were expressed as mgm glucose per 100 gram dry weight of tissue.

### RESULTS AND DISCUSSION

The specific intensity of anthocyanin content of the hypocotyl and the cotyledons was measured using spectronic 20 colorimeter at different wavelengths. Fig (1) showed that the peak of absorption of anthocyanin in beet seedling was at 530mm. It was not possible to express the pigment in absolute units in view of the fact that its molecular extinction coefficient was not known.

It is clear from Fig (2) that the dark and light curves followed the same pattern from the start of anthocyanin determination on the 4<sup>th</sup> day after germination of the seeds until the 10<sup>th</sup> day of growth, either for the cotyledons, or for the corresponding hypocotyl, or for the whole seedlings. For all curves there was a gradual increase in the anthocyanin content of the different parts starting from the 4<sup>th</sup> day of germination until the 7<sup>th</sup> day of growth. After the 7<sup>th</sup> day, there was a gradual decline until the 10<sup>th</sup> day of growth. After the 10<sup>th</sup> day the anthocyanin level of parts of light-exposed seedlings increased gradually until the 12<sup>th</sup> day of growth. However, under dark conditions, and after the 10<sup>th</sup> day of growth, a further gradual decline persisted in the anthocyanin content of both hypocotyl and their respective cotyledons until a value reaching almost zero on the 12<sup>th</sup> day of growth.

Anthocyanin content of the hypocotyl was always higher than those of the corresponding cotyledons either in light or dark but the content of the light exposed seedlings was higher than those of the dark exposed ones Fig. (2).

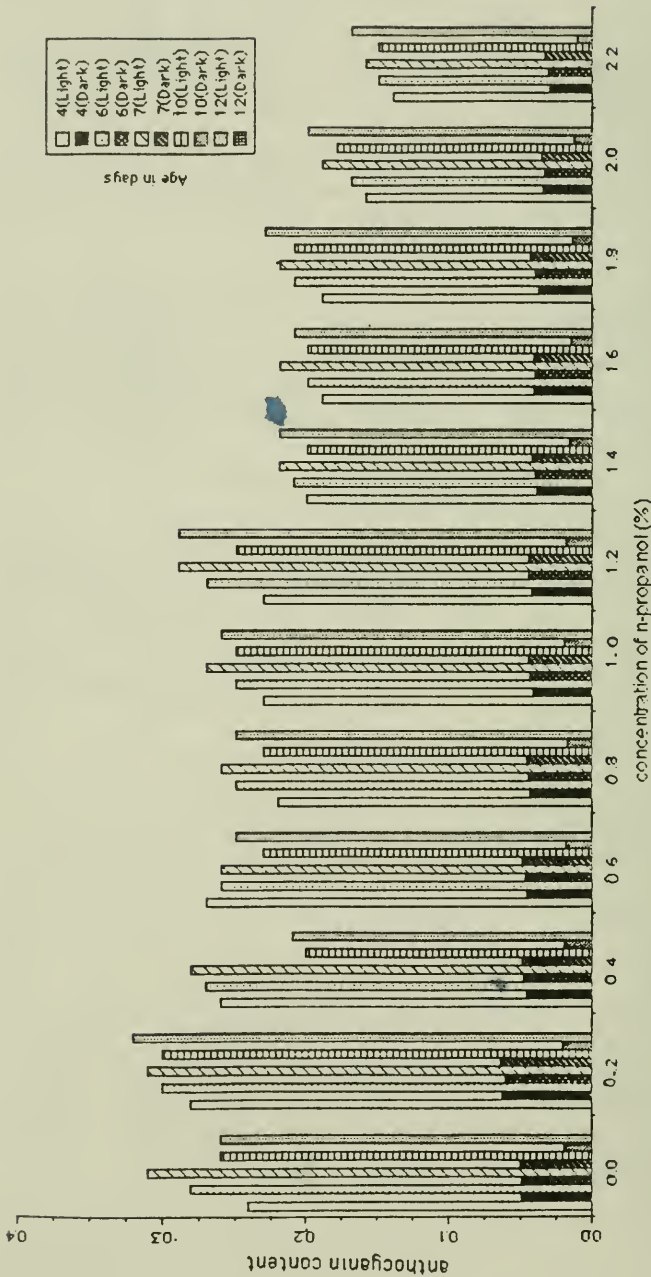


Fig (3) Effect of different conc. of n-propanol on the anthocyanin formation in the cotyledons of beet seedlings (grown in light & dark)

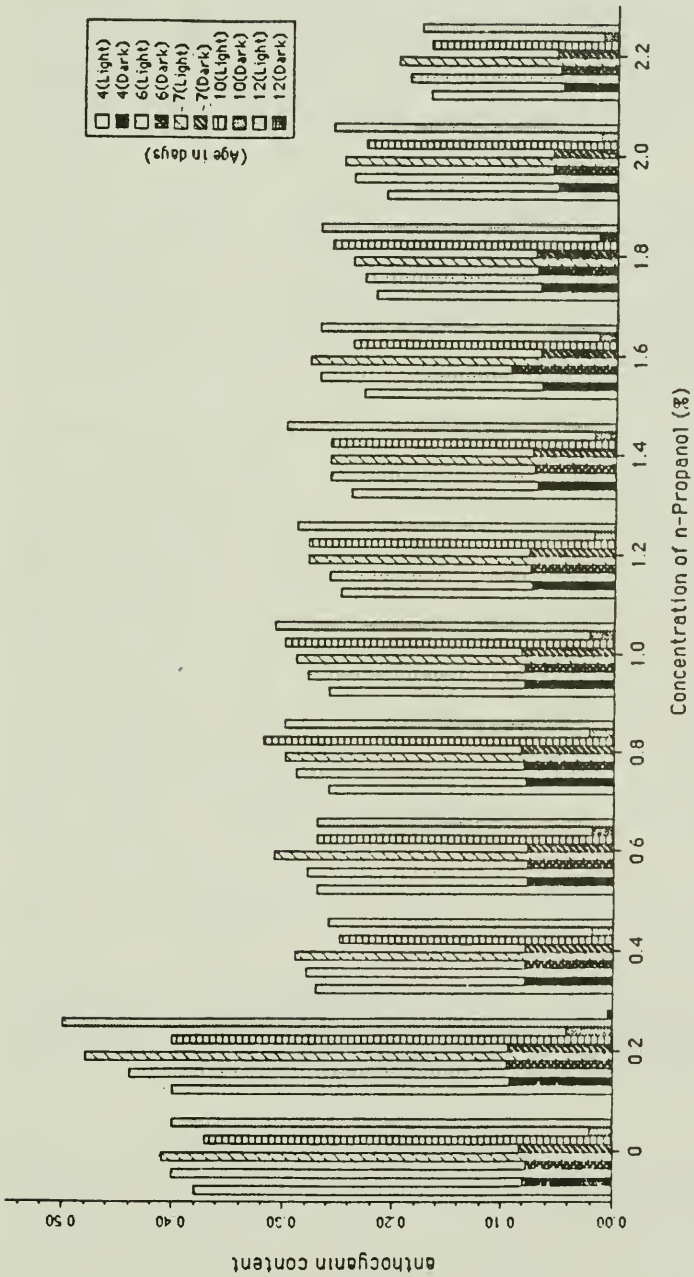


Fig (4) Effect of different conc. of n-propanol on the anthocyanin formation in the hypocotyl of beet seedlings (grown in light & dark)

The high content of anthocyanin in hypocotyl over that of the corresponding cotyledons might be due to the higher activity of the continued newly formed cells of the growing hypocotyl. Similarly, Pecket (1965) found that higher anthocyanin formation occurs during the period of the most rapid growth rate of the petals of *Lathyrus odorata* flowers. Also, it can be seen in Fig. (2) that anthocyanin formation in beet seedlings was dependent on materials stored in cotyledons during the successive days of growth where anthocyanin content increased gradually from the start of assay on the 4<sup>th</sup> day until reaching its maximum on the 7<sup>th</sup>, after which it declined gradually until the 10<sup>th</sup> day of growth. Similar results were obtained by Troyer (1964) who found that hypocotyl of 7 days old buckwheat seedlings can form more anthocyanin than those from younger or older plants.

Fig. (3) and (4) shows the effect of different concentrations of n-PrOH given to two-days old seedlings exposed to continuous light or left in darkness. It is clear from all histograms that a gradual increase in anthocyanin content of the different parts of the seedlings under the different concentrations used of n-PrOH starting from the 4<sup>th</sup> day of germination until the 7<sup>th</sup> day of growth. The increase was 24% in cotyledons for control under continuous light, and 15% for 0.2% n-propanol. In the corresponding hypocotyls, there was 10% increase for control and 30% when treated with 0.2% n-propanol. After the 7<sup>th</sup> day, there was a gradual decline until the 10<sup>th</sup> day, after which day the anthocyanin content of light-exposed parts increased gradually until the 12<sup>th</sup> day of growth, by 10% for the cotyledons treated with 0.2% n-propanol and 24% for the hypocotyls. However, under dark conditions, and after the 10<sup>th</sup> day of growth, a further gradual decline persisted in anthocyanin content of both hypocotyl and their respective cotyledons on the 12<sup>th</sup> day of growth.

From Fig. (4) it can be concluded that anthocyanin content of hypocotyl of seedlings grown in light was significantly decreased by gradually increasing the n-propanol concentration at all the stages of growth.

It is also clear that 0.2% n-PrOH was more effective than the other concentrations in increasing significantly the anthocyanin content of both cotyledons and hypocotyl. Since seedlings treated with n-PrOH promoted a greater production of anthocyanin. These data are consistent with the concept that n-PrOH increase membrane permeability and facilitates the entry of substrate to the site of antocyanin biosynthesis (Pecket and Small, 1980). Table (1) and (2) showed that the total sugars was significantly

increased by anthocyanin biosynthesis. Throughout the whole experimental period the anthocyanin content of the parts of light-exposed seedlings were higher than those of the corresponding parts of the dark-exposed ones, and in the hypocotyl higher than in the corresponding cotyledons, either under light or dark.

It is interesting to notice that after the 7<sup>th</sup> day of growth, although photosynthetic carbohydrates are rendered available in light-exposed seedlings, yet gradual decline in anthocyanin content was apparent until the 10<sup>th</sup> day of growth. Such decline in photosynthetic carbohydrates was interpreted by Malaviya et al (1966) as due to the presence of a factor other than carbohydrates on which anthocyanin biosynthesis was dependent and this factor seems to be in the cotyledons and becomes lost during continued growth. This factor seems to be lost in beet seedlings older than 10 days, since after the 10<sup>th</sup> day of growth, the anthocyanin level of the light-exposed seedlings increased gradually by further development of photosynthetic organs. Malaviya et al (1966) found that *Colocassia plumosa* seedlings grown in dark failed to produce any anthocyanin after 5 days in darkness, but before this there was a gradual decline which was increased by elongating the period of growth in darkness. He attributed such decline to the absence of photosynthetic carbohydrates. This study showed that light might have promoted anthocyanin formation in light-exposed seedlings through its activation of organelles responsible for anthocyanin biosynthesis as stated by Pecket and Small (1980). In addition, light is known to increase permeability of cell membranes and this also might activate anthocyanin biosynthesis.

The anthocyanin level of light-exposed seedlings after the 10<sup>th</sup> day of growth increased gradually by the lapse of time due to loss of the cotyledonary factor already referred to in this discussion, and to the interference of the stimulating effect of photosynthesis on anthocyanin formation. However, in the dark, after the 10<sup>th</sup> day of growth, the gradual decline was due to the continuous consumption of photosynthates (Malaviya and Laloraya, 1966).

#### ACKNOWLEDGEMENT

The authors gratefully acknowledge professor M.A. Nosseir for his kind advice during this work.

Table (1): Effect of different conc. of n-propanol on the total sugars of the cotyledons of beet seedlings (light &amp; dark) (mg glucose/100 g.d.wt.).

Age in days	Treatment	conc. of n-propanol (%)											L S D		
		0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	5%	1%
4	dark	80.9	83.7*	72.9**	78.3*	76.4**	75.9**	75.6**	76.1**	75.3**	75.0**	72.1**	71.9**	2.26	3.29
	light	287.4	306.1**	297.2**	281.6*	280.9*	266.4**	278.3**	272.6**	252.6**	246.4**	242.3**	230.1	5.13	7.46
6	dark	81.2	84.4**	80.3	77.9**	75.9**	76.1**	75.9**	76.2**	76.6**	75.4**	73.2	72.6**	2.05	2.98
	light	293.9	321.3**	304.3**	287.8*	288.1*	281.3**	281.2**	290.6	261.3**	258.1**	251.2**	239.8**	5.42	7.88
7	dark	83.6	98.7**	83.8	80.8*	80.6*	76.8**	76.3**	77.0**	76.8**	76.1**	74.6**	73.1**	1.93	2.81
	light	301.2	432.9**	322.4**	303.6	300.6	288.7**	294.9*	300.8	289.3**	280.2**	258.3**	242.1**	5.73	8.33
10	dark	79.8	92.6**	80.6	79.3	76.9**	76.6**	76.4**	76.8**	75.1**	74.8**	71.8**	71.0**	1.91	2.78
	light	280.6	382.7**	303.8**	291.8**	281.6	281.1	278.2	272.9*	260.6**	259.9**	242.6**	236.2	5.69	8.28
12	dark	62.7	63.6	63.9	63.6	63.1	64.9*	64.6*	64.9*	64.7*	65.9*	65.1*	64.6*	1.89	2.75
	light	293.2	430.6**	306.3**	302.9**	299.3	292.6	281.1**	291.3	288.6	288.3	250.3**	239.1**	5.67	8.25

\* Results significantly different from control at the 5% level.

\*\* Results significantly different from control at the 1% level.

Table (2): Effect of different conc. of n-propanol on the total sugars of the hypocotyl of beet seedlings (light &amp; dark) (mg glucose/100 g. d. wt.).

Age in days	Treatment	conc. of n-propanol (%)													L S D		
		0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	5%	1%		
4	dark	91.3	104.1*	103.8*	93.2	92.7	92.7	89.4	89.3	89.4	88.7*	76.4**	76.7**	2.47	3.59		
	light	456.9	521.8**	521.6**	475.2**	454.8	450.6	446.3**	451.6	451.9	450.3	376.2**	353.1**	7.18	10.44		
6	dark	92.4	109.7**	103.8**	93.1	92.7	92.6	90.6	90.9	90.7	89.6*	80.8**	77.3**	2.51	3.65		
	light	469.8	546.7**	527.4**	527.3**	470.9	460.8*	451.8**	458.4**	474.3	470.9	383.1**	354.6**	7.07	10.28		
7	dark	94.5	115.8**	106.2**	93.9	92.3	92.9	91.2*	91.9*	92.8	92.1	81.4**	78.6**	2.46	3.58		
	light	475.7	698.4**	531.6**	532.0**	477.2	478.1	477.9	480.3	482.1	480.9	444.3**	408.1**	7.46	10.85		
10	dark	56.2	61.8**	57.2	56.7	81.4**	81.7**	80.8**	80.6**	80.3**	80.9**	71.6**	69.4**	2.67	3.88		
	light	471.6	610.7**	527.5**	527.5**	475.1	469.7	467.9	475.6	476.2	474.6	409.8**	408.3**	7.43	10.81		
12	dark	46.6	48.7*	45.7	45.2	46.3	46.0	46.1	45.7	45.1	44.8	43.2**	42.6**	1.98	2.88		
	light	472.8	699.3**	530.9**	511.4**	461.7*	450.1**	437.2**	446.7**	442.5**	442.2**	375.6	474.6	8.10	11.78		

\* Results significantly different from control at the 5% level.

\*\* Results significantly different from control at the 1% level.

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A REVISED SYNOPSIS OF THE WHITE PINES

(PINUS, SECTION QUINQUEFOLIIS)

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ABSTRACT

A revised subdivision of the 11 species of section Quinquefoliis emend. (Synonym: section Strobus emend.) is proposed in accordance with the principles of Philosophia botanica by Linné. The basis of the section (emended here) is the long, effective seed wing, and the basis of the 3 subsections is highly practical: it uses the characters of the cones, often found lying on the ground under the trees. The subsections possess satisfactory coherence, both morphologically and geographically.

INTRODUCTION

This synopsis revises the ones previously written by myself (Landry 1974 and 1977) wherein sections and series had been segregated. While time marches on, the human person has a natural tendency to change her mind according to the experience gained. I now think that for a genus of less than 100 species, it is not necessary to use series. The divisional rank of subgenus and the subdivisional ranks of section and subsection do suffice. I concur in that respect with Engler, Gausson, Little & Critchfield, Pilger, Shaw and many others. However, the classifications now extant need further refining, new subgeneras, sections and subsections could be created for outstanding species and groups of species.

The treatment that we propose hereunder: 1) is in accordance with Linné (1751); 2) it is also the logical suite of the conclusions of Critchfield (1986); 3) above all, it is highly practical.

Here is a short development of those 3 bases: 1) A decade ago (Landry, 1979) we had published a fundamental analysis of the ways of classifying the divisions and the subdivisions of a higher plant genus. We had taken the example of the genus PINUS. To our astonishment, the unanimity did not exist between 10 sys-

tematicians on how to proceed and on what kind of basic data should be used. Consequently, the results and conclusions differed widely from author to author. We then commented such a "tragic" situation and made ourselves this sentence of Gausson (1960, p. 17): "Classification clashes with the defects of all (plant) classifications: to group together all (the species) which resemble each other means that we place together (species) in a similar evolutive state: it does not mean grouping together closely related species." We had then concluded that for the time being - i.e. until we finally understand the process of evolution - the most practical way to classify plants remains to follow the ideas of Linné (1751) who chose the reproductive system as a main basis to plant classification. Why? Because, its morphology is more refined. Why simplify and use only morphology? Because confusion tends to happen when we take into consideration more than one kind of data.

2) Critchfield (1986, p. 654) confirmed our opinion when he wrote this: "The contradictions between reproductive characters, vegetative morphology, crossing data and biochemical variations appear to be irreconcilable".

3) Our system is moreover a system of maximal practicability. It follows the simplest dendrological rule of considering just what is most easily seen and found, namely macroscopic morphological characters and easily picked up material. To fulfill such a prerequisite, the taxons hereunder proposed are diagnostically described by means of just the cones, including the trace left by the seeds on the underside of the scales. No conelets to scrutinize, no strobiles. It is so easier to simply pick up the cones as they very often lie on the ground under the mature trees. Even half rotten cones will suffice. The only other character used is the stature of the trees (very large, large, medium) but it is not neatly diagnostic; only indicative.

The material observed was mostly located in the Dominion Arboretum at Ottawa, the Arnold Arboretum at Cambridge, Mass., the Strybing Arboretum at San Francisco. We also studied in situ the Cordilleran species and Pinus strobus.

SECTION QUINQUEFOLIIS EMEND.

This epithet was first validly published by Duhamel du Monceau (1755, vol.2, p.127). Duhamel included 2 species: P. cembra and P. strobis. Then Little & Critchfield (1969, p.8) selected P. strobis as the lectotype species. Now, here we emend the diagnostic characters and the circumscription of the section as follows: semina alata normalis, umbone terminali, that is: long, effective seed wing, umbo terminal. By doing so we separate section Quinquefoliis from section Cembra characterized by seeds wingless or with short, non effective wings (i.e. shorter than the body of the seeds) in addition to the terminal umbo. Why give here so much importance to the long, effective seed wing? Because there is an important geographic correlation: section Quinquefoliis is much less continental than section Cembra. In a subsequent paper we will develop this fact.

The following key takes into account the cone apophyses dimensions and the length of the seed wings. Regarding the apophyse we had considered also the degree of their reflexion but we finally found that it was not always clear. Pinus ayacahuite, for exemple sometimes has all its apophysis reflexed, sometimes only the upper third. And Pinus monticola has sometimes a fifth, sometimes half.

KEY TO THE SUBSECTIONS OF  
SECTION QUINQUEFOLIIS

1. Cone relatively light: the midcone apophysis are narrow (10-27 mm) and thin (2-3 mm).....2
2. Seed wing (at midcone) 2 times or more longer than the body of the seed .....subsection Strobi
2. Seed wing (at midcone) 1-2 times longer than the body of the seed .....subsection Gojiae
1. Cone relatively heavy: the midcone apophysis are wide (30-35 mm) and thick (5-6 mm).....subsection Nat-clehianae

## SUBSECTION STROBI EMEND.

First valid publication: Loudon (1838, p.2280) who listed P. strobis (here selected as the lectotype), and also P. lambertiana P. monticola and P. wallichiana. He insisted that P. strobis and P. wallichiana were very similar.

As emended here, this subsection now comprises 7 species. We describe it as follows: umbo terminal, rather light cones and very long seed wings (at least twice longer than the length of the seed itself). They are: Pinus strobis (type), and P. ayacahuite, P. chiapensis, P. dalatensis, P. monticola, P. peuce, and P. wallichiana.

Interested like the psalmist who sung: "Great are the works of Adonai YHVH, studied by those who want them", I would like to know why those 7 species are specially distributed. Right now, we can notice 3 first facts: globally (1) that subsection is relatively southerly and (2) it is situated not too far from ancient or present seas or oceans, and (3) we find it distributed around the Northern Hemisphere except in the Extreme Orient where subsection Gojæ gradually replaces it.

## SUBSECTION GOJÆ

Subsection Gojæ n. subsect. Umbone terminali, apophysis comparate paucis grandibus, semina ala brevia separabili (ala 1-2X semina). Holotypus: Pinus morrisonicola Hayata. - Subsection Gojæ n. subsect. Terminal umbo, apophysis comparatively smaller, seed-wing short (wing 1-2 times the length of the body of the seed). - Sous-section Gojæ n. subsect. Ombilic terminal, apophyses comparativement petites, graines munies d'ailes courtes (1-2 fois la longueur du corps de la graine).

That name is from a sino-japanese root meaning "five leaves".

This series comprises Pinus kwangtungensis, Pinus morrisonicola (type) and Pinus pentaphylla. Concerning Pinus wangii, we consider it a species dubium. I respectfully pray here the esteemed Chinese dendrologists to furnish me with informations and specimens of taxon wangii, very closely related to Pinus

kwangtungensis.

The said 3 species grow not far from the sea in the southeastern Extreme Orient. They are medium trees commonly attaining 25-30 m.

Pinus pentapnylla is the right name of the Japanese White Pine, due to the fact that the complex Pinus X parviflora is a group of nothomorphs of Pinus pentapnylla hybridized with Pinus pumila. Please read more below about this subject.

## SUBSECTION NAT-CLEHIANAE

Subsection Nat-clehianae n. subsect. Umbo terminali, apopnysi comparate grandior: 30-35 mm lata, 5-6 mm crassa; pedunculatum conis 5-15 cm longus. Monotypicus: Pinus lambertiana Douglas. - Subsection Nat-clehianae n. subsect. Terminal umbo, apophysis comparatively bigger: width 30-35 mm, thickness 5-6 mm; length of cone peduncle 5-15 cm. I add this: the apophysis are lustrous when green or fresh or when the cones are just fallen on the ground (before they start rotting). - Sous-section Nat-clehianae n. subsect. Umbilic terminal, apopnysses comparativement plus grosses: largeur 30-35 mm, épaisseur 5-7 mm; longueur du pédoncule du cône 5-15 cm. J'ajoute que les apophyses sont lustrées lorsque vertes ou fraîches ou quand le cône vient de tomber au sol (avant qu'il commence à pourrir).

Please see the herewith drawing, which shows cones of (from left to right): Pinus ayacahuite (not entirely open), P. monticola, P. strobus and P. Lambertiana. Two of the main differences separating Pinus lambertiana are shown: much wider midcone scales; much longer cone peduncle.

This subsection is made of very large trees commonly attaining 45-60 m, i.e. by far the largest trees of the genus Pinus. Their silhouette is also unique: near the top of the crown of mature trees, we notice very long horizontal branches terminated by the big cones easily seen from a distance. The poet John Muir in The Mountains of California, p.158, was amazed by its special appearance: "Notwithstanding they are ever tossing their immense arms in what might seem most extravagant gestures, there is a majesty and repose about them that precludes all possibility of the grotesque, or even picturesque, in their general expression".

(Cited by Sargent, 1897, p.30). I have observed them in the vicinity of mount Shasta, as isolated trees, and fully concurr.

The name of this subsection is taken from the writings of the discoverer of Pinus lambertiana (i.e. Douglas, 1827, p. 499): "The vernacular name of (that Pine), in the language of the Umpqua Indians, is Nat-cleh." There for me remains to know exactly what that name means.

It is not necessarily because the tree is a giant that the cones are massive. The Sequoias, for example, have relatively small cones.

#### KNOWN NATURAL HYBRIDS

The intermediate morphological characters and the actual geographical range of the following 3 hybrid species indicate that they are relict hybrid swarms. We now know that a lack of present range overlap by the parent species is not a sine qua non condition for recognizing hybrids.

- Pinus X bhutanica = P. armandii X P. wallichiana. Please read Grierson et al. (1980) who described it as a species.

- Pinus X parviflora = P. pentaphylla X P. pumila. Here the best reference is Mayr (1980, p. 78-80).

We add that the shape of the scales is about rounded, i.e. ad media res between Pinus pentaphylla (scales longer) and Pinus pumila (scales wider). The cones also do not open much, they are sometimes barely dehiscent. The seedwings are quite short and quite fragile, a character that situate them near the lack of spermoderm of Pinus pumila. The reader is referred to a very excellent illustration of one of the nothomorphs of Pinus X parviflora by the Japan Forest Technical Association (1964, p.34-35, pl. 17).

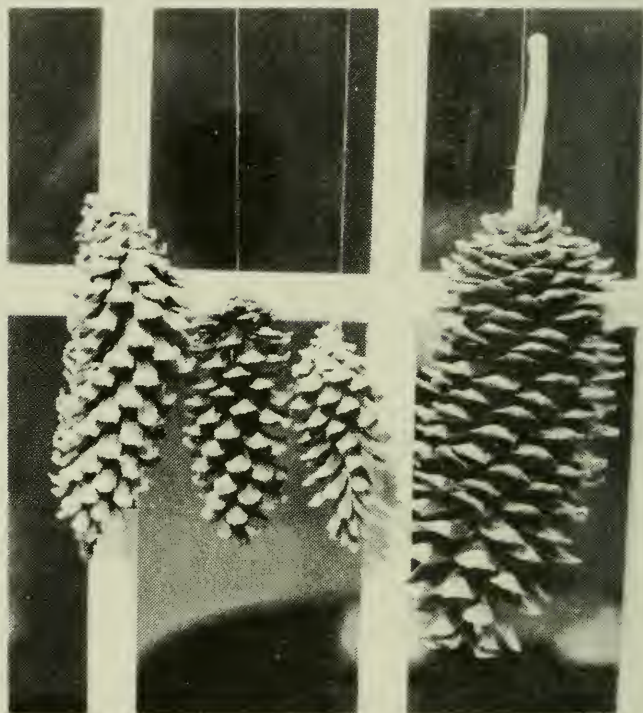
- Pinus X veitchii = P. ayacahuite X P. strobiformis. Please consult Shaw (1909, p.10).

#### RECOGNITION

This paper is published to honor William B. Critchfield in recognition for his first order contribution to the knowledge of the genus Pinus since over 30 years.

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Cones of (from left to right): Pinus ayacahuite (not entirely open), P. monticola, P. strobus and P. lambertiana. Two of the main differences separating Pinus lambertiana are shown: much wider midcone scales; much longer cone peduncle.

A REVISED SYNOPSIS OF THE PINES 2

THE AROLLA PINES

(PINUS, SECTION CEMBRA)

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ABSTRACT

Section Cembra, here emended, is of 8 species with terminal umbos and wingless seeds (or seeds having a short, ineffective wing). It is subdivided into 3 subsections which have clear cut characters, without overlapping. The shape of the midcone scales is mainly considered; also the cespitosity of the plant (or its absence). The proposed treatment is quite practical, and classical.

SECTION CEMBRA EMEND.

Section Cembra Spach (1842, p. 398) is hereby emended to include only the Pinus species with a terminal umbo and wingless seeds, or seeds having a short, ineffective wing. We exclude the degree of dehiscence or indehiscence of the cones, because we cannot effectively observe it without taking great pains and lots of time. For example, over one century of botanizing had elapsed before it was found (by D.F. Tomback in 1980 or so; please read Critchfield, 1986, p. 648), that the cones of Pinus albicaulis are sometimes dehiscent. Other species - Pinus koraiensis, Pinus pumila - open partly their cones, and that is confusing. Finally many other species of Pinus look closed or nearly closed on the ground after pouring rains. They will become wide open after a dry spell of weather.

The characters that we use to subdivide this section are those of the cone scales and their umbos. We had considered the degree of reflexion of the apophysis but upon close study it was noticed that there was too much variation intraspecifically. For example the

apophysis of Pinus strobiformis are sometimes all strongly reflexed, and sometimes only half of them are reflexed. Those of Pinus koraiensis are reflexed or not. Etc.

## KEY TO THE SUBSECTIONS

1. Midcone scales longer than wide, or rounded. Trees .....2
2. Apophysis thin (2-5mm). Umbo small, blunt to subacute, not prickling.....subsection Cembrae.
22. Apophysis thick (6-7mm). Umbo salient, subacute to acute, prickling.....subsection Nucifragae.
11. Midcone scales wider than long. Shrubs.....subsection Coxinoides.

SUBSECTION CEMBRAE EMEND

First valid publication by Loudon (1838, p. 2274). He comprised only Pinus cembra. The synonyms of that subsection are listed in Little & Critchfield (1969, p. 8).

Our new emended description is given above by the words of the key (articles 1 and 2). It comprises 6 species:

Pinus cembra (type) (including P. sibirica), P. armandi (including P. dabeshanensis), P. fenzeliana, P. flexilis, P. koraiensis and P. strobiformis.

All are continental, except Pinus koraiensis and Pinus fenzeliana which are both continental and maritime.

Pinus sibirica is considered by me and by many others as a variety of Pinus cembra. I dare call it a "small" species or a "microspecies". In order to come to that conclusion, I obey to the principle of equity which stipulates that we call a taxon by the name of "microspecies" when it can be distinguished by fewer net morphological differences. In the case of taxon sibirica, only 2 net such differences have been found: 1) seeds with a fragile husk; 2) bud scales shining. I therefore propose that it be called var. sibirica Loudon (1838, p. 2275).

Pinus dabeshanensis Cheng & Law differs from Pinus armandi, according to its authors, mainly by the reflexed midcone scales. But the degree of reflexion

of cone scales in sections Cembra and Quinguefoliis often varies intraspecifically according to latitude and altitude. Please read further above, under the heading "Section Cembra emend".

We here again have the case of a "small" species which in all equity we cannot place in the same level as the "big" species.

"Pinus dabeshanensis Cheng & Law in Cheng et al. (1975, p. 85)" is the precise reference for further study of its rank.

Taxon dabeshanensis was first published in a great monograph of Chinese Conifers, wherein thank God many taxonomic problems were solved.

#### SUBSECTION NUCIFRAGAE

This new subsection comprises only Pinus albicaulis Engelm. The cones of this species are peculiar by their subacute or acute umbos. When we grab the whole cone, our hand feels a bit prickled. By that trait, Pinus albicaulis can be slightly related to some of the species of subgenus Pinus (cones with dorsal, simple umbo).

Secondly, the midcone apophysis are much thicker (6-7mm) than those of the other species belonging to section Cembra.

Thirdly, it has been reported (Shaw, 1914, p. 28) that the seeds of that species have no spermoderm at all.

Fourthly, Weaver & Dale (1974, p. 227) inform us that it is often multi-trunked: "In half of the stands [surveyed in Montana] over half the trees had two or more stems. [...] Trees with five or more stems appear in two-thirds of the stands, but no tree with more than eleven stems were seen. The clumping may be due to branching at the base or, more likely, to the germination of several seeds in a cone or a squirrel cache". (The only other Pinus belonging to subgenus Strobis and which is more clumped is Pinus pumila. Please see photo of a 9-stemmed clump of Pinus pumila here under. Pinus pumila is near always cespitose).

Formal creation: subsection Nucifragae nov. s. Strobili umbone sub-mucronato. Apophysii crassa (6-7mm). Monotypus: Pinus albicaulis Engelm.



That is a low tree (common height: 8-10m). Of all the Pines belonging to subgenus Strobus in America, it is the most cold resistant and the most northerly, reaching Latitude North 55°. Peculiarly, it grows only near the timberline of high altitude sites.

The subsection's name recalls that the Nucifraga birds "own" those Pines, together with the squirrels.

#### SUBSECTION COXINOIDES

Subsection Coxinoides nov. s.— Strobili squamis latiores et breviores. Arbusti coxinoides. Monotypus: Pinus pumila Regel.

This subsection is extraordinary. Its midcone scales are wider than long; it is the only species of the subgenus Strobus which has a shrubby habit. It often forms pure dense stands that are so thick as to be nearly impenetrable by human beings, partly due to its cespitose habit (photo).

Essentially a continental species, it occupies the record latitude amplitude of the genus Pinus (ranging from Latitude 35°30' in Japan to Latitude 70°45' in Siberia) totalling 35°15'. It is also the most northerly species of the genus Pinus (see Crithfield & Little, 1966) and by far the most cold resistant. The deadly winds coming from the Arctic regions do not attain him very much because of its low stature. It "sleeps" below the snow level during the hard winter months.

#### KNOWN NATURAL HYBRIDS

A natural hybrid should be called by a binomial (followed by a notomorph epithet if needed).

1- Pinus X parapumila Ishii n. sp. hybr. Arbustum ad media res Pinorum cembra et pumila. Canales distantiores. -Shrub intermediate between Pinus cembra and Pinus pumila. Resin canals longer distanced (than those of Pinus pumila).

Ishii (1952, p. 115) had forgotten to write his description in latin when he described that natural hybrid species.

2- Pinus X novaemexicana n. sp. hybr. Arbor ad media res Pinorum flexilis et strobiformis. Semina

alata breviorissima. -Tree intermediate between Pinus flexilis and Pinus strobiformis. Seeds with a very short wing (ineffective).

Most details about this natural hybrid species are furnished by Steinhoff & Andresen (1971), and Andresen & Steinhoff (1971) who did during the Sixties and the beginning of the Seventies an essential contribution to the knowledge of the Pines in U.S.A. and Mexico.

A synonym exists of this hybrid, according to what I conclude from the observations of Andresen & Steinhoff (1971, p. 59); here is what those authors write: "The cone scales of var. (macrocarpa) are intermediate between vars  $\alpha$  and  $\gamma$  and are also intermediate within the clinal array of the P. flexilis-strobiformis complex of Arizona and New Mexico".

That synonym is Pinus flexilis var. macrocarpa Engelman (1878, p. 258).

#### RECOGNITION

This paper is published to honor Seiji Ishii for his first order contribution to the knowledge of the genus Pinus since over 30 years. Ishii innovated in the classification of the genus Pinus by giving preponderance to the morphology of the seeds.

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A YELLOW-FRUITED FORM  
OF PRUNUS GENTRYI (ROSACEAE)

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The Mountain Pima of the Sierra Madre of the Mexican state of Chihuahua recognize two folk species of the wild cherry Prunus gentryi Standl., differentiated by the color of the fruit. The first, called "ahuasiqui negro," is very dark purple, almost black. The second, "ahuasiqui blanco," is characterized by a yellow mesocarp and an exocarp which is either yellow or sometimes red if exposed to the sun. The latter is hereby given formal taxonomic recognition, as follows:

*Prunus gentryi* Standl. f. *flavipulpa*  
Laferrière, forma nova.

Differt a forma *gentryi* mesocarpio flavo et exocarpio flavo vel coccineo.

Like f. *gentryi* but with yellow mesocarp and yellow to scarlet exocarp.

Type: Nabogame, Chihuahua, 1800 m, 28°30'N 108°30'W, 2 Aug 1988, Laferrière 1600 (Holotype at ARIZ; isotypes at MEXU, CHAP, UC, MO, US, F, UNL); Topotype: Nabogame, 28 Jul 1988, Laferrière 1572 (ARIZ, MEXU, CHAP, CAS, NY, COL).

The name "flavipulpa" means "with yellow pulp." Both the purple and the yellow forms of this species are common along streambanks in the vicinity of the type locality. The Pima consider the yellow-fruited form to be sweeter in taste.

## A. Lourteig

Cuando Plumier ilustró los géneros en Catálogo, utilizó los dibujos que le parecieron más adecuados para expresar los caracteres genéricos, aunque pertenecieran a más de una especie. Esta práctica es utilizada por muchos otros autores y es lógica, pues se trata de presentar un género y no una especie. Cuando el género es monotípico o cuando se puede probar que todos los dibujos corresponden a una sola especie (como ocurre a veces), la ilustración es además de genérica, específica. En el caso presente sólo intentó presentar Palma y usó el porte de una planta y los detalles de otra. Esto fué bien observado por Martius y por Urban quienes ya hicieron la separación. En su descripción del género Palma, en p. 2, Plumier con un gran sentido pedagógico señala las letras que acompañan, en la lámina 1, las distintas partes del hábito de la palmera. "...caudicis unius recti A, ramos non producentis..., in orbem positus B, folia deferentibus;...inter quas vaginae seu spathae C..." que están grabadas al lado de los órganos correspondientes en la figura que representa esta especie.

El protólogo correspondiente a los icones MSS 7: 7,8,9,10 es la base de Geonoma? Plumeriana Martius, Palmetum Orbignianum 34. 1843; Hist. Palmarum 3: 316, 331. 1853. Martius hizo algunos pequeños cambios en la transcripción del MSS de Plumier, así: en la diagnosis comienza: "G. cespitosa, caudice elato 30 pedalis..". En realidad Plumier se expresó así: "Palma haec palustribus locis potissimum gaudet; pluras insimul ex eadem sede,...." lo que significa que varias, al mismo tiempo (crecían en el mismo lugar. Por esta diferencia han habido siempre dudas para la ubicación de la especie en el género al cual pertenece. Las fotografías que ilustran los trabajos de Bailey (fig. 100) y otros, muestran siempre otros individuos juntos y hay siempre grupos de esta planta entre alta vegetación arbustiva y otras. Corresponde bien a lo que se concibe como Calyptronoma. En la descripción, Martius agregó algunos términos entre paréntesis, adaptando así la descripción plumeriana a la época moderna de Martius, tales como pinnae, spathae, pedunculis. Al citar la tab. 1 del Catálogo de géneros de Plumier se refiere bien al hábito, eliminando los detalles que pertenecen a otra planta, por lo que esta lámina fué hecha para ilustrar "Palma" y no una especie determinada. Urban procedió con la misma inteligencia. Las confusiones vinieron más tarde, con los botánicos contemporáneos (ej. Bailey, Gentes Herb. 4: 169-170. 1938; Wessel Boer p. 568. 1968).

Todas las ilustraciones inéditas corresponden bien a lo que conocemos con el binomio de Calyptronoma rivalis y a los dibujos y fotografías tanto de Cook como de Bailey (39c, 90, 91, 92d, 99, 100).

Como el nombre de Martius tiene prioridad sobre el de Cook, está correctamente publicado, descrito, ilustrado y por ende tipificado, una nueva combinación es necesaria :

Calyptronome Plumeriana (Martius) Lourteig n. comb.

Geonoma? Plumeriana Martius, Palmetum Orbignianum 34. 1843; Hist. Nat. Palmarum 3: 316, 331. 1853. Wessel Boer, Geonomoid Palma 65. 1968. Tipo: Plumier, Catal. Gen. Tab. 1 hábito, excl. detalles y MSS 7, ic.7, 8,9,10 citados por Urban, Symb. Antil. 8: 76. 1920: " tab. 1 ad dexteram (fig. 6 summae) et tab. manusc. 7-10 ", basados en una planta recogida por Plumier en la Isla de Santo Domingo, "Fond des negres, inter le Petit Goive et l'isle a Vache".

Sinón. Cocope rivalis O.F.Cook, Bull. Torre. Bot. Club 28: 568, tab. 47, fig. 2. 1901. Tipo: Puerto Rico, Aguadilla, near San Sebastián, Cook et al.(cf. Bailey).

Calyptronome rivalis (O.F.Cook) Bailey, Gentes Herb. 4 (5):171. 1938. Palma Pinao Aublet, Fl. Guiana Franç. 2: 974. 1775 quoad cit. Plumer. Calyptrogyne occidentalis auct. (Urban, l.c.) quoad syn. Plumer. et Mart. non Calyptronome occidentalis (Sw.) Moore, Gentes Herb. 9: 252. 1963.

Aublet, l.c. sub Palma Pinao cita el protólogo de Plumier sin la lámina. Además dice que hay tres variedades, que no describe ni diferencia; no existe género Palma, por lo tanto no pueden identificarse; los datos que menciona se refieren a plantas que crecen en Guayana Francesa.

Muséum National d'Histoire Naturelle (Paris).

A. Lourteig

L.R. Landrum in Monograph 45. Flora Neotropica (Myrtaceae) p. 106 y 107 incluye Myrtus cotinifolia Plumier, publicado por Burmann, Plantarum Americanarum fasc. 9. 1759, como sinónimo de Pimenta racemosa (P. Miller) J.W.Moore.

Burmann publicó esa obra porque había comprado las copias de una parte de los Icones de Plumier que habían pertenecido a Boerhaave y que sólo comportan los protólogos correspondientes, sin descripciones (v. Heller & Stearn, Appendix... p. 47, 1958 in Linnaeus, Sp. Plant. edit. facsim. Edit. Stearn). Sobre esas copias yo he trabajado.

Burmann usó los protólogos de Plumier para denominar las ilustraciones, pero creó sus propios protólogos que inscribió debajo de los originales de Plumier y que no son necesariamente equivalentes; luego añadió textos y referencias a otros autores todos posteriores a Plumier, sin ninguna investigación. Plumier, muerto en 1704, no tiene ninguna responsabilidad en esta obra, que se puede calificar de bastarda, puesto que su razón de ser es el aprovechamiento de sus ilustraciones siendo los textos de Burmann.

Aunque esta obra es posterior a 1752 (creación de la Nomenclatura binaria de Linné) no deja de ser pre-linneana, dado que sólo usa "protólogos" es decir "nomenclatura polinomial".

El azar ha querido, en el caso de Myrtus cotini-folio, que el protólogo corto se pueda confundir con un nombre binario, como lo hizo Landrum. No es tal, porque en la época en que Plumier lo escribió (siglo XVII) no existía la nomenclatura binomial. Este protólogo fué puesto en binomio por Gmelin, recién en 1791.

El libro de Burmann ha sido sumamente perjudicial para la obra de Plumier y, aun hoy, para la tipificación de las especies linneanas de América. Salvo por la citación de las láminas, obligada porque Linné las usó en Species Plantarum, Genera y Systema, con los protólogos, no debemos tener en cuenta las supuestas sinonimias de Burmann.

Burmann publica Myrtus cotini-folio p. 203, equivocándose en el texto (como tantas veces) citando M55 7: 79. Este icón es lo que Plumier describió como: Myrtus arborescens Citri foliis glabris, fructu Caryophylli sapore, el cual corresponde a Pimenta racemosa (P.Miller) J.W.Moore (V. Urban, Repert. Sp. Nov. Beihefte 5: 136. 1920 sub Amo-

mis caryophyllata (Jacquin) Kurg et Urban ). Pero el protólogo enunciado por Burmann va acompañado de la lámina 203, fig. 2, lo cual no puede omitirse como lo hace Landrum, y ésta corresponde al MSS 7, icón 83 que es una reproducción parcial, cruda, de la hermosa lámina en acuarela con análisis florales, de Plumier. Aun así, no puede confundirse con la especie de Pimenta en cuestión, lo que hace sospechar que Landrum no la vió.

Por consiguiente, la sinonimia a Pimenta racemosa citada por Landrum l.c. p. 107, es falsa ya que el nombre de la especie y la ilustración corresponden a Myrcia citrifolia excl. sinonimia.

En resumen:

Myrtus Cotini-fo-  
lia)"; Plant. Americ. Edit. Burmann 203, excl. synon., tab. 208, fig. 2.

Myrtus citrifolia Aublet, Fl. Guiana Franc. 2: Table des noms 28; 1: 513. 1775 = Myrcia citrifolia (Aublet) Urban, Repert. Sp. Nov. 16: 150.1919; Symb. Antil. 8: 479. 1920.

Syn. Eugenia paniculata Jacquin, Collectanea 2: 108, tab. 5, fig. 1. 1788.

Myrtus coriacea Vahl; Symbolae 2: 59. 1791.

Myrtus cotinifolia Gmelin, Systema 2: 792. 1791.

El tipo es la lámina, l.c., basada en una planta recogida y descrita por Plumier, originaria de Martinica, Cul de Sac a Vache.

Muséum National d'Histoire Naturelle, Paris.

STUDIES IN THE EUPATORIEAE (ASTERACEAE) CCXXIV.  
THREE PREVIOUSLY MISPLACED SOUTH AMERICAN SPECIES

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The following three species have been recognized in the literature since long before the recent study of the tribe Eupatorieae (King & Robinson 1987), but for various reasons have been misplaced or overlooked in that treatment.

**GRAZIELIA BREVIPETIOLATA** R. M. King & H. Robinson, nom. nov. Eupatorium brevipetiolatum [Schultz-Bip.] Baker ex Hieron., Bot. Jahrb. 22: 781. 1897. hom. illeg. Hieronymus cites E. vernoniopsis var.? brevipetiolata Schultz-Bip., msc. in Herb. Reg. Berol. as the source of the name. The name was mentioned by Baker (1876) in a note but was still not validated. The Hieronymus validation fails because of an earlier 1884 validation of a Schultz-Bipontinus manuscript name Eupatorium brevipetiolatum by Klatt for a Mexican species now placed in the genus Bartlettina. The species name brevipetiolata is not preoccupied in the genus Grazielia and is therefore retained here. The type specimen is that cited by both Baker (1876) and Hieronymus (1897): Sellow 673, in the Berlin herbarium. Since the destruction of the holotype in Berlin the Paris specimen is selected here as lectotype. The Baker reference of Brasilia meridionali was corrected by Hieronymus the Uruguay, and all material seen is from the latter country.

The species resembles Grazielia gaudichaudiana (DC.) K. & R. of Brazil, but the leaves are larger (blades mostly 2-5 cm long), the margins are closely crenulate-serrulate, and the secondary veins are pinnate in a strongly and evenly ascending pattern.

**HETEROCONDYLUS DIDYMUS** (Klatt) R. M. King & H. Robinson, comb. nov. Eupatorium didymum Klatt, Ann. K. K. Naturhist. Hofmus. 9: 356. 1894. Previously in this series of studies this species was transferred to the genus Ayapanopsis but examination shows the proper placement is in Heterocondylus. This Bolivian species is the third member of the genus with opposite leaves. It somewhat resembles the common H. alatus (Vell.) K. & R. of Brazil (once known as Eupatorium vautherianum DC.), but the present species has a smaller and more corymbose inflorescence with more subequal involucre bracts.

**PRAXELIS SANCTOPAULENSIS** (B.L.Robinson) R.M. King & H. Robinson, comb. nov. Eupatorium sanctopaulense B.L.Robinson, Contr. Gray Herb. n.s. 68: 32. 1923. The species was placed in Chromolaena earlier in the present series of studies of the Eupatorieae, but reexamination shows that the receptacle is consistly highly conical.

Literature Cited.

- Baker, J. G. 1876. Compositae II. Eupatoriaceae. In C. F. P. Martius, Flora brasiliensis 6(2): 181-375, pl. 51-102.
- Hieronymus, G. 1897. Erster Beitrag zur Kenntnis der Siphonogamenflora der Argentina und der angrenzenden LÄnder, besonders von Uruguay, Paraguay, Brasilien und Bolivien. Bot. Jahrb. 22: 672-798.
- King, R. M. and H. Robinson. 1987. The genera of the Eupatorieae (Asteraceae). Monographs in Systematic Botany, Missouri Bot. Garden 22: i-x, 1-581.

Studies on Mikania (Compositae)-XVI: Priority of the Name  
M. dentata Sprengel over M. ternata (Vell. Conc.) B. L. Robinson

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These notes result from a literature review preliminary to a treatment of the genus for Paraguay. The plant known as Mikania ternata (Vell. Conc.) B. L. Robinson is native to southern and southeastern Brazil, eastern Paraguay, Argentina (Misiones), and central Peru. It is one of the very few species of the genus used as an ornamental (Graf, 1976), probably because of its palmately compound leaves and the tendency of the vegetative parts to be purplish in color. It is sometimes sold commercially under the name Mikania apiifolia DC.

The combination Mikania ternata was proposed by B. L. Robinson in 1911, based on the name Cacalia ternata of Vellozo in Flora Fluminensis (most often cited as published in 1825) because of the apparent priority of that name over either M. dentata Sprengel or M. apiifolia DC. which are both names for the same species. Carauta (1973) has shown that while three fourths of the text of Flora Fluminensis (p. 1-353) was printed in 1825, it remained stored in the "Typographia Nacional" for four years. The sale (distribution) of the incomplete text began in 1829. Under articles 29 (publication is effected by distribution of printed matter) and 30 (effective date of publication is the date on which the printed matter became available) of the International Code of Botanical Nomenclature, the effective date of Vellozo's species described in the first unfinished edition is between 7 September and 28 November 1829 (Carauta, 1973).

It is now clear that the name Mikania dentata Sprengel, published in 1826, has priority over [the basionym] Cacalia ternata, and must be considered as the correct name for the plant currently known as Mikania ternata. Complete and correct nomenclature for this species is as follows:

Mikania dentata Sprengel, Syst. Veg. Fl. Peruv. Chil. 3: 422.  
1826, not to be confused with Mikania dentata

G. M. Barroso, Arch. Jard. Bot. Rio de Janeiro 16:  
275. 1959, nom. illeg.

Cacalia ternata Vell. Conc., Fl. Flum. 315. 1825 [1829].

Cacalia septemnata Vell. Conc., Fl. Flum. 316. 1825  
[1829].

Mikania apiifolia DC., Prodr. 5: 202. 1836.

Mikania ternata (Vell. Conc.) B. L. Robinson, Proc. Amer.  
Acad. Arts. 47: 198. 1911.

Appreciation is expressed to L. Ramella, coordinator for  
"Flora del Paraguay" for pointing out the dates of publication of  
Flora Fluminensis.

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Carauta, J.P.P. 1973. The text of flora fluminensis and its  
effective date of publication. Taxon 22: 281-284.

Graf, A.B. 1976. Exotica 3. Roehrs Co., Inc. East Rutherford, NJ.  
1837 pp.

A NEW SPECIES OF RUMFORDIA (ASTERACEAE, HELIANTHEAE)  
FROM NUEVO LEON, MEXICO

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Routine identification of Mexican Asteraceae has revealed the following novelty. It is closely related to R. alcortae and differs most markedly by having exauriculate petioles.

RUMFORDIA EXAURICULATA B. Turner, sp. nov.

R. alcortae Rzed. similis sed foliis plerumque majoribus et tenuioribus petiolis exauriculatis et flosculis radiatis numerosioribus differt.

Suffruticose herbs or shrublets 1-2 m high. Stems terete, purplish, variously puberulent to glandular-pubescent, these sometimes intermixed. Heads hemispheric, radiate, 5-40 in a terminal capitulescence, ultimate peduncles mostly 2-4 cm long. Involucres 5-7 mm high, 2-3 seriate, the bracts subequal, the outer series weakly spreading, rarely reflexed. Receptacle hemispheric, paleate with persistent pales, the latter as long as, or somewhat longer than, the enfolded florets. Ray florets mostly 21, pistillate, fertile, the ligules yellow, 5-9 mm long. Disk florets numerous, fertile, the corollas yellow, the tubes ca 1.5 mm long, glandular-pubescent, the throat ca 2 mm long, the lobes ca 1/2 mm long. Achenes glabrous, somewhat radially compressed, falcate, black and striate at maturity, ca 2 mm long, epappose.

Chromosome number,  $n=16$  pairs.

TYPE: MEXICO.NUEVO LEON: Mcpio. Doctor Arroyo, ca 35 km NE of Doctor Arroyo, along road ca 0.5 mi S of "El Puerto," NE of San Antonio Pena Nevada, NW side of Cerro Pena Nevada, 2650 m, oak woods, "abundant on steep banks below road, also under oaks," (23° 46' N, 99° 52' W), 16 Oct 1988, Guy Nesom 6788 with D. Morgan (holotype: TEX; isotypes: ANSM, ARIZ, CAS, MEXU, MO, NY, US, XAL).

ADDITIONAL SPECIMENS EXAMINED: MEXICO.NUEVO LEON: Mcpio. Villa de Santiago, Canon la Boca, Laguna de Sanchez (25° 24' N, 100° 19' W), 1600 m, 10 Aug 1983, Villarreal et al. 2353 (TEX); Mcpio. Aramberri, Cerro Grande, 2400 m, 14 Sep 1986, Hinton et al. 19038 (TEX); Cerro Grande, 2380 m, 10 Oct 1986, Hinton et al 19061; Mcpio. Galeana, Cerro El Gallo, 2100 m, Hinton et al. 19186 (TEX).

Rumfordia exauriculata superficially resembles immature specimens of Smallanthus uvedalius (L.) Mackenzie; indeed, so much so that I needlessly filed the above cited specimens (except the type) with that taxon. Subsequent, careful examination, reveals these to belong to Rumfordia, closely related to, but clearly distinct from R. alcortae. The latter occurs to the south of R. exauriculata (Fig. 1) and is readily recognized by its leaves, which have conspicuous auricles at the base of the petioles. Such auricles tend to be deciduous with age, but the 7 or more collections of this species which I have examined reveal the auricles to be present on at least some, if not all, of the leaves. The auricles were not present on any of the

above-cited specimens of *R. exauriculata*. In addition, the latter species has larger, thinner leaves and the heads have mostly 21 ray florets (rarely as few as 15).

Sanders (1977) did not examine sheets of this taxon in his treatment of *Rumfordia*. He did note, however, that its closest relative, *R. alcortae*, was distinctive and did not readily relate to other members of the genus. I agree with this assessment and would argue that *R. alcortae* and *R. exauriculata* are as close to *Smallanthus* as they are to *Rumfordia*, differing from the former largely by their fertile disk florets or hemisphere receptacles, although Robinson (1981) would position these in different subtribes. Sanders (1977) notes that the only known chromosome count for *Rumfordia* is  $n=24$  pairs in *R. floribunda*. *Rumfordia exauriculata* appears to have a chromosome number of  $n=16$  pairs, which is also found in *Smallanthus uvedalius*. However, as noted by Sanders, counts of  $n=16$  pairs may be tetraploid on a base of  $x=8$ . Thus, *Rumfordia floribunda* may also have an ancestral base of  $x=8$ , the number  $n=24$  pairs being possibly hexaploid or  $6x$ .

I am grateful to Dr. Guy Nesom for the Latin diagnosis and helpful suggestions with an early draft of the manuscript.

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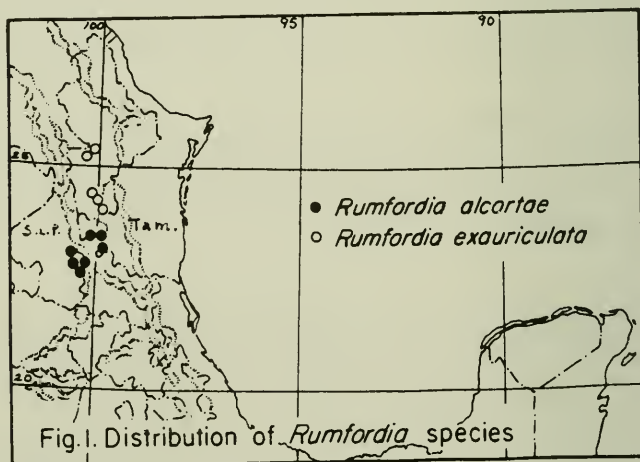


Fig. 1. Distribution of *Rumfordia* species

NEW SPECIES AND NEW COMBINATIONS IN MEXICAN ASTERACEAE  
(HELIANTHELLA, SABAZIA AND VERBESINA)

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Preparation of a treatment of the Asteraceae for Mexico has prompted the following new species and combinations:

HELIANTHELLA DURANGENSIS B. Turner, sp. nov. Fig. 1.

*H. ciliata* S.F. Blake arcte similis sed habitu robustiore, foliis majorioribus 3-nervatis ad super basim et acheniis majorioribus epapposis differt.

Perennial herbs 30-35 cm high. Stems somewhat recumbent below, sparsely appressed pubescent. Leaves opposite on the lower portions of stem, alternate above, gradually reduced upwards, the mid-stem leaves mostly 4-6 cm long, 10-15 mm wide, internodes mostly 3-5 cm long; petioles 0-1 mm long; blades ovate-lanceolate to oblanceolate, 3-nervate from well above the base (8-12 mm), glabrous to very sparsely strigose, except for the prominently incurved-strigose margins with hairs mostly ca 0.8 mm long. Heads 3.5-5.5 cm wide across the expanded rays. Involucres 2-3 seriate, the outer bracts foliaceous, 10-20 mm long, ciliate. Receptacular bracts, those of the outer series, mostly truncate and glabrous apically, without pubescent appendages. Ray floret ca 11, neuter, the ligules 15-20 mm long, 8-12 mm wide. Disk florets numerous, the corollas 3.5-4.5 mm long, the tubes ca 1 mm long, the limbs tubular, 2.5-3.5 mm long, mostly purplish, glabrous, except for the moderately pubescent lobes. Achenes obovate, ca 8 mm long, ca 5 mm wide, appressed silky-pubescent with hairs 1 mm long or less, epappose.

TYPE: MEXICO.DURANGO: Meadows in pine forest along highway 40, E of El Salto, 2 Sep 1969, Clarke & Jones 690902-99 (holotype UCR).

In Weber's (1952) treatment of *Helianthella* this taxon would key to *H. ciliata*, which is known from only a few collections from about Chihuahua City, Chi. The present taxon differs in being more robust, with larger leaves which are 3-nerved from well above the base and larger heads with outer involucre bracts broad and foliaceous, the apices truncate and without obtuse, markedly pubescent, appendages. In addition the achenes are epappose with longer, appressed-silky, short hairs. Blake described *H. ciliata* as possessing 3-4 pappus squamulae, these deeply lacinate-ciliate, connate at the base, and 1.0-1.3 mm long. The present species might be said to have a similar "pappus" but the connation would be imaginary at best and the "lacinations" 0.1-0.5 mm deep.

VERBESINA JACKSONII B. Turner, sp. nov.

*V. callilepis* S.F. Blake arcte similis sed foliis plerumque alternatis et basalibus laminis plerumque lanceolati-ellipticis venatione subtiliter reticulati differt.

Perennial, simple or sparsely branched herbs, 50-70 cm high. Stems terete, hispidous, mostly leafy below, arising from slender ligneous rootstocks. Leaves 5-7, largely clustered along the lower 1/5 of the stem, opposite at first but soon alternate, mostly 6-13 cm long, 1.2-2.5 cm wide; blades linear-elliptic to oblanceolate, tapered to the base or markedly clasping, coarsely and conspicuously hispid above with erect hairs, less so beneath, the hairs mostly along the major veins

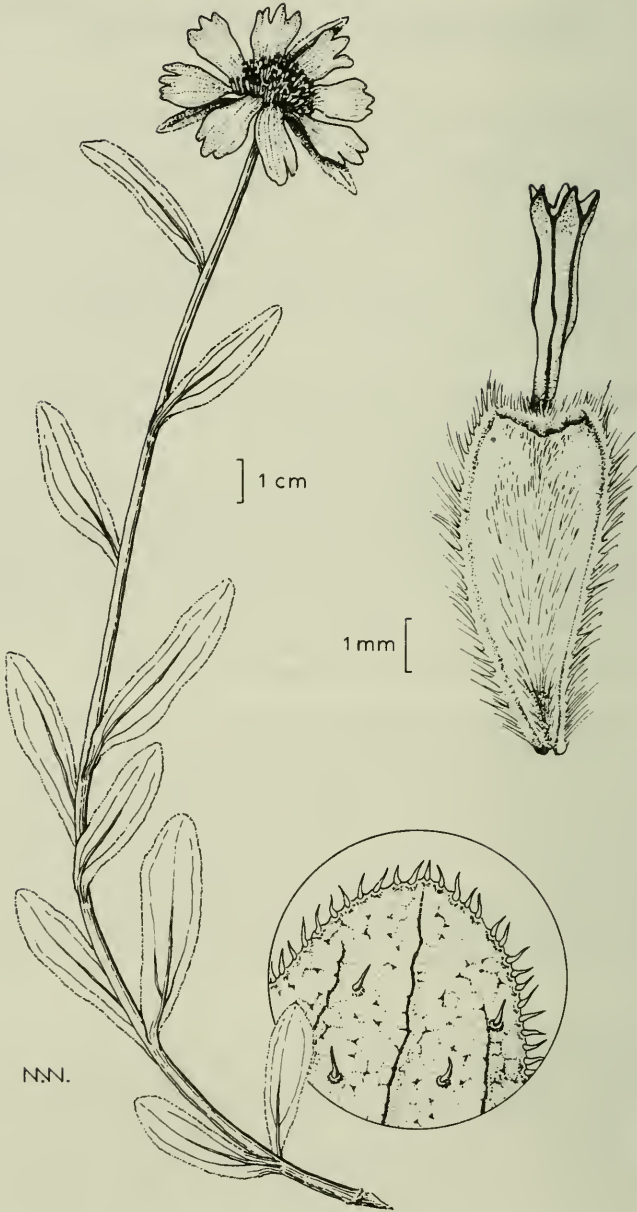


Fig 1. *Helianthella durangensis*, from holotype.

of the markedly reticulate-pinnate venation, the margins serrulate. Heads radiate, borne 2-3 on a rather elongate common peduncle, the ultimate peduncles 10-15 cm long (ignoring the few bracts or reduced leaves). Involucres hemispheric, 3-seriate, the bracts blackish, subequal, spatulate, coarsely hispid, closely appressed, with mostly erose scarious margins. Ray florets 11, neuter, the ligules yellow, 12-15 mm long. Disk florets 30-40, the corollas yellowish-brown, ca 5 mm long. Achenes (immature) with narrow wings, glabrous, epappose.

TYPE: MEXICO.DURANGO: 23 mi NE of Durango-Sinaloa state line, open pine woodland, 8 Sep 1965, R.C. Jackson 7200 [the original label read 7201, but this has been hand-marked to read 7200] (holotype TEX).

Additional collection examined: DURANGO.Mcpio. de El Salto: 3.2 mi E of La Ciudad along highway 40 (ca 105°40'W, 23°44'N), 2600 m; "uncommon...on a slope under pines," 19 Aug 1988, A.C. Sanders 8134 (UCR).

The holotype has been held for some years now as close to, but different from, V. callilepis, a species of the upper headwaters of the Rio Mayo in Chihuahua. The latter differs quite markedly in its broadly elliptical mostly opposite leaves which are not confined to the lower portions of the stem.

It is a pleasure to name this poorly known taxon for Dr. R.C. Jackson who, to my knowledge, first collected it in 1965, this in spite of the fact that numerous collectors have worked the area, including the present author who has collected in the area of the type locality several times. As noted, the only other collection has been that of Sanders, who collected it 23 years thereafter.

Raymond C. Jackson is currently Professor of Biology at Texas Tech University, Lubbock, Texas. He has made numerous collections over much of Mexico and is perhaps best known for his cytogenetical and systematic work on the genus Machaeranthera.

SABAZIA ELATA (Canne) B. Turner, comb. nov.

based upon Galinsoga elata Canne, Rhodora 79:340.1977.

Canne (1977) positioned this taxon in the sect. Elata of the genus Galinsoga, a group which I feel belongs to Sabazia, or at least closer to Sabazia than to Galinsoga as classically defined.

SABAZIA GLANDULOSA (Canne) B. Turner, comb. nov.

based upon Galinsoga glandulosa Canne, Rhodora 79:380.1977.

Canne (1977) positioned this species in the sect. Galinsoga of Galinsoga with the notation that its relationship was "obscure" among the taxa of this group. I relate the species to the sect. Tricarpha of Sabazia which Longpre (1970) treated as a distinct genus.

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## BOOK REVIEWS

Alma L. Moldenke

"COLORADO FLORA: WESTERN SLOPE" by William A. Weber xvii + 530 pp., 107 multi-fig. black/white draw., 64 color photo. & 3 maps, Colorado Associated University Press, Boulder, Colorado 80309. 1988. \$14.50 paperbound & \$19.50 clothbound.

In the very first paragraph of the preface Weber orients his readers to the primal importance of plants as "mankind's most precious resource". Plants supply all of mankind's fuel (not atomic), housing, clothing, food, medicine, all animal products, watersheds, and oxygen. The removal of excess carbon dioxide from the atmosphere could have been added to this appraisal of the importance of plants. "Botany is the science that is ultimately responsible for our survival, and it needs to be recognized as such." There is a serious introduction well worth careful reading about floristic zones, plant geography and the author's consequent treatment of plant families and genera. Keys to the families and within them to the genera and species are clearcut, often enriched with interesting botanical "tidbits", and helpfully illustrated. After an early amateur start Weber has been a real botanist -- field, teaching, geographic and systematic -- for a long professional career.

"WILDFLOWERS OF THE WESTERN CASCADES" by Robert A. Ross & Henrietta L. Chambers, 141 pp., 182 color photo. on 64 pl., 99 black/white draw. & 4 pp draw. in illus. glossary & 1 map. Timber Press, Portland, Oregon 97225. 1988. \$19.95 paperbound.

This is a delightful, attractive and easily workable wild flower guide to nearly 300 species (omitting grasses, sedges and rushes) growing on Iron Mountain near Sweet Home in the Western Cascade Mountains. The first author described 18 different plant communities on this mountain. The second author described the obvious diagnostic features of these flowering plants. Shirley A. Stevenson provided line drawings throughout. Rather than using keys that novices are often afraid to tackle, the plants are introduced according to their specific habitats. Viewing these sites and learning from this book should make human existence happier, more interesting and more aware of the need to preserve such beauty.

"MICROFUNGI ON MISCELLANEOUS SUBSTRATES: An Identification Handbook" by Martin B. Ellis & J. Pamela Ellis, viii + 244 pp., 56 multi-draw. pl. 1988. \$46.95.

This book continues in similar format the authors' very fine study of fungi on higher plants published in 1985. It details by habitats, keys, descriptions and plate drawings fungi growing on 1. bryophytes, 2. other fungi, 3. myxomycetes, 4. fire sites, 5. earth, 6. dung and 7. plant and animal products such as feathers and cloth. Each of these keys has its own keys to genera and species as well as references to the detailed penline drawings on the detailed plates. This carefully presented book will be very useful for university and college students of botany, for technicians who need this information for their specifically related problems, for ecologists and for the large group (mainly in Britain) of serious amateurs in this phase of nature study.

"ANNUAL REVIEW OF ENTOMOLOGY Volume 33" edited by Thomas E. Mittler, x + 550 pp., 42 fig., 8 black/white photo., 18 tab. & 3 maps. Annual Reviews Inc., Palo Alto, California 94303-0897. 1988. \$34.00.

This selection of 23 papers by 37 very capable authors has a wide range of important and interesting topics. Some are: evaluation of IPM over the drenching use of dangerous insecticides, moth hearing and defense, evolutionary and ecological relationships of insects on widespread thistles, insect migrations as effected by atmospheric structures and motions, systematics as a necessary support of entomology (and for all other groups of organisms), arthropod regulation of below ground detrital food webs, and winged mayfly "subimagos". Because of the varied nature, range, depth and collated bibliographic sources these papers and this series has so much to offer not only to the entomologists in training and to the professional ones but also to many other kinds of biologists.

"ILLUSTRATED GENERA OF SMUT FUNGI" by Kálmán Vánky, viii + 159 pp., 120 draw. smutted plants & 125 LM, TEM & SEM photo., VCH Publishers Inc., New York, New York 10160-0425. 1987. \$40.00 soft cover.

Published as Volume I of Cryptogamic Studies, the author deals with all 51 known genera and many synonyms within the Ustilaginales. The bases and details for classification are discussed in the introduction and keys. The author has labored over three decades in this

field. There are excellent drawings of smutted plants, sori and germinating spores as well as clear microphotographs of sori and spores. A very thorough study of the literature on this subject appears throughout the text and in the bibliography. There is a full index of all involved fungal names. Botanists as students, teachers and researchers, as well as phytopathologists and mycologists, will find this study very important.

"THE ATLAS OF NATURAL WONDERS" by Rupert O. Matthews, 240 pp., 200 color and black/white photo., 64 maps, 50 draw., Facts on File Inc., New York, N.Y. 10016. 1988. \$35.00.

This beautiful informative book is organized by the English author by longitudes from the Greenwich Meridian eastward around the world. The book jacket appraises this work very well when it claims that this atlas "takes the reader on a journey round these great natural sites -- each of which is stunningly photographed" with their "plants and animals" and with the plea to "preserve our most precious heritage -- the natural world." This gifted author-photographer gives measurements in both metric and U.S. systems throughout. From the coffee table, to casual perusal, for serious reading, for reference and study this book offers so much so impressively.

"A SENSE OF PLACE: The Life and Work of Forrest Shreve" by Janice Emily Bowers, xii + 196 pp., 12 black/white photo. & 2 maps. University of Arizona Press, Tucson, Arizona 85719. 1988. \$19.95.

This book has been prepared by a competent botanist and experienced author. She relates Shreve's observations, conclusions and field techniques first in Jamaica and then in the U.S. southwestern deserts. Even though Egler and Gleason appreciated his ideas, they were passed over and only much later reiterated by others as their own. I have always thought of Shreve as an astute, thoroughly honest, careful thinker. As this author ably demonstrates, he had great skill in turning his field observations (i.e., desert botany) into important ecological principles. The appendix offers helpful material in its (1) list of common plant names and their scientific equivalents, (2) notes and their sources to the chapters, (3) bibliography, (4) and most important -- publication listing of Forrest Shreve, as well as (5) an index.

"THE FLORA OF NEW ENGLAND - A Manual for the Identification of All Vascular Plants Including Ferns and Fern Allies Growing Without Cultivation in New England" by Frank Conkling Seymour, xvii + 611 pp., numerous line draw. & 1 map. Third Printing 1988, John Johnson, Natural History Books, North Bennington, Vermont 05257. 1988. \$20.00.

The first edition was published in 1982 by the author as PHYTOLOGIA MEMOIRS V. He had a second printing run off in 1985. After his death his wife made this third printing. To it has been added 32 pages by Paul Martin Brown on "notes, additions and corrections". In all three forms there is the same Foreword by the world famous botanist, Richard Evans Schultes, appreciative of the author's thorough work and stressing the medical aids that come out of such studies.

"BUTTERFLIES OF THE WORLD" by Rod & Ken Preston-Mafham, 192 pp., 63 color photo., 46 black/white photo., 17 line draw. incl 1 map, Facts on File Inc., New York, N.Y. 10016. 1988. \$22.95.

After an introduction to the main families, structures and life cycles of these interesting creatures, the adult behaviors for reproduction and survival, variations, enemies, ecology, distribution and relationships with man are well presented making this book a careful treatment of this part of the Lepidoptera. These author-photographers, who have had wonderful field experiences at home in England and afar in Africa and South America, have presented the material very interestingly and attractively.

"CLIMATE AND PLANT DISTRIBUTION" by F.L. Woodward, xi + 174 pp., & 48 black/white fig. incl. 5 maps, Cambridge University Press, Cambridge & London, U.K. & New York, N.Y. 10022. 1987. \$39.50 cloth bound & \$14.95 paper bound.

"The central thesis for plant ecology is that climate exerts the dominant control on the distribution of the major vegetation types of the world." The chapters deal with 1. history, 2. scale, 3. world climate, 4. climate and vegetation, 5. climate and the distribution of taxa, and 6. review. Each chapter has carefully detailed bibliographies. I found the series of World-scale maps in chapter 4 to be the book's most valuable contribution.

"INVERTEBRATES OF THE H.J. ANDREWS EXPERIMENTAL FOREST, WESTERN CASCADE MOUNTAINS, OREGON: IV. The Oribatid Mites (Acari: Cryptostigmata)" by Andrew R. Moldenke and Becky L. Fichter, vi + 112 pp., 2 diag. keys, 323 SEM photo. and draw., 4 fig. & 2 color comparison photo., 2 tab. & 2 maps. United States Department of Agriculture, FOREST SERVICE, Pacific Northwest Research Station, 319 Pine Street, P.O. Box 3890, Portland, OR. 97208. 1988. No charge.

Because of all the above listed carefully photographed and drawn illustrations with pointers to diagnostic features, and because of the clear and precise language used in the keys for the immature and adult stages, this publication will prove of considerable value to many more scientists and students than just the acarologists digging around the forest floor detritus especially at the bases of such evergreens as the Douglas-firs. Even the glossary is illustrated. The color plates show all taxa from the Andrews Forest. The text describes each species with microhabitat preferences, patterns of abundance and seasonal phenology. This study can be highly valuable to advanced students, forestry researchers, and as university and laboratory library source material.

"THE NATURE OF NATURALIZATION II Studies in Naturalization 1925-1980 The Introduced Flora of Aton Forest, Connecticut" by Frank E. Egler ix + 145 pp., 3 black/white illus. 1983. Obtain from author.

This is a progress report on a 55-year-old effort to study attempted naturalization results of 618 herbs, shrubs and trees in nine different growing places in this ordinary northeast U.S. area. Voucher specimens from this study are in the Claude E. Phillips Herbarium at the University of Delaware. Recommendations follow the reported results. The author emphasizes that these different habitat types are not successional but lastingly distinctive. This is also a progress report on the author and his workers efforts "to encourage other plants to invade these communities but with very little success".

"THE GREEN WORLD - An Introduction to Plants and People" Second Edition by Richard M. Klein xiii + 610 pp., 358 black/white fig. incl. 21 maps, 138 photo., & 47 tab. Harper & Row Publishers, New York, N.Y. 10022. 1987. \$37.95.

This is an excellently oriented and presented text and general reading book. It covers in easy flowing

language and logical thinking: 1. what plants are and can do, 2. agriculture of grains, fruits and vegetables, 3. discovery and social effects of condiments, beverages, medicines and drugs including alcohol, 4. changed history subsequent to paper invention, cotton cloth and thread, rubber, tobacco and essential oils, 5. the causes and effects of floods, dust storms, shade tree blights, and 6. the far reaching effects of present day destruction of the world's tropical forests.

A biblical fig is called the sycamore fig instead of the sycamore fig (*Ficus sycomorus* L.); the King James translators and/or printers started this error in 1611.

This book is excellent for a survey course for non-science majors and especially for "education" majors instead of all that condensed stuff on the ascendancy of sporophyte over gametophyte since there is never time to present it fascinatingly. Since the contents are so effectively explained, it would be fine for a small credit reading course for botany, zoology, biology and certain social studies majors. Also it would be an excellent text for some more serious public courses in botanical gardens, museums and conservation and nature centers.

"PLANTAE WILSONIANAE An Enumeration of the Woody Plants Collected in Western China for the Arnold Arboretum of Harvard University During the Years 1907, 1908 and 1910 by E. H. Wilson" edited by Charles Sprague Sargent, Vol I x + 611 pp., Vol II vii + 661 pp. & Vol III x + 666 pp. Dioscorides Press Inc, Portland, Oregon 97225. 1988. \$110.00.

The Dioscorides Press has offered herewith a highly valuable contribution to botany for plant taxonomists, systematists, ecologists, plant geographers and horticulturalists and students in these fields. "Chinese" Wilson had to be an indefatigable and astute collector to return to Harvard University with about 65,000 specimens, including as new 4 genera, 521 species and 356 varieties and forms. Recorded here are also the specimens of Augustin Henry including as new 150 spp., 51 var. and 17 f. mainly from Yunnan. These now exactly replicated volumes were first published by Cambridge University Press in 1913, 1916 and 1917. This set is also an acknowledgement of the monumental work of the editor, Charles Sprague Sargent.

"THE FACTS ON FILE DICTIONARY OF BOTANY" edited by Stephen Blackmore & Elizabeth Toothill, ii + 391 pp., 55 black/white fig. Facts on File Inc., New York, N.Y. 10016. 1984. \$21.95.

This carefully prepared, thoroughly cross referenced, clearly explained dictionary should prove useful to college students of botany in its many phases as well as to laboratory and greenhouse technicians.

"JAPANESE PLANTS: Know Them & Use Them" by Betty W. Richards & Anne Kaneko 224 pp., 107 color photo. on 48 pl., Charles E. Tuttle Co., Rutland Vermont 05701-0410. 1988. \$14.95.

In and through this beautiful little book the authors hope that they "have given background that you would probably not gain otherwise about the way the skillfully photographed plants figure in legend, culture and cuisine. It shows our *Cornus florida* as the well established garden tree received in exchange for the 1000 Sato-zakura and 1000 Someiyoshino cherries that bloom so gorgeously around the tidal basin in Washington, D.C. This book also describes about a dozen of the more famous and ever so beautifully landscaped botanical gardens and gives information about access to them.

"LAS GRAMINEAS DE MEXICO Tomo II" by Alan Ackerman Beetle for the COTECOLA, Manzanillo CP06760 Mexico, D.F., Mexico, 344 pp., 47 color photo., 177 full pp. & 51 part pp black/white fig. & 232 geog. distrib. maps, 1987. Available from COTECOLA or author, Dept. Range Management, College of Agriculture, Laramie, WY 82071.

Over 350 species of grasses are fully described, illustrated and located on geographic distribution maps in this second volume on Mexican grasses by the same author who did an excellent job on the first volume. Among many other genera there are included: *Bambusa* with 6 species and 1 form, *Bouteloua* with 37 species and 21 varieties and 1 form, *Bromus* with 29 species and 4 varieties and *Digitaria* with 26 species and 5 varieties. The descriptions are effectively and well written. The many illustrations show both general appearances and diagnostic features distinctly. Incidentally a large number of bright young natives are getting excellent field and herbarium experience.

"MICRO-ALGAL BIOTECHNOLOGY" edited by Michael A. Borowitzka & Lesley J. Borowitzka x + 477 pp., 47 black/white fig. incl. 16 photo. & 63 tab., Cambridge University Press, Cambridge & London, U.K. & New York, N.Y. 10022. 1988. \$79.50.

This book consists of 6 papers on such unicellular cyanophytes or cyanobacteria as *Chlorella*, *Dunaliella* and *Scenedesmes*, 6 papers on products and uses of these micro-algae as sources of vitamins, fats, oils, aquaculture, agriculture and waste-water treatment, and 4 papers on the technology of micro-algal mass culture. The first author has added a useful appendix on "algal growth media and sources of algal cultures". This book is an important reference source and working manual guide.

"VEGETATION ECOLOGY OF CENTRAL EUROPE" Fourth Edition by Heinz Ellenberg, translated by Gordon K. Strutt xxii + 731 pp., 499 black/white fig. incl. 160 photo & 52 maps, Cambridge University Press, Cambridge & London, U.K., & New York, N.Y. 10022. 1988. \$125.00.

The first edition of the excellent and thoroughly scientific and encyclopedic treatment of ecology appeared in Germany in 1963 and has been much studied and admired by a large German-reading group, especially in the universities in Europe and also its revisions of 1978 and 1982. It remains the most comprehensive treatise in its field. How fortunate that it is now available updated in English.

"SHRUBS OF THE GREAT BASIN: A Natural History" by Hugh Mozingo, xxi + 342 pp., 69 black/white draw., 2 maps & 56 color photos. University of Nevada Press, Reno, Nevada. 1987. \$27.95 cloth bound, \$16.95 paper bound.

An excellent introduction describes the physical features, geography and geology of the Great Basin that takes in almost all of the state of Nevada and small amounts of contiguous states. It obliterates by better scientific reasoning and other proofs several ideas about this area and it explains why the shrub form of growth is most successful in this area. Following 65 shrub plants in 25 families are individually featured with descriptions, illustrations, uses by man and other animals, and taxonomic placement. This book, clearly printed, is a worthwhile addition to any kind of botanical library.

"THE FIELD GUIDE TO GEOLOGY" by David Lambert and the Diagram Group, 256 pp., 500+ illus., Facts on File Publishers Inc., New York, N.Y. 10016. 1988. \$22.95.

This interestingly and effectively explained and copiously diagrammed text presents "the ingredients and processes that forged our planet". Scientifically oriented youngsters, adult readers who would like to recall earlier studies or adventure into new reading fields, college students mired down in the verbiage of some geology texts can gain so much by reading or studying this book.

"LEONARDO DA VINCI ON PLANTS AND GARDENS" by William A. Emboden ii + 234 pp., 99 fig & 8 color plates, Dioscorides Press, Portland, Oregon 97225. 1987. \$34.95.

This is an impressive, interesting and beautiful book to study or just to spot-read and to picture-view. This new orientation of Da Vinci's art work has enlargements of the individual plants and gardens illustrated inconspicuously or prominently as parts of his larger famous canvasses. Since Da Vinci's botany notebooks are still lost, botanically interested readers will be highly appreciative of Appendix V with its 105 "Plants Mentioned by Leonardo In His Notebooks Alphabetically Arranged by Genus" and species followed by common names and citations in his manuscripts. Other appendices list the plants in Il Magnifico, the garden of Lorenzo de' Medici where Leonardo made drawings of plants, the plants in his Rebus I, and the botanical iconography of his codices and manuscripts by folio.

"A SCANNING MICROSCOPE SURVEY OF THE EPIDERMIS OF EAST AFRICAN GRASSES, V AND WEST AFRICAN SUPPLEMENT" by Patricia G. Palmer & Susan Gerberth-Jones, iii + 157 pp., 720 SEM photos on 120 pl., Smithsonian Institution Press, Washington, D.C. 20560.

"The purpose of this survey is to develop a reference collection of the micromorphological features of the leaves of modern grasses" and "to provide a standard of comparison for identifying fossil leaf fragments that are abundant in African lake sediments". The text has ad- and ab-axial descriptions of the leaf surfaces for stomata, interstitial cells, other cells, prickles and other diagnostic features for 47 genera in East Africa and 13 exclusive to West Africa. The text is carefully prepared and the SEM photographs are of excellent quality.

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## TRANSFER NOTICE

This is the last number -6- and volume -65- of PHYTOLOGIA to be associated with

### Dr. HAROLD N. MOLDENKE

as publisher and considerable contributor since the very first volume and number dating back 55 years when it was founded by Dr. H.A. Gleason and himself. Dr. Moldenke has suffered serious illnesses that make this change necessary. He wants to express his gratitude to his wife Alma - who has assisted in this publication for almost 50 years - and to their son Andrew for his major assistance over the past two years.

Starting with the first number (1) of the next volume (66) ownership of PHYTOLOGIA will be turned over to Prof. B.L. Turner - botanist long at the University of Texas at Austin (ZIP 78712) - and to the managing editorship of Dr. Michael Warnock - botanist at Sam Houston State University, Huntsville, TX (ZIP 77340) and at the home address for manuscripts and information - 185 Westridge Dr., Huntsville, TX 77340.

All the Moldenkes wish to thank the many previous PHYTOLOGIA authors who have recently written their appreciation for the services that Harold Moldenke and PHYTOLOGIA have offered them.

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