WRIGHTIA

A Botanical Journal

VOLUME 7
Number 1
1981

PUBLISHED BY
THE UNIVERSITY OF TEXAS AT DALLAS
BOX 688, RICHARDSON, TEXAS 75080
U.S.A.

WRIGHTIA

A Botanical Journal

VOLUME 7, NUMBER 1

Issued June 1, 1981

CONTENTS

Printed in the U.S.A.
The University of Texas at Dallas
Richardson, Texas

WRIGHTIA

Volume 7 June 1, 1981 Number 1

REVISIONAL STUDIES IN THE GENUS SISYRINCHIUM—I

Pierfelice Ravenna[1]

Eight new species, and four subspecies of *Sisyrinchium* from Argentina and Brazil are described. Moreover, due to the priority of *S. filifolium* Gaud. over *S. junceum* E. Mey., the former is reinstated, and the new combination *S. filifolium* ssp. *Lainezii* (Hick.) Ravenna (*Symphiostemon Lainezii* Hicken) is established as an advance of a revision of the complex. *S. platycaule* Bak., previously reduced by Johnston (1938) to synonymy of *S. Sellowianum* Kl., is revalidated. The character of free filaments in *S. galapagense* Rav. is reconsidered under the new light of an additional specimen received from U; it appears now that the filaments are sometimes partially joined in a column.

TABLE OF CONTENTS

The present paper pretends to initiate a series in which new species, revisional subjects, and miscellaneous notes on the genus may be treated. The purpose is to advance toward a general monograph of the genus.

As in most of my articles, this is the result of the direct examination in the field, or under experimental culture, of the great part of the species and subspecies here included. These will be illustrated in future unified studies.

1. New species and subspecies from Argentina and Brazil

Sisyrinchium tucumanum Ravenna, sp. nov.—Herba gracilis ad 15–31 cm. alta. Rhizoma pusillus radicibus tenuis leviter fibrosis emitens. Folia laevissima fusco-viridia apicem versus attenuata ad 11–23 cm. longa circ. 0.8–1.3 mm. lata. Caulis floriferus anguste ancipiti-alatus ad 11–21.5 cm. longus ad apicem circ. 1.5 mm. latus. Spatha unica vel duae pauciflorae pedunculatae (pedunculi circ. 3.5–9 cm. longi) ad 13.5–18 mm. longae et 2 mm. latae; valvae acutae subaequales. Flos luteus vel vitellinus infundibulatus circ. 5–7 mm. latus. Pedicelli glabri. Ovarium obovatum glabrum ad 2–2.5 mm. longum circ. 1–1.1 mm. latum. Tepala oblanceolata, exteriora ad 3.5 mm.

[1]Casilla 21128, Sucursal 21, Santiago, Chile.

longa circ. 3 mm. lata, interiora subaequalia sed leviter angustiora. Filamenta in columna filiformi lutea connata circ. 1.8 mm. longa ad basin circ. 0.4–0.5 mm. glandulosa. Antherae contiguae oblongo-sagittatae etiam post dehiscentiam erectae. Stylus circ. 3 mm. longus; styli rami in lagaena ovato-conica ad 0.7 mm. longa circ. 0.2 mm. lata ad summum stigmatosa toti connati. Capsula elliptica vel obovata glabra ad 3.5–5 mm. longa circ. 2.7–4 mm. lata. Semina subglobosa nigra minute foveolata ad 0.6–0.7 mm. lata con-cavitate micropilari notata.

Argentina: Tucuman, dep. de Capital, Munecas, 500 m.; leg. *Schreiter 1868*, 13-XII-1921 (LIL type), dep. de Tafi, Siambon, 1200 m.; leg. *S. Venturi 3943*, 10-X-1925 (LIL). Idem ibid., 1300 m.; leg. *Schreiter 6798*, XII-1931 (LIL). Idem, Rio del Chamico, 900 m.; leg. *S. Venturi 1901*, 26-IX-1922 (LIL).

Belonging in the section *Sisyrinchium* proper, the species is related to *S. chilense* Hook. by virtue of the elongate, subfiliform staminal column with few glands near the base. *Sisyrinchium pachyrhizum* Bak. is also an allied species bearing however a dense and conspicuous area of elaiophores in the lower part of the column. *S. tucumanum* Rav. differs from both species in the thin roots, delicate habit, smooth and dark-green leaves and stems, and the existence of only one or two spathes.

I have examined living plants near San Javier, at the top of the first hills above the town of Tucuman. At first glance it was thought to be *S. foliosum* Johnst. Nevertheless, an ulterior study of the type specimen of this revealed that *S. foliosum* is a synonym of *S. pachyrhizum*. *S. tucumanum* is now extremely rare and certainly endangered by the increasing human activity in the area.

Sisyrinchium uliginosum Ravenna, sp. nov.—Plantae circ. 40–100 cm. altae. Rhizoma brevis saepe oblicuus 3–4 mm. latus radicibus tenuis fibrosis emitens. Folia basalia pauca lineari-ensiformia vel lineari-attenuata fusco-viridia ad margines minute ciliolata ad 20–42 cm. longa circ. 2–8.5 mm. lata. Caulis floriferus foliosus ancipiti-alatus ad margines minutissime ciliolatus; folia caulina 4–5 inferius basalibus simile necnon brevius; caetera gradate reducta ad bracteiformia. Spathae plures (ultra sex) complanatae pauciflorae ad 17–22 mm. longae valvis subaequalibus. Flores late infundibulati lutei ad 9–10 mm. lati. Pedicelli filiformes glabri e spatham valde exserti ad 20–30 mm. longi. Tepala oblanceolata apiculata ad 7.5–8 mm. longa, exteriora 2–3.5 mm. lata, interiora leviter angustiora. Columna staminum subfiliformia ad 2.1–2.3 mm. longa circ. 0.2–0.3 mm. lata inferne glandulis stipitatis rallis notata. Antherae oblongae contiguae rectae circ. 1.5 mm. longae. Styli rami inter antheras occulti. Capsula obovata vel elliptica ad 4.8–6 mm. longa et 4–5 mm. lata.

Brazil: Santa Catarina, Lebon Regis, 900 m., banhado; leg. *Reitz & Klein 3365*, 6-XII-1962 (HBR type, Herb. Ravenna isotype). Idem, im Walde am Bande der Serra do Oratorio; leg. *Ule 1625*, Januar 1890 (HBG) Idem, mun. Campos Novos, Duas Pontes, Campo umido, 800 m.; leg. *R.M. Klein 4300*, 30-X-1963 (HBR). Idem, mun. Bom Retiro, Campo dos Padres, by Faz. Santo Antonio, bog and pasture, ca. 1650 m.; leg. *L.B. Smith & R. Reitz 10302*, 23-I-1957 (HBR, US ?). Idem, mun. Santa Cecilia, Campo do Areao, 1100 m.; leg. *R. Reitz & R.M. Klein 14177*, 19-XII-1962 (HBR). Idem, mun Agua Doce, Campo das Palmas, 28.5 km. southeast of Horizonte (Parana), ca. 26° 45′ S, 51° 25′ W, alt. 1000–1200 m.; leg. *L.B. Smith & R.M. Klein 13466*, 3-XII-1964

(HBR, US ?). Idem, mun. Orleaes, Headwalls (aparados da serra), source of Rio do Oratorio, alt. 1200 m.; leg. *L.B. Smith & R. Reitz 10242*, 17-I-1957 (HBR, US ?). Rio Grande do Sul, Faz. Englert, pr. S. Francisco de Paula, in subpaludosis dense graminosis; leg. *B. Rambo 56425*, 2-I-1955 (HBR 13615, PACA ?). Argentina: Entre Rios, delta inferior, Rio Seibo; leg. *Burkart 5051 & 7628* (SI). Idem Arroyo Martinez; leg. *Burkart 15060* (SI). Idem ibid.; leg. *Boelcke 908 & 974* (SI).

This species appears to be related to the precedent and to *Sisyrinchium megapotamicum* Malme. It turns dark when drying.

In the Museum of Santiago, Chile, there are two specimens from Sello's collection. One is labelled *S. gracile* (SGO 4245), the other *S. Sellowii* (SGO 4246). Both are, no doubt, part of the type collections respectively from *S. megapotamicum* (see Malme 1935) and *S. pachyrizum* Bak. (syn. *S. foliosum* Johnst.). The former is a slender, totally glabrous plant with mostly wingless stems; the latter has puberulous pedicels and ovary, and the staminal column is densely glandular below. Both species do not become dark when drying.

Sisyrinchium obconicum Ravenna, sp. nov.—Planta ad 15–40 cm. alta. Rhizoma perbrevis radicibus tenuibus leviter fibrosis emitens. Folia basalia plura linearia gracilia usque 18 cm. longa et 1–1.2 mm. lata viridia. Caules floriferi plures ancipiti-alati inferne circ. 1.2 mm. lati sursum ramosi folio abbreviato et bracteis paucis gerentes. Spathae pedunculatae pauciflorae ad 10–15 mm. longae valvis subaequalibus. Flores luteo-vitellini late infundibulati circ. 10 mm. lati. Ovarium obovatum glabrum ad 1.2 mm. longum circ. 0.8 mm. latum. Tepala oblanceolata, exteriora usque 9 mm. longa et 3.5–4 mm lata, interiora subaequalia. Columna staminum obconica vel turbinata inferne attenuata glabra lutea circ. 1.9–2 mm. longa. Antherae oblongae erectae vel suberectae ad 1.5 mm. longae. Styli rami inter antheras occultae.

Argentina: Cordoba, San Francisco; leg. *Ruiz Leal 23442*, 1964 (MEN, LP ?). Santa Fe, dep. Reconquista, Ocampo, banado; leg. *Venturi 316*, 9-X-1905 (BA, LIL ?). Culta in Bonaria ex plantis ad viam ferream pr. El Socorro prov. Bonaria Argentinae collectis; leg. *Ravenna 581*, XI-1966 (Herb. Ravenna type, K isotype).

This species was collected and introduced into experimental culture by me several years ago. Following Cabrera (1953), I treated it as *Sisyrinchium megapotamicum* Malme in Cabrera's Flora de la Provincia de Buenos Aires. The figure appearing in the latter work, by M.T.C. is inaccurate and wrong in several aspects. This can be observed in the shape and relative size of staminal column and anthers in the respective detail.

S. obconicum Rav. is distinguished from *S. megapotamicum* Malme mainly by the obconical staminal column.

Sisyrinchium plicatulum Ravenna, sp. nov.—Plantae saepe densae. Rhizoma interdum laxus multiceps. Folia basalia ad anthesin saepe tres vel quinque late lineari-attenuata leviter plicata erecta vel suberecta pallide viridia valde glaucescentia ad 44–56 cm. longa circ. 10–21 mm. lata. Scapus ancipiti-alatus ad 30–47 cm. longus circ. 9–11.5 mm. latus folio unico erecto abbreviato instructus. Spathae saepe pedunculatae laxe et flexuose fasciculatae; valvae subaequales vel satis inaequales acutae pallide virides ad margines haud scariosae nec membranosae. Flos rotaceus luteus glaberrimus circ. 26 mm. latus. Pedicelli valvis aequantes vel leviter longiores. Ovarium

obovatum obtuse triquetrum glabrum viride ad 3.2 mm. longum circ. 1.9 mm. latum. Tepala lanceolato-attenuata, exteriora usque 15 mm. longa circ. 4.4 mm. lata, interiora usque 14.2 mm. longa circ. 4 mm. lata. Filamenta erecta lutea circ. 4.6 mm. longa ad basin tantum connata. Antherae sagittatae lobis basalibus patentibus circ. 0.8 mm. longis ad maturitatem circinatae; pollen luteo-aurantiacus. Stylus circ. 3–3.2 mm. longus. Styli rami oblique erecto-patentes lutei ad 3.4 mm. longi ad apicem minute capitato-stigmatosi. Capsula obovata circ. 5 mm. lata.

Brazil: Rio Grande do Sul, Taimbezinho, matinho no comeco do Taimbe ou canion; leg. *J.C. et al.*, 3-XII-1971 (ICN, U). Santa Catarina, mun. Ipumerim, Linha Bonita, bank of small stream, ca. 26° 58′ S, 52° 11′ W, 600 m.; leg. *L.B. Smith & R. Reitz 12914*, 24-X-1964 (HBR). Idem mun. Campo Alegre, lower fazenda of Ernesto Scheide, 900 m.; leg. *L.B. Smith & R. Klein 7491A*, 9-XI-1956 (HBR). Idem Estrada Dona Francisca, lado da estrada, 600 m.; leg. *Reitz & Klein 5584*, 6-XI-1957 (HBR). Culta in Bonaria ex plantis in umbrosis pr. summum Morro-Cristae mun. Tres-Barras civit. Santa-Catarina Brasiliae collectis; leg. Ravenna 582, XI-1966 (Herb. Ravennae type).

Sisyrinchium plicatulum belongs in the *S. macrocephalum* R. Grah. alliance, which includes *S. nidulare* Hand.-Mazz., *S. congestum* Klatt, and a few still undescribed species. From all of these, it is easily separable by the thin-textured, slightly plicately-nerved leaves, the lax fascicle of spathes, at least when fully developed, the lanceolate-attenuate tepals and the filaments joined only at the very base.

S. eserrulatum Johnst. (see Johnston 1938) is a synonym of *S. congestum* Klatt. An isotype of the latter is found at the Museum of Santiago.

Sisyrinchium itabiritense Ravenna, sp. nov.—Planta usque 60 cm. alta. Rhizoma brevis radicis fibrosis fasciculatis emitens. Folia basalia pauca ad 7 cm. longa circ. 1–1.5 mm. lata sed ad anthesin saepe nulla. Caules floriferi plures ramosi flexuosi ancipites angustissime alati bracteati; bracteae plures usque partem mediam caulis circ. 35–54 mm. longae deinde 17–20 mm. longae valvae exteriorae spatharum simulantes. Spathae laterales sessiles a bracteis caulis occultae. Spatha apicalis breviter pedunculata (pedunc. 11–17 mm. longus) circ. 17–18 mm. longa; valvae subaequales plerumque ad margines haud scarioso-membranaceae. Flores roseo-lilacei. Pedicelli e spatha valde exserti. Ovarium obovatum glabrum circ. 1 mm. longum circ. 0.8 mm. latum. Perigonium 8–10 mm. latum. Tepala patentissima oblanceolata venis fusci-oribus notata ad 6–7 mm. longi circ. 2–2.5 mm. lata. Columna staminum 1.5 mm. longa deinde filamenta circ. 1 mm. liberi et erecto-patentes. Antherae oblongo-sagittatae luteae ad basin bilobatae versatiles et tortiles vel incurvae circ. 2 mm. longae. Stylus longitudinis columnae staminum. Styli rami erecto-patentes circ. 1.2 mm. longi. Capsula globosa glabra 2.8–4 mm. lata. Semina parva nigra perfecta non vidi.

Brazil: Minas Gerais, mun. Belo Horizonte, Itabirito; leg. *E. Pereira 3092 & Pabst 3927* (RB type, HB and Herb. Ravenna isotypes).

Superficially, this species may be taken as one of the members of the *Sisyrinchium vaginatum* complex. However, the existence of although short basal leaves, the quite narrow stem wings, and the flower color, makes it unmistakable. I have examined living plants at Serra de Ouro Branco; unfortunately the specimens were damaged in travelling.

Sisyrinchium soboliferum Ravenna, sp. nov.—Plantae saepe densae ad 10–60 cm. altae. Rhizoma brevis vel congeste ramosus ad 1–2.5 cm. longus radicibus tenuibus vel paullo fibrosis emitens. Folia basalia linearia vel lineari-attenuata fusco-viridia nitida laevia ad 8–60 cm. longa et 3–6.2 mm. lata. Scapi plures ancipite-alati subfoliacei ad 8–70 cm. longi folio unico 4–9.5 cm. longo continuantes. Spathae compressae glabrae congestae sessiles vel subsessiles multiflorae tres vel quinque virides margines versus castaneis marginis membranaceo-scariosis translucidis post anthesin soboliferae; valvae arcte carinatae subaequales acuminatae ad 14–18 mm. longae. Pedicelli filiformes erecto-patentes pilosi ochraceo- vel castaneo-virides ad 14–22 mm. longi. Flores rotacei lilaceo-violacei vel roseo-violacei ad 14–22 mm. lati. Ovarium obovatum vel subglobosum tenere viride nitidum dense pilosum ad 1.3–1.9 mm. longum circ. 1.3–1.8 mm. latum. Tepala oblanceolata subaequalia apiculata ad 10–11.5 mm. longa, exteriora ad 3.5–4.5 mm. lata, interiora circ. 4–4.8 mm. lata; apiculus circ. 1–1.3 mm. longus uncinato-attenuatus pilosus. Columna staminum subintegra lagaeniformis ad 3–3.5 mm. longa sursum filamenta circ. 0.9–1 mm. libera inferne 2 mm. lata densissime glandulis luteis stipitatis vestita ad medium et apicem versus sordide albicans vel albido-lilacea pilis deflexis sparse instructa. Antherae oblongae erectae contiguae vel subcontiguae luteae ad 1–1.3 mm. longae. Stylus circ. 4–4.2 mm. longus. Styli rami ad 0.8–0.9 mm. concrescentes deinde erectae 0.1–0.2 mm. longi vel toti concrescentes. Capsula globosa pilosa ad 3–4 mm. lata. Semina globosa nigra rugulosa circ. 1 mm. lata.

Brazil: Santa Catarina, auf fehlsen am Salto de Itajahy, bei Blumenau; leg. *Ule 983*, XI-1888 (HBG). Parana, mun. Guarapuava, Guara; leg. *Hatschbach 20484*, com Guimaraes, 5-XII-1968 (Herb. Ravenna, Herb. Hatschbach). Idem ibid.; leg. *Hatschbach 23084*, com P. Ravenna, 3-XII-1969 (Herb. Ravenna, Herb. Hatschbach, and others ?). Ad Parque Nac. Iguazu Argentinae; leg. *Ravenna 1045*, 6-XII-1969 (Herb. Ravenna type, BA, C, G, K, NY, P, RB, isotypes).

The species produces plantlets on the inflorescence, in the same manner as in the *Trimezia* species previously included in *Neomarica*. *Sisyrinchium iridifolium* H.B.K. is the only other species that sometimes bears offsets in the past flowered aerial stem; the latter, however, is not scapiform. Its near affinity is found in *S. hirsutum* Kranzl., *S. platycaule* Bak. (see note in this work), and *S. Sellowianum* Klatt.

The specimen from Parana has been previously named by me as "*S. iguazuanum*," but since the plant has been found also in other places than Iguazu, it seemed better to base the epithet upon a character.

In Argentina, *S. soboliferum* was found growing near *Amaryllis petiolata* and *Oxalis Regnellii*.

Sisyrinchium convallium Ravenna, sp. nov.—Planta ad 40–50 cm. alta. Rhizoma brevis saepe multiceps vel pauciramosus usque 3 mm. latus. Folia lineari-ensiformia erecto-patentia glauco-viridia pruinosa ad basin unacuiaque inflorescentiae circ. quinque ad 15–25 cm. longa circ. 4–6 mm. lata. Caulis ultra medium ancipite-alatus, deinde ad inflorescentiam praesertim teres. Folium inferius basalibus simile deinde gradate reducta ad bracteiformia; bracteae inflorescentiae ventricosae caulem distincte vaginantes praeter duas inferiores valde obtusae ad margines maembranaceae spathas includentes. Spathae laterales 3–5 membranaceo-translucidae sessiles multi-

florae ad 13–16 mm. longae; apicalis breviter pedunculata viridia textura foliacea bivalvata valvis obtusis leviter inaequalibus ad 13 et 16 mm. longis. Pedicelli valvam superiorem leviter breviores vel distincte exserti. Flores rotacei lutei ad 15–17 (–20) mm. lati. Ovarium obovatum pallide viride dense pilosum ad 2.3 mm. longum circ. 1.8 mm. latum. Tepala obovato-lanceolata ad 7–8 mm. longa extus venis fusco-castaneis notata, exteriora ad 4.4. mm. lata, interiora 2.9–3 mm. lata. Filamenta pallide lutescentia vel luteo-viridescentia circ. 3 mm. in columna concrescentia deinde circ. 2.1 mm. libera erecto-patentia subulata. Antherae oblongae versatiles vel ad apicem incurvae luteae circ. 1.8–2 mm. longae. Stylus columna staminum aequans. Styli rami filiformes patentes ad apicem stigmatosi circ. 3–3.3 mm. longi. Capsula late elliptica glabra vel glabrescente laete viride.

Culta in Santiago Chiliae ex plantis in convalle supra La Reina collectis; leg. *Ravenna 3040,* 8-XI-1977 (Herb. Ravenna type, SGO, K, C isotypes). In convalle ad pedem Cuesta de los Condores ad viam lacus Maule prov. Talca Chiliae; leg. *Ravenna 1997,* Nov. 1971 (Herb. Rav.). Argentina: prov. Santa Cruz, dep. Deseado, 5 km. del rio Deseado; leg. *Correa 2663* (BAB, as *S. arenarium* ssp. *microspathum).*

Sisyrinchium convallium appears to be related to *S. arenarium* Poepp. and such closely allied species as *S. adenostemon* Phil. and *S. macrocarpum* Hieron. From the former, it is distinguishable by the flat perigone; from the second and the subspecies *microspathum* (see in this work), by the much connate filaments, and well developed, spreading style arms. *S. macrocarpum* and subspecies *laetum* Rav. bear an hirsute staminal column, and trigonous, or almost so, larger capsules.

Sisyrinchium angustifolium Phil. might be the same. However, the poor type specimen (SGO 47345) makes impossible the absolute certainty in this respect. As a lucky circumstance, the binomial is illegitimate by the earlier *S. Angustifolium* Miller.

Sisyrinchium macrocephalum Grah. ssp. **fuscoviride** Ravenna, ssp. nov.—A subspecie *macrocephalum* foliis angustioribus fusco-viridibus haud pruinosis differt.

Argentina: Santa Fe, dep. Reconquista, Ocampo; leg. *Venturi 345,* 21-XI-1905 (BA). In humbrosis humidis secus rivulis ad Gualeguaichu prov. Entre-Rios Argentinae; leg. *Ravenna 1027,* XII-1968 (Herb. Ravenna type).

This subspecies differs from the widely distributed subspecies *macrocephalum* by the narrow dark green, not at all pruinose leaves. The type is found in Argentina in the province of Cordoba, to the northwest (Cuesta de La Chilca, Catamarca; leg. Vervoorst), and north through the Precordillera into Bolivia. Moreover, it is rather common in Uruguay, Paraguay (as *S. grande* Bak., see Hassler et Chodat 1903), and South Brazil. The subspecies *fuscoviride* is known so far only from Entre Rios and Santa Fe, although its presence in Corrientes could be expected.

Sisyrinchium macrocephalum Grah. ssp. **giganteum** Ravenna, ssp. nov.—A subspecie *macrocephalum* habitu paludoso statura magna usque 170 cm. foliis circ. 20–25 mm. latis viridibus haud cinereo-viridibus bracteis et spathis inflorescentiae brevioribus recedit.

Brazil: Santa Catarina, mun. Agua Doce, bog by small river, C Campos de Palmas, 28.5 km. southeast of Horizonte (Parana), 100–1200 m.; leg. *L.B.*

Smith & R.M. Klein 13468 (HBR). Idem, mun. Catanduvas, forest and ruderal, east of Catanduvas, 700–800 m.; leg. *Smith & Klein 13001*, 7/8-XI-1964 (HBR). Idem. mun. Curitibanos, bog 5 km. W of Curitibanos on the road to Campos Novos, 850 m.; leg. *Smith & Klein 11117*, 9-II-1957 (HBR). Idem, mun. Lajes, along the Estrada de Rodagem Federal, south of Lajes; ca. 900 m.; leg. *Smith & Klein 8195*, 3-XII-1956 (HBR). Idem, Lajes, Morro do Pinheiro Seco, banhado do campo, 900 m.; leg. *P.R. Reitz 6641*, 3-II-1963 (HBR). Idem, Matos Costa, 1100 m.; leg. *Reitz & Klein 13743*, 27-X-1962 (HBR). Parana, mun. Curitiba, Rodovia do Xisto, Rio Barigui; leg. *Hatschbach 30573*, 28-X-1972 (Herb. Ravenna, Herb. Hatschbach and others ?). In palude pr. Posto Agropecuario mun Guarapuava civit. Parana Brasiliae; leg. *Ravenna 1010* et *Hatschbach 23079*, 3-XII-1969 (Herb. Ravenna type, Herb. Hatschbach isotype).

This is distinguishable from subspecies *macrocephalum* by virtue of its height to 170 cm., the green (not ash-green) leaves reaching 22 mm. in breadth, and the shorter bracts and spathes of the inflorescence.

Sisyrinchium vaginatum Spreng. ssp. **ciliolatum** Ravenna, ssp. nov.—Plantae saepe densae fusco-virides. Rhizoma breviter ramosus caulibus erectis vel erecto-patentibus emitens. Folia basalia absentia. Caules ancipite-alati ad margines ciliolati vel ciliolato-papillosi foliis pluribus brevibus saepe bracteiformibus instructi. Caules steriles flexuosi ad 12–57 cm. longi et 2–2.7 mm. lati foliis pluribus ad 15–50 mm. longa circ. 2–3.5 mm. lata. Caules floriferi sterilibus latiores foliis saepe brevioribus ad 20–38 mm. longis et 3.2–4 mm. latis instructi. Folia ad apicem leviter falcato-incurva ad margines minutissime ciliolata vel glabrescentia; pars connata vaginae ad marginem interiorem interdum papilloso-ciliolata. Spatha compressa 4–9-flora ad 18–30 mm. longa valvis subaequalibus. Flores erecti lutei rotacei circ. 20–25 mm. lati. Ovarium obovatum viride glabrum ad 2–2.1 mm. longum circ. 1.5 mm. latum. Tepala oblanceolata acuta, interiora 10–13 mm. longa et 4–4.3 mm. lata, interiora paullo breviora. Columna staminum circ. 1.7 mm. longa medio inferiori albicans superne lutea deinde filamenta circ. 1.2–1.3 mm. libera. Antherae oblongae luteae versatiles circ. 4.2 mm. longae. Stylus filiformis ad 2.2 mm. longus. Styli rami patentissimi filiformes ad 3 mm. longi.

Argentina: Corrientes, dep. Santo Tome, margen izquierda del arroyo Aguapey, 52 km. al SE de ruta nac. No. 12, desvio a Gob. Virasoro; leg. *Krapovickas et al. 16625*, 29-XI-1970 (Herb Rav., CORR). Entre Rios, dep. Federacion, banados del Rio Mocoreta; leg. *Burkart 6372* (SI). Idem ibid.; leg. *Burkart 21691* (SI). Culta in Bonaria ex plantis in humbrosis pr. fluminis Uruguay ad Federacion prov. Entre Rios Argentinae collectis; leg. *Ravenna 1026*, XII-1968 (Herb. Ravenna type).

The present subspecies appears closely related to **Sisyrinchium vaginatum** Spreng. ssp. **Marchio** (Vell.) Rav., comb. nov. *(S. Marchio* Vellozo, Fl. Flum.: 273, 1825; vol. 7: tab. 2, 1827). It is easily separable, however, by the ciliation present especially on the stem margins, and by the narrower tepals. A revision of the whole *S. vaginatum* complex is in preparation.

Sisyrinchium hirsutum Baker ex Hassler et Chodat ssp. **dasyspathum** Ravenna ssp. nov.—A subspecie *hirsutum* textura flaccidiora bracteis et spathis distincte et uniformiter puberulis ad margines late membranaceis differt.

Argentina: Misiones dep. Obera, 10 km. SO de Obera, ruta prov. 105, arroyo Salto; leg. *L.A. Mroginski 778*, 10-XI-1972 (Herb. Rav., CORR). Same province, sine/loc.; leg. *Villamil* s.n., XI-1965 (Herb. Rav., BAA ?) Supra muros diruptos reliquiae San Ignacio prov. Misiones Argentinae; leg. *Ravenna 1097*, 9-XII-1969 (Herb. Ravenna type, K isotype). Brazil: Santa Catarina, mun. Sao Joaquim, Bom Jardim, Curral Falso; leg. *Reitz & Klein 8414*, 19-II-1959 (HBR).

The subspecies *hirsutum* bears flatter spathes being ciliate only at the keel; the membranous edges are wider. The plant does not become so dark in drying as in subspecies *dasyspathum*. The former is found also in Santa Catarina, Brazil, as represented by the following specimen:

Brazil, Santa Catarina, Ibirama, ao lado do caminho; leg. *R.M. Klein 610*, 20-X-1953 (HBR).

Sisyrinchium adenostemon Phil. ssp. **microspathum** (Phil.) Ravenna stat. nov.—*Sisyrinchium microspathum* Philippi, Anal. Univ. Chile 91: 627, 1895. *S. arenarium* Poepp. ssp. *microspathum* (Phil.) Ravenna, Bonplandia 2 (16): 287, 1968. Ravenna, Iridaceae, in Correa (Ed.) Fl. Patagonica II: 176, 1969 (as to name only).

Several years ago (Ravenna 1968), I treated this entity as a subspecies of *S. arenarium* Poepp. This was tentative, since I had not had an opportunity to examine Philippi's types. As a resident in Santiago for the last ten years, I had access to the latter and to living plants in the field, too. It was also possible to cultivate side by side some closely related species. Consequently, it can be assumed now that *S. microspathum* Phil. is a subspecies of *S. adenostemon* Phil. (see Ravenna 1979). The presence or absence of elaiophores on the filaments or staminal column in certain species, may not be diagnostic at the species level.

2. The status of Sisyrinchium filifolium Gaud.

Sisyrinchium filifolium Gaudichaud, Ann. Sci. Nat. Ser. II, 5: 101, 1825. Some years ago (Ravenna 1968 & 1969), I treated this entity as a subspecies of *S. junceum* E. Mey. I overlooked, however, that it has the priority over the latter, and should be reinstated to its original rank.

Sisyrinchium filifolium must be regarded, from now on, as the type subspecies of a complex that includes about eighteen subspecies from Argentina, Bolivia, Chile, and Peru. The application of the binomial *S. junceum* E. Meyer, supposedly collected in the Chilean Cordillera seems obscure. I was informed by the Berlin Museum that the type is a single poor specimen. If the binomial could not be referred unmistakably to any of the Chilean subspecies, which are many, it would be advisable to neglect it. A revision of this difficult complex is in course.

Sisyrinchium filifolium Gaud. ssp. **Lainezii** (Hick.) Ravenna, stat. nov. *Symphyostemon Lainezii* Hicken, An. Soc. Cient. Arg. 65: 301, 1908. *Phaiophleps Lainezii* (Hick.) R.C. Foster, Contr. Gray Herb. Harv. 127: 43, 1939. *Sisyrinchium junceum* E. Meyer ssp. *Lainezii* (Hick.) Ravenna, Bonplandia 2 (16): 287, 1968.

The illustration by M.T.C., which appeared under this epithet in Cabrera's "Flora de la Provincia de Buenos Aires," does not agree with my description

(Ravenna 1969), nor with the specimens cited. It represents another subspecies of the complex.

3. Revalidation of Sisyrinchium platycaule Bak.

Sisyrinchium platycaule Baker, Handb. Irid.: 132, 1892. Although being quite a distinct species, this has been reduced by Johnston (1938) to synonymy of *Sisyrinchium Sellowianum* Kl. *S. platycaule* is a tiny plant with often prostrate, smooth, dark-green, tender leaves; the leaf sheaths are flaccid and loosely clasping. The most frequently decumbent scape is foliaceous in texture, and bearing a single leaf at the apex. The latter subtends one or two, often shortly peduncled (rarely sessile), few-flowered spathes.

The species will be fully treated by me in a subsequent monograph of the Argentine species of the genus. It has not been recorded so far from this country, being even adventive in lawns of certain public parks of Buenos Aires.

Argentina: Misiones, Santa Ana, in palude; leg. *C. Spegazzini*, I-1907 (LP). Paraguay: leg. *Balansa 555* (P type, phototype seen).

4. On the filaments of Sisyrinchium galapagense Rav.

Sisyrinchium galapagense has been recently proposed by me (Ravenna 1969) as a new species. The filaments were described as free to the base. Lately, however, I received from the Utrecht Museum a beautifully preserved specimen, which proved that the character is not constant. In fact, in some of the flowers the filaments appear as joined for a little more than half of their length. In others they seem free.

Ecuador: Galapagos, Santa Cruz island, on Cerro Precioso, 772 mi.; leg. *H. van der Werff* 1743, no date (U, Herb. Rav.).

Acknowledgements

I feel indebted to the directors or curators of the institutions where I consulted material, or who cooperated by sending dry specimens or phototypes. The herbaria are the following: BA, BAB, CORR, G, GH, HB, HBG, HBR, Herb. Hatschbach, K, LIL, LP, MEN, P, RB, SI, SGO, U.

Literature Cited

Cabrera, A.L., 1953, Manual de la flora de los alrededores de Buenos Aires, 589 pp., Ed. Acme S.A.

Hassler, E. & R. Chodat., 1903, Plantae Hasslerianae; *Bull. Herb. Boiss.* Ser. II 3 (12): 1106.

Johnston, I., 1938, The species of Sisyrinchium in Uruguay, Paraguay, and Brazil; *Jour. Arn. Arb. Harv. Univ.* 19: 376.

Malme, G.O., a:n, 1935, Einige Wahrend der zweiten Regnellschen Reise gesammelte Phanerogamen II; *Arkiv Bot.* Band 26 A (9): 1-19.

Ravenna, P., 1968, Notas sobre Iridaceae III; *Bonplandia* (Arg.) 2 (16): 274-291.

_____ 1969, Iridaceae, in Correa (Ed.) Flora Patagonica II: 167-186.

ON THE PRESENCE OF THE GENUS ORTHROSANTHUS (IRIDACEAE) IN THE ARGENTINE FLORA

Pierfelice Ravenna

In America, the genus *Orthrosanthus* Sweet, is cited as an element of the flora of Mexico, Guatemala, Costa Rica, Nicaragua, Panama, Venezuela, Colombia, Ecuador, Peru, and Bolivia. It is usually found at relatively high altitudes, in pine or oak woods, "paramos," or "pajonales de altura"; often it reaches 4.800 m., at least in Peru and Ecuador. Three species and one subspecies are presently known. These are: *O. chimboracensis* (H.B.K.) Bak., *O. chimboracensis* ssp. *tunariensis* (Ktze.) Rav., *O. acorifolius* (H.B.K.) Rav., and *O. monadelphus* Rav. A fourth species is recognized here: **O. exsertus** (Fost.) Rav., stat. nov. *O. chimboracensis* var. *exsertus* R. C. Fost., Contr. Gray Herb. Harv. Univ. 155: 49. 1945. A unified eventually illustrated treatment will be given by me in the future.

In addition to the information above, it is worthy of mention that the southernmost distribution sites of *O. chimboracensis* ssp. *tunariensis* are found in Argentina. Personally, I have observed its existence in the area of Pena Negra, between Yavi and Santa Victoria, prov. of Salta, at an altitude of 3500–3800 m. The genus is therefore recorded for the first time in the flora of Argentina. The following specimens are cited:

Argentina: Salta, dep. Santa Victoria, Santa Victoria; leg. *Kiesling 242*, 31-XII-1972. Jujuy, dep. Valle Grande, Serranias de Calilegua, Cerro Amarillo; leg. *Fabris et al. 5806,* 18-II-1965 (LP).

SYMPA, A NEW GENUS OF IRIDACEAE FROM RIO GRANDE DO SUL, BRAZIL

Pierfelice Ravenna

Among a number of herbarium sheets sent to the writer for determination and study by the Utrecht Museum, one specimen proved to represent an undescribed genus.

A new genus and species of the Iridaceae, viz., *Sympa riograndensis* Rav., is described from the state of Rio Grande do Sul, Brazil. Its relationships are mainly with *Trifurcia* Herb.

Sympa Ravenna, gen. nov.—Flos regularis pedicellatus. Tepala exteriora obovato-pandurata; interiora multo minora geniculata breviter unguiculata, lamina inferne concaviuscula glandulis densis notata deinde revoluto-patentia orbiculato-triangularis. Filamenta in columna subteres tota connata. Antherae oblongae contiguae erectae columnae pariter leviter longiora. Ovarium inferum anguste obovatum. Stylus filiformis ad apicem tantum breviter trifurcatus. Styli rami filiformes ad apicem stigmatosi. Capsula elliptica vel obovato-elliptica.–Plantae humiles bulbosae. Bulbus tunicatus

subglobosus. Folia basalia plicato-taeniolata tenera. Caulis floriferus teres foliatus et bracteatus. Spathae pedunculatae biflorae valvis inaequalibus subventricosis.

Typus generis: *Sympa riograndensis* Rav.

A single species is known from Central Rio Grande do Sul, Brazil. The genus name has been taken from the Greek sympas, which means altogether, alluding to the concrescent filaments and contiguous anthers that enclose the style and style arms.

The general habit including bulb, leaves, and inflorescence, recalls *Trifurcia* Herb., a genus with three representatives in Rio Grande do Sul.

The perigone follows, too, essentially, the same pattern as in *Trifurcia*. Only the short claw and blade of the inner tepals appear as at variance with this genus.

The decisive distinctive characters of *Sympa* are in the androecium, with its erect contiguous anthers, and in the simple, short, filiform style arms.

Sympa appears then as closely related to *Trifurcia*, having possibly evolved from it. It also represents a link between *Trifurcia* and other genera still to be described.

Sympa riograndensis Ravenna, sp. nov.—Planta humilis usque 15–17 cm. alta. Bulbus subglobosus ad 16–18 mm. latus tunicis siccis brunneis in pseudocollo circ. 10–15 mm. longo productis obtectus. Folia basalia saepe dua taeniolato-plicata flaccida ad 15–17 cm. longa circ. 5–7 mm. lata. Caulis teres ad basin et medium foliis duis vel unico basalibus similibus necnon paullo brevioribus et bracteis duis vel unica circ. 23–45 mm. longa instructus. Spathae 1–3 bivalvatae biflorae valvis subventricosis inaequalibus; valva inferior 25–34 mm. longa, superior 34–48 mm. longa superne marginibus membranaceis undulatis. Flos erectus violaceus. Tepala exteriora obovato-pandurata verosimiliter 35–37 mm. long circ. 20–22 mm. lata, inferiora multo minora geniculata unguiculis brevibus circ. 3 mm. longis; lamina inferne dense glandulosa concava deinde patens. Columna staminum teres vel subteres circ. 4 mm. longa. Antherae columnae pariter paullo longiores oblongae erectae contiguae. Stylus filiformis ad apicem tantum perbreviter trifidus. Styli rami filiformes ad apicem stigmatosi. Capsula immatura e spatham exserta elliptica.

Brazil: Rio Grande do Sul, 17 km. W de Sao Gabriel, campo com baixada umida; leg. *J.C. Lindeman et al.*, 13-X-1971 (ICN type, U isotype).

The discovery of this species in Central Rio Grande do Sul is an unexpected event, considering that the region has been supposedly fully explored by many botanists in the past.

The writer is indebted to the Botany staff of the Utrecht Museum for lending the specimen which served for the present study.

THE TRIBE TRIMEZIEAE OF THE IRIDACEAE

Pierfelice Ravenna

Hutchinson (1959, p. 649) included the American genera of the Iridaceae in the following tribes: *Irideae,* with *Iris* as the sole genus represented; *Sisyrinchieae,* at present with seven representatives; *Tigridieae* according to my knowledge with twenty-seven genera; *Cipureae,* which should merge in *Tigridieae;* and *Mariceae,* with *Neomarica (= Trimezia), Cypella,* and *Trimezia.*

Mariceae Hutch. was based on *Marica* Schreb., which as stated by Sprague (1928) is a synonym of *Cipura* Aubl. This sole fact makes necessary to drop the tribe name. Moreover, Hutchinson places the discordant genera *Cypella* (of tribe *Tigridieae),* and *Romulea* (an Old World genus belonging in *Croceae)* in it.

It is, therefore, indispensable to propose newly a tribe with *Trimezia* as the type genus:

Trimezieae Ravenna, tribus nova—Rhizoma multiceps vel uniceps plus minusve tuberosus seu interdum abbreviatus vaginis foliorum carnosis inter se stricte amplectentibus bulbum tunicis exterioribus fibrosis obtectum conformantibus. Folia linearia lineari-ensiformia ensiformia vel teretia.

Type genus: *Trimezia.* Genera so far included: *Trimezia* Herb., and *Pseudotrimezia* Fost. L 40018639

Floral features such as those concerning perigone shape, inner tepals, androecium or gynoecium, although useful for defining genera in the Iridaceae, often are found in rather far groups or vary substantially within a single tribe. The variation in the androecium and gynoecium within tribe *Tigridieae* is an example of the latter. The similarity in the flowers of *Moraea* (tribe *Irideae)* subgen. *Viesseuxia, Gynandriris (Irideae),* and *Mastigostyla (Tigridiae),* although superficial in itself, is an instance of the former.

By contrast, vegetative characters, such as kind of rootstock and leaves, appear as much more stable through the genera. This probably is due to the fact that they apparently evolved earlier, lasting until the present with relatively little diversification. Hence, they are more relevant than the floral features for grouping the genera.

Literature Cited

Hutchinson, J., 1959: The Families of Flowering Plants II, Monocotyledones, 2d. edition: 511–792, Oxford Academic Press.

Sprague, T. A., 1928: Marica and Neomarica; *Bull. Misc. Inf. Kew* 1928: 278–281.

EIGHT NEW SPECIES AND TWO NEW SUBSPECIES OF CYPELLA (IRIDACEAE)

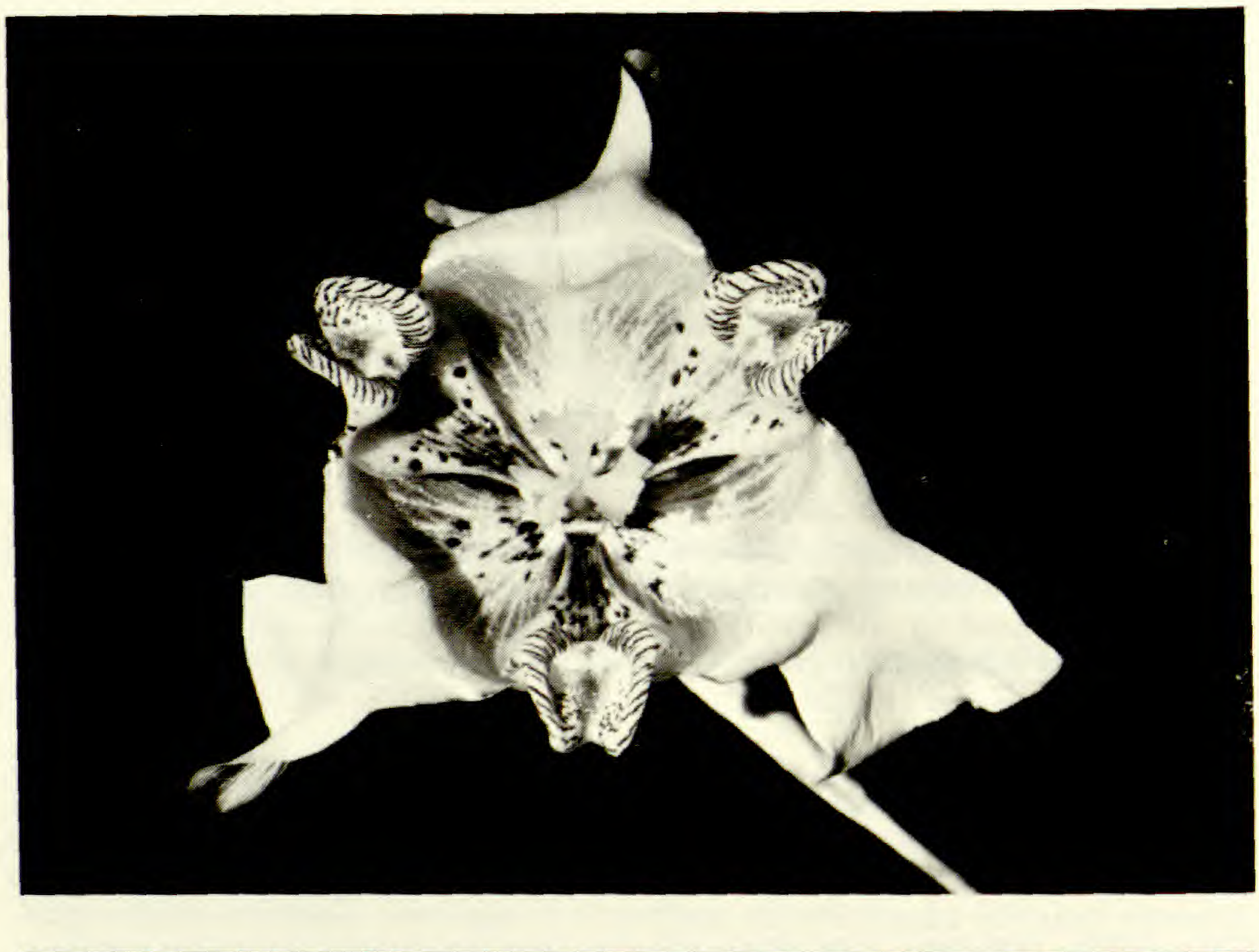
Pierfelice Ravenna

Eight new species, namely *C. laeta, C. laxa, C. discolor, C. Pabstiana, C. fucata, C. curuzupensis, C. armosa,* and *C. lapidosa* are proposed. Moreover, two new subspecies, respectively of *C. Hauthalii* and *C. Herbertii,* are described. A new form belonging in the subspecies of *C. Herbertii* is also named. The entities belong in the floras of Argentina, Brazil, Paraguay, and Uruguay.

All but one of the species and subspecies proposed here were studied from living material. This part of the work was carried out in the field, or on plants that were subsequently introduced in my experimental collection.

I feel indebted to the institutions that cooperated by making available specimens of this genus. The herbaria are the following: B, BA, BAB, BAFC, CORR, HBR, K, LP, MBM, SI.

Cypella laeta Ravenna, sp. nov. (sectionis *Nais)* Fig. 1.—Planta ad 20–35 cm. alta. Bulbus subglobosus ad 15–28 mm. latus tunicis fuscis obtectus. Folia basalia ad anthesin usque quattuor vel unicum ad 15–20 cm. longa circ. 2–5 mm. lata superne attenuata. Caulis teres pruinosus inferne folio abbreviato superne bracteis approximatis spathas 2–4 originans. Spathae leviter pruinosae; valva inferior ad 14–22 mm. longae, superior circ. duplo longiora convoluta. Flos sordide aureo-luteus ad 45–51 mm. latus. Ovarium oblongo-clavatum ad 4–8 mm. longum circ. 1.8–2.2 mm. latum. Tepala exteriora pandurata ad 34–37 mm. longa circ. 18–20 mm. lata inferne circ. 16–17 mm. concaviuscula ad margines membranaceo-translucida in urceola conniventia ad basin fusco-purpureo-suffusa deinde lamina undulato-reflexa ad basin partis reflexae area piloso-glandulosa interdum fusco-punctata extus sparse fusco-venata superne apiculata. Tepala interiora ad 18–23 mm. longa circ. 7–10.5 mm. lata; unguicula erecto-patentia fusco-purpureo-striolata et maculata ad basin angustata circ. 15 mm. longa; lamina geniculato-recurvata ad margines revolutos citrina oblique nigro- vel fusco-brunneo striolata ad medium urceolato-depressa dense glanduloso-tumescente ad apicem reflexum angustata brunneo-ochraceo-maculata acuta; glandulae (elaiophora) luteae vel fuscae paullo translucidae. Filamenta libera pallide ochracea praeter basin incrassatam fusco-purpureo-striolatam et tinctam 6 mm. longa. Antherae oblongae 7 mm. longae; pollen loculique fusco-brunnei. Stylus circ. 9 mm. longus. Styli rami ad 3.5 mm. connati deinde 3.6 mm. liberi erecto-patentes; cristae tres, abaxial ovato-triangularis usque 2 mm. longa ad apicem minute crenata, adaxiales cultriformes arcuatae petalaceae circ. 3.5–4 mm. longae; replicaturae stigmatosae parvae recurvatae. Capsula obovata vel obovato-clavata ad 10–18 mm. longa circ. 7–9 mm. lata.



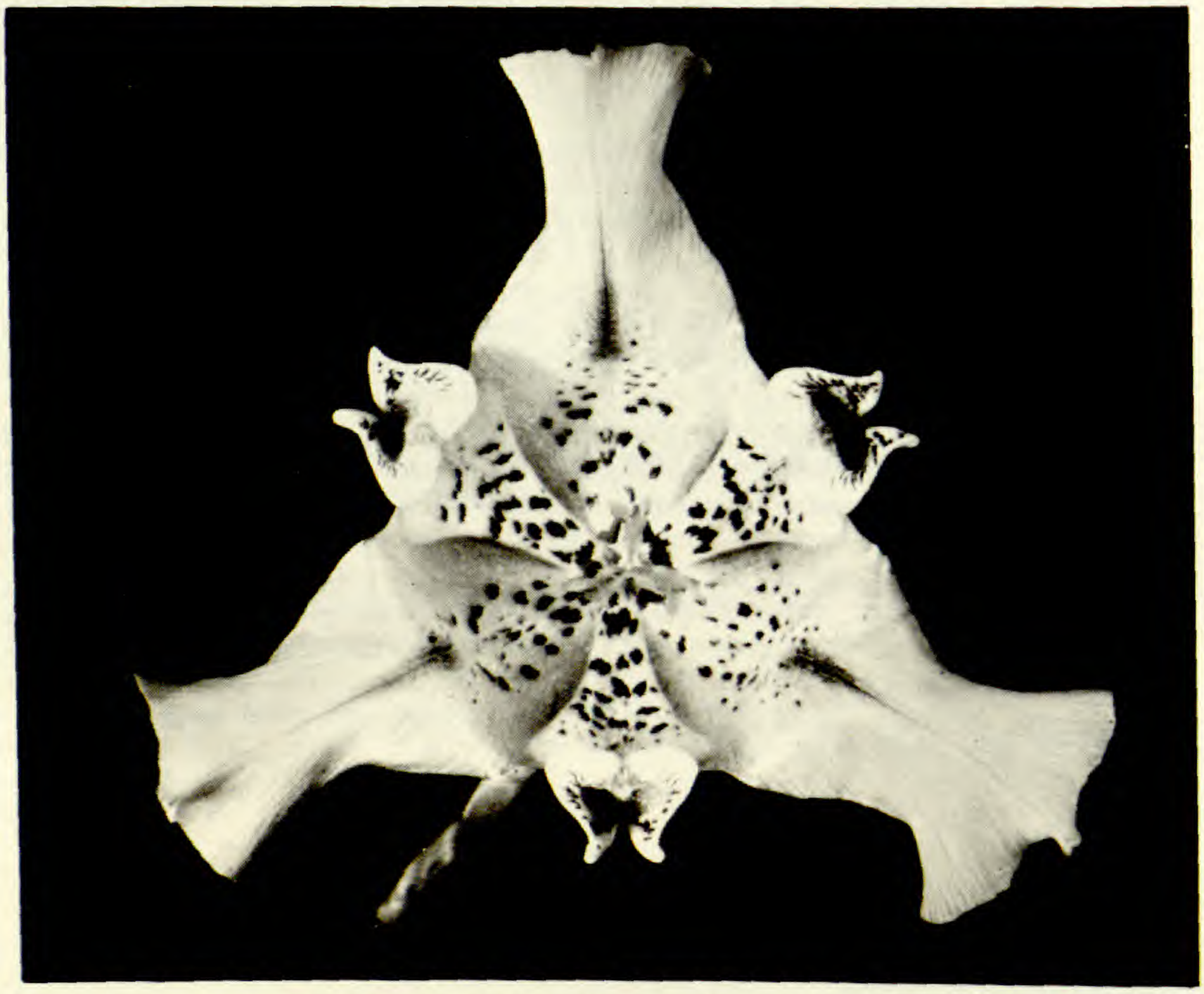


Fig. 1. Above, *Cypella laeta* Rav. upper view of flower; photo P. Ravenna. Below, *C. discolor* Rav., flower from above; photo S. Magno.

In grassy, well drained places of the east part of the Argentine provinces of Entre Rios and Misiones. Its presence in the province of Corrientes could be expected.

Argentina: prov. Misiones, Paso de las Tunas pr. Campo Grande, *C. Spegazzini* (?), II-1907 (LPS 19064, LP). Prov. Entre Rios, Parque San Martin, *Gamerro s.n.* (BAFC). Ibidem, Estacion Agronomica, *Burkart 784*, 16-I-1927 (SI). Ibidem, Ruta 14, camos altos, *Burkart et al.*, 25-IV-1952 (SI). Culta in Bonaria ex bulbis ad Parque San Martin pr. Concordiam prov. Entre-Rios Argentinae collectis, *Ravenna 506*, XII-1967 (Herb. Ravenna, type).

One of the few species with two-flowered spathes. The others are *C. aquatilis* Rav., *C. discolor* Rav., *C. Osteniana* Beauv., and *C. Hauthalii* (Ktze.) Fost.

The morphology of the inner tepals places the species in section *Nais*. Actually, *C. laeta* appears as closely related to *C. aquatilis*, the type of the section (see Ravenna 1981), and to *C. crenata* (Vell.) Rav. The former is remarkable by its submerged habit, the production of plantlets on the inflorescence, and the short, spreading blade of the outer-tepals. The latter species inhabits the bogs of southeastern Minas Gerais, Brazil, and is a very slender, taller plant, with extremely narrow and longer leaves.

Cypella laxa Ravenna, sp. nov. (sectionis *Nais*)—Planta usque 30–85 cm. alta. Bulbus subglobosus ad 5–14 mm. latus. Vagina basalis unica ex bulbo circ. 7.5–14 mm. longa. Folia basalia ad anthesin dua vel saepe unicum lineari-attenuata ad 17–50 mm. longa circ. 1–3 mm. lata. Folium caulinum abbreviatum 9–40 cm. longum et bractea unica vel duabus distantibus (si spatha unica) seu usque quattuor approximatis (si spathae tres) circ. 17–53 mm. longis. Spatha uniflora saepe unica distincte pedunculata vel raro usque tres; valva inferior 17–41 mm. longa, superior convoluta 33–51 mm. longa. Pedicellus longitudinis valvae superioris vel paullo longior. Flos luteus ad 30–50 mm. latus. Ovarium clavatum viride ad 4.5–6 mm. longum. Tepala exteriora ad 25–35 mm. longa circ. 12–20 mm. lata unguiculis concavis fusco-rubro-striolatis; lamina perflaccida laxe reflexa. Tepala interiora ad 14–15 mm. longa circ. 9–15 mm. lata prope basin ochraceo-purpureo-maculata; lamina inferne valde depressa glandulis densis (elaiophoris) ad lateras striis nigro-purpureis obliquis notata. Filamenta filiformia ad basin libera circ. 3 mm. longa paulo divergentia. Antherae oblongo-lineares ad 7–8.2 mm. longae circ. 1.3–1.4 mm. latae connectivo nigro purpureo liquidum secretante; pollen loculique cinereo-virides. Stylus 5.5–6.8 mm. longus. Styli rami paullo divergentes ad 2 mm. connati deinde 4–4.7 mm. longi praeter apicem purpurescentem albo ochracei; cristae luteo-ochraceae, adaxiales 3.2–3.5 mm. longae, abaxial parva. Capsula clavata vel clavato-elliptica praeter apicem fuscum pallide viridis circ. 12 mm. longa.

Rather frequent in the Brazilian states of Parana and Santa Catarina; it is found exclusively in bogs.

Brazil: State of Santa Catarina, mun. Lajes, Encruzilhada, 900 m., *R. M. Klein 3207*, 5-XI-1962 (HBR, Herb. Rav.). Mun. Agua Doce, Faz. Esperanca, Campos de Palmas, 6 km. S of Horizonte (Parana), 1100–1200 m., *L. B. Smith & R. M. Klein 13517*, 4-XI-1964 (HBR). Mun. Irani, bog at Campo de Irani, 700–900 m., *Smith & Klein 13034*, 8-XI-1964 (HBR). State of Parana mun Palmas, S. Agostinho, brejo, *Hatschbach 15419*, 13-XII-1966 (MBM, Herb. Rav.). Ibidem, *Hatschbach et al. 28291*, 6-XII-1971 (MBM, Herb. Rav., U).

Mun. Contendas, Rodovia do Xisto, *Hatschbach 17551*, 22-X-1967 (MBM, Herb. Rav., F). Mun. Piraquara, Pinhaes, brejo, *Hatschbach 33411*, 12-XI-1973 (MBM, Herb. Rav.) Mun. Curitiba, Atuba, orla de brejo, *Hatschbach 32778*, 30-I-1973 (MBM, Herb. Rav.). Ibidem, Jardim Natalia, brejo, *Hatschbach 33430*, 30-XI-1973 (MBM, Herb. Rav.). Mun. Marmeleiro, Estrada Marmeleiro-Campo Ere, brejo, *Hatschbach 26409*, 21-II-1971 (MBM, Herb. Rav., AAR). Ibidem, *Hatschbach 22668*, 25-X-1969 (MBM, Herb. Rav., K). Mun. Guarapuava, Rio Campo Real, *Hatschbach & O. Guimaraes 20517*, 6-XII-1968 (MBM, Herb. Rav.). In uliginosis circ. 2 km. a Posto Agropecuario mun. Guarapuavae civit. Paranaensis Brasiliae, *Ravenna 1008 cum G. Hatschbach*, 3-XII-1969 (Herb. Ravenna, holotype; RB, isotype).

Years ago, I determined most of the material from Parana as *Cypella crenata* (Vell.) Rav. However, as soon as it was possible to examine populations in the field, both from the mentioned State as well as from Caldas, Minas Gerais (the area of *C. crenata*), the new species was evident.

The northern plant has orange flowers, with the outer-tepal blade firmer in texture, and longer, erect filaments. Both species are otherwise closely related.

Cypella discolor Ravenna, sp. nov. (sectionis *Nais*), Fig. 1—Planta usque 20 cm. alta. Bulbus ovatus ad 20–30 mm. longus circ. 14–17 mm. latus tunicis exterioribus siccis fusco-ochraceis in pseudocollo brevi productus. Folia basalia lineari-attenuata ad anthesin dua vel unicum pallide viridia taeniolato-plicata ad 20–25 cm. longa circ. 4–6 mm. lata. Caulis gracilis ramosus. Spathae uniflorae breviter pedunculatae pedunculis 6–19 mm. longis; valva inferior acuta ad apicem marcescens circ. 13.5–15 mm. longa, superior circ. 24–25 mm. longa cinvoluta. Pedicelli saepe 23 mm. longi. Flos inodorus. Ovarium subclavatum viride ad 4.7–4.8 mm. longum circ. 2.4 mm. latum. Perigonium ad centrum profunde urceolatum ad 39 mm. latum. Tepala exteriora ad 26 mm. longa circ. 13 mm. lata; unguiculum circ. 10 mm. longum purpureo-suffusum; lamina patens circ. 14 mm. longa pandurata albiuscula tenuissime fusco-venata inferne stria media purpurescente notata ad apicem apiculo incurvo circ. 2.2 mm. longo instructa. Tepala interiora ad 17 mm. longa circ. 8 mm. lata; unguiculum circ. 10 mm. longum purpureo-suffusum; lamina circ. 2 mm. subplana deinde abrupte recurvato-reflexa valde biconvexa et depressa in fundo depressionis densiter sordideque glandulosa medio superiore depressionis lutea ad margines revolutos striolis maculisque purpureis et fusco-castaneis notata apicem reflexum versus lutea et sordide purpurescens venis fuscis peracuta. Filamenta filiformia purpurescens ad 5.7 mm. longa ad basin incrassatam circ. 0.7–0.8 mm. connata. Antherae oblongo-sagittatae apiculatae ad 5.7 mm. longae ad basin 1.8–1.9 mm. latae connectivo latiusculo; pollen loculique sordide virides. Stylus circ. 7 mm. longus. Styli rami oblique erecti ad 3–3.2 mm. connati deinde circ. 3 mm. longi antice albicantes postice purpurescentes; cristae tres purpurescentes, adaxiales oblongo-acutae ad 3.2 mm. longae, abaxial 1.4 mm. longa integra subtriangularis; replicaturae stigmatosae patentes 0.6 mm. longae. Capsula obovato-clavata ad 8 mm. longa circ. 4 mm. lata cycatrix perigonii lata. Semina irregulariter compressa vel angulata castanea minutissime ruguloso-colliculata ad 1.9–2.1 mm. longa circ. 1.3–1.6 mm. lata.

Meadows near stream, in low open woods at Passo da Guarda, in the Brazilian state of Rio Grande do Sul.

Culta in Bonaria ex bulbis ad Passo da Guarda civit. Rio Grande do Sul Brasiliae collectis, *Ravenna 507*, XII-1967 (Herb. Ravenna, type).

Among the one-flowered species of sect. *Nais*, *C. discolor* appears as a very distinct species. Its whitish and purple flowers have no parallel in the genus. *C. Osteniana* Beauv., of section *Cypella*, has whitish, dark-veined flowers. However, the much less deep cup and the features of the section distinguish it well from the new species.

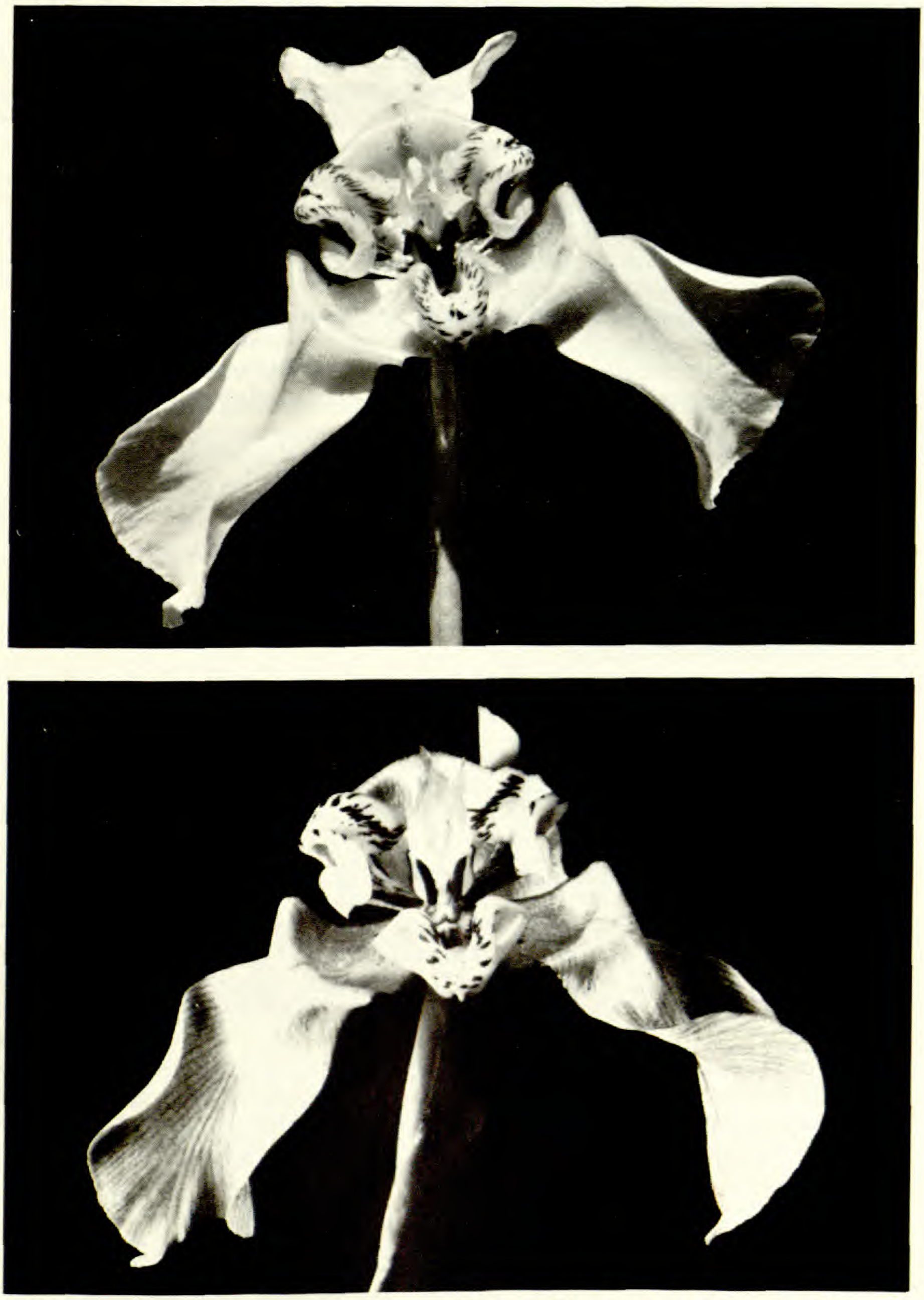


Fig. 2. Above, *Cypella Pabstiana* Rav., side view of flower; photo P. Ravenna. Below, *Cypella fucata* Rav., side view of flower; photo S. Magno.

Cypella Pabstiana Ravenna, sp. nov. (sectionis *Cypella*), Fig. 2—Planta usque 33 cm. alta. Bulbus subglobosus ad 13–15 mm. latus tunicis exterioribus ochraceis sursum in pseudocollo circ. 30–35 mm. productis. Folium basale ad anthesin unicum lineari-attenuatum ad 10 cm. (vel ultra longum) circ. 1.5–1.8 mm. latum. Caulis saepe geniculatus ramosus folio abbreviato 74 mm. longo et bracteis pluribus approximatis circ. 19–29 mm. longibus. Spathae uniflorae usque tres pedunculatae succesivae ad axillas bractearum in bostrice disposita; valva inferior 20–22 mm. longa, superior 42–45 mm. longa convoluta. Flos luteus ad 40–45 mm. latum. Ovarium clavatum ad 5.5 mm. longum circ. 2 mm. latum. Tepala exteriora pandurata ad 30 mm. longa circ. 26.5 mm. lata prope basin minutissime fusco-purpureo-punctata partis concavae circ. 9 mm. longa. Tepala interiora ad 8 mm. longa circ. 7 mm. lata; unguicula patentia pallide ochracea fusco-purpureo-striolata circ. 5 mm. longa; lamina geniculata arcte recurvato-reflexa longitudinaliter depressa albicantia inferne glandulosa (elaiophora) aurantiaca minute nigro-punctulata vel striolata ad lateras aurantiaca oblique vel transverse nigro-striolata. Filamenta circ. 2.5 mm. longa basin versus incrassata circ. 1.9 mm. connata purpureo tincta deinde libera sordide lutescentia. Antherae subsagittatae ad 4.4 mm. longae circ. 2 mm. latae connectivo lato luteo leviter excurrente liquidum secretante pollen fusco-viridescens. Stylus circ. 4 mm. longus.

Endemic in dry, grassy fields of Entre Rios, municipe of Guarapuava, in the Brazilian state of Parana.

Brazil: Parana, mun. Guarapuava, Entre Rios, *Hatschbach 22552*, 21–X–1969 (MBM). In campis siccis graminosis ad Entre Rios mun. Guarapuava civit. Parana Brasiliae, *Ravenna 1013, cum Gert Hatschbach*, 4–XII–1969 (Herb. Ravenna, type).

The species is dedicated to the memory of Dr. Guido F. J. Pabst, distinguished botanist who specialized in the Orchidaceae. The premature and unexpected death of this friend and collaborator on the Brazilian flora left a painful vacuum in botany.

Cypella Pabstiana is nearly allied to *C. Herbertii* (Lindl.) Herb., differing in the low stature, narrower leaves, yellow flowers, and smaller floral organs.

Cypella fucata Ravenna, sp. nov. (sectionis *Cypella*), Fig. 2—Planta ad 10–20 cm. alta. Bulbus globosus ad 10–12 mm. latus tunicis exterioribus siccis ochraceis in pseudocollo circ. 9–32 mm. longo productis. Folia basalia ad anthesin nulla vel unicum raro dua anguste lineari-plicata ad 8–12 cm. longa circ. 0.6–2.5 mm. lata. Caulis pergracilis interdum geniculatum folio unico 6–8 cm. longo instructus. Spathae paucae uniflorae pedunculatae; valva inferior 14–23 mm. longa, superior 33–36 mm. longa. Pedicelli circ. 30–42 mm. longi. Flores sordide aurantiaci ad 25–33 mm. lati. Ovarium clavatum ad 4–6 mm. longum circ. 1.5–1.9 mm. latum. Tepala exteriora flexuosa inferne inconspicue concava tenuiter fusco-venata; lamina modice vel abrupte reflexa. Tepala interiora arcte geniculato-recurvata ad 4–7 mm. longa; lamina ad medium praeter apicem canaliculata alba inferne area dense glandulosa ad lateras arcte revoluta striis nigris obliquis ad apicem aurantiaca acuta. Filamenta circ. 1.8 mm. longa albo-viridescentia ad basin tantum connata purpureo-striata. Antherae late oblongae ad 3.6 mm. longae ad basin 1.9–2.1 mm. latae connectivo circ. 0.95 mm. lato; pollen loculique nigro-viridescentes. Styli rami suberecti ad 2.4 mm. connati pallides deinde circ. 1.2 mm. liberi aurantiaci; cristae adaxiales ad 3.8–4 mm. longae cultri-

formes erecteae; abaxial circ. 0.8–2 mm. longa bifida vel leviter bilobata; replicaturae stigmatosae patentes 0.35 mm. longae. Capsula clavata ad 7–9 mm. longa circ. 4 mm. lata.

Grassy fields in the Brazilian states of Santa Catarina and Rio Grande do Sul; also in northeastern Uruguay (dept. of Cerro Largo). Populations are usually formed by few individuals.

Brazil: Santa Catarina, mun. Lajes, Morro do Pinheiro Seco, 3 km. east of Lajes, 900–950 m., *L. B. Smith & P. R. Reitz 10003*, 15-I-1957 (HBR). Ibidem, *Reitz 6579*, 4-II-1963 (HBR, Herb. Rav.). Culta in Bonaria ex bulbis ad pedem collis ubi Gruta do Segredo est pr. Cacapava civit. Rio Grande do Sul Brasiliae, *Ravenna 500*, XII-1965 (Herb. Ravenna, type).

Cypella fucata is related both to *C. Herbertii* (Lindl.) Herb. and *C. Osteniana* Beauv. The former is known as a much stouter plant with larger flowers; the filaments are connate for half or more of their length, and the adaxial crests arquate. Our plant resembles *C. Osteniana* in the size of the plant and flowers and in the carriage of the outer tepals; the latter are dark-veined as in *C. fucata*. However, the relatively large bulb, whitish color of the perigone, and rather long and divergent style-crests make *C. Osteniana* unmistakable.

Cypella curuzupensis Ravenna, sp. nov. (sectionis *Nais*)—Planta 25–44 cm. alta. Bulbus depresso-globosus magnitudinis nucis avellanae minoribus tunicis ochraceis in pseudocollo productis. Folia linearia ad 15–30 cm. longa in vivo circ. 0.8–1 mm. raro 2 mm. lata. Caulis gracilis simplex spatha unica vel duabus raro tribus pedunculatae ex bracteas 1–3 approximatas instructus. Spatha uniflora; valva inferior 12–24 mm. longa vaginans, superior 32–34.5 mm. longa. Flos circ. 38 mm. latus. Ovarium clavatum ad 6.5 mm. longum circ. 2 mm. latum. Tepala exteriora ovata ad 23 mm. longa circ. 25.5 mm. lata inferne concaviuscula. Tepala interiora 15 mm. longa unguiculis 11 mm. longis ad basin 1.3 mm. latis superne 10.8 mm. latis; lamina ad basin 11 mm. lata area glanduloso-tumescenti notata ad lateras vitellina caeterum luteum fusco maculatum. Filamenta libera filiformia superne lutescentia prope basin brunnea ad 5.8 mm. longa. Antherae oblongae ad 6.2 mm. longae pre dehiscentiam 2 mm. lata; connectivum minute brunneo-striolatum; loculi fusci. Styli rami pallide luteo-ochracei vel sordide lutescentes ad 3.5 concrescentes deinde 3.5 mm. liberi suberecti; cristae adaciales circ. 3–3.2 mm. longae, abaxial integra 1.8 mm. longa. Capsula obovato-clavata circ. 10 mm. longa circ. 5–6 mm. lata. Semina angulata parva ochracea.

Endemic to a bog and nearby damp meadows at Curuzupe, formerly called Mbubevo, in the region of Villa Rica, Paraguay. Although as scarce, the irids *Cypella armosa* Rav., and *Sisyrinchium vaginatum* Spreng. ssp. *Balansae* (Bak.) Rav. are found in the same area.

Paraguay: Mbubevo, *P. Joergensen Hansen 3871*, XII (BA 28/1683, SI). In paludibus pr. Curuzupe (ante Mbubevo) regionis Villa-Ricae Paraguariae, *Ravenna 463*, 17-II-1966 (Herb. Ravenna, type).

There is some question whether this species truly belongs in section *Nais*, mainly because of the scarcely depressed blade of the inner tepals. However, the relative size of the claw and blade in the latter seems to indicate so. The plant shows the most slender habit in the genus.

The rainy weather at the time of collecting prevented my taking photo-

graphs of the flower and sketching the essential organs. Experimental culture was attempted without success.

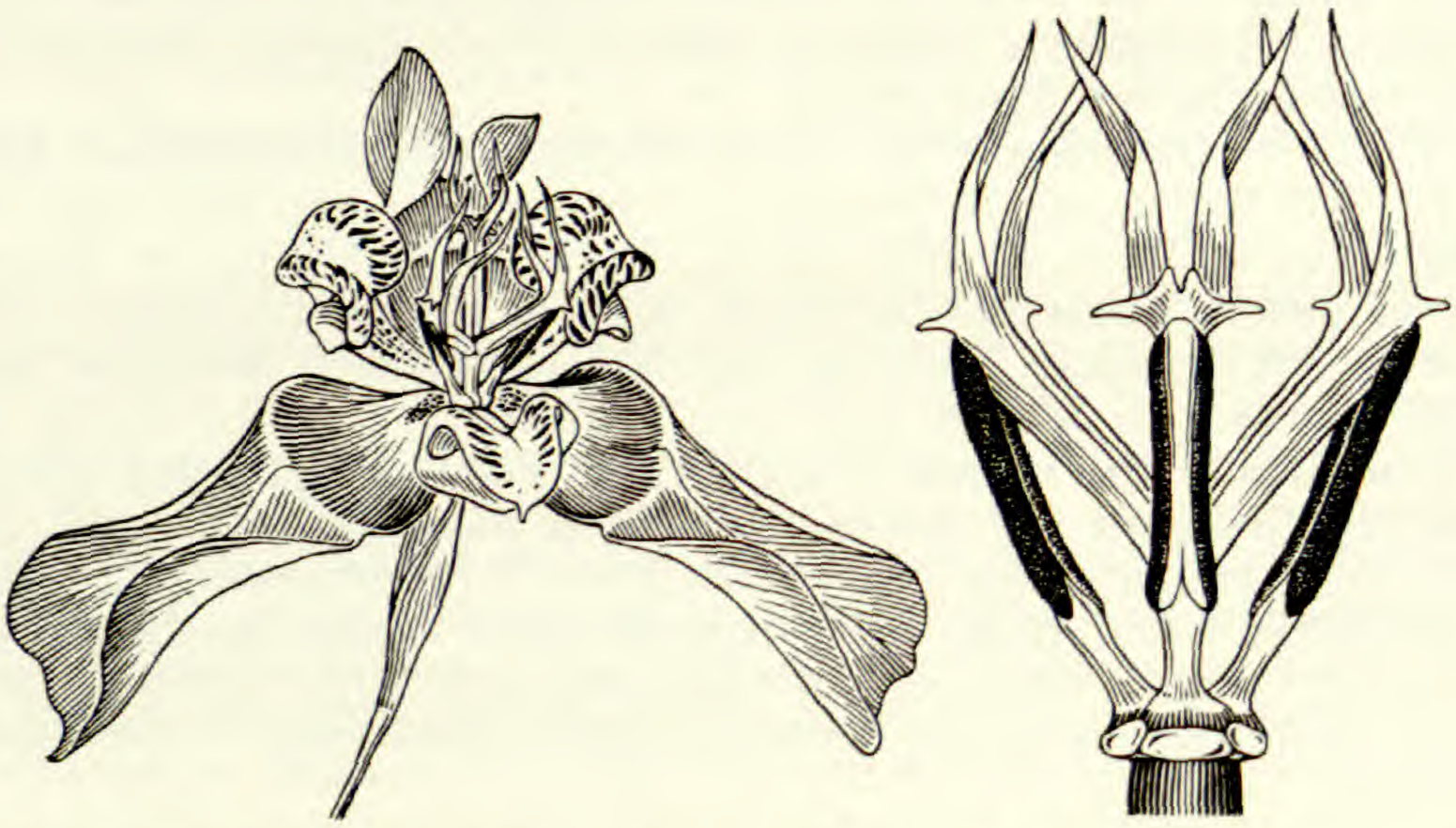


Fig. 3. *Cypella armosa* Rav., flower (x 1); right, androecium and gynoecium (x 2½). Drawn by S. Magno.

Cypella armosa Ravenna, sp. nov. (sectionis *Cypella*), Fig. 3—Planta gracilis ad 58 cm. alta. Bulbus subglobosus vel raro subovatus ad 9 mm. longus circ. 6–9 mm. latus. Folia basalia 1–2 ad 12–20 cm. longa circ. 2–4 mm. lata. Spathae usque tre uniflorae; valva inferior ad 23–28 mm. longa, superior 42–56 mm. longa. Flos utrimque luteus circ. 5–6.5 cm. latus. Tepala exteriora spathulato-pandurata inferne modice concava deinde lamina leviter vel arcte reflexa ad 38–40 mm. longa circ. 12–16 mm. lata apiculata. Tepala interiora arcte geniculato-recurvata ad 15 mm. longa; unguiculum ad 9 mm. longum ad basin 2.1 mm. latum ad apicem 2.5 mm. latum; lamina praeter apicem deppressio longitudinali albicanti inferne stria glandulosa luteo-aurantiaca parceque nigra circ. 2.8 mm. longa ad lateras aurantiaca striis nigris obliquis prope apicem albolutea maculis fuscis notata, apice abrupte reflexo aurantiaco. Filamenta 3.2 mm. longa. Antherae oblongo-lineares connectivo angusto superne tantum ad styli ramos applicitae leviter apiculatae (apiculo circ. 0.3 mm. longo) 7 mm. longae; pollen loculique nigri. Stylus ex ovario circ. 4.2 mm. longus. Styli rami oblique patentes circ. 6.5 mm. longi; replicaturae stigmatosae 0.7–0.8 mm. longae; cristae adaxiales flexuosae auran-

tiacae leviter divergentes ad 5.5–7.5 mm. longae, abaxial leviter bifida circ. 0.8 mm. longa. Capsula obovato-clavata. Semina parva angulata ochracea.

Temporarily inundated pastures of the provinces of Chaco, Corrientes, Formosa, Santa Fe, and Misiones in Argentina, and in the areas of San Bernardino and Villa Rica (near Curuzupe) in Paraguay.

Argentina: Prov. Formosa, Formosa, in campo, *Kermes 303*, 15-XI-1900 (BAB, SI). Ibidem, *Joergensen* (SI). Prov. Chaco, Colonia Benitez, *A. G. Schultz 156*, X/XI-1928 (BAB, SI). Ibidem, Resistencia, *A. Muniez 9*, 20-III-1928 (BAB 80728). Prov. Santa Fe, Colonia Macias, *R. A. Spegazzini*, 24/30-XI-1942 (BAB 64543). Prov. Corrientes, dep. Ituzaingo, Estancia

Puerto Valle, *W. Partridge*, II-XI-1962 (BA 59641). Prov. Misiones, in campis prope Posadas, *C. Spegazzini* (LPS 19061, LP). Culta in Bonaria ex campis pr. aeroportum Posadas, *Ravenna 1046*, XII-1970 (Herb. Ravenna). In herbosis inundatis pr. San Bernardino Paraguariae, *Ravenna 462*, II-1966 (Herb. Ravenna, type).

Cypella armosa is closely related to *C. exilis* Rav., which it resembles in the anthers and style-arms shape. It departs from that species in the taller habit, larger flowers of a different color, and larger anthers and style-arms.

The specific epithet is formed by the Latin term *armus*, armlet, in the augmentative form, alluding to the rather long style-arms.

Cypella lapidosa Ravenna, sp. nov. (sectionis *Cypella*)—Planta ad 18-30 cm. alta. Bulbus subglobosus ad 10-12 mm. lątus tunicis exterioribus ochraceis in pseudocollo circ. 20-35 mm. longo productis. Folia basalia ad anthesin ut videtur nulla in plantae juveniles paucae usque 15-17 mm. longae; folium caulinum lineari-attenuatum ad 12-13 longum circ. 0.7-3 mm. latae deinde bracteis tribus circ. 13-26 mm. longis duabus superioribus approximatis. Spathae saepe duae uniflorae pedunculatae vel unica; valva inferior circ. 13-17 mm. longa, superior 23-32 mm. longa. Pedicelli longitudinis spathae vel leviter breviores. Ovarium clavatum ad 6.5 mm. longum circ. 1.6-1.8 mm. latum. Perigonium aurantiacum. Tepala exteriora patentia pandurata ad 28-30 mm. longa circ. 17-18 mm. lata. Tepala interiora arcte geniculato-recurvata ad 8-9 mm. longa circ. 5-6 mm. lata. Filamenta circ. 2.8 mm. longa basin versus 2 mm. connata et incrassata. Antherae oblongo-lanceolatae apice obtuso ad 5.8 mm. longae inferne 1.8-2 mm. latae connectivo latiusculo leviter excurrente. Stylus 6 mm. longus. Styli rami tote vel subtote concrescentes circ. 4 mm. longae; cristae adaxiales 1.3-1.5 mm. longae, abaxial parva.

Argentina: Prov. Corrientes, dep. Santo Tome, Garruchos, Estancia San Juan Bautista, costa del rio Uruguay, en pedregal, *Krapovickas et al. 25815*, 20-II-1974 (Herb. Ravenna, holotype; CORR, isotype).

Cypella lapidosa is closely related to *C. fucata* Rav. and to *C. exilis* Rav. It is separable from both by the much concrescent filaments and style-arms. Moreover, the anthers in the latter species are linear-oblong, with a narrow connective, and the style-arms much longer and mostly free from each other.

Cypella Hauthalii (Ktze.) Fost. ssp. **opalina** Ravenna, ssp. nov. — A subspecie typica floribus minoribus albicanti-opalescentibus lamina tepalorum exteriorum breviora ad apicem leviter recurvata area glandulosa tepalorum interiorum magis lutea recedit.

Argentina: prov. Corrientes, dep. Santo Tome, Estancia San Juan Bautista, costa del rio Uruguay, *Krapovickas et al. 25807*, 20-IX-1974 (CORR, Herb. Rav.). Cultivated at Kew Gardens from bulbs collected at Garruchos near the banks of the Uruguay river, prov. Corrientes, Argentina, *B. Mathew* (Herb. Rav., K?). Culta in Santiago ex bulbo ad ripas fluminis Uruguay pr. Garruchos prov. Corrientes Argentinae collecto, *Ravenna 3300*, X-1980 (Herb. Ravenna, type).

The bulb that flowered here at Santiago was received through the courtesy of Mr. Bryan Mathew of the Royal Botanic Gardens, Kew, England.

The typical subspecies is found in the northwest part of Corrientes; also in Misiones and southeast Paraguay. Subspecies *opalina* differs from it

by the smaller, whitish opaline flowers, with shorter outer segments. According to the collectors, it grows in inundated places.

Cypella Herbertii (Lindl.) Herb. ssp. **reflexa** Ravenna, ssp. nov.—A subspecie typica floribus minoribus lamina tepalorum exteriorum laxe reflexa.

Argentina: Prov. Entre Rios, dep. Parana, camino Maria Grande–Parana, *E. Nicora 6582* (SI). Prope Parana ad viam Maria Grande prov. Entre Rios Argentinae, *Ravenna 1042*, XII–1969 (Herb. Ravenna, holotype; CORR, and K, isotypes).

The present subspecies is distinguished by the usually more slender habit, smaller flowers, and by the laxly reflexed blade of the outer-tepals. The following two forms are keyed:

A. Flowers yellow; blade of the outer-tepals minutely dark-spotted below ..... f.*reflexa*
AA. Flowers orange; blade of the outer-tepals not spotted ..... f.*palmeti*

Cypella Herbertii (Lindl.) Herb. ssp. **reflexa** Rav. f. **palmeti** Ravenna, fma. nov.—A forma *reflexa* floribus aurantiacis basi laminae emaculata differt.

In herbosis inter palmas Butiae-yatay ad "Palmar de Colon" prov. Entre-Rios Argentinae, *Ravenna 1043*, XII–1969 (Herb. Ravenna, type).

This form is rather frequent in pastures among palms of *Butia yatay*, differing from the form *reflexa* in the contrasting characters of the key.

Literature Cited

Ravenna, P., 1981: A submerged new species of Cypella (Iridaceae), and a new section for the genus (sensu stricto); *Nord. Jour.* Bot. 1.

NEOTROPICAL MYRSINACEAE — V

Cyrus Longworth Lundell[1]

Ardisia Burgeri Lundell, sp. nov. — Arbor parva; ramuli crassiusculi, apice lepidoti; folia glabra, petiolata, petiolo 1–1.5 cm. longo, canaliculato; lamina chartacea, anguste oblonga vel anguste oblanceolata, 25–36 cm. longa, 5.5–7.5 cm. lata, apice acuminata, basi attenuata, subcuneata; inflorescentia terminalis, paniculata, 10–15 cm. longa, parce lepidota, basi dense lepidota; flores umbellati vel subcorymbosi; pedicelli 7–10 mm. longi; sepala 5, subcoriacea, lanceolato-oblonga, symmetrica, 2.4–3 mm. longa, aurantiaco-punctata, integra; fructus subglobosus, punctatus.

Costa Rica: Prov. Alajuela, Llanura de San Carlos, wet tropical rain forest near Los Angeles, alt. 100 m., Feb. 21, 1966, *Antonio Molina R., Louis O. Williams, William C. Burger & Bruce Wallena 17670* (F, holotype; LL, xerox copy & fragment), small tree 5 meters tall.

Among the species in the *Icacorea* complex, this taxon is distinguished by the slender leaves more than a foot long and the subcoriaceous oblongish sepals up to 3 mm. long. The short peduncle of the inflorescence is densely lepidote, typical of plants of this relationship. Only immature fruits are available.

Ardisia carchiana Lundell, sp. nov. — Frutex; ramuli crassi, apice ca. 1 cm. diam.; megistophylla, petiolata, petiolo crasso, 2–3 cm. longo; lamina coriacea, glabra, obovato-elliptica, ad 40 cm. longa, 18 cm. lata, apice rotundata et late apiculata, basi acuta, subcuneata, nigropunctata; inflorescentia terminalis, paniculata, ca. 12 cm. longa, furfuracea; flores capitellati, subsessiles; pedicelli fructiferi ca. 1 mm. longi, crassi; sepala 5, lanceolato-oblonga, 2–2.5 mm. longa, obtusa, symmetrica, nigropunctata; fructus subglobosus, nigropunctatus.

Ecuador: Prov. Carchi, Peñas Blancas, 20 km. below Maldonado on the Rio San Juan, wet montane forest, elev. 900–1000 m., May 27, 1978, *M. T. Madison, T. C. Plowman, H. A. Kennedy & L. Besse 4625* (F, holotype; LL, xerox copy & fragment of holotype), shrub 3 m. tall, leaves shiny above, dull below, immature fruits dark green.

A. carchiana may have affinity to *A. megistophylla* Lundell, but both taxa are known from incomplete material and their relationships are uncertain. The large rigidly coriaceous leaves, glabrous in fruiting collection, the furfuraceous inflorescence, subsessile fruits, and the large black rounded glands of leaves and sepals and fruits well-mark *A. carchiana.*

[1]Director, Plant Sciences Laboratory, The University of Texas at Dallas, Box 688, Richardson, Texas 75080

Ardisia duriuscula Lundell, sp. nov. — Arbor parva; ramuli crassi, furfuracei; folia petiolis ad 2 cm. longis, crassis latisque stipitata; lamina duriuscula, oblanceolata, 17–26 cm. longa, 5.5–8.5 cm. lata, apice acuta, basi attenuata, integra, subtus dense peradpresse lepidota et parce furfuracea, supra glabra; inflorescentia axillaris, paniculata, pyramidata, ad 18 cm. longa, pedunculata, dense furfuracea; flores capitellati; pedicelli subnulli, ad 1.5 mm. longi, crassi; sepala 5 vel 6, libera, coriacea, inaequalia, asymmetrica, late suborbicularia, 2–2.5 mm. longa, punctata, ciliata; corolla glabra, 6 mm. longa, coriacea, parce nigropunctata; petala basi coalita ca. 1.5 mm., apice asymmetrica, acuta; stamina ca. 4 mm. longa; filamenta ca. 1.5 mm. longa; antherae crassae, lanceolatae, ca. 3 mm. longae, epunctatae, apice obtusae, basi subsagittatae; ovarium ovoideum, apice subtruncatum; stylus 5 mm. longus; placenta pluriseriata; ovula numerosa, ca. 50, parvissima. Costa Rica: Prov. Heredia and San Jose, Cerros de Zurqui, open pasture and remnants of lower montane rain forest formations on ridges and steep slopes along the Rio Para Blanca, alt. 1600–1800 m., Feb. 6 & 7, 1977, *Wm. Burger, Gary Visconti & Johnnie Gentry 10288* (F, holotype; LL, xerox copy & fragment of holotype), tree at edge of pasture, about 6 m. tall, inflorescence dull yellowish-green, flowers white, leaves deep yellowish-green.

The species is notable for its large axillary pyramidal furfuraceous inflorescences (in the holotype), leaves drying hard, and the closely appressed scales together with scattered elevated scales, these appearing trichome-like on undersurface of leaves and stem. The unequal thick sepals, either 5 or 6, usually are ciliate on the overlapped margin. The thick anthers are longitudinally dehiscent, and minutely apiculate.

Probably related to *A. Hagenii* Lundell, a species with capitellate flowers and similar depressed-orbicular coriaceous sepals ciliate on the overlapped margin. In *A. Hagenii* the inflorescence is narrow and terminal with the sepals lepidote, not glabrous as in *A. duriuscula.*

Gentlea tenuis Lundell, sp. nov. — Frutex, ramulis tenuis, minute lepidotis; folia parva, petiolata, petiolo 4–7 mm. longo, anguste marginato, canaliculato; lamina chartacea, lanceolata vel elliptica, 2.5–6 cm. longa, 1–2 cm. lata, integra, apice acuminata, basi acuta et revoluta, punctata, glabra; inflorescentia paniculata, terminalis, parva, 1.5–2.5 cm. longa, pedunculata, bracteolata, minute lepidota; flores umbellati, 5-meri; pedicelli lepidoti, 2–3 mm. longi; sepala ovata, inaequalia, 1.2–2 mm. longa, hyalina, minute aurantiaco-punctata, apice obtusa, minute erosa, extus parce lepidota; petala lanceolata, 2.5–3 mm. longa; stamina ad 4 mm. longa; antherae cordatae, ad 0.5 mm. longae, minute apiculatae; ovarium punctatum; placenta subglobosa; ovula 12, pluriseriata; fructus globosus, ca. 4 mm. diam.

Mexico: Chiapas, Municipio of Rayon, in the Selva Negra 10 km. above Rayon Meycalapa along road to Jitotol, steep slope with dense Montane Rain Forest, *Magnolia, Podocarpus, Calatola* and *Ardisia,* elev. 1700 m., December 12, 1971, *D. E. Breedlove 23144* (F, holotype; LL, xerox copy and fragment), shrub, 6 ft. tall, flowers white; same locality, *Breedlove* & A. R. Smith 32425 (F), shrub 10 ft. tall.

G. tenuis has affinity to *G. costaricensis* Lundell, a species which differs in the conspicuous reticulation of its leaves. Also, leaves of *G. costaricensis* are widest above middle, the sepals are glabrous and more rounded, and the fruits are larger. Both taxa have similar large rounded mostly orange-red leaf glands usually most conspicuous on the upper surface.

The sepals and petals of *G. tenuis* are very thin and inconspicuously punctate.

Other related species are *G. Austin-Smithii* Lundell, *G. parviflora* Lundell and *G. Vatteri* (Standl. & Steyerm.) Lundell. The latter has very small coarsely crenate leaves and furfuraceous indumentum, while all the other species are lepidote and have entire leaves.

WRIGHTIA

A Botanical Journal

VOLUME 7
Number 2
1982

PUBLISHED BY
THE UNIVERSITY OF TEXAS AT DALLAS
Box 688, Richardson, Texas 75080
U.S.A.

Printed in the U.S.A.
The University of Texas at Dallas
Richardson, Texas

WRIGHTIA

A Botanical Journal

VOLUME 7, NUMBER 2

Issued February 15, 1982

CONTENTS

Fig. 4. Dr. and Mrs. C.L. Lundell are joined by President Lorene Rogers (center) at the opening of the Lundell Library, November 17, 1978. The book being examined is copy number 1 of the 10-copy special edition of *Captain Cook's Florilegium.* Photograph by Frank Armstrong.

WRIGHTIA

Volume 7 February 15, 1982 Number 2

BOTANY FROM LINNAEUS TO LAMARCK[1]

Albert C. Lewis

LINNAEUS AT TEXAS

This exhibition of books by Linnaeus and the Linnaeans, and of plant specimens described in these books, provides an opportunity to compare two types of collecting enterprises. The naturalist, and the botanist in particular, relies on the collection of plant specimens to form, through analysis of similarities and differences, the basis for a classification of the plant kingdom. The book collector does not usually claim such scientific applications, and book-collecting motives are probably too numerous and diverse to be categorized properly, yet the collector of the archetypal collector Linnaeus must surely warrant a rather special place in the hierarchy of the book-collecting world, for Linnaeus's eighteenth-century books still represent a benchmark in taxonomic literature. The books in the exhibition are drawn from the collections at the Humanities Research Center, principally the Lundell Library; the plant specimens on exhibit (not included in the checklist) are from the Lundell Herbarium in the Department of Botany of The University of Texas at Austin. A resume of the history of the Lundell Library reveals why it can be said that, in several different ways, Dr. C.L. Lundell brought Linnaeus to Texas.

Over the past thirty-eight years the Lundell Library has been developed as a research collection that reflects the activities and interests of both Dr. and Mrs. C.L. Lundell. While part of the collection has been linked with the research needs of the Texas Research Foundation, founded and directed by Dr. Lundell, it has been primarily a resource for the study of natural history—especially in the field of botany. Thus one can find among the 20,000 publications, 240 manuscript boxes, and the many photographs not only material having to do with introducing and applying modern scientific techniques for the benefit of Texas agriculture, but a range of classic works that makes the library of national importance both bibliographically and historically.

[1]An exhibition in the Leeds Gallery of eighteenth-century books and colored engravings from the Lundell Library, together with plant specimens from the Lundell Herbarium, illustrating the spread of Linnaean ideas in botany. The Humanities Research Center, The University of Texas at Austin, October 15, 1981–January 15, 1982.

Fig. 5. The Lundell Library, stacks of rare books in the reception room.

Fig. 6. The Lundell Library, a view of the reception room, with stacks of rare books on the right side, with cabinets on the left side.

Fig. 7. The Lundell Library, a corner of the reception room.

In 1946 the Texas Research Foundation came into being as an independent research corporation; its predecessor, the Institute of Technology and Plant Industry, had been formed in 1943 as part of Southern Methodist University. As the prime mover in forming both the Institute and the Foundation, Dr. Lundell knew firsthand the uses to which privately funded research could be put in support of Texas agriculture. Born on a farm at Del Valle and raised on his father's cotton plantation near Bastrop—both communities within the environs of Austin—Dr. Lundell came naturally to his ideas on the relationship between agriculture and research, and these were deepened by his studies in the plant sciences at Columbia University and at the University of Michigan where he received his doctorate. As early as 1928 he pursued studies on the environmental background of Mayan civilization, and made major archaeological discoveries in the Yucatan Peninsula, the most notable being the metropolis of Calakmul discovered in 1931. While at the University of Michigan he also served as Research Associate in the Division of Historical Research of the Carnegie Institution of Washington from 1933 through 1941.

The Lundell Library and its room on the sixth floor of the Harry Ransom Center Building are gifts of Dr. and Mrs. Lundell to The University of Texas at Austin. The colonial furnishings of the room, many of them antiques, combine with leather-bound volumes in wall bookcases to form the thoughtful and attractive atmosphere of a traditional scholar's library. In one corner of the room is the Lundell family Bible containing handwritten records of Swedish ancestors. Mrs. Lundell, a botanist in her own right who served on the staff of the University of Michigan Herbarium for nearly a decade, has preserved in the Library her field journals relating to botanical research projects in Texas and Mexico. The papers of the Texas Research Foundation, also part of the Library, include reports, general correspondence, personnel records, and documents pertaining to such special events as the Hoblitzelle Awards, named for the founder of the Interstate Theatres chain, Karl Hoblitzelle.

Dr. Harry H. Ransom, in his Newcomen Society Address of 1962, "The Vision of Karl Hoblitzelle," quoted views expressed by Hoblitzelle in 1954—views which were closely allied with Dr. Lundell's own fundamental aims: "There are two things of importance in Texas today. One is a revitalized agriculture, based on sound research, the findings of which are applied by men who are proud to be farmers. The second is a higher standard of education and research in public institutions of higher learning." In *Texas Research Foundation: Its Historical Background—through 1966*, by Roy Roddy (1967), the author shows how the development of the Foundation involved many of the most prominent Texas businessmen of the time. The story of the Foundation thus presents an historically interesting example of ties between scientific research and Texas business, industry, and agriculture.

Along with Linnaeus, most of the other famous names in botany are represented in the library. One can find the works of such figures of the past as Adanson, Darwin, Hooker, Bentham, Lindley, Reichenbach, Scopoli, Sargent, Hemsley, Jacquin, Lamarck, the de Candolles, Sagra, and Swartz, as well as works of such prolific twentieth-century scientists as L.H. Bailey

and H.N. Moldenke. Complementing the Asa Gray collection are the works of other early botanists such as Torrey, Michaux, Catesby, Wright, Beck, Nuttall, Greene, and Engelmann. There are also numerous books describing early voyages and explorations, surveys of the Texas–Mexico boundary, and surveys of railroad routes from the east to the west coasts of the United States.

The Lundell Library is also the repository for the official archives of the Botanical Society of America. The Society archives contain original manuscript minute books going back to its founding in 1894, with additions to the archives continuing to be made periodically.

LINNAEUS

During his lifetime, Linnaeus exerted an influence in the fields of natural history and botany that has had few parallels in the history of science. Driven by indomitable ambition and aided by an amazing capacity for work, he accomplished a task that he had set for himself in his youth: the establishment of new systems for the three kingdoms of nature in order to facilitate the description of all known animals, plants, and minerals.

FLORA LAPPONICA. Amsterdam, 1737.	S 279
GENERA PLANTARUM. Leiden, 1737.	S 284, 285
BIBLIOTHECA BOTANICA Amsterdam, 1736.	S 250
CRITICA BOTANICA. Leiden, 1737.	S 276
HORTUS CLIFFORTIANUS. Amsterdam, 1737.	S 328
SYSTEMA NATURAE. Leipzig, 1788–91.	S 117
PHILOSOPHIA BOTANICA. Stockholm, 1751.	S 437
SPECIES PLANTARUM. Stockholm, 1753.	S 480a
CLASSES PLANTARUM. Leiden, 1738.	S 332
SPECIMEN ACADEMICUM DE OECONOMIA NATURAE. Uppsala, [1749].	S 1514

ORATIO DE TELLURIS.
Leiden, 1744. S 1377

MATERIA MEDICA. LIBER I. DE PLANTIS.
Stockholm, 1749. S 968

LINNAEUS'S PUPILS

As a popular teacher, Linnaeus had many students who took the doctorate under him (though he was often the author of their dissertations which are collected in the first work below). Exhibited are books by some of the best known and most travelled of his former students.

AMOENITATES ACADEMICAE SEU DISSERTATIONES BOTANICAE.
Geneva, 1786. S 1330

Petter Forskål 1732?-1763
FLORA AEGYPTIACO-ARABICA.
Copenhagen, 1775. P 2969

Petter Forskål
ICONES RERUM NATURALIUM.
Copenhagen, 1776. P 2970

Pehr Kalm 1716-1779
"Några norrsken, observaerade i Norra America," in KONGLIGA SWENSKA WETENSKAPS ACADEMIENS HANDLINGAR, 1752.
Stockholm

Per Lofling 1729-1956
REISE NACH DEN SPANISCHEN LÄNDERN IN EUROPA UND AMERICA IN DEN JAHREN 1751 BIS 1756.
Berlin/Stralsund, 1766.

Anders Sparrman 1748-1820
UTVALDA ALLMANT NYTTIGA.
Stockholm, 1797.

Anders Sparrman
A VOYAGE ROUND THE WORLD WITH CAPTAIN JAMES COOK.
London, 1944.

Daniel Carl Solander 1733-1782
BANKS' FLORILEGIUM. PARTS I AND II: AUSTRALIA
London, 1980.
Set number 22 of 100.

C.P. Thunberg 1743-1828
FLORA JAPONICA.
Leipzig, 1784. P 9257

THE NETHERLANDS AND AUSTRIA: A FAITHFUL BEGINNING

During the years 1735 to 1738 in the Netherlands Linnaeus's talent matured and he achieved an international reputation. The scientists Gronovius and Burman were of special help to him and also came under his influence. Burman published the monumental work on the flora of Amboina by Rumpf and the important work on West Indian flora by Plumier.

Works published in Austria in the second half of the eighteenth century reflect a strong flourishing of botanical activity. Especially through the work of Jacquin, Linnaeus's basic taxonomic ideas were adopted by Austrians.

J.F. Gronovius 1690-1760
FLORA VIRGINICA.
Leiden, 1762.

J.F. Gronovius
FLORA ORIENTALIS.
Leiden, 1755. S 635f

Jan Burman 1706-1779
THESAURUS ZEYLANICUS.
Amsterdam, 1737. P 1388-89

Jan Burman
RARIORUM AFRICANARUM PLANTARUM DECAS PRIMA [-DECIMA].
Amsterdam, 1738-39. P 1390

Georg Eberhard Rumpf 1627-1702
HERBARIUM AMBOINENSE.
Amsterdam/The Hague/Utrecht, 1741-50 P 7908

Charles Plumier 1646-1704
PLANTARUM AMERICANARUM FASCICULUS PRIMUS [-DECIMUS].
Amsterdam/Leiden, 1755-60. P 7217

Nicolaus Joseph von Jacquin 1727-1817
ICONES PLANTARUM RARIORUM.
Vienna, 1781-93. P 4368

Nicolaus Joseph von Jacquin
PLANTARUM RARIORUM HORTI CAESAREI SCHOENBRUNNENSIS DESCRIPTIONES ET ICONES.
Vienna/London/Leiden, 1797-1804. P 4372

Giovanni A. Scopoli 1723-1788
FLORA CARNIOLICA.
Vienna, 1771. S 640b

Heinrich J.N. von Crantz 1722-1799
INSTITUTIONES REI HERBARIAE JUXTA NUTUM NATURAE DIGESTAE EX HABITU.
Vienna, 1766. S 649a

Heinrich J.N. von Crantz
STIRPIUM AUSTRIACARUM.
Vienna, 1769. P 1954

GREAT BRITAIN: LINNAEAN VICTORY

The Linnaean generic reform, the sexual system, and the insistence on purely diagnostic phrase names for species found no real echo in England until well after the publication of the *Species Plantarum*. When it came, after 1759, it came quickly and convincingly.

John Ray dominated the British botanical scene long after his death in 1705. The Irish naturalist Patrick Browne was the first true Linnaean in Great Britain.

John Ray 1627-1705
SYNOPSIS METHODICA STIRPIUM BRITANNICARUM.
London, 1724. P 7438

Patrick Browne 1720?-1790
THE CIVIL AND NATURAL HISTORY OF JAMAICA IN THREE PARTS.
London, 1756. S 636

William Hudson 1730-1793
FLORA ANGLICA.
London, 1762. S 643b

William Withering 1741-1799
A BOTANICAL ARRANGEMENT OF ALL THE VEGETABLES NATURALLY GROWING IN GREAT BRITAIN.
Birmingham, 1776. S 675b

William Curtis 1746-1799
FLORA LONDINENSIS.
London, [1775-]1777-98. P 2004

CURTIS'S BOTANICAL MAGAZINE.
London, 1787- P 2007

Philip Miller 1691-1771
THE GARDENERS DICTIONARY.
London, 1731. P 6237

John Hill 1716/17-1775
THE VEGETABLE SYSTEM.
London, 1771-86. P 4070

John Hill
EDEN: OR, A COMPLEAT BODY OF GARDENING.
London, 1757. S 637d

John Hill
HORTUS KEWENSIS.
London, 1769. P 4069

William Aiton 1731-1793
HORTUS KEWENSIS.
London, 1810-12. P 78

SWITZERLAND: ALBRECHT VON HALLER, ANTI-LINNAEAN

The Swiss naturalist, poet, and novelist von Haller was one of Linnaeus's most outspoken opponents and a strong influence in the German-Swiss scientific world. It was mainly his failure to grasp the importance of the binary system of nomenclature that caused him to have less influence on the botanical world in general. Von Haller published the third edition (1745) of Ruppius's *Flora.*

A. von Haller 1708-1777
ENUMERATIO METHODICA STIRPIUM HELVETIAE INDIGENARUM.
Göttingen, 1742. P 3718

A. von Haller
HISTORIA STIRPIUM INDIGENARUM HELVETIAE INCHOATA.
Berne, 1768. P 3725

A. von Haller
BIBLIOTHECA BOTANICA.
Zürich, 1771. P 3727

H.B. Ruppius 1688-1719
FLORA JENENSIS.
Jena, 1745. P 7913

FRANCE: THE BIRTH OF SYSTEMATICS

Gouan was the first in France to use the binary nomenclature of Linnaeus. He and the others represented below brought Linnaeus's work to bear on the new ideas concerning creation and evolution within the plant and animal kingdoms. The culmination of their contributions came after the French Revolution with the work of Lamarck.

Antoine Gouan 1733-1821
FLORA MONSPELIACA.
Lyon, 1765. P 3486

Jean-François Seguier 1703-1784
BIBLIOTHECA BOTANICA.
Gravenhage, 1740. P 8586

Jean-François Seguier
PLANTAE VERONENSES.
Verona, 1745-54. P 8590, 8594

J.B.C. [Fusee] Aublet 1720-1778
HISTOIRE DES PLANTES DE LA GUIANE FRANÇOISE.
London/Paris, 1775. S Add. 664c

C.L. L'Heritier de Brutelle 1746-1800
STIRPES NOVAE AUT MINUS COGNITAE.
Paris, 1784-85. P 5268

C.L. L'Heritier de Brutelle
SERTUM ANGLICUM.
Paris, 1788. P 5270

Pierre Bulliard 1742-1793
HERBIER DE LA FRANCE.
Paris, 1780-95 P 1356

Antoine-Laurent de Jussieu 1748-1836
GENERA PLANTARUM SECUNDUM ORDINES NATURALES DISPOSITA.
Paris, 1789. P 4549

J.B. Lamarck 1744-1829
FLORE FRANÇOISE.
Paris, 1778. P 5002

J.B. Lamarck
TABLEAU ENCYCLOPEDIQUE ET METHODIQUE DES TROIS REGNES DE LA NATURE. BOTANIQUE.
Paris, 1791-1823. P 5005

ACKNOWLEDGMENTS

The entire exhibition—in structure, selection of exhibition items, and annotations—has relied heavily on Frans A. Stafleu's *Linnaeus and the Linnaeans: The Spreading of Their Ideas in Systematic Botany, 1735-1789* (Utrecht, 1971).

The exhibition and brochure were prepared by Albert C. Lewis, October 1981.

BIBLIOGRAPHIES CITED

P Pritzel, G.A. *Thesaurus Literaturae Botanicae*, Leipzig, 1872.
S Soulsby, B.H. *A Catalogue of the Works of Linnaeus.* London, 1933.

NEOTROPICAL MYRSINACEAE — VII

Cyrus Longworth Lundell[1]

Amatlania Lundell, gen. nov. — Frutices vel arbores foliis alternis, petiolatis, subintegris, crenulatis, dentatis vel pectinatis; ramuli glabrati, minute glanduloso-puberuli vel villosi; inflorescentiae terminales vel raro axillares, paniculatae, glanduloso-puberulae vel villosae; flores hermaphroditi, 5-meri, corymbosi, pedicellati, glanduloso-puberuli; sepala libera, membranacea vel coriacea, punctata, glanduloso-ciliolata vel ciliata; corolla convoluta; petala basi connata, intus glandulosa-puberula; stamina 5, petalis haud multo breviora antheris lanceolatis vel angustis, rimis apice triangulo-dilatatis dehiscentibus, apiculatis, basi filamentis brevibus affixa, filamentis glanduloso-pubescentibus; ovarium glabrum, stylo gracillimo; ovula pluriseriata; bacca globosa vel subglobosa.

Type species: *Amatlania Liebmannii* (Oerst.) Lundell (=*Ardisia Liebmannii* Oerst.).

All the taxa have branchlets and inflorescences covered with minute reddish glandular pubescence, and in two species, *A. jalapensis* Lundell and *A. pellucida* Oerst., the pubescence is heterotrichous with longer villous hairs intermixed in the short glandular-hair covering. The petiolate leaves vary from large membranaceous to smaller subcoriaceous to rigidly coriaceous blades. They have margins ranging from conspicuously pectinate to dentate to subentire, the latter inconspicuously crenulate. Punctation of the leaves is variable. The paniculate inflorescences are pubescent like the branchlets, with pedicellate flowers in corymbs. The sepals, nearly free and ovate to oblong, range from coriaceous to thin and hyaline with the margin ciliolate or ciliate with gland-tipped hairs. The glands of the sepals, orange to blackish are mostly small, rounded and conspicuous. The corolla is convolute and constricted apically with the petals connate into a short tube which is glandular within. The stamens, attached in the tube, are shorter than the petals, with the filaments pubescent with gland-tipped hairs. The anthers, longer than the filaments, are lanceolate or linear-lanceolate, apiculate, and dehiscent at first by rimose pores. Dorsally the anthers are eglandular or with small inconspicuous glands.

Amatlania, named for the type locality of the type species, resembles *Oerstedianthus* Lundell in some aspects, but differs notably in the nature of the indumentum. Both genera have filaments with gland-tipped hairs. That the two genera are related remains to be determined by future studies as additional collections of the complex become available. Some of the species are not well-marked.

The genus *Amatlania* ranges from Veracruz and Oaxaca south into Central America, with a variety, *A. pellucida* var. *myriodonta* in Panama and Colombia.

[1]Director, Plant Sciences Laboratory, The University of Texas at Dallas, Box 688, Richardson, Texas 75080

Key to Taxa

Leaves membranaceous, the margin conspicuously pectinate with slender long unequal teeth.

Glands of blades small, elevated and rather dense over entire surface ..... 1. *A. pellucida.*

Glands of blades large, scattered sparsely over entire surface, not elevated ..... 2. *A. pellucida* var. *pectinata.*

Glands of blades elevated, small and reddish, bordering blade and in the teeth ..... 3. *A. pellucida* var. *myriodonta.*

Leaves chartaceous to rigidly coriaceous, the margin entire, inconspicuously crenulate to dentate, not pectinate with long teeth.

Leaves coriaceous to rigidly coriaceous, the margin inconspicuously crenulate, rarely entire.

Leaf blades rigidly coriaceous, large, oblong, the petioles long, sharply marginate and winged; inflorescences axillary and terminal, small, few-flowered ..... 4. *A. angustialata.*

Leaf blades coriaceous, small, oblanceolate, the petioles slender, inconspicuously marginate; inflorescences terminal, open and large, exceeding leaves, multiflowered ..... 5. *A. rarescens.*

Leaves chartaceous, the margin acutely dentate or rarely entire on same branchlet.

Leaves acute or obtuse, elliptic or oblong, up to 9 cm. wide, the margin either dentate or entire ..... 6. *A. Schippii.*

Leaves acuminate, lanceolate or oblanceolate, rarely over 5 cm. wide, the margin uniformly dentate with small teeth, never entire.

Indumentum heterotrichous, the minute reddish gland-tipped hairs intermixed with villous hairs, sepals thin with wide hyaline margin, lanceolate, the medial glands blackish ..... 7. *A. jalapensis.*

Indumentum uniformly minute, consisting of minute reddish gland-tipped hairs.

Sepals coriaceous with thin margin, broadly ovate or ovate-orbicular, the medial glands small and dense; anthers acute ..... 8. *A. Liebmannii.*

Sepals thin, triangular, lanceolate, or lanceolate-oblong, the medial glands larger; anthers mucronate ..... 9. *A. crenipetala.*

1. **Amatlania pellucida** (Oerst.) Lundell, comb. nov. *Ardisia pellucida* Oerst., Vid. Medd. Kjoebenhavn 1861: 130, t. 2. 1861. Mexico: Veracruz, type from Pital, *F. M. Liebmann 29C* (holotype, C; fragment and photo, LL).

2. **Amatlania pellucida** (Oerst.) Lundell var. **pectinata** (Donn. Sm.) Lundell, comb. nov. *Ardisia pectinata* Donn. Sm., Bot. Gaz. 12: 132. 1887. Guatemala: Dept. Alta Verapaz, *H. von Tuerckheim 942* (holotype, US; fragment and photo, LL). *Ardisia pellucida* Oerst. var. *pectinata* (Donn. Sm.) Lundell, Wrightia 3: 99. 1964.

3. **Amatlania pellucida** (Oerst.) Lundell var. **myriodonta** (Standl.) Lundell, comb. nov. *Ardisia myriodonta* Standl., Journ. Wash. Acad. Sci. 17: 13. 1927. Panama: Barro Colorado Island, *Paul C. Standley 40848* (holotype, US; fragment and xerox, LL).

4. **Amatlania angustialata** (Lundell) Lundell, comb. nov. *Ardisia angustialata* Lundell, Wrightia 3: 25. 1962. Mexico: Chiapas, Pinabeto, near Motozintla, *Eizi Matuda 5462* (holotype and xerox, LL).

5. **Amatlania rarescens** (Standl.) Lundell, comb. nov. *Ardisia rarescens* Standl., Field Mus. Bot. 4: 248. 1929. Mexico: Chiapas, Cerro del Boqueron, *C.A. Purpus 7032* (holotype, F; fragment and xerox, LL; isotype, US).

6. **Amatlania Schippii** (Standl.) Lundell, comb. nov. *Ardisia Schippii* Standl., Field Mus. Publ. Bot. 12: 412. 1936. Belize: Temash River, *W. A. Schipp 1365* (holotype, F; fragment and photo, LL; isotype, NY). *Ardisia izabalana* Lundell, Wrightia 5: 88. 1975. Guatemala: Dept. Izabal, El Estor, *C. L. Lundell & Elias Contreras 18898* (holotype, LL).

The leaf form is heteromorphous, the holotype of *A. Schippii* with four leaves attached to stem, has one leaf with entire margin, the other three with uniformly dentate margins!

The type of *Ardisia izabalana* has narrow oblong rather than elliptic leaves, these entire, and obtuse rather than acute. The indumentum is sparse in *A. izabalana*. The two types and two other collections from Belize and Alta Verapaz are all variable, but appear referable to one species.

This variability of features in a number of species has been noted in various families in this rain forest with vastly different ecological niches from sea level to cloud forest.

7. **Amatlania jalapensis** (Lundell) Lundell, comb. nov. *Ardisia jalapensis* Lundell, Wrightia 6: 104. 1980. Mexico: Veracruz, Jalapa, *M. C. Sola B. 610* (holotype, LL; isotype, MEXU).

8. **Amatlania Liebmannii** (Oerst.) Lundell, comb. nov. *Ardisia Liebmannii* Oerst., Vid. Medd. Kjoebenhavn 1861: 129. 1861. Mexico: Veracruz, Amatlan, July, 1842, *F. M. Liebmann 7A* (holotype, C; fragment and photo, LL); Mirador, 1843, *Liebmann 7* (C; fragment, LL).

9. **Amatlania crenipetala** (Mez) Lundell, comb. nov. *Ardisia crenipetala* Mez, Pflanzenreich IV. Fam. 236: 91. 1902. Mexico: Orizaba, *Botteri 146* (holotype, G; fragment, LL). *Ardisia Rekoi* Lundell, Bot. Mus. Leafl., Harvard Univ. 9: 185, tab. 6. 1941. Mexico: Oaxaca, District of Teotitlan, *R. E. Schultes & B. P. Reko 273* (holotype, MICH; fragment and photo, LL).

The *A. Liebmannii* complex, which includes *A. jalapensis* and *A. crenipetala*, is poorly represented in herbaria and needs field study. The small, thick, ovate or suborbicular sepals of *A. Liebmannii* appear to set it apart from the other two species. Differences in the anthers may be significant also.

Chontalesia Lundell, gen. nov. — Frutices vel arbores, ramulis novellis lepidotis, glabratis, foliis elongatis lanceolatis vel oblanceolatis ad apices ramorum confertis, paniculis terminalibus sessilibus laxis novellis lepidotis, ramulis filiformibus; flores hermaphroditi, 5-meri, subcorymbosi, prope apicem 5–6 gerentibus, pedicellis elongatis; sepala fere libera, anguste lanceolato-oblonga, coriacea, ad 1 cm. longa, symmetrica, striato-venosa, punctata; corolla rotata contorta, calyce aequalis; antherae anguste lanceolatae, subsessiles, apice 2-porosae, acuminatae; ovarium glabrum, pluriovulatum; fructus subglobosus, ad 1.2 cm. diam.

Type species: *Chontalesia calycosa* (Hemsl.) Lundell (= *Ardisia calycosa* Hemsl.).

The monotypic genus *Chontalesia*, named for the type locality, is unique among the Myrsinaceae of the Neotropics in having a large striate accrescent calyx with essentially free firm narrowly lanceolate sepals persistent and reflexed in fruit. Hemsley compared the sepals of his species with those of *Ardisia opegrapha* Oerst. (= *Graphardisia opegrapha* [Oerst.] Lundell), but their resemblance is restricted to size, and of no significance. The corolla of *Chontalesia calycosa* in mature bud slightly exceeds the calyx, not shorter as Hemsley surmised in his comparison.

The branchlets and inflorescences of very young growth are lepidote (see *Liesner 5066*, LL, MO), so the species is not glabrous as described by Hemsley, Mez, Standley and others.

The subverticellate short-petiolate narrowly oblanceolate leaves aggregated at stem apex, the short peduncled open lax inflorescences sometimes equalling the leaves, the slender secondary and tertiary branches of the inflorescences and the long slender pedicels up to 2.5 cm. long further distinguish the genus. The punctation of the leaves is irregular but conspicuous.

Since no open corollas are present in the numerous collections available from Nicaragua and Costa Rica, the description is from mature buds which equal or exceed the sepals in length. The petals are punctate and connate at base. The stamens are essentially sessile in the buds, with very slender lanceolate anthers attenuate to the acuminate apex and equalling the petals in length. Hemsley describes the anthers as "apice 2-porosae," which I have not been able to confirm from specimens available.

Chontalesia calycosa (Hemsl.) Lundell, comb. nov. *Ardisia calycosa* Hemsl., Biol. Centr. Amer. Bot. II. 292. 1882. Nicaragua: type from Chontales, *Tate 454* (holotype, K).

Ctenardisia Ducke, Archiv. Jard. Bot. Rio Janeiro 5: 179. 1930.

Ctenardisia is very distinct in the nature of its placenta. The ovules are in one series, erect around the base of a columella which supports the thin membranous wall of the placenta.

A similar type of placenta is found in some species of *Parathesis* Hook. f., but the genera are not otherwise similar in any feature. In *Yunckeria* Lundell (Wrightia 3: 111-114. 1964) the placenta is similar, and that genus for the present is considered a synonym of *Ctenardisia*. The placenta of *Yunckeria* is illustrated in the *Flora of Guatemala* (Fieldiana: Bot. 24, part VIII, 199, fig. 56. 1966). There are differences among the taxa in ovule number and size and in the shape of the placenta. In time, as additional collections accumulate, *Yunckeria* may be found to be a distinct genus. See Fig. 9.

Type species: *Ctenardisia speciosa* Ducke.

There are two Amazonian species from Brazil and three Mesoamerican. Of the latter, two are from Chiapas, the third ranges from Belize and Honduras into Nicaragua.

The two Brazilian species are noteworthy for their large oblanceolate leaves and terminal long-peduncled simple inflorescences which sometimes exceed the leaves (up to 75 cm. long). The peduncles of the corymbs in the long simple racemes range in length from less than 5 mm. in flower up to 4 cm. in fruit.

In the Mesoamerican species the corymbs are in 2- or 3-pinnate panicles less than 10 cm. long.

The narrow elongated racemes of peduncled corymbs in the Brazilian species are striking but do not appear to be of generic significance with our present knowledge of the group.

Key to Taxa

Brazilian species; leaves either pectinate-dentate or entire.
- Leaves pectinate-dentate with short acute teeth ..... 1. *C. speciosa.*
- Leaves with entire margin ..... 2. *C. stenobotrys.*

Mesoamerican species; leaves entire.
- Leaves elliptic, apex short-acuminate (Chiapas) ..... 3. *C. Purpusii.*
- Leaves obovate or oblanceolate, apex obtuse or rounded and apiculate.
  - Leaves pallid, subcoriaceous; sepals about 1.5 mm. long (Chiapas) ..... 4. *C. ovandensis.*
  - Leaves reddish-brown, conspicuously so on undersurface, thin; sepals 2-2.5 mm. long (Belize south to Nicaragua) .... 5. *C. amplifolia.*

Fig. 8. Holotype of *Ctenardisia stenobotrys* (Standl.) Lundell & Pipoly. *Ardisia stenobotrys* Standl., *E.G. Holt & E.R. Blake 521* (F).

1. **Ctenardisia speciosa** Ducke, Archiv. Jard. Bot. Rio Janeiro 5: 179. 1930. Brazil: in silvis primariis non inundatis ad orientem lacus Salgado prope flumen Frombetas inferius (civitate Para) locis humidis, florifera septiembre (9/7/1927), fructibus februario (2/7/1927), *A. Ducke 2524* (isotypes, NY, US; xerox and fragment, LL).

2. **Ctenardisia stenobotrys** (Standl.) Lundell & Pipoly, comb. nov. *Ardisia stenobotrys* Standl., Field Mus. Pub. Bot. 11: 170. 1936. Fig. 8.

Brazil: State of Amazonas, Rio Maturaca, below Salto de Hua, Dec. 10–12, 1930, *E.G. Holt & E.R. Blake 521* (holotype, F; isotype, NY; xerox copies and fragment, LL).

The species has been collected only in the Rio Maturaca area (LL, NY).

Dr. Getulio Agostini recognized that *A. stenobotrys* was a species of *Ctenardisia* as early as 1968 but never made the transfer to that genus. My own interest in the status of the species dates back to 1971 when I noted the peculiarity of its placenta. Subsequent studies were undertaken by Mr. John J. Pipoly III in connection with his recent work on the South American Myrsinaceae.

3. **Ctenardisia Purpusii** (T.S. Brandegee) Lundell, comb. nov. *Ardisia Purpusii* Brandegee, Univ. Calif. Pub. Bot. 6: 189. 1915. *Yunckeria Purpusii* (Brandegee) Lundell, Wrightia 3: 112. 1964. Mexico: Chiapas, Finca Orlanda, Sept. 1913, *C.A. Purpus 7119* (holotype, US; isotype, NY; fragment of holotype, photo and xerox copies, LL).

The taxon is known only from the type collection.

4. **Ctenardisia ovandensis** (Lundell) Lundell, comb. nov. *Ardisia ovandensis* Lundell, Contrib. Univ. Mich. Herb. 4: 21. 1940. *Yunckeria ovandensis* (Lundell) Lundell, Wrightia 3: 112. 1964. Mexico: Chiapas, Mt. Ovando, July, 1938, *Eizi Matuda 2549* (holotype, MICH; isotypes, F, LL); Pico del Loro, near Escuintla, June 25, 1941, *Matuda 4281* (F, LL, US). Other collections are known (F, LL, MEXU).

The pedicels are minutely papillate in young bud. Otherwise all the taxa in the genus appear to be glabrous.

5. **Ctenardisia amplifolia** (Standl.) Lundell, comb. nov. *Ardisia amplifolia* Standl., Field Mus. Pub. Bot. 4: 249. 1929. *Yunckeria amplifolia* (Standl.) Lundell, Wrightia 3: 113. 1964. Fig. 9.

Nicaragua: region of Braggman's Bluff, *F.C. Englesing 230* (holotype, F; xerox and fragment, LL).

The species is well represented from Honduras and Nicaragua, with one collection, *Percy H. Gentle 3215* (LL) from Belize.

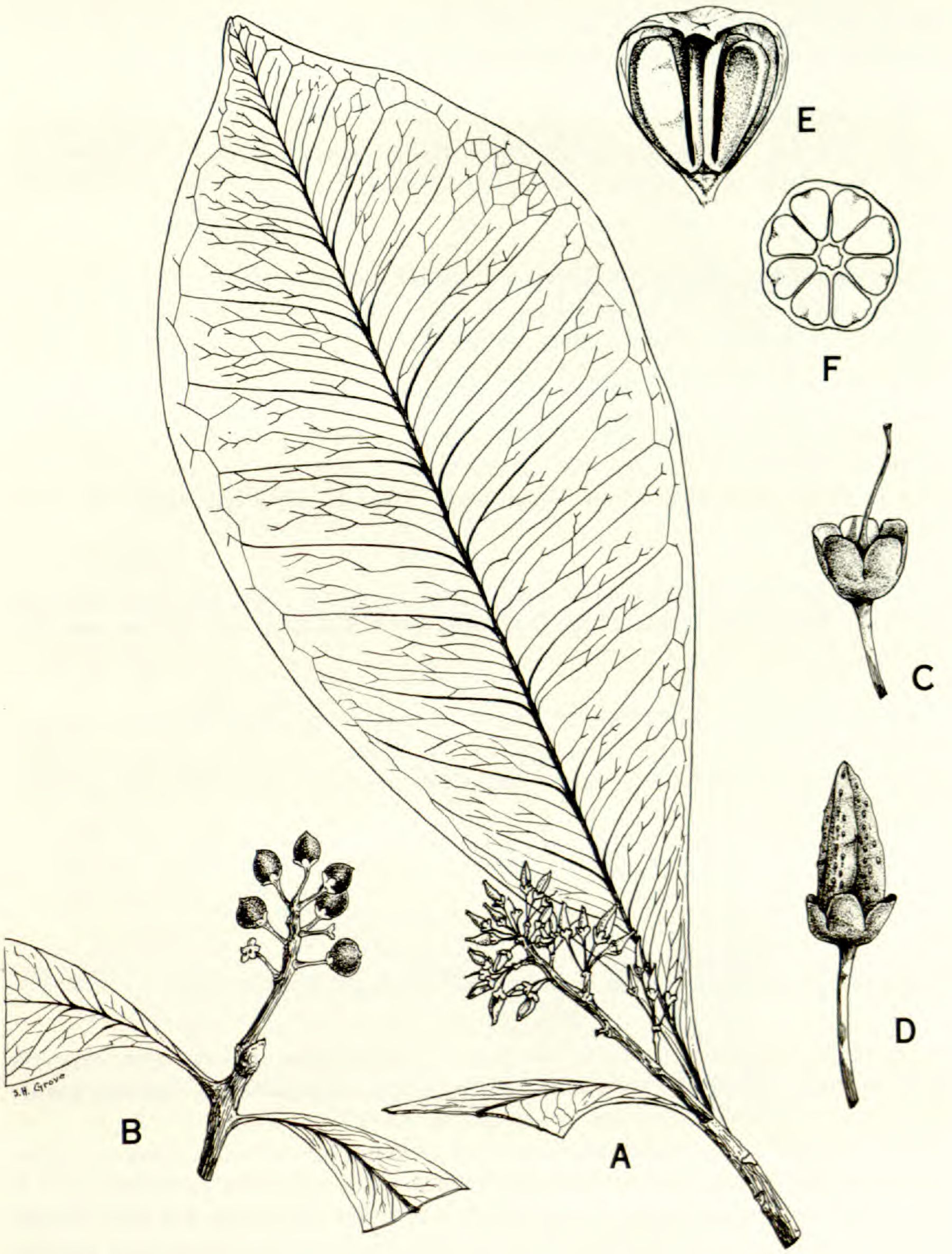


Fig. 9. Holotype of *Ctenardisia amplifolia* (Standl.) Lundell. *Ardisia amplifolia* Standl., *F.C. Englesing 230* (F). *Yunckeria amplifolia* (Standl.) Lundell. A, Flowering branchlet; x ½. B, Branchlet with fruits; x ½. C, Calyx and style; x 2½. D, Flower bud; x 2½. E, Placenta with enclosed erect ovules surrounding columella; x 10. F, Placenta cross section; x 10. Courtesy of the Field Museum of Natural History.

Graphardisia (Mez) Lundell, Phytologia 48: 139. 1981.

Graphardisia albovirens (Mez) Lundell, comb. nov. *Ardisia albovirens* Mez, Repert. Sp. Nov. 16: 311. 1920. Brazil: Rio Acre, Xapury, *Ule 9682* (isotype, K; fragment and photograph, LL).

Graphardisia nigrovirens (Macbr.) Lundell, comb. nov. *Ardisia nigrovirens* Macbr., Candollea 5: 397. 1934. Peru: Dept. Loreto, Puerto Arturo, Oct.-Nov. 1929, *L. Williams 5081* (holotype, F; fragment and photograph, LL).

Graphardisia Romeroi (Cuatr.) Lundell, comb. nov. *Ardisia Romeroi* Cuatr., Rev. Acad. Colomb. Cienc. 8: 319. 1951. Colombia: Dept. Bolivar, Camino de Monte Libano a San Pedro, May 28, 1949, *R. Romero C. 1756* (holotype, F; fragment and photograph, LL).

Graphardisia sapoana (Lundell) Lundell, comb. nov. *Ardisia sapoana* Lundell, Phytologia 48: 135. 1981. Panama: Prov. Darien, NE slope of Summit Cerro Sapo, approach from Garachine, May 9, 1979, *B. Hammel 7297* (holotype, LL).

Graphardisia tuirana (Lundell) Lundell, comb. nov. *Ardisia tuirana* Lundell, Wrightia 6: 91. 1979. Panama: Prov. Darien, Rio Tuira and Rio Paca, *J.A. Duke 5025* (holotype, LL).

Graphardisia Weberbaueri (Mez) Lundell, comb. nov. *Ardisia Weberbaueri* Mez, Fedde, Rep. Nov. Spec. 3: 97. 1906. Peru: Prov. Farma, Dept. Junin, prope La Merced in valle Chanchamoyo, Dec. 1902, *Weberbauer 1809* (holotype, Herb. Berol.).

Ibarraea Lundell, Phytologia 48: 137. 1981.

Ibarraea mayana (Lundell) Lundell, Phytologia 48: 139. 1981 Fig. 10.

Ibarraea Wendtii Lundell, sp. nov. — Arbuscula, 4-5 m. alta, omnino glabra; folia petiolata, petiolo ca. 2 cm. longo, canaliculato; lamina membranacea, oblongo-lanceolata vel elliptica, 13–18 cm. longa, 5–9.5 cm. lata, apice breviter acuminata, basi acuta et breviter decurrens, integra; inflorescentia terminalis, bipinnatim paniculata, folia superans; pedicelli 1.5–1.8 cm. longi; flores racemosi; sepala lanceolato-ovata vel ovata, 3–4 mm. longa, erosa et ciliata, prope apicem dense et minute aurantiaco-punctata; corolla ca. 1 cm. longa; petala oblongo-elliptica, apice asymmetrica, intus prope basin flavo-glandulosa, punctis perpaucis conspersa; stamina magna, ca. 6 mm. longa; filamenta punctata, basi ca. 1.4 mm. lata, prope apicem ca. 0.8 mm. lata, ca. 2.5 mm. longa; antherae ovato-lanceolatae, basi sagittatae, apice apiculatae, punctatae, prope basin nigropunctatae; ovarium ovoideum, glabrum; placenta globosa; multiovulata, ovula pluriseriata.

Fig. 10. Holotype of *Ibarraea mayana* (Lundell) Lundell. *Ardisia mayana* Lundell, *Elias Contreras 1162* (LL). A, Branch with inflorescence; x ½. B, Calyx and pistil; x 2½. C, Open flower, showing star-shaped eye at base of corolla; x 2½. D, Stamen, dorsal view; x 5. Courtesy of the Field Museum of Natural History.

Mexico: Veracruz, Municipio Minatitlan, 8.2 km. al N de la terraceria La Laguna-Rio Grande, sobre el camino a Ejido Belisario Dominguez, el cual sale de la terraceria 14.7 km. al E de La Laguna, elve. 130 m., July 16, 1980, *Tom Wendt, A. Villalobos, R. Lara M., & I. Navarrete 2584* (holotype, LL), planta lenosa de 4–5 m. de alto, petalos blancos con amarillo en las bases formando una estrella.

The star of the corolla is yellow. The leaves have a narrow marginal area of orange glands, the glands otherwise few and dispersed, not elevated. The sepals have a dense area of small orange glands apically with the blackish glands below few and dispersed. The large stamens have broad filaments and the ovate-lanceolate anthers are apiculate and glandular at apex, and conspiculously glandular above base with small black glands. It has affinity to *Ibarraea Lindenii* (Mez) Lundell but differs at once in its yellow-star eye and in other floral features.

Icacorea Aubl., Pl. Guian. 2: Suppl. 1. 1775.

Icacorea oaxacana Lundell, sp. nov. — Arbuscula, ad 3 m. alta, lepidota; folia glabrata, petiolis ad 8 mm. longis, anguste marginatis; lamina chartacea, anguste oblongo-lanceolata, 14–22 cm. longa, 4–6 cm. lata, apice acuminata, basi breviter decurrens; inflorescentia parce lepidota, terminalis, tripinnatim paniculata, ca. 10 cm. longa; flores cobymbosi, 5-meri, glabri; pedicelli ca. 6 mm. longi; sepala libera, oblongo-ovata, ad 2.5 mm. longa, obtusa, symmetrica, minute ciliolata, punctata; corolla ca. 9 mm. longa; petala oblonga, basi connata, parce punctata, apice obtusa, stamina ca. 7 mm. longa; filamenta ca. 2.8 mm. longa, prope basin affixa; antherae epunctatae, lineari-lanceolatae, ca. 4.5 mm. longae, erectae, apice obtusiusculae; ovarium ovoideum; ovula 20–22, pluriseriata.

Mexico: Oaxaca, Municipio Pluma Hidalgo, Carretera Pochutla-Oaxaca, 1 km. al N de Chacalapa, 13 km. al N de Pochutla, orilla de un pequeño rio, alt. 225 m., Nov. 13, 1979, *S.D. Koch, P.A. Fryxell y T. Wendt 79512* (holotype, LL), arbolito de 2–3 m. de alto, flores color blanco, anteras amarillas, frutos negros.

Like a host of taxa in *Icacorea* sensu stricto, this resembles several species of Mesoamerica, such as *I. belizensis* (Lundell) Lundell, but differs in having elongated narrow leaves, rather large sepals, large corolla, and slender typical epunctate anthers about 4.5 mm. long dehiscent by apical pores.

Parathesis (A.DC.) Hooker f., Bentham & Hooker f., Gen 2: 645. 1876.

Parathesis Kochii Lundell, sp. nov. — Arbuscula, 2.5 m. alta; ramuli dense stellato-furrugineo-tomentosi; folia petiolis 5–7 mm. longis; lamina membranacea, oblanceolata, 7–11 cm. longa, 2.6–4.5 cm. lata, apice caudato-

acuminata, basi cuneata, supra glabra, costa subtus stellato-tomentosa, lamina parce stellato-pubescentia, pellucido-punctata, crenulata; inflorescentia terminalis, parva, sessilis, tripinnatim paniculata, ad 6 cm. longa, stellato-ferrugineo-tomentosa; flores corymbosi, pedicelli ad 5 mm. longi, parce et minute stellato-puberuli; sepala valvata, anguste lanceolata, 1–1.3 mm. longa, acuminata, minute stellato-puberula; corolla ca. 3 mm. longa; petala valvata, lanceolata, obtusiuscula, extus parce puberula, intus villosa; stamina ca. 3 mm. longa, epunctata; filamenta crassa; antherae subsessiles, erectae, lanceolatae, basi sagittatae, apice obtusiusculae; ovarium glabrum; ovula 4, uniseriata.

Mexico: Oaxaca, Municipio Matias Romero, lomas al E de Arroyo Amaca, al N del Rio Verde, 9.5 km. por camina al SE del Aserradero La Floresta, ca. 21.5 km. al S de Esmeralda, elev. 400 m., May 25, 1981, *Tom Wendt, S. Koch, A. Villalobos, I. Garcia, et al. 3308* (holotype, LL), arbolito de 2.5 m.

Only mature flower buds are available, and measurements of floral parts were taken from these. This is a unique species notable for its small flowers with epunctate anthers and glabrous ovary.

Parathesis Kochii is similar in some aspects to *P. chiapensis* Fernald, which has red stellate pubescence of branchlets and leaves, much larger flowers and inflorescences, similar glabrous ovary, but with anthers black-punctate dorsally. It is not closely related to any species of Mesoamerica.

Parathesis Wendtii Lundell, sp nov. — Arbuscula, 4 m. alta; ramuli crassiusculi, peradpresse pubescenti, glabrati; folia glabrata, longe petiolata, petiolo 2–2.5 cm. longo; lamina membranacea, 15–30 cm. longa, 7.5–10.5 cm. lata, integra, apice subabrupte caudato-acuminata, basi cuneata, breviter decurrens; inflorescentia axillaris, tripinnatim paniculata, tenuis, laxa, ad 22 cm. longa, longe pedunculata, puberula; flores corymbosi, 5-meri; pedicelli 6–8 mm. longi, puberuli; sepala anguste triangularia, 1.2–1.5 mm. longa, acuminata, minute puberula, lineari-aurantiaco-punctata; corolla ca. 8.2 mm. longa, extus minute puberula, intus villosa; petala basi connata, anguste lineari-lanceolata, ca. 8 mm. longa, basi 1–1.4 mm. lata, lineari-punctata, reflexa; stamina 5 mm. longa; filamenta ca. 4 mm. longa, dense glanduloso-pubescentia; antherae ca. 1 mm. longae, basi sagittatae, apice cuspidatae, minute nigropunctatae vel raro epunctatae; ovarium ovoideum; placenta subglobosa; ovula 6, 1-seriata.

Mexico: Oaxaca, Municipio Matias Romero, lomas al E de Arroyo Amaca, al N del Rio Verde, 9.5 km. por camino al SE de Aserradero La Floresta, ca. 21.5 km. al S de Esmeralda, elev. 400 m., May 22, 1981, *Tom Wendt, A. Villalobos, I. Navarrete y J. Anguiano 3281* (holotype, LL), arbolito de 4 m., flores blancas, pendiente en selva.

P. Wendtii is an outstanding species, apparently related to *P. Oerstediana* Mez, also described from Oaxaca. *P. Wendtii* differs in pubescence, much longer pedicels, flowers much larger with narrowly linear petals fully 8 mm. long, filaments about 4 mm. long and densely pubescent with gland-tipped hairs, and small erect anthers cuspidate at apex and mostly minutely black-punctate. The placenta has 6 erect ovules surrounding a columella, and encased by a membranous cover, as in the genus *Ctenardisia*.

Valerioanthus Lundell, gen. nov. — Frutices vel arbores, ramulis et foliis rufo-hirsutis vel rufo-stellato-hirsutis, foliis alternis, subsessilibus, petiolis ad 5–10 mm. longis, membranaceis, subintegerrimis, nigropunctatis; inflorescentiae terminales, paniculatae, dense rufo-hirsutae; flores hermaphroditi, 5-meri, umbellati, pedicellati; sepala libera, ovata vel lanceolata, hirsuta, punctata, symmetrica; corolla glabra, dense nigropunctata; petala elliptica, asymmetrica, basi connata; stamina prope basin corollae affixa, filamentis brevibus latis, glabris; antherae oblongo-lanceolatae, apice obtusae vel apiculatae; ovarium glabrum; ovula pluriseriata.

Type species: *Valerioanthus Nevermannii* (Standl.) Lundell (= *Ardisia Nevermannii* Standl.).

Valerioanthus, named for the collector, Juvenal Valerio, is distinguished by its coarse red hirsute pubescence, the trichomes up to 2 mm. long. Only two species are known. In *V. Nevermannii* the trichomes are simple and rigid, while those of *V. ursinus* usually are minutely stellate at apex and septate. No other known species of the Myrsinaceae of the Neotropics have such stiff long tapering red trichomes covering all parts except the corolla and ovary.

Only flower buds of *V. ursinus* are available, and in these the anthers are connivent and obtuse. In *V. Nevermannii* the anthers are dehiscent by apical pores and apiculate. The unique elliptic petals are densely black-punctate with mostly small rounded glands. Additional collections in flower are needed for studies of the complex.

Both species, one from Costa Rica, the other from Panama, are known only from the type localities and collections cited in the original descriptions.

Key to Taxa

Sepals ovate or oval, about 1.5 mm. long; hirsute pubescence of stiff red simple trichomes ..... *V. Nevermannii.*

Sepals lanceolate, 5–7 mm. long; hirsute pubescence of stiff red septate trichomes usually minutely stellate at apex ..... *V. ursinus.*

Valerioanthus Nevermannii (Standl.) Lundell, comb. nov. *Ardisia Nevermannii* Standl., Journ. Wash. Acad. Sci. 17: 524. 1927. Costa Rica: Prov. Limon, on the Rio Reventazon below El Cairo, *Paul C. Standley & Juvenal Valerio 48603* (holotype US; photo and fragment, LL).

Valerioanthus ursinus (Lundell) Lundell, comb. nov. *Ardisia ursina* Lundell, Wrightia 6: 97. 1979. Panama: Prov. Panama, El Llano-Carti Road, 10 km. from Inter-American Highway, *S. Mori & J. Kallunki 2314* (holotype, MO; xerox and fragment, LL).

NEW COMBINATIONS IN THE GENUS FORTUNATIA (LILIACEAE)

Pierfelice Ravenna

As an advance to a revisional study of *Fortunatia* Macbr. (Liliaceae-Scilleae), some species originally included in *Ornithogalum*, *Scilla*, and *Allium* are transferred to the genus. These species belong to the floras of Argentina, Bolivia, Chile, and Peru.

Fortunatia arida (Poepp.) Ravenna, comb. nov. *Ornithogalum aridum* Poeppig, Fragm. Synops. Pl. Phanerog.: 13. 1833. *Ornithogalum chloroleucum* Lindley, Edwards Bot. Reg. 9: pl. 1853. 1836. *Scilla chloroleuca* (Lindl.) Kunth, Enum. Pl. 4: 325. 1843.

Cocucci (1969) treated this species as a synonym of *Fortunatia biflora* (Ruiz et Pav.) Macbr., which obviously is a mistake. The species is remarkable by its ovate-lanceolate tepals and the broad, abruptly narrowed at the apex, flat filaments.

Fortunatia argentinensis (Lillo et Haum.) Ravenna, comb. nov. *Scilla argentinensis* Lillo et Hauman, An. Mus. Nac. Hist. Nat. Buenos Aires 29: 423. 1917.

This species has been considered erroneously by Cocucci (loc. cit.) as another synonym of *Fortunatia biflora* (Ruiz et Pav.) Macbr. It is distinguished mainly in the deeply channeled, paler, glaucous leaves and the greenish-white or greenish (not snow-white) flowers.

Fortunatia sessilis (Fries) Ravenna, comb. nov. *Allium sessile* Fries, Nov. Act. Reg. Soc. Scient. Upsal. ser. IV, 1 (1): 165. 1905. *Nothoscordum sessile* (Fries) Beauverd, Bull. Herb. Boiss., ser. II, S: 1000, fig. 3, D-G. 1908. *N. fictile* Macbride, Field Mus. Bot. 11: 12. 1931.

This extremely interesting plant was included successively in *Allium* and *Nothoscordum* until Guaglianone (1972) demonstrated that the inflorescence is a contracted panicle. Several years ago I collected bulbs and dry specimens from near Cuchu-Ingenio in the Dept. of Potosi, Bolivia. The species flowered in my experimental collection.

Nothoscordum fictile Macbr., was based on some specimens from Peru that are stouter than the type, but it should be regarded as a synonym.

References

Cocucci, A., 1969, El genero *Camassia* Lindl. (Liliaceae) en Sudamerica; Kurtziana 5: 181-190.

Guaglianone, E.R., 1972, Sinopsis de las especies de *Ipheion* Raf. y *Nothoscordum* Kunth (Liliaceae) de Entre Rios y regiones vecinas; Darwiniana 17: 159-240, ill.

CONTRIBUTIONS TOWARD A MONOGRAPH OF CYBIANTHUS (MYRSINACEAE) II. THE SYSTEMATIC POSITION OF ARDISIA PERPUNCTICULOSA

John J. Pipoly III and Cyrus Longworth Lundell

Abstract

Pipoly III, John J. (The New York Botanical Garden, Bronx NY 10458) and Cyrus Longworth Lundell (Director, Plant Sciences Laboratory, The University of Texas at Dallas. P.O. Box 688. Richardson TX 75080). Contributions toward a monograph of *Cybianthus* (Myrsinaceae) II. The systematic position of *Ardisia perpuncticulosa.* Reexamination of *A. perpuncticulosa* Lundell revealed that it is better placed in *Cybianthus* subgenus *Weigeltia* (A. DC.) Agostini. The transfer to *Cybianthus* is made, a discussion of the subgenus and an artificial key separating *C. perpuncticulosus* from its nearest relatives, *C. Lawrencei, C. bogotensis* and *C. albiflorus,* are provided.

During the course of our collaborative effort in revisionary studies of Neotropical Myrsinaceae, the generic placement of a species described from fruiting material, *Ardisia perpuncticulosa* Lundell, was brought into question. Reexamination of the type revealed that the glabrous and valvate calyx lobes excluded this species from both *Ardisia* and *Parathesis,* the former having imbricate, glabrous lobes, while the latter bearing a tomentum on its valvate corolla lobes. The valvate sepals and paniculate inflorescence indicated placement in *Cybianthus* subgenus *Weigeltia* (A. DC.) Agostini, necessitating the following new combination:

Cybianthus perpuncticulosus (Lundell) Pipoly & Lundell, comb. nov. *Ardisia perpuncticulosa* Lundell, Wrightia 5 (6): 194. 1975. Panama: Darien, vicinity of Cerro Tacarcuna, summit camp, along N stream of camp, 1 Feb. 1975 (fr) *A. Gentry & S. Mori 14049* (holotype, LL; isotype, MO).

With generic delimitation heavily dependent upon ovule position and number, and position or fusion of the androecium relative to the corolla tube, determination of fruiting specimens is often difficult (Agostini, 1971; Lundell, 1966a, 1966b, 1981; Pipoly, 1981). Although it would seem less than desirable to describe new taxa from fruiting material, there is often no viable alternative because more than two-thirds of available herbarium material is sterile or in fruit! (Lundell, 1981). Therefore, problems in generic assignment under these conditions are not unexpected.

Cybianthus subgenus *Weigeltia* is readily separated from all other subgenera by its valvate sepals, corolla lobes with glandular-papillae only proximally within, and dorsifixed anthers which are as long or slightly longer than wide (Agostini, 1980). As with other taxa in the genus, dioecism, minute

flowers and a lack of adequate collections force the use of few, seemingly fine distinctions for specific delimitation. However, within subgenus *Weigeltia*, unlike several of the other subgenera, floral merosity and isomorphic staminate and pistillate perianth parts are constant characters which facilitate recognition of species. The subgenus is composed of two groups, the majority of species possessing paniculate inflorescences, with the remainder bearing racemose inflorescences. Although four species of the latter group have been reviewed (Pipoly, 1981), no phyletic interpretations can be made until a revision of the approximately thirty-eight species of the subgenus is completed.

Cybianthus perpuncticulosus is closely related to three of the ten taxa of the subgenus known from the Andes. All have chartaceous to membranaceous leaves and paniculate, densely glandular-papillose inflorescences. With a total of less than 100 specimens known for the entire group, the current delimitation of species is tentative. Diagnostic characters separating *C. perpuncticulosus* from the other three related species are presented in the following key.

1. Inflorescence pinnately paniculate, not pyramidal; leaf blades without punctate or striolate schizogenous glands, elliptic to oblong.
   2. Calyx epunctate, 0.6–0.8 mm. long, the lobes erose; leaf margins subentire to irregularly serrate ..... *C. Lawrencei* (Moldenke) Agostini.
   2. Calyx punctate, the schizogenous glands not raised, 0.8–1.0 mm. long, the lobes entire; leaf margins entire ..... *C. bogotensis* (Mez in Engler) Agostini.
1. Inflorescence pyramidal-paniculate; leaf blades with punctate or striolate schizogenous glands, oblong to obovate.
   3. Calyx 0.6–0.8 mm. long, 4-lobed, the lobes bearing prominently raised punctate schizogenous glands, margins not abruptly contracted basally; leaves striolate below, not perpuncticulose above ..... *C. albiflorus* (A.C. Smith) Agostini.
   3. Calyx 1.5–1.7 mm. long, 5-lobed, the lobes punctate, but the glands not prominently raised, margins abruptly contracted basally; leaves estriolate below, prominently perpuncticulose above ..... *C. perpuncticulosus* (Lundell) Pipoly & Lundell.

Acknowledgements

We would like to thank Drs. Ghillean Prance, Scott Mori and Arthur Cronquist for critical reading of the manuscript. The work of John Pipoly is supported by a New York Botanical Garden Herbarium Fellowship, which is gratefully acknowledged.

Literature Cited

Agostini, G. 1971. A revision of the genus *Cybianthus* section *Conomorpha* (Myrsinaceae). Ph.D. thesis, The City University of New York. 317 pp.

_____. 1980. Una nueva clasificacion del genero *Cybianthus* (Myrsinaceae). Acta Biol. Venez. 10(2): 129–185.

Lundell, C.L. 1966a. Flora of Guatemala: Myrsinaceae. Fieldiana, Bot. 24(8): 135–200.

_____. 1966b. The genus *Parathesis* of the Myrsinaceae. Contr. Texas Res. Found. V. 206 pp.

Pipoly, J. 1981. Contributions toward a monograph of *Cybianthus* (Myrsinaceae): I. Subgenus *Iteoides* and the identity of *Conomorpha loretensis*. Brittonia, 33(4): 493–497.

VOLUME 7 NUMBER 2 pages 56-95

pg. 27-38 behind pgs. 56-95

NOTES ON AGRICULTURE OF THE ANCIENT MAYA, EXPLORATION, AND SUNDRY INVESTIGATIONS IN PETEN, GUATEMALA

Cyrus Longworth Lundell[1]

TABLE OF CONTENTS

[1]Unless otherwise noted, all photographs are by the author.

AGRICULTURE

Foreword

In 1928 and 1929 and through the 1930's, I undertook exploration and agricultural studies in the Yucatan Peninsula. My observations of the results of millenia of occupation by the Maya and their predecessors, led me to found the agricultural research center at Renner in 1943–1944. The goal was to stem the tide of blackland deterioration in Texas. Soils of the Yucatan Peninsula uplands are similar, and what happened there could happen in Texas.

Born at Del Valle in Austin, Texas on a blackland farm, and reared in the Texas blacklands, I undertook to organize soil and crop production research to find methods to restore the productivity of the once fertile cotton belt of Texas. In 1946 the enterprise at Renner became Texas Research Foundation, chartered as an independent non-profit research and educational institution. It was dissolved in 1972 upon my retirement at age 65.

In the Yucatan Peninsula the black rendzina upland soils developed from limestone under forest cover, while the almost identical shallow black rendzina soils of the great blacklands of Texas developed over limestone under tall grass prairie conditions. The soils of both areas are of the montmorillonite clay types which erode dramatically under cultivation filling river basins, lakes and reservoirs with heavy clay silt.

My observations during boyhood as a farm boy of the breakdown of the Texas blacklands under cultivation, because of sheet erosion caused by the loss of humus which had maintained the physical properties through bacterial action, and subsequent studies of these same soils of the Yucatan Peninsula, are the basis of my conclusions on the role of agriculture in the rise and fall of Maya civilization.

Among the pertinent publications documenting the research in Texas and the Yucatan Peninsula are Lundell in 1937, *The Vegetation of Peten*, Carnegie Inst. Washington, Publ. 478; Lundell in 1967, *Agricultural Research at Renner, 1944–1966*, Texas Research Foundation; and Laws in 1962, *The Soils and Vegetation of a Relict Area of Blackland Prairie, Part I. An Investigation of the soils of the Stultz Meadow, a Relict Area of Blackland Prairie*, Wrightia 2: 229-241; Laws in 1961, *Investigations of Swamp Soils from the Tintal and Pinal Associations of Peten, Guatemala*, Wrightia 2: 127-132.

For twenty-eight years I headed and directed the research at Renner, which had as its basic purpose the restoration of the agricultural productivity of the Texas blacklands, and this goal was achieved. The attainment was recorded by Roy Roddy in 1967, *Texas Research Foundation, Its Historical Background—through 1966.*

Milpa Agriculture

Milpa agriculture, described as the slash and burn system, is probably one of the most destructive and wasteful developed by man. Forest or regrowth

Fig. 11. Tikal, the reconstruction in 1960 of Temple I. Remnants of the secondary forest remained to be cleared from the ruins.

Fig. 12. *Clusia suborbicularis* Lundell growing on roof comb of Temple II at Tikal.

is felled, cut up and piled, and burned during the dry season. All the smaller limbs, leaves, surface litter, and herbaceous growth is burned, leaving a thin mantle of ashes over the surface. When the rains come, planting of corn, beans and lesser crops are made using pointed sticks with fire hardened tips to make the holes for the seed. Large limbs and trunks of the trees criss-cross the land. But the crop the first year is excellent, the second year it starts to decline as the humus diminishes and weeds increase. After two or three years the milpa area is abandoned and another site is cleared, and the cycle is repeated over the years. Population pressure will shorten the period of abandonment for regrowth to rebuild humus, the key to production.

As today, away from urban centers, milpa agriculture perseveres for the population is sparse and the available land unlimited for cutting and burning of the forest cover.

In ancient times where the population was small, milpa (slash and burn) agriculture could be practiced. In such an epoch, such as we have again today, this practice could prevail.

Agriculture of the Ancient Maya

In my earlier publications on the agriculture of the lowland Maya, I reported field evidence that the ancient Maya utilized every bit of arable land available at one time or another over the millenia of occupation. Potsherds, flints, metates, areas of all sizes marked off by shaped limestone blocks, soil retaining structures, drainage ditches, and other physical remains are everywhere.

Except for the swamps *(bajos)*, the pinelands of southeastern Peten and Belize, the central Peten savanna country, together with precipitous limestone peaks, the limestone Peten lowlands are covered with a mantle of black montmorillonite clay high in humus content. Everywhere this mantle is thin, but very fertile where the organic residues have accumulated.

In areas of milpa agriculture cyclic resilience of production is evident from the ebb and flow of the population over the centuries with abandonment and resettlement. This system of burning and erosion depleted the soil, it was abandoned, and slowly with reforestation, the fertility was restored and the people returned.

This certainly occurred with the milpa system (slash and burn) which requires vast acreages of land to make possible the abandonment after two or more years of production, with regrowth of forest and fertility to follow in ever longer cycles. The milpa system that prevails today with the small population in scattered villages is a reversion to a condition where land is limitless.

Such a wasteful agricultural system could not have supported the masses of people during the time of the ancient Maya. With corn, beans, pumpkins, tomatoes, cotton, and a host of other endemic plant sources of necessities, selected and improved by their scientists through millenia of empirical observations, the basis for the support and development of a distinctive culture existed.

Fig. 13. Upland forest bordering the quarry at Tikal showing the thin layer of soil overlying the limestone. The thin mantle of montmorillonite type of black clay soil, high in humus and covered by forest litter, is typical of the uplands. The limestone varies from beds of soft marl to stone of marble-like hardness. Trees have roots which spread out like pancakes on the surface, for tap roots can not penetrate the limestone substrata.

That the ancient Maya were a gifted people is obvious to all. They had no metals, no implements except sharpened sticks, tools of flint and obsidian, no beasts of burden, limited sources of food proteins, but they were resourceful almost beyond comprehension in utilizing the natural assets of their environment.

Without beasts of burden, with only crude implements such as fire hardened sharpened sticks for soil tillage and planting, an intensive agriculture was developed which of necessity was manpower intensive. And this was the key to production to feed the masses of the ancient Maya.

Intensive agriculture implied practices such as soil conservation through terraces, drainage structures, and the maintenance of the physical structure and fertility of the soil by the use of organic residues.

Probably crop practices in tropical areas of China would come nearest in

demonstrating practices of the ancient Maya, although the Chinese have water buffalo for tillage. The Chinese have maintained soil fertility and conserved their soil through millenia. The use of plant and animal residues have been the key. Their manpower intensive agriculture of today was likely even more manpower intensive in the system of the ancient Maya. Everything was done by hand as in much of China today.

Although a karst country with large areas of internal drainage, such as the central Peten savanna region, Peten is well watered. There was no need among the ancients for irrigation systems, but that does not mean that they did not water dooryard gardens or small plots during the hot dry season. Their crop production fields, possibly covering as much as 25 percent of the surface area of Peten, provided their basic food supply, namely corn and beans. That the uplands of Peten and the limestone plateau of El Cayo District, Belize were the food basket of the great ancient Maya centers of Peten, such as Tikal, and other lowland urban areas, during possibly the entire millenium of their rise to greatness, we can theorize on a sound basis.

They had a good rainy growing season, fertile soils of limestone uplands and plains, and a dedication to soil conservation as indicated by the stone-faced terraces covering hundreds of square miles of hillsides in Belize and southeastern Peten. That these terraced lands were used continuously for generations for crop production, we can assume. Certainly the narrow terraced fields surrounding the hills were not for milpa agriculture, with its abandonment of land for decades, but for continuous manpower-intensive land use. That these areas were hand-weeded, cultivated and planted year after year, and all organic residues utilized to maintain fertility we have sound reason to conjecture.

As for transportation, the Maya today plant milpas in favorable forest covered areas many miles from their villages. They harvest their corn and other crops and store them in elevated bins. As the produce is needed, it is carried in packs on their backs suspended from forehead straps. With their backpacks, a pouch containing corn masa and a gourd bottle of water for sustenance, they bear their burden over incredible distances today, as they must have from times immemorial.

As to the organization of the ancient Maya labor force, we know from writings of Landa and early chroniclers that the totalitarian theocracy which governed the Maya maintained complete control, and organized labor into units with assigned duties.

Recapitulating, intensive agriculture required unlimited manpower, manpower organized in efficient units to carry out specific assigned duties. The ancient Maya of necessity depended on manual labor in all production operations from soil preparation to planting, weeding and harvesting.

Conservation in all aspects, such as the control of soil erosion, the utilization of all organic residues to maintain soil fertility and structure, was a necessity. The luxury of wasteful burning of residues to reduce labor and control plant growth could not be permitted in such a system, hence no milpa system except in outlying areas of small population could be tolerated.

Fig. 14. The 1961 hurricane which passed over Tikal felled a swath of the forest, the shallow rooted trees falling like dominoes.

We can assume that the size of upland crop production units depended upon the terrain, much of which is hilly. There must have been large well cared for fields for basic crops—corn, beans, pumpkins, yams, manihot, cotton, etc., interspersed with smaller units, some irrigated, along with dooryard gardens.

Forest products played a major role for food, fruits, condiments, spices, incense, thatch for roofing, timber, poles and lianas for construction. Cacao and avocados were important. We know little of their medicinal, insecticidal, and herbicidal plants. That they had specific uses for many plants is evidenced by the use of bark of a *Lonchocarpus* tree in beer making, the alcoholic drink of the Maya. In their plaster they utilized organic silicates as discovered

by Laws in 1962, *An Investigation of Temple Plasters from Tikal, Guatemala, with Evidence of the Use by the Ancient Maya of Plant Extracts in Plaster Making*, Wrightia 2: 217–229. What was the source of these extracts? Lundell in 1939, *Plants Probably Utilized by the Old Empire Maya of Peten and Adjacent Lowlands*, Papers Mich. Acad. 24: 37–56, gives a partial enumeration of the useful plants of the area.

Their agriculture was the base upon which the great Maya civilization rose, and finally decayed. That they developed and maintained it for over a millenium is the greatest tribute we can pay to this race.

The quest for knowledge about the environmental background of the Maya civilization and the great accomplishments of these people in so many fields will be an endless but worthy task!

Fig. 15. The hotel, Posada de la Selva, at Tikal.

Fig. 16. The cottage headquarters for the botanical work at Tikal, with the author making specimens of the *botan* palm, *Sabal Morrisiana* Bartlett.

Fig. 17. The hunting lodge on the bank of the Rio Pasion at Sayaxche, headquarters of the 1964 Expedition in southern Peten.

EXPLORATION

Introduction

To continue research on the environmental background of the lowland Maya, studies were initiated at Tikal in January, 1959, as a cooperative project between Texas Research Foundation and the University of Pennsylvania Museum. My earlier investigations in Peten were made late in 1931 and in 1932 while connected with the chicle industry, and as Director of the 1933 expedition of the University of Michigan and the Carnegie Institution of Washington to Guatemala. Results of these studies were published in 1937 in *The Vegetation of Peten* (Carnegie Inst. Publ. 478) in which I summarized what was known about the physiographic ecology, flora, and agriculture.

Although O.F. Cook and R.D. Martin made a plant collection in northern Peten in 1922, the first extensive collections were those secured by Professor H.H. Bartlett in 1931. His work was concentrated in the vicinity of Uaxactun, but he visited Tikal. Bartlett's report on the vegetation of the area, including Tikal, appeared in 1935 (Carnegie Inst. Publ. 461: 1-25).

With the initiation of the Tikal Project by the University of Pennsylvania Museum in 1956, facilities became available to carry out a survey in this ancient Maya center.

Fig. 18. Field assistants, Elias Contreras (on left) and Rolando Tun Ortiz in the plant drying shelter at Sayaxche with the Rio Pasion in the background.

The Tikal area affords special opportunities for advanced studies to reconstruct the background of the Maya culture with particular reference to agriculture. These studies became possible in January, 1959 when a three-year grant was received from The Rockefeller Foundation for an "evaluation of the ancient agriculture of the lowland Maya area of Guatemala." The inventory of the plant resources of Peten was continued through 1970's.

Although the emphasis initially was concentrated at Tikal, exploratory work in other areas of Peten have been extensive. Through the courtesy of the Signal Oil Company, which made available its facilities at San Luis, a reconnaissance trip to southeastern Peten was made during the week from July 9-15, 1959, in the region from Machaquila along the road south through Poptun, and beyond San Luis. Pinelands at Poptun are similar floristically to like areas in southern British Honduras. The rain forest at San Luis and Canchacan closely resembles the forest at Valentin on the limestone plateau in southern El Cayo District, Belize (Lundell, Carnegie Inst. Publ. 522: 3-35. 1940).

In 1960, my own investigations were concentrated in the Tikal National Park, but plant exploration extended from the Mexican border into south Central Peten through the work of my Guatemalan field assistants.

The American Philosophical Society made grants from its Penrose and Michaux funds in support of the field work in Peten, making possible year-round studies to obtain a representative collection of the flora. The collecting implemented studies which I resumed in 1961, 1962 and 1964 from the base camp at Tikal, but extended as far south as Poptun. My exploration in 1964 was primarily in the rain forest of the Rio Pasion basin. It extended from headquarters at Sayaxche along the Rio Pasion and tributaries and up the Salinas and Lacuntun Rivers in Chiapas, Mexico.

Supplementing 1960 collections made in the Remate area at the eastern end of Lake Peten from the middle of March through June, and around Dos Lagunas near the Campeche boundary from October until the end of December, 1960, Elias Contreras continued field work from time to time since March, 1961 in the pineland, savanna and rain forest areas of southern Peten. with concentration of collecting around Dolores and La Cumbre. His collecting, supplementing my own, has contributed substantially to our knowledge of the vegetation of these areas. Over 20,000 collections have been made in Peten, and most of these are represented in LL, F, and MICH. A high percentage of these remain to be studied critically.

With the dissolution of Texas Research Foundation upon my retirement in 1972 as head of the corporation, I resumed my botanical exploration and research under the auspices of The University of Texas at Dallas. Results since 1972 of the fifty years of study of the plant resources of Guatemala are published mostly in *Wrightia*, a publication since 1972 of The University of Texas at Dallas, now in its seventh volume.

Upland Forest of Northern Peten

Where the uplands of northern Peten have remained largely undisturbed since abandonment about 1000 A.D., they support high forest which the Maya classify on the basis of dominance of certain species (Bartlett, 1935, l.c.; Lundell, 1937, l.c.), notably the *ramon* (breadnut), *Brosimum Alicastrum* Sw.; the *chicozapote* (sapodilla), *Achras Zapota* L., and the *caoba* (mahogany), *Swietenia macrophylla* King. They comprise, respectively the *ramonal*, the *zapotal*, and the *caobal*. On all the Maya ruins, the *ramonal* is characteristic of the association. Outside of the center proper of Tikal which had been cleared earlier by archaeologists, the older forest is *zapotal*. In the broad valleys where the *caoba* is present, the association may be called the *caobal*.

Between the uplands and the swamps, there are poorly drained areas supporting transitional associations, such as the *botanal*, wherein the *botan* palm, *Sabal Morrisiana* Bartlett, forms continuous stands. The *escobal*, dominated by the thorny-trunked *escoba* palm, *Cryosophila argentea* Bartlett, is found on other areas of similar terrain.

At Tikal, considerable clearing has been done during the past century, first by a colony of settlers in the 1880's, and since the turn of the century by archaeological expeditions. Young secondary forest is present in these areas, and it is characterized by such fast growing trees as *Bursera Simaruba* (L.) Sarg., and species of the genera *Cecropia*, *Ficus*, *Stemmadenia*, and *Myriocarpa*. In clearing, certain trees were spared, mostly the *chicozapote* and the *zapote*, and these tower over the stands of lower trees which form the mass of the secondary forest.

In the *zapotal*, the association is retrogressive. Because of tapping for chicle, the stands have been decimated. Fallen trees of *Achras Zapota* criss-cross the forest, and the rotting logs are wonderful places for botanizing for orchids, ferns, aroids and other shade-loving herbs, but their presence is a sad commentary on the greed and destructiveness of man. With the opening up of the Tikal area, it is inevitable that most of the upland seres will be retrogressive as man hacks away at the forest. The Tikal National Park, a sanctuary by law, is being depleted of desirable timber, as well as continuously bled for chicle.

Before their clearing, the five great temples at Tikal supported distinctive low forest growth in which species of *Coccoloba*, *Diospyros*, *Eugenia*, *Alvaradoa*, *Ficus*, *Clusia*, *Hampea* and *Jacquinia* were prominent. On the open areas, particularly the exposed roof combs, species of *Agave*, *Russelia*, *Clusia*, and numerous bromeliads, orchids, and aroids abounded.

Swamp Forest of Northern Peten

The swamp forest, called by the Maya *akalche*, and generally designated *bajo*, occupies extensive silted lowlands. Bajo de Santa Fe to the north and east of Tikal, and Bajo del Hormiguero several miles to the south, have the gnarled low forest growth described by Lundell, 1939 (l.c., pp. 27–32). The *tintal*, characterized by the *tinta* tree (logwood), *Haematoxylon campechianum* L., is the conspicuous taxon of the association.

Fig. 19. Old upland forest on the ruins at Tikal. Note the tapping scars at right on the *chicozapote, Achras Zapota* L. This species is the source of the chicle of commerce, formerly a valuable export used in making chewing gum.

Botanically the *bajos* are of great interest. They have been collected extensively since 1959. A degree of endemism exists which indicates that the scrub forest is of great age. It has many species in common with the dry forest and desert flora of the State of Yucatan.

These swampy lowlands are silted basins. Much of the silting occurred during the thousand or more years that the Maya planted and exposed the uplands to soil erosion. That they were shallow lakes during early periods of Maya occupation of adjacent sites can be conjectured, for in wet seasons water stands for months over vast expanses of the basins.

Such lakes would have facilitated travel and transportation by dugouts to outlying areas of the great centers such as Tikal, Naachtun and Calakmul, much as we now have on Peten lakes.

Bajos were most important as a source of water during the dry season. Causeways into the swamps, and water holes *(aguadas)* dug by man, are indicative of this. The high water table provided easy access to a dry season water supply when the upland supply was exhausted.

Fig. 20. On the shallow upland soils, many of the trees are buttressed, like the *ramon*, *Brosimum Alicastrum* Sw., in the foreground.

Soils of the *bajos* are infertile heavy acid clays of the montmorillonite type as described by Laws (Wrightia 2: 127–132, 1962). The *bajos* are water-logged or covered by shallow water over much of their surface for up to nine months of the year. In exposed treeless expanses some *bajos* are covered by dense stands of the tall saw-grass, *Scleria bracteata* Cav. In open areas during the dry season the dried out clay surface cracks in a mosaic of large blocks which turn up around the edges.

Under these edaphic conditions, no significant agricultural use of the *bajos* was possible.

A diagrammatic cross-section through northern Peten, showing topography, soils and zonation of the vegetation, is given in Plate 14 (folded) of Lundell, *The Vegetation of Peten* (Carnegie Inst. of Washington Publ. 478, 1937).

Fig. 21. A strangler fig, a species of *Ficus*, growing around a *ramon* (breadnut) tree, *Brosimum Alicastrum* Sw. at Tikal.

Fig. 22. The supporting aerial roots of the liana, *Coussapoa oligocephala* Donn. Sm., surrounding a *chicozapote* tree, *Achras Zapota* L., at Tikal.

Fig. 23. An *aguada* in the Tikal National Forest. These water holes appear to be man-made. The aquatic vegetation of each differs.

Of ecological significance is the discovery of a pineland hammock in the Bajo de Santa Fe. Its vegetation is essentially the same as that of similar plant associations in Belize. My exploration of this hammock added a number of species to the flora of northern Peten (Wrightia 2: 111-126. 1961). Pines were important as torch wood.

Fig. 24. The deep fluted trunk of the logwood tree, *Haematoxylon campechianum* L., in Bajo del Hormiguero. This historic species, known as *tinta* locally, the source of haematoxylin dye, was the prized logwood of commerce, one of the first great forest resources to be exploited. It is reported that pirates in early colonial days valued logwood with gold as a source of loot.

OTHER COROLLARY INVESTIGATIONS

Sundry Studies

In addition to the plant resources study, other pertinent investigations were carried out. Soil samples taken in the Tikal National Park were studied at Renner. A detailed report on these from two swamp sites in Bajo de Santa Fe was published by Dr. W. Derby Laws in 1961, *Wrightia* 2: 127–132.

To investigate the sixteenth-century report by Diego de Landa that the Maya of Yucatan used plant extracts in plaster making, samples of plaster and mortar were taken from Temple I and Temple II at Tikal to determine if the ancient Maya did likewise. Analyses show that lime was not used in the plaster tested, and furthermore, the evidence is overwhelming that plant extracts from varied sources were utilized by the ancient Maya of Tikal in

Fig. 25. The dense *bajo* (swamp) forest of Bajo de Santa Fe at Tikal. Note epiphytes, orchid and bromeliad on tree trunk at right.

Fig. 26. The swamp forest of Bajo de Santa Fe at Tikal. Note head of sedge, *Rhynchospora cephalotis* (L.) Vahl, at bottom center.

Fig. 27. The *escobal*, a dense swamp association of the *escoba* palm, *Cryosophila argentea* Bartlett, with viciously thorny trunks. Photograph by O.F. Cook.

plaster and mortar. Evidently these extracts were the sources of silicates of organic origin which are present in all samples.

In the course of preparation of the Tikal plaster samples for analysis, a very distinctive odor was noted when water was added to the ground plaster and a much stronger odor was present when samples were autoclaved, requiring aeration of the laboratory! The fumes given off resembled those of herbicides.

The question is raised: Did the ancient Maya find plant extracts which inhibited mold and other plant growth? Plaster in some rooms of temples at Tikal is remarkably white after more than a thousand years.

Plant Materials from Excavations at Tikal

In connection with the studies of economic plants and their progenitors in the lowlands, plant materials from excavations at Tikal were identified and catalogued. The following, representing the earliest authenticated records of plants utilized by the ancient Maya, are primarily represented by charred remains and lime-encrusted casts of seeds.

1. Cache 98, Lot 12K/19, Jan. 30, 1961, Tikal
   - A. Thumb sized crudely molded pieces of a resinous material, probably *copal,* formed a base over which seeds were deposited. Evidence for this is the charred mass of seeds embedded in the upper surface of the partially burned carbonaceous material.
   - B. Seeds of the following plants are present:
     - (1) *Zea Mays* L. Although badly charred, fragments of the pericarp with well defined structure, and several corn kernels have been extracted. A small kernel, about 6 mm. in diameter, may represent a popcorn.
     - (2) *Cucurbita Pepo* L. The best preserved seeds in Cache 98 are of the pumpkin. These seeds are identical to those of the "small sugar" variety cultivated today.
     - (3) *Phaseolus* sp., possibly *Phaseolus lunatus* L. Only a single charred seed has been identified as a bean.
     - (4) *Theobroma* sp. Most of the charred seed mass evidently represents the *cacao.* Since the shriveled seeds are comparatively small, possibly they are from *Theobroma bicolor* Humb. & Bonpl., rather than *Theobroma Cacao* L., the commonly cultivated species.

   Although the charred mass contains fiber remains, and fragments possibly representing seed of other species, their identification is not possible.

2. Lot 12C/34 (12C-563) Burial 10, Str. 5D-34. Late Early Classic.
   The calcified fragments represent seeds of a species of *Cucurbita.*
   Dr. Thomas W. Whitaker, authority on the genus *Cucurbita,* has ex-

Fig. 28. *Cucurbita Lundelliana* L.H. Bailey, a progenitor of the cultivated *Cucurbita*, growing at Tikal. This wild gourd was discovered in Peten in 1933. Whitaker in 1956, Am. Nat. 90: 171-176; and in 1959, Madroño 15: 4-13, reported on the genetics of the species and its relationships.

amined this material and he reports as follows: "I regret that the fragments were not in condition to make an identification at the species level. However, I am positive they are seed of some species of *Cucurbita*, probably *C. moschata* Duch."

The discovery in 1961 of well preserved seeds of *Cucurbita Pepo L.* in Cache 98 makes probable the identification to species of the calcified fragments in burial 10 of structure 5D-34. I am convinced that the species represented is *Cucurbita Pepo* L.

Another small calcified seed cast in the same burial may possibly be that of a very small bean of the pinto variety, *Phaseolus* sp. No other fragments are identifiable.

3. Lot 4F/5 (4F-30) Temple I tunnel. Fill between Feature 6 and Feature 7. Late Classic with some Early Classic.

A charred subglobose fruit about 1 cm. in diameter with thick pedun-

cular scar 3.5 mm. in diameter and crowned by the persistent small base of style.

Although positive identification even to family is impossible, this appears to be the burnt remains of a small green sapotaceous fruit, possibly of the sapodilla, *Achras Zapota* L.

4. Lot 4C/3 (4C-49) Cache 49A. Late Classic.

   Referable to the Euphorbiaceae with capsular fruits, this well-preserved seed fragment may be from a species of either *Jatropha* or *Cnidoscolus*. It cannot be matched with seed of any species now known from the area.

5. Lot 4B/2 (3) Temple I. From burned layer in surface debris near foot of the stairway. Mixed.

   The remains of plant origin consist of well-preserved charred material, as follows:

   A. Seeds of the *"ox"* or *"ramon"* tree, *Brosimum Alicastrum* SW.
   B. Club-shaped sporophores, from a fungus in the family Clavariaceae.
   C. Charcoal of undetermined woody species.

The Discovery of a Rock Sculpture at Tikal

Condensed from an article in The Dallas Morning News, page 4, Section 5, September 11, 1960.

The President of Guatemala, Miguel Ydigoras Fuentes, last week officially designated what may be the most important archaeological discovery of the year in his country as "The Lundell Sculpture."

This is in honor of Dr. C. L. Lundell of Dallas, who discovered the massive piece of sculpture last February on a causeway amidst the ruins of the ancient metropolis of Tikal in northern Guatemala.

It is the first piece of rock sculpture ever found in what was probably the biggest Mayan center. It shows the heroic figures of a prisoner with a rope around his neck standing before a seated dignitary, probably a priest.

Last week, Dr. Lundell received a black and white drawing of his discovery done by Antonio Tejeda, the foremost Mayan artist and director of the archaeological museum of Guatemala.

The ancient Mayan priests were the world's pioneer mathematicians and were marvelously accurate astronomers. They were obsessed with time and dates, and they recorded dates on stones.

Dr. Lundell is primarily interested in botany and is a leading authority on the plant life in the ancient Maya area of Guatemala and Mexico. He was searching for plants on a trail, over which the resident archaeologists had trod for several years, when he found outcroppings of the sculpture.

Fig. 29. On February 22, 1960, while plant collecting along the Maler Causeway in Tikal, a rock carving was discovered. Shown in situ, after being cleared, this archaeological find is unique in that it is the first rock sculpture known from Tikal. It was covered by forest and a centuries-old accumulation of soil and forest litter. The rock carving was named "The Lundell Sculpture" by the President of Guatemala, Miguel Ydigoras Fuentes. Photograph by Frank Tolbert.

Fig. 30. The Lundell Sculpture on the Maler Causeway at Tikal. Measuring about twenty feet wide and fifteen feet high, the human figures depicted in this bedrock carving are of heroic size. The hieroglyphs are approximately two feet square. Sketch by Antonio Tejeda.

President Ydigoras came to the remote site of Tikal and congratulated the Dallas scientist on the discovery.

On that visit to Tikal, the Guatemalan president, who has his troubles with Cuban-inspired Communists in his country, indicated the figure of the prisoner with the rope around his neck and said:

"Dr. Lundell, I think you may have found a picture of El Presidente of the ancient Mayas. For that fellow is all tied up with ropes like me."

A 60-foot allspice tree and an 80-foot *ramon*, or breadnut, tree were growing right on top of the sculpture and the trees and deep accumulation of soil had to be removed carefully by Dr. Lundell and his Guatemalan assistants to keep from damaging the carving.

ACKNOWLEDGMENT

For expediting shipments in Guatemala City, and for handling all permits and official arrangements, Jorge Ibarra, Director of the Museum of Natural History of Guatemala, facilitated the program from 1959 through the 1970's. Grateful acknowledgment is made to him for his generous cooperation.

REFERENCES

Laws, W. Derby

1961. Investigations of Swamp Soils from the Tintal and Pinal Associations of Peten, Guatemala. Wrightia 2: 127–132.
1962. An Investigation of Temple Plasters from Tikal, Guatemala, with Evidence of the Use by the Ancient Maya of Plant Extracts in Plaster Making. Wrightia 2: 217–228.
1962. The Soils and Vegetation of a Relict Area of Blackland Prairie, Part I. An Investigation of the Soils of the Stultz Meadow, a Relict Area of Blackland Prairie. Wrightia 2: 229–241.

Lundell, Cyrus Longworth

1933. Chicle Exploitation in the Sapodilla Forest of the Yucatan Peninsula. Field Lab. 2: 15–21, 2 figs.
1933. Report on the 1933 Carnegie-Michigan Expedition to Guatemala. Carnegie Inst. Washington Yearbook. 1932: 96–97, 108–109.
1933. Archaeological Discoveries in the Maya Area. Proc. Am. Philos. Soc. 72: 147–179, 8 figs.
1934. Ruins of Polol and other Archaeological Discoveries in the Department of Peten, Guatemala. Carnegie Inst. Washington Publ. 436: 173–186, 9 pls., 4 figs.
1934. Preliminary Sketch of the Phytogeography of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 436: 253–355, 1 fig.
1937. The Vegetation of Peten. Carnegie Inst. Washington Publ. 478: viii + 243, 39 pls., 3 figs.
1938. The Botanical Expedition to Yucatan and Quintana Roo, Mexico. Carnegie Inst. Washington Yearbook No. 37: 7–11.
1939. Plants Probably Utilized by the Old Empire Maya of Peten and Adjacent Lowlands. Papers Mich. Acad. 24: 37–56.
1940. The 1936 Michigan-Carnegie Botanical Expedition to British Honduras. Carnegie Inst. Washington Publ. 522: 1–57, 4 pls., 1 map.
1941. Flora In: Alfred M. Tozzer, Landa's Relacion De Las Cosas De Yucatan. Papers of the Peabody Museum of American Archaeology and Ethnology. Harvard Univ. 18: 245–247.
1942. Flora of Eastern Tabasco and Adjacent Mexico Areas. Contr. Univ. Mich. Herb. No. 8: 1–74, 4 pls., 8 figs., 1 map.
1942. The Vegetation and Natural Resources of British Honduras. Chron. Bot. 7: 169–171.
1961. The Flora of Tikal. Expedition 3: 38–43.

1962. Plant Exploration of the Southern Lowlands of Peten, Guatemala. Am. Philos. Soc. Yearbook: 308-311.
1967. Agricultural Research at Renner, 1944-1966. Publ. Texas Research Foundation, Renner, Texas. × + 670 pp., illustrated.
1976. The 1931-1932 Odyssey in Campeche and Peten. Wrightia 5: 199-220, figs. 16-32.

Cyrus Longworth Lundell and Collaborators
1936. Botany of the Maya Area. Miscellaneous Papers I-XIII. Carnegie Inst. Washington Publ. 461: 328 pp., 57 pls., 19 figs.
1940. Botany of the Maya Area. Miscellaneous Papers XIV-XXI. Carnegie Inst. Washington Publ. 522: 474 pp., 7 pls., 29 figs., 1 map.

Whitaker, Thomas W.
1956. The Origin of the Cultivated Cucurbita. The American Naturalist. Vol. XC, No. 852: 171-176, 1 fig.

NEW OR NOTEWORTHY SPECIES OF MIDDLE AMERICAN BIGNONIACEAE

Alwyn H. Gentry[1]

Already two new Central American species of Bignoniaceae, tribe Crescentieae, have been collected since publication of the Flora Neotropica monograph of this group (Gentry, 1980). In addition several significant range extensions of MesoAmerican Bignoniaceae are reported and a new combination proposed to accord specific rank to *Arrabidaea chica* var. *viscida*. Finally a new Panamanian species of the problematical genus *Gibsoniothamnus* — intermediate between Bignoniaceae and Scrophulariaceae — is described.

Amphitecna Lundellii A. Gentry, sp. nov. — Arbor 10–20 m. alta. Folia oblongo-obovata vel oblanceolata, acuta, cuneata, chartacea. Flores solitarii vel bini, in alabastro longissimi acuminati. Calyx spathaceus, acuminati. Corolla tubulo-infundibuliformis, 3.5–5.5 cm. longa, 1.5–2 cm. lata ad orem. Fructus ignotus.

Tree 10–20 m. tall, 20–25 cm. dbh., the branchlets angulate when young, becoming terete. Leaves alternate to subopposite, oblong-obovate to oblanceolate, acute, tapering to a cuneate base, 5–17 cm. long. 2–6 cm. wide, chartaceous, scattered lepidote, otherwise glabrous, midrib raised above, prominent below, 2° and 3° venation plane above, prominulous below, not white-edged, drying dark gray below, dark olive to dark gray above; petiole 0.5–1.5 cm. long, merging with attenuate leaf base. Inflorescence a single flower or cluster of several flowers, terminal or in the axils of uppermost leaves, the pedicel 5–7.5 cm. long. Flowers in bud long-acuminate with the acumen equalling the base; calyx spathaceously split to base, long-acuminate at tip, 3–4.5 cm. long, 1.1–1.5 cm. wide, glabrous; corolla greenish, tubular infundibuliform, without a fold or bulge in throat, 3.5–5.5 cm. long, 1.5–2 cm. wide at mouth, the lobes fused into a reflexed rim, glabrous; stamens subexserted, the anther thecae divergent, 4–5 mm. long; pistil 3.5–4 cm. long, ovary rounded-conical, 3 mm. long, 2 mm. wide, glabrous; disk annular pulvinate, 2 mm. long, 4–5 mm. wide. Fruit not seen.

Type: Guatemala: Baja Verapaz: Niño Perdido, on top of hill in high forest, east of km. 150–151, 30 Aug. 1975, *C. L. Lundell & Elias Contreras 19760* (MO, holotype; LL, isotype). Guatemala: Baja Verapaz: loc. cit., 30 Aug. 1975, *Lundell & Contreras 19765* (MO, LL). Niño Perdido, in high forest, on La Cumbre de San Jose, 6 km, *"guiro de montaña,"* 21 Jun. 1977, *Lundell & Contreras 21175* (MO, LL).

Only two other species of *Amphitecna* have spathaceous calyces. One of these, *Amphitecna Steyermarkii* (A. Gentry) A. Gentry, is probably the closest relative of *A. Lundellii*. It differs in longer more coriaceous, sessile leaves and

[1]Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166.

a shorter much less pronounced bud acumen; *A. Steyermarkii* occurs farther west in Huehuetenango and Chiapas and at higher altitudes than *A. Lundellii*. The other species of *Amphitecna* with a spathaceous calyx is *A. spathicalyx* (A. Gentry) A. Gentry of central Panama which has much thicker strongly shagreened elliptic leaves with white-margined venation.

Arrabidaea viscida (Donn. Sm.) A. Gentry, comb. nov. — *Arrabidaea chica* var. *viscida* Donn. Sm., Bot. Gaz. 20: 7. 1895. Type: Guatemala, Santa Rosa, *Heyde & Lux 4550* (US, holotype; MICH, MO, isotypes)

This poorly known taxon of southern Guatemala and adjacent Chiapas has never been adequately placed. In Seibert's (1940) treatment of Maya Area Bignoniaceae and in the Flora of Guatemala (Standley & L. Williams, 1974) it was referred to *A. litoralis* (HBK.) Standl., a taxon synonymous with *A. mollissima* (HBK.) Bur. & K. Schum., which apparently was used by Standley as a sort of garbage disposal for problematical collections of various species of *Arrabidaea*. It is clearly not closely related to *A. chica* (H.&B.). Verl. nor to *A. mollissima* and is much closer to *A. costaricensis* (Kränzl.) A. Gentry, to which I have previously referred it (Gentry, 1977). It differs from *A. costaricensis* in its liana habit (*A. costaricensis* is almost always an erect shrubby tree) mostly gland-tipped inflorescence trichomes, openly paniculate terminal inflorescence (rather than a few-flowered racemose or racemiform lateral inflorescence), and a thinner irregularly truncate calyx. The calyx and inflorescence of *A. viscida* are thus more like another related species, highly variable *A. corallina* (Jacq.) Sandw., but that species lacks the gland-tipped inflorescence trichomes, has a longer, usually denticulate calyx, and (in Central America) has a denser, longer, vegetative indumentum. *Arrabidaea corallina* is restricted to drier lowland areas in Central America.

The collections of *A. viscida* that I have seen are:

Guatemala: Santa Rosa: Casillas, 4000 ft., May 1893, *Heyde & Lux 4550* (MICH, MO, US). Baja Verapaz: 12 mi. SW of Granados, dry subtropical forest, 12 Jul. 1970, *Harmon & Duyer 3013* (MO).

Mexico: Chiapas: Munic. Ixtapa, wooded slope along Mexican Hwy. 190 at the Zinacantan paraje of Muctajoc, 4400 ft., vine, flowers purple, 15 Jul. 1966, *Laughlin 1269* (DS, F; fragm. MO); between Mazapa and Motozintla, 1200 m., woody vine, flowers pink, *Matuda 4837* (F). Trapichito, Comitan, 1350 m., woody vine in dry bush, 2 Jun. 1945, *Matuda (1)5664* (F, MO); steep wooded slope 15 km. N of Tuxtla Gutierrez along road to El Sumidero, Munic. Tuxtla Gutierrez, 3800 ft., vine, flowers purple, 2 Jul. 1965, *Breedlove 10646* (DS, MICH) (glabrescent form). Guerrero: Cañon de la Mano Negra, 4–8 km. N of Iguala, 1100–1150 m., dry stream bed and very steep limestone walls and ledges, woody vine in tree, fruit only, seen once, 15 Feb. 1970, *Anderson & Anderson 5797* (MICH); Cañon de la Mano (Iguala), 11 May 1946, *Miranda 3930* (MEXU). Morelos: Cañon de Lobos, 20 km. ESE de Cuernavaca, sobre la carretera a Cuantla, bosque tropical deciduo en el fondo del canon, 1320 m., arbusto con hojas completas, flores abundantes de color lila muy vistosas, 6 Aug. 1967, *J. Flores C. 16* (MICH). Colima: Along road from Hwy. 15 to

Playa del Oro, W of Santiago, dense low forest on steep slopes, occasional woody vine, scandent, corolla purple except white in throat, 30 Aug. 1973, *Stevens & Fairhurst 1845* (MO) (glabrescent form); 3 km. N of Playa de Oro, wooded ridges overlooking Pacific Ocean, 25 km. WNW of Manzanillo, ca. 50 m., flowers rich lilac, the throat white, vine, climbing over shrubbery, 3 Aug. 1960, *Iltis et al. 666* (MICH) (glabrescent form).

Parmentiera Dressleri A. Gentry, sp. nov. — Arbor parva 2–3 m. alta. Folia 3-foliolata, folioliis ellipticis vel obovato-ellipticis, acutis, acuminatis, integris. Flores solitarii, cauliflori vel ramiflori, Calyx spathaceus, acutiusculus. Corolla late tubulo-infundibuliformis, 2.5 cm. longa, 2 cm. lata ad orem. Fructus 23–24 cm. longus, 1.5 cm. latus, non porcatus.

Small tree 2–3 m. tall; branchlets terete to subangulate, unarmed, without noticeable lenticels. Leaves opposite, 3-foliolate, the leaflets elliptic to obovate-elliptic, acute, cuneate at base, entire, 5–13 cm. long, 3.5–5.5 cm. wide, puberulous in the domatiate nerve axils beneath, otherwise essentially glabrous; petiolules not clearly differentiated, that of the terminal leaflet ca. 1–2 cm. long. Inflorescence a single flower, cauliflorous or ramiflorous, the pedicel less than 1 cm. long. Flowers with the calyx spathaceous, mostly glabrous, inconspicuously lepidote near base, bluntly acute, 1.6–1.7 cm. long; corolla white, broadly tubular-infundibuliform, 2.5 cm. long, 2 cm. wide at mouth of tube, the lobes ca. 0.8 cm. long, glabrous. Stamens and pistil not examined. Fruit 23–24 cm. long, 1.5 cm. wide, not ridged.

Type: Panama: Panama: Cerro Jefe, 28 Aug. 1971, *R. Dressler 4092* (MO, holotype). Panama: Panama: Cerro Jefe, *Dressler 3679* (F). Colon: Rio Gatun, District of Portobelo, 2200 ft., 12 Mar. 1980, *T. Antonio 3797* (MO).

This species was discussed as a possible variant of *P. macrophylla* Standl. in the Flora Neotropica treatment (Gentry, 1980). Discovery of its fruit proves that it is sufficiently distinct for specific recognition. The flowers are much smaller than those of *P. macrophylla* and the fruit is much narrower and lacks the conspicuous ridges of that species.

Schlegelia brachyantha Griseb. — This West Indian species has recently been collected in both Panama and Venezuela for the first time. Both of the mainland collections are in fruit, but they seem almost certainly referable to this taxon. In the Flora of Panama *S. brachyantha*, with fruits 6–8 mm. in diameter, would key out with the small-fruited taxa, although its flowers are slightly larger (corolla 2 cm. long, 5–6 mm. across the throat) than in the other small-fruited Panamanian species. It is closest to *S. parviflora* (Oerst.) Monachino but, besides having larger flowers, differs in having the flowers solitary or in fascicles of two or three at the nodes and completely lacking an inflorescence rachis. Its leaves are smaller (3–8 cm. by 1.5–3.5 cm.) than in any other Panamanian species of *Schlegelia*. Whether these two collections from widely separated isolated mountains in Panama and Venezuela represent long-distance dispersal from the West Indies by migrating birds, or whether the species is much more widespread than previously supposed remains to be determined.

Panama: Chiriqui: Palo Alto, 4.5 mi. NE of Boquete, trail towards Cerro La Trompeta, 6200 ft., 25 May 1979, *Hammel 7463* (MO).

Venezuela: Yaracuy: Distrito San Felipe, Rio Taria, 10 km. al norte de Salom, 10° 15′ N, 68° 29′ 30″ W, 1200 m., 7 Dec. 1980, *Steyermark & Carreño 123825* (MO).

Tabebuia striata A. Gentry — This species, known only from extreme eastern Panama, was described (Gentry, 1973) in the absence of flowers. At that time I noted that it is uncomfortably close to Guayanan *T. stenocalyx* Sprague & Stapf. Seeds from the type collection of *T. striata* were planted at Summit Gardens, Panama in 1971 and two small trees survived. The largest of these put out a single flower in February 1975 as a 4-year old sapling about 3 meters tall *(Mori & Kallunki 4895* [MO]). In addition, *T. striata* turns out to be locally common in parts of Colombia's Choco Department from which complete flowering material is now available (Bahia Solano, cliffs along coast, 4–5 Aug. 1976, *Gentry & Fallen 17162, 17211* [both COL, MO]). The flower of *T. striata* thus can now be described: Corolla white, basically salverform but campanulately broadened near top of tube, the tube 5.5–7 cm. long, 1–1.5 cm. wide at top of tube, the lobes 1.5–3 cm. long, puberulous and lepidote glandular on lobes, glabrous to very sparsely lepidote in throat, the stamens didynamous, subexserted, the anther thecae divergent, 3–4 mm. long, the connective slightly apiculate.

Although this flower is indeed similar to that of *T. stenocalyx*, as anticipated, *T. striata* still seems specifically distinct. The characteristic pubescence of the corolla lobes of *T. stenocalyx* is reduced and partly replaced by minute lepidote glands in *T. striata*. The upper corolla tube, puberulous in *T. stenocalyx*, is glabrous to sparsely lepidote in *T. striata*. The corolla tube of *T. striata* is wider (1–1.5 cm. wide at mouth) and campanulately broadened toward the top while that of *T. stenocalyx* is narrower (0.5–0.7 cm. wide at mouth) and more salverform. The anther connective of *T. striata* is more or less apiculate in contrast to that of *T. stenocalyx*. Were it not for these floral differences it would undoubtedly be necessary to lump these two species: the fruit and leaf characteristics of the two species prove to overlap completely. Even though distinct, these species constitute a good example of the frequent pattern of closely related taxa disjunct from the Guayana region to eastern Panama and adjacent Colombia (Gentry, 1982).

Gibsoniothamnus truncatus A. Gentry, sp. nov. — Frutex epiphyticus. Folia elliptica, acuta, cuneata, coriacea. Inflorescentia terminalis, irregulariter confertim racemosa. Calyx cupulatus, truncatus. Corolla tubularis, 2–2.5 cm. longa. 2–4 mm. lata. Fructus immaturus globosus, 5 mm. diametro, calyce inclusus.

Epiphytic shrub. Branchlets acutely tetragonal when young, becoming irregularly ridged with age. Leaves elliptic, 4–10 cm. long, 1.4–4 cm. wide, acute at base and apex, coriaceous, glabrous above and below, with small inconspicuous more or less ciliate domatia in axils of some lateral nerves, gland-

ular lepidote below, with larger glands near base of midvein, the margins revolute, drying dark above, olive below; petiole 0.6–2 cm. long. Inflorescence terminal, irregularly contracted-racemose, usually with poorly developed congested several-flowered side branches ca. 1–2 mm. long, the bracts and bracteoles triangular, minute, less than 1 mm. long, the pedicels glabrous, mostly 1.5–2 cm. long, to 3 cm. long in fruit, glabrous except the bracts and bracteoles. Calyx cupular, evenly truncate, the truncate margin subtended by reduced scarcely evident submarginal teeth, glabrous except the "teeth," 4–5 mm. long, 4–5 mm. wide. Corolla light pink or lavender to white, tubular, 2–2.5 cm. long, 2–4 mm. wide at mouth of tube, the five lobes rounded, 2 mm. long, mostly glabrous, the lobes ciliate, densely villous inside at level of stamen insertion, with a few stalked-lepidote glands at base of lobes inside. Stamens 4, inserted base of tube, the thecae divergent, held just below throat, 0.5–0.8 mm. long. Pistil ca. 1.5 cm. long, the ovary globose, 2 mm. long and 2 mm. wide. Fruit (immature) a spherical berry ca. 5 mm. in diameter, completely enclosed by the calyx.

Type: Panama: Cocle: 7 km. N of El Cope near Rivera Sawmill at Alto Calvario, Forgotten Hill, 700–850 m., 2 Jul. 1977, *Folsom 4092* (MO, holotype). Panama: Cocle: same locality, 5 Jul. 1977, *Folsom 4145* (MO); El Cope, Atlantic side, ca. 1200 m., 23 Jun. 1979, *Antonio 1167* (MO).

Gibsoniothamnus is a very problematic genus both as to familial placement and species delimitation. However, *G. truncatus* is easily distinguished on account of its truncate calyx. All other species of the genus have well developed calyx teeth, sometimes enlarged into striking wings. Nevertheless *G. truncatus* does have inconspicuous small submarginal enations, presumably representing the remnants of vestigial calyx teeth.

Gibsoniothamnus pterocalyx A. Gentry — This species was reduced to the synonymy of a sensu latu *G. cornutus* (Donn. Sm.) A. Gentry by D'Arcy (1979) in the Flora of Panama treatment of Scrophulariaceae. Several additional collections are now available and suggest that the distinguishing characters (single axillary flowers, only slightly angulate stems and laterally compressed calyx teeth extended as wings in *G. pterocalyx* vs. flowers fasciculate, twigs strongly tetragonal, and calyx teeth strictly marginal in *G. cornutus)* between *G. pterocalyx* and *G. cornutus* (sensu D'Arcy) are constant, and specific separation is warranted. In fact I suspect that *G. pterocalyx* may prove to need further subdivision. It includes a small-leaved form with laterally extended calyx lobes from the Fortuna Dam area of Chiriqui Province, Panama (treated by D'Arcy as part of *G. alatus* A. Gentry) as well as the larger-leafed typical form from Bocas del Toro Province. The known range of the small-leaved form has now been extended to Costa Rica (Alajuela Province: 2 km. N. of Bijagua, 400–500 m., *Utley & Utley 3161* [MO]; 8 km. N of Bijagua, 300 m., *Croat 36505* [MO]), where it seems very distinct from more or less sympatric pubescent-calyxed *G. epiphyticus* (Standl.) L. Wms. (the latter also lumped by D'Arcy with *G. cornutus* but probably specifically distinct).

Gibsoniothamnus alatus A. Gentry — This species is unique in the genus in the extreme development of its lateral calyx wings. It differs markedly from the small-leaved form of *G. pterocalyx* in its much larger broader calyx wings. As thus delimited it is endemic to Cerro Pirre in southern Darien Province. However, recent collections from Alto de Nique at the extreme southern end of the Cerro Pirre Massif extend its range (barely) into Colombia and represent the first South American records of the genus. Both of the Colombian specimens were collected exactly on the ridge separating the two countries. Though both were collected on the Colombian side of the ridge, one was epiphytic in a tree growing on the Panamanian side!

Colombia: Choco: Alto de Nique, exactly on the Panamanian border, cloud forest, 1300–1520 m., *Gentry et al. 28645, 28653* (both COL, MO).

Gibsoniothamnus Allenii A. Gentry and **G. latidentatus** A. Gentry — Both of these taxa were included by D'Arcy under *G. cornutus*, the latter maintained as a distinct variety. Recent collections of *G. latidentatus* from Veraguas Province (trail to Cerro Tute, near Santa Fe, 3200–3400 ft., *Antonio 3961;* Cerro Tute, 4000 ft., *Antonio 1873* [both MO]) are obviously *G. latidentatus* as defined by the triangular calyx lobes. In addition another collection from the same region may represent *G. latidentatus.* This is *Dressler 5942* (MO), 16 km. NW of Santa Fe, descent to Rio Calovebora, 650 m. It differs from typical *G. latidentatus* in having a few long trichomes along the main veins below, a longer calyx, and a corolla described as yellow cream rather than magenta or red.

Gibsoniothamnus Allenii has also now been collected in Panama Province (Cerro Campana, *Folsom 3631* [MO]) as well as from the type locality near La Mesa, Cocle Province.

Heretofore each known population of Panamanian *Gibsoniothamnus* has been internally homogeneous but morphologically unique from the populations occurring in other geographical areas. Since both *G. latidentatus* and *G. Allenii* are now shown to retain their differentiating characters in the additional localities from which they are reported above suggests that these differences are fundamental enough to justify their specific separation.

Two other collections of *Gibsoniothamnus* related to *G. Allenii* and *G. pterocalyx* remain unaccounted for. One is from Coclesito, Cocle Province (*Hammel 7206* [MO]) and the other from the upper Rio Tuquesa, Darien Province *(Croat 27281* [MO]). The Coclesito plant is unusual in its reported orange or orange red corolla, green calyx and single axillary flowers. The Darien collection has subulate calyx teeth ca. 1 cm. long which are extended as ridges on the sides of the calyx as in *G. pterocalyx* but has the strongly angled twigs of *G. Allenii.*

Literature Cited

D'Arcy, W.G. 1979. Scrophulariaceae. In Flora of Panama. Ann. Missouri Bot. Gard. 77: 173–274.

Gentry, A.H. 1973. Bignoniaceae. In Flora of Panama. Ann. Missouri Bot. Gard. 60: 781–997.

———. 1977. Notes on Middle American Bignoniaceae. Rhodora 79: 430–444.

———. 1980. Bignoniaceae — Part I (Crescentieae and Tourrettieae). Flora Neotropica Monograph 25: 1–130.

———. 1982. Phytogeographic patterns as evidence for a Choco refuge, pp. 112–136. In G. Prance (ed.). The Biological Model of Diversification in the Tropics. Columbia University Press.

Seibert, R.J. 1940. Botany of the Maya area: Miscellaneous papers XXI: The Bignoniaceae of the Maya area. Publ. Carnegie Inst. Wash. 522: 375–434.

Standley, P.C. and L.O. Williams. 1974. Bignoniaceae. In Flora of Guatemala. Fieldiana, Bot. 24(10): 153–234.

NEW SPECIES AND MISCELLANEOUS NOTES IN THE GENUS TRIMEZIA (IRIDACEAE) — I

Pierfelice Ravenna[1]

A series of successive articles on *Trimezia* will include new species, subspecies, and short revisional notes. The genus is a fairly outstanding representative of the Iridaceae in the neotropics, ranging from northeastern Argentina and south Brazil (Rio Grande do Sul), to the east side of the Sierra Madre in central Mexico (Veracruz).

Five new species, namely *Trimezia sincorana*, *T. connata*, *T. guianensis*, *T. guaricana*, and *T. caulosa* are described. The new combination *T. galaxioides* (Gom.) Rav. (*Sisyrinchium galaxioides* Gomes) is established. The species belong in the floras of Brazil, Guiana, and Venezuela.

Trimezia sincorana Ravenna, sp. nov. — Planta procera ad 1–1.68 m. alta. Rhizoma verticalis percrassus tuberosus saepe usque 8 cm. latus extus fuscus intus luteus radicis pluribus crassiusculis emitens. Folia basalia plura lineari-attenuata viridia ad 35–90 cm. longa circ. 4–15 mm. lata nervio medio crassiori parti subterranea vaginis basin versus gradate incrassata. Caulis teres foliis tres vel quattuor basalibus similibus necnon gradate reducta superne foliis alteribus parvis saepe bracteiformibus instructus. Spathae usque tres pedunculatae inter se divergentes multiflorae ventricosae ad 20–25 mm. longae circ. 8–9 mm. latae. Pedicelli complanati ad 25 mm. longi circ. 2.5 mm. lati ad margines puberuli. Flores laete lutei circ. 4–4.7 mm. lati inodori centrum versus concavi. Ovarium clavato-oblongum pallide viride ad 5.3–5.5 mm. longum circ. 1.5–2.6 mm. latum. Tepala exteriora obovata ad 24–25 mm. longa circ. 15–16.5 mm. lata inferne usque 6.5 mm. pallidiora prope basin veram maculis castaneis paucis prope basin laminae dense castaneo-maculata et piloso-glandulosa; lamina modice reflexa ad apicem obtuse apiculata. Tepala interiora ad 11–14 mm. longa cir. 6.4–7 mm. lata; unguiculum ad margines piloso-glandulosum ut in exterioribus variegatum; lamina inferne glandulosa et cenereo-maculata. Filamenta circ. 3.2 mm. longa ad basin incrassatam purpureo-tinctam connata deinde filiformia. Antherae oblongae ad 3.9 mm. longae; pollen loculique fusci. Stylus circ. 3 mm. longus. Styli rami suberecti lutescentes ad 3.8 mm. concrescentes circ. 1.4 mm. liberi; cristae duae adaxiales acutae ad 1.1–1.2 mm. longae. Capsula matura oblongo-clavata ad 15 mm. longa circ. 6–8 mm. lata usque medium sursum trivalvata. Semina ignota.

Among shrubs, often in a dark, sandy soil at Serra do Sincora, as for instance, along the Bahiano River, near Andarai, and as far as Mucuge, prov. of Bahia, Brazil.

*Casilla 21128, Sucursal 21, Santiago, Chile.

Brazil: Bahia, Serra do Sincora, Mucuge, *R. de Lemos Froes 19989*, II-1943 (Inst. Agr. do Norte). Idem, mun. Andarai, velha estrada entre Andarai e Mucuge, via Igatu, 2 km. ao sur de Igatu, ca. 800 m., *S. A. Mori & F. P. Benton 13204*, 23-XII-1979 (CEPLAC, Herb. Rav.). Serra do Sincora (no further data available), *Harley et al. 16122* (K, Herb. Rav.). In decliviis supra fluminem Bahiano prope Andarahi (Serra do Sincora) civit. Bahia Brasiliae, *Ravenna 171*, XII-1962 (Herb. Rav., type). Vernacular name: *"lirio."*

Among the species of the typical *Trimezia* alliance, *T. sincorana* is probably one of the most elegant. In habit, and particularly in the small ventricose spathes, it resembles *T. Steyermarkii* Fost., a species from Guatemala. From this it is separable by virtue of the rather large, tuberous rhizome and the more stiff, almost erect leaves. *T. spectabilis* Rav. (Ravenna 1968) is another allied species which is readily distinguished by the rootstock and the less slender leaves.

The rhizome is used by the natives, as a powder, in preparing *"tapioca de lirio,"* a nutritive and slightly purgative meal for children. Milk and a bit of sugar are sometimes added to it.

Trimezia connata Ravenna, sp. nov. Fig. 31.

Planta ad 20–40 cm. alta. Bulbus subconicus leviter compressus ad 4–5.5 cm. longus circ. 14–24 mm. latus ex rhizomate breve circ. 5–18 mm. longo. Folia basalia circ. 2–6 linearia sursum attenuata viridia ad 15–90 cm. longa circ. 5–8.2 mm. lata nervio medio crassiore notata. Caulis teres. Caulis teres usque 15–30 cm. longus folio reducto ad 8–31 cm. longo interdumque bractea circ. 32 mm. longa instructus. Spathae usque tres vel saepius duae pedunculatae pluriflorae ad 22–25 mm. longae; valvae subaequales vel paullo inaequales naviculatae ad 18–24 mm. longae; bracteae interiores valvas superantes membranaceo-cartaceae. Flores lutei ad 22 mm. longi circ. 18.5 mm. lati. Ovarium clavatum obtuso-triquetrum viride ad 5 mm. longum circ. 1.6–1.7 mm. latum. Tepala exteriora obovato-spathulata conniventia ad margines valde revoluta apiculis inter se fortiter adhaerentibus. Tepala interiora sursum geniculato-recurvata unguiculis circ. 31 mm. longis sex-maculatis; lamina inferne brunneo-maculata area glandulosa densa instructa deinde emaculata. Filamenta usque basin libera lutescentia emaculata praeter basin paullo incrassatam tenuissime filiformia ad 3.8–4.5 mm. longa. Antherae oblongo-lineares ad 4.5 mm. longae circ. 0.8 mm. latae; pollen luteo-viridescens. Stylus circ. 5 mm. longus. Styli rami usque 3.8 mm. concrescentia deinde circ. 2.7–2.8 mm. liberi; cristae nullae; replicaturae stigmatosae 0.6 mm. longae. Capsula clavata ad 12–15 mm. longa circ. 4–6.5 mm. lata, cycatrix perigoni lata supra trigibbata. Semina usque 11 per loculo subglobosa vel paullo angulata rufo-ochracea ad 2–2.4 mm. lata hylo parvo instructa.

Among shrubs and herbs, between the village called Morro do Chapeu and the homonym hill, at 1200 m. above the sea, in the state of Bahia, Brazil.

Brazil: Mun. Morro do Chapeu, rod. BA-426, km. 6 no sentido M. do Chapeu — Jacobina, *A. J. Ribeiro 45*, 12-VIII-1979 (CEPLAC, Herb. Rav.).

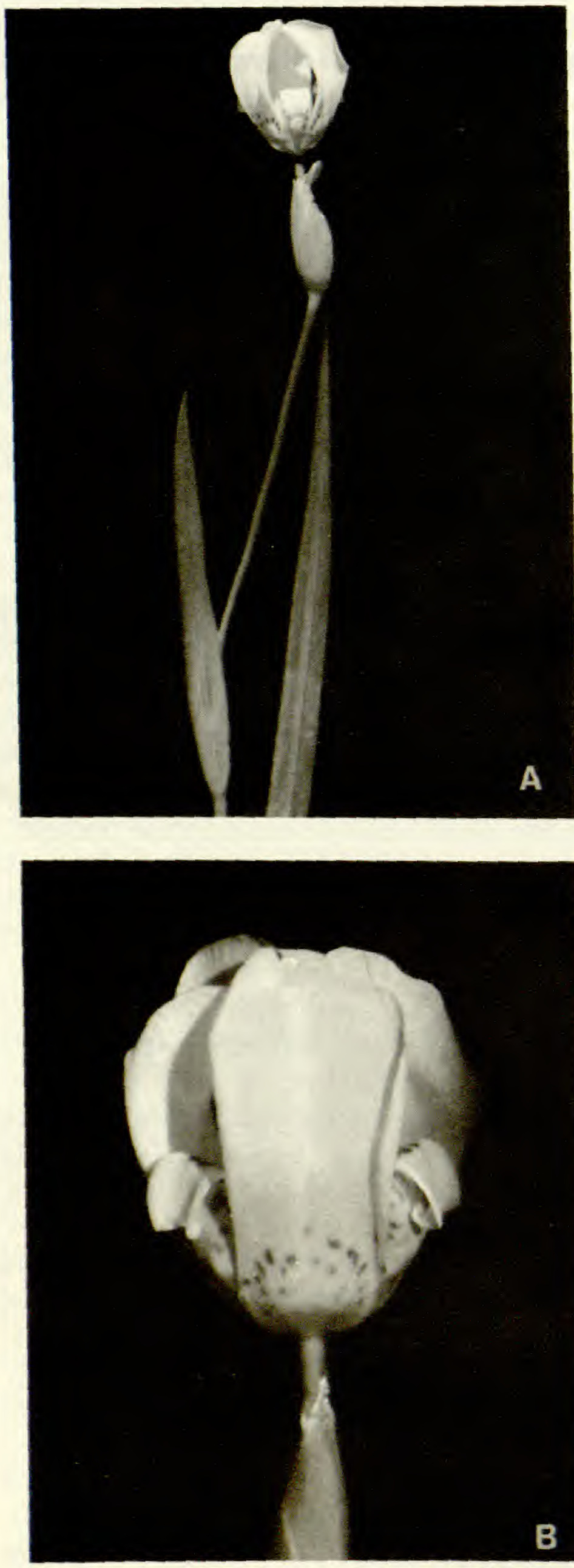


Fig. 31. *Trimezia connata* Rav.: A, Flowering stem and leaf; x ½. B, Side view of flower; x 1½. C, Androeceum and gynaeceum; x 8½. Photos and drawing by P. Ravenna.

Idem, Serra do Tombador, dry middle slopes of Morro do Chapeu, 1125 m., *H. S. Irwin et al. 32419*, 17-II-1971 (NY, K). Inter urbem Morro do Chapeu et collem ejusdem dictum civit. Bahia Brasiliae, *Ravenna 1102*, III-1968 (Herb. Rav., type; K, NY, RB, U, isotypes).

Trimezia connata is a peculiar and unmistakable species. Its erect outer tepals are firmly adhered to each other by the apicules. Another case in the family of this kind of adherence is found in the genus *Larentia* where the connective is intimately attached to the style tissue.

Trimezia guianensis Ravenna, sp. nov. — Planta usque 87 cm. alta. Rhizoma brevis verticalis ad apicem vaginis incrassatis persistentibus foliorum vetustorum fibris obtectis instructus. Folia basalia usque tres linearia nervio medio prominente marginibusque tenuibus ad 5-67 cm. longa circ. 4-6 mm. lata. Caulis teres inferne folio reducto bracteaque circ. 50 mm. longa instructus. Spathe longe pedunculata (pedunculus circ. 30 cm. longus) multiflora ad 27 mm. longa; valvae leviter inaequales. Flos luteus ad 35 mm. latus. Tepala exteriora obovata ad 18 mm. longa circ. 10.5 mm. lata. Tepala interiora geniculato-recurvata ad 8 mm. longa circ. 5.8 mm. lata ad unguiculos castaneo-suffusa; lamina castaneo-striolata (fide collectorum). Filamenta ut videtur libera ad 3 mm. longa. Antherae oblongae luteae ad 3.5-3.8 mm. longae. Stylus circ. 3.8 mm. longus. Styli rami ad 4-5 mm. longi inferne connati; cristae breves.

Guiana: Upper Mazarum River basin, savanna between G. S. Camp 1 and Haieka River, along trail to Ayanganna, 747 m., *S. S. Tillet et al. 45199*, 20/21-VIII-1960 (VEN, type; NY, isotype). Idem, Pakaraima mountains, Samwarakna-tipu (Holi-tipu), 1100 m., *B. Maguire et al. 40657*, 10-II-1955 (NY).

Superficially, *Trimezia guianensis* resembles *T. Fosteriana* Steyerm. from Venezuela. However, its leaves with thin margins and a distinct midrib, smaller flowers, with the outer tepals not glandular on the abaxial face below, and free filaments are keen distinctive features.

Trimezia guaricana Ravenna, sp. nov. — Planta usque 29-40 cm. alta. Rhizoma brevis ad 7-11 mm. longus circ. 7 mm. latus radicibus carnosis fascicultais emitens vaginisque crassiusculi foliorum vetustorum bulbo simulantibus sursum obtectus. Folia basalia ca. quattuor ensiformia supra solum 37-42 cm. longa circ. 5-14 mm. lata flaccida nervio medio prominens sursum attenuata. Caulis teres gracilis folio unico basalibus simili ad 20.5-21 cm. longo. Spathae parvae lanceolatae pluriflorae ad 15-17 mm. longae valvis subaequalibus vel leviter inaequalibus. Pedicelli spathae saepe exserti usque 19 mm. longi. Ovarium obovato-clavatum ad 2.5 mm. longum circ. 1.2 mm. latum. Tepala exteriora in alabastra obovata ad 6 mm. longa circ. 2.5 mm. lata ad apicem pennicillato-apiculata. Tepala interiora geniculato-recurvata ad 5.5 mm. longa circ. 1.7 mm. lata. Filamenta libera filiformia circ. 1.8 mm. longa. Antherae oblongo-lingulatae circ. 2.7 mm. longae. Stylus filiformis filamentis aequans. Styli rami crassi usque medium

vel ultra concrescentes circ. 3 mm. longi; cristae duae adaxiales acutiusculae in alabastro circ. 0.7 mm. longae.

Venezuela: Guarico, Ortiz-Galeras de El Pao, a unos 20 km. de San Francisco de Tiznado, Hato El Tranquero, *L. Aristiguieta et al. 6279*, 20-VIII-1966 (VEN, type).

Trimezia guaricana appears to be related to *T. martinicensis* (Linn.) Herb., which is also commonly found in Venezuela. From this it is distinguished at first glance by the very small spathes. In general habit it resembles more likely to *T. galaxioides* (Gom.) Rav. (in this paper), but the morphology of floral organs readily separates both species.

Trimezia caulosa Ravenna, sp. nov. — Planta elata ad 42–118 cm. alta. Rhizoma brevis subverticalis circ. 12–20 mm. latus radices plures fibrosas emitens. Folia basalia lineari-ensiformia suberecta firmula marginibus tenuibus nervioque medio crassiore ad 57–161 cm. longa circ. 11–15 mm. lata infra solum base vaginae modice incrassata et valde persistens. Caulis teres efoliato bracteis duis distantibus circ. 8.5–4 cm. longibus instructus. Spatha unica longe vel saepe longissime pedunculata multiflora valvis subaequalibus vel modice inaequalibus ad 25–35 mm. longis herbaceis. Pedicelli complanati glabri. Flores lutei ad 20–35 mm. lati. Ovarium clavatum ad 5.3–6 mm. longum circ. 1.5 mm. latum. Tepala exteriora obovata oblique patentia ad 14–24 mm. longa circ. 6–10 mm. lata minute apiculata. Tepala interiora circ. 10 mm. longa (haud in extenso) 3 mm. lata unguiculis 6 mm. longis; lamina geniculato-recurvata. Filamenta libera angustissime linearia tenuia ad basin ampliata circ. 3.5 mm. longa. Antherae oblongo-lineares circ. 3.5 mm. longae. Stylus filiformis 4–4.4 mm. longus. Styli rami usque 3–3.2 mm. concrescentes deinde 1.4–1.5 mm. liberi (excluso cristae). Cristae ut videtur duae erecteae cultriformes circ. 1.5–1.8 mm. longae.

Rainy forest, especially in the "pau-brasil" wood environment, to the south of the Bahia state, Brazil.

Brazil: Bahia, mun. Porto Seguro, 16 km. W de Porto Seguor, proxima a Estacao Ecologica do Pau-Brasil, *A. Espunino 368*, 3-XI-1978 (Herb. Rav., CEPEC). Idem, Santa Cruz de Cabralia, Reserva Ecologica do Pau-Brasil, *T. S. Santos 1924*, 15-IX-1971 (Herb. Rav., type; CEPLAC, isotype). Ibidem, *A. Espunino 16*, 1-X-1971 (Herb. Rav., CEPLAC).

Trimezia caulosa is distinguished by the lack of a well developed leaf on the stem, and especially by the long-peduncled solitary spathe. Its relationships are with *T. sincorana* Rav., and *T. guianensis* Rav. (see both in this paper). The former has a leafy stem with more than one spathe. In the latter, the spathe arises from a reduced leaf and a bract, both being approximate.

Trimezia galaxioides (Gom.) Ravenna, comb. nov. — *Sisyrinchium galaxioides* Gomes, Mem. Acad. Real Cienc. Lisboa, Mem. Corresp. 3: 99. 1812. *Marica semiaperta* Loddiges, Cooke's Bot. Cab. 7: tab. 685. 1821. *Cipura semiaperta* (Lodd.) Heinhold, Nomencl. Bot. Hort. 1: 197. 1840. *Lansbergia caracasana* sensu Klatt, in Martius Fl. Bras. 3 (1): 527, tab. 67, f. 2. 1871;

non De Vries (1846). *Trimezia semiaperta* (Lodd.) Ravenna, Rev. Inst. Munic. Bot. Buenos Aires 2: 60. 1964. Vernacular name: *"maririco."*

Frequent in shady places, often not far from the sea, between the Brazilian states of Rio de Janeiro and Santa Catarina.

Brazil: Rio de Janeiro, under the Serra dos Orgaos, *Burchell 2592* (BR). Canta Gallo (?), *Th. Peckholt 141*, 1859 (BR). Environs de Rio de Janeiro et Ouro Preto, recuilles en 1883 et 1884, *A. Glaziou 19670* (NY). Parana, mun. Morretes, Anhaia, *Hatschbach 33708*, 22-I-1974 (MBM, Herb. Rav.). Idem, Rio do Pinto, *Hatschbach 29780*, 6-VII-1972 (MBM, Herb. Rav.). Mun. Paranagua, Piacaguera, *Hatschbach 21372*. 23-IV-1969 (MBM, Herb. Rav.). Idem, Rio Cachoerinha, *Hatschbach 20848*, 18-I-1969. Santa Catarina, Ilha de Santa Catarina, mun. Florianopolis, Naufragados, 200 m., *A. Bresolin 97*, 19-I-1971 (HBR). Idem, Morro do Ribeirão, *Klein et al. 6774*, 13-IX-1966 (HBR). Ibidem, *Klein 7149*, 14-II-1967 (HBR, Herb. Rav.).

The species is fairly well illustrated in Martius' Flora Brasiliensis under the binomial *"Lansbergia caracasana* De Vries." The latter is a nomenclatural synonym of *Trimezia martinicensis*, as it is *Remaclea funebris* Morren, roughly figured in the same work.

The description of Gomes is rather accurate and leaves no doubt about the correct application of the epithet. The vernacular name *"maririco"* is applied to this as well as to another still undescribed species which inhabits mainly Minas Gerais.

Glaziou's specimen, cited above, represents *T. galaxioides*. Apparently he observed the mentioned allied species at Minas and assigned the plant also to Ouro Prêto, which obviously is a mistake. The rootstock of both species is commonly used since long time ago as a purgative.

Acknowledgments

My appreciation to the Herbaria that cooperated by making available dry material for study as follows: BR, CEPLAC (Itabuna, Brazil), HRB, K, MBM (Curitiba, Br.), VEN, Inst. Agr. do Norte (Belem).

Literature Cited

Ravenna, P., 1968: Notas sobre Iridaceae III, Bonplandia (Argentina) 2 (16): 273-291.

WRIGHTIA

A Botanical Journal

VOLUME 7
Number 3
1983

PUBLISHED BY
THE UNIVERSITY OF TEXAS AT DALLAS
Box 688, Richardson, Texas 75080
U.S.A.

Printed in the U.S.A.
The University of Texas at Dallas
Richardson, Texas

WRIGHTIA

A Botanical Journal

VOLUME 7, NUMBER 3

Issued January 31, 1983

CONTENTS

Fig. 32. The advanced deciduous forest of Yucatan as it appears along the Kaua road near Chichen Itza and in the vicinity of Yokdzonoot.

WRIGHTIA

Volume 7 January 31, 1983 Number 3

THE FLORA OF NORTHERN YUCATAN AND THE COBA AREA OF QUINTANA ROO, MEXICO: COLLECTIONS AND OBSERVATIONS IN 1938

Cyrus Longworth Lundell[1]

and

Amelia A. Lundell

NORTHERN YUCATAN

COBA AREA OF QUINTANA ROO

[1]All photographs are by the authors.

NORTHERN YUCATAN

Introduction

Prior to 1938 my studies of the Yucatan Peninsula flora had been confined to Campeche, Peten, and British Honduras. In September, 1928, as Assistant Physiologist of the Tropical Plant Research Foundation, I was stationed at Honey Camp in northern British Honduras to carry on field studies of *Achras Zapota* L. (Lundell, 1933). Here I collected my first plant specimens, the prelude to a lifetime of work in the Peninsula.

In 1938 a report was published in the Yearbook No. 37, pp. 7-11 of the Carnegie Institution of Washington covering the 1938 botanical expedition.

This 1982 summary expands upon that report, includes photographs of the areas investigated, and gives an annotated list of plant collections with vernacular names and uses. The more than 8,000 specimens obtained during the course of the field study were painstakingly labeled by Amelia A. Lundell after their identification. The first set of specimens from the 1938 expedition is in the University of Michigan Herbarium. Duplicates were distributed to other major herbaria in the United States and to Mexico. The junior author, who as research assistant helped collect, assumed the responsibility for recording the vernacular names and for making the notes on the plant uses as included herewith. Her Journal, covering the expedition from the day of departure from Ann Arbor, Michigan through the summer in Yucatan and Quintana Roo and the return to the University of Michigan, is filed in the Lundell Library of The University of Texas at Austin.

A member of the staff of the University of Michigan Herbarium, she was appointed a staff member of the Carnegie Institution of Washington by Dr. Sylvanus G. Morley, head of the Carnegie project in Yucatan, for the 1938 summer work with headquarters at Chichen Itza.

While a member of the staff of the University of Michigan Herbarium in a curatorship position through 1943, I was also a Research Associate in the Division of Historical Research of the Carnegie Institution of Washington from 1933 through 1941. I headed joint expeditions of the University of Michigan and the Carnegie Institution of Washington to Guatemala in 1933, to British Honduras in 1936, to northern Mexico in 1934 and 1937, and to Yucatan and Quintana Roo, Mexico in 1938. The junior author was a member of the 1934 and 1937 expeditions to Mexico.

The 1938 expedition to Yucatan and Quintana Roo covered the period from May 27 through August 3, 1938. The vegetation study, supported by the Horace H. Rackham School of Graduate Studies, the Faculty Research Fund of the University of Michigan, and the Carnegie Institution of Washington, carried out exploration of the dry coastal area forty miles east and west of Progreso, around Chichen Itza for a radius of twenty miles, and in the vicinity of the Maya ruins of Coba, Quintana Roo. Important but smaller collections

were made along the road south to Uxmal and around Merida.

Facilities of the Carnegie Institution of Washington at Chichen Itza, generously placed at the disposal of the expedition by Dr. Sylvanus G. Morley, who was our host, contributed substantially to the success of the field work.

The observations were first published in the 1938 Carnegie Yearbook report.

The State of Yucatan has been worked more extensively by resident collectors and visiting botanists than any other part of the Yucatan Peninsula, yet few data have been gathered concerning such important subjects as the general aspects of the vegetation, zonation, abundance and distribution of species, successional stages, relic forest areas and their importance in the interpretation of the natural climatic climax forest. Biotic influences include the effect of *milpa* agriculture, fire dstruction, and the henequen industry. In the course of the studies, a large series of herbarium specimens was collected, included among which are adequate collections of such difficult groups as cacti and palms, some of which still remain unidentified in 1982! Many of the described endemics, some known from single collections without locality data, were rediscovered and gathered repeatedly with both flowers and fruits. A few species were new to science. Clearer taxonomic interpretation of a number of species and some genera, heretofore inadequately known, was made possible from the ample herbarium material obtained.

To substantiate and amplify ethnobotanical data, this subject received special attention by the junior author.

Collections were made of reptiles and amphibians from Chichen Itza and Coba, and fish from Lake Coba and Lake Macanxoc, Quintana Roo. The specimens were turned over to the Museum of Zoology of the University of Michigan.

Geology

The limestone of the flat northern plain of the Yucatan Peninsula is fossiliferous in character. The paleontological evidence of the fossils in the limestone indicates that the latter belongs to two periods of geological time, the Pliocene and the Post-Pliocene, but it is not easy to draw a line of demarcation between the two. It appears as though the Post-Pliocene, except in the coastal area, were present only in patches, having been removed by atmospheric decay and denudation (Heilprin, 1891).

Where less compact the rock may be said to be a mass of loosely united shells, a condition that is best shown in superficial layers. Secondary deposits of calcite in the form of veins, crystals and nodular masses are abundant, contributing to the irregular surface. The rocky surface is visible over a very large part of its extent, being but scantily covered with red soil. The residual soil appears to be a product of iron impurities introduced into the limestone at its formation. The impurities were possibly a product of volcanic discharges which visited the region for a long time (Heilprin, 1891).

Physiography

The limestone plain of northern Yucatan, as well as that of northern Quintana Roo and Campeche, is flat. The northern coast across all of the State of Yucatan is skirted by a narrow sand reef with low dunes and flats behind which lies an extensive shallow lagoon of brackish water, known as the *cienaga.* (The latter is known not only for its physical characteristics but for its vicious mosquitos which sting painfully when they bite.) The cienaga has outlets from the sea and is open at its western end.

As to elevation, from Progreso south the average increase of the Peninsula from the northern coast southward is about one foot for each mile (Cole, 1910). Merida is about 30 feet above sea level, while Dzitas and Chichen Itza are above 80 feet. South of the northern plain there is a series of ridges extending across the Peninsula northwesterly from southern Quintana Roo across southern Yucatan with a single ridge terminating beyond the City of Campeche. The ridges reach a maximum elevation of approximately 900 feet and differ geologically from the northern plain.

The State of Yucatan is practically without rivers and lakes. Lake Chichankanab on the south is mostly in Quintana Roo. Northern Quintana Roo has various small lakes, notably those at Coba and Lake Bacalar in the south.

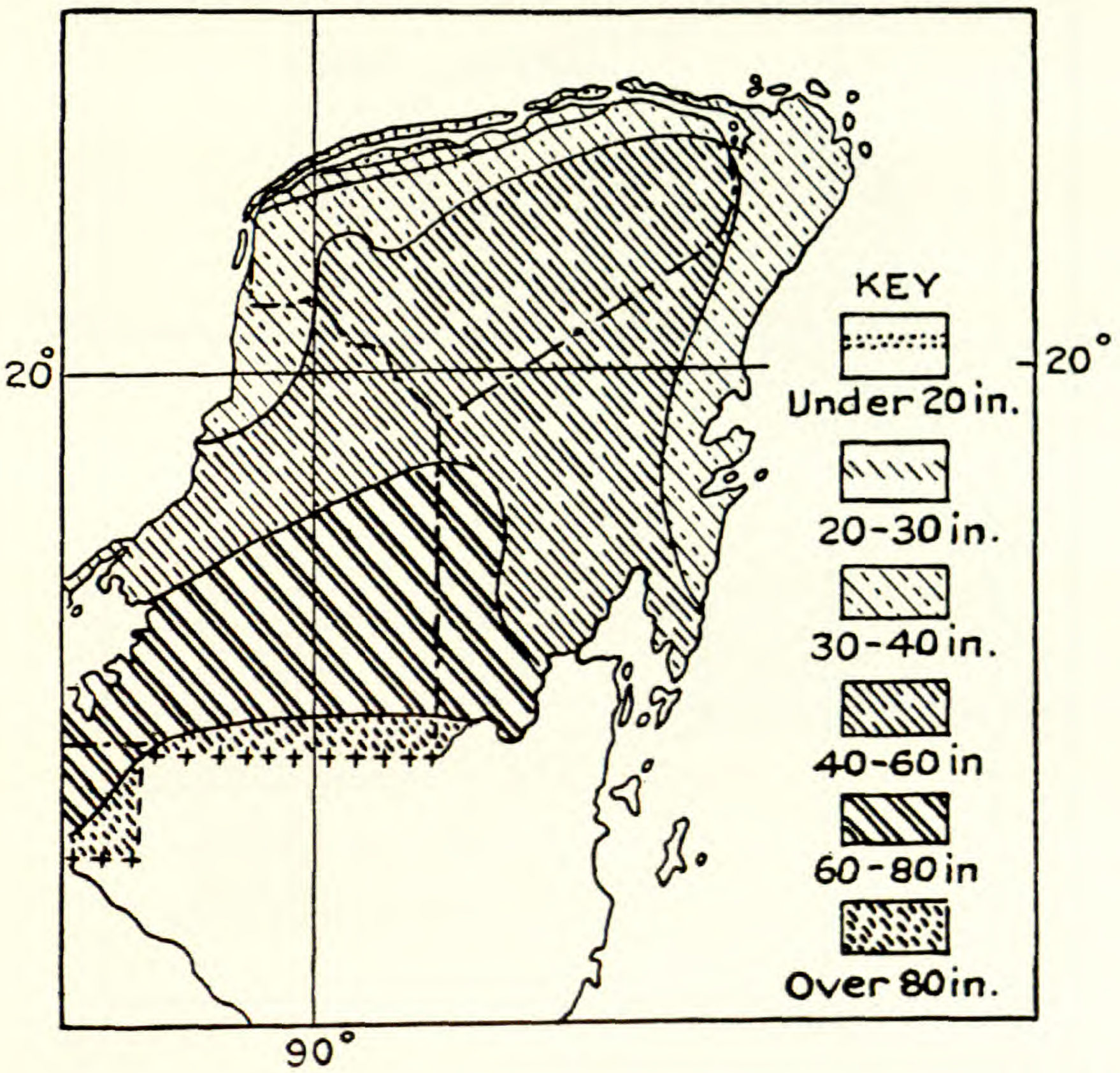
As stated in Shattuck (1933), the soil of the northern part of the Peninsula is so thin and arid that it seems incredible that anything should grow upon it and whatever soil there may once have been is now impoverished by repeated burning of the bush. The scant soil is of a reddish color and largely accumulated in rock fissures in denuded areas. It rests upon a limestone which is so fissured and porous that rainwater quickly runs in and disappears.

Merida was once known as the city of a thousand windmills, which tapped the shallow Yucatan aquifer. The sources of water in the northern plains are rainwater which may be collected in storage tanks or cisterns or accumulated in natural or man-made *aguadas,* the small reservoirs of the Peninsula. Artificial wells are common, but the most important sources of water are the *cenotes,* which are natural sink holes of this karst country. The plains are dotted with these, the most famous one being the Sacred Cenote at Chichen Itza. There are deep caves with water and natural springs along the coast, fed by underground streams, mostly flowing northward. Casares (1905–1906), Cole (1910), and Stephens (1848) are sources of data on water supplies.

Climate

Data on the climate of the Yucatan Peninsula are given in a chapter by Page *in* Shattuck (1933, pp. 409–422).

As stated by Page, Yucatan is entirely within the tropics and has only slight climatic variations. It is tropical with small temperature range from summer to winter or from one part of the region to the other in the same

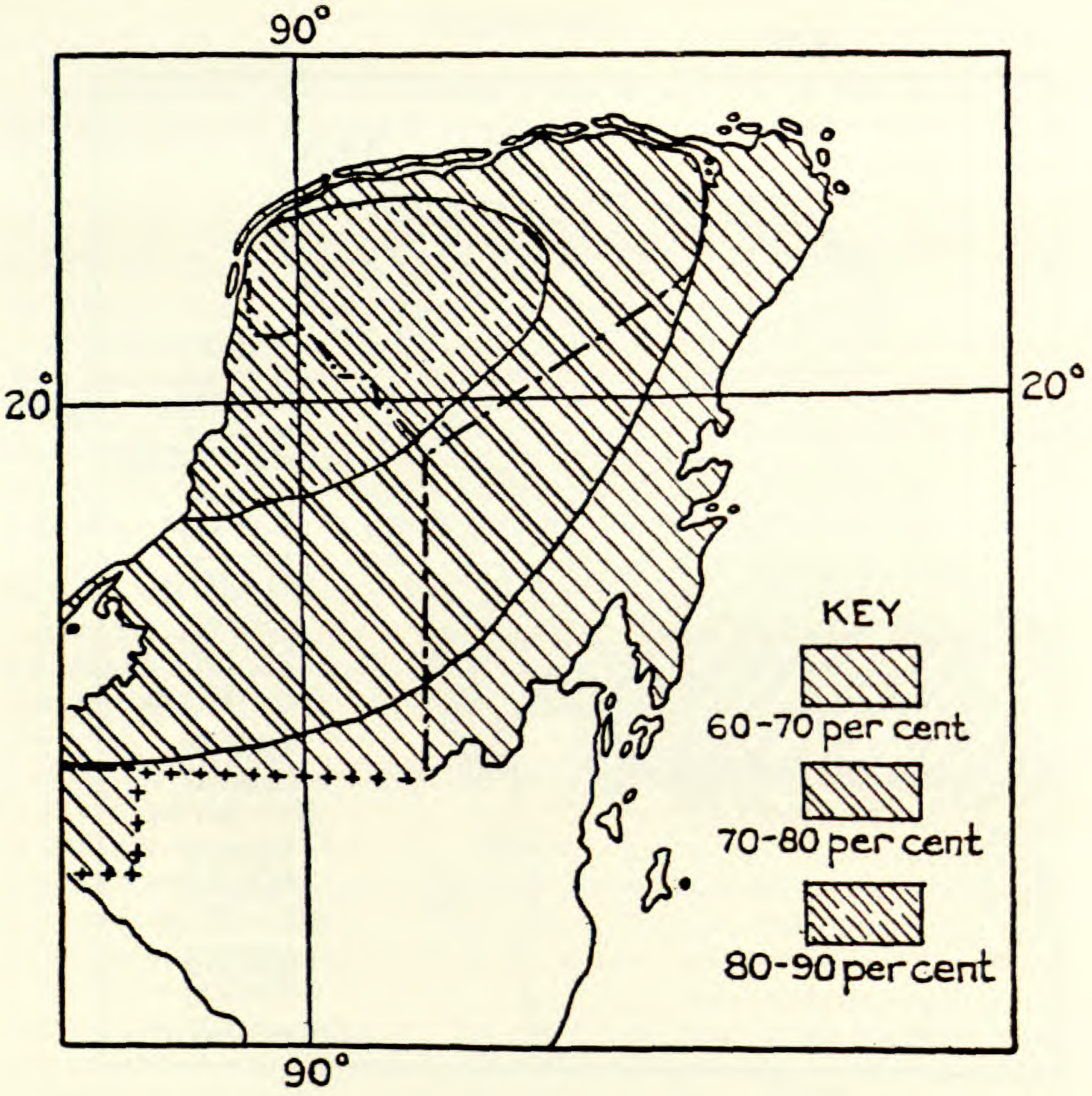


Map. 1. Rainfall of Yucatan, based upon all available data up to and including the year 1927. From Page (1933).

season. From northwest to southeast the rainy season is longer and the rainfall more abundant. In its low latitude it is under the influence of tropical hurricanes in late summer and fall and has occasional northers in winter with uncomfortable temperatures dropping sometimes into the low forties at Merida. Because of higher temperature and lower pressure inland, convection is more intense and rainfall consequently greater there than along the immediate coast.

The lowest temperature recorded in any place on the Yucatan Peninsula is 39.2° F., at Champoton in January 1906, and the highest, 116.6° F., in March of the same year at the same station.

Rainfall distribution, as it pertains to crops and to the flora, is the most interesting phase of the climate. Amounts vary greatly, especially between the coastal and interior stations, the interior having the heaviest, and the

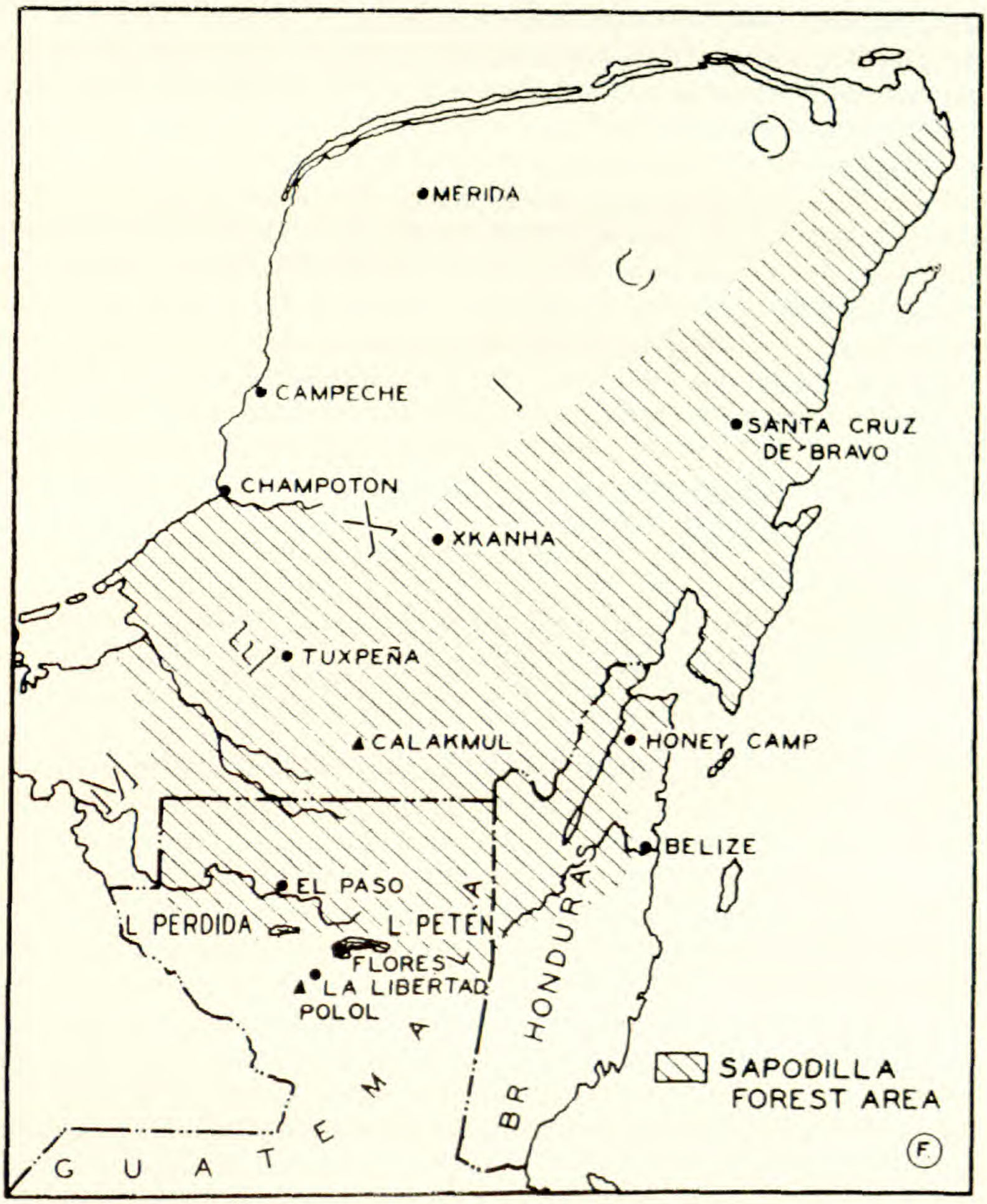


Map 2. Percentage of total rainfall occurring from May to October. From Page (1933).

south much more than the north. The nature of the vegetation attests to these differences. May 1 (from Page) shows the rainfall and its distribution in the Mexican part of the Peninsula, and Map 2 (from Page) gives the percentage of total rainfall occurring from May to October.

Rainfall total fluctuates from year to year, for three to four times as much rain falls in some years as compared to others. At Progreso the mean annual rainfall is 17.82 inches, at Merida 34.73 inches, and at Chichen Itza 46.69 inches, about the same as at Valladolid.

In a narrow xerophytic belt along the north coast of the peninsula where rainfall some years is as low as 12 inches, the area is most interesting botanically with a high degree of endemism.



Map 3. Area covered by the sapodilla forest on the Yucatan Peninsula. From Lundell (1933).

Agriculture

With a dry season of six months, November through April, with bush fires consuming forest litter and humus, with a mantle of depleted reddish soil so thin that it is found mostly in rock crevices, the agriculture supporting the Maya in northern Yucatan has always had a precarious base.

Yet, *milpas* (corn fields), where the staple crops of the native population are corn and beans, supplemented by plantings of tomatoes, pumpkins,

squash, peppers, sweet potatoes and other lesser sources of food, have sustained the Maya for more than a millenium. Today a good corn crop means money for cloth and other necessities, but a poor season and crop failure mean hard times. Famine conditions must have prevailed from time to time over the ages, considering the erratic rainfall pattern. No wonder that the life of the Maya centers around their milpas, now as in the past.

Intensive agriculture was practiced in past ages, but it is limited now to dooryard gardens. These are few and consist of small plots or plantings in elevated containers. To have a garden requires that an area be laid out, surrounded by soil retaining blocks of limestone, and filled with soil. It is necessary to gather up soil from the surrounding countryside. Fenced in with poles to keep pigs, chickens and other animals out, and hand watered as necessary, such dooryard plantings supplement the diet. Here alone is it possible to grow successive crops year round. Leaf cutting ants, aside from the animals, are the worst pests.

From cities and villages, employment in agricultural and forest enterprises has provided a source of income. In the dry northwest sector of Yucatan and Campeche, with rainfall from 20 to 30 inches, henequen plantations flourished until foreign competition made the industry unprofitable on a large scale. See Edwards (1924) for an account of the henequen plantations and *sisal* fiber production.

Preceding henequen, indigo production was widespread but the introduction of aniline dyes brought an end to this. From the forest of southern Yucatan, State of Campeche, and Quintana Roo, logwood in post-Conquest times was a major export. Later mahogany cutting and the production of chicle for chewing gum from the sapodilla forest provided labor with a good source of income. Now almost all has dwindled away from over exploitation and loss of markets.

Over the ages agriculture has sustained the masses of Maya in their countless villages and ceremonial centers. No wonder that their marvelous calendar and their religion are centered around corn, their staple of life.

But, it is remarkable that any of the native flora has survived under such land use conditions!

Plant Exploration

In Standley (1930), the *Flora of Yucatan*, there is a chronological account of the botanical exploration of the Mexican states of the Yucatan Peninsula (pp. 166–169). To this must be added the collections of Lundell (1934) in Campeche in 1931–1932, those of W. C. Steere and Jason R. Swallen in 1932 in Yucatan, Quintana Roo and Campeche, and the collections made in 1938 by the Lundells, reported herewith from Yucatan and Quintana Roo. No record is available for other collections made since 1938.

Although collecting began in northern Yucatan and Campeche early in the nineteenth century and continued intermittently by various plant collectors, the *Flora of Yucatan* by Standley is based primarily on the work of

Dr. George F. Gaumer, who started his studies in 1885–1886 on Cozumel Island. Although not a botanist, Gaumer possessed a general knowledge of plants. His botanical activities continued over a period of more than thirty years from his headquarters in Izamal. As a practicing physician in Yucatan he was interested in medicinal and other properties attributed to the plants locally and recorded Maya plant names for most of the species.

Collaborating with Dr. Charles F. Millspaugh of the Field Museum, who supported his work, Gaumer and Millspaugh were the two most responsible for our knowledge of the plants of Yucatan as represented in Standley's *Flora*. Gaumer is commemorated for his pioneer efforts by the numerous species which bear his name.

Regarding the state of our knowledge of the flora of the Yucatan Peninsula, a statement made by Proctor (1982), regarding the flora of Jamaica, applies equally well to the Peninsula, especially northern Yucatan.

> The local distribution of native plants is so remarkably complex, and often so narrowly localized, that until virtually every wooded hilltop, cliff-face, mossy woodland, boggy wetland, dry thorn-shrub, or other special habitat has been thoroughly examined at different seasons of the year, our knowledge of the Jamaican flora will be incomplete. Further, anyone who makes really thorough collections in any more or less undisturbed or uncollected habitat, particularly at favorable seasons, is likely to turn up new records and even species new to science.

With its history of continuous occupation by the Maya with shifting populations over at least two thousand years, with clearings for agriculture, recurrent bush fires sweeping the forests and countryside, and vegetation ranging from xerophytic on the north coast to true Amazonian-type rain forest in southern Peten and Belize, together with a high degree of local endemism, our knowledge of the flora of the Yucatan Peninsula still remains inadequate. Vast areas have not been explored.

With its rainfall ranging from less than 20 inches in the xerophytic zone along the north coast to as much as 60 inches in its eastern and southern sectors, the State of Yucatan offers few relic areas of natural vegetation, but finding and exploring these will be rewarding. Every collection of substance turns up species not recorded previously as well as some which are new to science.

In northern Yucatan, collecting was started at Progreso on May 27, 1938, *Lundell & Lundell 7305 (Eustoma exaltatum)* being the first number. On May 28 collecting was continued on the Merida to Chichen Itza road, and on May 29 our work at Chichen Itza was initiated with number *7308*, and continued in that area through May 31 and number *7342*. A one-day trip was made to Progreso on June 2 where numbers *7388–7399* were collected. On the return trip to Chichen Itza on June 3, collecting was resumed in that area with number *7342*, and including the June 2 work at Progreso, was continued there through June 18 and number *7608*.

The trip to Coba from Valladolid began on June 22 with number *7609* and

Fig. 33. Making plant specimens in the advanced deciduous forest on the Piste to Libre Union road near Chichen Itza. Note the Model A Ford Station Wagon with Chichen Itza sign on top.

Fig. 34. Older secondary forest near Chichen Itza.

continued through July 8 with the last collection number *7858* made at Chulutan on the way back to Valladolid.

Collecting was resumed in the Chichen Itza area on July 10 with number *7859* and continued until July 14 and number *7936*. Our headquarters were transferred to Merida for the remainder of the 1938 trip.

Collecting was resumed on July 17 with number *7937* made at Progreso and continued through July along the north coast, in the cienaga, and over the plains to Merida through July 30. Side trips were made to Uxmal with collections along the Merida to Uxmal road and at Muna and Uxmal.

Numbers for the 1938 expedition were *7305* thru *8220*, including living plants sent to the Botanical Garden of the University of Michigan.

A total of 915 collections of plants was made in 1938 of which 666 were from the State of Yucatan, 249 from Quintana Roo. In addition a number of species were observed and recorded but not collected, and these are included in the lists without collection numbers.

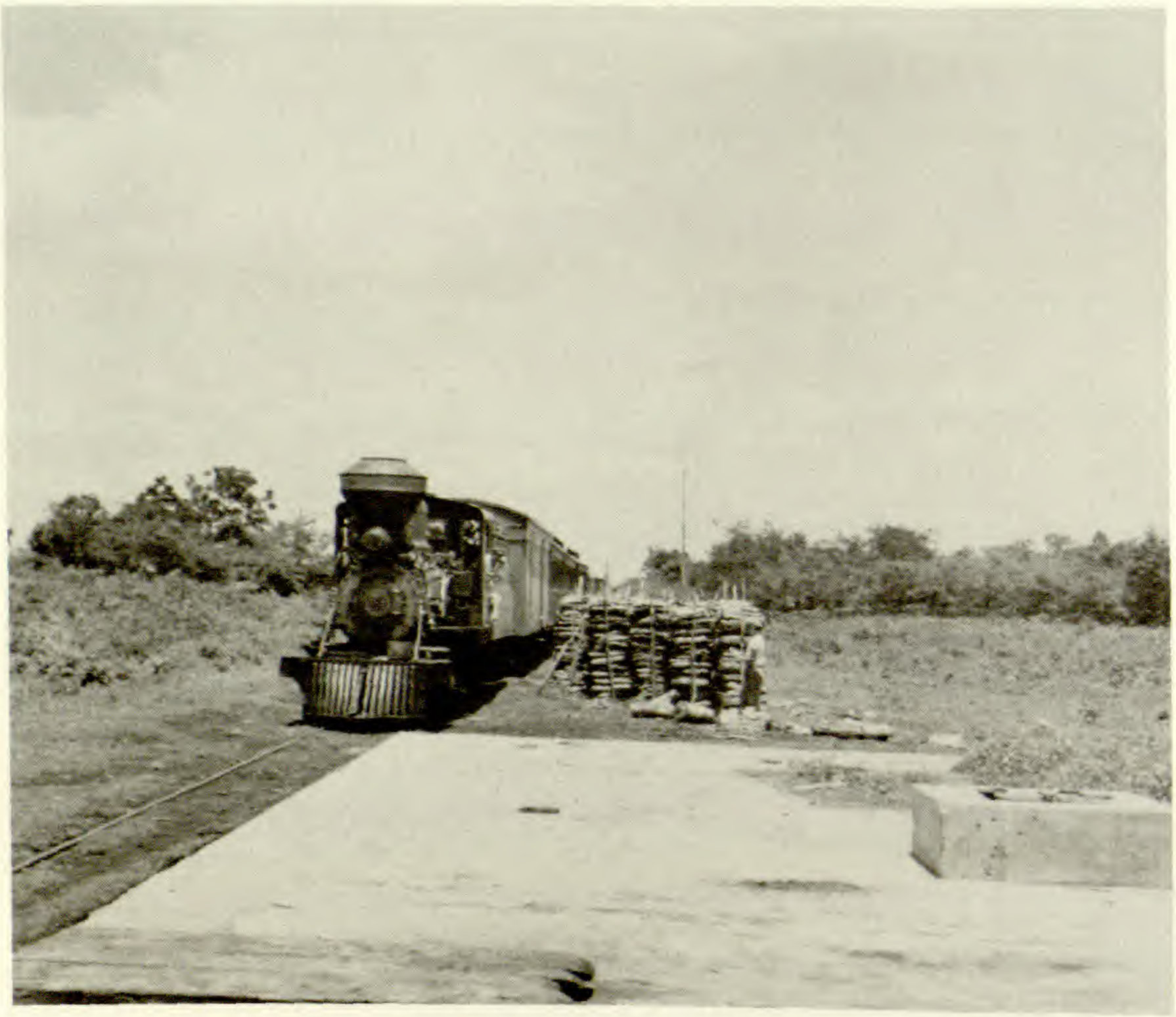


Fig. 35. A wood-burning locomotive on the railroad from Merida to Valladolid. The stop is at Dzitas, the local station nearest Chichen Itza. The low second growth thorn thicket in background is representative of much of the vegetation of Yucatan.

Vegetation of Northern Yucatan

The dry coastal area, with rainfall of only 13.5 inches at Progreso in 1911, extends as a belt across the northwestern edge of the Peninsula. Here there are three distinct zones: (1) the reef of low sand dunes and flats between the sea and the *cienaga;* (2) the shallow cienaga and salt flats; and (3) the flat limestone plain extending south from the edge of the cienaga into the interior across northern Yucatan, Campeche and Quintana Roo.

South of the cienaga, the northwest coastal area, to the southeast across the northern plain, there is a marked increase in annual precipitation. The total in 1911 reached 66.8 inches at Valladolid, as contrasted with that at Progreso, and is heaviest to the east and south. The transition in the vegetation is pronounced but gradual and correlated with the rainfall. The soil is everywhere shallow in the northern plain of Yucatan, Campeche and Quintana Roo and the climate does not vary perceptibly, except for rainfall.

The coastal reef of low sand dunes and flats, between the cienaga and the sea, support a xerophytic growth ranging up to 15 feet in height. Around Progreso and other villages, cutting for wood, charcoal, and other needs keeps the vegetation down so that it is scrubby and low.

The conspicuous shrubs and small trees of this narrow coastal zone include the following: *Coccoloba uvifera, Scaveola Plumierii, Crossopetalum Rhacoma, Suriana maritima, Chrysobalanus Icaco, Ernodea littoralis, Batis maritima, Tricerma phyllanthoides, Capparis incana, Caesalpinia vesicaria, Gossypium* sp., *Agave* spp., *Bumelia neglecta, Lycium* sp., *Jacquinia aurantiaca, Hemiangium excelsum, Cordia Sebestina,* and several palms. Cacti are locally abundant. Of particular interest is the occurrence on the sand dunes, as shrubs or small gnarled trees, of such species as *Achras Zapota, Krugiodendron ferreum, Thevetia Gaumeri,* and *Metopium Brownei,* all of which are large trees in the advanced forests of the interior.

Common herbaceous plants of the seashore habitat are *Cakile edentula, Tournefortia gnaphalodes, Sesuvium Portulacastrum, Eustoma exaltatum, Atriplex pentandra,* and among the vines, *Echites umbellata* and *Ipomoea Pes-caprae.*

The cienaga, a brackish and saltwater lagoon behind the dunes, has wide areas of open water with islands and borders of mangrove. The mangrove of the tidal area has typical swamp growth with *Rhizophora Mangle, Conocarpus erecta, Anicennia nitida,* and *Laguncularia racemosa.* Open areas of the bordering flats are covered with *Salicornia, Batis,* and other halophytes.

From the southern edge of the cienaga, flat limestone plains have a distinctive vegetation which originally must have covered the cleared henequen plantation area south to Merida and beyond, and westward into Campeche. Because of the high percentage of endemics and the predominance of cacti, this xerophytic zone, where rainfall ranges from 30 to 40 inches annually, mostly nearer 30 south of Progreso, is one of the most interesting areas botanically of the peninsula.

Fig. 36. The *henequen, Agave fourcroydes,* is the *Agave* which was planted in the vast plantations covering the northern xerophytic plains of Yucatan and Campeche. Clean cultivation eliminated all traces of the native vegetation except for scattered relic areas. The most important export, it was the source of the great wealth of Yucatan in the 1920's and earlier. As much as 280,000,000 pounds of henequen fiber was exported from Yucatan in 1923. It is used in the manufacture of binder twine, the principal fiber for that purpose. Competition from foreign sources of fiber together with the decay of the industry under conditions existing in Yucatan ended this prosperity.

The small, very scattered relic areas of scrub forest of cacti, thorny shrubs and small trees, inland from Telchac and other coastal localities, appear to be representative of the original vegetation. It reaches a height up to 45 feet but averages much less.

The large cacti, *Nopalea Gaumeri, N. inaperta, Pachycereus Gaumeri, Lemaireocereus griseus,* and *Cephalocereus Gaumeri,* are abundant, forming almost impenetrable thickets in places. Low cacti, *Opuntia Dillenii, Acanthocereus pentagonus,* and several other species not identified, are locally conspicuous. The interesting small species of *Neomammillaria* abound here only. Species in the following genera are associates of the cacti: *Coccoloba, Acacia, Mimosa, Pedilanthus, Agave, Haematoxylum, Euphorbia, Prosopis, Zanthoxylum, Pithecolobium,* and *Croton.*

Inland from this xerophytic cacti-thorn scrub forest zone, the limestone plain rises slightly, extending unbroken southward to the low sierras bordering Yucatan on the south and southwest. With increase of rainfall from the coast inland, the xerophytic vegetation undergoes a marked transition, although this transition is masked.

The greater part of the State of Yucatan, not planted in henequen or cleared for *milpas,* is covered with low thickets from 10 to 25 feet in height. These are

all second growth, the result of repeated clearings and bush fires. Two species of legumes, *Acacia Gaumeri* and *Mimosa hemiendyta*, both native, are among the principal dominants, with a host of shrubs and vines as associates. This widespread assemblage, often considered to be the typical vegetation of Yucatan, is nothing more than a successional phase. Chapman (1896) observed that the scrubby character of the vegetation, even east of the henequen belt, is largely artificial due to deforestation by man.

It is doubtful that there is any truly pristine vegetation to be found in the State of Yucatan or elsewhere in the peninsula. That agriculture of the ancient Maya was at one time more highly developed with soil conservation and labor intensive methods of production, as pointed out by Lundell (1936, 1982), there is ample evidence; but we can assume that the milpa method of slash and burn predominated over much of the peninsula for most of the two thousand or more years of Maya history. The destruction of the original vegetation resulted, for we know that they moved their milpas after two or three years, and the tempo of clearing and revegetation has depended upon population fluctuation. Where milpas could be planted, no part of the limestone areas of the peninsula remained undisturbed.

Fig. 37. A henequen plantation stretching to the far horizon. Such plantations covered the wide xerophytic zone across the northern top of the Peninsula extending inland from the coastal cienaga. See H. T. Edwards (1924) under references for an account of the henequen industry in Yucatan.

Fig. 38. A mansion in Merida built with the wealth from the henequen industry. This was converted into a guest house.

Fig. 39. The palatial interior of the mansion. For the vegetation survey along the north coast of Yucatan we were guests in this home, using space in the basement for our workroom.

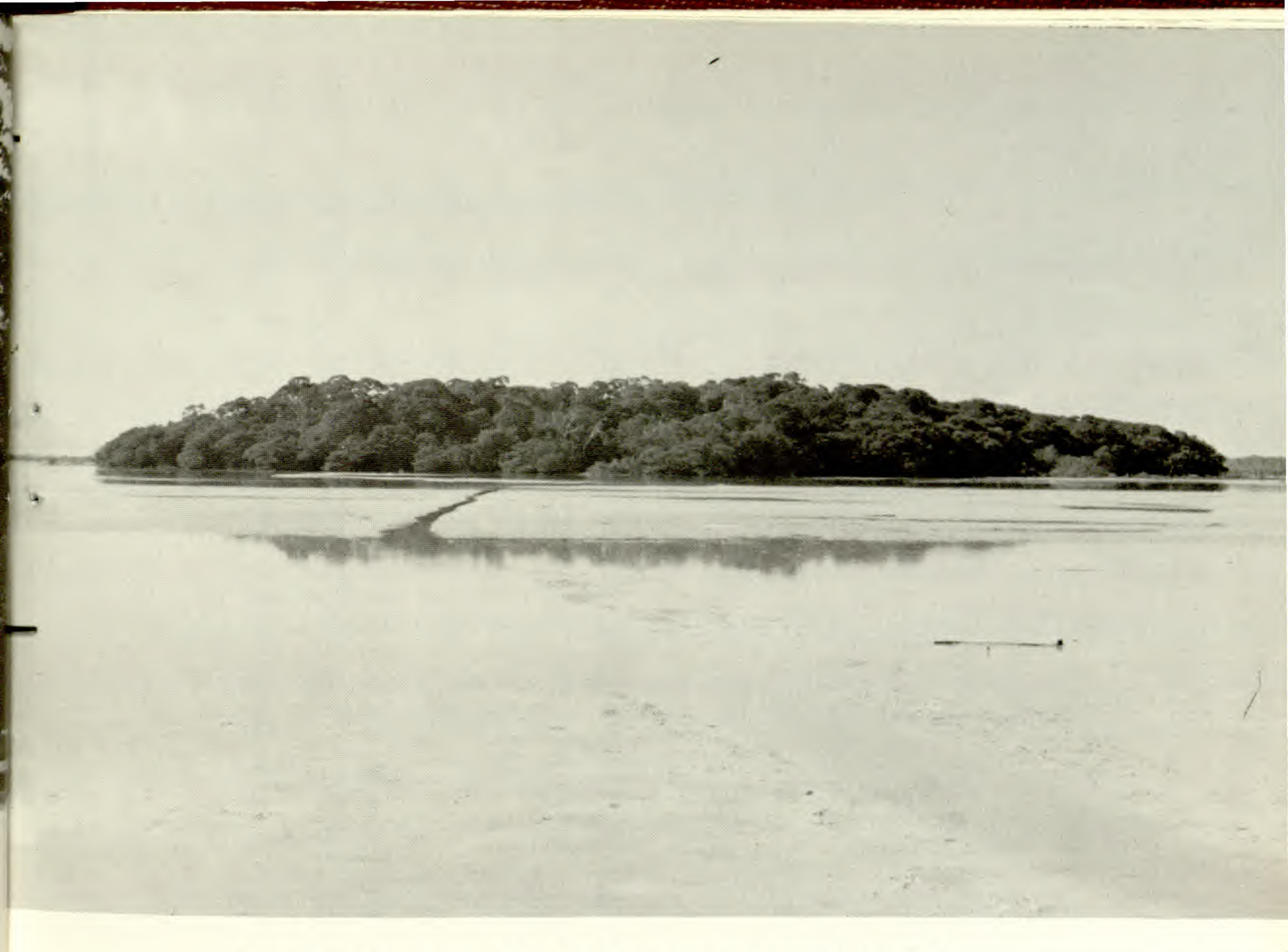


Fig. 40. A mangrove island in the cienaga, the coastal brackish swamp behind the beaches and low dunes of the dry north coast. The association in this habitat is typically halophytic.

Abandonment of the higher rainfall country of northern Peten, most of Campeche, Quintana Roo, and eastern and southern parts of the State of Yucatan with gradual collapse over a century or so of the civilization of the ancient Maya about 1000 A.D., resulted in reforestation with the sapodilla tree, *Achras Zapota*, becoming dominant in most of the uplands formerly in milpas. See Map 3.

Today, progressing eastward from Merida toward Valladolid and Chichen Itza, stands of high forest are encountered which are not xerophytic. Here the rainfall is twice that of Merida. This is old dry forest, mostly deciduous, and quite distinctive. I have designated this as advanced deciduous forest. Eastward toward the Caribbean and southward the forest becomes taller and more luxuriant. This is advanced evergreen sapodilla *(Achras Zapota)* forest which now characterizes, where not destroyed by milpa clearings and fires, eastern and southern sections of the State of Yucatan, all of Quintana Roo, and most of Campeche. Here the rainfall inland ranges up to 80 inches annually, and higher in Peten. See Map 1.

Bequaert (1933, pp. 513-514) described the dry forest of Yucatan, and I quote extracts from him:

> The spontaneous vegetation in the region of Chichen Itza is not xerophytic in the strict sense of the word. It combines a number of features of tropical humid forests with others peculiar to xerophytic woodlands,

and is perhaps best described as a dry forest. Nevertheless, it belongs among the tropophytic types of plant formations, which are commonly found between the tropics wherever the rainfall, though reaching a fairly high annual amount, is mainly or wholly restricted to a few months in the year. Under such conditions, the perennial parts of the plants show decided xerophilous adaptations, enabling them to survive the prolonged dry season. The herbs are either terrestrial species, with deeply buried or well-protected rhizomes or bulbs, or else epiphytes able to withstand desiccation or provided with water-storing devices. There are very few or no annuals, since their seeds stand little chance of escaping the bush-fires. Most shrubs, trees and woody creepers drop their leaves after the rains and pass the winter in a dormant condition, though some species bloom at that season. Many of the woody plants are thorny. With the first moisture of spring, the well-protected buds expand and produce fresh leaves which show no xerophilous structures and differ little from those of tropical rain forest trees.

Within a few weeks after the first rains, the landscape changes from a picture of desolation to one of tropical luxuriance. The seasonal changes in life are well described in the following extract from a letter by the late Dr. George F. Gaumer, which I quote from Millspaugh (1895, p. 4):

> March is one of our dryest months, quite hot but very healthy; many of the forest trees are then in bloom, though nearly leafless; for hunting wild animals and birds it is, however, the best month in the year. January and February are not so hot and have more flowers, while April and May are much hotter and the flowers are fewer still. In October, November and December, flowers are very abundant and the weather cool. June is by far the most delightful month of all the year. Nature, clad in the splendor of her fresh green attire, is everywhere bedecked with beautiful flowers, among which flit myriads of bright-hued butterflies and brilliant plumaged birds; rains are frequent, however, and form the only drawback to collecting. July, August and September are unsafe months for foreigners to visit this region, although there is no danger if they come in January and remain through this period.

The subxerophytic or tropophytic features of northern Yucatan appear to be due to the combination of three factors. The foremost of these is unquestionably the seasonal distribution and the low total amount of the rainfall, as E. Huntington (1912, p. 810) has rightly pointed out. This factor is made more potent by the dryness, rocky nature and porosity of the limestone soil, or the so-called "karsted" condition of the country. Finally, the continued and extensive destruction of the original vegetation, carried on for centuries as shown above, and the repeated burning over of the surface soil, have heavily handicapped the return of the true tropical forest types, which at one time may have covered most of the Peninsula. Before these depredations started, the bedrock may well have carried everywhere a substantial layer of humus and detrital soil, in which enough moisture could

Fig. 41. The dense low vegetation covering the low coastal dunes and sandy flats of Progreso. In this vegetation *Coccoloba uvifera*, *Achras Zapota*, *Agave* spp., *Paurotis Wrightii*, *Cocothinax argentea*, various cacti, and a host of other species typify the habitat. *Achras Zapota*, with flowers not differing in any aspect except for the longer pedicels, is here a low sand-binding shrub, a marvel of the adaptation of this species!

accumulate to allow for a more hygrophilous flora, especially of herbaceous plants.

The floristic composition and physiognomy of the advanced deciduous forest stands out in marked contrast to that of the widespread secondary thickets. The height usually exceeds 50 feet. Species rare in the thickets are here abundant, whereas *Acacia Gaumeri*, *Mimosa hemiendyta*, and other conspicuous elements of the low bush are comparatively rare.

Principal trees of the advanced deciduous forest include the following species:

Liliaceae:	*Beaucarnea Ameliae* Lundell
Moraceae:	*Brosimum Alicastrum* Sw.
	Chlorophora tinctoria (L.) Gaud.
	Ficus cotinifolia H.B.K.
	Ficus glaucescens (Liebm.) Miq.
	Ficus yucatanensis Standl.
Olacaceae:	*Ximenia americana* L.
Polygonaceae:	*Coccoloba acapulcensis* Standl.

Fig. 42. The xerophytic cactus-thorn forest of Yucatan growing south of the cienaga along the northern semi-desert plains across the top of the Peninsula. This zone of great endemism was cleared for planting henequen, and only relic areas remain. Here the giant endemic Cactaceae, as well as the endemic Euphorbiaceae and Leguminosae, make the association one of the most notable phytogeographic areas of Mexico.

The high degree of endemism in the flora indicates that the climate of the Peninsula has been stable for untold millenia with little change during the era man has occupied the region.

The photograph was taken of a relic stand of the xerophytic forest along the road from Telchac to Motul. Our field assistant, Eugenio May, stands in foreground. A naturalist and archaeologist, he worked with us at Chichen Itza, Coba and in the vegetation survey along the north coast of Yucatan. A Mayan, he was fluent also in Spanish and English, assisting in recording Maya plant names and uses.

	Coccoloba spicata Lundell
	Gymnopodium antigonoides (Rob.) Blake
	Neomillspaughia emarginata (Gross) Blake
Nyctaginaceae:	*Guapira linearibracteata* (Heimerl) Lundell
Annonaceae:	*Malmea Gaumeri* (Greenm.) Lundell
	Sapranthus campechianus (H.B.K.) Standl.
Lauraceae:	*Nectandra coriacea* (Sw.) Griseb.
Hernandiaceae:	*Gyrocarpus americanus* Jacq.
Capparidaceae:	*Capparis yucatanensis* Lundell
Leguminosae:	*Acacia Gaumeri* Blake

Fig. 43. A giant cactus, common in the xerophytic forest of the north coast of Yucatan.

	Caesalpinia Gaumeri Greenm.
	Caesalpinia platyloba Wats.
	Caesalpinia yucatanensis Greenm.
	Enterolobium cyclocarpum (Jacq.) Griseb.
	Lonchocarpus Xuul Lundell
	Lonchocarpus yucatanensis Pittier
	Lysiloma bahamense Benth.
	Piscidia piscipula (L.) Sarg.
	Pithecolobium albicans (Kunth) Benth.
	Swartzia cubensis (Britt. & Wils.) Standl.
Erythroxylaceae:	*Erythroxylon Bequaertii* Standl.
Rutaceae:	*Esenbeckia Yaaxhokob* Lundell
Burseraceae:	*Bursera Simaruba* (L.) Sarg.
	Protium Copal (Schlecht. & Cham.) Engler
Meliaceae:	*Cedrela mexicana* M. Roem.
	Trichilia arborea C.DC.
	Trichilia hirta L.
Simarubaceae:	*Alvaradoa amorphoides* Liebm.
	Simaruba glauca DC.
Malpighiaceae:	*Malpighia punicifolia* L.
Euphorbiaceae:	*Croton Ameliae* Lundell
	Croton arboreus Millsp.
	Drypetes lateriflora (Sw.) Krug & Urb.
	Jatropha Gaumeri Greenm.
Anacardiaceae:	*Metopium Brownei* (Jacq.) Urban
Celastraceae:	*Wimmeria obtusifolia* Standl.
Sapindaceae:	*Sapindus Saponaria* L.
	Talisia olivaeformis (H.B.K.) Radlk.
	Thouinia paucidentata Radlk.
Rhamnaceae:	*Colubrina Greggii* Wats. var. *yucatanensis* M. Johnst.
	Colubrina reclinata (L'Her.) Brongn.
	Krugiodendron ferreum (Vahl) Urban
Tiliaceae:	*Luehea speciosa* Willd.
Malvaceae:	*Hampea trilobata* Standl.
Bombacaceae:	*Bombax ellipticum* H.B.K.
	Ceiba aesculifolia (H.B.K.) Britt. & Baker
	Ceiba pentandra (L.) Gaertn.
	Ceiba Schottii Britt. & Baker
Sterculiaceae:	*Guazuma ulmifolia* Lam.
Flacourtiaceae:	*Casearia nitida* (L.) Jacq.
	Samyda yucatanensis Standl.
	Zuelania Guidonia (Sw.) Britt. & Millsp.
Myrtaceae:	*Eugenia itzana* Lundell
	Psidium yucatanense Lundell
Theophrastaceae:	*Jacquinia flammea* Millsp.
Ebenaceae:	*Diospyros anisandra* Blake

	Diospyros cuneata Standl.
	Diospyros yucatanensis Lundell
Sapotaceae:	*Achras Zapota* L.
	Bumelia mayana Standl.
	Chrysophyllum oliviforme L.
	Mastichodendron Gaumeri (Pittier) Lundell
Apocynaceae:	*Thevetia Gaumeri* Hemsl.
Boraginaceae:	*Bourreria pulchra* (Millsp.) Millsp.
	Cordia dodecandra DC.
	Cordia Sebestina L.
	Ehretia tinifolia L.
Verbenaceae:	*Cornutia latifolia* (H.B.K.) Moldenke
	Rehdera trinervis (Blake) Moldenke
	Vitex Gaumeri Greenm.
Bignoniaceae:	*Tabebuia chrysantha* (Jacq.) Nicholson
Rubiaceae:	*Alseis yucatanensis* Standl.
	Cosmocalyx spectabilis Standl.
	Coutarea octomera Hemsl.
	Guettarda Combsii Urban
	Guettarda elliptica Sw.
	Randia longiloba Hemsl.

The most extensive remnants of the advanced deciduous forest were found in the vicinity of Yokdzonoot between the villages of Piste and Libre Union, and along the road from Chichen Itza to Kaua. Scattered stands on the road from Merida to Uxmal have much the same assemblage of species, but no dominants such as the sapodilla which characterizes the wet forest to the east and south in the State of Yucatan, in Quintana Roo, Campeche, and northern Peten and northern Belize (Lundell, 1933, 1937).

The lists of trees, shrubs and other plants in the advanced deciduous forest given by Bequaert (1933, pp. 516-522) are more comprehensive but out of date as to nomenclature (in 1982!). Also, the Steere and Lundell collections of 1932 and 1938, respectively, in the University of Michigan Herbarium, add many additional species to the flora of this deciduous forest. Of course, the earlier collections of Gaumer are the basis for most of our knowledge of the flora of northern Yucatan.

Annotated List of the Species Collected or Observed in the State of Yucatan

The flora of the Yucatan Peninsula including all of Peten, Belize, Tabasco east of the Usumacinta River, Campeche, Quintana Roo and Yucatan, is closer related to that of the West Indies, in particular Cuba and Jamaica, than other Mexican and Central American areas. To clarify relationships, a definitive flora of all of Mexico, Central America and the West Indies is needed.

Fig. 44. The xerophytic forest near Telchac on the north coast of Yucatan.

The high endemism may well be reduced by a definitive flora of Cuba especially. New elements of the West Indian flora are being found in each large collection, as evidenced by the discovery in recent years of species of *Ottoschultzia* and *Reynosia* in Peten. Yet, as in Jamaica, there is a high degree of endemism in the Yucatan Peninsula, possibly as much as 15 percent of the flora.

As already stated, the complete first set of the 1938 collection from northern Yucatan and the Coba area of Quintana Roo is in the Herbarium of the University of Michigan. Duplicates, aside from those sent to collaborators for identification, were distributed widely on exchange.

Collaborators in the identification of the 1938 collections were S. F. Blake (Compositae), Agnes Chase and Jason R. Swallen (Gramineae), Elzada Clover (Cactaceae), E. P. Killip (Passifloraceae, Smilacaceae), E. C. Leonard (Acanthaceae), W. R. Maxon (Pteridophyta), Harold N. Moldenke (Avicenniaceae and Verbenaceae), Hugh T. O'Neill (Cyperaceae), F. W. Pennell (Schrophulariaceae), C. V. Morton (Dioscoreaceae, Smilacaceae, Solanaceae), Charles Schweinfurth (Orchidaceae), R. J. Seibert (Bignoniaceae), Lyman B. Smith (Bromeliaceae), William Trelease and T. G. Yuncker (Piperaceae), L.C. Wheeler (genus *Euphorbia*), Robert E. Woodson, Jr. (Apocynaceae).

Except for newly described and other species cited, the Annotated List consists of species as named on the labels of specimens when distributed. With the state of our knowledge of the flora, no attempt has been made to make a general updating of the name changes since 1938.

In the Annotated List, data are presented on medicinal and other uses of Yucatan plants. This information was recorded by Amelia A. Lundell in her Journal, assisted by Eugenio May and Marty Dzib (both Mayans speaking Maya, Spanish and English), and by Francisco Campos, working with Bambino Yam, a local *yerbatero* (native medicine man) from the village of Yaxche, near Chichen Itza.

Maya names of plants were recorded with their meaning so far as that was obtainable from the *yerbatero*. So that the data recorded would be current in 1938, no attempt was made to coordinate the spelling of names or give recorded uses with published accounts by Gaumer and others as listed by Standley (1930). Hence this provides some ethnobotanical information not previously recorded.

It is noteworthy how important the naturalized lime tree has become in native medicine. The use of lime juice in particular is widespread.

POLYPODIACEAE

Acrostichum daneaefolium L. & F. Abundant in mangrove swamp, 30 km. west of Progreso, *Lundell & Lundell 8187*, coarse fern, 10 ft.

Blechnum pyramidatum (Lam.) Urb. Along Merida to Progreso road, km. 31, along railroad, *Lundell & Lundell 8218*.

Polypodium Palmeri Maxon. Chichen Itza, on tree at edge of Thompson's Cenote, *Lundell & Lundell 7335*, scandent.

TYPHACEAE

Typha angustifolia L. Flats south of Progreso, km. 32 of road to Merida, coarse perennial herb.

GRAMINEAE

Anthephora hermaphrodita (L.) Kuntze. In roadside clearing, Progreso road, km. 26, *Lundell & Lundell 7980.*

Cenchrus echinatus L. West of Progreso, in beach zone scrub, *Lundell & Lundell 7954*, grass-bur.

Cenchrus pilosus H.B.K. Progreso road, along railroad, km. 31, *Lundell & Lundell 8018.*

Echinochloa colonum (L.) Link. Progreso road, km. 31, in flats, *Lundell & Lundell 8019, 8026.*

Eragrostis ciliaris (L.) R. Br. In beach zone, 30 km. east of Progreso, *Lundell & Lundell 8105*, annual.

Eragrostis domingensis (Pers.) Steud. Along Merida to Progreso road, km. 30, cleared flats, *Lundell & Lundell 8032*, perennial grass in large clumps.

Leptochloa filiformis (Lam.) Beauv. Progreso road, km. 27, in cleared flats, *Lundell & Lundell 8036*, coarse culms.

Panicum Chapmani Vasey. Progreso road, km. 31, in flats, *Lundell & Lundell 8008.*

Panicum fasciculatum Swartz. Along railroad, Progreso road, km. 17, *Lundell & Lundell 7963*, grass with smut.

Panicum geminatum Forsk. Progreso road, km. 31, in pools of flats, *Lundell & Lundell 8007.*

Panicum Ghiesbreghtii Fourn. Chichen Itza, roadside, *Lundell & Lundell 7427.*

Panicum maximum Jacq. Uxmal, in clearing, *Lundell & Lundell 8166*, coarse culms.

Panicum variifolium Swallen. Chichen Itza, in advanced second growth, *Lundell & Lundell 7425*.

Paspalum Blodgettii Chapm. Uxmal road, km. 36, roadside, *Lundell & Lundell 8096*, perennial. Uxmal, in clearing, *Lundell & Lundell 8164*.

Paspalum Hartwegianum Fourn. Progreso road, km. 29, in pools of flats, *Lundell & Lundell 8126*, perennial.

Paspalum malacophyllum Trin. Uxmal, in clearing, *Lundell & Lundell 8168*, coarse, glaucous, green.

Setaria magna Griseb. Flats south of Progreso, km. 32 of road, *Lundell & Lundell 8183*, coarse perennial grass, growing with *Typha*.

Setariopsis auriculata (Fourn.) Scribn. Chichen Itza, roadside at Akab Dzib, *Lundell & Lundell 7920*, annual.

Sporobolus virginicus (L.) Kunth. In salt flats with *Salicornia*, bordering Cienaga, west of Progreso, *Lundell & Lundell 7940*, perennial.

Trichachne insularis (L.) Nees. Progreso road, common in fields and clearings, *Lundell & Lundell 8191*, coarse culms.

CYPERACEAE

Dichromena colorata (L.) A. S. Hitchc. Progreso road, km. 33, in salt marsh, *Lundell & Lundell 8208*, sedge.

Eleocharis cellulosa Torr. Progreso road, km. 32, in marsh, *Lundell & Lundell 8211*.

Fimbristylis monostachya (L.) Hassk. In beach zone, 30 km. east of Progreso, *Lundell & Lundell 8098*, perennial.

Fimbristylis spadicea (L.) Vahl. Progreso, km. 33 of road, in salt marsh, *Lundell & Lundell 8209, 8210*.

Fuirena simplex Vahl. Flats south of Progreso, km. 32 of road, *Lundell & Lundell 8182*, perennial herb, growing with *Typha*.

PALMAE

Chamaedorea Seifrizii Burret. Chichen Itza, in garden, reported to be native, *Lundell & Lundell 7318*, slender stems 1 in. diam., 8-12 ft. high, branches of infructescence orange, erect, fruits globose. *Xiat.*

Chamaedorea sp. Chichen Itza, in advanced forest, *Lundell & Lundell 7529*, stems slender, clustered, 6-8 ft. high, perianth yellow. *Xiat.*

Sabal Japa Wright. Chichen Itza, in yard of Carnegie headquarters, *Lundell & Lundell 7368*, diam. 1 ft., height 20 ft., leaf segments erect, fruits globose, black, eaten by birds. *Huano.*

Additional species of palms for which identifications are not available are represented by the following collections:

Palm. Progreso, in beach zone, *Lundell & Lundell 7394*, plants 5-8 ft. tall.
Palm. Progreso, abundant in beach zone, *Lundell & Lundell 8178*, 6 ft., fruits white.
Palm of beach zone, abundant, 25 km. west of Progreso, *Lundell & Lundell* 8180.
Palm of beach zone, abundant, 25 km. west of Progreso, *Lundell & Lundell 8181.*

ARACEAE

Monstera deliciosa Liebm. Chichen Itza, a large epiphytic vine with edible fruiting spadices.

Philodendron sp. Near Yokdzonoot, in advanced forest, *Lundell & Lundell 7503*, scandent epiphyte, fruits red. *Sacxtaabcan* (*Sac* = white, *can* = snake [white roots resemble snake]).

Pistia Stratiotes L. Maxcanu, in water tanks, *Gaumer 23275, water-lettuce*, a floating aquatic plant, with a rosette of broad spongy leaves; very different in appearance from all other Araceae. *Lechuguilla.*

Syngonium podophyllum Schott. Izamal, *Gaumer 1091, Greenman 375*, a large glabrous epiphytic vine; leaves pedately parted into 5 or more oblong or oblanceolate segments. *Ochil.*

Syngonium sp. Chichen Itza, *Lundell & Lundell 7506*, scandent, spathe dark red, spadix soft and pulpy. *Xaaxtaabcan.*

Xanthosoma yucatanense Engl. Piste, *Lundell & Lundell 7894*, vine with large tuberous root, root boiled like potato and eaten with honey. *Macal.*

BROMELIACEAE

Bromelia Karatas L. Near Libre Union, in thickets and advanced forest, *Lundell & Lundell 7576*, acaulescent, leaves 5–8 ft. long, perianth orchid. *Pinuela.*

Catopsis nutans (Sw.) Gris. Chichen Itza, in second growth around Thompson's Cenote, *Lundell & Lundell 7322*, epiphyte.

Tillandsia Balbisiana Schult. Chichen Itza, in second growth, *Lundell & Lundell 7330, 7333*, epiphyte. Chichen Itza, *Lundell & Lundell 7442*, epiphyte. Chichen Itza, on Valladolid road, in advanced forest, *Lundell & Lundell 7522*, epiphyte, bracts red, perianth purple. Chichen Itza, in old forest, *Lundell & Lundell 7923*, epiphyte, perianth purplish. East of Progreso, in beach zone, *Lundell & Lundell 8116*, epiphyte, inflorescence red. *Xchu* (a parasite).

Tillandsia brachycaulos Schlecht. Chichen Itza, on trees among ruins, *Lundell & Lundell 7578*, epiphyte in colonies, perianth purple.

Tillandsia dasyliriifolia Baker. Progreso, in beach zone, common as terrestrial, *Lundell & Lundell 7391*, plants 4 ft. tall.

Tillandsia fasciculata Sw. Chichen Itza, *Lundell & Lundell 7443, 7559*, epiphyte, bracts reddish.

Tillandsia Schiedeana Steud. Chichen Itza, in second growth around Thompson's Cenote, *Lundell & Lundell 7334*, epiphyte.

Tillandsia streptophylla Scheidw. Near Yokdzonoot, in advanced forest, *Lundell & Lundell 7491*, coarse epiphyte. *Xmulixchu* (*Xmulix* = curly, *chu* = parasite).

If a woman who has just had a baby gets up and goes out too soon, she develops a headache which is cured by grinding the entire plant, wetting it with honey and patting the paste on the forehead.

Tillandsia subimbricata Bak. Chichen Itza, on tree among ruins, *Lundell & Lundell 7558*, epiphyte, bracts yellow, perianth purple.

PONTEDERIACEAE

Heteranthera limosa (Sw.) Willd. Progreso road, km. 30, abundant in pools of cleared flats, *Lundell & Lundell 8202*, aquatic, flowers blue.

LILIACEAE

Beaucarnea Ameliae Lundell, Bull. Torr. Bot. Club 66: 585, fig. 1. 1939. Noh Itza, km. 104, from grove of trees, *Lundell & Lundell 7566*, tree, up to 10 in. diam., 25 ft. high, enlarged at base. Progreso road, km. 29, in cut-over flats, *Lundell & Lundell 8128* (isotype, LL), base enlarged, flowers nearly white, panicles pyramidal, 30 in. high, lower bracts leafy, upper short. *Dzipil.*

It is used as offering to the saints. Planted for ornament.

Nolina pliabilis (Baker) Lundell, Bull. Torrey Bot. Club 66: 587. 1939. *Dasylirion pliabile* Baker, Journ. Linn. Soc. Bot. 18: 240. 1880. In littoral area near Sisal, Oct. 24, 1875, *Arthur Schott 892* (isotype, F). *Tzipil.*

AMARYLLIDACEAE

Agave decipiens Baker, vel aff. Plants abundant in beach zone everywhere, collected 35 km. east of Progreso, *Lundell & Lundell 8110*, trunk up to 2 ft. high.

Furcraea Cahum Trel. Near Noh Itza, in advanced forest, *Lundell & Lundell 7564, 7565*, plants with short trunk, 8 in. diam., 2 ft. high, the leaves 5-8 ft. long, perianth greenish. *Cahum.*

Fiber from leaves is silk-like. Used for fine rope, soft twine and lariats.

Zephyranthes sp. Along Merida to Progreso road, km. 33, in cleared flats, *Lundell & Lundell 8066*, bulbous perennial, perianth yellow.

SMILACACEAE

Smilax spinosa Mill. Chichen Itza, in thicket on Valladolid road, *Lundell & Lundell 7521*, thorny vine, 15 ft. long, flowers greenish. Chichen Itza, vine on fence, *Lundell & Lundell 7523. Xcooceh (Xcoo* = teeth, *ceh* = deer [thorns on vine look like teeth of deer]).

Root is ground and boiled with sugar to make a liquid which is taken to purify the blood. Color of wine when cooked.

DIOSCOREACEAE

Dioscorea Gaumeri Knuth. Chichen Itza, in second growth, *Lundell & Lundell 7918*, herbaceous vine, perianth dark purple. Uxmal road, km. 40, in low forest, *Lundell & Lundell 8092*, herbaceous vine, flowers purple.

Dioscorea macrostachya Benth. Uxmal, in clearing, *Lundell & Lundell 8167*, herbaceous vine, 12 ft. In thicket on hills south of Muna, *Lundell & Lundell 8173*, herbaceous vine, perianth red-purple.

Dioscorea matagalpensis Uline. Near Xocenpich, in second growth, *Lundell & Lundell 7880*, glabrous, herbaceous vine. Uxmal road, km. 18, along fences and in thicket, *Lundell & Lundell 8084*, herbaceous vine, flowers pale green.

Dioscorea pilosiuscula Bert. Along roadside, near Piste, *Lundell & Lundell 7870*, vine. Near Xocenpich, in second growth, *Lundell & Lundell 7881*, pubescent, vine. Chichen Itza, Kaua road, in second growth, *Lundell & Lundell 7902, 7913, 7914*, vine. Near Piste, in second growth, *Lundell & Lundell 7934*, vine. Uxmal road, km. 40, in low forest, *Lundell & Lundell 8093*, vine. *Macalcuch* (same name for all species of *Dioscorea).*

ORCHIDACEAE

Schomburgkia tibicinis Batem. Progreso, large terrestrial colonies in beach zone, *Lundell & Lundell 7397*, scapes 3-5 ft. tall.

Stenorrhynchus orchioides (Sw.) L. C. Rich. Chichen Itza, in plaza, near Castillo, *Lundell & Lundell 7315*, fleshy herb with cluster of tuberous roots, flowers salmon-colored.

Triphora cubensis (Rchb.f.) Ames. Chichen Itza, in garden (said to be native in Old Chichen Itza), *Lundell & Lundell 7324*, slender reddish herb with tuberous root.

PIPERACEAE

Piper medium Jacq. Near Piste, in old thicket, *Lundell & Lundell 7551*, shrub. *Yaaxpehech.*

Piper sempervirens (Trel.) Lundell. Chichen Itza, in second growth, *Lundell & Lundell 7406*, shrub, 6 ft. high, spikes and flowers white. Chichen Itza, in advanced forest, on Valladolid road, *Lundell & Lundell 7467*, shrub, 10 ft. high. Chichen Itza, Kaua road, in old forest, *Lundell & Lundell 7916*, shrub, 8 ft. *Xaaxpeheche, Xbeheche (Xbehe* = forked, *che* = tree).

Leaves cure splitting of hair; boil leaves and wash hair with liquid. Soak leaves in water, drink one-half glass; a cure for malaria.

Piper yucatanense C.DC. Izamal, *Gaumer* in 1888. A shrub with inflorescence similar to that of *Piper sempervirens.*

ULMACEAE

Celtis iguanaea (Jacq.) Sarg. Chichen Itza, common in old thickets, *Lundell & Lundell 7591*, woody, clambering, thorny. In thorn thicket, Progreso road, km. 28, *Lundell & Lundell 7993*, shrub, 8 ft. (sterile). *Sitzmeic.*

Named this because the plant grows over trees binding them together. Fruits are edible, yellow when ripe.

Trema floridana Britton. Chichen Itza, in second growth on Valladolid road, *Lundell & Lundell 7462*, slender tree, 12 ft. high, berries red. *Yaaxhol* (*Yaax* = green, *hol* = hole).

Leaves serve as forage for horses. Fruits eaten by wild birds.

MORACEAE

Brosimum Alicastrum Sw. In vicinity of Chichen Itza, usually a large tree. *Ramon, Ox.*

Leaves and twigs harvested for forage.

Cecropia peltata L. Near Piste, common in old thickets, *Lundell & Lundell 7548*, tree, up to 6 in. diam., 25 ft. high. *Xkochleh* (*Xkoch* = castorbean, *leh* = leaf).

Chlorophora tinctoria (L.) Gaud. In advanced deciduous forest, Chichen Itza, a common tree. *Mora.*

Ficus cotinifolia H.B.K. Chichen Itza, in clearing, *Lundell & Lundell 7317*, strangler fig, tree, 35 ft. high, fruits geminate.

Ficus glaucescens (Liebm.) Miq. Chichen Itza, around Xtoloc Cenote, *Lundell & Lundell 7556*, receptacles solitary. *Sakahua.*

Planted for shade. Deer eat fruit.

Ficus religiosa L. Planted along streets in Merida, *Lundell & Lundell 8073*, tree, 10 in. diam., 35 ft. high. *Alamo morado.*

Ficus yucatanensis Standl. Along Piste to Libre Union road, km. 112, in advanced forest, *Lundell & Lundell 7572*, strangler fig, 40 ft. high. *Sakahua.*

LORANTHACEAE

Phoradendron Gaumeri Trel. On Merida to Progreso road, km. 10, in thorn thicket, *Lundell & Lundell 8121*, parasite on *Gymnopodium.*

OLACACEAE

Ximenia americana L. Chichen Itza, Valladolid road, in advanced deciduous forest, *Lundell & Lundell 7514*, small tree, fruits yellow, plum-like, edible.

POLYGONACEAE

Coccoloba acapulcensis Standl. *C. Browniana* Standl. *C. cardiophylla* Standl. Chichen Itza, along Kaua road in advanced deciduous forest, *Lundell & Lundell 7471*, tree, 3 in. diam., 25 ft. high, perianth greenish. Chichen Itza, Valladolid road, in advanced forest, *Lundell & Lundell 7513*, tree, 4 in. diam., 20 ft. high. Near Ebtun, in advanced deciduous forest, *Lundell & Lundell 7534*, slender tree, fruits globose. *Totohiu* (*Toto* = straight, *hiu* = hardwood), *Xtohyuche* (*Xtoh* = straight, *Yu* = very, *che* = tree).

Blades of axe or machete are dulled by trying to cut this hard wood. Wood used for beams in roofs of houses. A medicine is made to cure pellagra by boiling leaves of this tree with equal number from *pasmarxiu*, *cruzcheik* and *botunak*. Liquid is rubbed on infected parts and also for bathing.

Coccoloba spicata Lundell, Bull. Torrey Bot. Club 66: 594, f.4. 1939. In thicket around Sacred Cenote, Chichen Itza, *Lundell & Lundell 7325* (holotype, MICH). *Bob.*

Coccoloba uvifera (L.) Jacq. Progreso, abundant in beach zone, being one of characteristic species, *Lundell & Lundell 8060*, shrub, flowers pale green.

Gymnopodium antigonoides (Rob.) Blake. Piste, abundant in second growth, *Lundell & Lundell 7385*, small tree, 15 ft. high, bark coarsely shredded. Chichen Itza, in second growth, *Lundell & Lundell 7410, 7459*, small tree, flowers pale green. Near Ebtun, in advanced forest, *Lundell & Lundell 7535*, shrub. Along Piste to Libre Union road, abundant large shrub in advanced forest 30 km. east and west of Chichen Itza, *Lundell & Lundell 7571*. *Dzidzilche* (*Dzidzil* = crumbles, *che* = wood [bark crumbles]).

Flowers used by bees to flavor their honey. Wood is used for making some kinds of furniture.

Gymnopodium floribundum Rolfe. Uxmal road, km. 35, in thicket, *Lundell & Lundell 8089*, treelet, 12 ft.

Neomillspaughia emarginata (Gross) Blake. Near Yokdzonoot, abundant in second growth forest, *Lundell & Lundell 7487*, small tree, 15 ft. high, perianth nearly white. Near Xocenpich, abundant in second growth, *Lundell & Lundell 7882*, shrub, 8–20 ft. high. *Sac Itza* (*Sac* = white, *Itza* = name of Maya tribe).

Cures rheumatism by rubbing leaves very hard on infected part.

CHENOPODIACEAE

Atriplex pentandra (Jacq.) Standl. Progreso, rather common in beach zone, *Lundell & Lundell 8156*, coarse herb.

Salicornia Bigelovii Torr. Progreso, in drainage ditch, beach zone, locally abundant, *Lundell & Lundell 8141*, annual.

Salicornia perennis Mill. East of Progreso, abundant in wet sand, open areas along cienaga, bordering mangrove, *Lundell & Lundell 8112*.

Suaeda mexicana Standl. Progreso, on beach, *Lundell & Lundell 8153*, herb.

AMARANTACEAE

Alternanthera ramosissima (Mart.) Chod. Progreso, common in beach zone, *Lundell & Lundell 8186*, tall herb.

Amaranthus annectens Blake. Progreso, common on beach, *Lundell & Lundell 8061*, annual herb.

Gomphrena dispersa Standl. Progreso road, km. 30, in cleared flats, *Lundell & Lundell 8204*, herb.

Iresine Celosia L. Progreso, abundant in beach zone, *Lundell & Lundell 8150*, herb, 2–4 ft.

Philoxerus vermicularis (L.) R. Br. Progreso, in cleared flats, south of cienaga, *Lundell & Lundell 8021*, herb.

NYCTAGINACEAE

Boerhaavia erecta L. In clearings, Progreso road, km. 26, *Lundell & Lundell 7989*, annual.

Commicarpus scandens (L.) Standl. West of Progreso, along beach, *Lundell & Lundell 7953*, slender herb with long branches, perianth white.

Guapira linearibracteata (Heimerl) Lundell, Wrightia 3: 22. 1962. Piste, in second growth, *Lundell & Lundell 7343, 7360, 7365*, shrub or small tree, 3 in. diam., 15 ft. high, fruits subglobose, dark red. Xocenpich, in second growth, *Lundell & Lundell 7358, 7359*, arborescent shrub, perianth green and tan. Chichen Itza, in second growth, *Lundell & Lundell 7429*, tree, 30 ft. high. *Xtaadzih.*

Neea choriophylla Standl., vel aff. Chichen Itza, near the Castillo, in low thicket, *Lundell & Lundell 7422A*, shrub. Uxmal, in clearing, *Lundell & Lundell 8163*, erect slender shrub, 3 ft.

Neea hirtella Lundell, Bull. Torr. Bot Club 69: 388. 1942. Chichen Itza, in low thicket near the Castillo, *Lundell & Lundell 7422* (isotype, LL), shrub, 2-3 ft. high, fruits ellipsoid, dark red.

Neea sphaerantha Standl. Common in beach zone, 35 km. east of Progreso, *Lundell & Lundell 8107*, arborescent shrub.

Okenia hypogaea S. & C. On beach, 30 km. east of Progreso, *Lundell & Lundell 8101*, viscid annual, corolla purple.

Oxybaphus violaceus (L.) Choisy. Chichen Itza, common in clearing, *Lundell & Lundell 7605*, perennial herb, corolla purple.

BATIDACEAE

Batis maritima L. Progreso, abundant at edge of mangrove swamp, in cienaga, *Lundell & Lundell 8138*, perennial herb.

AIZOACEAE

Trianthema Portulacastrum L. Progreso road, km. 31, abundant in cleared flats, *Lundell & Lundell 8207*, fleshy herb, flowers pink.

PORTULACACEAE

Portulaca oleracea L. Progreso road, km. 31, abundant in cleared flats, *Lundell & Lundell 8206*, fleshy herb, perianth yellow. *Verdalago, Xucul.*

Talinum paniculatum (Jacq.) Gaertn. Progreso road, km. 27, roadside, *Lundell & Lundell 8200*, erect herb.

Talinum triangulare (Jacq.) Willd. Chichen Itza, around Thompson's Cenote, in thicket, *Lundell & Lundell 7592*, fleshy perennial herb, corolla white. In thorn thicket, Progreso road, km. 28, *Lundell & Lundell 7991*, fleshy herb with white petals.

ANNONACEAE

Annona reticulata L. Chichen Itza, planted for its fruit, *Lundell & Lundell 7528*, tree, 6 in. diam., 20 ft. high, flowers pale green. *Oop.*

Leaves are ground up, wet with honey or lime juice and patted on to cure infection. Fruit edible.

Malmea Gaumeri (Greenm.) Lundell, Wrightia 5: 27. 1974. *Guatteria Gaumeri* Greenm. Chichen Itza, common in second growth, *Lundell & Lundell 7432*, evergreen tree, 3 in. diam., 20 ft. high, berries ellipsoid, blood-red. Chichen Itza, in advanced forest, *Lundell & Lundell 7516*, slender tree, 2 in. diam., 15 ft. high. *Elemuy (Ele* = burn, *muy* = name of tree).

Liquid from boiled root taken for kidney cleansing. Wood is used in roofs of houses.

Sapranthus campechianus (H.B.K.) Standl. Chichen Itza, in advanced forest, *Lundell & Lundell 7450*, arborescent shrub, 4 ft. high, petals maroon. *Hasmaax (Has* = banana, *maax* = monkey).

Grind leaves, make a poltice and put under the arm to cure kernels.

LAURACEAE

Cassytha filiformis L. West of Progreso, on plants in beach zone scrub, *Lundell & Lundell 7957*, parasite. Progreso road, km. 33, on shrubs in mangrove belt, *Lundell & Lundell 8068*, parasitic vine, orange and green stems.

Nectandra coriacea (Sw.) Griseb. Chichen Itza, in advanced second growth on Valladolid road, *Lundell & Lundell 7435, 7484*, evergreen tree, 20 ft. high, corolla white. *Xhochob, Xochoc (Xoch* = owl, *oc* = feet).

Inhabited by species of ant called Xhoch. Wood used in house construction.

HERNANDIACEAE

Gyrocarpus americanus Jacq. Progreso road, km. 23, in thorn thicket, *Lundell & Lundell 7987*, tree, 6 in. diam., 12 ft. high, said to grow large in southern forest, infructescence borne below leaves, on enlarged stem area. *Ciste.*

CRUCIFERAE

Brassica juncea (L.) Coss. Progreso road, km. 31, along railroad, *Lundell & Lundell 8020*, erect annual.

Cakile edentula (Bigel.) Hook. On beach, east of Progreso, *Lundell & Lundell 8051*, herb, corolla white or lavender.

CAPPARIDACEAE

Capparis flexuosa L. Progreso road, km. 25, in thorn thicket, *Lundell & Lundell 8041*, woody vine.

Capparis incana H.B.K. Chichen Itza, in advanced forest on Valladolid road, *Lundell & Lundell 7586*, arborescent, capsule reddish within, pulp red surrounding seed. East of Progreso, abundant in beach zone, and present in thorn thicket south of cienaga, *Lundell & Lundell 8115*, shrub or tree up to 12 ft. high, 6 in. diam. *Cocche* (*Coc* = cough, *che* = tree).

Liquid from boiled leaves and roots given babies for whooping cough and asthma.

Capparis yucatanensis Lundell, Bull. Torr. Bot. Club 69: 389. 1942. Chichen Itza, in advanced forest on Valladolid road, *Lundell & Lundell 7452* (isotype, LL), arborescent shrub, 12 ft. high.

Crataeva glauca Lundell, Bull. Torr. Bot. Club 69: 389. 1942. Merida to Progreso road, in thorn thicket, km. 20, *Lundell & Lundell 8142*, tree, 6 in. diam., 15 ft. high. *Kolokmax.*

ROSACEAE

Chrysobalanus Icaco L. Along the reef in coastal thicket, Progreso, a shrub.

LEGUMINOSAE

Acacia dolichostachya Blake. Piste, in second growth, *Lundell & Lundell 7344*, tree, 2 in. diam., 12 ft. high, stamens nearly white, flowers very fragrant. *Supte, Xaax.*

Acacia Gaumeri Blake. Near Piste, abundant in old thicket, *Lundell & Lundell 7550*, shrub or small tree, flowers yellow-green. Progreso road, abundant, one of dominants in thorn thicket everywhere, *Lundell & Lundell 8192*, shrub, 15 ft. *Boxcatzim* (*Box* = black, *catzim* = a family of trees [also a family name among the Maya]).

Acacia Milleriana Standl. Chichen Itza, in second growth, *Lundell & Lundell 7418*, thorny tree, 8 in. diam., 25 ft. high, flowers fragrant. *Chimay.*

Hard wood, very durable, used for door and window frames.

Acacia riparioides (B. & R.) Standl. Near Piste, *Lundell & Lundell 7936*, shrub, 10 ft., stamens greenish-white. Progreso road, km. 23, in thorn thicket, common, *Lundell & Lundell 8195*, shrub or small tree, 12 ft. *Xtelsak.*

Aeschynomene fascicularis Schl. & Cham. Chichen Itza roadside, *Lundell & Lundell 7340*, suffrutescent, corolla dark yellow.

Apoplanesia paniculata Presl. Progreso road, km. 22, in thorn thicket, *Lundell & Lundall 7986*, treelet, 15 ft., bark white. *Kukche.*

Bauhinia spathacea DC. Piste, in second growth, *Lundell & Lundell 7369*, arborescent shrub, 6 ft. high, petals white. In thorn thicket, Progreso road, km. 18, *Lundell & Lundell 7968*, shrub or treelet, 6–8 ft., corolla white. *Dzurubtook, Tsulubtook, Tsulutok.*

Flower used for curing cough, also, for a fever.

Caesalpinia Gaumeri Greenm. Chichen Itza, in advanced forest, on Valladolid road, *Lundell & Lundell 7588*, tree, 6 in. diam., 25 ft. high, common in old second growth. *Xkitamche* (wild pig tree).

Plant smells like wild pig. Its wood used for corner posts and beams in houses, and for charcoal and for burning lime.

Caesalpinia platyloba Wats. Chichen Itza, in advanced forest, a common tree.

Caesalpinia vesicaria L. Progreso, one of characteristic plants of beach zone, *Lundell & Lundell 8177*, thorny shrub.

Caesalpinia violacea (Mill.) Standl. Piste, in second growth, *Lundell & Lundell 7346*, tree, 3 in. diam., 18 ft. high, corolla yellow. Chichen Itza, in second growth, *Lundell & Lundell 7405*, tree, 8 in. diam., 30 ft. high, wings and keel of flower yellow, sepals fringed, reddish. *Chacte (Chacte* = red).

Red wood used for beams.

Caesalpinia yucatanensis Greenm. In advanced forest, vicinity of Chichen Itza, a common small tree.

Calliandra yucatanensis (B. & R.) Standl., vel aff. Chichen Itza, Valladolid road, in second growth, *Lundell & Lundell 7411*, arborescent shrub, 12 ft. high, stamens white. *Meexmuxib* (*Meex* = mustache or beard, *muxib* = old man [old man's beard]).

Canavalia maritima (Aubl.) Thou. In beach zone, 35 km. east of Progreso, *Lundell & Lundell 8106*, coarse vine, petals lavender, growing over shrubs.

Cassia emarginata L. Uxmal road, in legume thickets, *Lundell & Lundell 8076*, tree or large shrub, 8–15 ft. *Xtu'habin.*

Cassia itzana Lundell, Bull. Torr. Bot. Club 60:390. 1942. In beach zone scrub, west of Progreso, *Lundell & Lundell 7959* (holotype, LL), perennial herb, prostrate, corolla yellow. Beach zone, east of Progreso, *Lundell & Lundell 8055*, perennial herb, corolla yellow. Off Merida to Progreso road, km. 29, in cut-over flats, *Lundell & Lundell 8127*, shrub, 2 ft.

Cassia Peralteana H.B.K. Chichen Itza, in second growth at Sacred Cenote, *Lundell & Lundell 7320*, shrub. Near Yokdzonoot, in low second growth, *Lundell & Lundell 7490*, shrub, 10 ft., corolla yellow. Uxmal road, km. 40, in thicket, *Lundell & Lundell 8088*, shrub, 6 ft., corolla yellow. *Xaaxhabin (Xaax* = green, *habin* = a kind of hard wood).

Cassia yucatana (B. & R.) Lundell, Publ. Carnegie Inst. Wash. 436: 313. 1934. Chichen Itza, in second growth on Valladolid road, *Lundell & Lundell 7444*, shrub, 3 ft. high, petals yellow. *Cabatzalam (Caba* = low, *tzalam* = a species of tree [means a low plant with leaves like the large *tzalam tree*], *Kambahtzalam;* also called *oroxiu* because the flowers are bright and yellow).

Serves as forage for cattle.

Centrosema Plumierii Turp. Thicket on hills south of Muna, *Lundell & Lundell 8175*, herbaceous vine, standard with large purple center.

Centrosema virginianum (L.) Benth. In thorn thicket, along Merida to Progreso road, km. 26, *Lundell & Lundell 7990*, vine, corolla bluish.

Desmanthus virgatus (L.) Willd. Along roadside, km. 20, Progreso road, *Lundell & Lundell 8190*, perennial.

Desmodium frutescens (Jacq.) Schindl. Chichen Itza, roadside, *Lundell & Lundell 7909*, perennial.

Diphysa carthagenensis Jacq. Chichen Itza, in low thicket near the Castillo, *Lundell & Lundell 7423*, shrub, 12 ft. high, corolla yellow. Near Piste, in old thicket, *Lundell & Lundell 7540*, shrub. Uxmal road, km. 27, in thicket, *Lundell & Lundell 8081*, shrub, 6 ft., corolla yellow. *Dzudzuc (Dzudzuc* = peak).

Medicine is made by grinding the herb and wetting it with lime juice. This paste is placed in small peak on a carbuncle or boil.

Enterolobium cyclocarpum (Jacq.) Griseb. Vicinity of Chichen Itza, in advanced deciduous forest, a large tree. *Pich.*

Erythrina Standleyana Krukoff. Chichen Itza, in advanced forest, *Lundell & Lundell 7453*, arborescent shrub, 10 ft. high. Merida to Progreso road, km. 28, rather common in thorn thicket, *Lundell & Lundell 8045*, spreading shrub, 10 ft. *Chacmoolche (Chac* = red, *mool* = jaguar, *che* = tree).

Root is roasted and when dry it is powdered. Used to cure ulcers and open sores. Very poisonous.

Galactia striata (Jacq.) Urban. Along roadside, near Piste, *Lundell & Lundell 7868*, herbaceous vine, corolla purplish.

Haematoxylum campechianum L. Progreso road, km. 31, in thorn thicket, in flats, *Lundell & Lundell 8001*, shrub, 8 ft. *Ek.*

Indigofera mucronata Spreng. Progreso road, km. 13, in thorn thicket, *Lundell & Lundell 7969*, slender perennial with clambering branches, petals salmon-red.

Leucaena glauca (L.) Benth. Progreso road, km. 23, in thorn thicket, *Lundell & Lundell 8193*, treelet, 10 ft. *Uaxim.*

Lonchocarpus Xuul Lundell, Bull. Torr. Bot. Club 69: 391. 1942. Xocenpich, in second growth, *Lundell & Lundell 7353, 7356*, shrub. Chichen Itza, in advanced forest, on Valladolid road, *Lundell & Lundell 7475, 7481, 7482* (paratypes), tree, up to 8 in. diam., 30 ft. high, corolla purple and green. On Piste to Yokdzonoot road, in old forest, *Lundell & Lundell 7864* (holotype, MICH; isotype, LL), tree, 3 in. diam., 20 ft. high. *Kanxuul (Kan* = yellow, *xuul* = end), *Xuul.*

Wood used in house construction. Leaves or bark are boiled with honey added. The drink cures night sweat.

When cattle or chickens get sick and die, they are placed in a plot fenced in by wood of this tree. The suspicion is that this kills the epidemic.

Lonchocarpus yucatanensis Pittier. Near Piste, in old thicket, *Lundell & Lundell 7552*, small tree, corolla rose-pink. On Yokdzonoot road, in old forest, *Lundell & Lundell 7866*, tree, 5 in. diam., 30 ft. high, flowers red-purple. *Yaaxxuul (Yaax* = green, *xuul* = end).

The hard wood used for part of wagon and for beams in houses.

Lysiloma bahamense Benth. Chichen Itza, in second growth, *Lundell & Lundell 7436*, tree, 6 in. diam., 30 ft. high, stamens white. *Tzalam.*

Mimosa hemiendyta Rose & Robinson. On Yokdzonoot road, in old forest, *Lundell & Lundell 7875*, large spiny shrub, 12-20 ft., bark white *(Sac)*, stamens pinkish. On Merida to Progreso road, km. 23, abundant everywhere, a dominant of thorn thicket over Yucatan, *Lundell & Lundell 8196*, shrub, stamens pink. *Saccatzim.*

Mimosa sp. In thorn thicket, south of cienaga, along Motul road leaving Telchac, *Lundell & Lundell 8102*, shrub, 4 ft., flowers tinged pink.

Phaseolus lathyroides L. Progreso road, km. 30, in cleared, swampy, rocky flats, *Lundell & Lundell 8016*, herb, corolla purple.

Piscidia piscipula (L.) Sarg. Vicinity of Chichen Itza, in advanced deciduous forest, a common tree. *Habin.*

Pithecolobium albicans (Kunth) Benth. Near Xocenpich, common in second growth, *Lundell & Lundell 7887*, tree, 6 in. diam., 30 ft. high, stamens white, bark used for tanning. Progreso road, km. 10, abundant in thorn thicket, *Lundell & Lundell 8119*, tree, 12 ft., trunk and branches thorny. Progreso road, km. 20, *Lundell & Lundell 8189*, thorny shrub, 20 ft. *Chucum.*

Pithecolobium dulce (Roxb.) Benth. Chichen Itza, in old thicket, *Lundell & Lundell 7601*, thorny shrub, pods red. Progreso road, one of the characteristic species of thorn-thicket, abundant, *Lundell & Lundell 8131*, shrub, 6–12 ft., spreading. *Tsiuche, Xdzuiche.*

Pithecolobium keyense Britton, vel aff. Progreso, locally abundant in beach zone, *Lundell & Lundell 8184*, shrub, spreading.

Swartzia cubensis (Britt. & Wils.) Standl. Chichen Itza, in advanced forest, on Valladolid road, *Lundell & Lundell 7445*, tree, 14 in. diam., 50 ft. high, fruits orange-yellow. *Swartzia Lundellii* Standl., described from Peten, is considered a synonym. *Katalox (Katal* = blocked or something in way, *ox* = name of the *ramon, Brosimum Alicastrum* Sw.).

Fruit eaten by deer and wild turkeys.

OXALIDACEAE

Oxalis yucatanensis (Rose) R. Knuth. Uxmal road, km. 40, roadside, *Lundell & Lundell 8091*, erect perennial, corolla yellow.

ERYTHROXYLACEAE

Erythroxylon Bequaertii Standl. Near Kaua, in advanced forest, *Lundell & Lundell 7533*, tree, 3 in. diam., 25 ft. high. *Sacikiche* (white wood).

Erythroxylon brevipes DC. Chichen Itza, in thicket around the Sacred Cenote, *Lundell & Lundell 7527*, tree, 4 in. diam., 15 ft. high, petals yellow-green. Near Kaua, in advanced forest, *Lundell & Lundell 7531*, small tree. Libre Union road, *Lundell & Lundell 7567*, tree. *Borikiche* (black wood), *Xikilche.*

ZYGOPHYLLACEAE

Guaiacum sanctum L. Progreso road, km. 26, in thorn thicket, *Lundell & Lundell 8038*, shrub, 9 ft., spreading, capsules orange, flesh surrounding seed red.

Tribulus cistoides L. Progreso, abundant on beach, *Lundell & Lundell 8149*, prostrate herb, corolla yellow.

RUTACEAE

Esenbeckia Yaaxhokob Lundell, Lloydia 4: 50. 1941. Near Kaua off the Chichen Itza to Kaua road, in advanced deciduous forest, *Lundell & Lundell 7532* (paratype), a tree, 30 ft. high, 8 in. diam. In thorn thicket, off Merida to Progreso road, km. 20, *Lundell & Lundell 7983* (paratype), small tree. *Yaaxhokob.*

Pilocarpus racemosus Vahl. Old forest, near Yokdzonoot, *Lundell & Lundell 7861*, small tree with dry fruit.

BURSERACEAE

Bursera Schlechtendalii Engl. Progreso road, near cienaga, km. 32, in thorn thicket, *Lundell & Lundell 7975*, shrub, 8 ft., wood lemon-odored, latex white. *Sacchacah.*

Bursera Simaruba (L.) Sarg. Piste, in second growth, *Lundell & Lundell 7366*, small tree. *Chacah.*

Protium Copal (Schlecht. & Cham.) Engler. Chichen Itza, in advanced deciduous forest, a common tree. *Pom. Copal.*

A principal source of incense.

MELIACEAE

Cedrela mexicana M. Roem. Chichen Itza, in clearing, *Lundell & Lundell 7440*, tree, 24 in. diam., 75 ft. high, flowers pale green. *Cedro.*

Trichilia arborea C.DC. Chichen Itza, in advanced deciduous forest, a medium sized tree. *Chobenche.*

Trichilia hirta L. Chichen Itza, second growth around plaza, near Castillo, *Lundell & Lundell 7316*, tree, 4 in. diam., 12 ft. high. Chichen Itza, in old thicket, *Lundell & Lundell 7555*, small tree, corolla greenish. In thorn thicket, Merida to Progreso road, km. 13, *Lundell & Lundell 7970*, small tree, 12 ft. *Chobenche.*

A laxative is made by taking 10 to 12 leaves, crumbling them into a pint of water, straining the mix and then taking as drink. Also used to eliminate bile.

SIMARUBACEAE

Alvaradoa amorphoides Liebm. Chichen Itza, in advanced deciduous forest, a common small tree.

Simaruba glauca DC. Chichen Itza, in advanced deciduous forest, a large tree.

MALPIGHIACEAE

Bunchosia Swartziana Griseb. Piste, in second growth, *Lundell & Lundell 7370*, arborescent shrub, corolla yellow. Chichen Itza, on Valladolid road, in advanced forest, *Lundell & Lundell 7581*, slender tree, 2 in. diam., 12 ft. high, petals yellow, fruits red. *Sipche.*

A ceremonial shrub used to sweep floor to chase away bad spirits.

Byrsonima bucidaefolia Standl. Chichen Itza, in advanced forest, on Valladolid road, *Lundell & Lundell 7448*, tree, 8 in. diam., 35 ft. high, petals white to rose-red. Near Yokdzonoot, in advanced forest, *Lundell & Lundell 7492*, tree, 6 in. diam., 35 ft. high, fruits white when ripe. *Sacpah (Sac* = white, *pah* = sour).

Sour white fruit either eaten raw, made into preserves or pickled in vinegar and served like olives.

Heteropteris Beecheyana A. Juss. In old forest near Yokdzonoot, *Lundell & Lundell 7922*, woody vine.

Hiraea obovata (H.B.K.) Ndzu. Chichen itza, abundant in second growth, *Lundell & Lundell 7408*, woody vine, petals bright yellow. *Xyahak (Yah* = zapote [with an X before it means that the leaves are similar to leaf of *zapote*], *ak* = vine).

Malpighia punicifolia L. Chichen Itza, in second growth, *Lundell & Lundell 7409*, tree, 20 ft. high, corolla rose-pink. Near Yokdzonoot, in advanced forest, *Lundell & Lundell 7498*, tree, 20 ft. high, fruits red, pulpy, edible. *Uayate, Xhuyabche* (*Xhuyab* = dream, *che* = tree), or *Xhuyate.*

Fruit is edible. Sap of tree causes hands to itch.

EUPHORBIACEAE

Acalypha Gaumeri Standl. Chichen Itza, in second growth, *Lundell & Lundell 7417*, shrub. *Xmukuycoc (Xmukuy* = turtle dove, *coc* = deaf [deaf turtle dove]).

Leaves are boiled and then rubbed over the body to prevent convulsions.

Acalypha unibracteata Muell. Arg. Piste, in second growth, *Lundell & Lundell 7371*, shrub, 6 ft. high. Chichen Itza, in second growth, *Lundell & Lundell 7420*, slender shrub, 5 ft. high. *Chilibtux (Chilib* = tiny piece of wood, *tux* = turkey female, and also dimple in cheek).

Forage for cattle. Twigs used to make bird cages.

Acalypha villosa Jacq. Chichen Itza, in second growth, near Sacred Cenote, *Lundell & Lundell 7309*, shrub, 3–7 ft. high. Chichen Itza, Thompson's Cenote, *Lundell & Lundell 7337*, arborescent shrub, 3–6 ft. high. Chichen Itza, in second growth, *Lundell & Lundell 7419*, common shrub. *Xhoybak (Xhoy* = to grow, *bak* = meat [fattens cattle]).

Leaves used as forage for cattle.

Astrocasia phyllanthoides Robins & Millsp. Piste, in second growth, *Lundell & Lundell 7345*, shrub or small tree, flowers pale green.

Cnidoscolus Chaya Lundell, Bull. Torrey Bot. Club 72: 321. 1945. Merida to Progreso road, km. 27, common in cactus thicket, *Lundell & Lundell 8201* (holotype, LL), arborescent shrub, 8 ft. high. *Chaya, Xtsaa.*

Croton Ameliae Lundell, Phytologia 1: 401. 1940. In advanced deciduous forest along Kaua road, east of Chichen Itza, *Lundell & Lundell 7447* (isotype, LL), arborescent shrub, 5 ft. high, flowers nearly white. *Bolomtihui.*

Liquid from boiled leaves used to wash infections. Cures pellagra.

Croton arboreus Millsp. Chichen Itza, in second growth, *Lundell & Lundell 7339*, shrub, 6 ft. high, flowers pale green. Piste, in second growth, *Lundell & Lundell 7402*, shrub or small tree. Chichen Itza, in advanced second growth, Valladolid road, *Lundell & Lundell 7458*, tree, 8 in. diam., 40 ft. high. *Perescutz.*

Cures infection of eyelid. A drop of the sap is applied to lid being very careful not to get any in the eye for the sap is strong like iodine and the same color.

Croton chichenensis Lundell, Phytologia 1: 449. 1940. Chichen Itza, in low second growth around the Sacred Cenote, *Lundell & Lundell 7326* (holotype, MICH), shrub, 2–3 ft. high, flowers green. Progreso road, km. 29, in thorn thicket, *Lundell & Lundell 8029*, shrub, 4 ft. high. Uxmal road, km. 18, roadsides and thickets, common, *Lundell & Lundell 8085*, shrub, 3 ft. On Merida to Progreso road, km. 10, edge of thorn thicket, *Lundell & Lundell 8122*, shrub, 3 ft. high.

Croton Gaumeri Millsp. Chichen Itza, at Sacred Cenote, *Lundell & Lundell 7322*, shrubby, 3 ft. high. Progreso road, km. 20, along railway, *Lundell & Lundell 8144*, shrub.

Croton Gaumeri Millsp., vel aff. Along Merida to Chichen Itza road, about km. 100, roadside, *Lundell & Lundell 7307*, low shrub.

Croton glandulosepalus Millsp. Chichen Itza, second growth at Sacred Cenote, *Lundell & Lundell 7328*, shrub, 2 ft. high, flowers pale green. Piste, in second growth, *Lundell & Lundell 7383*, shrub, 6 ft. high. *Xpasmarziu.*
Used to cure pleurisy, also, bad wind.

Croton Icche Lundell, Phytologia 1: 404. 1940. Near Piste, in old thicket, *Lundell & Lundell 7547* (paratype), shrub, 10 ft. high. Along Yokdzonoot road, common in advanced forest, *Lundell & Lundell 7871* (holotype, MICH), treelet, 1–2 in. diam., 10–15 ft. high. *Cocche (Coc* = insect, *che* = tree), *Icche.*
Root is ground and patted on chest of baby with asthma.

Croton itzaeus Lundell, Phytologia 1: 405. 1940. Progreso, km. 29 of Merida road, in cactus thicket bordering south edge of cienaga, *Lundell & Lundell 8046* (holotype, MICH), shrub. 3 ft.

Croton lobatus L. Piste, in village clearing, *Lundell & Lundell 7536*, herb. *Ocnom (Oc* = feet, *nom* = partridge [leaves resemble feet of partridge]).

Croton Lundellii Standl. Chichen Itza, in second growth on ruins, *Lundell & Lundell 7919*, shrub (sterile). Common in thorn thicket along road to Motul, south of Telchac, near cienaga, *Lundell & Lundell 8104*, shrub, 8 ft.

Croton malvavisciifolius Millsp. Along Merida to Progreso road, km. 11, along railway, *Lundell & Lundell 8133*, shrub, 1–3 ft.

Croton Millspaughii Standl., vel aff. Uxmal road, km. 18, common along roadside, *Lundell & Lundell 8086*, shrub, 2 ft.

Croton peraeruginosus Croizat. Chichen Itza, second growth at Sacred Cenote, *Lundell & Lundell 7327*, shrub, 2 ft. high. Uxmal road, km. 18, roadside, common, *Lundell & Lundell 8082*, shrub, 3 ft.

Croton punctatus Jacq. Progreso, abundant on beach, *Lundell & Lundell 8069*, herb.

Croton Sutup Lundell, Phytologia 1: 407. 1940. In low second growth near Piste, *Lundell & Lundell 7363* (holotype, MICH), shrub, 6 ft. high. *Sutup.*

Croton yucatanensis Lundell, Phytologia 1: 408. 1940. In second growth, km. 77, along Merida to Chichen Itza road, *Lundell & Lundell 7400* (holotype, MICH). In low second growth bordering Sacred Cenote at Chichen Itza, *Lundell & Lundell 7524* (paratype), arborescent shrub, up to 8 ft. high. Off Merida to Progreso road, km. 23, in thorn thicket, *Lundell & Lundell 8197*, shrub, 4–6 ft.

Dalechampia scandens L. Chichen Itza, in advanced second growth, Valladolid road, *Lundell & Lundell 7480*, herbaceous vine. *Xmoolcoh* (*Xmool* = claw, *coh* = puma or mountain lion [leaves are shaped like the claws of the puma]).

Leaves are rubbed on forehead and temples to relieve a headache.

Dalechampia Schottii Greenm. Near Libre Union, along roadside, *Lundell & Lundell 7574*, vine, bracts pale green. *Xhauak*.

Liquid from boiled leaves cures fever.

Ditaxis tinctoria (Millsp.) Pax & Hoffm. Chichen Itza, in second growth near Sacred Cenote, *Lundell & Lundell 7308*, shrub, 3 ft. high, flowers pale green.

Drypetes lateriflora (Sw.) Krug & Urb. Chichen Itza, in advanced second growth, Valladolid road, *Lundell & Lundell 7449*, evergreen tree, 4 in. diam., 25 ft. high, fruits orange-red. *Dtiiche*.

Hard wood used for beams in houses.

Euphorbia anychioides Boiss. West of Progreso, in beach zone scrub, *Lundell & Lundell 7958*, perennial herb. Progreso road, km. 30, along roadside, *Lundell & Lundell 8006*, prostrate annual.

Euphorbia aff. **biformis** Wats. Chichen Itza, roadside, *Lundell & Lundell 7451*, perennial herb. *Viperolxiu* (*Viperol* = antidote for snake bite, *xiu* = weed or grass).

Viperol is combined with the two other ingredients, namely *tamnekokob* and *xchochelak*. Plant ground up with other two ingredients, water added and taken as drink with some of mixture also applied to wound caused by snake.

Euphorbia buxifolia Lam. East of Progreso, on beach, *Lundell & Lundell 8049*, erect perennial herb.

Euphorbia cozumelensis Millsp., vel aff. Common in beach zone, 30 km. east of Progreso, *Lundell & Lundell 8100*, prostrate herb.

Euphorbia dioica H.B.K. On rocks in clearing, off Merida to Progreso road, km. 28, *Lundell & Lundell 7997*, prostrate herb, plants reddish. Progreso road, km. 31, along roadside, *Lundell & Lundell 8010*, prostrate annual.

Euphorbia glomerifera (Millsp.) Wheeler. Chichen Itza, roadside, Valladolid road, *Lundell & Lundell 7590*, herb. On Merida to Progreso road, km. 31, along railroad, *Lundell & Lundell 8013*, erect annual. Progreso road, km. 29, in cleared flats, *Lundell & Lundell 8048*, erect annual. Progreso road, km. 32, roadside, *Lundell & Lundell 8212*, erect herb. *Buyxiu* (*Buy* = film, *xiu* = eye).

Sap is a milk-like liquid and a single drop is put in eye to remove white film on eyeball.

Euphorbia heterophylla L. Progreso road, km. 31, along railroad, *Lundell & Lundell 8015*, annual. In beach zone, east of Progreso, *Lundell & Lundell 8050*, annual, 18 in. *Xhomkaak*.

Euphorbia hirta L. var. **procumbens** (DC.) N.E.Br. Along Merida to Progreso road, km. 30, among grasses along roadside, *Lundell & Lundell 8002*, erect annual. Progreso road, km. 27, in cleared flats, *Lundell & Lundell 8035*, erect annual. Uxmal, in clearing, *Lundell & Lundell 8161*, herb. Progreso road, km. 28, along roadside, *Lundell & Lundell 8217*, annual.

Euphorbia Mendezii Boiss. Uxmal, in clearing, *Lundell & Lundell 8169*, prostrate herb.

Euphorbia Schlechtendalii Boiss. Near Dzitas, in second growth, *Lundell & Lundell 7891*, shrub, 8 ft. high, latex white.

Euphorbia spp. Roadside, Progreso road, km. 25, *Lundell & Lundell 7994*, prostrate annual. Progreso road, km. 30, among grasses along roadside, *Lundell & Lundell 8003*, erect annual.

Gymnanthes lucida Sw. East of Progreso near Telchac, in beach zone, km. 35, *Lundell & Lundell 8117*, shrub, 4 ft.

Jatropha Gaumeri Greenm. Near Yokdzonoot, in advanced second growth, *Lundell & Lundell 7502*, small tree, 6 in. diam., 25 ft. high, abundant. *Pomolche*.

The sap is used to treat ulcers or open sores on body or in mouth. The sap is dropped onto the sore.

Children use the light wood for making whistles. Leaves are substituted for banana leaves for patting corn paste into tortillas.

Manihot carthaginensis (Jacq.) Muell. Arg. Chichen Itza, in advanced second growth, Valladolid road, *Lundell & Lundell 7473*, arborescent, perianth green. *Xacche* (*Xac* = turtle, *che* = tree), *Xbatulche*.

Leaves are mixed with sap of *sabila* and boiled; the liquid is rubbed on with lime juice to cure inflammation of swollen parts. Wood is used for making whistles and toys.

Pedilanthus itzaeus Millsp. Progreso, planted along fences, *Lundell & Lundell 8158*, shrub, 4–6 ft., flowers pink.

Pedilanthus nodiflorus Millsp. In thorn thicket, along Merida to Progreso road, km. 28, *Lundell & Lundell 7978*, shrub, stems green, 3 ft., leafless, flowers reddish.

Pedilanthus sp. Merida, *Lundell & Lundell 8170*, shrub, planted for ornament.

Phyllanthus antillanus (A. Juss.) Muell. Arg. Xocenpich, in second growth, *Lundell & Lundell 7352*, tree, 4 in. diam., 15 ft. high, flowers green. Chichen Itza, *Lundell & Lundell 7463*, tree. *Iximche (Ixim* = corn, *che* = tree).
Wood used in house construction and for charcoal.

Phyllanthus brasiliensis (Aubl.) Poir. Near Yokdzonoot, in second growth, *Lundell & Lundell 7497*, small arborescent shrub, flowers pale green. *Xpayhul (Xpay* = catch, *hul* = draft).
For treatment of cold caused by draft, ground leaves are wet with lime juice and applied to chest, also, to breasts when hard as a result of drafts.

Phyllanthus glaucescens H.B.K. Chichen Itza, in thicket, *Lundell & Lundell 7486*, small tree, perianth rose-red.

Sebastiania adenophora Pax & Hoffm. Chichen Itza, in thicket around Sacred Cenote, *Lundell & Lundell 7526*, tree, 4 in. diam., 20 ft. high, flowers yellowish. *Chechem blanco.*

Sebastiania sp. (?). Common in thorn thicket, Motul road, south of Telchac, *Lundell & Lundell 8103*, tree, 6 in. diam., 12 ft. high, latex white.

Tragia glanduligera Pax & K. Hoffm. Roadside, near Piste, *Lundell & Lundell 7935*, herb, perennial vine.

Tragia yucatanensis Millsp. Roadside near Chichen Itza, *Lundell & Lundell 7438*, perennial, flowers yellow-green. *Ppoppox.*
Leaves rubbed on sprain or sore part to relieve it (as a liniment).

ANACARDIACEAE

Metopium Brownei (Jacq.) Urban. Progreso, beach zone, abundant and characteristic of area, *Lundell & Lundell 8070*, shrub, 4–6 ft. *Chechem.*

CELASTRACEAE

Crossopetalum Gaumeri (Loes.) Lundell. Chichen Itza, second growth at Sacred Cenote, *Lundell & Lundell 7319*, slender shrub, fruits obovoid, brilliant red. Piste, in second growth, *Lundell & Lundell 7349, 7376*, slender shrub, 3 ft. high, berries bright red. Chichen Itza, *Lundell & Lundell 7441*, petals maroon. *Xtaazih.*

Red fruit eaten by chachalacas.

Crossopetalum Rhacoma Crantz. Progreso, very common in beach zone, *Lundell & Lundell 7388*, shrub, 2 ft. high, petals rose-red, fruits globose, brilliant red. Abundant in beach zone, 30 km. east of Progreso, *Lundell & Lundell 8097*, shrub, 2–3 ft., crown spreading, berries globose, red, petals red.

Tricerma phyllanthoides (Benth.) Lundell, Wrightia 4: 158. 1971. Progreso, in beach zone, *Lundell & Lundell 7398*, shrub, 2–4 ft. high, flowers green. Progreso, abundant in beach zone, *Lundell & Lundell 8151*, shrub, 4 ft., aril dark red, capsule orange.

Wimmeria obtusifolia Standl. In forest between Piste and Yokdzonoot, at km. 113, *Lundell & Lundell 7862*, tree, 10 in. diam., 40 ft. high, bark smooth, whitish, trunk asymmetrical, grooved, resembling *Pimenta*, said to become larger. At Dzibiac, km. 113, *Lundell & Lundell 7928*, tree, 9 in. diam., 45 ft. high, bark smooth, whitish. South of Piste, *Lundell & Lundell 8216. Amche (Am* = spider, *che* = tree [threads of broken leaf or bark suggest spider web, hence the name]).

HIPPOCRATEACEAE

Hemiangium excelsum (H.B.K.) A. C. Smith. Chichen Itza, second growth near Sacred Cenote, *Lundell & Lundell 7313*, erect tree, 4–8 in. diam., 12–20 ft. high, flowers pale green. Chichen Itza, abundant in advanced forest, Valladolid road, *Lundell & Lundell 7477*, tree. West of Progreso, common in beach zone scrub, *Lundell & Lundell 7937*, shrub, 6 ft., flowers green. Progreso road, km. 23, in thorn thicket, *Lundell & Lundell 8194*, tree, 12 ft. *Sacbob (Sac* = white, *bob* = large [a large tree, the trunk and wood white]).

SAPINDACEAE

Paullinia Cururu L. Chichen Itza, in thicket around Thompson's Cenote, *Lundell & Lundell 7593*, woody vine. Chichen Itza, in old thicket, *Lundell & Lundell 7602*, woody vine, corolla greenish. *Uayumak.*

Sapindus Saponaria L. Chichen Itza, in advanced deciduous forest, a common tree.

Serjania adiantoides Radlk. Near Piste, *Lundell & Lundell 7874*, woody vine.

Talisia olivaeformis (H.B.K.) Radlk. Chichen Itza, in clearing, a tree yielding edible fruits. *Guayo.*

Thouinia paucidentata Radlk. Chichen Itza, in advanced forest, *Lundell & Lundell 7457*, tree, 3 in. diam., 30 ft. high, flowers pale green. *Kanchunep (Kan* = yellow, *chunep* = tree with thick leaves [tree with yellow thick leaves]).

Wood used for beams in houses. Leaves are boiled, the liquid is taken and used to bathe in to cure colic or some stomach ailment.

RHAMNACEAE

Colubrina Greggii Wats. var. **yucatanensis** M. C. Johnst., Wrightia 3: 95. 1964. Chichen Itza, second growth near Sacred Cenote, *Lundell & Lundell 7310* (holotype, LL; isotype, US), weak shrub, 9 ft. high, branches long and slender, flowers pale green. Thompson's Cenote, in second growth, *Lundell & Lundell 7331*, weak shrub, 6 ft. high, flowers pale green. Chichen Itza, *Lundell & Lundell 7454*, small tree. *Pimientache (Pimienta* = pepper, *che* = tree [leaves like those of pepper tree]).

Colubrina reclinata (L'Her.) Brongn. Near Yokdzonoot, in old forest, *Lundell & Lundell 7932*, tree, 6 in. diam., 30 ft. high, corolla greenish.

Karwinskia Humboldtiana (R. & S.) Zucc. In thorn thicket, Progreso road, km. 28, *Lundell & Lundell 7992*, shrub, 8 ft. (sterile).

Krugiodendron ferreum (Vahl) Urban. Chichen Itza, in advanced forest, Valladolid road, *Lundell & Lundell 7472*, tree, 16 in. diam., 30 ft. high. East of Progreso, in beach zone, *Lundell & Lundell 8118*, shrub, 4 ft. *Chintok (Chin* = drooping branches, *tok* = hard).

Wood is used for beams in roofs and framework of houses. Bark is boiled and to this is added small pieces of bark of *chicozapote* tree; the liquid is taken internally to cure dysentery. Liquid is color of red wine.

Zizyphus yucatanensis Standl. In thorn thicket, Progreso road, km. 23, *Lundell & Lundell 7984*, tree, 25 ft.

VITACEAE

Ampelocissus Erdwendbergii Planch. Chichen Itza, in second growth, *Lundell & Lundell 7461*, vine, 25 ft. long, fruits red. *Buhumak, Uvasak (Uvas* = grape, *ak* = vine).

Fruits eaten by birds.

Cissus trifoliata L. Progreso road, km. 30, in thorn thicket, *Lundell & Lundell 7974*, perennial vine.

TILIACEAE

Corchorus orinocensis H.B.K. Along roadside, Merida to Progreso road, km. 13, *Lundell & Lundell 7971*, annual, flowers yellow.

Luehea speciosa Willd. Chichen Itza, on Valladolid road, in advanced forest, *Lundell & Lundell 7582*, tree, up to 10 in. diam., 35 ft. high. *Xkascakat.*

MALVACEAE

Abutilon Gaumeri Standl., ex char. Chichen Itza, in second growth, *Lundell & Lundell 7407*, shrub, 4 ft. high, petals dark yellow. Near Yokdzonoot, in old thicket, *Lundell & Lundell 7500*, arborescent shrub. *Sachol (Sac* = white, *hol* = hole [white hole]), *Yaaxmisib (Yaax* = green, *misib* = Indian broom [branches are tied together to make a broom; the broom is called *chilibmisib*]).

This plant is used when barbecuing. After large stones are placed on the charcoals, this plant is placed on stones with the deer or other meat on top and then covered by plant. This helps to preserve cooked meat.

Cienfugosia yucatanensis Millsp. Progreso, km. 31, in cleared flats, *Lundell & Lundell 8017*, perennial, corolla yellow.

Gaya calyptrata (Cav.) H.B.K. Piste, in clearing, *Lundell & Lundell 7537*, herb, corolla orange-yellow. *Sacxiu (Sac* = white, *xiu* = herb [leaves turn from green to white when plant dies]).

Gossypium hirsutum L. Progreso, abundant in beach zone, one of the characteristic plants of area, *Lundell & Lundell 8054, 8054A*, shrub, corolla white, turning reddish.

Hampea trilobata Standl. Chichen Itza, in advanced forest, Valladolid road, *Lundell & Lundell 7483*, tree, 3 in. diam., 20 ft. high, petals white. Merida to Progreso road, km. 30, common in cut-over flats, *Lundell & Lundell 8129*, shrub. *Hool.*

Strips of tree bark used for cordage, especially for tying together the poles in house construction. Also, used for tourniquet to stop blood flow.

Hibiscus tubiflorus DC. Chichen Itza, in second growth, *Lundell & Lundell 7421*, slender shrub, petals salmon-red. Progreso road, km. 25, in thorn thicket, *Lundell & Lundell 8043*, perennial, slender, 3–4 ft., corolla bright red. Uxmal road, km. 35, roadside, *Lundell & Lundell 8075*, slender erect shrub, 2–4 ft., corolla red. *Tulipan.*

Malvaviscus grandiflorus H.B.K. Progreso road, km. 30, in thorn thicket, *Lundell & Lundell 8005*, shrub, 8 ft., corolla red. East of Progreso, in beach zone, *Lundell & Lundell 8053*, shrub, 3 ft., corolla red.

Sida ciliaris L. Progreso road, km. 10, along railroad, *Lundell & Lundell 8120*, annual, corolla salmon.

BOMBACACEAE

Bombax ellipticum H.B.K. Piste, in village, a large deciduous tree. *Amapola.*

Ceiba aesculifolia (H.B.K.) Britt. & Baker. Chichen Itza, in clearing, a giant deciduous tree. *Pochote.*

Ceiba pentandra (L.) Gaertn. Chichen Itza, in old clearing, a giant deciduous tree. *Yaxche, Ceiba.*

Ceiba Schottii Britt. & Baker. Near Piste, in advanced forest, *Lundell & Lundell 7539*, tree, 8 in. diam., 30 ft. high, trunk with cushioned thorns, flowers with fragrance of vanilla. *Pum (Pum* = pimple [thorns on bark resemble pimples]).

Used to cure a disease called *pumkaak*. Medicine made by taking the bark and leaves, boiling them and using the liquid to wash in.

Root of young trees eaten raw. Cotton-like fiber of fruits used for stuffing pillows.

STERCULIACEAE

Ayenia fasciculata Millsp. Near Piste, in old thicket, *Lundell & Lundell 7543*, shrub, 8 ft. high, flowers pale green. *Xiupech (Xiu* = herb, *pech* = tick).

This herb is brushed over clothes and persons to get rid of ticks. In village of Uayma the stem of this plant is used for the rim of locally made hats.

Guazuma ulmifolia Lam. Near Chichen Itza, in advanced deciduous forest, a common tree. *Pixoy.*

Helicteres baruensis Jacq. Near Piste, in thickets, *Lundell & Lundell 7545*, shrub, up to 12 ft. high. Progreso road, km. 25, in thorn thicket, *Lundell & Lundell 8042*, shrub, 8 ft. *Sutut* (fruit is screw-like and name is derived from this).

Fruit is put in mouth of two-year-old to make child talk. Wood is used for the small cross poles on roof to which the thatch is attached.

Waltheria americana L. Progreso, in beach zone, *Lundell & Lundell 8185*, perennial herb.

COCHLOSPERMACEAE

Amoreuxia palmatifida Moc. & Sesse. Progreso road, km. 29, in cleared flats, *Lundell & Lundell 8033*, perennial with tuberous root, corolla orange-yellow, red in throat. Progreso road, km. 30, in cut-over flats, *Lundell & Lundell 8130*, perennial herb, corolla orange.

VIOLACEAE

Hybanthus yucatanensis Millsp. Piste, in second growth, *Lundell & Lundell 7373*, shrub, 4–10 ft. high, corolla creamy-green, abundant. *Sacbakecan* (*Sac* = white, *bak* = bone, *ecan* = snake [white bones of snake]).

Cures malaria.

FLACOURTIACEAE

Casearia nitida (L.) Jacq. Along Merida to Chichen Itza road, roadside, about km. 100, *Lundell & Lundell 7306*, shrub, about 1 m. high, flowers pale green, the plant is atypical. Chichen Itza, second growth near Sacred Cenote, *Lundell & Lundell 7311*, shrub, 6 ft. high, flowers pale green.

Casearia randioides Lundell, Contrib. Univ. Michigan Herb. 6: 48, fig. 3. 1941. Piste, in second growth, *Lundell & Lundell 7380*, shrub, corolla pale green. In thorn thicket, along Merida to Progreso road, km. 20, *Lundell & Lundell 7982* (isotype, LL), shrub, or small tree with erect branches. *Tehche* (*Teh* = to break apart, *che* = wood [wood hard but brittle]).

Laetia Thamnia L. Chichen Itza, common in second growth, *Lundell & Lundell 7430*, tree, 2 in. diam., 15 ft. high, flowers white.

Samyda yucatanensis Standl. Chichen Itza, in second growth, *Lundell & Lundell 7328*, arborescent shrub, 3–9 ft. high, corolla lobes white within, pale green externally. Along Piste to Libre Union road, roadside thicket, *Lundell & Lundell 7570*, shrub, 3 ft. high, fruits ellipsoid, dehiscent, pulp dark red, aril orange. Uxmal road, km. 30, in legume thicket, *Lundell & Lundell 8078*, shrub, 4 ft., perianth pale green. *Jasmin Kaax*, *Xnichmaax* (*Xnich* = gritting teeth, *maax* = monkey [the corollas suggest gritting teeth of monkey]).

Xylosma anisophylla Standl. Near Piste, in old thicket, *Lundell & Lundell 7541*, spiny arborescent shrub, 8 ft. high. *Xpudzmucuy* (*Xpudz* = needle, *mucuy* = turtle dove).

Cures infection from thorn prick with crushed leaves placed on wound.

Zuelania Guidonia (Sw.) Britt. & Millsp. Chichen Itza, in advanced forest on Valladolid road, *Lundell & Lundell 7515*, tree, 8 in. diam., 45 ft. high, fruits up to 4 in. diam., subglobose, three- or four-lobed or grooved, dehiscent at maturity. *Tamaay* (*Tamaay* = sticky waste littering forest floor).

Fruit not edible. Wood used in house construction.

PASSIFLORACEAE

Passiflora coriacea Juss. Piste, in second growth, *Lundell & Lundell 7375*, herbaceous vine. Chichen Itza, *Lundell & Lundell 7439*, herbaceous vine. Chichen Itza, *Lundell & Lundell 7470*, leaves thick.

Passiflora foetida L. var. **ciliata** (Dryand.) Mast. Progreso, common in beach zone, *Lundell & Lundell 8152*, herbaceous vine, fruits red.

Passiflora foetida L. var. **gossypifolia** (Desv.) Mast. Among grasses along roadside, Progreso road, km. 18, *Lundell & Lundell 7965*, herbaceous vine.

Passiflora foetida L. var. **nicaraguensis** Killip. Chichen Itza, roadside, *Lundell & Lundell 7917*, herbaceous vine, fruits bright red. East of Progreso, in beach zone, rather common, *Lundell & Lundell 8114*, herbaceous vine.

Passiflora foetida L. var. **subpalmata** Killip. Chichen Itza, in plaza, near Castillo, *Lundell & Lundell 7314*, vine, petals nearly white, stamens purplish. Along Merida to Progreso road, km. 10, roadside, *Lundell & Lundell 8123*, herbaceous vine. *Pochiil.*

Passiflora pulchella H.B.K. In thorn thicket, Progreso road, km. 19, *Lundell & Lundell 7967*, vine, 6 ft., petals lavender within, greenish outside, stamens yellow.

Passiflora suberosa L. Piste, in second growth, *Lundell & Lundell 7377*, herbaceous vine. Chichen Itza, in second growth, *Lundell & Lundell 7437*, herbaceous vine, flowers pale green. Chichen Itza, in advanced second growth, Valladolid road, *Lundell & Lundell 7446*. Near Piste, in thicket, *Lundell & Lundell 7546*. Progreso road, km. 29, in thorn thicket, *Lundell & Lundell 8030*, perennial vine, flowers green. *Corrimientoak (Corrimiento* = a local disease, *ak* = vine [leaves are soaked in alcohol and rubbed on infected part]), *Xcancelak.*

A vine, the leaves of which are ground and applied to swollen parts of body. The paste also cures headaches when patted on forehead with binding around head.

CACTACEAE

Acanthocereus pentagonus (L.) B. & R. Piste, in thickets, *Lundell & Lundell 7505*, stems 4–10 ft. long, three- or four-ribbed, branched. East of Progreso, abundant in beach zone, *Lundell & Lundell 8062*, three- or five-ribbed, stems unbranched, long, arcuate or prostrate, flowers cream, tinged green, fruits red. *Nuntzutzuy* (*Nun* = lame, *tzutzuy* = name of bird that eats the fruit).

When spines get into hand near a bone, it paralyzes the hand. The fruit is eaten, as well as the tender shoots, either fried or boiled.

Cephalocereus barbadensis B. & R. Piste, in second growth, *Lundell & Lundell 7387*, stems eight-ribbed, erect, branched at base, flowers greenish. Off Merida to Progreso road, km. 17, in thorn thicket, *Lundell & Lundell 7962*, stem 4 in. at base, plants 8 ft. high, branched, mature fruits red, pulp surrounding the small black seed red, fruits wrinkled, glabrous, depressed-globose.

Hylocereus undatus (Haw.) B. & R. Chichen Itza, in old thicket at Thompson's Cenote, *Lundell & Lundell 7596*, stems arcuately ascending, 4–8 ft. long. *Pitahaya.*

Fruits are edible. Stem is placed in water, hair is rinsed in the liquid to make it grow.

Lemaireocereus Chende (Gosselin) B. & R. Chichen Itza, in old thicket at Thompson's Cenote, rare here, common northwestward in Yucatan, *Lundell & Lundell 7595*, main stem 8 in. diam., ultimate branches about 4 in. diam., eight- or nine-ribbed, branches arising near base of plant, erect, plant 25 ft. high, massive. *Culub.*

Inner part of plant ground up, put on a cloth and bound around infected part of body to cure rheumatism.

Lemaireocereus Godinganus B. & R. Progreso road, km. 29, in cut-over flats, common in undisturbed areas, being the conspicuous plant, *Lundell & Lundell 8135*, the giant cactus of Yucatan, up to 30 ft. high, 8 in. diam., few-branched, branches erect.

Mamillaria spp. Off Merida to Progreso road, km. 25, roadside, *Lundell & Lundell 8214, 8215*, short-spine and long-spine plants.

Neomammillaria Gaumeri B. & R. Progreso road, km. 25, occasional on sand dunes of beach zone, abundant in flats south of cienaga, *Lundell & Lundell 8136*, plants globose or elongated, fruits red, clavate. Progreso, on sand dune, occasional in zone, *Lundell & Lundell 8155*, depressed-globose, fruits red.

Nopalea cochenillifera (L.) Salm.-Dyck. Merida, planted for ornament, *Lundell & Lundell 8157*, coarse, up to 10 ft., much-branched. *Nopalillo.*

Nopalea Gaumeri B. & R. Piste, in second growth, *Lundell & Lundell 7367*, plants 8 ft. high, flowers salmon-red. In thorn thicket, off Merida to Progreso road, km. 23, *Lundell & Lundell 7985*, much-branched, 4–10 ft., perianth red. Progreso road, km. 26, abundant in thorn thicket, *Lundell & Lundell 8040*, arborescent, trunk 6 in. diam., much-branched, 6–9 ft., narrow branches. *Nopal, Tsakam.*

Nopalea inaperta Schott. Progreso road, km. 27, abundant in flats, *Lundell & Lundell 8039*, arborescent, trunk 8 in. diam., much-branched, 12 ft. *Nopal.*

Opuntia Dillenii (Ker.-Gawler) Haw. Piste, *Lundell & Lundell 7504*, stands of plants 2–4 ft. high in village plaza, flowers vary from yellow to salmon-pink. *Pakan* (prickly pear with edible fruit).

Selenicereus hondurensis (Schumann) B. & R. Progreso, occasional in beach zone, *Lundell & Lundell 7399*, slender plants, 2–4 ft. long, flowers white. Progreso, in beach zone, occasional, *Lundell & Lundell 8063*, slender cactus, climbing on shrubs, fruits dark pink.

Selenicereus Kunthianus (Otto) B. & R. Progreso, rather common in beach zone, *Lundell & Lundell 8148*, fruits ovoid, spiny, pink. *Sacamak.*

Other cacti collected but unidentified are at Michigan: *Lundell & Lundell 7897* (living), *7898* (living), *7899* (living), *7988*, *8134*.

LYTHRACEAE

Ammannia coccinea Rottb. Progreso road, km. 29, in cleared flats, *Lundell & Lundell 8047*, erect herb, flowers pink.

Ammannia Koehnei Britton. In mangrove swamp, 30 km. west of Progreso, *Lundell & Lundell 8188*, erect herb.

Cuphea Gaumeri Koehne. Chichen Itza, roadside, *Lundell & Lundell 7414*, perennial herb, petals pinkish-lavender. Chichen Itza, in thicket, Thompson's Cenote, *Lundell & Lundell 7594*, perennial herb, corolla rose-red. Progreso, in lowlands, south of cienaga, *Lundell & Lundell 7949*, herb.

COMBRETACEAE

Conocarpus erecta L. Progreso, mangrove swamp, in cienaga, *Lundell & Lundell 8137*, shrub, a dominant.

RHIZOPHORACEAE

Rhizophora Mangle L. Progreso, in swamp of cienaga, *Lundell & Lundell 8139*, shrub, a dominant.

MYRTACEAE

Eugenia Gaumeri Standl. Chichen Itza, in second growth, *Lundell & Lundell 7416*, small tree, 12 ft. high, trunk grooved, bark smooth, nearly white, petals white. In old forest, near Yokdzonoot, *Lundell & Lundell 7933*, treelet, 10 ft., fruits black, globose.

Eugenia itzana Lundell, Bull. Torr. Bot. Club 69: 395. 1942. Chichen Itza, in advanced growth, on Valladolid road, *Lundell & Lundell 7589* (holotype, MICH), arborescent, 1 in. diam., 9 ft. high, petals white. *Chanich.*

Fresh leaves are rubbed on gums to cure disease of gums.

Eugenia leptopa Lundell, Bull. Torr. Bot. Club 69: 396. 1942. Along Piste to Yokdzonoot road, common in old forest, *Lundell & Lundell 7869* (holotype, MICH; isotype, LL), treelet, 12 ft., with white smooth bark, fruits about 1 cm. in diam., red, subglobose. In old forest, near Yokdzonoot, *Lundell & Lundell 7927*, treelet, 1½ in. diam., 10 ft. high. In beach zone, 35 km. east of Progreso, near Telchac, *Lundell & Lundell 8111* (paratype, LL), treelet, 6 ft. *Saclob.*

Eugenia mayana Standl. Near Libre Union, in advanced forest, *Lundell & Lundell 7560*, arborescent, 10 ft. high. In second growth, near Dzitas, *Lundell & Lundell 7892*, small tree, fruits globose, veins slightly impressed on upper leaf surface. *Saclob (Sac* = white, *lob* = tool for cutting grass).

Handle of the tool *(corba)* is made from wood of this tree.

Psidium yucatanense Lundell, Contr. Univ. Mich. Herb. 7: 35. 1942. Near Yokdzonoot, in advanced forest, *Lundell & Lundell 7494*, tree, 8 in. diam., 35 ft. high, bark smooth, nearly white. Yucatan, in forest, June 13, 1932, *W. C. Steere 1293*, shrub. *Pichiche (Pichi* = guayabo fruit, *che* = tree).

Wood is used in construction. Fruit of this species seldom eaten by people.

UMBELLIFERAE

Hydrocotyle bonariensis Lam. Progreso, bordering pools, in flats south of cienaga, *Lundell & Lundell 8023*, herb.

THEOPHRASTACEAE

Jacquinia aurantiaca Ait. Progreso, common in beach zone, *Lundell & Lundell 7395*, shrub, 2-3 ft. high, fruits globose, orange-yellow. West of Progreso, common in beach zone scrub, *Lundell & Lundell 7944*, shrub, 1-3 ft., corolla orange-red.

Jacquinia flammea Millsp. Yokdzonoot road, in old forest, *Lundell & Lundell 7873*, treelet, 2 in. diam., 15 ft. high, leaves three-nerved, the nerves slightly impressed above.

MYRSINACEAE

Ardisia escallonioides Schlecht. & Cham. Izamal, *Gaumer s.n.* Also collected at Coba, Quintana Roo.

Parathesis cubana (A.DC) Mol. & G. Maza. Yucatan: 1840, *J. J. Linden s.n.*
The shrub is abundant in Belize and Peten, where it may be considered weedy in cut-over areas.

EBENACEAE

Diospyros anisandra Blake. Near Yokdzonoot, in advanced forest, *Lundell & Lundell 7496*, small slender tree, 25 ft. high, corolla yellow-green. Chichen Itza, in advanced forest, Valladolid road, *Lundell & Lundell 7530*, shrub, corolla yellow-green, leaves shiny. Near Libre Union, common in forest undergrowth, *Lundell & Lundell 7563*, arborescent shrub. Libre Union road, *Lundell & Lundell 7568*. Abundant in old forest, near Yokdzonoot, *Lundell & Lundell 7925*, shrub or treelet, 6–15 ft. In thorn thicket, Progreso road, km. 23, *Lundell & Lundell 7981*, shrub, 8 ft. Uxmal in thicket, abundant all over Yucatan, *Lundell & Lundell 8165*, shrub, 8 ft. *Xkakalche (Xkakal* = bitter, *che* = tree).
Cures boils. Liquid from boiled leaves placed in bathing water to cure a skin disease.

Diospyros cuneata Standl. Progreso, in beach zone, *Lundell & Lundell 7393*, shrub, 4 ft. high. Yokdzonoot, in advanced forest, *Lundell & Lundell 7488*, tree, 4 in. diam., 26 ft. high, corolla creamy-white. Chichen Itza, in old thicket, *Lundell & Lundell 7599*, in old thicket. West of Progreso, common in beach zone scrub, *Lundell & Lundell 7943*, shrub, 6 ft. *Silil, Tzilil.*
Leaves are boiled and entire body is washed with the liquid. This is to cure a skin disease called "sarna," a disease caused by a germ which covers entire body with pinhole-sized infections, each one festered. The liquid discolors the body.
The fruits, a wild persimmon, are eaten by some people and by the chachalaca, a bird.

Diospyros yucatanensis Lundell var. **longipedicellata** Lundell, Contrib. Univ. Michigan Herb. 7: 45. 1942. Chichen Itza, in second growth, *Lundell & Lundell 7424* (paratype), arborescent shrub, 15 ft. high, corolla white. Chichen Itza, in advanced forest, Valladolid road, *Lundell & Lundell 7509* (holotype, MICH: isotype, LL), arborescent, 1 in. diam., 10 ft. high. *Xuchiche, Xuchulche.*
Wood used for beams in roofs of houses. When bark removed, the wood lasts longer. Birds eat fruit of this wild persimmon.

SAPOTACEAE

Achras Zapota L. Beach zone, 20 km. west of Progreso, *Lundell & Lundell 8179*, spreading shrub, 6 ft. *Ya, Chicozapote.*

Once a dominant tree in advanced forest of eastern and southern Yucatan, southward through Quintana Roo, Campeche, northern Belize and northern Peten. The source of chicle gum.

Bumelia mayana Standl. Piste, in thicket, *Lundell & Lundell 7340A*, shrub. Near Yokdzonoot, in advanced forest, *Lundell & Lundell 7501*, small tree, 20 ft. high, flowers fragrant, pale green. Kaua road, near Chichen Itza, *Lundell & Lundell 8220*, shrub. *Pakalche (Pakal* = planted, *che* = tree).

Leaves resemble those of the *pakal*, the sweet orange. Fruit eaten by birds.

Bumelia neglecta (Cronquist) Lundell, Wrightia 5: 90. 1975. *Bumelia americana* (Miller) Stearn subsp. *neglecta* (Cronquist) Stearn. Progreso, in scrub on low sand dunes, *Lundell & Lundell 7392* (LL, flowers & fruits), common spinescent shrub, 3–6 ft. high, ripe fruits globose, black.

Chrysophyllum oliviforme L. Near Libre Union, in advanced forest, *Lundell & Lundell 7561*, tree, 6 in. diam., 30 ft. high. *Chuceh* (*Chu* = an edible berry called *nance*, *ceh* = deer).

Deer eat fruits. A medicine is made by grinding leaves of tree together with leaves of *caimito* tree, then applied to carbuncles to cure them.

Dipholis salicifolia (L.) A.DC. Chichen itza, relic tree growing beside Temple of the High Priest, *Lundell & Lundell 7557*, trunk 12 in. diam., 35 ft. high.

Mastichodendron Gaumeri (Pittier) Lundell, Wrightia 5: 92. 1975. *Sideroxylon Gaumeri* Pittier. Near Yokdzonoot, in advanced forest, *Lundell & Lundell 7495*, tree, 1 ft. diam., 45 ft. high, flowers foetid, corolla yellow. *Subul.*

Evergreen tree, the fruits used as toys by children.

GENTIANACEAE

Eustoma exaltatum (L.) Griseb. Progreso, in sandy beach zone, *Lundell & Lundell 7305*, herb with thick glaucous leaves. Progreso, mangrove area roadside, *Lundell & Lundell 7389*, herb, corolla lavender.

APOCYNACEAE

Echites umbellata Jacq. Progreso, in beach zone scrub, *Lundell & Lundell 7960*, herbaceous vine, tube greenish, lobes white. East of Progreso, common in beach zone, *Lundell & Lundell 8056*, herbaceous vine, corolla white.

Echites yucatanensis Millsp. Chichen Itza, in second growth, *Lundell & Lundell 7455*, perennial vine, corolla lobes white, tube green. Near Piste, in old thicket, *Lundell & Lundell 7542*, herbaceous vine, corolla tube green, lobes white. *Kanluum ak (Kan* = yellow, *luum* = earth, *ak* = vine), *Sacxtamnekokob (Sac* = white, *xtamne* = liver, *kokob* = snake).

Leaves ground with three other ingredients, namely *xigsotdz, tamnekokob* and *chocheac*, mixed with lime or lemon juice to make a paste which is applied to kernels or carbuncles under arms.

Medicine is made by grinding the leaves and vine, mixed with another vine, *xtuukiscan*, and lime seeds, wet with lime juice, applied to infected wounds.

Mandevilla subsagittata (R. & P.) Woodson. In old forest, near Piste, *Lundell & Lundell 7872*, herbaceous vine, corolla yellow. Uxmal road, km. 27, in thicket, *Lundell & Lundell 8080*, perennial vine, corolla yellow.

Plumeria obtusa L. Chichen Itza, second growth at Sacred Cenote, *Lundell & Lundell 7323*, tree, 8 in. diam., 20 ft. high, corolla lobes white, pale orange-yellow in throat. *Nicte*.

Prestonia amanuensis Woods. Chichen Itza, in second growth, *Lundell & Lundell 7460*, woody vine. *Tzootzikim (Tzootz* = hair, *ik* = pepper, *im* = breast).

Drop of sap put in eye to remove film from eyeball.

Rauwolfia hirsuta Jacq. Chichen Itza, in clearing, *Lundell & Lundell 7464*, shrub, 3 ft. high, corolla pale green. *Kambamuc*.

Root is ground into powder which is applied to surface to heal beef worms in cattle.

Tabernaemontana amygdalifolia Jacq. Chichen Itza, second growth near Sacred Cenote, *Lundell & Lundell 7312*, shrub, 6 ft. high, corolla lobes white, yellow at base.

Thevetia Gaumeri Hemsl. Chichen Itza, in advanced deciduous forest, a frequent tree.

ASCLEPIADACEAE

Cynanchum Schlechtendalii (Decaisne in DC.) Standl. & Steyerm. West of Progreso, in beach zone scrub, *Lundell & Lundell 7941*, vine. East of Progreso, on shrubs in beach zone, *Lundell & Lundell 8113*, perennial vine, corolla white.

Gonolobus barbatus H.B.K. Near Muna, in thicket, *Lundell & Lundell 8160*, herbaceous vine, corolla variegated green and yellow with yellow beard.

Gonolobus cteniophorus (Blake) Woods. Near Piste, in old thicket, *Lundell & Lundell 7577*, vine, 15 ft. long, corolla red-black. Progreso road, km. 33, on shrubs in cleared flats, *Lundell & Lundell 8065*, herbaceous vine.

Marsdenia Coulteri Hemsl. Piste, in second growth, *Lundell & Lundell 7374*, herbaceous vine, corolla greenish or creamy-white. Near Yokdzonoot, in old thicket, *Lundell & Lundell 7499*, vine. *Xboochkaak, Yaaxahnal.*

Leaves are boiled and liquid rubbed on skin to cure pimples.

Matelea crassifolia (Standl.) Woods. Piste, in second growth, *Lundell & Lundell 7381, 7553*, herbaceous vine, corolla green and tan variegated. Near Xocenpich, in second growth, *Lundell & Lundell 7889*, herbaceous vine, corolla greenish. Chichen Itza, Kaua road, in old forest, *Lundell & Lundell 7904*, herbaceous vine, corolla variegated tan and green. *Puyak (Puy* = crumbles, *ak* = vine), *Xtzoozikim.*

Sap used for eye drops. Boil leaves and use liquid and leaves to rub on to cure a mouth disease.

Matelea obovata (H.B.K.) Woods. Chichen Itza, Kaua road, in old forest, *Lundell & Lundell 7905*, herbaceous vine, corolla dark green within, paler outside. Sisal road, in thicket, *Lundell & Lundell 8143*, herbaceous vine, corolla dark green.

Matelea velutina (Schlecht.) Woodson. Chichen Itza, Kaua road, in old forest, *Lundell & Lundell 7903*, herbaceous vine, corolla green.

Matelea yucatanensis (Standl.) Woods. Near Xocenpich, in second growth, *Lundell & Lundell 7885*, herbaceous vine, corolla variegated purple-black. Progreso road, km. 31, in thicket, *Lundell & Lundell 8012*, herbaceous vine, 5 ft., corolla pale green.

CONVOLVULACEAE

Evolvulus glaber Spreng. Progreso road, km. 31, common in cleared flats, *Lundell & Lundell 8014*, prostrate perennial, corolla pale blue.

Exogonium Steerei Standl. Chichen Itza, in advanced forest, on Valladolid road, *Lundell & Lundell 7465*, perennial vine, 35 ft. long, corolla rose. *Xtuuhxikin (Xtuuh* = infected, *xikin* = ear [to treat infected ear]).

Ipomoea ornithopoda Robinson. Chichen Itza, in acahual (young growth of abandoned milpa), *Lundell & Lundell 7485*, herbaceous vine, corolla white. *Chunkinsihil (Chunkin* = midday or noon, *sihil* = open [flowers open at noon]).

Fruit of plant is warmed and lightly patted on the cut of the umbilical cord of newborn babies—called *ppitituch.*

Ipomoea Pes-caprae (L.) Roth. Along seashore, Progreso, trailing, course vine.

Ipomoea sagittata Cav. Progreso, in swampy cleared flats, bordering cienaga, *Lundell & Lundell 8057*, herbaceous vine, corolla lavender.

Ipomoea Seleri Millsp. Chichen Itza, roadside thicket, Valladolid road, *Lundell & Lundell 7510, 7584*, vine, corolla purple. Uxmal road, km. 30, roadside, *Lundell & Lundell 8074*, herbaceous vine, corolla dark lavender. *Tuhxikin (Tuh* = rotten, *xikin* = ear), *Xtuxicnil (Xtu* = sore, *xicnil* = ear).

Leaves and stems of vine are pulverized and put on infected ear (or rotten ear).

Ipomoea tuxtlensis House. Near Xocenpich, in second growth, *Lundell & Lundell 7886*, herbaceous vine, corolla rose-pink.

BORAGINACEAE

Bourreria pulchra (Millsp.) Millsp. Piste, in second growth, *Lundell & Lundell 7384*, tree, 2 in. diam., 30 ft. high. Chichen Itza, in advanced forest, Valladolid road, *Lundell & Lundell 7468*, tree, 6 in. diam., 25 ft. high. Uxmal road, km. 20, in thicket, common, *Lundell & Lundell 8079*, small tree, corolla white. *Bacalche (Bacal* = cob, *che* = tree), *Vacche (Vac* = bone, *che* = tree), *Xbacalche (Xbacal* = corn cob, *che* = wood).

Wood is light in weight like corn cob. Leaves and stems ground into powder which is applied to infected parts, such as ulcers, open sores or wounds.

Cordia dodecandra DC. Chichen Itza, in advanced forest, Valladolid road, *Lundell & Lundell 7585*, tree, up to 10 in. diam., 45 ft. high, ripe fruits yellow. *Koopte, Siricote.*

Fruit is boiled with honey to make preserves. Leaves are like sandpaper and used for scrubbing dishes. Wood used for beams in roofs and for swivel sticks to make chocolate. Fruit when ripe has color of ripe pear. When eaten raw it blackens or stains teeth.

Cordia globosa (Jacq.) H.B.K. West of Progreso, in beach zone scrub, *Lundell & Lundell 7961*, much-branched shrub, 3 ft., corolla white.

Cordia Sebestena L. Common in beach zone, 30 km. east of Progreso, *Lundell & Lundell 8099*, shrub or small tree, corolla dark orange.

Ehretia tinifolia L. Chichen Itza, common in old second growth, *Lundell & Lundell 7386*, tree, 6–12 in. diam., 15–35 ft. high, evergreen. *Beec, Roble.*

Heliotropium angiospermum Murr. Roadside, Progreso road, km. 28, *Lundell & Lundell 7999*, annual, 2 ft., corolla white.

Heliotropium curassavicum L. South of Progreso, along railroad through mangrove swamp, *Lundell & Lundell 7950*, prostrate perennial, corolla white.

Heliotropium fruticosum L. Piste, in second growth, *Lundell & Lundell 7364*, shrub, corolla white, yellow in throat. Progreso road, km. 28, in thorn thicket, *Lundell & Lundell 8044*, spreading crown shrub, corolla white. *Sacsahun.*

Leaves are boiled, and the liquid is used for bathing with the boiled leaves rubbed over the infected skin areas of the disease called "sarna."

Heliotropium phyllostachyum Torr. Along roadside, Progreso road, km. 13, *Lundell & Lundell 7973*, erect annual. Uxmal, in clearing, *Lundell & Lundell 8162*, herb, corolla white.

Tournefortia gnaphalodes (L.) R. Br. On seashore, Progreso, small shrub.

Tournefortia volubilis L. Xocenpich, in second growth, *Lundell & Lundell 7351*, woody vine of 6 ft. *Yaaxak (Yaax* = green, *ak* = vine).

AVICENNIACEAE

Avicennia nitida Jacq. Progreso, in swamp of cienaga, *Lundell & Lundell 8140*, shrub, corolla nearly white, a dominant.

VERBENACEAE

Bouchea prismatica (L.) Kuntze. Piste, waste places, *Lundell & Lundell 7876*, annual, corolla lavender.

Callicarpa acuminata H.B.K. Chichen Itza, in thicket on Valladolid road, *Lundell & Lundell 7519*, shrub, corolla white.

Citharexylum Schottii Greenm. Piste, in dooryard, *Lundell & Lundell 7878*, treelet, 2 in. diam., 15 ft. high, corolla pale green. Progreso road, km. 19, in thorn thicket, *Lundell & Lundell 8132*, shrub or tree, 6–15 ft. *Xchobenche.*

Cornutia latifolia (H.B.K.) Moldenke. Xocenpich, in second growth, *Lundell & Lundell 7888*, low tree, 6 in. diam., 50 ft. high, corolla bluish-purple.

Duranta repens L. Chichen Itza, abundant in second growth, *Lundell & Lundell 7342*, shrub, 6–12 ft. high, corolla lavender. *Campo-koche.*

Ghinia curassavica (L.) Millsp. Thicket, on hills south of Muna, *Lundell & Lundell 8176*, perennial herb, corolla blue.

Lantana citrosa (Small) Moldenke. Abundant all along Uxmal road, km. 40, *Lundell & Lundell 8087*, shrub, 4–6 ft., corolla white, yellow in throat.

Lantana involucrata L. West of Progreso, common in beach zone scrub, *Lundell & Lundell 7946*, much-branched shrub, 2–3 ft. high, corolla tinged lavender.

Lantana scorta Moldenke. Along Merida to Chichen Itza road, km. 60, in second growth, *Lundell & Lundell 7401*, shrub, 4 ft. high, corolla either red or orange. Progreso road, common in thorn thicket, *Lundell & Lundell 8205*, shrub, corolla orange, 4–6 ft.

Lantana velutina Mart. & Gal. Piste, in second growth, *Lundell & Lundell 7348*, diffusely branched shrub, 3 ft. high, corolla white, yellow in throat.

Petrea volubilis L. Chichen Itza, in second growth, *Lundell & Lundell 7329*, woody vine, sepals pale bluish-purple, corolla purplish. Chichen Itza, in second growth, *Lundell & Lundell 7413*, woody vine, corolla purplish. *Piocha viejo, Yochobtzimin* (*Yoch* = food, *ob* = crackling, *tzimin* = horse).
When the dry leaves are crushed they sound like a toasted tortilla.

Rehdera trinervis (Blake) Moldenke. Chichen Itza, in advanced forest, on Valladolid road, *Lundell & Lundell 7587*, tree, 10 in. diam., 35 ft. high. *Sacuisiche* (*Sac* = white, *uisi* = straight, *che* = tree).
The durable wood is used for beams in houses.

Stachytarpheta jamaicensis (L.) Vahl. In first village west of Progreso, *Lundell & Lundell 7942*, herb, corolla bluish-purple.

Stachytarpheta Lundellae Moldenke, Phytologia 1: 435. 1940. Dzitas, in second growth, *Lundell & Lundell 7355*, shrub, 4 ft. high, corolla dark red. Chichen Itza, roadside, *Lundell & Lundell 7412* (holotype, NY), herb, corolla cerise-red, purplish in throat.

Vitex Gaumeri Greenm. Chichen Itza, second growth at Sacred Cenote, *Lundell & Lundell 7321*, tree, 10 in. diam., 30 ft. high, corolla bluish-purple. *Yaxnic.*

LABIATAE

Ocimum micranthum Willd. Progreso road, km. 27, in cleared flats, *Lundell & Lundell 8034*, herb. *Xcacaltun.*

Salvia Fernaldii Standl. Chichen Itza, roadside, *Lundell & Lundell 7456*, herb, corolla blue. *Pasmarxiu.*

Boil leaves and drink a small amount and bathe in remainder. To cure a man when he works in field, gets hot and perspires; a rain comes and he cools off too quickly which causes him to get pale, almost yellow (sunstroke?). This is cured by liquid from plant.

SOLANACEAE

Capsicum frutescens L. In clearing, Progreso road, km. 28, *Lundell & Lundell 7998*, perennial herb. *Max.*

Lycium carolinianum Walt. Progreso, in beach zone, *Lundell & Lundell 7396*, whitish spinescent shrub, 4–5 ft. high. West of Progreso, common in beach zone scrub, *Lundell & Lundell 7955*, thorny shrub, 3–6 ft., berries orange-red. Progreso to Telchac road, abundant in beach zone, often in salt spray of beach, *Lundell & Lundell 8109*, shrub, bushy and clambering, or prostrate on sand.

Physalis mayana Standl. Piste to Libre Union road, roadside, *Lundell & Lundell 7569*, herb, corolla lobes yellow, throat brownish. In clearing, Progreso road, km. 28, *Lundell & Lundell 7996*, perennial, 18 in., corolla yellow and brown. Uxmal road, km. 18, in thicket, *Lundell & Lundell 8083*, shrub, 6 ft., slender, fruits or calyx dull reddish or maroon, fruits orange-red. *Xpahcanul.*

Schwenkia americana L. Along roadside, Progreso road, km. 18, *Lundell & Lundell 7966*, herb, corolla purplish.

Solanum amazonium Ker. In thorn thicket, Progreso road, km. 25, *Lundell & Lundell 7995*, perennial, 3 ft., corolla lavender.

Solanum hirtum Vahl. Chichen Itza, roadside, *Lundell & Lundell 7476*, shrubby, petals white. Uxmal road, km. 40, common along roads and in waste places, *Lundell & Lundell 8090*, thorny shrub, 3–5 ft. *Xputbalam, Xtompaap, (Xtom* = kind of fruit, *paap* = a species of bird [this bird eats the fruit]).

Juice of fruit is squeezed into water, gargled to cure sore throat.

Solanum ochraceo-ferrugineum (Dunal) Fernald. Chichen Itza, Valladolid road, in clearing, *Lundell & Lundell 7520*, shrub, 4 ft. high, corolla white. *Bortomkux (Bor* = black, *tom* = to step on, *kux* = thorn [a plant with black thorns]).

Solanum Pavonii Dunal. Chichen Itza, near the Castillo, *Lundell & Lundell 7404*, vine.

Solanum variifolium Standl. Chichen Itza, Kaua road, in old forest, *Lundell & Lundell 7906*, clambering shrub, 7 ft.

Solanum verbascifolium L. Progreso road, km. 31, abundant along railroad, *Lundell & Lundell 8011*, annual, fruits red.

Solanum yucatanum Standl. Uxmal road, km. 40, roadside, *Lundell & Lundell 8094*, thorny shrub, 3 ft., flowers pale green, fruit red.

SCROPHULARIACEAE

Angelonia sp. Progreso road, km. 31, in cleared flats, *Lundell & Lundell 8028*, erect herb, corolla purple. Progreso road, km. 29, in cleared flats, *Lundell & Lundell 8031*, perennial herb, corolla purple.

Bacopa Monnieri (L.) Wettst. Progreso, in cleared flats south of cienaga, *Lundell & Lundell 8022*, prostrate herb.

Capraria biflora L. f. **hirta** Loes. West of Progreso, in beach zone scrub, *Lundell & Lundell 7956*, perennial, 4 ft., corolla white. Progreso, abundant along railroad through flats south of cienaga, *Lundell & Lundell 7976*, perennial herb, corolla white.

Conobea pusilla (Benth.) Benth. & Hook. Progreso road, km. 30, among grasses along roadside, *Lundell & Lundell 8004*, erect annual, corolla purple.

Gerardia maritima Raf. var. **grandiflora** Benth. Progreso, around pools in flats south of cienaga, *Lundell & Lundell 8024*, perennial, corolla pink.

Pagesia sp. Progreso road, km. 27, in cleared flats, *Lundell & Lundell 8037*, annual, flowers yellow.

Pogostoma saxifragaefolia (C. & S.) Schrad. Piste, waste places, *Lundell & Lundell 7877*, perennial, corolla pale lavender, darkest in throat.

Russelia flavoviridis Blake. Near Dzitas, in second growth, *Lundell & Lundell 7354, 7890*, perennial, 3–6 ft., corolla bright red. *Chactziitz.*

MARTYNIACEAE

Martynia annua L. Sisal road, roadside, *Lundell & Lundell 8145*, coarse herb, 2–3 ft., viscid, tube pale lavender, lobes with purple spot within.

BIGNONIACEAE

Amphilophium paniculatum (L.) H.B.K. Near Xocenpich, in second growth, *Lundell & Lundell 7884*, woody vine, flowers purplish. Chichen Itza, Kaua road, in second growth, *Lundell & Lundell 7908*, woody vine, 12 ft., sterile.

Amphilophium paniculatum (L.) H.B.K. var. **molle** (S. & C.) Standl. Chichen Itza, Kaua road, in old forest, *Lundell & Lundell 7911*, woody vine, 10 ft.

Arrabidaea floribunda (H.B.K.) Loes. Piste, in second growth, *Lundell & Lundell 7362*, woody vine, corolla orchid with paler throat. Chichen Itza, on Valladolid road, in low thicket, *Lundell & Lundell 7583*, woody vine, 8 ft. long. Yokdzonoot road, common in second growth and old forest, *Lundell & Lundell 7867*, woody vine, corolla purplish. *Sacak* (*Sac* = white, *ak* = vine).

Cydista diversifolia (H.B.K.) Miers. In Dzitas, *Lundell & Lundell 7893*, woody vine, 15 ft., corolla purple. In thorn thicket, off Merida to Progreso road, km. 25, *Lundell & Lundell 8000*, woody vine, corolla lavender-pink. Uxmal road, km. 30, in legume thicket, *Lundell & Lundell 8077*, woody vine, corolla purple. *Sosciak*.

Cydista heterophylla Seibert. Xocenpich, in second growth, *Lundell & Lundell 7350* (holotype, MICH), woody vine of 15 ft., leaves simple, corolla purple.

Cydista potosina (K. Schum. & Loes.) Loes. Piste, in second growth, *Lundell & Lundell 7347*, woody vine. Chichen Itza, in old thicket, *Lundell & Lundell 7600*, woody vine, 12 ft. long. *Ekixil, Xekkixil*.

Doxantha unguis-cati (L.) Rehder. Near Yokdzonoot, in advanced forest, *Lundell & Lundell 7489*, woody vine, 25 ft. long, corolla orange-yellow. *Ichactoloc* (*Ichac* = claw, *toloc* = a species of lizard [claw of the lizard vine]).

The vine has claw-like hooked tendrils. Used for curing the bite of the *toloc* lizard, which has a comb on head. Leaves are powdered and then wet with lime juice, which is applied to bite wound. Vine is used as cordage in house construction.

Neomacfadya podopogon (DC.) H. Bu. Chichen Itza, in advanced forest, Valladolid road, *Lundell & Lundell 7479*, woody vine, corolla lavender. *Aksuuk* (*Ak* = vine, *suuk* = bee's nest).

A basket is made of the vine in the shape of a bee's nest. These baskets are used for harvesting corn.

Onohualcoa Seleri (Loes.) Lundell, gen. nov., Contrib. Univ. Michigan Herb. 7: 52. 1942. Off Piste to Yokdzonoot road, in *hopche* (acahual), *Lundell & Lundell 7865*, woody vine.

Parmentiera aculeata (H.B.K.) Seem. Off Merida to Progreso road, km. 27, common, in thorn thicket, *Lundell & Lundell 8198*, shrub, 5 ft.

Pithecoctenium echinatum (Jacq.) K. Schum. Chichen Itza, edge of Thompson's Cenote, *Lundell & Lundell 7336*, woody vine, corolla creamy-yellow. Piste, in old thicket, *Lundell & Lundell 7554*. *Peine de extabay, xachemaax, xachextabay* (*xache* = comb, *maax* = monkey, *xtabay* = women).

Stizophyllum perforatum (Cham.) Miers. Piste, in second growth, *Lundell & Lundell 7382*, woody vine, corolla creamy-white. Chichen Itza, Kaua road, in old forest, *Lundell & Lundell 7910*, woody vine, corolla creamy-white. *Akbach* (*Ak* = vine, *bach* = chachalaca).

Tabebuia chrysantha (Jacq.) Nicholson. Chichen Itza, small deciduous tree in thicket.

ACANTHACEAE

Bravaisia tubiflora Hemsl. One of the dominant species of beach zone at Progreso, *Lundell & Lundell 8146*, shrub, 4 ft.

Elytraria bromoides Oerst. Chichen Itza, in clearing, *Lundell & Lundell 7604*, perennial herb, corolla white. *Acan.*

Justicia carthaginensis Jacq. Near Libre Union, in advanced forest, *Lundell & Lundell 7575*, herb, corolla rose-red. Near Xocenpich, in second growth, *Lundell & Lundell 7883*, perennial, corolla rose-red. West of Progreso, common in beach scrub zone, *Lundell & Lundell 7938*, perennial up to 4 ft. high, corolla rose-red, an almost glabrous variety.

Justicia Lundellii Leonard, Carn. Inst. Wash. Publ. 461: 226, fig. 16. 1936. Xocenpich, in second growth, *Lundell & Lundell 7357*, perennial. *Akab Xiu.*

Ruellia nudiflora (Engelm. & Gray) Urb. var. **yucatana** Leonard. Near Yokdzonoot, roadside, *Lundell & Lundell 7493*, herb with tubers, corolla bluish-purple. Chichen Itza, in clearing near the Castillo, *Lundell & Lundell 7525*, perennial herb, corolla white. Chichen Itza, in clearings, *Lundell & Lundell 7597*, perennial herb, corolla purplish. Chichen Itza, common around the Castillo, *Lundell & Lundell 7607*, perennial herb, corolla pink. *Cambaly-axnic, Cabayaaxnik* (*Caba* = low, *yaaxnik* = a species of tree [a low plant with flowers that resemble those of the *yaxnic* tree, *Vitex Gaumeri*]).

The whole plant is combined with a small amount of *akabixiu*, a small plant, and *cnachacche*, a tree, boiled together, with the liquid used for bathing to reduce fever. Flowers are used as an offering to the saints by placing them on an altar.

Stenandrium subcordatum Standl. Chichen Itza, in forest shade, Valladolid road, *Lundell & Lundell 7511*, perennial herb, corolla pink. *Ehpeedy* (*Ehpeedy* = relapse).

When a person has a relapse of any illness, medicine is made from this plant by boiling with the water used for bathing.

RUBIACEAE

Alseis yucatanensis Standl. Near Kaua, on Valladolid road, in advanced forest, *Lundell & Lundell 7466*, tree, 10 in. diam., 50 ft. high, flowers fragrant, corolla pale green. *Xchacalhaasche* (*Xchac* = red, *al* = shoots, *haas* = banana, *che* = tree).

Leaves resemble those of the *mamey* (*Calocarpum mammosum*).

Asemnanthe pubescens Hook.f. Chichen Itza, in advanced forest on Valladolid road, *Lundell & Lundell 7478*, shrub, 3 ft. high. In Peten in swamp forest. *Tehikaax* (*Teh* = tea, *ikaax* = wild).

Drink boiled leaf liquid to cure diarrhea.

Borreria verticillata (L.) Mey. Chichen Itza, Kaua road, along roadside, *Lundell & Lundell 7915*, perennial, corolla white.

Chiococca alba (L.) Hitchc. Chichen Itza, in second growth, *Lundell & Lundell 7424*, woody vine, corolla pale yellow, flowers fragrant. Progreso, in beach zone scrub, *Lundell & Lundell 7939*, woody, clambering, corolla dark purplish. Progreso, in beach zone scrub, *Lundell & Lundell 7939A*, corolla yellowish. *Xkanchacche* (*Xkan* = yellow, *chac* = red, *che* = wood).

Root is boiled and liquid used as a mouth wash to cure toothache.

Cosmocalyx spectabilis Standl. Chichen Itza, in advanced growth on Valladolid road, *Lundell & Lundell 7517*, tree, 10 in. diam., 35 ft. high, corolla orange-yellow. Chichen Itza, Valladolid road, in old forest, *Lundell & Lundell 7901*, tree, 10 in. diam., 50 ft. high, corolla orange. *Chactecoc* (*Chacte* = a species of tree, *coc* = a species of insect).

A durable wood used in house construction and for railroad ties.

Coutarea octomera Hemsl. Chichen Itza, in second growth, *Lundell & Lundell 7469*, small tree, flowers fragrant, corolla white. Chichen Itza, *Lundell & Lundell 7507*. *Xpayluch*.

Wood is used in making hooks for bellybands for horses or mules.

Ernodia littoralis Sw. Progreso, in beach zone, *Lundell & Lundell 7390*, shrub. Progreso, abundant in beach zone, *Lundell & Lundell 8154*, shrub, corolla red.

Exostema caribaeum (Jacq.) R. & S. Uxmal road, km. 40, in low forest, *Lundell & Lundell 8095*, treelet, corolla white, said to grow to 12 in. diam. *Baczotz* (*Bac* = bone).

Wood used to make combs, very hard.

Guettarda Combsii Urban. Chichen Itza, in advanced forest on Valladolid road, *Lundell & Lundell 7474*, tree, 6 in. diam., 30 ft. high, corolla white. *Testab.*

Wood is very hard when dry, does not decay nor do insects attack it. Wood used in house construction.

Guettarda elliptica Sw. Chichen Itza, in advanced second growth, *Lundell & Lundell 7433*, tree, 12 in. diam., 30 ft. high, corolla pale green. Near Piste, in old thicket, *Lundell & Lundell 7544*, tree, corolla pale green. Yokdzonoot, rather common in old forest, *Lundell & Lundell 7924*, tree, with smooth bark, 3 in. diam., 20 ft. high, corolla greenish-white. Yokdzonoot, in old forest, *Lundell & Lundell 7926*, treelet, scaly bark, 3 in. diam., 20 ft. high, corolla pale green. *Cipche, Xkibche* (*Xkib* = sleepwalker disease, *che* = tree).

The plant is used to whip sleepwalker and this is reputed to cure him. A sleepwalker is called *xchuculkib.*

Hamelia patens Jacq. Uxmal, roadside, *Lundell & Lundell 8159*, shrub, 6 ft., corolla red. Chichen Itza, in thicket, *Lundell & Lundell 7608*, shrub.

Machaonia Lindeniana Baill. Near Piste, in old thicket, *Lundell & Lundell 7538*, shrub, 10 ft. high, corolla almost white. *Sacikiche, Pisteche.*

Psychotria pubescens Sw. Chichen Itza, in advanced forest on Valladolid road, *Lundell & Lundell 7512*, shrub, 3 ft. high, corolla greenish-yellow. Chichen Itza, in old thicket, *Lundell & Lundell 7598*, shrub, 4 ft. high. corolla yellowish. *Cabalchactecoc* (*Cabal* = low, *chacte* = a species of tree, *coc* = a species of insect), *Cambalchactecoc.*

Wood and leaves resemble *chacte* tree. A disease carried by the insect *coc* is cured by medicine made from this plant. Leaves warmed first and then crushed and applied to body of baby to cure asthma.

Psychotria undata Jacq. Chichen Itza, in advanced forest on Valladolid road, *Lundell & Lundell 7518*, shrub, 3 ft. high, corolla white.

Randia aculeata L. Piste, in second growth, *Lundell & Lundell 7372*, shrub, 2–3 ft., corolla tube greenish, lobes white. *Peech Citam* (*Citam* = wild boar).

Randia Gaumeri Greenm. & Thomps. Near Yokdzonoot, in old forest, *Lundell & Lundell 7930*, treelet, 20 ft.

Randia longiloba Hemsl. Chichen Itza, in advanced second growth, *Lundell & Lundell 7431*, tree, 6 in. diam., 30 ft. high, spiny, flowers fragrant, corolla lobes white, tube green. *Xkax*.

Randia truncata Greenm. & Thomps. Piste, in second growth, *Lundell & Lundell 7379*, small tree, corolla tube pale green, lobes white. Chichen Itza, in second growth, *Lundell & Lundell 7415*, shrub, up to 6 ft., corolla lobes white, tube pale green. Yokdzonoot road, in old forest, *Lundell & Lundell 7863*, treelet, 2 in. diam., 10 ft. high.

CUCURBITACEAE

Cayaponia alata Cogn., vel aff. Near Yokdzonoot, in old forest, *Lundell & Lundell 7931*, herbaceous vine, corolla greenish. *Kaxak*.

Corallocarpus emetocatharticus (Grosourdy) Cogn. Chichen Itza, in second growth, *Lundell & Lundell 7341*, fleshy vine, ripe fruits brilliant red, variegated. *Xtakan*.

Cucumis Anguria L. Progreso road, km. 33, in cleared flat, *Lundell & Lundell 8067*, prostrate herbaceous vine, corolla yellow.

Melothria guadalupensis (Spreng.) Cogn. Roadside, hills south of Muna, *Lundell & Lundell 8174*, herbaceous vine.

GOODENIACEAE

Scaevola Plumieri (L.) Vahl. East of Progreso, on beach in spray, characteristic plant of beach, *Lundell & Lundell 8058*, sandbinding shrub.

COMPOSITAE

Ageratum Lundellii King & Robinson, Wrightia 6: 23. 1978. Chichen Itza, on wall, *Lundell & Lundell 7859*, herb, heads bluish. Roadside, hills south of Muna, *Lundell & Lundell 8172*, herb, heads blue. Described from Bajo de Santa Fe, Tikal, Guatemala, *C. L. Lundell 15647* (holotype, US; isotype, LL).

Ambrosia hispida Pursh. Progreso, common in beach zone, *Lundell & Lundell 8059*, perennial herb.

Baccharis dioica Vahl. Progreso, abundant in beach zone, *Lundell & Lundell 8072*, shrub, 3-6 ft.

Baltimora recta L. Progreso road, km. 10, common along railroad, *Lundell & Lundell 8124*, erect annual, heads yellow.

Bidens pilosa L. var. **radiata** Sch. Bip. West of Progreso, in beach zone scrub, *Lundell & Lundell 7952*, clambering herb, rays white. Progreso, on sand dunes, beach zone, *Lundell & Lundell 8147*, prostrate herb with long slender ascending branches, rays white.

Borrichia frutescens (L.) DC. South of Progreso, common along railroad through mangrove swamp, *Lundell & Lundell 7951*, perennial in colonies, leaves thick, pale, heads yellow.

Calea Peckii Robinson. Chichen Itza, in low thicket, *Lundell & Lundell 7603*, clambering perennial. *Kintah.*

Chromolaena Lundellii King & Robinson, Wrightia 6: 24. 1978. Progreso along railroad through flats south of cienaga, *Lundell & Lundell 7977*, herb, heads blue. Described from Peten.

Eclipta alba (L.) Hassk. Progreso road, km. 31, in cleared flats, *Lundell & Lundell 8027*, herb, heads white.

Flaveria linearis Lag. East of Progreso, on beach, *Lundell & Lundell 8064*, perennial herb, heads yellow.

Koanophyllon albicaulon (Sch. Bip. ex Klatt) K. & R. *Eupatorium albicaule* Sch. Bip. Piste, in second growth, *Lundell & Lundell 7378*, arborescent shrub, 6–10 ft. high. *Sactah* (*Sac* = white, *tah* = torch).

Lactuca intybacea Jacq. Progreso, in flats south of cienaga, *Lundell & Lundell 7979*, herb.

Lagascea mollis Cav. Chichen Itza, in yard, *Lundell & Lundell 7907*, annual. Progreso road, km. 30, along railroad, *Lundell & Lundell 8203*, annual.

Melampodium divaricatum (Rich.) DC. Chichen Itza, in yard, *Lundell & Lundell 7860*, herb, heads yellow.

Melampodium gracile Less. Abundant along roadside, Progreso road, km. 13, *Lundell & Lundell 7972*, annual, heads yellow.

Melanthera nivea (L.) Small. East of Progreso, in beach zone, *Lundell & Lundell 8052*, herb.

Mikania micrantha H.B.K. Progreso road, km. 32, in marsh, growing on *Typha*, *Lundell & Lundell 8213*, vine.

Montanoa Schottii Rob. & Greenm. Chichen Itza, Valladolid road, in low thicket, *Lundell & Lundell 7580*, clambering plant, 3–6 ft. high, rays white. *Xomax* (*Xom* = foam, *ax* = vine [foams when dropped in water]).

Notoptera Gaumeri Greenm. Yokdzonoot road, in old forest, *Lundell & Lundell 7921*, clambering perennial, 15 ft., flowers fragrant.

Parthenium Schottii Greenm. Progreso, in lowlands, south of cienaga, *Lundell & Lundell 7948*, coarse herb, 4 ft.

Pectis elongata H.B.K. Progreso road, km. 31, along roadside, *Lundell & Lundell 8009*, erect annual, strong scented.

Plagiolophus Millspaughii Greenm. Roadside, hills south of Muna, *Lundell & Lundell 8171*, herb, heads white.

Pluchea camphorata (L.) DC. Progreso, in cleared flats south of cienaga, *Lundell & Lundell 8025*, herb, heads lavender.

Porophyllum punctatum (Mill.) Blake. Common in beach zone scrub, west of Progreso, *Lundell & Lundell 7945*, shrubby, brittle, 2–3 ft., heads greenish.

Sanvitalia procumbens Lam. Along roadside, Progreso road, km. 17, *Lundell & Lundell 7964*, prostrate annual, rays orange.

Vernonia scorpioides (Lam.) Pers. Chichen Itza, Kaua road, in second growth, *Lundell & Lundell 7912*, clambering perennial, heads tinged purple.

Wedelia parviceps Blake. Chichen Itza, along Valladolid road, *Lundell & Lundell 7508*, herb, 3 ft. high, flowers yellow. *Yaaxsahun* (*Yaax* = green, *sahun* = name of another plant).
Used as forage for horses.

COBA AREA OF QUINTANA ROO

Foreword

Quintana Roo has remained botanically little known, for the early exploration of Cozumel Island and later the western area bordering the State of Yucatan has provided only limited floristic records. These were mainly from collections of Millspaugh and Gaumer.

In the hope that an expedition into the east coast forest with Coba as the hub for an intensive study of the vegetation, the 1938 trip was planned.

From our Carnegie Institution headquarters at Chichen Itza we organized the expedition. Camping equipment was borrowed from the Institution's storehouse, and this was supplemented by supplies such as canned foods, kerosene, and other necessities purchased in Merida and Valladolid. Our Merida agent, Francisco Campos, not only handled the purchases but helped organize the cargo at both Chichen Itza and Valladolid for transportation to Coba by packmule.

Our helpers accompanying us from Chichen Itza on the Coba trip were Eugenio May, Marty Dzib, and Carlos Marrufo, the two former were fluent in English and Spanish as well as Maya. This was important in our contacts with the Maya in Quintana Roo and helped with plant names. In addition to the packmule handlers (*arrieros*), three local Maya workers were hired in Quintana Roo.

Excerpts from the Journal of Trip to Coba

June 20th, Monday. By noon everything was in readiness for our departure tomorrow morning for Coba via Valladolid. During the afternoon we rested a little and later did more photographic work. For a tree ring count Carlos cut a cross section of the *Cedrela* tree felled by Steggerda in February 1938.

June 21st, Tuesday. Got up at 5:15 a.m. and soon had everything packed and ready to go on the truck. Campos, Marty, Carlos, and Eugenio loaded the truck while we ate breakfast. Met the Morleys and other staff members at breakfast this morning and received best wishes as well as last minute advice!

Soon the truck was loaded to carry our equipment to the railroad station at Dzitas. The truck left Chichen Itza for Dzitas at 7 a.m. for it had to arrive early enough to get the equipment labeled and ready for shipment. From Dzitas, Campos and Marty took the train to Valladolid. C. L., Carlos, Eugenio and I drove in the station wagon for the last few days without rain made the road to Valladolid passable. We felt that it would be easier on us to go by road rather than make a trip on the local train.

Fig. 45. The fire-swept forest along the trail from Dzitnup to Coba. Such devastation occurs in long dry seasons when *milpa* fires get out of control and burn the dry uncut secondary forest. Note the barren limestone exposed by the fire.

We left Chichen Itza in the station wagon at 7:35 a.m. and reached Valladolid at 9:30 a.m. We first went to the home of Isidro Mendoza, who would serve as our agent at Valladolid. He drove us to a house adjoining the stables where our mules were ready for the next day's journey. Here the men making the trip were to stay. Their room was very large and had a clean tile floor. We were taken to the local hotel. Our room there did not compare with that of our crew, but when one is weary any place where it is possible to either hang a hammock or put up a cot is acceptable.

At 11 o'clock that morning we met the train from Dzitas that Marty and Campos were due to arrive on. After seeing so many unfamiliar faces, it was like greeting old friends when Marty and Campos turned up. A truck was hired and our supplies and equipment were stored in the room where the crew were to stay overnight.

Accompanied by Campos we returned to the hotel for lunch. This consisted of chicken—covered with the hottest pepper I have ever had; also, rice prepared with tomatoes and more hot pepper, tortillas, and a custard for dessert. For our drinks we ordered Coca-Cola but they didn't have any, and since we couldn't drink their water we were forced to drink beer.

After lunch we shopped for more supplies, including four five-gallon tins of kerosene for our plant-drying lanterns, a full load for a packmule.

June 22nd, Wednesday. We awoke before 4 a.m. so were up and dressed by the time Campos came to call us. All the crew ate with us at the hotel since no other eating place was open.

When we reached the place where our equipment was stored, we found that the packmules were already loaded. There were 27 boxes and kyacks full of supplies plus the equipment. The *arrieros* (mule skinners) said this was the largest camp load ever taken to Coba. There were 20 packmules plus the riding animals.

Campos bade us farewell as he was returning to Merida, and Pedro, Carlos, Eugenio, Marty, C. L. and I all got on our mules and started out at 6 a.m. I didn't feel too secure at first, never having been on a mule before, but soon I felt brave enough to try galloping. We looked like a young army going out for the crew members each carried either a shotgun or rifle and machete.

Along the way we could hear shots and fireworks in the distance. When we reached the village, we found it was the occasion of a religious holiday. When they saw us arrive, the celebration was halted. I seemed to be the main object of their curiosity, for seeing a white woman on mule back was something that had never occurred there before.

The ride was awful and the occasions were few and far between when we were able to even trot the mules. Narrow trails and sharp rocks made any speed at all impossible. We were forced to take four rest periods, and each time we would walk awhile because of our sore muscles. Our only remarks were "How much farther and when will we reach the village where we will spend the night."

Fig. 46. The burned-over forest near Coba. Only a few large trees survive. Since accumulated organic litter is burned and the soil is washed into very shallow crevices, much of the forest floor is left exposed with a rocky limestone surface.

At 3 p.m. we reached the Maya village of Dzitnup. Here we obtained permission to sleep in the schoolhouse, which consisted of a stone floor, a gate and half walls of poles with a thatch roof. We dismounted and staggered into the school, and each of us stretched out on the benches. Marty finally went to one of the houses to buy some coffee and toasted tortillas which he and C. L. ate, but I couldn't stir up any interest in either food or drink.

Very soon we had an audience standing outside the rail surrounding the school hut, and every available space was taken by a brown figure. They just watched us and conversed among themselves. Soon this proved to be a major annoyance.

The 20-mule pack train didn't arrive until 6 o'clock. This caused quite a stir for the natives had never seen so much equipment, and they stood around with eager faces to watch us unload each mule and unpack what was needed overnight. Marty and I sat about to get something to eat. We rented a kitchen and Marty boiled water for the dishes and warmed up some beans and soup. We also had some salmon and bread. It was very disgusting not to be able to at least eat in peace, but all around the wall the men and boys stood and watched us. Occasionally they would say something to one another and laugh, and several times when I looked up I saw the empty cans we had opened being

Fig. 47. Young second growth vegetation covering a year-old fire-swept forest area near Coba. Species of *Cecropia*, *Ipomoea*, *Croton* and numerous other fast growing plants soon cover the burned-over forest and begin the slow process of rebuilding the soil. In a remarkably short period of years, the accumulation of forest litter and humus makes possible the clearing again for *milpa* plantings, and the cycle is repeated. The vigorous regeneration of vegetation on the limestone of the Peninsula sustained Maya *milpa* agriculture.

passed from one to another and each one would smell them. The women and girls were naturally absent, but we could see them peeking between the pole walls of their huts.

Cots, hammocks and nets were hung. I was the only lady there and I had some difficulty in finding any privacy at all. Finally at dusk I was able to crawl under my net and prepare for bed. By now I was too exhausted to care

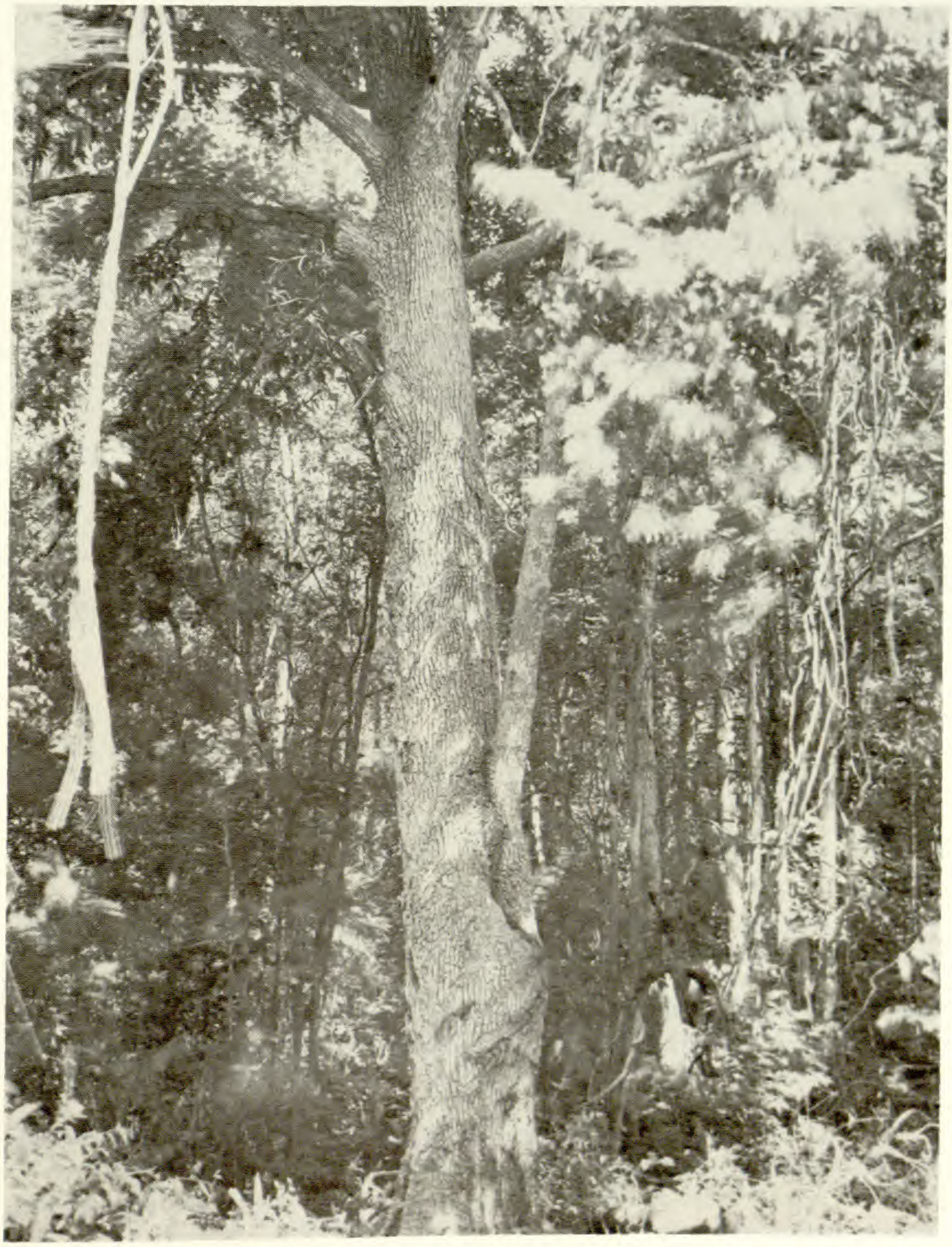


Fig. 48. The advanced forest covering the ruins of Coba approaches in relic areas the climax vegetation which originally covered much of northern Quintana Roo. The large *Achras Zapota* tree in foreground, with its tapping scars, was one of the dominant species of this forest.

whether the natives were watching or not. C. L. and I slept in one end of the schoolhouse and Carlos, Eugenio, Marty, and Pedro slept in the other end. C. L. reported the appearance of big cockroaches, but I was lucky in being able to sleep so sound that everything was forgotten. If you allow yourself to think or listen, it is impossible to sleep for you visualize all the creeping and crawling things which you know exist around these villages.

June 23rd, Thursday. Marty got up about 3:30 a.m. and started boiling water for the canteens. The rest of us got up about 4. By now there was much activity for the mules were being loaded.

Led by Pedro, C. L., Marty, Carlos and I left the village at 6 o'clock. Earlier two natives locally hired left on foot to cut away trees and vines which had fallen across the trail. Never had we seen such barren and desolate country. Fires had burned the forest all the way to Coba, a distance said to be about 18 miles. Huge limestone rocks were exposed along the trail so the mules had to walk very slow to keep from falling. Often my mule stumbled and I felt sure the next moment would find both of us thrown down on one of the large rocks, both of us with broken limbs. You could never take your eyes off the trail but had to duck the vines and protruding limbs and jagged tree trunks. Nearing Coba, toward the end of our journey, my mule refused to be guided and no amount of pulling on his reins would prevent the accident which left me with a lacerated hand. The mule pulled me into a vine (*Byttneria aculeata*) and I was suddenly faced with the choice of being thrown off the mule completely or suffering a badly torn hand. Feeling that a lacerated hand would be less painful than broken ribs, I grabbed the vine and managed to balance myself sufficiently to at least stay on the mule. My hand was badly torn and the pain was terrific. My ribs were bruised as well. The only advantage was that I was able to forget at least for a time the groaning muscles from the hard trail ride. We were only a short distance from Coba so I wouldn't stop to have my hand bandaged. Soon we saw the lake and what a welcome sight it was. By now we were riding through the extensive ruins of the site.

We had been told that the thatched shelters here were good, but on our arrival we found only tick and flea infested huts left by a recent airfield clearing crew. Because of this we were so glad we had brought along the extra men so that new quarters could be erected. A large emergency airfield had been cleared at Coba, and the quarters were between it and the lake.

The first thing C. L. did was to take out the emergency medical kit and clean out the cuts on my hand with iodine. Then the entire hand was bandaged. By now the pain and exhaustion overtook me so he and Marty had to fix a place for me to lie down.

C. L. went in search of a good place to build a new shelter. He selected a place beside the lake where the cool breeze could reach us. Soon work started felling trees and clearing the site. After I felt better I went down to watch them. It is fascinating to see the Maya work, using all that nature provides, a people truly dependent on their environment for all needs. All building materials came from the forest. Their only tools were machetes and axes.

Fig. 49. Old second growth forest covering the ruins of Coba. Note mounds in clearing of approach to airstrip.

The axes looked like the tomahawks the American Indians used except they had longer handles. The frame of the house, also the walls, were made of timbers and poles, varying in size for the purposes needed. Woody vines and strips of bark were used to tie everything together, and then palm leaves from the genus *Sabal* were used for the thatch.

Realizing that the new shelter could not be completed for at least three days, three of the men set to work to clean up the old huts left by the airfield workers. Marty cleared one to be used as a kitchen. Carlos, Pedro and Eugenio fixed up one for themselves and they cleaned up one for C. L. and me. Ours was then sprayed with flit to kill the fleas and ticks. A tarpaulin was spread on the ground and our cots and nets set up.

After the evening meal, C. L. and I took a stroll down the airfield clearing that lies amidst the ruins. Suddenly we both stood still and listened. Fantastic, as we both agreed, we heard a constant tinkling of small bells coming from the main plaza of the ruins. The sound is uncanny and wierd. On our return to camp we told our Maya workers what we had heard, and here is the story as they told it:

Many centuries ago the ancient Maya medicine men carved out figures of men and placed them in the buildings. These stone images remain in the ruins, coming to life only at night on Thursdays and Fridays. At this time they sometimes ring bells, sometimes they stroll around with their dogs and

the bark of the dogs can be heard. Other times they are heard in battle and their cries ring out. These images are called *alux*. When they are around they send ill winds and these ill winds cause babies to be ill but do not affect adults. Only the medicine men can chase them away. This is done by his prayers. Marty tells me that he has often heard the *alux* in the ruins.

I still wonder how these natives can retain such endurance and strength on the diet they exist on. After working hard all day they merely made themselves some tortillas. When Carlos came out eating his supper we had quite a laugh, for instead of making several thin tortillas, he made one which was as large as a plate and over a half an inch thick. In fact, I believe he could have killed a jaguar had he hurled the tortilla at it.

We sprayed our nets and retired. Pedro went hunting and soon a shot was heard. We were anxiously awaiting his return hoping he might have a deer, but when he returned he carried an animal and none of the natives knew what it was. They brought it to our hut, and it was a little grey fox.

Fig. 50. An open savanna in the Coba area with scattered palms, a species of *Acrocomia*, shrubby small trees such as the *nance*, *Byrsonima crassifolia*, with a host of grasses and other herbaceous plants mostly not in flower at time of our visit.

Marty stayed up later than the rest of us to boil the water for tomorrow's canteens.

June 24th, Friday. Up at 5:30 for already the packmules are being readied for the trip back to Valladolid.

Eugenio, Pedro and the two workers hired at Dzitnup went back to work on our new shelter. C.L. and Carlos cut a wide path from the new house to the edge of the lake. While cutting the path they killed a barber pole snake, closely related to a coral snake and incidentally the first specimen we collected at Coba. They then cleared a place on the lake where we could swim. A platform was built with rocks out into the water with a palm leaf blind on the exposed side.

After lunch C.L., Carlos and I explored the ruins. I didn't stay with them long for I was soon too exhausted. They climbed up to see some temples, which we understand have not been reported.

I am beginning to enjoy camp life and marvel at how quickly a person can adjust to new conditions.

At 4 o'clock I went down and enjoyed a most delightful swim. The water is of the right temperature and after a hot day it is heavenly to sit down on the rocks or splash in the water. I even shampooed my hair. The enjoyable part of it is in knowing that there are no tourist cabins across the lake and you are enjoying privacy which would not be possible in most places.

After the evening meal we again strolled through the ruins, this time in the direction of Dzitnup. There were two mounds that we wanted to investigate. As we neared the wide stairs leading to the main plaza, we again heard what sounds so distinctly like the tinkling of the small bells—a most uncanny sound to be coming from a place when you know no human being is around. From a distance the ruins of a standing temple can be seen rising up almost as high as a fifteen-story building. The architecture of these ancient ruins is entirely different from that of the later sites such as Chichen Itza and Uxmal. The stairs are so much wider which makes climbing much easier. The limestone blocks used in the structure of the buildings were not cut but were used in their crude state and were put together with mortar and covered with plaster.

That night our crew went hunting and about an hour later we heard a shot. We anxiously waited for their return to see what meat we would have tomorrow. Carlos and Marty returned and very excitedly told us they had shot a large deer and needed help to carry it back to camp.

Hunting is a relaxation and provides needed variety to their meals.

Their excitement didn't die down until quite late. This together with toads hopping on our nets prevented us from falling asleep for several hours. We spent a restless night. It rained for a while and then we were awakened by sounds which suggested that some small animal must be around. We were unable to spot it with our flash lights.

Fig. 51. A section of the airstrip clearing in foreground, with thatched shelters in campsite in the high forest on shore of lake at Coba.

Fig. 52. Our temporary quarters in the old campsite at Coba. Infested with fleas and ticks and overrun with snakes, we sprayed the site, placed a tarpaulin on the ground, and put up our cots under the mosquito nets. During the cold tropic nights snakes crawled under the tarpaulin ground cover for warmth, not over the surface.

June 25th, Saturday. We awoke this morning feeling that a saloon keeper of British Honduras was right when he said that if a man says he loves the bush he is either a fool or a liar. Each morning you have to be so cautious so that you do not pull on your boot with a scorpion in the toe or stretch out your hand and find that some snake found your ground cloth a comfortable place under which to keep warm during the night. Yesterday two snakes were brought in, some were killed by the workers as they were in the bush cutting the palm leaves for the roof of the house, and then they reported having seen some which they didn't have a chance to kill.

Marty and Pedro busied themselves with the task of butchering the deer while the rest of the workers put the roof on our new shelter.

Fried deer liver for lunch and afterwards data were written up. I again worked in the kitchen. I had Marty cut a roast from the saddle of the deer and fixed it for dinner. The men took the remainder of the carcass and barbecued it for their own use. Marty put the skin out to dry for he said he could get two and a half pesos for it.

A lizard and one snake were brought in today. By now it begins to look as if there will be better zoological collecting here than botanical, which is very disappointing for us.

The men look very tired tonight and they should be for they work hard from early morning until late in the afternoon. They always eat late for they prepare their own meals and corn must first be ground and then patted into tortillas to be cooked on a flat iron plate. Tonight they are having barbecued leg of deer.

Just before I went to sleep I saw Marty sitting by the campfire sewing—probably putting still another patch on his trousers. Only a few pieces of the original material are left from which they were made.

June 26th, Sunday. It is very warm and after breakfast C. L., Carlos and I go out to collect. We take the path that leads to the main plaza of the ruins. We climb up and down over the mounds, stopping occasionally to make specimens of some plant we are taking for a record for so far we have found very few unfamiliar species.

Collecting was not good. For me the mosquitos were so large in the high forest that I was most uncomfortable. One press was filled and we returned to camp. C. L. and Carlos again went out to collect along the lake shore. I stayed in to write letters.

Marty was left at camp for there was washing for him to do. The other four men again worked on the house, trying to at least complete the workroom so that larger plant driers may be set up. The makeshift drier which we have in our hut is too small to accommodate even a poor day's collecting.

All afternoon C. L. worked on his plant specimens, and later supervised the building of a work table in the laboratory.

June 27th, Monday. Up early since we were going out collecting on mule back this morning. After breakfast the mules were saddled and C. L. and I rode, but Carlos and Pedro were on foot. Marty is building a work table

Fig. 53. Our swimming hole in Lake Coba. With her nest behind us in the forest, a large alligator was always nearby at a discreet distance watching us with only her eyes and snout exposed above the surface.

for the kitchen and Eugenio and the laborer from the village will complete the pole walls of our new shelter.

It is a bright and cool morning when we set out but after riding through the thick growth of the bush for awhile we got hot. The insects were very annoying and never have I seen mosquitos so large. At first we couldn't find anything of interest to collect, but as we rode on into the higher forest we were able to spot some plants not taken earlier. Since the goal was to record every species in the Coba area, anything collectible was taken but rarely duplicated.

We returned to camp at 11:30 and since we were already very tired of the hard bread we brought from Valladolid, I decided to try my luck at baking corn bread in the dutch oven over an open fire. My first experience wasn't too successful. The corn bread rose up, had a good texture and taste, but was burned on the bottom and not browned on top. Better luck next time. It seems I must have hot coals placed evenly on the top and the few I had on were too scattered. Our lunch today was very plain consisting of tomato soup, beans, stewed tomatoes, coffee, corn bread and oranges.

After lunch C. L. took pictures of our camp for after tomorrow we shall be

home in our new quarters. I look forward to being able to unpack everything. As it is, I usually have to go through eight kyacks before finding what I need.

The men return to work, four on the house, with C. L. writing up the plants we collected this morning. I completed my daily journal notes.

The breeze is blowing very hard this afternoon. For this we are very thankful for besides cooling us off, it also means fewer insects. As quickly as the breeze came up, it has just as quickly disappeared, leaving the air heavy and the humidity stifling. It is very grey and we are all wishing for rain.

We would not let Marty serve us any venison after the second day, although I am sure the workers will be eating it until it is all gone. One of our Maya laborers left to return to his village even though work on the house wasn't finished. We wondered about this, and finally decided he probably thought it would be better to lose two days of work and carry home some of the deer rather than stay on the job and earn a few more pesos. This, Marty admitted, was true and that is the way they usually reason things out.

Lab work wasn't completed until after 4 o'clock, after which C. L. went to catch fish for dinner. Marty went too but couldn't catch a thing for as yet he hasn't learned how to fish. However, C. L. caught all we needed for dinner and kept the smaller fish to take back to Michigan as specimens. I stayed at camp to fix dinner.

After dinner we took Eugenio over to the new house to tell him what else should be done. The tables, bench and driers have already been set up and the bedroom will be completed so we can move in.

June 28th, Tuesday. We wake up early to face another clear and bright day.

C. L. and Carlos left on muleback to collect on the trail to Dzitnup. There are some plants in flower now that may have passed by the time we return. I stayed in camp to help Marty. Eugenio, Pedro and the village laborer are completing the house so we can move in tonight.

I went into the kitchen to start lunch. Just as I stepped in I saw a 6-foot snake crawl from under the table. He disappeared before I could get a stick with which to kill him. I felt none too comfortable after this and more than once found myself glancing under the table but ever hopeful that I would find myself alone.

C. L. and Carlos returned to camp about 11 o'clock with the presses full, although C. L. again expresses his disappointment over the meager flora.

Now we are ready to move into the new quarters. Tarpaulins are stretched across the bedroom floor extending up a little on the wall and tied securely to keep out snakes. Boxes are placed on top of one another to form deep shelves where groceries are kept. It is good to be able to unpack for the first time since we reached Coba. Everything is sorted and placed in its proper place.

The kitchen is next placed in order. In one corner Marty has stones placed for the fire. Just outside two large rocks form the base for his cedar-log wash basin. Covered kerosene cans hold our water supply, and sharp pegs driven in a tree nearby make a nice rack for hanging up pots and pans. The kitchen cabinet consists of a table made of poles tied together to form the top, and

Fig. 54. Our "home" at Coba, erected in three days by two of our field men helped by two Maya Indians from Dzitnup. Built entirely of materials from the forest covering the ruins, this pole and log shelter, tied together with stems of vines and strips of bark, was thatched with leaves of the *botan* palm, a species of *Sabal.* The pole enclosed room of the house was our tarpaulin-covered floor sleeping quarters. The open side contained kitchen facilities, table, and workbench together with plant driers.

Fig. 55. Amelia sitting on a camp stool beside the kitchen fire in our Coba "home." This was her first jungle camping trip. Her Journal covers daily experiences for the entire expedition to Yucatan and Quintana Roo.

Fig. 56. Marty Dzib, our assistant and helper with cooking chores, standing in the kitchen. Note hollowed out section of log used for washing utensils. The cooking was done in an open fireplace consisting of three or four large rocks, with spaces between them for logs to be fed into the fire as it burned, typical of the Maya practice throughout the Peninsula.

Fig. 57. Plant driers with canvas skirts, the kerosene lanterns beneath provided heat to dry the herbarium specimens. The work and dining table, bench, and washstand are all made of poles firmly tied together with tough stems of vines. Plant press is on the bench. Marty Dzib stands in kitchen in background.

six tree trunks form the base. We have a bright and colorful oil cloth covering it completely. Here again boxes are placed on top to form shelves, wherein are kept the dishes, flatware and spices. A flap of oil cloth prevents dust or insects from entering. It was so amusing to watch the natives as we prepared our kitchen and bedroom. They had never thought of building tables or benches and when we put on the oil cloth they stared even more. The natives must be shown how to utilize to their own advantage those natural resources which are within their reach. Our men have all said they were going back home and build such tables in their own homes.

C.L. worked most of the afternoon on his plants. His numbers of today reached the same total as of yesterday—that is 27 collections with up to ten duplicates of each number.

Pedro and Eugenio dug a gutter out in front and across the side of the hut so water could drain off after a rain. Carlos removed rocks and cleaned off quite a large area just in front so that we could see an animal or a snake in time to shoot it before it reached the house.

Lab work and our moving were completed shortly after 4 o'clock, so C.L. and I went fishing. C.L. caught 16 fish and I caught 2. The larger ones were prepared for dinner and smaller ones kept for specimens.

We celebrated tonight for it was the first night we have had a real table to eat off of and a table cloth and napkins. For dinner we had soup, french fried potatoes, fresh fish, cucumber pickles, coffee and canned sweetened grapefruit for dessert. It was dark before we finished dinner so lamps were lit and after the table was cleared, letters were written to go out on the mule train in the morning. We retired at 8:30 for quite a large insect decided to make life miserable for us. The large beetle-like insects had very long legs, and as they would fly over they made a hum like an airplane motor, making us duck. As I went to sleep I could still hear them as they flew against our nets.

June 29th, Wednesday. We were awakened early by hearing the mules as they were being saddled for the weekly trip to Valladolid. By now Marty, too, was busy, carrying water and boiling it for the coffee. C.L. had to make a list of supplies to be brought in on the next trip of our mules from Valladolid.

The laborer from Dzitnup was paid off today for we no longer needed him. He left with the mule train to return to his village.

After breakfast Pedro was sent out hunting for we would like to have some doves or other game birds for lunch today. C.L., Eugenio and Carlos go collecting on foot. I had to stay in camp for a lesion on my leg is infected and I cannot wear boots. Marty and I cleaned up the house and then he cut and gathered wood for our kitchen fires.

It is very cool today and again the sun is shining brightly. From our new home we have a good view of the lake and even looking at the water makes one feel cool.

C.L., Carlos and Eugenio return to camp about 11:30 having collected in the Macanxac section of the Coba ruins. Again very few interesting plants were found, which adds to the disappointed feeling we already have. C.L.

tries to make at least thirty plant collections a day in the field with up to ten duplicates of each number.

Pedro returned from the hunt about noon and instead of the birds we sent him for he came in camp carrying two sprays of flowers which he thought we might want, but the plants had already been collected.

In the afternoon C.L. and I did the lab work and this time we sent Marty and Eugenio hunting. Our lab work was completed shortly after 4 o'clock.

Marty and Eugenio returned carrying two large partridges. Again we enjoyed a most delicious dinner. I prepared the partridge as I would chicken. The meat was a little tough but full of flavor.

Two chicleros arrived. They will leave again early in the morning for a two-day trip to select a suitable place for a chicle camp. They will then return and bring back more chicleros who will stay in the bush for months tapping the *chicozapote, Achras Zapota,* for chicle. It was good information to have that the old sapodilla forest was that close to Coba, but disappointing in that we could not make a trip to collect in it.

After dinner C.L. and I took a walk to the savanna region adjoining the airfield. Numbers of interesting plants were found.

June 30th, Thursday. Woke up real early this morning feeling cold enough to wish for another blanket.

We left for the field about 7:15—C.L. and I on mule back and Carlos, Pedro and Eugenio walked. Marty remained in camp.

We again collected on the Playa trail east of Coba, going out for a distance of about 3 miles, mounting and unmounting whenever we spotted a species to collect.

After two presses were filled we turned around and headed back to camp. Our mules always go faster on the way back and very few times are we forced to use a stick on them. Once my mule reared up and refused to go, and the guide had to clear away a lot of brush before I could coax him to go forward. He said the mule must have seen a snake, which is undoubtedly true, for after the trail was cleared the mule allowed the guide to lead him across.

After lunch C.L. worked on the plant specimens while I recorded notes. Marty and Eugenio provided Maya names for the plants.

C.L. completed the lab work at 3:30. With this work out of the way earlier than usual we went down to seine for fish specimens and also to fish for "our dinner." Corn mush was used in the seine and bird meat was used on the hooks. C.L. did the fishing and again caught a nice mess for dinner.

Soon we heard thunder and dark clouds began to gather. Before I could return to camp it showered so heavily that I was wet before reaching the house. C.L. didn't let the shower disturb his fishing but stood under a tree until it let up a little. It was good that I returned when I did for the roof was leaking in five places and already the water was beginning to drop on the packages of dried plants.

Eugenio came down to get his gun saying he heard turkeys singing in the trees at the other end of the runway. Marty got so excited, and since he is the best hunter of them all, I told him I would finish up the kitchen work and he could go with the crew. They were like children, and as they got ready they went around whispering although they were at least a half mile from the turkeys. Later we heard one shot, and after we had gone to bed we heard them returning. Carlos came to our door and showed us a nice big turkey hen. Pedro shot it. We suggested that they clean the bird at once and cut it in half—one part for C.L., Marty and me and the other half for the crew. As they worked you could still detect a note of excitement in their voices, and they continued to tell each other how the bird was killed.

July 1st, Friday. It was cool again this morning and it was with effort that we crawled from under our blankets at about 6:30. I rebelled against eating another egg so instead fixed myself some French toast which C.L. said was heavy enough to sink all the way to China.

C.L. left for the field with Pedro, Eugenio and Carlos. They collected in the savanna, north of the main ruins here at Coba. Since he had the men with him, I decided to help Marty prepare the turkey.

Marty reported a "near fatal accident" of last night. He finds the lake too cold to bathe in so he warms a big can of water and takes his bath in this way. Due to the hunting trip, it was quite dark before he got around to taking his bath. He entered a small enclosure beside his house carrying his lantern in one hand and water can in the other. There within 4 or 5 inches from his face he glanced around just as a snake was ready to strike. He jumped back and ran to get a stick but by now the snake was gone, but from his description it undoubtedly was a coral snake. Such reports make me feel that leaving here next Friday is weeks away rather than seven days.

The crew returned from the field trip with presses full. Many new additions to the flora were recorded.

July 2nd, Saturday. After an early breakfast C.L., Eugenio, Pedro, Carlos and I left at about 7 o'clock for the field. C.L. and I rode the mules and the others walked. We collected on the Playa trail. It was a bright morning but the trees and shrubs were quite wet and as we brushed past them, the water dropped on us and very soon our clothes were damp as a result. Collecting was much better. Several interesting vines were found as a result of felling a tree.

At one time as a tree was falling C.L. ran to get out of the way and due to the slippery rocks lost his balance and fell. He hit his head on a rock but fortunately, the rock was flat and covered with leaves rather than sharp. His narrow escape left me feeling shaky.

He tied up the mules and walked ahead for in this manner we can spot things far more easily. Presses full, we returned to camp at a little after 11 o'clock.

Marty called our attention to a snake between rocks beside our house. It was poised there with its head held erect as it watched us. Marty got his rifle and shot it. We thought he missed for we couldn't see the snake, but by using a stick he fished under the rock and there found the snake with its head badly shot to pieces.

Lab work was completed by 2:30 so C.L. went out collecting again. He plans to return at 4 o'clock so he can pack the boxes of specimens which will go out by mule train on Monday to Valladolid.

After dinner C.L. and I went down to the ruins to examine a sculptured monument which had not been reported. It was quite large and had fallen over. Part of the figure on its face was visible but the date was too weather-worn to interpret.

July 3rd, Sunday. After breakfast C.L. left for the field taking Eugenio, Carlos and Pedro with him. They left about 7:45. Fish specimens were taken from Lake Coba. They used the seine and then fished some too. Enough fish were caught for our lunch and Carlos returned to camp early so we could clean them and have them ready. After getting the fish specimens they collected plant specimens and didn't return to camp until 1 o'clock.

Meanwhile Marty and I washed and baked. I baked cookies and corn bread while Marty kept supplying me with hot coals. The cookies were alright, although they would have been much better if we had had some flavoring.

The mule train from Valladolid arrived with mail and food supplies. Good mail! The most important letter contained our Mexican collecting permits (at long last). This will make our work and contacts with officials much easier. Campos also sent a set of pictures which had been developed in Merida.

Boxes were unpacked and food supplies were put away. It will be the last time for this since we are leaving next Friday—that is, if we can get the mule train back by then.

C.L. worked on the plants until about 2:30—at which time he went out to take photographs of Coba. This takes time and another afternoon had to be set aside for it.

C.L. returned quite late from his photographing trip. While exploring and photographing one of the unreported temples bordering the airfield, he and Eugenio found an altar, wherein was a jar. This interesting pottery discovery was photographed but was left in place. The earlier discovered stela, in front of mound on which temple stood, was photographed.

The two chicleros returned and will spend the night here before continuing their journey home tomorrow evening. They brought some wild pig meat back with them as they killed four peccaries while on the trip. This they shared with our workers. Before dark one chiclero went and killed a Faisan, a large game bird very much like a turkey. We offered to buy it and he sold it to us for one and a half pesos which at the present rate of exchange means the bird cost about 35 cents.

Quietness settles on the camp early for the chicleros and also the mule train to Valladolid will leave early tomorrow.

July 4th, Monday. C. L. was up early to take plants out of the driers so they could be included in the cargo leaving today.

C. L. and I went collecting right after breakfast. Eugenio, Carlos and Pedro went with us and Marty stayed at camp. Before leaving we had to remind the crew to take quinine for we furnish them with capsules every day. They dislike taking them because it makes their ears ring and they get weak.

Again we collected on the Playa trail—C. L. and I on mule back and the others walked. We had much better luck today, collecting several interesting vines. We dismounted and walked on for some distance, trying to go a little farther into the high bush each day. It was extremely hot and we were wet from perspiration. When we returned to camp at about 11:30, we were a weary bunch.

After lunch C. L. worked on the plant specimens, and I recorded notes until about 2:30.

C. L. will spend the remainder of the afternoon injecting and preparing the fish, snakes, toads and other zoological specimens he has on hand.

Carlos and Eugenio went out with C. L. to do photography, and Pedro had to climb and cut leaves of the *ramon, Brosimum Alicastrum*, forage for our mules.

After a most uninteresting meal, C. L. and I went down the airfield to look for fossils in the limestone. We found many interesting ones which we collected. While doing this we saw another long snake, and now C. L. frankly admits he has never been in a region where there were so many snakes. Such a remark carries a great deal of weight since this is his tenth trip into the uninhabited wilds of the Yucatan Peninsula.

July 5th, Tuesday. C. L. and I go out collecting by mule back with Pedro, Carlos and Eugenio on foot. Again we collect on the Playa trail but we go much farther—about six miles out from Coba. We do not get many things but several interesting plants were found. On our return Eugenio was sent on ahead with the gun to try to shoot some birds for lunch. He returned soon after we did carrying one dove for three people!

C. L. started working on his plants right after lunch. Plants were written up and placed in the driers. This work completed, he again injected and wrapped fish specimens in cheese cloth and placed them in the storage can with formaldehyde.

The crew reported the presence of tigers and monkeys although I haven't as yet seen any. Deer tracks and tiger tracks were found in the bush this afternoon. They tell me that a person can always tell where a tiger has been because of the trail of destruction it leaves—small twigs are broken and vines are torn away.

C. L. has put in a hard day. Collecting and writing up of the plants alone is a full day's work, but then to also prepare zoological specimens fills each day to the limit. He sometimes calls himself a fool for doing this because it is hard work without due credit or consideration by those to whom the specimens are assigned. Such are the rewards of a field biologist.

Lundell & Lundell 7760, Lonchocarpus yucatanensis Pittier, *Yaaxxuul* (*Yaax* = green, *xuul* = finish, end). The Mayas have a superstition regarding this tree. When an epidemic kills chickens, one baby chick is killed and buried against the root on the east side of this tree, and this they believe will stop the disease. This tree was so named because it is believed to end and finish all bad things.

July 6th, Wednesday. Up at 6:30 and Marty and I again tried fixing pancakes—this time with much better results.

C. L. took Carlos with him and collected in the savanna. Eugenio and Pedro were sent to clear around the new monument at the base of the mound of what I have named the Temple of the Round Column. This made for better photography.

C. L. returned about 11 o'clock to take more photographs of our Coba "home" and the camp.

After the monument and Temple had been photographed again, plants were written up, one drier was taken down and packing began.

July 7th, Thursday. This morning we were up and ready for breakfast by 7 o'clock. Eugenio and Pedro left earlier to hunt since we are all very tired of beans and rice by now.

C. L. and Carlos packed boxes and kyacks. Marty and I sorted out food items which will be needed on the trail back to Valladolid.

We soon heard six shots so we knew that today's menu would be far more interesting. Pictures were taken of the birds and hunters. Marty and I took a bird and dressed it. We roasted part of it and fried the remainder. The crew barbecued the other bird for themselves. This means meat sandwiches tomorrow instead of egg.

There is a great deal of activity today for much work must be done before the packing is completed.

We are anxiously awaiting the arrival of the arrieros for if they do not arrive this afternoon we shall have to delay our trip by one day. This will not inconvenience us too much insofar as collecting goes for we can collect all day. However, having packed most of our things will make it necessary to either unpack or try to live through one day without some useful supplies or equipment.

We all spent the latter part of the afternoon in a nervous state for the arrieros were so late. Carlos even offered to walk if C. L. and I would take the two mules we had in camp and start out. However, at 6 o'clock we heard the welcome sound of the packmules arriving. Dinner was eaten and last minute packing finished before we retired, leaving an early morning call of 3:30. A hard rain fell during the night.

July 8th, Friday. Marty came down at 3 o'clock to make his fire and start breakfast. C. L. and I were already awake for we had little or no sleep.

While I prepared our lunch for the trip, Marty finished fixing breakfast. Carlos would carry out the boxes as quickly as C. L. packed them. Eugenio helped take down the nets, cots and rolled up the tarpaulins while Pedro fed and saddled the mules. Everyone had been assigned their duties so little time was lost.

At 5:30 five of us left camp with Eugenio remaining to see that everything was packed and loaded on the mules. It was just beginning to turn light as we started out. The bush was very wet from the rain of the night before and before traveling very far, our shirts and trousers were wet from the branches hitting against us as we passed. Everyone was in good spirits—especially Carlos. We soon passed out of the high bush and reached the desolate burned over area. This part of our ride was most monotonous for all you see is fire destruction. Here too, is the rocky part of our road and we have to constantly watch so that our mules will not step in the deep holes between the rocks. It will mean a broken leg for the animal and possibly serious injuries to the rider. C. L. photographed this area for it proves again the extent of fire destruction to high forest. We also collected along the way for several things were found here which were either not seen at Coba or some which were not in flower on our earlier passage.

We reached Dzitnup at about 11 o'clock, but remembering our visit when last we passed through, we pushed our mules through so fast the natives had little chance to do more than get their heads out of the door before we were gone.

Our destination for this day was Chulutan where we were planning to spend the night, reaching there at 1 p.m. An old school shed was the only place for us to use for shelter. This had been abandoned for the thatch roof was full of wide holes and the place was really terrible. C. L. and I took one look and debated whether or not we would stay. However, traveling constantly we couldn't have reached Valladolid before 10 p.m. The two villages between Chulutan and Valladolid offered no dwelling place for the night so we decided to rest our mules, eat something, give ourselves a few hours of sleep and then start out again at 12 o'clock (midnight). The packmules would not arrive for hours so after we had eaten the sandwiches we brought with us, Carlos, C. L. and I went out to collect. Marty was left at the schoolhouse to see if he could do anything to make the place look anything but the pigsty that it was.

Walking down the Valladolid trail we found little of interest so we returned to find that Marty had been successful in improving the place a little. When we asked him if there were fleas, he said, "We shall see tonight." We not only saw but *felt*. When better biting fleas are made, they will make their homes here in Yucatan.

By now the curious natives began to gather around. We ignored them completely. Eventually we all rested for the packmules would be late.

At 7 o'clock Eugenio rode in saying the mule train was following. Its arrival really created a stir and as soon as the kyacks and boxes were unloaded Indians stood all around the wall watching us and would whisper and laugh with each other.

Marty and I fixed the meal while C. L., Carlos and Eugenio put up the nets and cots. As I would empty a can and throw it away, I would soon see brown hands reaching down into the grass to retrieve it and with it in hand would hurriedly disappear. The weeds around the place were tall so they could hide easily. I am still unable to supply myself with a satisfactory explanation as to why they are so fascinated by the ownership of a discarded tin can. They stood around as we ate, and even when we crawled under our nets we could still hear them whispering and laughing so we knew they had withdrawn only a very short distance.

Since we were leaving at midnight, we just removed our boots for neither C. L. nor I felt that we cared to have our sleeping garments or bedclothes contaminated but would just lie down on bare cots to rest for a few hours.

At 12:20 C. L., Carlos, Marty and I left on our mules with Pedro as our guide, walking ahead. Each of us carried our flashlights for although the moon was bright, we were able to make the most of it only in the few clearings. Riding through dense growth the path was rocky so we had to light it for our mules. At first I was tense for not being accustomed to night travel in the bush I was afraid of being caught again by a spiny vine. For this reason I tried to keep my mule directly behind C. L. so that I could have the benefit of his flashlight as well as the miner's headlamp worn by Pedro just ahead of him. By 1:30 a.m. we all got very sleepy so we stopped and rested for a short time. Our next rest came at 4:30 a.m. for by now we were very weary. Never had I felt worse and C. L. agreed, so we put our panchos down on a flat rock and rested. The natives did likewise. A short while later we again mounted our mules. By now we could put away our flashlights for it was light enough to see the road.

As we passed through the villages all we could hear were the barking dogs and of course the ever-present and very *noisy* insects of Yucatan. After leaving Chulutan the next village was Kanxoc. We soon reached the last village before arriving in Valladolid. This was the village of Tixhualahtun, two "leagues" from Valladolid. On our tired mules these two leagues seemed to stretch out more and more and we began to wonder if we would ever get to Valladolid.

July 9th, Saturday. We reached the bodega at 8:30 a.m. The last few blocks were taken very fast by my mule for I felt sure he knew he was "home."

C. L. and I immediately hired a car and went to the home of Mendoza, our agent in Valladolid. He made many friendly inquiries regarding our trip.

We made inquiries about the Valladolid–Chichen road and found that it was passable which meant that we could leave right away rather than wait until 12:30 to go by train to Dzitas and then by car. We hired a run-down Ford and what a ride. We took Carlos with us but left Marty to take care of shipping our equipment after the packmules arrived. Pedro was left in Valladolid for he had only been hired for the Coba trip.

Here again the road to Chichen seemed endless and C. L. and I were thrown

from one side of the car to the other during the rough trip. Sleep overcame us several times, but we just dozed off and then suddenly were jerked up by the rough riding or the blasting of the none-too-sweet-tone horn which the driver thought it necessary to blow at least every five-minute interval. When the horn wasn't blown, Carlos was sending out a constant stream of senseless conversation to the driver.

We reached Chichen Itza at 10:45 a.m. There was much activity for many tourists were there.

Our room in the Carnegie enclave had been prepared and what a nice feeling it was to see good clean beds waiting for us to rest our very weary bodies. We sent Carlos to the hotel to arrange for our meals there since the Carnegie hacienda at Chichen had closed for the season.

Clean clothes were unpacked and after a refreshing shower we dressed and went to lunch. Campos was at the hotel with tourists so we were able to make arrangements with him for our trip to Merida.

The hotel was filled with people—typical tourists. C. L. put on white duck trousers and polo shirt and said he felt like a tourist. I told him I didn't for I had too many clothes on for them. Such costumes as the ladies were wearing. What impressions of the women of the United States they must give these people.

Back to the room to take a much needed rest. C. L. and I sigh with contentment as we lie down on the crisp clean sheets, a real luxury after our stay in Coba. We slept soundly, and the hardships of the trip were far removed from our minds when we awakened. Now we found ourselves thinking more of the nicer things about Coba and soon forgot the discomforts.

Back again after dinner and we found Marty and Eugenio here with our boxes and kyacks from Coba. They were delayed by a two-hour rain in Dzitas. We feel good to have everyone safely at home and our cargo in good condition.

Vegetation of the Coba Area

The collections at Coba revealed a close floristic relationship between the evergreen east coast advanced forest and the similar but deciduous forest of Yucatan as found around Chichen Itza. The second growth likewise had most species in common, but in Yucatan it was predominantly thorn forest.

The sapodilla forest delimited by Lundell (1933) extended from the north-east coast of the peninsula through Quintana Roo south to the Belize River in British Honduras and Lake Peten Itza in Guatemala and westward through the central Peninsula into southern Yucatan and Campeche to the Gulf of Mexico. North of the Peten border, the sapodilla forest is dryer and less luxuriant and differs from that in the quasi-rainforest of northern Peten. The latter has distinctive palm associations such as the *escobal* dominated by the *escoba* palm, *Cryosophila argentea*, and the *botanal*, where the *botan* palm, *Sabal Morrisiana*, forms groves in the uplands. Palms are comparatively scarce in the upland forest north of Peten.

From the northwest dry plains at Progreso to the southeast border of Peten with its Amazonian forest, the flora changes as the rainfall increases from north to south, and grows richer and more diverse in its nature. Absent in the dry north, with only a few species in northern Peten, the Melastomataceae predominate as undergrowth shrubs in the rain forest at the base of the Peninsula, and other groups have a similar distribution pattern.

Although nearly all the forest of Quintana Roo from Valladolid to Coba, along the route covered by the 1938 expedition, had been destroyed by fires at one time or another with second growth vegetation covering the sectors not recently denuded, relic forest areas covering the ruins of Coba were similar to advanced sapodilla forest of the East coast.

Forest covering the main group of ruins at Coba, especially the Macanxoc section, was quite high, up to 30 meters, and not severely damaged by fire. It was typical *ramonal* dominated by the *ramon* tree, *Brosimum Alicastrum*. The associated species of trees and shrubs included *Achras Zapota, Cedrela mexicana, Swietenia macrophylla, Talisia olivaeformis, Protium Copal, Ficus, Enterolobium cyclocarpum, Lysiloma bahamense, Caesalpinia, Mastichodendron Gaumeri, Chrysophyllum oliviforme, Thevetia Gaumeri, Krugiodendron ferreum, Metopium Brownei, Piscidia piscipula, Vitex Gaumeri, Coccoloba hondurensis, Bursera Simaruba, Chlorophora tinctoria, Malmea, Piper, Hybanthus yucatanensis*, and *Allophylus Cominia*. The *ramonal* association is found on all Maya ruins in the sapodilla forest of the Peninsula, north of Lake Peten Itza and the Belize River.

The role of fire in the destruction of tropical forest is nowhere more evident than in the part of Quintana Roo traversed in 1938. Beyond the village of Dzitnup, along the trail to Coba, we rode for four hours through utterly desolated country. For years the dry-season bush fires, chiefly from *milpa* clearings, swept through the countryside. In some places a few scattered large relic trees, such as *Vitex Gaumeri, Metopium Brownei*, and *Piscidia piscipula*, noted as being fire resistant, still stand as evidence that high forest once covered the area, a fact attested to by the Maya in Dzitnup.

In some sections not a living plant remained from the former forest, only fallen trees and standing skeletons. Not only had the forest been killed, but the destruction of the humus and roots by fire had resulted in complete erosion of the thin mantle of soil into crevices to leave barren stretches of white pitted limestone.

Approaching the ruins of Coba, a section along the trail had escaped the fires for possibly several years. Here the rank second growth consisted mainly of cecropias, acalyphas, *Trema floridana*, and morning glory vines. East of Coba fire destruction had not been as severe. The area of fire-burned forest was said by *chicleros* to extend from Coba almost to Tancah on the east coast.

Similar fire destruction, leaving only barren limestone, was observed in 1936 in the El Cayo District of British Honduras on the limestone plateau south of the Mountain Pine Ridge (Lundell, 1940), and at Uaxactun in Peten (Lundell, 1962).

Fire destruction must be repeatedly emphasized as one of the primary factors to be considered in the interpretation of the vegetation of the Yucatan Peninsula. Failure to recognize its extent and importance is due probably to confusion of rank second growth with old upland forest. The desolate area between the village of Dzitnup and Coba was a convincing demonstration of the widespread destructiveness of tropical forest fires.

Annotated List of the Species Collected or Observed in the State of Quintana Roo

The annotated list which follows records species either collected or observed on the trip to Coba. Collecting was very disappointing, with so much nearly barren countryside due to the fires which had swept all the area traversed except for forested sections of the Coba ruins. The limestone plain from Valladolid to Coba was unbroken, but the surface was rocky and rough, supporting low second growth. The lakes at Coba and a small savanna in the ruins provided the only diversity of habitat.

Collecting started on June 22 at Kanxoc on the trail to Coba with No. *7609* and continued through July 8 with No. *7858* taken at Chulutan on the return trip, a total of 249 numbers of plants. The Maya plant names were supplied by Maya laborers and by Marty Dzib and Eugenio May, who accompanied us from Chichen Itza.

Since all the collections and observations were made in a short period of 17 days under unfavorable environmental conditions, the representation of the flora is meager. Only on the ruins at Coba was it possible to collect and observe advanced evergreen forest as it prevailed in the area in times past.

POLYPODIACEAE

Cheilanthes notholaenoides (Desv.) Maxon. Coba, on wall of temple, Structure T, *Lundell & Lundell 7844*.

ALISMACEAE

Sagittaria lancifolia L. Coba, edge of Lake Coba, *Lundell & Lundell 7685*, aquatic herb, 2–4 ft. high, flowers white.

GRAMINEAE

Andropogon glomeratus (Walt.) B.S.P. Coba, common in savanna, *Lundell & Lundell 7835*, perennial.

Andropogon saccharoides Swartz. Coba, north of main group of ruins, common in savanna, *Lundell & Lundell 7729*, perennial.

Digitaria horizontalis Willd. Coba, large patch in airfield, *Lundell & Lundell 7834*, annual.

Eragrostis amabilis (L.) Wight & Arn. North of Lake Coba, in savanna, *Lundell & Lundell 7788*, perennial.

Ichnanthus lanceolatus Scribn. & Smith. East of Coba, in burned forest, *Lundell & Lundell 7660.*

Leptochloa domingensis (Jacq.) Trin. North of Lake Coba, in savanna, *Lundell & Lundell 7786*, perennial.

Olyra latifolia L. Coba ruins, in forest, *Lundell & Lundell 7698*, perennial.

Olyra yucatana Chase. Coba ruins, forest floor, *Lundell & Lundell 7694*, perennial.

Panicum Bartlettii Swallen. Coba, in low second growth, *Lundell & Lundell 7657.*

Panicum fasciculatum Swartz. North of Lake Coba, in savanna, *Lundell & Lundell 7789*, coarse grass.

Panicum Ghiesbreghtii Fourn. North of Lake Coba, in savanna, *Lundell & Lundell 7791*, very common.

Panicum hirsutum Swartz. Coba, edge of Lake Coba, *Lundell & Lundell 7622*, perennial, growing in large clumps, hispid.

Panicum variifolium Swallen. East of Coba, in burned forest, *Lundell & Lundell 7662.* Coba ruins, *Lundell & Lundell 7692*, rather common in forest.

Paspalum Blodgettii Chapm. Coba, in savanna, *Lundell & Lundell 7738*, perennial. North of Lake Coba, in savanna, *Lundell & Lundell 7790*, perennial.

Paspalum malacophyllum Trin. Coba, in savanna, *Lundell & Lundell 7838*, coarse grass.

Setaria geniculata (Lam.) Beauv. Coba, common locally in savanna, *Lundell & Lundell 7730*, perennial.

Trachypogon angustifolius (H.B.K.) Nees. Coba, in savanna, *Lundell & Lundell 7842*, perennial.

Trichachne insularis (L.) Nees. Coba, north of main ruins, on mound bordering savanna, *Lundell & Lundell 7833*, coarse grass.

Unidentified species. East of Coba, in burned forest, *Lundell & Lundell 7661.*

CYPERACEAE

Cyperus esculentus L. Coba, in savanna, *Lundell & Lundell 7836.*

Cyperus Mutisii (H.B.K.) Griseb. Coba, in savanna, *Lundell & Lundell 7837*, coarse sedge.

Dichromena ciliata Vahl. Coba, in savanna, *Lundell & Lundell 7839.*

Eleocharis cellulosa Torr. Abundant in Lake Coba, *Lundell & Lundell 7796*, aquatic sedge.

PALMAE

Chamaedorea sp. Coba, common in burned forest covering the ruins. *Xiat.*

Sabal Japa Wright. Coba, around Lake Macanxoc, *Lundell & Lundell 7727*, palm 6–10 in. diam., up to 60 ft. high, fruits globose, black, infructescence exceeding leaves in length. *Xaan.*

BROMELIACEAE

Aechmea Kienastii E. Morr. On trees, ruins of Coba, rather common, *Lundell & Lundell 7683*, epiphyte.

Bromelia Karatas L. Coba, a common terrestrial plant.

Bromelia Pinguin L. Coba, a common terrestrial plant.

Tillandsia fasciculata Sw. Ruins of Coba, *Lundell & Lundell 7704*, epiphyte.

Tillandsia valenzuelana A. Rich. East of Coba, in burned forest, *Lundell & Lundell 7767*, epiphyte. East of Coba, in burned forest, *Lundell & Lundell 7825*, epiphyte.

LILIACEAE

Beaucarnea Ameliae Lundell, Bull. Torr. Bot. Club 66: 585, fig. 1. 1939. East of Coba, in burned forest, *Lundell & Lundell 7763*, tree, 25 ft. high, with enlarged base.

Echeandia paniculata Rose. Coba, in savanna, *Lundell & Lundell 7840*, perennial with a cluster of fleshy roots.

Schoenocaulon sp. Coba, in savanna, *Lundell & Lundell 7735*, bulbous perennial.

SMILACACEAE

Smilax mollis H. & B. Coba, in low second growth covering abandoned milpa, east end of Lake Macanxoc, *Lundell & Lundell 7647*, perennial vine, 15 ft.

Smilax spinosa Mill. Coba ruins, in forest, bank of lake, *Lundell & Lundell 7620*, perennial, thorny vine, 12 ft. Coba, in low second growth, *Lundell & Lundell 7655*, perennial vine, 7 ft. East of Coba, in burned forest, *Lundell & Lundell 7770*, perennial vine.

DIOSCOREACEAE

Dioscorea pilosiuscula Bert. East of Coba, in burned forest, *Lundell & Lundell 7816*, herbaceous vine, 8 ft.

AMARYLLIDACEAE

Agave decipiens Baker, vel aff. East of Coba, in burned forest, *Lundell & Lundell 7817*, stems or trunk 2–4 ft. high, about 6 in. diam., scape about 6 ft. high, infructescence bearing bulblets, leaves enlarged and clasping at base. *Chelem.*

Turcraea Cahum Trel. Coba, in the forest covering the ruins.

ORCHIDACEAE

Epidendrum difforme Jacq. East of Coba, in burned forest, *Lundell & Lundell 7723*, epiphytic, flowers pale green.

Epidendrum imatophyllum Lindl. Ruins of Coba, masses on trees, *Lundell & Lundell 7626*, epiphytic, flowers purple.

Oncidium carthaginense Sw. Coba ruins, on tree at edge of lake, *Lundell & Lundell 7618*, epiphytic, flowers variegated rose-red, yellow in center.

Oncidium pusillum (L.) Rchb.f. (sterile). Ruins of Coba, *Lundell & Lundell 7623*, small epiphyte. Coba, at camp, *Lundell & Lundell 7847*, epiphyte.

Notylia Huegelii Fenzl. East of Coba, in burned forest, *Lundell & Lundell 7809*, epiphytic, flowers pale green.

Schomburgkia tibicinis Batem. East of Coba, in burned forest, *Lundell & Lundell 7803*, large epiphyte.

PIPERACEAE

Peperomia glutinosa Millsp. Ruins of Coba, *Lundell & Lundell 7627*, fleshy perennial, terrestrial on rocks, common.

Peperomia petenensis Trel. Ruins of Coba, on rocks, *Lundell & Lundell 7628*, large-leaved fleshy perennial.

Piper medium Jacq. Coba, common among ruins, *Lundell & Lundell 7634*, shrub, 12 ft.

ULMACEAE

Celtis iguanaea (Jacq.) Sarg. Coba, in second growth, a clambering shrub. *Muc.*

Trema floridana Britton. In second growth on Dzitnup trail, arborescent shrub or small tree.

MORACEAE

Brosimum Alicastrum Sw. Coba, dominant tree on ruins, *Lundell & Lundell 7699*, tree, 12 in. diam., 75 ft. high. *Ramon, Ox.*

Its leaves are cut for forage for mules and horses in the forest of the Yucatan Peninsula.

Cecropia peltata L. Abundant in second growth, Dzitnup trail, a tree, the most conspicuous species in old burned forest. *Ixcoch.*

Chlorophora tinctoria (L.) Gaud. Coba, in high forest covering the ruins, a common tree. *Mora.*

Ficus cotinifolia H.B.K. Ruins of Coba, *Lundell & Lundell 7629*, giant fig, 4 ft. diam., 65 ft. high, receptacles geminate.

Ficus radula Willd. Coba, edge of Lake Macanxoc, *Lundell & Lundell 7778*, tree, 14 in. diam., 40 ft. high, receptacles solitary.

Ficus yucatanensis Standl. Coba ruins, in forest, *Lundell & Lundell 7701*, tree, 12 in. diam., 60 ft. high. Chulutan, edge of well, *Lundell & Lundell 7855*, large tree, 60 ft. high, receptacles geminate.

Ficus sp. (sterile). East of Coba, in burned forest, *Lundell & Lundell 7720*, tree, 12 in. diam., 60 ft. high, *Copo maax.*

ARISTOLOCHIACEAE

Aristolochia pentandra Jacq. Coba, in milpa, *Lundell & Lundell 7753*, vine.

POLYGONACEAE

Coccoloba acapulcensis Standl. In burned forest, east of Coba, *Lundell & Lundell 7644*, small tree, 3 in. diam., 20 ft. high, fruits globose.

Coccoloba cozumelensis Hemsl. East of Coba, in burned forest, *Lundell & Lundell 7804*, tree, 3 in. diam., 20 ft. high. In burned forest about 6 miles east of Coba, *Lundell & Lundell 7830*, tree, 2 in. diam., 25 ft. high.

Coccoloba hondurensis Lundell. Coba, in forest on the ruins, a common tree. *Bobche.*

Coccoloba spicata Lundell, Bull. Torr. Bot. Club 66: 594, fig. 4. 1939. East of Coba, common in burned forest, *Lundell & Lundell 7813*, tree, 8 in. diam., 50 ft. high. *Bob.*

Gymnopodium antigonoides (Rob.) Blake. East of Coba, common in burned forest, *Lundell & Lundell 7761*, shrub, up to 20 ft.

Neomillspaughia emarginata (Gross) Blake. East of Coba, in burned forest, *Lundell & Lundell 7814*, large shrub, 15 ft., flowers white. *Dzasdtza, Dzaitza.*

AMARANTACEAE

Acnida cuspidata Bert. Coba, in wet soil at edge of Lake Macanxoc, *Lundell & Lundell 7777*, coarse herb, 2 in. diam., 8 ft. high.

NYCTAGINACEAE

Neea choriophylla Standl. vel aff. Coba, in low second growth, *Lundell & Lundell 7658*, shrub, 3 ft. West of Lake Coba, in low second growth, *Lundell & Lundell 7680*, arborescent shrub, 3 ft.

Guapira linearibracteata (Heimerl) Lundell, Wrightia 3: 22. 1962. East of Coba along Playa trail, in burned forest, *Lundell & Lundell 7706*, tree, 6 in. diam., 30 ft. high, berries dark red, very juicy.

ANNONACEAE

Annona glabra L. Coba ruins, edge of Lake Macanxoc, *Lundell & Lundell 7617*, tree, 6 in. diam., 20 ft. high.

Malmea depressa (Baill.) Fries. East of Coba, common in burned forest, *Lundell & Lundell 7640*, small tree, 3 in. diam., 18 ft. high. *Elemuy, Box elemuy* (box variety has black bark).

LAURACEAE

Nectandra coriacea (Sw.) Griseb. East of Coba, in fire swept forest, *Lundell & Lundell 7707*, small tree, 3 in. diam., 15 ft. high. *Ocotea Lundellii* Standl. is a synonym.

CAPPARIDACEAE

Cleome aculeata L. Coba, in savanna, *Lundell & Lundell 7739*, thorny herb, petals white.

Crataeva glauca Lundell, Bull. Torr. Bot. Club 69: 389. 1942. Ruins of Coba, *Lundell & Lundell 7632*, tree, 4 in. diam., 20 ft. high, fruits globose, hard.

LEGUMINOSAE

(All the genera and species are alphabetized, not listed under the separate subfamilies)

Bauhinia divaricata L. Low second growth in fire swept area west of Coba near end of Lake Coba, *Lundell & Lundell 7663*, shrub, 12 ft. *Bauhinia spathacea* DC. is considered a synonym.

Benthamantha mollis (H.B.K.) Alef. East of Coba, in burned forest, *Lundell & Lundell 7645*, slender clambering shrub.

Caesalpinia Gaumeri Greenm. East of Coba, in burned forest, rather common, *Lundell & Lundell 7771*, tree, 10 in. diam., 45 ft. high.

Caesalpinia violacea (Mill.) Standl. East of Coba, in burned forest, *Lundell & Lundell 7757*, tree, 4 in. diam., 30 ft. high. *Chacte.*

Calliandra Grisebachii (B. & R.) Standl., vel aff. (pubescent form). Dzitnup trail, in fire swept area, *Lundell & Lundell 7846*, shrub, 6 ft., stamens white.

Cassia yucatana (B. & R.) Lundell. West of Lake Coba, in low second growth of fire swept area, *Lundell & Lundell 7666*, shrub, 5 ft., petals yellow.

Cassia aff. **yucatanensis** (B. & R.) Lundell. Chulutan, in second growth, *Lundell & Lundell 7858*, shrub, 6 ft.

Centrosema unifoliatum (Rose) Lundell. Coba, in savanna, *Lundell & Lundell 7746*, herbaceous vine, petals lavender.

Dalbergia glabra (Mill.) Standl. Coba ruins, in forest, *Lundell & Lundell 7695*, woody vine, 25 ft.

Enterolobium cyclocarpum (Jacq.) Griseb. Coba, in high old forest covering the ruins. Occasional giant trees.

Lonchocarpus yucatanensis Pittier. East of Coba, in burned forest, *Lundell & Lundell 7760*, tree, 6 in. diam., 40 ft. high, corolla reddish-purple. *Yaaxxuul.*

Lysiloma bahamense Benth. Coba, in high forest on ruins, upper tier, a dominant tree. *Tzalam.*

Piscidia piscipula (L.) Sarg. Coba, in high forest on ruins, upper tier, common tree. *Habim.*

Pithecolobium albicans (Kunth) Benth. East of Coba, in burned forest, *Lundell & Lundell 7769*, tree, thorns on trunk, 8 in. diam., 35 ft. high, stamens white, flowers fragrant.

Pithecolobium albicans (Kunth.) Benth. East of Coba, in burned forest, *Lundell & Lundell 7769*, tree, thorns on trunk, 8 in. diam., 35 ft. high, stamens white, flowers fragrant.

Swartzia cubensis (Britt. & Wils.) Standl. East of Coba, in burned forest, *Lundell & Lundell 7712*, tree, 10 in. diam., 45 ft. high.

ERYTHROXYLACEAE

Erythroxylon areolatum L. Coba, in low second growth, *Lundell & Lundell 7656*, shrub.

Erythroxylon Bequaertii Standl. East of Coba, in burned forest, rather common, *Lundell & Lundell 7807*, shrub or tree, up to 6 in. diam., 20 ft. high.

Erythroxylon brevipes DC. West end of Lake Coba, in second growth, *Lundell & Lundell 7688*, treelet, 12 ft. Abundant in fire swept forest, east of Coba, *Lundell & Lundell 7808*, treelet or tree, up to 6 in. diam., 35 ft. high.

RUTACEAE

Amyris sylvatica Jacq. Coba ruins, in forest, *Lundell & Lundell 7697*, treelet, 10 ft. high, with strong lemon odor.

Esenbeckia Yaaxhokob Lundell, Lloydia 4: 50. 1941. In burned forest about 6 miles east of Coba, *Lundell & Lundell 7831*, tree, 3 in. diam., 30 ft. high, flowers pale green.

MELIACEAE

Cedrela mexicana Roem. Coba, in forest on the ruins, occasional large tree.

Swietenia macrophylla King. Coba, in old forest on the ruins, rare here. *Punab.*

Trichilia hirta L. Forest on ruins of Coba, *Lundell & Lundell 7684*, tree, 12 ft. high, corolla pale green.

SIMARUBACEAE

Picramnia antidesma Sw. Coba, in low second growth, *Lundell & Lundell 7651*, shrub, 4 ft., flowers pale green.

BURSERACEAE

Bursera Simaruba (L.) Sarg. Coba, common in all forest, *Lundell & Lundell 7773*, tree, up to 12 in. diam., 60 ft. high. *Chacah.*

Protium Copal (Schl. & Cham.) Engl. Ruins of Coba, abundant in forest, *Lundell & Lundell 7611*, tree. *Copal, Pom.*

The source of incense, this tree has been reported as having been grown in plantations by the Maya before the Conquest in 1642.

MALPIGHIACEAE

Byrsonima bucidaefolia Standl. East of Coba, common in burned forest, *Lundell & Lundell 7772*, tree, 8 in. diam., 25 ft. high, petals orange-yellow to red.

Byrsonima crassifolia (L.) H.B.K. Coba, in savanna, growing with *Acrocomia*, *Lundell & Lundell 7736*, tree, 6 in. diam., 15 ft. high, petals orange-yellow to red. *Chi, Nance.*

Stigmaphyllon ellipticum (H.B.K.) A. Juss. In low second growth of fire swept area, west end of Lake Coba, *Lundell & Lundell 7668*, woody vine, petals yellow.

EUPHORBIACEAE

Acalypha Gaumeri Pax. East of Coba, in burned forest, common locally, *Lundell & Lundell 7764*, shrub, 3-4 ft.

Acalypha persimilis Muell. Arg., vel aff. Coba, in clearing, *Lundell & Lundell 7776*, herb.

Acalypha unibracteata Muell. Arg. Abundant with *Cecropia* in second growth of fire swept forest between Dzitnup and Coba. A slender shrub. *Chilibtux.*

Astrocasia phyllanthoides Robins. & Millsp. East of Coba, in burned forest, rare here, *Lundell & Lundell 7827*, treelet.

Croton arboreus Millsp. East of Coba, in burned forest, *Lundell & Lundell 7828*, treelet.

Croton campechianus Standl., Carnegie Inst. Wash. Publ. 461: 66. 1935. East of Coba, in burned forest, *Lundell & Lundell 7638*, arborescent shrub, 4–6 ft.

Croton glandulosepalus Millsp. East of Coba, in burned forest, *Lundell & Lundell 7636*, arborescent shrub, 4–7 ft., hairs on fruits viscid.

Croton Icche Lundell, Phytologia 1: 404. 1940. East of Coba, in burned area, *Lundell & Lundell 7719*, treelet, 2 in. diam., 15 ft. high. *Icche* (*Ic* = chile, *che* = tree or wood [leaves and wood with strong odor like chile pepper]).

Croton lobatus L. Coba, in clearing, *Lundell & Lundell 7775*, herb.

Croton Lundellii Standl., Carnegie Inst. Wash. Publ. 436: 314. 1934. In second growth, Coba, a shrub, usually arborescent.

Croton malvavisciifolius Millsp. Collected near Chulutan, abundant in area between Dzitnup and Kanxoc, *Lundell & Lundell 7852*, shrub, 5–8 ft.

Dalechampia Schottii Greenman. Near Dzitnup, in fire swept area, *Lundell & Lundell 7853*, herbaceous vine.

Dalechampia scandens L. West of Lake Coba, in low second growth of fire swept area, *Lundell & Lundell 7669*, herbaceous vine.

Drypetes lateriflora (Sw.) Krug & Urb. East of Coba, rather common in all old or burned forest, *Lundell & Lundell 7709*, tree, 4 in. diam., 25 ft. high. *Xchauche*.

Euphorbia glomerifera (Millsp.) Wh. Along road through low second growth, end of Lake Coba, *Lundell & Lundell 7665*, perennial herb.

Euphorbia hirta L. var. **typica**. Coba, in savanna, *Lundell & Lundell 7752*, herb with ascending branches, leaves white beneath.

Euphorbia hypericifolia L. Coba, in savanna, *Lundell & Lundell 7749*, erect herb, perianth white.

Euphorbia plicata S. Wats., vel aff. Abundant in second growth, near Chulutan, *Lundell & Lundell 7857*, shrub, 4–12 ft.

Euphorbia spp. Coba, in savanna, *Lundell & Lundell 7745*, perennial herb. Coba, on rocks in savanna, *Lundell & Lundell 7750*, prostrate herb.

Manihot carthaginensis (Jacq.) Muell. Arg. Coba, edge of savanna, *Lundell & Lundell 7737*. Dzitnup trail, in fire swept area, *Lundell & Lundell 7848*, shrub. *Chichput* (*Chich* = bird, *put* = papaya [a wild papaya]).
Roots are dried, cooked in honey. Latex applied to snake bite.

Phyllanthus brasiliensis (Aubl.) Poir. Ruins of Coba, in forest, *Lundell & Lundell 7614*, treelet with large leaves clustered at end of simple or few-branched stem.

Phyllanthus glaucescens H.B.K. Coba ruins, in forest, *Lundell & Lundell 7693*, tree, 3 in. diam., 20 ft. high, perianth reddish.

Phyllanthus lathyroides H.B.K. Coba, along trail, *Lundell & Lundell 7779*, perennial.

Phyllanthus micrandrus Muell. Arg. Near Kanxoc, in second growth along road, *Lundell & Lundell 7609*, shrub, 8 ft. high. East of Coba, in burned forest, *Lundell & Lundell 7797*, shrub, 4 ft.

Tragia yucatanensis Millsp. Coba, in savanna, *Lundell & Lundell 7741*, perennial herb.

CELASTRACEAE

Crossopetalum Gaumeri (Loes.) Lundell, Wrightia 3: 8. 1961. East of Coba, occasional in burned forest, *Lundell & Lundell 7643*, slender shrub, fruits obovoid, bright red.

ANACARDIACEAE

Metopium Brownei (Jacq.) Urban. On Coba ruins, common tree in upper tier of forest.

HIPPOCRATEACEAE

Hemiangium excelsum (H.B.K.) A. C. Smith. East of Coba, common in burned forest, *Lundell & Lundell 7759*, tree, 6 in. diam., 35 ft. high, petals green.

SAPINDACEAE

Allophylus Cominia (L.) Sw. Coba, in burned over forest, a shrub or small tree.

Exothea diphylla (Standl.) Lundell. East of Coba, in burned forest, rather common, *Lundell & Lundell 7756*, tree, 10 in. diam., 50 ft. high. *Uayumcox*.

Paullinia pinnata L. Coba, in low second growth, *Lundell & Lundell 7649*, woody vine, 6 ft. West of Lake Coba, in low second growth, *Lundell & Lundell 7678*, woody vine, corolla pale green-white.

Talisia olivaeformis (H.B.K.) Radlk. Coba, in high forest on the ruins, a common tree, the fruits plum-like and edible.

Thouinia paucidentata Radlk. East of Coba, common in burned forest, *Lundell & Lundell 7819*, tree, 8 in. diam., 35 ft. high.

RHAMNACEAE

Krugiodendron ferreum (Vahl) Urb. Ruins of Coba, *Lundell & Lundell 7633*, tree, 8 in. diam., 40 ft. high. *Chintok.*

TILIACEAE

Corchorus orinocensis H.B.K. Coba, in savanna, *Lundell & Lundell 7732*, annual. *Chichibe.*

Heliocarpus horridus Lundell, Bull. Torr. Bot. Club 66: 597. 1939. East of Coba, in burned forest, *Lundell & Lundell 7821*, small tree, 15 ft. *Holol.*

MALVACEAE

Hampea trilobata Standl. East of Coba, in burned forest, rather common, *Lundell & Lundell 7766*, treelet, 1–2 in. diam., 8–15 ft. high.

Hibiscus tubiflorus DC. Trail to Dzitnup, in low second growth of fire swept area, *Lundell & Lundell 7671*, shrub, 4 ft.

Malachra capitata L. Clearing at edge of Lake Macanxoc in wet soil, *Lundell & Lundell 7705*, coarse herb, 4 ft., corolla orange.

GUTTIFERAE

Rheedia edulis (Seem.) Triana & Planch. Abundant along shore of Lake Macanxoc and Lake Coba, *Lundell & Lundell 7815*, small tree up to 25 ft.

STERCULIACEAE

Melochia tomentosa L. West of Lake Coba, bank of aguada, *Lundell & Lundell 7670*, shrub, 5 ft.

Byttneria aculeata Jacq. Along Coba trail in second growth. A scandent shrub armed with stout sharp recurved prickles.

VIOLACEAE

Hybanthus yucatanensis Millsp. Coba ruins, Macanxoc group, rather common in forest, *Lundell & Lundell 7690*, shrub, 4–8 ft., thorny. *Sacbacelcan.*

FLACOURTIACEAE

Casearia aculeata Jacq. Coba, edge of savanna, *Lundell & Lundell 7751*, shrub, 12 ft.

Casearia nitida (L.) Jacq. Ruins of Coba, *Lundell & Lundell 7624*, small tree, 3 in. diam., 15 ft. high. East of Coba, in burned forest, rather common, *Lundell & Lundell 7714*, tree, 4 in. diam., 20 ft. high. *Xiimche.*

Casearia subsessiliflora Lundell, Contrib. Univ. Michigan Herb. 6: 50. 1941. East of Coba, in burned forest, *Lundell & Lundell 7824* (holotype, MICH), treelet, 12 ft. high, flowers pale green.

Laetia Thamnia L. East of Coba, in burned forest, *Lundell & Lundell 7721*, treelet, 2 in. diam., 15 ft. high.

Prockia crucis L. Chulutan, in second growth, *Lundell & Lundell 7856*, shrub.

Samyda yucatanensis Standl. East of Coba, in burned forest, *Lundell & Lundell 7832*, shrub, 12 ft., fruit dehiscent, three-valved, pulp red, aril or flesh surrounding seed orange.

Zuelania Guidonia (Sw.) Britt. & Millsp. East of Coba, in burned forest, *Lundell & Lundell 7726*, tree, 8 in. diam., 50 ft. high, with very straight bole. *Tamay.*

PASSIFLORACEAE

Passiflora biflora Lam. Coba, in second growth, *Lundell & Lundell 7774*, perennial vine. *Xiczotz* (*Xic* = wings, *zotz* = bat [leaves like bat wings]).

Passiflora foetida L. var. **ciliata** (Dryand.) Mast. East of Coba, in burned forest, *Lundell & Lundell 7823*, herbaceous vine, fruit red.

Passiflora suberosa L. Coba, in low second growth, *Lundell & Lundell 7653*, herbaceous vine, fruits dark blue.

LOASACEAE

Gronovia scandens L. Coba, in airfield clearing, *Lundell & Lundell 7621*, herbaceous vine, corolla pale yellow-green, stamens orange, plant hispid with stinging hairs. Coba, abundant in airfield, *Lundell & Lundell 7843*, herbaceous vine with stinging hairs. *Laalmuch*.

BEGONIACEAE

Begonia nicaraguensis Standl. Coba, common on ruins, *Lundell & Lundell 7691*, fleshy herb with stem 10–30 cm. high.

CACTACEAE

Deamia testudo (Karwinsky) B. & R. Dzitnup trail west of Lake Coba, in fire swept area, *Lundell & Lundell 7675*, epiphytic cactus.

Epiphyllum strictum (Lem.) B. & R. Ruins of Coba, on trees in high forest, very common, *Lundell & Lundell 7615*, epiphytic cactus, the stems as much as 10 ft. long, perianth pale green and white.

MYRTACEAE

Eugenia itzana Lundell, Bull. Torr. Bot. Club 69: 395. 1942. West end of Lake Coba, in second growth, *Lundell & Lundell 7687*, treelet, 2 in. diam., 12 ft. high. East of Coba, in burned forest, *Lundell & Lundell 7818*, small tree.

Eugenia mayana Standl. Coba, in low second growth, *Lundell & Lundell 7654*, small tree, 2 in. diam., 12 ft. high. East of Coba, in burned forest, *Lundell & Lundell 7805*, treelet, 2 in. diam., 12 ft. high.

Eugenia yucatanensis Standl. Ruins of Coba, in forest, *Lundell & Lundell 7613*, small tree, 2 in. diam., 15 ft. high, fruits costate, purple-black at maturity. Ruins of Coba, in high forest, *Lundell & Lundell 7625*, treelet, 12 ft. high.

Psidium molle Bertol. North of Lake Coba, in savanna, *Lundell & Lundell 7785*, arborescent shrub, petals white.

THEOPHRASTACEAE

Jacquinia aurantiaca Ait. Coba ruins, bank of Lake Macanxoc, *Lundell & Lundell 7616*, shrub or tree up to 6 in. diam., corolla orange-red.

MYRSINACEAE

Ardisia escallonioides Schl. & Cham. East of Coba, in burned forest, *Lundell & Lundell 7725*, arborescent shrub.

SAPOTACEAE

Achras Zapota L. Ruins of Coba, *Lundell & Lundell 7728*, tree, 10 in. diam., 40 ft. high. *Chicozapote, Ya.*

The source of chicle gum, the most important forest product of the Yucatan Peninsula during most of the 20th century.

Bumelia mayana Standl. In forest east of Coba on Playa trail, *Lundell & Lundell 7635*, spiny shrub, flowers pale green, fragrant. East of Coba, *Lundell & Lundell 7717*, tree, 6 in. diam., 30 ft. high, flowers very fragrant, corolla pale green.

Chrysophyllum oliviforme L. East of Coba, *Lundell & Lundell 7639*, tree, 6 in. diam., 25 ft. high, bark nearly black, flaky, trunk slightly grooved.

Mastichodendron Gaumeri (Pittier) Lundell, Wrightia 5: 92. 1975. Ruins of Coba, in forest, *Lundell & Lundell 7612*, tree, 8 in. diam., 35 ft. high.

EBENACEAE

Diospyros cuneata Standl. East of Coba, common in forest, *Lundell & Lundell 7637*, tree, 10 in. diam., 45 ft. high. Near Dzitnup, in second growth, *Lundell & Lundell 7851*, small tree.

Diospyros yucatanensis Lundell. East of Coba, in burned forest, *Lundell & Lundell 7711*, shrub or small tree, 2 in. diam., 20 ft. high. *Xuchuche.*

APOCYNACEAE

Echites yucatanensis Millsp. East of Coba, in forest, *Lundell & Lundell 7802*, perennial vine, corolla lobes white, tube green.

Mandevilla subsagittata (R. & P.) Woods. In low second growth of fire swept area, Dzitnup trail, *Lundell & Lundell 7673*, herbaceous vine, 4 ft., corolla yellow. North of Lake Coba, in savanna, *Lundell & Lundell 7784*, herbaceous vine, corolla yellow.

Plumeria alba L. Dzitnup, planted in the village, a spreading tree. *Zacnicte.*

Prestonia amanuensis Woods. East of Coba, in burned forest, *Lundell & Lundell 7768*, perennial vine, 15 ft., corolla lobes greenish-yellow, throat greenish.

Thevetia Gaumeri Hemsl. Coba, occasional in old forest, *Lundell & Lundell 7713*, tree 3–16 in. diam., 15–45 ft. high. *Acitz.*

Urechites Andrieuxii Muell.-Arg. Ruins of Coba, bank of Lake Macanxoc, *Lundell & Lundell 7631*, herbaceous vine, 15 ft., corolla yellow.

ASCLEPIADACEAE

Gonolobus stenanthus (Standl.) Woodson. Coba ruins, in forest, *Lundell & Lundell 7700*, woody vine, 40 ft., petals red-black. East of Coba, in burned forest, *Lundell & Lundell 7765*, perennial vine, 20 ft., corolla red-black.

Gonolobus yucatanensis (Woods.) Woods. East of Coba, in burned forest, *Lundell & Lundell 7801*, perennial vine, rust on leaf.

Marsdenia macrophylla (H.B.K.) Fourn. Coba ruins, in forest, *Lundell & Lundell 7702*, woody vine, 65 ft., perianth green, leaves whitish beneath, strongly discolorous.

Marsdenia mayana Lundell. East of Coba, in burned forest, *Lundell & Lundell 7718*, perennial vine, 10–40 ft., fruits oblong, fleshy, yellow and indehiscent at maturity.

Matelea crassifolia (Standl.) Woods. East of Coba, in burned forest, *Lundell & Lundell 7806*, perennial vine.

Matelea Gentlei (Lundell & Standl.) Woods. East of Coba, in burned forest, *Lundell & Lundell 7758*, perennial vine, 25 ft., corolla green.

Matelea obovata (H.B.K.) Woods. West end of Lake Coba, in second growth, *Lundell & Lundell 7689*, herbaceous vine, corolla green.

Matelea stenosepala Lundell, Bull. Torr. Bot. Club 69: 398. 1942. Coba, in low second growth, *Lundell & Lundell 7648* (holotype, MICH), herbaceous vine, 6 ft., corolla dark red-black.

CONVOLVULACEAE

Evolvulus sericeus Sw. Coba, common in savanna, *Lundell & Lundell 7733*, perennial herb.

Ipomoea ornithopoda Robinson. Coba, on mounds in savanna, *Lundell & Lundell 7731*, herbaceous vine, stems glabrous.

Ipomoea triloba L. Coba, in savanna, *Lundell & Lundell 7740*, herbaceous vine, corolla red-purple. Clearing at edge of Lake Coba, *Lundell & Lundell 7794*, herbaceous vine.

BORAGINACEAE

Cordia curassavica (Jacq.) Roem. & Schult. Clearing at edge of Lake Coba, *Lundell & Lundell 7686*, shrub, 10 ft.

Ehretia tinifolia L. Coba ruins, in forest, *Lundell & Lundell 7696*, tree, 8 in. diam., 35 ft. high, corolla white, fruits orange-yellow.

Tournefortia hirsutissima L. Coba, in low second growth, *Lundell & Lundell 7826*, shrub, corolla white.

Tournefortia peruviana Poir. West of Lake Coba, in low second growth, *Lundell & Lundell 7667*, clambering shrub, corolla pale green.

Tournefortia umbellata H.B.K. East of Coba, *Lundell & Lundell 7798*, slender shrub, 2 ft.

VERBENACEAE

Callicarpa acuminata H.B.K. East of Coba, in burned forest, *Lundell & Lundell 7810*, shrub, 15 ft., corolla white.

Citharexylum hexangulare Greenm. West of Lake Coba, in low second growth, *Lundell & Lundell 7679*, shrub, 3–5 ft., corolla white.

Citharexylum Schottii Greenm. In second growth along shore of Lake Coba, *Lundell & Lundell 7781*, arborescent shrub, corolla pale yellow-green.

Lantana scorta Moldenke. Dzitnup trail, in low second growth of fire swept area, *Lundell & Lundell 7672*, shrub, 4 ft., corolla orange-red.

Phyla nodiflora Greene var. **reptans** (H.B.K.) Moldenke. Colonies in saturated soil at edge of Lake Coba, *Lundell & Lundell 7792*, herb, rooting at nodes, corolla white.

Rehdera trinervis (Blake) Moldenke. East of Coba, in forest, *Lundell & Lundell 7812*, tree, 8 in. diam., 45 ft. high, corolla pale green, nearly white,

flowers very fragrant. *Sacuisilche* (*Sac* = white, *uisil* = grooves or furrows, *che* = tree [tree with white furrowed bark]).

Vitex Gaumeri Greenm. In high forest on the Coba ruins. Trees up to 65 ft. high are dominant in top tier of forest. *Yaxnic.*

LABIATAE

Salvia Fernaldii Standl. East of Coba, in trail, *Lundell & Lundell 7708*, herb, corolla pale blue. East of Coba, along trail through burned forest, *Lundell & Lundell 7811*, perennial herb, corolla blue.

Teucrium vesicarium Mill. In clearing on bank of Lake Macanxoc, abundant in colonies, in wet soil, *Lundell & Lundell 7703*, stoloniferous herb, corolla lavender.

SOLANACEAE

Cestrum nocturnum L. In low second growth at end of Lake Coba, *Lundell & Lundell 7664*, shrub, 6 ft.

Solanum (Lycianthes) **sideroxyloides** Schlecht. East of Coba, in burned forest, *Lundell & Lundell 7800*, clambering shrub, 15 ft.

Solanum (Lycianthes) sp. Ruins of Coba, bank of Lake Macanxoc, *Lundell & Lundell 7630*, perennial vine, fruits red, calyx thick and stiff. Coba, in forest, *Lundell & Lundell 7780*, clambering shrub, petals bluish.

SCROPHULARIACEAE

Buchnera pusilla H.B.K. Coba, in savanna, *Lundell & Lundell 7734*, erect perennial herb, corolla white or tinged lavender.

Capraria biflora L.f. var. **hirta** Loes. West of Lake Coba, in fire swept area, *Lundell & Lundell 7676*, coarse herb, 4 ft. Chulutan, in waste places, *Lundell & Lundell 7854*, shrub, 2–4 ft., corolla white.

Pagesia sp. Coba, in road through low second growth, *Lundell & Lundell 7659*, herb. North of Lake Coba, in savanna, *Lundell & Lundell 7783*, herb, corolla yellow.

Russelia campechiana Standl. Dzitnup area, in fire swept country, *Lundell & Lundell 7850*, clambering perennial, 6 ft.

Russelia flavoviridis Blake. In second growth along Dzitnup road, *Lundell & Lundell 7610*, perennial herb, corolla red. Coba, in savanna, *Lundell & Lundell 7744*, perennial herb, corolla red. East of Coba, in burned forest,

Lundell & Lundell 7799, perennial herb, 5 ft., corolla red. Coba, on top of Structure I, *Lundell & Lundell 7845*, clambering perennial, corolla bright red. Dzitnup trail, in fire swept area, *Lundell & Lundell 7849*, clambering perennial, 6 ft., corolla bright red.

BIGNONIACEAE

Neomacfadya podopogon (DC.) H. Bn. West end of Lake Coba, in second growth, *Lundell & Lundell 7681*, woody vine, corolla pink. East of Coba, in burned forest, *Lundell & Lundell 7715*, woody vine, 25 ft., corolla pink.

Stizophyllum perforatum (Cham.) Miers. East of Coba, in burned forest, *Lundell & Lundell 7716*, woody vine, 10 ft. East of Coba, *Lundell & Lundell 7829*, woody vine.

ACANTHACEAE

Justicia cobensis Lundell, Contrib. Univ. Michigan Herb. 6: 62. 1941. East of Coba, common on floor of advanced forest in burned area, *Lundell & Lundell 7642*, (holotype, MICH), perennial herb, corolla bluish-lavender.

Ruellia nudiflora (Engelm & Gray) Urb. var. **yucatana** Leonard. Coba, in savanna, *Lundell & Lundell 7841*, perennial herb, corolla bluish-purple.

RUBIACEAE

Asemnanthe pubescens Hook.f. East of Coba, in forest, *Lundell & Lundell 7822*, shrub, 6 ft.

Borreria verticillata (L.) Mey. Coba, in savanna, *Lundell & Lundell 7742*, perennial herb.

Guettarda Combsii Urban. East of Coba, common in forest, *Lundell & Lundell 7710*, tree, 6 in. diam., 35 ft. high, flowers fragrant, corolla white. *Tastab* (*Tas* = bring, *tab* = salt).

Guettarda elliptica Swartz. East of Coba, *Lundell & Lundell 7820*, tree, 2 in. diam., 15 ft. high, corolla pale green.

Machaonia Lindeniana Baill. East of Coba, *Lundell & Lundell 7722*, treelet, 2 in. diam., 15 ft. high. *Kuchel* (*Ku* = nest, *chel* = a bird).

Morinda yucatanensis Greenm. Coba, in second growth, a subscandent shrub. *Xoyencab.*

Psychotria microdon (DC.) Urban. East of Coba, *Lundell & Lundell 7646*, shrub, 8 ft.

Psychotria pubescens Sw. East of Coba, in burned forest, *Lundell & Lundell 7641*, shrub, 5 ft., corolla yellowish.

Psychotria sessilifolia Mart. & Gal. West of Lake Coba, in low second growth of fire swept area, *Lundell & Lundell 7677*, shrub, 4 ft., corolla yellow-green.

Randia aculeata L. Coba, in low second growth, *Lundell & Lundell 7650*, shrub, 3 ft.

Randia longiloba Hemsl. Coba, in forest on the ruins, thorny shrub.

Randia truncata Greenm. & Thomps. East of Coba, *Lundell & Lundell 7724*, thorny shrub. *Xpetkitam.*

CUCURBITACEAE

Sicydium tamnifolium (H.B.K.) Cogn. Ruins of Coba, in forest, *Lundell & Lundell 7682*, herbaceous vine.

COMPOSITAE

Ageratum Lundellii King & H. Robinson. North of Lake Coba, in savanna, *Lundell & Lundell 7782*, herb, heads blue.

Baltimora recta L. Coba, in savanna, *Lundell & Lundell 7747*, herb, heads yellow.

Calea Peckii Robinson. Coba, in savanna, *Lundell & Lundell 7743*, perennial herb.

Koanophyllon albicaulon (Sch. Bip. ex Klatt) K. & R. *Eupatorium albicaule* Sch. Bip. ex Klatt. Coba ruins, bank of lake, *Lundell & Lundell 7619*, shrub, 4 in. diam., 18 ft. high.

Melampodium divaricatum (Rich.) DC. Coba, in milpa, *Lundell & Lundell 7879*, annual.

Melanthera nivea (L.) Small. Lake Coba, abundant around lakes, *Lundell & Lundell 7795*, coarse herb.

Pluchea camphorata (L.) DC. Edge of Lake Coba, *Lundell & Lundell 7793*, coarse herb, heads lavender.

Sclerocarpus uniserialis (Hook.) Benth. & Hook. Coba, in savanna, *Lundell & Lundell 7748*, herb, 3 ft., heads yellow.

Spilanthes filipes Greenm. East of Coba, along trail, *Lundell & Lundell 7755*, herb.

Tridax procumbens L. Coba, in savanna, herb.

Wedelia parviceps Blake. Abundant around aguada on Dzitnup trail near Lake Coba, *Lundell & Lundell 7674*, herb, 3 ft.

Wedelia trilobata (L.) Hitchc. Coba, in clearing at edge of Lake Macanxoc, *Lundell & Lundell 7754*, herb forming large colonies, heads yellow.

ARCHAEOLOGICAL NOTES ON COBA RUINS

Temple of the Round Column

The clearing for the airstrip at Coba had uncovered several large mounds on each side, as well as numerous small ones on the approach end of the field. On one of these large mounds a small standing structure is of particular interest. It has been designated as the *Temple of the Round Column* for the central supporting column consists of drum-like sections with a large square headstone. The round column is unique. The cornice is of architectural significance.

Fig. 58. The cleared airstrip in Coba, bordered with high mounds. These were swept by fire leaving the ruins exposed, including the Temple of the Round Column with its large sculptured stela at base.

This small temple with its large substructure is located approximately 1200 feet east of Structure XXV (Thompson, 1932).

On the platform in front of the temple a small open altar near its edge contained a pottery vessel of unusual form. The temple and the altar are shown in Figures 58–61.

Fig. 59. Temple of the Round Column at Coba on top of high mound. Most of second growth forest which covered it had been removed when airstrip was cleared.

Fig. 60. Front of the small Temple of the Round Column. The central supporting column of drum sections with square headstone is unique in being round. The architecture of this structure together with the style of the sculptured monument at the base of the mound indicate that it was erected in the classic period of the ancient Maya.

Fig. 61. On the wide platform of the Temple of the Round Column, near its front, there was an altar which contained a pottery vessel. This clay vessel probably served as an incense burner. Note the clay plug at left which fits loosely into the orifice of the jar.

A New Sculptured Monument

In front of the large mound supporting the Temple of the Round Column, a leaning sculptured stela stands in a small rectangular low-walled enclosure.

The leaning base of the monument stands to a height of 6 feet 7 inches. The fallen upper part, broken into four sections, measures 7 feet 10 inches in length, giving the entire stela a height of 15 feet 5 inches. Its width in the center is 4 feet 4.5 inches, which is narrowed to 4 feet just below the rounded top. From the middle, where it measures 13.5 inches in thickness, the monument tapers to the edges and top to a thickness of only 8.5 inches.

The face is sculptured. The glyph-blocks, surrounding a large figure suggestive of those on Macanxoc stelae, are badly weathered. An unsuccessful attempt was made to lift the leaning base, for the sculpture on its protected face appears to be better preserved.

This sculptured monument was designated as Stela 25 (Lundell, 1938). It is shown in Figures 62 and 63.

Fig. 62. A large sculptured stela at base of mound in front of the Temple of the Round Column. Note that the monument stood in a low square stone-walled enclosure. The hieroglyphs were so badly worn by the elements and cracked off by fire that no date was discernible.

Fig. 63. The fallen upper part of the stela. It had been fractured into four segments which were assembled for this photograph showing the weathered glyphs and sculpture.

References

Bequaert, J.C.
1933. Botanical Notes from Yucatan. Carnegie Inst. Washington Publ. 431: 505-524.

Casares, D.
1905-1906. Proc. Am. Antiquarian Soc. 17 (n.s.): 207-230.

Chapman, T.M.
1896. Notes on Birds Observed in Yucatan. Bull. Am. Mus. Nat. Hist. 8: 271-290.

Cole, L.J.
1910. Bull. Am. Geogr. Soc. XLII, p. 321.

Edwards, H.T.
1924. Production of Henequen Fiber in Yucatan and Campeche. U.S. Dept. Agric., Bull. 1278, 20 pp.

Epling, Carl
1940. The Labiatae of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 522: 227-245.

Gleason, Henry Allan
1940. The Malastomaceae of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 522: 325-373.

Heilprin, A.
1891. Geological Researches in Yucatan. Proc. Acad. Nat. Sci. Phila., pp. 136-158.

Huntington, E.
1912. The Peninsula of Yucatan. Bull. Am. Geogr. Soc. XLIV: 801-822.

Killip, E. P.
1936. Passifloraceae of the Mayan Region. Carnegie Inst. Washington Publ. 461: 301-328, 2 pls.

Killip, E. P. and Morton, C. V.
1936. A Revision of the Mexican and Central American Species of Smilax. Carnegie Inst. Washington Publ. 461: 257-297, 11 pls.

Laws, W. Derby
1961. Investigations of Swamp Soils from the Tintal and Pinal Associations of Peten, Guatemala. Wrightia 2: 127-132.
1962. An Investigation of Temple Plasters from Tikal, Guatemala, with Evidence of the Use by the Ancient Maya of Plant Extracts in Plaster Making. Wrightia 2: 217-228.

Leonard, E. C.
1936. The Acanthaceae of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 471: 193–238, 19 figs.

Lundell, Cyrus Longworth
1932. Exploring Nohoxna. Southwest Rev. 17: 395–406, 1 map.
1933. The Agriculture of the Maya. Southwest Rev. 19: 65–77.
1933. Archaeological Discoveries in the Maya Area. Proc. Am. Philos. Soc. 72: 147–179, 8 figs.
1933. Chicle Exploitation in the Sapodilla Forest of the Yucatan Peninsula. Field Lab. 2: 15–21, 2 figs.
1933. Report on the 1933 Carnegie–Michigan Expedition to Guatemala. Carnegie Inst. Washington Yearbook, 1932: 96–97, 108–109.
1934. Flora of Campeche: *in*, Preliminary Sketch of the Phytogeography of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 436: 253–355, 1 fig.

Over 450 species, either collected or observed in Campeche, are listed. Of the 600 Lundell collections from Campeche in 1931–1932, most were made at Tuxpeña.

1934. Ruins of Polol and other Archaeological Discoveries in the Department of Peten, Guatemala. Carnegie Inst. Washington Publ. 436: 173–186, 9 pls., 4 figs.
1937. The Vegetation of Peten. Carnegie Inst. Washington Publ. 478: viii + 243, 39 pls., 3 figs.
1937. Studies of Mexican and Central American Plants—I. Carnegie Inst. Washington Publ. 478: 208–221.
1938. The Botanical Expedition to Yucatan and Quintana Roo, Mexico. Carnegie Inst. Washington Yearbook No. 37: 7–11.
1939. Plants Probably Utilized by the Old Empire Maya of Peten and Adjacent Lowlands. Papers Mich. Acad. 24: 37–56.
1939. Studies of Mexican and Central American Plants—VIII. Bull. Torrey Bot. Club 66: 583–604.
1940. The 1936 Michigan-Carnegie Botanical Expedition to British Honduras. Carnegie Inst. Washington Publ. 522: 1–57, 1 fig., 5 tables, 4 pls. Includes updated bibliography through 1940.
1940. New Species of Croton from the Yucatan Peninsula. Phytologia 1: 401–409.
1940. Noteworthy Spermatophytes from Mexico and Central America. Phytologia 1: 449–452.
1941. Flora: *in* Alfred M. Tozzer, Landa's Relacion De Las Cosas De Yucatan. Papers of the Peabody Museum of American Archaeology and Ethnology. Harvard Univ. 18: 245–247.
1941. Undescribed Plants from Tropical America. Lloydia 4: 44–56.

1941. Studies of American Spermatophytes—I. Contrib. Univ. of Michigan Herb. 6: 1-66, 5 figs.
1942. The Vegetation and Natural Resources of British Honduras. Chron. Bot. 7: 169-171.
1942. Flora of Eastern Tabasco and Adjacent Mexican Areas. Contr. Univ. Mich. Herb. No. 8: 1-74, 4 pls., 8 figs., 1 map.
1945. The Genus Cnidoscolus in Mexico: New Species and Critical Notes. Bull. Torrey Bot. Club 72: 319-334.
1961. The Flora of Tikal. Expedition 3: 38-43.
1962. Plant Exploration of the Southern Lowlands of Peten, Guatemala. Am. Philos. Soc. Yearbook: 308-311.
1967. Agricultural Research at Renner, 1944-1966. Publ. Texas Research Foundation, Renner, Texas, x + 670 pp., illustrated.
1976. The 1931-1932 Odyssey in Campeche and Peten. Wrightia 5: 199-220, figs. 16-32.
1982. Notes on Agriculture of the Ancient Maya, Exploration, and Sundry Investigations in Peten, Guatemala. Wrightia: 7: 55-82.

Lundell, Cyrus Longworth and Collaborators
1936. Botany of the Maya Area. Miscellaneous Papers I-XIII. Carnegie Inst. Washington Publ. 461: 328 pp., 56 pls., 19 figs.
1940. Botany of the Maya Area. Miscellaneous Papers XIV-XXI. Carnegie Inst. Washington Publ. 522: 474 pp., 7 pls., 29 figs., 1 map.

Millspaugh, C. F.
1895. Contribution to the Flora of Yucatan. Field Columbian Mus., Chicago, Bot. Ser. 1: 1-50 + i-vii.
1896. Contribution II to the Coastal and Plain Flora of Yucatan. Field Columbian Mus., Chicago, Bot. Ser. 1: 281-339, pls. VIII-XXI.
1898. Contribution III to the Coastal and Plain Flora of Yucatan. Field Columbian Mus., Chicago, Bot. Ser. 1: 341-410.
1903. Plantae Yucatanae. Fasc. 1. Polypodiaceae and Schizaeaceae. Field Columbian Mus., Chicago, Bot. Ser. 3: 1-14.

Millspaugh, C. F. and Chase, A.
1903. Plantae Yucatanae. Fasc. 1. Gramineae and Cyperaceae. Field Columbian Mus., Chicago, Bot. Ser. 3: 15-84.
1904. Plantae Yucatanae. Fasc. 2. Compositae. Field Columbian Mus., Chicago, Bot. Ser. 3: 85-151.

Moldenke, Harold N.
1940. The Eriocaulaceae, Verbenaceae, and Avicenniaceae of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 522: 139-223.

Morton, C. V.
1936. Enumeration of the Malpighiaceae of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 461: 127–140.
1936. Notes on Dioscorea, with Special Reference to the Species of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 461: 241–253.

O'Neill, Hugh T.
1940. The Sedges of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 522: 249–322, 1 table, 3 figs.

Page, John L.
1933. The Climate of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 431: 409–422, tables 79–90, figs. 12–22.

Proctor, George R.
1982. More Additions to the Flora of Jamaica. Journ. Arnold Arboretum 63: 199.

Seibert, Russell J.
1940. The Bignoniaceae of the Maya Area. Carnegie Inst. Washington Publ. 522: 377–434, 3 pls.

Shattuck, George C. and Collaborators
1933. The Peninsula of Yucatan. Carnegie Inst. Washington Publ. 431: i–xiv + 1–576, illustrated.

Smith, Lyman B. and Lundell, Cyrus Longworth
1940. The Bromeliaceae of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 522: 105–136, 2 tables, 20 figs.

Standley, Paul C.
1930. Flora of Yucatan. Field Mus. Nat. Hist., Chicago, Bot. Ser. 3: 155–492. Includes a comprehensive bibliography through 1929.
1935. New Plants from the Yucatan Peninsula. Carnegie Inst. Washington Publ. 461: 51–91.

Stephens, J. L.
1848. Incidents of Travel in Yucatan. 2 vols., illustrated.

Swallen, Jason R.
1934. The Grasses of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 436: 325–355.
1936. The Grasses of British Honduras and Peten, Guatemala. Carnegie Inst. Washington Publ. 461: 143–187, pls. 4.

Thompson, J. Eric, Pollock, Harry E. D., and Charlot, Jean
1932. A Preliminary Study of the Ruins of Coba, Quintana Roo, Mexico. Carnegie Inst. Washington Publ. 424: i–vi + 1–213, illustrated.

Whitaker, Thomas W.
1956. The Origin of the Cultivated Cucurbita. The American Naturalist, Vol. XC, No. 852: 171-176, 1 fig.
1959. Madroño 15: 4-13.

Woodson, Robert E., Jr.
1940. The Apocynaceous Flora of the Yucatan Peninsula. Carnegie Inst. Washington Publ. 522: 61-102, 6 figs.

A NEW SPECIES OF VIGUIERA (ASTERACEAE: HELIANTHEAE) FROM MEXICO

Neil A. Harriman[1] and Harold Robinson[2]

A new species of *Viguiera* from Mexico has been detected among collections at Ohio State University and the U.S. National Herbarium. The type series, collected in the State of Puebla by Hartman and Funk, was originally studied by the latter collector, who was unable to identify it with any species in Blake's monograph of *Viguiera* (Blake, 1918). Subsequently, an earlier collection of the species by John Beaman from Puebla was encountered by the present authors. The new species is named *Viguiera Funkiae* after Dr. Vicki Funk who made the initial study of the material.

Viguiera Funkiae Harriman & Robinson, sp. nov. Fig. 64. Frutex vel arbuscula 3–4 m. alta. Caulis pallide brunnescens striatus glaber praeter pedunculum tenuiter adpressum pilosum. Folia opposita, petiolis 2 cm. longis circum nodis anguste connatis distaliter subabrupte breviter alatis; laminae chartaceae ovatae plerumque 8–11 cm. longae et 5–6 cm. latae supra basin valde trinervatae breviter decurrentes margine multo serratae apice breviter distincte acuminatae supra et subtus minute scabro-strumosae subtus plerumque in nervis persistentiter pilosulae. Inflorescentiae cymosae vel interdum unicapitatae, ramis ultimis 1.0–3.5 cm. longis pilosulus. Capitula 2.0–2.3 cm. alta et 2.0–2.5 cm. lata radii exclusi; squamae involucri 5–6 seriatae imbricatae fere glabrae basibus plusminusve induratae apice herbaceae et leniter subcarnosae vel in squamis exterioribus omnino herbaceae in apicibus omnibus in juventutibus squarrosae vel maturitatibus laxe effusae. Paleae disci planae vel parum carinatae striatae acutae in carinis et apicibus raro pilosulae. Flores radii ca. 16 flavae steriles, ligulis usque 24 mm. longis, tubis 3.5–4.0 mm. longis. Flores disci plerumque 60–75; corollae hermaphroditae flavae 8–10 mm. longae, tubis 2.5–3.0 mm. longis, faucibus abrupte campanulatis superne cylindraceis 4–5 mm. longis, lobis 5 ca. 1.85–2.00 mm. longis et 1.0–1.2 mm. latis intus rubro-suffusis; thecae antherarum nigrescentes 3–4 mm. longae; appendices antherarum flavae ca. 0.8 mm. longae et 0.4 mm. latae abaxialiter dense glanduliferae; rami stylorum in apicibus breviter appendiculati. Achaenia submatura 4.5–5.0 mm. longa nigrescentia striata sericeo-setulifera; pappus ubique squamelliformiter fimbriatus 1.0–1.5 mm. longae exaristatae. Grana pollinis in diametro ca. 30 μm. Chromosomatum numerus ignotus.

[1]Department of Biology, University of Wisconsin-Oshkosh, Oshkosh, Wisconsin 54901
[2]Department of Botany, Smithsonian Institution, Washington, D.C. 20560

Fig. 64. *Viguiera Funkiae* Harriman & Robinson, holotype, *Hartman & Funk 4153.*

Type: Mexico. Puebla: one mile S of Asuncion de Chila, 22 Aug. 1976, *Ronald L. Hartman & Vicki Funk 4153* (holotype: US; isotypes MEXU, OS, OSH). Paratypes: Mexico. Puebla: ca. 9 kms. south of Izucar de Matamoros; ca. 1150 m. altitude; in thorn-scrub desert; only one plant seen. 21 Aug. 1960. *John H. Beaman 4211* (MSC, US).

The most distinctive features of the new species are the large heads with many series of spreading rather fleshy-tipped involucral bracts, the opposite leaves with only partially winged petioles, and the pappus without awns. The species belongs to the non-typical element of *Viguiera* that has only short appendages on the tips of the style branches. The large-headed species of *Viguiera* in Mexico are treated within the two series, *Maculatae* Blake and *Grammatoglossae* Blake of the section *Chloracra* Blake in Blake's somewhat artificial breakdown of the genus (Blake, 1918). In the *Maculatae*, *V. Funkiae* will key to *V. adenophylla* Blake which differs by its herbaceous habit, alternate leaves, and two-seriate involucre. Within the *Grammatoglossae*, the new species will key to either *V. Pringlei* Robins. & Greenm. or *V. Seemannii* Sch.-Bip., both of which have much smaller, nearly entire leaves with very short or no petioles, and much shorter rays. *Viguiera Funkiae* has some of the aspect of such members of the *Maculatae* as *V. sphaerocephala* (DC.) Hemsl. or *V. oaxacana* (Greenm.) Blake, both of which differ by the recurved cusps on the palea and more abruptly cuneate bases on the leaf blades. The new species differs from all the species mentioned by the lack of awns on the pappus. The lack of awns is in particular contrast to the broad form of awns found in such species as *V. oaxacana* and the more recently described *V. Blakei* McVaugh (1972).

In the Hartman and Funk specimens of *Viguiera Funkiae*, the heads are slightly less mature, and the involucral bracts are strikingly imbricated, their free tips squarrose, reminiscent of certain species of *Grindelia*. The Beaman collection is somewhat more mature and shows the tips of the bracts as more elongate, free, and spreading, but not truly squarrose.

Literature Cited

Blake, S.F. 1918. A revision of the genus *Viguiera*. Contrib. Gray Herb. n.s. 54: 1–205.

McVaugh, R. 1972. Compositarum Mexicanarum Pugillus. Contrib. Univ. Mich. Herb. 9 (4): 359–484.

A NEW SPECIES AND A NEW SUBGENUS IN ENNEALOPHUS (IRIDACEAE)

Pierfelice Ravenna[1]

Ennealophus fimbriatus Ravenna, sp. nov. of the Iridaceae is described from northern Argentina. The species is closely allied to *E. euryandrus* (Gris.) Rav., both representing a new subgenus, namely *Actine* Rav., subgen. nov.

Ennealophus fimbriatus Ravenna, sp. nov. Fig. 65.
Planta ad 40–45 cm. alta. Bulbus ovato-oblongus ad 25 mm. longus circ. 9 mm. latus tunicis fusco ochraceis obtectus. Folia basalia dua vel unicum ensiformia flaccida viridi-glaucescentia sursum attentuata ad 25–35 cm. longa circ. 16–20 mm. lata. Caulis floriferus flexuosus inferne folio basalibus simili superne bractea unica instructus. Spathae saepe duae bivalvatae; valvae inaequilongae membranaceae marcescentes ad anthesin divergentes circ. 12 et 16 mm. longae respective. Inflorescentia 6–12-flora. Alabastri extra spatham longe producti. Pedicelli leviter complanati ad 16–30 mm. longi. Ovarium clavatum ad 4.5 mm. longum circ. 2 mm. latum. Perigonium pallide violaceum ad 36–40 mm. latum. Tepala exteriora late obovata patentissima ad 17–20 mm. longa circ. 16–18 mm. lata prope basin sparse glandulosa. Tepala interiora imbricato-contigua geniculata in urceola oris subtriangularis conniventia ad 11–15 mm. longa circ. 7.6–9 mm. lata; lamina reflexa subovata acuta ad 8.5 mm. longa circ. 3.5–4 mm. lata. Columna staminum elongata ad 4 mm. longa prope basin leviter ampliatam fusco-purpureo-tincta vel striolata. Antherae subsagittatae circ. 2 mm. longae; pollen loculique azurei. Stylus tenuiter filiformis ad 3.8–4 mm. longus. Styli rami latiusculi conduplicati ad 3 mm. longi (lobum abaxialem inclusum) circ. 3 mm. lati; cristae adaxiales fimbriato-plumosae ad 2 mm. longae; lobus abaxial patens fimbriatus circ. 1.3–1.5 mm. longus; replicaturae stigmatosae parvae patentes. Pedicelli fructiferi radiati. Capsula obovata ad 10–12 mm. longa circ. 8 mm. lata modice trigibbata; cycatrix perigonii lata. Semina angulata fusco-ochracea.

In rocky slopes, or rarely in grassy places, of the Argentine provinces of Jujuy and Salta. It often grows near *Dickia chaguar*, *Abromeitiella brevifolia*, *Sedum jujuyense*, and *Barbaceniopsis humahuacensis* between 1600 and 3000 m.

Argentina: Prov. Jujuy, Dept. Tumbaya, Volcan, abra de la laguna; *Venturi 4959*, 12-II-1927 (BA, LIL, LP, NY, SI). Idem ibid., *F. Claren*, 24-II-1901 (BAF 11760, S ?). Idem ibid., Cantera, 2100 m., *Fabris 6293*, 9-I-1966 (LP). Dept. Tilcara, Yala de Monte Carmelo, 2900 m., *Fabris et al. 6433*, 19/21-I1966 (LP). Dept. San Salvador de Jujuy, Quebrada de Yala, *Cabrera & Fabris 17495*, 12-I-1966 (LP). Dept. El Carmen, Dique La Cienaga, *Fabris &*

[1]Casilla 21128, Sucursal 21, Santiago, Chile.

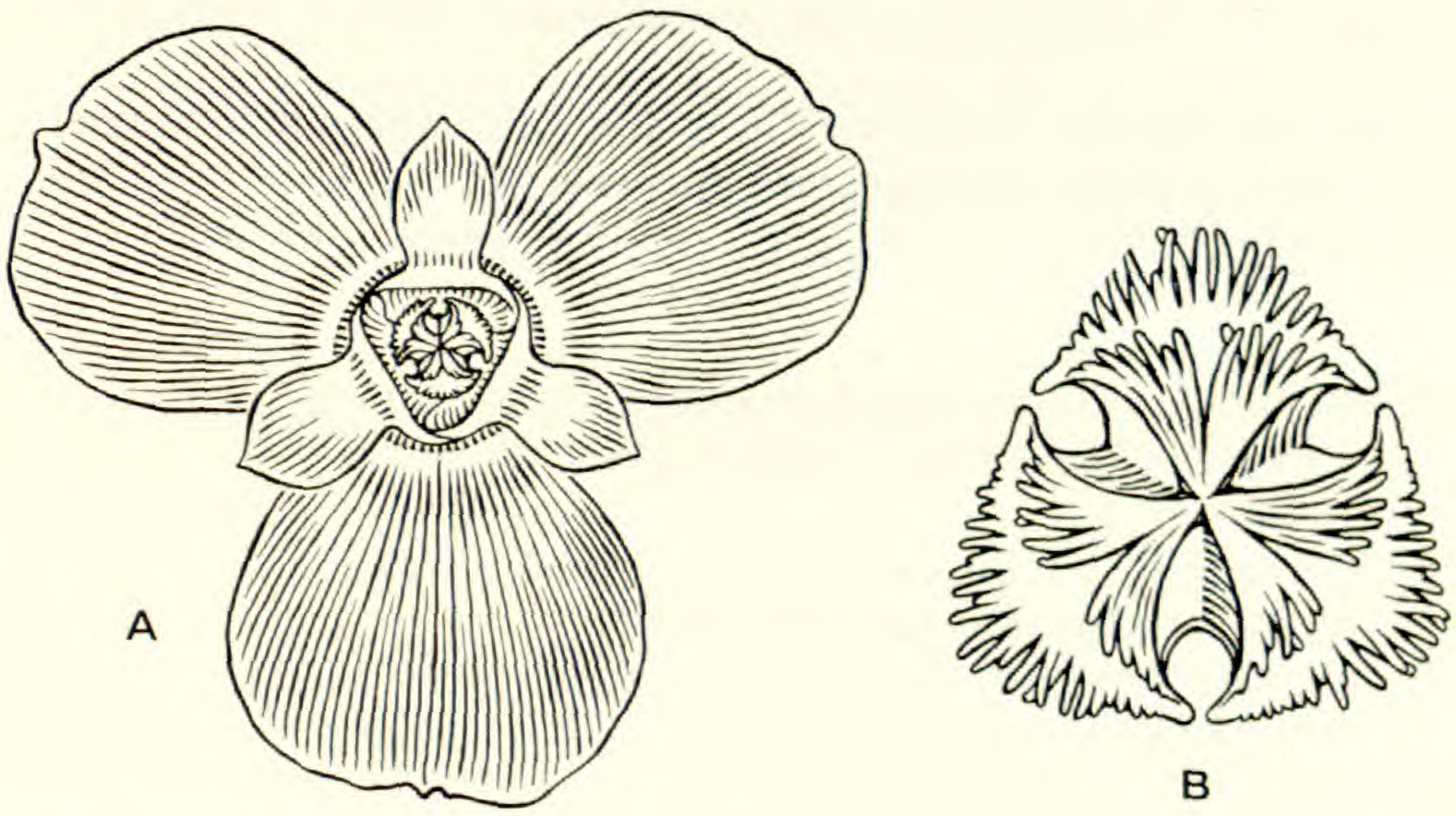


Fig. 65. *Ennealophus fimbriatus* Rav. A, flower, upper view; x 2. B, style arms, upper view; x 9. Drawing by S. Magno.

Tello 3683, 8-XII-1962 (LP). Dept. Valle Grande, Valle Colorado, *Fabris et al. 3599*, 23-XII-1962 (LP). Prov. Salta, Rosario de Lerma, Campo Quijano, 1600 m., en una quebrada, *S. Venturi 8050*, 1929 (SI, LIL). Pampa Grande, *C. Spegazzini* s/n, L-1897 (LPS 18771 & 18772: LP). Culta in Bonaria ex bulbis pr. Volcan prov. Jujuy Argentinae collectis, *Ravenna 78*, XI-1960 (Herb. Ravenna, type).

Ennealophus fimbriatus is closely related to *E. euryandrus* (Gris.) Rav. (Ravenna 1973), differing in the larger perigone, the non-inflated staminal column, narrower anthers, and larger, deeply snipped style-arms. Moreover, the capsule is obovate and shorter instead of club-shaped.

The species was collected and cultivated by me several years ago. Its publication was postponed until the genus could be fully interpreted in its boundaries and number of entities.

Key to the Species of *Ennealophus*

A. Pedicels scarcely exceeding the spathe, not radiately arranged. Spathe valves subequal, not marcescent.
  B. Claws of the inner tepals forming a triangular-mouthed crater. Style-arms crests distinct. Capsule obovate to elliptical ..... *E. foliosus* (H.B.K.) Rav.
  BB. Claws of the inner tepals forming a round-mouthed crater. Style-arms crests obsolete. Capsule oblong ..... *E. boliviensis* (Bak.) Rav.
AA. Pedicels long, much exserted and radiately arranged. Spathe valves unequal, marcescent.
  B. Claws of the inner tepals forming a round-mouthed container. Capsule oblong ..... *E. euryandrus* (Gris.) Rav.
  BB. Claws of the inner tepals forming a triangular-mouthed container. Capsule obovate ..... *E. fimbriatus* Rav.

Ennealophus N.E. Brown, subgen. **Actine** Ravenna, subgen. nov. A subgenere *Ennealophus* caulis fructiferi decumbentis, spathae valvae inaequales marcescentes, alabastri ex spatha longe radiatimque crescentes, laminae tepalorum interiorum brevis vel obsoletae differt. Typus subgeneris: *E. euryandrus* (Gris.) Rav.

It differs from subgenus *Ennealophus* by virtue of the decumbent fruiting stems, the unequal marcescent spathe-valves, the long, much exserted and radiately disposed buds, and the short or nearly obsolete blade of the inner tepals. Species included: *E. euryandrus* (Gris.) Rav. and *E. fimbriatus* Rav.

Reference

Ravenna, P., 1973, *Tucma*, genero neuvo de Iridaceas, de la Precordillera de los Andes del North de Argentina; Anal. Mus. Hist. Nat. Valparaiso 6: 41–47.

CONTRIBUTIONS TOWARD A MONOGRAPH OF CYBIANTHUS (MYRSINACEAE) IV. NOTES ON SUBGENERA STAPFIA AND MICROCONOMORPHA

John J. Pipoly III

Abstract

Pipoly III, John J. (New York Botanical Garden, Bronx, NY 10458). Contributions toward a monograph of *Cybianthus* (Myrsinaceae) IV. Notes on subgenera *Stapfia* and *Microconomorpha*. Wrightia 7(3). 1983. Emended descriptions, keys, descriptions and synonymy for subgenera *Stapfia* and *Microconomorpha* are provided. *Conomorpha baruana* Lundell is transferred to *Cybianthus* subg. *Stapfia*, necessitating the new combination, *Cybianthus baruanus* (Lundell) Pipoly. *Conomorpha panamensis* Lundell, transferred to *Cybianthus* subg. *Conomorpha* by Agostini (1980), is found to be a variant of the widespread polymorphic species, *Cybianthus pastensis* (Mez) Agostini. Four binomials are lectotypified. All taxa in the present investigation were found to have functionally staminate, bisexual, and functionally pistillate flowers within the same plant or inflorescence. Although flowers of differing sexuality are essentially monomorphic, field work in the Cordilleras Central and Occidental of Colombia are needed to understand the breeding systems and concomitant vegetative variation.

Discussion

This fourth paper in the present series originated primarily in continuing collaboration between the author and Dr. C.L. Lundell. The systematic position of several species described by Lundell was brought into question and Agostini's perceptive classification (1980) was critically reexamined. The most striking observation reported here is that, in each of the three species known from flowering material, *Cybianthus pastensis* (Mez) Agostini, *C. Stapfii* (Mez) Agostini, and *C. perseoides* (Mez) Agostini, functionally staminate, bisexual, and functionally pistillate flowers were found variously distributed on the specimens, two or all of these states often occurring on the same inflorescence. This sexual instability should not be surprising, however, and in no way destroys the taxonomic unity of the genus. The same phenonenon has been noted to a lesser extent by Lundell (1971) in the genus *Stylogyne*. *Cybianthus* subgenera *Stapfia* and *Microconomorpha* are Andean except for populations of *C. pastensis* on the Panamanian-Costa Rican border and the northeastern slopes of the Cordillera de Talamanca, and one population

of *Conomorpha baruana*, from Chiriqui. Although Agostini (1971, 1980) considered the two subgenera closely related based on pseudoverticillate leaves and anther structure, it is now apparent that subg. *Microconomorpha* is more closely related to subg. *Iteoides*, recently reviewed by the author (Pipoly, 1981). It should be noted, however, that many *Cybianthus* species are polymorphic, and definite statements concerning relationships can be made only after appropriate field study. Intensive population studies are required before variation in habit, sexuality and breeding systems is understood.

Cybianthus subgenus **Stapfia** Agostini emend. Pipoly

Cybianthus subgenus *Stapfia* Agostini, Acta Biol. Venez. 10(2): 147. 1980.

TYPE SPECIES: *Cybianthus Stapfii* (Mez in Engler) Agostini, based on *Conomorpha Stapfii* Mez in Engler, Das Pflanzenreich IV. 236: 257. 1902.

Shrubs or small trees. *Branchlets* tomentose, with dendroid or stellate ferrugineous trichomes or both, the stellate trichomes often appearing furfuraceous. *Leaves* subopposite to pseudoverticillate, the petioles tomentose, glabrescent. *Inflorescence* an irregularly formed terminal group of racemes which mimic a panicle or a poorly to well-developed panicle. *Flowers* (3–4) 5-merous, the number of parts sometimes variable in one inflorescence; *calyx* lobes slightly to prominently imbricate, the margins densely glandular-ciliate, the secretory glands not prominently raised; *corolla* cotyliform, the lobes valvate or slightly imbricate, glandular-granulose only along the margins without but over the entire surface within, the secretory glands not prominently raised; *stamens and staminodes* with filaments one to three times longer than the anthers, the filaments connate through half their length or less into a conspicuous tube, the anthers elongate-triangular to ovate-triangular, erect, dorsifixed ca 1/3 from base, dehiscent by narrow longitudinal slits, the staminodes at times smaller but always producing copious amounts of abortive pollen; *pistil and pistillode* obturbinate, the ovary densely lepidote, the style elongate, truncate, the stigma punctiform. *Fruit* drupa-drupaceous, 1-seeded.

Because so little is known about their ecology and micromorphological characters, the relationship between subgenus *Stapfia* and the other subgenera of *Cybianthus* is uncertain. It resembles the vicariant subg. *Laxiflorus* Agostini in corolla lobes glandular-granulose not only along the margins without but over the entire inner surface, in anthers longer than wide and dehiscent by longitudinal slits, in flat perianth glands and stellate and/or dendroid tomentose branchlets, but differs as follows:

1. Calyx lobes valvate; filaments shorter than or as long as the distally curved anthers; inflorescence always a simple axillary raceme, the bracts linear-lanceolate; pistil obnapiform, the pistillode lageniform; leaves always alternate, never subopposite or pseudoverticillate;

Guayana Highland and Amazonia ..... *Cybianthus* subg. *Laxiflorus*.

1. Calyx lobes imbricate; filaments (one to) three times longer than the erect anthers; inflorescence a poorly to well-developed panicle or appearing paniculate, the bracts ovate; pistil and pistillode obturbinate; leaves subopposite to pseudoverticillate; Andes of northern Colombia and adjacent Venezuela ..... *Cybianthus* subg. *Stapfia*.

The construction of the key presented by Agostini (1980) implies a close relationship between subgenera *Stapfia* and *Microconomorpha*, but the characters uniting the two: pseudoverticillate leaves, glandular-ciliate calyx lobes and anthers at once longer than wide and dehiscent by longitudinal slits, may be due to parallelism. The two subgenera differ, however, by several important characters, as enumerated below:

1. Perianth glands prominently raised; calyx lobes valvate, marginally dentate; branchlets glandular-granulose; corolla glabrous along margins without; anthers curved distally .... *Cybianthus* subg. *Microconomorpha*.

1. Perianth glands flat; calyx lobes imbricate, marginally entire to subentire; branchlets stellate and/or dendroid ferrugineous-tomentose; corolla glandular-granulose along margins without; anthers erect ..... *Cybianthus* subg. *Stapfia*.

A species recently described from fruiting material as *Conomorpha baruana* Lundell (1979) has the stellate-tomentose branchlets, subopposite leaves, a terminal cluster of irregularly formed racemes and glandular-ciliate sepals of *Cybianthus* subg. *Stapfia*, to which it is here transferred:

Cybianthus baruanus (Lundell) Pipoly, comb. nov.

Conomorpha baruana Lundell, Wrightia 6(4): 96. 1979. Panama: Chiriqui, on W slope of El Baru, 6000–7000 ft., very common up to well over 11,000 ft., 27 Mar 1970 (fr), *E. Tyson & H. Loftin 5956* (HOLOTYPE: MO!).

Cybianthus Stapfii (Mez) Agostini, an original element of *Conomorpha* subg. *Microconomorpha* Mez (1902), was transferred to its own subgenus (Agostini, 1980) because of its paniculate inflorescences, flat perianth glands and imbricate calyx lobes. Native to the Sierra Nevada de Santa Marta and both the Colombian and Venezuelan slopes of the Sierra de Perija, *C. Stapfii* is known from fewer than a dozen gatherings. Because one of the two syntypes (*Purdie s.n.*, P, K) cited by Mez has not been located, lectotypification of the species is postponed. The two species of subgenus *Stapfia* (as here emended) are distinguished by the following key:

1. Leaf blades ovate to obovate, 2.4–6.5 cm. wide, glabrous above and below, the margins flat; calyx glabrous, 0.9–1.2 mm. long, the lobes ovate- to broadly ovate-triangular, prominently rugose below, conspicuously orange-punctate ..... *C. Stapfii*.

1. Leaf blades oblong, 1–2 cm. wide, glabrous above, glaucous and floccose-tomentose below, the margins revolute; calyx glandular-puberulent without, 1.3–1.7 mm. long, the lobes deltate, flat, epunctate .... *C. baruanus*.

Cybianthus subgenus **microconomorpha** (Mez in Engler) Agostini emend.
Pipoly. *Conomorpha* A.DC. subg. *Microconomorpha* Mez in Engler, Das Pflanzenreich IV. 236: 251. 1902. *Microconomorpha* (Mez) Lundell, Wrightia 5(9): 349. 1977. *Cybianthus* subg. *Microconomorpha* (Mez) Agostini, Acta Biol. Venez. 10(2): 150. 1980. LECTOTYPE, (Lundell, 1977): *Conomorpha verticillata* A. Zahlbruckner, Ann. K. K. Naturhist. Hofmus. 7: 3. 1892, non Mez (1902). = *Cybianthus pastensis* (Mez in Engler) Agostini.

Shrubs or small trees. *Branchlets* glandular-granulose, the granules often stipitate. *Leaves* pseudoverticillate. *Inflorescence* a simple raceme or bipinnately paniculate, the peduncle 1–4 cm. long, densely glandular-granulose; inflorescence and floral bracts, perianth and pistil bearing prominently raised secretory glands; *inflorescence bracts* large, often foliaceous and persistent; *floral bracts* linear-lanceolate, caducous. *Flowers* white to yellowish-green, (4)–5–(6)-merous; *calyx* lobes valvate, the margins densely glandular-ciliate; *corolla* rotate to cotyliform, the lobes imbricate, glabrous without, glandular-granulose over the entire surface within; *stamens and staminodes* connate by their filaments, forming a conspicuous tube, the filaments usually one to three times longer than the anthers, the anthers elongate-triangular or ovate, prominently curved distally, cordate to hastate basally, dorsifixed ca. 1/3 to more than 1/2 length from base, dehiscent by narrow longitudinal slits, the staminodes producing abortive or mostly abortive pollen grains; *pistil* obturbinate, densely translucent-lepidote, the style thick, truncate, the stigma punctiform, the placenta umbonate, bearing 3–4 uniseriate ovules immersed in placental tissue, but exposed apically by placental pores; *pistillode* similar to pistil, at times reduced in size, hollow or bearing at most 2 abortive ovules. *Fruit* drupaceous, 1-seeded.

The systematic position of subg. *Microconomorpha* and specific delimitation therein has been controversial since its original circumscription (Mez, 1902). Mez distinguished *Microconomorpha* primarily by pseudoverticillate leaves, 5-merous flowers and prominently raised secretory glands on the pistil. He included six species, which were separated by features of inflorescence (paniculate vs. racemose), petals (margins ciliolate vs. eciliolate and crenate vs. entire) and leaf margins (entire, crenate or crenate-sinuate). Studies by Agostini (1980) and the present author have revealed that the genus consists of only two polymorphic species, which vary in all the characters used, save the inflorescence type.

Lundell (1977) elevated the subgenus to generic rank and lectotypified it with *Conomorpha Jelskii* Mez (1902). Agostini (1980), apparently unaware of Lundell's work, again lectotypified the subgenus with *Conomorpha verticillata* A. Zahlbr. (1982) non Mez, and contradictorily stated that the type species for the subgenus was *Cybianthus pastensis* (Mez) Agostini. Although Lundell (1977) indicated "This [*Conomorpha Jelskii* Mez] is the first taxon treated by Mez under his new subgenus *Microconomorpha* and is taken as

the type species of the genus *Microconomorpha*," he clearly had an understanding of the group concerned, and the selection of *Conomorpha Jelskii* (a superfluous name for *Conomorpha verticillata* A. Zahlbr.) is in agreement with the protologue. Because *Conomorpha Jelskii* is homotypic with *Conomorpha verticillata* A. Zahlbr., the lectotypification by Lundell (1977) should be retained, but the latter basionym cited by Agostini should be used. Although Macbride (1934) demonstrated that the Mez name was superfluous, his reduction of *Conomorpha verticillata* A. Zahlbr. to a variety (Macbride, 1959), *Conomorpha Preslii* Macbride var. *Jelskii* (Mez) Macbride, was done correctly, as epithets have no priority outside their own rank. It is interesting to note that Agostini (1980) was apparently unaware of Lundell's (1977) lectotypification, but selected a name based on the same type.

Cybianthus subg. *Microconomorpha*, with very small flowers, distally curved anthers, glandular-granulose branchlets, valvate calyx lobes and corollas which are internally glandular-granulose throughout appears to be closely related to subgenus *Iteoides* Agostini (Pipoly, 1981). The two subgenera are tenuously separable by the following key:

1. Leaves alternate; inflorescence a simple raceme, the peduncle 0.1–0.5 cm. long; filaments almost none to slightly shorter than the anthers ..... *Cybianthus* subg. *Iteoides*.
1. Leaves pseudoverticillate; inflorescence a raceme or panicle, the peduncle 1–4 cm. long; filaments from one to three times longer than the anthers ..... *Cybianthus* subg. *Microconomorpha*.

Key to the Species of *Cybianthus* subg. *Microconomorpha*

1. Inflorescence a simple raceme; filaments free for 0.4–0.6 (0.7) mm.; anthers acute to rounded apically, not apiculate, hastate basally, glandular-punctate ventrally and dorsally ..... 1. *C. pastensis*.
1. Inflorescence bipinnately paniculate, or rarely reduced to an irregularly branched panicle; filaments free for 0.8–1.1 mm.; anthers minutely to prominently apiculate, cordate basally, eglandular ventrally and dorsally ..... 2. *C. perseoides*.

1. **Cybianthus pastensis** (Mez in Engler) Agostini

Myrsine verticillata Presl, Reliquiae Haenkeanae 2: 64. 1835. *Conomorpha verticillata* (Presl) Mez in Engler, Das Pflanzenreich IV. 236: 252. 1902, non A. Zahlbr. (1892). *Conomorpha Preslii* Macbride, Candollea 5: 398. 1934. *Microconomorpha verticillata* (Presl) Lundell, Wrightia 5(9): 349. 1977. TYPE: Peru: Huanuco, "in montanibus huanucocencibus Peruviae," *Haenke 98* (LECTOTYPE, here designated: PR !; ISOLECTOTYPE: W !). Non *Cybianthus verticillatus* (Vellozo) Agostini, Acta Biol. Venez. 10(2): 168. 1980.

Conomorpha verticillata A. Zahlbruckner, Ann. K. K. Naturhist.

Hofmus. 7: 3. 1892. *Conomorpha Jelskii* Mez in Engler, Das Pflanzenreich IV. 236: 252. 1902, nom. superfl. *Conomorpha Preslii* Macbride var. *Jelskii* (Mez) Macbride, Field Mus. Nat. Hist. Bot. Ser. 13(5): 201. 1959. *Microconomorpha Jelskii* (Mez) Lundell, Wrightia 5(9): 349. 1977. TYPE: Peru: Cajamarca, Cutervo, Apr. 1879, *Jelski 11* (HOLOTYPE: W !; CLASTOTYPE: F !, and photo, neg. no. 31980).

Conomorpha pastensis Mez in Engler, Das Pflanzenreich IV. 236: 252. 1902. *Microconomorpha pastensis* (Mez) Lundell, Wrightia 5(9): 349. 1977. *Cybianthus pastensis* (Mez) Agostini, Acta Biol. Venez. 10(2): 151. 1980. TYPE: Colombia: Nariño, "Paramo de Puruguai, Prov. de Pasto," 2500 m., 1866, *Triana 2585* (LECTOTYPE, here designated: W !; ISOLECTOTYPES: G !, C- as photo at F !).

Conomorpha dentata Mez in Engler, Das Pflanzenreich IV. 236: 252. 1902. *Microconomorpha dentata* (Mez) Lundell, Wrightia 5(9): 349. 1977. TYPE: Ecuador: in cordillera from Quito to Tungurahua, 2000–3000 m., 1857–9, *R. Spruce 5175* (LECTOTYPE, here designated: K !; ISOLECTOTYPES: LD !, C- as photo at F ! neg. no. 22956).

Conomorpha quercifolia Mez in Engler, Das Pflanzenreich IV. 236: 253. 1902. *Microconomorpha quercifolia* (Mez) Lundell, Wrightia 5(9): 349. 1977. TYPE: Peru: sine loc. *Pavon s.n.* (LECTOTYPE, here designated: G !).

Conomorpha panamensis Lundell, Wrightia 5(8): 290. 1976. *Microconomorpha panamensis* (Lundell) Lundell, Wrightia 5(9): 349. 1977. *Cybianthus Morii* Agostini, Acta Biol. Venez. 10(2): 154. 1980. TYPE: Panama: Chiriqui, Cerro Pando, on continental divide and Panama-Costa Rica border, ca. 16 km. W of Hato del Volcan, 2000–2482 m., 20 Jul. 1975, *Mori & Bolten 7292* (HOLOTYPE: LL !; ISOTYPE: MO).

Shrub or tree to 6 m. tall, the branchlets and inflorescence densely ferrugineous glandular-granulose. *Petioles* marginate, (0.2) 0.5–2.0 (2.7) cm. long. *Leaf blades* membranaceous to coriaceous, narrowly oblanceolate to oblong or obovate, (5.5) 6.5–14.5 x (1.2) 2.0–4.5 (5.5) cm., apically attenuate, acuminate or acute, basally cuneate, marginally undulate, lobate, crenate or dentate, the secretory glands often raised above and below at least when young, minutely ferrugineous-lepidote above and below, prominently reticulate. *Inflorescence* erect or lax, 1.8–5.5 cm. long, the rachis thin to thick; *inflorescence bracts* obovate to elliptic, (4.3) 6.0–11.0 x 3.0–7.0 mm., apically acute to acuminate, basally cuneate, densely punctate, with prominently raised glands; *floral bracts* linear-lanceolate, (0.8) 1.4–2.2 (7.0) mm. long, caducous; *pedicels* (1.3) 2.0–7.0 (7.5) mm. long. *Flowers* (4) 5-merous, white to yellowish-green; *calyx* shallowly cotyliform, (0.6) 0.8–1.1 (1.5) mm. long, unequally divided, the lobes united through 1/5–1/2 their length, widely ovate to ovate-triangular, (0.4) 0.6–1.0 x (0.4) 0.6–1.0, rounded to acute apically, glabrous, densely orange- or black-punctate, the margins subentire to erose-dentate, densely glandular-ciliate; *corolla* cotyliform, 2.0–2.6 (3.6) mm. long, the tube

ca. 0.2–0.3 mm., the lobes highly reflexed at anthesis, ovate to narrowly ovate, 1.7–2.3 (2.8) x 0.8–1.3 (1.5) mm., rounded to obtuse apically, prominently orange- or black-punctate; *stamens and staminodes* 1.0–1.6 (2.5) mm. long, free for 0.3–0.7 mm., the anthers elongate-triangular, 0.6–1.2 mm. long, apically obtuse, basally hastate, the connective red-glandular-punctate ventrally and dorsally at base of anther, dorsifixed ca. 1/3 to slightly less than 1/2 from base; *pistil and pistillode* 1.2–1.8 mm. long, the ovary (0.6) 0.8–1.0 x 1.0–1.3 (1.5) mm., prominently translucent-lepidote, the style thick, 0.5–0.8 mm. long, the stigma punctiform, the pistillode ovary hollow or containing one abortive ovule. *Fruit* globose, green, turning red, then black, 3–4 mm. in diam. when dried.

Cybianthus pastensis exhibits a high degree of polymorphism in leaf and flower morphology throughout its range. Distributed from Costa Rica to Peru, at elevations from 1500–3200 m., it consists of many populations differentiated slightly in degree of leaf margin incision, texture of leaf blade, and length of flowers, the diversity giving rise to overdescription.

Populations matching the type of *Myrsine verticillata* Presl, from Peru and southern Ecuador, are notable only for their chartaceous to membranaceous leaves with rather irregular margins. Although Mez (1902) claimed that the corolla lobes of *Conomorpha pastensis* were entire, while those of *C. verticillata* (Presl) Mez were crenulate, on several specimens I have found both entire and crenulate petals on the same inflorescence.

Conomorpha verticillata A. Zahlbr., described from Peru, is notable only for its slightly more coriaceous leaves with essentially entire margins and acute apices. *Conomorpha dentata* Mez represents populations from Ecuador with a more robust habit, slightly larger flowers, subcoriaceous leaves and prominent teeth on the leaf margins, otherwise inseparable from the type of *Conomorpha pastensis* Mez, described from Colombia. *Conomorpha quercifolia* Mez is unusual only by its more rounded lobes on the leaf margins. The type of *Conomorpha panamensis* Lundell and a collection of the same ecotype from Cartago, Costa Rica (*Lems 640909*), NY), closely match the type of *Conomorpha verticillata* A. Zahlbr., except that the glandular-granules of the branchlets and inflorescence are more elongate and somewhat stipitate. These disjunct populations are otherwise inseparable by quantitative or qualitative characters. Because Agostini did not see the type of *Conomorpha panamensis*, the stipitate glandular-granules described by Lundell as lepidote probably provided the reason for Agostini's (1980) placement of the species in subgenus *Conomorpha* (A. DC.) Agostini, despite the fact that Lundell (1977) had correctly placed it in subgenus *Microconomorpha*.

Representative specimens examined: Costa Rica: Cartago, beyond El Empalme, km. 55, Pan American Hwy, 2400 m., 9 Sep. 1964 *Lems 640909* (NY). Colombia: Antioquia, Quebrada La Fragua, W fork of headwaters of Rio Pabon, 7 km. W of El Pateado, 33 km. S of URRAO, 3000 m., 6 Mar. 1944 *Fosberg & Core 21570* (US); Vicinity of Medillin, 1 Feb. 1928 *Toro 942* (NY), 30 Jun. 1928 *Toro 1199* (NY); Bolivar, below Paramo de Chaquiro, Cordillera

Occidental, 2800-3100 m., 24 Feb. 1918 *Pennell 4362* (GH, NY, US); Cauca, Cordillera Central, W slope, headwaters of Rio Palo, 3300-3350 m., 1-2 Dec. 1944 *Cuatrecasas 18913* (A, F), Cordillera Central, E slope near Moscopan, banks of Rio San Jose, 2280 m., 30-31 Jan. 1947 *Cuatrecasas 23502* (COL, F), Cordillera Occidental, 2700 m., Feb. 1938 *Dryander 2078* (NY, US), Inza, 2000-3000 m., Nov.-Dec. 1896 *Lehmann 8681* (F), Santa Ana, 2700-3000 m., 29-30 Jun. 1922 *Pennell 7460* (GH, NY, US), Monte El Trueno, 2700-3000 m., 20-30 Jun. 1922 *Pennell 7548* (GH, NY, US); Cundinamarca, Cordillera Oriental, ridge above upper San Antonio, Rio San Martin, 15 km. SE of Gutierrez, 60 km. S of Bogota, 2775 m., 3 Aug. 1944 *M. Grant 9828* (NY); Huila, ridge between Quebrada la Caudela and Rio Naranjo, 18 km. SW of San Augustin, 1900 m., 12 Feb. 1943 *Fosberg 20134* (NY), La Plata, 2600 m., 20 Mar. 1939 *von Sneidern 2521* (F, US); Putumayo, Comisaria del Putumayo, upper basin of Rio Putumayo, Valle de Sibunday, Cordillera La Cabana, 2800 m., 2 Jan. 1941 *Cuatrecasas 11628* (F, US); Valle, Cordillera Occidental, Los Farallones, Quebrada del Raton, Mina El Diamante, 2950-3000 m., 30 Jul. 1946 *Cuatrecasas 21762* (NY), Cordillera Occidental, La Cumbre, 2000-2300 m., 11-18 Sep. 1922 *Killip 11379* (GH, US), 1800-2000 m., *Pennell 5145* (GH, NY, US); without specific locality, *Mutis 5750* (US). Ecuador: Loja, 3500 m., 1 Dec. 1876 *Andre 4551* (F, K, NY), divide between Quebrada Jipiru and E fork of Rio Zamora, W slope of Cordillera de Zamora, El Condor, 2700 m., 19 Feb. 1945 *Fosberg & Giler 23119* (NY, US); Morona-Santiago, between Campanas and Arenillas, along Rio Tintas, 10 leagues SE of El Pan, 2195 m., 13 Jul. 1943 *Steyermark 53642* (F, NY), above Mirador, 2375 m., 9 Sep. 1943 *Steyermark 54273* (NY), along Rio Valladolid, between Quebrada Honda and Tambo Valladolid, 2000-3000 m., 12 Oct. 1943 *Steyermark 53897* (F, NY); Napo, E of Borja, Cerro Antisana, 28 Jul. 1960 *Grubb et al. 1073* (NY), Between Cuyuja and Papallacta on road to Baeza, 78° 01′W, 0°21′S, 2800-2900 m., 5 Jun. 1973 *Holm-Nielsen 6818* (AAU), Salcedo-Napo, 2390-2590 m., 7 Feb. 1977 *Boeke 930* (NY); Zamora-Chinchipe, road to Loja-Zamora, km. 14, 79°09′W, 0°4′ S, 2750-2770 m., 19-20 Apr. 1973 *Holm-Nielsen et al. 3965* (AAU). Peru: Cajamarca, Cutervo, 10 km. NW of Socota, 3200 m., 10 Dec. 1938 *Stork & Horton 10134* (F), Jaen, E side of Cordillera E of Huancabamba, 2400-2600 m., Apr. 1942 *Weberbauer 6099* (US).

2. **Cybianthus perseoides** (Mez in Engler) Agostini

Conomorpha perseoides Mez in Engler, Das Pflanzenreich IV. 236: 252. 1902. *Microconomorpha perseoides* (Mez) Lundell, Wrightia 5(9): 349. 1977. *Cybianthus perseoides* (Mez) Agostini, Acta Biol. Venez. 10(2): 151. 1980. TYPE: Colombia: "N. Granada," *Purdie s.n.* (LECTOTYPE, here designated: K !).

Shrub or tree to 8 m. tall, the branchlets and inflorescence densely ferrugineous glandular-granulose, the branchlets glabrescent. *Petioles* thick, (1.0) 1.5-3.5 cm. long, somewhat marginate, but with the costa raised above and below, slightly glandular-granulose, glabrescent. *Leaf blades* chartaceous

to coriaceous, elliptic to obovate, often inequalateral, (7.0) 8.0–35.5 (37.5) x (2.4) 3.0–12.0 cm., apically rounded, acute or subacuminate, basally acute to cuneate, decurrent on the petiole, the margins flat, entire, prominently glandular-punctate with a few scattered ferrugineous-lepidote scales above, densely ferrugineous-lepidote below, with a few scattered glandular punctations. *Inflorescence* bipinnately paniculate, at times irregularly so, erect, (2.5) 7.0–13.5 cm. long, the rachis opaque, red; *inflorescence bracts* obovate, 2.1–3.5 x 1.0–1.5 cm., densely glandular-punctate, at times persistent; *floral bracts* linear-lanceolate, (0.4) 0.7–2.1 (3.0) mm. long, glandular-punctate, glandular-ciliate marginally, caducous; *pedicels* 1.2–2.2 mm. long, densely ferrugineous glandular-granulose. *Flowers* (4) 5-merous, white to cream, 1.8–2.9 mm. long; *calyx* shallowly cotyliform, 1.0–1.4 mm. long, often unequally divided, the tube ca. 0.2–0.4 mm. long, sparsely glandular-granulose without, the lobes widely ovate, 0.6–1.2 x 0.8–1.0 mm., obtuse to rounded apically, membranaceous, prominently orange- or red-punctate, the margins densely glandular-ciliate; *corolla* cotyliform to rotate, the tube 0.1–0.2 mm. long, the lobes highly reflexed at anthesis, ovate to obovate, 1.6–2.5 x 0.9–1.1 mm., apically rounded to obtuse, glandular-ciliate marginally; *stamens and staminodes* 1.7–2.0 mm. long, the filaments connate into a tube 0.4–0.6 (0.7) mm. long, free for 0.8–0.9 mm., the anthers ovate, 0.9–1.0 mm. long, minutely to prominently apiculate, basally cordate, dorsifixed ca. 1/3–1/2 from base; *pistil and pistillode* 1.3–1.7 mm. long, the ovary 0.5–0.8 x 0.7–1.0 mm., densely translucent-lepidote and glandular-punctate, the style thick, 0.6–0.9 mm. long, the stigma punctiform. *Fruit* globose, green turning red, then purple, 3–6 mm. diam. when dried.

Cybianthus perseoides exhibits much variation in inflorescence and leaf morphology between highland and lowland populations. Distributed from the Sierra de Perija and Sierra Nevada de Santa Marta, to the province of Huila, Colombia, populations found at elevations below 2400 m. have large, chartaceous leaves and long inflorescences with a thin rachis, whereas those found above 3000 m. have smaller, inequalateral coriaceous leaves and short inflorescences with a thick rachis.

Representative specimens examined: Colombia: Huila, Cordillera Oriental, Loma de Lavaderos, between Rio Granadillo and Quebrada Balseras, 15 km. S of San Augustin, 16 Apr. 1944 *E. Little 7673* (NY, US); Magdalena, Sierra Nevada de Santa Marta, between San Pedro and headwaters of Rio Sevilla, 3330–3410 m., *Barclay & Juajibioy 6726* (MO, US), 1 km. NW of Quebrada of Laguna Rio Frio, near Jose Hilario 75° 53′W, 10° 55′N, 3400 m., 31 Jul. 1972 *E. Forero & J. Kirkbride 626* (COL, NY), on trail to Finca Cecilia E of Quebrada Indiana, 10° 59′N, 73° 59′W, 1700 m., 1 Sep. 1972 *J. Kirkbride 2046* (COL, NY), Pie del Palmidal, divide between Rio Sevilla nd Rio Frio, W side of Sierra Nevada, 1820 m., 28 Nov. 1944 *Kernan 147* (US), Cordillera Oriental, Sierra de Perija, 6 km. ENE of Manaure, 42 km. E of Valledupar, 7 km. from Venezuelan border, 2175 m., 2 Feb. 1945 *M. Grant 10760* (NY, US); Norte de Santander, Pamplona La Baja, 1846 *Funck & Schlim 1374* (G,

P); Santander, vicinity of Las Vegas, 2600-3000 m., 21-23 Dec. 1926 *Killip & A.C. Smith 18816* (NY, US). Venezuela: Zulia, Sierra de Perija, 9° 30'N, 73° 06'W, Campamento Frontera VI, between headwaters of Rio del Norte and S branch of rio Aricauisa, 2400 m., 23-28 Jul. 1974 *P. Berry 141* (NY, VEN).

Acknowledgements

I wish to express my appreciation to Dr. C.L. Lundell, whose continued collaboration made the study possible. Nomenclature discussions with Drs. Arthur Cronquist and Rupert Barneby were most appreciated. Drs. Arthur Cronquist and Jim Luteyn, Ms. Sue Keller and Mrs. Steve Clemants critically reviewed the manuscript and provided helpful suggestions. The curators of the following herbaria are thanked for providing loans or gifts for determination: A, AAU, COL, F, G, GH, K, LD, LL, MO, P, PR, US, VEN, W. My work at NY is supported by a New York Botanical Garden Herbarium Fellowship, which is gratefully acknowledged.

Literature Cited

Agostini, G. 1971. A revision of the genus *Cybianthus* section *Conomorpha* (Myrsinaceae). Ph.D. thesis, the City University of New York. NY.

_____. 1980. Una nueva clasificacion del genero *Cybianthus* (Myrsinaceae). Acta Biol. Venez. 10(2): 129-185.

Lundell, C.L. 1971. Flora of Panama: Myrsinaceae. Ann. Missouri Bot. Gard. 58: 285-353.

_____. 1977. Studies of American Plants—XIV. Wrightia 5(9): 331-359.

_____. 1979. Neotropical Myrsinaceae—II. Wrightia 6(4): 60-100.

Macbride, J. 1934. New or renamed spermatophytes, mostly Peruvian. Candollea 5: 346-402.

_____. 1959. Flora of Peru: Myrsinaceae. Field Mus. Nat. Hist. Bot. Ser. 13(5): 162-203.

Mez, C. 1902. Myrsinaceae. *In:* A. Engler, editor. Das Pflanzenreich IV. 236: 1-437.

Pipoly, J. 1981. Contributions toward a monograph of *Cybianthus* (Myrsinaceae): I. Subgenus *Iteoides* and the identity of *Conomorpha loretensis*. Brittonia 33(4): 493-497.

_____. Contributions toward a monograph of *Cybianthus* (Myrsinaceae): III. A revision of subgenus *Laxiflorus*. Brittonia 35(1).

Zahlbruckner, A. 1892. Novitiae peruvianae. Ann. K. K. Naturhist. Hofmus. 7(1): 1-10.

on TROPICOS names, type

NEOTROPICAL MYRSINACEAE — VIII

Cyrus Longworth Lundell

Auriculardisia Solomonii (Lundell) Lundell, comb. nov. *Ardisia Solomonii* Lundell, Phytologia 48: 135. 1981.

Gentlea cuneifolia Lundell, sp. nov. — Frutex; ramuli e gracilioribus, glabrati; folia petiolata, petiolis 4–7 mm. longis, marginatis, canaliculatis; lamina membranacea, punctata, integra, obovata vel elliptica, 5–9 cm. longa, 1.3–4 cm. lata, apice subabrupte acuminata, basi cuneata; inflorescentia terminalis, minute rufo-glanduloso-puberula, paniculata, 3–4 cm. longa et lata; flores subumbellati; pedicelli 3–6.5 mm. longi; sepala 5, anguste lanceolata, 2–2.5 mm. longa, ad 0.45 mm. lata, acuminata, punctata, parce puberula; fructus ad 4 mm. diam., subglobosus, costatus.

Mexico: Veracruz, Mun. San Andres Tuxtla, Cerca del aguaje en el lado S del Volcan San Martin Tuxtla, bosque Caducifolio primario, alt. 1250 m., Feb. 15, 1972, *John H. Beaman & Carlos Alvarez del Castillo 5751* (holotype, LL), arbusto, 2 m., fruto rosa-verde.

The minute gland-tipped hairs of the inflorescence, obovate thin leaves cuneate and decurrent at base and short acuminate at apex, and the very slender long thin sepals well-mark the taxon.

Gentlea tenuis Lundell, Wrightia 7: 24. 1981.

Mexico: Veracruz, region of Los Tuxtlas, 3 mi. NNW of Ocotal Chico, 4400 ft., March 29, 1965, *Gary N. Ross 122* (US; fragment & xerox, LL), small tree in elfin forest, green berries.

This taxon, so recently described from Chiapas, Municipio of Rayon, is a splendid addition to the flora of Veracruz, the second species of this genus recorded. It is related to *G. Molinae* Lundell of Honduras, known only from fruiting material.

Heberdenia penduliflora (A.DC.) Mez, Pflanzenreich IV. 236: 175. 1902.

Mexico: Veracruz, Los Bejucos camino de Xometla a la Perla al NW de Orizaba, alt. 2250 m., March 5, 1967, *Marino Rosas R. 198* (LL), hierba 80 cm., flor blanca; municipio de Chiconquiaco, Guacamaya, bosque de encino, alt. 1900 m., Dec. 9, 1972, *F. Ventura A. 7579* (LL), arbusto erecto de 1.5 m. de alto, flores blancas, estambres blancos, fruto rojo; municipio de Chiconquiaco, La Parra, bosque de encino en ladera de cerro, alt. 1750 m., Jan. 16, 1973, *F. Ventura A. 7730* (LL), arbusto rastrero, flores blanquecinas, escasa; carretera al sur de Huayacocotla, 17 km. del bordo con Hidalgo, Huacocotla, bosque de encino, July 13, 1977, *J. J. Fay & J. I. Calzada 861* (F), arbusto, 1.5 m.; 1 km. beyond La Joya toward Perote on main Jalapa-Perote highway, lava flow, April 14, 1978, *S. Galen Smith 6205* (LL), arbusto, 1 m.

Mexico: Oaxaca, Sierra de Juarez, along highway 175 between Valle Nacional and Oaxaca, 36 miles above (west of) Valle Nacional, primary forest on very steep slopes, elev. 2400 m., June 30, 1977, *Thomas B. Croat 39892* (MO; xerox copy, LL), shrub 1.5 m., fruits red.

A Sesse & Mociño collection from Mexico, Negative 30749 of the Field Museum of Natural History, shows the drawing of the DeCandolle type (G). Presumably this collection came from Veracruz.

Ibarraea Wendtii Lundell, Wrightia 7: 46. 1982.

Mexico: Veracruz, Municipio Hidalgotitlan, N de La Laguna, junto al N del viero de hule y al O del Rio Cuevas, elev. 125 m., Nov. 28, 1981, *Tom Wendt y A. Villalobos C. 3520* (LL), hasta 4 m. y mas.

Described from the State of Veracruz, other collections from Municipio Hidalgotitlan appear to be referable here: *Brigada Vazquez 425, 1249* (MEXU); *J. Dorantes et al 3484* (MEXU). The specimens are only in bud or fruit.

Icacorea Capollina (DC.) Lundell, comb. nov. *Ardisia Capollina* DC., Trans. Linn. Soc. Bot. 17: 116. 1834.

Mexico: Plantae Novae Hispaniae, *Sesse, Mociño, Castillo et Maldonado 1398* (leaf, F), *Capolin zimarron.*

Parathesis Calzadae Lundell, sp. nov. — Arbor, 12 m.; ramuli crassiusculi; folia longe petiolata, petiolis 1.5–1.8 cm. longis, tenuis, canaliculatis; lamina glabra, crenulata vel subintegra, oblanceolata vel anguste rhombiformia, 7–14 cm. longa, 2.3–4.5 cm. lata, basi cuneata, apice acuminata, minute punctata; inflorescentia axillaris, paniculata, ad 10 cm. longa, glabra; flores subcorymbosi; pedicelli 3–4 mm. longi; sepala 5, parva, lineari-lanceolata, 0.6–0.75 mm. longa, attenuato-acuminata, minute et parce puberula, aurantiaco-punctata; alabastra anguste oblonga, ca. 3.2 mm. longa, minute puberula, apice obtusa; petala 5, lineari-oblonga, ca. 3 mm. longa, 0.4 mm. lata, intus minute villosa, aurantiaco-punctata; stamina ca. 3 mm. longa; filamenta ad 1.5 mm. longa, tenuis; antherae lineari-lanceolatae, ad 2 mm. longae, parce punctatae vel epunctatae, basi subsagittatae; ovarium glabrum; ovula 4 vel 5, erecta, uniseriata.

Mexico: Veracruz, cima del volcan de San Martin, Mun. San Andres Tuxtla, selva baja perennifolia, primaria, 1970, *Juan Ismael Calzada 65* (holotype, LL), arbol, 12 m., flor blanca.

P. Calzadae is closely related to *P. melanosticta* (Schlecht.) Hemsl. but differs notably in having a glabrous ovary and style among other features which characterize the taxon. Both species have very small flowers, those of *P. Calzadae* being the smallest in the genus. In leaf form, glabrous, densely punctate leaf blades inconspicuously veined, shorter pedicels, slender acuminate sepals, petals linear and only 0.4 mm. wide, 3 mm. long, and with flowers orange-punctate rather than black-punctate, *P. Calzadae* is amply distinct

from *P. melanosticta.* Both species have ovules uniseriate, erect, enclosed by a membrane, and the anthers are longitudinally dehiscent.

Parathesis cubana (A.DC.) Mol. & G. Maza var. **cuneifolia** Lundell, var. nov. — Planta 1.3 m. alta; folia longe petiolata, petiolis 1.2–2.5 cm. longis, canaliculatis; lamina chartacea, glabra, obovata, 6–12 cm. longa, 3–5 cm. lata, apice rotundata vel late obtusa, basi cuneata, nigra, integra vel subintegra; inflorescentia terminalis, paniculata, ad 12 cm. longa, minute et dense adpresse puberula; flores corymbosi, minute et dense papillato-puberuli; pedicelli ad 5 mm. longi; sepala 5, parvissima, ovata, 0.6–0.7 mm. longa, acuta; petala 5, lineari-lanceolata, ad 6 mm. longa, 1 mm. lata, intus dense villoso-tomentosa, aurantiaco-punctata; stamina ca. 4 mm. longa; filamenta ca. 1.5 mm. longa; antherae lineari-lanceolatae, ca. 3 mm. longae, apice birimosae, dorso aurantiaco-punctatae, basi subsagittatae; ovarium glabrum; ovula parva, 12–16, pluriseriata.

Mexico: Veracruz, Playa Vicente, acahual, Dec. 10, 1969, *G. Martinez Calderon 2062* (holotype, LL), herbacea, 1.3 m., flor blanca.

The variety, which has been collected also in Peten and Belize, is distinct in having leaves cuneate at base with petioles up to 2.5 cm. long, smaller sepals, and style entirely glabrous. In the type of the species from Cuba and in typical collections, the petioles are short, usually about 1 cm. long, and the base of the style is pubescent.

Parathesis macrocarpa Lundell, sp. nov. — Ramuli crassi, glabri, lenticellati; folia longe petiolata, petiolo 2–2.3 cm. longo, basi canaliculato; lamina subcoriacea, integra, oblanceolata, 4–4.5 cm. lata, 12.5–14 cm. longa, apice obtusa, basi attenuata, cuneata, glabra; inflorescentia terminalis, late paniculata, ad 15 cm. longa et lata, parce et minute puberula vel papillosa; flores corymbosi; pedicelli fructiferi 4–6 mm. longi, crassi; sepala 5, parva, valvata, anguste triangularia, ca. 1 mm. longa, minute puberula; fructus subglobosus, 1–1.2 cm. diam.

Mexico: Chiapas, Cerro al E Ocote, Barranca Zarahuatos, 30 km. NO Ocozocuautla, May 30, 1950, *F. Miranda 6338* (holotype, MEXU; xerox, LL).

The specimen is very poor, and I have hesitated to name it every time it turns up in my studies of the genus *Parathesis.* The obtuse long petiolate oblanceolate leaves, the large spreading inflorescence with thick primary branches, the very small narrowly triangular puberulent sepals, and the unusually large fruits are combined features with which I cannot associate any known taxon in the genus. The base of the style has a few short hairs.

Hopefully this region (evidently one of rain forest from the nature of the specimen) will be visited again and the species collected in flower.

Parathesis Neei Lundell, sp. nov. — Frutex, 3–4 m.; ramuli crassi, rufo-stellato-tomentosi; folia magna, petiolis crassis, 1.5–2 cm. longis; lamina crenulata, subcoriacea, elliptica, 19–30 cm. longa, 8–12 cm. lata, apice sub-

abrupte acuminata, basi subcuneata, supra glabra, subtus rufo-stellato-pubescentia; inflorescentia terminalis, pyramidalis, rufo-stellato-tomentella, paniculata, sessilia, ad 20 cm. longa, basi 15 cm. lata; flores corymbasi; paniculata, sessilia, ad 20 cm. longa, basi 15 cm. lata; flores corymbosi; pedicelli fructiferi crassi, ad 3 mm. longi; sepala 5, lanceolata, 1.7–2 mm. diam.

Mexico: Veracruz, along dirt road 9 km. E of Tebanca (9 km. E of east side of Lago Catemaco) and 0.6 km. W of Bastonal lumber camp, alt. 980 m., Jan. 15, 1981, *M. Nee & G. Schatz 19872* (holotype, F; xerox and fragment, LL), shrub, 3 m. tall, fruits light red and greenish; along dirt road 7.2 km. E of Tebanca (7.2 km. E of east side of Lago Catemaco), 2.6 km. W of Bastonal lumber camp, alt. 910 m., Jan. 15, 1981, *M. Nee & G. Schatz 19926* (paratype, F; xerox and fragment, LL), shrub, 4 m. tall, fruit red.

Although only fruiting specimens are available, the Veracruz shrub appears to be related to *P. amplifolia* Lundell of Panama. *P. Neei* has coarser stellate and dendroid indument, much shorter and thicker petioles, and pedicels usually less than 3 mm. long.

Parathesis pajapanensis Lundell, sp. nov. — Arbor; ramuli crassiusculi, glabri; folia parva, glabra, petiolata, petiolo, ad 1.4 mm. longo, canaliculato; lamina integra, subcoriacea, dense punctata, obovata, 7–10 cm. longa, 3.8–4.2 cm. lata, apice subabrupte acuminata, basi cuneata; inflorescentia glabra, terminalis, paniculata, ad 10 cm. longa; flores subcorymbosi; pedicelli fructiferi 3–6 mm. longi; sepala valvata, triangularia, ca. 1 mm. longa, apice acuta, punctata, extus minute puberula; fructus costatus, punctatus, depresso-globosus.

Mexico: Veracruz, Mun. Pajapan, 5 km. NW of Pajapan, SE slopes of Cerro San Martin Pajapan, forest on steep slopes, alt. 700 m., Nov. 3, 1981, *M. Nee & J. I. Calzada 22737* (LL), tree, fruit green and reddish.

The only collection available is unfortunately in fruit. In this stage, the plant appears to be glabrous, although the sepals are minutely puberulent and there appear to be a few short hairs at the base of the style of the fruits. The glands are everywhere reddish, and those of the fruits are rounded, elevated and conspicuous. The acumen of the leaves is short, and the base is decurrent on the rather slender petioles. The venation of the leaf blades is evident but in no way similar to that of *P. lenticellata* Lundell, to which the species may be related.

Parathesis perpunctata Lundell, sp. nov. — Arbor parva, 4–7 m. alta; ramuli graciles, glabrati; folia parva, membranacea, nigra, subtus novella peradpresse pubescentia, glabrata, minute et dense perpunctata, petiolis 7–15 mm. longis, gracilis, canaliculatis; lamina lanceolato-elliptica vel oblanceolata, 5–10 cm. longa, 1.8–3.4 cm. lata, basi cuneata, apice subacuminata vel obtusiuscula, integra; inflorescentia terminalis, glabrata, parva, pauciflora, paniculata, ad 4.5 cm. longa; pedicelli fructiferi 6–10 mm. longi,

puberuli; sepala 5, anguste triangulata, acuminata, 1–1.3 mm. longa, extus puberula; fructus subglobosus, ad 8 mm. diam., apice rufo-tomentosus.

Mexico: Veracruz, Municipio Hidalgotitlan, lomitas al SE de Poblado 6, elev. 210 m., Oct. 4, 1980, *Tom Wendt, A. Villalobos, I. Navarrete y J. Anguiana 3092* (holotype, LL), arbolito de 7 m., 14 cm. diam.; same locality and date *Wendt et al 2830* (paratype, LL).

In the absence of flowers, the relationship of *P. perpunctata* can only be conjectured. The red tomentum persisting at the apex of the mature fruits suggests *P. Schultesii* Lundell, described from Oaxaca, but it is known also only from fruiting material and the two are very dissimilar in various vegetative features.

The leaves of *P. perpunctata* are very densely pellucid-punctate with minute glands.

Another collection in fruit, *A. Gomez Pompa & L. Nevling 1478* (LL), from Las Choapas, Mun. Las Choapas, appears to be referable to this species.

Parathesis tenuis Standl., Contr. U.S. Nat. Herb. 23: 1111. 1924. Lundell, The Genus Parathesis of the Myrsinaceae, Contr. Texas Research Foundation 5: 166, fig. 62 & pl. 11. 1966.

Mexico: Veracruz, Cerro Cintepec al E de Zapoapan, Mun. Catemaco, alt. ca. 900 m., selva alta perennifolia, primaria, Feb. 8, 1972, *John H. Beaman 5607* (LL), arbusto, 3 m., fruto rojo; 700 m. al sur de la Estacion Biologica Tropical "Los Tuxtlas," ca. 20 km. N of Catemaco, Mun. San Andres Tuxtla, selva alta perennifolia, April 3, 1973, *Alberto Villegas Herrera 68* (LL), arbol, 25 m., tallo jugoso, flor blancusca; along dirt road 7.2 km. E of Tebanca (7.2 km. E of east side of Lago Catemaco), 2.6 km. W of Bastonal lumber camp, in rich forest with *Liquidambar macrophylla* and tropical evergreen species, alt. 910 m., Jan. 15, 1981, *M. Nee & G. Schatz 19931* (F), shrub, fruit turning bright red.

Mexico: Chiapas, shady forest, mountains near Fenia, April 1925, *C. A. Purpus 23* (LL).

Liebmann 14 (isotype, LL), 1841–43, probably was collected in this region.

Only fruiting material from Veracruz has been available, but the cited collections agree very well with the isotype (LL), an excellent flowering specimen. The intricate reticulation and often dense punctation of the small lanceolate leaves are very distinctive. The margin of the leaf blades is obscurely crenulate but may be considered subentire.

Parathesis Villalobosii Lundell, sp. nov. — Arbor, 5 m.; ramuli crassiusculi, rufo-stellato-tomentosi; folia longissima, membranacea, supra glabra, subtus rufo-stellato-pubescentia, petiolata, petiolo 1–2 cm. longo, canaliculato; lamina minute crenulato-denticulata, anguste oblanceolata, 15–30 cm. longa, 3.5–6.5 cm. lata, apice caudato-acuminata, basi attenuata, acuminata; inflorescentia terminalis, supra folia, paniculata, 27–35 cm. longa, basi ad 25 cm. lata, rufo-stellato-tomentosa, multiflora; pedicelli 9–12 mm. longi;

flores corymbosi, stellato-pubescenti, ca. 7 mm. longi; sepala 5, anguste lanceolata, 2–2.2 mm. longa, acuminata, stellato-puberula; petala lanceolata, ad 6.5 mm. longa, lineato-punctata, extus stellato-puberula, intus villosa; stamina ca. 4 mm. longa; filamenta crassa, ca. 1.2 mm. longa, punctata; antherae lanceolatae, acuminatae, dorso dense aurantiaco- vel nigro-aurantiaco-glandulosae; ovarium glabrum; placenta parva; ovula 6 vel 7, uniseriata; fructus subglobosus, ca. 1 cm. diam.

Mexico: Veracruz, Mun. Minatitlan, loma grande, al S de Poblado 11, ca. 27 km. al E de la Laguna, alt. ca. 900 m., June 4, 1981, *Tom Wendt, A. Villalobos, J. Garcia, I. Navarrete y Anguiano 3412* (holotype, LL), *3404* (paratype, LL), arbol de 5 m.; flores rosas, anteras amarillas con conectivo negro, filamentos rosas; fruto maduro morado muy oscuro, la carne rojo oscura, jugosa, de sabor agradable.

A very well-marked species with affinity to *P. columnaris* Lundell, *P. congesta* Lundell and *P. sessilifolia* Donn. Sm. The narrow elongated petiolate leaves, pubescence of fine red sessile stellate hairs, and the magnificent large inflorescence are features by which the taxon may be immediately recognized. The corymbs elongate after anthesis so that the fruits appear racemose below the corymb with the pedicels up to 1.2 cm. long in flower. Notable are the wide filaments which appear in some flowers to be almost as wide as the base of the anthers.

Zunilia hyalina (Lundell) Lundell, Phytologia 49: 354. 1981. *Ardisia hyalina* Lundell, Wrightia 3: 99. 1964.

Mexico: Veracruz, Sierra de Chiconquiaco entre Chiconquiaco y Misantla, en bosque de encino-liquidambar, alt. 1280 m., Nov. 19, 1963, *A Gomez-Pompa 1155* (A, GH, LL), fruto color morado, 0.5 cm. de diam. en fresco.

Described from the vicinity of Xilitla on Cerro Miramar in San Luis Potosi, it is known also from the Municipio de Tamazunchale in the same state. Only the single collection has been recorded from Veracruz.

REVISIONAL STUDIES IN THE GENUS URCEOLINA (AMARYLLIDACEAE) II[1]

Pierfelice Ravenna

I. On the status of *Eucharis* as a subgenus of *Urceolina*

In recent years (see Ravenna 1978, 1982) I described some new species of *Urceolina*, of subgenera *Urceolina* and *Eucharis*. I therefore supported the opinion of Traub (1971) that *Eucharis* must be considered a subgenus of *Urceolina*. I expressed however doubts (loc. cit. 1982) about the inclusion of *Plagiolirion* and *Mathieua* in *Urceolina*.

Although I accept now the placement of *Plagiolirion Horsmannii* in *Urceolina*, I do maintain my reluctance concerning *Mathieua galanthoides*. The already given reason deals with the fact that the latter lives in a quite dry area on the Pacific coast, contrasting with the rest of the *Urceolina* species (including *Eucharis* and *Calliphruria* as subgenera) that inhabit the rainy forests of the east side of the Andes and the Amazonian lowlands. Traub, in a footnote inserted in my article (loc. cit. 1982, p. 49), claims that "it should be emphasized that difference in habit does not necessarily require changing the generic status," and he mentions as an instance the various habitats of *Amaryllis*. I must say, however, that what is true in one genus does not necessarily imply the same in another genus. Time will say if *Mathieua* should be restored.

Recently it was claimed to me that the inclusion of *Eucharis* in *Urceolina* is not well supported and that the former may well be maintained as separated from the latter. In the past, hybrids between species of both groups (*Urceocharis*) were obtained; however, this sole fact is not sufficient to prove generic identity. More important is the existence of coincident features in habit, leaves, fruit, and seeds, and the variability of the androecium, which in several *Eucharis* species approaches to the form in *Urceolina*. The urceolate, constricted above perigone and its yellow color (instead of snow-white) appear therefore as the only characters for the distinction of *Urceolina* and *Eucharis*. *U. Hartwegiana*, formerly included in *Calliphruria*, has a campanulate perigone that, if not exactly of the same type, resembles somewhat that in *Urceolina*. The yellow color of the perigone, though being a distinctive feature of *Urceolina* proper, cannot be taken as a basis for separating genera.

It seems, therefore, that the reduction of *Eucharis* as a subgenus of *Urceolina* is fully justifiable.

[1]Part I of this work appeared as a section of my "Contributions to South American Amaryllidaceae IX, in Plant Life 38: 48-54, 1982.

II. A new species from northern Peru

Urceolina oxyandra Rav., sp. nov. (subgeneris *Eucharis*) — Planta ad 26 cm. alta. Bulbus non vidi. Folium in exemplare sicco unicum; petiolum circ. 12–13 cm. longum superne usque 25–28 mm. gradate ampliatum; lamina oblique patentia ovato-lanceolata ad 18 cm. longa circ. 67–70 mm. lata subacuta. Scapus teres ad 19 cm. longum circ. 3 mm. latus. Spathae valvae lanceolatae erecto-patentes membranaceae circ. 30–33 mm. longae; bracteae interiores lanceolatae ad 25–29 mm. longae. Inflorescentia circ. 5–7-flora. Pedicelli erecti ad 23–29 mm. longi. Flores pariter cernui albi (?). Ovarium ovato-ellipticum ad 5–6 mm. longum 2.7–3 mm. latum. Perigonii tubus circ. 27 mm. longus apicem versus leviter curvatus. Perigonium cernuum ad 35–37 mm. latum. Tepala exteriora lanceolato-elliptica vel lanceolata ad 16–22 mm. longa circ. 7–8 mm. lata ad apicem apiculo inferne piloso circ. 0.8–1 mm. longo notata. Tepala interiora elliptica ad 19–22 mm. longa circ. 8.5–10 mm. lata obtusa vel subacuta. Filamenta rigide cultriformia acutaque, sepalina ad 11.5–14.3 mm. longa, petalina circ. 10–11.2 mm. longa, utraque series ad basin circ. 0.8–1.5 mm. connatas et edentatas. Antherae erectae oblongo-lanceolatae in quarto inferiore ad filamenum affixeae circ. 2.5–2.9 mm. longae. Stylus filiformis albus ad 45–46 mm. longus. Stigma trilobatus, lobis circ 1.3–1.5 mm. longis ad apicem obtusis.

Grown at University of California Botanical Garden, pressed 26 April 1967 by P. C. Hutchison from imported plants collected in Peru, dept. Huanuco, prov. Huanuco, Rio Chinchao, below Carpish, on road to Tingo Maria, 1800 m., *P. C. Hutchison et al. 5983*, 19 July 1964 (USM, holotype).

The specific epithet was framed from the Greek and refers to the stiff, dagger-shaped filaments which are only slightly joined at the base, bearing no teeth. This form is unique in subgenus *Eucharis* and strengthening even more the present status of this group within *Urceolina*. The erect anthers also represent an unusual feature.

Omission in a previous note:

In a note on the first record of authentic *Urceolina* material from Bolivia (Ravenna 1982, p. 54), a phrase was omitted. This refers to the citation of "*Urceolina peruviana*" in the Bolivian flora by Foster (1958), which actually corresponds to *Stenomesson miniatum* (Herb.) Rav. (see Ravenna 1978, pp. 69–71).

Acknowledgments

I feel obliged to the Botany staff of the Museo de Historia Natural "Javier Prado," Universidad de San Marcos, Lima, Peru, for lending me several specimens of *Urceolina* for study.

Literature Cited

Foster, R. C., 1958: A catalogue of the ferns and flowering plants of Bolivia; Contr. Gray Herb. Harv. Univ. 184, 223 pp.

Ravenna, P., 1978: Contributions to South American Amaryllidaceae VII; Pl. Life 34: 69-91.

_____ 1982: Contributions to South American Amaryllidaceae IX; Pl. Life 38: 42-55.

Traub, H. P., 1971: Amaryllid notes 1971; Pl. Life 27: 57-59.

18997

A NEW COMBINATION IN LINDMANIA (BROMELIACEAE)

Pierfelice Ravenna

The new combination *Lindmania schidosperma* (Bak.) Rav. (Bromeliaceae), based on *Chlorophytum schidospermum* Baker, is established. The specific epithet antedates *Lindmania Weberbauerii* Mez, which is therefore placed in synonymy.

2485 1869 226 612 **Lindmania schidosperma** (Bak.) Ravenna, comb. nov. — *Chlorophytum schidospermum* Baker, Journ. Linn. Soc. London 15: 326, 1876. — *Lindmania Weberbauerii* Mez, Rep. Sp. Nov. 12: 417, 1913. — *Cottendorfia Rusbyii* Baker, Bull. Torr. Bot. Club 29: 697, 1902. — *Schidospermum Sanseviera* Grisebach, Berb. Amer. Austr.: 56, 1857 (nomen nudum). — The plant was first named, though not validly published, by Grisebach (1857) as *Schidospermum Sanseviera.* Baker (1876) describes the species in *Chlorophytum* of the Liliaceae as *Ch. schidospermum.* Macbride (1936), in Flora of Peru, follows Baker.

Peru: Puno, San Govan (Sangaban), W. Lechler Plantae Peruvianae 2382, July 1854 (ed. R. F. Hochenecht) (K, phototype seen).

A phototype received through the courtesy of Kew Botanic Gardens revealed the actual identity of the species. Inquiries in the literature disclosed that Mez redescribed it as *L. Weberbaueri.*

Literature Cited

Baker, J. G., 1876: Journ. Linn. Soc. London 15: 326 (*Chlorophytum*).

Grisebach, A., 1857: Berberides Americae Australis: 56.

Macbride, F., 1936: Liliaceae, in Flora of Peru; Field Mus. Publ. Bot. 13: 617-630.

NEOTROPICAL MYRSINACEAE — VIII

(Continued from page 250)

Parathesis lenticellata Lundell, Wrightia 6: 99. 1979. Shrub or small tree, the branchlets at first minutely appressed pubescent, glabrate; leaves glabrous, the petioles rather slender, 2–5 mm. long; leaf blades subcoriaceous, conspicuously reticulate-veined, perpunctate with small pellucid glands, margin denticulate to subdentate, obovate or oblanceolate, 4.5–11.5 cm. long, 2.5–6 cm. wide, abruptly short acuminate at apex, with acutish to obtuse acumen, base cuneate and decurrent on petiole; inflorescence terminal, essentially sessile, paniculate, congested, up to 12 cm. long, mostly smaller, puberulent with minute ferruginous hairs; flowers corymbose, puberulent, conspicuously punctate with black mostly linear glands, 5-parted; pedicels up to 5 mm. long; sepals narrowly lanceolate, 1.3–1.7 mm. long, attenuate-acuminate; petals narrowly lanceolate, about 5 mm. long, puberulent, villous-pubescent on inner surface except medially; stamens erect, about 3 mm. long; filaments thickish, about 1.8 mm. long, sparsely punctate; anthers lanceolate, 2–2.2 mm. long, attached above base, the dorsal area punctate with black glands; ovary glabrous but with style rather sparsely puberulent at base; ovules 5 or 6, uniseriate, erect; fruits subglobose, drying mature up to 1.3 cm. in diameter.

Mexico: Veracruz, Santiago Tuxtla, en el Cerro del Vigia de Santiago Tuxtla, selva mediana subperennifolia, alt. 700 m., Sept. 13, 1978, *J. I. Calzada y V. Sosa 4771* (holotype, LL), arbusto, 4 m.; Estacion de Biologica Los Tuxtlas, ca. 20 km. N of Catemaco, selva alta perennifolia, primaria, 1970, *Juan I. Calzada 238* (LL), arbol, 6 m., flor blanca; same locality, Aug. 1971, *Calzada 465* (LL); Mun. Catemaco, Coyame, cerca de Catemaco, alt. 180 m., Jan. 21, 1972, *R. Hernandez M. 1380* (LL), arbusto, 3–4 m., fruto rojo; Estacion de Biologica Los Tuxtlas, alt. 500 m., April 19, 1972, *R. Cedillo T. 192* (MEXU), arbol, perenne, 4 m., escaso; Playa del Jicacal, April 11, 1972, *Juan Ismael Calzada 737* (LL), arbol, 6 m., flor color rosada, fruto rojo oscuro; Playa Escondida, entre Sontecompan y Montepis, alt. ca. 50 m., July 8, 1972, *John H. Beaman & Carlos Alvarez del Castillo 6346* (LL), arbol, 5 m.; Mun. Santiago Tuxtla, Cima del Cerro Vigia de Santiago Tuxtla, alt. ca. 950 m., July 22, 1972, *Beaman 6409* (LL), arbolito, 4 m., fruto rojo; Cerro El Vigia, alt. 450 m., July 1975, *H. Chazaro 420* (F), arbusto, 3 m., flor blanca y amarilla; Playa Escondida, seaside cliffs, alt. 0–100 m., Mar. 30, 1979, *J. I. Calzada, I. Cantu R., & G. Williams L. 1810* (F), shrub to 3 m., fruits red, drying deep purple; same locality and date, *Calzada et al 1813* (F), flowers pink; Playa Escondida, N of Sontecomapan, alt. 50–60 m., wet tropical forest, *Al Gentry & Emily Lott 32286* (LL), tree, 35 m., flowers light pink, fruits turning blackish.

The species is related to *P. membranacea* Lundell, described from Belize and *P. lanceolata* Brandeg. of Chiapas. It differs from both in its rather congested inflorescences, obovate subcoriaceous leaves subabruptly long-cuneate at base and decurrent on the short petioles, and with apex rounded and abruptly subacuminate, the acumen triangular and usually obtusish. Noteworthy are the fruits which dry up to 1.3 cm. in diameter. The leaves are densely punctate with minute pellucid glands.

WRIGHTIA

A Botanical Journal

VOLUME 7

Number 4

1984

PUBLISHED BY
THE UNIVERSITY OF TEXAS AT DALLAS
Box 830688, Richardson, Texas 75083-0688
U.S.A.

WRIGHTIA

A Botanical Journal

VOLUME 7, NUMBER 4

Issued December 15, 1984

CONTENTS

Printed in the U.S.A.
The University of Texas at Dallas
Richardson, Texas

Fig. 66. Coit Meadow soil (Profile A of Fig. 67). Dr. C.L. Lundell, in May, 1971, standing in excavation where the sample was taken in Profile A. The Houston black clay exceeded eight feet in depth at this site. Photograph by Calvin Pigg.

WRIGHTIA

Volume 7 December 15, 1984 Number 4

CHARACTERISTICS OF THE SOIL OF COIT MEADOW, A RELICT AREA OF BLACKLAND PRAIRIE IN COLLIN COUNTY, TEXAS

Hans Brawand[1]

The Coit Meadow, located adjacent to Renner Road within the city limits of Plano, Texas, was studied relative to specified chemical and physical characteristics of the underlying Houston black clay.

The study was initiated as it is believed that the meadow has not been cultivated or otherwise physically disturbed in recent history, as evidenced by the prevalent little hill and mound or hog-wallow microtopography and the currently encountered vegetation. The present soil characteristics thus may show conditions which existed prior to the influence of agriculture.

MEASUREMENT SPECIFICATIONS

The Coit Meadow area exhibits prevailing southward and westward slopes, but there is also a slight easterly slope from about profile Location C (Fig. 67) toward the old farm road. A detailed soil map including the Coit Meadow is also shown on Sheet No. 59 of the Collin County Soil Survey Report (5). Technical information regarding the Houston black clay is obtainable in publications by Godfrey (4), Hanson and Wheeler (5), Kunze and Templin (6), and Templin, Mowery and Kunze (7).

[1]Editor's note: Dr. Hans Brawand was Principal Soil Scientist of Texas Research Foundation at Renner when this study of the soil of Coit Meadow was made. Texas Research Foundation was dissolved in 1972.

Dr. Brawand extended to Dr. John R. Birchett, Leslie R. Mason and Carl J. Grimes his appreciation for substantial technical support of this soil investigation.

A forthcoming report on the flora of the Coit Meadow and related investigations of other relict areas of the blackland prairie in Dallas and Collin counties will complete the editor's and collaborators' studies of the vegetation and soils.

Studies of the relict areas served as a guide at Renner in evaluating the progress made in restoring the physical and chemical properties of the blackland soils under cultivation. See Lundell, Cyrus Longworth. Agricultural Research at Renner, 1944–1966. Publication of Texas Research Foundation. X + 670 pp., illustrated. 1967.

Three soil sites were chosen at slope positions that could be considered representative of the Coit Meadow area. Open soil pits of dimensions from 6 to 8 feet in depth, 4 to 6 feet in width and 10 to 12 feet in length were dug to allow detailed examination and unobstructed sampling of each profile. Samples were taken within undisturbed soil layers at depths of 0–2, 10–12, 20–22, 30–32, 40–42 inches at each site.

Duplicate undisturbed soil cores were obtained in three-ounce seamless tin boxes at each depth at each location to measure bulk density, moisture at sampling time, and soil moisture percentages at the stages of saturation, field capacity and wilting point. Bulk soil samples were needed for determinations of soil reaction, available calcium, potassium, phosphorus, total nitrogen, soil organic matter, water stability of soil aggregates and mechanical analysis.

The soil organic matter was determined by the Walkley-Black procedure with slight modification. The method of Bremner and Keaney served to assess total nitrogen. Available calcium, potassium and phosphorus are based on the procedure established by the Texas Agricultural Experiment Station. Additionally, phosphorus was also measured by the 0.5 N $NaHCO_3$ extraction of Olsen.

According to a modified aggregate stability testing method (1, 8), 25-gram samples of 2 to 5 mm diameter soil aggregates were allowed to absorb water by capillarity on the top screen of a wet-sieving assembly, followed by 15 minutes of soaking and 30 minutes of vertical sieve oscillation through a one-inch distance at 14 strokes per minute. Aggregation percentages were not determined.

Forty-gram soil samples were placed in 600-ml beakers and allowed to soak in dilute sodium hexametaphosphate overnight for subsequent mechanical analysis, according to a modified Bouyoucos (2) and Day (3) outline. Following 30 minutes dispersion in a Waring blender, readings for sand, silt and clay were obtained from temperature corrected standard hydrometer readings at 4 and 120 minutes.

RESULTS AND DISCUSSION

No imposed treatments were involved in this research. According to the nature of the study, available calcium, potassium and phosphorus rather than total quantities, were determined. The prevailing level of plant nutrients is likely to influence botanical association and plant composition on long-time basis. Additionally, of course, physical soil characteristics and microclimatic variables play a role in shaping the biological-ecological foundation.

Some profile differences were observed at the sampling sites appearing in Fig. 67. Profile A exhibited uniformly black soil beyond the sampled depth. Profile B, however, featured an abrupt change of Houston black clay to fairly firm calcareous parent material at about 34 inches. The change from black soil to calcareous subsoil was seen occurring gradually in the 20 to 40 inch transition zone at Site C.

The data in Table 1 suggest calcium levels in excess of plant growth requirement, especially so in Profile C (Fig. 67). Potassium supplies are considered adequate. Mineralized phosphorus, however, proved well below expectation on the basis of two different extraction approaches. If truly factual, near absence of available phosphorus may have translated itself into discernible biological consequences. Soil reaction or pH-values are in Table 2.

The mineralized nitrogen was not determined. According to other research, the mineralized nitrogen may be surmised constituting a dependent variable of the soil organic matter or the total nitrogen. The independently measured organic matter and total nitrogen for the Coit Meadow soil profiles (Table 2) show a near maximum correlation of r = 0.992, with a corresponding regression coefficient of 0.0525 percent of additional nitrogen per percent increase in organic matter. Near maximum water stability of the soil aggregates is reported (Table 3).

Other computations revealed a highly significant negative correlation of r = -0.848 between bulk density and soil organic matter. The bulk density decrease per percent increase of organic matter averaged 0.0751 gram. A rather high correlation of r = -0.974 points to another negative relationship between bulk density and water content at soil saturation (Tables 3 and 4). This means that the maximum quantity of water the soil can hold decreases with increasing soil compaction or massiveness.

Gravitational water, the quantity of water between the designated stages of soil saturation and field capacity (Table 4), amounts to a calculated profile mean of 16.7 percent or 7.01 inches in the 0–42 inch soil depth. Similarly, the so-called available water or the quantity of water between the reference points of field capacity and wilting percentage shows 13.9 percent, representing 5.84 inches on the average in the 0–42 inch profile. Compared to Profiles A and B, the cited soil moisture reference points for Profile C appear quite low. However, actual gravitational and available water supplies vary little between the three sites.

The quantity of gravitational water is indicative of the non-capillary porosity involving comparatively large soil pores. According to published research (1) an ideal soil's pore space should be nearly equally divided between non-capillary or large pores and the capillary or small pores. Poor tilth was encountered when the non-capillary porosity amounted to less than 10 percent by volume of the total soil. This non-capillary porosity may thus be a reliable index for soil structure in relation to plant growth.

The five measured depths of the Coit Meadow soil profiles show 26.8, 15.6, 14.0, 14.9, 12.1 percent non-capillary pore space, on the average (Table 4). The data on field capacity, the amount of water held in the soil after drainage of the gravitational water, are indicative of the capillary porosity. The soil moisture data in this report were standardized on the soil volume at field capacity at each soil depth, since Houston black clay is known to swell and shrink on wetting and drying.

The mechanical analysis entries in Table 5, assessing soil textural conditions, show but minor variation between individual profiles. Calculated

profile means of 17.4 percent sand, 22.6 percent silt and 60.0 percent clay are reported. The sand content shows a gradual decrease with increasing soil depth, while obtaining reversed information for silt percentages. Clay values proved nearly alike at all depths.

To the extent that present information on the Coit Meadow soil may be conclusive, available phosphorus is in very short supply. Other measured chemical and physical conditions are considered favorable for plant growth. Yet, should this meadow be subjected to sustained cotton production, it must be realized that the high organic matter level in the top soil could be depleted rapidly, to the detriment of currently ideal soil structural characteristics and thus to efficient water infiltration, percolation, storage and to soil productivity.

The tabulated physical characteristics indicate that the Coit Meadow soil is quite comparable to conditions encountered in the Stults Meadow relict area as described by *W. Derby Laws* et al: The Soils and Vegetation of a Relict Area of Blackland Prairie: Part I: An Investigation of the Soils of the Stults Meadow, a Relict Area of Blackland Prairie. Wrightia 2: 229-241. 1962. The profile means of 2.51 and 4.13 percent of organic matter for the Coit and Stults Meadow soils, respectively, point to a surprisingly wide unexplained variation. Total nitrogen was a little lower also in the Coit profiles. Comparisons of calcium, potassium and phosphorus contents in the soils of the two locations are not in order, since the data were obtained by different analytical approach.

(SOIL SURVEY SHEET NO. 59)

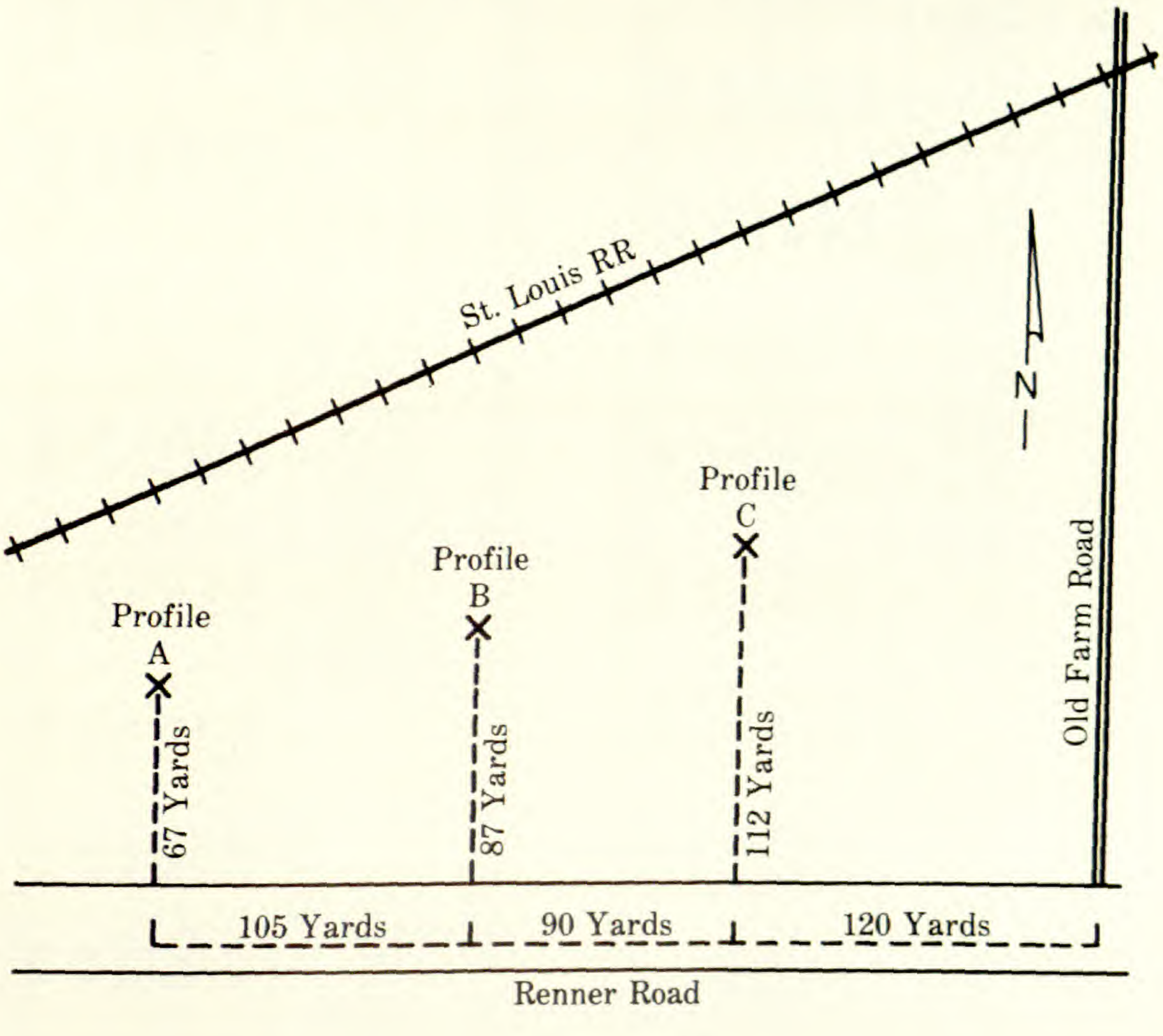


Fig. 67: LOCATION OF THE COIT VIRGIN MEADOW IN COLLIN COUNTY, TEXAS

TABLE 1: CALCIUM, POTASSIUM, PHOSPHORUS SUPPLY FOR PLANT GROWTH

SOIL PROFILE DEPTH	AVAILABLE CALCIUM WEIGHT PERCENT				AVAILABLE POTASSIUM PARTS PER MILLION				AVAILABLE PHOSPHORUS PARTS PER MILLION			
	A	B	C	MEAN	A	B	C	MEAN	A	B	C	MEAN
00-02″	1.25	1.22	11.70	4.72	410	470	410	430	1.04	0.48	0.52	0.68
10-12	3.29	1.13	12.20	5.54	270	310	270	283	0.36	0.32	0.38	0.35
20-22	4.76	1.35	15.10	7.07	260	300	190	250	0.28	0.27	0.19	0.25
30-32	6.20	2.48	17.40	8.69	230	290	140	220	0.21	0.25	0.12	0.19
40-42	5.24	16.90	18.30	13.48	250	150	100	167	0.19	0.27	0.04	0.17
MEAN	4.14	4.62	14.94	7.90	284	304	222	270	0.42	0.32	0.25	0.33

TABLE 2: SOIL REACTION, ORGANIC MATTER AND TOTAL NITROGEN

SOIL PROFILE DEPTH	SOIL REACTION pH				ORGANIC MATTER WEIGHT PERCENT				TOTAL NITROGEN WEIGHT PERCENT			
	A	B	C	MEAN	A	B	C	MEAN	A	B	C	MEAN
00-02″	7.7	7.6	8.1	7.8	4.70	5.52	5.41	5.21	.252	.272	.310	0.278
10-12	8.2	7.3	8.2	7.9	2.42	3.44	3.90	3.25	.133	.186	.238	0.186
20-22	8.3	7.9	8.3	8.2	1.61	2.50	2.13	2.08	.090	.127	.119	0.112
30-32	8.3	8.2	8.4	8.3	1.16	1.77	1.10	1.34	.065	.093	.070	0.076
40-42	8.3	8.5	8.5	8.4	0.89	0.48	0.58	0.65	.052	.039	.040	0.044
MEAN	8.2	7.9	8.3	8.1	2.16	2.74	2.62	2.51	0.118	0.143	0.155	0.139

TABLE 3: AGGREGATE STABILITY, BULK DENSITY, MOISTURE AT SAMPLING

SOIL PROFILE DEPTH	AGGREGATE STABILITY WEIGHT PERCENT				BULK DENSITY GRAMS/CM³				MOISTURE AT SAMPLING VOLUME PERCENT			
	A	B	C	MEAN	A	B	C	MEAN	A	B	C	MEAN
00-02″	99.2	99.1	98.3	98.9	0.849	0.832	0.842	0.841	28.7	23.0	20.1	23.9
10-12	98.7	98.9	99.2	98.9	0.964	1.018	1.113	1.032	31.4	36.4	30.2	32.7
20-22	96.1	98.1	99.2	97.8	1.065	1.012	1.248	1.108	34.8	36.3	27.8	33.0
30-32	94.3	97.6	97.5	96.5	1.100	1.097	1.232	1.143	31.8	37.8	24.2	31.3
40-42	97.3	93.0	95.1	95.1	1.165	1.192	1.316	1.224	36.0	32.2	25.1	31.1
MEAN	97.1	97.3	97.9	97.4	1.029	1.030	1.150	1.070	32.5	33.1	25.5	30.4

TABLE 4: SOIL MOISTURE AT SATURATION, FIELD CAPACITY, WILTING POINT

SOIL PROFILE DEPTH	SOIL SATURATION VOLUME PERCENT				FIELD CAPACITY VOLUME PERCENT				WILTING POINT VOLUME PERCENT			
	A	B	C	MEAN	A	B	C	MEAN	A	B	C	MEAN
00-02″	59.4	63.4	64.5	62.4	38.2	35.8	32.8	35.6	23.6	23.8	20.6	22.7
10-12	57.4	56.2	52.1	55.2	37.4	43.4	38.0	39.6	24.2	27.8	22.9	25.0
20-22	55.3	56.8	45.4	52.5	38.9	42.0	34.6	38.5	24.6	27.6	21.4	24.5
30-32	53.0	54.0	45.8	50.9	36.8	43.4	27.8	36.0	23.1	27.0	17.6	22.6
40-42	51.2	48.4	40.7	46.8	40.4	35.0	28.6	34.7	26.0	18.2	16.4	20.2
MEAN	55.3	55.8	49.7	53.6	38.3	39.9	32.4	36.9	24.3	24.9	19.8	23.0

TABLE 5: MECHANICAL ANALYSIS OF THE COIT MEADOW PROFILES

SOIL PROFILE DEPTH	SAND (2.00-0.020MM) WEIGHT PERCENT				SILT (0.020-0.002MM) WEIGHT PERCENT				CLAY (SMALLER 0.002MM) WEIGHT PERCENT			
	A	B	C	MEAN	A	B	C	MEAN	A	B	C	MEAN
00-02″	21.9	22.7	18.5	21.0	20.1	18.7	20.6	19.8	58.0	58.6	60.9	59.2
10-12	19.8	17.0	19.3	18.7	20.2	23.1	19.6	21.0	60.0	59.9	61.1	60.3
20-22	20.3	17.4	15.7	17.8	20.0	20.0	24.0	21.3	59.7	62.6	60.3	60.9
30-32	18.3	16.3	13.2	15.9	23.0	21.1	29.7	24.6	58.7	62.6	57.1	59.5
40-42	15.5	11.5	14.2	13.7	25.3	26.0	27.3	26.2	59.2	62.5	58.5	60.1
MEAN	19.2	17.0	16.2	17.4	21.7	21.8	24.2	22.6	59.1	61.2	59.6	60.0

References

1. Baver, L.D. Soil Physics, John Wiley & Sons, Inc., New York, N.Y. 1956.
2. Bouyoucos, G.J. Directions for Making Mechanical Analyses of Soil by the Hydrometer Method. Soil Science 42: 225-228. 1936.
3. Day, P. Particle Fractionation and Particle Size Analysis. Agronomy 9, Part 1: 545-567. 1965.
4. Godfrey, C.L. A Summary of the Soils of the Blackland Prairies of Texas. Texas Agric. Exp. Sta., MP-698, Feb. 1964.
5. Hanson, A. and Wheeler, F.F. Soil Survey of Collin County, Texas. USDA, SGS and Texas Agric. Exp. Sta., June. 1969.
6. Kunze, G.W. and Templin, E.H. Houston Black Clay, The Type Grumusol: Mineralogical and Chemical Characterization. SSSA Proc. 20: 91-96. 1956.
7. Templin, E.H., Mowery, I.C. and Kunze, G.W. Houston Black Clay, The Type Grumusol: Field Morphology and Geography. SSSA Proc. 20: 88-90. 1956.
8. Yoder, R.E. A Direct Method of Aggregate Analysis of Soils and a Study of the Physical Nature of Erosion Losses. J. Amer. Soc. Agron. 28: 337-355. 1936.

NEOTROPICAL MYRSINACEAE — XIV

Cyrus Longworth Lundell[1]

In studying accumulated collections from the Neotropics, fourteen new taxa have been recognized in *Auriculardisia* Lundell. These are described and four other species are transferred to the genus. Additional taxa are described in the genera *Graphardisia* (Mez) Lundell, *Icacorea* Aubl., and *Myrsine* L.

Most of the Myrsinaceae reported on were received for identification from the Missouri Botanical Garden (MO) and the Field Museum of Natural History (F), where either holotypes or isotypes of most species are deposited. The aggressive exploration program of these institutions in the Neotropics is contributing immensely to our knowledge of such neglected families.

Auriculardisia Lundell, Phytologia 49: 341. 1981

Auriculardisia albisepala Lundell, sp. nov. — Arbor, 6–8 m.; ramuli crassiusculi, dense lepidoti; folia petiolata, petiolo ad 1 cm. longo, canaliculato, subtus lepidoto; lamina chartacea, lanceolata, 8.5–11 cm. longa, 3–4 cm. lata, apice subabrupte acuminata, basi rotundata, integra, supra glabra, subtus minute peradpresse lepidota, utrinque nigropunctata; inflorescentia terminalis, paniculata, ca. 12 cm. longa, furfuracea, trichoma stipitata; flores 5-meri, capitellati; pedicelli crassi, 1–1.5 mm. longi; sepala parva, asymmetrica, late ovata, ad 1 mm. longa, margine hyalina, erosa, nigropunctata; stylo 3 mm. longo.

Panama: Prov. Veraguas, trail on ridge to summit of Cerro Tute, Cordillera de Tute, 1 km. past Escuela Agricola Altos de Piedras, W of Santa Fe, lower montane rain forest, elev. 950–1250 m., Dec. 15, 1981, *S. Knapp & K. Sytsma 2548* (holotype, LL), tree, 6–8 m., calyx white, fruit dirty purple.

Without flowers the relationship of *A. albisepala* is uncertain. But a very distinct taxon is represented by this collection.

A. albisepala is notable for several features: the leaves are rounded at base and the blades are punctate with conspicuous elevated rounded glands scattered over the surface, the open few-branched inflorescence is densely furfuraceous with the trichomes mostly stipitate, the few flowers are borne in small heads on short branches with the thick pedicels not over 1.5 mm. long, and the small asymmetric ovate sepals are scarcely 1 mm. long and auriculate.

Auriculardisia apoda (Standl. & Steyerm.) Lundell, comb. nov. *Ardisia apoda* Standl. & Steyerm., Field Mus. Pub. Bot. 23: 219. 1947. *Icacorea apoda* (Standl. & Steyerm.) Lundell, Phytologia 49: 347. 1981.

The small sepals are asymmetric with a distinct ciliolate hyaline auricle. *Auriculardisia apoda* has a resemblance to *Auriculardisia megistophylla* (Lundell) Lundell of Panama. Both taxa are known from very poor specimens.

[1]Director, Plant Sciences Laboratory, The University of Texas at Dallas, Box 830688, Richardson, Texas 75083-0688

Auriculardisia baruana Lundell, sp. nov. — Frutex, 2 m.; ramuli crassiusculi, peradpresse et minute lepidoti; folia petiolata, petiolo crasso, subtus basi parce lepidoto, 2–4 mm. longo, marginato; lamina coriacea, glabra, subtus reticulato-venosa, oblanceolata, 3.5–8.5 cm. longa, 1.5–3.5 cm. lata, apice obtusiuscula, basi acuta, integra, minute punctata; inflorescentia terminalis, paniculata, 5–7 cm. longa, parce et minute lepidota; flores 5-meri, subcorymbosi; pedicelli clavati, 5–9 mm. longi; sepala asymmetrica, crassa, auriculata, ovata, ad 2.4 mm. longa, basi ad 2.5 mm. lata, apice rotundata, dense et minute punctata, margine hyalina; fructus punctatus; stylo ca. 4.5 mm. longo.

Panama: Chiriqui Province, Volcan Baru, east slope on road from Boquete, 8 km. W of Boquete (air distance), oak woodland, elev. 1900 m., January 8, 1983, *Bruce A. Stein 1267* (holotype, LL), shrub ca. 2 m. tall, fruit pink.

The rigid rather slender long clavate pedicels, the broadly ovate asymmetric rather thick sepals densely black punctate medially with small glands and with hyaline auriculate margin, as well as the coriaceous oblanceolate obtuse leaves are features of note. The short style indicates that the flowers are about 5 mm. long.

Auriculardisia chiriquiana Lundell, sp. nov. — Frutex ca. 4 m.; ramuli crassiusculi, dense adpresse lepidoti; folia petiolata, petiolo 1–1.6 cm. longo, anguste marginato, subtus dense lepidoto; lamina chartacea, lanceolata vel oblongo-lanceolata, 12–20 cm. longa, 3–6 cm. lata, apice acuminata, basi acuta, venosa, integra, punctata, supra glabra, subtus dense et adpresse lepidota; inflorescentia terminalis, paniculata, pyramidalis, ad 18 cm. longa, pauciramosa, dense et adpresse lepidota; flores 5-meri, subsessiles, capitati; sepala coriacea, dense lepidota, asymmetrica, ovata, 4–5 mm. longa, 4–5.5 mm. lata, punctata, margine hyalina, ciliata et fimbriata; corolla glabra, punctata; stamina subsessilis; antherae lanceolatae, acutae; ovula parva, pluriseriata.

Panama: Chiriqui Province, trail up Cerro Pate Macho, premontane wet forest, elev. 1500–1900 m., January 7, 1983, *Bruce A. Stein, Bob Schmalzel, & David W. Roubik 1223* (holotype, LL), shrub ca. 4 m. tall.

Although only flower buds are available for comparison, *A. chiriquiana* appears to be related to *A. cartagoana* (Lundell) Lundell, a species with smaller essentially glabrous sepals and much larger leaves with shorter petioles.

The sepals of *A. chiriquiana* are punctate with scattered small blackish glands.

Auriculardisia Cutteri (Standl.) Lundell, comb. nov. *Ardisia Cutteri* Standl., Journ. Wash. Acad. Sci. 17: 52. 1927.

Auriculardisia Dukei (Lundell) Lundell, comb. nov. *Ardisia Dukei* Lundell, Wrightia 4: 45. 1968. *Icacorea Dukei* (Lundell) Lundell, Phytologia 49: 348. 1981.

The small sepals are asymmetric with the hyaline auricle ciliolate.

Audiculardisia heterotricha Lundell, sp. nov. — Parva, ca. 1.2 m. alta, heterotricha; ramuli crassiusculi; folia magna, supra glabra, subtus heterotricha, basi marginata, petiolo ad 6 mm. longo, canaliculato; lamina chartacea, elliptica, ad 35 cm. longa, 13.5 cm. lata, apice acuminata, basi acutiuscula, integra; inflorescentia terminalis, crassiuscula, pauciflora, anguste paniculata, ca. 10 cm. longa, lepidota et rufo-tomentosa, trichomata elongata superne stellata; flores 5-meri; pedicelli crassi, rufo-tomentosi, 2.5–3.5 mm. longi; sepala asymmetrica, ovato-lanceolata, ca. 3 mm. longa, acuta, heterotricha, auricula hyalina, ciliolata; fructus subglobosus, ca. 8 mm. diam., punctatus.

Panama: Prov. Panama, on road near slopes of Cerro Jefe, elev. 2400 ft., Jan. 20, 1980, *T.M. Antonio, H.E. Moore & F.E. Putz 3417* (holotype, MO; xerox and fragment, LL), woody, about 1.2 m. tall, fruit green becoming black.

Among all the Myrsinaceae of Mesoamerica, this is the only heterotrichous taxon with closely appressed scales (lepidote) and slender elongated trichomes mostly stellate at apex. On the undersurface of the leaves, these trichomes are scattered, on the branchlets and petioles they form a dense red-tomentose cover. The sepals are likewise lepidote but the associated trichomes are sparser and shorter. The narrow panicle has a short peduncle and four short remote branches.

The large leaves are essentially sessile with the blade decurrent on the petiole almost to base.

Auriculardisia hugonensis Lundell, sp. nov. — Arbor, 10 m.; ramuli crassi, adpresse lepidoti; folia petiolata, petiolo ad 5 mm. longo, crassiusculo, late marginato, subtus minute lepidoto; lamina chartacea vel subcoriacea, anguste oblongo-lanceolata, ad 15 cm. longa, 2.8–5 cm. lata, apice subabrupte subacuminata, basi acuta, marginata, supra glabra, subtus minute et dense lepidota; inflorescentia terminalis, sessilis, crassiuscula, paniculata, pauciramosa, ad 13 cm. longa, minute lepidota; flores 5-meri, subcorymbosi; pedicelli crassi, 2.5–2.8 mm. longi; sepala crassiuscula, reflexa, late ovata, ad 2 mm. longa, 2.5 mm. lata, auricula hyalina, fimbriato-ciliata, parce nigropunctata; fructus subglobosus, ca. 1 cm. diam., punctatus.

Colombia: Dept. del Choco, Municipio de Quibdo, Corregimiento de Guayabal, Rio Hugon, alt. ca. 8 m., Sept. 12, 1976, *E. Forero & R. Jaramillo 2812* (holotype, NY; fragment and xerox, LL), arbol de 10 m., frutos vino tinto oscuro.

The very thick pedicels, less than 2 mm. long, have the sepals under the fruits pressed against them as if reflexed. The only other similar taxon now known in the genus from Colombia is *Auriculardisia unguiensis* (Lundell) Lundell, which has small leaves, but a zigzag smaller inflorescence with slender pedicels and larger sepals. Both species are known only from fruiting specimens.

A. hugonensis superficially resembles *A. blepharodes* (Lundell) Lundell of Costa Rica which has much larger sepals and slender emarginate petioles.

Auriculardisia latisepala Lundell, sp. nov. — Arbor, ca. 10 m.; ramuli crassi, dense lepidoti; folia petiolata, petiolo crassiusculo, marginato, ad 1.5 cm. longo; lamina supra glabra, subtus minute adpresse lepidota, chartacea, anguste oblongo-elliptica vel lanceolata, 17–30 cm. longa, 5.5–8.5 cm. lata, apice subabrupte acuminata, basi acuminata, revoluta, utrinque reticulato-venosa, minute et dense nigropunctata, subintegra; inflorescentia terminalis, late paniculata, pyramidalis, sessilis vel brevi-pedunculata, lepidota; flores 5-meri, subcapitati, aurantiaco-punctati; pedicelli crassi, 1.5–2 mm. longi; sepala crassa, pallida, aurantiaca, asymmetrica, late ovato-rotundata, ad 3.5 mm. longa, 4.2 mm. lata, apice rotundata, retusa, auricula hyalina et eroso-ciliata; corolla 8–9.5 mm. longa, aurantiaco-punctata; petala basi connata ca. 2.5 mm., late lanceolato-elliptica, apice asymmetrica, obtusa; stamina ca. 5 mm. longa; filamenta ca. 2 mm. longa; antherae crassae, lanceolato-ellipticae, ca. 4 mm. longae, basi subsagittatae, apice apiculatae; ovarium punctatum, stylo ca. 7.5 mm. longo; ovula ca. 18.

Costa Rica: Prov. Puntarenas, 6 km. south of San Vito de Java, forest and forest edges on and around Wilson's finca, ca. 4000 ft. elevation, Aug. 19, 1967, *Peter H. Raven 21953A* (holotype, F; xerox and fragment, LL); same locality, Aug. 16, 1967, *Raven 21827* (paratypes, F, NY), tree 30 ft. tall, flowers pink, anthers yellow.

Auriculardisia cartagoana (Lundell) Lundell has similar but sessile pallid orange flowers, with leaves sessile and larger.

Auriculardisia micrantha Lundell, sp. nov. — Arbor; ramuli crassiusculi, adpresse furfuracei; folia ad apices ramorum subverticillatim congestis, subcoriacea, supra glabra, subtus peradpresse lepidota, petiolata, petiolo anguste marginato, 1–1.5 cm. longo; lamina anguste oblanceolata, 10–17 cm. longa, 2.5–5 cm. lata, integra, apice subabrupte acuminata, basi attenuata, utrinque venosa; inflorescentia terminalis, late pyramidalis, laxa, ad 18 cm. longa, paniculata, parce et minute furfuracea, trichoma substipitata; flores 5- raro 4-meri, subcorymbosi, subcapitati; pedicelli crassiusculi, 2–4 mm. longi; sepala parva, asymmetrica, auriculata, late ovata, 1–1.4 mm. longa, minute ciliatula, margine hyalina, rubro- vel nigropunctata, glandula parva; corolla ca. 3.5 mm. longa; petala basi connata, anguste oblongo-elliptica, apice asymmetrica, acutiuscula, minute punctata; stamina prope basin corollae affixa, ad 2.8 mm. longa; filamenta ca. 1.3 mm. longa; antherae lanceolatae, ca. 2 mm. longae, acutae; ovula parva, ca. 12, pluriseriata.

Costa Rica: Flora de Monteverde, Cordillera de Tilaran, al lado del camino por la ventana (Divis. Continental), elev. 1560–1580 m., Aug. 15, 1976, *V.J. Dryer 577* (holotype, MO; isotype, F), arbor 2 m.

A. micrantha is related to *Auriculardisia crassiramea* (Standl.) Lundell, a very distinct species with coarse large scales densely covering the compact inflorescence, and with smaller flowers and narrower sepals acuminate apically. Both species have similar congested subverticillate leaves with long slender petioles. They are not to be confused with *Auriculardisia palmana* (Donn. Sm.) Lundell, which also has small congested flowers but with opposite leaves and indument altogether different.

Noteworthy in *A. micrantha* are the small dentate densely punctate foliaceous bracts of the inflorescence (holotype, MO). Like other species in this small-flowered complex, the anthers are longitudinally dehiscent and sagittate at base, with the filaments slender and subequalling the anthers. The indument of the inflorescences of *A. micrantha* consists of scattered small short-stipitate scales, as contrasted with the sordid large scales of *A. crassiramea.*

A. micrantha is in the same complex with subverticillate leaves as *Auriculardisia Solomonii* (Lundell) Lundell, both from the Monteverde area. The open inflorescences and pedicels up to twice as long appear to separate *A. micrantha.*

Auriculardisia microcalyx Lundell, sp. nov. — Arbor, 10 m.; ramuli crassi, peradpresse furfuracei; folia magna, subsessilis, petiolo crasso, ad 1.3 cm. longo, late marginato; lamina chartacea vel subcoriacea, supra glabra, subtus peradpresse lepidoto-furfuracea, oblonga vel oblanceolata, 27–40 cm. longa, 7.5–9 cm. lata, integra, apice acuminata, basi angustata, revoluta, marginata; inflorescentia late paniculata, pyramidalis, ad 25 cm. longa, 30 cm. lata, multiramosa, crassiuscula, lepidota; flores 4- vel 5-meri, subcapitati; pedicelli subnulli, crassi, ca. 1 mm. longi; sepala hyalina, asymmetrica, obovata vel rotundata, ad 2 mm. longa, 2.5 mm. lata, minute et parce nigropunctata, auricula ciliolata; fructus ad 7 mm. diam.

Costa Rica: Prov. Alajuela, 15 km. by air NW of San Ramon, Cerro Azahar, headwaters of Rio San Pedro, alt. 1400–1500 m., May 14, 1983, *Ronald Liesner et al. 15575* (holotype, LL), tree 10 m., fruit purple-black.

The small rounded sepals are unique in that they are thin and hyaline, being transparent with small scattered glands. The crowded fruits with thick short pedicels wider than long indicate that the flowers are subsessile in heads. The small scales of the inflorescence are in part elevated, giving a roughened appearance to the lepidote covering.

Auriculardisia nebulosa Lundell, sp. nov. — Arbor, 8–10 m.; ramuli crassiusculi, adpresse lepidoti; folia coriacea, supra glabrata, subtus dense et minute peradpresse lepidota, petiolata, petiolo canaliculato, 8–10 mm. longo; lamina integra, lanceolata vel oblanceolata, 10–12 cm. longa, 3–5 cm. lata, apice subabrupte late acuminata, basi acuminata, revoluta; inflorescentia terminalis, paniculata, crassiuscula, subsessilis, ad 13 cm. longa, basi ca. 12 cm. lata et bracteolata, dense lepidota; flores 5-meri, corymbosi; pedicelli parce lepidoti, 3–7 mm. longi; sepala crassa, dense nigropunctata, parce lepidota, asymmetrica, suborbicularia, ad 2.5 mm. longa, 3.5 mm. lata, apice rotundata, emarginata, auricula hyalina, ciliolata; stylo ca. 3.8 mm. longo.

Panama: Prov. Panama, Cerro Jefe, cloud forest, 850–900 m., Oct. 29, 1980, *Kenneth J. Sytsma 1980* (holotype, LL), tree, 8–10 m., greenish purple fruits.

This small cloud forest tree belongs in the small assemblage of species with the rachis and branches of the inflorescence zigzag. Its densely black punctate thick sepals, strongly depressed-orbicular, are rounded and emarginate with only the hyaline auricle ciliolate. The coriaceous leaves and pedicels up to 7 mm. long further distinguish *A. nebulosa*.

Auriculardisia parviflora Lundell, sp. nov. — Frutex; ramuli graciles, adpresse lepidoti; folia petiolata, petiolo canaliculato, 1–1.4 cm. longo; lamina chartacea, integra, lanceolata vel anguste elliptica, 13.5–15 cm. longa, 4.3–5.4 cm. lata, apice acuminata, basi subcuneata, supra glabra, subtus adpresse et dense lepidota; inflorescentia terminalis, paniculata, ca. 9 cm. longa, minute lepidota; flores 5-meri, corymbosi; pedicelli 2–3 mm. longi; sepala dense et minute nigropunctata, ciliolata, parce lepidota, subglabra, late ovata, asymmetrica, ad 2 mm. longa, 3.3 mm. lata, auricula magna, hyalina, ciliata; corolla dense nigropunctata; antherae lanceolatae, acuminatae.

Panama: Prov. Darien, Cerro Pirre, Aug. 4, 1967, *Narciso Bristan 1236* (holotype, US), small shrub, hard wood, gray fruits.

In bud only, the description of the flowers was made from these.

The sepals (in bud) are distorted by the large ciliate hyaline auricle, half as wide as the sepals. Notable are the dense small black glands of the flower parts, excluding the auricle.

Auriculardisia parviflora does not appear to be related to *A. tenuis* (Lundell) Lundell, also from Cerro Pirre. The latter has minute flowers, much smaller leaves, and a filiform-branched inflorescence.

Auriculardisia roseiflora Lundell, sp. nov. — Arbor, 4 m.; ramuli crassiusculi, adpresse lepidoto-furfuracei; folia chartacea, supra glabra, subtus dense adpresse furfuracea, petiolata, petiolo crasso, marginato, ca. 1.5 cm. longo; lamina lanceolata vel oblongo-elliptica, 22–25 cm. longa, 7–9 cm. lata, apice subabrupte acuminata, basi attenuata, marginata, integra; inflorescentia terminalis, crassiuscula, paniculata, pauciramosa, dense furfuracea; flores 5-meri, lepidoti; pedicelli 6–8 mm. longi, crassiusculi; sepala lepidota, coriacea, suborbicularia, asymmetrica, ad 3 mm. longa, 5 mm. lata, rotundata, dense et minute nigropunctata, auricula hyalina, ciliato-fimbriata; corolla roseola, coriacea, ca. 9 mm. longa; petala crassa, basi connata ca. 3 mm., lepidota, elliptica, ad 6 mm. longa, dense et minute nigropunctata, apice asymmetrica; stamina ca. 5 mm. longa, subsessilis; filamenta ad 1.5 mm. longa; antherae crassae, lanceolatae, ca. 4 mm. longae, apiculatae, apice birimosae; ovarium oblongum; ovula numerosa, ca. 48, pluriseriata.

Panama: Prov. Cocle, trail from Continental Divide near the sawmill above El Cope to Rio Blanco del Norte, premontane wet forest, alt. 350–700 m., Feb. 20, 1982, *S. Knapp, J. Mallet & R. Dressler 3646* (holotype, MO; xerox and fragment, LL), treelet 4 m., flowers pink, calyx white, anthers bright yellow.

A unique taxon in that the large thick anthers are subsessile and attached at the apex of the corolla tube with the filaments scarcely 1 mm. long. Also, the corolla tube and the base of the petals are lepidote on outer surface. The elongated pedicels and thick lepidote calyx are other features of note.

Auriculardisia sessilifolia Lundell, sp. nov. — Frutex, ca. 1 m.; ramuli crassi, furfuracei; sessilifolia, apice rotundata, basi angustata et latimarginata; lamina chartacea, spatulato-oblanceolata, ad 38 cm. longa, 10 cm. lata, supra glabrata, subtus novella adpresse furfuracea, integra; inflorescentia magna, terminalis, paniculata, 36 cm. longa, pyramidalis, adpresse lepidoto-furfuracea, peduncula ca. 9 cm. longa; flores 5-meri, dense corymbosi; pedicelli crassiusculi reflexi, ad 4 mm. longi; sepala asymmetrica, subcoriacea, punctata, rotundata, ad 2.2 mm. longa, 3 mm. lata, apiculata, auriculata, margine hyalina, ciliolata; fructus punctatus.

Costa Rica: Prov. Alajuela, Cordillera Central near San Juan de Laja about 15 km. north of Zarcero, remnant montane rain forest area, alt. ca. 1350 m., Feb. 7, 1965, *Louis O. Williams, Antonio Molina R., Terua P. Williams, & Dorothy N. Gibson 28998* (holotype, F; xerox, LL), shrubby, less than 1 m. tall, fruits pale red; in forest.

A remarkably distinct low shrub which has very long spatulate sessile leaves with the broadly marginate base rounded. The thick pedunculate paniculate terminal inflorescence equals or exceeds the upper leaves. Its floriferous branches are rather slender and short, terminated by crowded corymbose flowers with pedicels mostly curved. The rounded thick sepals are punctate medially with small dispersed blackish glands, with the hyaline auricle ciliolate.

Auriculardisia sordida Lundell, sp. nov. — Frutex, ad 1 m.; ramuli adpresse furfuracei, crassi; folia membranacea, supra glabra, subtus lepidota vel furfuracea, nigropunctata, petiolata, petiolo late marginato; lamina oblanceolata vel obovata, 15–25 cm. longa, 5–8.3 cm. lata, integra, apice subabrupte acuminata vel acuminata, basi attentuata; inflorescentia terminalis, anguste paniculata, ad 11 cm. longa, bipinnata, furfuracea; flores 5-meri, subcorymbosi, macro-nigropunctati, parce furfuracei; pedicelli furfuracei, 3–5 mm. longi; sepala 5, asymmetrica, furfuracea, late ovata, ad 1.5 mm. longa, margine hyalina, auriculata; corolla ca. 5 mm. longa; petala basi connata ca. 1.5 mm., ovato-elliptica, 3–4 mm. longa; stamina 5, ca. 2.5 mm. longa; filamenta connata; antherae ovato-ellipticae, ad 2.2 mm. longae, apiculatae; ovarium dense et minute nigropunctata; ovula 6–8.

Costa Rica: Prov. Alajuela, Finca Los Ensayos ca. 11 miles NW of Zarcero, primary forest and perimeter, elev. ca. 850 m., Aug. 15, 1977, *Thomas B. Croat 43538* (holotype, LL), shrub to 1 m. tall, flowers reddish-violet, fruits green.

Auriculardisia sordida is closely related to *A. squamata* Lundell, differing notably in the nature of its inflorescence, which is a terminal panicle up to 11 cm. long. The flowers of the two taxa are much alike, but somewhat larger in *A. sordida*. The leaves likewise are larger in *A. sordida* with the lateral veins slender but rather conspicuous. In *A. squamata* the leaf venation is obscure.

Auriculardisia tenuis (Lundell) Lundell, comb. nov. *Ardisia tenuis* Lundell, Wrightia 4: 149. 1970. *Icacorea tenuis* (Lundell) Lundell, Phytologia 49: 352. 1981. *Ardisia pirreana* Lundell, Phytologia 48: 134. 1981. *Auriculardisia pirreana* (Lundell) Lundell, Phytologia 49: 345. 1981.

Auriculardisia toroana Lundell, sp. nov. — Arbor, ca. 3 m.; ramuli crassi, adpresse furfuracei; folia petiolata vel subsessilis, petiolo crasso, marginato, ad 1 cm. longo, subtus furfuraceo; lamina subcoriacea, oblanceolata, 12–23 cm. longa, 3–7.5 cm. lata, apice acuminata, basi acuminata, marginata, supra glabra, subtus dense adpresse furfuracea, integra; inflorescentia terminalis, pauciramosa, crassiuscula, furfuracea, ca. 17 cm. longa; flores 5-meri, subcapitati; pedicelli crassi, ca. 2 mm. longi; sepala crassa, late asymmetrica, late auriculata, ca. 2.2 mm. longa, rotundata, ad 4 mm. lata, nigropunctata, auricula hyalina et ciliata; corolla coriacea, ca. 8 mm. longa; petala basi connata ca. 3 mm., lanceolata, opaca, punctata, apice acutiuscula; stamina ca. 6 mm. longa; filamenta ca. 2 mm., supra basi affixa; antherae ca. 4 mm. longae, lanceolatae, acutae; ovarium punctatum; stylo ca. 6 mm. longo; ovula ca. 33, pluriseriata.

Panama: Prov. of Bocas del Toro, 15 km. up the Changuinola river to I.R.H.E. dam site No. 1, near campsite on trail to ridge NE of campsite, alt. 800–900 ft., Dec. 12, 1979, *T. Antonio 3079* (holotype, LL), tree ca. 3 m., flowers light maroon, anthers yellow; at edge of forest.

The hyaline auricle, nearly half the size of the small thick lopsided sepal, is the most conspicuously developed I have found in the genus. This alone makes the taxon unique. The coriaceous opaque corolla with narrow petals united into a tube 3 mm. long, with stamens attached above base, and the numerous ovules further characterize *A. toroana*.

Graphardisia (Mez) Lundell, Phytologia 48: 139. 1981

Graphardisia hyalina Lundell, sp. nov. — Frutex, 1.3 m.; ramuli graciles, glabri; folia petiolis, 1–2 cm. longis canaliculatis stipitata; lamina glabra, pergamentacea, dense nigropunctata, lanceolata vel lanceolato-elliptica, 12–17 cm. longa, 6–7 cm. lata, apice acuta, basi acuminata, marginata, margine subintegra vel integra, utrinque punctis dense lineoliformibus picta; inflorescentia subsessilis, terminalis, glabra, compacte pinnatim paniculata, ca. 6 cm. longa, dense bracteolata; flores 5-meri, corymbosi; pedicelli graciles, ad 1.7 cm. longi; sepala membranacea, hyalina, lanceolato-oblonga, ca. 6 mm. longa, ad 2.4 mm. lata, apice anguste rotundata; dense lineato-nigropunctata; petala hyalina, late elliptica ca. 7–9 mm. longa, 5–6 mm. lata, bi- vel trilineata, et punctata, basi coalita ca. 2 mm., intus basi glandulosa; stamina ca. 4.5 mm. longa; filamenta glabra, ca. 1.5 mm. longa; antherae ca. 3 mm. longae; ovarium punctatum.

Costa Rica: Prov. Alajuela, primary forest and perimeter, Finca Los Ensayos, ca. 11 miles NW of Zarcero, elev. ca. 850 m., Aug. 15, 1977, *Thomas B. Croat 43565* (holotype, LL), shrub 1.3 m., flowers pale reddish-violet in bud, whitest when open.

The anthers have rounded lobes at base and taper to the narrow apex which is dehiscent with two very small pores. The species is closely related to *Graphardisia zelayensis* (Lundell) Lundell of Nicaragua. The latter has a smaller pink corolla with petals more densely punctate, thicker leaves, and an inflorescence not as compactly bracteate.

Another Nicaraguan taxon in this complex is *Graphardisia bracteolata* (Lundell) Lundell, described from a fruiting collection.

Icacorea Aubl., Pl. Guian. 2: Suppl. 1. 1775

Icacorea parvipunctata Lundell, sp. nov. — Frutex, 1.5 m.; ramuli minute adpresse lepidoti; folia membranacea, subtus minute lepidota, supra glabra, petiolata, petiolo canaliculato, 4–6 mm. longo; lamina parvipunctata, integra, elliptica, 8–15 cm. longa, 4–6 cm. lata, apice subabrupte subacuminata, basi acuta; inflorescentia terminalis vel axillaris, paniculata, laxa, pauciflora, ca. 6 cm. longa, gracilis, basi dense lepidota; flores 5-meri, corymbosi; pedicelli 3.5–4 mm. longi; sepala hyalina, ovato-elliptica, ad 1.5 mm. longa, parvipunctata; fructus punctatus.

Mexico: Oaxaca, along Highway 175, in the vicinity of La Galera (ca. 500 m. south) 2.1 miles north of turn-off to Pluma Hidalgo, 9.6 miles south of Puente Jalatengo near village of Jalatengo, loose rocky slope along ravine above spring on highway, elev. 1340 m., Jan. 20, 1979, *Thomas B. Croat 46150* (holotype, MO; xerox, LL), shrub 1.5 m., peduncles and rachises reddish, fruits green.

The very thin leaves, densely black punctate with minute black glands, and the small few-flowered inflorescences appear to distinguish this taxon. Referable to the complex of *Icacorea compressa* (H.B.K.) Standl., the species appears to be distinctive.

Myrsine L., Linn. Syst. ed. I (1735);
Gen. ed. I. 54 (1737)

Myrsine vestita Lundell, sp. nov. — Arbor, 5 m.; ramuli crassiusculi, rufo-villoso-tomentosi; folia supra puberula, subtus villoso-pilosa, petiolata, petiolo ad 1.4 cm. longo, canaliculato, subtus tomentoso; lamina subcoriacea, oblanceolata, 3–8 cm. longa, 1.2–2.7 cm. lata, apice late obtusa, basi acuta, revoluta, minute punctata, integra; inflorescentia axillaris; flores 5-meri, fasciculati, subsessiles; pedicelli fructiferi crassi, ad 0.7 mm. longi; sepala crassa, ovata, ca. 1 mm. longa, acuta, ciliolata, parce punctata vel epunctata; fructus globosus, ca. 3.5 mm. diam.

Costa Rica: Prov. Puntarenas, Cordillera de Talamanca, slopes between Cerro Echandi and Cerro Buru, forested ridge with *Quercus, Clusia* and *Clethra* dominant, among mossy outcropping rocks, elev. 2600–2700 m., Aug. 24, 1983, *G. Davidse et al. 24018* (holotype, LL), tree 5 m. tall, fruit carmine purple.

The pubescent yellowish leaves are notable among the Mesoamerican species, the upper surface being puberulent with many of the short hairs incurved. The pubescence of the stems is bright red.

The small ciliolate sepals are sparsely punctate with small black glands, or epunctate. The fruits, densely aggregated and subsessile, have thick pedicels up to 0.7 mm. long.

Myrsine rufa (Lundell) Lundell, from the same Cordillera Talamanca in Costa Rica, has similar pubescence on the branchlets but glabrous larger leaf blades, and flowers differing in some aspects. It is a montane species also, and appears closely related to *M. restita*.

Another taxon, *Myrsine panamensis* (Lundell) Lundell, described from a staminate plant, has similar mostly elliptic leaves drying yellowish, which are puberulent above along the petiole but otherwise glabrous. Also, the branchlets are puberulent, not villous-tomentose. *M. restita* is a mountain species from above 2600 meters, while the type of *M. panamensis* was collected on an island in the Gulf of Panama.