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# PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 51

May 1982

No. 1

LIBRARY

JUN 14 1982

NEW YORK  
BOTANICAL GARDEN

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road  
Plainfield, New Jersey 07060  
U.S.A.

Price of this number \$3.00; for this volume \$13.00 in advance or \$14.00 after close of the volume; \$5.00 extra to all foreign addresses and domestic dealers; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.



VEINTICINCO ( 25 ) HELICONIAS NUEVAS DE COLOMBIA

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&

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Se ha hecho un recorrido por gran parte del territorio colombiano con el propósito de coleccionar especies de *Heliconia*. Como resultado parcial del estudio de este material, presentamos las veinticinco nuevas especies descritas en este trabajo.

Consideramos necesario aclarar algunos términos utilizados por nosotros en las descripciones a fin de que se logre una fiel interpretación de los mismos. El patrón seguido en las figuras "Hábitos" es el siguiente:

X ) Nos hemos desviado del sistema que trata de medir el porte de la planta como un todo, v.g. "Herba 5 m alta". En su lugar se utiliza el tamaño del pseudotallo como medida del porte de la planta - representado por X en las figuras - el cual se mide desde el cormo hasta el comienzo de los pecíolos en las Musoides y desde el cormo hasta el comienzo del pedúnculo en las Cannoides y Zingiberoides. Aparte se mencionan las medidas de los pecíolos y las láminas. Este sistema creemos que es más exacto dado que algunas plantas tienen hojas casi verticales o verticales (*H. marginata*; *H. mariae*), otras plantas tienen hojas casi horizontales (*H. chartacea*) y la gran mayoría son intermedias.

A large area of the Republic of Colombia has been surveyed with the purpose of collecting *Heliconia*. As a partial result of our studies, we present the twenty five species described herein.

It is necessary to elaborate on some of the concepts used to describe these new species. The following comments refer to figure "Hábitos":

X) We have deviated from the system of attempting to measure the whole plant, i.e., "Herba 5 m alta" and instead we give the measurements of the petiole and the blade separately. The pseudostem measurement is taken from the corm to the beginning of the petiole in Musoids and from the corm to the beginning of the (terminal) peduncle in both Cannoid and Zingiberoid. This system, we believe, is more exact since some plants have almost vertical leaves (*H. marginata*, *H. mariae*), other plants have almost horizontal leaves (*H. chartacea*) and the great majority are intermediate

The following refers to vegetative as well as flowering habits. The flowering habits are: Terminal, Basal and Intermediate. The vegetative habits are: Musoid, Cannoid and Zingiberoid.



Lo siguiente en las figuras que nos ocupan se refiere a los hábitos vegetativos y de floración. Los hábitos vegetativos son: Musoide, Cannoide y Zingiberoide. Los hábitos de floración són: Terminal, Basal e Intermedios.

M ) Planta musoide común con inflorescencia péndula terminal. ( Ej. *H. collinsiana*, *H. mariae* )

N ) Planta musoide común con inflorescencia erecta terminal ( Ej. *H. rivularis*, *H. latispatha* )

O ) Esta figura representa una especie aún no descrita, musoide con inflorescencia intermedia péndula.

P ) Representación de la especie aquí descrita como *H. reptans* Abalo & Morales. Es también una planta musoide con inflorescencia péndula intermedia.

Q 1, Q 2 ) Plantas con hábito cannoide según nuestra opinión. Nos hemos desviado de la acepción dada a este término hasta ahora, en el convencimiento de que cualquier biólogo con experiencia a nivel de campo coincidirá con nosotros en que las plantas de este hábito tienen mayor similitud a una *Canna*. La inflorescencia basal no es tan común para este grupo como lo es para el grupo zingiberoide. ( Ejemplos de plantas con hábito cannoide: *H. metallica*, *H. deflexa*, algunos ejemplares de *H. rostrata*, esta última péndula )

R ) Esta figura representa la

M ) This figure represents the common pendent musoid plant with terminal inflorescence. (Ex. *H. collinsiana*, *H. mariae*)

N ) This figure represents the common erect musoid plant with terminal inflorescence. (Ex. *H. rivularis*, *H. latispatha* )

O ) This figure represents a yet undescribed species, musoid with pendent intermediate inflorescence.

P ) This figure represents the species described herein as *H. reptans* Abalo & Morales. It is a musoid plant with intermediate inflorescence.

Q 1, Q 2 ) These figures represent what we now call cannoide. We have deviated from the previous use of this term. We believe that any field biologist will relate better to this term as applied here, as well as to the following one ( fig. R ). The basal inflorescence is not as common for this group as it is for the zingiberoids. ( Examples of cannoids are: *H. metallica*, *H. deflexa* and some individuals of *H. rostrata*, this last being a pendent species)

R ) This figure represents what we call zingiberoide. The basal inflorescence is fairly common for this group, especially under conditions of stress. ( Ex. *H. hirsuta*, *H. aureo-rosea*, *H. longiflora* )

All the illustrations of the new species were made from living material, the only way to properly make them since *Heliconia* inflorescences make pitiful herbarium specimens. Aristeguieta

planta que llamamos zingibe-roide. La inflorescencia basal es bastante común en este grupo, sobre todo cuando la planta se encuentra bajo condiciones desfavorables. ( Ej. *H. hirsuta*, *H. aureo-rosea*, *H. longiflora* )

Todas las ilustraciones han sido hechas directamente de material vivo; la única forma de hacerlas correctamente, ya que las inflorescencias de *Heliconia* herborizadas son un triste espectáculo. Aristeguieta (1961) fué el pionero de la ilustración a partir de material vivo. Según Daniels & Stiles (1979) "Un biólogo de campo puede distinguir las inflorescencias a simple vista, pero debido a su tamaño generalmente grande y a su naturaleza herbácea estas inflorescencias invariablemente se encogen y se distorsionan al herborizarse. Dado que la taxonomía de las *Heliconias* hasta ahora ha sido basada casi exclusivamente en material de herbario, la literatura publicada sobre el género guarda muy poca relación con las plantas a nivel de campo." Asimismo continúan diciendo: "La pérdida de la estructura tridimensional, la distorsión y el encogimiento hacen que los ejemplares de herbario de *Heliconia* sean extremadamente difíciles de identificar, no importando cuan inequívocos sean a nivel de campo." Todas las medidas de las partes florales, así como las vegetativas también están basadas en material vivo.

En todas las ilustraciones de las especies se ha seguido el siguiente patrón:

(1961) was the pioneer in the use of live material for illustrations. We quote " A field biologist can distinguish the inflorescences at a glance, but because of their generally large size and herbaceous texture these inflorescences invariably become shrunken and distorted when made into herbarium specimens. Since the taxonomy of *Heliconia* has heretofore been based almost exclusively on herbarium material, the published literature of the genus all too often bears little relation to the plants in the field". (Daniels & Stiles 1979 ) "Loss of three dimensional structure, distortion and shrinkage make specimens of *Heliconia* exceedingly difficult to identify in the herbarium, however distinct they may be in the field". ( Ibid.) All measurements of floral as well as vegetative parts also refer to live material.

The pattern followed for the illustrations is:

- A ) Inflorescence
- B ) Spathe cut open
- C ) Bract
- D ) Flower
- E ) Staminode
- F ) Aristiform rudiment

As far as we know there are no published ( or verbal ) reports of the structure we call "aristiform rudiment" in *Heliconia* inflorescences. We encountered it for the first time in *H. estiletioides* Abalo & Morales, and it has appeared in several pendent

- A ) Inflorescencia completa species.
- B ) Espata abierta
- C ) Bráctea
- D ) Flor
- E ) Estaminodio
- F ) Rudimento aristiforme

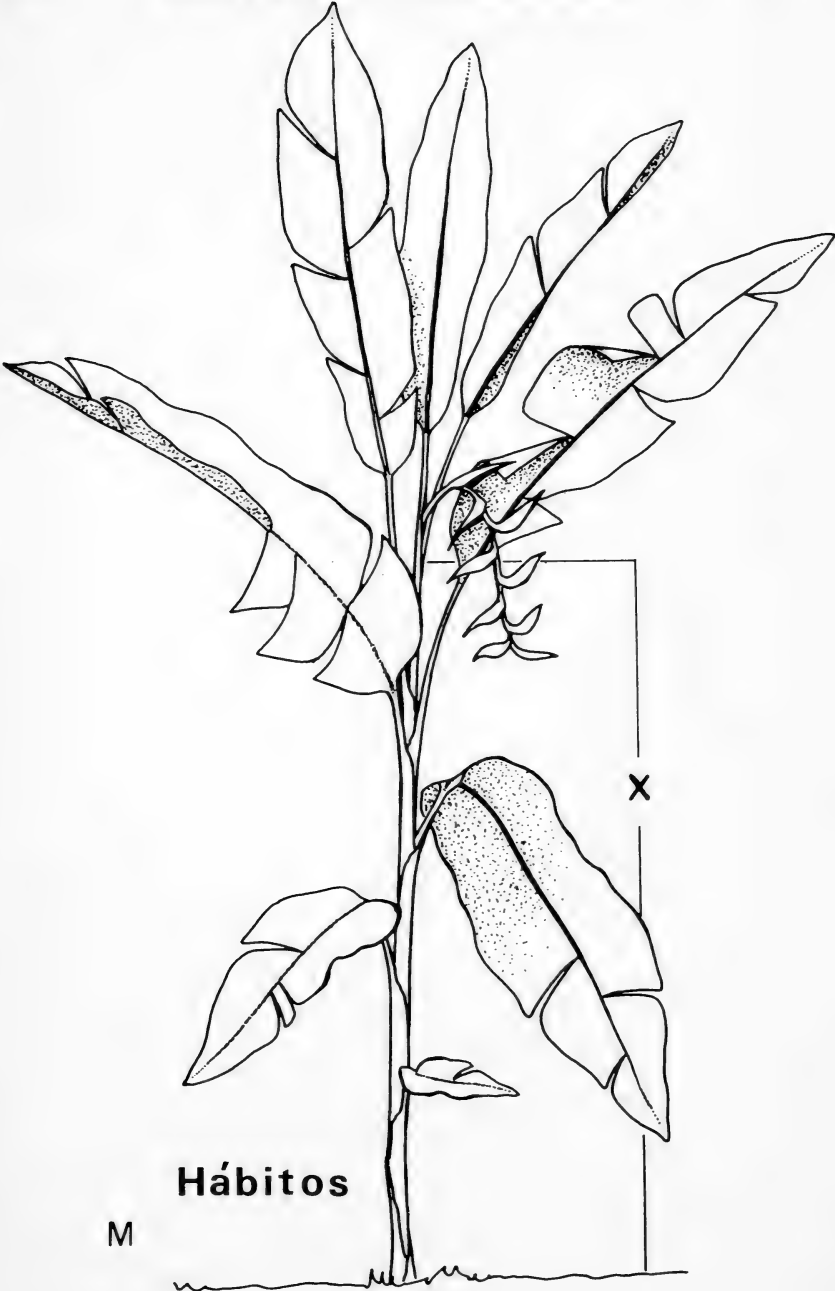
El elemento que llamamos "rudimento aristiforme" no ha sido hasta ahora reportado en publicación alguna en relación con el género *Heliconia*. Lo encontramos por primera vez en la *H. estiletoides* Abalo & Morales, pero posteriormente lo hemos observado en otras especies p<sub>é</sub>n<sub>d</sub>ulas.

El estaminodio es un elemento muy interesante de las *Heliconias*. Según Luiz Emygdio de Mello Filho, es una característica clave en la identificación de las especies de *Heliconia* (comunicación personal). "Presenta una diversidad morfológica razonable" según Emilia Santos (1978). Puede ser un "vestigio de una flor" según Mello Filho (1972). Hemos presentado descripciones y dibujos de los estaminodios de todas las nuevas especies aquí descritas.

The staminode is a very interesting structure of *Heliconia*. According to Luiz Emygdio de Mello Filho, it is a key character in the identification of *Heliconia* species (personal communication). It "presents a reasonable morphological diversity" (E. Santos 1978). It may be a "vestigial flower" (Mello Filho 1972). We have included drawings as well as descriptions of this structure for all our new species.

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- DANIELS, G.F. & F.G. STILES. 1979. The *Heliconia* taxa of Costa Rica: keys and descriptions. *Brenesia* 15, Suplemento 1.
- MELLO FILHO, L.E. 1972. Uma nova interpretação da morfologia floral de *Heliconia* L. (*Musacea*). *An Acad. Brasil. Cienc.* 44 (3-4): 608.
- SANTOS, E. 1978. Revisão das espécies do género *Heliconia* L. (*Musacea* s.l.) espontâneas na região Fluminense. *Rodriguesia* 30:99 - 221.

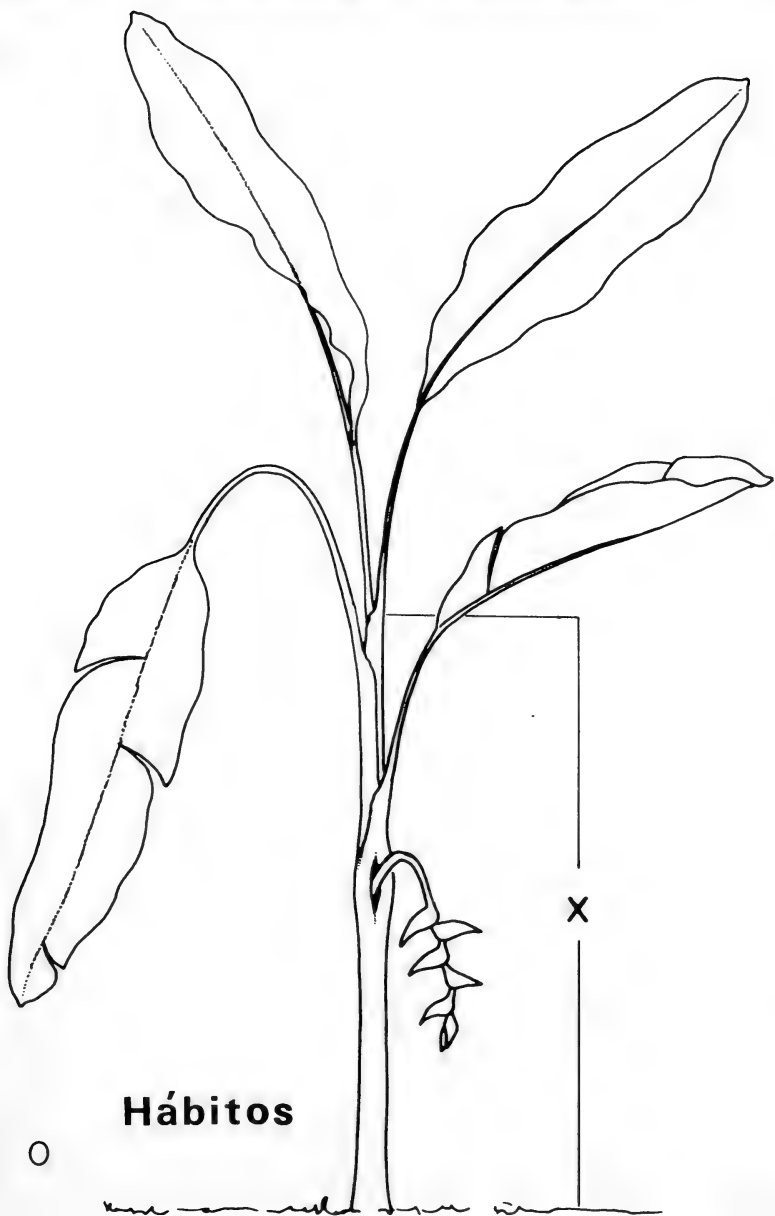


**Hábitos**

M

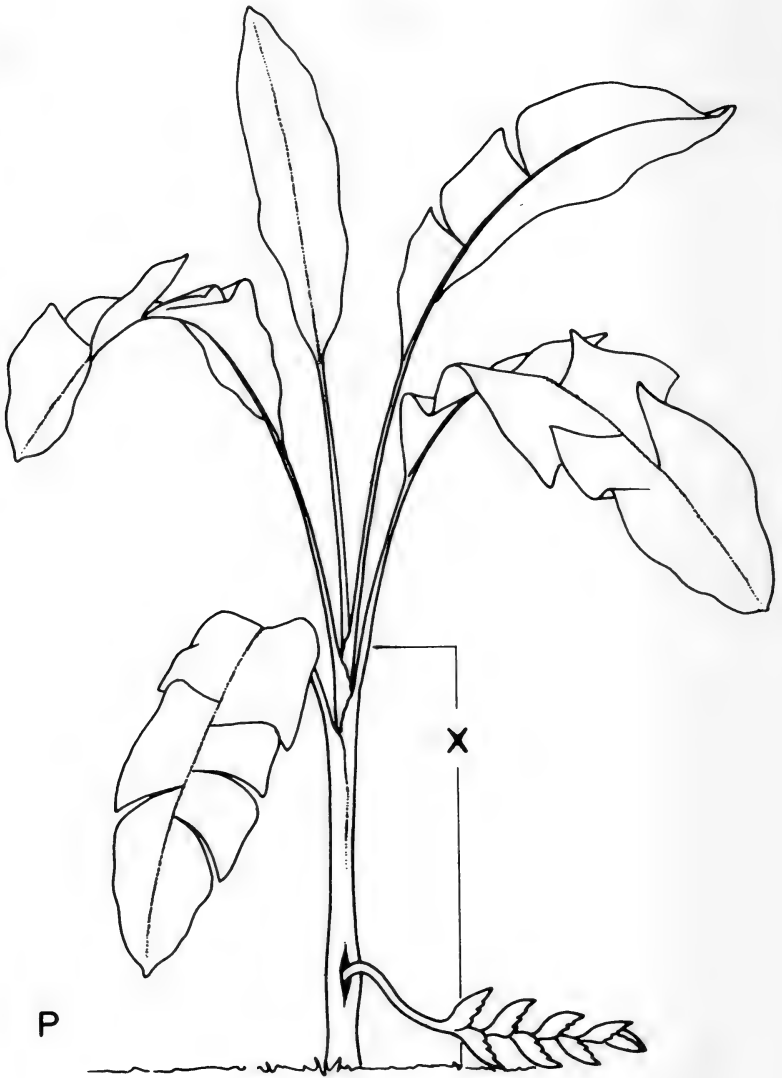


**Hábitos**



**Hábitos**

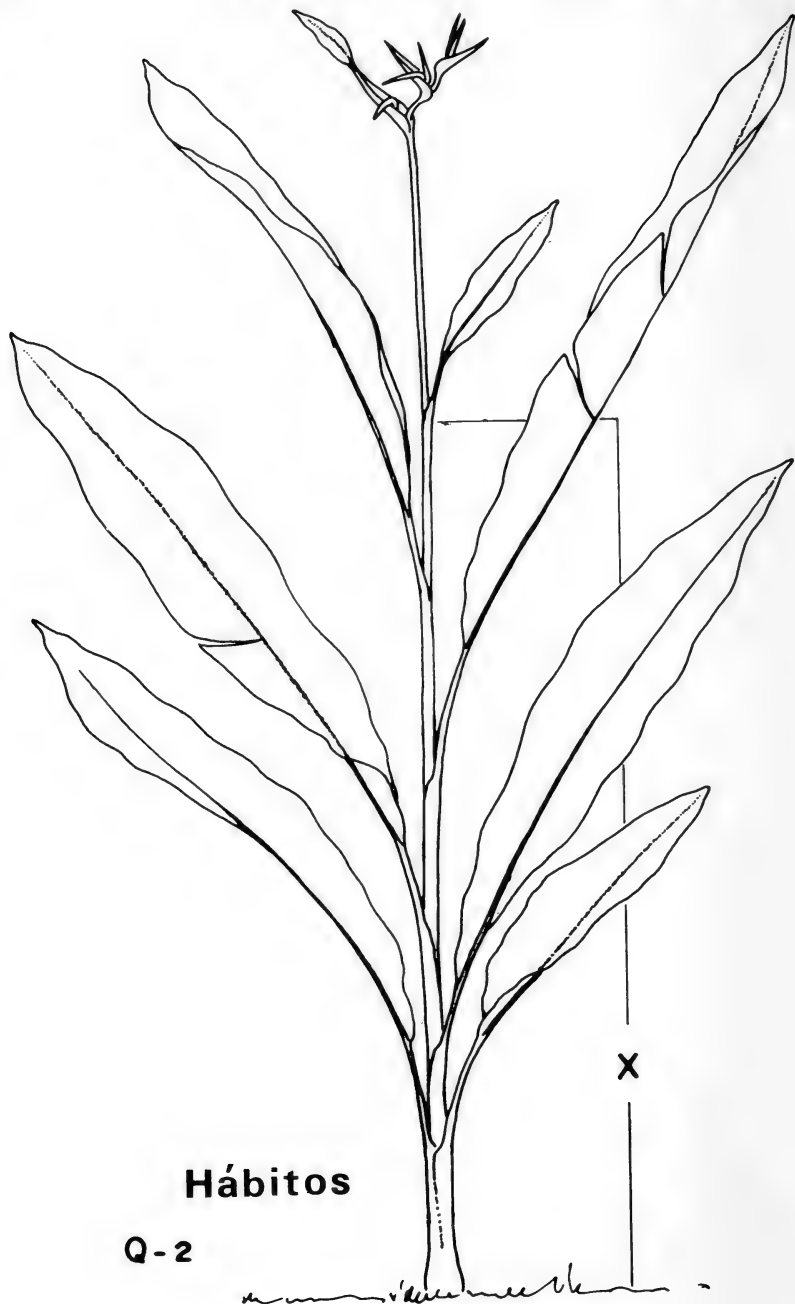
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**Hábitos**

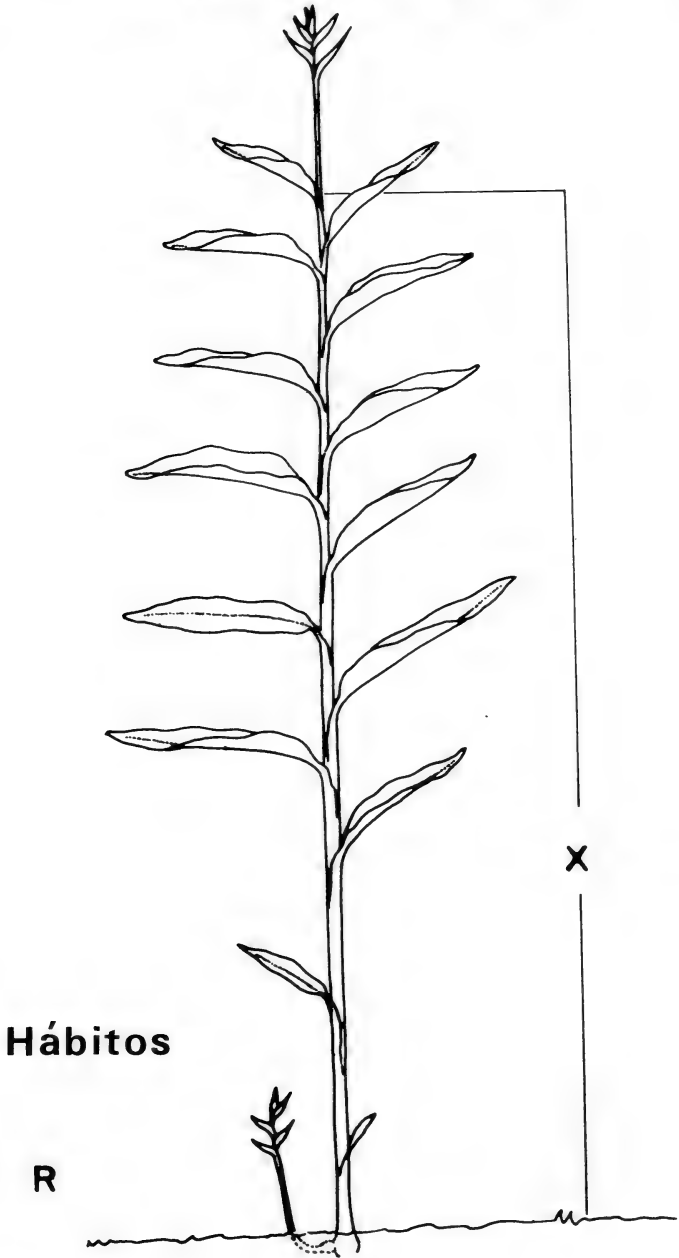






**Hábitos**

Q-2



*Heliconia andina* Abalo & Morales, sp. nov.

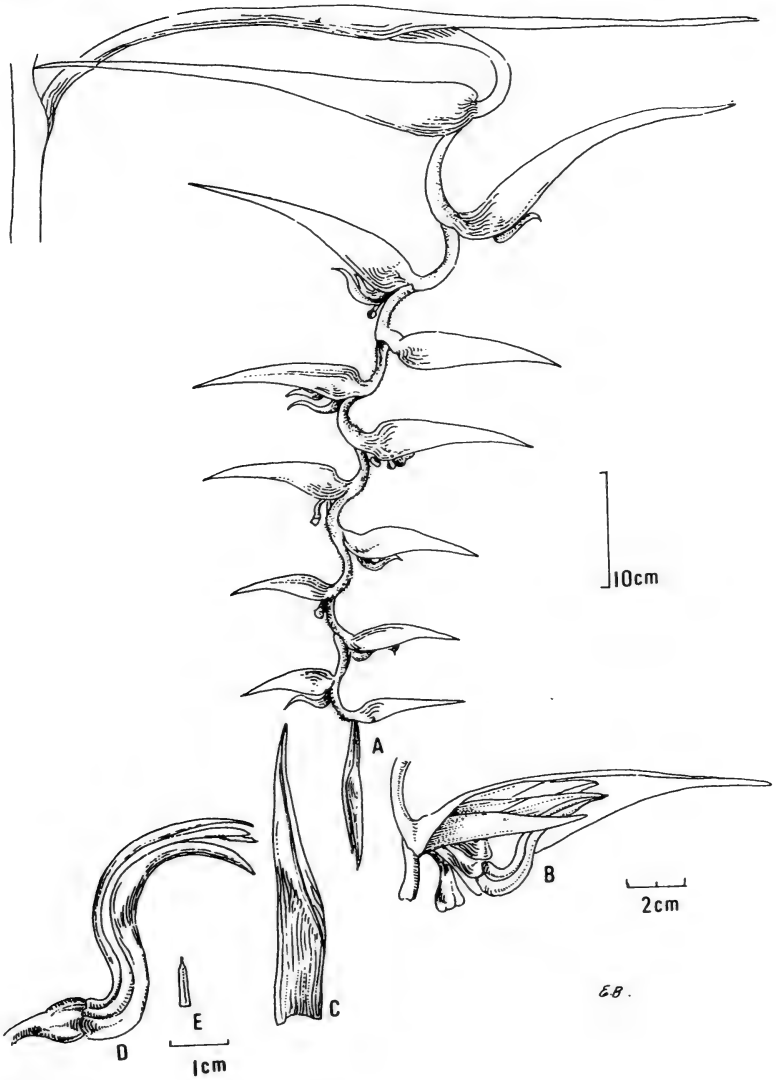
*Planta musoides. Pseudocaulis 2 - 3 m altus. Petiolus 40 - 80 cm longus. Lamina 150 - 200 cm longa, 24 - 28 cm lata. Inflorescencia pendula; rachis rubra, pubescens. Spathae distichae, cinnabarinæ. Flores exserti; perianthium luteum, geniculatum.*

Planta musoide. Pseudotallo 2 - 3 m. Hojas con pecíolo 40 - 80 cm, glabro; lámina 150 - 200 cm de largo por 24 - 28 cm de ancho, de base cuneada, ápice obtuso con acumen. Inflorescencia pēndula, 55 - 105 cm de largo; espata basal verde y glabra 40 - 70 cm de largo y 4 cm de ancho cuando extendida; pedúnculo verde, glabro, 15 - 25 cm de largo; raquis rojo, pubescente, 40 - 80 cm de largo. Espatas 15 - 25 por inflorescencia, dísticas, la primera 30 - 40 cm de largo por 2.0 - 2.5 cm de ancho, rojo-naranja en la base y borde, el resto verde, no reflexa; las otras rojo-naranja, medianamente reflexas, finamente pubescentes en la base y glabras hacia el ápice, las medias 9 - 14 cm de largo por 1.5 - 2.0 cm de ancho. Brácteas crema, membranáceas, carinadas, pubescentes, 4.5 - 5.5 cm de largo por 1.0 - 1.3 cm de ancho. Flores 10 - 23 por espata; perianto amarillo, glabro, geniculado, 4.0 - 4.5 cm de largo; estaminodio blanco, linear con acumen, 0.7 - 0.9 cm de largo por 0.2 cm de ancho; pedicelos pubescentes a glabros inclusive en una misma espata, 1.5 cm de largo. Frutos inmaduros amarillos, glabros.

Tipo: Gustavo Morales & José Abalo 216, 20 Septiembre 1980, Colombia, Intendencia Putumayo, Mocoa, 16 Km via Pasto, 1120 msm. (COL, holotipo; US, MY, isotipos)

El nombre dado a esta especie hace referencia a la cordillera de los Andes en cuya ladera oriental se encuentra su habitat, desde el sur de Colombia, pasando por el Ecuador, hasta el norte del Perú.

Habitat: Zonas de alta precipitación. Suelos pesados. Aperturas tales como márgenes de arroyos, bordes de carreteras. Laderas.



**Heliconia andina**

*Heliconia atratensis* Abalo & Morales, sp. nov.

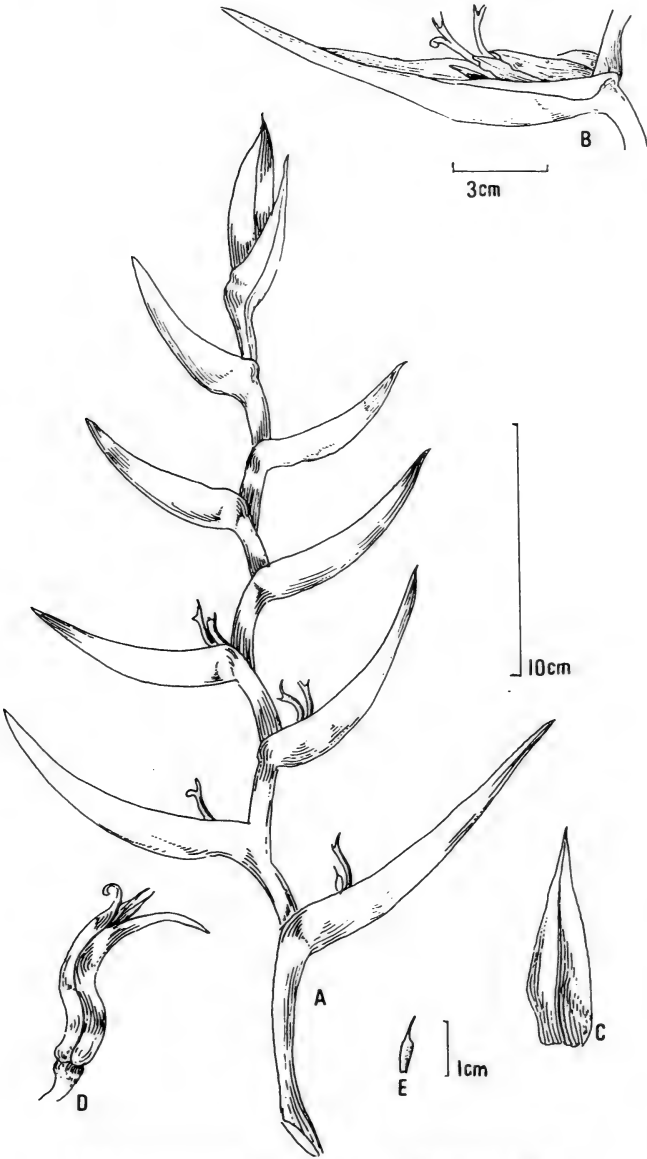
*Planta musoides. Pseudocaulis 1.5 - 2.0 m altus. Petiolus ruber, 150 - 175 cm longus. Lamina 85 - 125 cm longa, 35 - 50 cm lata, costa rubra. Inflorescentia erecta. Spathae distichae, rosae; perianthium roseolum.*

Planta musoide. Pseudotallo 1.5 - 2.0 m. Hojas con el pecíolo y la nervadura central rojos, principalmente cuando jóvenes; pecíolo 150 - 175 cm de largo; lámina 85 - 125 cm de largo por 35 - 50 cm de ancho, base inequilátera mas o menos truncada, ápice acuminado. Inflorescencia erecta; pedúnculo verde, 10 - 15 cm de largo, pubérulo a glabro; raquis rojo claro, 25 - 45 cm de largo, pubérulo a glabro. Espatas rojo claro a rosado oscuro, dísticas, 9 - 14 por inflorescencia, lanceolado conduplicadas, ápice acuminado, glabras o pubérulas en los bordes hacia la base, borde involuto en la base y recto desde la parte media hacia el ápice. Brácteas crema, carinadas, pubescentes principalmente sobre el dorso, 4.0 - 5.0 cm de largo por 1.5 - 2.0 cm de ancho. Flores 15 en promedio por espata, gibosas e incurvadas; perianto rosado claro, 4.5 - 5.0 cm de largo, glabro; estaminodio mas o menos fusiforme con el ápice acuminado, 0.7 - 0.8 cm de largo y 0.2 - 0.3 cm de ancho en la parte media; pedicelos glabros, 2.0 - 2.5 cm de largo. Ovarios glabros.

Tipo: Gustavo Morales 231, 21 Octubre 1980, Colombia, Departamento Chocó, Quibdó, 6 Km via Istmina, 40 msm ( COL, holotipo; US, MY, isotipos )

El nombre de esta especie hace referencia al rio Atrato, en cuyas márgenes habita.

Habitat: Zonas de muy alta precipitación. Suelos arcillosos, anegados. Sitios protegidos.



**Heliconia atratensis**



*Heliconia boultoniana* Abalo & Morales, sp. nov.

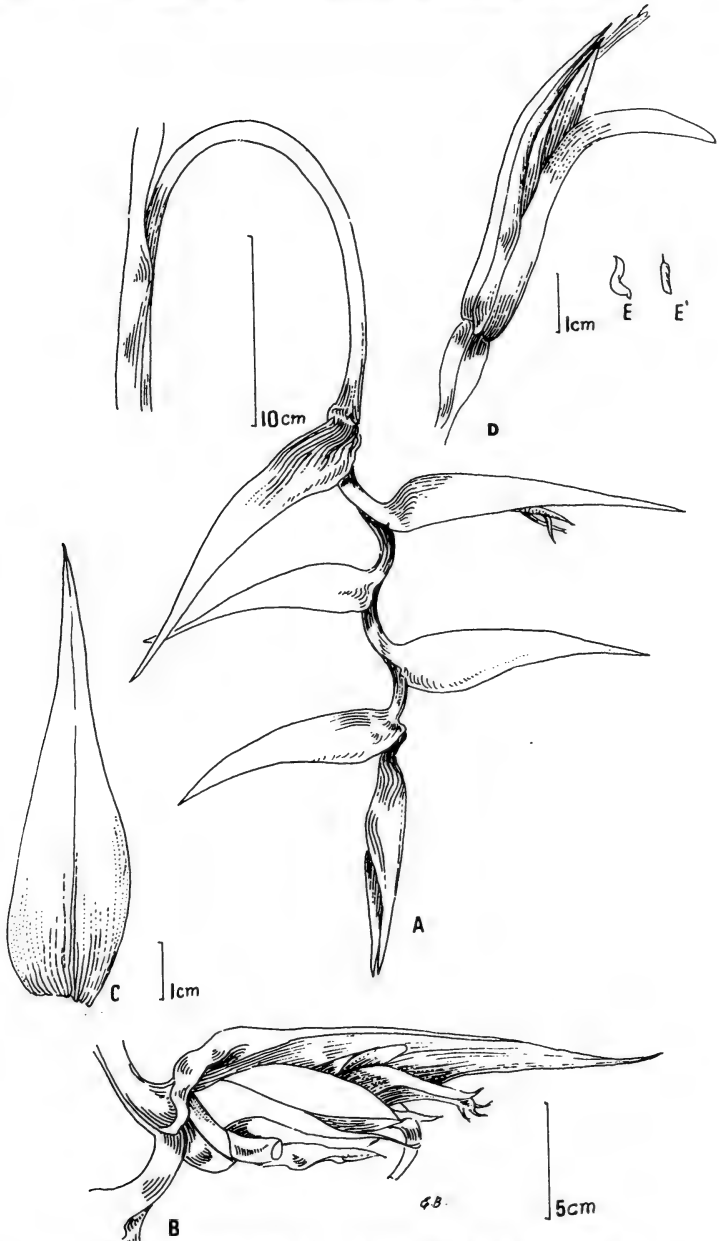
*Planta musoides. Pseudocaulis 3 - 6 m altus, valde ceraceus. Petiolus 50 - 110 cm longus, glaber. Lamina 70 - 300 cm longa, 30 - 50 cm lata. Inflorescentia pendula. Spatha viridis, ceracea; basis et margo aureus. Perianthium luteum. Ovarium album.*

Planta musoide. Pseudotallo 3 - 6 m, ceroso. Hojas 4 - 6, pecíolo 50 - 110 cm de largo, glabro; lámina 70 - 300 cm de largo por 30 - 50 cm de ancho, base inequilátera cordada, ápice obtuso. Inflorescencia péndula, 50 - 75 cm de largo; pedúnculo verde, 14 - 25 cm de largo, glabro; raquis amarillo, 35 - 50 cm de largo, glabro. Espatas externamente verdes con la base y el borde amarillos, glabras, cerosas, internamente verde muy claro y amarillo hacia el borde, aterciopeladas; borde mas o menos revoluto; ápice agudo; 8 - 14 por inflorescencia, espiraladas; espata basal esteril, 23 - 32 cm de largo por 3.0 - 3.5 cm de ancho; espatas medias 11 - 16 cm de largo por 3.0 - 3.5 cm de ancho. Brácteas crema, pubescentes en el exterior principalmente sobre la carina, 6.0 - 8.0 cm de largo por 2.0 - 2.5 cm de ancho en la base. Flores 8 - 12 por espata; perianto amarillo, 5.5 - 6.0 cm de largo; sépalos muy pubescentes; pétalos glabros; estaminodio blanco, geniculado, cuando extendido lineal de ápice acuminado, 0.6 cm de largo por 0.2 cm de ancho; ovario blanco, pubescente sobre los vértices, 1.0 - 1.3 cm de largo por 0.6 - 0.8 cm de ancho; pedicelos blancos, pubescentes, 2.0 cm de largo. Frutos crema, pubéculos, azules al madurar.

Tipo: Gustavo Morales 265, 5 Enero 1982, Colombia, cultivada en Departamento Cundinamarca, Silvania, 1600 msm de rizomas colectados en Departamento de Caldas, Anserma, 10 Km vía Riosucio, 2050 msm, 27 Enero 1979 (COL, holotipo)

Dedicamos esta especie a nuestro amigo y colaborador Henry Lord Boulton.

Habitat: Zonas de precipitación media. Suelos arcillosos muy pesados. Sitios abiertos. Laderas.



**Heliconia boultoniana**

*Heliconia caquetensis* Abalo & Morales, sp. nov.

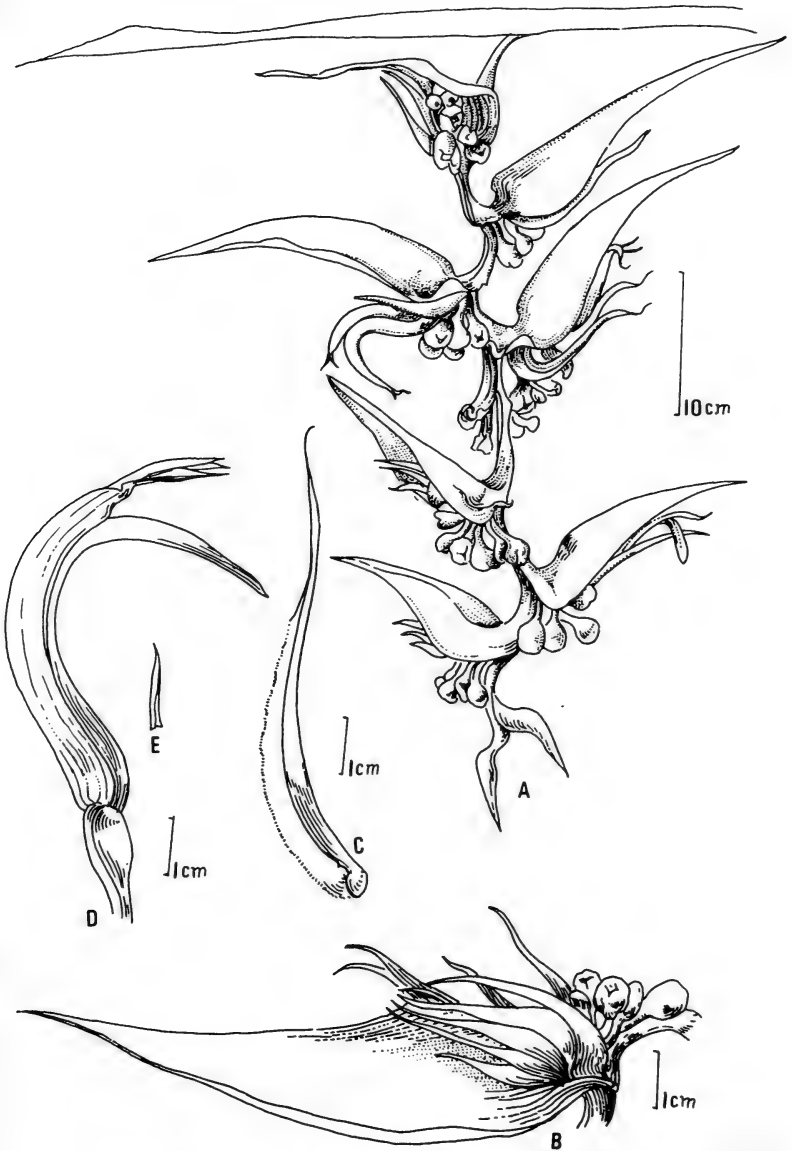
*Planta musoides. Pseudocaulis brunneus, 1.5 - 2.5 m altus. Petiolus 30 - 70 cm longus. Lamina 50 - 120 cm longa, 16 - 25 cm lata. Inflorescentia pendula, rachis torsiva. Spathae rubrae. Bractee externae cremeae, apex ruber. Bractee internae eburneae. Perianthium luteum. Ovarium luteum.*

Planta musoide. Pseudotallo caoba, 1.5 - 2.5 m. Hojas con pecíolo 30 - 70 cm de largo, glabro; lámina 50 - 120 cm de largo por 16 - 25 cm de ancho, base inequilátera, semicordada, ápice agudo. Inflorescencia péndula, 41 - 52 cm de largo; pedúnculo 15 - 20 cm de largo; raquis rojo bermellón, glabro, 26 - 32 cm de largo, 3.0 - 4.5 cm entre espatas. Espatas 8 - 12 por inflorescencia, espiraladas, mas o menos amplexantes, glabras; la primera fértil o nó, roja bermellón en la base y verde en el ápice, 30 - 40 cm de largo por 2.0 - 3.5 cm de ancho; las demás rojas bermellón y disminuyendo gradualmente de tamaño siendo las medias de 14 - 17 cm de largo por 2.0 - 2.5 cm de ancho y las últimas 5 - 8 cm de largo por 0.5 - 1.5 cm de ancho. Brácteas externas crema en la base y rojo bermellón hacia el ápice; las internas blanco cremoso, membranáceas, 6 - 8 cm de largo por 0.8 - 1.3 cm de ancho, pubescentes a lo largo de toda la carina. Flores 6 - 10 por espata; perianto amarillo, 6.0 - 7.0 cm de largo, glabro; estaminodios blancos, 1.3 - 1.6 cm de largo por 0.2 cm de ancho en la base, ensiformes; pedicelos amarillo-verdosos, de 1.5 - 2.0 cm de largo, el primero pubescente en uno de los vértices del lado del raquis, los demás glabros; ovarios y frutos inmaduros amarillos, glabros.

Tipo: Gustavo Morales 252, 30 Diciembre 1980, Colombia, Intendencia del Caquetá, 43 - 45 Km Altamira vía Florencia, 2050 msm (COL, holotipo; US, MY, isotipos)

El nombre *caquetensis* hace referencia a la Intendencia del Caquetá, localidad del tipo de esta especie.

Habitat: Zonas de alta precipitación. Suelos pesados. Aperturas tales como márgenes de arroyos, bordes de carreteras. Laderas.



***Heliconia caquetensis***

S.B.

*Heliconia cararensis* Abalo & Morales, sp. nov.

*Planta zingiberoides. Pseudocaulis 1.0 - 2.3 m altus. Folia sessilia. Inflorescentia erecta terminalis; saepe basalis. Spathae citrinae, distichae. Perianthium luteum; apex atroviridis. Ovarium coccineum, pubescens, valde laetum; basis lutea.*

Planta zingiberoides. Pseudotallo 1.0 - 2.3 m. Hojas dísticas, sésiles de 18 - 22 cm de largo por 5 - 8 cm de ancho, ápice agudo. Inflorescencia terminal, a veces basal, erecta; pedúnculo verde, 10 - 20 cm de largo, con pubescencia en aumento desde la base hacia el ápice; raquis 5 - 10 cm de largo, amarillo cuando joven y verde al envejecer, pubescente. Espatas dísticas amarillo-verdosas, 7 - 10 por inflorescencia, lanceolado-conduplicadas, largamente acuminadas, la base ligeramente auriculada, pubescentes en la base y hasta la parte media por los bordes, las medias 5.0 - 6.5 cm de largo por 0.5 - 0.6 cm de ancho. Brácteas membranáceas, ligeramente carinadas, pubescentes, mas o menos triangulares, 1.7 - 2.0 cm de largo por 0.6 - 0.8 cm de ancho. Flores 6 - 10 por espata, ligeramente curvadas, triangulares en corte transverso; perianto amarillo con el ápice verde oscuro, 3.0 cm de largo; sépalos pubescentes, pétalos glabros; estaminodio ovado, ápice acuminado, 0.4 cm de largo por 0.2 cm de ancho; pedicelos pubescentes, 1.4 cm de largo; ovarios amarillos en la base y rojos en el ápice, pubescentes, muy brillantes; frutos inmaduros con la base amarilla y la mitad superior rojo-naranja muy brillantes, pubescentes.

Tipo: Gustavo Morales & José Abalo 239, 25 Octubre 1980, Colombia, Departamento Santander, Región del Carare, Puerto Olaya, 34 Km vía Cimitarra, El Sinaí, 260 msm ( COL, holotipo; US MY, isotipos )

El nombre *cararensis* hace referencia a la región del Carare, localidad del tipo de esta especie.

Habitat: Zonas de alta precipitación. Suelos arcillo-arenosos. Sitios abiertos. Terrenos planos, bien drenados.



**Heliconia cararensis**

*Heliconia carmelae* Abalo & Morales, sp. nov.

*Planta musoides. Pseudocaulis 1.5 - 2.0 m altus. Petiolus 80 - 110 cm longus. Lamina 130 - 160 cm longa, 20 - 25 cm lata, subtus ceracea. Inflorescentia pendula. Pedunculus pars viridis et pars ruber. Rachis juvenis lutea; rachis matura rubra. Spathae juvenes rubrae et luteae; spathae maturae rubrae. Perianthium luteum. Ovarium album, glabrum.*

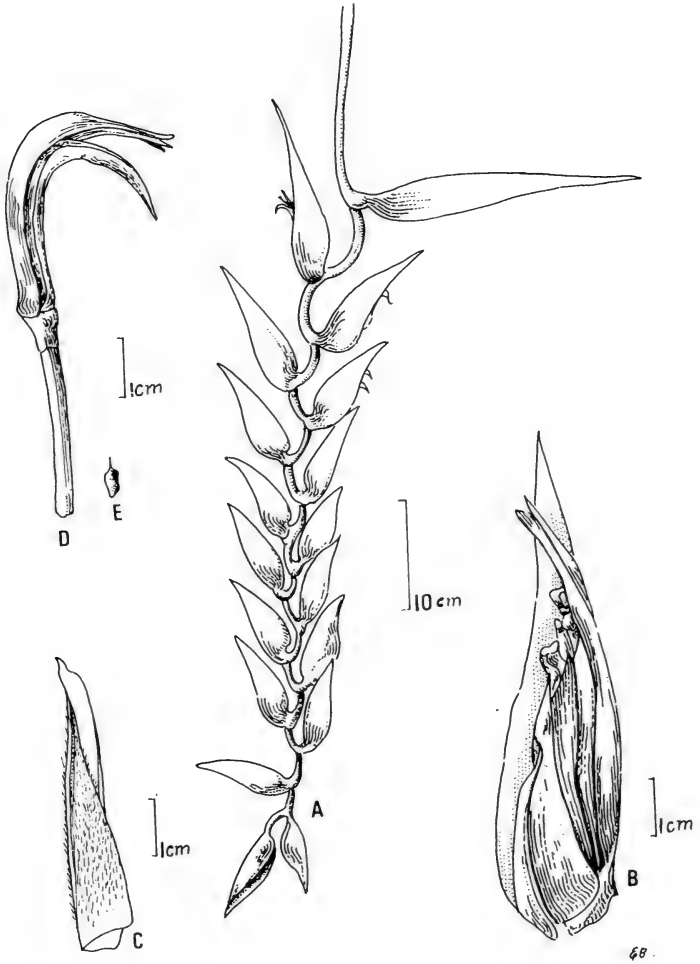
Planta musoide. Pseudotallo 1.5 - 2.0 m. Hojas con pecíolo 80 - 110 cm de largo, glabro; lámina cerosa por el envés, 130 - 160 cm de largo por 20 - 25 cm de ancho, base inequilátera, truncada, ápice agudo. Inflorescencia pendula, 110 - 160 cm de largo; espata basal verde, glabra, atenuada, 40 - 60 cm de largo por 3 - 4 cm de ancho en la base cuando extendida; pedúnculo la mitad verde y la mitad rojo, 40 - 60 cm de largo, glabro; raquis amarillo cuando joven y rojo al madurar, pubérulo, 70 - 100 cm de largo, flexuoso. Espatas rojas con la base amarilla cuando jóvenes, luego al madurar el amarillo se va reduciendo hasta desaparecer en el borde y muy cerca al raquis, 25 - 40 por inflorescencia, reflexas, glabras por el exterior y pubescentes aterciopeladas interiormente, las medias 7.5 - 8.5 cm de largo por 3.0 cm de ancho. Brácteas amarillas, carinadas con acumen, muy pubescentes exteriormente, membranáceas, 5.0 - 6.5 cm de largo por 1.5 - 2.5 cm de ancho. Flores 8 - 17 por espata; perianto amarillo, 4.0 - 5.0 cm de largo, sépalos pubescentes, pétalos glabros; estaminodio crema, obovado con ápice acuminado, 0.6 cm de largo, 0.3 cm de ancho en la parte media; pedicelos de los ovarios blancos, 1.5 - 2.5 cm de largo, pubérulos; pedicelos de los frutos 4.5 - 5.0 cm de largo; ovario blanco, glabro. Frutos maduros azul claro.

Tipo: Gustavo Morales 105, 19 Marzo 1979, Colombia, Departamento Caldas, Berlín, 3 km vía Florencia, 1100 msm.  
(COL, holotipo)

Esta especie está dedicada a Carmela G. de Abalo, madre de uno de los autores.

Habitat: Zonas de muy alta precipitación. Suelos arcillosos con alto contenido de materia orgánica. Sitios semi abiertos. Laderas húmedas.





***Heliconia carmelae***

*Heliconia chrysocraspeda* Abalo & Morales, sp. nov.

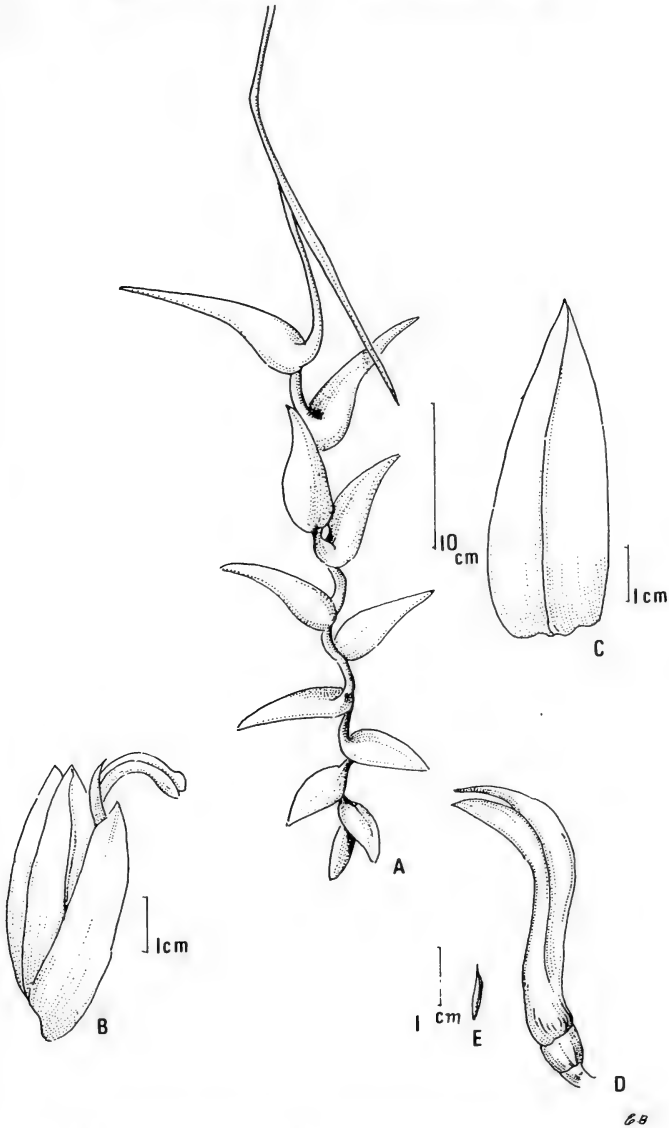
*Planta musoides. Pseudocaulis 1.5 - 2.0 m altus. Petiolus 70 - 120 cm longus. Lamina 100 - 250 cm longa, 20 - 40 cm lata. Inflorescentia pendula. Spathae distichae, rubrae, aureomarginatae. Perianthium luteum, 5 cm longum, glabrum. Pedicellus 1.0 cm longus, glaber.*

Planta musoide. Pseudotallo 1.5 - 2.0 m. Hojas con pecíolo 70 - 120 cm de largo, glabro; lámina 100 - 250 cm de largo por 20 - 40 cm de ancho, base inequilátera, cuneada, ápice agudo. Inflorescencia péndula, 55 - 85 cm de largo; pedúnculo verde, 15 - 25 cm de largo; raquis rojo, glabro, 40 - 60 cm de largo. Espatas rojas con el borde amarillo, 12 - 18 por inflorescencia, dísticas, reflexas, glabras, las medias 9 - 12 cm de largo por 2.5 cm de ancho. Brácteas crema, membranáceas, fuertemente carinadas, de apariencia vellosa exteriormente, 5.0 - 6.0 cm de largo por 3.0 - 3.5 cm de ancho. Flores 6 - 10 por espata; perianto amarillo, 5 cm de largo cuando extendido, glabro; estaminodio ovado-angosto, ápice agudo, 1.0 cm de largo por 0.2 cm de ancho; pedicelos glabros, 1.0 cm de largo.

Tipo: Gustavo Morales & José Abalo 219, 22 Septiembre 1980, Colombia, Departamento Chocó, San José del Palmar, ( cerca del límite con el Departamento Valle ) 1970 msm ( COL, holotipo; US, MY, isotipos )

El nombre, tomado del griego, hace referencia al margen amarillo en sus espatas.

Habitat: Zonas de muy alta precipitación. Suelos arcillosos con alto contenido de materia orgánica. Sitios semi abiertos. Laderas.



**Heliconia chrysocraspeda**

*Heliconia colombiana* Abalo & Morales, sp. nov.

*Planta musoides. Pseudocaulis 0.6 - 1.2 m altus. Petiolus 10 - 25 cm longus. Lamina 60 - 90 cm longa, 20 - 27 cm lata, costa subtus rubra. Inflorescentia erecta, sessilis. Spathae paucae. Flores exserti, triquetri. Perianthium luteum, apex virescens.*

Planta musoide. Pseudotallo 0.6 - 1.2 m. Hojas con pecíolo 10 - 25 cm de largo, glabro; lámina 60 - 90 cm de largo por 20 - 27 cm de ancho, base inequilátera cuneada, ápice acuminado; desde la parte media del pecíolo y en la nervadura central por el envés de la lámina presenta una franja rojo oscura. Inflorescencia erecta, sésil; raquis rojo, 15 - 25 cm de largo, pubérulo a glabro. Espatas dispuestas helicoidalmente, 5 - 8 (6) por inflorescencia, lanceolado - conductuplicadas, acuminadas, glabras a pubérulas, la mas inferior verde con el borde rojo oscuro, 15 - 25 cm de largo por 1.5 - 2.5 cm de ancho. Las demás rojo oscuro, disminuyendo gradualmente de tamaño hasta 5.5 cm de largo y 0.8 cm de ancho. Brácteas crema, membranáceas, 4.0 - 5.0 cm de largo por 1.0 - 1.5 cm de ancho, glabras, ligeramente carinadas. Flores 8 - 11 en las espatas medias, exsertas, triangulares en corte transverso; perianto amarillo con el ápice amarillo verdoso, glabro, 4.5 - 5.0 cm de largo; estaminodio amarillo claro, laminar, cóncavo, de 0.5 - 0.6 cm de largo y 0.4 cm de ancho en su parte media, de ápice obtuso con acumen; pedicelos amarillo verdosos, 1.5 - 2.5 cm de largo, glabros a pubérulos; ovario verde claro, glabro.

Tipo: Gustavo Morales 102, 3 Marzo 1979, Colombia, Departamento Norte de Santander, Abrego, 69 Km vía Sardinata, 1750 msm ( COL, holotipo )

El nombre hace referencia a la República de Colombia.

Habitat: Zonas de precipitación media. Suelos arcillosos, muy pesados. Sitios semi-abiertos. Laderas.



***Heliconia colombiana***

60-

*Heliconia estheri* Abalo & Morales, sp. nov.

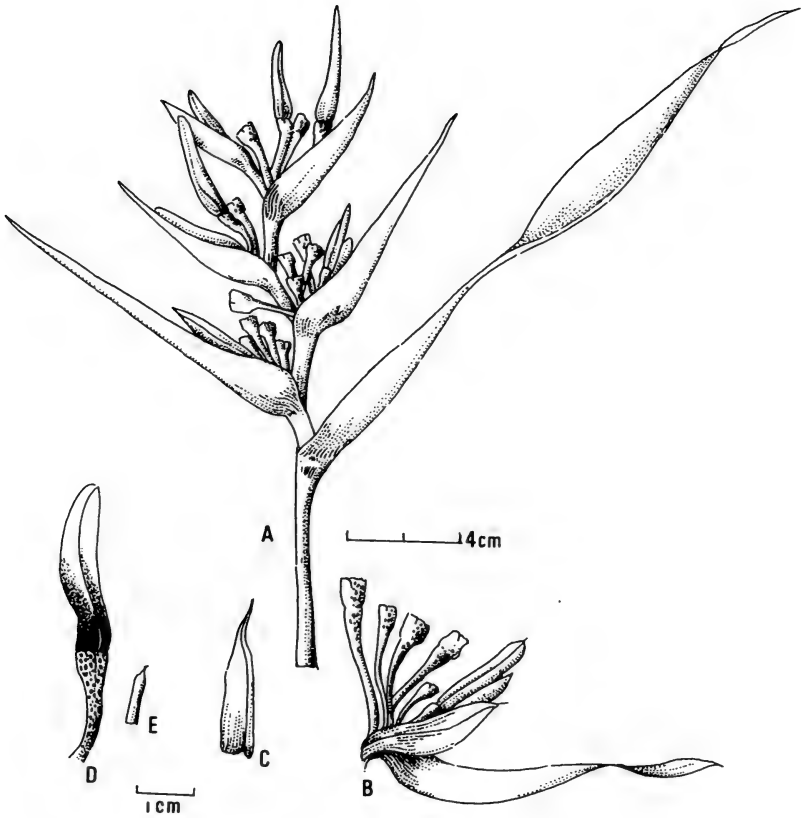
*Planta musoides. Pseudocaulis 40 - 60 cm altus. Petiolus 16 - 40 cm longus. Lamina 30 - 60 cm longa, 10 - 21 cm lata, atroviridis, aspectus velutinis; costa viridis pallida. Inflorescentia erecta; rachis alba, spathae: Basis alba, apex lilacinum. Perianthium basis atrococcinea in apice rubro claro et lentiter rubro supra luteo. Pedicellus albidus valde brunneo maculato. Ovarium viride, atroviridi maculato.*

Planta musoide. Pseudotallo 40 - 60 cm. Hojas 5 - 6, pecíolo glabro, 16 - 40 cm de largo; lámina 30 - 60 cm de largo por 10 - 21 cm de ancho, ovada angosta, base inequilátera cuneada, ápice acuminado con el haz verde muy oscuro, de aspecto aterciopelado y la nervadura central verde muy claro. Inflorescencia erecta, 29 - 45 cm de largo; pedúnculo verde, ligeramente ceroso, glabro, 20 - 33 cm de largo; raquis blanco, glabro, 9 - 12 cm de largo. Espatas 7 en promedio por inflorescencia, dísticas, lanceolado-conduplicadas, externa e internamente blancas en la base y lila desde la parte media hasta el ápice, glabras, la espata basal foliolada o no, espatas medias 6 - 8 cm de largo por 0.9 - 1.3 cm de ancho en la parte media y extendidas. Brácteas blancas, 2.3 - 2.7 cm de largo por 0.6 cm de ancho, membranáceas, lanceoladas, ápice acuminado, glabras. Flores 7 - 10 por espata; perianto rojo muy oscuro en la base que se va desvaneciendo hacia el ápice para ser, desde la parte media, moteado de rojo sobre fondo amarillo intenso, los bordes de los sépalos desde la parte media y el ápice amarillos intenso, 3.0 - 3.5 cm de largo, terete, sépalos y pétalos glabros; estaminodio blanco, lanceolado, 0.5 - 0.7 cm de largo por 0.2 cm de ancho; ovario verde claro moteado de verde oscuro hacia el ápice y desvaneciéndose el moteado hacia la base; pedicelo blancuzco muy moteado de marrón, glabro, 1.5 cm de largo.

Tipo: Gustavo Morales & José Abalo 274, 10 Febrero 1982, Colombia, Departamento Norte de Santander, Toledo, 52 - 70 Km de Puente Nuevo vía Cubará, Samoré, 1250 - 800 msm ( COL, holotipo; US, MY, isotipos )

Esta especie está dedicada a Esther de Morales, esposa de uno de los autores.

Habitat: Zonas de alta precipitación. Suelos limo-arcillosos. Sitios abiertos a protegidos. Laderas.



***Heliconia estheri***

*Heliconia estiletioides* Abalo & Morales, sp. nov.

*Planta musoides. Pseudocaulis 1.5 - 2.5 m altus. Petiolus 70 - 100 cm longus. Lamina 140 - 200 cm longa, 30 - 45 cm lata. Inflorescentia pendula. Pedunculus valde pubescens. Rachis rubra, pubescens. Spathae rubrae; apices lutei. Perianthium luteum. Rudimentum aristoides adest.*

Planta musoide. Pseudotallo 1.5 - 2.5 m. Hojas con pecíolo 70 - 100 cm de largo, glabro; lámina 140 - 200 cm de largo por 30 - 45 cm de ancho, de base inequilátera, cuneada y ápice agudo. Inflorescencia péndula, 95 - 160 cm de largo; espata basal verde, glabra, 30 - 80 cm de largo por 5 - 7 cm de ancho en la parte media y extendida; pedúnculo rojo, 50 - 80 cm de largo, muy pubescente; raquis rojo, pubescente, flexuoso, 45 - 80 cm de largo. Espatas rojas con el ápice amarillo, 12 - 30 por inflorescencia, pubescentes en la base y glabras hacia el ápice, la primera 10 - 30 cm de largo por 2.5 - 3.0 cm de ancho, estéril o fértil, el resto fértiles, reflexas, las medias 7 - 11 cm de largo por 2.5 - 3.5 cm de ancho. Brácteas membranaceas, carinadas, pubescentes exteriormente, 4.5 - 6.0 cm de largo por 1.2 - 2.0 cm de ancho; en la primera bráctea generalmente hay un rudimento aristiforme muy pubescente, 3.5 - 4.5 cm de largo. Flores 15 - 32 por espata; perianto amarillo, 4.5 - 5.0 cm de largo, sépalos muy pubescentes, pétalos glabros; estaminodio lanceolado, ápice acuminado, 0.7 cm de largo por 0.15 cm de ancho; pedicelos amarillos muy pubescentes; 1.0 - 1.5 cm de largo; ovarios amarillos, glabros; frutos inmaduros amarillos, globosos.

Tipo: Gustavo Morales & José Abalo 222, 24 Septiembre 1980, Colombia, Departamento Cundinamarca, Sasaima, 62 Km Bogotá vía Villeta, 1700 msm (COL, holotipo; US, MY, isotipos)

El nombre de esta especie hace referencia al rudimento en forma de arista que recuerda a un estilete, generalmente presente entre la primera y segunda bráctea. Aunque se halla presente en otras especies, fué observado en esta por primera vez.

Habitat: Zonas de precipitación media. Suelos arcillosos. Sitios abiertos. Terrenos planos con tendencia a anegarse.





**Heliconia estiletioides**

*Heliconia fernandezii* Abalo & Morales, sp. nov.

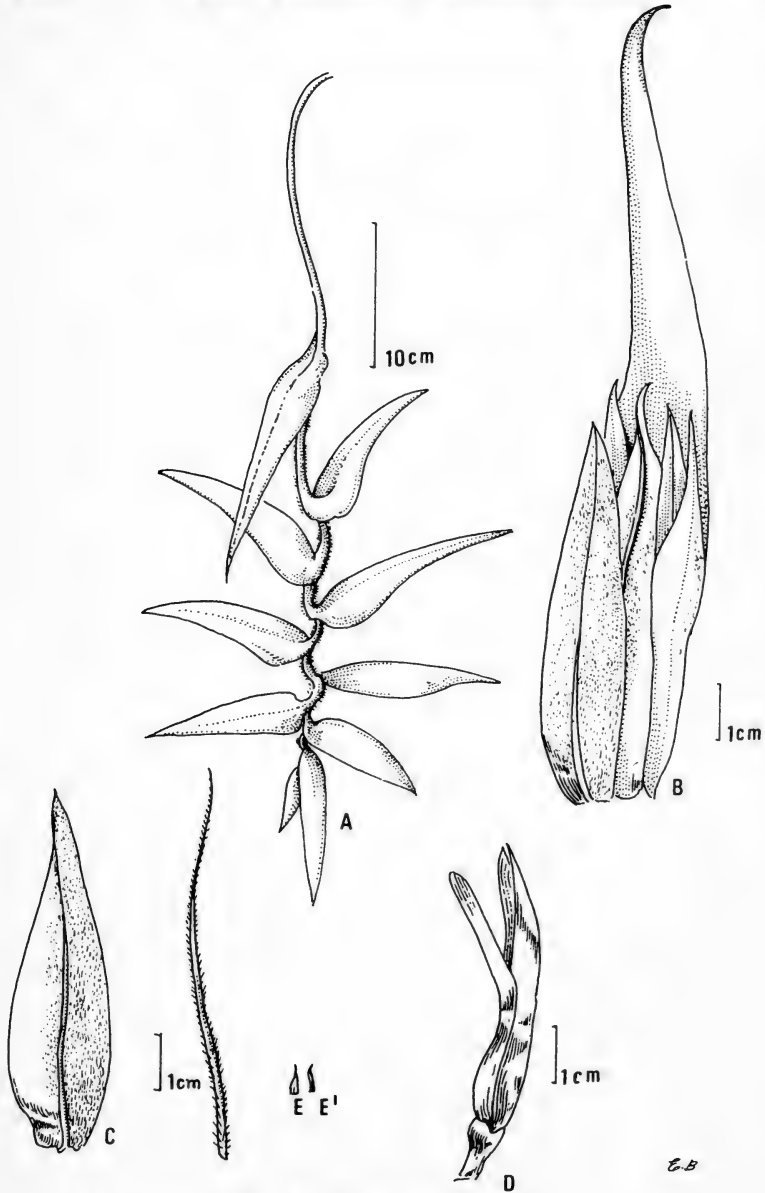
*Planta musoides. Pseudocaulis* 4 - 5 m altus. *Petiolus* 50 - 70 cm longus. *Lamina* 140 - 200 cm longa, 30 - 45 cm lata. *Inflorescentia pendula. Spathae rubrae, triangulo luteo. Perianthium luteum, pubescens. Rudimentum aristoides adest. Ovarium luteum, glabrum.*

Planta musoide. Pseudotallo 4 - 5 m. Hojas con pecíolo 50 - 70 cm de largo, glabro; lámina 140 - 200 cm de largo por 30 - 45 cm de ancho, base inequilátera, cordada y ápice obtuso. Inflorescencia péndula, 85 - 110 cm de largo; pedúnculo verde hacia el pseudotallo y rojo hacia la inflorescencia, 40 - 50 cm de largo y 1.2 cm de grosor, glabro; raquis rojo, flexuoso, pubescente, aterciopelado, 45 - 60 cm de largo por 1.0 cm de grosor. Espatas rojas, con amarillo en los bordes y en una franja que va desde cerca al ápice hasta la parte media formando un triángulo, 15 - 20 por inflorescencia, suave espiraladas, auriculadas, de borde ondulado, reflexas, glabras; espatas medias 10 - 12 cm de largo por 3.5 cm de ancho. Brácteas crema, membráceas, carinadas, pubescentes, aterciopeladas, 6.0 - 7.0 cm de largo por 2.0 cm de ancho; en algunas espatas y entre la primera y segunda brácteas puede aparecer un rudimento aristiforme muy pubescente, 5 - 7 cm de largo. Flores 10 en promedio por espata; perianto amarillo, 5 cm de largo, sépalos muy pubescentes, pétalos glabros; estaminodio triangular, ápice acuminado 0.5 cm de largo por 0.2 cm de ancho; pedicelos pubescentes, 2.0 cm de largo. Frutos inmaduros amarillos, glabros.

Tipo: Gustavo Morales 64, 28 Enero 1979, Colombia, Departamento Antioquia, Cañas Gordas, 6 Km vía Santa Fé, 1700 msm.  
(COL, holotipo)

Esta especie está dedicada al Dr. Alvaro Fernández, profesor del Instituto de Ciencias Naturales, Universidad Nacional de Colombia, gracias a cuya colaboración iniciaron los autores el presente trabajo.

Habitat: Zonas de precipitación media. Suelos arcillo-arenosos. Sitios abiertos. Laderas bien drenadas.



***Heliconia fernandezii***

*Heliconia fragilis* Abalo & Morales, sp. nov.

*Planta musoides. Pseudocaulis rubiginosus, 1.5 - 2.0 m altus. Petiolus 40 - 80 cm longus. Lamina 70 - 130 cm longa, 20 - 24 cm lata, costa rubra. Inflorescentia pendula, valde fragilis. Spathae rubrae. Bracteae luteae, persistens, expositae.*

Planta musoide. Pseudotallo rojo oscuro, 1.5 - 2.0 m. Hojas con la nervadura central roja; pecíolo 40 - 80 cm de largo, glabro; lámina 70 - 130 cm de largo por 20 - 24 cm de ancho, base inequilátera, semitruncada, ápice agudo. Inflorescencia péndula, muy frágil, 58 - 82 cm de largo; pedúnculo rojo, 18 - 22 cm de largo, glabro; raquis amarillo cuando joven y rojo al madurar, flexuoso, glabro, 40 - 60 cm de largo. Espatas rojo carmín con el borde y el ápice tempranamente necrosados, 16 en promedio por inflorescencia, dísticas, borde recto, pubescentes en la base, las medias 7.5 - 10 cm de largo por 2.0 - 2.5 cm de ancho. Brácteas amarillas claras, membranáceas, fuertemente carinadas, glabras, 5.5 - 6.0 cm de largo por 2.0 - 2.5 cm de ancho, las mas externas expuestas y conservando su color. Flores 8 - 10 por espata; perianto amarillo, glabro, 5.0 - 5.5 cm de largo; estaminodio linear - mucronado, 1.0 cm de largo por 0.15 cm de ancho; pedicelos glabros, 1.0 cm de largo. Frutos inmaduros amarillos, glabros.

Tipo: Gustavo Morales 52, 7 Enero 1979, Colombia, Departamento Nariño, Altaquer, 8 Km vía Junín, 1250 msm. ( COL, holotipo; US, isotipo )

El nombre de esta especie hace referencia a la extrema fragilidad de su raquis.

Habitat: Zonas de alta precipitación. Suelos muy arcillosos y húmedos. Sitios semi-abiertos o pequeñas aperturas. Terrenos planos o de pendiente suave.



***Heliconia fragilis***

*Heliconia huilensis* Abalo & Morales, sp. nov.

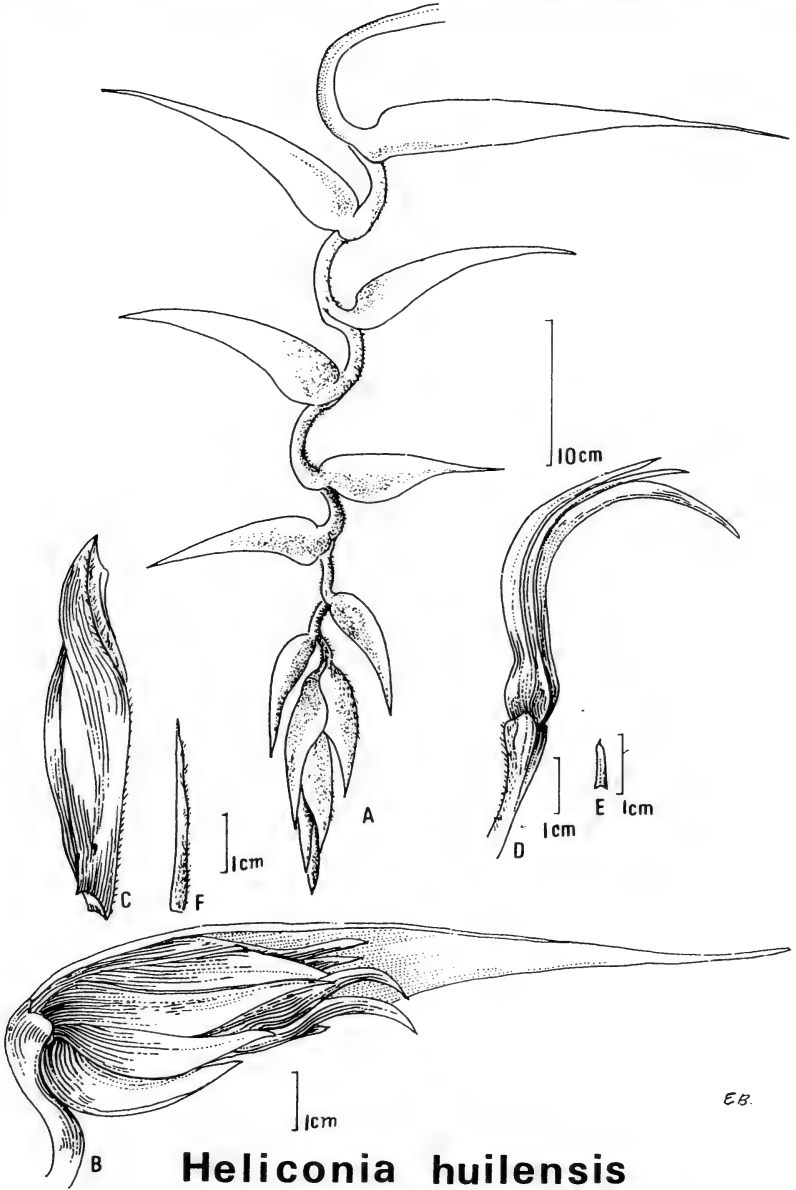
*Planta musoides. Pseudocaulis 1.5 - 3.0 m altus. Petiolus 30 - 120 cm longus. Lamina 100 - 200 cm longa, 27 - 42 cm lata. Inflorescentia pendula. Rachis rubra, pubescens. Spatheae rubrae, distichae. Perianthium luteum, pubescens. Ovarium luteum, glabrum. Rudimentum aristoides adest.*

Planta musoide. Pseudotallo 1.5 - 3.0 m de alto. Hojas con pecíolo 30 - 120 cm de largo; lámina 100 - 200 cm de largo por 27 - 42 cm de ancho, de base inequilátera, cuneada, ápice acuminado. Inflorescencia péndula, 60 - 130 cm de largo; pedúnculo rojo oscuro, 10 - 30 cm de largo, pubescente; raquis rojo, pubescente, 50 - 100 cm de largo, 4 - 6 cm entre espatas. Espatas rojas, 12 - 20 por inflorescencia, dísticas, borde recto, pubescentes, reflexas, las medias 10 - 16 cm de largo por 2.5 - 3.5 cm de ancho. Brácteas amarillo claro, membranáceas, carinadas, 5.0 - 6.0 cm de largo por 2.5 cm de ancho en la parte media, pubescentes principalmente sobre la carina y con aumento hacia el ápice; en la segunda bráctea puede aparecer un rudimento aristiforme pubescente, 2.5 - 3.0 cm de largo. Flores 20 - 28 por espata; perianto amarillo, 5.5 - 6.0 cm de largo, sépalos pubescentes, pétalos glabros; estaminodio blanco, 0.8 cm de largo por 0.2 cm de ancho, linear, mucronado; pedicelos amarillo claro, pubescentes, 2.0 cm de largo; ovarios amarillos, glabros.

Tipo: Gustavo Morales & José Abalo 198, 14 Septiembre 1980, Colombia, Departamento Huila, Gigante, Vereda Cachaya, 1700 msm (COL, holotipo; US, MY, isotipos)

El nombre de esta especie hace referencia al Departamento Huila, localidad de su tipo.

Habitat: Zonas de alta precipitación. Suelos arcillosos. Sitios semi-abiertos. Laderas.



***Heliconia huilensis***

*Heliconia laxa* Abalo & Morales, sp. nov.

*Planta musoides. Pseudocaulis lentiginosus, 1 - 2 m altus. Petiolus 45 - 75 cm longus. Lamina 70 - 150 cm longa, 26 - 31 cm lata. Inflorescentia pendula, rubra. Pedunculus valde laxus. Perianthium luteum, pubescens. Pedicellus pubescens. Ovarium: basis pubescens, apex glaber.*

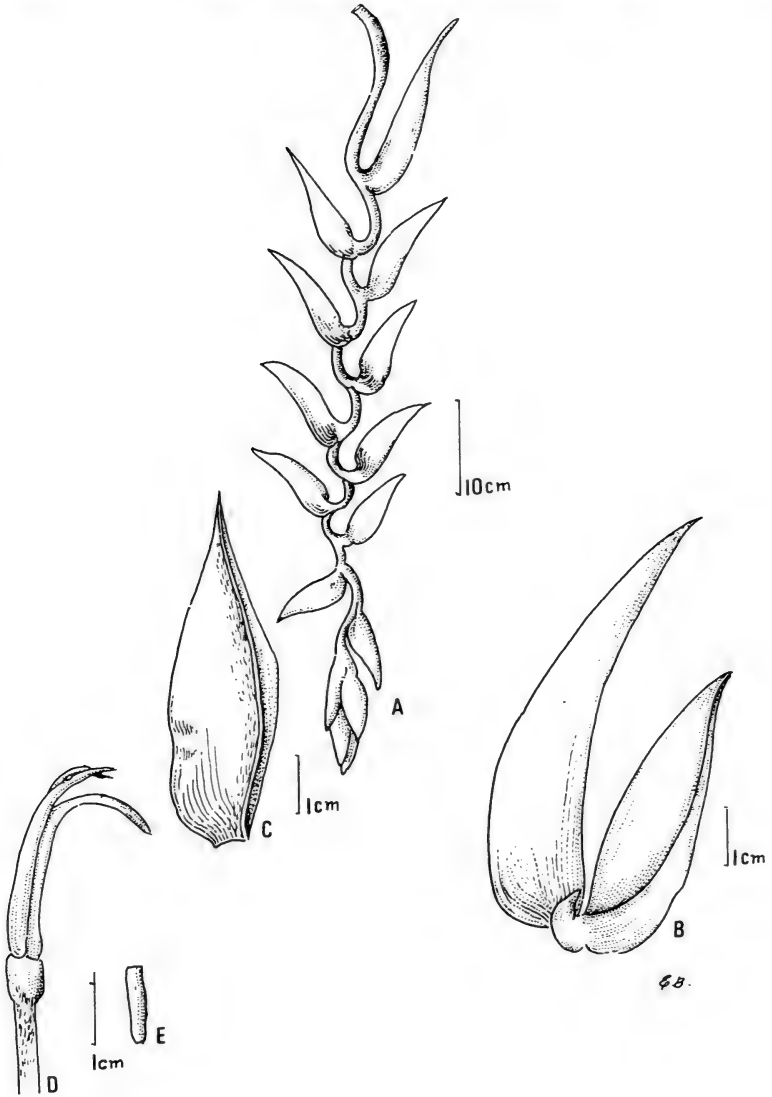
Planta musoide. Pseudotallo 1 - 2 m, lentiginoso, color crema verdoso con pecas color marrón. Hojas con pecíolo 45 - 75 cm de largo, glabro; lámina 70 - 150 cm de largo por 26 - 31 cm de ancho, base truncada, ápice obtuso. Inflorescencia péndula, 65 - 85 cm de largo; pedúnculo rojo, 25 - 30 cm de largo, pubérulo a glabro; raquis rojo, 40 - 55 cm de largo, finamente pubescente. Espatas rojas, unas 18 por inflorescencia, dísticas, reflexas, borde ligeramente ondulado, pubérulas principalmente hacia la base y los bordes, espatas medias 8 - 13 cm de largo por 2.5 - 3.0 cm de ancho. Brácteas membranáceas, carinadas, pubérulas en el dorso, 4.5 cm de largo por 2.0 cm de ancho; a partir de la segunda bráctea pueden aparecer 2 - 4 rudimentos aristiformes, amarillentos, pubescentes, 4.0 - 5.0 cm de largo. Flores 8 - 12 por espata, teretes; perianto amarillo, sépalos pubescentes, pétalos glabros, 4.0 - 4.5 cm de largo; estaminodios lineares, ápice redondeado, 1.4 cm de largo por 0.3 cm de ancho; pedicelos muy pubescentes, 1.5 cm de largo; ovarios pubescentes hacia la base y mas o menos glabros hacia el ápice.

Tipo: Gustavo Morales & José Abalo 241, 25 Octubre 1980, Colombia, Departamento Santander, Landázuri, 6 Km vía Cimitarra, 500 msm (COL, holotipo; US, MY, isotipos)

El nombre de esta especie hace referencia a la flaccidez de su pedúnculo.

Habitat: Zonas de muy alta precipitación. Suelos arcillosos o rocosos (pizarra) con alto contenido de materia orgánica. Sitios semi-abiertos a protegidos. Laderas.





**Heliconia laxa**

*Heliconia longissima* Abalo & Morales, sp. nov.

*Planta musoides. Pseudocaulis* 2 - 4 m altus. *Petiulus* 80 - 120 cm longus. *Lamina* 250 - 350 cm longa, 30 - 50 cm lata, subtus ceracea. *Inflorescentia* rubra, pendula, 180 - 410 cm longa; *pedunculus* ruber, flexuosos. *Spathae* rubrae. *Perianthium* luteum. *Pedicellus ovario* 3.0 - 3.5 cm longus. *Pedicellus fructu maturo et immaturo* 5.5 - 6.0 cm longus. *Rudimentum aristoides* adest. *Ovarium* luteum.

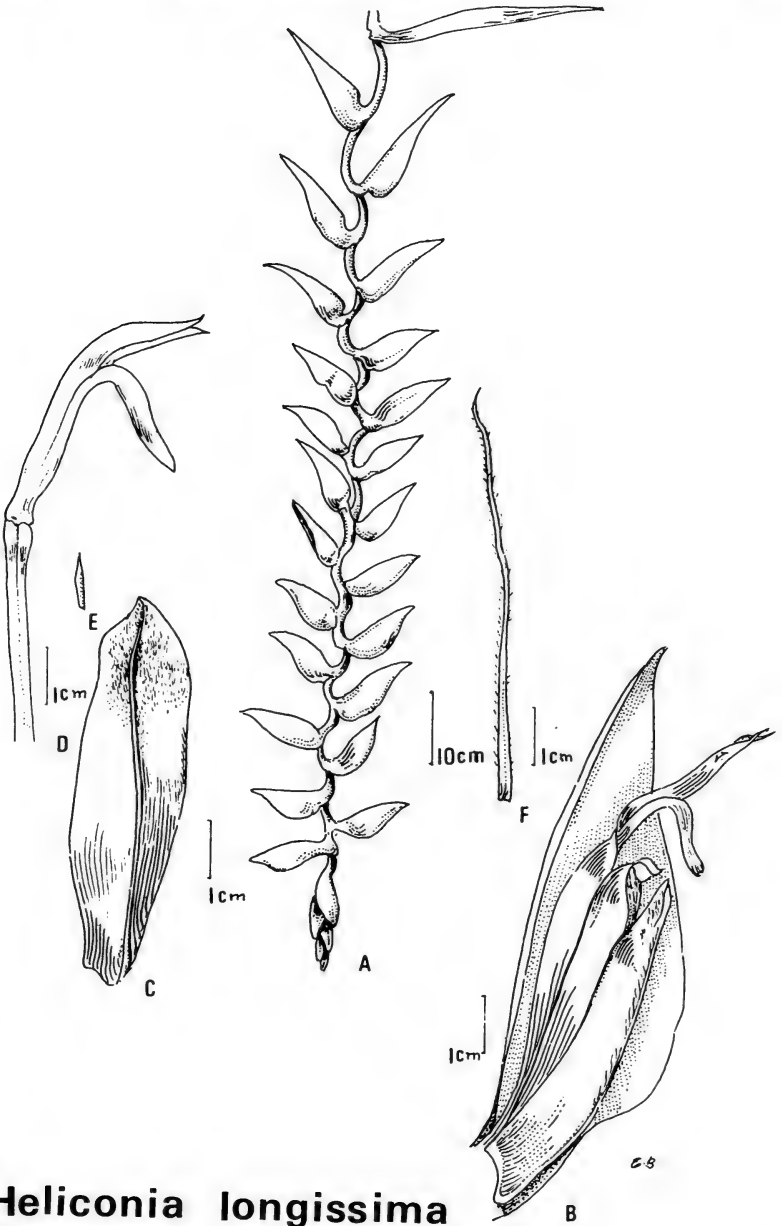
Planta musoide. Pseudotallo 2 - 4 m. Hojas con pecíolo 80 - 120 cm de largo, glabro; lámina muy cerosa por el envés, 250 - 350 cm de largo por 30 - 50 cm de ancho, base inequilátera, cordada y ápice agudo. Inflorescencia péndula, 180 - 410 cm de largo; espata basal verde y glabra, 30 - 70 cm de largo y 4 - 5 cm de ancho cuando extendida; pedúnculo rojo, glabro, 40 - 90 cm de largo; raquis rojo, pubescente, flexuoso, 140 - 320 cm de largo. Espatas rojas, 30 - 55 por inflorescencia, dísticas, formando una larga espiral, pubérulas, borde involuto en la base, reflexas, las medias 10 - 14 cm de largo por 3 - 4 cm de ancho. Brácteas carinadas, 7.0 - 8.0 cm de largo por 1.5 - 2.5 cm de ancho, pubescencia en aumento desde la base hacia el ápice. Flores 11 - 18 por espata; perianto amarillo, 5 - 6 cm de largo; sépalos pubérulos, pétalos glabros; estaminodio fusiforme con el ápice agudo, 0.9 cm de largo por 0.2 cm de ancho en la parte media; pedicelos mas o menos triangulares en corte transverso, los que sostienen los ovarios 3.0 - 3.5 cm de largo, los que sostienen los frutos 5.5 - 6.0 cm de largo aún sin madurar; ovarios amarillos, glabros. Rudimento aristiforme 7 cm de largo.

Observaciones: Esta especie difiere de las especies *H. longa* y *H. curtispatha* en el tamaño de la inflorescencia, la forma de las espatas, de las flores y estaminodio y también en caracteres vegetativos de la planta.

Tipo: Gustavo Morales & José Abalo 240, 25 Octubre 1980, Colombia, Departamento Santander, Cimitarra, 14 Km vía Landázuri, 360 msm (COL, holotipo, US, isotipo)

El nombre de esta especie hace referencia a su inflorescencia extremadamente larga.

Habitat: Zonas de muy alta precipitación. Suelos arcillosos muy pesados. Sitios semi-abiertos. Barrancos.



***Heliconia longissima***

*Heliconia luteoviridis* Abalo & Morales, sp. nov.

*Planta musoides. Pseudocaulis 1.0 - 2.0 m altus. Petiolus 80 - 110 cm longus. Lamina 80 - 120 cm longa, 20 - 22 cm lata. Inflorescentia erecta, sessilis. Spathae luteae, distichae. Perianthium flavovirens. Ovarium luteum.*

Planta musoide. Pseudotallo 1 - 2 m. Hojas con pecíolo 80 - 110 cm; lámina 80 - 120 cm de largo por 20 - 22 cm de ancho, de base inequilátera, mas o menos truncada, ápice agudo. Inflorescencia erecta, sésil; raquis amarillo, 18 - 22 cm de largo. Espatas amarillas, dísticas, cimbiformes, la primera foliolada o no, borde mas o menos recto, 7 - 12 por inflorescencia, glabras, ápice agudo, las medias 9 - 14 cm de largo por 1.5 - 2.0 cm de ancho. Brácteas membranáceas, ligeramente carinadas, glabras, 4.0 - 4.5 cm de largo por 1.2 - 1.5 cm de ancho. Flores 10 por espata, recurvadas; perianto amarillo-verdoso con el ápice amarillo, 4.0 - 4.5 cm de largo, glabro; pedicelos verde claro, glabros, 2.0 cm de largo; estaminodio lanceolado, 1.6 cm de largo, 0.4 cm de ancho en la parte media; ovarios amarillos, glabros.

Tipo: Gustavo Morales 73, 1 Febrero 1979, Colombia, Departamento Chocó, La Mansa, 4 Km vía el Carmen, 1900 msm. (COL, holotipo)

El nombre de esta especie hace referencia a los colores imperantes en su inflorescencia.

Habitat: Zona de precipitación media. Suelos arcillosos con acumulaciones superficiales de materia orgánica. Rizoma superficial, con los extremos de las raíces anclados en la arcilla. Sitios semi-abiertos, arroyos, carreteras. Laderas.



***Heliconia luteoviridis***

*Heliconia mucilagina* Abalo & Morales, sp. nov.

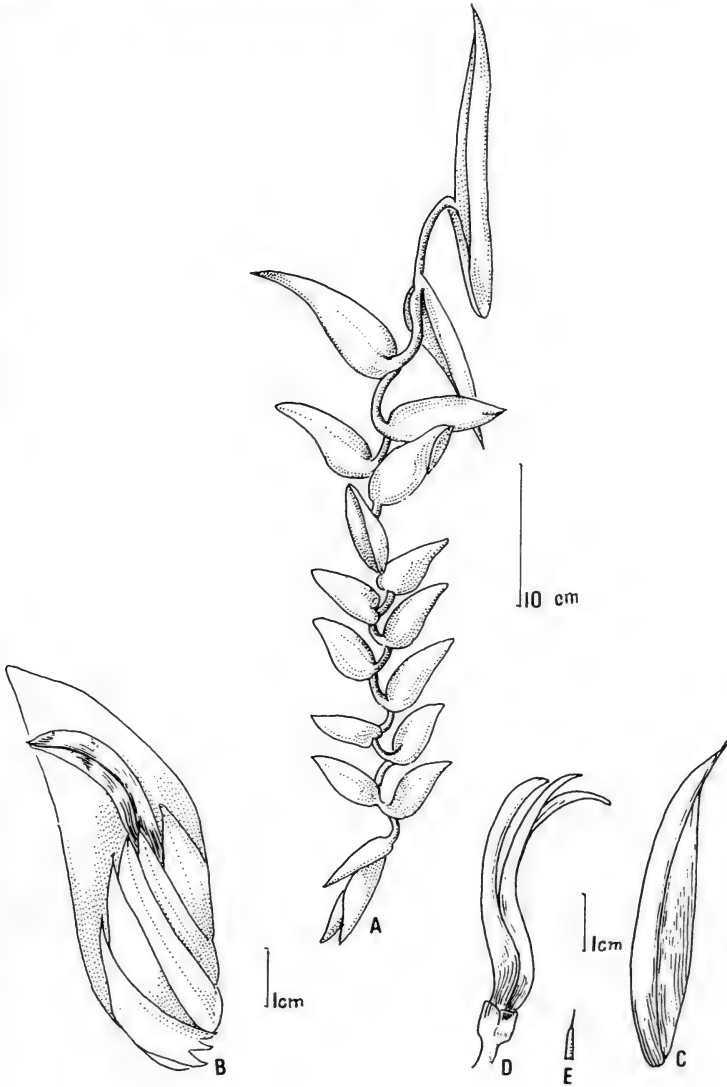
*Planta musoides. Pseudocaulis 1.5 - 2.0 m altus. Petiolus 80 - 130 cm longus. Lamina 110 - 140 cm longa, 20 - 30 cm lata. Inflorescentia pendula, aliquantulum in mucro involuta. Rachis juvenis lutea et rubra; rachis matura rubra. Spathae juvenes rubrae et luteae; spathae maturae rubrae. Perianthium luteum.*

Planta musoide. Pseudotallo 1.5 - 2.0 m. Hojas con pecíolo 80 - 130 cm de largo, glabro; lámina 110 - 140 cm de largo por 20 - 30 cm de ancho, base inequilátera, cuneada, ápice acuminado. Inflorescencia péndula, parcialmente cubierta de mucílago, 45 - 65 cm de largo; pedúnculo rojo, 10 - 20 cm de largo, finamente pubescente; raquis rojo amarillento cuando joven y rojo al madurar, 35 - 45 cm de largo, finamente pubescente, flexuoso. Espatas rojas con la base amarilla cuando jóvenes y completamente rojas al madurar, 15 - 25 por inflorescencia, suave espiraladas, borde inferior involuto, ápice tempranamente necrosado, pubescentes en la base y glabras hacia el ápice, las medias 6.0 - 8.0 cm de largo por 2.0 - 3.0 cm de ancho. Brácteas crema, membranáceas, carinadas, 5.0 - 5.5 cm de largo por 1.4 - 1.6 cm de ancho, glabras en la base y ligeramente pubescentes hacia el ápice. Flores 16 - 22 por espata; perianto amarillo, 4.5 cm de largo, sépalos pubescentes, pétalos glabros, estaminodio canaliculado con acumen, 0.7 cm largo por 0.2 cm de ancho en la parte media; pedicelos 1.5 - 2.0 cm de largo; ovarios glabros.

Tipo: Gustavo Morales 79, 2 Febrero 1979, Colombia, Departamento Chocó, Quibdó, 6 Km vía Isthmina, 40 msm ( COL, holotipo; US, isotipo )

El nombre hace referencia a la cobertura de mucílago que está presente en la inflorescencia.

Habitat: Zonas de muy alta precipitación. Suelos arcillosos, anegados. Sitios protegidos.



***Heliconia mucilagina***

E.O.

*Heliconia nariniensis* Abalo & Morales, sp. nov.

*Planta musoides. Pseudocaulis pubescens, 1.5 - 2.5 m altus. Petiolus 40 - 100 cm longus. Lamina 80 - 180 cm longa, 22 - 38 cm lata, valde inaequilatera. Inflorescentia pendula. Spathae rubrae, reflexae, pubescentes. Perianthium luteum pubescens. Ovarium luteum.*

Planta musoide. Pseudotallo 1.5 - 2.5 m, pubescente. Hojas con pecíolo 40 - 100 cm de largo, glabro; lámina muy inequilátera, 80 - 180 cm de largo por 22 - 38 cm de ancho, base inequilátera truncada a mas o menos cuneada, ápice agudo. Inflorescencia péndula, 75 - 155 cm de largo; pedúnculo rojo, muy pubescente, 30 - 70 cm de largo; raquis rojo, flexuoso, pubescente, 45 - 85 cm de largo. Espatas rojas, 14 - 25 por inflorescencia, reflexas, pubescentes interna y externamente, revolutas; la primera fértil, 16 - 24 cm de largo por 3.0 - 3.5 cm de ancho; las medias de 7.5 - 12 cm de largo por 2.2 - 4.0 cm de ancho. Brácteas amarillas claras, membranáceas, carinadas, pubescentes, 5 - 7 cm de largo por 1.5 - 2.5 cm de ancho. Flores 8 - 18 por espata; perianto amarillo, pubescente, 4.5 - 5.5 cm de largo; estaminodio amarillo claro, mas o menos claviforme cuando extendido y con el ápice acuminado, 0.8 - 1.0 cm de largo por 0.2 cm de ancho; pedicelos amarillos, pubescentes, 1.0 - 2.0 cm de largo; ovarios amarillos, pubescentes.

Tipo: Gustavo Morales 50, 7 Enero 1979, Colombia, Departamento Nariño, Ricaurte, 6 Km vía Altaquer, 1150 msm ( COL, holotipo; US, MY, isotipos )

El nombre *nariniensis* hace referencia al Departamento de Nariño, localidad del tipo de esta especie.

Habitat: Zonas de alta precipitación. Suelos arcillosos. Sitios abiertos. Laderas.





**Heliconia nariniensis**

1/8

*Heliconia nitida* Abalo & Morales, sp. nov.

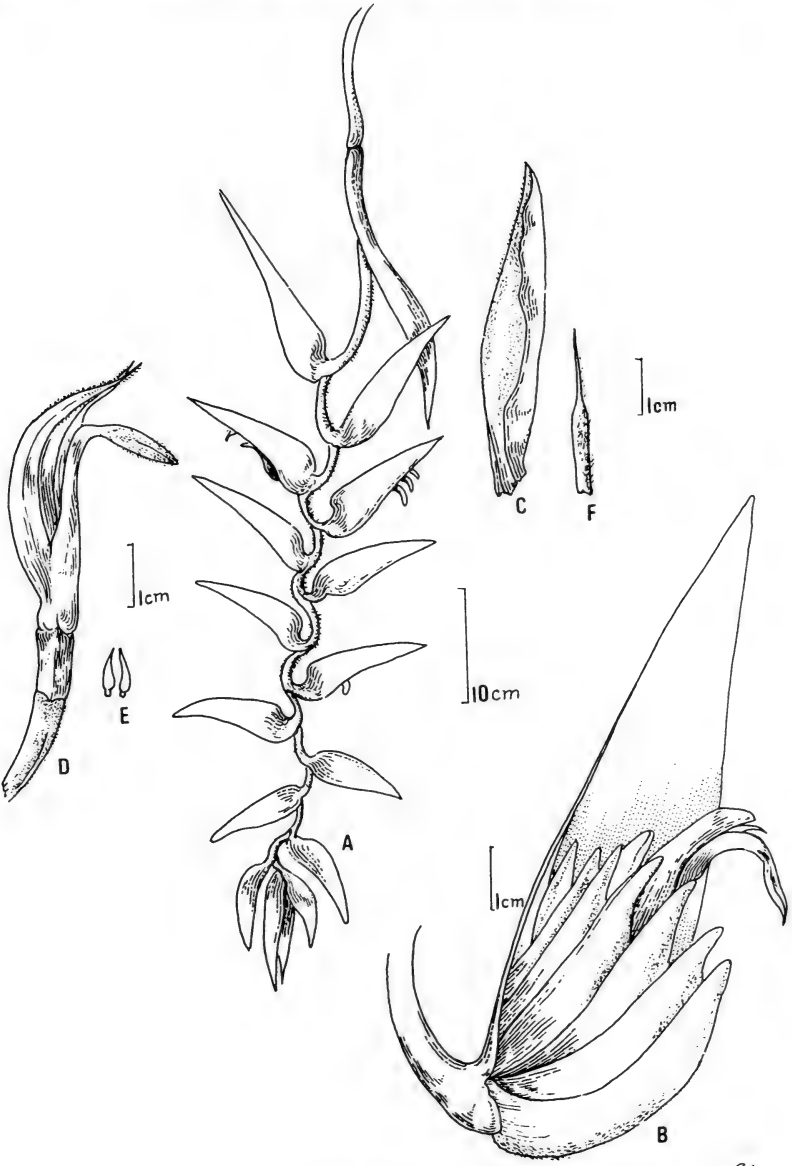
*Planta musoides. Pseudocaulis* 2.0 - 3.0 m altus, laevis, nitidus. *Petiolus* 50 - 150 cm longus. *Lamina* 110 - 160 cm longa, 35 - 40 cm lata. *Inflorescentia* pendula. *Rachis* rubra et lutea. *Spathae juvenes* rubrae et luteae; *spathae maturae* rubrae. *Perianthium* luteum. *Pedicellus* laete pubescens. *Rudimentum aristoides* adest. *Ovarium* luteolum.

Planta musoide. Pseudotallo 2 - 3 m, liso, brillante. Hojas 5 - 6, pecíolo glabro, 50 - 150 cm de largo; lámina 110 - 160 cm de largo por 35 - 40 cm de ancho, base cordada, ápice obtuso mucronado. Inflorescencia péndula, 85 - 110 cm de largo; pedúnculo rojo-verdoso, pubescente, aterciopelado, 25 - 40 cm de largo; raquis rojo frente a la espata y amarillo lateralmente, finamente pubescente. Espatas exteriormente rojas, con la parte inferior de la base y el borde amarillos cuando jóvenes, al madurar la parte inferior de la base se torna roja, pubescentes hacia la base, interiormente amarillo-naranja, aterciopelada, de borde mas o menos recto, ápice agudo, 17 - 22 por inflorescencia, reflexas, espiraladas; espatas medias 10 - 15 cm de largo por 3 - 4 cm de ancho. Brácteas amarillo claro, pubescentes exteriormente, fuertemente carinadas, 5.5 - 6.0 cm de largo por 2.0 cm de ancho extendida. Rudimento aristiforme amarillo claro, muy pubescente, 2.7 - 4.5 cm de largo. Flores 10 - 14 por espata; perianto amarillo, giboso, 5.0 cm de largo, sépalos pubescentes, pétalos glabros; estaminodio crema, linear-triangular a subulado, 0.8 - 1.0 cm de largo por 0.2 cm de ancho en la base; ovario amarillo claro, glabro; pedicelo amarillo claro, muy pubescente, 2.0 cm de largo.

Tipo: Gustavo Morales 273, 11 Enero 1982. Colombia, Departamento Santander, Jordán, 8 Km vía Velez, La Peña de los Micos, 1400 msm ( COL, holotipo; US, MY, isotipos )

El nombre *nitida* hace referencia al pseudotallo liso y brillante de esta especie.

Habitat: Zonas de alta precipitación. Suelos arcillosos a pedregosos con gran cantidad de materia orgánica. Sitios protegidos, sombríos. Laderas.



**Heliconia nitida**

*Heliconia oleosa* Abalo & Morales, sp. nov.

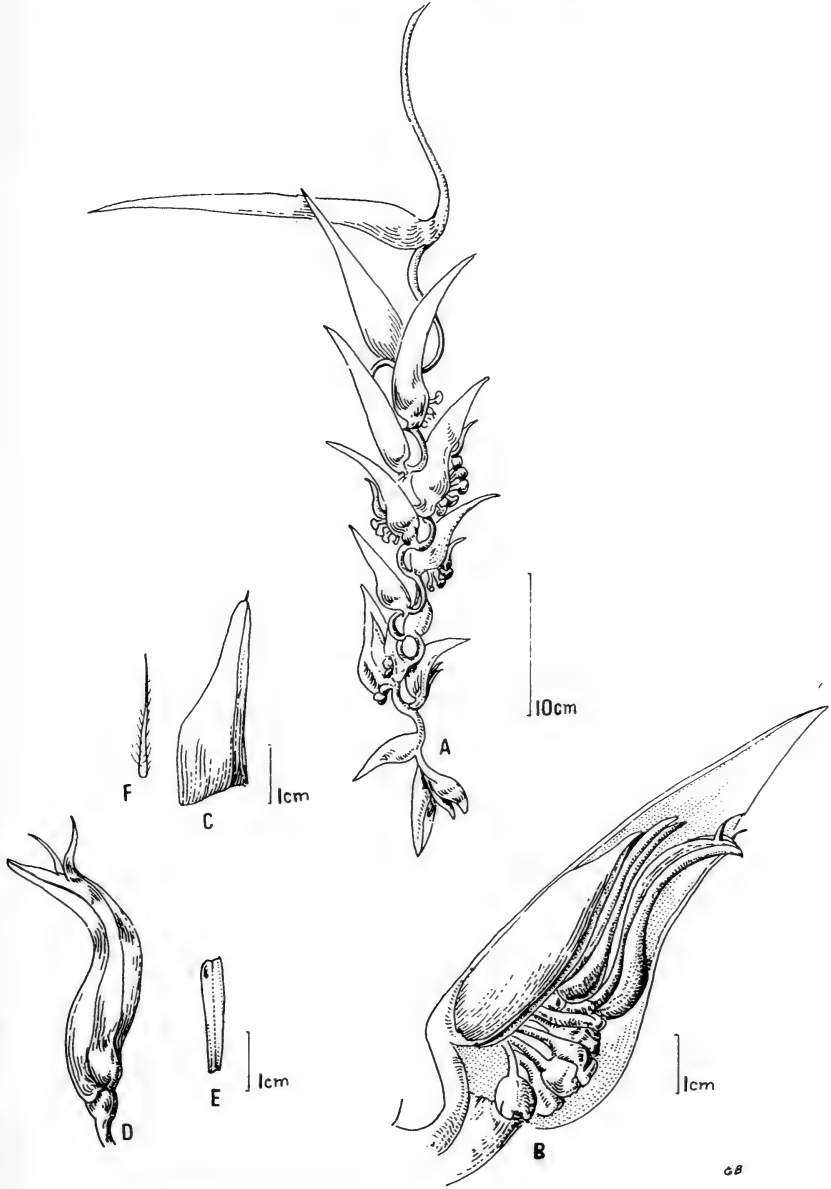
*Planta musoides. Pseudocaulis lentiginosus, 1.5 - 2.5 m altus. Folia sessilia. Lamina 180 - 250 cm longa, 20 - 25 cm lata, basis anguste cuneata. Inflorescentia pendula. Spathae rubrae, oleosae ad tactum et olfactum. Flores gibbosi; perianthium luteum. Rudimentum aristoides adest. Ovarium luteum, pubescens.*

Planta musoide. Pseudotallo 1.5 - 2.5 m, lentiginoso. Hojas 4 - 6, sésiles; lámina 180 - 250 cm de largo por 20 - 25 cm de ancho en la parte media, base largamente cuneada, ápice agudo. Inflorescencia péndula, 80 - 120 cm de largo; pedúnculo verde amarillento, pubescente, 20 - 40 cm de largo; raquis amarillo naranja a rojo, pubescente, 60 - 100 cm de largo. Espatas 18 - 30 por inflorescencia, reflexas, dispuestas en suave espiral, externamente rojo escarlata, pubescentes, oleosas al tacto y olfato, internamente rojo ladrillo, finamente pubescentes, borde recto hacia el ápice e involuto hacia la base, ápice agudo; primera espata basal estéril, 27 - 42 cm de largo por 3.5 - 4.0 cm de ancho en la base, ápice muy agudo, espatas basales 12 - 34 cm de largo por 2.5 - 4.0 cm de ancho en la base, espatas medias 7 - 12 cm de largo por 3 - 4 cm de ancho, espatas apicales 6 - 7 cm de largo por 3.2 - 3.5 cm de ancho. Brácteas amarillo claro, pubescentes en la cara externa, 4 - 5 cm de largo por 1.5 cm de ancho en la base, ápice unguiculado. Rudimento aristiforme amarillo claro, pubescente, 1.5 hasta 6.0 cm de largo. Flores gibosas, hasta 38 en las espatas basales, 20 - 30 en las medias y 14 - 20 en las apicales. Perianto amarillo, 5.0 cm de largo, sépalos pubérulos a pubescentes, pétalos glabros; estamindio amarillo claro, linear, de ápice truncado y suavemente emarginado, 1.6 - 2.0 cm de largo por 0.3 - 0.5 cm de ancho; ovario amarillo claro, pubescente; pedicelo amarillo claro, pubescente, 1.5 - 1.8 cm de largo.

Tipo: Gustavo Morales 270, 11 Enero 1982, Colombia, Departamento Santander, Landázuri, 3 - 8 Km vía Jordán, 1050 - 1200 msm (COL, holotipo; US, MY, isotipos)

El nombre de esta especie hace referencia al aspecto y sensación al tacto de su inflorescencia.

Habitat: Zonas de alta precipitación. Suelos formado por roca plana (pizarra) creciendo muy superficialmente sobre acumulaciones de materia orgánica. Sitios semi-abiertos. Laderas, barrancos.



**Heliconia oleosa**

*Heliconia reptans* Abalo & Morales, sp. nov.

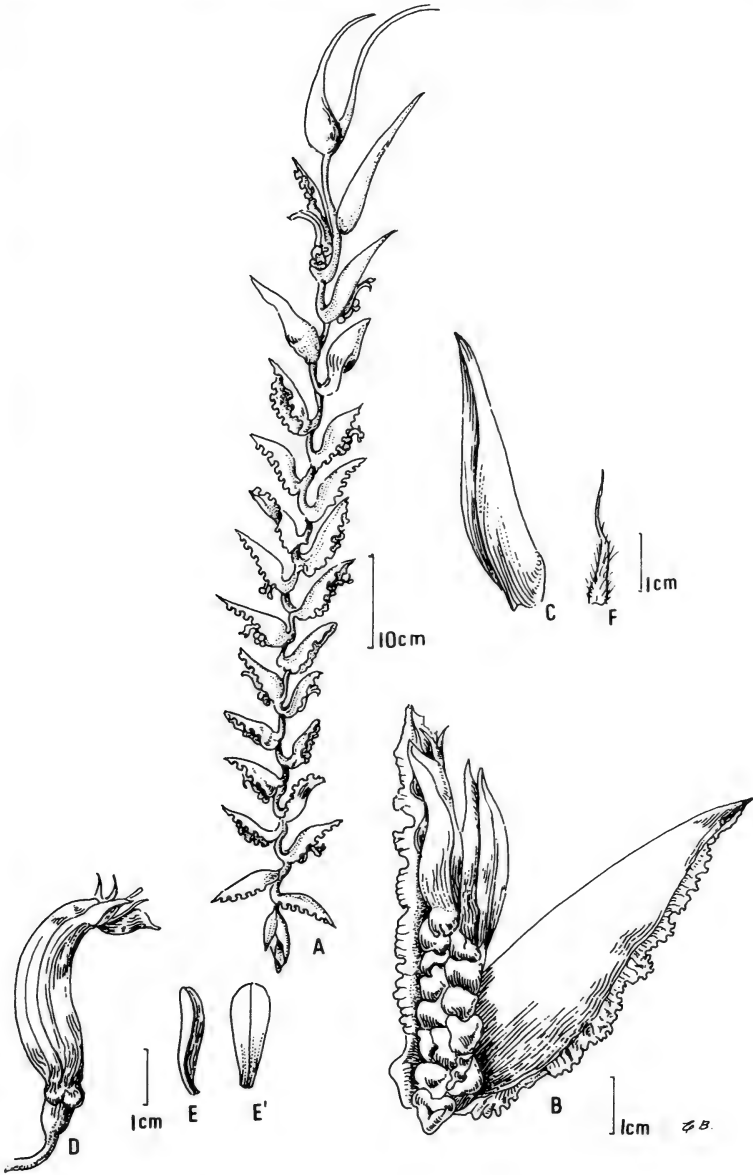
*Planta musoides. Pseudocaulis 1.2 - 2.2 m altus. Petiolus 35 - 110 cm longus. Lamina 120 - 170 cm longa, 25 - 35 cm lata. Inflorescentia pendula, emergit circa 15 cm alta pseudocauli et quiescet solo. Spathae xerampelinae; margo undulatus. Flores multi. Perianthium luteum. Rudimentum aristoides adest. Ovarium luteum.*

Planta musoide. Pseudotallo 1.2 - 2.2 m, rojo marrón. Hojas 5 - 6, pecíolo 35 - 110 cm de largo, glabro; lámina 120 - 170 cm de largo por 25 - 35 cm de ancho, base cordada, ápice apiculado. Inflorescencia 80 - 140 cm de largo que brota del pseudotallo a 15 - 20 cm del suelo y al desarrollarse descansa en el piso sobre el raquis desde aproximadamente la parte media hasta el ápice y las espatas reflexas y dísticas se curvan ligeramente hacia arriba; pedúnculo verde, 25 - 35 cm de largo; raquis rojo marrón, 60 - 105 cm de largo. Espatas rojo marrón, 34 - 45 por inflorescencia; borde rizado, ápice ligeramente agudo; primera espata basal fértil, verdosa, 20 - 25 cm de largo por 3 cm de ancho en la base, ápice muy agudo; espatas medias 7 - 11 cm de largo por 2.5 - 3.5 cm de ancho, ápice muy agudo. Brácteas crema, 5.0 cm de largo por 2.0 cm de ancho. Rudimento aristiforme amarillo, pubescente, 1.2 - 3.0 cm de largo. Flores 34 - 55 en cada espata basal, 25 - 32 en cada espata media y 12 - 23 en cada espata apical; perianto amarillo, 4.5 cm de largo; estaminodio blanco, obovado angosto, ápice truncado ligeramente emarginado, 2.0 cm de largo por 0.6 cm de ancho; ovario amarillo; pedicelo amarillo, pubescente, 1.5 cm de largo.

Tipo: Gustavo Morales 271, 11 Enero 1982, Colombia, Departamento Santander, Landázuri, 9 Km vía Vélez, 1100 msm ( COL, holotipo; US, MY, isotipos )

El nombre de esta especie hace referencia al hábito reptante de su inflorescencia.

Habitat: Zonas de alta precipitación. Suelos formados por roca plana ( pizarra ) creciendo muy superficialmente sobre acumulaciones de materia orgánica. Sitios semi-abiertos. Laderas, barrancos.



**Heliconia reptans**

*Heliconia rhodantha* Abalo & Morales, sp. nov.

*Planta musoides. Pseudocaulis* 2.0 - 4.0 m altus. *Petiolus* 80 - 110 cm longus. *Lamina* 150 - 200 cm longa, 40 - 50 cm lata. *Inflorescentia pendula. Spathae rubrae, distichae, continuae, longa taenia faciens. Perianthium roseum. Ovarium subviolaceum, albescens.*

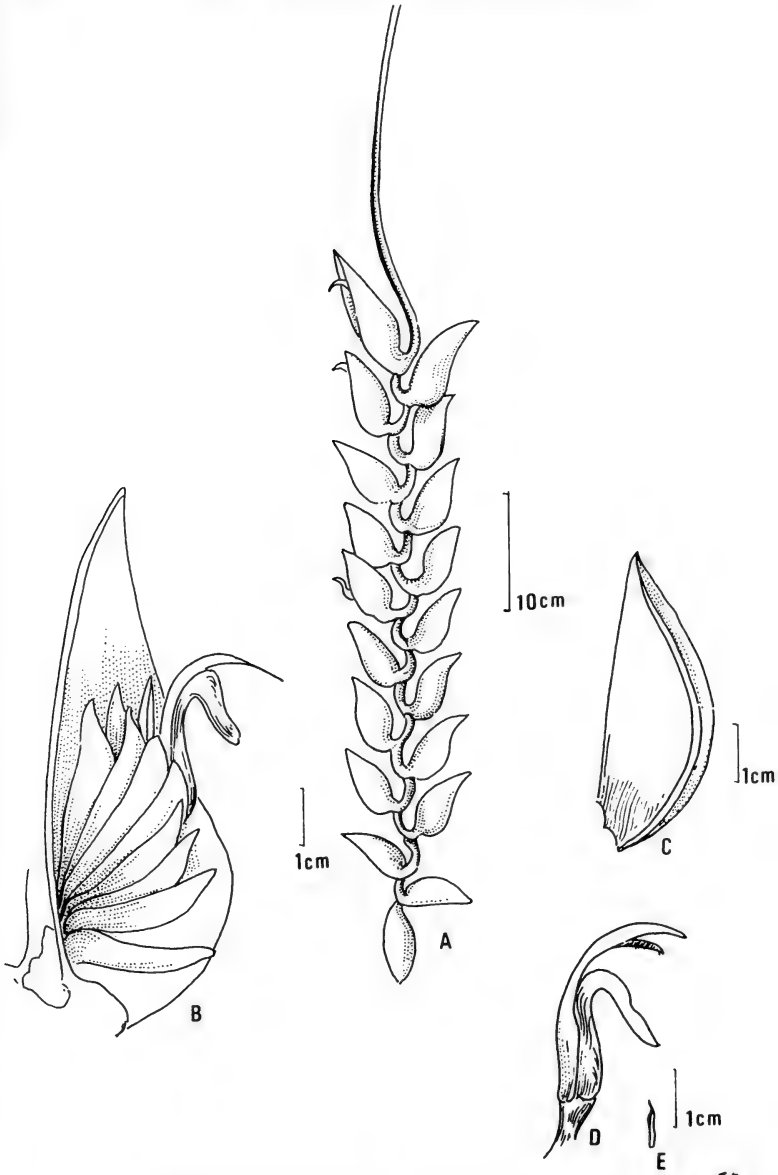
Planta musoide. Pseudotallo 2 - 4 m. Hojas con pecíolo 80 - 110 cm de largo, glabro; lámina 150 - 200 cm de largo por 40 - 50 cm de ancho, de base inequilátera, semitruncada, ápice obtuso. Inflorescencia péndula, 100 - 135 cm de largo; pedúnculo verde, 50 - 65 cm de largo, pubescente, aterciope-lado; raquis rojo, finamente pubescente, flexuoso, 50 - 70 cm de largo. Espatas rojas, 18 - 30 por inflorescencia, dísticas, reflexas, finamente pubescentes, con el ápice necrosado tempranamente, 6 - 9 cm de largo por 2.5 - 3.5 cm de ancho. Bráctees crema, membranáceas, carinadas, vellosas, 4.5 - 5.5 cm de largo por 2.0 - 2.5 cm de ancho. Flores 15 - 20 por espata; perianto rosado, 4.5 cm de largo, giboso, glabro; estaminodio linear, ápice acuminado, 0.8 cm de largo por 0.2 cm de ancho; pedicelos glabros, 1.5 cm de largo; ovarios morado muy pálido a blancuzcos.

Tipo: Gustavo Morales 76, 1 Febrero 1979, Colombia, Departamento Chocó, El Carmen, 47 Km vía Quibdó, 500 msm.  
( COL, holotipo )

El nombre de esta especie hace referencia a la coloración rosada del perianto.

Habitat: Zonas de muy alta precipitación. Suelos arcillosos con muy alto contenido de materia orgánica. Sitios semi-abiertos. Laderas muy húmedas.





**Heliconia rhodantha**

*Heliconia rigida* Abalo & Morales, sp. nov.

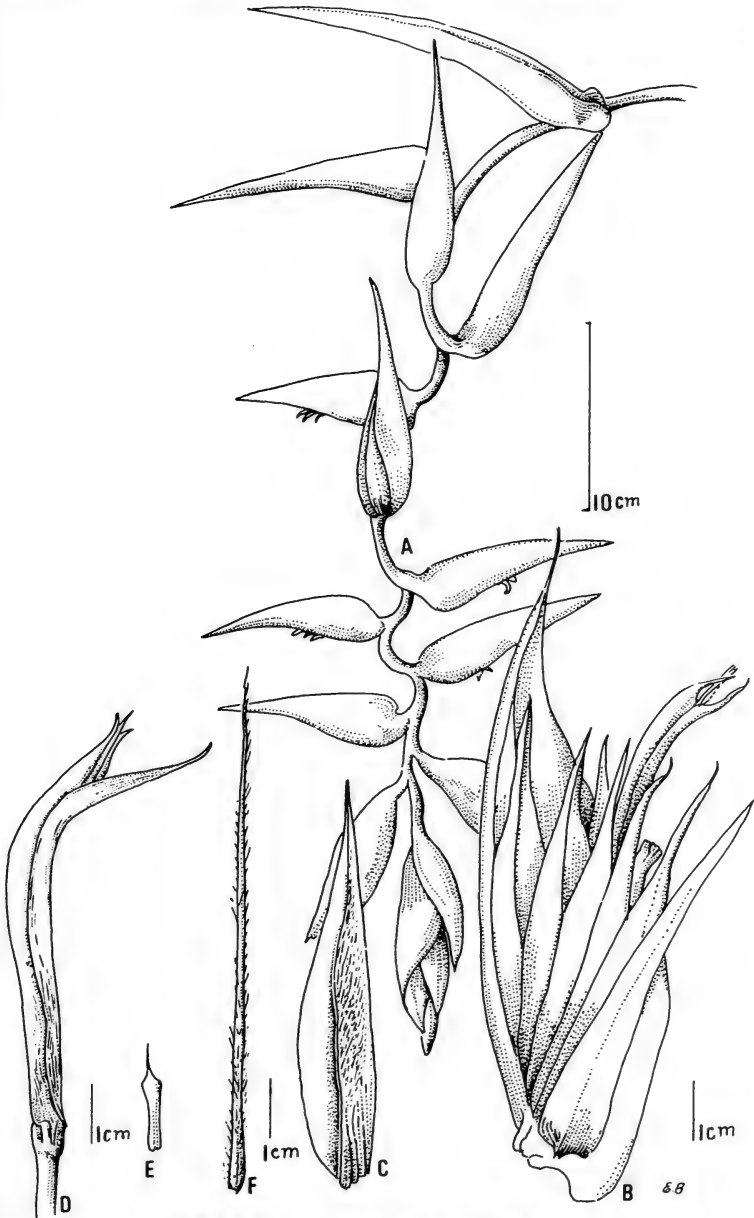
*Planta musoides. Pseudocaulis ceraceus, 3 - 4 m altus. Petiolus 100 - 170 cm longus, glaber. Lamina 100 - 250 cm longa, 40 - 45 cm lata, subtus ceracea. Inflorescentia pendula; pedunculus ruber, pubescens; rachis valde rigida, rubra, pubescens. Spathae valde rigidae, rubrae, margo et apex luteus. Perianthium luteum. Ovarium album. Fructus immaturus albus, apex lilacinus. Rudimentum aristoides adest.*

Planta musoide. Pseudotallo 3 - 4 m, mas o menos ceroso. Hojas 5 - 6, pecíolo 100 - 170 cm de largo, glabro; lámina 100 - 250 cm de largo por 40 - 45 cm de ancho, cerosas por el envés, base cordada, ápice obtuso con acumen. Inflorescencia péndula, 65 - 220 cm de largo; pedúnculo rojo, pubescente, 15 - 30 cm de largo; raquis rojo, finamente pubescente, muy rígido, 50 - 200 cm de largo; distancia entre espatas 1.0 - 2.5 cm. Espatas exteriormente rojas con el borde y el ápice amarillos, finamente pubescentes, internamente amarillas, aterciopeladas en los bordes y ápice, glabras al centro, 28 - 86 por inflorescencia, espiraladas, formando ángulo de 90° con respecto al raquis, muy rígidas, bordes rizados; espatas medias 9 - 13 cm de largo por 3.0 - 4.5 cm de ancho. Brácteas amarillo claro, 7.0 - 7.5 cm de largo por 2.0 - 2.3 cm de ancho, extendidas y en la base, carinadas, cara externa pubescente. Rudimento aristiforme amarillo claro, 6.0 - 10.0 cm de largo, muy pubescente. Flores 10 - 22 por espata; perianto amarillo, 7.0 cm de largo, sépalos pubérulos, pétalos glabros; estaminodio blanco, lanceolado, 2.0 cm de largo por 0.4 cm de ancho en el cuarto subapical; pedicelo blanco, pubescente en los vértices, pedicelos de los ovarios 2.0 cm de largo, de los frutos 5.0 - 6.0 cm de largo; ovarios blancos, glabros, 1.3 cm de largo. Frutos inmaduros con la parte superior lila.

Tipo: Gustavo Morales 268, 9 Enero 1982, Colombia, Departamento Caldas, La Dorada, 34 Km vía Norcasia, 320 msm ( COL, holotipo; US, MY, isotipos )

El nombre de esta especie hace referencia a la extrema rigidez de su inflorescencia.

Habitat: Zonas de precipitación media. Suelos muy arcillosos. Sitios abiertos. Terrenos de pendiente suave.



***Heliconia rigida***

*Heliconia scarlatina* Abalo & Morales, sp. nov.

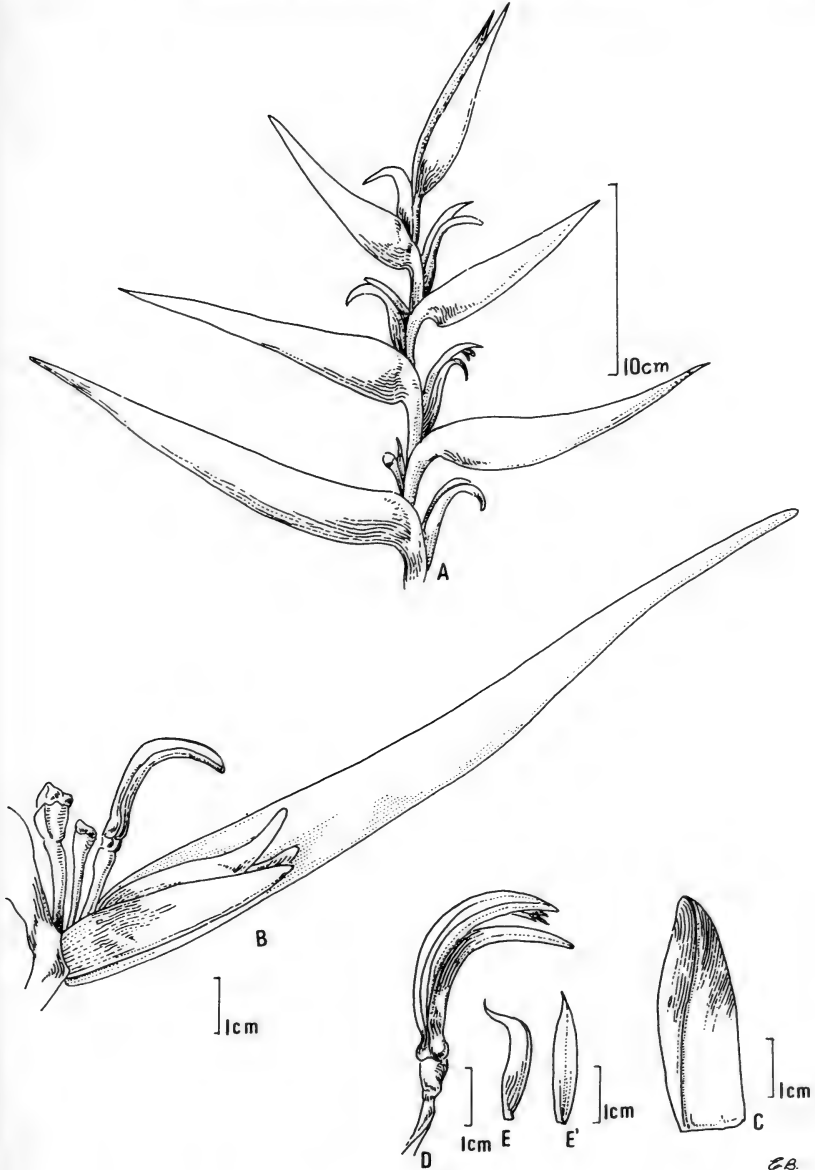
*Planta musoides. Pseudocaulis 0.8 - 1.2 m altus. Petiolus 70 - 90 cm longus. Lamina 50 - 70 cm longa, 20 - 24 cm lata, atroviridis, aspectus velutinus. Inflorescentia rubra, erecta. Perianthium album, apex viridis; recurvatum. Ovarium album, viride in medio.*

Planta musoide. Pseudotallo 0.8 - 1.2 m. Hojas con pecíolo 70 - 90 cm de largo, glabro; lámina verde oscuro aterciopelada por el haz, 50 - 90 cm de largo por 20 - 38 cm de ancho, la nervadura central con banda rojiza por el envés, base inequilátera truncada, ápice acuminado. Inflorescencia erecta; pedúnculo rojo, 5 - 10 cm de largo, pubérulo a glabro; raquis rojo, 20 - 35 cm de largo, finamente pubescente a glabro, 2 - 3 cm entre espatas. Espatas rojas, dísticas, 8 - 12 por inflorescencia, lanceolado-conduplicadas, finamente pubescentes a glabras, bordes mas o menos revolutos, las medias 10 - 15 cm de largo por 1.5 - 2.0 cm de ancho. Brácteas membranáceas, 3.5 - 4.5 cm de largo por 0.7 - 1.5 cm de ancho, glabras. Flores 10 - 20 por espata, recurvadas; perianto blanco con bandas verde claro hacia el ápice, glabro, 3.0 - 4.0 cm de largo; estaminodios blancos, elíptico-canaliculados, ápice agudo, 2.0 - 2.5 cm de largo por 0.4 - 0.6 cm de ancho en la parte media y extendida; pedicelos verde claro, glabros, 1.0 - 2.0 cm de largo; ovarios blancos con una franja verde irregular en la parte media, glabros.

Tipo: Gustavo Morales & José Abalo 243, 25 Octubre 1980, Colombia, Departamento Santander, Jordán Alto, 8 Km vía Vélez, Peña de los Micos, 1400 msm (COL, holotipo)

El nombre de esta especie hace referencia a la coloración dominante en su inflorescencia.

Habitat: Zonas de alta precipitación. Suelos arcillosos a pedregosos con gran cantidad de materia orgánica. Sitios protegidos, sombríos. Laderas.



**Heliconia scarlatina**

*Heliconia venusta* Abalo & Morales, sp. nov.

*Planta cannoides. Pseudocaulis* 1 - 3 m altus. *Petiolus* 5 - 15 cm longus. *Lamina* 45 - 80 cm longa, 12 - 16 cm lata, *costa rubella. Inflorescentia erecta. Rachis rubra, pubescens. Spathae rubrae, distichae. Flores exserti. Perianthium luteum, apex flavovirens. Ovarium: Basis lutea, apex ruber.*

Planta cannoide. Pseudotallo 1 - 3 m. Hojas con nervadura central rojiza, algunas moradas por el envés; pecíolo 5 - 15 cm de largo; lámina 45 - 80 cm de largo por 12 - 16 cm de ancho, base inequilátera, cuneada, ápice acuminado. Inflorescencia erecta; pedúnculo verde, glabro, 8 - 12 cm de largo; raquis rojo, pubescente, 8 - 18 cm de largo. Espatas rojas, dísticas, 6 - 18 por inflorescencia, atenuado-cimbiformes, largamente acuminadas, borde revoluto en la base y recto hacia el ápice, la primera espata foliolada o nó, pubescente en el borde inferior, las demás glabras, las medias 8 - 14 cm de largo por 1.5 - 2.0 cm de ancho. Brácteas crema, membranáceas, carinadas, 5.5 - 6.0 cm de largo por 1.5 - 2.0 cm de ancho, las externas pubescentes por el dorso, las internas mas o menos glabras. Flores 8 - 14 por espata, triangulares en corte transverso, exsertas; perianto amarillo con el ápice verdoso, 5.0 - 5.5 cm de largo, sépalos pubescentes, pétalos glabros; estaminodio amarillo claro a blanco, tricuspidadado, con la cúspide central ensiforme, 0.9 - 1.2 cm de largo por 0.4 - 0.6 cm de ancho en la parte media; pedicelos verde-rojizos, 1.5 - 2.0 cm de largo, pubescentes; ovario amarillo-rojizo en la base y rojo hacia el ápice, pubéculos a glabros.

Tipo: Gustavo Morales & José Abalo, 14 Septiembre 1980, Colombia, Departamento Huila, Gigante, Vereda Cachaya, 1700 msm (COL, holotipo; US, MY, isotipos)

El nombre *venusta* es indicativo de la belleza de esta especie.

Habitat: Zonas de alta precipitación. Suelos arcillosos. Sitios semi-abiertos. Laderas.



***Heliconia venusta***

ADDITIONAL NOTES ON THE GENUS *ACANTHOLIPPIA*. VI

Harold N. Moldenke

*ACANTHOLIPPIA* Griseb.

Additional & emended bibliography: Goebel, *Pflanzenbiol. Schild.* 2: 13, pl. 12, fig. 1--4. 1891; R. A. Phil., *Ann. Mus. Nac. Chile Bot.* 1: [Cat. Praev. Pl. Itin. Tarap.] 69. 1891; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 133, 151, & 152. 1895; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 1, 250. 1903; Reiche & Phil. in Reiche, *Estud. Crit. Fl. Chil.* 5: 298--301. 1910; Speg., *Mycet. Argent.* 5: 375. 1910; Sydow, *Justs Bot. Jahresber.* 39 (1): 377. 1912; Sanzin, *Anal. Soc. Cient. Argent.* 88: 96--98, 100, 101, 133, & 134, fig. 2. 1919; Stapf, *Ind. Lond.* 1: 26. 1929; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 2, 250. 1941; Cabrera, *Revist. Invest. Agric. Buenos Aires* 11: 327, 336, 339, 343, 357, 359, 366, 369, & 397, fig. 1C. 1957; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 3, 250. 1959; Mukhopadhyay, *Pollen Morph. Verb.* [thesis]. 1971; Thanikaimoni, *Ind. Franc. Pond. Trav. Sect. Scient. Tech.* 12 (2): [3] (1973) and 13: [5] & 328. 1976; Anon., *Roy. Bot. Gard. Kew Lib. Curr. Awaren.* 9: 22. 1978; Markgraf & D'Antoni, *Pollen Fl. Argent.* 29, 97, 118, 203, & 207, pl. 42-356. 1978; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 40, 47, 50, & 57. 1978; Mold., *Phytologia* 40: 261--262 & 504 (1978) and 44: 328 & 505. 1979; Hocking, *Excerpt. Bot. A.33*: 89. 1979; Rogerson, Becker, & Prince, *Bull. Torrey Bot. Club* 106: 62. 1979; Botta, *Darwiniana* 22: 511--532. 1980; Mold., *Phytol. Mem.* 2: 4, 173, 182, 184, 369, 420, 422, & 519. 1980; Mold., *Phytologia* 45: 40, 339, & 503 (1980) and 48: 171, 182, & 505. 1981; Rogerson, Becker, Buck, & Long, *Bull. Torrey Bot. Club* 108: 394. 1981; Mold., *Phytologia* 50: 249, 268, & 503. 1982.

*ACANTHOLIPPIA DESERTICOLA* (R. A. Phil.) Mold.

Additional synonymy: *Acantholippia punensis* Botta, *Hickenia* 1: 195. 1979.

Additional & emended bibliography: R. A. Phil., *Ann. Mus. Nac. Chile Bot.* 1: [Cat. Praev. Pl. Itin. Tarap.] 69. 1891; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 151 & 152. 1895; R. A. Phil., *Anal. Univ. Chile* 90: 620 & 622. 1896; Reiche & Phil. in Reiche, *Estud. Crit. Fl. Chile* 5: 298, 300, & 301. 1910; Speg., *Mycet. Argent.* 5: 375 & 378. 1910; Sydow, *Justs Bot. Jahresber.* 39 (1): 377 & 409. 1912; Mold., *Phytol.* 40: 261--262. 1978; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 50. 1978; Botta, *Hickenia* 1: 195. 1979; Hocking, *Excerpt. Bot. A.33*: 89. 1979; Botta, *Darwiniana* 22: 514--518, fig. 1. 1980; Mold., *Phytol. Mem.* 2: 173, 182, 184, & 519. 1980; Mold., *Phytologia* 45: 339 (1980), 48: 182 (1981), and 50: 249. 1982.

Additional illustrations: Botta, *Darwiniana* 22: 518, fig. 1. 1980.

Philippi (1891) reports this species from near Breas, in Tarapa-



cá, Chile, where it is known as "ricarica". Spegazzini (1910) records a fungus, *Camarasporium andicola* Speg., as parasitic on *Lippia microphylla* in Argentina. Since the true *L. microphylla* Cham. does not occur in Argentina, it seems obvious that the plant referred to by Spegazzini is *L. microphylla* R. A. Phil., a synonym of *Acantholippia deserticola*.

The *Lippia trifida* var. *gracilis* Phil., previously regarded as a synonym of *A. deserticola*, is now regarded as *A. trifida* var. *reichei* Mold.

Additional citations" MOUNTED ILLUSTRATIONS: Botta, Darwiniana 22: 518, fig. 1. 1980 (Z, Z).

#### *ACANTHOLIPPIA HASTULATA* Griseb.

Additional & emended bibliography: Cabrera, Revist. Invest. Agric. Buenos Aires 11: 339, 343, 357, 359, 369, & 397, fig. 1C. 1957; Mold., Phytologia 40: 262. 1978; Botta, Darwiniana 22: 523--525, fig. 4. 1980; Mold., Phytol. Mem. 2: 173, 184, & 519. 1980

Emended illustrations: Cabrera, Revist. Invest. Agric. Buenos Aires 11: 339, fig. 1C. 1957; Botta, Darwiniana 22: [524], fig. 4. 1980.

#### *ACANTHOLIPPIA RIOJANA* (Hieron.) Hieron. & Mold.

Additional bibliography: Goebel, Pflanzenbiol. Schild. 2: 13, pl. 12, fig. 1--4. 1891; Stapf, Ind. Lond. 1: 26. 1929; Mold., Phytologia 40: 262. 1978; Botta, Darwiniana 22: 513--515 & 519--520, fig. 2. 1980; Mold., Phytol. Mem. 2: 184 & 519. 1980.

Additional illustrations: Goebel, Pflanzenbiol. Schild. 2: pl. 12, fig. 1--4. 1891; Botta, Darwiniana 22: 520, fig. 2. 1980.

Additional citations: MOUNTED ILLUSTRATIONS: Botta, Darwiniana 22: 520, fig. 2. 1980 (Z, Z).

#### *ACANTHOLIPPIA SERIPHIOIDES* (A. Gray) Mold.

Additional & emended bibliography: Sanzin, Anal. Soc. Cient. Argent. 88: 100, 101, & 134. 1919; Markgraf & D'Antoni, Pollen Fl. Argent. 29, 97, 118, 2-3, & 207, pl. 42-356. 1978; Mold., Phytologia 40: 262. 1978; Botta, Darwiniana 22: 514, 516, & 525, fig. 5. 1980; Mold., Phytol. Mem. 2: 184, 420, 422, & 519. 1980.

Additional illustrations: Markgraf & D'Antoni, Pollen Fl. Argent. pl. 42-256. 1978; Botta, Darwiniana 22: 527, fig. 5. 1980.

Recent collectors refer to this plant as a small shrub, to 0.5 m. tall, and have encountered it in dry rocky places at 1900--2450 m. altitude. The corollas are said to have been "white" on Mische 255.

Markgraf & D'Antoni (1978) describe the pollen of this species as "Tricolporate, verrucate. Grain prolate spheroidal, 16 x 15 um. Exine 1.3 um thick. Pore lalongate, 5 x 2 um. Margo 2.5--3 um. wide. Polar A 0.15, amb sub-angulare" on the basis of *Lagiglia* 27 from Mendoza, Argentina, and list the vernacular names, "alargato" and "tomillo". I assume that by "um" these authors mean mu or micron.

Sanzin (1919) states that this species flowers from November to March and lists it from San Juan, Río Negro, San Luis, and Chubut in Argentina.

Additional citations: ARGENTINA: Chubut: *O'Donell* 3239 (Ws). Mendoza: *Castellanos* 3468 (W--2923097); *Miehe* 255 (Ld). Santa Cruz: *Dusén s.n.* [Puerto Mazaredo, Dec. 17, 1904] (N). MOUNTED ILLUSTRATIONS: *Botta, Darwiniana* 22: 527, fig. 5. 1980 (Z)

*ACANTHOLIPPIA TARAPACANA* *Botta, Hickenia* 1: 197. 1979.

Bibliography: *Botta, Hickenia* 1: 197. 1979; *Botta, Darwiniana* 22: 514, 516, 521, & [522], fig. 3. 1980; *Mold., Phytologia* 50: 249 & 268. 1982.

Illustrations: *Botta, Darwiniana* 22: [522], fig. 3. 1980.

This species is based on *Ricardi* 3363 from Puyulos, on the railway from Arica to La Paz, at 3750 m. altitude, in the department of Arica, Tarapaca, Chile, collected on September 16, 1955. and deposited in the San Isidro herbarium. *Botta* (1980) cites also *Ricardi* 3418, *Ricardi & Marticorena* 4725/1110, *Ricardi, Marticorena, & Matthei* 77, and *Schlegel* 4884 from Chile.

The only vernacular name thus far recorded for the species is "chachacoma".

Citations: MOUNTED ILLUSTRATIONS: *Botta, Darwiniana* 22: [522], fig. 3. 1980 (Z, Z).

*ACANTHOLIPPIA TRIFIDA* (C. Gay) *Mold.*

Additional & emended bibliography: *Reiche & Phil. in Reiche, Estud. Crit. Fl. Chile* 5: 298--300. 1910; *Sanzin, Anal. Soc. Cient. Argent.* 88: 96--98, 100, 101, 133, & 134, fig. 2. 1919; *Mold., Phytologia* 40: 262 (1978) and 44: 328. 1979; *Hocking, Excerpt. Bot. A.33*: 89. 1979; *Botta, Darwiniana* 22: 514, 516, & 528--531, fig. 6. 1980; *Mold., Phytol. Mem.* 2: 182, 369, 420, 422, & 519. 1980; *Mold., Phytologia* 48: 171. 1981.

Additional & emended illustrations: *Sanzin, Anal. Soc. Cient. Argent.* 88: 101, fig. 2. 1919; *Botta, Darwiniana* 22: [530], fig. 6. 1980.

*Sanzin* (1919) regards *Lippia floribunda* R. A. Phil. and *L. foliolosa* R. A. Phil. and conspecific with and synonymys of the present species, but I regard the former as a synonym of *Aloysia reichii* *Mold.* and the latter as a synonym of *Acantholippia seriphioides* (A. Gray) *Mold.* He describes the species as "Pequeño arbusto, muy común en la Precordillera a una altura de 1000 a 1500 metros. Numerosos ejemplares de varias procedencias (leg. *Sanzin*)." He records the common name, "tomillo", and also lists it as characteristic of the subandean life zone, 900--1500 m. altitude.

The *Lippia gracilis* R. A. Phil., previously placed in the synonymy of typical *A. trifida*, is now regarded as belonging to that of its var. *reichii* *Mold.* The *O'Donell* 3239, distributed as *A. trifida*, seems actually to be *A. seriphioides* (A. Gray) *Mold.*

Additional citations: MOUNTED ILLUSTRATIONS: *Botta, Darwiniana* 22: [530], fig. 3. 1980 (Z, Z).

*ACANTHOLIPPIA TRIFIDA* var. *REICHEI* *Mold., Phytologia* 44: 328. 1979.

Synonymy: *Lippia gracilis* R. A. Phil., *Anal. Univ. Chile* 90: 620. 1896 [not *L. gracilis* *Schau.*, 1847]. *Lippia trifida* var. *gracilis* *Phil. ex Reiche, Estud. Crit. Fl. Chile* 300. 1907.

[to be continued]

# PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 51

June 1982

No. 2

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Published by Harold N. Moldenke and Alma L. Moldenke

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# AMENDED OUTLINES AND INDICES FOR SIX RECENTLY PUBLISHED SYSTEMS OF ANGIOSPERM CLASSIFICATION

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No less than six major systems of angiosperm (Magnoliophyta or Angiospermae) classification have been published since 1980 (Takhtajan 1980; Cronquist 1981; Rouleau 1981; Dahlgren et al. 1981; Thorne 1981; Young in press). These systems are presented in different formats and frequently are not indexed. Therefore, it is difficult to use and compare the various treatments. In order to make these systems readily available and usable to a larger proportion of the botanical community, we have compiled and amended outlines and indices of these various works and present them here in a form of uniformly arranged appendixes.

At this time we are not assessing the various systems presented here; an evaluation of them will appear at a later date. The appendixes are presented in alphabetical order by the author of each system. The format of each is similar so that the various systems may be easily compared. The sequence of arrangement for each system follows the sequence established by the original author(s). Subclasses are indicated by Roman numerals; superorders by capital letters; orders by Arabic numbers; suborders by the Arabic number of the order plus a lower case letter beginning

with "a"; and, families are indicated by Arabic numbers. The distinction between orders and families may be noted by their terminations (-ales and -aceae). The following example will illustrate:

- I. Magnoliidae
  - A. Magnolianaee
    - 1. Magnoliales
      - 1a. Degenerineae
        - 1. Degeneriaceae
      - 1b. Magnoliineae
    - 2. Himantandraceae

Superordinal terminations have been standardized and the -anae ending used. The rationale for using this ending has been discussed elsewhere (Reveal & Bedell in press). Taxa recognized by the various authors appear in bold-face type while all synonyms (both explicit and implicit) appear in italics. The endings on synonyms have been deleted from the outline to save space. Thus:

- 1. Magnoliales (*Annon.*,  
*Caneill.*)

This indicates that the author treats Annonales and Canellales as synonyms of Magnoliales. Synonyms not explicitly listed, but implied by the various authors have also been included where possible. For instance Cronquist (1981) does not explicitly list Celtidaceae as a synonym of Ulmaceae, but it is

implied because he includes the genus *Celtis* in Ulmaceae. We have attempted to be as complete as possible in the listing of synonyms in the various systems of classification. It should be noted, however, that we are presently compiling a list of family epithets from the literature, determining the type of each family name, and will present that later. With such a list, it would be possible to annotate Rouleau's system with such names for only he attempts to treat all genera of the flowering plants.

Following each outline of a system is an index to the taxa treated in that classification. The taxa are listed alphabetically and are followed by either a Roman numeral (for subclasses), a capital letter (superorders), an Arabic number (orders and families), or a combination of numbers and a letter (suborders) that indicate their placement in that particular system of classification. Again, all synonyms appear in italics. The following is an example:

Alismataceae, 336  
 Alismatales, 72  
 Alismatanae, U  
 Alismatidae, VIII  
 Alismatineae, 72b  
 Alliaceae, 353  
 Aloeaceae, 359  
 Alseuosmiaceae, 171  
 Alsinaceae, 76

Alismataceae is family 336, Alismatales is order 72, Alismatanae is superorder U, Alismatidae is subclass VIII, Alismatineae is suborder 72b. Both Alliaceae and Alseuosmiaceae

are considered by the author to be recognizable families, while Aloeaceae and Alsinaceae are considered to be synonyms of families 359 and 76 respectively.

We hope this will provide a quick and easy way to find various taxa and their placement in the six recently published systems of angiosperm classification.

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## APPENDIX I

## The Cronquist System of Angiosperm Classification

## MAGNOLIOPSIDA

## I. Magnoliidae

1. Magnoliales (*Annon.*, *Canell.*)
  1. Winteraceae
  2. Degeneriaceae
  3. Himantandraceae
  4. Eupomatiaceae
  5. Austrobaileyaceae
  6. Magnoliaceae
  7. Lactoridaceae
  8. Annonaceae (*Monodr.*)
  9. Myristicaceae
  10. Canellaceae
2. Laurales
  11. Amborellaceae
  12. Trimeniaceae
  13. Monimiaceae (*Atherospermat.*, *Hortoni.*, *Siparun.*)
  14. Gomortegaceae
  15. Calycanthaceae
  16. Idiospermaceae
  17. Lauraceae (*Cassyth.*)
  18. Hernandiaceae (*Gyrocarp.*)
3. Piperales
  19. Chloranthaceae
  20. Saururaceae
  21. Piperaceae (*Peperomi.*)
4. Aristolochiales
  22. Aristolochiaceae
5. Illiciales
  23. Illiciaceae
  24. Schisandraceae
6. Nymphaeales
  25. Nelumbonaceae
  26. Nymphaeaceae (*Euryal.*)
  27. Barclayaceae
  28. Cabombaceae
  29. Ceratophyllaceae
7. Ranunculales (*Berberid.*, *Coriari.*)
  30. Ranunculaceae (*Glau-cidi.*, *Hellebor.*,

*Hydrastid.*)

31. Circaeasteraceae (*Kingdoni.*)
32. Berberidaceae (*Leontic.*, *Nandin.*, *Podophyll.*)
33. Sargentodoxaceae
34. Lardizabaralaceae
35. Menispermaceae
36. Coriariaceae
37. Sabiaceae (*Meliosm.*)
8. Papaverales
  38. Papaveraceae (*Chelidoni.*, *Eschscholzi.*, *Platystemon.*)
  39. Fumariaceae (*Hypeco.*, *Pteridophyll.*)
- II. Hamamelididae
  9. Trochodendrales
    40. Tetracentraceae
    41. Trochodendraceae
  10. Hamamelidales (*Cercidiphyll.*, *Euptele.*)
    42. Cercidiphyllaceae
    43. Eupteleaceae
    44. Platanaceae
    45. Hamamelidaceae (*Altingi.*, *Disanth.*, *Liquidambar.*, *Rhodolei.*)
    46. Myrothamnaceae
  11. Daphniphyllales
    47. Daphniphyllaceae
  12. Didymelales
    48. Didymelaceae
  13. Eucommiales
    49. Eucommiaceae
  14. Urticales (*Barbey.*)
    50. Barbeyaceae
    51. Ulmaceae (*Celtid.*)
    52. Cannabaceae
    53. Moraceae
    54. Cecropiaceae
    55. Urticaceae
  15. Leitneriales
    56. Leitneriaceae
  16. Juglandales

57. Rhoipteleaceae  
 58. Juglandaceae (*Platyacary.*)  
 17. Myricales  
 59. Myricaceae  
 18. Fagales (*Balanop., Betul.*)  
 60. Balanopaceae  
 61. Fagaceae (*Nothofag.*)  
 62. Betulaceae (*Carpin., Coryl.*)  
 19. Casuarinales  
 63. Casuarinaceae  
 III. Caryophyllidae  
 20. Caryophyllales (*Cact., Chenopodi.*)  
 64. Phytolaccaceae (*Agdestid., Babreui., Giseki., Petiveri., Stegnospermat., Rivin.*)  
 65. Achatocarpaceae  
 66. Nyctaginaceae  
 67. Aizoaceae (*Ficoid., Mesembryanthem., Sesuvi., Tetragoni.*)  
 68. Didiereaceae  
 69. Cactaceae  
 70. Chenopodiaceae (*Dysphani., Halophyt., Salicorni., Salsol.*)  
 71. Amaranthaceae  
 72. Portulacaceae (*Hector-ell., Monti.*)  
 73. Basellaceae  
 74. Molluginaceae  
 75. Caryophyllaceae (*Alsin., Illecebr., Paronychi.*)  
 21. Polygonales  
 76. Polygonaceae  
 22. Plumbaginales  
 77. Plumbaginaceae (*Limoni., Static.*)  
 IV. Dilleniidae  
 23. Dilleniales (*Paeoni.*)  
 78. Dilleniaceae  
 79. Paeoniaceae  
 24. Theales  
 80. Ochnaceae (*Diegodendr., Lophir., Luxemburgi., Strasburgeri., Sauvagesi., Wallace.*)  
 81. Sphaerosepalaceae (*Rho-*  
*palocarp.*)  
 82. Sarcolaenaceae  
 83. Diptercarpaceae  
 84. Caryocaraceae  
 85. Theaceae (*Asteropei., Bonneti., Camelli., Sladeni., Ternstroemi.*)  
 86. Actinidiaceae (*Sauraii.*)  
 87. Scytopetalaceae (*Rhapto-petal.*)  
 88. Pentaphylacaceae  
 89. Tetrameristaceae  
 90. Pellicieraceae  
 91. Oncothecaceae  
 92. Marcgraviaceae  
 93. Quinaceae  
 94. Elatinaceae  
 95. Paracryphiaceae  
 96. Medusagynaceae  
 97. Clusiaceae (*Garcini., Guttiferae, Hyperic.*)  
 25. Malvales  
 98. Elaeocarpaceae (*Aristo-teli.*)  
 99. Tiliaceae  
 100. Sterculiaceae (*Bytt-neri.*)  
 101. Bombacaceae  
 102. Malvaceae  
 26. Lecythidales  
 103. Lecythidaceae (*Aster-anth., Barringtoni., Foetidi., Napoleon.*)  
 27. Nepenthales (*Droser., Sar-raceni.*)  
 104. Sarraceniaceae  
 105. Nepenthaceae  
 106. Droseraceae (*Dionae.*)  
 28. Violales (*Begnoni., Cucur-bit., Fouquieri., Loas., Tamaric.*)  
 28a. Violineae  
 107. Flacourtiaceae (*Neu-manni., Plagiopter., Soyauxi.*)  
 108. Peridiscaceae  
 109. Bixaceae (*Cochlosperm.*)  
 110. Cistaceae  
 111. Huaceae  
 112. Lacistemataceae



113. Scyphostegiaceae  
 114. Stachyuraceae  
 115. Violaceae (*Leoni.*)  
 28b. Tamaricineae  
 116. Tamaricaceae  
 117. Frankeniaceae  
 28c. Ancistrocladineae  
 118. Dioncophyllaceae (*Tri-  
phyophyll.*)  
 119. Ancistrocladaceae  
 28d. Passiflorineae  
 120. Turneraceae  
 121. Malesherbiaceae  
 122. Passifloraceae  
 123. Achariaceae  
 124. Caricaceae  
 28e. Fouquieriineae  
 125. Fouquieriaceae  
 28f. Hoplestigmatineae  
 126. Hoplestigmataceae  
 28g. Curcubitineae  
 127. Curcubitaceae  
 28h. Begoniineae  
 128. Datisceae (*Tetramel.*)  
 129. Begoniaceae  
 28i. Loasineae  
 130. Loasaceae (*Gronovi.*)  
 29. Salicales  
 131. Salicaceae  
 30. Capparales  
 132. Tovariaceae  
 133. Capparaceae (*Cleom.,  
Koeberlini., Penta-  
diplandr., Physen.*)  
 134. Brassicaceae (*Crucif-  
erae*)  
 135. Moringaceae  
 136. Resedaceae  
 31. Batales  
 137. Gyrostemonaceae  
 138. Bataceae  
 32. Ericales  
 139. Cyrillaceae  
 140. Clethraceae  
 141. Grubbiaceae  
 142. Empetraceae  
 143. Epacridaceae (*Prionot.,  
Stypheli., Witt-  
steini.*)  
 144. Ericaceae (*Rhododendr.,  
Vaccini.*)  
 145. Pyrolaceae  
 146. Monotropaceae (*Hypopi-  
thyd., Semicircul.*)  
 33. Diapensiales  
 147. Diapensiaceae  
 34. Ebenales  
 148. Sapotaceae (*Achr., Boer-  
lagell., Bumeli., Sar-  
cospermat.*)  
 149. Ebenaceae  
 150. Styracaceae  
 151. Lissocarpaceae  
 152. Symplocaceae  
 35. Primulales  
 153. Theophrastaceae  
 154. Myrsinaceae (*Aegicerat.*)  
 155. Primulaceae (*Corid.*)  
 V. Rosidae  
 36. Rosales (*Connar., Cunoni.,  
Grossulari., Pittospor.,  
Saxifrag.*)  
 36a. Cunoniineae  
 156. Brunelliaceae  
 157. Connaraceae  
 158. Eucryphiaceae  
 159. Cunoniaceae (*Bauer.*)  
 160. Davidsoniaceae  
 161. Dialypetalanthaceae  
 36b. Pittosporineae  
 162. Pittosporaceae  
 163. Byblidaceae (*Roridul.*)  
 36c. Grossulariineae  
 164. Hydrangeaceae (*Kirenge-  
shom., Philadelph.*)  
 165. Columelliaceae  
 166. Grossulariaceae (*Brexii.,  
Dulongi., Escalloni.,  
Ite., Montini., Phyl-  
lonom., Pterostemon.,  
Tetracarpae., Tribel.*)  
 167. Greyiaceae  
 168. Bruniaceae (*Berzeli.*)  
 169. Anisophylleaceae (*Poly-  
gonanth.*)  
 170. Alseuosmiaceae  
 36d. Saxifragineae  
 171. Crassulaceae  
 172. Cephalotaceae  
 173. Saxifragaceae (*Eremo-  
syn., Franco., Lepuro-  
petal., Parnassi.,*

- Penthor.*, *Vahli.*)  
 36e. Rosineae  
 174. Rosaceae (*Amygdal.*,  
*Drup.*, *Mal.*, *Pom.*,  
*Spirae.*)  
 175. Neuradaceae  
 176. Crossosomataceae  
 177. Chrysobalanaceae  
 178. Surianaceae (*Stylobasi.*)  
 179. Rhabdodendraceae  
 37. Fabales  
 180. Mimosaceae  
 181. Caesalpiniaceae  
 182. Fabaceae (*Leguminosae*,  
*Papilion.*)  
 38. Proteales (*Elaeagn.*)  
 183. Elaeagnaceae  
 184. Proteaceae  
 39. Podostemales (*Gunner.*)  
 185. Podostemaceae (*Tri-*  
*stich.*)  
 40. Haloragales  
 186. Haloragaceae (*Myrio-*  
*phyll.*)  
 187. Gunneraceae  
 41. Myrtales (*Thymelae.*)  
 188. Sonneratiaceae  
 189. Lythraceae  
 190. Penaeaceae  
 191. Crypteroniaceae  
 192. Thymelaeaceae (*Aqui-*  
*lari.*, *Gonystyl.*)  
 193. Trapaceae (*Hydrocary.*)  
 194. Myrtaceae (*Heteropyxid.*,  
*Leptosperm.*, *Psilo-*  
*xyl.*)  
 195. Punicaceae  
 196. Onagraceae  
 197. Oliniaceae  
 198. Melastomataceae (*Meme-*  
*cyl.*, *Mouriri.*)  
 199. Combretaceae (*Strepho-*  
*nemat.*)  
 42. Rhizophorales  
 200. Rhizophoraceae  
 43. Cornales  
 201. Alangiaceae  
 202. Nyssaceae (*Davidi.*)  
 203. Cornaceae (*Aralidi.*,  
*Aucub.*, *Coroki.*,  
*Curtisi.*, *Griselini.*,  
*Helwingi.*, *Mastixi.*,  
*Melanophyll.*, *Tori-*  
*celli.*)  
 204. Garryaceae  
 44. Santalales (*Balanophor.*,  
*Olac.*)  
 205. Medusandraceae  
 206. Dipentodontaceae  
 207. Olacaceae (*Aptandr.*,  
*Cathedr.*, *Chauno-*  
*chiton.*, *Coul.*, *Ery-*  
*thropal.*, *Heisteri.*,  
*Octoknem.*, *Schoepfi.*,  
*Scorodocarp.*, *Strom-*  
*bosi.*, *Tetrastylidi.*)  
 208. Opiliaceae (*Cansjer.*)  
 209. Santalaceae (*Anthobol.*,  
*Canopod.*, *Exocarp.*,  
*Oxyrid.*, *Podosperm.*)  
 210. Misodendraceae  
 211. Lorantheaceae  
 212. Viscaceae  
 213. Eremolepidaceae  
 214. Balanophoraceae (*Cyno-*  
*mori.*)  
 45. Rafflesiales (*Cytin.*)  
 215. Hydnoraceae  
 216. Mitrastemonaceae  
 217. Rafflesiaceae (*Cytin.*)  
 46. Celastrales (*Salvador.*)  
 218. Geissolomataceae  
 219. Celastraceae (*Canoti.*,  
*Chingithamn.*, *Goupi.*,  
*Lophopyxid.*, *Siphono-*  
*dont.*)  
 220. Hippocrateaceae  
 221. Stackhousiaceae  
 222. Salvadoraceae  
 223. Tepuianthaceae  
 224. Aquifoliaceae (*Phel-*  
*line.*, *Sphenostemon.*)  
 225. Icacinaceae  
 226. Aextoxicaceae  
 227. Cardiopteridaceae  
 228. Corynocarpaceae  
 229. Dichapetalaceae (*Chail-*  
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*Misonodendraceae*, 210  
*Mitrastemonaceae*, 216  
*Molluginaceae*, 74  
*Monimiaceae*, 13  
*Monodraceae*, 8  
*Monotropaceae*, 146  
*Montiaceae*, 72  
*Montiniaceae*, 166  
*Moraceae*, 53  
*Morinaceae*, 317  
*Moringaceae*, 135  
*Mouririaceae*, 198  
*Moutabeaceae*, 246  
*Musaceae*, 360  
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*Myriophyllaceae*, 186  
*Myristicaceae*, 9  
*Myrothamnaceae*, 46  
*Myrsinaceae*, 154  
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*Nandinaceae*, 32  
*Napoleonaceae*, 103  
*Naucleaceae*, 312  
*Nelumbonaceae*, 25  
*Nelsoniaceae*, 300  
*Neottiaceae*, 384  
*Nepenthaceae*, 105  
 Nepenthales, 27  
*Neumanniaceae*, 107  
*Neuradaceae*, 175  
*Nitrariaceae*, 263  
*Nolanaceae*, 278  
*Nolinaceae*, 374  
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 Nymphaeales, 6  
*Nypaceae*, 336  
*Nyssaceae*, 202  
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*Octoknemaceae*, 207  
*Olacaceae*, 207  
*Olacales*, 44  
*Oleaceae*, 294  
*Oleales*, 59  
*Oliniaceae*, 197  
*Onagraceae*, 196  
*Oncothecaceae*, 91  
*Opiliaceae*, 208  
*Orchidaceae*, 384  
 Orchidales, 83  
*Orchidanthaceae*, 361  
*Orobanchaceae*, 298  
*Oxalidaceae*, 264  
*Oxyridaceae*, 209  
*Pachysandraceae*, 230  
*Paeoniaceae*, 79  
*Paeoniales*, 23  
*Palmae*, 336  
*Pandaceae*, 232  
*Pandanaceae*, 338  
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*Papaveraceae*, 38  
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*Paronychiaceae*, 75  
*Passifloraceae*, 122  
*Passiflorineae*, 28d  
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*Peganaceae*, 263  
*Pelliceraceae*, 90  
*Penaeaceae*, 190  
*Pentadiplandraceae*, 133  
*Pentaphragmataceae*, 305  
*Pentaphylacaceae*, 88  
*Penthoraceae*, 173  
*Peperomiaceae*, 21  
*Peridiscaceae*, 108  
*Periplocaceae*, 276  
*Petermanniaceae*, 379  
*Petiveriaceae*, 64  
*Petrosaviaceae*, 334  
*Phellineaceae*, 224  
*Philadelphaceae*, 164  
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*Philydraceae*, 366  
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*Phoenicaceae*, 336  
*Phrymaceae*, 287  
*Phylicaceae*, 234  
*Phyllonomaceae*, 166  
*Physenaceae*, 133  
*Phytelephasiaceae*, 336  
*Phytolaccaceae*, 64  
*Picrodendraceae*, 233  
*Pinguiculaceae*, 304  
*Piperaceae*, 21  
*Piperales*, 3  
*Pistaciaceae*, 257  
*Pistiaceae*, 339  
*Pittosporaceae*, 162  
*Pittosporales*, 36  
*Pittosporineae*, 36b  
*Plagiopteraceae*, 107  
*Plantaginaceae*, 292  
*Plantaginales*, 58  
*Platanaceae*, 44  
*Platycaryaceae*, 58  
*Platystemonaceae*, 38  
*Plocospermataceae*, 275  
*Plumbaginaceae*, 77  
*Plumbaginales*, 22  
*Plumeriaceae*, 275  
*Poales*, 77  
*Podoaceae*, 257  
*Podophyllaceae*, 32  
*Podospermaceae*, 209  
*Podostemaceae*, 185  
*Podostemales*, 39  
*Polemoniaceae*, 283  
*Polemoniales*, 55  
*Polygalaceae*, 246  
*Polygalales*, 50  
*Polygonaceae*, 76  
*Polygonales*, 21  
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*Pomaceae*, 174  
*Pontederiaceae*, 367  
*Pontederiales*, 82  
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*Potaliaceae*, 271  
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*Pteridophyllaceae*, 39  
*Pterostemonaceae*, 166  
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*Pyrolaceae*, 145  
  
*Quinaceae*, 93  
  
*Rafflesiaceae*, 217  
*Rafflesiales*, 45  
*Ranunculaceae*, 30  
*Ranunculales*, 7  
*Rapateaceae*, 341  
*Resedaceae*, 136  
*Restionaceae*, 348  
*Restionales*, 75  
*Retziaceae*, 272  
*Rhabdodendraceae*, 179  
*Rhamnaceae*, 234  
*Rhamnales*, 48  
*Rhaptopetalaceae*, 87  
*Rhinanthaceae*, 295  
*Rhipogonaceae*, 379  
*Rhizophoraceae*, 200  
*Rhizophorales*, 42

- Rhododendraceae*, 144  
*Rhodoleiaceae*, 45  
 Rhoipteleaceae, 57  
*Rhopalocarpaceae*, 81  
*Rivinaceae*, 64  
*Roridulaceae*, 163  
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*Roxburghiaceae*, 378  
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 Rubiales, 61  
 Ruppiaceae, 328  
*Ruscaceae*, 370  
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- Sabiaceae, 37  
 Saccifoliaceae, 274  
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 Salicales, 29  
*Salicorniaceae*, 70  
*Salpiglossidaceae*, 279  
*Salsolaceae*, 70  
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*Sambucaceae*, 314  
*Saniculaceae*, 270  
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 Santalales, 44  
 Sapindaceae, 253  
 Sapindales, 51  
 Sapotaceae, 148  
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*Sarcospermataceae*, 148  
 Sargentodoxaceae, 33  
 Sarraceniaceae, 104  
 Sarraceniales, 27  
*Saurauiaceae*, 86  
 Saururaceae, 20  
*Sauvagesiaceae*, 80  
 Saxifragaceae, 173  
 Saxifragales, 36  
 Saxifragineae, 36d  
*Scepaeaceae*, 233  
 Scheuchzeriaceae, 325  
 Schisandraceae, 24  
*Schoepfiaceae*, 207  
*Sclerophylacaceae*, 279  
*Scorodocarpaceae*, 207
- Scrophulariaceae, 295  
 Scrophulariales, 59  
*Scutellariaceae*, 288  
 Scyphostegiaceae, 113  
 Scyttopetalaceae, 87  
*Selaginaceae*, 296  
*Semicirculaceae*, 146  
*Sesuviaceae*, 67  
 Simaroubaceae, 259  
 Simmondsiaceae, 231  
*Siparunaceae*, 13  
*Siphonodontaceae*, 219  
*Sladeniaceae*, 85  
 Smilacaceae, 379  
 Solanaceae, 279  
 Solanales, 55  
 Sonneratiaceae, 188  
*Soyauxiaceae*, 107  
 Sparganiaceae, 355  
 Sphaerosepalaceae, 81  
 Sphenocleaceae, 306  
*Sphenostemonaceae*, 224  
*Spigeliaceae*, 271  
*Spiraeaceae*, 174  
 Stachyuraceae, 114  
 Stackhousiaceae, 221  
 Staphyleaceae, 249  
 Staticaceae, 77  
*Stegnospermataceae*, 64  
 Stemonaceae, 378  
*Stenomeridaceae*, 380  
 Sterculiaceae, 100  
*Stilaginaceae*, 233  
 Stilbaceae, 287  
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*Strephonemataceae*, 199  
*Streptochaetaceae*, 353  
*Strombosiaceae*, 207  
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 Stylidiaceae, 308  
*Stylobasiaceae*, 178  
*Stylocerataceae*, 230  
*Stypheliaceae*, 143  
 Styracaceae, 150  
 Surianaceae, 178  
*Symphoremataceae*, 287  
 Symplocaceae, 152  
 Syringaceae, 294
- Taccaceae, 377  
 Tamaceae, 380

- Tamaricaceae, 116  
*Tamaricales*, 28  
 Tamaricineae, 28b  
*Tecophilaeaceae*, 370  
 Tepuianthaceae, 223  
*Ternstroemiaceae*, 85  
*Tetracarpaeaceae*, 166  
 Tetracentraceae, 40  
*Tetrachondraceae*, 288  
*Tetragoniaceae*, 67  
*Tetramelaceae*, 128  
 Tetrameristaceae, 89  
*Tetrastylidiaceae*, 207  
*Thalassiaceae*, 323  
 Theaceae, 85  
 Theales, 24  
 Theligonaceae, 313  
 Theophrastaceae, 153  
*Thismiaceae*, 382  
*Thunbergiaceae*, 300  
 Thurniaceae, 351  
 Thymelaeaceae, 192  
*Thymelaeales*, 41  
*Thyridiaceae*, 384  
 Tiliaceae, 99  
*Tillandsiaceae*, 357  
*Toricelliaceae*, 203  
 Tovariaceae, 132  
 Trapaceae, 193  
*Trapellaceae*, 301  
 Tremandraceae, 245  
*Tribelaceae*, 166  
*Tribulaceae*, 263  
*Trichopodaceae*, 380  
*Tricyritidaceae*, 370  
*Triglochinaceae*, 326  
 Trigonaceae, 244  
 Trilliaceae, 370  
 Trimeniaceae, 12  
*Triphyophyllaceae*, 118  
*Triplostegiaceae*, 316  
*Tripterebellaceae*, 382  
*Tristichaceae*, 185  
 Triuridaceae, 335  
 Triuridales, 68  
 Trochodendraceae, 41  
 Trochodendrales, 9  
 Tropaeolaceae, 267  
*Tropaeolales*, 52  
 Turneraceae, 120  
 Typhaceae, 356  
 Typhales, 79  
*Uapaceae*, 233  
 Ulmaceae, 51  
*Umbellales*, 53  
*Umbelliferae*, 270  
 Urticaceae, 55  
 Urticales, 14  
*Urticulariaceae*, 304  
  
*Vacciniaceae*, 144  
*Vahliaceae*, 173  
 Valerianaceae, 316  
*Vallisneriaceae*, 323  
*Vanillaceae*, 384  
 Velloziaceae, 372  
*Velloziales*, 82  
 Verbenaceae, 287  
*Viburnaceae*, 314  
 Violaceae, 115  
 Violales, 28  
 Violineae, 28a  
 Viscaceae, 212  
 Vitaceae, 236  
*Viticaceae*, 287  
*Vivianiaceae*, 265  
 Vochysiaceae, 243  
  
*Wallaceaceae*, 80  
*Wellstediaceae*, 286  
 Winteraceae, 1  
*Wittsteiniaceae*, 143  
  
 Xanthophyllaceae, 247  
 Xanthorrhoeaceae, 375  
*Xerotaceae*, 375  
 Xyridaceae, 342  
  
 Zannichelliaceae, 330  
 Zingiberaceae, 362  
 Zingiberales, 81  
 Zingiberidae, X  
 Zosteraceae, 333  
*Zosteriales*, 67  
 Zygomphylaceae, 263

## APPENDIX II

## The Dahlgren System of Angiosperm Classification

- I. Dicotyledoneae (*Magoliidae*)
- A. Magnolianae (*Annon.*, *Raf-flesi.*)
1. Annonales
    1. Annonaceae
    2. Myristicaceae
    3. Eupomatiaceae
    4. Canellaceae
  2. Aristolochiales
    5. Aristolochiaceae
  3. Rafflesiales
    6. Rafflesiaceae (*Cytin.*, *Mitrastemon.*)
    7. Hydnoraceae
  4. Magnoliales
    8. Winteraceae
    9. Degeneriaceae
    10. Himantandraceae
    11. Magnoliaceae
    12. Lactoridaceae
    13. Chloranthaceae
  5. Illiciiales
    14. Illiciaceae
    15. Schisandraceae
  6. Laurales
    16. Amborellaceae
    17. Austrobaileyaceae
    18. Trimeniaceae
    19. Monimiaceae (*Atherospermat.*, *Siparun.*)
    20. Gomortegaceae
    21. Calycanthaceae (*Idiosperm.*)
    22. Lauraceae
    23. Hernandiaceae (*Gyrocarp.*)
  7. Nelumbonales
    24. Nelumbonaceae
- B. Nymphaeanae
8. Piperales
    25. Saururaceae
    26. Piperaceae (*Peperomi.*)
  9. Nymphaeales
    27. Cabombaceae
    28. Ceratophyllaceae
    29. Nymphaeaceae (*Barclay.*)
- C. Ranunculanae
10. Ranunculales (*Berberid.*)
    30. Lardizabalaceae
    31. Sargentodoxaceae
    32. Menispermaceae
    33. Kingdoniaceae
    34. Circaeasteriaceae
    35. Ranunculaceae (*Hydras-tid.*)
    36. Berberidaceae (*Glaucidi.*, *Leontic.*, *Podophyll.*)
    37. Nandinaceae
  11. Papaverales
    38. Papaveraceae
    39. Fumariaceae (*Hypeco.*)
- D. Caryophyllanae (*Chenopodi.*)
12. Caryophyllales (*Cact.*, *Chenopodi.*)
    40. Phytolaccaceae (*Achato-carp.*, *Agdestid.*)
    41. Basellaceae
    42. Portulacaceae
    43. Stegnospermataceae
    44. Nyctaginaceae
    45. Aizoaceae (*Mesembryan-them.*, *Tetragoni.*)
    46. Didiereaceae
    47. Cactaceae
    48. Hectorellaceae
    49. Halophytaceae
    50. Chenopodiaceae (*Dys-phan.*)
    51. Amaranthaceae
    52. Molluginaceae
    53. Caryophyllaceae (*Ille-cebr.*)
- E. Polygonanae
13. Polygonales
    54. Polygonaceae
- F. Malvanae (*Dilleni.*)
14. Paeoniales
    55. Paeoniaceae
  15. Dilleniales
    56. Dilleniaceae
  16. Malvales
    57. Sterculiaceae (*Byttneri.*)
    58. Elaeocarpaceae

59. Plagiopteraceae  
 60. Bixaceae  
 61. Cochlospermaceae  
 62. Cistaceae  
 63. Sphaerosepalaceae  
 64. Sarcolaenaceae  
 65. Huaceae  
 66. Tiliaceae  
 67. Dipterocarpaceae  
 68. Malvaceae  
 69. Bombacaceae  
 17. Urticales (*Barbey.*)  
 70. Ulmaceae  
 71. Moraceae  
 72. Cecropiaceae  
 73. Barbeyaceae  
 74. Cannabaceae  
 75. Urticaceae  
 18. Rhamnales  
 76. Rhamnaceae  
 19. Elaeagnales  
 77. Elaeagnaceae  
 20. Plumbaginales  
 78. Limoniaceae  
 79. Plumbaginaceae  
 21. Thymelaeales  
 80. Thymelaeaceae  
 22. Euphorbiales (*Didymel.*)  
 81. Euphorbiaceae (*Hymenocardi., Picrodendr., Uapac.*)  
 82. Simmondsiaceae  
 83. Pandaceae  
 84. Aextoxicaceae  
 85. Dichapetalaceae  
 86. Didymelaceae  
 G. Violanae  
 23. Violales  
 87. Flacourtiaceae (*Lacistem.*)  
 88. Passifloraceae  
 89. Dipentodontaceae  
 90. Peridiscaceae  
 91. Scyphostegiaceae  
 92. Violaceae  
 93. Turneraceae  
 94. Malesherbiaceae  
 95. Achariaceae  
 96. Daticaceae  
 97. Begoniaceae  
 98. Cucurbitaceae  
 99. Caricaceae  
 24. Salicales  
 100. Salicaceae  
 25. Tamaricales  
 101. Tamaricaceae  
 102. Frankeniaceae  
 26. Capparales (*Bat.*)  
 103. Capparaceae (*Cleom., Koeberlini., Pentadiplandr., Phsen.*)  
 104. Brassicaceae (*Cruciferae*)  
 105. Tovariaceae  
 106. Resedaceae  
 107. Gyrostemonaceae  
 108. Bataceae  
 109. Moringaceae  
 27. Salvadorales  
 110. Salvadoraceae  
 H. Theanae  
 28. Theales (*Lecythid., Nepenth.*)  
 111. Stachyuraceae  
 112. Pentaphylacaceae  
 113. Marcgraviaceae  
 114. Quinaceae  
 115. Ancistrocladaceae  
 116. Dioncophyllaceae  
 117. Nepenthaceae  
 118. Medusagynaceae  
 119. Caryocaraceae  
 120. Strasburgeriaceae  
 121. Ochnaceae (*Diegodendr., Sauvagesi.*)  
 122. Oncothecaceae  
 123. Scytopetalaceae  
 124. Lecythidaceae (*Asteranth., Foetidi., Barringtoni., Napoleon.*)  
 125. Theaceae (*Asteropei., Bonneti., Pellicier., Tetramerist., Ternstroemi.*)  
 126. Clusiaceae (*Guttiferae, Hyperi.*)  
 127. Elatinaceae  
 29. Droserales  
 128. Droseraceae  
 129. Lepuropetalaceae  
 130. Parnassiaceae



- I. Primulanae
30. Ebenales
131. Ebenaceae
132. Sapotaceae
133. Styracaceae
134. Lissocarpaceae
31. Primulales
135. Myrsinaceae
136. Aegicerataceae
137. Theophrastaceae
138. Primulaceae
139. Coriaceae
- J. Rosanae (*Hamamelid.*)
32. Trochodendrales (*Cercidiphyll.*, *Euptele.*)
140. Trochodendraceae
141. Tetracentraceae
142. Eupteleaceae
143. Cercidiphyllaceae
33. Hamamelidales
144. Hamamelidaceae (*Altingi.*, *Rhodolei.*)
145. Platanaceae
146. Myrothamnaceae
147. Geissolomataceae
34. Fagales
148. Fagaceae (*Nothofag.*)
149. Corylaceae
150. Betulaceae
35. Balanopales
151. Balanopaceae
36. Juglandales
152. Rhoipteleaceae
153. Juglandaceae
37. Myricales
154. Myricaceae
38. Casuarinales
155. Cacuarinaceae
39. Buxales (*Daphniphyll.*)
156. Buxaceae
157. Daphniphyllaceae
40. Cunoniales
158. Cunoniaceae
159. Baueraceae
160. Grossulariaceae (*Ribes.*)
161. Brunelliaceae
162. Davidsoniaceae
163. Eucryphiaceae
164. Bruniaceae
165. Grubbiaceae
41. Saxifragales
166. Crassulaceae
167. Cephalotaceae
168. Iteaceae
169. Francoaceae
170. Saxifragaceae
171. Vahliaceae
172. Greyiaceae
42. Gunnerales
173. Gunneraceae
43. Rosales
174. Crossosomataceae
175. Rosaceae
176. Neuradaceae
177. Malaceae (*Pom.*)
178. Amygdalaceae
179. Chrysobalanaceae
- K. Podostemanae
44. Podostemales
180. Podostemaceae (*Tristich.*)
- L. Fabanae
45. Fabales
181. Mimosaceae
182. Caesalpiniaceae
183. Fabaceae (*Leguminosae*)
- M. Proteanae
46. Proteales
184. Proteaceae
- N. Myrtanae
47. Myrtales
185. Myrtaceae (*Heteropyxid.*)
186. Psiloxylaceae
187. Oliniaceae
188. Melastomataceae (*Memecyl.*)
189. Penaeaceae
190. Crypteroniaceae
191. Lythraceae
192. Sonneratiaceae
193. Punicaceae
194. Combretaceae
195. Onagraceae
196. Trapaceae
48. Haloragales
197. Haloragaceae
49. Rhizophorales
198. Rhizophoraceae
- O. Rutanae (*Gerani.*)
50. Rutales

199. Rutaceae (*Flindersi.*,  
*Rhabdodendr.*)
200. Cneoraceae
201. Surianaceae
202. Simaroubaceae (*Kirk.*)
203. Burseraceae
204. Meliaceae (*Aitoni.*,  
*Ptaeroxyl.*)
51. Sapindales (*Leitneri.*)
205. Coriariaceae
206. Anacardiaceae (*Juli-*  
*ani.*, *Pistaci.*)
207. Leitneriaceae
208. Podoaceae
209. Sapindaceae (*Stylo-*  
*basidi.*)
210. Hippocastanaceae
211. Aceraceae
212. Akaniaceae
213. Bretschneideraceae
214. Emblingiaceae
215. Meliosmaceae
216. Staphyleaceae
217. Sabiaceae
218. Connaraceae
219. Melianthaceae
52. Balsaminales
220. Balsaminaceae
53. Polygalales
221. Malpighiaceae
222. Trigoniaceae
223. Vochysiaceae
224. Polygalaceae (*Diclidan-*  
*ther.*, *Xanthophyll.*)
225. Krameriaceae
54. Geraniales
226. Zygophyllaceae
227. Nitrariaceae
228. Peganaceae
229. Balanitaceae
230. Erythroxylaceae
231. Houmiriaceae
232. Linaceae (*Hugoni.*)
233. Ctenolophonaceae
234. Ixonanthaceae
235. Lepidobotryaceae
236. Oxalidaceae (*Averrho.*)
237. Geraniaceae
238. Dirachmaceae
239. Ledocarpaceae
240. Vivianiaceae
241. Biebersteiniaceae
55. Tropaeolales
242. Tropaeolaceae
243. Limnanthaceae
- P. Santalanae
56. Celastrales
244. Celastraceae (*Goupi.*,  
*Hippocrate.*, *Siphono-*  
*dont.*, *Tripterygi.*)
245. Stackhousiaceae
246. Lophopyxidaceae
247. Cardiopteridaceae
248. Corynocarpaceae
57. Vitales
249. Vitaceae (*Lee.*)
58. Santalales
250. Olacaceae (*Octoknemat.*)
251. Opiliaceae
252. Loranthaceae
253. Misodendraceae
254. Eremolepidaceae
255. Santalaceae
256. Viscaceae
- Q. Balanophoranae
59. Balanophorales
257. Cynomoriaceae
258. Balanophoraceae
- R. Apianae (*Arali.*)
60. Pittosporales
259. Pittosporaceae
260. Tremandraceae
261. Byblidaceae
61. Apiales (*Arali.*)
262. Torricelliaceae
263. Araliaceae
264. Apiaceae
- S. Asteranae
62. Campanulales
265. Pentaphragmataceae
266. Campanulaceae (*Spheno-*  
*cle.*)
267. Lobeliaceae
63. Asterales
268. Asteraceae (*Compositae*)
- T. Solananae
64. Solanales (*Polemoni.*)
269. Solanaceae (*Nolan.*)
270. Duckeodendraceae
271. Sclerophylacaceae
272. Goetzeaceae
273. Convolvulaceae (*Hum-*

- berti.*)
274. Cuscutaceae
275. Cobaeaceae
276. Polemoniaceae
65. Boraginales
277. Hydrophyllaceae
278. Ehretiaceae
279. Boraginaceae
280. Wellstediaceae
281. Lennoaceae
282. Hoplestigmataceae
- U. Cornanae
66. Fouquieriales
283. Fouquieriaceae
67. Ericales (*Diapensi.*)
284. Actinidiaceae (*Saurau.*)
285. Clethraceae
286. Cyrillaceae
287. Ericaceae
288. Empetraceae
289. Monotropaceae
290. Pyrolaceae
291. Epacridaceae
292. Roridulaceae
293. Diapensiaceae
68. Eucommiales
294. Eucommiaceae
69. Sarraceniales
295. Sarraceniaceae
70. Cornales
296. Garryaceae
297. Alangiaceae
298. Nyssaceae
299. Cornaceae
300. Aucubaceae
301. Corokiaceae
302. Davidiaceae
303. Helwingiaceae
304. Phellinaceae
305. Aquifoliaceae
306. Paracryphiaceae
307. Sphenostemonaceae
308. Symplocaceae
309. Anisophyllaceae
310. Icacinaceae
311. Escalloniaceae
312. Montiniaceae
313. Medusandraceae
314. Columelliaceae
315. Stylidiaceae (*Donati.*)
316. Alseuosmiaceae
317. Hydrangeaceae
318. Dialypetalanthaceae
319. Sambucaceae
320. Adoxaceae
321. Dulongiaceae
322. Tribelaceae
323. Eremosynaceae
324. Pterostemonaceae
325. Tetracarpaeaceae
71. Dipsacales
326. Caprifoliaceae
327. Viburnaceae
328. Valerianaceae
329. Triplostegiaceae
330. Dipsacaceae
331. Morinaceae
332. Calyceraceae
- V. Loasanae
72. Loasales
333. Loasaceae
- W. Gentiananae
73. Goodeniales
334. Goodeniaceae (*Brunoni.*)
74. Oleales
335. Oleaceae
75. Gentianales (*Rubi.*)
336. Loganiaceae (*Antoni., Potali., Spigeli., Strychn.*)
337. Rubiaceae (*Theligon.*)
338. Menyanthaceae
339. Gentianaceae
340. Apocynaceae
341. Asclepiadaceae
- X. Lamianae
76. Scrophulariales (*Plantagin.*)
342. Bignoniaceae
343. Myoporaceae
344. Gesneriaceae
345. Buddlejaceae
346. Scrophulariaceae (*Nelsoni., Orobanch.*)
347. Globulariaceae
348. Selaginaceae
349. Stilbaceae
350. Retziaceae
351. Plantaginaceae
352. Lentibulariaceae
353. Pedaliaceae
354. Trapellaceae

355. Martyniaceae  
 356. Acanthaceae  
 357. Thunbergiaceae  
 358. Mendonciaceae  
 359. Henriqueziaceae  
 77. Hippuridales  
 360. Hippuridaceae  
 78. Hydrostachyales  
 361. Hydrostachyaceae  
 79. Lamiales (*Callitrich.*)  
 362. Verbenaceae (*Phrym.*)  
 363. Callitrichaceae  
 364. Lamiaceae (*Labiatae*)  
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## APPENDIX III

## The Rouleau System of Angiosperm Classification

## Magnoliopsida

## I. Magnoliidae

## A. Magnolianae

## 1. Magnoliales

1. Magnoliaceae
2. Degeneriaceae
3. Himantandraceae
4. Eupomatiaceae
5. Annonaceae
6. Canellaceae
7. Myristicaceae
8. Winteraceae

## 2. Laurales

9. Austrobaileyaceae
10. Amborellaceae
11. Trimeniaceae
12. Sphenostemonaceae
13. Monimiaceae
14. Siparunaceae
15. Atherospermataceae
16. Gomortegaceae
17. Hernandiaceae
18. Chloranthaceae
19. Lactoridaceae
20. Calycanthaceae
21. Idiospermaceae
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*Phyllonomaceae*, 225  
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- Vochysiaceae, 332
  
- Wellstediaceae, 421
- Winteraceae, 8
  
- Xanthophyllaceae, 334
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- Zingiberanae, X
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## APPENDIX IV

## The Takhtajan System of Angiosperm Classification

## MAGNOLIOPSIDA

- I. Magnoliidae  
 A. Magnolianae  
 1. Magnoliales (*Annon.*, *Winter.*)  
 1a. Winterineae  
 1. Winteraceae  
 1b. Magnoliineae  
 2. Degeneriaceae  
 3. Eupomatiaceae  
 4. Himantandraceae  
 5. Magnoliaceae  
 1c. Annonineae  
 6. Annonaceae (*Monodor.*)  
 7. Canellaceae  
 8. Myristicaceae  
 2. Illiciales  
 9. Illiciaceae  
 10. Schisandraceae  
 3. Laurales (*Chloranth.*, *Lactorid.*)  
 3a. Monimineae  
 11. Austrobaileyaceae  
 12. Amborellaceae  
 13. Trimeniaceae  
 14. Monimiaceae (*Atherospermat.*, *Hortoni.*, *Siparun.*)  
 15. Gomortegaceae  
 16. Calycanthaceae (*Idiosperm.*)  
 3b. Chloranthineae  
 17. Chloranthaceae  
 3c. Lactoridineae  
 18. Lactoridaceae  
 3d. Laurineae  
 19. Lauraceae (*Cassyth.*)  
 20. Hernandiaceae (*Gyrocarp.*)  
 4. Piperales  
 21. Saururaceae  
 22. Piperaceae (*Peperomi.*)  
 5. Aristolochiales  
 23. Aristolochiaceae  
 B. Rafflesianae  
 6. Rafflesiales  
 24. Hydnoraceae  
 25. Rafflesiaceae (*Apodanth.*, *Cytin.*, *Mitrastemon.*)  
 C. Nymphaeanae  
 7. Nymphaeales  
 7a. Nymphaeineae  
 26. Cabombaceae  
 27. Nymphaeaceae (*Barclay.*, *Euryal.*)  
 7b. Ceratophyllineae  
 28. Ceratophyllaceae  
 8. Nelumbonales  
 29. Nelumbonaceae  
 II. Ranunculidae  
 D. Ranunculanae  
 9. Ranunculales (*Berberid.*)  
 30. Lardizabalaceae  
 31. Sargentodoxaceae  
 32. Menispermaceae  
 33. Berberidaceae (*Leontic.*, *Nandin.*, *Podophyll.*)  
 34. Ranunculaceae (*Hellebor.*, *Hydrastid.*, *Kingdoni.*)  
 35. Glaucidiaceae  
 36. Circaeasteraceae  
 10. Papaverales  
 37. Papaveraceae (*Chelidoni.*, *Eschscholzi.*, *Fumari.*, *Hypeco.*, *Platystemon.*, *Pteridophyll.*)  
 11. Sarraceniales  
 38. Sarraceniaceae  
 III. Hamamelididae  
 E. Hamamelidanae  
 12. Trochodendrales  
 39. Trochodendraceae  
 40. Tetracentraceae  
 13. Cercidiphyllales  
 41. Cercidiphyllaceae  
 14. Eupteleales  
 42. Eupteleaceae  
 15. Didymelales  
 43. Didymelaceae  
 16. Hamamelidales  
 16a. Hamamelidinae

44. Hamamelidaceae (*Altingi.*,  
*Disanth.*, *Liquidambar.*, *Rhodolei.*)
45. Platanaceae
46. Myrothamnaceae
47. Daphniphyllaceae
- 16b. Buxineae
48. Buxaceae (*Pachysandr.*,  
*Stylocerat.*)
49. Simmondsiaceae
17. Eucommiales
50. Eucommiaceae
18. Urticales
- 18a. Ulmineae
51. Ulmaceae (*Celtid.*)
- 18b. Utricineae
52. Moraceae
53. Cannabaceae
54. Cercrophiaceae
55. Urticaceae
19. Barbeyales
56. Barbeyaceae
20. Casuarinales
57. Casuarinaceae
21. Fagales (*Betul.*)
- 21a. Fagineae
58. Fagaceae (*Nothofag.*)
- 21b. Betulineae
59. Betulaceae (*Carpin.*,  
*Coryl.*)
22. Balanopales
60. Balanopaceae
23. Leitneriales
61. Leitneriaceae
- F. Juglandanae
24. Myricales
62. Myricaceae
25. Juglandales
63. Rhoipteleaceae
64. Juglandaceae (*Platy-*  
*cary.*)
- IV. Caryophyllidae
- G. Caryophyllanae
26. Caryophyllales (*Chenopodi.*)
- 26a. Phytolaccineae
65. Phytolaccaceae (*Agde-*  
*stid.*, *Barbeui.*, *Gi-*  
*seki.*, *Petiveri.*,  
*Rivin.*)
66. Achatocarpaceae
67. Nyctaginaceae
68. Aizoaceae (*Mesembry-*  
*anthem.*, *Sesuvi.*,  
*Tetragoni.*)
69. Cactaceae
70. Portulacaceae (*Monti.*)
71. Hectorellaceae
72. Basellaceae
73. Didiereaceae
74. Stegnospermataceae
- 26b. Caryophyllinae
75. Molluginaceae
76. Caryophyllaceae (*Alsin.*,  
*Illecebr.*, *Paronychi.*)
- 26c. Chenopodiineae
77. Amaranthaceae
78. Chenopodiaceae (*Dysphani.*,  
*Salicorni.*, *Salsol.*)
27. Polygonales
79. Polygonaceae
- H. Plumbaginanae
28. Plumbaginales
80. Plumbaginaceae (*Limoni.*,  
*Static.*)
- V. Dilleniidae
- I. Dilleniaceae
29. Dilleniales
81. Dilleniaceae
82. Crossosomataceae
30. Paeoniales
83. Paeoniaceae
31. Theales
84. Ochnaceae (*Lophir.*)
85. Sauvagesiaceae (*Luxem-*  
*burgi.*)
86. Strasburgeriaceae
87. Diegodendraceae
88. Ancistrocladaceae
89. Dioncophyllaceae
90. Theaceae (*Sladeni.*,  
*Ternstroemi.*)
91. Oncothecaceae
92. Pentaphragmaceae
93. Tetrameristaceae
94. Caryocaraceae
95. Asteropeiaceae
96. Marcgraviaceae
97. Pelliceriaceae
98. Quinaceae
99. Medusagynaceae
100. Bonnetiaceae
101. Clusiaceae (*Calophyll.*,

- Guttiferae, Hyperic., Moronobe.)*  
 102. Elatinaceae  
 32. Violales  
 32a. Violineae  
 103. Flacourtiaceae (*Erythro-sperm., Hamali., Lacistemat., Neumanni., Prock., Samyd.*)  
 104. Passifloraceae (*Paropsi.*)  
 105. Stachyuraceae  
 106. Violaceae (*Leoni.*)  
 107. Bixaceae (*Cochlosperm.*)  
 108. Cistaceae  
 109. Peridiscaceae  
 110. Scyphostegiaceae  
 111. Dipentodontaceae  
 112. Turneraceae  
 113. Malesherbiaceae  
 114. Achariaceae  
 115. Caricaceae  
 32b. Cucurbitineae  
 116. Cucurbitaceae (*Zanoni.*)  
 33. Begoniales (*Datisc.*)  
 117. Daticaceae (*Tetramel.*)  
 118. Begoniaceae  
 34. Capparales  
 34a. Capparineae  
 119. Capparaceae (*Cleom., Koeberlini., Pentadiplandr.*)  
 120. Tovariaceae  
 121. Brassicaceae (*Cruciferae*)  
 34b. Resedineae  
 122. Resedaceae  
 34c. Moringineae  
 123. Moringaceae  
 35. Tamaricales (*Fouquieri.*)  
 35a. Tamaricineae  
 124. Frankeniaceae  
 125. Tamaricaceae  
 35b. Fouquierineae  
 126. Fouquieriaceae  
 36. Salicales  
 127. Salicaceae  
 J. Ericanae  
 37. Ericales  
 128. Actinidiaceae (*Saurai.*)  
 129. Clethraceae  
 130. Ericaceae (*Monotrop., Pyrol., Rhododendr., Vaccini., Wittsteini.*)  
 131. Empetraceae  
 132. Epacridaceae (*Prionot.*)  
 133. Diapensiaceae  
 134. Cyrillaceae  
 135. Grubbiaceae  
 38. Ebenales  
 38a. Styracineae  
 136. Styracaceae  
 137. Symplocaceae  
 138. Lissocarpaceae  
 38b. Ebenineae  
 139. Ebenaceae  
 140. Sapotaceae (*Sarcospermat.*)  
 39. Primulales  
 141. Myrsinaceae (*Aegicerat.*)  
 142. Theophrastaceae  
 143. Primulaceae (*Corid.*)  
 K. Malvanae  
 40. Malvales  
 144. Elaeocarpaceae  
 145. Tiliaceae  
 146. Sterculiaceae (*Byttneri.*)  
 147. Huaceae  
 148. Scytopetalaceae  
 149. Dipterocarpaceae  
 150. Sarcolaenaceae (*Chlaen., Rhodolaen., Schizolaen.*)  
 151. Sphaerosepalaceae (*Rhopalocarp.*)  
 152. Bombacaceae  
 153. Malvaceae  
 41. Euphorbiales  
 154. Euphorbiaceae (*Acalyph., Androstachyd., Bischofi., Hymenocardi., Per., Phyllanth., Picrodendr., Stilagin., Uapac.*)  
 155. Pandaceae  
 156. Dichapetalaceae (*Chailleti.*)  
 157. Aextoxicaceae  
 42. Thymelaeales  
 158. Thymelaeaceae (*Aquilari., Gonystyl.*)  
 VI. Rosidae

- L. Rosanae
43. Saxifragales (*Cunoni.*,  
*Droser.*, *Grossular.*,  
*Gunner.*, *Pittospor.*)
- 43a. Cunoniineae
159. Brunelliaceae
160. Cunoniaceae (*Bauer.*)
161. Davidsoniaceae
162. Eucryphiaceae
- 43b. Pittosporineae
163. Escalloniaceae (*Brexii.*,  
*Coroki.*, *Dulongi.*,  
*Ite.*, *Phyllonom.*,  
*Tetracarpae.*, *Tribel.*)
164. Hydrangeaceae (*Kirengeshom.*, *Philadelph.*)
165. Montiniaceae
166. Columelliaceae
167. Roridulaceae
168. Pittosporaceae
169. Byblidaceae
170. Bruniaceae
171. Alseuosmiaceae
172. Pterostemonaceae
- 43c. Saxifragineae
173. Saxifragaceae (*Astilb.*,  
*Peltiphyll.*, *Penthor.*)
174. Crassulaceae (*Semperviv.*)
175. Cephalotaceae
176. Grossulariaceae (*Ribesii.*, *Rousse.*)
177. Vahliaceae
178. Eremosynaceae
179. Greyiaceae
180. Francoaceae
181. Parnassiaceae (*Lepuropetal.*)
182. Droseraceae
183. Gunneraceae
44. Rosales
184. Rosaceae (*Amygdal.*,  
*Drup.*, *Mal.*, *Prun.*,  
*Spirae.*)
185. Chrysobalanaceae
186. Neuradaceae
45. Fabales
187. Fabaceae (*Caesalpinii.*,  
*Leguminosae.*, *Mimos.*)
46. Connarales
188. Connaraceae
47. Podostemales
189. Podostemaceae (*Tristich.*)
48. Nepenthales
190. Nepenthaceae
- M. Myrtanae
49. Myrtales (*Halorag.*, *Lecythid.*, *Rhizophor.*)
- 49a. Myrtineae
191. Crypteroniaceae
192. Lythraceae
193. Sonneratiaceae
194. Punicaceae
195. Melastomataceae (*Memecyl.*)
196. Oliniaceae
197. Penaeaceae
198. Myrtaceae (*Heteropyxid.*,  
*Leptosperm.*, *Psiloxyl.*)
199. Combretaceae (*Strephanemat.*)
200. Onagraceae
201. Trapaceae
- 49b. Haloragineae
202. Haloragaceae (*Myriophyll.*)
- 49c. Rhizophorineae
203. Rhizophoraceae (*Anisophylle.*, *Legnotid.*,  
*Polygonanth.*)
- 49d. Lecythidineae
204. Lecythidaceae (*Asteranth.*, *Barringtoni.*,  
*Foetidi.*, *Napoleon.*)
- N. Rutanae
50. Rutales
- 50a. Rutineae
205. Rutaceae (*Auranti.*,  
*Flindersi.*)
206. Rhabdodendraceae
207. Cneoraceae
208. Simaroubaceae (*Irvingii.*,  
*Suriani.*)
209. Zygophyllaceae (*Pegan.*)
210. Nitrariaceae
211. Balanitaceae
212. Meliaceae (*Aitoni.*, *Cedrel.*)
213. Kirkiaceae
214. Ptaeroxylaceae

215. Burseraceae  
 216. Anacardiaceae (*Pistaci.*)  
 217. Julianiaceae  
 218. Podoaceae (*Dobine.*)  
 50b. Coriariaceae  
 219. Coriariaceae  
 51. Sapindales (*Acer., Bat.*)  
 220. Staphyleaceae  
 221. Sapindaceae (*Dodonae.*)  
 222. Aceraceae  
 223. Hippocastanaceae  
 224. Stylobasiaceae  
 225. Gyrostemonaceae  
 226. Bataceae  
 227. Emblingiaceae  
 228. Bretschneideraceae  
 229. Melianthaceae  
 230. Akaniaceae  
 231. Sabiaceae (*Meliosm.*)  
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## APPENDIX V

## The Thorne System of Angiosperm Classification

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1. Annonales (*Aristolochi.*,  
*Canell.*, *Chloranth.*,  
*Illici.*, *Lactorid.*,  
*Laur.*, *Magnoli.*,  
*Piper.*)
    - 1a. Winterineae
      1. Winteraceae
    - 1b. Illiciineae
      2. Illiciaceae
      3. Schisandraceae
    - 1c. Annonineae (*Magnoli.*)
      4. Magnoliaceae
      5. Degeneriaceae
      6. Himantandraceae
      7. Eupomatiaceae
      8. Annonaceae
      9. Myristicaceae
      10. Canellaceae
    - 1d. Aristolochiineae
      11. Aristolochiaceae
    - 1e. Laurineae
      12. Amborellaceae
      13. Austrobaileyaceae
      14. Trimeniaceae
      15. Chloranthaceae
      16. Lactoridaceae
      17. Monimiaceae (*Athero-*  
*spermat.*, *Hortoni.*,  
*Siparun.*)
      18. Gomortegaceae
      19. Calycanthaceae (*Idio-*  
*sperm.*)
      20. Lauraceae (*Cassyth.*)
      21. Hernandiaceae (*Gyrocarp.*)
    - 1f. Piperineae
      22. Saururaceae
      23. Piperaceae (*Peperomi.*)
  2. Nelumbonales
    24. Nelumbonaceae
  3. Paeoniales
    25. Paeoniaceae
    26. Glaucidiaceae
  4. Berberidales (*Papaver.*,  
*Ranuncul.*)
    - 4a. Berberidineae
      27. Lardizabalaceae
      28. Sargentodoxaceae
      29. Menispermaceae
      30. Nandinaceae
      31. Berberidaceae (*Leonti.*,  
*Podophyll.*)
      32. Ranunculaceae (*Hydra-*  
*stid.*)
      33. Circaeasteraceae (*King-*  
*doni.*)
    - 4b. Papaverineae
      34. Papaveraceae (*Chelidoni.*,  
*Eschscholzi.*, *Fumari.*,  
*Hypeco.*, *Platystemon.*,  
*Pteridophyll.*)
- B. Nymphaeanae
5. Nymphaeales
    35. Cabombaceae
    36. Nymphaeaceae (*Barclay.*,  
*Euryal.*)
    37. Ceratophyllaceae
- C. Rafflesianae
6. Rafflesiales
    38. Rafflesiaceae (*Apodanth.*,  
*Cytin.*, *Mitrastemon.*)
    39. Hydnoraceae
- D. Theiflorae (*Dilleni.*, *Pri-*  
*mul.*)
7. Theales (*Dilleni.*, *Lecythid.*,  
*Nepenth.*, *Sarraceni.*)
    - 7a. Dilleniineae
      40. Dilleniaceae
    - 7b. Theineae
      41. Actinidiaceae (*Saurau.*)
      42. Paracryphiaceae
      43. Stachyuraceae
      44. Theaceae (*Asteropei.*,  
*Bonneti.*, *Pellicier.*,  
*Ternstroemi.*, *Tetra-*  
*merist.*)
    45. Symplocaceae
    46. Caryocaraceae
    47. Oncothecaceae
    48. Aquifoliaceae
    49. Phellinaceae

50. Icacinaceae  
 51. Sphenostemonaceae  
 52. Cardiopteridaceae  
 53. Marcgraviaceae  
 7c. Clethrineae  
 54. Pentaphylacaceae  
 55. Clethraceae  
 56. Cyrillaceae  
 7d. Sarraceniineae  
 57. Sarraceniaceae  
 7e. Scyttopetalineae  
 58. Ochnaceae (*Diegodendr.*,  
*Sauvagesi.*)  
 59. Quiinaceae  
 60. Scyttopetalaceae  
 61. Sphaerosepalaceae  
 62. Medusagynaceae  
 63. Strasburgeriaceae  
 64. Ancistrocladaceae  
 65. Dioncophyllaceae  
 7f. Nepenthineae  
 66. Nepenthaceae  
 7g. Hypericineae  
 67. Clusiaceae (*Guttiferae*,  
*Hyperic.*)  
 68. Elatinaceae  
 7h. Lecythidineae  
 69. Lecythidaceae (*Aster-*  
*anth.*, *Foetidi.*, *Na-*  
*peolon.*, *Planchoni.*)  
 8. Ericales  
 70. Ericaceae (*Monotrop.*,  
*Pyrol.*, *Rhododendr.*,  
*Vaccini.*)  
 71. Epacridaceae  
 72. Empetraceae  
 9. Ebenales  
 9a. Ebenineae (*Sapot.*)  
 73. Ebeniaceae (*Lissocarp.*)  
 74. Sapotaceae (*Sarcosperm.*)  
 9b. Styracineae  
 75. Styracaceae  
 10. Primulales (*Plumbagin.*)  
 10a. Primulineae  
 76. Myrsinaceae (*Aegicerat.*,  
*Theophrast.*)  
 77. Primulaceae  
 10b. Plumbaginineae  
 78. Plumbaginaceae (*Aegia-*  
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*Static.*)  
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 79. Polygonaceae  
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 12. Chenopodiales (*Caryophyll.*)  
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*carp.*, *Agdestid.*,  
*Barbeui.*, *Giseki.*,  
*Stegnospermat.*)  
 81. Aizoaceae (*Mesembryanthem.*,  
*Mollugin.*, *Tetragoni.*)  
 82. Caryophyllaceae (*Alsin.*,  
*Illecebr.*)  
 83. Halophytaceae  
 84. Nyctaginaceae  
 85. Chenopodiaceae (*Dys-*  
*phani.*, *Salicorni.*,  
*Salsol.*)  
 86. Amaranthaceae  
 12b. Portulacineae  
 87. Portulacaceae (*Hecto-*  
*rell.*)  
 88. Basellaceae  
 89. Didiereaceae  
 90. Cactaceae  
 F. Geranianes  
 13. Geraniales (*Balsamin.*,  
*Lin.*, *Polygal.*, *Tro-*  
*paol.*)  
 13a. Linineae  
 91. Houmiriaceae  
 92. Ctenolophonaceae  
 93. Linaceae (*Ixonanth.*)  
 94. Erythroxylaceae  
 95. Zygophyllaceae (*Pegan.*,  
*Tribul.*)  
 13b. Geraniineae  
 96. Oxalidaceae (*Averrho.*,  
*Lepidobotry.*)  
 97. Geraniaceae (*Bieber-*  
*steini.*, *Dirachm.*)  
 98. Vivianiaceae  
 99. Ledocarpaceae  
 100. Balsaminaceae  
 101. Tropaeolaceae  
 102. Limnanthaceae  
 13c. Polygalineae  
 103. Malpighiaceae  
 104. Polygalaceae (*Diclid-*  
*anther.*, *Xanthophyll.*)

105. Krameriaceae  
 106. Trigoniaceae  
 107. Vochysiaceae  
 G. Santalanae  
 14. Celastrales  
 108. Celastraceae (*Canoti.*,  
*Goupi.*, *Hippocrate.*,  
*Siphonodont.*)  
 109. Lophopyxidaceae  
 110. Stackhousiaceae  
 15. Santalales (*Olac.*)  
 111. Olacaceae (*Octoknem.*,  
*Opili.*, *Schoepfi.*)  
 112. Medusandraceae  
 113. Santalaceae  
 114. Eremolepidaceae  
 115. Misodendraceae  
 116. Loranthaceae  
 117. Viscaceae  
 15. Balanophorales  
 118. Balanophoraceae (*Helosid.*,  
*Lophophyt.*,  
*Sarcophyt.*)  
 119. Cynomoriaceae  
 H. Violanae  
 16. Violales (*Begoni.*, *Cucurbit.*,  
*Loas.*, *Salic.*)  
 16a. Violineae  
 120. Flacourtiaceae (*Lacistemat.*,  
*Procki.*)  
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## APPENDIX VI

## The Young System of Angiosperm Classification

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 3. Winteraceae  
 4. Cannellaceae  
 5. Annonaceae  
 2. Illiciales  
 6. Austrobaileyaceae  
 7. Illiciaceae  
 8. Schizandraceae  
 9. Nelumbonaceae  
 B. Nymphaeanae  
 3. Nymphaeales  
 10. Nymphaeaceae  
 11. Cabombaceae  
 C. Ranunculanae  
 4. Degeneriales  
 12. Degeneriaceae  
 5. Laurales  
 13. Lactoridaceae  
 14. Idiospermaceae  
 15. Calycanthaceae  
 16. Monimiaceae  
 17. Amborellaceae  
 18. Chloranthaceae  
 19. Trimeniaceae  
 20. Gomortegaceae  
 21. Lauraceae  
 22. Hernandiaceae (*Gyrocarp.*)  
 6. Aristolochiales  
 23. Himantandraceae  
 24. Myristicaceae  
 25. Aristolochiaceae  
 26. Piperaceae  
 27. Saururaceae  
 7. Ranunculales  
 28. Ceratophyllaceae  
 29. Lardizabalaceae  
 30. Nandinaceae  
 31. Berberidaceae  
 32. Menispermaceae  
 33. Sargentodoxaceae  
 34. Podophyllaceae  
 35. Ranunculaceae  
 36. Glaucidaceae  
 37. Paeoniaceae  
 38. Circaeasteraceae  
 39. Hydrastidaceae  
 40. Papaveraceae  
 41. Fumariaceae (*Hypeco.*)
- II. Lilidae  
 D. Alismatanae  
 8. Alismatales  
 42. Alismataceae (*Limn-charit.*)  
 43. Butomaceae  
 44. Hydrocharitaceae (*Halo-phil, Thalassi.*)  
 9. Zosteriales  
 45. Aponogetonaceae  
 46. Scheuchzeriaceae  
 47. Juncaginaceae (*Lilae.*)  
 48. Posidoniaceae  
 49. Potamogetonaceae (*Ruppi.*)  
 50. Zannichelliaceae  
 51. Cymodoceaceae  
 52. Zosteraceae  
 53. Najadaceae  
 E. Triuridanae  
 10. Triuridales  
 54. Triuridaceae (*Petrosavi.*)  
 F. Aranae  
 11. Arales  
 55. Araceae  
 56. Lemnaceae  
 G. Arecanae  
 12. Arecales  
 57. Arecaceae (*Palmae*)  
 13. Cyclanthales  
 58. Cyclanthaceae  
 14. Pandanales  
 59. Pandanaceae  
 H. Lilianae  
 15. Dioscoreales  
 60. Dioscoreaceae  
 61. Stemonaceae  
 62. Taccaceae

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 63. Liliaceae  
 64. Philydraceae  
 65. Pontederiaceae  
 66. Haemodoraceae  
 67. Cyanastraceae  
 68. Iridaceae  
 69. Geosiridaceae  
 70. Velloziaceae  
 71. Agavaceae  
 72. Aloaceae  
 73. Xanthorrhoeaceae  
 74. Hanguanaceae  
 75. Smilacaceae
17. Typhales  
 76. Typhaceae (*Spargani.*)
18. Burmanniales  
 77. Burmanniaceae  
 78. Corsiaceae
19. Orchidales  
 79. Orchidaceae
- I. Commelinanae  
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 80. Rapteaceae  
 81. Xyridaceae  
 82. Mayacaceae  
 83. Commelinaceae
21. Eriocaulales  
 84. Eriocaulaceae
22. Restionales  
 85. Flagellariaceae  
 86. Joinvilleaceae  
 87. Restionaceae  
 88. Centrolepidaceae  
 89. Ecdeiocoleaceae  
 90. Hydatellaceae
23. Juncales  
 91. Juncaceae (*Thurni.*)
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 92. Cyperaceae
25. Poales  
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- J. Zingiberanae  
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27. Zingiberiaceae  
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 99. Zingiberaceae
100. Costaceae  
 101. Cannaceae  
 102. Marantaceae
- III. Dilleniidae  
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 105. Stachyuraceae  
 106. Theaceae  
 107. Icacinaceae  
 108. Cardiopteridaceae  
 109. Aquifoliaceae  
 110. Phellinaceae  
 111. Oncothecaceae  
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 113. Parachryphiaceae  
 114. Marcgraviaceae  
 115. Caryocaraceae  
 116. Clethraceae  
 117. Cyrillaceae  
 118. Pentaphyllaceae
30. Sarraceniales  
 119. Sarraceniaceae
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 120. Ochnaceae  
 121. Quiinaceae  
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 123. Sphaerosepalaceae  
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 125. Strasburgeriaceae  
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 131. Ericaceae  
 132. Epacridaceae  
 133. Empetraceae
36. Diapensiales  
 134. Diapensiaceae
37. Ebenales  
 135. Ebenaceae  
 136. Sapotaceae  
 137. Symplocaceae  
 138. Lissocarpaceae

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 38. *Primulales*  
 140. *Myrsinaceae*  
 141. *Theophrastaceae*  
 142. *Primulaceae*  
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 143. *Plumbaginaceae*  
 144. *Polygonaceae*  
 L. *Caryophyllanae*  
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 145. *Molluginaceae*  
 146. *Aizoaceae*  
 147. *Cactaceae*  
 148. *Caryophyllaceae*  
 149. *Portulacaceae*  
 150. *Hectorellaceae*  
 41. *Chenopodiales*  
 151. *Barbeuiaceae*  
 152. *Didiereaceae*  
 153. *StegnospERMATAceae*  
 154. *Agdestidaceae*  
 155. *Petiveriaceae*  
 156. *Gisekiaceae*  
 157. *Nyctaginaceae*  
 158. *Phytolaccaceae*  
 159. *Chenopodiaceae*  
 160. *Amaranthaceae*  
 161. *Achatocarpaceae*  
 162. *Basellaceae*  
 163. *Halophytaceae*  
 M. *Malvanae*  
 42. *Malvales*  
 164. *Sterculiaceae*  
 165. *Huaceae*  
 166. *Elaeocarpaceae*  
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 172. *Bixaceae*  
 173. *Cochlospermaceae*  
 174. *Cistaceae*  
 175. *Malvaceae*  
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 177. *Cannabaceae*  
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 179. *Cecropiaceae*  
 180. *Moraceae*  
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 185. *Simmondsiaceae*  
 186. *Pandaceae*  
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 188. *Didymelaceae*  
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 191. *Dipentodontaceae*  
 192. *Peridiscaceae*  
 193. *Scyphostegiaceae*  
 194. *Violaceae*  
 195. *Turneraceae*  
 196. *Malesherbiaceae*  
 197. *Passifloraceae*  
 198. *Achariaceae*  
 199. *Caricaceae*  
 200. *Cucurbitaceae*  
 201. *Begoniaceae*  
 202. *Datisceae*  
 47. *Loasales*  
 203. *Loasaceae*  
 48. *Salicales*  
 204. *Salicaceae*  
 49. *Tamaricales*  
 205. *Tamaricaceae*  
 206. *Frankiniaceae*  
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 207. *Capparaceae*  
 208. *Tovariaceae*  
 209. *Moringaceae*  
 210. *Bataceae*  
 211. *Gyrostemonaceae*  
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 219. *Eupteleaceae*



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 220. Eucommiaceae
54. Hamamelidales  
 221. Hamamelidaceae  
 222. Platanaceae
55. Myrothamiales  
 223. Myrothamnaceae  
 224. Geissolomataceae
56. Casuarinales  
 225. Casuarinaceae
57. Fagales  
 226. Fagaceae  
 227. Betulaceae
- P. Santalanae
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 228. Medusandraceae  
 229. Celastraceae (*Hippurid.*)  
 230. Lophopyxidaceae  
 231. Stackhousiaceae  
 232. Corynocarpaceae
59. Vitales  
 233. Vitaceae
60. Santales  
 234. Olacaceae  
 235. Santalaceae  
 236. Eremolepidaceae  
 237. Mysodendraceae  
 238. Loranthaceae  
 239. Viscaceae
61. Balanophorales  
 240. Balanophoraceae  
 241. Cynomoriaceae
62. Rafflesiales  
 242. Rafflesiaceae  
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 246. Coriariaceae  
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 248. Meliaceae (*Aitoni.*)  
 249. Ptaeroxylaceae  
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257. Akaniaceae
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259. Aceraceae
260. Hippocastanaceae
261. Bretschneideraceae
65. Fabales  
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DISTRIBUTION OF CHAMAECYPARIS FUNEBRIS (ENDL.) CARR.  
AND CUPRESSUS CHENGIANA HU. (CUPRESSACEAE).

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The distribution and nomenclature of Chamaecyparis funebris (Endl.) Franco and Cupressus Chengiana Hu has often been incorrectly classified in several texts. The former was recognized as a taxon of Cupressus L. by Silba (Phytologia 49:394. 1981) on the basis of chemical and cultivation research. Its distribution in texts has included a distinct species, Cupressus Corneyana Carr. The distribution of C. Chengiana Hu has included another distinct species, namely C. gigantea Cheng & Fu (Franco, Portug. Acta Biol. 9: 190. 1969 and Silba, Baileya 21: 144. 1981) and a recent synonym, C. jilangeensis Zhao.

CHAMAECYPARIS FUNEBRIS (Endl.) Franco, Agros 24: 93. 1941. Cupressus funebris Endl., Syn. Conif. 58. 1847.

The distribution given by Franco (1941) included Nepal, Sikkim, Bhutan and China. However, Franco (Portug. Acta Biol. Ser. B. 9:183-195. 1969) later determined that the Western populations represented Cupressus Corneyana Carr and true C. funebris was only known from central China.

Cupressus Corneyana Carr. was only recently discovered wild, in Norbding, Bhutan (Long, Notes R.B.G. Edinb. 38: 311-314). Some commercial seed firms in India still market C. Corneyana as C. funebris. It is interesting to note that according to my research (Phytologia 49:390-399. 1981), C. Corneyana is the only Old World cypress that has seedlings with 3-5 cotyledons. A collection labeled as C. Corneyana by Franco (1969) from Panchen, Monyul District, S. Tibet, Ludlow & Sherriff 1254, March 1936 (BM) is located at 27°41' N. by 91°48' E. near the border of Bhutan [Stearn, Bull. Brit. Mus. (Nat. Hist.) Bot. 5: 243-268. 1976], may represent a wild collection. Cheng et Fu (Fl. Reip. Pop. Sin. 7: 332. 1978) state that C. torulosa Don (a native of the Western Himalayas) is also found in south and east Tibet on limestone region. It seems evident, however, that the Cupressus referred to by Cheng et Fu is in all probability C. Corneyana Carr.

The Kashmir cypress, C. torulosa cv. 'cashmeriana' was formerly regarded as a separate species described from Tibet (Royle ex Carr., Tr. Conif., 2:161. 1867). However this taxon has never been found wild and the only collection recorded by Franco (1969) by Royle is from Tehri Garhwal, N.W. India and rightly belongs

to C. torulosa Don. It may be possible that 'cashmeriana' resulted as a 'sport' from this seed. Similarly, several cultivars of Chamaecyparis pisifera Endl. bear juvenile foliage that never seems to change to adult foliage. These were once classified under a separate genus, Retinospora Sieb et Zucc., until it was discovered they were distinct cultivars of Chamaecyparis Sp.

I was unaware in Phytologia 49: 390-399. 1981 that the specimen examined by Zavarin (Phytochem 6:1387-1394. 1967) came from N. India and that some cultivated plants I observed also originated from N. India. Thus these are really C. Corneyana. In light of these facts I have reviewed the taxonomy of C. funebris and conclude that its characteristics fit the genus Chamaecyparis Spach more closely than Cupressus L.

The statistics of cotyledons given under C. funebris by Silba (Phytologia 49: 394. 1981) were from material collected in North India, so those statistics really belong under C. Corneyana. In late 1981 I obtained a seed lot of C. funebris collected in Changsha, Hunan from Dr. P. Chih Kang of the Chinese Academy of Forestry, Peking, China. Seedlings of this lot bore 2 bluntly acute cotyledons 7-9 mm. long by 1-1.2 mm. wide, not 3-5 as C. Corneyana.

Chamaecyparis funebris shares some parallel features with C. nootkatensis Spach. [Pringle s.n., Oregon, U.S.A., 1881 (NY)] in branching and leaf characteristics, which are comparatively close to Cupressus L. However, both species have small cones (usually less than 15 mm.), which shed their seeds upon maturity. Whereas, most Cupressus L. have cones over 20 mm. long that remain closed after ripening.

Chamaecyparis funebris is widely distributed in China from Anwei to Yunnan along the Yangste River drainage (Harrison. 1966. Hanb. Conif.). It is also known from Szechuan [Fang 3356, 1928 (NY)] and occurs as far inland as Mount Omei, Szechuan.

CUPRESSUS CHENGIANA Hu, Taiwania 10:57. 1964.

**Synonymy:** Cupressus fallax Franco, Portuz. Acta Biol. 9: 190. 1969.- Cupressus jiangensis Zhao, Acta Phytotax. Sin. 18: 210. 1980.- Cupressus Chengiana var. jiangensis (Zhao) Silba, Phytologia 49: 394. 1981.

Cupressus Chengiana Hu is fairly widespread in

S.E. Kansu and N.W. Szechuan along the Min River drainage, whose borders are quite close to populations of *Chamaecyparis funebris*.

In *Phytologia* 49: 395, 1981 there is a photograph of the type tree of *C. jiangeensis* Zhao surrounded by trees of *Chamaecyparis funebris* at Jiange Xian, Huaying Shan, Szechuan (30°24' N. by 107°20' E.). It seems rather odd that *C. jiangeensis* is only re-created in the wild by one individual tree in the middle of a forest of another unrelated species of *Chamaecyparis*. Rather, it seems more logical that the lone specimen of *C. jiangeensis* in Huaying Shan is actually a specimen of *C. Chengiana* that was introduced by the Min River drainage, or by bird, or by man. Since this lone specimen is surrounded by another species it's cones and seeds are most likely to produce the first bigeneric hybrid in the wild. Zhao (1980) distinguishes *C. jiangeensis* from *C. Chengiana* by it having an ovoid cone with 12 scales, whereas the latter has globose cones with 8-10 scales. However, *C. Chengiana* Hu, H. Smith 13387, 11-13-1934 from Kangting, Szechuan (NY) has both globose and ovoid cones with 8-12 scales. The description of *C. jiangeensis* Zhao (1980) seems to fit well in the characters of *C. Chengiana* [Meyer 1981 & Cheng 2073 (NY)] and is here reduced to synonymy with it.

The specimen listed by Franco (1969) as *Ludlow, Sherriff & Elliot* 13345 from Nye, Tsangpo Valley, Kongbo, S.E. Tibet (BM) is located at 29°01' N. by 93°17' E. (Stearn, 1976). The type specimen of *C. gigantea* Cheng & Fu cited as *Qing Zang* 3318 from Nang Xian, Tsangpo Valley (PE) in *Acta Phytotax. Sin.* 13: 86, 1975 is located at 93°05' E by 29°02' N. Obviously then, the specimen collected by *Ludlow, Sherriff & Elliot* is really *C. gigantea*. I believe the name '*gigantea*' refers to the size of the tree and not the foliage or cones. *Cupressus Duclouxiana* Hickel was recently discovered wild [*Ludlow, Sherriff & Elliot* 12130, 1-11-1947 (BM)] near Trulung, Pome, S.E. Tibet at 30°03' N by 95°03' E. Thus *C. gigantea* occurs west of *C. Duclouxiana*, which occurs west of *C. Chengiana*. *Cupressus gigantea* is cultivated as *Ludlow, Sherriff & Elliot* 13345 at the Univ. Washington, Seattle; Univ. Berkeley, Calif. and Hilliers Arboretum, Winchester, England. In late 1981 I obtained seeds of *C. Chengiana* collected from Kangding, Szechuan from Dr. P. Chih Kang and was able to distribute this to all the arboreta listed in *Phytologia* 49: 419-420, 1981 besides Seattle.

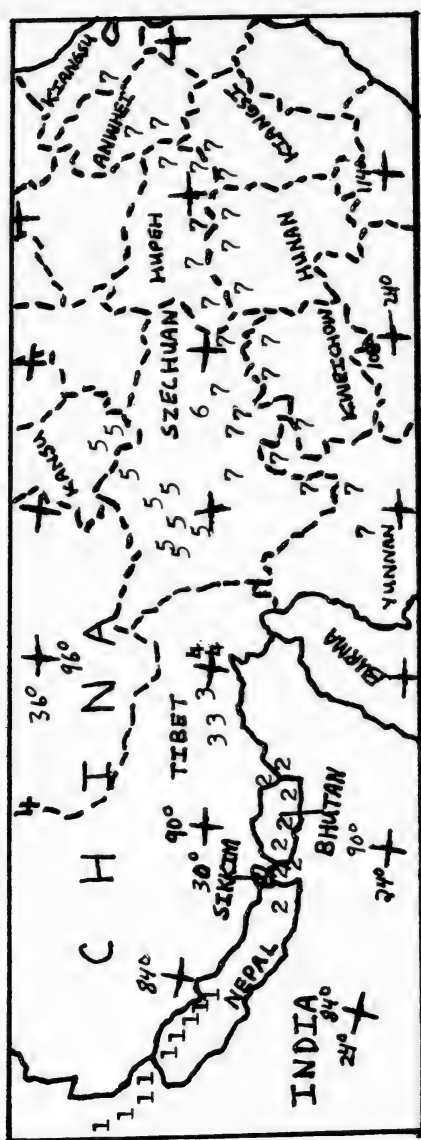


Fig. 1. Distribution of Asiatic cypresses. 1. *Cupressus torulosa* Don.  
 2. *C. Corneyana* Carr. 3. *C. gigantea* Cheng & Fu. 4. *C. Duclouxiana* Hickey.  
 5. *C. Chengiana* Hu. 6. *C. Chengiana* Hu (C. *jiangensis* Zhao). 7. *Chamaecyparis*  
*funebris* (Endl.) Franco.

VALIDATION OF THE GENERIC NAME OLMECA AND ITS TWO SPECIES

(POACEAE: BAMBUSOIDEAE)

Thomas R. Soderstrom  
Department of Botany  
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This past year I reported on the discovery of a new and unusual bamboo genus in Mexico, which I named Olmecca, in honor of the Olmec Indians who once roamed the forests where this bamboo grows in Veracruz, Oaxaca, and Chiapas. So far the genus is known only from two species, both of which bear fleshy fruits, a feature previously unknown in any bamboo of the New World. The generic name was published with full Latin descriptions for all taxa in the following paper: Soderstrom, T. R. Olmecca, a new genus of Mexican bamboos with fleshy fruits. Amer. J. Bot. 68: 1361-1373. 1981.

Unfortunately, I failed to indicate the type species of the genus, thus making invalid not only the generic name (Art. 37) but that of both species names (Art. 43) as well. The following is meant to correct that oversight and validate in the present publication (under Art. 45.1) the names involved.

Olmecca Soderstrom, gen. nov. (Latin description: Amer. J. Bot. 68: 1362. 1981.)

T.: Olmecca reflexa Soderstrom.

Olmecca reflexa Soderstrom, sp. nov. (Latin description and typification: Amer. J. Bot. 68: 1369-1371. 1981.)  
Holotype (US): Mexico. Chiapas: Mun. Ocozocoautla de Espinosa, 45 km N of Ocozocoautla, steep ravines with Lower Montane Rain Forest, elev. 550 m, 31 January 1973, D. E. Breedlove 32844. Isotype: DS.

Olmecca recta Soderstrom, sp. nov. (Latin description and typification: Amer. J. Bot. 68: 1365-1367. 1981.)  
Holotype (US): Mexico. Veracruz, between Catamaco and Zontecomapan, on road to Monte Pio. Wet slopes above Zontecomapan, alt. ca. 200 m, 11 April 1952, H. E. Moore, Jr., and Max Cetto 6268. Isotype: BH.

NOTES ON NEW AND NOTEWORTHY PLANTS. CLVII

Harold N. Moldenke

*CLERODENDRUM CYRTOPHYLLUM* f. *DENTATUM* Mold., f. nov.

Haec forma a forma typica speciei laminis foliorum apicaliter parce grosseque dentatis recedit.

This form differs from the typical form of the species in having its leaf-blades very coarsely dentate near the apex with 1--3 large divaricate teeth on each side.

The type of the form was collected by Joseph P. W. Woo (no. 152) in a thicket along a stream at Sheung Shui, Hong Kong, on July 16, 1972, and is deposited in the University of Michigan herbarium at Ann Arbor. The collector notes that the plant was "common" in the type locality and describes it as a shrub, 2 m. tall, the corollas white, and the fruit at first green, then red, and finally purple.

*CLERODENDRUM TERNIFOLIUM* var. *SERRATIFOLIUM* Mold., f. nov.

Haec forma a forma typica speciei laminis foliorum subtus dense pubescentibus marginalibus irregulariter serratis differt.

This form differs from the typical form of the species in having the leaf-blades very densely pubescent over the entire lower surface and the margins irregularly serrate.

The form is based on *George S. Bunting 5162* from "carretera Maracaibo--La Cañada--Potrerito y hacia adentro al OSO unos 29 km. hasta Los Negrones, 23--25 kms. al OSO de Potrerito, en zona de bosque seco deciduo, talado en gran parte, alt. 20--50 m.", Dept. Urdaneta, Zulia, Venezuela, collected on June 12, 1977, and is deposited in my personal herbarium. The collector describes the plant as an "Arbusto con varias ramas erectas que presentan numerosas ramitas laterales floríferas. Hojas atrecio-peladas en el envés. Cáliz verde claro, corola blanca, anteras perduzcas."

*LIPPIA CONTERMINA* var. *HIRSUTA* Mold., var. nov.

Haec varietas a forma typica speciei ramis glanduloso-hirtellis hirsutisque differt.

This variety differs from the typical form of the species in having its stems and branches rather densely glandular-hirsutulous and also eglandular white-hirsute with rather irregular and weak hairs.

The type of the variety was collected by J. Fernandez Casas and J. Molero (no. FC.3660) between Caapucú and Villaflorida, Paraguay, in a dry field about 8 km. from Villaflorida, on September 15, 1980, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collectors describe the plant as an herb with yellow "flowers" [corollas].

*VERBENA OFFICINALIS* f. *ANOMALA* Mold., f. nov.

Haec forma a forma typica speciei spicis floriferis plusminusve apicaliter multibrachiatis ramulis erectis parallelis dense multifloris recedit.

This form differs from the typical form of the species in having some or all of its flowering and fruiting spikes much branched toward their apex, the branches all very slender, erect or sharply ascending, parallel, and densely many-flowered.

The form is based on *H. Y. Liang* 64970 from an open slope on Hainan island, China, collected on January 21, 1934, and deposited in the University of Michigan herbarium at Ann Arbor. The collector describes the corollas as purple-blue and the fruit green. It seems very possible that this may prove to be a virus-induced form.

*VERBENA TEUCRIIFOLIA* var. *EXILIS* (Schau.) Mold., stat. nov.

*Verbena exilis* Schau. in A. DC., Prodr. 11: 553. 1847.

*VITEX TURCZANINOWII* f. *PUBERULA* (H. J. Lam) Mold., stat. nov.

*Vitex heterophylla* var. *puberula* H. J. Lam, Verbenac. Malay. Arch. 189. 1919.

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#### NOTE ON *SENECIO*

William A. Weber

#### Errata: Weber & Löve, New Combinations (*Phytologia* 49:44-50)

The following errors in citation should be corrected: page 46, the basionym for *Packeria cana* f. *eradiata* (D. C. Eaton) Weber & Löve should be *Senecio canus* var. *eradiatus* D. C. Eaton in S. Wats., Bot. King's Exped. 190. 1871; page 47, the basionym for *Packeria neomexicana* (A. Gray) Weber & Löve should be *Senecio neomexicanus* A. Gray, Syn. Fl. N. Am. 1(2):392. 1884.

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS *CALLICARPA*.  
XXX

Harold N. Moldenke

*CALLICARPA ERIOCLONA* var. *PAUCINERVIA* (Merr.) Mold.

Additional bibliography: Mold., *Phytologia* 50: 473, 475, & 482. 1982.

Moran describes this plant as a shrub, 2 m. tall, with lavender corollas, and found it growing at the edge of cliffs, flowering in July.

Additional citations: MARIANA ISLANDS: Guam: R. Moran 4525 (Mi).

*CALLICARPA FORMOSANA* Rolfe

Additional bibliography: Mold., *Phytologia* 50: 477 & 483--484. 1982.

Additional citations: TAIWAN: Suzuki s.n. [March 24, 1930] (Mi).

*CALLICARPA FURFURACEA* Ridl.

Additional bibliography: Bakh., *Journ. Arnold Arb.* 16: 70 & 472. 1935; Mold., *Phytologia* 50: 485. 1982.

*CALLICARPA GLABRA* Koidz.

Additional bibliography: Mold., *Phytologia* 50: 485. 1982.

Additional illustrations: Hatusima & Yoshinaga, *Bull. Fac. Agr. Kagosh. Univ.* 2: 107, pl. 13, fig. 3. 1970.

*CALLICARPA JAPONICA* f. *ALBIBACCA* Hara

Additional bibliography: Diaconescu, *Act. Bot. Hort. Bucur.* 1979/1980: 114. 1981; Mold., *Phytologia* 50: 488. 1982.

*CALLICARPA LONGIFOLIA* Lam.

Additional bibliography: Mold., *Phytologia* 50: 492--495. 1982.

The Madani SAN.35063, distributed as typical *C. longifolia*, seems better placed as its f. *floccosa* Schau.

Additional citations: GREATER SUNDA ISLANDS: Sabah: Ampuria SAN.33286 (Ld); Chai SAN.25975 (Ld); Cockburn SAN.70937 (Sn--40624); Muroh SAN.70607 (Sn--40623); Wing SAN.19010 (Ld).

*CALLICARPA OSHIMENSIS* Hayata

Additional bibliography: Mold., *Phytologia* 50: 500. 1982.

Hsiao (1978) asserts that this species occurs only in the Ryukyu Archipelago islands and not in Taiwan.

*CALLICARPA OSHIMENSIS* var. *IRIOMOTENSIS* (Masam.) Hatus.

Additional bibliography: Hatusima & Yoshinaga, *Bull. Fac. Agr. Kagosh. Univ.* 2: 92 & 108, pl. 14, fig. 4. 1970; Mold., *Phytologia* 40: 472. 1978; Mold., *Phytol. Mem.* 2: 302 & 527. 1980.

Illustrations: Hatusima & Yoshinaga, *Bull. Fac. Agr. Kagosh. Univ.* 2: 108, pl. 14, fig. 4. 1970.



*CALLICARPA OSHIMENSIS* var. *OKINAWENSIS* (Nakai) Hatus.

Additional bibliography: Hatusima & Yoshinaga, Bull. Fac. Agr. Kagosh. Univ. 2: 92 & 108, pl. 14, fig. 5. 1970; Mold., Phytologia 40: 472--473. 1978; Mold., Phytol. Mem. 2: 302 & 527. 1980.

Illustrations: Hatusima & Yoshinaga, Bull. Fac. Agr. Kagosh. Univ. 2: 108, pl. 14, fig. 5. 1970.

*CALLICARPA PACHYCLADA* Quisumb. & Merr.

Additional bibliography: Mold., Phytologia 33: 502. 1976; Mold., Phytol. Mem. 2: 306, 312, & 527. 1980.

*CALLICARPA PARVIFOLIA* Hook. & Arn.

Additional bibliography: Mold., Phytologia 40: 473. 1978; Woolliams, Notes Waumea Arboret. 6: 11. 1979; Mold., Phytol. Mem. 2: 310 & 527. 1980.

Woolliams (1979) states that this species is "probably endangered and certainly is very rare. We have not seen it in fruit but the relatively compact growth and grey coloured foliage make it an attractive plant."

*CALLICARPA PAUCIFLORA* Chun

Additional bibliography: Mold., Phytologia 33: 502. 1976; Mold., Phytol. Mem. 2: 276 & 527. 1980.

*CALLICARPA PEDUNCULATA* R. Br.

Additional & emended synonymy: *Mamanira alba* Rumpf, Herb. Amboin. 4: 124, pl. 49. 1750. *Callicarpus oblongifolia* B. acuminatissima Hassk., Cat. Pl. Hort. Bot. Bogor. Cult. Alt. 136. 1844. *Callicarpa lantana* Vahl ex Baill., Hist. Pl. 11: 95, sphalm. 1891. *Callicarpus oblongifolia* ♀ acuminatissima Hassk. ex Mold., Résumé Suppl. 14: 7, in syn. 1966.

Additional & emended bibliography: Roxb., Hort. Beng., imp. 1, [83]. 1814; Walp., Repert. Bot. Syst. 4: 127 & 128. 1845; Bailey & Tenison-Woods, Proc. Linn. Soc. N. S. Wales 174. 1880; Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: Nov. App. 158. 1880; F. Muell., Second Syst. Census Austr. Pl. 1: 173. 1889; K. Schum. & Hollr., Fl. Kaiser Wilhems. 119. 1889; F. M. Bailey, Cat. Indig. Nat. Pl. Queensl. 35. 1890; Baill., Hist. Pl. 11: 95. 1891; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a):143. 1895; Koord., Exkursionsfl. 3: 134 & 382. 1912; E. D. Merr., Enum. Philip. Flow. Pl. 3: 385 & 388. 1923; Heyne, Nutt. Plant. Ned. Ind., ed. 2, 1: 23 (1927), ed. 2, 2: 1311 (1927), and ed. 2, 3: 1646. 1927; Bakh., Journ. Arnold Arb. 16: 70. 1935; L. H. & E. Z. Bailey, Hortus Thrid 201. 1976; Mold., Phytologia 40: 473. 1978; Mold., Phytol. Mem. 2: 258, 271, 276, 282, 295, 304, 306, 312, 320, 322, 325, 328--330, 334, 340, 346, 378, 422, & 527. 1980; Roxb., Hort. Beng., imp. 2, [83]. 1980; Hu, Enum. Chin. Mat. Med. 152 & 218. 1981; Mold., Phytologia 50: 258, 477, 483, 492, & 498. 1982.

*Mamanira alba* Rumpf has previously been regarded by me as a synonym of *Callicarpa longifolia* Lam., but according to Merrill (1917) it is better placed in the synonymy of *C. pedunculata*.

The Baileys (1976) assert that the fruit of this species varies "from "purple or deep lilac to white".

Schumann & Hollrung (1889) cite *Hollrung 546* from New Guinea, commenting that "Von der Südspitze der Halbinsel Malacca würde sie bis nach Queensland und sogar nach Neu Süd-Wales verfolgt. Sie ist der *C. macrophylla* Vahl sehr nahestehend und vielleicht von ihr nicht spezifisch zu trennen; wir überhaupt die Arten der Gattung *Callicarpa* einer ernstlichen Revision dringend bedürfen. Ich habe durchaus den Eindruck, als ob in der letzten monographischen Bearbeitung zu viehle nicht unterscheidbare Arten aufgestellt und manche aus verschiedenen Pflanzen combinirt worden sind." Schumann & Lauterbach (1900) cite *Hellwig 568* and *Hollrung 546* from New Guinea and *Hügel s.n.* from New Britain.

Hu (1981) records the common names, "tzu-chu (chih-hsüeh-ts'ao)" and "purple pearl", and asserts that the species occurs in Chinese pharmacopoeias as "Folium *Callicarpae Pedunculatae*".

Warburg (1890) states: "Schon von Hollrung in deutsch Neu-Guinea, von der Challender-expedition auf Kl. Key gefunden. Meine Pflanze stammt von Kl. Key, wo die Pflanze einen wichtigen Bestandteil des Gebüsches auf den trockenen Kalkkrücken ausmacht", giving its overall distribution as "Durch Malesien bis nach Australien hin verbreitet".

Bakhuizen (1935) cites *Kajewski 2420* from Guadalcanal and records the vernacular name, "bau".

The *Ting & Shih 1563*, distributed as *C. pedunculata*, seems better placed as *C. formosana* Rolfe, a very closely related taxon.

*CALLICARPA PEDUNCULATA* var. *GLABRIUSCULA* H. J. Lam

Additional bibliography: Mold., *Phytologia* 33: 503. 1976; Mold., *Phytol. Mem.* 2: 312, 320, 322, 346, & 528. 1980.

*CALLICARPA PEDUNCULATA* var. *GLANDULOSA* H. J. Lam

Additional bibliography: Mold., *Phytologia* 33: 503. 1976; Mold., *Phytol. Mem.* 2: 312, 325, & 528. 1980.

*CALLICARPA PEDUNCULATA* var. *PSILOCALYX* J. J. Lam

Additional bibliography: Mold., *Phytologia* 33: 503. 1976; Mold., *Phytol. Mem.* 2: 325 & 528. 1980.

*CALLICARPA PETELOTII* Dop

Additional bibliography: Mold., *Phytologia* 33: 503. 1976; Mold., *Phytol. Mem.* 2: 291 & 528. 1980.

*CALLICARPA PHANEROPHLEBIA* Merr.

Additional bibliography: Mold., *Phytologia* 40: 473. 1978; Mold., *Phytol. Mem.* 2: 306 & 528. 1980.

Merrill (1923) cites only the type collection and asserts that the species is endemic to open places along streams at low altitudes on Luzon.

*CALLICARPA PILOSISSIMA* Maxim.

Additional bibliography: Mold., *Phytologia* 33: 504. 1976; Hsiao,

Fl. Taiwan 4: 413 & 417. 1978; Mold., Phytologia 40: 473. 1978; Hsiao, Fl. Taiwan 6: 121. 1980; Mold., Phytol. Mem. 2: 276, 304, 312, & 528. 1980; Mold., Phytologia 50: 58. 1981.

Hsiao (1978) avers that this species is endemic to Taiwan and is "Scattered and common in thickets and forests at medium altitudes (500--1,500 m) throughout the island", citing *Faurie 1468*, *Gressitt 247*, *Henry 120*, *Keng s.n.*, *Suzuki s.n.*, *Tanaka 5477*, and *Wilson 9649 & 11088*.

*CALLICARPA PILOSISSIMA* var. *HENRYI* Yamamoto

Additional bibliography: Mold., Phytologia 40: 473. 1978; Mold., Phytol. Mem. 2: 276, 304, & 528. 1980.

*CALLICARPA PLATYPHYLLA* Merr.

Additional bibliography: Mold., Phytologia 33: 504. 1976; Mold., Phytol. Mem. 2: 306 & 528. 1980.

Merrill (1923) states that this species inhabits forests at low altitudes on Luzon, where it is endemic.

*CALLICARPA PLUMOSA* Quisumb. & Merr.

Additional bibliography: Mold., Phytologia 40: 473. 1978; Mold., Phytol. Mem. 2: 291, 306, & 528. 1980.

*CALLICARPA POILANEI* Dop

Additional & emended bibliography: Fletcher, Kew Bull. Misc. Inf. 1938: 404, 407, 412, & 413. 1938; Mold., Phytologia 33: 504. 1976; Mold., Phytol. Mem. 2: 284, 288, 291, & 528. 1980.

Illustrations: Dop in Lecomte, Fl. Gén. Indo-chine 4: 787. 1935. Fletcher (1938) cites only *Kerr 19788* and *Put 901* from Thailand, where the species is said to grow in evergreen forests.

*CALLICARPA PSEUDORUBELLA* Chang

Additional bibliography: Mold., Phytologia 33: 504. 1976; Mold., Phytol. Mem. 2: 276 & 528. 1980.

*CALLICARPA PSILOCALYX* C. B. Clarke

Additional & emended bibliography: Fletcher, Kew Bull. Misc. Inf. 1938: 404, 412, 414, & 415. 1938; Mold., Phytologia 40: 473--474. 1978; Mold., Phytol. Mem. 2: 258, 271, 284, & 528. 1980.

Fletcher (1938) notes that the type of this species is from Burma and cites from Thailand only *Collins 1667* and *Marcan 149*. It inhabits the evergreen forests in Thailand. In Burma recent collectors refer to it as gregarious and as an abundant small tree, the fruit green when young, but white or pink when mature. They have found it growing along with bamboos along riversides, at 1200--2300 feet altitude, in flower in October, and in fruit in September.

Additional citations: BURMA: South Burma: *Keenan, Aung, & Rule 1522* (Lb--113402), *1619* (Lb--113416).

*CALLICARPA RAMIFLORA* Merr.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber.

53 (1): 1070. 1932; Mold., *Phytologia* 40: 474. 1978; Mold., *Phytol. Mem.* 2: 306 & 528. 1980; Mold., *Phytologia* 50: 293. 1982.

Merrill (1923) cites *Clemens 1167* and *Ramos B.S.15278 & 30275* from Leyte, Catanduanes, and Mindanao, where, he says, the species grows in and is endemic to forests at low and medium altitudes. He rightly comments that it is "Remote from *Callicarpa pentandra* Roxb., where Bakhuizen has erroneously placed it as a synonym".

*CALLICARPA RANDAIENSIS* Hayata

Additional synonymy: *Callicarpa formosana* f. *angustata* (Rehd.) Mold. ex Hsiao, *Fl. Taiwan* 417, in syn. 1978 [not *C. formosana* f. *angustata* Mold., 1952]. *Callicarpa japonica* var. *angustata* sensu Li ex Hsiao, *Fl. Taiwan* 4: 417, in syn. 1978.

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 39 (2): 319. 1913; Hsiao, *Fl. Taiwan* 4: 413 & 417--418. 1978; Mold., *Phytologia* 40: 474. 1978; Hsiao, *Fl. Taiwan* 6: 121. 1980; Mold., *Phytol. Mem.* 2: 276, 299, 304, 377, & 528. 1980.

Liu (1962) calls this plant the "Luanta beauty-berry" and "small-leaved beauty-berry". Hsiao (1978) regards it as endemic to Taiwan, where it occurs in forests at high altitudes (1000--2500 m.). He cites *Liu s.n.*, *Liu, Chen, & Kao s.n.*, *Liu & al.* 273, and *Suzuki 6986*.

*CALLICARPA RANDAIENSIS* var. *KOREANA* Mold.

Additional bibliography: Mold., *Phytologia* 33: 505. 1976; Mold., *Phytol. Mem.* 2: 299 & 528. 1980.

*CALLICARPA REMOTISERRULATA* Hayata

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 39 (2): 319. 1913; Mold., *Phytologia* 33: 505. 1976; Hsiao, *Fl. Taiwan* 4: 413 & 418 (1978) and 6: 121. 1980; Mold., *Phytol. Mem.* 2: 304 & 528. 1980.

Hsiao (1978) regards this species as endemic to Taiwan, where, he says, it inhabits thickets in the Hengchun peninsula only. He cites *Kao 7311*, *Nakahara 619*, and *Suzuki 6086*.

*CALLICARPA RESINOSA* Wright & Mold.

Additional & emended bibliography: Alain in León & Alain, *Fl. Cuba, imp.* 1, 4: 304 & 306. 1957; Mold., *Phytologia* 33: 505. 1976; Mold., *Phytol. Mem.* 2: 88 & 528. 1980.

*CALLICARPA RETICULATA* Sw.

Additional & emended bibliography: G. Don in Sweet, *Hort. Brit.*, ed. 3, 550. 1839; Bocq. in Baill., *Rec. Obs. Bot.* 3: 192. 1863; Mold., *Phytologia* 40: 474. 1978; Mold., *Phytol. Mem.* 2: 93, 346, & 528. 1980.

*CALLICARPA REVOLUTA* Mold.

Additional & emended bibliography: Alain in León & Alain, *Fl. Cuba, imp.* 1, 4: 305 & 307. 1957; Mold., *Phytologia* 34: 157. 1976; Mold., *Phytol. Mem.* 2: 88 & 528. 1980.

[to be continued]

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An international journal to expedite botanical and phytoecological publication

Vol. 51

June 1982

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road  
Plainfield, New Jersey 07060  
U.S.A.

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STUDIES IN THE LIABEAE (ASTERACEAE). XV.

A NEW SPECIES OF *FERREYRANTHUS*.

Harold Robinson  
Department of Botany  
Smithsonian Institution, Washington, D.C., 20560.

Material recently obtained from Dr. Ramon Ferreyra of the Museo at the Universidad Nacional Mayor de San Marcos in Lima, Peru, includes a specimen of *Ferreyranthus* from the State of Amazonas that seems related to but clearly distinct from *F. excelsus*. The specimen has caused the re-examination of the complete complex of *Ferreyranthus* in Peru having smooth or nearly smooth upper leaf surfaces. The results are as follows.

*Ferreyranthus excelsus* (Poepp. & Endl.) R. & B. is based on type material from Huanuco, and it apparently ranges from Junin northward in the central mountainous area of Peru. All specimens show leaves entire or subserrulate, often somewhat acuminate, and show ovate-lanceolate lower leaves with more elongate petioliform bases expanding abruptly into the blade. The specimens nearer the type locality show secondary veins rather evenly spaced and widely spreading, and show a more fulvous pubescence and minute reticulations on the undersurface of the leaf. Specimens from the northern part of the range in Amazonas show more irregularly spaced and angled secondary veins, usually with some congestion basally, and show appressed whitish tomentum and no minute reticulation on the lower surface. Additional collections may show that there is sufficient discontinuity to warrant separate species status for the more northern material.

*FERREYRANTHUS FRUTICOSUS* (Muschler) H. Robinson, comb. nov.  
*Liabum fruticosum* Muschler, Engl. Bot. Jahrb. 50, Beibl. 3: 81. 1913. was originally described from the State of Cajamarca in northern Peru. Four collections have been seen in this study from the interior of Cajamarca: Prov. Chota, *Ferreyra* 8463; Rio Chotano, *Ferreyra* 787; Prov. Celendin, *Ferreyra* 13309; and without precise locality, *Mathews* 3034. The species differs by the more hexagonal stems compared to the more terete and densely striated stems of related species. The leaves also differ by all being elliptical with regularly spreading rather evenly spaced secondary veins. The tomentum on the leaf undersurface is more lax and sordid, not being closely appressed to the surface.

A third species is recognized on the basis of the *Ferreyra* specimen from Amazonas. The leaves of the specimen all have

short petioliform bases and rather abruptly expanded ovate blades with distinctly serrate margins. The stems are essentially terete with dense striations, and the pubescence on the leaf under-surface is lax but white without minute reticulations. The secondary veins are sometimes slightly more congested at the base of the blade. The species seems most closely related to the northern material of *F. excelsus*, which occurs in the same area, but differs in the length of the petioliform bases on the lower leaves and the serration of the margin. The species name further honors Dr. Ramon Ferreyra after whom the genus is named.

**FERREYRANTHUS RAMONII** H. Robinson, sp. nov.

Plantae fruticosae ad 0.80-1.20 m altae mediocriter ramosae. Caules atro-rubrescentes teretes striati dense evanescentiter arachnoideo-albo-tomentosi. Folia opposita base circum nodis late connata vaginata, petiolis ca. 5-8 mm longis anguste alatis; laminae ovatae plerumque 7-10 cm longae et 3-4 cm latae base breviter acutae margine multo mucronate serratae apice acutae supra obscuro-virides laeves vel vix rugosae perminute puberulae subtus dense albo-tomentosae in nervulis leniter prominulae, nervis secundariis pinnatis utrinque ca. 6-7. Inflorescentiae late corymboso-paniculatae, ramis ultimis tenuibus 2-5 mm longis albo-arachnoideo-tomentosis. Capitula late campanulata ca. 6 mm alta et 5 mm lata radii exclusi; squamae involucri ca. 35 sub-imbricatae ca. 4-seriatae 0.7-4.0 mm longae et 0.3-1.0 mm latae apice plerumque breviter acutae margine tenuiter puberulo-fimbriatae extus inferne sparse arachnoideo-puberulae et glandulopunctatae superne subglabrae. Flores radii 6-7; corollae flavae ca. 5 mm longae extus sparse minute glanduliferae et inferne persparse puberulae, tubis ca. 2 mm longis, limbis ca. 3 mm longis et 1.2 mm latis. Flores disci 9-12; corollae flavae ca. 5-6 mm longae, tubis ca. 2.5 mm longis superne infundibularibus, faucibus ca. 1.3 mm longis inferne minute glanduliferis late cylindraceutis, lobis linearibus ca. 2 mm longis et 0.4 mm latis superne minute glanduliferis; filamenta in parte inferiore paucemamillifera in parte superiore ca. 0.4 mm longa; thecae ca. 2.5 mm longae base anguste acutae et denticulatae; appendices antherarum ovatae ca. 0.4 mm longae et 0.23 mm latae; rami stylorum ca. 1 mm longi. Achaenia submatura ca. 1 mm longa dense setulifera sparse minute glandulifera; setae pappi ca. 25 ca. 3.5-4.0 mm longae superne vix latiores, squamellis exterioribus 0.3-0.5 mm longis. Grana pollinis in diametro ca. 32  $\mu$ m.

TYPE: PERU: Amazonas: Prov. Bongará, entre Pomacochas y Jazán. Alt. 1800-1900 m. Habitat, bosque. Arbusto 0.80-1.20 m, flores amarillas. Agosto 19, 1963. *Ramon Ferreyra 75259* (Holotype, US; isotype, USM).





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MUSEO DE HISTORIA NATURAL "J. PRADO"  
PLANTAS DEL PERU

Lugar: AMAZONAS Esp: Bosquef  
*Ferreyranthus ramonii* Robinson  
Ubicación: entre Tassaconas y Jesús  
Flora: abundante; arbusto 1.0 - 1.5 m.  
Habitat: bosque  
Fecha: Agosto 16, 1963 Altitud: 100 m.  
N. V.: Det.  
Colector: Benito Torreya 15299  
Herbario: San Marcos, U.S.A.

*Ferreyranthus ramonii* H. Robinson, Holotype, United States National Herbarium. Photo by Victor E. Krantz, Staff Photographer, National Museum of Natural History.

STUDIES IN THE EUPATORIEAE (ASTERACEAE). CCXIV.

NEW SPECIES OF *CHROMOLAENA* AND *STEVIA* FROM BOLIVIA.

R. M. King and H. Robinson

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Three previously undescribed species of Eupatorieae are represented in material collected in Bolivia by St. G. Beck working at the Herbario Nacional de Bolivia in the Instituto de Ecología, UMSA La Paz. The species of *Chromolaena* and *Stevia* are as follows.

*CHROMOLAENA* BECKII R. M. King and H. Robinson, sp. nov.

Plantae suffrutescentes late patentés ad 20 cm altae. Caules rubescentes teretes vix striati hirsuti. Folia opposita, petiolis 2-3 mm longis; laminae ovatae plerumque 1.5-2.5 cm longae et 1.2-2.2 cm latae base late rotundatae trinervatae margine 5-8-crenato-serratae apice obtusae vel breviter acutae supra planae et breviter pilosae subtus reticulato-prominulae dense glandulo-punctatae puberulae plerumque in nervis pilosulae. Inflorescentiae breviter thyrsoideo-paniculatae in ramulis subcymosae, ramis ultimis 1-7 mm longis ascendentibus pilosulis. Capitula 8-9 mm alta et ca. 3.5 mm lata cylindracea; squamae involucri ca. 25 appressae imbricatae 1.5-5.0 mm longae et 1.0-1.5 mm latae apice plerumque truncatae et minute erecto-patenter apiculatae extus tristriatae superne viridi-maculatae interiores purpurascens dense breviter puberulae. Flores ca. 15 in capitulo; corollae superne violaceae 4.5-5.0 mm longae, tubis ca. 1.5 mm longis, faucibus ca. 2.5 mm longis extus glabris in canali fulvo-resiniferis, lobis ca. 0.8 mm longis et 0.5 mm latis intus dense papillosis extus glandulo-punctatis sparse puberulis, pilis in cellulis apicalibus plerumque clavatis non glanduliferis; filamenta in parte superiore ca. 0.2 mm longa; thecae 1.7 mm longae; appendices antherarum ca. 0.4 mm longae et 0.2 mm latae; appendices stylorum dense papillosae. Achaenia ca. 2.7 mm longa plerumque in costis dense setulifera; setae pappi ca. 36 plerumque ca. 4.5 mm longae apice leniter latiores. Grana pollinis in diametro ca. 30  $\mu$ m.

TYPE: BOLIVIA: Santa Cruz: Prov. A. Ibañez, Santa Cruz ca. 22 kms. hacia Abapó (Sud). ca. 500 m.s.n.m. Chaparral abierto con cesped bajo. -20 cm. 14.3.1981. *St.G.Beck 6502* (Holotype, US).

The new species is close in leaf shape and position to *Chromolaena congesta* (H. & A.) K. & R. and *C. elliptica* (H. & A.) K. & R., but differs from both in the more truncate involucral bracts tips which are broadest just below the tip, and by the

reddish coloration of the inner bract tips. The first of the similar species differs further by the dense, more incurved, sub-tomentose pubescence and fine reticulation of the lower leaf surface. The second species, *C. elliptica*, differs most obviously by the decumbent habit and more elongate internodes and reduced leaves of the erect branches that terminate in the inflorescences. The heads are reminiscent of *C. ivaeifolia* (L.) K. & R. but the involucre bracts are not as strongly appendaged and the leaves are broadly short ovate rather than lanceolate or linear.

STEVIA BECKII R. M. King and H. Robinson, sp. nov.

Plantae herbaceae erectae ad 0.8 m altae non vel pauce ramosae. Caules teretes pauci-striati brunnescentes sparse vel dense hirtelli. Folia opposita superne remotiora subsessilia, petiolis ca. 1 mm longis; laminae late ovatae plerumque 1.5-2.0 cm longae et 1.0-1.8 cm latae base late obtusae vel subtruncatae margine ca. 8-10-serrulatae apice breviter acutae supra planae subtus leniter reticulato-prominulae et vix subcarnosae utrinque pilosulae et glandulo-punctatae fere ad basem leniter trinervatae vel 5-nervatae. Inflorescentiae laxae paniculatae, ramis ultimis plerumque 5-10 mm longis dense stipitato-glanduliferis. Capitula ca. 8 mm alta; squamae involucri atro-purpureae ca. 5 mm longae apice argute acutae extus stipitato-glanduliferae. Corolla rosaceae in lobis pallidiores ca. 6 mm longae extus puberulae inferne et in lobis densius inferne et in lobis glandulo-punctatae; basi stylorum in cellulis subquadratis ampliatis distincte minute noduliferis. Achaenia ca. 3 mm longa dense scabridulae; adelphocarpi 4 in pappis 3-4-aristiferi, aristis ca. 4.5 mm longis; idiocarpi 1 in pappis omnino squamuliferi, squamellis 0.2-0.3 mm longis. Grana pollinis in diametro ca. 22  $\mu$ m.

TYPE: BOLIVIA: Santa Cruz: Prov. Florida, Santa Cruz 110 kms. hacia Cochabamba. 1550-1650 m. Vegetación alrededor de las ruinas de Samaipata. Hierba -80 cm., flor rosada. 23.3. 1981. *St. G. Beck 6777* (Holotype, US).

The new species has a distinctive lax inflorescence and subsessile broadly ovate leaves that are reminiscent of *Stevia parvifolia* Hassl., *S. anambayensis* B.L. Robinson, and *S. amplexicaulis* Hassl. of Paraguay. The three habitually similar species all differ by having 12-19 awns on all the achenes and by having few or no stipitate glands on the involucre bracts.

STEVIA POTOSIENSIS R. M. King and H. Robinson, sp. nov.

Plantae suffruticosae ca. 0.4 m altae multo ramosae. Caules teretes dense pilosi, internodiis plerumque ca. 2 cm longis; laminae ovatae 1-2 cm longae et 0.6-1.3 cm latae base rotundatae breviter trinervatae margine 5-7-crenato-serrulatae apice breviter acutae supra planae subtus leniter prominulae carnosius in punctis subimmersius utrinque dense pilosulae et glandulo-punctatae. Inflorescentiae in ramis terminales dense glomerulatae. Capitula ca. 1 cm longa; squamae involucri

plerumque virides ca. 5 mm longae et 1 mm latae apice breviter acutae extus dense stipitato-glanduliferae. Corollae purpureae in lobis pallidiores vel albescentes ca. 6 mm longae inferne et in apicem loborum dense puberulae sparse glandulo-punctatae; basi stylorum non noduliferi. Achaenia ca. 4.5 mm longa minute scabridulae superne pauca setulifera; idiocarpi 0-2 in pappis 1-2-aristiferi, aristis ca. 4 mm longis; adelphocarpi 3-5 in pappis omnino squamuliferi, squamellis ca. 0.5 mm longis. Grana pollinis in diametro ca. 25  $\mu$ m.

TYPE: BOLIVIA: Potosí: Prov. Bustillos, uncia 22 kms hacia Pocoata. 3800 m. Ladera rocosa con Cactus columnares. Hierba -40 cm, hojas pelosas, corola morada. 6.3.1981. *St.G.Beck 6153* (Holotype, US).

The new species is distinct by the combination of its dense branching, small ovate pubescent leaves, and dense inflorescences with stipitate-glandular involucre bracts. The species keys in the key to Bolivian *Stevia* by Robinson (1932) to *S. soratensis* Hieron. or *S. bridgesii* Rusby. The first of these differs by the less branched plants, and by the larger more triangular leaves with non-carnose reticulately patterned lower leaf surfaces. The second differs by the more setose pappus, and by the more lanceolate less densely glandular-punctate leaves. The corollas of the new species seem rather distinctive in the lack of puberulence outside on the throat and bases of the lobes but the density on the tube and lobe tips.

#### Literature Cited

- Robinson, B. L. 1932. The Stevias of Bolivia. *Contrib. Gray Herb. n.s.* 100: 36-69.



*Chromolaena beckii* R. M. King and H. Robinson, Holotype, United States National Herbarium. Photos by Victor E. Krantz, Staff Photographer, National Museum of Natural History.



*Stevia beckii* R. M. King and H. Robinson, Holotype, United States National Herbarium.



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Comp. *Stevia potosiensis* R.M. King & H. Robinson

Holotype

Dpto. Potosí, Prov. Bustillos, Uncia  
22 km. hacia Pocoata, 3800 m.Ladera rocosa con Cactus columnares.  
Hierba -40 cm. hojas pelosas, corola morada

6.3.1981 Det. G. Hook No. 6153

*Stevia potosiensis* R. M. King and H. Robinson, Holotype,  
United States National Herbarium.



Enlargements of heads. Top right: *Chromolaena beckii*; Top left: *Stevia beckii*; Bottom: *Stevia potosiensis*.



STUDIES IN THE EUPATORIEAE (ASTERACEAE). CCXV.

ADDITIONS TO *AUSTROEUPATORIUM* AND *CRONQUISTIANTHUS*.

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Recent work in the tribe has shown the need for the following two new combinations in *Austro eupatorium* and five new species descriptions and one new combination in *Cronquistianthus*.

*AUSTROEUPATORIUM APENSIS* R. M. King and H. Robinson, comb. nov.

*Eupatorium apense* Chod., Herb. Boiss. ser. 2. 3: 708.

1903. The species has the superficial appearance of *Stomatanthes oblongifolius* (Sch.Bip. ex Baker) H. Robins., but is clearly an *Austro eupatorium* in the pubescence of its achenes and the form of its anther filaments.

*AUSTROEUPATORIUM SILPHIIFOLIUM* R. M. King and H. Robinson, comb.

nov. *Eupatorium silphiifolium* Martius, Flora 20 (2): 105.

1837. The name has previously been placed in the synonymy of *A. inulaefolium* (H.B.K.) K. & R., but examination of type material shows the plant to be the same as *Eupatorium monardaefolium* Walp. over which the Martius name has priority by three years.

*CRONQUISTIANTHUS CELENDINENSIS* R. M. King and H. Robinson, sp.

nov. Plantae fruticosae ad 1 m altae multo ramosae. Caules rubro-brunnescentes teretes puberuli. Folia opposita, petiolis 2-3 mm longis; laminae ovatae vel deltoideae plerumque 1-2 cm longae et 0.5-1.0 cm latae base obtusae vel truncatae margine multo crenatae reflexae apice breviter acutae supra in nervis depressae puberulae ceterum glabrae subtus laxe albo-tomentellae et dense glandulo-punctatae fere ad basem subtrinervatae, nervis secundariis paucis. Inflorescentiae laxae late corymboso-paniculatae in ramulis ultimis glabris paucicapitatae subglomerulatae. Capitula ca. 5 mm lata et 2-3 mm alta; squamae involucri plerumque flavae ca. 22 subimbricatae 3-4-seriatae late ovatae vel oblongae 0.5-4.0 mm longae et 0.3-1.0 mm latae apice rotundatae extus glabrae laeviter 2-4-costatae; receptacula glabra. Flores ca. 8 in capitulo; corollae albae anguste infundibulares ca. 2.5 mm longae extus plerumque glabrae in lobis multo glandulo-punctatae, tubis ca. 1 mm longis, faucibus ca. 1 mm longis, lobis ca. 0.45 mm longis et 0.25 mm latis; filamenta in parte superiore ca. 0.25 mm longa; thecae ca. 0.7 mm longae; appendices antherarum oblongae ca. 0.2 mm longae et 0.17 mm latae. Achaenia 1.5-1.8 mm longae in costis plerumque superne scabridulae; setae pappi albae ca. 35 plerumque 1.7-2.3 mm longae apice tenuiores.

Grana pollinis in diametro ca. 20  $\mu$ m.

TYPE: PERU: Cajamarca: Prov. Celendin. Celendin, ravine in hills above town. Alt. ca. 2700 m. Shrub to 1 m. Flowers fragrant, white. 17 May 1964. *Hutchison & Wright 5134* (Holotype, US; isotypes, UC, USM, F. PARATYPES: PERU: Cajamarca: Prov. Celendin. Celendin, hills opposite town ca. 2 km on Balsas road, steep rocky slightly grazed shrubland. Alt. ca. 2700 m. Shrub 1 m or less. Glossy dark green leaves. Flowers white. Very common. 18 May 1964. *Hutchison & Wright 5155* (F, UC, US, USM); Canyon Rio Maranon above Balsas, 8.5 km below summit of road to Celendin. Alt. 2740. Shrub to 1 m. Leaves shiny green above, pale green beneath. Flowers whitish. 27 May 1964. *Hutchison & Wright 5392* (UC, US); On road from Celendin to Balsas. Shrub to 3 ft. tall with white flowers. Roadside weed. May 29, 1966. *Gabriel Edwin & José Schunke V. 3580* (US).

The new species is most distinct in the small heads with mostly yellowish involucre bracts, and by the glabrous upper surfaces of the leaves.

CRONQUISTIANTHUS CHACHAPOYENSIS R. M. King and H. Robinson, sp.

nov. Plantae fruticosae ca. 1 m altae mediocriter ramosae. Caules teretes vix vel non striati dense antrorse subappresse cinereo-puberuli glabrescentes. Folia opposita, petiolis 3-5 mm longis; laminae oblongo-lanceolatae plerumque 3-4 cm longae et 0.6-1.2 cm latae base acutae margine intgerae apice anguste rotundatae supra atro-virides minute subvelutinae subtus pallidiores velutino-tomentosae. Inflorescentiae late corymboso-paniculatae in ramulis cymosis, ramis ultimis 0-4 mm longis dense appresse cinereo-puberulis. Capitula submatura late cylindracea sensim late infundibulares ca. 5 mm altae et 2-4 mm latae; squamae involucri ca. 12 subimbricatae 4-5-seriatae oblongae 0.5-4.0 mm longae et 0.3-1.3 mm latae apice rotundatae minute puberulo-fimbriatae extus glabrae plerumque 4-costatae. Flores ca. 8 in capitulo; corollae albae ca. 2.5 mm longae anguste infundibulares extus plerumque in tubis superioribus et in lobis glandulo-punctatae et sparse minute puberulae, tubis late cylindraceis ca. 1 mm longis, faucibus ca. 1 mm longis, lobis ca. 0.45 mm longis et 0.3 mm latis; filamenta in parte superiore ca. 0.2 mm longa; thecae ca. 0.7 mm longae; appendices antherarum ca. 0.3 mm longae et 0.2 mm latae. Achaenia 1.8-2.0 mm longa plerumque in costis setulifera inter costam glandulo-punctata; setae pappi albae 35-40 plerumque 1.8-2.0 mm longae apice non latiores. Grana pollinis in diametro ca. 20  $\mu$ m.

TYPE: PERU: Amazonas: Prov. Chachapoyas, debajo de Chachapoyas. Alt. 1800-1900 m, habitat Monte bajo, flores blancas. Mayo 19, 1962. *Ramón Ferreyra 14440* (Holotype, US).

The species is most distinct in the cymose rather than glomerulate ultimate units of the inflorescence. The oblong entire leaves are also rather distinctive.

*CRONQUISTIANTHUS DETERMINATUS* (B. L. Robinson) R. M. King and H. Robinson, stat. et comb. nov. *Eupatorium urubambense* var. *determinatum* B. L. Robinson, Contr. Gray Herb., n.s. 68: 33. 1923. In the density of the inflorescence and the dense stipitate glandular pubescence of the stems, the species is close to *Cronquistianthus infantessii* K. & R. The distinctions are given below under the latter.

*CRONQUISTIANTHUS INFANTESII* R. M. King and H. Robinson, sp. nov. Plantae fruticosae ca. 0.5 m altae multo ramosae. Caules teretes vix vel non striati dense breviter stipitato-glanduliferi. Folia opposita, petiolis ca. 5 mm longis; laminae late ovatae plerumque 8-16 mm longae et 6-12 mm latae base obtusae vel subtruncatae margine multo-crenatae reflexae breviter acutae supra subbullatae pilosulae et dense glandulo-punctatae subtus in nervulis prominentiter reticulatae et dense antrorse appresse puberulae glandulo-punctatae?, nervis secundariis paucis aliquantum irregularibus ascendentibus inferioribus subtrinnervatis. Inflorescentiae in ramulis dense breviter stipitato-glanduliferis et sparse pilosulis terminales. Capitula in glomerulis densis sessilia vel subsessilia 6-7 mm alta et 3-4 mm lata; squamae involucri ca. 20 subimbricatae ca. 4-seriatae late ovatae vel oblongae 1-5 mm longae et 0.8-1.5 mm latae apice rotundatae margine lateraliter puberulo-fimbriatae extus 4-6-costatae in squamis exterioribus minute puberulae interioribus glabrae; receptacula hirtella. Flores ca. 12 in capitulo; corollae albae ca. 3.5 mm longae superne plerumque in lobis dense glandulo-punctatae, tubis ca. 1.2 mm longis, faucibus ca. 1.7 mm longis, lobis ca. 0.5 mm longis et 0.4 mm latis; filamenta in parte superiore ca. 0.3 mm longa; thecae ca. 1.2 mm longae; appendices antherarum ca. 0.3 mm longae et 0.2 mm latae. Achaenia 2.0-2.2 mm longa breviter setulifera non glandulifera; setae pappi albae ca. 35 plerumque 1.5-2.5 mm longae apice sensim vix tenuiores. Grana pollinis in diametro ca. 22  $\mu$ m.

TYPE: PERU: Libertad: Prov. Huamachuco, Sartimbamba. Estimulante, flores blancas. 7-5-1962. *J. Infantessii* 916 (Holotype, US).

The specimens were originally determined as *C. chamaedriifolius* (H.B.K.) K. & R., but that has leaves more strongly trinervate with less bullate and more velutinous upper surfaces. The latter also has more broadly rounded involucre bracts with prominent darkened differentiated margins, and yellowish pappus bristles about as long as the corolla. The new species may also be confused with *C. marubiiifolius* (Hieron.) K. & R., but that differs by its pilosulous stems, less densely branched inflorescence, and the more rows of involucre bracts with distinct margins. The closest relative seems to be *C. determinatus* (B.L.Robins.) K. & R. of the adjacent state of Ancash, which also has dense stipitate-glandular pubescence on the stems. The latter differs by the pappus more nearly as long as the corolla,

the larger corollas and achenes, and the leaves with more ascending trinervation reaching midleaf.

*CRONQUISTIANTHUS MACBRIDEI* R. M. King and H. Robinson, sp. nov.

Plantae fruticosae ca. 1.5 m altae mediocriter ramosae. Caules teretes perdense hispiduli. Folia opposita, petiolis 1-4 mm longis; laminae ovatae plerumque 2-5 cm longae et 1.1-2.7 cm latae base leniter cordatae distincte trinervatae margine multo crenatae apice anguste acutae supra leniter bullatae perdense scabridulae subтус reticulato-exsculptae dense hispidulae non glanduliferae. Inflorescentiae in ramis dense corymbosae, ramulis perdense hispidulis. Capitula in glomerulis sessilia vel breviter pedicellata ca. 7 mm longa et 3 mm lata; squamae involucri ca. 25 subimbricatae ca. 4-seriatae interiores superne purpurascens late ovatae vel oblongae 1-5 mm longae et 1.0-1.5 mm latae apice late rotundatae margine et extus superne puberulae plerumque 4-costatae; receptacula glabra. Flores ca. 10 in capitulo; corollae lavandulae ca. 4 mm longae anguste infundulares extus plerumque glabrae in lobis multo glandulo-punctatae, tubis ca. 1.5 mm longis, faucibus ca. 2 mm longis, lobis ca. 0.6 mm longis et 0.3 mm latis; filamenta in parte superiore ca. 0.4 mm longa; thecae ca. 1 mm longae; appendices antherarum ca. 0.2 mm longae et 0.17 mm latae. Achaenia ca. 2 mm longa plerumque superne scabridula; setae pappi albae ca. 35 plerumque 2.5-3.0 mm longae apice sensim angustiores. Grana pollinis in diametro ca. 20  $\mu$ m.

TYPE: PERU: Huanuco: Huacachi, estacion near Muna, open rocky ridge, about 6500 feet. Slender-stemmed open shrub, 4-5 ft high, flowers heliotrope. May 20-June 1, 1923. *J. F. Macbride 3887* (Holotype, US).

The species is distinct in the extremely dense hispidulous pubescence of the stems and undersurfaces of the leaves, the lack of glandular-punctations on the leaves, and the distinctly pointed short-petiolate leaves. The species is perhaps close to *C. glomeratus* (DC.) K. & R., but that is not bullate, it is not densely hispidulous, and it has long petioles. The specimen was determined as *Eupatorium marubii-folium* Hieron. by B. L. Robinson, but that has smaller, more blunt, less distinctly trinervate leaves, it is antrorsely puberulous, and it has glandular punctations on the leaf undersurface.

*CRONQUISTIANTHUS ROSEI* R. M. King and H. Robinson, sp. nov.

Plantae fruticosae ad 1 m altae interdum flexuosae variabiliter ramosae. Caules teretes dense hispiduli. Folia opposita, petiolis 1-3 mm longis; laminae late ovatae plerumque 1.0-2.3 cm longae et 0.8-1.8 cm latae base subtruncatae vel subcordatae margine multo crenatae vel dentatae apice breviter acutae vel anguste obtusae supra bullatae pilosulae subtus sparse glandulopunctatae plerumque in nervis et nervulis dense pilosulae fere ad basem subtrinervatae. Inflorescentiae terminales dense

corymbosae, ramulis dense hispidulis. Capitula in glomerulis sessilia vel breviter pedicellata 7-8 mm alta et ca. 4 mm lata; squamae involucri ca. 20 subimbricatae ca. 4-seriatae in partibus expositis purpurascens late ovatae vel oblongae 2-6 mm longae et 1.5-2.0 mm latae apice late rotundatae lateraliter in marginis puberulo-fimbriatae extus glabrae multicostatae; receptacula glabra. Flores ca. 12 in capitulo; corollae lavandulae vel albae 4.5-5.0 mm longae extus plerumque glabrae in lobis glandulopunctatae, tubis 1.5-2.0 mm longis, faucibus ca. 2 mm longis, lobis ca. 0.6 mm longis et 0.4 mm latis; filamenta in parte superiore ca. 0.3 mm longa; thecae 1.3-1.5 mm longae; appendices antherarum ca. 0.3 mm longae et 0.2 mm latae apice rotundatae. Achaenia ca. 2.5 mm longa setulifera superne densiora; setae pappi sordidae ca. 35 plerumque 3-4 mm longae apice tenuiores. Grana pollinis in diametro ca. 25  $\mu$ m.

TYPE: ECUADOR: Azuay: Vicinity of Cuenca. Sept. 17-24, 1918. *J.N. Rose, A. Pachano & G. Rose 22979* (Holotype, US). PARATYPES: ECUADOR: Loja: Vicinity of Zaragura. Sept. 27-28, 1918. *J.N. Rose, A. Pachano & G. Rose 23162* (US); Caffar: between Tambo and Suscal. North rim of the valley of the río de Canar. Shrub 1 m. Leaves dark brownish green, bracts pale green, reddish tipped, corolla tube pale greenish, lobes pale lilac, stigmas bright lilac. April 23, 1945. *Manuel Giler, Camp no. E-2783* (US).

The species seems closest to *Cronquistianthus bulliferus* (Blake) K. & R. (*Eupatorium rugosum* H.B.K. non Houtt.), and has a sordid tenuous-tipped pappus as in that species, but the new species has much smaller heads with only ca. 12 flowers. The heads of *C. bulliferus* are ca. 1 cm high with 18-20 flowers and the involucre bracts are more strongly costate. The new species has been identified as *Eupatorium chamaedrifolium* H.B.K. by B. L. Robinson, and seems to be the source of the impression that the pappus in the latter is darkened. Actually, the latter is a thoroughly distinct species with essentially non-bullate densely velutinous upper leaf surfaces, less crenate margins on the leaves, and less truncate bases on the blades.



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UNIVERSIDAD NACIONAL MAYOR DE SAN MARCOS  
MUSEO DE HISTORIA NATURAL "J. PRADY"  
PLANTAS DEL PERU

Localidad: AMAZONAS Prov. Chachapoyas  
Cronquistianthus chachapoyensis  
Localidad debajo de Chachapoyas  
Forma: blanda  
Fecha: Mayo 15, 1962 Altitud: 1200 - 1400 m.  
M. V.: CW  
Colector: Basilio Ferrery LHC  
Herbario San Marcos U.S.A.

*Cronquistianthus chachapoyensis* R. M. King and H. Robinson,  
Holotype, United States National Herbarium. Photos by Victor E.  
Krantz, Staff Photographer, National Museum of Natural History.



No.  
*Cronquistianthus chongchaitianus*  
 R. M. King & H. Robinson

*Cronquistianthus infantesii*  
 R. M. King & H. Robinson  
 Holotype

UNIVERSIDAD NACIONAL MAYOR DE SAN MARCOS  
 FACULTAD DE FARMACIA Y BIQUIMICA

HERBARIO

N. nombre: \_\_\_\_\_  
 N. vulgar: \_\_\_\_\_  
 Localidad: \_\_\_\_\_  
 Habitat: \_\_\_\_\_  
 Coleccionador: \_\_\_\_\_

UNITED STATES  
 2578741 A  
 NATIONAL HERBARIUM

*Cronquistianthus infantesii* R. M. King and H. Robinson,  
 Holotype, United States National Herbarium.



Enlargements of heads of *Cronquistianthus*, Top: *C. chachapoyensis*. Bottom: *C. infantisii*.



## Saxifraga, Sect. Porophyllum Gaudin in the USSR

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ABSTRACT. 26 species of Saxifraga, sect. Porophyllum occur in the USSR: one in the Eastern (Ukrainian) Carpathians, 22 in the Caucasus, and three in the mountains of Middle Asia. S. biebersteinii Sipl., nom. nov., and S. caspica Sipl., nom. nov., are proposed for the invalid names S. laevis Bieb. and S. meyeri Manden., respectively. Two new species, Saxifraga polytrichoides Sipl. and S. unifoveolata Sipl. are proposed, and two new combinations, S. grisea Sipl. and S. sommierii (Engl. & Irmsch.) Sipl. The relationships of some critical species are also discussed.

Section Porophyllum of the genus Saxifraga contains perennial caespitose plants with woody basal caudicles clothed with coriaceous marcescent leaves that possess calcium-secretory pores along the margins. The flowers are pendent or erect on adenotrichous flowering stalks. The ovary is deeply inferior.

The present work is based primarily on materials in the herbarium of the Botanical Institute of the Academy of Sciences of the USSR in Leningrad (LE) and, to a lesser extent, on materials of the herbaria of Moscow and Kiev. The English-language part of this work is a translation from the original Russian of the draft manuscript. This must be noted for the following reason: since the species of the Porophyllum section occur in the USSR exclusively within the limits of southern Soviet colonies, I had to work with the collection-documenting texts in eleven languages, of which I knew only six, and had to find a translator for the texts written in five other languages. Therefore, when quoting the labels of the specimens studied, I am quoting them in the original language--if this language employs the Roman alphabet--or in the English translation in all instances when the alphabet of the language on the labels is not Roman, e.g. when these labels were written in Cyrillic or in such exotic alphabets as Georgian and Armenian. This, incidentally, accounts for the inevitable variations in transliterating proper names and names of geographical locations. The text of the label is an important source of information; in these cases it has to be quoted in full, since Soviet botany has almost completely discarded the time-honored tradition of indicating the specimen number on the label, a practice that results in decreased precision of presentation when describing different specimens investigated.

In the citations, the altitudes above sea level are quoted in the units that are indicated on the labels of the respective specimens. In transliterating proper names I generally followed the rules of American bibliography except when the collector in

question is a well-known botanist and there already exists a tradition of transliterating his name into Roman characters (as a rule, the transliteration in such instances is German). I follow the Russian geographical tradition, calling "Middle Asia" that part of Central Asia inside the USSR border and south of the line Caspian Sea-Aral Sea-Balkhash Lake-Tarbagatay Range.

Key to the USSR species of *Saxifraga* Sect. *Porophyllum*

1. Flowering stalks single-flowered, sometimes almost absent and then the flowers submerged among the upper leaves of the caudicles..... (2)
- Flowering stalks with apical inflorescences, sometimes few-flowered..... (5)
2. Leaves of caudicles with 3-5 calcium-secreting pores on margins; petals purple or red..... (3)
- Leaves of caudicles with one calcium-secreting pore near the apex; petals white or yellow..... (4)
3. Plant light or gray-blue and coralloid due to the divaricate, imbricate-leaved caudicles; flowering stems with glandular trichomes; petals scarlet. 22. *S. columnaris*.
- Plant green, cushion-shaped due to shortened, approximate, densely-foliated caudicles; flowering stems glabrous; petals purple. 23. *S. dinnikii*.
4. Caudicles imbricate-foliolate; leaves thickened at apex and curved outward; peduncles and pedicels hardly developed; flowers sessile with white petals. Plants of Middle Asia (Western Pamir). 26. *S. pulvinaria*.
- Caudicles with whorled leaves; leaves narrowed toward the apex and not curved; flowers on well-developed pedicels; petals yellow. Plants of Caucasus (Balkaria). 25. *S. carinata*.
5. Plants of Carpathians or Middle Asia.....(6)
- Plants of Caucasus.....(8)
6. Peduncles up to 15 cm tall with 5-16-flowered inflorescence; caudicle leaves with 19-25 pores; petals greenish-yellow, 5-nerved. Plants of the Carpathians. 1. *S. luteo-viridis*.
- Peduncles up to 5 cm tall; caudicle leaves with 3-5 pores; petals white, 3-nerved. Plants of Middle Asia.....(7)
7. Caudicle leaves 3-4 mm long and 1-1.5 mm broad, thickened at apex, rounded or obtuse, concave; sepals with glandular trichomes, ciliate. 2. *S. albertii*.
- Caudicle leaves 10-15 mm long and 2.5-3 mm broad, acuminate, slightly keeled below; sepals glabrous. 3. *S. vvedenskyi*.

8. Flower stalks glabrous.....(9)  
 -- Flower stalks pilose or with glandular trichomes.....(13)
9. Caudicles with whorled leaves; leaves slightly channeled, with smooth margins that bend downward.....(10)  
 -- Caudicles with alternate leaves, though sometimes mixed with whorled leaves; leaves not channeled, the margins plane, ciliate or aristulate-ciliate along lower half or third.....(11)
10. Caudicle leaves 9-20 mm long, divaricate; sepals reflexed at maturity, with 3 simple nerves. 8. S. subverticillata.  
 -- Caudicle leaves 5-10 mm long, mostly appressed to the stem; sepals with 3 branched nerves, appressed to the capsule at maturity. 9. S. colchica.
11. Caudicle leaves with 5-7 easily-visible pores, broader at base gradually narrowed toward the apex, the upper 1/3 of margins smooth. 19. S. kuznezowiana.  
 -- Caudicle leaves with 1-3 obscure pores on some leaves, broader at the middle and abruptly narrowed toward the apex, the upper 1/3 of margins ciliate or aristulate-ciliate.....(12)
12. Caudicle leaves 4-5 mm long and ca. 1.5 mm broad; sepals sub-orbicular, with smooth margins. 11. S. sosnowskyi.  
 -- Caudicle leaves 5-10 mm long and about 2 mm broad; sepals elliptical, subacute or acute, with ciliate-toothed margins. 10. S. caucasica.
13. Caudicle leaves tapering, the upper 1/3 of margins smooth.(14)  
 -- Caudicle leaves oblong or lanceolate, the upper 1/3 with ciliate or aristulate margins.....(18)
14. Petals 3-5-nerved, broader than the sepals.....(15)  
 -- Petals 1-nerved, narrower than the sepals.....(17)
15. Petals always with some red, varying from reddish-yellow to reddish-orange. 24. S. X oettingenii.  
 -- Petals always without red, varying from bright yellow to bright golden.....(16)
16. Caudicles with whorled leaves; sepals with glandular trichomes; petals 5-nerved. 20. S. charadzeae.  
 -- Caudicles with alternate leaves; sepals glabrous; petals 3-nerved. 17. S. juniperifolia.
17. Caudicles with widely-spaced leaves; leaves dull gray-green, curved outward, with 5-7 pores. 18. S. grisea.  
 -- Caudicles with imbricate leaves; leaves shining, bright-green, not curved, with 1-3 pores. 21. S. ruprechtiana.

18. Flower stalk covered with long, white hairs. 12. S. desoulavyi.  
 -- Flower stalk covered with short, brick-red hairs.....(19)
19. Petals 3-5-nerved, broader than the sepals.....(20)  
 -- Petals 1-nerved, narrower than the sepals.....(23)
20. Caudicles with widely-spaced leaves and basal rosettes; leaves about 20 mm long, shining, not curved, the veins readily visible; petals 5-nerved. 4. S. pseudolaervis.  
 -- Caudicles with imbricate leaves, columnar, without basal rosette; leaves 2-10 mm long, dull, hollow, with inconspicuous veins; petals 3-5-nerved.....(21)
21. Leaves 2-3 mm long, with pectinate-ciliate margins; petals 3-nerved, equalling the sepals. 7. S. polytrichoides.  
 -- Leaves 4-10 mm long, with cartilaginous-toothed margins, sometimes becoming ciliate toward the base; petals 3-5-nerved, twice as long as the sepals.....(22)
22. Leaves up to 7 mm long, oblong-spatulate, with small apical teeth; petals clawless, 5-nerved. 6. S. caspica.  
 -- Leaves up to 10 mm long, oblong-elliptical, flat, without apical teeth; petals clawed, 3-nerved. 5. S. biebersteinii.
23. Caudicle leaves not curved, with 1-5 pores; petals twice as long as the sepals.....(24)  
 -- Caudicle leaves somewhat curved, always with 3-5 pores; petals equalling or slightly exceeding the sepals.....(25)
24. All leaves with 1 apical pore; caudicles 1-3 cm long with imbricate leaves, appearing columnar. 15. S. unifoveolata.  
 -- All leaves with 3-5 pores; caudicles up to 15 cm long, with whorled leaves. 16. S. abchasica.
25. Leaves 7-8 mm long, widely spaced, with upper 1/3 of margins usually smooth. 13. S. scleropoda.  
 -- Leaves 3-4 mm long, crowded, margins aristulate-ciliate. 14. S. sommierii.

Conspectus of the USSR species of Saxifraga, Sect. Porophyllum

Sect. Porophyllum Gaudin, Fl. Helv. 3:84. 1828; Schoenbeck-Temesy in K. H. Rechinger, Fl. Iran. 42:11. 1967. — Sect. Aizoonia Tausch, Hort. Canal. 1: [19] (sine pag., sub "Saxifraga steinmannii"), p.p., excl. typo, "Aizonia". 1823. — Sect. Kabschia Engl., Linnaea 1:14. 1867-1868; Oettingen, Fl. Cauc. Crit. 40:37. 1913.

Type: *Saxifraga caesia* L.

1. *Saxifraga luteo-viridis* Schott & Kotschy, Bot. Zeit. 9:65. 1851; Bordz., Fl. URSR 5:482. 1953; D. A. Webb, Fl. Europ. 1:379. 1964; Czopik, Visokog. fl. Ukrain. Karpat, p. 76. 1976. -- *S. corymbosa* var. *luteo-viridis* (Schott & Kotschy) Engl. & Irmsch., Pflanzenreich 69:540, fig. 110D. 1919.

Type: "in alpium Marmoroszensium alpe petrosa ultra regionem nivalem (Herb. Waldsteinii)" (PR?).

This species, endemic to the Eastern Carpathians, the Transylvanian Alps and the Bulgarian mountains, rarely penetrates the territory of the USSR: the Zanoga and Gnetesa mountains alongside the Soviet-Rumanian border (Czopik, loc. cit.). It grows in the subalpine belt (1400-1600 m) in rock-strewn calcium-rich habitats with southern exposure.

Specimens examined: LE: Ivano-Frankovsk province, Kosovskii region, Chivchinski Range, Mt. Zhupane (upper reaches of the Bolshoi Chernyi Cheremosh River), 27 VI 1964, Czopik. KW: Chivchinski Range, Mt. Gnetesa, eastern spur, 1600 m, 17 VII 1970, Czopik, Ornst & Verenko.

2. *Saxifraga albertii* Regel & Schmalh., Acta Horti Petropol. 5(2):584. 1878; Engl. & Irmsch., Pflanzenreich 69:569. 1919; Lonsinsk., Fl. SSSR 9:194. tab. 11, fig. 6. 1939; Abdull., Opr. rast. Sr. Az. 4:237. 1974.

Type: "In Turkestaniae montibus Alexander in tractu Karabura, 8,000' alt., 1876, leg. A. Regel" (LE!).

High mountain belts of western Tien Shan (Kirgizski, Talasski Alatau and Chatkalski ranges) and western part of Alai (Alaiski, Turkestanski and Zarafshanski ranges).

Specimens examined: LE: Tian-Shan occid., supra glaciem Ak-Turpak, 12,900', 27 VII 1897, fl., Fedtschenko; ibidem, Maidantal Glacier, 11,500', 29 VII 1897, fl., Fedtschenko; ibidem, Santalash River valley, 13 VIII 1902, veg., Fedtschenko; Talasski Alatau, Aksu-Dzhabagly Nature Preserve, in crevices of almost bare rock between the far reaches of the Dzhesymsai and Kshi-kayandy (alpine belt), 17 VII 1952, fl., Tsvelev; Kirgisia australis, distr. Dzhalalabad, ad rupes marmoreas in regione subnivialis montis Baubaschata jugi Ferganici, juxta nives glaciemque, 3200 m.s.m., 16 VIII 1945, veg., Fedorov; ibidem, Karavanski region, southern shore of the Sary-Chilek Lake, Arkit village, 4 IX 1945, Knorring & Pyataeva; N. Abhang des Lasyr Passes zw. Darwas und Roshan nach Jasgolan zu 11,000', 22 IX-4 X 1882, veg., Regel; Seravshan, Voru, 19 VII 1892, veg., Komarov; ibidem, Sabak, 27 VII 1893, veg., Komarov; ibidem, Rovosat Pass, talus by glacier, 19 IX 1931, veg., Nikitin 1837; Turkestanski Range, Mt. Kara-Muinak (Malyi Andygen), in crevices, 12 VII 1941, veg., Pryakhin.

3. *Saxifraga vvedenskyi* Abdull., Opr. rast. Sr. Az. 4:246 (descr. Lat.), 238. 1974.

Type: Eastern Fergana, Kyzyl-Dzharski region, Karasu River val-

ley, Itokara Canyon, Kulungata brook, 17 IX 1927, fl., M. Sovetkina 1261 (TAK).

An endemic of the Chatkalski Range in the eastern part of Tien Shan. I have not seen any specimens.

4. Saxifraga pseudolaevis Oetting., Acta Horti bot. Univ. Jurjev. 10 (1):15. 1909; Oetting., Fl. Cauc. Crit. 3(5):39. 1915; Losinsk., Fl. SSSR 9:189, tab. 11, fig. 5. 1939; Grossh., Fl. Kavk. ed. 2, 4:282 p.p., tab. 33, fig. 1. (sub "S. laevis"). 1950; Manden., Zam. po sist. i geograf. rast. Tbil. bot. inst. 34:19 p.p. 1977; Galushko, Fl. Sev. Kavk. 2:73. 1980. -- S. laevis subsp. pseudolaevis (Oetting.) Engl. & Irmsh., Pflanzenreich 69:555 p.p., fig. 114C. 1919.

Type: "Iberia (mons Gud), Wilhelms" (LE!).

Endemic to the southern slope of the Great Caucasus; growing in the alpine belt of the Central Caucasus from the Krestovyi Pass in the east to the southern spur of the Elbrus in the west where it penetrates the northern slope at the Boksan headwaters.

The isolated habitat of S. pseudolaevis is indicated on I. Mandenova's map (1977:18) in the easternmost part of the Main Caucasian Range and also on the southern slope. I have never seen these materials and must admit that, judging from the text with its accompanying map, Mandenova considers S. pseudolaevis a species not existing in the Eastern Caucasus.

Specimens examined: LE: Siania, Ingur, 1 VII 1894, veg., Radde; in locis lapidosis prope Kobi, IX, s.a., fl., Hohenacker; Gudaure, 29 VI 1894, fr., Fedtschenko; Kobi, 26 VII 1888, fr., Akinfiev; Devdorak Glacier, 14 VI 1888, fl., Akinfiev; Mt. Gud, 1888, fl., Akinfiev; Lake Kel and Ksanka Pass, 2900 m, 5 VIII 1930, fr., Busch; Lake Kel and Kel Pass, 2950-3100 m, 25 VIII 1933, fr., Busch; ibidem, 18 VII 1936, fl., Busch; talus in Kel Mountains, 3080 m, 21 VII 1937, fl., Kvartskhelia; Middle Ermani Canyon, alpine meadow, 2800 m, 12 VIII 1935, fl., Busch; Upper Ermani Canyon, 2500 m, 1 IX 1935, fr., Busch; Lower Ermani Canyon, 16 VII 1937, veg., Kvartskhelia; Bolshaya Liakhva headwaters, on gravel site, 30 VII 1961, fr., Dolukhanov; in monte Kadlosan (Kakasan), in schistosis (reg. subalpina), 21 VIII 1923, veg., Juzepczuk 495; inter pagg. Vanel et Ruk (Roka), in faucibus fl. Ziakhwa, in rupibus humides, 19 VIII 1923, veg., Woronow & Juzepczuk 376; Uretval Pass, 3200 m, 4 IX 1933, fl., fr., Busch; Roka Pass, alpine meadow on N slope, 2900 m, 24 VII 1929, fr., Busch; Kel volcanic plateau, 2850 m, 4 VII 1924, fl., Dzevanovski 11.

5. Saxifraga biebersteinii Sipl. nom. nov. -- S. laevis Bieb., Fl. Taur.-Cauc. 1:314. 1808, non Haw. 1803; Sternb., Revis. Saxifrag., p. 59. 1810; Ledeb., Fl. Ross. 2:205. 1844; Boiss., Fl. Orient. 2:803. 1870; Oetting., Acta Horti bot. Univ. Jurjev. 10 (1):15. 1909; Oetting., Fl. Cauc. Crit. 3 (5):39. 1915; Losinsk., Fl. SSSR 9:189, tab. 11, fig. 4. 1939; Grossh., Fl. Kavk. ed. 2, 4:280 p.p., excl. icon quod sp. antec. repres. 1950. -- S. meyeri

auct., non Sternb. et non Manden.: Galushko, Fl. Sev. Kavk. 2:73. 1980.

Type: "Crescit in alpinis Caucasiacis. Dr. Adams" (LE!).

Adams evidently gathered this authentic material on Mt. Kazbek where he also collected some other Caucasian high-mountain plants, for example, *Saxifraga flagellaris* Willd. ex Sternb. (Adams 1834:243). In 1801-1803, this was the only place in the alpine belt of the Main Caucasian Range where he could have been while traveling through the Caucasus if one considers the road conditions at that time and the ongoing war between the mountain tribes and the Russians.

The Great Caucasian watershed region is still extremely inaccessible and still studied fragmentarily today. This is how I explain the extreme scarcity of information about this species. I have seen only two samples other than the type (LE!): [Kazbek], Devdorak Glacier, 14 VI 1888, fl., Akinfiev; in monte Fidar [Fidar-khokh], 21 VIII 1923, fr., Woronow 433.

This species apparently grows farther north and at higher altitudes than *S. pseudolaemis*--below the snowline of the Main Caucasian Range, in the Central Caucasus and possibly only within the borders of the Northern Ossetine.

Dr. Ida Mandenova is correct; if one combines what we call *S. biebersteinii* here with *S. pseudolaemis*, the earlier name will be *S. pseudolaemis* (Mandenova 1977:16). However, I cannot support such a combination. I believe that one must thoroughly study both species before dividing the one into two or joining them. One should not join one species to another or consider the names of two species as synonyms (which often means the same thing) only because there is a lack of data on one of them.

6. *Saxifraga caspica* Sipl., nom. nov. -- *S. meyeri* Manden., Zam. po sist. i geograf. rast. Tbil. bot. inst. 34:18. 1977, non Sternb., 1831. -- *S. laevis* auct., non Bieb.: Oetting., Acta Horti bot. Univ. Jurjev. 10(1):15. 1909. -- *S. laevis* Bieb. var. eulaevis Engl. & Irmsch., Pflanzenreich 69:556, fig. 114D. 1919.

Type: In alpinis Schachdagh, 30 VII 1830, fl., C. A. Meyer 1351 (Enum. Cauc. Casp.) (LE!).

On rocks of the subnival and alpine belts of the eastern part of the Main Caucasian Range; its isolated habitat is also two degrees of latitude farther north in the Andiiski Range (see Mandenova's map, 1977:18). Apparently all habitats of this plant, endemic to eastern Caucasus, are northern and located on the slope of the Main Caucasian Range facing the Caspian Sea. It does not appear on the southern slope but gives way to the aforementioned species there.

Specimens examined: LE: Daghestania: Magi-Dagh, 1874, fl., Becker 1977; Schalbus-Dagh, 1876, fl., Becker 257; ibidem, 1880, fl., Becker 1237; distr. Samur, in fauce inter fl. Daschagie-czai et Gedy-m-czai prope m. Czilim, 9,100-9,900', 14-15 VIII 1900, fl., fr., Alexeenko 14524-5, 14530, 14532-5. Azerbaidzhania: distr.

Kuba, m. Schach-Dagh, in fissuris rupium calcareum, 11,400', 30 VII 1898, fl., Alexeenko 14499, 14541, 14547; Mt. Shakh-Dagh, southern slope, 2,800 m, 26 VIII 1903, veg., Razevich; in rupibus angustiarum supra pagum Sudur, 7,000', 3 VII 1899, veg., Alexeenko 14511; inter m. Mastyrğa-Dagh et Kizil-kaja, 5 VII 1929, fl., Sachokia; in pascuis Ashtraf-Eilag, 8 VI 1928, fl., Achverdov; in pascuis alpinis prope pag. Adur, 17 VIII 1930, fl., Kasumov.

According to the labels cited above, S. caspica grows at an elevation of 2,600-3,800 meters. However, Mandenova (1977:18), referring to B. Prima's (1974) research, notes that S. caspica spreads downward along the pebbly banks of rivers to 2,000 meters.

7. Saxifraga polytrichoides Sipl., sp. nov. -- Planta densissime caespitosa surculis caulinis abbreviatis 0.5-2.0 cm longis et ca. 4 mm latis, erectis vel ascendentibus ramosissimis columniformibus dense imbricatim foliatis, pulvinum planum formantibus. Surculorum caulinarum folia numerosa, infera atrofusca et semiputrifacta, suprema griseo-viridia, apice plus minusve approximata, oblonga, 2-3 mm longa et ca. 0.8 mm lata, supra superne excavata, subtus inferne carinata (medio vix compressa et cochleariformia) toto margine macro grandiciliata (supra medium longius ciliata), apice subaristata, foveolis 1-3 instructa. Caules floriferi ca. 1.5 cm alti, erecti, 2-3-foliati, tenues, parce albo crispo-pilosi, 3-5-flori, pedicellis subglabris; folia caulina duplo longiora, lanceolata, basi petiolatiformi-attenuata, margine ciliata, unifoveolata. Calyx glaber et laevis; sepalia oblonga, 3.5 mm longa et 1.5 mm lata, apice rotundata, submembranacea, ciliata, trinervia, intrinsecus unifoveolata; petala sepalis aequilonga, duplo angustiora, lanceolata, flava, trinervia; stamina sepalis duplo longiora; capsula subglobosa, stylis divergentibus staminibus duplo longioribus.

Typus: Daghestania, distr. Tzumadinensis, jugum Bogossense, ad fontes fl. Kila prope meteostacionem, 8 VIII 1972, defl., T. Popova (LE!).

Affinitas. A S. caspica Sipl. foliis cochleariformibus grandiciliatis duplo-triplo brevioribus et petalis brevioribus trinerviis bene differt.

Omnes specimina examinata in loco classico collecta.

Saxifraga polytrichoides is a sod-forming plant and resembles the moss Polytrichum alpestre Hoppe (= P. strictum Sm.). Only the presence of very conspicuous yellow flowers signals it as a vascular plant. Besides, the S. polytrichoides turf always contains the moss, Distichium capillaceum (Hedw.) B.S.G., which provides an almost complete disguise.

8. Saxifraga subverticillata Boiss., Fl. Orient. 2:803. 1872; Engl. & Irmsch., Pflanzenreich 69:553, fig. 114A. 1919; Oetting., Fl. Cauc. Crit. 3(5):40 p.p. 1915; Losinsk., Fl. SSSR 9:188, tab. 11, fig. 8. 1939; Grossh., Fl. Kavk. ed. 2, 4:280, tab. 32, fig. 12, map 346. 1950; Galuschko, Fl. Sev. Kavk. 2:72. 1980.



Type: Caucasus Orientalis, in spelunca calcar. ad fl. Andaki (Argun), 760 hexap., 14 IX 1860, fr., Ruprecht (LE!).

Endemic to the Great Caucasus, known from the upper reaches of The Malaya Laba River in the west to the source of the Samur River in the east, it grows in the alpine and subnival belts between 2,000-2,500 meters in moist shady and rocky habitats.

Specimens examined: LE: Caucasus Orientalis, Dagestania australis, fl. Samur, infra Kussur, 29 VII 1860, veg., Ruprecht; ibidem, Kaputscha, in rupibus humidis calcareis 10 hexap. supra fl. Beshita, 745-755 hexap., 17 VII 1861, fr., Ruprecht; Inguri, s.a., fr., coll. ignot.; Imeretia, Oni, prope fl. Rion, VII 1877, fr., Brotherus; Fiach-don, 7,500', 25 VII 1894, fr., Akinfiyev; Kutaisi distr., Racha, s.a., fl., Medvedev 133; Georgia, Pshavarskaya Aragva headwater, Noroula Canyon by Shuopkho village, rocks of left bank, 8 IV 1966, fl., Mordak; Caucasian Nature Preserve, Khodnyi Glacier, above snowbed, 12 VIII 1964, fl., fr., Popova.

9. *Saxifraga colchica* Albov, Acta Horti bot. Tifl. 1(suppl. 1): 96. 1895; Engl. & Irmsch., Pflanzenreich 69:555. fig. 114B. 1919; Losinsk., Fl. SSSR 9:189, tab. 11, fig. 9. 1939; Grossh., Fl. Kavk. ed. 2, 4:280, map 346. 1950; Galushko, Fl. Sev. Kavk. 2:72. 1980. — *S. subverticillata* var. *colchica* (Albov) Oetting., Fl. Cauc. Crit. 3(5):40. 1915.

Type: Mingrelia, ad rupes montis Czita-Gwala, 2,250 m, 4 VII 1893. fl., fr., N. Alboff 345 (LE!).

Endemic to the Main Caucasian Range, spreading along the southern slope of this mountain system within the boundary of western Georgia. However, in the Northern Caucasus it is known only in the outer reaches of the Urushten River (Galushko & Kudryashova 1967:170). On rocks of the alpine belt.

Specimens examined: LE: Dolomis-Tsvari, 9,000', VIII, s.a., fr., coll. ignot. 58; Chernomorski province, Kardatacha Lake, 6 VIII 1895, fr., Lipski; Gvarabi, 2,200 m, 6 VIII 1933, fr., Kolkovskii 2519.

10. *Saxifraga caucasica* Somm. & Levier, Acta Horti Petropol. 13(2):188. 1894; idem, loc. cit. 16:168, tab. 17. 1900; Oetting., Fl. Cauc. Crit. 3(5):37. 1915; Losinsk., Fl. SSSR 9:191. 1939; Grossh., Fl. Kavk. ed. 2, 4:282, tab. 33, fig. 4, map 321. 1950; Galushko, Fl. Sev. Kavk. 2:72, fig. 13d. 1980.— *S. caucasica* var. *levieri* Engl. & Irmsch., Pflanzenreich 69:552, fig. 113G,H. 1919.

Type: In jugo Teberdinski pereval dicto, inter flumina Tieberda et Daut, ditones Kuban, supra jugum 2,800-3,000 m, 2 IX 1890, S. Sommer et E. Levier 494 (LE!).

Endemic to the Great Caucasus, extending to the outer reaches of the Kuban River, along the Teberda and Uchup, that is, between the Klukhorski and Bogoski passes and on Mt. Elbrus. It grows on rocks of the alpine belt between 2,300 and 3,400 meters.

Specimens examined: LE: Bogoski Pass, northern slope, 11,000', s.a., fl., Akinfiev; Mt. Elbrus, Rtsyvashki Glacier, 29 VII 1893, fl., Lipski; Maruk, Svany, 2,300 m, 21 VIII 1933, fr., Kolakovski 2522.

11. Saxifraga sosnowskyi Manden., Zam. po sist. i geograf. rast. Tbil. bot. inst. 19:10. 1956. — S. caucasica auct. non Somm. & Levier: Manden., Fl. Georg. 4:385 p.p. 1948.

Type: Georgia, Kartalinia, Tskhra-Tskaro Range, rocks, 15 VII 1916, fl., Kozlovski (TBI).

Along ledges and crevices of rocks in the alpine belt of the Small Caucasus, such as Kartalinia and Meskhetia in Georgia. It has been observed in the Mts. Ardzhevan, Sanisio, Kodiani, Dzham-Dzham and Tisseli. In the Small Caucasus it replaces the closely related C. caucasica, which is found only in the Great Caucasus.

12. Saxifraga desoulavyi Oetting., Acta Horti Bot. Univ. Jurj. 10:16. 1910; Oetting., Fl. Cauc. Crit. 3(5):47. 1915; Losinsk., Fl. SSSR 9:190 p.p. 1939; Grossh., Fl. Kavk. ed. 2, 4:282, map 324. 1950; Galushko, Fl. Sev. Kavk. 2:73. 1980.—S. caucasica var. desoulavyi (Oetting.) Engl. & Irmsch., Pflanzenreich 69:553, fig. 113H. 1919.

Type: "Habitat in Caucaso Magno Centrali, Balkaria, Shtulu, 7,000', s.a., Desoulavy" (TU).

This endemic species was known for a long time only in its classic habitat, Mt. Shtulu, on the border between Kabardino-Balkaria and Georgia. At the present time it is known from Northern Ossetia as well, where it grows in moraines and gravelly places about 2,500 meters (Galushko & Kudryashova 1967:172).

13. Saxifraga scleropoda Somm. & Levier, Acta Horti Petropol. 13(2):186. 1894; Somm. & Levier, loc. cit. 16:170, tab. 18, fig. 1-5. 1900. Oetting., Fl. Cauc. crit. 3(5):45 p.p. 1915; Engl. & Irmsch., Pflanzenreich 69:556 p.p. 1919; Losinsk., Fl. SSSR 9:190 p.p. 1939; Grossh., Fl. Kavk. ed. 2, 4:282, tab. 33, fig. 2, map 348 p.p. 1950; Galushko, Fl. Sev. Kavk. 2:73, fig. 13h. 1980.

Type: Kuban, in alta valle Tieberda, ad rupes, 1,550 m, 31 VIII 1890, Sommier & Levier 496 (LE!).

Endemic to the Main Caucasian Range, extending from Mt. Fisht-Oshten in the west to the Chegem River in the east; more common on the northern slope of the range. On rocks, scree and moraines of the alpine belt between 1,800 m (Peredovoi Range, Urup River) and 3,500 m (Syltrek Lake), but most often at about 2,400 m in stony, calcium-rich sites.

14. Saxifraga sommeri (Engl. & Irmsch.) Sipl., **comb. nov.** S. scleropoda var. sommeri Engl. & Irmsch., Pflanzenreich 69:557. 1919. S. scleropoda var. nivalis Somm. & Levier, Acta Horti Petropol. 13(2):187. 1894; Somm. & Levier, loc. cit. 16:171, tab. 18, fig. 6, 7. 1900; Oetting., Fl. Cauc. Crit. 3(5):46 p.p. 1915; Grossh., Fl. Kavk. ed. 2, 4:282, map 348 p.p. 1950.

Type: Abchasia, in alpinis supra jug. Kluchor, 2,700-2,800 m, 28 VIII 1890, S. Sommer et E. Levier 196 (LE!).

Endemic to the central and western parts of the Great Caucasus.

Specimens examined: LE: Mt. Elbrus, in alpinis locis lapidosis s.a. (Herb. Meyer); Mt. Elbrus, Malka Glacier, 14 VII 1892, fr., Lipski; Balkaria, alpine meadow on the top of Mt. Likhtygen, 2,900 m, 30 VIII 1927, veg., Busch 78; Utkul Glacier, 1890, fr., Lipski; moraine of the Tsei Glacier, 27 VII 1891, veg., Akinfiyev; moraines of the Donguzorun Glacier, 8,500-9,000', 17 VII 1897, fr., Akinfiyev; ibidem, VII 1913, fl., fr., Busch; moraine of the Bashil Glacier, 7,000-7,200', 1 VIII 1913, fl., Busch 92; mountain steppe Syltrak, on rocks, 5,000-6,000', 26 VI 1911, Busch 56; moraines of the Bezenchi Glacier across from Ullu-Tulluku, 8,500', 10 VII 1913, fr., Busch; Teberda headwaters, on rocks, 9,000-11,000', 18 VI 1899, fl., Desoulavy; Caucasian Nature Preserve, Mt. Khuko, southern slope along Shakhe River, subalpine meadow, 13 V 1973, fl., Sergeenko.

15. *Saxifraga unifoveolata* Sipl. sp. nov. Planta radice lignosa, densissime caespitosa, surculis caulinis 1-3 cm longis et 3-5 mm crassis dense imbricatisque foliatis columnariformibus. Folia surculorum caulinarum minima, 2.2-3.0 mm longa et ca. 0.75 mm lata, oblongo-ovata, supra medium latiora, griseo-viridia, margine ciliata, apice mucronulata et marginata, tantum una foveola apicali instructa; folia caulina lanceolata, duplo longiora, margine flexuoso-ciliata. Caules floriferi 2-4 cm. alti, laxi foliati, albido-crispo-pilosi; flores 5-9. Calyx basi rotundatus, subglaber; sepala ca. 1.75 mm longa, oblonga, apice rotundata, trinervia, glabra, margine submembranacea, serrulato-ciliata. Petala lanceolata, flava, basin versus linearia, uninervia, sepalis subduplo longiora. Capsula fusca, ca. 2.5 mm longa, rotundato-ovata, stylis divergentibus; semina ca. 0.2 mm longa, atropurpurea, elliptica.

Typus: Reservatum publicum Caucasicum, in rupibus declivis orientalis montis Oshten, 9 VII 1955, L. Vassiljeva (LE!).

Affinitas. A *S. scleropoda* Somm. & Levier foliis parvis unifoveolatis bene differt. A habitu simillima *S. ruprechtiana* Manden. foliis apice abrupte angustatis et subtus non carinatis (non sensim acutatis et subtus carinatis) differt.

Paratypi: LE: Kuban, Mt. Tkach, subalpine meadow, 6,500', 8 VII 1906, fr., Klopotov; Bolshoi Bombak (Parnygu), alpine belt, 9,000', on rock in the place "Georgievski gai", 16 VII 1906, fr., Klopotov; Kishi (Chegea) headwaters, glacial moraine, 8,000', 4 VIII 1906, veg., Klopotov; Bolshaya Markhi western headwater, alpine belt, 2 IX 1907, Busch 801; Terek distr., Kufak Glacier moraine, 7,700-8,000', 7 VIII 1913, fr., Busch 91; Cherkesia, southern slope of Mt. Fisht, on stones, 6 IX 1927, fr., Woronow & Steup; rocks on the northern slope of Mt. Chuba, 10 VII 1929, fr., Leskov & Rusalev 318; Peredovoi Range, Urup River, on the summit of Mt. Augazy by geodetic mark, on rocks, 2,521 m, 17 VIII 1945,

veg., Grubov.

16. Saxifraga abchasica Oetting., Acta Horti Bot. Univ. Jurjev. 8:97. 1908; Oetting., Fl. Cauc. Crit. 3(5):45. 1915; Losinsk., Fl. SSSR 9:191, tab. 11, fig. 3. 1939; Grossh., Fl. Kavk., ed. 2, 4:282, tab. 33, fig. 3, map 330. 1950. S. scleropoda var. abchasica (Oetting.) Engl. & Irmsch., Pflanzenreich 69:557, fig. 114F. 1919.

Type: West Transcaucasia, Abchasia, Gagra Mountains, Mt. Shmek, limestone rocks on the southern slope, 7,600', 1 VIII 1905, fl., fr., Woronow 258 (LE!).

Described as endemic to the Abkhasian Mountains where the author who described this species believed S. scleropoda to be absent. This supposition has not been supported subsequently. Typical S. scleropoda grows in Abkhasia and a plant conforming to the type of S. abchasica can be found beyond the Abkhasia border. Both species, in spite of some similarities and partially overlapping areas of distribution, are completely independent of one another. S. abchasica grows on rocks in the alpine and subalpine belts 2,000 and 2,700 meters.

Specimens examined. LE: Ossetine, Kariu-khokh, on north and south slopes, 7 VI 1890, fr.; Kuznetsow 555; Ulukash, 7,000-8,000', 4 VI 1892, fl., Akinfiev; Bzybski Range, on rocks, 7,000-8,000', veg., Albov.

17. Saxifraga juniperifolia Adams in Web. & Mohr, Beitr. Naturk. 1:53. 1805; Oetting., Fl. Cauc. Crit. 3(5):42 p.p. 1915; Engl. & Irmsch., Pflanzenreich 69:549 p.p., fig. 113A. 1919; Losinsk., Fl. SSSR 9:188, tab. 11, fig. 7 p.p. 1939; Grossh., Fl. Kavk., ed. 2, 4:279, tab. 32, fig. 11, map 345 p.p. 1950; Galushko, Fl. Sev. Kavk. 2:73. 1980. -- S. juniperina Bieb., Fl. Taur.-Cauc. 1:314, 427. 1808; Bieb., loc. cit. 3:291. 1819; Sternb., Revis. Saxifr. p. 31, tab. 10. 1810; Boiss., Fl. Orient. 2:804. 1872.

Type: "Ex Caucaso Iberico. Comm. Schlegelmilch. Adam." (LE!).

On rocks in the subalpine and alpine belts both in sun and shade, often extending downward below the forest belt to 1,460 (Kazbegi) -1,800 (Andi in Dagestan) meters (Galushko & Kudryashova, 1967 p. 171). It extends upward to 3,200 meters on Mt. Bazar in Dagestan. In the Great Caucasus it spreads from the outer reaches of the Podkumok River in the Skalistyi Range and Mt. Elbrus in the west to the outer reaches of the Samur River in the east. Farther south, isolated stands of this species may be encountered in Armenia in the Shishkaya, Dzhan-Akhmet and Kapudzhukh Mountains, and in Turkey in the Pont Mountains in the Chorokh River Basin.

18. Saxifraga grisea Sipl., sp. nov. S. juniperifolia Adams var. cinerea Oetting., Fl. Cauc. crit. 3(5):43. 1915 (non S. cinerea H. Smith, Bull. Brit. Mus. [Nat. Hist.] Bot. 2:128. 1958);

Engl. & Irmsch., *Pflanzenreich* 69:552, fig. 113E. 1919; Grossh., *Fl. Kavk.* ed. 2, 4:280. 1950.

Type: Caucasus, Ossetine, on the rocks in Alagir Canyon, 10 VI 1900, fl., V. Markovich (LE!).

Endemic to the Mt. Kazbek region of the Caucasus, on rocks in the wooded, partially subalpine belts from about 850 to 2,300 meters. Most often, however, it is found at about 1,700 meters in conifer forests.

19. *Saxifraga kuznezowiana* Oettingen, *Acta Horti Bot. Univ. Jurjev.* 10:15. 1910; Oetting., *Fl. Cauc. Crit.* 3(5):42, "kuznezowii". 1915; Losinsk., *Fl. SSSR* 9:192. 1939; Grossh., *Fl. Kavk.* ed. 2, 4:283, map 326. 1950; Galushko, *Fl. Sev. Kavk.* 2:72. 1980. — *S. juniperifolia* var. *kuznezowiana* (Oetting.) Engl. & Irmsch., *Pflanzenreich* 69:552. 1919.

Type: "Habitat in Caucaso Magni Centrali trajecti Mamisson, VII 1897, Desoulavy" (ubi?).

Endemic to the Central Caucasus, known until now only as first described. The type specimen location has not been established. Judging from Oettingen's diagnosis, this species is clearly related to what is known at the present time as *Saxifraga charadzeae* Otschiauri and, although there are some very essential differences between them, it seems entirely plausible that both species are described from two ends of a small area of some rare ecological race of *S. juniperifolia* sens. lat. with dilated five-nerved petals. It cannot be excluded that subsequent research may provide evidence justifying the union of these taxa.

20. *Saxifraga charadzeae* Otschiauri, *Zam. po sist. i geograf. Tbil. bot. inst.* 23:68, fig. 1. 1963; Galushko, *Fl. Sev. Kavk.* 2:73, fig. 13e. 1980.

Type: Northern Caucasus, Assu River Canyon, Tsei-Lam Range, on limestone in subalpine belt, 11 V 1959, fl., D. Ochiauri & K. Kimeridze (TSM).

Endemic to the eastern part of the Northern Caucasus. Until now it has been found only in two areas: the Tsei-Lam Mountains in Northeastern Georgia (the Assu River basin) where it grows in tufts on limestone deposits near timberline, mostly on northern slopes and in the Andiiski Range in Dagestan. Possibly it is simply a form of the last species.

Specimens examined: LE: Dagestan, Andi village, left bank of the river, 19 VI 1964, fl., Popova.

21. *Saxifraga ruprechtiana* Mandenova, *Zam. po sist. i geograf. rast. Tbil. bot. inst.* 19:12. 1956; Galushko, *Fl. Sev. Kavk.* 2:73, fig. 13g. 1980. — *S. juniperina* delta *brachyphylla* Boiss., *Fl. Orient.* 2:804. 1872. *S. juniperifolia* var. *imbricata* Rupr. ex Oetting., *Fl. Cauc. Crit.* 3(5):44 p.p. 1915. *S. juniperifolia* var. *brachyphylla* (Boiss.) Engl. & Irmsch., *Pflanzenreich* 69:551, fig. 113D. 1919.

Type: Caucasus Orientalis, Tuschetia, pr. Diklo, in m. Sadischi, 1,750-1.730 hexap., 2 VIII 1861, fr., Ruprecht (LE!).

Endemic to the central and eastern parts of the Great Caucasus, this species is infrequently encountered on limestone rocks in the subnival belt from 2,200 meters and higher in eastern Georgia, in Mingrelia, Khevsuria and Tushetia, in Kabardino-Balkaria, Ossetine and Dagestan (Bogoski Range).

Specimens examined: LE: Mingrelia: limestone rocks by the brinks of the Askhi Plateau, 6,800', 1 VII 1911, fl., Sheikovnikov. Balkaria: Suuk-Auzkaya, Cave Canyon, 2,450 m, 16 VI 1927, fl., Busch; Ogary-Erkhy talus, alpine meadow on NE slope, 2,900-3,000 m, 16 VI 1927, fl., Busch; Turetle, 2,400 m. 30 VI 1927, fl., fr., Busch; Cherek Besengiiski headwater, 1 VI 1969, fl., Menitski.

22. Saxifraga columnaris Schmalhausen, Ber. Deutsch. Bot. Ges. 10:288, tab. 17, fig. 8-12. 1892; Schmalh., Bull. Soc. Geogr. Cauc. 1:186, tab. 17, fig. 8-18. 1892; Oetting., Fl. Cauc. Crit. 3(5):48. 1915; Losinsk., Fl. SSSR 9:194, tab. 11, fig. 1. 1939; Grossh., Fl. Kavk. ed. 2, 4:283, tab. 33, fig. 5, map 349. 1950; Galushko, Fl. Sev. Kavk. 2:70, fig. 13a. 1980.

Type: Balkaria in Northern Caucasus, Psekan-Su, 15 VII 1891, fl., fr., Akinfiev (LE!).

Endemic to the Skalistyi Range of the Central Caucasus, growing on dolomite rocks in the middle and upper belts from the Malka River in the west to Mt. Skalistaya in the east (Galushko, loc. cit.).

Specimens examined: LE: Northern Ossetine: Curtathia, Fiach-Don, 7,000', 26 VII 1894, veg., Akinfiev. Balkaria: Sukan-Su, 6,000', 16 VII 1896, veg., coll. ignot.; Suuk-Auz, Kara-Su River at Suuk-Auz-tar, rocks, 2,250 m, 19 VI 1927, fl., Busch; Skalistyi Range, Gizhgit, Bichenchu Pass, 3 IX 1964, veg., Popova; ibidem, 1 VI 1965, fl., Popova; Khulamski Cherek River Canyon, Kara-Su village, in crevices of sheer limestone rocks (often hanging down, festoon-fashion, according to the collector's note), 11 V 1968, veg., Kharkevich.

23. Saxifraga dinnikii Schmalhausen, Ber. Deutsch. Bot. Ges. 10:288, tab. 17, fig. 6, 7. 1892; Oetting., Fl. Cauc. Crit. 3(5):-48. 1915; Engl. & Irmsh., Pflanzenreich 69:571. 1919; Losinsk., Fl. SSSR 9:197, tab. 11, fig. 2. 1939; Grossh., Fl. Kavk. ed. 2, 4:283, map 350. 1950; Galushko & Kudryashova, Novitates sist. (Leningrad) 2:126-129 (icon descriptioque optima). 1965; Galushko, Fl. Sev. Kavk. 2:72, fig. 13c. 1980.

Type: Balkaria, Psekan-Su, 15 VII 1891, fr., I. Akinfiev (LE!).

Endemic to the central part of the Great Caucasus, confined to dolomite deposits of the Skalistyi Range in Kabardino-Balkaria, from Chegem to Khynzy-Su, collections being made especially often along the Cherek Bezengiiski and Kara-Su Bezengiiski rivers.

Specimens examined: LE: Balkaria: Kizil-kaya rocks by Khulam Pass, 10,000', 27 VII 1893, fl., Lipski; Khulamvtsek, 27 VII 1893, fr., Lipski; Suuk-Auz, 2600 m, 22 VI 1925, fr., Busch; Suuk-Auz-tar, rocks, 2,250 m, 19 VI 1927, fr., Busch; ibidem, Cove Canyon, 2,400 m, 17 VI 1927, fr., Busch; Skalistyi Range, Sukan-Su River canyon, on rocks, 29 IV 1962, fl., Galushko & Kudryashova; ibidem, Gizhigit to Bechenchu Pass, 3 IX 1964, veg., Popova; Khulamski Cherek Creek canyon, Kara-Su village, on wet limestone rocks, frequent, 11 V 1968, defl., Kharkevich.

24. *Saxifraga* X *oettingenii* Galushko & Kudryashova, Der. Kust. Sev. Kavk. p. 176. 1967; Galushko, Fl. Sev. Kavk. 2:72. 1980. *S. X akinfievii* Galushko & Kudryashova, loc. cit., p. 173; Galushko, loc. cit. 2:72.

Type: Caucaso Borealis, Balkaria, ad fl. Sukan-Su, in rupibus jugi Skalistyi, 3 V 1962, A. Galushko & G. Kudryashova (ubi?).

I was not able to find the types of *S. X oettingenii* or *S. X akinfievii*, although the authors of both of these species designated the location of the holotypes as "(LE)", the Botanical Institute in Leningrad. They cannot be found there, and, as far as I can ascertain, never were deposited there.

Endemic to the Skalistyi Range of the Central Caucasus, and known only from the type locality on the dolomite rocks of the middle belt. It represents the hybrid, *Saxifraga dinnikii* X *S. juniperifolia*. It differs from the former in its peduncles, only rarely single-flowered (usually with 2-5 flowers), and from the latter in its multi- (more than five-) nerved petals which are longer than the stamens. The color of the petals varies from pale yellow to various shades of rosy yellow grading to orange.

25. *Saxifraga carinata* Oettingen, Acta Horti Bot. Univ. Jurjev. 8:96. 1908; Oetting., Fl. Cauc. Crit. 3(5):47. 1915; Losinsk., Fl. SSSR 9:193. 1939; Grossh., Fl. Kavk. ed. 2, 4:283, map 316. 1950; Galushko, Fl. Sev. Kavk. 2:70, fig. 13b. 1980.

Type: "Hab. in Caucaso medio (Balkaria), in rupibus montis Schtulu, 9,000', VII 1901, defl., Desoulavy" (TU).

An endemic of the Central Caucasus, known only from the upper reaches of the Cherek Balkarski River, where it is extremely abundant in the place "Polyana Shtulu", forming thick cushions of yellow flowers (Galushko & Kudryashova 1967:175).

26. *Saxifraga pulvinaria* H. Smith, Bull. Brit. Mus. (Nat. Hist.), Bot. (2) 4:105, fig. 4m-o. 1958; Ikonnikov, Opr. rast. Pamira, p. 149. 1963; Schoenbeck-Temesy, in K. H. Rechinger, Fl. Iran. 42:13. 1967; Abdull, Opr. rast. Sr. Az. 4:237. 1974. *S. imbricata* Royle, Ill. Fl. Himal. Mount. p. 226, tab. 49, fig. 1. 1835, non Lam. 1778; Engl. & Irmsch., Pflanzenreich 69:573, fig. 120 ("drawings are partly incorrect" — H. Smith, loc. cit.). 1919.

Type: Kumawur ["the type... was collected in Kunawar, Simla Hill States....As the Royle collections are not available, the type cannot be examined" -- H. Smith, loc. cit.], Isotype (LE!). I was very fortunate to find isotypes of this species in the herbarium of the Botanical Institute in Leningrad.

A Himalayan-Hindu Kush high-mountain species occurring in Afghanistan, India and Pakistan in a belt of cushion-like vegetation at an altitude of 3,800-5,850 meters, S. pulvinaria barely penetrates USSR territory in Eastern Pamir (the Ak-Tash Mountains). Its characteristic cushions are found on the pebbly slopes of the cold high-mountain desert.

Specimens examined: LE: Eastern Pamir, Shindy-Sai, Ak-Tash Mts., in limestone crevices, 4,800 m, 9 IX 1947, Stanyukovich; Ak-Tash Mts., rocks on eastern slope, 4,300 m, 21 VII 1953, fl., Ikonnikov 3a.

#### Geographical Distribution

The Saxifraga species of the Porophyllum section are unevenly distributed throughout the Soviet territory in the following three widely-separated regions: the Carpathians, the Caucasus and Middle Asia.

The only species of the Eastern (or Ukrainian) Carpathians--Saxifraga luteo-viridis, is, strictly speaking, absent in this region. It is listed here only because the Soviet-Rumanian border happens to pass across two mountaintops along the extreme north-western border of distribution of this Southern Carpathian species.

The situation is similar with S. pulvinaria, a Himalayan plant which barely enters the Soviet part of the Pamir. Only S. albertii and its close relative, S. vvedenskyi, can in all fairness be described as representatives of the section in the vast plateaus of the Tien Shan and the Pamiro-Alai. If we take into account the fact that the Hindu Kush Range and the Kashmir Mountains bring the above-mentioned mountain systems into one orographical whole with the Himalaya (with their 40 species of this section), the sparseness of the Middle Asian Saxifraga is a phytogeographical enigma, just like the absence of the genus Rhododendron in the mountains of Middle Asia even though it abounds in the Himalaya.

But it is not only the Tien Shan and the Pamiro-Alai that are poor in species of the Porophyllum section. Comparable in their size and altitude the Iran mountains of Elburz and Zagrossa, the Pont Mountains and the numerous ranges of Turkish Armenia have one or two species of the section, if any (Schoenbeck-Temesy 1967; Matthews 1972). Therefore, the presence of 22 species of this section in the Caucasus is, in itself, a phytogeographic phenomenon which makes it possible to regard this mountain region as an isolated center of species-generation, a center that is less significant (judging solely by the total number of species) than the



Himalaya but quite comparable with mountains of Central and Southern Europe (18 species, according to Webb, 1964).

This isolation becomes more pointed if we take into account the fact that only one species, *S. juniperifolia*, is distributed along the Great as well as the Small Caucasus and penetrates Turkish territory. And only one species, *S. sosnovskiyi*, is endemic to the Small Caucasus. The remaining 20 species are endemic to the Great Caucasus.

#### Acknowledgements

I wish to acknowledge the assistance of the Russian Nature Preserve Service, which, in 1971-1975, gave me excellent opportunities to visit the Carpathian and Caucasian mountains twice and to become acquainted with saxifrages in nature and in the local herbaria.

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ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS *CALLICARPA*.  
XXXI

Harold N. Moldenke

*CALLICARPA RIDLEYI* S. Moore

Additional bibliography: Mold., *Phytologia* 34: 157. 1976;  
Mold., *Phytol. Mem.* 2: 312 & 528. 1980.

*CALLICARPA RIVULARIS* Merr.

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.*  
40 (2): 334. 1915; Mold., *Phytologia* 34: 157. 1976; Mold., *Phytol.*  
*Mem.* 2: 306 & 528. 1980.

Merrill (1923) cites only *Foxworthy B.S.660 & 719* from Palawan,  
where, he says, the species is endemic on riverbanks and among the  
boulders in streambeds, at 60--100 m. altitude.

*CALLICARPA ROIGII* Britton

Additional & emended bibliography: Alain in León & Alain, *Fl.*  
*Cuba*, imp. 1, 4: 304 & 306. 1957; Mold., *Phytologia* 40: 474. 1978;  
Mold., *Phytol. Mem.* 2: 88 & 528. 1980.

*CALLICARPA RUBELLA* Lindl.

Additional synonymy: *Callicarpa rubella* f. *creanta* P'ei ex  
Mold., *Phytologia* 50: 258, in syn. 1982.

Additional & emended bibliography: G. Don in Sweet, *Hort. Brit.*,  
ed. 3, 550. 1839; C. Muell. in Walp., *Ann. Bot. Syst.* 5: 709. 1860;  
Fletcher, *Kew Bull. Misc. Inf.* 1938: 404, 412, & 414. 1938; Wors-  
dell, *Ind. Lond. Suppl.* 1: 160. 1941; Mold., *Phytologia* 40: 471 &  
474--475. 1978; Hu, *Journ. Arnold Arb.* 61: 87. 1980; Lauener, *Notes*  
*Roy. Bot. Gard. Edinb.* 38: 482--483. 1980; Mold., *Phytol. Mem.* 2:  
258, 270, 271, 276, 281, 282, 284, 288, 291 295, 312, 346, 378, &  
528. 1980; Mold., *Phytologia* 50: 255 & 258. 1982.

Maxwell describes this plant as single-stemmed, 2 m. tall, the  
stems and leaves glandular-sticky, the inflorescence axes violet,  
the calyx green, the corolla and filaments pink, and the anthers  
yellow, and has found it growing along roadsides in partly open  
areas of evergreen forests, at 1600 m. altitude. Other recent col-  
lectors describe it as a tall shrub, 1.7 m. tall, with long, slender,  
ascending or spreading branches, the leaves medium-green above,  
slightly paler and slightly sticky and soft-pubescent beneath, dull  
on both surfaces, the calyx purple, and the fruit glossy light-  
purple or bright-magenta. They have encountered it on sloping hill-  
sides and steep wooded banks, at 60--2000 m. altitude, in flower in  
June, September, and November, and in fruit in November. The corol-  
las are said to have been "pale-magenta" on *Stone 12797*, "light  
pinkish-purple" on *Biegel 5165*, and "pink" on *Phengklai & al. 4105*.

Fletcher (1938) lists this species from the eastern Himalayas,  
China, Indochina, and the Malay Archipelago, citing *Garrett 1028*,  
*Kerr 5541, 5934, & 19384*, and *Put 3028* from Thailand where it in-

habits evergreen forests at 1300--1400 m. altitude.

Additional citations: CHINA: Kwangtung: Chow & al. 78058 (N, W--2895172). THAILAND: Phengkklai, Tamura, Niyomdham, & Sangkachand 4105 (N). MALAYA: Pahang: Maxwell 78-204 (Ac); Sinclair 9966 (W--2946379); B. C. Stone 12797 (Ld). CULTIVATED: Zimbabwe: Biegel 5165 (Ba--374220).

*CALLICARPA RUBELLA* var. *DIELSII* (Léveillé) Li

Additional bibliography: Mold., Phytologia 34: 159. 1976; Lauener, Notes Roy Bot. Gard. Edinb. 38: 482. 1980; Mold., Phytolog. Mem. 2: 276 & 528. 1980.

*CALLICARPA RUBELLA* var. *HEMSLEYANA* Diels

Additional bibliography: Mold., Phytologia 34: 159. 1976; Hu, Journ. Arnold Arb. 61: 87. 1980; Lauener, Notes Roy. Bot. Gard. Edinb. 38: 482--483. 1980; Mold., Phytol. Mem. 2: 276, 282, & 528. 1980.

*CALLICARPA RUBELLA* f. *ROBUSTA* P'ei

Additional bibliography: Mold., Phytologia 34: 159. 1976; Mold., Phytol. Mem. 2: 281 & 528. 1980.

*CALLICARPA RUDIS* S. Moore

Additional bibliography: Mold., Phytologia 34: 159. 1976; Mold., Phytol. Mem. 2: 312 & 528. 1980.

*CALLICARPA SACCATA* Steen.

Additional bibliography: Mold., Phytologia 34: 159--160. 1976; Mold., Phytol. Mem. 2: 312 & 528. 1980; Mold., Phytologia 50: 53. 1981.

*CALLICARPA SALVIAEFOLIA* W. Griff.

Additional bibliography: Mold., Phytologia 34: 160. 1976; Mold., Phytol. Mem. 2: 258 & 528. 1980.

*CALLICARPA SELLEANA* Urb. & Ekm. ex Urb., Arkiv Bot. Stockh. 22A: 108--109. 1929.

Additional & emended bibliography: Urb., Arkiv Bot. Stockh. 22A: 108--109. 1929; Mold., Phytologia 34: 160. 1976; Mold., Phytol. Mem. 2: 94 & 528. 1980.

*CALLICARPA SHAFERI* Britton & P. Wils.

Additional & emended bibliography: Alain in León & Alain, Fl. Cuba, imp. 1, 4: 304 & 306. 1957; Mold., Phytologia 34: 160. 1976; Mold., Phytol. Mem. 2: 88, 91, & 528. 1980; Mold., Phytologia 50: 478. 1982.

Recent collectors have encountered this plant in woods and along riversides. The corollas are said to have been "light pink-white" on the Ekman collection cited below.

Additional citations: CUBA: Pinar del Río: Alain 6087 (W--2284465); Ekman 17316 (W--2113564).

**CALLICARPA SHIKOKIANA** Mak.

Additional & emended bibliography: C. K. Schneid., *Illustr. Handb. Laubholzsk.* 2: 593. 1911; Hatusima & Yoshinaga, *Bull. Fac. Agr. Kagosh. Univ.* 2: 91 & 107, pl. 13, fig. 1. 1970; *Mold., Phytologia* 34: 160. 1976; *Mold., Phytol. Mem.* 2: 300, 302, & 528. 1980.

Additional illustrations: Hatusima & Yoshinaga, *Bull. Fac. Agr. Kagosh. Univ.* 2: 107, pl. 13, fig. 1. 1970.

**CALLICARPA XSHIRASAWANA** Mak.

Additional & emended bibliography: C. K. Schneid., *Illustr. Handb. Laubholzsk.* 2: 591. 1911; Hatusima & Yoshinaga, *Bull. Fac. Agr. Kagosh. Univ.* 2: 92 & 108, pl. 14, fig. 1. 1970; L. H. & E. Z. Bailey, *Hortus Third* 201. 1976; *Mold., Phytologia* 40: 475. 1978; *Mold., Phytol. Mem.* 2: 299, 300, 346, & 528. 1980; Diaconescu, *Act. Bot. Hort. Bucur.* 1979/1980: 114. 1981.

Additional illustrations: Hatusima & Yoshinaga, *Bull. Fac. Agr. Kagosh. Univ.* 2: 108, pl. 14, fig. 1. 1970.

The Baileys (1976) regard this supposed hybrid as conspecific with typical *C. mollis* Sieb. & Zucc. Diaconescu (1981) records it as cultivated in Romania.

**CALLICARPA SIMONDII** Dop

Additional bibliography: *Mold., Phytologia* 34: 161. 1976; *Mold., Phytol. Mem.* 2: 291 & 528. 1980.

**CALLICARPA SIONG-SAIENSIS** Metc.

Additional bibliography: *Mold., Phytologia* 34: 161. 1976; *Mold., Phytol. Mem.* 2: 281 & 528. 1980.

**CALLICARPA SORDIDA** Urb.

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 40 (2): 334. 1915; *Mold., Phytologia* 34: 161. 1976; *Mold., Phytol. Mem.* 2: 94 & 528. 1980.

Additional citations: HISPANIOLA: Dominican Republic: A. H. Liogier 8003-3 (N).

**CALLICARPA STAFFII** Mold., *Phytologia* 43: 222. 1979.

Synonymy: *Premna cauliflora* Stapf, *Trans. Linn. Soc. Lond. Bot.* 4: 215. 1894 [not *Callicarpa cauliflora* Merr., 1912]. *Premna caulifera* Stapf ex Mold., *Résumé* 337, in syn. 1959.

Bibliography: Stapf, *Trans. Linn. Soc. Lond. Bot.* 4: 215. 1894; *Mold., Known Geogr. Distrib. Verbenac.*, ed. 1, 65 & 98 (1942) and ed. 2, 145, 146, & 193. 1949; *Mold., Résumé* 192, 193, 337, & 465. 1959; *Mold., Fifth Summ.* 1: 326 (1971) and 2: 606 & 900. 1971; *Mold., Phytologia* 43: 222. 1979; *Mold., Phytol. Mem.* 2: 312, 423, & 528. 1980.

Collectors describe this species as a tree, 15 feet tall, sparingly branched, or a shrub, 3 m. tall, the flowers cauliflorous, "in small bunches", the corollas gamopetalous, 4-lobed, the stamens 4, the fruit white, then red, bright-red, or bright-scarlet. They

have found it growing in forests and on hillsides, at 1000--1500 m. altitude, flowering in January and August, and in fruit in January, March, August, and November. The corollas are said to have been "white" on Chew & al. 1674. The fruits are erroneously described as "berries" by Chew and his associates, whereas they actually are drupes. *Clemens 9959* is described as a toptype collection.

Material of this species has been misidentified and distributed in some herbaria as *Premna* sp. and as *Loganiaceae*. It is said by some to have "the aspect of *Saurauia*" (*Saurauiaceae*). The *Pascual 1090*, distributed as "*Premna caulifera* Stapf", actually represents *Callicarpa involuocrata* Merr.

Citations: GREATER SUNDA ISLANDS: Sabah: Chew, Corner, & Stainton 1674 (N); M. S. Clemens 9959 (N--photo, Ph, Z--photo); Kokawa & Hotta 4624 (Sn--100600); Nooteboom & Abam 1537 (Sn--118536).

#### *CALLICARPA STENOPHYLLA* Merr.

Additional bibliography: Mold., *Phytologia* 34: 161. 1976; Mold., *Phytol. Mem.* 2: 306 & 528. 1980.

Merrill (1923) cites Curran, Merritt, & Zschokke F.B.18162, Darling F.B.16574, Ramos B.S.5739, 5790, 27388, & 33012, and Ramos & Edano B.S.26312, 37635, & 37679 from Luzon, where, he says, the species is endemic in thickets at low and medium altitudes, ascending to 1500 m. He remarks, quite justly, that this species "is remote from both *Callicarpa formosana* Rolfe and from *C. blancoi* Rolfe, both of which, together with this species, Bakhuizen has erroneously reduced to *C. pedunculata* R. Br."

#### *CALLICARPA SUBALBIDA* Elm.

Additional bibliography: Mold., *Phytologia* 34: 161. 1976; Mold., *Phytol. Mem.* 2: 306 & 528. 1980.

Merrill (1923) cites Elmer 9184, McGregor B.S.10269, Ocampo B.S.27955, Ramos B.S.41009 & 41059, Ramos & Edaño B.S.28969, and Robinson B.S.6861 from Luzon, where, he says, the species is endemic in forests along streams at low and medium altitudes.

#### *CALLICARPA SUBCANDIDA* Elm.

Additional bibliography: Mold., *Phytologia* 34: 161. 1976; Mold., *Phytol. Mem.* 2: 306 & 528. 1980.

#### *CALLICARPA SUBINTEGRA* Merr.

Additional bibliography: Mold., *Phytologia* 40: 475. 1978; Mold., *Phytol. Mem.* 2: 306 & 528. 1980; Mold., *Phytologia* 50: 364. 1982.

Merrill (1923) cites only Ramos & Edaño B.S.26619 & 29707 from Luzon, where, he says, the species is endemic on forested slopes at about 200 m. altitude.

#### *CALLICARPA SUBINTEGRA* var. *PARVA* Merr.

Additional bibliography: Mold., *Phytologia* 40: 475. 1978; Mold., *Phytol. Mem.* 2: 306 & 528. 1980.

*CALLICARPA SUBPUBESCENS* Hook. & Arn.

Additional synonymy: *Callicarpa subpubescens* Koidz. ex Mold., Phytol. Mem. 2: 378, in syn. 1980.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 39 (2: 319. 1913; Mold., Phytologia 40: 475. 1978; Woolliams, Notes Waimea Arboret. 6: 11. 1979; Mold., Phytol. Mem. 2: 310, 378, & 528. 1980; Mold., Phytologia 50: 485. 1982.

Recent collectors describe this plant as a shrub, 3 m. tall, and have found it growing in evergreen forests, flowering in May. The corollas on Yamazaki & Enomoto 114 are said to have been "purple" when fresh.

Woolliams (1979) reports that *C. subpubescens* is the commonest of "three endemic species" on Chichijima island, but actually none of the *Callicarpa* species he enumerates is endemic to that island. He notes that *C. subpubescens* occurs also on the "nearby Volcano Islands." The most conspicuous feature is the cluster of purple fruits. While in the islands, seeds of a white-fruited form were also collected." As yet I have seen no material of this white-fruited form.

The Fujita & Shimizu 120, distributed as *C. subpubescens*, is actually *C. glabra* Koidz.

Additional citations: BONIN ISLANDS: Chichijima: Yamazaki & Enomoto 114 (Ac).

*CALLICARPA SUPERPOSITA* Merr.

Additional bibliography: Mold., Phytologia 34: 162. 1976; Mold., Phytol. Mem. 2: 312 & 528. 1980.

Chai describes this species as a tree, 5 feet tall, with blue corollas, and encountered it in primary forests on hillsides, at 100 feet altitude, in flower in March. He records the vernacular name, "rendegong".

Additional citations: GREATER SUNDA ISLANDS: Sabah: Chai SAN. 26994 (Ld).

*CALLICARPA SURIGAENSIS* Merr.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1070. 1932; Mold., Phytologia 34: 162. 1976; Mold., Phytol. Mem. 2: 306 & 528. 1980; Mold., Phytologia 50: 144, 218, & 369. 1982.

Merrill (1923) cites only Ahern 318, Allen 168, Quadras s.n., and Ramos & Pascasio B.S.34379, 34538, & 34545 from Mindanao, where, he claims, the species is endemic in primary and other forests along streams at low altitudes.

*CALLICARPA TAKAKUMENSIS* Hatusima

Additional bibliography: Mold., Phytologia 34: 162. 1976; Mold., Phytol. Mem. 2: 300 & 528. 1980.

*CALLICARPA TIKUSIKENSIS* Masam.

Additional bibliography: Mold., Phytologia 34: 162. 1976; Mold., Phytol. Mem. 2: 304 & 528. 1980.

*CALLICARPA TINGWUENSIS* Chang

Additional bibliography: Mold., *Phytologia* 34: 162. 1976; Mold., *Phytol. Mem.* 2: 276 & 528. 1980.

*CALLICARPA TOMENTOSA* (L.) Murr.

Additional & emended synonymy: *Callicarpa arborea* Miq. ex C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 567, in syn. 1885 [not *C. arborea* Merr., 1923, nor Roxb., 1814, nor Wall., 1829]. *Callicarpa tomentosa* (L.) Merr. ex Mold., *Phytol. Mem.* 2: 528, sphalm. 1980.

Additional & emended bibliography: Poir. in Lam., *Tabl. Encycl. Méth. Bot.* [Illustr. Gen.] 1: 293. 1792; Roxb., *Hort. Beng.*, imp. 1, [83]. 1814; G. Don in Sweet, *Hort. Brit.*, ed. 3, 550. 1839; Walp., *Repert. Bot. Syst.* 4: 125, 127, & 128. 1845; W. Griff., *Icon. Pl. Asiat.* 4: pl. 447, fig. 2, & 448, fig. 2. 1854; W. Griff., *Notul. Pl. Asiat.* 4: 173. 1854; Miq., *Fl. Ind. Bat. Suppl.* 1: 243 & 569. 1860; Bocq. in Baill., *Rec. Obs. Bot.* 3: 192. 1863; Beddome, *Forester's Man. Bot. S. India clxxxiii.* 1870; Petch, *Ann. Roy. Bot. Gard. Perad.* 5: 251. 1912; Sydow. *Justs Bot. Jahresber.* 40 (1): 438. 1913; E. D. Merr., *Interpret. Rumph. Herb. Amboin.* 448 & 449. 1917; Firminger, *Man. Gard. India*, ed. 6, 2: 388. 1918; Haines, *Bot. Bihar Orissa*, ed. 1, 4: 709. 1922; E. D. Merr., *Enum. Philip. Flow. Pl.* 3: 386. 1923; Heyne, *Nutt. Plant. Ned. Ind.*, ed. 2, 1: 23 (1927) and ed. 2, 2: 1312. 1927; Kirtikar & Basu, *Indian Med. Pl.*, ed. 1, imp. 1, 3: 1920 & 1921, pl. 733. 1935; Beer & Lam, *Blumea* 2: 222. 1936; Fletcher, *Kew Bull. Misc. Inf.* 1938: 404 & 411--413. 1938; Metcalfe & Chalk, *Anat. Dicot.* 2: 1036, fig. 248 F. 1950; Corner, *Wayside Trees*, ed. 2, 697 & 698. 1952; Haines, *Bot. Bihar Orissa*, ed. 2, 2: 744. 1961; Kirtikar & Basu, *Indian Med. Pl.*, ed. 2, imp. 2, 3: 1920 & 1921, pl. 733. 1975; Chin, *Gard. Bull. Singapore* 30: 192. 1977; Mold., *Phytologia* 40: 475--476. 1978; Sharma, Shetty, Vivekanathan, & Rathnakrishnan, *Journ. Bomb. Nat. Hist. Soc.* 75: 33. 1978; Hsiao, *Fl. Taiwan* 6: 120. 1980; Mold., *Phytol. Mem.* 2: 257--259, 267, 270, 271, 276, 282, 284, 295, 306, 312, 320, 325, 328, 346, 376--378, & 528. 1980; Roxb., *Hort. Beng.*, imp. 2, [83]. 1980; Sharma, Shetty, Vivekan., & Rathnakr., *Journ. Bomb. Nat. Hist. Soc.* 75: 33. 1981; Mold., *Phytologia* 50: 52 (1981) and 50: 144, 150, 151, 218, 258, 268, 293, 363, 365, 369, & 370. 1982.

Additional illustrations: Kirtikar & Basu, *Indian Med. Pl.*, ed. 2, imp. 1, pl. 733 1935; Metcalfe & Chalk, *Anat. Dicot.* 2: 1036, fig. 248 F. 1950; Kirtikar & Basu, *Indian Med. Pl.*, ed. 2, imp. 2, pl. 733. 1975.

Sharma and his associates (1978) record this species from Tamil Nadu, India, describing it as an occasional large shrub with purple "flowers" [corollas], growing at 875 m. altitude, citing *Vivekanathan 40780*. Other collectors refer to it as a shrub or tree, 4--10 m. tall, with a bole to 4 m. high and a girth of 80 cm., the lower side of the leaf-blades silvery-white. They have encountered it in secondary, low or intermediate, evergreen forests, at 810 m. altitude, in flower in March and November. The

corollas are said to have been "purplish-pink" on *Waas 1217*, "pink" on *Waas 503*, and "pinkish-purple, sweet-scented" on *Cramer 5012*.

Petch (1912) records the fungus, *Uredo callicarpae* Petch, from the leaves of this host plant in Sri Lanka.

Fletcher (1938) notes that the type of *C. lanata* L. is from Sri Lanka, lists the species also from India, Burma, Malay Archipelago, and Philippine Islands, citing only *Winit 1701 & 1773* from Thailand, where it is said to inhabit the evergreen forests.

Sharma & al. (1981) cite *Vivekananthan 40780* from Tamil Nadu, India, describing the plant as a "Large shrub with purple flowers, occasional". Corner (1952) calls it the "Great Woolly Malayan Lilac" and describes it as "A tree up to 60 ft. high flowering at 15 feet: twigs, inflorescences and undersides of the leaves thickly brownish white woolly. Leaf-blades 5--12 x 2--6", elliptic, tapered to a long point and to a narrow base: stalk 1--2". Flowers .1" wide, purple-lilac: inflorescence 3--5" wide, on a stalk 1--2 1/2" long. Berries .1" wide, dull purple when ripe", giving its distribution as "India, Siam, Malay Peninsula, Sumatra: common in the middle of the country, not known south of Malacca." He lists the vernacular names, "derdap dapur" and "tumah dapur".

Material of *C. tomentosa* has been misidentified and distributed in some herbaria as *Solanum* sp. or "*Solanaceae*".

Additional citations: SRI LANKA: *Bernardi 15983* (W--2808796); *Cramer 4864* (W--2877623), *5012* (W--2867615); *Waas 503* (Lc), *1217* (W--2808356).

#### *CALLICARPA TONKINENSIS* Dop

Additional bibliography: Mold., *Phytologia* 34: 165. 1976; Mold., *Phytol. Mem.* 2: 291 & 528. 1980.

#### *CALLICARPA TOSAENSIS* Mak.

Additional & emended bibliography: C. K. Schneid., *Illustr. Handb. Laubholz.* 2: 593. 1911; Mold., *Phytologia* 34: 165. 1976; Mold., *Phytol. Mem.* 2: 300 & 528. 1980.

#### *CALLICARPA TSIANGII* Mold.

Additional bibliography: Mold., *Phytologia* 34: 165. 1976; Mold., *Phytol. Mem.* 2: 276 & 528. 1980.

#### *CALLICARPA VANSTEENISI* Mold.

Additional bibliography: Mold., *Phytologia* 34: 165. 1976; Mold., *Phytol. Mem.* 2: 312 & 528. 1980.

#### *CALLICARPA VESTITA* Wall.

Emended synonymy: *Callicarpa arborea* Wall. apud Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 1: 386, in syn. 1893 [not *C. arborea* L., 1966, nor "L. sensu Gamble". 1971, nor Merr., 1923, nor Miq., 1885, nor Roxb., 1814].

Additional bibliography: H. N. & A. L. Mold., *Pl. Life* 2: 65. 1948; L. H. & E. Z. Bailey, *Hortus Thirid* 201. 1976; Mold., *Phytologia* 34: 165--166. 1976; Mold., *Phytol. Mem.* 2: 257--259, 346, 378,



& 529. 1980.

The Baileys (1976) describe the corollas of this species as "pinkish to pale purple".

*CALLICARPA VILLOSA* Vahl

Additional bibliography: Roxb., Hort. Beng., imp. 1, [10]. 1814; Walp., Repert. Bot. Syst. 4: 126. 1845; Bocq. in Baill., Rec. Obs. Bot. 3: 192. 1863; Anon., Kew Bull. Gen. Index 1929-1956: 59. 1959; Mold., Phytologia 40: 476. 1978; Mold., Phytol. Mem. 2: 259, 346, & 529. 1980; Roxb., Hort. Beng., imp. 2, [10]. 1980.

*CALLICARPA VILLOSISSIMA* Ridl.

Additional bibliography: Mold., Phytologia 34: 166. 1976; Mold., Phytol. Mem. 2: 284, 295, & 529. 1980.

*CALLICARPA VIRIDIS* Domin

Additional bibliography: Mold., Phytologia 40: 476. 1978; Mold., Phytol. Mem. 2: 334 & 529. 1980.

*CALLICARPA WEBERI* Merr.

Additional bibliography: Mold., Phytologia 40: 476. 1978; Hocking, Excerpt. Bot. A.33: 90. 1979; Mold., Phytol. Mem. 2: 306 & 529. 1980; Mold., Phytologia 50: 369. 1982.

Merrill (1923) cites only the type collection of this species and asserts that the species is endemic to thickets and forests at low altitudes on Bancalan island in the Philippines. He comments, with justification, that this species "has nothing to do with *Callicarpa pentandra* Roxb., where it was placed by Bakhuizen as a synonym".

*CALLICARPA WOODII* Merr.

Additional bibliography: Mold., Phytologia 34: 166. 1976; Mold., Phytol. Mem. 2: 312 & 529. 1980.

*CALLICARPA WRIGHTII* Britton & P. Wils.

Additional & emended bibliography: Alain in León & Alain, Fl. Cuba, imp. 1, 4: 304 & 306--307. 1957; Mold., Phytologia 34: 166. 1976; Mold., Phytol. Mem. 2: 88 & 529. 1980.

ADDITIONAL NOTES ON THE GENUS *VITEX*. XXIII

Harold N. Moldenke

*VITEX* Tourn.

Additional bibliography: J. Burm., Thes. Zeyl. 209--210, 229, [238], [248], & [250], pl. 109. 1737; Blume, Cat. Gewass., imp. 1, 86. 1823; Desf., Cat. Pl. Hort. Paris., ed. 3, 391--392. 1829; Reichenb., Deutsch. Bot. [Repert. Herb. Nom.] 108. 1841; Walp., Repert. Bot. Syst. 4: 81--92. 1845; Lindl., Veget. Kingd., ed. 1, 664 (1846), ed. 2, 664 (1847), and ed. 3, 664. 1853; Bocq. in Baill., Rec. Obs. Bot. 3: 178, 180, 181, 184, 185, & 252--254. 1863; F. Muell., Fragm. 6: 152--153. 1868; Lindl. & Moore, Treas. Bot., imp. 1, 1: 30 (1870), imp. 1, 2: 1222 (1870), imp. 2, 1: 30 (1876), and imp. 2, 2: 1222. 1876; Bailey & Tenison-Woods, Proc. Linn. Soc. N. S. Wales 1880: 174. 1880; Lindl. & Moore, Treas. Bot., imp. 3, 1: 30 (1884) and imp. 3, 2: 1222. 1884; Durand, Gen. Phan. 32. 1888; Coll. & Hemsl., Journ. Linn. Soc. Lond. Bot. 28: 110--111. 1890; Warb., Engl. Bot. Jahrb. 10: 428 & 429. 1890; Hook. f., Curtis Bot. Mag. 117: pl. 7187. 1891; Lace & Hemsl., Journ. Linn. Soc. Lond. Bot. 28: 296 & 297. 1891; Ceron, Cat. Pl. Herb. Manila 133. 1892; Hemsl., Journ. Linn. Soc. Lond. Bot. 30: 187. 1894; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 132--144, 169--172, & 178, fig. 64 A--D. 1895; S. Moore, Trans. Linn. Soc. Lond. Bot., ser. 2, 4: 440. 1895; Reinecke, Engl. Bot. Jahrb. 25: 671. 1898; Lindl. & Moore, Treas. Bot., imp. 4, 1: 30 (1899) and imp. 4, 2: 1220. 1899; Burkill, Journ. Linn. Soc. Lond. Bot. 35: 50. 1901; Boorsma, Bull. Inst. Bot. Buitenz. 14: 35. 1902; E. D. Merr., Bull. Philip. Forest. Bur. 1: 51--52. 1903; Ridl., Journ. Roy. Asiat. Soc. Straits 57: 84 (1910) and 59: 156--157. 1911; Koord., Exkursionsfl. 3: 132, 136--137, & 495. 1912; E. D. Merr., Philip. Journ. Sci. Bot. 7: 165 & 343--344. 1912; C. B. Robinson, Philip. Journ. Sci. Bot. 7: 415. 1912; Heyne, Nutt. Plant. Ned. Ind., ed. 2, 1: 24 (1927). ed. 2, 2: 1313 & 1315--1320 (1927), and ed. 2, 3: 1646. 1927; Ekman, Arkiv Bot. Stockh. 22A: 51 & 110. 1929; White, Journ. Arnold Arb. 10: 264. 1929; Mold., Phytologia 1: 101--104. 1934; Bakh., Journ. Arnold Arb. 16: 74--75. 1935; Beer & Lam, Blumea 2: 228. 1936; Corner, Wayside Trees, ed. 1, pl. 216. 1940; Gentry, Carnegie Inst. Wash. Publ. 527. 1942; Lemée, Dict. Descrip. Syn. Gen. Pl. Phan. 8b: 656. 1943; Blume, Cat. Gewass., imp. 2, 86. 1946; Corner, Wayside Trees, ed. 2, 686, 695, & 706--711, text fig. 256. 1952; Basu & Singh, Indian Journ. Pharm. 6: 71. 1954; Lemmon & Sherman, Fls. World 104, pl. 232 & 234. 1958; Venkataraman, Prog. Chem. Org. Nar. Prod. 17: 1. 1959; Balakrish., Ramanath., Seshadri, & Venkataram., Proc. Roy. Soc. 268A: 1. 1962; Jurd, Chem. Flavon. Comp. 1962: 107. 1962; White & Angus, Forest Fl. N. Rhodes. 365, 370--372, & 455. 1962; Diaconescu, Act. Bot. Hort. Bucur. 1961: 1040. 1963; Eglér, Bol. Mus. Para. Goeldi, ser. 2, Bot. 18: 80.

1963; Salmon, N. Zeal. Pl. Col. 77, pl. 216 & 217. 1963; Beard, Descrip. Cat. W. Austral. Pl., ed. 1, 93. 1965; Mabry, Kagan, & Rösler, Phytochem. 4: 177. 1965; Lourteig, Taxon 15: 28. 1966; Garms, Nat. Hist. Eur. 109. 1967; Harborne, Compar. Biochem. Flavon. 57 & 228. 1967; Meijer, Bot. Bull. Herb. Forest Dept. Sabah 10: 223. 1968; Beard, West Austral. Pl., ed. 2, 113. 1970; Chippendale, Proc. Linn. Soc. N. S. Wales 96: 256. 1971; Crockett, Landsc. Gard. 120. 1971; Crockett, Flow. Shrubs 27 & 145. 1972; T. B. Muir, Muelleria 2: 167. 1972; Bennett, Fl. Howrah 303 & 306. 1976; Bianchini & Corbetta, Health Pl. World 119. 1977; Kodanda Rao & E. & B. Venkata Rao, Biol. Abstr. 64: 6284. 1977; Allen, Pruning Graft. 152. 1978; Heywood, Flow. Pl. World 237 1978; Hsiao, Fl. Taiwan 4: 410 & 432--435, pl. 1060. 1978; A. C. Sm., Allertonia 1: 414. 1978; Vedel, Trees Shrubs Med. 88 & 89. 1978; Benson, Pl. Classif., ed. 2, 277. 1979; Horst in Westcott, Pl. Disease Handb., ed. 4, 717. 1979; Biswas & Maheshwari, Journ. Bomb. Nat. Hist. Soc. 77: 225. 1980; Hsiao, Fl. Taiwan 6: 122. 1980; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 468. 1980; Klein, Sellowia 32: 172. 1980; Lauener, Notes Roy. Bot. Gard. Edinb. 38: 453 & 485. 1980; Cronq., Integ. Syst. Classif. 923. 1981; Hickey & King, 100 Fam. Flow. Pl. 346--348. 1981; Mold., Phytologia 49: 161--182. 1981; Munz & Slausen, Ind. Illust. Living Things Outside N. Am. 69 & 429. 1981; Rogerson, Becker, Buck, & Long, Bull. Torrey Bot. Club 108: 503. 1981; Rooyen, Theron, & Grobbelaar, Journ. S. Afr. Bot. 47: 409, 421, & 441. 1981; Sharma, Shetty, Vivekan., & Pathakr., Journ. Bomb. Nat. Hist. Soc. 75: 33. 1981; Webb & Tracey in Groves, Austral. Veg. [81]. 1981; L. O. Williams, Ceiba 24: 333. 1981; Cronq. in S. P. Parker, Synop. Classif. Liv. Org. 1: 451. 1982; Janzen & Martin, Science 215: 23. 1982; Mold., Phytologia 50: 233, 238, 239, 242, 243, 245, 246, 248, 250--254, 261, 262, 266, 267, 269, 270, 425, 430, 508, & 512 (1982) and 51: 163. 1982.

The *Liesner & González 9451*, distributed as *Vitex* sp., is something in the *Bignoniaceae*, while *Steiermark & Berry 111972* is also probably non-verbenaceous.

#### VITEX ACUMINATA R. Br.

Additional bibliography: Walp., Repert. Bot. Syst. 4: 86. 1845; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 172. 1895; F. M. Bailey, Queensl. Fl. 4: 1179 & 1180. 1901; Mold., Phytologia 49: 163. 1981; Webb & Tracey in Groves, Austral. Veg. [81]. 1981.

#### VITEX AGNUS-CASTUS L.

Additional bibliography: Walp., Repert. Bot. Syst. 4: 90. 1845; Lindl., Veg. Kingd. 664. 1846; Bocq. in Baill., Rec. Obs. Bot. 3: 253. 1863; Lindl. & Moore, Treas. Bot., ed. 1, 1: 30 (1870), ed. 2, 1: 30 (1876), and ed. 3, 1: 30. 1884; Lace & Hemsl., Journ. Linn. Soc. Lond. Bot. 28: 296, 297, & 318. 1891; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 171, fig. 64 A--D, & 172. 1895; Lindl. & Moore, Treas. Bot., ed. 3, 1: 30. 1899; Koord., Excursions-

fl. 3: 136 & 495. 1912; Lemmon & Sherman, Fls. World 104, pl. 232 & 234. 1958; Diaconescu, Act. Bot. Hort. Bucur. 1961: 1040. 1963; Garms, Nat. Hist. Eur. 109. 1967; Crockett, Landsc. Gard. 120. 1971; Crockett, Flow. Shrubs 27 & 145. 1972; Bianchini & Corbetta, Health Pl. World 119. 1977; Vedel, Trees Shrubs Medit. 88 & 89. 1978; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 468. 1980; Mold., Phytologia 49: 163. 1981; Munz & Slauson, Ind. Illust. Living Things Outside N. Am. 69 & 429. 1981; Mold., Phytologia 50: 233, 239, 250, & 266. 1982.

Additional & emended illustrations: Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 171, fig. 64 A--D. 1895; Lemmon & Sherman, Fls. World 104, pl. 232 (in color) & 234 (in color). 1958; Garms, Nat. Hist. Eur. 109 (in color). 1967; Crockett, Landsc. Gard. 120 (in color). 1971; Crockett, Flow. Shrubs 27 (in color) & 145 (in color). 1972; Bianchini & Corbetta, Health Pl. World 119 (in color). 1977; Vedel, Trees Shrubs Med. 88 (in color). 1978.

The corollas are said to have been "light-purple" on *Bauiliss BS*. 6236 and the leaves "smell of lavender".

Diaconescu (1963) records the fungus, *Phoma viticis* Celott, as attacking this host in Romania.

Material of typical *V. agnus-castus* has been misidentified and distributed in some herbaria as *V. agnus-castus* var. *pseudonegundo* Hausskn. and as *V. rehmanni* Gürke. On the other hand, the *Perkins s.n.* [Aug. 1, 1937], distributed as typical *V. agnus-castus* actually is its f. *latifolia* (Mill.) Rehd., while *Dinsmore s.n.* [July 11, 1912] is var. *pseudonegundo* Hausskn.

Additional citations: SARDINIA: *Vaccari 356* (It). UNION OF SOVIET SOCIALIST REPUBLICS: Turkmanskaya: *Nikitin & Ivanov s.n.* [18.06.1975] (Ba--385325). CULTIVATED: Alabama: *Whitehead 437* (It). California: *Burnham s.n.* [April 1896] (It). Ohio: *E. G. Hutchinson s.n.* [Sept. 22, 1934] (It). South Africa: *Bayliss BS*. 6236 (Ba).

*VITEX AGNUS-CASTUS* f. *ALBA* (West.) Mold.

Additional bibliography: Mold., *Phytologia* 48: 416--417 (1981) and 50: 250 & 266. 1982.

*VITEX AGNUS-CASTUS* f. *CAERULEA* (Rehd.) Mold.

Additional bibliography: J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 468. 1980; Mold., *Phytologia* 48: 416 & 417. 1981.

*VITEX AGNUS-CASTUS* f. *LATIFOLIA* (Mill.) Rehd.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 90. 1845; Mold., *Phytologia* 48: 417 (1981) and 49: 177. 1981.

Peterson describes this plant as a branching shrub to 10 feet tall, the corollas "R[oyal] H[orticultural] S[ociety] Fan 2 Violet-Blue 93/B" and found it in flower in July.

Additional citations: CULTIVATED: Massachusetts: *Perkins s.n.* [Aug. 14, 1937] (It). Pennsylvania: *Peterson J.2370* (Ba--371549). MOUNTED ILLUSTRATIONS: Unnumbered color plate labeled "Vitex Macrophylla" (It).

*VITEX AGNUS-CASTUS* var. *PSEUDO-NEGUNDO* Hausskn.

Additional bibliography: Mold., *Phytologia* 48: 417, 485, & 487--489. 1981.

Recent collectors describe this plant as 1--3 m. tall, growing by water and in gravel in wadi beds, at 25 m. altitude, in flower in May and September, and in fruit in September.

Additional citations: ISRAEL: *Dinsmore s.n.* [Saron, July 11, 1912] (It). IRAQ: *Agnew & Barkley s.n.* [27.5.1962] (W--2897908). IRAN: *N. Miller 176* (Mi).

*VITEX AGNUS-CASTUS* f. *ROSEA* Rehd.

Additional bibliography: Mold., *Phytologia* 49: 164. 1981.

*Jativa* describes this plant as a "tree 14 ft. tall, 16 ft. wide, branches ascending-spreading, flowers pinkish-white", and found it in flower in August.

Additional citations: CULTIVATED: California: *Jativa 3136* [LASCA Acc. 58-8-1189] (Ba--376830).

*VITEX AJUGAEFLORA* Dop, Bull. Soc. Hist. Nat. Toulouse 57: 202--203, pl. 4. 1928.

Additional & emended bibliography: Dop, Bull. Soc. Hist. Nat. Toulouse 57: 202--203 & 209--211, pl. 4. 1928; Mold., *Phytologia* 49: 164. 1981.

Additional illustrations: Dop, Bull. Soc. Hist. Nat. Toulouse 57: opp. 202, pl. 4. 1928.

Dop (1928) states that this plant "C'est un arbre de 20 á 30 mètres; répandu en Cochinchine et dans le Sud de l'Annam". He lists the vernacular names, "binh ling ngs" and "feunang", and comments that "Pierre signale ce bois comme un bois dur, à coeur brun rougâtre quand il est fraîchement coupé. Poilane l'indique comme bon bois de construction."

*VITEX ALTISSIMA* L. f.

Additional synonymy: *Vitex altissima* ♂ *macrophylla* Walp., *Repert. Bot. Syst.* 4: 84. 1845.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 83--84. 1845; Bocq. in Baill., *Rec. Obs. Bot.* 3: 253. 1863; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Sharma, Shetty, Vivekan., & Rathakr., *Journ. Bomb. Nat. Hist. Soc.* 75: 33. 1981; Mold., *Phytologia* 49: 164--165, 371, 372, 382, 383, & 440--442 (1981) and 50: 266. 1982.

Additional citations: INDIA: Karnataka: *Saldanha 13162* (Mi), *13425* (Mi), *13974* (Mi), *14365* (Mi).

*VITEX ALTISSIMA* f. juv. *ALATA* (Willd.) Mold.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 83. 1845; Mold., *Phytologia* 48: 418 (1981) and 49: 382, 383, & 442. 1981.

*VITEX AMBONIENSIS* Gürke

Additional bibliography: White & Angus, *Forest Fl. N. Rhodes.* 371. 1962; Mold., *Phytologia* 48: 418--419, 463, & 465 (1981) and 49: 376. 1981; Rooyen, Theron, & Grobbelaar, *Journ. S. Afr. Bot.*

47: 409, 421, & 441. 1981.

*VITEX AMBONIENSIS* var. *AMANIENSIS* Pieper

Additional bibliography: Mold., Phytologia 44: 386. 1979; Mold., Phytol. Mem. 2: 228 & 588. 1980.

*VITEX AMBONIENSIS* var. *SCHLECHTERI* Pieper

Additional bibliography: Mold., Phytologia 45: 480. 1980; Mold., Phytol. Mem. 2: 241 & 588. 1980.

*VITEX ANDONGENSIS* J. G. Baker

Additional bibliography: Mold., Phytologia 44: 386. 1979; Mold., Phytol. Mem. 2: 234 & 588. 1980.

*VITEX ANGOLENSIS* Gürke

Additional bibliography: Mold., Phytologia 44: 386. 1979; Mold., Phytol. Mem. 2: 234 & 588. 1980.

*VITEX APPUNI* Mold.

Additional bibliography: Mold., Phytologia 45: 480. 1980; Mold., Phytol. Mem. 2: 121, 123, 171, 457, & 588. 1980; Mold., Phytologia 49: 362 & 365. 1981.

Additional citations: VENEZUELA: Guárico: *Aristeguieta 6083* (N, W--2926022).

*VITEX AUREA* Mold.

Additional bibliography: Mold., Phytologia 44: 387. 1979; Mold., Phytol. Mem. 2: 251, 366, & 588. 1980.

*VITEX AXILLARIS* Wall.

Additional bibliography: Walp., Repert. Bot. Syst. 4: 91. 1845; Mold., Phytologia 44: 387. 1979; Mold., Phytol. Mem. 2: 275, 457, & 588. 1980.

*VITEX BAKERI* B. L. Robinson

Additional bibliography: Mold., Phytologia 44: 387--388 & 415. 1979; Mold., Phytol. Mem. 2: 202, 213, 457, & 588. 1980.

*VITEX BALBI* Chiov.

Additional bibliography: Mold., Phytologia 44: 388-390. 1979; Mold., Phytol. Mem. 2: 231 & 588. 1980.

*VITEX BARBATA* Planch.

Additional bibliography: Mold., Phytologia 44: 390 & 479. 1979; Mold., Phytol. Mem. 2: 200, 205--207, 209, 211, 216, & 588. 1980; Mold., Phytologia 49: 367. 1981.

*VITEX BEFOTAKENSIS* Mold.

Additional bibliography: Mold., Phytologia 44: 390. 1979; Mold., Phytol. Mem. 2: 251 & 588. 1980

*VITEX BENTHAMIANA* Domin

Additional bibliography: F. Muell., *Fragm.* 6: 15. 1868; Mold., *Phytologia* 45: 481. 1980; Mold., *Phytol. Mem.* 2: 339 & 588. 1980.

The Landsborough collection, cited below, was previously incorrectly cited by me as *V. trifolia* var. *subtrisecta* (Kuntze) Mold., a very closely related taxon.

Additional citations: AUSTRALIA: Northern Territory: *Landsborough s.n.* [Gulf of Carpenteria] (Pa).

*VITEX BOJERI* Schau.

Additional bibliography: Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Mold., *Phytologia* 44: 392. 1979; Mold., *Phytol. Mem.* 2: 251 & 588. 1980.

*VITEX BREVILABIATA* Ducke

Additional bibliography: Egler, *Bol. Mus. Para. Goeldi*, ser. 2, Bot. 18: 80. 1963; Mold., *Phytologia* 49: 165. 1981.

Egler (1963) regards *Herb. Rio de Janeiro 311* as a "syntype" collection of this species, but actually the species is based only on no. 18954.

Additional citations: BRAZIL: Amazonas: *Prance, Berg, Bisby, Steward, Monteiro, & Ramos 18027* (W--2898198).

*VITEX BUCHANANII* J. G. Baker

Additional bibliography: White & Angus, *Forest Fl. N. Rhodes.* 371. 1962; Mold., *Phytologia* 49: 165 & 466. 1981.

The *Phillips 2159*, misidentified and distributed as *V. buchananii*, actually is *V. radula* Mildbr.

*VITEX CALOTHYRSA* Sandw.

Additional bibliography: Mold., *Phytologia* 49: 166 (1981) and 50: 245. 1982.

Bossio has found this species in fruit in March.

Additional citations: VENEZUELA: Amazonas: *Bossio 16* (E--2892148, N).

*VITEX CANESCENS* Kurz

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 91. 1845; Collett & Hemsl., *Journ. Linn. Soc. Lond. Bot.* 28: 110. 1890; Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: 206, 210, & 211. 1928; Mold., *Phytologia* 48: 419 & 443. 1981.

Collett & Hemslay (1890) give the natural distribution of this species as "Assam to Ava and Pegu". Dop (1928) cites *Harmand 1862, Hayata 679*, and *Poilane 102, 155, 6054, & 6275* from Annam, *Thorel s.n.* from Cambodia, and *Baudouin s.n., Pierre 648, Talmy s.n., and Thorel 1591* from Cochinchina. Craib (1912) cites *Kerr 1705 & 1766* and *Vanpruk 143* from Thailand, giving the overall distribution of the species as Assam, Burma, and Yunnan.

Recent collectors describe the plant as a shrub, 6 feet tall, the leaves dull-green above, lighter green beneath, slightly hairy, the flowers fragrant, and the corollas "white", and have encounter-

ed it at 600 feet altitude.

The *Majumder & Islam 87*, distributed as *V. canescens*, actually is *V. glabrata* var. *bombacifolia* (Wall.) Mold.

Additional citations: NEW GUINEA: Papua: *Streimann NGF.26189* (W--2899990).

#### VITEX CAPITATA Vahl

Additional citations: Walp., *Repert. Bot. Syst.* 4: 86 & 88. 1845; Bocq. in *Baill.*, *Rec. Obs. Bot.* 3: 253. 1863; Briq. in *Engl. & Prantl*, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Mold., *Phytologia* 47: 452 (1981) and 49: 466. 1981.

Recent collectors describe this species as a tree or treelet, 3--5 m. tall, with light-green leaves, and have found it growing on small sand dunes in marshes, on rocky windswept slopes, and in rock cracks on rocky hills with *Byrsonima* and *Trachypogon* dominant, at 160 m. altitude. They have found it in flower in February and April and in fruit in May, the flowers "visited by numerous and various bees". The corollas are said to have been "blue with white nectar-guides" on *Davidse & González 15482 & 16081*, "violet-blue with white nectar-guides" on their no. 14611, and "white and violet with yellow nectar-guides" on their no. 14576.

Bunting and his associates describe the plant as having "troncos varios; hojas nuevas de color verde suave, lustrosas especialmente en la haz; corola violeta, lóbulos superiores pálidos, lóbulo inferior más intenso con mancha central bien intensa, uña cremosa; estambres semejantes en color".

Additional citations: VENEZUELA: Apure: *Davidse & Gonzalez 14576* (Ld), *14611* (Ld), *15482* (Ld), *16081* (Ld). Bolívar: *Aristeguita 5283* (W--2925970). Guárico: *Aristeguieta 4187* (N). Zulia: *Bunting, Sanchez, & Alfonzo G. 7319*(Ld), *7530* (Ld).

#### VITEX CHRYSOMALLUM Steud.

Additional bibliography: Briq. in *Engl. & Prantl*, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Mold., *Phytologia* 48: 453. 1981.

#### VITEX CILIATA Pierre

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 30. 1845; Mold., *Phytologia* 48: 453. 1981.

VITEX COCHINCHINENSIS Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: 199--200, pl. 3. 1928.

Additional & emended bibliography: Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: 199 & 210--211, pl. 3. 1928; Mold., *Phytologia* 48: 454. 1981.

Additional illustrations: Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: opp. 200, pl. 3. 1928.

A shrub, 1--2 m. tall; branchlets rounded or subtetragonal, fulvous-pubescent; leaves 3-foliolate; petioles 3.5--4.5 cm. long, round in cross-section, not alate, pubescent; leaflet-blades chartaceous, ovate or ovate-elliptic, apically acute or acuminate, basally rounded or obtuse, asperous and sparsely pilose above.

[to be continued]



BOOK REVIEWS

XII

George M. Hocking  
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Auburn, Alabama

"MUSKELRELAXANZIEN," edited by F. W. Ahnefeld and six others. Klinische Anaesthesiologie und Intensivtherapie Band 22: XI + 1-281, 104 figs., 37 tabs., flexible cover. Springer-Verlag Berlin Heidelberg, New York. 1980. DM. 78,-- (approx. U.S. \$46.10).

Muscle relaxants like the anesthetics belong today to the spectrum of activities composing long-lasting narcosis. It is therefore surprising how different opinions still are even today on the neurophysiological actions of muscle relaxants. In the workshop reported in this volume, researchers in basic subjects and clinicians discuss the desirable and undesirable actions of depolarizing muscle relaxants, their point of attachment to the neuromuscular end plates and the possibilities of influencing the action. A comprehensive discussion defines the requirements of an ideal muscle relaxant and compares the older, well-known and the newly developed preparations of this category. Finally, recommendations are made for the administration, the necessary monitoring, and for the use of antagonizing substances where necessary. Some sections are devoted to the use of muscle relaxants in babies, infants, and children, in pregnancy, and during the birth process. Much of the text consists of questions and answers as a means of eliciting specific information that might be overlooked in general discussions. A list is given (with addresses) of 32 speakers and participants in discussions, including six of the seven editors.

GMH

"DIE INTRAVENOESE NARKOSE (Intravenous narcosis)", edited by F. W. Ahnefeld et al. Klinische Anaesthesiologie und Intensivtherapie Band 23: XI + 1-330, 122 figs., tabs. Springer-Verlag Berlin, Heidelberg, New York. 1981. DM 78,--; approx. U.S. \$33.20.

Besides inhalation anesthesia and muscle relaxation, intravenous narcosis is the most important component in the induction of general anesthesia. The plurality of medications and combinations available makes necessary an inventory of the

armamentarium. Important points covered in this treatment include indications, contraindications, by-effects of the various drugs, their effects in inhibiting various drug functions, and their usage in definite patient types (geriatrics, obstetrics, pediatrics, surgery, cardiac surgery, intensive care). Entire chapters are devoted to each topic. This volume reports a workshop supported by the Eli Lilly Company (where? when?). Participants include all but one of the eight editors plus 22 others, mostly German, a few from other countries of Central Europe. There are chapters on the history of intravenous narcosis (IVN), theories of IVN, the kinetics and metabolism of hypnotics, of tranquilizers (minor and major), of opioid analgetics and antagonists, and of such IVN as barbiturates and Fentanyl during anesthesia and intensive therapy in patients with liver and kidney insufficiency. There are also chapters on premedication, barbiturates, etodimate, etc., ketamine, ataralgesic combinations, the benzodiazepines (as Librium), analgetics, neuroleptic anesthesia (NLA) (combination of a neuroleptic with a potent analgesic such as Droperidol with Fentanyl), special side-effects of IVN, brain protective action of barbiturates, access through placenta of IVN to uterus and fetus, IVN anesthesia in postoperative sedation and analgesia, measurement of anxiolysis in anesthesia, IVN in patients with cerebral convulsive states, and others. It is unfortunate that such a wealth of information is not available in the English language. The book, in flexible cover, is well printed, uniformly with others in this important series, "Clinical Anesthesiology and Intensive Therapy."

GJH

"AL-BIRUNI'S BOOK... INTRODUCTION, COMMENTARY, AND EVALUATION, PART (VOLUME) 2, by Sami K. Hamarneh (Smithsonian Institution, Washington, D.C.) 1973. 152 pp., 9 figs., 1 map. U.S. \$6.

In this commentary on the "Book on Pharmacy and Materia Medica" of Abu Raihan al-Biruni, written during his lifetime (AD 937-1051), Dr. Hamarneh has included a statement of the origins and history of the manuscript, an essay on the transliteration system used (Arabic to English), and several chapters discussing the relations of Al-Biruni to Arabism, to pharmacy and therapeutics ("pharmacology"), to drugs of natural origin, to environmental sciences and the ecology, and to toxicology, with bibliographic footnotes to furnish complete references to all matters. Special features include biographical sketches of the various authors cited in his work (pp. 106-137), and of special importance, a glossary of toxic and potent drugs (pp. 52-61). One appendix consists of an alphabetic listing by Arabic names of materia medica, a glossary with comments

(pp. 67-105). This useful compilation includes animal and mineral as well as plant remedies, as they are described in Al-Biruni, with comments from our present knowledge of these materials. This is a very interesting compendium. There are two useful indices, one of botanical names, the second of "other" names, mostly the Arabic.

GMH

"ANNUELLES ET LEGUMES 1977: RESULTATS DES CULTURES D'ESSAI."

(Anonymous). Jardin Botanique de Montréal (Canada): 1-271, 14 figs.; 1977.

Tabulated data on vars. of many spp., with source, cultivation, flower, other characteristics, general evaluation, etc. Under annuals, taxa of 65 genera are so described (*Ageratum*, *Agrostemma*, etc.). Under vegetables, 29 kinds are described, such as carrot, onion, Romaine lettuce, etc.

GMH

"A BAREFOOT DOCTOR'S MANUAL, The American translation of the official Chinese Paramedical Manual, (Anonymous)": X + 1-948, figs. and tabs. Running Press, 38 S. 19th St., Philadelphia, PA. 19103. 1977. \$5.95.

This large paper-back volume is made up of seven "chapters" in the following order: human anatomy; hygiene; some diagnostic technics and therapeutic technics; birth control planning; diagnosis and treatment of common diseases; and Chinese medicinal plants. The last chapter occupies nearly half of the book; besides plants native to China, there are a number of medicinal plants of North America and Europe. The copy was made by off-set methods from typewritten copy, but in view of the very low price, one can hardly be critical of that. There is a great deal of information in the book; it should be present in many libraries, both of individuals and institutions. Two things might be criticized: (1) the lack of an index or rather of indexes - one general, the other of scientific plant names (the one page table of contents is hardly adequate); (2) a glossary of Chinese terms used throughout the text, such as yin, liang, ch'ien, han, chin, etc. We have a great deal to learn from China and this book will contribute much to our knowledge of the folk medicinal materials now so widely used in this country.

GMH

"DAS KAKTEENLEXIKON: ENUMERATIO DIAGNOSTICA CACTACEARUM. ED. 5." by C. Backeberg. 1-822, 543 figs. (some in color), Gustav Fischer Verlag, Stuttgart, BRD. 188 maps; 1979. DM 58--

In this comprehensive work covering all known taxa of the Cactaceae, there are a number of features of value. The chief valuable attraction of the lexicon is the listing under genera of all known species and infra-specific taxa of the family. Some of these are designated as new species and new combinations but these apparently are unchanged entries from the first edition since some are authored by Backeberg, who died shortly before the first edition of his great work appeared in 1966. (These taxa are of course no longer new and the designation should have been removed from the second and later editions.) The next most important contribution of the book is the large collection of colored and black and white photographs and drawings, which compose more than one-third of the pagination of the volume. Between these two sections lies a series of distribution maps, showing the geographic positioning of many subdivisions of the family in the Western Hemisphere, in which cactus species are native. A lengthy appendix (54 pages) prepared by the person now in charge since Backeberg's passing, Dr. Walther Haage, gives in similar format to the main listing those species of cactus described since 1966 and up to 1974 (circa) (there is no indication of cut-off date but no references from 1975-77 were noted). This appendix also includes new information and entities that were omitted in the main list. Other features of the work include a diagnostic key to the various levels from sub-family to genus; essays on the classical principles of <sup>systematics</sup> and the cultivation of cacti. The information given on each taxon includes citation, plant form, descriptions of main axis, thorns, spines, ribs, flowers, place of growth, and so on. Although the book is entirely in German, the simple language used in the specific descriptions should be no obstacle to non-German language persons utilizing the book to almost full advantage. There is no question about the availability of illustrations and maps, of course. Hence this volume is of universal appeal and utility.

GMH

"EVOLUTION AND PLANTS OF THE PAST," by H. P. Banks (Fundamentals of Botany Series). x + 170 pp., 82 figs., 7 tabs. Wadsworth Publishing Co., Inc., Belmont, Calif. 1970. \$ (paperback).

This brochure represents a well written and interesting account of paleobotany. Various chapters discuss the fossilization process in plants and the technics of fossil study; the

earliest known plant life (Thallophyta), which developed in the oceanic waters; later the land was invaded and here important developments took place with important new developments; the Coal Age or the Carboniferous Period gave a tremendous growth of great plants. Evolution is treated in one chapter. The development of the Coniferae is traced and the last chapter deals with the evolution of the Angiosperms, representing the culmination of evolution in the plant kingdom. References appear at the end of each chapter and a glossary and index at book's end. The line drawings are excellent and better than the half-tones.

GMH

"FROM THE SHEPHERD'S PURSE: the identification, preparation, and use of medicinal plants," by Max G. Barlow. 1-191. Many col. pls. and figs., maps. Spice West Co., Box 24, McCammon, Idaho 83250. 1979.

Chiefly by means of diagrams, this book is intended to show for each of 48 plant species the habit (drawing and colored photo), parts used, distribution in the USA, time of day to be collected, time of year, medicinal uses, and preparations. There are detailed directions for collecting and preserving the plant parts for use. Elementary taxonomic principles are introduced. Considerable information is furnished on the milling and grinding of the crude materials. Other features include a glossary, index, and tabulated weights and measures. However, there is no bibliography. The illustrations are generally excellent, but the text portion is somewhat amateurish. The book is indicated as Volume I of "Medicinal Botany (plant taxonomy approach).

GMH

"MORPHOLOGY OF PLANTS AND FUNGI, FOURTH EDITION," by Harold C. Bold, Constantine J. Alexopoulos, and Theodore Delevoryas. XI + 1-819, many figs. Harper & Row, Publishers, New York, Philadelphia. 1980.

While this work is chiefly concerned with the morphology of Phyta (Plants) and Myceteae (Fungi), it also has a good deal to say about classification. The system of classification proposed by the authors and quite similar in all four editions of their work is at considerable variance with earlier attempts at arranging the members of the plant kingdom (using the term broadly), notably those of Eichler (1883) (modified) and Tippe (1942). This is best shown in the end papers at the back of the volume where the systems are placed in parallel to show changes in name or elimination of the various groups. One who is familiar with

the older nomenclature and classification of Engler (et al.) will not feel quite comfortable with the new names. However, there is substantial evidence of the superiority of the new categories used. A typical chapter of the 36 composing the book shows the following sequence of topics: an introduction to the group; detailed treatment in sequence with many figures and diagrams of representative taxa; summary and schematic classification; and discussion questions. All literature references are at the end of the volume in the Bibliography, along with the glossary and index to text and figures. The informative end papers are well suited and placed for ready reference. For those in front, the divisions of geological time are coordinated with the duration of the various plant groups. This work should be an inspiration and thorough guide to the serious student of plant morphology.

GMH

"PLANTES MEDICINALES DE LA CÔTE D'IVOIRE." Travaux et Documents de l'O.R.S.T. O.M. No. 32. A. Bouquet and M. Debray. 232 pp., many tabs; 7 pls; 1974. (Office de la Recherche Scientifique et Technique Outre-Mer, 70-74, route d'Aulnay, 93140 Bondy, France. Price 32 fr.

This volume is a treasure of great value covering all aspects of the medicinal plants of the Ivory Coast in West Africa. Some 700 plant species were screened in this extensive and intensive study of the medicinal flora, up to now so poorly known, of Western Africa. The plants are arranged in the alphabetic order of their families, beginning with the Acanthaceae and finishing with the Zygophyllaceae. The arrangement of content is as follows: first a review of the folk medical usage so far revealed of the various species of the family, then in tabular form the results of the various tests applied to the plant materials. The tables are supplied with abbreviations, a key to which appears as a footnote at the end of the first family (p. 12). (It would better have appeared in a distinctive position before the text). The first column of the table gives the scientific plant name, the second column indicates the part used, then follow tests for alkaloids (with Mayer's and Dragendorff's reagents), quinones, saponosides, flavonoids, tannins, and sterols or terpenes. The results shown are semi-quantitative - negative (0) or positive (+, ++, +++); the meaning of + is not explained. Meanings of the abbreviations for plant parts "ET" and "ER" are not indicated; they apparently refer to stem bark and root bark (Ecorce de tige and écorce de racine). There is no summary to convey data having the greatest possibilities of value in medicine of some of the materials studied so that the interested person is obliged to carefully comb the text for such information. The two indexes are very

thorough: scientific names and Ivory Coast names; (noms ivo-riens). This work is without question of great value in the continuing search for better medicinal agents.

GMH

"PACIFIC SEASHORES: A GUIDE TO INTERTIDAL ECOLOGY," by Thomas Carefoot. 208 pp., 176 drawings, 30 b. & w. photos, 80 pls. (color) University of Washington Press (Seattle). Paper back. 1978. \$12.95.

The balance of nature expressed in the term "ecology" is furnished with numerous excellent examples in this large-page (letter size) volume. Perhaps the most complex environment of all is that found at the seashore. A great commingling of plants and animals, of predators and victims, of simple versus complex, can be witnessed in this ecology. Most attention in the book has been given to rocky intertidal (littoral) habitats in contrast to the muddy or sandy. This kind of habitat is vividly portrayed on the outside cover photograph which most probably represents a segment of the west Vancouver Island coastal area, where many of these studies were made by the author. The furious agitation of the ocean waves illustrates the violence which plant and animal organisms in this habitat must be able to withstand or even use to their advantage. The text is clearly and interestingly written and richly and beautifully illustrated with line drawings which are supplemented by colored photographs generally of high quality. The numbering of the illustrations with large integers is an excellent idea really aiding in the concurrent reading of the text. Much can be learned of the morphology and life cycle of common denizens of the seashore such as the starfish and sea urchin. That such peaceful-seeming animals are active predators sacrificing many plants and animals to their voracious appetites may come to many as a surprise. -- The author is a professor at the University of British Columbia at Point Gray, Vancouver, hence adjacent to many interesting seaside localities and overlooking the waters of the Straits of Georgia. Not far away is the famous Biological Station of the University of Washington at Friday Harbor on San Juan Island, where I learned many years ago from an eminent biologist that the waters were richer in marine life than those at the celebrated Naples (Italy) marine station.

G M H

"Medicinal plants - old and new," by Julia F. Morton. - Bull. Med. Library Assn. 56: 161-167; 1968.

Review of the historic role played by plants in the art of medicine, which became less important with the introduction of many synthetic drugs during the first half of the 19th century. Interest in plant medicinals has shown a resurgence in recent years with the discovery of the antibiotics, tranquilizing alkaloids and steroid hormones. Many folk remedies are still in need of thorough study as a possible starting point for potent medicinal agents.

G M H

"GUIDE OF (TO) PLANTS USED AS FOLK REMEDIES IN PUERTO RICO"

Part I., by Hector A. Lozada (Ph.D.) and Nydia M. King (Ph.D)  
iv, 31 pp., College of Pharmacy, Univ. Puerto Rico, Rio  
Piedras, P.R. 1966. Gratis

This gives a rather thorough tabulation of botanical, Spanish, and English names, alleged medicinal properties and uses, other uses, pharmacological and toxicological investigations, and phytochemistry, followed by specific references, for six plant species: Argemone Mexicana L., Bryophyllum pinnatum (Lam.) Kurtz., Cecropia peltata L., Jatropha curcas L. (Curcas curcas (L.) Britt.), Elaphrium simaruba (L.) Rose, and Solanum nigrum L. A general bibliography appears at the end of the pamphlet.

GMH

"COMMON AND UNCOMMON USES OF HERBS FOR HEALTHFUL LIVING" by

Richard Lucas, Paper back: xvi, 208 pp., ARC Books, Arco  
Publishing Co., 219 Park Av. South, New York 10003. 1969  
\$1.65.

This is the second book by the author of "Nature's Medicines". He has divided the text into distinct packages, which makes the discussion considerably clearer and more interesting. Thus, Chapter 3 with 8 pages discusses the many values of olive oil. Other chapters deal with the elder bush, dandelion, saffron (!), parsley, mistletoe, rosemary, onion, sage, and nettle. There are also chapters dealing with an association of plant drugs, such as those of the American Indians, marine healing plants, herbal remedies against cancer, the use of herbs for bathing and beauty treatments; herbal substitutes for tobacco; and a "roundup" chapter taking up 19 different medicinal herbs. There are several formulas. Scattered references occur; there is a glossary of medicinal terms; and a brief statement about simple medicinal formulation. At the end a rather detailed index assists the user.

GMH

"ATLAS OF THE FLORA OF THE GREAT PLAINS," by R. L. McGregor (Coordinator)  
and T. N. Barkley (Editor), XV + 600 pp., 2218 maps. Iowa State  
University Press, Ames, Iowa. 1977. \$25.00.

County maps of the central United States used in this Atlas include four entire states (Kansas, Nebraska, North and South Dakota) and parts of nine other states. These outline maps are used to plot the distribution of some 2200 taxa found in this area. Taxa of Pteridophyta and Spermatophyta are arranged in the order of the Cronquist scheme ("Evolution and Classification of Flowering Plants," 1981) Approximately 850 taxa



of less common Great Plains plants are listed in Section 2 and are arranged in the same order as the plants in the Atlas. Between these two, one will have a rather useful checklist of the plants found in the Great Plains. This Atlas is to be followed by a comprehensive Flora of the same area. An index gives contact with both the Atlas plants and the listed plants. The work is solidly bound and clearly printed and is a very useful addition to publications on the North American flora. We will look forward to the appearance of the Flora which will include keys, full descriptions, illustrations, data on the ecological relationships, and the accepted nomenclature (including synonymies) for approximately 3,000 taxa of vascular plants.

GMH

"THE STORY OF PINES," by Nicholas T. Mirov and Jean Hasbrouck. xi + 148 pp., 53 figs., 1 map, 2 col. pls., 2 tabs. Indian University Press, Bloomington, Ind. 47401. 1976. \$7.95.

This semi-popular book about members of genus *Pinus* was written by an outstanding authority, Dr. Mirov, and his wife. (They are pictured on the dust cover). In this volume, Mirov (Russian born) has concentrated many of the more interesting facts about the pines, a subject which seems to have been almost an obsession with him during a long tenure with the U. S. Department of Agriculture, studying the chemistry of the pine oils. Appended to the text is a listing of the pines of the world, showing 104 species (authorities not indicated). Not only interesting facts but also an attractive style makes reading this book a pleasure and it should be of value in developing an interest in plants among the laymen. It is not possible to have too many books of this genre on the shelves of bookstores and libraries. The price is reasonable.

GMH

"THE TARAHUMAR OF MEXICO: THEIR ENVIRONMENT AND MATERIAL CULTURE," by Campbell W. Pennington. x + 267 pp., 4 maps, 2 charts, 33 pls. University of Utah Press, Salt Lake City, Utah. 1963. \$7.50.

In this account of an ancient Amerindian tribe living in western Chihuahua State, Mexico, Chapter One gives background information on the tribe, their relationships with the Spaniards, how far back we can trace them, the numbers of individuals in the tribe at various times in their history, etc. Chapter Two, in discussing the environment, includes a survey of the plants in various regions, showing the predominating or characteristic species. Chapter Three takes up their agricultural practices, Four the gardening modes and usages, Five the cultivation of trees, Six the preparation of their foods, mostly vegetable, Seven the gathering of foods, both plant and animal, Eight their animal husbandry, and Nine the vegetable beverages used by this people. But Chapter Ten is of special interest, as this deals with numerous drug and ceremonial plants of the Taramuhar. Especially on pages 177-194, which deals with strictly medicinal species, there is much interesting and potentially valuable (to human health) information. Plants which could be identified by the

author or taxonomic specialists represented species belonging to 53 families. There were quite a number of plants not identified except in some cases by the vernacular native name. Examples of these plants are *Hedeoma dentatum*, known commonly as "yerba del catarro" (catarrh herb), which is employed in colds; *Mentha canadensis* used in intestinal disorders; and *Solanum rostratum* used in menstrual difficulties. Apparently no attempt has been made by the author to investigate more fully these many uses, since he served merely as an observer or reporter. Naturally, from here on, the pharmacognosist, chemist, pharmacologist, and finally (if the drug be found worthy, the clinical investigator must carry out their scientifically rigorous tests to determine the definite value (or worthlessness) of the material found useful by the lowly Indians. This book may well add to the backlog of materials to be tested along modern lines. There seems to be no mention of the state of health of the Indian tribesmen and it may be that few or no studies have as yet been made. It would be interesting to find how long the older people lived, since recent studies have shown that, whereas the average longevity is low due to childhood and other communicable diseases and accidents, yet the oldest individuals known on earth have been found in such primitive societies as this. Extensive bibliography and detailed index complete the book.

GMH

"EXTINCTION IS FOREVER (SYMPOSIUM), edited by Ghilleen T. Prance and T. S. Elias. 438 pp., figs., maps. New York Botanical Garden, Bronx Park, New York, N. Y. 1977.

The subtitle of this book "Threatened and endangered species of plants in the Americas and their significance in ecosystems of today and in the future" conveys the subject matter: the vulnerability of living beings and the irreversible loss when they die out is truly tragic when one considers the permanent deprivation of the precious gene pool. In one chapter, "The phytogeographic subdivisions of Amazonia and their influence on the selection of biological reserves" (pp. 195-213; Prance), seven major phytogeographic regions are proposed for Amazonia (n. South America) including the Atlantic coastal, Jari-Trombetas, Xingu-Madeira, Roraima-Manaus, north west Upper Rio Negro; Solimoes-Amazonas west, and the southwest. These areas are based primarily on monographic studies of five woody plant families common and widespread in Amazonia.

GMH

"Woods for stropping razors," by John S. Dendy. - J. Alabama Acad. Sci. 40: 60-64; 1969.

Balakkak wood (from *Sesbania roxburghii* Merr.) was found in use in the Philippines by barbers as a strop for the razor; and in Brazil, the author found timbauba root wood (from *Enterolobium contortisillicum* Morong) used in the same way. Experiments with straight-edge razors showed that these woods put a sharp edge on blades previously honed. Further experiments showed similar values using root woods of *Nyssa aquatica* L., *Annona glabra* L. (USA), and balsa (*Ochroma ladopus* Swartz), the latter said in use in Panama. Students told of similar uses of woods in Pakistan, Thailand, India, and Nepal.

"NATURAL PEST CONTROL AGENTS," D. G. Crosby, Adv. Chem. Series 53: vi + 146 pp.; 1966. (Amer. Chem. Soc.)

This number incorporates papers presented at a Symposium at the 149th meeting of the American Chemical Society, Detroit, April 8, 1965. Some papers included were: LICHTENSTEIN, E.P.: 34-38, 7 tabs.: insecticides occurring naturally in crops (myristicin with insecticidal properties was found in edible parts of parsnips; the toxicity and insecticidal properties were determined; 2-phenylethyl-isosulfocyanate occurs in edible parts of turnips, etc.). - MOORE, J.B.: Pyrethrum: pp. 39-50; (see also 51-64 (analysis of pyrethrins); STOESL, A.: 80-89, 4 figs.: some antifungal factors in barley (one of these was p-coumaroylajmaline which acts to control Cochliobolus sativus (Ito et Kunth) Drasel. ex Dastur (Helminthosporium sativum). Other topics were biologically active agents against Helminthosporium sativum; regulation of plant growth by constituents of higher plants (112-41)(106-11)

G M H

"WILD FLOWERS OF ALABAMA AND ADJOINING STATES." Dean, Blanche E., Mason, Amy, and Thomas, J.L. University of Alabama Press, Montgomery (Alabama): XXII + 230 pp., 9 figs., 1 map, 400 pls; 1973. \$10.00.

In this attractive book, descriptions and useful illustrations for 400 of the most outstanding flowering plants of Alabama (mostly herbs, but with several trees and shrubs) are presented out of ca. 3000 native to, or naturalized in, the state. The representation of plant families is very wide, there even being one member of the Gramineae (Uniola, sea oats); the plants are in Englerian order. While the book, with its introductory material and glossary, is primarily intended to illuminate the subject for the layman, yet it will be serviceable also to the more serious student of botany. One side of the double page spread is occupied by the texts, the opposite (right) side by the colorful illustrations. The botanical names are complete with the authority names. It is one of the few guides to the state's flora which have been published and while not comprehensive it will fill a gap in information sources. Mohr's "Plant life of Alabama" (1901), while more scientific in treatment, is not of much use as a guide, lacking as it does keys and almost all descriptions. Also of course it is much out of date and a large proportion of the epithets used have been changed in accordance with the international rules. The 1973 book while lacking keys does provide illustrations sufficiently realistic to allow ready identification of many species.

G M H

"RHODORA, INDEX TO VOLUMES 51-75 (1949-1973)," by E. Rouleau (Compiler). New England Botanical Club, Botanical Museum, Cambridge, Mass. 02138. vii + 287 pp.; 1976. Price: \$10.00.

This collective index to "Rhodora: Journal of the New England Botanical Club" supplements another multivolume index, similar in format, an index to volumes 1 (1899) to 50 (1948) of the journal (the latter is still available; cost \$20.00). There are two indexes in each compilation: the first to taxa cited (mostly fam. and gen.) and the second a combined author and title index, the title entry being based on key words. Bold-face type is used to indicate newly described taxa or taxa with a new status. Bibliographic citations are most complete under the author name. Entries under the key word (of title) are skeletonized. Author entries are complete even up to citation of figures, etc. Where there is more than one author, the article is cited under each author. This compilation should be very useful to the botanist and especially to the taxonomist, since it covers a very active period in the botanical sphere.

GMH

"AN ANNOTATED CATALOGUE OF THE VASCULAR PLANTS OF WEST PAKISTAN AND KASHMIR," by R.R. Stewart. Flora of West Pakistan (Nasir and Ali). viii + xviii + 1028 pp., 1 map, 1 portr.; 1972.

This is the first flora of West Pakistan (now Pakistan), although Hooker's Flora of British India (1872-1906) included this area of Asia. The author estimates the number of taxa of the area at ca. 6,000. Included are 4492 taxa of dicots, ca. 1140 monocots, 128 pteridophytes, and 23 gymnosperms. This work represents the fruition of nearly 50 years of collecting by the author in nearly all parts of the area, while he was Principal at Gordon College, Rawalpindi. This catalog includes only nomenclatural information and collecting information, sometimes with mentions of use, ecology, etc. There are no keys. Besides the systematic portion, there is an interesting introduction, and following the text useful compilations of authorities, collectors (often with vital data), variant spellings, abbreviations, and the comprehensive index of genera and spp. There are several new combinations, including: Thelypteris laterrepens (Trotter et Rope) (Polypodium l.); T. subpubescens (Blume) (Aspidium s.); Plecoptis loriformis var. steniste (Clarke) (Polypodium lineare var. s.); Digitaria adscendens subsp. chrysolephara (Fig. et de. Not.) (D.c.), and others.

GMH

"WILD TEAS, COFFES, AND CORDIALS," by Hilary Stewart. 130 pp., 61 figs. Univ. Washington Press, Seattle, Wash. 98105 (also Douglas & McIntyre, Vancouver, B. C., Canada). 1981. \$7.95 (paper)

In this attractive book, fifty wild-growing beverage plants of the Pacific Northwest are each given two pages of coverage - one page for text opposite a drawing of the plant and its parts. Several introductory pages give the elements of collecting and preparing the plant, along with instructions on making teas (steeping, simmering, serving) and coffees (roasting, brewing, serving), and other drinks. For each plant, the author gives the botanical and common names, habitat, season, preparation of the beverage, and interesting facts about the plant under the entry "Did you know..." The text is well written and easy to read. Many of the plants are widely distributed so that this text should be as useful in one part of the continent as another. In a day when we are constantly reminded not to use or overuse caffeine beverages, this should give many an opportunity to utilize non-caffeine beverages in the home.

GMH

"COMPENDIUM OF ELM DISEASES," by R. J. Stipes and R. J. Campana (Editors) vii + 1-98, 106 figs., 200 col. pls., 8 tabs. The American Phytopathological Society, St. Paul, Minnesota 55121. 1981. \$11.00.

Another in the excellent series of monographs on plant diseases, this has been written by 29 specialists in plant pathology, including the two editors. The text is divided into (1) Introduction, discussing generalities of the plants and their diseases; (2) biotic diseases (wilts, cankers, root rot, nematodes, etc.); (3) abiotic diseases (nutrient deficiencies, chemical toxicity, mechanical damage, etc.); and (3) other agents affecting *Ulmus* species, such as mycorrhizae, insects, etc. There are four useful appendices, a glossary, and the index.

GMH

"THE STAMP COLLECTOR'S ENCYCLOPEDIA," by R. J. Sutton. Ed. 6. 365 pp., many figs. Arco Publishing Company, Inc., 219 Park Ave. South, New York 10003. 1975. \$1.95.

This paperback volume proved to be a reprint of the work of the same title published as a hardback by the Philosophical Library of New York, with the exception that the last five pages had been deleted. (Since these dealt with currencies and equivalent values now mostly out of date, this may be just as well). The work is international in scope and covers postage stamps issued from the beginning (1840) and is of real value to the philatelist. Besides brief notes on each country issuing stamps, there are definitions of many philatelic terms. However, it would take a great deal larger book to cover the subject thoroughly. Some suggestions are in order. Definitions of many color terms might well have been included. Nothing is said about poster stamps. Many terms appearing on the postal papers of various countries (such as Italy, Russia, Ukraine, Turkey) might have been listed and defined. Definitions of coinage units would have been useful: thus mil(1)s (Egypt, Cyprus, Libya, Sudan, Tunisia (millièmes)). Several important abbreviations which were not found are: SASE

(self addressed stamped envelope); LAR (Libyan Arab Republic); FDC (first day cover). Belize = British Honduras. A cross reference to FECTP is not completed (p. 243).

GMH

ERRATA AND EMENDATA of previous reviews in PHYTOLOGIA

- Vol. 37 (2) 155; 1977. Title should be DESMIDIALES not Dessidiales (Prescott et al.)
- Vol. 46 (4): 277; 1980. "Flora of Canyonlands" by S. L. Walsh, was published by Brigham Young University, Provo, Utah.
- Vol. 47 (6): 484; 1981. Hagers Handbuch der Pharmazie, edited by List and Hoerhammer. The publisher was Springer-Verlag Berlin - Heidelberg - New York.
- Do. p. 487. "The color dictionary of flowers and plants..." by Hay and Syngé. The publisher was Crown Publishers, Inc., New York, N. Y.
- Do. p. 488. "Dobutamin..." The editor was H. Just. (Publ. Springer-Verlag Berlin - Heidelberg - New York).
- Vol. 48 (2): 202; 1981. "Botanists of the Eucalypts" by Norman Hall, is available in the USA from International Scholarly Book Services, Inc., POB 555, Forest Grove, Oregon 97116.

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 "The economic botany of the Paulownias," by Shiu-Ying Hu. -  
 Econ. Bot. 15: 11-27; 1961.

Characteristics of six species of Paulownia (Scrophulariaceae) are discussed, together with a key for identification. The many uses, mostly in China, are discussed in considerable detail: the wood is especially useful, however the trees are among the most attractive ornamental trees of the world. The plant also furnishes medicinal materials which have been quite popular in China, particularly to stimulate hair growth and for turning gray hair dark. If the latter uses were provable, it would seem there would be a great demand for the leaves and capsules which are used for this purpose.

GMH

# PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

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Vol. 51

July 1982

No. 4

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Published by Harold N. Moldenke and Alma L. Moldenke

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STUDIES ON MIKANIA (COMPOSITAE)-VIII

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and

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Continued studies on *Mikania* (Compositae-Eupatorieae) have resulted in the following new species and notes on the distribution or synonymy of others.

*MIKANIA CERCIFOLIA* Holmes, sp. nov.

Suffrutex volubilis; foliis cordiformis, acutis, 2-3 cm longis, 2-3 cm latis, reticulatis, quinquenervis, marginibus denticulatis; corymbosis 2.5-3 cm longis et 3 cm latis; capitulis 11 mm longis; corollis 6 mm longis, dentibus limbi lanceolatis, ca 2 mm longis; achaenis ca 4.5 mm longis; pappi seti ca 80, 5-5.5 mm longis, scabridis.

Suffrutescent liana; stems twisted, glabrous, often crisped-puberulent on younger parts, greenish to purplish, 4-angled, the angles lightly winged to ribbed; internodes 3-9 cm long. Leaves opposite, semi-coriaceous, broadly cordiform, 2-3 cm long and 2-3 cm wide, apices acute, margins ciliate and denticulate, the teeth 5-7 mm apart, basal sinus open, 5-nervate from the base, upper surfaces green, glandular, prominently reticulate, the veinlets exerted from the surface, lower surfaces purplish, somewhat glandular and obscurely puberulent, the major nerves whitish, the veinlets reticulated, exerted from the surface, but less prominent than above; petioles 1-1.5 cm long, 4-angled, sparingly to moderately setose, somewhat grooved above, the opposite petioles connate by a stipule-like ridge ca 5-7 mm long, 1-1.5 mm wide, margins entire to incised. Capitulescence a terminal and lateral corymb, 2.5-3 cm high, 5 cm in diameter, branching trichotomously, the heads disposed in clusters of 3's at the tips of the branchlets; branchlets 4-angled, puberulent, glandular; bracts ovate to subrhombic, 5-10 mm long, apices acute to rounded, margins denticulate, ciliate, bases truncate to cuneate; pedicels 0.5-3 mm long, angular, puberulent, glandular, the center pedicel usually ca one-half the length of the outer two. Heads ca 11 mm long; exterior bracts ovate to obovate, ca 7 mm long, apices obtuse, margins ciliate, surfaces reticulate, bases acute to cuneate, those of the outer pair of heads borne near the summit of the pedicel, the center one borne near the base. Phyllaries elliptic-oblong, 7-7.5 mm long, the outer pair puberulent, the inner glabrous, apices acute, setose. Corollas ca 6 mm long,

tube narrow, ca 3.7 mm long, throat abruptly expanded, ca 0.3 mm long, teeth lanceolate, ca 2 mm long, the veins submarginal. Achenes ca 4.5 mm long, pale to light green, puberulent toward the summit. Pappus bristles ca 5-5.5 mm long, ca 80, slightly buff (in age after drying), gradually thinning toward the apices, margins scabrid (Fig. 1).

Holotype: BOLIVIA: Gran Poder, small gold mine ca 40 km N of Sorata, in narrow wooded valley below Tacacoma (long. 68-30 W, lat. 15-30 S), damp shady slope, alt. ca 3000 m, 4 Jun 1950, Brooke 6442 (BM).

*Mikania cercifolia* is distinctive in possessing 4-angled stems and opposite leaves that are connate by a stipule-like ridge. The cordiform leaves are fairly uniform in size, normally 2-3 cm long and wide, and have denticulate margins and prominently reticulate surfaces. The trichotomously branching corymb has heads ultimately disposed in groups of threes, the center head borne on a pedicel that is about one-half the length of the pedicels of the outer pair. The corolla is characterized by a narrow tube, very short and abruptly expanded throat, and lanceolate teeth about 5-6x the length of the throat. Veins of the teeth are submarginal.

The new species appears related to *Mikania fiebrigii* Hieron., known only from Bolivia. That species has terete stems, larger leaves that are prominently incised-dentate, much larger stipule-like enations, linear exterior bract, and corolla with the throat being slightly longer than the teeth.

The species is named after its leaves, much resembling those of *Cercis canadensis* L.

Paratype: BOLIVIA: Cochabamba, near Cervecería Colon, Quebrada Colon, 20 km E of Cochabamba, on riverbank in tangled tall Compositae, *Salvia*, *Datura*, *Cleome*, etc., perennial herb, procumbent, rays dark brown, 14 Mar 1939, Eyerdam 24771 (GH, UC).

MIKANIA STENOPHYLLA Holmes, sp. nov.

Suffrutex volubilis; foliis anguste hastiformis, attenuatis, 3-5 cm longis, 0.6-2.5 cm latis; corymbosis 1-3 cm longis, 1-3 cm latis; capitulis ca 5 mm longis; corollis 3-3.3 mm longis, dentibus limbi ovatis, 0.5-0.6 mm longis; achaenis ca 1.5 mm longis; pappi setis 35-40, ca 3.3 mm longis, scaberulis.

Slender twiner; stems terete to obscurely angled, 1-2 mm in diameter, glabrate to finely puberulent; internodes 8-18 cm long. Leaves opposite, narrowly hastiform, 3-5 cm long, 0.6- 2.5 mm wide, apices acuminate, margins subentire to denticulate to remotely serrate, basal lobes acute, to ca 8 mm long, bases subcuneate at point of insertion of the petiole, palmately 5-nervate, above glabrate to puberulent, veinlets obscure, below puberulent, glandular; petiole thin, 1.5-3.5 cm long, sulcate (after drying), puberulent, opposite petioles connected by a lacerate stipule-like enation, ca as wide as the stem, the lobes ca 0.8 mm long, apparently deciduous from the lower nodes. Capitulescence a corymb, terminal and axillary, 1-3 cm high, 1-3 cm wide; branchlets sulcate, puberulent; bracts linear, to ca 1.3 cm long, puberulent. Heads ca 5 mm long; exterior bract linear to lanceolate, ca 2 mm long, appressed

puberulent, apices acuminate. Phyllaries lanceolate-elliptic, ca 3.3 mm long, appressed puberulent, 1-3 nervate, apices acuminate. Corollas cream to white, 3-3.3 mm long, tube 1.3-1.5 mm long, throat funnelliform, 1-1.2 mm long, teeth ovate, glandular, 0.5-0.6 mm long; stigmatic surfaces hirsute. Achenes dark brown, ca 1.5 mm long, glandular. Pappus bristles ca 3.3 mm long, ca 35-40, white (Fig. 2).

Holotype: BRASIL: Mato Grosso, Porto XV (mun. Bataguacu), brejo ao Rio Parana, 31 Aug 1973, Hatschbach 32528 (MBM, holotype, NATC, isotype).

The new species has close affinities with the *Mikania scandens* (L.) Willd. complex, a group of small headed slender twiners with hastate to cordate to saggitate leaf bases and corymbose capitulescences. Apparently nearest to *Mikania periplocifolia* H. & A. of southern South America, a species with a much denser capitulescence, approaching a glomerule, considerably wider leaves, and phyllaries with rounded apices.

*Mikania ypacarayensis* Holmes and McDaniel, also of southern South America, is another species of this complex that is similar to the new species. It is distinguished by its densely pubescent stems, wider leaves, much larger capitulescence, and achenes with upwardly scabrid angles.

Paratype: BRASIL: Mato Grosso, Col. Paxixi (mun. Aquidauana, 19 Feb 1970, Hatschbach 23818 (MBM, NATC).

MIKANIA LINDLEYANA DC. Prodr. 5:195. 1836. Type: GUIANA (CGE, not seen; Fig. 3).

*Mikania lindleyana* is a species distributed over much of northern South America. Robinson (1928) first reported this species in Panama, based on the specimen cited below. I have compared this specimen with plants from South America and agree with Robinson's determination. This species was not included in King & Robinson's (1975) treatment of the genus for the "Flora of Panama."

Specimen examined: PANAMA: Frijoli Station of the Panama Railroad, climbing high on trees in wet woods, 6 Feb 1862, Hayes 490 (BM).

MIKANIA GONZALEZII B.L.Robins. and Greenm., Proc. Boston Soc. Nat. Hist. 29:107. 1899. Syntypes: MEXICO: Vera Cruz, Colonia Melchor Ocampo, 1200 m, 8 Dec 1895, Conzatti 18 (GH); Vera Cruz, Canton de Cordoba, 27 Dec 1897, Conzatti and Gonzalez 637, in part (GH?).

*Mikania gonzalezii* rather closely resembles *M. cordifolia* (L. f.) Willd., but has somewhat larger heads, flattish (uncrisped) corolla teeth, broader and blunter phyllaries, and less prominently angled stems. Robinson (1928) reported the occurrence of the species in Colombia (Killip and Smith 19469 (GH)). The range of this plant may now be extended into Panama, and is expected to be found throughout much of Central America. This, with the preceding species and *M. cristata* B.L.Robins. (Holmes & McDaniel, 1979), numbers the *Mikania* known from Panama at 18.

Specimen examined: PANAMA: Chiriqui, Palo Santo, 3 mi N Volcan, 19 Feb 1971, Croat 13579 (LL; King & Robinson (1975) cite Croat 13579 (MO) as *M. cordifolia*, but I have not examined that specimen.)

MIKANIA CONGESTA DC., Prodr. 5:197. 1836. Type: PUERTO RICO: Bertero s.n. (G-DC).

Mikania congesta is distributed from Puerto Rico and the Lesser Antilles through northern South America to Brasil, Bolivia, and Peru. Adams (1972) did not include this species in the flora of Jamaica. However, the plant was reported in Jamaica by Moore (1928). I have examined the specimen cited by him and confirm his determination. The species somewhat closely resembles M. micrantha HBK., but the capitulescence is glomerate rather than corymbose. The exterior bract is also the same length or longer than the involucre, while in M. micrantha, the bract is ca one-half the length of the involucre.

Specimen examined: JAMAICA: without exact location, Masson s.n. (BM).

WILLOUGHBYA LUZONIENSIS Merrill, Philipp. Journ. Sci. 4: 320. 1909.

Willoughbya is a synonym of Mikania. The plant described by Merrill is certainly not a Mikania. His description calls for a plant with an ovoid or ovoid-elliptical berry, ca 2.5 cm long and 2 cm in diameter, among other differences. The description appears to refer to the genus Willughbeia Roxb. (Apocynaceae), Pl. Corom. 3: 77. t. 280. Feb-Mar 1820.

I wish to thank Gert Hatschbach of the Museu Botanico Municipal, Curitiba, Parana, Brasil, for some of the specimens used in this study. Also to Chris Wells of Mississippi State University for the use of his computer-word processor used to type this manuscript. Appreciation is extended to the herbaria cited for their loan of specimens.

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- Moore, S. 1928. Notes on Jamaican plants. Journ. Bot. 66: 165-166 (Mikania).
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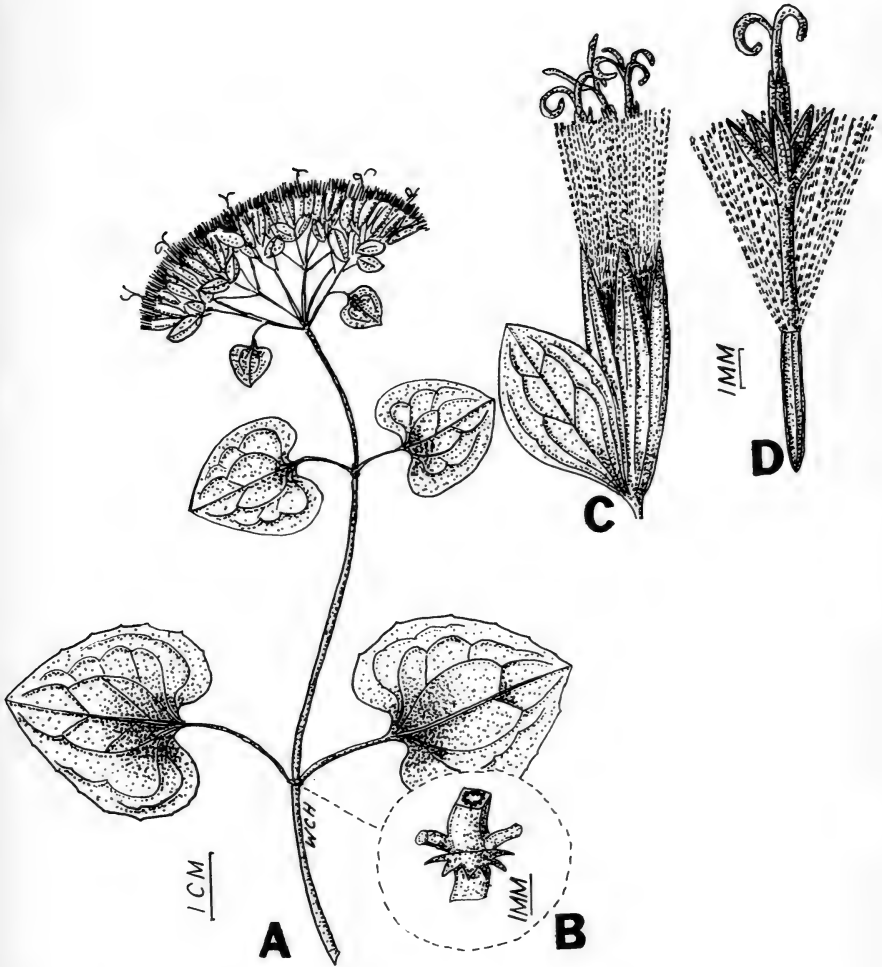


Fig. 1. *Mikania cercifolia* Holmes. A. habit. B. node and stem. C. head. D. flower. (After Brooke 6442 (BM)).

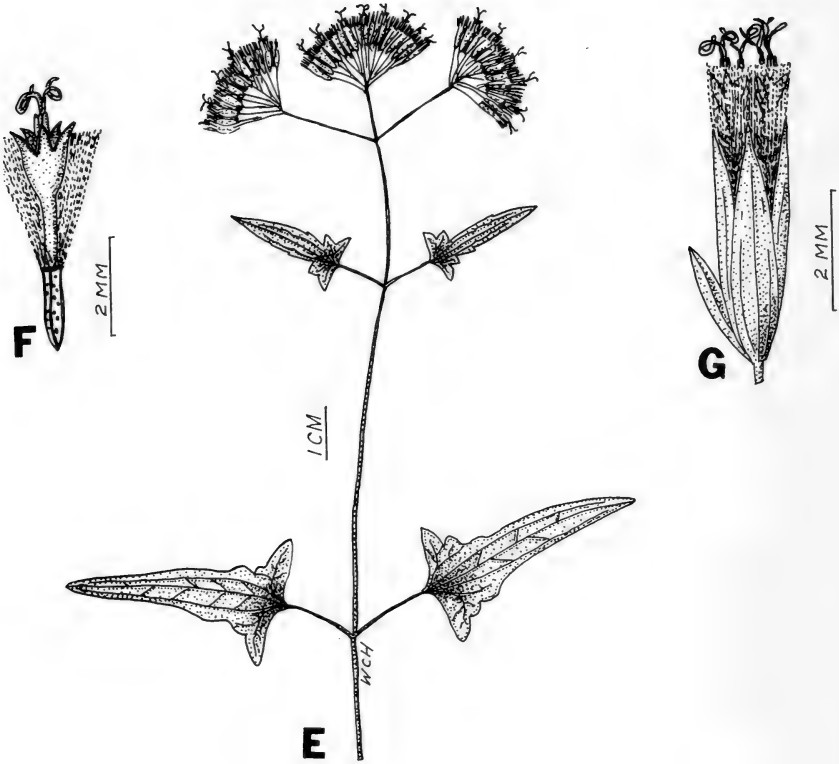


Fig. 2. *Mikania stenofolia* Holmes. E. habit. F. flower. G. Head. (After Hatschbach 32528 (NATC)).

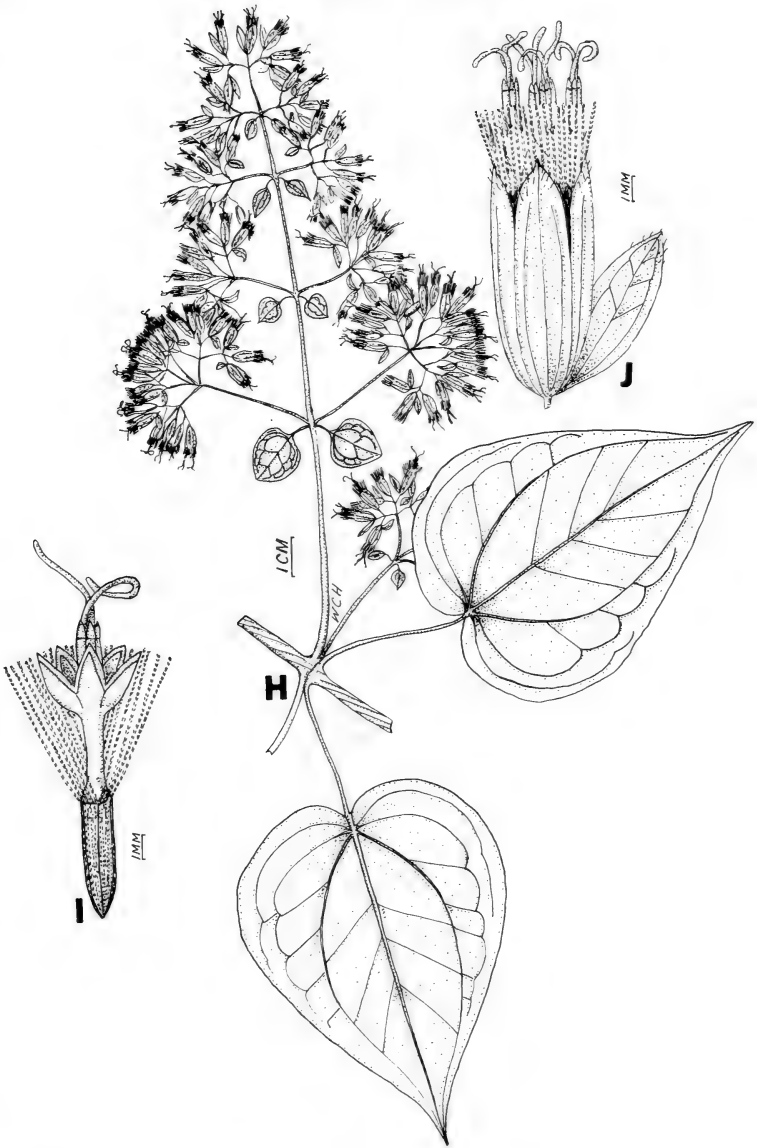


Fig. 3. Mikania lindleyana DC. H. habit. I. flower. J. Head.  
(After Hayes 490 (BM).

COMBINATIONS IN LYCOPERSICON (SOLANACEAE)

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LYCOPERSICON PENNELLII (Correll) D'Arcy, comb. nov.

Solanum pennellii Correll, Madrono 14: 233, fig. 1 (B). 1958

TYPE: Peru, Lima, Quive, 800-1000 m, Pennell 14304 (PH).

LYCOPERSICON PENNELLII var PUBERULUM (Correll) D'Arcy, comb.

nov. Solanum pennellii var puberulum Correll, Wrightia 2:  
197. 1961.

TYPE: Peru, Ica, between Nazca and Palpa, 500-600 m,  
Ferreya 14028, not seen.

This species was used to typify Solanum sect. Neolycopersicon Correll, Potato & Wild Rel. 39. 1962., and that section should now be known as Lycopersicon sect. Neolycopersicon.

This species differs conspicuously from other members of Lycopersicon in having anthers with terminal pores, a character which hitherto has been used to diagnose Lycopersicon as distinct from Solanum. However, increasing evidence justifies its consideration as a solid member of Lycopersicon and not of Solanum, even though it has been artificially placed in that group. Evidence from crossing relationships, isoenzyme data, (Rick 1979) and chloroplast DNA (Palmer & Zamir 1982) support its placement in Lycopersicon.

Judging from this data, it seems unlikely that Lycopersicon pennellii is a direct connecting link between Solanum and Lycopersicon, even though it expresses a number of characters which appear to bridge the two groups.

The argument as to whether Lycopersicon as a whole should be considered part of Solanum as was the practice a few generations ago has been answered by Rick (1976), and most workers familiar with a broad range elements in both groups consider Lycopersicon to be a distinct genus.

Palmer, J. D. & D. Zamir 1982. Chloroplast DNA evolution and phylogenetic relationships in Lycopersicon. Proc. Nat. Acad. Sci. (in press).

Rick, C.M. 1979. Biosystematic studies in Lycopersicon and closely related Solanum species. pp. 667-677 in J. G. Hawkes et al. The Biology and taxonomy of the Solanaceae. Academic Press, London.



SIGNIFICANT COLLECTIONS OF LOUISIANA PLANTS  
IX. TENSAS PARISH

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A survey and study of the vascular plants of Tensas Parish, Louisiana was made from November, 1979 through October, 1981 (Briley 1981). During this study specimens of 113 families, 388 genera and 723 species or subspecific taxa were collected or found to be on deposit in other Louisiana herbaria.

Tensas Parish is located along the Mississippi River in northeast Louisiana. It was originally covered with a forest of bottomland hardwoods. Most of the area is now cleared and its mostly clay soils are used to cultivate cotton and soybeans. Because of the uniform, mostly level, topography and mostly clay soils, a rich variety of habitats for plants does not occur in the parish. However, several plants that are rare in northeast Louisiana were found.

Tridens albescens (Vasey) Woot. and Standl. was collected along the roadside of La. 608 near Winter Quarters Commemorative Area (Briley 2861). This specimen was determined by Charles M. Allen and was not known from Louisiana when his book on the Louisiana grasses was published (Allen 1980). (Dr. Allen's kind help with the determination of the grasses for this and at least twenty other thesis projects is most gratefully acknowledged.) The authors later searched the roadbanks of the area and could find no more specimens.

Several populations of Melanthera hastata Michx. were located in the parish. Although this composite had already been collected in Tensas Parish (Parks 1973), it is rare in Louisiana and is known only from Tensas, Iberia, Rapides, and West Feliciana Parishes.

Other uncommon or rare plants for Tensas Parish include: Arenaria lanuginosa, Ceratophyllum echinatum, Cissus incisa, Conyza bonariensis, Conyza ramosissima, Crotalaria spectabilis, Cyrtomium fortunei, Glyceria arkansana, Hackelia virginiana, Helianthus grosse-serratus, Laportea canadensis, Lathyrus aphaca, Leonotis nepetaefolia, Lithospermum tuberosum, Malachra capitata, Pentodon pentandrus and Scutellaria lateriflora.

Two sandy areas occur in Tensas Parish and several plants included in the parish's flora are known only from these areas of deep sand. Several sandy spots occur between the Mississippi River Levee and the

river. Eragrostis barelieri occurs in this habit and was recently reported new to Louisiana (Allen 1981). One area located between Lake Bruin and the Mississippi River Levee consists of a field with very deep sand. Plants occurring in this sandy area are unusual for Tensas Parish and include: Aristida oligantha, Cenchrus incertus, Cycoloma atriplicifolium, Diodia teres, Facelis retusa, Gnaphalium obtusifolium, Krigia virginica, Linaria texana, Paspalum setaceum, Quercus minima, Smilax auriculata, Sporobolus pyramidatus and Trifolium arvense.

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SIGNIFICANT COLLECTIONS OF LOUISIANA PLANTS  
X. FRANKLIN PARISH.

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A survey and study of the vascular plants of Franklin Parish, Louisiana was made from February, 1981 through March, 1982 (Joye 1982). During this study specimens of 123 families, 422 genera and 811 species or subspecific taxa were collected or found to be on deposit in other Louisiana herbaria.

Franklin Parish is located in the agricultural area of northeast Louisiana. Most of the land is now cleared and is being used to cultivate cotton and soybeans. The soils are mostly clay although large areas of sandy soils occur along Bayou Macon. Several good habitats for plants occur in the parish. One small wooded area near Gilbert and Wisner has a large population of Trillium ludovicianum and Tilia caroliniana. A prairie area south of Liddieville is covered with grasses, sedges and Crataegus and also has Buchnera floridana, Neptunia pubescens and Vicia tetrasperma. The most unusual habitat is a small wooded area near Bayou Macon that still has several large old Liriodendron tulipifera trees. The vegetation in this area resembles that of the western and central hilly areas of the state. Phlox divaricata, Mitchella repens, Botrychium virginianum, and Ophioglossum vulgatum are common in this woods.

Other uncommon plants collected from Franklin Parish include: Acalypha setosa, Aeschynomene indica, Ammoselinum butleri, Cinna arundinacea, Crotalaria spectabilis, Dactyloctenium aegyptum, Erigeron pulchellus, Evolvulus sericeus, Glinus radiatus, Glyceria arkansana, Hedyotis rosea, Hottonia inflata, Leonotis nepetaefolia, Listera australis, Lysimachia lanceolata, Malachra capitata, Matricaria matricarioides, Ranunculus marginatus, Ranunculus trilobus, Trifolium arvense, Trifolium vesiculosum, and Woodsia obtusa.

LITERATURE CITED

- Joye, Gary Fisher. 1982. A preliminary survey of the vascular flora of Franklin Parish, Louisiana. Unpublished Masters of Science Thesis, Northeast Louisiana University, Monroe. 94 pp.

NOTES ON NEW AND NOTEWORTHY PLANTS. CLVIII

Harold N. Moldenke

*DURANTA SPRUCEI* var. *COTOPAXIENSIS* Mold., var. nov.

Haec varietas a forma typica speciei recedit corollis albis fructibus maturis rubris.

This variety differs from the typical form of the species in having white corollas and red mature fruits.

The variety is based on *Dodson & Gentry 12205* from along a riverbank at Tenefuerste on the Río Pilao, km. 52--53, Quevado to Latacunga, at 750--1300 m. altitude, Cotopaxi, Ecuador, collected on February 7, 1982, and deposited in the Lundell Herbarium at the University of Texas.

*LANTANA ARMATA* var. *GUIANENSIS* Mold., var. nov.

Haec varietas a forma typica speciei inflorescentiis maturitate elongato-spiciformibus recedit.

This variety differs from the typical form of the species in having its inflorescences elongate at maturity in spike-like fashion, similar to what is seen in *L. trifolia* L., the spikes attaining a length of about 2 cm.

The variety is based on *R. Schnell 11475* from near Grand Santi, Bonville village, French Guiana, collected on August 26, 1961, and deposited in the Britton Herbarium at the New York Botanical Garden.

*PAEPALANTHUS LEUCOCYANEUS* f. *EGLERI* Mold., f. nov.

Haec forma a forma typica speciei vaginis laxe villosis recedit.

This form differs from the typical form of the species in having its sheaths loosely villous with wide-spreading, weak, twisted hairs.

The species is based on *Irwin, Eglér, & Murça Pires 47133* from wet places among rocks at Cachoeira Grande Roche on the Rio Oiapoque, Amapá, Brazil, locally common, 3°48' N., 51°53' W., and is deposited in the Britton Herbarium at the New York Botanical Garden. It is named in honor of Walter Alberto Eglér, one of its collectors who was extremely kind and helpful to my wife and myself on our visit to Brazil in 1948.

*PAEPALANTHUS PULCHELLUS* var. *PUBERULENTUS* Mold., var. nov.

Haec varietas a forma typica speciei vaginis densissime puberulentis recedit.

This variety differs from the typical form of the species in having the sheaths very densely puberulent but not at all hispid.

The variety is based on *Hatschbach 43162* from arredores in brejo at Campo Alegre do Goiás, Goiás, Brazil, collected on August 16, 1980, and deposited in the Lundell Herbarium at the

University of Texas.

*SYNGONANTHUS CAULESCENS* f. *LONGIFOLIUS* Mold., f. nov.

Haec forma a forma typica speciei foliis caulibus usque ad 5.5 vel 6 cm. longis recedit.

This form differs from the typical form of the species in having its stem leaves 5.5--6 cm. in length.

The form is based on *G. Cremers* 4833 from along a drainage canal on the Toulouse Savanna on the road to Tour de l'Ile, southeast of Cayenne, French Guiana, collected on July 4, 1977, and deposited in the Herbarium du Centre Orstom in Cayenne.

*SYNGONANTHUS HUMBOLDTII* var. *SIMPLEX* Mold., var. nov.

Haec varietas a forma typica speciei caulibus simplicibus non-interruptis recedit.

This variety differs from the typical form of the species in having its aerial stems simple, without the whorl of leaves at about the mid-point as seen in the typical form.

The variety is based on *Martinelli* 6895 from "afloramentos areniticos, campinas inundavais da margem do Rio Jaramacaru", at 70 m. altitude, Campo do Ariramba, Para, Brazil, collected on June 8, 1980, and deposited in the Britton Herbarium at the New York Botanical Garden. The collector describes the plant as "Palustre, heliofila, frequente; folhas concolores; infl. verde; capitulos alvos."

*SYNGONANTHUS COWANI* var. *SIMPLEX* Mold., var. nov.

Haec varietas a forma typica speciei caulibus simplicibus recedit.

This variety differs from the typical form of the species in having its erect aerial stems simple, not interrupted by any whorl of leaves before the terminal whorl is reached.

It is based on *Otto Huber* 5096, "sabana en la ribera derecha (N) del Rio Guayapo medio", Dept. Atures, Amazonas, Venezuela, collected on March 9, 1980, and deposited in the Lundell Herbarium at the University of Texas. The collector describes the plant as an "Hierba baja cerca del borde del bosque, poco frecuente. Cabezuelas blancas."

*SYNGONANTHUS DUIDAE* var. *LONGIFOLIUS* Mold., var. nov.

Haec varietas a forma typica speciei foliis usque ad 3 cm. longis.

This variety differs from the typical form of the species in having its leaves to about 3 cm. in length.

It is based on *Koyama & Agostini* 7515 from wet shallow soil and moss on rocks along river margins, local and infrequent, with sedges, upstream on Rio Pulpul above Salto Pulpul at the southern foot of the peaks of Uaipun-tepul, at 1200 m. altitude, Bolivar, Venezuela, collected on March 6, 1967, and deposited in the Britton Herbarium at the New York Botanical Garden.

ADDITIONAL NOTES ON THE GENUS *VITEX*. XXXIV

Harold N. Moldenke

*VITEX* Tourn.

Additional synonymy: *Viticipremna* J. J. Lam, Verbenac. Malay. Arch. 162. 1919.

Additional & emended bibliography: Seem., Journ. Bot. Lond. 3: 258. 1865; Seem., Fl. Vit. 189--191. 1866; Drake del Castillo, Fl. Polynés. Franç. 150--152. 1893; Hemsl., Journ. Linn. Soc. Lond. Bot. 30: 187 & 206. 1894; Burkill, Journ. Linn. Soc. Lond. Bot. 35: 50. 1901; Ebert, Beitr. Kennt. Chin. Arzneis. 84--85. 1907; E. D. Merr., Philip. Journ. Sci. Bot. 3: 432. 1908; Pulle in Lorentz, Nova Guinea, ser. 1, 8 (1): 401 (1911) and ser. 1, 8 (2): 685. 1914; Stehle, Fl. Guad. 4: 103. 1943; Yuncker, B. P. Bishop Mus. Bull. 220: 232. 1959; Lord, Trees Shrubs Austr. Gard., ed. 5, xx, 97, 232, & 321. 1978; Rzedowski, Veget. Mex. 171, 176, 186, 187, 231, & 356. 1978; Salmon, Nat. Trees N. Zeal., imp. 1, 342 & [343], fig. 1--9 (1980) and imp. 2, 342 & [343], fig. 1--9. 1981; Buck & al., Bull. Torrey Bot. Club 109: 106. 1982; Mold., Phytologia 51: 212--218. 1982.

Sirait and his associates (1962) assert that plants of this genus possess hormone-like properties.

*VITEX AGNUS-CASTUS* L.

Additional & emended bibliography: Lindl., Veget. Kingd., ed. 1, 664 (1846), ed. 2, 664 (1847), and ed. 3, 664. 1853; Stehlé, Fl. Guad. 4: 103. 1943; Lord, Trees Shrubs Austr. Gard., ed. 5, 321. 1978; Mold., Phytologia 51: 213--215. 1982.

In the Dominican Republic this plant is known as "pimiento de Guinea". Lord (1978) calls it the "lilac chaste-tree", describing it as 6--10 feet tall, with lilac-colored corollas, and comments that it is "An uncommon shrub in this country [Australia], but valued abroad for its late summer flowers and aromatic fragrance which pervades the whole plant. The greyish compound leaves consist of 5--7 leaflets, the terminal one being much longer. The dense lilac flowers are in large upright sprays, and are improved by hard pruning in early spring. In Melbourne [it] blooms [from] January to March and is very lovely."

Additional citations: NORTH CAROLINA: Rockingham Co.: Leonard & Russ 2562 (M). CULTIVATED: Bahama Islands: Fairchild 2573 (W--1556600). Dominican Republic: Ekman H.15916 (W--1555160); Liogier & Liogier 25669 (N). Guadeloupe: Stehlé 1853 (W--1713197).

*VITEX AGNUS-CASTUS* f. *CAERULEA* (Rehd.) Mold.

Additional bibliography: Mold., Phytologia 51: 214. 1982.

Sargent reports that this plant in Puerto Rico is "said to have medicinal properties."

Additional citations: CULTIVATED: Puerto Rico: F. H. Sargent 607 (W--1781018).

*VITEX CLEMENTIS* Britton & P. Wils.

Additional bibliography: Mold., *Phytologia* 48: 453--454. 1981.

Additional citations: CUBA: Oriente: *Clemente* 6520 (W--2288934).

*VITEX COCHINCHINENSIS* Dop

Additional bibliography: Mold., *Phytologia* 51: 218. 1982.

Leaflet blades tomentose beneath, the terminal one 7--9 cm. long and 3--4 cm. wide, on a petiolule 4--5 mm. long, the lateral ones smaller, subsessile; secondaries 12--14, at first straight, later recurving; veinlet reticulation inconspicuous; panicles formed of continuous spikes, sometimes interrupted, fulvous-pubescent, the cymes many-flowered, glomerulose, tomentose, on peduncles 1--3 mm. long; bracts numerous, linear, firm, 1 cm. long, tomentose; bractlets numerous, firm, equaling the flowers; flowers subsessile, 5--6 mm. long; calyx campanulate, 3 mm. long, externally white-tomentose, the limb 5-lobed, the lobes deltoid, apically acute, equaling the tube, one smaller or absent; corolla infundibular, externally yellow-pubescent and conspicuously glandulose, internally glabrous except for the stamen insertion, the tube 2.5 mm. long, the limb 2-lipped, the upper lip 2-lobed, the lobes deltoid and apically acute, the lower lip 3-lobed, the middle lobe larger and apically rounded; stamens slightly exerted; filaments basally white-villous; style equaling the stamens; stigma 2-fid; drupes globular, 6--7 mm. in diameter, basally included by the fruiting-calyx and bractlets.

The species is based on an unnumbered Baudouin collection from somewhere in Cochinchina, on *Lefevre* 233 from Plaine des Tombeaux, *Thorel* 1114 from Saigon, and *Lecomte & Finet* 1867 & 1962 and *Pierre* 5228 from Thu Duc, Cochinchina, with no specific type designated. Dop (1928) comments that "Cette espèce se distingue nettement de tous les autres *Vitex* indochinois par ses inflorescences en épis souvent continus, de cymes, contractées, gloméruleuses. Par beaucoup de points elle se rapproche de la diagnose du *V. spicata* Loureiro (Flora Cochinchinensis, p. 390). Mais il y a entre la diagnose de Loureiro et mon espèce des différences qui ne permettent pas d'affirmer d'une façon absolue que la plante de Cochinchine est le *V. spicata* de Loureiro. En effet, la plante de Loureiro est décrite comme ayant généralement les feuilles 5-foliolées, alors que dans les nombreux échantillons de *V. cochinchinensis* que j'ai vus, je n'ai compté constamment que 3-folioles. En outre, ces folioles sont dans mon espèce ovales et entières, alors que Loureiro les décrit lanceolées et généralement crénelées. L'inflorescence correspond assez dans les deux descriptions, si l'on traduit le mot involucelli de Loureiro par bractées et bractéoles. Il n'y a donc aucune certitude à rapporter *V. cochinchinensis* au *V. spicata* Loureiro." Incidentally, Loureiro's binomial is now regarded as a synonym of *Vitex negundo* L.

*VITEX COFASSUS* Reinw.

Additional & emended bibliography: Fern.-Villar in Blanco, Fl. Filip., ed. 3, Nov. App. 160. 1880; Pulle in Lorentz, Nova

Guinea, ser. 1, 8 (2) 685. 1914; Heyne, Nutt. Plant. Ned. Ind., ed. 1, 4: 112--113. 1917; E. D. Merr., Enum. Philip. Flow. Pl. 3: 398. 1923; Heyne, Nutt. Plant. Ned. Ind., ed. 2, 1: 24 (1927) and ed. 2, 2: 1315--1316. 1927; Bakh., Journ. Arnold Arb. 16: 74--75. 1935; Mold., Phytologia 49: 166, 371, & 374. 1981.

The corollas are said to have been "mauve" on *Millar NGF.38477*.

Bakhuizen (1935) cites *Kajewski 1533 & 1843* from Bougainville, *Kajewski 2381* from Malaita, *Kajewski 2387, 2489, & 2605* from Guadalcanal, *Brass 2821* from San Cristoval, and *Brass 3154 & 3272* from Ysabel island, growing from sealevel to 1200 m. altitude, and records the vernacular names, "father", "hada", "moi-kewie", "vada", "varha", "vasa", "vatha", and "wara".

Pulle (1914) cites *Gjellerup 35 & 406* from West Irian, giving the overall distribution of the species as New Guinea and the Molucca Islands. He notes that *Gjellerup 35* "zeigt nur sehr selten die typische Artikulation des Blattstieles".

Additional citations: MOLUCCA ISLANDS: Mangole: *Herb. Neth. Ind. For. Serv. bb.29766* (Mi). NEW GUINEA: Territory of New Guinea: *Millar NGF.38477* (W--2918016). BISMARK ARCHIPELAGO: New Ireland: *Croft & Lelean LAE.65427* (W--2898845, W--2915343).

#### VITEX COMPRESSA Turcz.

Additional bibliography: Mold., Phytologia 48: 454--455 (1981) and 50: 246. 1982.

Recent collectors describe this species as a tree, 8--18 m. tall, the trunk to 10 cm. in diameter at breast height, the flower buds whitish, the corolla hairs white, the filaments light-violet, the anthers blackish, the pollen white, and the immature fruit green. They have found it growing in deciduous forests, at 5--250 m. altitude, in flower in April, May, June, and August, and in fruit in April and September. They record the vernacular name, "cenicero". The fruit is shiny when ripe and 12 mm. in diameter.

Bunting refers to the corollas as opening light-violet, deeper violet in the throat, 1.3 cm. long, the upper lobes pale-violet, the lower (larger) lobe more deep-violet, with a yellow spot at the base and cream-colored hairs, 7 mm. wide, the median lobe 4 mm. wide. On *Aristeguieta 5315* the corollas are said to have been "blue", while on *Arnoldo 2274* they were "pale-blue" and on *Haught 4159* "pale-blue with a yellow spot". *Arnoldo* comments that his *no. 2274* is "possibly another species than 2275" -- a true statement, since 2275 is *V. cymosa* Bert.

The *Bunting 7652*, distributed as *V. compressa*, actually is *V. stahelii* Mold.

Additional citations: SOUTHERN NETHERLANDS ANTILLES: Curaçao: *Arnoldo 2274* (W--2373173). COLOMBIA: Magdalena: *Haught 4159* (W--1708930). VENEZUELA: Bolívar: *Aristeguieta 5315* (W--2925968); *Liesner & González 5519* (Ld). Distrito Federal: *Steyermark & Espinoza 106876* (N). Falcón: *Bunting & Bowles 5079* (Ld). Zulia: *Bunting 5106* (Ld), *6588* (Ld), *7087* (Ld), *7173* (Ld). BRAZIL: Pará: *Cid, Ramos, Mota, & Rosas 2116* [Herb. Inst. Nac. Pesq. Amaz. 96355] (Ld, N).



*VITEX COMPRESSA* f. *ANGUSTIFOLIA* Mold.

Additional bibliography: Mold., *Phytologia* 48: 455 (1981) and 50: 246. 1982.

Recent collectors describe this plant as a tree, 10 m. tall, the leaflet-blades firmly membranous, dull-green above, pale dull-green beneath, and record the vernacular name, "aceiruno macho". They have encountered it at 50 m. altitude, in fruit in May.

Additional citations: VENEZUELA: Zulia: Steyermark, Davidse, & Stoddart 122576 (Ld).

*VITEX CYMOSA* Bert.

Additional & emended bibliography: Walp., *Repert. Bot. Syst.* 4: 86. 1845; S. Moore, *Trans. Linn. Soc. Lond. Bot.*, ser. 2, 4: 440. 1895; López-Palacios, *Fl. Venez. Verb.* 581, 582, 602--606, 627, 649, & 654, fig. 140. 1977; Mold., *Phytologia* 49: 166 & 450. 1981.

Recent collectors describe this plant as a leafy tree, 6--12 m. tall, the trunk 10--60 cm. in diameter at breast height, the flowers aromatic, and the [immature] fruit green. They have found it growing in clay soil of riverine forests, in anthesis in March and July and in fruit in September and December. The corollas are said to have been "blue" on Cid & al. 1384 and "rose" on Cid & al. 2146 & 2396.

Bunting describes the plant as a "gran árbol de copa redonda y densa; corteza oscura, fuertemente fisurada longitudinalmente y fácil de sacar pedazos; copa 12 m. o más de ancho (!); hojas jóvenes con pelos de color beige en envés y en pecíolos, hoja madura algo gruesos y quebradiza, lustrosa y verde intenso en la haz; pedúnculos morados; folíolos algo gruesos, la haz de color verde intenso ≠ lustrosa con nervios y retículo impresos, punta de color crema, el envés más claro con nervios de color crema y todos elevados y sensibles al tacto; cáliz morado-pardo con pelos grises, con lóbulos extendidos como cuello, verde oscuro-violeta; corola toda violeta, em yema abierta en base del tubo, grisáceo arriba, abierta lavanda-violeta con lobo inferior de violeta un poco más intenso, con una zona amarillenta centica hacia su base con pelos blancos, 1.7--2 x 1.4 cm. de ancho, tubo 1 cm. de largo, lobo inferior 1 cm. de ancho con zona blanca amarillento y vellosa en parte unguiculada, lóbulo céntrico inferior 9 mm. de ancho; estambres y estilo de violeta claro; filamentos matizados con violeta pálida; anteras negruzcas o pardo-negruzcas, con polen blanco; estigma de villeta oscuro; fruto ≠ ovoide o elipsoide, verde-crema y lustroso, matizado volviéndose rojo-pardo o morado, luego negro, globoso, 2.2 cm. de diámetro, volviéndose blando."

Additional citations: VENEZUELA: Trujillo: Bunting & Chacón 5049 (Ld). Zulia: Bunting 5112 (Ld, Ld), 5628 (Ld), 6219 (Ld); Bunting & Alfonza G. 7074 (Ld); Bunting & Bowles 5251 (Ld); Steyermark, Davidse, & Stoddart 123027 (Ld), 123391 (Ld). BRAZIL: Amazonas: Rodrigues & Coêlho 2728 (N). Pará: Cid, Ramos, & Mota 1384 [Herb. Inst. Nac. Pesq. Amaz. 94830] (Ld, N); Cid, Ramos,

*Mota, & Rosas 1714* [Herb. Inst. Nac. Pesq. Amaz. 95851] (N, Z), 2022 [Herb. Inst. Nac. Pesq. Amaz. 96261] (Ld, N), 2146 [Herb. Inst. Nac. Pesq. Amaz. 96385] (Ld, N), 2396 [Herb. Inst. Nac. Pesq. Amaz. 96745] (Ld, N).

*VITEX DIVARICATA* Sw.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 84. 1845; Urb., *Symb. Antil.* 7: 357--358. 1912; Mold., *Phytologia* 1: 103. 1939; J. T. & R. Kartesz, *Syn. Checklist Vasc. Fl.* 2: 468. 1980; Mold., *Phytologia* 48: 456 & 486 (1981) and 49: 373. 1981.

Bunting and his associates describe this species as a treelet, 4 m. tall, or tree, 12 m. tall, the trunk to 25 cm. in diameter at breast height, the leaves more or less shiny above, pale and more or less grayish beneath, "tallos de la inflorescencia matizados parduzcos", the calyx green, the corolla violet, the upper lobes lighter, the lower deeper in color, or "corola lavanda o blanca matizada con violeta muy clara, lóbulo grande violeta clara", with an agreeable odor, and the [immature] fruit green, very shiny, more or less obovoid. They have encountered the plant at 250 m. altitude, in flower in April and November, and in fruit in April.

Additional citations: VENEZUELA: Mérida: *Bunting 5826* (Ld). Zulia: *Bunting, Sánchez, & Alfonso G. 7401* (Ld), 7453 (Ld).

*VITEX DIVARICATA* var. *CUBENSIS* Urb.

Additional bibliography: Mold., *Phytologia* 44: 415. 1979; Mold., *Phytol. Mem.* 2: 91, 96, 366, & 589. 1980.

In regard to his var. *haitiensis* Urban (1929) says: "Magis ad var. *cubensem* Urb., quam ad typum accedit. Illa foliolis plerumque 3, non v. minus abrupte acuminatis non dematiatis diversa est."

Recent collectors describe var. *cubensis* as a small tree, 6 m. tall, or shrub, 3--4 m. tall, and have found it growing in woods and among limestone rocks, flowering in March and June. The corollas are said to have been "blue" on *Alain 2905* and *Ekman 11448*.

The *Clemente, Chrysogone, & Alain 3906*, distributed as *V. divaricata* var. *cubensis*, actually is *V. heptaphylla* A. L. Juss.

Additional citations: CUBA: Las Villas: *C. F. Baker 3409* (W--523715--cotype). Oriente: *Ekman 6274* (W--2113450); *Lopés F. 1323* (W--2227038). Pinar del Río: *Alain 2905* (W--2288211), 4278 (W--2284599), 6046 (W--2284449); *Ekman 11448* (W--2113451); *M. Fernandez HAC.29153* (W--2909374).

*VITEX DIVERSIFOLIA* Kurz

Additional bibliography: Mold., *Phytologia* 44: 387 & 415--416. 1979; Mold., *Phytol. Mem.* 2: 274 & 589. 1980; Mold., *Phytologia* 50: 252. 1982.

*VITEX DJUMAENSIS* DeWild.

Additional bibliography: Mold., *Phytologia* 44: 416. 1979; Mold., *Phytol. Mem.* 2: 221 & 589. 1980.

*VITEX DONIANA* Sweet

Additional bibliography: Walp., Repert. Bot. Syst. 4: 88. 1845; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 172. 1895; White & Angus, Forest Fl. N. Rhodes. 371. 1962; Mold., Phytologia 48: 456--457. 1981.

The *Phillips 2924*, distributed as typical *V. doniana*, actually is its var. *parvifolia* (Engl.) Mold.

Additional citations: NIGERIA: *Bernardi 8727* (W--2896837).

*VITEX DONIANA* var. *PARVIFOLIA* (Engl.) Mold.

Additional bibliography: Mold., Phytologia 44: 479--480 (1979) and 46: 30. 1980; Mold., Phytol. Mem. 2: 202, 213, 215, 221, 223, 224, 228, 236, 241, 366, & 590. 1980.

Phillips describes this plant as a tree, 50 feet tall, the crown 30 feet wide, the corollas "white and deep-purple", and encountered it in lakeshore sand, at 1500 feet altitude, in flower in October.

Additional citations: MALAWI: *Phillips 2924* (Ba--377862).

*VITEX DRYADUM* S. Moore

Additional bibliography: Mold., Phytologia 44: 480. 1979; Mold., Phytol. Mem. 2: 241 & 590. 1980.

*VITEX DUBOISII* Mold.

Additional bibliography: Mold., Phytologia 44: 480. 1979; Mold., Phytol. Mem. 2: 221 & 590. 1980.

*VITEX DUCKEI* Huber

Additional bibliography: Mold., Phytologia 45: 483 & 495. 1980; Mold., Phytol. Mem. 2: 171, 457, & 590. 1980.

Recent collectors refer to this species as a tree, 6 m. tall, and have found it in anthesis in September. The corollas are said to have been "rose" colored on *Cid & al. 2488*.

Additional citations: BRAZIL: Amazõnas: *Rodrigues & Lima 3451* (N). Pará: *Cid, Ramos, Mota, & Rosas 2466* [Herb. Inst. Nac. Pesq. Amaz. 96915] (Ld), *2488* (N).

*VITEX DUCLOUXII* Dop

Additional & emended bibliography: Dop, Bull. Soc. Hist. Nat. Toulouse 57: 208 & 211. 1928; Mold., Phytologia 44: 481. 1979; Mold., Phytol. Mem. 2: 280 & 590. 1980.

*VITEX EBERHARDTII* Dop

Synonymy: *Vitex eberhardtii* Dop, Bull. Soc. Hist. Nat. Toulouse 57: 210, sphalm. 1928.

Additional & emended bibliography: Dop, Bull. Soc. Hist. Nat. Toulouse 57: 204, 210, & 211. 1928; Mold., Phytologia 44: 481. 1979; Mold., Phytol. Mem. 2: 290, 294, & 590. 1980; Mold., Phytologia 50: 266. 1982.

Dop (1928) comments that this "Espèce facile à reconnaître à ses inflorescences et son calice glabre et à ses fleurs dont la corolle

est plus grande que celle des autres *Vitex* de ce groupe."

*VITEX ELAKELAKENSIS* Mold.

Additional bibliography: Mold., *Phytologia* 44: 481. 1979; Mold., *Phytol. Mem.* 2: 251 & 590. 1980.

*VITEX ELMERI* Mold.

Additional bibliography: Mold., *Phytologia* 44: 481. 1979; Mold., *Phytol. Mem.* 2: 309, 458, & 590. 1980.

*VITEX EPIDICTYODES* Mildbr.

Additional bibliography: Mold., *Phytologia* 44: 481 (1979) and 46: 31. 1980; Mold., *Phytol. Mem.* 2: 221, 223, 228, 239, & 590. 1980.

*VITEX ERIOCLONA* H. J. Lam

Additional bibliography: Heyne, *Nutt. Plant. Ned. Ind.*, ed. 2, 1: 24 (1927) and ed. 2, 2: 1316. 1927; Mold., *Phytologia* 44: 481--482. 1979; Mold., *Phytol. Mem.* 2: 319 & 590. 1980.

*VITEX EXCELSA* Mold.

Additional bibliography: Mold., *Phytologia* 48: 457. 1981.

Additional citations: BRAZIL: Para: *Vilhena, Lobo, & Ribeiro* 176 (N).

*VITEX EXCELSA* var. *PETIOLATA* Mold.

Additional bibliography: Mold., *Phytologia* 44: 482. 1979; Mold., *Phytol. Mem.* 2: 136 & 590. 1980.

*VITEX FARAFANGANENSIS* Mold.

Additional bibliography: Mold., *Phytologia* 44: 482. 1979; Mold., *Phytol. Mem.* 2: 251 & 590. 1980.

*VITEX FERRUGINEA* Schum. & Thonn.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 86 & 90. 1845; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Mold., *Phytologia* 44: 482--483. 1979; Mold., *Phytol. Mem.* 2: 206, 209--211, 213, 221, 224, 228, 234, 456, & 590. 1980.

*VITEX FISCHERI* Gürke

Additional bibliography: Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; White & Angus, *Forest Fl. N. Rhodes.* 371. 1962; Mold., *Phytologia* 44: 483--484 (1979) and 45: 494. 1980; Mold., *Phytol. Mem.* 2: 224, 228, 231, & 590. 1980.

*VITEX FLAVA* Ridl.

Additional bibliography: Mold., *Phytologia* 44: 484. 1979; Mold., *Phytol. Mem.* 2: 219 & 590. 1980.

*VITEX FLAVENS* H.B.K.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 86. 1845; Bock. in Baill., *Rec. Obs. Bot.* 3: 253. 1863; Mold., *Phytologia*

48: 457 (1981) and 49: 368. 1981.

The *Vilhena, Lobo, & Ribeiro 176*, distributed as *V. flavens*, actually is *V. excelsa* Mold.

*VITEX FLORIBUNDA* Legris

Additional bibliography: Mold., *Phytologia* 44: 485. 1979; Mold., *Phytol. Mem.* 2: 266 & 590. 1980.

*VITEX FLORIDULA* Duchass. & Walp.

Additional bibliography: Mold., *Phytologia* 45: 483. 1980; Mold., *Phytol. Mem.* 2: 84, 458, & 590. 1980; Mold., *Phytologia* 49: 373. 1981.

*VITEX FROESII* Mold.

Additional bibliography: Mold., *Phytologia* 44: 486. 1979; Mold., *Phytol. Mem.* 2: 171 & 590. 1980.

*VITEX GABUNENSIS* Gürke

Additional bibliography: Mold., *Phytologia* 44: 486. 1979; Mold., *Phytol. Mem.* 2: 216 & 590. 1980.

*VITEX GAMOSEPALA* W. Griff.

Additional & emended bibliography: W. Griff., *Notul. Pl. Asiat.* 4: 178--179, pl. 448, fig. 2. 1854; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Ridl., *Journ. Roy. Asiat. Soc. Straits* 57: 84. 1910; Corner, *Wayside Trees*, ed. 2, 707 & 708. 1952; Mold., *Phytologia* 48: 457. 1981.

Ridley (1910) says that this species grows in both woods and open country. Corber (1952) calls it the "Glabrous Yellow *Vitex*", lists the vernacular names, "leban pachat" and "leban pelamdok", and describes it as "A shrub or small tree to 40 ft. high: twigs, leaves and inflorescences glabrous or nearly so: twigs and leaf-stalks light fawn brown: young leaves reddish pink. Leaves with 3 stalked leaflets: middle leaflet 3--8 x 1 1/2 -- 3 1/2", elliptic, rather long-tipped, with 4--7 pairs of side-veins: leaf-stalk 1--4" long. Flowers 1/2" long, 1/4" wide, clear yellow, in small stalked clusters up to 2" long, in the leaf-axils: calyx with 3 small teeth. Fruit 1/4" wide, round, black." He gives its distribution as "Malay Peninsula, Sumatra, Borneo: common in open country and in the forest, especially by streams and on hillsides up to an altitude of 4,000 ft."

*VITEX GAMOSEPALA* var. *KUNSTLERI* King & Gamble

Additional bibliography: Mold., *Phytologia* 44: 487 & 488. 1979; Mold., *Phytol. Mem.* 2: 297, 319, & 590. 1980.

*VITEX GAMOSEPALA* var. *SCORTECHINII* King & Gamble

Additional bibliography: Mold., *Phytologia* 44: 488. 1979; Mold., *Phytol. Mem.* 2: 297, 319, & 590. 1980.

*VITEX GARDNERIANA* Schau.

Additional bibliography: Mold., *Phytologia* 45: 483. 1980; Mold.,

Phytol. Mem. 2: 171 & 590. 1980.

*VITEX GAUMERI* Greenm.

Additional bibliography: Rzedowski, *Veget. Mex.* 171 & 187, fig. 203. 1978; *Mold., Phytologia* 48: 457--458 (1981), 49: 451 (1981), and 50: 243. 1982.

Additional illustrations: Rzedowski, *Veget. Mex.* 187, fig. 203 (in color). 1978.

Barrera encountered this plant in "selva mediana subpereni-folia", at 20 m. altitude, in Mexico. Other collectors refer to it as a tree, 5--12 m. tall, the trunk 12 inches in diameter at breast height, and have found it in open forests on semi-arid highlands, xerophytic areas, quebradas, and matorrales, at 300--1100 m. altitude, in flower in May and June. The corollas are described as having been "blue" on *Molina R. 7031*, "deep-blue and pleasantly fragrant" on *Yuncker & al. 8165*, and "purple" on *Molina R. 6584 & 6990*.

Additional citations: MEXICO: Quintana Roo: *Barrera 886* (Me--297054). Yucatán: *Lundell & Lundell 7321* (W--1975066). GUATEMALA: El Petén: *Ortiz 1259* (W--2925249). BELIZE: *Herb. Conserv. Forests Belize 4* [Project 46] (W--1977771). HONDURAS: Choluteca: *Williams & Molina R. 10918* (W--2085555). Comayagua: *Molina R. 6990* (W--2400820), *7031* (W--2400845); *Williams & Molina R. 12330* (W--2021784), *18156* (W--2085626). Copán: *Molina R. 6584* (W--2400844). Yoro: *Molina R. 6819* (W--2400846); *Yuncker, Koepper, & Wagner 8165* (W--1747643).

*VITEX GIGANTEA* H.B.K.

Additional bibliography: *Walp., Repert. Bot. Syst.* 4: 85--86. 1845; *Bocq. in Baill., Rec. Obs. Bot.* 3: 253. 1863; *Mold., Phytologia* 48: 458. 1981.

*VITEX GEORGII* DeWild.

Additional bibliography: *Mold., Phytologia* 44: 493. 1979; *Mold., Phytol. Mem.* 2: 221 & 590. 1980.

*VITEX GLABRATA* R. Br.

Additional & emended bibliography: *F. Muell., Fragm.* 6: 153. 1868; *Ceron, Cat. Pl. Herb. Manila* 133. 1892; *Briq. in Engl. & Prantl, Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; *F. M. Bailey, Queensl. Fl.* 4: 1179 & 1180. 1901; *Koord., Exkursionsfl.* 3: 137 & 495. 1912; *E. D. Merr., Philip. Journ. Sci. Bot.* 7: 343--344. 1912; *Heyne, Nutt. Plant. Ned. Ind.*, ed. 2, 1: 24 (1927) and ed. 2, 2: 1316. 1927; *Dop, Bull. Soc. Hist. Nat. Toulouse* 57: 204 & 207--211. 1928; *Kanjilal, Das, Kanjilal, & De, Fl. Assam* 3: 479, 480, 485, & 561. 1939; *Chippendale, Proc. Linn. Soc. N. S. Wales* 96: 256. 1971; *J. T. & R. Kartesz, Syn. Checklist Vasc. Fl.* 2: 468. 1980; *Mold., Phytologia* 49: 166, 457, & 459 (1981), 50: 252 (1982), and 51: 218. 1982.

Merrill (1923) cites the following collections from Balabac, Culion, Luzon, Mindanao, Negros, Mindor, and Palawan in the Philip-

pinus: Klemme 19546, Merrill 2162 & 9330, Miranda 20638 & 20771, Ramos 39371, Ramos & Pascasio 34472, Razon 23671, Somonte 24817, Whitford & Hutchinson 9490, and Williams 2949, all deposited in the Manila herbarium (now destroyed). He asserts that in the Philippines it inhabits forests at low altitudes and he gives its overall distribution, as known to him, as India to Indochina, Java, Timor, Celebes, New Guinea, and tropical Australia. When he published his *V. nitida* in 1912, based on Klemme 19546, "growing near the mountains" at Tangob, Misamis Province, Mindanao, known locally as "sasalit" or "tugaspan", he commented that it was "A species well characterized by its 3- and 5-foliolate leaves, the lower two leaflets, when present, much reduced, its axillary, peduncled cymes, truncate calyx, and densely pubescent corolla. It is most closely allied to *Vitex pentaphylla* Merr., but is apparently sufficiently distinct from that species." In 1923 he reduced both *V. nitida* and *V. pentaphylla* to synonymy under *V. glabrata*, where I am retaining them.

Heyne (1917) states that this is a "Boom, tot 25 M. hoog en 1.25 M. dik, aan de zuidkust met zuilvormigen stam en hoog aangezette kroon, op het Wilisgebergte daarentegen met korten, laag vertakten stam. Hij is verbreed over den geheelen Maleischen Archipel en groeit op Java verstrooid beneden 900 M. zeehoogte, doch is op sommige plaatsen niet zeldzaam. Het hout wordt soms voor huisbouw gebruikt: oude boomen zouden bij Tjilatjap zeer vaak hol zijn." Dop (1928) lists the vernacular names, "cay ma", "popoul tuh", and "xo con", and comments that "D'après Poilane, ce bois serait un bois jaune très dur." He cites Gaudichaud 287 and Poilane 7841 from Annam, Chatillon s.n., Godefroy 242, and Pierre 1213 from Cambodia, Corroy s.n., Gaudichaud s.n., and Poilane 40349 & 40781 from Cochinchina, and Harmand 323 and Thorel s.n. from Laos.

*VITEX GLABRATA* f. *BOMBACIFOLIA* (Wall.) Mold.

Additional bibliography: Walp., Repert. Bot. Syst. 4: 86--87 & 91. 1845; Mold., Phytol. Mem. 2: 266, 271, 274, 289, 366, 457, 460, & 590. 1980; Mold., Phytologia 45: 483--484 (1980) and 51: 218. 1982.

Material of this form has been misidentified and distributed in some herbaria as *V. canescens* Kurz.

Additional citations: BANGLADESH: Majumder & Islam 87 (Mi, Mi).

*VITEX GLABRATA* f. *PALLIDA* (Wall.) Mold.

Additional bibliography: Walp., Repert. Bot. Syst. 4: 91. 1845; Buek, Gen. Spec. Syn. Candoll. 3: 502. 1858; Mold., Phytologia 45: 484. 1980; Mold., Phytol. Mem. 2: 274, 459, & 590. 1980.

*VITEX GLABRATA* var. *POILANEI* Mold.

Additional bibliography: Mold., Phytologia 45: 484; Mold., Phytol. Mem. 2: 289, 294, & 590. 1980.

*VITEX GODERDZICA* Tsagareli

Additional bibliography: Mold., Phytologia 45: 484--485. 1980;

Mold., Phytol. Mem. 2: 369 & 590. 1980.

*VITEX GOLUNGENSIS* J. G. Baker

Additional bibliography: Mold., Phytologia 45: 485. 1980; Mold., Phytol. Mem. 2: 234 & 590. 1980.

*VITEX HARVEYANA* H. H. W. Pearson

Additional bibliography: Mold., Phytol. Mem. 2: 238, 241, 244, 246, & 590. 1980; Mold., Phytologia 45: 488--489 (1980), 48: 463 (1981), 49: 449 (1981), and 50: 251, 266, & 269. 1982.

*VITEX HARVEYANA* f. *GEMINATA* (H. H. W. Pearson) Mold.

Additional bibliography: Mold., Phytologia 45: 489 (1980) and 50: 251, 266, & 269. 1982.

*VITEX HAUSKNECHTII* Bormm.

Additional bibliography: Mold., Phytologia 45: 489--490. 1980; Mold., Phytol. Mem. 2: 255, 456, & 590. 1980.

*VITEX HEMSLEYI* Briq.

Additional bibliography: Mold., Phytologia 48: 459 (1981) and 49: 451. 1981.

Recent collectors describe this species as a tree, 8--10 m. tall, and have found it growing at sealevel, in anthesis in June and July. The corollas are said to have been "violet" on Neill 4581 and "blue" on Forment 887. The latter collector records the vernacular name, "azulillo".

Material of this species has been misidentified and distributed in some herbaria as *V. mollis* H.B.K.

Additional citations: MEXICO: Guerrero: Forment 887 (Me--293117). NICARAGUA: Zelaya: Neill 4581 (Ld).

*VITEX HENRYI* Mold.

Additional bibliography: Mold., Phytologia 45: 491. 1980; Mold., Phytol. Mem. 2: 280 & 590. 1980.

*VITEX HEPTAPHYLLA* A. L. Juss.

Additional synonymy: *Vitex heptophylla* A. L. Juss. ex Mold., Fifth Summ. 2: 718, in syn. 1971.

Additional bibliography: Walp., Repert. Bot. Syst. 4: 84 & 90--91. 1845; Mold., Phytologia 45: 491. 1980; Mold., Phytol. Mem. 2: 91, 96, & 590. 1980.

Recent collectors describe this species as a tree, 5--6 m. tall, the leaves 5--7-foliolate, and the fruit yellow or orange. They have found it growing in woods, thickets, and open pinelands, on wooded hillsides, and "common" on riverbanks, at 300--1000 m. altitude, in both flower and fruit in May and December. The corollas are said to have been "violet" in color on Jiménez 3690, "deep-violet" on Valeur 630, and "deep-purple" on Holdridge 1839. Valeur records the vernacular name, "mata becerro", while León & Alain (1974) call it "penda".

Material of this species has been misidentified and distributed



in some herbaria as *V. divaricata* var. *cubensis* Urb. and *V. umbrosa* Sw.

Additional citations: CUBA: Oriente: Alain, Acuña, & López Figueiras 5830 (W--2284402); Alain & Clemente 1046 (W--2288050); Clemente 5004 (W--2284410); Clemente, Chrysogone, & Alain 3906 (W--1883106); León 11801 (W--2289309). HISPANIOLA: Dominican Republic: Ekman H.12643 (W--1711562); J. Jimenez 3690 (W--2229700, W--2229701); Valeur 630 (W--1478796), 936 (W--1557071), 972 (W--1557102). Haiti: Holdridge 1839 (W--1880782).

*VITEX HIRSUTISSIMA* J. G. Baker

Additional bibliography: Mold., Phytologia 45: 491. 1980; Mold., Phytol. Mem. 2: 252 & 590. 1980.

*VITEX HOCKII* DeWild.

Additional bibliography: Mold., Phytologia 45: 492 (1980) and 46: 31. 1980; Mold., Phytol. Mem. 2: 221, 228, 234, & 590. 1980.

*VITEX HOLOADENON* Dop

Additional & emended bibliography: Dop, Bull. Soc. Hist. Nat. Toulouse 57: 204--205, 210, & 211. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 297. 1938; Mold., Phytologia 45: 492. 1980; Mold., Phytol. Mem. 2: 289, 458, & 590. 1980.

Dop (1928) comments that "Cette espèce est remarquable par ses feuilles 1-foliolées, son revêtement glandulaire dense aussi bien sur les fleurs que sur l'appareil végétatif et sa drupe obconique. Le grand développement de l'appareil glandulaire la rapproche des *V. luteoglandulosa* Lam. et *V. glandulosa* Lam. Elle s'en distingue particulièrement par ses feuilles 1-foliolées et sa drupe obconique." Other species of this genus with 1-foliolate leaves are *V. gardneriana* Schau. of Brazil, *V. cofassus* Reinw. of Indonesia, and various species of Madagascar.

*VITEX HOLOCALYX* J. G. Baker

Additional bibliography: Mold., Phytologia 45: 492. 1980; Mold., Phytol. Mem. 2: 234 & 591. 1980.

*VITEX HORNEI* Hemsl.

Additional bibliography: Mold., Phytologia 45: 492. 1980; Mold., Phytol. Mem. 2: 248 & 591. 1980.

*VITEX HUMBERTI* Mold.

Additional bibliography: Mold., Phytologia 45: 492. 1980; Mold., Phytol. Mem. 2: 252 & 591. 1980.

*VITEX HUMBERTI* var. *ANGUSTATA* Mold.

Additional bibliography: Mold., Phytologia 45: 492. 1980; Mold., Phytol. Mem. 2: 252 & 591. 1980.

*VITEX HYPOLEUCA* Schau.

Additional bibliography: Mold., Phytologia 45: 492. 1980; Mold., Phytol. Mem. 2: 171 & 591. 1980.

Recent collectors refer to this species as a tree or treelet, 4 m. tall, the leaves bicolorated, whitish beneath, and the fruit at first green, later dark, finally almost black, and have found it in fruit in May.

Additional citations: BRAZIL: Bahia: Carvalho, Mori, Boom, & Silva Guedes 723 (Ld, Ld, N).

*VITEX IBARENSIS* J. G. Baker

Additional bibliography: Mold., Phytologia 45: 492. 1980; Mold., Phytol. Mem. 2: 252 & 591. 1980.

*VITEX IMPRESSINERVA* Mildbr.

Additional bibliography: Mold., Phytologia 45: 493. 1980; Mold., Phytol. Mem. 2: 215 & 591. 1980.

*VITEX INTEGRIFOLIA* Urb.

Additional bibliography: Mold., Phytologia 45: 493. 1980; Mold., Phytol. Mem. 2: 96 & 591. 1980.

Additional citations: HISPANIOLA: Dominican Republic: Ekman H. 14882 (W--1479915).

*VITEX ISOTJENSIS* Gibbe

Additional bibliography: Mold., Phytologia 45: 493. 1980; Mold., Phytol. Mem. 2: 236, 458, & 591. 1980; Mold., Phytologia 49: 378. 1981.

*VITEX KLUGII* Mold.

Additional bibliography: Mold., Phytologia 48: 459. 1981.

Recent collectors have encountered this species in seasonally inundated tahuampa, at 120 m. altitude.

Additional citations: PERU: Loreto: Gentry, Vasquez, Jaramillo, & Stern 29191 (Ld).

*VITEX KUYLENII* Standl.

Additional bibliography: Mold., Phytologia 48: 459--460. 1981.

Material of this species has been misidentified and distributed in some herbaria as *V. mollis* H.B.K.

Additional citations: MEXICO: Guerrero: Forment 768 (Me--293089).

*VITEX KWANGSIENSIS* P'ei

Additional bibliography: Mold., Phytologia 46: 11. 1980; Mold., Phytol. Mem. 2: 280 & 591. 1980.

*VITEX LAMIANA* Pieper

Additional bibliography: Mold., Phytologia 46: 11. 1980; Mold., Phytol. Mem. 2: 228, 231, & 591. 1980.

*VITEX LANIGERA* Schau.

Additional bibliography: Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 172. 1895; Mold., Phytologia 48: 460. 1981.

**VITEX LASIANTHA** H. Hallier

Additional bibliography: Mold., *Phytologia* 46: 12. 1980; Mold., *Phytol. Mem.* 2: 252, 458, & 591. 1980.

**VITEX LASTELLEI** Mold.

Additional bibliography: Mold., *Phytologia* 46: 12. 1980; Mold., *Phytol. Mem.* 2: 328 & 591. 1980.

**VITEX LEUCOXYLON** L. f.

Additional synonymy: *Vitex triflora odorata, sylvestris* J. Burm., *Thes. Zeyl.* 209--210, pl. 109. 1737.

Additional bibliography: J. Burm., *Thes. Zeyl.* 209--210, pl. 109. 1737; Walp., *Repert. Bot. Syst.* 4: 82 & 91. 1845; Bocq. in Baill., *Rec. Obs. Bot.* 3: 253. 1863; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Mold., *Phytologia* 49: 166, 381, & 452. 1981; Sharma, Shetty, Vivekan., & Rathakr., *Journ. Bomb. Nat. Hist. Soc.* 75: 33. 1981.

Additional illustrations: J. Burm., *Thes. Zeyl.* pl. 109. 1737.

Sharma and his associates (1981) cite *Rathakrishnan 37983* and *Vivekananthan 40742* from Tamil Nadu, India, and describe the species as a "Tree with white fls., common" there.

Burman's *V. triflora odorata, sylvestris*, previously regarded by me as applying to *V. trifolia* L., appears to me now actually to be synonymous with *L. leucoxyton* instead.

Additional citations: MOUNTED ILLUSTRATIONS: Burm., *Thes. Zeyl.* pl. 109. 1737 (Ba).

**VITEX LEUCOXYLON** f. *SALIGNA* (Roxb.) Mold.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 91. 1845; Mold., *Phytologia* 49: 166. 1981.

**VITEX LEUCOXYLON** f. *ZEYLANICA* (Mold.) Mold.

Additional bibliography: Mold., *Phytologia* 48: 460. 1981.

Additional citations: SRI LANKA: *Fosberg & Jayasinghe 57012* (N).

**VITEX LIMONIFOLIA** Wall.

Emended synonymy: *Vitex limoniifolia* Wall. ex Fletcher, *Kew Bull. Misc. Inf.* 1938: 431 & 433. 1938.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 84. 1845; Collett & Hemsl., *Journ. Linn. Soc. Lond. Bot.* 28: 110. 1890; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: 198, 199, 210, & 211. 1928; Mold., *Phytologia* 48: 460--461 (1981) and 49: 445. 1981.

Craib (1911) cites *Kerr 2011* and *Vanpruk 184* from Thailand. Dop (1928) cites *Chatillon s.n.*, *Harmand s.n.*, *Pierre 5216*, and *Thorel 2007* from Cambodia and *Pierre 5612* from Thailand. Collett & Hemsley (1890) record the species from Meiktila and note that it was "also collected by Mr. Aplin at Koloubouk camp", listing it likewise from "Ava and Tenasserim to Siam".

**VITEX LOBATA** Mold.

Additional bibliography: Mold., *Phytologia* 46: 21. 1980; Mold.,

Phytol. Mem. 2: 252 & 591. 1980.

*VITEX LOKUNDJENSIS* Pieper

Additional bibliography: Mold., Phytologia 46: 12 & 21. 1980; Mold., Phytol. Mem. 2: 215, 221, 228, 238, & 591. 1980.

*VITEX LUKUNDJENSIS* var. *KRUCKEI* Pieper

Additional bibliography: Mold., Phytologia 46: 21. 1980; Mold., Phytol. Mem. 2: 215, 221, & 591. 1980.

*VITEX LONGIPETIOLATA* Gürke

Additional bibliography: Mold., Phytologia 46: 21--22. 1980; Mold., Phytol. Mem. 2: 215, 221, 234, & 591. 1980.

*VITEX LONGISEPALA* King & Gamble

Additional bibliography: Corner, Wayside Trees, ed. 2, 707 & 708. 1952; Mold., Phytologia 48: 461. 1981.

Corner (1952) calls this species the "Perak Yellow Vitex" and describes it as "A tree with the young leaves fawn-colour, like *V. vestita* but:-- Leaflets often broader, up to 4 1/2" wide: leaf-stalk up to 5" long. Flowers 2/3" long, 1/3" wide, considerably wider than in *V. gamosepala*: flower-clusters up to 3 1/2" long, few-flowered: calyx with 5 long, pale green sepals 1/4 -- 1/3" long: corolla with rich yellow throat. Fruit surrounded by the long sepals. Malaya: Penang to Malacca, common in Perak with *V. gamosepala*."

*VITEX LONGISEPALA* var. *LONGIPES* Mold.

Additional bibliography: Mold., Phytologia 46: 22. 1980; Mold., Phytol. Mem. 2: 298 & 591. 1980.

*VITEX LUCENS* T. Kirk

Additional & emended bibliography: D. Dietr., Syn. Pl. 3: 611. 1843; Walp., Repert. Bot. Syst. 4: 84 & 87. 1845; Seem., Journ. Bot. Lond. 3: 258. 1865; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 172. 1895; E. D. Merr., Bull. Philip. Forest. Bur. 1: 51. 1903; Heyne, Nutt. Plant. Ned. Ind., ed. 1, 4: 113--114. 1917; Lord, Trees Shrubs Austr. Gard., ed. 5, 97 & 321. 1978; Salmon, Nat. Trees N. Zeal., imp. 1, 342 & [343], fig. 1--9 (1980) and imp. 2, 342 & [343], fig. 1--9. 1981; Mold., Phytologia 49: 167, 371, 374, & 381. 1981.

Additional illustrations: Salmon, Nat. Trees N. Zeal., imp. 1, 342 & [343], fig. 1--9 (1980) and imp. 2, 342 & [343], fig. 1--9. 1981.

Orchard found this tree in fruit in October. Lord (1978) describes it as growing to 30 feet tall, "a handsome tree with glossy deep green leaves, the 3 to 5 rounded leaflets wavy-edged, and sprays of bright red 2-lipped flowers resembling Mint-bush but larger, over most of the year. Has been called New Zealand Oak, its figured and durable timber being a highly valued hardwood in the Dominion."

Additional citations: NEW ZEALAND: North: *MacDaniels P.563* (It); *Orchard 3540* (Ba--370074). MOUNTED ILLUSTRATIONS: Hook., Icon. Pl. "pl. 1519/1520" (Ba--380420).

*VITEX LUNDENSIS* Gürke

Additional bibliography: Mold., *Phytologia* 46: 28. 1980; Mold., *Phytol. Mem.* 2: 221 & 591. 1980.

*VITEX LUTEA* Exell

Additional bibliography: Mold., *Phytologia* 46: 28. 1980; Mold., *Phytol. Mem.* 2: 234 & 591. 1980.

*VITEX LUTEOGLANDULOSA* H. J. Lam

Additional bibliography: Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: 205. 1928; Mold., *Phytologia* 46: 28. 1980; Mold., *Phytol. Mem.* 2: 328 & 591. 1980.

Dop (1928) asserts that the "appareil glandulaire" of this species and of *V. holoadenon* Dop and *V. glandulosa* H. J. Lam [now regarded as a synonym of *V. parviflora* A. L. Juss.] is very similar.

*VITEX LUZONICA* H. J. Lam

Additional bibliography: E. D. Merr., *Enum. Philip. Flow. Pl.* 3: 394. 1923; Mold., *Phytologia* 46: 28. 1980; Mold., *Phytol. Mem.* 2: 309 & 591. 1980.

Merrill (1923) cites only *Ahern 706* "(not 760)" and comments that "This number seems to be missing in the herbarium of the [Philippine] Bureau of Science. The species is apparently related to *Vitex glabrata* R. Br. Endemic."

*VITEX MACROFOLIOLATA* Mold.

Additional bibliography: Mold., *Phytologia* 46: 28. 1980; Mold., *Phytol. Mem.* 2: 328 & 591. 1980.

*VITEX MADAGASCARIENSIS* Mold.

Additional bibliography: Mold., *Phytologia* 46: 28. 1980; Mold., *Phytol. Mem.* 2: 252 & 591. 1980.

*VITEX MADIENSIS* Oliv.

Additional bibliography: White & Angus, *Forest Fl. N. Rhodes.* 372 & 455. 1962; Mold., *Phytologia* 46: 28--31. 1980; Mold., *Phytol. Mem.* 2: 201, 202, 207, 209, 215--217, 221, 223, 224, 228, 234, 236, 239, 241, & 591. 1980; Mold., *Phytologia* 50: 267. 1982.

The *E. Phillips 2880*, distributed as typical *V. madiensis*, actually represents its var. *gossweileri* Pieper.

*VITEX MADIENSIS* var. *ANGUSTIFOLIA* Pieper

Additional bibliography: Mold., *Phytologia* 46: 30. 1980; Mold., *Phytol. Mem.* 2: 202 & 591. 1980.

*VITEX MADIENSIS* var. *AROMATICA* Pieper

Additional bibliography: Mold., *Phytologia* 46: 30. 1980; Mold.,

Phytol. Mem. 2: 209, 224, & 591. 1980.

*VITEX MADIENSIS* var. *GOSSWEILERI* Pieper

Additional bibliography: Mold., Phytologia 46: 30. 1980; Mold., Phytol. Mem. 2: 231, 234, 236, 239, & 591. 1980.

Phillips refers to this plant as a tree, 4 feet tall, and found it growing in grassland at 5500 feet altitude. He erroneously distributed it as typical *V. madiensis* Oliv.

Additional citations: MALAWI: *E. Phillips 2880* (Ba--377611).

*VITEX MADIENSIS* var. *MILANJIENSIS* (Britten) Pieper

Additional bibliography: Mold., Phytologia 48: 461 (1981) and 50: 267. 1982.

*VITEX MADIENSIS* var. *SCHWEINFURTHII* (Glürke) Pieper

Additional & emended bibliography: Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 172. 1895; J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 316 & 322. 1900; Mold., Phytologia 46: 29 & 31. 1980; Mold., Phytol. Mem. 2: 202, 215, 221, & 591. 1980.

*VITEX MASONIANA* Pittier

Additional bibliography: Mold., Phytologia 46: 32. 1980; Mold., Phytol. Mem. 2: 84, 112, & 592. 1980.

Recent collectors refer to this species as a tree, 75 feet tall, with gray-green [immature] fruit in July, and have found it growing in woods.

Additional citations: PANAMA: Darién: *Tyson, Dwyer, Blum, & Duke 4847* (N).

*VITEX MEDUSAECALYX* H. J. Lam

Additional bibliography: Mold., Phytologia 46: 32. 1980; Mold., Phytol. Mem. 2: 319 & 592. 1980.

*VITEX MEGAPOTAMICA* (Spreng.) Mold.

Additional bibliography: Walp., Repert. Bot. Syst. 4: 88. 1845; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 172. 1895; Klein, Sellowia 32: 172. 1980; Mold., Phytologia 48: 462. 1981.

Duarte describes this species as a tree, 6--8 m. tall, "planta que vai desde arbusto prostrado na areia fixando dunas até árvore".

Rimpler & Schulz (1967) have isolated an insect-moulting hormone, 20-hydroxyecdysone, from this species.

Material of this taxon has been misidentified and distributed in some herbaria as *V. schaueriana* Mold.

Additional citations: BRAZIL: Paraná: *Carvalho 101* (Ba). Santa Catarina Island: *Duarte 3060* [Herb. Jard. Bot. Rio Jan. 73512] (Mi, W--2949720). ARGENTINA: Misiones: *Renvoize 3204* (N), (N).

*VITEX MEGAPOTAMICA* f. *ALBIFLORA* Mold.

Additional bibliography: Mold., Phytologia 46: 35 & 36. 1980;

Mold., *Phytol. Mem.* 2: 171, 366, & 592. 1980.

*VITEX MEGAPOTAMICA* var. *MULTINERVIS* (Cham.) Mold.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 88. 1845; Mold., *Phytologia* 46: 31 & 35--38. 1980; Mold., *Phytol. Mem.* 2: 171, 180, 193, 366, 435, 459, 460, & 592. 1980.

Recent collectors refer to this plant as a tree, 8 m. tall, with wine-colored mature fruit (in March), and have found it growing in gallery forests. Kummrow refers to the fruit as black.

Additional citations: BRAZIL: Paraná: *Hatschbach* 39782 (Ba--375469); *Kummrow* 419 (Ba).

*VITEX MENABEENSIS* Capuron

Additional bibliography: Mold., *Phytologia* 46: 38. 1980; Mold., *Phytol. Mem.* 2: 252. 1980; Mold., *Phytologia* 50: 269. 1982.

*VITEX MEXIAE* Mold.

Additional bibliography: Mold., *Phytologia* 46: 38--39. 1980; Mold., *Phytol. Mem.* 2: 171, 366, 460, & 592. 1980.

Mimuri describes this plant as a shrub, 1.7 m. tall, the fruit spheroid-prolate, 1.1--1.7 cm. long and 0.9--1.6 cm. wide, "preto brilhante glaucescente", in January.

Additional citations: BRAZIL: São Paulo: *Mimuri* 1231 (N).

*VITEX MICRANTHA* Gürke

Additional bibliography: Mold., *Phytologia* 48: 462 (1981) and 49: 366. 1981.

*VITEX MICROPHYLLA* Mold.

Additional bibliography: Mold., *Phytologia* 46: 40. 1980; Mold., *Phytol. Mem.* 2: 252 & 592. 1980.

*VITEX MILNEI* Pieper

Additional bibliography: Mold., *Phytologia* 46: 40. 1980; Mold., *Phytol. Mem.* 2: 212, 215, & 592. 1980.

*VITEX MOLLIS* H.B.K.

Additional & emended bibliography: Walp., *Repert. Bot. Syst.* 4: 85. 1845; Bocq. in *Baill., Rec. Obs. Bot.* 3: 253. 1863; Gentry, *Carnegie Inst. Wash. Publ.* 527: 23, 33, 37, 42, 45, 66, 223, 224, & 306. 1942; Mold., *Phytologia* 49: 167 & 451. 1981; Janzen & Martin, *Science* 215: 23. 1982.

Recent collectors refer to this species as a tree, 6 m. tall, with fissured bark, and edible fruit -- "las hojas como thé para aliviar la tos y como estimulante; su sabor y olor esperecido al de el thé negro". They have encountered it in rocky, sunny or calcareous soil, in oak woods, and in low deciduous woods with *Juniperus* at 300--1650 m. altitude, in flower in March and December, and in fruit in April. They record the vernacular names, "atuto" and "nanche de perro". The corollas are said to have been "purple" on *Sousa s.* 3908 and "pale-purple" on *Sota Nuñez* &

Zarate P. 1259.

The Forment 887, distributed as *V. mollis*, appears to be *V. hemsleyi* Briq., while Forment 768 is the closely related *V. kuylenii* Standl.

Additional citations: MEXICO: Guerrero: Sota Nuñez & Ramos 551 (Me--284054); Sota Nuñez & Zárate P. 1259 (Me--284173). Jalisco: Herb. Coll. Idaho s.n. [7/24/61] (Me--286929); Magallanes 372 (Ld); Sousa S. 3908 (Ld). Michoacán: Medrano, López, & Dirzo M. 5819 (Me--293571); Sota Nuñez & Zárate P. 1302 (Me--284070). Puebla: Weedons M.701 (Me--287012, N).

*VITEX MOMBASSAE* Vatke

Additional bibliography: White & Angus, Forest Fl. N. Rhodes. 371. 1962; Mold., Phytologia 48: 462--465 (1981) and 49: 377 & 378. 1981.

*VITEX MOSSAMBICENSIS* var. *OLIGANTHA* (J. G. Baker) Pieper

Additional & emended bibliography: J. G. Baker in Thicket.-Dyer, Fl. Trop. Afr. 5: 316 & 327. 1900; Mold., Phytologia 48: 466. 1981.

*VITEX NEGUNDO* L.

Additional & emended bibliography: Walp., Repert. Bot. Syst. 4: 89--90. 1845; Lindl., Veget. Kingd., ed. 1, 664 (1846), ed. 2, 664 (1847), and ed. 3, 664. 1853; Bocq. in Baill., Rec. Obs. Bot. 3: 253. 1863; Koord., Excursionsfl. 3: 136 & 495. 1912; Heyne, Nutt. Plant. Ned. Ind., ed. 2, 1: 24 (1927) and ed. 2, 3: 1646. 1927; Dop, Bull. Soc. Hist. Nat. Toulouse 57: 199, 200, 206, 210, & 211. 1928; White, Journ. Arnold Arb. 10: 264. 1929; Guillaum., Journ. Arnold Arb. 13: 27. 1932; Corner, Wayside Trees, ed. 2, 707, 708, & 710. 1952; Kutuzkina, Paleont. Journ. Akad. Nauk SSSR 3: 158, fig. 2. 1970; Willaman & Li, Lloydia 33, Suppl. 3a: 220. 1970; Bennett, Fl. Howrah 306. 1976; Hsiao, Fl. Taiwan 4: 432--434, pl. 1060; Li, Nan-fang 100--102 & 168, fig. 29 & 30. 1979; Biswas & Maheswari, Journ. Bomb. Nat. Hist. Soc. 77: 225. 1980; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 468. 1980; Pant, Uniyal, & Prasad, Journ. Bomb. Nat. Hist. Soc. 78: 51. 1981; Mold., Phytologia 49: 167--181 & 457 (1981) and 50: 238, 251--253, 267, & 269. 1982.

Additional illustrations: Kutuzkina, Paleont. Journ. Acad. Nauk SSSR 3: 158, fig. 2. 1970.

Merrill (1923) states that this species is found "Throughout the Philippines at low and medium altitudes, in waste places, thickets, etc., often common", giving its overall distribution as "Tropical East Africa, Madagascar, India to Japan, southward through Malaya to western Polynesia".

Corner (1952) calls this the "Horse-shoe Vitex", listing the vernacular names, "lagundi", "lemuning", and "lenggundi". He describes the plant as "Like *V. trifolia* but:--Leaves with 3--5 leaflets, the middle leaflet distinctly stalked; leaflets with a long tip, the edge entire, notched, toothed or even deeply



lobed (nearly pinnately lobed): leaf-stalk longer, 1--2 1/2". Flowers smaller, 1/4 -- 1/3" long and wide: inflorescence as large branched terminal panicles 4--15" long and nearly as wide, the flowers closely set on short branches 1/2 -- 2" long: corolla pale to rather deep blue, often speckled, generally with a yellow horse-shoe like mark on the lower lip. Fruit .15" long, smaller, barely longer than the calyx. Trop. Africa to the Pacific: occurring like *V. trifolia* in Malaya, but commoner in gardens and certainly introduced."

Heyne (1927) lists the vernacular names, "ai toeban" and "lagoendi laoet laki laki", and gives the following statement about economic uses and chemistry: "Een afkooksel van den wortel geneest gezwollen en zuchtige lichamen en verdrijft de wormen. De bladeren, gekawd, genezen ulceratiën; gewreven, met peper gemengd en tot pillen gedraaid en twee of drie daarven ingenomen bij opkomende kiude koorts, verdrijven zij de koude....Greshoff...vond in den bast en de bladeren een chromogeen glucosied en Boorsma...een spoor alcaloïd."

Dop (1928) cites *Poilane* 1439, 1474, 6076, 7059, 8130, & 9585 from Annam, *Godefroy* 806 & s.n., *Lefèvre* 276, *Pierre* 389 & s.n., and *Thorel* 120 from Cochinchina, *Thorel* s.n. from Laos, *Balansa* 938, *Bon* 1086, 1636, & 1723, and *Mouret* s.n. from Tonkin, and *Zimmermann* s.n. from Thailand.

Biegel describes *V. negundo* as a shrub of open texture, 8 m. tall, with mauve-blue corollas, and found it growing at 1480 m. altitude, in anthesis in January.

Bennett (1976) cites *Bennett* 361 from West Bengal, while Biswas & Maheswari (1980) cite *Biswas* 116. Hsiao (1978) cites *Henry* 905, *Nakazawa* s.n., *Tanaka* 97, and *Wilson* 10972 from Taiwan. Guillaumin (1932) cites a no. 801 from Aneityum island in the New Hebrides, where, he avers, it is a common shrub to 3 m. tall on the seashore at sealevel, with leaves silvery beneath, and blue "flowers" and "fruit yellow when ripe". This is most certainly a misidentification for *V. trifolia* L. or one of its varieties, but the color given for the ripe fruit seems most questionable.

Banerji and his associates (1969) have isolated 5-hydroxy-3,6,7,3',4'-pentamethoflavone from the leaves of what they have identified as *Vitex negundo*.

The *Chun* 3855, distributed as typical *V. negundo*, actually represents its var. *cannabifolia* (Sieb. & Zucc.) Hand.-Mazz., while *Sinclair* 5950 is var. *intermedia* (P'ei) Mold.

Additional citations: PHILIPPINE ISLANDS: Luzon: *Ahern's collector* 102 (It). CULTIVATED: Zimbabwe: *Biegel* 5802 (Ba--387164). MOUNTED ILLUSTRATIONS: Hsiao, Fl. Taiwan 4: 433, pl. 1060. 1978 (Ld).

*VITEX NEGUNDO* var. *CANNABIFOLIA* (Sieb. & Zucc.) Hand.-Mazz.

Additional synonymy: *Vitex cannabina* Beal, in herb.

Additional bibliography: Mold., *Phytologia* 49: 167--172, 175, 177, 179, & 457 (1981) and 50: 252. 1982.

Jativa describes this plant as a shrub, to 13 feet tall, 12 ft.

wide, the branches ascending-spreading, and the corollas "light-blue" (in June). The seed from which his plant was grown came from the Kirghistan Botanical Garden in Russia.

Additional citations: CHINA: Hupeh: *Chun 3855* (It). CULTIVATED: California: *Jativa 2940* [LASCA Acc. 67-S-888] (Ba--376680). Massachusetts: *Beal s.n.* [Aug. 20, 1862] (Ba--382430).

*VITEX NEGUNDO* var. *HETEROPHYLLA* (Franch.) Rehd.

Additional bibliography: Bocq. in Baill., Rec. Obs. Bot. 3: 253. 1863; E. D. Merr., Enum. Philip. Flow. Pl. 3: 395. 1923; Dop, Bull. Soc. Hist. Nat. Toulouse 57: 206. 1928; Fosberg, Sachet, & Oliver, *Micronesica* 15: 239. 1979; J. T. & R. Kartesz, Checklist Vasc. Fl. 2: 468. 1980; Mold., *Phytologia* 49: 171--179 (1981) and 50: 253, 266, & 267. 1982.

Dop (1928) cites *Pierre 4550* from Cochinchina. Meyer found the plant growing "on city walls" in Chili, China.

The type specimen (holotype) of the synonymous *V. chinensis* Mill., from the Chelsea Physic Garden, was photographed by Dr. L. H. Bailey as his type photograph number 5055.

The *Jativa 2940*, distributed as *V. negundo* var. *heterophylla*, actually represents var. *cannabifolia* (Sieb. & Zucc.) Hand.-Mazz., while *Barker s.n.* [July 22, 1923] is var. *heterophylla* f. *multifida* (Carr.) Rehd. and *Jack 8172* is var. *intermedia* (P'ei) Mold.

Additional citations: CHINA: Chili: *F. N. Meyer 1008* (It). CULTIVATED: England: *P. Miller s.n.* [Chelsea Physic Garden; Bailey Hort. neg. 5055] (Ld--photo, Ld--photo).

*VITEX NEGUNDO* var. *HETEROPHYLLA* f. *ALBA* (Carr.) Mold.

Additional & emended bibliography: Desf., Tabl. Ecol. Bot., ed. 1, 53. 1804; Mold., *Phytologia* 49: 177--178 (1981) and 50: 266 & 267. 1982.

*VITEX NEGUNDO* var. *HETEROPHYLLA* f. *MULTIFIDA* (Carr.) Rehd.

Additional bibliography: Mold., *Phytologia* 49: 176--178 (1981) and 50: 267. 1982.

Additional citations: CULTIVATED: Massachusetts: *Barker s.n.* [July 22, 1923] (It).

*VITEX NEGUNDO* var. *INTERMEDIA* (P'ei) Mold.

Additional bibliography: J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 468. 1980; Mold., *Phytologia* 49: 171, 172, & 176--180 (1981) and 50: 253. 1982.

Sinclair refers to this plant as "a rare shrub in moderate flower and moderate unripe fruit" in August in Singapore, the corollas "lilac" in color. Jack refers to it as a 6-foot shrub.

Material has been misidentified and distributed in some herbaria as *V. negundo incisa* Clarke.

Additional citations: MALAYA: Singapore: *J. Sinclair 5950* (W--2924160). CULTIVATED: Cuba: *J. G. Jack 8172* (W--1555894), *8357* (W--1555950).

*VITEX NOVAE-POMMERANIAE* Warb., Engl. Bot. Jahrb. 13: 428. 1891.

Synonymy: *Vitex novae pommeraniae* Warb. apud K. Schum. & Lauterb., Fl. Deutsch. Schutzg. Südsee 524. 1900. *Viticipremna novae-pommeraniae* (Warb.) H. J. Lam, Verbenac. Malay. Arch. 163. 1919. *Viticipremna novo-pommeraniae* Menninger, 1960 Price List Flow. Trees [10]. 1960. *Viticipremna nova-pommeraniae* H. J. Lam apud Menninger, Flow. Trees World 298. 1962. *Viticipremna novaepommeranae* Foreman, Div. Bot. Dept. For. N. Guin. Bot. Bull. 5: 178. 1972. *Vitex glabrata* "sensu Kaneh." ex Fosberg, Sachet, & Oliver, Micronesica 15: 239, in syn. 1979 [not *Vitex glabrata* Blume, 1956, nor R. Br., 1810, nor F. Muell., 1895].

Bibliography: Warb., Engl. Bot. Jahrb. 13: 428 & 429. 1891; K. Schum. & Lauterb., Fl. Deutsch. Schutzg. Südsee 524. 1900; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 457. 1906; H. J. Lam, Verbenac. Malay. Arch. 163--164, 214, & 370. 1919; Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 47. 1921; H. J. Lam, Engl. Bot. Jahrb. 59: 92. 1924; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 246. 1929; Fedde, Justs Bot. Jahresber. 47 (2): 423. 1929; Junell, Symb. Bot. Upsal. 4: 94 & 95, fig. 143 & 144. 1934; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 457. 1941; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 577. 1941; Mold., Alph. List Inv. Names 54. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 67, 68, & 104 (1942) and ed. 2, 149, 150, & 203. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 457. 1959; Mold.; Résumé 202, 204, 387, & 479. 1959; Menninger, 1960 Price List Flow. Trees [10]. 1960; Menninger, Flow. Trees World 298. 1962; Mold., Fifth Summ. 1: 338 & 340 (1971) and 2: 724, 732, & 931. 1971; Foreman, Div. Bot. Dept. For. N. Guin. Bot. Bull. 5: 178. 1972; L. H. & E. Z. Bailey, Hortus Third 1162. 1976; Fosberg, Sachet, & Oliver, Micronesica 15: 239. 1979; Mold., Phytologia 44: 222 & 404. 1979; Mold., Phytol. Mem. 2: 328, 329, 368, 460, & 596. 1980; Mold., Phytologia 49: 455 (1981) and 50: 254, 266, 267, 269, & 270. 1982.

Illustrations: Junell, Symb. Bot. Upsal. 4: 95, fig. 143 & 144. 1934.

A shrub, 2 m. tall, or small, medium, or large tree, to 35 m. tall, pubescent with short, yellow-gray, slightly silky, glossy hairs; trunk (bole) to 20 m. high, to 1.5 m. in diameter at breast height, regular, smooth, yellow-brown, often buttressed for 2--2.5 m. or "spur-rooted to 30 inches, running into a broadly fluted stem"; crown medium-size, "light-yellow in general appearance", lightly leafy; outer bark gray-brown (or yellow-brown where peeling has taken place), about 1 cm. thick, with fine longitudinal fissures, small flakes peeling to 2 cm., corky in texture; under bark pale-green and "crumbly" or "light watery-brown"; inner bark about 9 mm. thick, yellow-brown, white when freshly cut (slash), later turning pale-green, brittle; wood straw-color or dark-straw, the sapwood not defined from the heartwood, soft and light, easy to cut, hard to split, with a slightly woolly cut on circular sawing, the pores moderately numerous to numerous, small, barely visible to the naked eye, arranged in short radial rows, the rays visible to the naked eye, not quite as wide as the pores,

the soft tissue diffuse, not conspicuous; young branchlets cinereous-pubescent or brown-tomentose; leaves decussate-opposite, 3--5-foliolate, yellow-green when young, darker green when older; petioles stout, 5--20 cm. long, cinereous-pubescent or brown-tomentose; petiolules brown-tomentose, 2--4.5 cm. long on the largest (central) leaflet, 8--10 mm. long on the smaller ones; leaflet-blades rigidly chartaceous, all petiolulate, oval or ovate-lanceolate to oblong or oblong-obovate, dull-green or dark-green and semi-glossy above, lighter green or mid-green beneath, usually widest above the middle, apically subobtusely acuminate, marginally entire, basally inequilaterally subobtusely or subacute, glabrous above, paler beneath and there marked with very small glands, drying brownish-gray above and olive-green beneath, the central one 12.2--22 cm. long and 6--7.5 cm. wide, the others steadily diminishing to 10 cm. long and 4 cm. wide; midrib and secondaries pubescent; secondaries 8--11 per side, only moderately arcuate; inflorescence terminal, paniculate, usually pedunculate, densely composite, robust, 14--18 cm. long, about 6 cm. wide, subequaling or longer than the subtending leaves, several times dichotomous from 3--4 cm. above the base, the branches opposite; peduncles to 20 cm. long; flower-buds small, inconspicuous, dull-green; flowers short-pedicellate, about 9 mm. long, fragrant; corolla bilabiate, internally tomentose, the throat villous, white [Streimann NGF.26189] to greenish-cream with a lilac lower lobe [Floyd 6646] or creamy with purple markings on the lower lip [Mair 1852]; fruiting-calyx persistent, large, ac-crescent, cupuliform, externally puberulent and glandulose, often 2-lobed or else the rim scarcely denticulate; fruit drupaceous, globose, 8--9 mm. long and wide, fleshy, externally glabrous, green when immature; seeds externally costate.

The species is based on material gathered in ravines of "Ratun auf den Gezellenhalbinsel" of New Britain. Warburg (1891) says that "Die Art steht der *V. acuminata* R. Br....sehr nahe, unterscheidet sich aber schon durch die Blattform und Größe, durch die stets gestielten Blättchen, durch die Kleinheit der Frucht, die Behaarung des Fruchtkelches etc." The specific name is sometimes written with uppercase initial letters for both parts of the specific epithet (as by Junell, 1934). Foreman (1972) places *Vitex quinata* (Lour.) F. N. Will. in its synonymy, but the two taxa are quite separate, although obviously closely related. He comments that the wood of *V. novae-pommeraniae* is "much like that of *V. cofassus*" Reinw. "but has much better form."

The Baileys (1976) list *V. novae-pommeraniae* as occurring in cultivation, native to New Guinea, New Britain, and New Ireland, describing it as a "Shrub or large tree", the leaflets 3--5 in number, ovate or obovate-oblong, to 3 1/4 inches long, apically acuminate, marginally entire, the flowers borne in panicles to 7 inches long, the corollas yellow. Junell (1934) discusses and illustrates the gynoeceum morphology.

Schumann & Lauterbach (1900) cite Hellwig 390 & 463 from north-eastern New Guinea and Dahl s.n. and Warburg s.n. from New Brit-

ain, and regarded it as endemic to these two islands. His publication is often cited as published in "1901", but it actually appeared in 1900. Lauterbach (1924) adds *Peekel 311* from New Ireland to collections seen, while Fedde & Schuster (1927) cite the species not only from New Britain, but also from New Guinea and New Zealand -- this last is obviously an error for New Ireland.

Collectors have encountered this plant in rainforests and in secondary lowland rainforests often burned by escaped garden fires, on rich brown loam soil, at 50--200 m. altitude, in full anthesis in February, March, June, and December, and in fruit in March and December. The corollas are described as "greenish-yellow; the lip violet-streaked" on *Dahl s.n.* and as simply "greenish-yellow" on *Peekel 311*. Floyd mistakenly describes the fruit as "berries" [they are drupes].

Vernacular names reported for the species are "garamut bitim" and "la vase". The wood is said to be used to make ax handles and as planks.

Citations: NEW GUINEA: Papua: *Streimann NGF.26189*(Ld, Mu). NEW GUINEAN ISLANDS: Los Negros: *Collector undesignated 546* (Ng--16978). BISMARCK ARCHIPELAGO: New Britain: *Croft & al. NGF.41409* (Mu); *Floyd 6436* (Ng--16887), *6646* (Bi, Bi, Ng--16883, W--2603269, W--2603270); *Mair 1852* (Ng--6557).

#### *VITEX OBOVATA* E. Mey.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 87. 1845; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Mold., *Phytologia* 49: 362. 1981.

#### *VITEX ORINOCENSIS* H.B.K.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 86. 1845; Bocq. in Baill., *Rec. Obs. Bot.* 3: 253. 1863; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Mold., *Phytologia* 49: 363--366 (1981) and 50: 246 & 248. 1982.

Gentry & Puig-Rosa refer to this plant as a tree, 4 m. tall, and have found it growing on inundated savannas.

Additional citations: VENEZUELA: Apure: *Gentry & Puig-Rosa 14336* (E--2892147). Barinas: *Ruiz Teran 1769* (E--2406802). BRAZIL: Bahia: *Mori & Benton 12868* (N).

#### *VITEX ORINOCENSIS* var. *MULTIFLORA* (Miq.) Huber

Additional synonymy: *Vitex orinocensis* var. *multifolia* (Miq.) Huber, in herb.

Additional bibliography: Mold., *Phytologia* 49: 363--366 (1981) and 50: 246. 1982.

Recent collectors refer to this plant as a tree, 5--15 m. tall, the trunk 18--25 cm. in diameter at breast height, the leaflet-blades shiny above, the peduncles reddish, and the fruit at first green, later turning black, ellipsoid, 1.5 cm. long, 1.1 cm. wide, juicy, edible when ripe, and have encountered it in disturbed woods and "in *Panicum maximum* pastures with only shade trees remaining of the original forest cover", at 80--200 m. altitude, in flower in May and October, and in fruit in June and December. The corollas

are said to have been "light-blue; with white nectar-guides, exterior of tube lavender, anthers dark-blue" on Lowrie & al. 575 and simply "blue" on Aristeguieta & Agostini 4574.

Additional & emended citations: VENEZUELA: Apure: Cuatrecasas 4150 (W--2780389). Cojedes: Delascio 4424 (E--2481730). Guárico: Aristeguieta & Agostini 4574 (N). Zulia: Bunting & Alfonso G. 6453 (Ld); Bunting & Fucci 8336 (Ld); Davidse, González, & León 18385 (Ld); Steyermark, Davidse, & Stoddart 123069 (Ld), 123121 (Ld), 123144 (Ld). SURINAM: Florschütz & Maas 2787 (Ld). BRAZIL: Acre: Lowrie, Lowry, Nelson, Ferreira, Rosas, Morreira, & Sousa 575 (Ld). CULTIVATED: Venezuela: Croat 38245a (E--2892189).

*VITEX PACHYPHYLLA* J. G. Baker

Additional bibliography: Mold., Phytologia 49: 367. 1981.

A wood section accompanies the illustration cited below.

Additional citations: MOUNTED ILLUSTRATIONS: Assoc. Colon.-Scienc. Co. Nat. Bois Colon. Evino. 1928 (Ba).

*VITEX PANSHINIANA* Mold.

Additional bibliography: Mold., Phytologia 49: 367--368 & 447 (1981) and 50: 246. 1982.

*VITEX PARVIFLORA* A. L. Juss.

Additional & emended bibliography: Walp., Repert. Bot. Syst. 4: 84--85 & 91. 1845; Bocq. in Baill., Rec. Obs. Bot. 3: 253. 1863; E. D. Merr., Bull. Philip. Forest. Bur. 1: 51. 1903; Heyne, Nutt. Plant. Ned. Ind., ed. 1, 4: 113--114. 1917; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 246. 1919; E. D. Merr., Enum. Philip. Flow. Pl. 3: 395--396. 1923; Heyne, Nutt. Plant. Ned. Ind., ed. 2, 1: 24 (1927), ed. 2, 2: 1317 (1927), and ed. 2, 3: 1646. 1927; Dop, Bull. Soc. Hist. Nat. Toulouse 57: 205. 1928; Hsiao, Fl. Taiwan 6: 122. 1980; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 468. 1980; Mold., Phytologia 49: 368--375 & 381 (1981), 49: 440, 443, 457, & 459 (1981), and 50: 253, 266, & 267. 1982.

Merrill (1923) comments that this species is found "Throughout the Philippines in all or most islands and provinces. Common in both secondary and open primary forests at low altitudes. This valuable timber tree, commercially known as molave, is common in many parts of the Philippines. It is represented by more than 225 individual collections [in the Manila herbarium, now destroyed]. The species is not closely allied to *V. cofassus* Reinw. and presents no intergrades with that species, of which Hallier considered it to be a variety. I have a photograph of Jussieu's type; it is identical with *V. littoralis* Decne. The inflorescences are often abnormal." He gives the extra-limital distribution as "Saleyer, Timor, Java, Celebes, Amboina".

Schauer (1847) cites *Cuming* 1365 and 1830 from the Philippines and a *Herb. Mus. Paris s.n.* from Timor.

Biegel describes the corollas on his no. 5236 as "blue, the lip darkest and with a yellow patch near its base".

Additional citations: CULTIVATED: Cuba: *J. G. Jack 8374* (W--1555893). Hawaiian Islands: *O. Degener 11244* (It). Zimbabwe: *Biegel 5236* (Ba).

*VITEX PARVIFLORA* var. *PUBERULENTA* Mold.

Additional bibliography: Mold., *Phytologia* 49: 374 (1981) and 50: 253 & 266. 1982.

*VITEX PARVIFLORA* f. *STERILIS* H. J. Lam

Additional bibliography: Mold., *Phytologia* 49: 373 & 375. 1981.

Additional citations: PHILIPPINE ISLANDS: Luzon: *Hagger 255* (It).

*VITEX PAYOS* (Lour.) Merr.

Additional bibliography: White & Angus, *Forest Fl. N. Rhodes*. 372. 1962; Mold., *Phytologia* 49: 376--379 (1981) and 50: 250, 266, & 269. 1982.

Greenway (1969) cites *Greenway & Kabwie 12530* from Tsavo East National Park.

*VITEX PEDUNCULARIS* Wall.

Additional & emended bibliography: Walp., *Repert. Bot. Syst.* 4: 91. 1845; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 172. 1895; Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: 207 & 209--211, 1928; Kanjilal, Das, Kanjilal, & De, *Fl. Assam* 3: 479, 480, 484--485, & 561. 1939; Sharma, Shetty, Vivekan., & Rathakr., *Journ. Bomb. Nat. Hist. Soc.* 75: 33. 1981; Mold., *Phytologia* 49: 379--383 (1981) and 50: 267. 1982.

Sharma and his associates (1981) cite *Vivekananthan 40805* from Tamil Nadu, India, describing the plant as a common tree with white "flowers" [corollas], at 950 m. altitude, flowering there in April. Craib (1911) cites *Kerr 572* and *Vanpruk 122* from Thailand, where it grows in mixed and deciduous jungles, at 300--450 m. altitude, giving its overall distribution as "Bengal, Assam, Burma". Dop (1928) cites *Hayata 806* and *Poilane 1356 & 7660* from Annam, *Harmand s.n.* and *Pierre 649* from Cambodia, *Harmand s.n.*, *Lefèvre 361*, and *Pierre 1865* from Cochinchina, and *Harmand 417 & 1293* and *Thorel 266* from Laos. He describes the species as a tree of the forests, 20--30 m. tall, very abundant on clay soils in Indochina, and records the vernacular names, "aloang conon", "cay chung vit", and "cay san trang". He comments, further, that "Poilane dit que c'est un bois rouge ou jaunâtre très dur, très bon pour tous travaux. Sa résistance aux termites est douteuse, bonne d'après les Annamites, mauvaise d'après les Moïs. Dans l'Indie Anglaise, au Pegu et au Tenasserim, ce bois est, d'après Kurz, recherché pour divers usages," and "Cette espèce présente quelquefois des feuilles 5-foliolées, papyracées ou subcoriaces".

Additional citations: BANGLADESH: *J. M. Cowan 179* (It); *Majumder & Islam 44* (Mi, Mi).

*VITEX PETERSIANA* Klotzsch

Additional bibliography: White & Angus, *Forest Fl. N. Rhodes*.

371. 1962; Mold., *Phytologia* 49: 384. 1981.

Gonde describes this species as a shrub, 6--8 feet tall, and encountered it on dark basaltic soil in mixed woodlands.

Additional citations: ZIMBABWE: *Gonde 51/74* (W--2922191).

*VITEX PIERREANA* Dop

Additional bibliography: Mold., *Phytologia* 49: 432--433. 1981.

Dop (1928) comments that "Cette espèce est voisine du *V. Eberhardtii*. Elle s'en distingue par l'inflorescence, le calice pubescent, les fleurs plus petites."

*VITEX PINNATA* L.

Additional & emended bibliography: Blume, *Cat. Gewass.*, imp. 1, 86. 1823; Walp., *Repert. Bot. Syst.* 4: 82--84 & 91. 1845; Bocq. in *Baill.*, *Rec. Obs. Bot.* 3: 253. 1863; Koord., *Meded. Lands. Plantent.* 19: 560. 1898; Ridl., *Journ. Roy. Asiat. Soc. Straits* 57: 84 (1910) and 59: 157. 1911; Koord., *Exkursionsfl.* 3: 136 & 495. 1912; Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: 198, 199, 208, 210, & 211. 1928; Corner, *Wayside Trees*, ed. 1, pl. 216. 1940; Blume, *Cat. Gewass.*, imp. 2, 86. 1946; Corner, *Wayside Trees*, ed. 2, 695, 706, 707, & 709--710, pl. 216. 1952; Mold., *Phytologia* 49: 373, 432--445, 452, 457, 459, & 468 (1981) and 50: 252--254, 267, 270, & 425. 1982.

Additional illustrations: Corner, *Wayside Trees*, ed. 1, pl. 216 (1940) and ed. 2, pl. 216. 1952.

Corner (1940) reports the vernacular name, "Malayan teak", for this species. Ridley (1910, 1911) describes the tree as "Common in open country", citing *Ridley 14938 & 14939* from Perlis, giving its overall distribution as India, Burma, and Malaya.

Corner (1952) describes this species as "An evergreen tree up to 80 ft. high, flowering at 15 ft.: bark pale yellowish grey or ashen, somewhat fissured and flaky in long thin pieces, the inner bark light yellow, turning green on exposure to the air: crown shabby green, rounded but rather uneven, with the limbs arching out and with many small branches standing stiffly up from them: twigs, leaf-stalks, inflorescences and undersides of the leaves hairy. Leaves with 3--5 large, sessile leaflets, the outer two often small: middle leaflets 3--11 x 1 1/4 -- 4", elliptic, long-tipped, rather dull shabby green, with 13--20 pairs of side-veins: leaf-stalk 1--4" long. Flowers 2/3" long and wide, in large, conical or flattened, terminal panicles 3--10" long and wide, the greenish brown bracts conspicuous: corolla violet blue, the upper lobes bluish white. Fruit 1/3" wide, green, then dull purple and finally black, surrounded by the calyx 1/3" wide. S.E. Asia, Malaysia: common in villages, open country and by rivers and seashores throughout Malaya." He lists the additional vernacular names, "leban", "halban", and "haleban", and continues: "The Leban is one of the commonest trees of secondary jungle, its berries being sought after and distributed by birds. It is not a beautiful tree for the dull green leaves, which are often disfigured by galls or perforated by insects, and the untidy inflorescences with their dingy bracts give the crown a shabby, if unmistakable, look. It flowers and fruits



through the year. In the open it has a short trunk that soon breaks up into branches but in moderate shade it becomes a fairly lofty tree which in shape and branching greatly resembles the Teak (*Tectona*). The fissured bark is evidently suitable for the roots of epiphytic orchids so that the Leban is well-known to the hunter of wild orchids who quickly learns to scan the branches in search of rarities. The timber is hard and heavy and is used in villages for ploughs and other agricultural instruments. An intense yellow dye can be extracted from the bark. At Sepang, all the trees have white or yellowish-white flowers." The fruits, of course, are drupes, not berries.

Talib & Husin refer to the tree as medium-sized, to 30 feet tall, the bole 6 feet high, the girth 2 feet, the bark smooth and black, the inner bark yellowish, the sapwood orange-yellow, and the fruit "black-green" (in October). They have found it growing along roadsides in secondary forests. Krukoff records the Sumatran vernacular names, "alóban-bátu" and "alobanbúnga".

Additional citations: BANGLADESH: J. M. Cowan 432 (It); *Majumder & Islam* 120 (Mi, Mi). PHILIPPINE ISLANDS: Palawan: *Edano, Herb. Philip. Bur. Sci.* 77441 (Mi). GREATER SUNDA ISLANDS: Sabah: *Talib B. & Husin SAN.84776* (Ld). Sumatra: *Krukoff* 314 (Mi), 335 (Mi).

*VITEX PINNATA* f. *PTILOTA* (Dop) Mold.

Additional bibliography: Mold., *Phytologia* 49: 432 & 444--445 (1981) and 50: 252, 254, 267, & 270. 1982.

*VITEX POLYGAMA* Cham.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 91--92. 1845; Bocq. in *Baill., Rec. Obs. Bot.* 3: 253. 1863; Mold., *Phytologia* 49: 368 & 446--448. 1981.

*VITEX PSEUDOLEA* Rusby

Additional bibliography: Mold., *Phytologia* 49: 450. 1981.

Schunke refers to this species as having "El tronco es semi-acanalado con los corteza rugosa de color amarilló pardo. Las hojas son caducas. Diámetro del tronco 30". He reports the tree 34--40 m. tall, the corolla light-violet, and the stamens dark-violet. He encountered it in high forests, at 500--600 m. altitude, in flower in May.

Additional citations: PERU: San Martín: *Schunke Vigo 8382* (Ld).

*VITEX PUBERULA* J. G. Baker

Additional bibliography: Mold., *Phytologia* 49: 450 (1981) and 50: 251. 1982.

Additional citations: ANGOLA: Loanda: *Welwitsch 5668* [F. G. Mey. photo 2996] (W--photo of type).

*VITEX PYRAMIDATA* B. L. Robinson

Additional bibliography: Rzedowski, *Veget. Mex.* 186. 1978; Mold., *Phytologia* 49: 450--452. 1981.

The corollas are said to have been "blue" on *Mason & Mason* 3346.

Another vernacular name recorded for the species in Mexico is "tescalama".

Additional citations: MEXICO: Jalisco: *Herb. Coll. Idaho s.n.* [7/25/61] (Me--287041). Nayarit: *Herb. Coll. Idaho s.n.* [7/2/55] (Me--286931); *Mason & Mason* 3346 (Mi).

*VITEX QUINATA* (Lour.) F. N. Will.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 83, 87--89, & 91. 1845; Bocq. in *Baill., Rec. Obs. Bot.* 3: 253. 1863; Corner, *Wayside Trees*, ed. 2, 707 & 710. 1952; Hsiao, *Fl. Taiwan* 6: 122. 1980; Mold., *Phytologia* 49: 443 & 452--460 (1981) and 50: 253, 266, 267, & 270. 1982.

Corner (1952) describes this species as "A tree with light grey, shallowly ridged and fissured bark and bright orange inner bark: like *V. coriacea* [*Teijsmanniodendron coriaceum*] but: -- Leaflets 3--5, with 8--10 pairs of side-veins, scarcely leathery. Panicles 6--14" long, larger, with stout branches. Fruit pear-shaped with a small point, dark green (? yellow when ripe). India, W. Malaysia to the Philippines: not infrequent in the middle of Malaya."

Dop (1928) notes that "La règle de priorité veut, comme l'a fait Williams, que le binôme *V. quinata* soit substituée au binôme *V. heterophylla* adopté par la presque totalité des botanistes. Je n'ai pas rencontré cette espèce dans l'Herbier du Museum. D'ailleurs Loureiro la signale en Chine et non en Indochine." Actually, most of the non-Chinese specimens cited by authors, including myself in earlier installments of this work, prove to be *Vitex turczaninowii* Merr. rather than *V. quinata*. Chan describes the corollas as "cream-yellow, lower limb tinged purple" and found the tree in full flower in July.

Additional citations: CHINA: Kwangtung: *Tsang* 21194 (Mi), 21477 (Mi). CHINESE COASTAL ISLANDS: Hainan: *Fung* 20420 (Mi); *How* 70858 (Mi); *Lei* 66 (Mi), 714 (Mi); *Liang* 62220 (Mi); *Wang* 33204 (Mi), 33757 (Mi). HONG KONG: *Chan s.n.* [July 20, 1973] (Mi); *Hu* 8445 (Mi); *Taam* 1532 (Mi), 1846 (Mi).

*VITEX QUINATA* var. *SERRATA* Mold.

Additional bibliography: Mold., *Phytologia* 49: 460 (1981) and 50: 270. 1982.

*VITEX RADULA* Mildbr.

Additional bibliography: Mold., *Phytologia* 49: 460. 1981.

Phillips describes this plant as a tree, 8--10 feet tall, the fruit green in May, and have found it growing in rainforests, at 4010 feet altitude. Material has been misidentified and distributed in some herbaria as *V. buchanani* Baker.

Additional citations: MALAWI: *Phillips* 2159 (Ba--376242).

*VITEX RAPINI* Beauvis.

Additional bibliography: Guillaum., *Journ. Arnold Arb.* 13: 27.

1932; Mold., *Phytologia* 49: 460. 1981.

*VITEX REHMANNI* Glrke

Additional bibliography: Mold., *Phytologia* 49: 462--463 (1981) and 51: 214. 1982.

*VITEX RUFESCENS* A. L. Juss.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 85 & 86. 1845; Mold., *Phytologia* 49: 464--465 (1981) and 50: 248 & 270. 1982.

*VITEX RUFESCENS* var. *PARAENSIS* Mold.

Additional bibliography: Mold., *Phytologia* 49: 465 (1981) and 50: 248 & 270. 1982.

*VITEX SCABRA* Wall.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 91. 1845; Mold., *Phytologia* 49: 465. 1981.

*VITEX SCANDENS* Mold.

Additional bibliography: Mold., *Phytologia* 49: 465--466. 1981.  
Streimann & Kairo describe this plant as a "Climber, leaves glossy on both sides, lighter green beneath, petals velvet red".  
Additional citations: NEW GUINEA: Territory of New Guinea: Streimann & Kairo NGF.21102 (W--2916868).

*VITEX SCHAUERIANA* Mold.

Additional bibliography: Mold., *Phytologia* 49: 466. 1981.  
The Duarte 3060 [Herb. Jard. Bot. Rio Jan. 73512], distributed as *V. schaueriana*, seems actually to be *V. megapotamica* (Spreng.) Mold.

*VITEX SCHOMBURGKIANA* Schau.

Additional bibliography: Mold., *Phytologia* 49: 466--467 (1981) and 50: 267. 1982.  
Additional citations: BRAZIL: Roraima: Prance, Steward, Ramos, Farias, & Monteiro 9578 (Mi).

*VITEX SELLOWIANA* Cham.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 89. 1845; Mold., *Phytologia* 49: 469. 1981.

*VITEX SIAMICA* F. N. Will.

Additional bibliography: Ridl., *Journ. Roy. Asiat. Soc. Straits* 59: 157. 1911; Corner, *Wayside Trees*, ed. 2, 708. 1952; Mold., *Phytologia* 48: 490 (1981) and 49: 469. 1981.  
Williams' original (1905) description of this species is: "Fru-tex? Ramuli teretes laeves glabri, lenticellis albis conspersi. Folia ternata; petiolo communi 3 1/2 -- 4 cm., glabro tereti. Foliola 6--9 cm. long., 2 1/2 -- 3 1/2 cm. lat., superiora minora; ovato-lanceolata acuminata, basi rotunda, coriacea, glabra, nervis

13--15-jugis, subtus vix prominentibus; petioluli 1 -- 1 1/2 cm. Inflorescentia paniculata; panícula 16--20 cm., ramis suberectis multifloris puberulis. Calyx cyathiformis, extus aspero-puberulus, dentibus 5 brevibus acutis, sinus levissime excavatis, in fructu auctus incrassatus. Drupa sect. transversa 3 1/2 mm., ovato-globosa tetrasperma nigra. -- *V. negundo* et *V. trifoliae* affinis." He cites as cotypes "Teruto (1888), Coah (1892), Curtis, n. 1683" from the Langkawi Archipelago. Dop (1928), citing only Curtis 1683, says: "Je n'ai pas rencontré cette espèce en Indochine française. Je le signale à cause de son nom spécifique et de l'étroite parenté qu'elle présente avec le *V. ajugaeflora*."

Ridley (1911) cites the species from Langkawi, Dayong Bonting and Kwah on the basis of Fox s.n., Ridley 12720, and Curtis 1683 from "Limestone rocks and Selangor".

Fletcher (1938) cites Curtis 1683, Fox 12720, Haniff & Nur 7079, Henderson 21385 & 23094, Kerr 10948, 13175, 17317, 18775, & 18923, Put 1025, 1378, 1643, & 4149, and Rabil 307 from Thailand. He notes that "Kerr 18923 and Rabil 307 have been referred to this species in spite of the fact that the ovary is distinctly pilose. In every other way the plants are so identical with this species that the writer does not feel justified in separating them." Possibly a varietal or form designation would be appropriate.

Recent collectors describe *V. siamica* as a small tree, 2--10 m. tall, shrubby treelet, "dangling shrub", or climber, the trunk to 15 cm. in diameter at breast height, the bark marked with many pale lenticels, the flowers visited by bees, and the sepals green. The corollas are said to have been "blue" on Balgooy 2306, "pale-lilac" on Stone 5894, "pale-lilac lip with a central yellow patch" on Stone 6922, "pale-lavender" on Stone 9516, "white" on Stone 6994, and "white/yellow" on Chung 46.

Collectors have found the species growing on sandy shores, cliffs, and dry rocky summits, in limestone crevices, in rocky limestone ground, and on limestone hills, hill summits, and ridgetops, in anthesis in February, May, July, August, and November, and in fruit in August. Stone refers to it as "common", "fairly common", and "rather common".

Material of this species has been misidentified and distributed in some herbaria as *V. negundo* L. and *V. trifolia* L. On the other hand, the B. C. Stone 8931, distributed as *V. siamica*, actually is *V. gamosepala* W. Griff.

Additional citations: MALAYA: Kelantan: Chin 1388 (Kl--19924); B. C. Stone 7466 (Kl--8257), 9516 (Kl--12365). Selangor: Chung 46 (Kl--19924); B. C. Stone 5894 (Kl--5626). MALAYAN ISLANDS: Bumbon Besar: Balgooy 2306 (Ac, N). Langkawi: Keng & al. K.6223 (Ac); B. C. Stone 6922 (Kl--7788), 6994 (Kl--7858). Timun: Turnau 773 (Kl--2773).

#### VITEX SIMPLICIFOLIA Oliv.

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 315, 320, 322, & 323. 1900; Fedde & Schust.,

Justs Bot. Jahresber. 57 (2): 403 (1938) and 60 (2): 576. 1941; H. N. & A. L. Mold., Pl. Life 2: 82 & 88. 1948; Kershaw, Veget. Act. Geobot. 15: 249, 258, 261--265, & 267. 1967; Hocking, Excerpt. Bot. A.13: 569. 1968; Kershaw, Journ. Ecol. [Brit.] 56: 473. 1968; Mold., Phytologia 17: 38--40. 1968; Mold., Résumé Suppl. 16: 7 & 29. 1968; Mold., Biol. Abstr. 50: 942. 1969; Mold., Fifth Summ. 1: 210, 211, 217, 221, 223, 225--227, & 234 (1971) and 2: 716, 727, 731, & 929. 1971; Mold., Phytologia 23: 420. 1972; Lewis & Elvin-Lewis, Med. Bot. 257. 1977; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 53. 1978; Mold., Phytologia 44: 388 (1979) and 46: 31. 1980; Mold., Phytol. Mem. 2: 201, 202, 207, 210--213, 215, 216, 218, 224, & 594. 1980; Mold., Phytologia 46: 486. 1980.

The *Vitex bakeri* B. L. Robinson and *V. schweinfurthii* Baker, previously regarded by me as synonyms of *V. simplicifolia* Oliv., should be deleted from its synonymy. *Vitex bakeri* is a valid taxon, very different from the type collection of *V. simplicifolia*.

*Vitex simplicifolia* is said by Kershaw (1968) to be a member in Nigeria of the *Gardenia erubescens*--*Detarium microcarpon* plant association growing on massive vesicular laterite mounds, on ironstone concretions in the *Isoberlinia*--*Detarium* association and in the *Isoberlinia*--*Uapaca* association. He says that it is abundant with *Detarium microcarpon* and *Combretum binderianum* in ironstone areas, restricted in other areas, the inhibitory properties of manganese offering a possible explanation of this phenomenon, but it is not definitely known whether manganese is universally present in ironstone deposits or whether the pH falls sufficiently to mobilize it. He also reports that this species, along with *Combretum binderianum* and *Crossopteryx febrifuga*, is characteristic of the ironstone areas of Nigeria. Lewis & Elvin-Lewis (1977) state that in the Ivory Coast a decoction is made from *V. simplicifolia* and is used in the treatment of snake-bite.

Huber (1963) refers to the species as "A small tree or shrub with dense, pale indumentum and mauve flowers [corollas]", inhabiting savannas. Drar (1970) found it in fruit in April in the Kordofan of Sudan.

The *Schweinfurth 1519*, previously cited by me as *V. simplicifolia*, are now regarded by me as representing *V. bakeri* B. L. Robinson.

#### *VITEX SIMPLICIFOLIA* var. *VOGELII* (J. G. Baker) Pieper

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 57 (2): 403. 1938; Mold., Phytologia 17: 39--40. 1968; Mold., Fifth Summ. 1: 223 & 225--227 (1971) and 2: 731 & 929. 1971; Mold., Phytol. Mem. 2: 213, 215, 216, 218, & 594. 1980.

#### *VITEX SNETHLAGIANA* Huber

Additional bibliography: Mold., Phytologia 17: 40. 1968; Mold., Fifth Summ. 1: 180 (1971) and 2: 929. 1971; Mold., Phytol. Mem. 2: 172 & 594. 1980.

*VITEX SPRUCEI* Briq.

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 60 (2): 576. 1941; Eglér, *Bot. Mus. Para. Goeldi*, ser. 2, Bot. 18: 80. 1963; Mold., *Phytologia* 17: 40. 1968; Mold., *Fifth Summ.* 1: 180 (1971) and 2: 725, 728, & 929. 1971; Porto, Longhi, Citadini, Ramos, & Mariath, *Act. Amaz.* 6: 304, 311, 312, & 316. 1976; Mold., *Phytologia* 36: 35. 1977; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 34. 1979; Mold., *Phytol. Mem.* 2: 112, 172, 460, & 594. 1980.

Recent collectors describe this plant as a bush or tree, to 20 m. tall, "muito copada", with fragrant flowers and green [immature] fruit, in flower in May, and in fruit in January. The corollas are said to have been "white" on Barata & Coelho s.n. and "white with purple on the larger petal" on Schultes & López 9949. Collectors have encountered it "at water's edge" and report the vernacular names, "leão-bravo" and "pião bravo".

Porto and her associates (1976) assert that this species is part of a *Vitex*--*Micrandra* ecologic community. They assert that *Vitex sprucei*, along with *Carapa guianensis* Aubl., *Jessenia bataua* (Mart.) Burret, and *Euterpe precatoria* Mart., are very frequent in the lowland associations. "Sendo *Vitex sprucei* Briq. a espécie mais uniformemente distribuída e de maior frequência dentro do grupo de espécies consideradas associadas, podemos denominar a vegetação estudada de comunidade *Vitex*--*Micrandra*.... Dentro da comunidade *Vitex*--*Micrandra* temos, a rigor, somente uma unidade de vegetação.... Quanto ao aspecto estrutural da vegetação pode-se afirmar existirem na comunidade *Vitex*--*Micrandra* 3 estratos bem definidos: um herbáceo.... representado predominantemente por *Rapateaceae*, *Marantaceae*, *Cannaceae*, *Zingiberaceae* e algumas *Pteridophyta*."

Additional citations: BRAZIL: Amazonas: Barata & Coelho s.n. [11/01/1968] (W--2920780); Prance, Pena, Ramos, & Monteiro 3938 (S); Rodrigues & Lima 4733 [Herb. Inst. Nac. Pesq. Amaz. 13259] (N); Schultes & López 9949 (W--1996970, W--1996971). Roraima: Murça Pires & Leite 14845 [320] (N).

*VITEX SPRUCEI* var. *LONGIDENTATA* (Mold.) Mold.

Additional bibliography: Mold., *Phytologia* 17: 40. 1968; Mold., *Fifth Summ.* 1: 180 (1971) and 2: 728 & 930. 1971; Mold., *Phytol. Mem.* 2: 172 & 594. 1980.

*VITEX SPRUCEI* var. *VAUPESENSIS* Mold.

Additional bibliography: Mold., *Phytologia* 17: 40. 1968; Mold., *Fifth Summ.* 1: 121 (1971) and 2: 930. 1971; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 34. 1979; Mold., *Phytol. Mem.* 2: 112, 172, 460, & 594. 1980.

Additional citations: BRAZIL: Amazonas: Steward, Araujo, Rogers, Ramos, & Ribamar 428 (N).

*VITEX STAHELII* Mold.

Additional & emended synonymy: *Vitex staheli* Mold., *Alph. List*

Inv. Names Suppl. 1: 29, in syn. 1947; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 15, 96, 97, & 102. 1975. *Vochysia racemosa* Lam., in herb.

Additional bibliography: Mold., *Mutisia* 6: 4. 1952; Mold., *Phytologia* 17: 40--41. 1968; Rollet, *Adansonia*, ser. 2, 8: 549. 1968; J. A. Steyermark, *Act. Bot. Venez.* 3: 72, 83, & 156. 1968; Mold., *Fifth Summ.* 1: 121, 128, 131, & 133 (1971) and 2: 728 & 930. 1971; Mold., *Phytologia* 28: 437. 1974; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 15: 96, 97, & 102. 1975; Mold., *Phytologia* 34: 257. 1976; López-Palacios, *Fl. Venez. Verb.* 581 & 623--627, fig. 145. 1977; López-Palacios, *Revist. Fac. Farm. Univ. Andes* 20: 34. 1979; Mold., *Phytologia* 44: 399 & 412. 1979; Mold., *Phytol. Mem.* 2: 112, 121, 124--126, & 594. 1980; Mold., *Phytologia* 49: 365 (1981) and 50: 246. 1982.

Illustrations: López-Palacios, *Fl. Venez. Verb.* [624], fig. 145. 1977.

Recent collectors describe this plant as a low-branched tree, 10--28 m. tall, nearly leafless during anthesis, the trunk 35--102 cm. in diameter at breast height, the bark shallowly and finely fissured, brownish-gray, the leaflets papery or firmly membranous, rich- or medium-green and slightly glossy above, paler green and dull beneath, calyx green, and the fruit subglobose, smooth, glossy, purple or dull-purple, finally black when mature. They have encountered it in semi-evergreen or deciduous forests, tall-tree primary forests (the trees 3--35 m. tall), and on savannas, rocky hillsides with semi-deciduous forests, at 50--400 m. altitude, in flower in April, October, and November, and in fruit in May and November. They record the additional vernacular names, "aceituno", "guarataro", and "totumillo morado".

The corollas are said to have been "purple" on Blanco 476 & 490, "blue, the throat white" on Davidse & González 16376, "violet" on Sastre 6173, "violet, the large lobe more intensely so than the others" on Bunting 5672, and "blue, with white nectar-guides" on Davidse & González 16564.

Prévost describes the tree as "defolié et entièrement recouvert de fleurs bleu-mauves. Sexualité axillaire et ramiflorie, par inflorescences pédonculées à multiples fleurs zygomorphes, 1.5 cm. de long, à gorge blanche sticées de violet, 4 étamines. Les nouvelles unités de croissance apparaissent. Les feuilles sont opposées, pétiolées et tri- or pentafoliolées."

The *Herb. Poiret* s.n. collection, cited below, is probably the holotype of *Vochysia racemosa* Lam. since it is annotated in Lamarck's own handwriting as "*Vochysia racemosa* m." My good friend and colleague, Dr. Alicia Lourteig, avers that it has been photographed in the Paris herbarium as "type (?) of *Vochysia racemosa*". Steyermark has suggested that it may be an *Aegiphila* species. An unknown Dutch hand has added "The 4 (5?) stamens are attached to the corolla throat, alternating with the lobes, at the place of attachment there is a hairy ring in the corolla-throat; anthers?; the ovary is 2-celled, with 4 ovules, apical, anatrop., the upper part hairy; style 1, forked (?)."

Steyermark cites (1968) for *Vitex stahelii*, from Venezuela, Blan-

co 476 & 490 and Marcano 143 & 163, while López-Palacios (1977) cites, from the same country, the following collections: Bolívar: Cardona 2119, Conejos 97, Little 17659, Rodríguez 2623, Williams 12696. Delta Amacuro: Blanco 475, 490, & 514, Marcano-Berti 143 & 163, Rusby & Squires 84 & 257, Wurdack & Monachino 39648.

Material of this species has been misidentified and distributed in some herbaria as *Vitex compressa* Turcz., *V. triflora* Vahl, and *Tabebuia* sp. On the other hand, the Breteler 3907, distributed as *V. stahelii*, actually is *V. orinocensis* var. *multiflora* (Miq.) Huber. López-Palacios informs us that *V. stahelii* may be distinguished from *V. orinocensis* var. *multiflora* by having its peduncles shorter than the petioles and by the fact that it is an upland (not a lowland) species.

Additional citations: VENEZUELA: Amazonas: Steyermark, Davidse, & Guanchez 122353 (Ld). Bolívar: Ll. Williams 12696 (N, Ve--12852). Delta Amacuro: Berti 163 (N, N); C. Blanco 476 (N, W--2557722), 490 (N, W--2557694), 514 (N, W--2557104); Davidse & González 16376 (Ld), 16564 (Ld). Táchira: Steyermark & Liesner 119159 (E--2773255). Zulia: Bunting 5672 (Ld); Trujillo 10974 (Eu--47848). FRENCH GUIANA: Herb. Poiret s.n. (P); Prévost 382 (Ld); Sastre 6173 (Cy).

#### VITEX STELLATA Mold.

Additional bibliography: Mold., *Phytologia* 17: 41. 1968; Mold., *Fifth Summ.* 1: 263 (1971) and 2: 930. 1971; Mold., *Phytologia Mem.* 2: 252 & 594. 1980.

#### VITEX STRICKERI Vatke & Hildebr.

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, *Fl. Trop. Afr.* 5: 315 & 318. 1900; Dale & Greenway, *Kenya Trees* 592 & 597--598. 1961; Mold., *Phytologia* 17: 41. 1968; Greenway, *Journ. East. Afr. Nat. Hist. Soc. Nat. Mus.* 27: 196. 1969; Gillett, *Numb. Check-list Trees Kenya* 47. 1970; Mold., *Fifth Summ.* 1: 234, 239, & 242 (1971) and 2: 725, 728, & 930. 1971; Mold., *Phytologia* 44: 389 (1979) and 46: 11. 1980; Mold., *Phytol. Mem.* 2: 224, 228, 232, & 594. 1980.

Recent collectors describe this plant as a bush, scrambling shrub, or creeping woody vine or liana of vigorous growth, or even as a coppice-growing tree, growing singly or in groups, profusely leafy, 1--8 m. tall, the stems erect, purple-brown, the branchlets brown-pubescent, tips of the twigs with orange-colored pubescence, the bark dark gray-brown, glabrous, smooth or rough, the sap colorless, the leaves 3-foliolate, very dry, soft dull-green, rough, the flowers hairy, slightly to strongly aromatic, the calyx 2-lipped, the corolla 1-sided, the stamens 4, attached within the corolla, the filaments hairy, and the fruit hard and edible. They have found it growing in loose brown or sandy soil at the edge of forests or thick cover, "in thick forests on gravel and black cotton soil", in sand near beaches, in old cultivated areas, in thickets on red loam, along streams in ravine thickets, on ant-hills, among rocks on hillsides, along roadsides near swamps, on rocky slopes, and in *Acacia*--*Commiphora* woodlands, from sealevel



to 200 m. altitude, in flower from November to April, July, and August, and in fruit from March to June.

The corollas are said to have been "white" on *Perdue & Kibuwa 8058* and *Tanner 1305, 2383, 2872, 3422, 3427, & 3986*, "cream" on *Burt 4640*, "yellowish-white" on *Strid 2796*, "lime-white" on *Tanner 630 & 3420*, "yellow-pink" on *Leippert 5513*, "pale-pink" on *Tanner 2065*, "lilac" on *Schlieben 5623*, and "largest lip purple, otherwise white" on *Archbold 1615*.

Leippert refers to the species as "common" in brushland where the rainfall is 700 mm. per year. Archbold mistakenly calls the drupaceous fruit a "berry".

Baker (1900) describes *V. strickeri* as "A shrub 5--6 ft. high; branchlets densely clothed with short brown pubescence. Leaves trifoliolate, subcoriaceous, scabrous above, densely pubescent with raised main veins beneath; leaflets ovate, acute, 1 1/2 -- 2 in. long, entire or slightly toothed, end one shortly petioled; main petiole densely pubescent, 1 in. long. Cymes forming a thyrsoid terminal panicle 2--4 in. long; branches very pubescent; pedicels very short. Calyx campanulate, pubescent, minutely toothed, 1/12 in. long at flowering. Corolla pubescent, twice as long as the calyx. Drupe yellow, glossy, glabrous, the size of a pea." Gürke (1895) describes it as "Ein mehrere Meter hoher Str[auch] mit ziemlich kleinen, 3zähligen B[lätter] und etwas erbsengrossen, hellbraunen Fr[üchte], in Buschgehölzen."

Dale & Greenway (1961) assert that *V. strickeri* is "Doubtfully distinct" from *V. lamiana* Pieper, claiming that it inhabits the coastal areas of Kikuyu and Teita.

Additional vernacular names recorded for *V. strickeri* are "mhamu", "mkungulungo", "mpulu'ngosha", "mugombo", "mukakinga", "mukichano", and "mvumba".

*Mhoro 1190* is placed here tentatively as its fruits seem to be borne solitary or paired at the ends of very short twigs.

The leaves of *V. strickeri* are used by natives to treat swollen gums. For this purpose the leaves are cooked and the resulting liquid is used to rinse the mouth. The roots are also boiled and the resulting liquid is drunk to alleviate "sharp stomach ache". The juice of pounded leaves is taken orally to combat snakebite or is "used directly for cobra poison in the eyes".

Baker (1900) cites unnumbered Hildebrandt and Kirk collections from Tanzania and of Wakefield from Mombasa. Dale & Greenway (1961) cite *Battiscombe 807*, *Gardner 2989*, *Wakefield s.n.*, and *Williams 320* from Kenya. Greenway (1969) cites *Sheldrick TNP/E/R /74* from Tsavo East National Park.

The Mearns collections, cited below, were previously erroneously cited by me as *V. volkensii* Gürke.

Additional citations: TANZANIA: Tanganyika: *Archbold 1615* (Ld); *Burt 4640* (Mu); *Endlich 777* (Mu), *777a* (Mu); *Leippert 5513* (Mu); *Mhoro 1190* (Tz); *Schlieben 5623* (Mu); *Tanner 630* (N), *1305* (N), *2065* (Ba, N), *2383* (Ba, N), *2872* (Ba, N), *3420* (Ba, N), *3422* (Ba, N), *3427* (Ba), *3986* (Ba, N). KENYA: *Mearns 262* (W--630276), *269* (W--630284); *Perdue & Kibuwa 8058* (Mu); *Strid 2796* (Go).

*VITEX STYLOSA* Dop

Additional & emended bibliography: Dop, Bull. Soc. Hist. Nat. Toulouse 57: 201--202 & 210--211. 1928; Fedde & Schust., Justs Bot. Jahresber. 56 (2): 286. 1937; Mold., Phytologia 17: 41. 1968; Mold., Fifth Summ. 1: 303 (1971) and 2: 930. 1971; Mold., Phytol. Mem. 2: 294 & 594. 1980.

*VITEX SUMATRANA* Miq.

Additional & emended bibliography: Miq., Fl. Ind. Bat. Suppl. 1: 242 & 567--568. 1860; Kurz, Forest Fl. Brit. Burma 2: 271 & 612. 1877; C. B. Clarke in Hook. f., Fl. Brit. India 4: 586. 1885; S. Moore, Journ. Bot. Lond. 63: Suppl. 81. 1925; Dop, Bull. Soc. Hist. Nat. Toulouse 57: 201 & 210--211. 1928; Fletcher, Kew Bull. Misc. Inf. 1938: 432 & 434. 1938; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 576. 1941; Mold., Phytologia 17: 30 & 41. 1968; Mold., Fifth Summ. 1: 285 & 329 (1971) and 2: 728 & 930. 1971; Mold., Phytol. Mem. 2: 274, 319, & 594. 1980.

The Moore (1925) reference in the bibliography (above) is often cited to "Rendle" or "S. Moore in Rendle", but it seems that Moore alone was the author.

Clarke (1885) comments, under *V. urceolata* C. B. Clarke, that "The inflorescence, calyx, corolla and drupe are so like those of *V. sumatrana*.....that it may be a variety of it; but in *V. sumatrana* the leaves are mostly 5-foliolate and pubescent beneath."

Dop (1928) says "Cette espèce me paraît avoir été souvent confondue avec le *V. quinata* Williams, avec lequel elle présente une ressemblance telle que Koorders et Valetton ont réuni les deux espèces. Cependant, il existe un caractère important très net sur lequel King et Gamble.....ainsi que Lam.....ont insisté: c'est que la corolle est entièrement glabre en dedans dans *V. sumatrana* et n'offre pas l'anneau de poils blancs que l'en observe dans presque tous les *Vitex* à l'insertion des étamines. J'ai pu m'assurer que la forme des folioles (non acuminées ou courtement et brusquement ou longuement acuminées) n'avait aucune valeur différentielle. J'ai la conviction que la plupart des plantes chinoise rapportées au *V. quinata* Williams appartiennent au *V. sumatrana* var. *urceolata*. Les échantillons récoltés à Hai nan par Henry.... appartiennent sans aucun doute à cette dernière espèce."

*VITEX SWYNNERTONII* S. Moore

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 39 (2): 320. 1913; Mold., Phytologia 17: 41. 1968; Mold., Fifth Summ. 1: 253 (1971) and 2: 930. 1971; Mold., Phytol. Mem. 2: 242 & 594. 1980.

The original type (holotype) specimen of this species, *Swynnerton 1054* was photographed in the British Museum herbarium as Missouri Botanical Garden type photograph number A.850.

Additional citations: MOZAMBIQUE: Gazaland: *Swynnerton 1054* [Missouri Bot. Gard. photos A.850] (Gz--photo of type, N--photo of type, W--photo of type).

*VITEX TANGENSIS* Gürke

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 316 & 321--322. 1900; Chiov., Result. Scient. Miss. Stef. 1: 144. 1916; Chiov., Fl. Somalia 1: 63. 1929; Glover, Prov. Check List Brit. Ital. Somal. 268. 1947; Dale & Greenway, Kenya Trees Shrubs 593 & 598. 1961; Mold., Phytologia 17: 41--42. 1968; Mold., Fifth Summ. 1: 239, 242, & 253 (1971) and 2: 726 & 930. 1971; Mold., Phytologia 23: 420 (1972) and 44: 390. 1979; Mold., Phytol. Mem. 2: 204, 228, 232, 242, & 594. 1980.

A many-stemmed shrub or small tree, 12--20 feet tall; branchlets short, yellowish- or drab-pubescent; leaves mostly 3- or occasionally 5-foliolate, distinctly petiolate; petioles slender, 2.5--3.7 cm. long; petiolules 5--10 mm. long or obsolete; leaflets distinctly short-petiolate or sessile, moderately firm, dark-green above (when mature) and paler beneath, oblong-lanceolate or lanceolate-elliptic to oblong, 2.5--8 cm. long, apically acute or acuminate, marginally entire, basally obtuse or attenuate into the petiolule, glabrous above when mature and pubescent or puberulent throughout beneath, glandular-resinous-punctate beneath; cymes very numerous, dense and congested, axillary, short-pedunculate, appearing with the new leaves; pedicels very short, densely pubescent; bracts lanceolate, yellow-subvelutinous; calyx campanulate, 2 mm. long, densely yellow-pubescent or -subvelutinous, its rim minutely 5-toothed, the teeth short and basally very broad, apically acute; corolla small, mauve, very pubescent, its tube twice as long as the calyx, 4 mm. long, the throat barbate; stamens and style exserted; fruits globose, 2.5--3 cm. wide, externally glabrous.

Gürke (1895) says of this species: "Dieser Str[auch] ist durch die sehr grossen, kugeligen Fr[ucht] auffallend; die Unterlippe ist dunkel-veilchenblau mit gelbem Haarpolster am Eingang des Schlundes, die 4 Lappen der Oberlippe sind schmutzig-gelblichweiss, die Staubbeutel blau." He cites *Volkens* 92 from "Buschgehölz". Dale & Greenway (1961) cite, from coastal savannas and scrub in Kenya, Dale 2776, Gardner 1465, Jeffery 152, Swynnerton 41 & 105, Trump 99, and Wakefield s.n. Chiovenda (1916) records the species from what was then Italian Somaliland.

Vernacular names listed for this plant are "mfududu", "mgegi", "mkaligote", and "mufudumaji".

*VITEX TELORAVINA* J. G. Baker

Additional bibliography: Mold., Phytologia 17: 42. 1968; Mold., Fifth Summ. 1: 263 (1971) and 2: 728, 788, & 930. 1971; Mold., Phytol. Mem. 2: 252 & 594. 1980.

Bernardi refers to this plant as a tree, 3--8 m. tall, and encountered it in open places in woods on denuded granitic mountains, at 1000--1200 m. altitude, in flower in November.

Additional citations: MADAGASCAR: Bernardi 11172 (N).

*VITEX THOMASI* DeWild.

Additional bibliography: Mold., Phytologia 17: 43. 1968; Mold.,

Fifth Summ. 1: 232 (1971) and 2: 930. 1971; Mold., Phytol. Mem. 2: 222 & 594. 1980.

*VITEX THOMASI* f. *KASAIENSIS* DeWild.

Additional bibliography: Mold., Phytologia 17: 43. 1968; Mold., Fifth Summ. 1: 232 (1971) and 2: 9-0. 1971; Mold., Phytol. Mem. 2: 222 & 594. 1980.

*VITEX THONNERI* DeWild.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 40 (2): 336 (1915) and 57 (2): 402. 1938; Mold., Phytologia 17: 43. 1968; Mold., Fifth Summ. 1: 225, 227, & 232 (1971) and 2: 728 & 930. 1971; Mold., Phytologia 44: 408. 1979; Mold., Phytol. Mem. 2: 215, 218, 222, & 594. 1980.

The *G. P. Cooper* 355, distributed as *V. thonneri*, actually is *V. congolensis* DeWild. & Th. Dur.

*VITEX THONNERI* var. *TIBATENSIS* (Engl.) Pieper

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; Mold., Phytologia 17: 43. 1968; Mold., Fifth Summ. 1: 225 (1971) and 2: 728 & 930. 1971; Mold., Phytol. Mem. 2: 215 & 594. 1980.

*VITEX THORELII* Dop

Additional & emended bibliography: Dop, Bull. Soc. Hist. Nat. Toulouse 57: 206--207, 210, & 211. 1928; Fedde & Schust., Justs Bot. Jahresber. 56 (2): 286. 1937; Mold., Phytologia 17: 43. 1968; Mold., Fifth Summ. 1: 303 (1971) and 2: 930. 1971; Mold., Phytol. Mem. 2: 289 & 594. 1980.

*VITEX THYRSIFLORA* J. G. Baker

Additional synonymy: *Vitex thyrsofolius* J. G. Baker ex Bouquet, Invent. Pl. Méd. Tox. Cong. Braz. 33. 1967.

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, Fl. Trop. Afr. 5: 315 & 319. 1900; Hutchins. & Dalz., Fl. W. Trop. Afr., ed. 1, 2: 276. 1931; Kräusel, Justs Bot. Jahresber. 50 (1): 609. 1932; Wangerin, Justs Bot. Jahresber. 52 (1): 373. 1933; Fedde, Justs Bot. Jahresber. 52 (1): 826. 1934; Hutchins. & Dalz., Fl. W. Trop. Afr., ed. 2, 2: 276. 1936; Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; Roberty, Pét. Fl. Ouest-Afr. 178. 1954; Grout de Beaufort & Schnell, Mem. Inst. Fond. Afr. Noire 75: 8, 9, & 44--48, pl. 10 A & B. 1966; Schnell, Mem. Soc. Bot. France 113: 129 & 130, fig. 61. 1966; Schnell & Grout de Beaufort, Contrib. Etud. Pl. Myrmecod. 44--47, pl. 10, fig. A & B. 1966; Bouquet, Invent. Pl. Méd. Tox. Cong. Braz. 33. 1967; Mold., Phytologia 17: 33 & 43--44. 1968; Mold., Résumé Suppl. 17: 4. 1968; Schnell, Revist. Fac. Farm. Univ. Andes 7: 130--131, fig. 4A. 1970; Mold., Fifth Summ. 1: 217--221, 223, 225, 232, 233, & 253 (1971) and 2: 712, 723, 724, 728, & 930. 1971; Lewalle, Bull. Jard. Bot. Nat. Belg. 42 [Trav. Univ. Off. Bujumb. Fac. Sci. C.20]: [231]. 1972; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 40.

1978; Mold., Phytol. Mem. 2: 212, 213, 215, 217, 222, 223, 242, 460, & 594. 1980.

Additional illustrations: Grout de Beaufort & Schnell, Mém. Inst. Fond. Afr. Noire 75: 47, pl. 10, fig. A & B. 1966; Schnell, Mém. Soc. Bot. France 113: 129, fig. 61. 1966; Schnell & Grout de Beaufort, Contrib. Etud. Pl. Myrmecod. 44--47, pl. 10, fig. A & B. 1966; Schnell, Revist. Fac. Farm. Univ. Andes 7: 130, fig. 4A. 1970.

Schnell & Grout de Beaufort (1966) regard *V. agraria* Chev., *V. obanensis* Wernh., and *V. staudtii* Gürke as synonyms of *V. thyrsoflora*, but add also *V. myrmecophila* Mildbr. which I regard as *V. thyrsoflora* var. *laxiflora* Pieper. They cite *Lebrun 2911* from Congo [Zaire] and *LeTestu 4721* from Ubangi [Central African Republic] as typical of *V. thyrsoflora* and *Letouzey 3882* from the Camerouns and *Tisserant 1159* from Ubangi as "*V. cf. thyrsoflora*". Their conclusions regarding myrmecophily in this genus are worth repeating here: "Les espèces étudiées nous montrent des caractères myrmécophiles réalisés avec une fréquence remarquable. Suivant les cas, les rameaux sont non colonisés (sans pores), ou colonisés, avec des pores, à localisation précise. Le lien avec les fourmis du genre *Viticola* paraît étroit. Wheeler admet que *Viticola tessmanni* est un hôte obligatoire de *Vitex staudtii*."

"La disposition paire et opposée des orifices, et leur rotation de 90° d'un noeud à l'autre sont des caractères remarquables. Une étude anatomique permettrait de préciser la structure histologique des emplacements prédestinés, auxquels les fourmis percent les orifices; les observations anatomiques de Bailey (1921-1922) ont mis en évidence que l'épaisseur de l'anneau ligneux est plus grande sur les faces du rameau correspondant aux feuilles que sur les faces intermédiaires, -- sur lesquelles sont percés les pores. En raison de la disposition décussée des feuilles, cette structure se trouve décalée de 90° d'un entrenoeud au suivant; ainsi la disposition des pores, liée à l'épaisseur de l'anneau ligneux, se trouve commandée en définitive par la phyllotaxie des rameaux; il serait également fort intéressant de pouvoir déterminer par quel processus (mécanique ou peut-être même chimique) les fourmis détectent ces emplacements de moindre résistance, dans lesquels elles foreront les pores."

"L'existence de pores non nodaux, et même franchement internodaux, montre cependant la possibilité d'une certaine labilité du déterminisme de la localisation. La présence assez fréquente de cicatrices subéreuses non percées, disposées en ligne sur les entrenoeuds, plaide dans le même sens. On notera toutefois que c'est essentiellement sur les noeuds que se trouvent les pores bien individualisés, alors que les attaques partielles sont presque toujours internodales. Par ailleurs, lorsqu'il existe des pores non nodaux, ceux-ci de même que les cicatrices dues à des attaques peu accentuées, se trouvent sur les faces de l'entrenoeud ne portant pas les feuilles, -- illustrant le caractère prédéterminé de cette localisation des pores en relation avec les insertions foliaires."

Recent collectors have encountered *Vitex thyrsoiflora* along gravelly roadsides and in gallery forests, at 1000--1200 m. altitude, describing it as a tree, 19 feet tall, and have found in it full flower in May. The corollas are said to have been "white" on Konnoh 175.

Additional citations: LIBERIA: Jacques-Georges 27676 (Mu); Konnoh 175 (W--2126712). BURUNDI: Lewalle 3515 (Ld). MOUNTED ILLUSTRATIONS: Schnell & Grout de Beaufort, Contrib. Etud. Pl. Myrmec. pl. 10. 1966 (Ld).

*VITEX THYRSIFLORA* var. *LAXIFLORA* Pieper

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 57 (2): 402. 1938; Grout de Beaufort & Schnell, Mém. Inst. Fond. Afr. Noire 78: 45, pl. 10, fig. C. 1966; Schnell & Grout de Beaufort, Contrib. Etud. Pl. Myrmec. 45, pl. 10, fig. C. 1966; Mold., Phytologia 17: 44. 1968; Mold., Fifth Summ. 1: 225 (1971) and 2: 712, 723, & 930. 1971; Mold., Phytol. Mem. 2: 215 & 594. 1980.

Illustrations: Grout de Beaufort & Schnell, Mém. Inst. Fond. Afr. Noire 75: 45, pl. 10, fig. C. 1966; Schnell & Grout de Beaufort, Contrib. Etud. Pl. Myrmec. 45, pl. 10, fig. C. 1966.

*VITEX TOMENTULOSA* Mold.

Additional & emended bibliography: Fedde & Schust., Justs Bot. Jahresber. 60 (2): 576. 1941; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 317 & 318. 1957; Mold., Phytologia 17: 44. 1968; Mold., Fifth Summ. 1: 98 (1971) and 2: 930. 1971; Alain in León & Alain, Fl. Cuba, imp. 2, 2: 317 & 318. 1974; Mold., Phytol. Mem. 2: 91 & 594. 1980.

Recent collectors have encountered this plant in woods and coastal thickets and limestone cliffs.

Additional citations: CUBA: Oriente: León 16336 (W--2289548); Sagra 809 (P), 909 (P). Pinar del Rio: Acuña & Zayas 19936 (N), 19938 (N).

*VITEX TRICHANTHERA* J. G. Baker

Additional bibliography: Mold., Phytologia 17: 44. 1968; Mold., Fifth Summ. 1: 263 & 426 (1971) and 2: 617 & 930. 1971; Mold., Phytol. Mem. 2: 252 & 594. 1980.

*VITEX TRIFLORA* Vahl

Additional & emended synonymy: *Vitex triflorus* Vahl ex Cain, Man. Veg. Anal., imp. 1, 278 & 279. 1959. *Vitex triflora* Vahl ex López-Palacios, Fl. Venez. Verb. 627, in syn. 1977. *Vitex triflora* var. *trifoliata* López-Palacios, Fl. Venez. Verb. 654, in syn. 1977. *Vitex triflora* Mold., Phytol. Mem. 2: 460, in syn. 1980.

Additional bibliography: Sweet, Hort. Brit., ed. 1, 1: 323. 1826; Loud., Hort. Brit., ed. 1, 246. 1830; Sweet, Hort. Brit., ed. 2, 416. 1830; Loud., Hort. Brit., ed. 2, 246. 1832; G. Don in Loud., Hort. Brit., ed. 3, 246. 1839; Sweet, Hort. Brit., ed. 3, 550. 1839; D. Dietr., Syn. Pl. 3: 610 & 611. 1843; Voigt, Hort. Suburb. Calc. 473. 1845; Walp., Repert. Bot. Syst. 4: 81--82, 86,

91, & 92. 1845; Schau. in A. DC., Prodr. 11: 693--694. 1847; Buek, Gen. Spec. Syn. Candol. 3: 86 & 502. 1858; F. Muell. in Walp., Ann. Bot. Syst. 5: 712. 1860; Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1154. 1876; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 172. 1895; Peckolt, Bericht. Deutsch. Pharm. Gesel. 14: 482. 1904; H. N. & A. L. Mold., Pl. Life 2: 67. 1948; Murça Pires, Donzhansky, & Black, Bot. Gaz. 114: 473. 1953; R. C. Foster, Contrib. Gray Herb. 184: 171. 1958; Cain, Man. Veg. Anal., imp. 1, 67, 278, & 279, fig. 45. 1959; Macbr., Field Mus. Publ. Bot. 13 (5): 692 & 697. 1960; Glerum & Smit, Invent. Florest. Amaz. 9: 35 & 112. 1965; Mold., Phytologia 17: 11--13, 45--47, 50, 54, & 56. 1968; Mold., Résumé Suppl. 16: 25 & 29. 1968; Cain, Man. Veg. Anal., imp. 2, 67, 278, & 279, fig. 45. 1971; Mold., Fifth Summ. 1: 128, 131, 133, 134, 137, 144, 180, 184, 375, 420, 423, & 466 (1971) and 2: 570, 614, 615, 713, 717, 725, 727, 729, 730, 766, 769, 770, 787, & 930. 1971; Anon., Biol. Abstr. 54 (7): B.A.S.I.C. S.282. 1972; Mold., Phytologia 23: 315--316 & 418 (1972) and 25: 168, 244, & 245. 1973; Hocking, Excerpt. Bot. A.23: 291. 1974; López-Palacios, Revist. Fac. Farm. Univ. Andes 15: 102, fig. [21]. 1975; Soukup, Biota 11: 20. 1976; López-Palacios, Fl. Venez. Verb. 289, 582, 610, 627--630, 647, 651, 653, & 654, fig. 146. 1977; Mold., Phytologia 36: 35, 36, & 48. 1977; López-Palacios, Revist. Fac. Farm Univ. Andes 20: 34. 1979; Mold., Phytologia 44: 384. 1979; Mold., Phytol. Mem. 2: 121, 124--126, 136, 172, 176, 367, 460, & 594. 1980; Mold., Phytologia 50: 245, 248, 266, & 267. 1982.

Additional & emended illustrations: Huber, Bol. Mus. Para. Goeldi 5: pl. 1, fig. 5--8. 1909; Cain, Man. Veg. Anal., imp. 1, 278, fig. 45 (1959) and imp. 2, 278, fig. 45. 1971; López-Palacios, Revist. Fac. Farm. Univ. Andes 15: fig. 21. 1975; López-Palacios, Fl. Venez. Verb. [628], fig. 146. 1977.

Recent collectors describe this plant as a shrub, 2--5 m. tall, treelet, or small tree, 3--20 m. tall; trunk to 70 cm. in diameter at breast height; bark with longitudinal furrows; wood white or light-yellow; leaves bright dark-green or brilliant pale-green, the venation prominent beneath; bracts brilliant yellow-green; buds brown; peduncles white; flower-buds white; flowers fragrant; calyx green, blue or whitish; anthers darker; fruiting-calyx enlarged, green; fruit green to light-yellow when young, brown to black when mature.

Cain (1959) states that the blade areas of the leaves average 67.4 percent of the length-breadth rectangles, showing by the application of the 'rule of thumb' that the blade area of the leaves is approximately 2/3 of the length-breadth rectangular area.

Collectors have encountered this plant in forests and disturbed primate forests (mata) on terra firme (non-inundated soil), in high, tall, seasonally very dry, and riverine forests, on forested slopes and granite peaks, in sandy soil of mata, on rocky outcrops on summits, on riverbanks, and on plateaus covered by ferrobauite, at 118--800 m. altitude, in anthesis from May to November, and in fruit in January and from September to November.

The corollas are said to have been "rosy" on *Cid & al. 647* and *Cordeiro 735*, "rosy-white" on *Cid & al. 78*, "blue" on *Croat 20610*, *Mennaga 497*, *Prance & al. 6031 & 7093*, *Silva 1148*, and *Silva & Sousa 2393 & 2476*, "light-blue" on *Prance & al. 6060*, "violet" on *Granville B.4623*, "brilliant-violet" on *Schunke 8267*, "light-violet (10 PB 6/3 or 10 PB 7/6)" on *Schunke 843, 6569, & 6668*, "violet with brown stripes in the throat" on *Prance & al. 14344*, "lilac" on *Ribeiro 1413*, "pale-blue, lip darker blue" on *Maas & al. 2220*, "pale-purple, 2 lobes ('limbs') white" on *Irwin & al. 55130*, "white with brown hairs inside" on *Hallé 1029*, "tube and throat dirty-white, limb purple-blue (10 PB 5/10), tube inside with dark-blue (10 PB 2/6) lines" on *Lindeman & al. 547*, and "tube light-purple outside, white with purple lines inside, lower petal blue, base with yellow pubescence, other petals white" on *Bisby & al. P.18091*.

Granville describes this species as follows: "Arbre 12 m. de haut environ; tronc cylindrique sans contreforts; bois brun jaune clair, dur; rhytidome mince, gris clair, mat; rameaux noirs à lenticelles blanchâtre allongées; feuilles opposées, trifoliolées; inflorescences en cymes axillaires de 3 fleurs parfumées; calice zygomorphe, vert, à tube de 7 mm. et 5 dents étalées groupées en 2 lèvres (une a 2 dents, une a 3 dents) de 1 cm. de long; corolle zygomorphe à tube de 28 mm. de long, blanchâtre à l'extérieur, blanc strié de violet à l'intérieur, légèrement arqué, 5 dents étalées dont 4 oblongues, de 7 x 3 mm., blanc lilacé, les 2 dents supérieures soudées sur le tiers de leur longueur, la cinquième dent est étalée en forme de labelle, violet clair, suborbiculaire, de 12 mm. de Ø, dentelée sur les bords; étamines 4 libres exsertes, dont 2 de 22 mm. et 2 de 23 mm., anthères violettes; ovaire supère vert obové, de 4 mm. de long à style unique, filiforme, blanc, de 10 mm.; stigmate violet clair, discrètement bilobé." Oldeman, however, says "corolle jaune ambré, style crème, étamine brun chocolat."

Loudon (1832) and Sweet (1826) both assert that *Vitex triflora* was introduced into cultivation in England from French Guiana in 1823.

Additional vernacular names reported for this species include "coramiñón", "guarataro", "sacha tahuarí", "tahuari", "taraman", "taruma", "three-flowered chaste-tree", and "yanomano".

Lopez-Palacios (1979) predicts that this species will eventually be found in Amazonian Colombia. Peckolt (1904) reports that "Die pflaumengrossen, wiesbefilzten, saftigen, wohlgeschmeckenden Steinbeeren sind ein beliebtes Waldobst."

*Granville B.4171*, collected on October 19, 1971, bears a statement on its accompanying label that it represents the first known collection of this species in French Guiana, but as early as in my 1958 work I have cited no less than 20 earlier collections (54 herbarium sheets) from this country!

*Denslow 2414* is sterile, but judging by the material available seems to represent this taxon. *Krukoff 5765* is a mixture of *Vitex triflora* and its form *quinquefoliolata* (Mold.) Mold.

Macbride (1960) cites *Ducke 7561, Klug 1254, 1492, & 2791*, and



Williams 4195 from Peru. López-Palacios (1977) cites Aristeguieta & Lizot 7372 and Williams 15688 from Amazonas, Venezuela.

Material of *Vitex triflora* has been misidentified and distributed in some herbaria as *V. klugii* Mold. and *V. stahelii* Mold., Acanthaceae, Bignoniaceae, Boraginaceae, and Rubiaceae. On the other hand, the Gentry, Ayala, & Revilla 15638, distributed as typical *V. triflora*, actually is its var. *coriacea* Huber, while Albuquerque Lobo, Vilhena, & Ribeiro 19 is var. *kraatzii* Huber.

Additional citations: COLOMBIA: Antioquia: J. Denslow 2414 (Ws). VENEZUELA: Amazonas: Aristeguieta & Lizot 7362 (Ld, N, W--2882623); Steyermark, Davidse, & Guanchez 122148 (Ld); Ll. Williams 15688 (N). SURINAM: Irwin, Prance, Soderstrom, & Holmgren 55130 (N, W--2736812); Lindeman, Stoffers, Gbrts-van Rijn, & Jansen-Jacobs 547 (N); B. Maguire 24837 (Se--182921); Mennaga 497 (N); Mori & Bolten 8568 (Ld, N). FRENCH GUIANA: Cremers 7078 (Ld); Granville 3629 (Ld), B.4171 (N, N), 4569 (N, N), 4623 (N); Halle 1029 (P); Maas, Maas, Mennaga, & Koek-Noorman 2220 (N); Oledeman B.752 (N), B.2326 (Cy, Cy); Prévost 330 (E, Ld). PERU: Huánuco: Schunke Vigo 843 (N, W--2863126), 5897 (W--2699136), 6569 (W--2653840). Loreto: Croat 20610 (Lc, Ld, N); R. Ramirez 7 (Ld). San Martín: Schunke Vigo 6668 (W--2788266), 8267 (N). BRAZIL: Acre: Krukoff 5765 in part (Mu); Lowrie, Lowry, & Souza 248 (Ld); Prance, Coêlho, Ramos, & Farias 7786 (Ac, N). Amapá: Murça Pires & Cavalcante 52602 (S). Amazonas: Bisby, Steward, & Ramos P.18091 (N); Cid, Buck, Nelson, Almeida, Mota, & Lima 78 (Ld), 647 (Ld); Krukoff 4704 (Mu); Monteiro, Pinheiro, & Ramos 14268 (N); Prance, Hill, Coêlho, & Ramos 24306 (N); Prance, Maas, Atchley, Steward, Woolcott, Coêlho, Monteiro, Pinheiro, & Ramos 14268 (Ac, N), 14344 (N); N. T. Silva 1148 (Ld, N). Pará: Cid, Ramos, Mota, & Rosas 2379 [Herb. Inst. Nac. Pesq. Amaz. 96728] (Ld, N); Murça Pires 9934 (N); N. T. Silva 1148 (N); Ribeiro 1413 [Herb. IPEAN. 162968] (Ld); Rosa 253 [Herb. IPEAN. 145967] (Ld); Silva & Rosário 3672 (N); Silva & Souza 2393 (Ac, N), 2476 (Ld, N), 2575 (Ac, N). Rondônia: Cordeiro 735 [Herb. IPEAN. 150399] (Ld); Forero & Wrigley 7093 (Ld, N); Prance, Forero, Wrigley, Ramos, & Farias 6005 (Ac, N), 6031 (N). BOLIVIA: Pando: Prance, Forero, Wrigley, Ramos, & Farias 6060 (Ld, N, W--2829507). MOUNTED ILLUSTRATIONS: Mart., Fl. Bras. 9: pl. 49. 1851 (Ld, N); Huber, Bol. Mus. Para. Goeldi 5: pl. 1, fig. 5--8. 1909 (W).

*VITEX TRIFLORA* var. *ANGUSTILOBA* Huber

Additional bibliography: Mold., Phytologia 17: 46. 1968; Mold., Fifth Summ. 1: 180 (1971) and 2: 729 & 930. 1971; Mold., Phytol. Mem. 2: 172 & 594. 1980; Mold., Phytologia 50: 248. 1982.

Recent collectors describe this plant as a tree, 2--10 m. tall, the trunk 10 cm. in diameter at breast height, and the fruit green when immature. They have found it growing on terra firme, in flower in September and October and in fruit in October. The corollas are said to have been "rose" in color on Austin & al. 7228 and "corolla-tube light-purple outside, white with purple lines inside, the lower petal blue, the base with yellow pubescence, the other petals white" on Bisby & al. P.18091.

The *Prance & al. 12523*, distributed as *V. triflora* var. *angustiloba*, actually is something rubiaceous, probably a species of *Psychotria*.

Additional citations: BRAZIL: Amapá: *Austin, Nauman, Secco, Rosário, & Santos 7228* (Ld, N). Amazônas: *Bisby, Steward, & Ramos P.18091* (W--2898197). Pará: *Murça Pires & Belém 12523* (Ld)

*VITEX TRIFLORA* var. *CORIACEA* Huber

Additional bibliography: *Mold., Phytologia 17: 46. 1968; Mold., Fifth Summ. 1: 180 (1971) and 2: 729 & 930. 1971; Mold., Phytol. Mem. 2: 136, 172, & 594. 1980.*

Recent collectors describe this plant as a tree, 5--10 m. tall, with "brown" fruit, and have found it growing in mostly cleared areas among remnant vegetation and in high woods on *terra firme*, in full anthesis in January and November, and in fruit in January. The corollas are said to have been "blue" on *Gentry & al. 15638* and "lilac" on *Oliveira 3641*. The vernacular name, "tarumã", has been reported for it and material has been distributed in some herbaria as typical *V. triflora* Vahl.

Additional citations: PERU: Loreto: *Gentry, Ayala, & Revilla 15638* (N). BRAZIL: Amapá: *E. Oliveira 3641* (N). Pará: *E. Oliveira 3865* (N). MOUNTED ILLUSTRATIONS: *Huber, Bol. Mus. Para. Goeldi 5: pl. 1, fig. 1--4. 1909* (W)

*VITEX TRIFLORA* var. *FLORIBUNDA* Huber

Additional bibliography: *Mold., Phytologia 17: 46--47. 1968; Mold., Fifth Summ. 1: 180 (1971) and 2: 725, 729, & 930. 1971; Mold., Phytologia 36: 35. 1977; Mold., Phytol. Mem. 2: 172 & 594. 1980.*

Recent collectors describe this plant as a tree, 6--10 m. tall, the trunk to 8 cm. in diameter at breast height and 1 m. in circumference, the calyx green, the stamens white or rose, and the anthers cream-color. The corollas are said to have been "rose" on *Cordeiro 536* and *Murça Pires & Belém 12342*. It has been found in anthesis in August.

The *Prance & al. 12297*, distributed as *Vitex triflora* var. *floribunda*, actually is not verbenaceous.

Additional citations: BRAZIL: Pará: *Murça Pires & Belém 12297* (Ld), *12342* (Ld). Rondônia: *Cordeiro 536* [Herb. IPEAN. 150200] (Ld). MOUNTED ILLUSTRATIONS: *Huber, Bol. Mus. Para. Goeldi 5: pl. 2, fig. 9--11 & 3, fig. 21. 1909* (W).

*VITEX TRIFLORA* var. *HIRSUTA* *Mold., Phytologia 23: 315--316. 1972.*

Bibliography: *Anon., Biol. Abstr. 54 (7): B.A.S.I.C. S.282. 1972; Mold., Phytologia 23: 315--316 & 418. 1972; Hocking, Excerpt. Bot. A.23: 291. 1974; Soukup, Biota 11: 20. 1976; Mold., Phytol. Mem. 2: 136, 172, & 595. 1980.*

Schunke describes this plant as a tree, 4--5 m. tall, the leaves brilliant pale-green, fragrant, the calyx pale-green, and the immature fruit greenish-yellow and pubescent. He found it growing in a high forest at 295 m. altitude, in fruit in October.

[to be continued]

New species and combinations in Chrysanthellum  
(Asteraceae-Coreopsidae)

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Several workers have requested that I make formal the novelties and combinations pending in my revisional study of the genus Chrysanthellum. In my treatment I have recognized 10 species, one of which, C. indicum, is a widespread, subtropical, montane weed which I intend to treat as comprised of four infraspecific taxa as follows.

Chrysanthellum indicum subsp. afroamericanum, B. L. Turner, subsp. nov.

A subspecies indicum et subspecies mexicanum involucris fructificantibus amplioribus (4-6 mm longis), marginibus cartilagineis achaeniorum validioribus (0.2-0.4 mm latis), floribus radiatis pluribus (13-34 rarius 8) differt.

HOLOTYPE (A!): ARGENTINA. Prov. Cordoba, Dept. Colon; Rio Ceballos, 15 Mar 1944, C. A. O'Donnel & J. M. Rodrigues V. 501. (Isotypes: F!, UC!)

The subspecies consists of a single bicontinental (South America-Africa) variety: Chrysanthellum indicum var. afroamericanum B. L. Turner, var. nov., based upon the above type and diagnosis.

Mostly montane or moderately elevated regions of South America and Africa where it occurs as a weed along paths, in gardens and disturbed areas generally; possibly introduced into Africa from South America in relatively recent times.

An exceedingly variable, weedy variety, especially on the eastern side of the Andes in northern Argentina, Bolivia, and Peru where it is undoubtedly native.

Chrysanthellum indicum subsp. mexicanum (Greenm.) B. L. Turner, comb. nov.

Based upon Chrysanthellum mexicanum, as cited below. The subspecies is represented by a single taxon, var. mexicanum.

Chrysanthellum indicum var. mexicanum (Greenm.) B. L. Turner, comb. nov. Chrysanthellum mexicanum Greenman., Proc. Amer. Acad. 39: 174. 1903.

HOLOTYPE (GH): MEXICO. Jalisco: Banks of ravines near Guadalajara, 10 Sep 1890. C. G. Pringle 3259. (Isotypes examined: F, GH, IP, KEW, MICH, NY, S, UC).

Mostly occurring in montane or moderately elevated subtropical regions of Mexico and Guatemala where it occurs as a weed along paths and roadways, especially in shallow wet depressions.

Similar to, but differing from, the var. indicum in possessing longer peduncles and longer leaves but especially by the somewhat larger disk achenes with narrower, more ciliate, cartilaginous margins. As noted by Greenman in his original description, var. mexicanum bears a close resemblance to var. indicum. After examining a broad suite of specimens from throughout the world, I find it most reasonable to treat the largely continental isolates of Chrysanthellum indicum as weak, but distinct, varieties, several of which are sufficiently differentiated so as to warrant the rank of subspecies.

Chrysanthellum tamaulipense Turner, sp. nov.

HOLOTYPE (TEX): MEXICO. Tamaulipas: 6 mi N of Aldama on the road to Soto la Marina. "Weedy growth in bottom of small arroyo through the basalt uplands." 25 Sep 1960, J. Crutchfield & M. C. Johnston 5726.

A Chrysanthellum involutum foliis mediocaulis minoribus petiolis brevioribus, partibus floris omnibus minoribus, apprime floribus disci perfertilibus differt. Known only from the holotype and one additional collection (Tamaulipas: 2.4 mi N of Aldama, 16 Sep 1964. Strother 544, TEX).

The species is undoubtedly closely related to Chrysanthellum involutum but is readily distinguished by its smaller, less petiolate, mid-stem leaves, generally smaller floral parts and especially by its quite fertile disk florets. In all these characters C. tamaulipense approaches C. indicum but its circinate, marginal achenes and 4nerved ligules place it nearer C. involutum.

Chrysanthellum michoacanum Turner, sp. nov.

HOLOTYPE (TEX): MEXICO. Michoacan: 11-13 km west-southwest of Apatzingán, along the road to Dos Aguas and Aguililla, ca. 300 m, 5-9 Sep 1972, J. V. A. Dieterle 4246. (Isotype: MICH!).

A Chrysanthellum integrifolium foliis vulgo ovatis, capitulis amplioribus, radiis longioribus, paleis receptaculi brevioribus, praecipue floribus disci centralibus rubiginosis aliquot (3--8) fortiter atrorubiginosis demum floribus peripheralibus duplo amplioribus differt.

Only two other collection sites are known, both near Apatzingán (Hinton et al. 12058, GH, NY, US; McVaugh 17907, MICH).

This taxon is undoubtedly most closely related to *Chrysanthellum integrifolium* but can be readily distinguished by its leaves, larger heads with longer ray florets, shorter chaff and most notably by the brownish-red disk florets, some of these (3--8) becoming much darker and nearly twice the size of the outer disk florets, which are presumably at the same (or yet later) stage of development. This latter phenomenon was not observed in the dry heads of *C. integrifolium*.

*Chrysanthellum perennans* Turner, sp. nov.

HOLOTYPE (LL): MEXICO. Oaxaca: Along the Pan-American Highway, 22 km NW of Zanatepec, 100 m elevation or less; high dense vegetation. 10 Jul 1958, R. M. King 463. Isotype (MICH!).

Herbae perennes erectae glabrae. Folia tripartita. Capitula solitaria longe pedunculata pedunculis 15--20 cm longis; flores radiati ca. 13, ligulis 8 mm longis, 2 mm latis aurantiacis 6--7-nervatis apice profunde lobatis, disci flores verosimiliter steriles.

Known only from the type locality where it reportedly is uncommon in sandy soil.

This is the only perennial taxon in the genus and is readily recognized by the elongate peduncles which arise single from each rosette. Unfortunately, the collections available do not have mature heads so that the shape of the achene is unknown. These will probably prove to be circinate to some degree, to judge from the position of the corolla upon the somewhat oblique ovary, for it is positioned off center towards the abaxial side.

## BOOK REVIEWS

Alma L. Moldenke

"THE ILLUSTRATED FLORA OF ILLINOIS - FLOWERING PLANTS - Basswoods to Spurges" by Robert H. Mohlenbrock, xiv & 234 pp., 103 b/w diagnostic line draw., 103 county geogr. dist. maps, and 1 tab. Southern Illinois University Press, P. O. Box 3697, Carbondale, Illinois 62901. 1982. \$22.95.

This is the tenth volume to appear in this excellent series which has two main advantages over some excellent manuals published or in preparation: (1) the print and illustrations are large enough to be easily legible and artistically appreciated and (2) the published parts can be and are being used before the whole work is printed. This volume presents the *Malvales*, *Urticales*, *Rhamnales* and *Euphorbiales* with their 10 families, 42 genera, 103 species, 15 lesser taxa and 14 excluded species. The classification basically follows Thorne 1968. There are descriptions of and keys to the families, their genera and their species. For each kind of plant there is listed scientific name, source, synonyms, common name, habitat, range, Illinois distribution, flowering and fruiting times. There is much of a family effort in this volume: a daughter prepared all the county distribution maps, the wife typed the manuscripts, the eldest son made all the beautiful accurate species drawings and the father wrote the text.

"INTRACELLULAR AND INTERCELLULAR REGULATION AND RECOGNITION IN ALGAE AND SYMBIANTS" "Intrazelluläre und Interzelluläre Erkennungs- und Regulationsmechanismen in Algen und Symbiosen" edited by Harald Lorenzen & Wolfgang Wiessner, 320 pp., 157 b/w fig., & 46 tab. Gustav Fischer Verlag, New York, N. Y. & D-7000 Stuttgart 72, West Germany. 1981. DM.86 paper-bound.

Published as a separate complete book of all 26 papers presented by 40 international specialists at a symposium in Göttingen as recently as the autumn of 1980, it is actually *Berichte der Deutschen Botanischen Gesellschaft* 94 (3) pp. 325--645, 1981. Only the introductory paper is in German and in it the editors summarize the presentations of the following papers which are written in English. Some of the articles covered are: Circadian timing in *Gonyaulax* and for metabolic regulation in *Chlorella*, liberation of reproductive units in *Volvox* and *Chlamydomonas*, photomorphogenesis of reproduction in marine macroalgae, formation of system II photosynthetic units during greening of *Euglena* cells, recognition of potential algae symbionts of *Hydra - Chlorella*, and evolutionary impact of intracellular symbiosis.

All the papers are well presented, written and documented with the most recent information available.

"METABOLISM AND MOLECULAR ACTIVITIES OF CYTOKININS" edited by J. Guern & C. Peaud-Lenoël, xii & 352 pp., 170 b/w fig. & photo. & 65 tab. Springer-Verlag, Berlin, Heidelberg & New York, N. Y. 10010. 1981. \$59.00.

Herein are the carefully reported, illustrated and documented proceedings of the International Colloquium of the Centre National de la Recherche Scientifique held at Gif-sur-Yvette as recently as September of 1980. There are 6 papers on cytokinin biosynthesis in tumor-inducing bacteria to higher plant callus tissue, 7 papers on cytokinin metabolism with one showing how changes are quick and are "a part of the normal hormonal balance in the wild-type [moss] protonema". There are 4 papers on cytokinin hormone receptors, 4 on protein synthesis, 8 on chloroplast development in which "differentiation and maturation of photosynthetic membranes are considered as responses to cytokinins", and 3 on animal systems responding to cytokinins or cytokinin analogs. The editors summarily state that "two lines of evidence led to the alternate hypothesis that cytokinins either stimulate the gross mechanism of protein synthesis, perhaps at the level of transcription, or that cytokinin impact stimulates specific biosynthetic pathways leading to selective changes in the macromolecule equipment of the cells". There are some very effective diagrams of involved chemical pathways.

"MARINE ALGAE IN PHARMACEUTICAL SCIENCE" edited by Heinz A. Hoppe, Tore Levring & Yukio Tanaka, xiv & 807 pp., 115 b/w fig., 96 tab., 4 photo. & 1 map. Walter de Gruyter & Co. Verlag, New York, N. Y. & 1000 Berlin 30, West Germany. 1979. \$107.00 or DM.170, slip-cover.

This comprehensive survey consists of articles presented at special sessions in the 9th International Seaweed Symposium held in Santa Barbara, California, and of requested articles from specialists so as to have the whole field covered in this single volume. It is offset-printed from typed manuscripts with a few that are unnecessarily verbose, with some spelling errors, with a few depauperate bibliographies (vide p. 680) and with a taxonomic index as well as a subject one that do not include all page references involved. Nevertheless the value of this book is considerable and will remain so for quite a while. Part I has 9 papers on general reviews such as "The Vegetation of the Sea" and "Seaweed Resources for Pharmaceutical Uses". Part II has 15 papers such as "Antibiotics from Algae" as special constituents of marine algae. Part III has 11 papers on selected algae and algal products such as "The Use of Algimates in Dentistry" and "Studies on

the Littoral Ecology and Ecophysiology of the Carrageenophytes in Tanzania".

"THE CHROMOSYSTEMATICS OF THE LICHEN GENUS *PERTUSARIA* IN NORTH AMERICA NORTH OF MEXICO" by Martyn J. Dibben, iv & 162 pp., 136 b/w photo. & fig., 29 tab., 56 geog. distrib. maps & 1 color photo. Milwaukee Public Museum Publications in Biology and Geology No. 5, Milwaukee, Wisconsin 53233. 1980. Paper-bound.

The author, under the Culbertsons at Duke University, presented this well-prepared dissertation for his Ph.D. He describes, lists the pertinent literature, gives the typical chemical reactions of cortex and medulla, geography, ecology, phylogeny, history and taxonomic appraisal for 66 species including 15 new ones. The excluded taxa are explained. The geographic distribution maps will be very useful to seriously interested readers. Some of the photographs are printed too darkly to be really helpful, but the cover has a fine composite color photograph of 14 species showing characteristics and substrate of these small sized crustose lichens.

"HOW TO KNOW THE SPIDERS" Third edition by B. J. Kaston, vii & 272 pp. & 700 b/w fig. William C. Brown Company Publishers, Dubuque, Iowa 52001. 1980 Second Printing. \$9.95 paper-bound spiral-backed.

This member of the "Picture Key Nature Series" with its addition of greater details, more helpful drawings, ranges, corrected taxonomy and 121 more species, is indicative of "a tremendous surge of interest in the study of Arachnids". Because of the helpful format of this publication the essential araneological vocabulary is effectively presented throughout the introductory chapters on spider characteristics, habitats, collection, enemies, sex differentiation, venom and silk. This is also true of the pictured keys which have descriptions and geographic distributions for each species.

"CONSUMER DRUG DIGEST" by the American Society of Hospital Pharmacists. xviii & 477 pp. Facts on File, Inc., New York, N. Y. 10016. 1982. \$9.95 paperbound.

"The purpose of this truly useful book is to help consumers, as patients, understand the medications they take." It "concentrates on the rational use of [over 1,000 generic and brand name] legitimate drugs in the treatment of properly diagnosed medical problems. For each medication there is its description, an account of how it works, possible side effects, precautions needed under specific conditions, how it is administered, advice on storage and what procedures to follow if a dose is missed.



# PHYTOLOGIA

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Vol. 51

July 1982

No. 5

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road  
Plainfield, New Jersey 07060  
U.S.A.

Price of this number \$3.00; for this volume \$13.00 in advance or \$14.00 after close of the volume; \$5.00 extra to all foreign addresses and domestic dealers; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.

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BOTANICAL GARDEN

CUTSIS BALOGH, GREENWOOD AND GONZALES  
A NEW GENUS FROM MEXICO

Pamela Balogh, Dept. of Botany, Smithsonian  
Institution, Washington, D.C.  
and  
Edward Greenwood, Oaxaca, Oaxaca, Mexico

CUTSIS Balogh, Greenwood, and Gonzales, Gen. Nov.  
(Subtribe Spiranthinae, Orchidaceae)  
Type- Neottia cinnabarina La Llave & Lexarza, in  
Nov. Veg. Descr. Fasc. 2. Orch. Opusc. 3. (1825)  
Neotype-Balogh and Graham 723 (US), Zacatecas, Mexico.

Herbaceous erect perennials, terrestrial. Roots thick, fleshy, fascicled. Leaves basal, clasping, ensheathing for almost  $\frac{1}{2}$  length of leaf, lanceolate, sessile, glabrous, thick, mostly persistent at flowering. Inflorescence a spike in a multi-ranked spiral, densely-flowered. Scapes glandular pubescent with septate trichomes, ensheathed by bracts. Bracts leaf-like, large, tubular, overlapping, lanceolate. Flowers subtended by bracts, segments recurved or flared at apex. Floral bracts leaf-like, 3-5 nerved, sessile, ovate to lanceolate, acuminate, ciliate with glandular septate trichomes, orange-red. Calyx orange to red outer surface, yellow inside, glandular with septate pubescence; dorsal sepal narrowly lanceolate, adherent to lateral petals; lateral sepals linear-lanceolate, falcate. Corolla orange to red outer surface, yellow inner surface; lateral petals linear-lanceolate, falcate, adherent to dorsal sepal; labellum pubescent in throat, narrowly oblong-lanceolate, expanded more or less in center of labellum, adherent to clinandrium to form a tube-like entrance to the nectar sac, short claw; auricles linear adnate. Column orange-yellow, pubescent on ventral surface, extended into a short foot, slightly curved, apex rounded; lateral wings reduced, connecting clinandrium to labellum and anther cap. Stigmatic surface broad, rounded, two fused lobes, parallel to anther. Anther dorsal, erect, subequal to rostellum, lid-like, sagittate, rounded at base, narrow at apex, shrinking away from pollinarium at maturity. Rostellum elongate, narrow, tubular at apex, membranous. Viscidium plug-like, inserted for at least  $\frac{1}{3}$  length into rostellum, fusiform-oblong, brown, adhesive surface on ventral face, subapical to pollinia. Pollinarium long, acicular, attached to dorsal surface of viscidium, pollinia pairs closely parallel except for a slight divergence at base, minor pollinia almost entirely enclosed by the major pollinia, pollinia narrowing towards apex, similar to

Stenorrhynchos.

Plantae herbaceae perennes terrestres. Radices crassis carnosis fasciculatis. Folia basalia amplectentia lanceolata sessilia glabra persistentia. Inflorescentiae spicatae spirales, scapi pubescentes, pilis glanduliferis septatis, vaginatis, bracteis foliiformibus amplectentibus lanceolatis imbricatis cinnabarinis. Bractee floriferae foliiformes tri-quintuplinerves sessiles ovato-lanceolatae acuminatae ciliatae cinnabarinae pilis glanduliferis septatis. Flores in segmentis recurvi; calyx extus cinnabarina intus lutea, pilis septatis saepe glanduliferis; sepalo dorsalis lineari-lanceolato acuminato ad petala lateralia adhaerenti; sepala lateralia lineari-lanceolata falcata. Corolla extus cinnabarina intus lutea glabra; petala lateralis lineari-lanceolata falcata, labello anguste oblongo-lanceolato, in medio dilatato ad clinandrium adhaerenti unguiculato, auriculis linearibus adnatis; columna cinnabarina ventraliter pubescens in pede producta, alis deminutis inter clinandrium et labellum continuis, stigmatibus 2 latis rotundatis contiguus ad antheram parallelis, anthera operculato sagittato basaliter rotundato apice attenuato, rostello elongato angusto tubularis membranaceo, viscidio obturaculiformis fusiformis subapicalis, pollinario longo acicularis, pollinio parallelo ad Stenorrhynchos similis.

The name Cutsis is derived from the Indian vernacular "Cutsis." This monotypic genus is distributed in southwestern Texas, Mexico, and western Guatemala where it prefers dry habitats such as rocky slopes, limestone areas, grassy roadsides, and lava fields. Cutsis flowers during the rainy season, from July to October, and often in large colonies. The most distinguishing characteristics are the tubular tipped rostellum, plug-like viscidium, and the two-toned flowers with recurved perianth parts.

Cutsis has most often been regarded as a single species of Stenorrhynchos and was originally described as Neottia cinnabarina from "Irapaeum, S. Michael del Monte" in western Mexico. Stenorrhynchos is distinct with its bristle-like hardened rostellum, sheath-like viscidium, erect perianth parts, recurved labellum, and lanceolate anther cap. Stenorrhynchos is most likely adapted for hummingbird pollination while Cutsis may be adapted for bee pollination.

Acknowledgement: We thank Harold Robinson, Dept. of Botany, Smithsonian Institution, Washington, D.C. for the Latin Diagnosis.

## MALE AND FEMALE GAMETOPHYTES IN BEGONIA DICHROA

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The genus Begonia, a member of Begoniaceae, is widely cultivated throughout the globe for its colourful foliage and flowers. Although the genus comprises 900 species,<sup>1</sup> very little work has been done on its embryology.<sup>1-10</sup> The present report deals with the male and female gametophytes in Begonia dichroa Sprague.

The anther is tetrasporangiate. Its wall consists of the epidermis, endothecium, two middle layers and secretory tapetum. The endothecium later on develops the fibrous thickenings. The pollen mother cells undergo simultaneous cytokinesis and produce decussate, isobilateral and tetrahedral tetrads. However, the last type being more frequent. Young pollen grains are round or slightly oval. At maturity the pollen grains become oblong or ellipsoidal. The mature pollen grains are two celled, tricolporate with a smooth exine and a thin intine. Degeneration of anther and pollen at different stages of development is quite common.

The winged inferior ovary is tricarpellary syncarpous and trilocular with many distinct short styles. The projecting axile placentae are bifurcated. The ovule is anatropous, bitegmic and weakly crassinucellate. The inner integument is 2-layered and the outer integument is 2 or 3-layered. The cells of the inner integument elongate radially, accumulate abundant cytoplasm and differentiate into an endothelium. The micropyle is formed by both the integuments. A well developed hypostase is also formed.

The single celled hypodermal archesporium cuts off a parietal cell towards outside and a megaspore mother cell towards inside. The parietal cell by further anti-periclinal divisions produces two parietal layers. The megaspore mother cell undergoes meiosis and produces either linear or T-shaped megaspore tetrads. The chalazal megaspore of the tetrad develops into 8-nucleate embryo sac of the polygonum type. The synergids are pear-shaped. The uninucleate antipodals are three in number and are ephemeral.

The micro and megasporogenesis are identical in all the members of the family hitherto investigated.<sup>1-10</sup> However, bitegmic and tenuinucellate ovules are reported

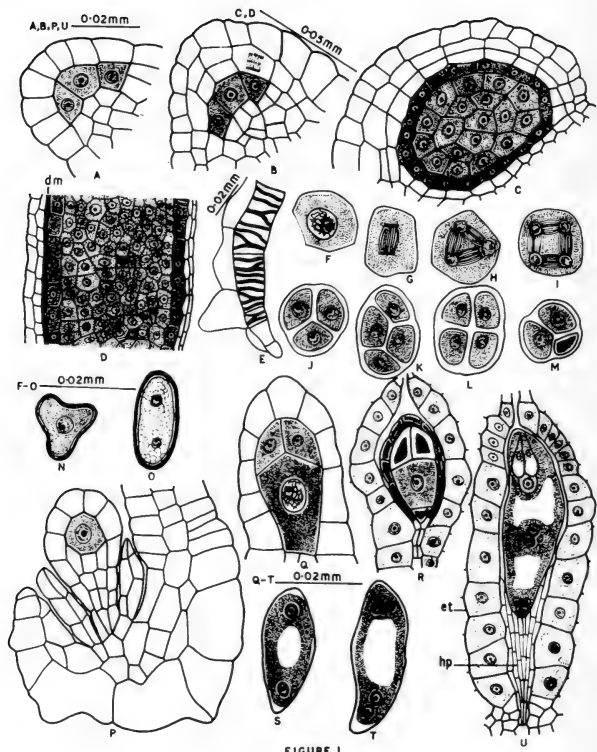


FIGURE 1

FIG. 1  
 A-D, Part of anther lobes showing development of anther wall and sporogenous tissue; E, Fibrous endothecium; F-I, Pollen mother cells in meiotic division; J-M, Pollen tetrads; N&O, Pollen grains; P-U, Stages in megasporogenesis and female gametophyte. (dm, degenerating middle layer; et, endothelium; hp, hypostase).

in a few species of Begonia<sup>8-10</sup> In B. dichroa the nucellus degenerates soon and the embryo sac directly comes in contact with the inner layer of the inner integument which differentiates into an endothelium as in B. crenata,<sup>10</sup> B. anamalayana and B. malabarica.<sup>9</sup> However, in a few species of Begonia the outer most layer of the nucellus develops into the epithelium.<sup>8</sup> But, Swamy and Parameswaran (1960) and Maheswari Devi and K.C. Naidu (1979) observed a perfectly well developed integumentary tapetum in all the species of Begonia investigated by them. Therefore, the epithelium of Sandt (1921) also may be regarded as the normally developed integumentary tapetum. It may be considered that the polypetalous families containing tenuinucellate ovules with integumentary tapetum are showing a tendency towards evolution of gamopetalous families.

#### ACKNOWLEDGEMENTS

The junior authors (KCN, VAL & KMR) are highly thankful to CSIR, New Delhi for the award of senior and junior Fellowships.

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NOTES ON NEW AND NOTEWORTHY PLANTS. CLIX

Harold N. Moldenke

*CARYOPTERIS CHOSENENSIS* Mold., nom. nov.

*Clerodendron divaricatum* Sieb. & Zucc., Abhandl. Akad. Wiss. Muench. Math.-Phys. 4 (3): 154. 1846 [not *Clerodendrum divaricatum* Jack, Malay. Misc., imp. 1, 15--17 & 48--49. 1820].

*SYNGONANTHUS COWANI* var. *INVOLUCRATUS* Mold., var. nov.

Haec varietas a forma typica speciei foliis supremis numerosis anguste linearibus 12--15 mm. longis involucrantiformibus recedit.

This variety differs from the typical form of the species in having the uppermost whorl of stem leaves narrowly linear, 12--15 mm. long, forming an involucre beneath the terminal umbel of very short-pedunculate heads.

The type of the variety was collected by Otto Huber (no. 4844) on the savannas about 30 km. west of Serrania El Tigre, in the region of the upper Caffer Yagua, Depto. Atabapo, Amazonas, Venezuela, 3°51' N. Lat., 66°27' W. Long., at about 130 m. altitude, on February 29, 1980, and is deposited in the Lundell Herbarium at the University of Texas, Austin. The collector describes the plant as "Hierba diminuta, hasta 5--8 cm de alto, frecuente en los canales de drenaje secos. Cabezuelas blancas."

*SYNGONANTHUS DUIDAE* var. *LONGIFOLIUS* Mold., var. nov.

Haec varietas a forma typica speciei foliis 3--4 cm. longis recedit.

This variety differs from the typical form of the species in having its leaves 3--4 cm. long.

The type of the variety was collected by T. Koyama and G. Agostini (no. 7515) in wet shallow soil and moss on rocks along the margin of Rio Pulpul, growing with sedges, local and infrequent, above Salto Pulpul at the southern foot of the peaks of Uaipuntepui, at 1200 m. altitude, Bolívar, Venezuela, on March 6, 1967, and is deposited in the Britton Herbarium at the New York Botanical Garden.

*SYNGONANTHUS XERANTHEMOIDES* var. *ANGUSTIFOLIUS* Mold., var. nov.

Haec varietas a forma typica speciei foliis anguste linearibus ca. 1 mm. latis recedit.

This variety differs from the typical form of the species in having its firmly rigid leaves narrowly linear and only about 1 mm. wide.

The type of the variety was collected by Otto Huber (no. 5112) on the savanna about 2--3 km. southeast of the lower Rio Guasacavi, 3°08' N. Lat., 67°30' E. Long., at an altitude of 90 m., Amazonas, Venezuela, on March 10, 1980, and is deposited in the Lundell Herbarium at the University of Texas. The collector notes that it was "Muy frecuente en toda la sabana; cabezuelas blancas."



NEW SPECIES FROM SOUTH AMERICA. III.

Donald R. Simpson

This is the third and last paper of this series. The second paper of this series\* presented descriptions of eight new species of trees and shrubs. In that paper I referred to two publications (Bentham, 1874; Macbride, 1943)\*\* in the discussion under Inga toca-cheana (p. 312) but neglected to include the bibliographic citations; these are given in the second footnote below.

Many of the new taxa described in the three papers of this series are based on collections of a dendrology study project which deserves brief mention here. Most of the project's collections were made by foresters of the Peruvian Forest Service. The project's final report\*\*\* can be consulted for the formation and realization. Identification of most of the project's collections was by Dr. Frances Kukachka at the U. S. Forest

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\* Simpson, Donald R. 1975. New Species from South America. II. *Phytologia* 30 (5): 304 - 316.

\*\* Bentham, George. 1874. Revision of the Suborder Mimoseae. *Trans. Linn. Soc. London* 30: 335 - 664 (under Inga diadema, p. 604): see also Bentham, G. 1876. *Leguminosae III. Mimoseae*, in *Mart. Fl. Bras.* 15 (pt. 2): 468.

Macbride, J. F. 1943. *Flora of Peru, Leguminosae*, in *Field Mus. Nat. Hist., Bot. Ser.* 13, pt. III, no. 1: 3 - 507 (under Inga tarapotensis, p. 43).

\*\*\* Ministerio de Agric, Servicio Forestal y de Caza: U. S. Dept. of Agric., Agric. Research Service. *Identification of Trees of Peru, Final Report.* 1966.

Service Wood Products Laboratory, Madison, Wisconsin, and by Dr. Louis O. Williams and myself at Field Museum of Natural History in Chicago. The collections were made in the Amazonian forests of eastern Peru and the forests in the Dept. of Tumbes in northwestern Peru. The project's collections vary considerably in quality, but all are of special botanical interest. This is due in part to the paucity of collections in herbaria from mature trees of the tropical forest canopy. This scarcity of collected materials is a consequence of the great difficulty of making collections from the forest canopy. The usual method of cutting the tree down to obtain a collection limits collectors to only a few such collections a day. Consequently our knowledge of the tree species composing the forest canopy is less complete than for the species of shrubs, herbs, lianas, and understory trees of the same forest. It is not surprising then, to encounter among the collections of this dendrology project such a large number of taxa new to science.

Part of the special quality of this material results from the method of collection. This involved selection of a large tree in the forest and numbering the tree with paint to facilitate relocation at regular intervals. The trees were checked regularly and when in flower a collection was made using tree climbing apparatus and leaving the tree in place undisturbed. Then, when the fruits had matured a second collection was made, and finally the tree was felled and samples of the wood were cut from the trunk. Thus from the same tree wood samples and collections of flowering and fruiting materials were obtained and although bearing different collection numbers they bear the same tree identification number.

The collections of Jose Schunke V. belong not to the dendrology project discussed above but to a project of general collection in the Peruvian forests. This project was funded by a grant from the National Science Foundation and involved the cooperative help of the Peruvian Forest Service. This project began about October or November, 1966, and continued until about 1972 or 1973.

An unusually fine set of collections were made several years ago in Dept. Antiochia, Colombia by Dr. Djaja Doel Soejarto. I was privileged to work on identification of the Rubiaceae in that material and found that among them was a distinctive new species of tree belonging to the genus Duroia which I am describing below.

## ANNONACEAE

### GUATTERIOPSIS RAMIFLORA D. Simp. sp. nov.

Arbor 10-12 m. alta; diametro trunci 9 pollices; ramulis glabris vel sparsissime minuteque strigosis, in siccitate nigrescentibus vel atrorufescentibus. Folia simplex, alternae, estipulata; lamina plerumque late obovata aliquandam late elliptica, apice rotundato vel latissime acuto, base late cuneata et in petiolum decurrenti, supra glabra, subtus per totam paginam sparse strigosa, plerumque 18-26 cm. longa, 10-14 cm. lata, nervis lateralis 18-22 paribus; petiolo supra late canaliculata, subtus rotundata et 2.5-3.5 cm. longo. Planta ramiflora, i.e., floribus binis usque quaternis ad nodos (defoliatinis?) vel in axillis foliorum veterum fasciculatis; pedicellis 2.5-

4 cm. longis, sparse strigosis. Flos magna; sepalo ovato vel elliptico 6-8 mm. lato, 7-10 mm. longo, extus a pilis longis adpressisque dense piloso, intus dense cortique villosis; petalis in statu plene expanso oblongis vel oblanceolato-oblongis, apice rotundato vel parum retuso, 12-20 mm. latis, 25-40 mm. longis, in alabastro a pilis aureis vel luteolis densissime villosis vel tomentosis, ad maturitatem sparce pubescentibus; conectivo antherarum parum umbonato, praeter papillas minutas glabro; stigmatibus tomentosis; ovario piloso. Fructus ignotus.

PERU: Dept. San Martin: Prov. Mariscal Caceres; Dist. Tocache Nuevo; en bosque alto, Quebrada de Ishichimi (Fundo Retiro), Jose Schunke V. 3924 (Type, F, holotype sheet no. 1,753,293; isotype sheets 1,753,292 and 1,753,294).

Of the four species of Guatterioopsis recognized by Fries (Hort. Berg. 12: 108-112. 1934; 12: 275. 1937), only one, G. sessiliflora (Benth.) R. E. Fries, is known from Peru. In addition to the one Peruvian collection cited by Fries (Killip & Smith 27,522), many collections of G. sessiliflora now in the herbarium show it to be relatively common.

The present species differs markedly from the other species of the genus in the unusually broad, obovate leaves with a broadly acute apex, the long pedicels, and the petals that at maturity are about 1.5 cm. wide by 3-4 cm. long. In contrast, G. sessiliflora has more narrow, oblong leaves with acuminate tips, flowers sessile or very short-pedicellate, and the petals deltoid or ovate in bud, becoming broadly ovate-elliptic to elliptic, usually only about 2 cm. long, and with an acute apex.

## MALMEA PACHITEAE D. Simp. sp. nov.

Frutex 2-3 m. altus. Folia parva; laminis chartaceis, oblongis, apice late acuto et saepe in breve acumen productum, basibus late acutis, plerumque 7-11 cm. longis, 2.2-3.5 cm. latis; petiolis plerumque 2-5 mm. longis. Flos folium oppositus singuli portatus; pedicello strigoso, articulato, bibracteato; bracteis, quarum una articulum subtenens, altera supra articulum affixa est, ca. 1-1.5 mm. longis, ca. 1.5 mm. latis; sepalis tribus, ovato-deltaideis, late acutis, ca. 3 mm. longis, 3.5-4.0 mm. latis, extus dense strigosis; petalis sex, extus sparse strigosis intus glabris, illis externis ovatis, 11-16 mm. longis, 10-14 mm. latis, illis internis late ellipticis, 14-22 mm. longis, ca. 11-20 mm. latis; staminibus numerosis, connectivo in discum spicalem ampliato, glabris vel subglabris; ovariis pilosis, stigmatibus glabra. Fructus ignotus. PERU: Dept. Huanuco: Prov. Pachitea; Dist. Honorita; en bosque alto, camino a Ayamiria, cerca del campamento Miel de Abeja a la orilla del Rio Pachitea (ca. 1 km. arriba de Tournavista), Bosque Nacional de Iparia, alt. 300-400 m., 1 dec. 1966, J. Schunke V. 1294 (Type, F: holotype sheet 1,733,810; isotype sheet 1,733,809).

The other Malmea species known from the Rio Pachitea drainage, M. raimondii (Diels) R. E. Fries, has much larger, nearly coriaceous leaves and much larger flowers than in M. pachiteae. Of all the species known from the western part of the Amazon Basin, M. pachiteae most resembles M. dichina R. E. Fries, based on Krukoff 5632 from Acre Territory, Brazil. In M. dichina the tertiary venation is very prominent on the leaves beneath, the blades usually broadest below midlength (i.e., lance-elliptic), apex tapering into a long acumen; length-width ratio of petals mostly

2:1, elliptic or lance-elliptic. In M. pachiteae the tertiary venation is very obscure beneath, the blades generally broadest about midlength, apex broadly acute and the acumen very short or lacking, the outer 3 petals with a length-width ratio about 1.2:1.

## BOMBACACEAE

PHRAGMOTHECA LEUCOFLORA D. Simp. sp. nov.

Arbor ca. 20 m. (66 ped.) alta; diametro trunci 20 pollices; diametro prope apicem ramulorum 6-8 mm.; ramulis juvenilis a squamis stellato-peltatis ferrugineis dense vestitis. Folia simplicia, alterna; laminis integris, ovatis, apice obtuso vel late acuto, mucronato vel in apiculum terminenti, basi cordata, lobis rotundatis et marginibus interioribus petiolum superimpositis, coriaceis, supra sparsissime stellato-lepidotis praeter secus nervos dense lepidotis, subtus dense lepidotis, e basi 9-11-nervatis, nervis supra parum impressis, subtus valde prominentibus, rete venulorum supra parum impressis, subtus valde prominentibus, rete venulorum supra obscuro subtus manifesto ac parum prominenti; petiolis teretibus, ad basim et apicem parum dilatatis, dense lepidotis, plerumque 8-12 cm. longis, diametro ca. 3 mm.; stipulis prominentibus lanceolatis acuminatis, in superficiebus ambabus dense lepidotis, 16-26 mm. longis, 5-8 mm. latis. Flores ad nodos folia oppositi singuli prodientes; pedunculo dense lepidoto, 20-25 mm. longo, circa 1/3 longitudinem a duabus (raro uno) bracteis et ca. 2/3 longitudinem a una bractea ornato, bracteis lineari-lanceolatis; calyce coriaceo, anguste campanulato, intus a pilis longis adpressis aureis densissime sericeo, plerumque trilobato, 40-50 mm. longo (lobis inclusis);

lobis calyculum late acutis vel obtusis, plerumque longioribus quam latioribus, 10-15 mm. longis et 12-20 mm. latis; petalis 5, oblanceolatis, apice (obtusos?), usque ad 70 mm. longis, prope apicem ca. 20 mm. latis, a pilis stellatis adpressis pubescentibus; tubo filamentorum calyculum a 15-22 mm. excedenti, longe retrorseque sericeo, lobis 5 plerumque 25-30 mm. longis, in quoque lobo duas series longitudinales cellularum antherarum portato, cellulis inferioris discretis, superioribus saepe connatis, indistincte multilocularis. Capsulae ellipsoidales, ca. 5 cm. longae, diametro 3 cm.; basi in calyculum perdurentem coriaceum inclusa; ex apice in 8-12 valvas dehiscentibus; nuculis 5, exterioribus fibrosis, semine uno in quoque nucula.

PERU: Dept. Loreto: Prov. Maynas; Dist. Alto Nanay, 150 m. alt., Peruvian Forest Serv. Dendrology Project tree no. I-148: flowering collection 28 Oct., 1964, A. Gutierrez R. 179 (holotype F, sheet no. 1,753,296); fruiting collection 18 Sept., 1963, A. Arostegui V. 128 (paratype F, bulk fruit specimen).

This genus created in 1946\* by Cuatrecasas contains, in addition to the Peruvian species described above, only two other species, both from the Pacific

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\* Cuatrecasas, Jose. 1946. Notas a la Flora de Colombia, VII. Rev. Acad. Colomb. Cien. Ex. Fis. y Nat., 6(24):533-551. March 31, 1946 (Phragmothea gen. nov., p. 549; through printing error the name of the type species was omitted).

\_\_\_\_\_ 1946. Notas a la Flora de Colombia, IX. Rev. Acad. Colomb. Cien. Ex. Fis. y Nat., 7(25/26):47-52. Dec. 30, 1946 (Phragmothea gen. nov. p. 49; corrected the omission in previous publication by repeating generic and specific descriptions and naming type species P. siderosa Cuatr.).

coastal forests of Colombia. The three species can be separated as follows.

- A. Leaf blades markedly cordate based, basally 9-11 nerved; stipule 16-26 mm. long; flowering peduncle 20-25 mm. long; capsule ca. 5 cm. long, 3 cm. diameter; western Amazon Basin  
 ----- P. flaviflora
- AA. Leaf blades rounded or slightly cordate at base, basal nerves 3; stipule unknown; flowering peduncle ca. 15 mm. long; capsule unknown; Pacific Coast lowlands of Dept. del Valle, Colombia ----- P. siderosa
- AAA. Leaf blades obtuse or rounded at base, basal nerves 5; stipule ca. 1 cm. long; fruiting peduncle 3.5 cm. long; capsule ca. 8 cm. long, 10 cm. diameter; Pacific Coast lowlands of Dept. El Choco, Colombia \_\_\_ P. fuchsii

The original description of P. fuchsii by Cuatrecasas (1971)\* was accompanied by a discussion contrasting it with the previously published P. siderosa. In that discussion other differences which are not incorporated in the key above were also mentioned.

## RUBIACEAE

DUROIA SOEJARTOI D. Simp. sp. nov.

Arbor magna; ramulis juvenilibus crassis quadrangularibus, et versus apicem dense hirsutus vel velutinis, mox glabratis. Folia simplicia, opposita; stipulis terminalibus extus dense hirsutis intus glabris connatis

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\* Cuatrecasas, Jose. 1971. Miscellaneous notes on neotropical flora. Phytologia 20(8):465-481. Jan., 1971 (Phragmothea fuchsii Cuatr. sp. nov. pp. 472-3).



caducis 1.7-2.5 cm. longis; laminis magnis, late ellipticis, apice acuto cuspidato, acumine ca. 1 cm. longo, ad basim acutis et in petiolo corte decurrentibus, coreaceis vel subcoreaceis, supra subnitidis costa nervisque dense hirsutis ceterum sparsissime hirsutis, subtus costa nervisque dense hirsutis ceterum hirsutis, costa nervisque supra impressis subtus prominentibus, nervis 15-20 paribus, venulis tertiariis subtus prominentibus scalariformibus. Inflorescentiae masculae terminales sessiles trichotomae corymbiformes; ramulis pedicellisque dense hirsutis; ramis primariis 2.5-5 cm. longis, secundariis plerumque minus quam 1 cm. longis; pedicelis 2-7 mm. longis. Flores ca. 15-20 in quoque inflorescentia; calyce extus et intus dense adpresse pubescenti praeter versus marginem sparse pubescenti cylindrico subtruncato inconspicuo dentato longitudinaliter inconspicuo 6-costato 8-10 mm. longo diametro 5-6 mm.; corolla alba salveriforma 6-lobata ad maturitate ca. 30-38 mm. longa, tubo 17-20 mm. longo diametro ca. 5-6 mm. cylindrico, prope basin angustata, extus a pilis retrorsis adpressisque dense sericeo praeter in 2 mm. basali glabro, intus glabro praeter retrorse barbato ca.  $\frac{1}{4}$  supra basin, lobis oblongis late acutis 15-17 mm. longis 6-7 mm. latis extus sericeis a pilis antrorsis intus tomentosis a pilis minimis adpressis antrorsis; staminibus 6, inclusis; filamentis a tubo corollae adnatis per totam longitudinem; connectivo antheram excedenti, ad apicem acuto vel acuminato, ad basim truncato vel retuso; antheris dorsifixis linearis ca. 10 mm. longis, in corollam ca. 15 mm. supra basim et ca. 3 mm. supra basim antherae affixis; stilo 14 mm. longo late lineari vel anguste elliptico acuto complanato glabro. Flores feminei ignoti. Fructus sessilis ovoido-oblongus ca. 8-10 cm. longus diametro ca. 5-7 cm. dense hirsutus

a pilis rubris vel ferrugineis; exocarpio in siccitate fibroso subligneo; seminibus multis.

COLOMBIA: Dept. Antioquia: deep primary forest on steep mountain side along Rio Anori 5 km. from Providencia. Valle del Rio Anori entre Dos Bocas y Anori. Zona transicional entre bosque humedo y muy humedo tropical montanoso, alt. 400-900m., 24-31 Mayo, 1973, Djaja D. Soejarto 4089 (holotype F, no. 1,788,505). Dept. del Valle: Rio Colima (region del Choco), La Trojita, 5-50 m. alt., 19 Feb.-10 Mar., 1944, J. Cuatrecasas 16,588 (paratype F, no. 1,166,908); costa del Pacifico, Rio Cajambre, Barco, 5-80 m. alt., 21-30 Abril, 1944, J. Cuatrecasas 17,144 (F); Bajo Calima, Junio 28, 1961, Isidoro Cabrera 575 (F).

The two Cuatrecasas collections were previously determined as D. hirsuta (P. & E.) Schum., and are probably to be found filed under that name in most herbaria. Except in having hirsute pubescence on the branchlets, petioles and fruits this species does not resemble D. hirsuta. It's probable relationships are with D. amapana Steyerm., D. aquatica (Aubl.) Brem., and perhaps D. eriopila L.f.

ELAEAGEA ARBOREA D. Simp. sp. nov.

Arbor ca. 17m. alta, diametro trunci 21 pollices; ramulis valde 4-porcatis inter porcas profunde sulcatis glabris vel in ramuli juniores minute tomentosis. Folia opposita sessilia vel subsessilia; vagina stipulae ca. 7 mm. longa truncata, ad matritatem plerumque basim versus fidenti, in sicco resinosissima intra vaginam, margine incrassato revolutoque; lamina orbiculari, oblongo-orbiculari vel interdum obovata, apice late obtuso rotundato vel raro subemarginato, basi plerumque late obtusa raro rotundata vel truncata,

in sicco supra nitida subtus hebeti, costa utrinque pilosa, nervis subtus pilosis, ceterum glabra. Inflorescentia paniculata pyramidali vel late ovoidea vel ellipsoidalis ubique tomentosa; pedunculo plerumque 5-8 cm. longo in sectione transversalis compresso-quadrangulato ut in rhombo transverso; ramis primariis oppositis plerumque 4-6 paribus, ramis secundariis oppositis vel alternis; omnibus ramis a bracteis ovatis, lanceolatis vel linearibus, acuminatis subtentis; bracteis par infimum ramorum primariorum subtenentibus late ovatis vel deltoideis acuminatis plerumque 4-7 mm. longis nonnumquam ampliatis foliiformibusque, bractea pedicellum subtenenti deminutissima plerumque 0.5-1 mm. longa. Flos extus pedicellusque glabrus vel pedicellus inferne tomentosus; pedicello 0.3-2 mm. longo; calyce extus et intus glabro truncato, parte libero ca. 0.7 mm. longo; corolla late campanulata 5-lobata extus et intus praeter fauce dense barbata glabra, tubo ca. 0.8-1 mm. longo, aestivatione loborum contorta sinistrorsa externe visa, lobis per anthesin reflexis; staminibus 5, lobis corollae alternantibus in tubo corollae sub sinibus insertis, filamentis ca. 2 mm. longis ad infimum barbatis ceterum glabratis, anthera submedialiter dorsifixa glabra ca. 1.2 mm. longa longitudinaliter dehiscentia; stylo glabro ca. 3.2 mm. longo in dimidio distale bifido; stigmatibus in pagina interiora ramulorum styli. Capsula matura glabra biloculare, placentatione axiali; seminibus numerosis tenuibus margine alato incluso ca. 1 mm. longis et 0.5-1 mm. latis.

PERU: Dept. Pasco: Prov. Oxapampa; Dist. Oxapampa; bosque humedo - montano bajo,\* La Felicidad,

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\* This is the name of one of the "life zones" in the Holdridge system as applied by Tosi in "Zonas de Vida

2,300 m. alt., Peruvian Forest Service Dendrology Project Tree no. OX-113 (flowering collection, 13/VI/1968, Eduardo Vasquez A. 152, holotype F, no. 1,753,295; fruiting collection, 3/IX/1968, Eduardo Vasquez A. 182, paratype F, no. 1,753,291).

## RUTACEAE

ZANTHOXYLOM ALBUQUERQUEI D. Simp. sp. nov.

Arbol ca. 21m. alta, diametro trunci ca. 48 cm. (19 polices); ramulis crassis plerumque a zonis internodiorum condensatorum praeditis, cortice longistrorsum porcato (interdum obscure porcato), ramulis junioribus dense velutinis a pilis in sicco rufescentibus vel cinnamomeis. Folia decidua hysterantha vel coetanea alterna paripinnata praeter foliola matura supra sparse velutina omnino dense velutina; petiolo tereti, plerumque 3-5 cm. longo; rachide prope basim tereti cetera lateraliter compresso (14) 30-35 cm. longo; foliolis 7-8 paribus sessilis pellucido-punctatis subcoriaceis vel chartaceis base truncatis atque parum obliquis, oblongis vel obovato-oblongis, apice late acutis vel obtusis (6) 10-12 (14) cm. longis (3.5) 4.5-6 (7) cm. latis, nervis quoque latere 15-18 sub angulo lato e costa divergentibus marginem versus arcuatis atque ad nervum proxime superiorem conjunctis, costa venisque supra parum impressis subtus prominentibus, rete supra vix vel haud visibili subtus nunc leviter nunc manifeste visibili. Inflorentiae in axillis foliorum summorum prodientes paniculatae praeter flores fructusque omnino dense velutinae, in statu florenti 10-12 (14) cm. longae

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Natural en el Peru." (See Instituto Interamericano de Ciencias Agricolas de la OEA, Zona Andina, Boletin Tecnico No. 5.)

et 6-8 cm. latae, in statu fructificantes 10-16 cm. longae et 8-12 cm. latae. Flores feminei subsessiles pentameri; sepalis triangulari-ovatis apice acutis praeter marginem ciliatum glabris vel sparse pubescentibus ca. 0.6 mm. longis; petalis praeter aliquot pilos in pagina dorsali dispersos glabris ellipticis apice acutis plerumque 2.5 mm. longis et 1.2-1.5 mm. latis; staminibus carentibus; disco ca. 0.3 mm. alto; pistillo 5-loculari subgloboso diametro ca. 1.5 mm., stylo 0.3-0.4 mm. longo, stigmatate peltato ca. 1.2 mm. lato. Fructus sessilis 5-loculares sed interdum ex abortu minus; cocco (in specimine typico verosimiliter submaturo) ca. 4 mm. longo et 3 mm. lato extus glanduloso-punctato glabro sed secus lineam dehiscentiae a pilis microscopicis sparse puberulo.

PERU: Dept. Loreto: Prov. Coronel Portillo; Dist. Calleria; Vivero del Region Forestal (Peruvian Forest Service Regional Tree Nursery), 4 km. de Pucallpa, alt. ca. 130 m., Peruvian Forest Service Dendrology Project tree no. PA-14 (flowering collection, June 27, 1968, Manuel Castillo S. 16, paratype F, no. 1,766,990; fruiting collection, Aug. 1, 1968, Manuel Castillo S. 28, holotype F, no. 1,766,987).

Notable among species of the western Amazon Basin for the very dense pubescence, deciduous leaves, sessile leaflets, leaflet base truncate and slightly oblique, pistil 5-carpellate and the fruit 5-coccic.

Another species with pubescence of simple unbranched hairs is found in eastern Brazil. This is Z. cinereum Engler, based on a type (Warming s. n.) from Lagoa Santa, Minas Geraes State, Brazil (photo ex B: F neg. 12,434). I have not seen any material of the type collection of this species but a topotype (A. P. Duarte 9615, Jard. Bot. Rio de Jan. no. 130,656) from Lagoa Santa is represented in the Field Museum herbarium

and matches the photograph of the type. The pubescence is much less dense than in Z. albuquerquei, the leaflets have a distinct petiolule ca. 3-7 mm. long, and the pistil is 3-carpellary (based on rudimentary pistils in staminate flowers). Another collection of Z. cinereum in herb. F, is E. P. Heringer 4082 (herb. Bradeanum no. 32,990) "leg. 6. 6. 55, in Horto Florestal de Paraopeba," Minas Geraes State, Brazil. It has more coriaceous leaflets than in the Duarte collection and the pistillate flowers have 3-carpelled pistils.

ZANTHOXYLUM SOBREVIELAE D. Simp. sp. nov.

Arbor ca. 22 m. alta, diametro trunci 16 pollices (ca. 40.5 cm.); ramulis longistrorsum striatis; ramulis juniores, foliis, inflorescentiisque stellato-pubescentibus. Folia paripinnata, alterna, 22-35 cm. longa; petiolo rhachidique supra non profunde sulcata subtus convexa sparse vel dense pubescenti; petiolo plerumque 5-7 cm. longo; rhachide plerumque 15-20 cm. longa; foliolis 6-8 paribus sessilis vel subsessilis et cum 0.5-1.5 (2) mm. longo petiolulo instructis, oblongis ellipticis vel oblanceolato-oblongis base obliquis obtusis vel rotundatis apice late acutis vel obtusis plerumque cuspidatis, cuspide acuminata 3-8 mm. longa, margo integro, subcoriaceis supra laevibus subnitidis sparsissime stellato-pubescentibus vel glabris subtus uniformiter denseque stellato-pubescentibus, costa supra in sulco angusto impressa subtus valde prominenti, nervis quoque latere 16-20 supra parum impressis subtus prominentibus, reti venularum supra haud manifesto subtus manifesto sed non prominenti. Inflorescentiae apicales vel in axillis foliorum summorum prodientes dense pubescentes a pilis adpressis stellatisque; ramulis a bracteis triangularis 0.5-2 mm. longis subtentibus; pedunculo (1) 3-5 cm. longo; pedicellis 0.5-1

mm. longis a bracteola late triangulari ca. 0.2-0.5 mm. longa subtenentibus. Flores feminei pentameri; lobis sepalorum late ovatis acutis ca. 0.3 mm. longis extus dense stellato-pubescentibus; petalis glabris oblongis acutis ca. 2 mm. longis pallide flavis (fide lectoris); disco ca. 0.2-0.3 mm. longo in parte superiore stellato-pubescenti; pistillo discum coronanti bicarpellato ca. 1.5 mm. longo et 1.3 mm. lato, carpellis confertis, stylis discretis 0.1-0.2 mm. longis, stigmatis coalitis in disco complanato-peltato diametro 0.8 mm. Fructificantia carpelia subglobosa diametro 4-5 mm. glabra, in sicco externe tuberculato-exasperata; semenibus testa nigra nitidaque ornatis.

PERU: Dept. Loreto: Prov. Coronel Portillo; Dist. Calleria; "bosque seco tropical,"\* km. 33, carretera Pucallpa a Huanuco, alt. 160 m., Peruvian Forest Service Dendrology Project tree no PA-36 (flowering collection Feb. 8, 1968, Manuel Castillo S. 1, holotype F, no. 1,766,988; fruiting collection May 14, 1968, Manuel Castillo S. 9, paratype F, no. 1,766,989).

BRAZIL: Acre State: Basin of Rio Jurua; upper Rio Jurupary, lat. 8-9° S., long. about 70° W., on terra firma, "tree 80 ft. high," July 15, 1933, Krukoff 5214 (F).

This species would probably "key" in Macbride's Flora of Peru to Z. ruizianum (Kl. ex Engl.) Macbr. Z. sobrevielae differs from Z. ruizianum in having the leaf rachis wingless vs. narrowly margined, the leaflet margin entire vs. crenate, and the leaflets of the former are about twice as large in the latter species.

None of the specimens have spines nor is there mention of such in the collectors field notes so I

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\* See footnote under Elaeagea arborea.

assume tentatively that the unarmed condition may be characteristic for the species. The stellate pubescence, pentamerous flowers, bicarpellate ovary, and even-pinnate leaves with 6-8 leaflet pairs all suggest a close relationship with Z. ruizianum. In the Flora of Peru, Macbride describes Z. ruizianum as having the young carpels solitary. The specimens he cites, including the fragment from the isotype at MA, all have a bicarpellate pistil. The photograph of the holotype (Field Museum Botany Negative number 12,460) shows opened flowers with pistil exactly matching that of the isotype fragment.

### STERCULIACEAE

*STERCULIA STIPULIFERA* Ducke subsp. *PERUVIANA* D. Simp.  
subsp. nov.

Arbor 15-25 m. alta; ramulis crassis, in parte subapicale diametro plerumque 1.5-2.0 cm., apice congeste foliiferis et a stipulis persistentibus imbricatis obtectis. Folia magna; stipulis ovatis vel triangularibus, late acutis vel acute acuminatis, (1) 1.5-2 cm. longis et 1-1.5 cm. latis, subcoriaceis, pagina interiora dense pubescenti et in statu sicco ferruginea; petiolis floccosis deinde glabris, longistrorsum striatis, subtus convexis, supra non profunde canaliculatis, ad apicem basemque tumidis; laminis palmatim 5-nervatis, rigide chartaceis vel subcoreaceis, ovato-oblongis vel oblongo-ellipticis, apice late acuto vel obtuso, base subcordata vel cordata, raro truncata, margine integro, (15) 20-35 (55) cm. longis, (11) 14-25 (52) cm. latis, supra laevibus et in vivo nitidis (fide collectoris) in sicco hebetatis costa atque nervis secundariis manifestis sed



non prominentibus venis tertiariis manifestis parum impressisque, sparse sed uniformiter stellato-pubescentibus mox glabratibus, subtus hebetatis costa nervis venisque prominentibus, praeter pubescentiam densiorem breviorumque secus nervos principales sparse pubescentibus a pilis stellatis longe stipitatisque per totam paginam. Inflorescentiae axillares, in quoque ramulo prope apicem plerumque 8-12 prodientes, laxae ramosae, anguste paniculatae, 18-35 cm. longae; rachibus ramulisque dense adpresseque tomentosae; bracteis ovato-ellipticis vel lanceolato-ellipticis, acutis vel acuminatis, coloribus atque pubescentiis eadem in stipulis, quarum grandioribus 1.5-2 cm. longis metientibus; floribus staminatis pistillatisque in eadem panícula portatis, illis quam his numerosioribus, his in anthesin illos praecedentibus. Calyx ca. 1.5 cm. longus praeter 2-3 mm. e basi coalitus liber; lobis lineari-lanceolatis acuminatisque extus stellato-tomentosis intus supra appendicem sparse tomentosae vel subglabris, infra appendicem pilis stellatis carentibus pilis simplicibus annulum dense pilosum ca. 2 mm. supra basim formantibus, ceterum sparse pilosis a pilis longis simplicibusque; androphoro gynophoroque ad basim glandulosam pubescentem tumido, illo ad maturitatem ca. 12 mm. longo, antheris 10, hoc ad maturitatem 6-7 mm. longo, sparse glanduloso pubescenti usque 1.5 mm. supra partim tumescentem ceterum glabro; ovario styloque densissime stellato-pubescenti; stigmate apicem styli truncati tegenti, obscure 5-lobata, minutissime papilloso. Fructus immaturi; carpelibus extus dense velutino-tomentosis, intus a pilis longis stellatis sparse hispidis, ca. 8 cm. longis, 4 cm. diametro, stipite 1-2 cm. longo; semenibus (in statu immaturo) numerosis.

PERU: Dept. San Martin: Prov. Mariscal Caceres; Dist. Tocache Nuevo; en bosque alto, Quebrada de Tenanta (margen izquierda del Rio Huallaga), 12 junio, 1970, Jose Schunke V. 4041 (F); en bosque alto, terreno humedo, Quebrada de Saule Chico (margen derecha del Rio Huallaga), 7 sept., 1970, Jose Schunke V. 4352 (paratype F, no. 1,769,654; isoparatype F, no. 1,767,297); en bosque alto, camino al caserio de Santa Rosa de Misholla, 4 km. de Puerto Pizana, 7 mayo, 1971, Jose Schunke V. 4869 (holotype F, no. 1,767,298; isotype F, no. 1,767,299).

Collections no. 4041 and 4869 were obtained in flowering stage, no. 4352 has immature fruits. The collector's field notes on flowers and fruits are as follows: J. Schunke V. 4869, "moderate yellowish pink 7.5R8/6, en el interior de la corolla strong red;" J. Schunke V. 4041, "flores rojo violeta, corola verde amarillenta, estigma amarillenta, ovario verde amarillenta;" J. Schunke V. 4352, "frutos inmaduro de color strong yellowish brown."

From subsp. stipulifera, subsp. peruviana differs in the larger leaves with blade 5-nerved from the usually cordate base, the inflorescence bearing both pistillate and staminate flowers, the latter more numerous. In subsp. stipulifera the smaller leaves have blades 1- or 3-nerved from the base, and the inflorescence is unisexual (? - type collection described as having staminate flowers only).

There is another plant which may belong to S. stipulifera subsp. peruviana or may be a related undescribed taxon. It is known to me only from the collections from one tree cited below. It has stipules with the color and pubescence of S. stipulifera but differing in being nearly three times longer, soft

and pliable rather than rigid coriaceous, and apparently not persistent. The leaves are oblanceolate-elliptic or obovate-elliptic and two to three times longer than broad, in texture and pubescence resembling subsp. peruviana, and the base 5-nerved but obtuse or truncate instead of cordate. The inflorescences are immature and still entirely enveloped in the bracts, but some flower buds large enough for dissection demonstrate that there are both pistillate and staminate flowers in the same panicle. A collection of two mature, dehisced fruits were obtained although without seeds. The fruiting carpels are subsessile, ca. 8 cm. long, ca. 4-7 cm. diam. in the plane of dehiscence, the carpel wall rigid, woody, 1.4-1.8 cm. thick, minutely appressed tomentellous without, densely hispid within. This tree is documented by the following two collections. The vernacular name is given as "Huarmi caspi."

PERU: Dept. Loreto: Prov. Maynas; Dist. Indiana: bosque humedo tropical, Varadero Mazan, alt. 130.m., Peruvian Forest Service Dendrology Project tree no. I-107: (branchlet with leaves and immature inflorescences, 18 sept., 1964, Abelardo Gutierrez R. 170 (F); mature fruits, 1 febr., 1963, Antonio Arostegui V. 92 (F).

Varadero is a slipway or sloping riverbank where boats can be pulled out of the water for cleaning or repair. Varadero Mazan is presumably a facility of that type at the village of Mazan on the Rio Mazan a little way above its confluence with the Rio Napo.

The branchlets which are only about 1/3 to 1/2 the diameter of S. stipulifera differ also in having regions of very condensed internodes with closely packed stipule and leaf scars, alternating with regions where the leaf and stipule scars are separated by normally elongated internodes. This phenomenon is

commonly encountered in tropical deciduous tree species, less frequently in tropical evergreen trees (e.g., several species of Buchenavia in the Combretaceae), and is usually associated with markedly seasonal (rather than continuous) production of new leaves. In the stipule-bearing stem tip of this Sterculia the young leaves and young inflorescences are just beginning to emerge from among the stipules. The general aspect of these leaves suggests that they represent the previous year's leaf production. This appearance suggesting a markedly seasonal flush of new leaves is not apparent either in subsp. stipulifera or subsp. peruviana.

THE JEWELED SHOOTING STAR (DODECATHEON AMETHYSTINUM):  
A POST GLACIAL MIGRANT IN THE MISSISSIPPI VALLEY

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Fassett (1944), in his monograph of the genus Dodecatheon in eastern North America, discusses the probable origin and past distribution of his jeweled shooting star, D. amethystinum, a plant which he first described (1929) as a variety of D. meadia L., but then later (1931) renamed as a species. At the time of Fassett's monograph, the only known collections of this shooting star were from the following three places: 1) bluff tops along the Mississippi River in the "Driftless Area" of the upper midwest (i.e. southwestern Wisconsin, northwestern Illinois and the valleys of the adjoining states); 2) cliff tops at Hannibal, Missouri; and, 3) scattered, isolated bluff tops in W. Virginia, Ohio and Pennsylvania, the latter stations all located south of the glacial line.

Fassett, who was a former student of the well known Harvard botanist M.L. Fernald and an advocate of his published (1925) theory on the "persistence of plants in unglaciated areas of Boreal America," attached special significance to the occurrence of the jeweled shooting star in the "Driftless Area" of the upper midwest. Because the known distribution of D. amethystinum in 1944 appeared to be similar in pattern and extent to some of the relic species of the driftless area which Fernald had earlier written about, Fassett concluded the plant had probably a similar history. Thus, he writes ". . . This appears to be one of those species which had a fairly general range northeastward before the Pleistocene glaciations, whose occurrence is now limited to localities which escaped glaciation."

Fassett's basic premise, the relic origin of D. amethystinum, while based in part on the known habitat preferences of this species, was arrived at only after an intensive study of herbarium distribution records. The latter being far from complete, however, falsely suggested to that author that he was dealing with a major plant disjunction.

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Today, a number of new bluff top localities for D. amethystinum have been recorded for Illinois, these situated in glaciated as well as driftless areas of the state. Since the range of this species now appears to be nearly continuous along the Mississippi River in this portion of the upper midwest, a reinterpretation of the plant's history is suggested. The following account then, is intended as a partial fulfillment of that aim.

#### TAXONOMIC TREATMENT

Following the publication of Fassett's initial set of works on this plant (1927, 1929 and 1931), it was subsequently upheld as a species by Steyermark (1940, 1963), Wherry (1943), Fassett (1944), Fernald (1950), Jones (1950), Strausbaugh and Core (1958), Iltis and Shaughnessy (1960), and Mohlenbrock (1978).

Thompson (1953), however, reduced D. amethystinum to synonymy under D. radiculatum Greene. This treatment of D. amethystinum, while not agreed to here, is seen to follow most logically when greater emphasis is placed on the relative thickness of the capsule wall as a taxonomic character than on the presence or absence of a filament tube. However, capsule wall thickness in this species complex does not appear to be correlated with any other previously studied character, whereas the degree of union of the filaments appears to be associated with the length/width ratio of the leaves, the latter clearly illustrated by the scatter-diagram analysis of Iltis and Shaughnessy (1960).

When the non-united filaments and broad leaves of D. amethystinum are taken into consideration, the plant appears to be more closely related to D. meadia than to D. radiculatum. This interpretation also appears to conform best with the known geographic facts. Thus, the distribution of this species is fully included within the range of D. meadia, whereas the distribution of D. radiculatum (excluding D. amethystinum; see Thompson, 1953) is completely separate and wholly western.

D. amethystinum differs from D. meadia in having linear-oblong, thin walled capsules and bluish-green leaves, the latter rarely marked with a basal red spot. The papery capsules of this species have yellowish-brown walls, these measuring from 35 to 120 microns in thickness. As previously noted by Fassett (1944), the walls are easily split by pressure from a pencil. D. meadia, on the other hand, has firm, reddish-brown, ovoid capsules, the walls of which vary in thickness from 135 to 325 microns (Fig. 1).

One final difference between the last two species lies in the degree of solubility of the reddish pigments contained in their leaves. Thus, Fassett (1944) notes that the leaf pigmentation of D. meadia is little affected by the immersion of the leaf blade in boiling water for up to three hours duration; whereas, in D. amethystinum, the coloration soon exits from the leaves.

#### ECOLOGICAL CONSIDERATIONS

D. amethystinum is found throughout its range on moist, shaded river bluffs. West of Cave Springs Hollow in Calhoun County, Illinois, where this species was recently discovered by the authors, it was found on north and west facing limestone ledges some 200 meters distant from the Mississippi River. Here, some of the plants grew on a thin cap of overlying soil no more than 2 cm thick in places. Subsequent lab tests showed this soil to be rich in organic matter and very slightly acidulous, with a pH of about 6.9.

Plants found growing in close association with D. amethystinum at this locality include the walking fern (Camptosorus rhizophyllus), blunt-lobed woodsia (Woodsia obtusa), and slender lip fern (Cheilanthes feei). In the crevices of the rock face itself were tall alumroot (Heuchera americana var. hirsuticaulis) and hydrangia (Hydrangia arborescens). Found on the steep wooded slopes immediately below the rock ledges were jack-in-the-pulpit (Arisaema atrorubens), false rue anemone (Isopyrum biternatum), yellow fumewort (Corydalis flavula), terrell grass (Elymus virginicus), Missouri gooseberry (Ribes missouriensis), spiderwort (Tradescantia subaspera), jewelweed (Impatiens sp.), and woolly blue violet (Viola sororia). Woody species of the area included shagbark hickory (Carya ovata), musclewood (Carpinus caroliniana), flowering dogwood (Cornus florida), sycamore (Platanus occidentalis), prairie rose (Rosa setigera), basswood (Tilia americana), sugar maple (Acer saccharum), and silver maple (Acer saccharinum).

Although the Cave Springs Hollow locality lies in non-glaciated territory, the jeweled shooting star is also known from the nearby glaciated counties of Pike, Greene, and Jersey, as well as the west-central Illinois county of Fulton (Mohlenbrock, 1978). It is also known from the vicinity of Hannibal, Missouri, which according to geologists, was another area once covered by Pleistocene ice.

According to Steyermark (1940), D. amethystinum is found at the Hannibal location on limestone ledges along the bluffs of the Mississippi River. Here, it grows in

close association with two northern plants, red-berried elder (Sambucus pubens) and wild sarsaparilla (Aralia nudicaulis), as well as with many plants of Ozarkian origin.

In Wisconsin, according to Iltis and Shaughnessy (1960), the plant is restricted to the cliffs and high bluffs of the Mississippi River. They report it grows on damp and mossy rock outcrops; on earth slopes in cool woods; on north facing bluffs; and, in deep ravines. It is also reported from cliffs of Ordovician limestone, as well as from the edges of open woods and small upland prairies.

Habitat information for this plant at Wyalusing State Park in Grant County, Wisconsin is especially complete. On some bluff tops within the park, according to Iltis and Shaughnessy (1960), the jeweled shooting star is associated mainly with the walking fern (Camptosorus rhizophyllus) and the endemic goldenrod of the driftless area (Solidago sciaphila); whereas in other, more heavily forested areas of the park it is found with the acute-lobed hepatica (Hepatica acutiloba), wild columbine (Aquilegia canadensis), flexuous-stemmed goldenrod (Solidago flexicaulis), miterwort (Mitella diphylla), heart-leaved aster (Aster cordifolius), bladder-fern (Cystopteris bulbifera), wild sarsaparilla (Aralia nudicaulis), Solomon's-seal (Polygonatum canaliculatum), spring beauty (Claytonia virginica) and Virginia-creeper (Parthenocissus vitacea). Dominant tree species at Wyalusing include sugar maple (Acer saccharum), basswood (Tilia americana) and paper birch (Betula papyrifera).

Iltis and Shaughnessy also report that soil samples taken from areas within Wyalusing State Park where D. amethystinum grows are mostly slightly acid. These range from pH 6.3 to 6.9. However, one sample was described as slightly alkaline (pH 7.4).

#### CONCLUSIONS

The known range of D. amethystinum in Illinois is considerably extended by collections cited here and by Mohlenbrock (1978). This plant now appears to be nearly continuous in distribution along the bluff tops of the Mississippi River from Calhoun County in central Illinois to Buffalo County in central Wisconsin. In addition, this species has a single station along the Illinois River in Fulton County, and appears to be equally at home in both glaciated and non-glaciated areas.

If one takes into account the above extended geogra-



phic data, the pattern of distribution of D. amethystinum in Illinois and Wisconsin would no longer appear to conform to the basic tenets of the 1925 Fernaldian theory on the "persistence of plants in unglaciated areas of Boreal America". No major disjunction in the range of this plant in the northern sector of its area of occurrence is apparent. Thus, far from representing a pre-glacial relic within the driftless area of the upper midwest, as proposed originally by Fassett (1931, 1944), this species would appear instead to be a post-glacial migrant to the southern Wisconsin area.

The above hypothesis is supported in part by the known post-Pleistocene changes in the climate and vegetation of the upper midwest. It has been reported by Dolf (1960), Spurr (1964) and others, for example, that a very warm and moist period, beginning about 2000 years ago and extending to about 1300 A.D., favored the growth of southerly plants in more northerly regions. According to Sauer (1965), the present day floristic associations of North America were displaced northward several hundred miles during the height of that period. During the past 600 years, however, there has been a gradual lowering of world temperatures, and this has resulted in the southward contraction of the range of many species (Ugent et al, 1981).

Utilizing the above information then, it is possible to reconstruct at least a partial history of the past migrations of the river bluff species, D. amethystinum. As would seem the case with the vast majority of midwestern plants, this species was probably limited in its distribution to areas well south of the glacial limits during the four major ice advances of the Pleistocene. Survival in the driftless area of the upper midwest may have been restricted to species of the arctic tundra, or, at best, to the more hardier species of the boreal forest. Northern river-bluff plants, or species with close relatives in the Missouri Ozarks (as for example D. amethystinum and its prairie-woodland counterpart, D. meadia), probably merely migrated south along the ridge tops of the Mississippi River or its embayment. Later, with the return of warm, humid conditions, these plants migrated northwards beyond their present day limits; returning only after the onset of the current worldwide temperature trend toward cooler weather.

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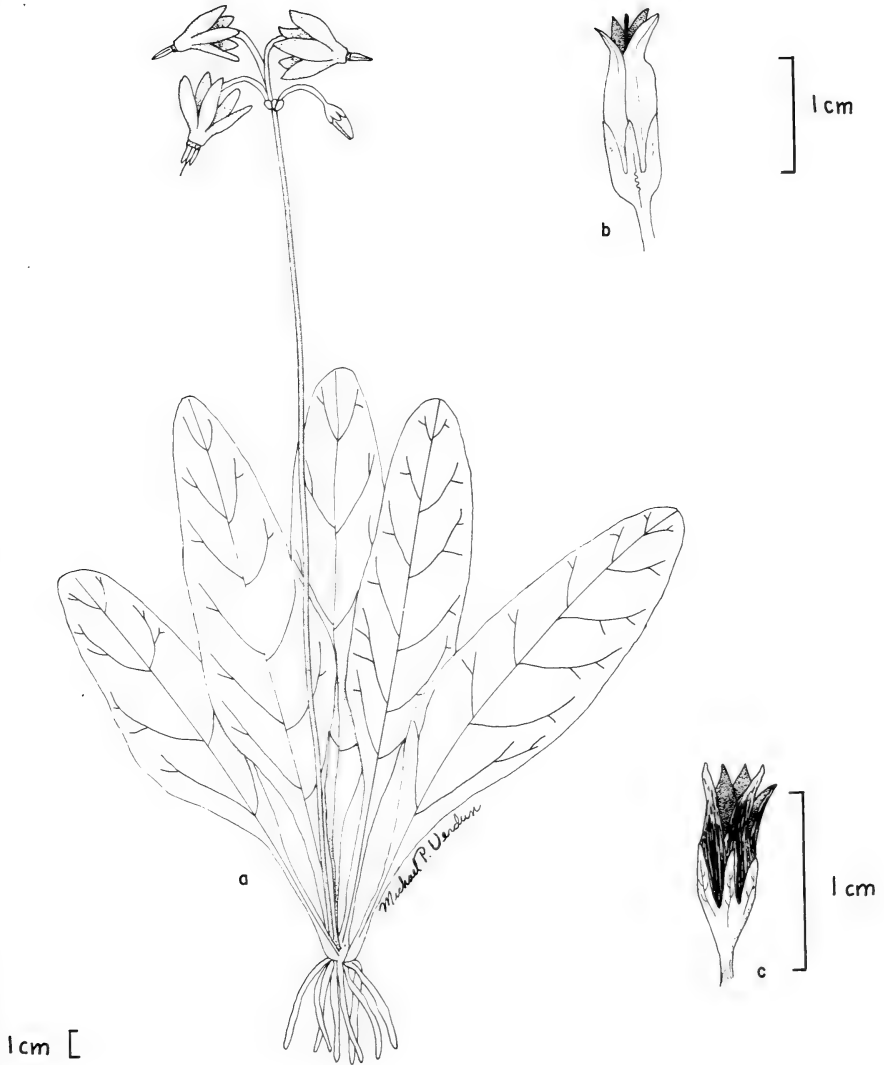


Fig. 1. *Dodecatheon amethystinum* from Cave Springs Hollow, Calhoun Co., Illinois (Ugent, Mibb & Verdun 23, 115. SIU).  
 a. Habit. b. Capsule. c. Capsule of *D. media*.

ADDITIONAL NOTES ON THE GENUS *VITEX*. XXXV

Harold N. Moldenke

*VITEX TRIFLORA* var. *HIRSUTA* Mold.

Additional bibliography: Mold., *Phytologia* 51: 290. 1982.

Schunke Vigo describes this plant as a tree, 4--5 m. tall, the leaves bright yellow-green, with prominent venation, and encountered it in high shady forest at 800 m. altitude.

Additional citations: PERU: Loreto: *Schunke Vigo* 5392 (Ld, N). San Martín: *Schunke Vigo* 7494 (Ld). BRAZIL: Acre: *Maas, Kubitzki, Steward, Ramos, Pinheiro, & Lima P.13120* (Ed--type, N--isotype).

*VITEX TRIFLORA* var. *KRAATZII* Huber

Additional bibliography: Mold., *Phytologia* 17: 47. 1968; Mold., *Fifth Summ.* 1: 180 (1971) and 2: 717, 729, & 930. 1971; Mold., *Phytol. Mem.* 2: 172 & 595. 1980; Mold., *Phytologia* 51: 289. 1982.

Recent collectors describe this plant as a shrub, 2 m. tall, or a tree, 4 m. tall, the [flower] buds green, and have encountered it in capoeira on terra firme and in secondary varzea forests, in flower in October and December, and in fruit in December. The corollas are said to have been "lilac" in color on *Silva & al. AS. 84* and "greenish" on *Albuquerque Lobo & al. 19* and *Nascimento 484*.

Additional citations: BRAZIL: Pará: *Albuquerque Lobo, Vilhena, & Ribeiro 19* (N); *Nascimento 484* (N), *848* (N); *Silva, Berg, Nelson, Henderson, Bahia, & Reis dos Santos AS.84* (N).

*VITEX TRIFLORA* var. *QUINQUEFOLIOLATA* Mold.

Additional bibliography: Mold., *Phytologia* 17: 47. 1968; Mold., *Fifth Summ.* 1: 137, 144, & 180 (1971) and 2: 729 & 930. 1971; *Soukup, Biota* 11: 20. 1976; *López-Palacios, Revist. Fac. Farm. Univ. Andes* 20: 34. 1979; Mold., *Phytologia* 44: 384. 1979; Mold., *Phytol. Mem.* 2: 130, 136, 172, 460, & 595. 1980; Mold., *Phytologia* 51: 288. 1982.

*VITEX TRIFOLIA* L.

Additional & emended synonymy: *Vitex trifolia minor, indica* Breyn, *Prod. Fasc. Rar. Pl.*, ed. 1, 2: 105--106. 1688. *Vitex trifolia indica, odora, hortensis, floribus caeruleis racemosis* P. Herm. ex Breyn, *Prod. Fasc. Rar. Pl.*, ed. 1, 2: 106, in syn. 1688. *Vitex trifolia indica odora hortensis floribus caeruleis racemosis. Nochile Lagondi. Malaice Jasminum indicum cyneum odore gravi Syringae caeruleae facie* P. Herm., *Mus. Zeyl.*, ed. 1, 48. 1717. *Vitex trifolia, floribus per ramos sparsis* Burm., *Thes. Zeyl.* 229. 1737. *Piperi similis fructus striatus faemina* Bauh. ex L., *Fl. Zeyl.* 194, in syn. 1747. *Cara-nosi Rheede* ex L., *Fl. Zeyl.* 194, in syn. 1747. *Vitex trifolia indica odorata hortensis, floribus caeruleis racemosis* Burm. ex L., *Fl. Zeyl.* 194. 1747. *Frutex indicus baccifer, fructu calyculato monoppyreno* Ray ex L., *Fl. Zeyl.* 194, in syn. 1747. *Nika* Herm. ex L., *Fl. Zeyl.* 194 in syn. 1747.

*Vitex foliis ternatis quinatisve, paniculis dichotomis* L., Sp. Pl., ed. 1, imp. 1, 2: 638. 1753. *Piperi similis, fructus striatus, femina* Bauh. ex L., Sp. Pl., ed. 1, imp. 1, 2: 638, in syn. 1753. *Vitex foliis ternatis quinatisve integerrimis, panicula dichotomis* L. ex N. L. Burm., Fl. Ind. Orient. 137. 1968. *Vitex trifoliata* Lam. ex Desf., Tabl. Écol. Bot., ed. 1, 53. 1804. *Vitex trifoliata* Roxb., Hort. Beng., imp. 1, 46. 1814. *Vitex trifoliata* L. ex Blume, Bijdr. Fl. Ned. Ind. 14: 812. 1826. *Vitex trifolia* Willd. ex Roxb., Fl. Ind., ed. 2, imp. 1, 3: 69. 1832. *Vitex trifolia*  $\alpha$  *trifoliata* Cham., Linnaea 7: 107. 1832. *Cazanosi* Rheede apud Decne., Nouv. Ann. Mus. Hist. Nat. Paris 3:400--401, in syn. 1834. *Vitex trifoliata* L. apud Decne., Nouv. Ann. Mus. Hist. Nat. Paris 3: 400. 1834. *Vitex trifolia*  $\alpha$  *trifoliolata* Schau. in A. DC., Prodr. 11: 683. 1847. *Vitex trifolia*  $\alpha$  *sc.* Pluk. ex Buek, Gen. Spec. Syn. Candoll. 3: 502 in syn. 1858. *Vitex agnus castus* var. *trifolia* Kurz, Forest Fl. Brit. Burma 2: 270. 1877. *Vitex agnus castus* var. Kurz ex C. B. Clarke in Hook. f., Fl. Brit. India 4: 583, in syn. 1885. *Vitex agnus-castus* var. *trifolia* Kurz ex Fletcher, Kew Bull. Misc. Inf. 1938: 432. 1938. *Vitex trifolia* var. *trifoliolata* Schau. ex Mold., Prelim. Alph. List Inv. Names 52, in syn. 1940. *Vitex negundo* (non L.) Matsum. ex Matsumune, Sci. Rep. Kanazawa Univ. 4: 49, in syn. 1955. *Vitex trifolia* var. *trifoliata* Cham. apud Mold., Phytologia 6: 165, in syn. 1958. *Vitex trifolia floribus per ramos sparsis* Burm. apud Mold., Phytologia 6: 165, in syn. 1958. *Vitex lagundi* Farnsworth, Pharmacog. Titles 8 (7): xii. 1973. *Vitex trifolia* ssp. *trifolia* Steen. ex Mold., Phytol. Mem. 2: 460, in syn. 1980.

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imp. 3, 3: pl. 740B. 1975.

In reference to illustrations of this species in botanical literature, Trimen (1895) states that "The foliage is pleasantly aromatic. There is no specimen or drawing [of it] in Herman's Herb., and the figure in Burm. Thes. t. 109, referred to this by Willdenow is certainly not a *Vitex* at all."

Recent collectors describe *Vitex trifolia* as a coppice-growing tree, 12--15 m. tall, a shrubby tree or shrub, 0.5--4 m. tall, the sap colorless, the leaves dry, dull-green, the flowers aromatic, the "petals recurved", and the fruit globular. They have encountered it in sandy clay soil and sandy volcanic soil, on riverbanks and beaches, and, according to Sauer (in Mauritius), at the outer edges of *Casuarina* plantations in back of wide sand beaches at river mouths, from sealevel to 1500 m. altitude. Puri (1960) found it growing with *V. negundo* in moist, edaphic, mangrove forests in the Sunderbans of Bengal. Davidse found it "on benches among coconuts just back of the *Spinifex* zone". Collectors have found it in full anthesis from April to August and from October to December, as well as in February, and in fruit in February, May, June, August, November, and December.

Datta & Majumder (1966) assert that in Bengal it flowers from March to May. Backer (1931) says that it blooms all through the year in Java, and Patel (1971) says the same thing. Cooke (1905) and Talbot assert that in India it blooms "more or less throughout the year", but Patel (1968) gives the time of anthesis as only June to December. Trimen (1895) reports it flowering in Sri Lanka in August and September and growing there in "low country, generally near the seacoast; rather common, especially in the dry region." Comanor refers to it as a "common shrub" there, while Thwaites & Hooker (1861) describe it as "not uncommon near the sea".

Sauer reports it "dominant instead of *Scaevola* on a small sector of beach ridge [on Mahe in the Seychelles], but 2 weeks later mostly killed back apparently by spray with SE wind and huge tides." He found it in flower and fruit there in May.

Schumann (1898) says of this species: "In Süd- und Ost-Asien weit verbreitet". Tanner found it rooting in permanent water in Tanzania. Fosberg reports it "common on low berms of coral sand and gravel rock on low beach ridges covered by unevenly closed scrub forest" in Sri Lanka.

Cooke (1905) truly remarks that *V. trifolia* is very closely allied to *V. negundo*, "from which it is distinguished by its sessile obtuse leaflets, occasionally simple leaves, and rather larger flowers and fruit." He gives its distribution as "Scattered throughout India in the tropical and subtropical regions, Ceylon, Japan, Philippines, N. Australia". Of course, he is here including the various infraspecific taxa in these statements (as is true of most authors).

Merrill (1917) records *V. trifolia* from Volcano Island; Parkinson (1922) lists it from Havelock island in the Andamans; Dunn & Tutcher (1912) list it from Hong Kong, New Territory, Lantao, and Macao; Ridley (1911) records it from Thailand and Lankawi, Prain

(1903) from Bangladesh and Central Bengal, Sonohara & al. (1952) from Kunigami, Nakagami, Shimajiri, Ishigaki, and Iriomoto islands, and Fong & al. (1972) from New Guinea. Again, most of these "records" probably apply to one of the infraspecific taxa, rather than to the typical form of the species.

Backer (1931) notes that "in streken met vrij krachtigen tot krachtigen oostmoeson, op periodiek sterk uitfrogende gronden, in djati- en secundair bosch, in struikwildernissen, langs wegen en waterloopen, aan akkerranden, plaatselijk vaak in groote hoeveelheden. Ook wel als pagerplant gekweekt", as its habitat in Java.

Seemann (1866) asserts that *V. trifolia* is "Common on the seabeach of all the Viti Islands", citing *Barclay s.n.*, *Home s.n.*, and *Seemann 354*, and "Also collected on Tonga (*Forster!*), New Caledonia (*Anderson! M'Gillivray!*), Aneitum, New Hebrides (*M'Gillivray!*), and Sandwich Islands (*Macrae!*)" -- but it is most probable that it is var. *bicolor* (Willd.) Mold. to which he is here referring. He also avers that the species is "Common in tropical New Guinea, China, the East Indies, and islands of eastern Africa." He admits that "We have in Polynesia both the trifoliolate and the unifoliolate form of this species."

Hemsley (1894) cites unnumbered Forster and Moseley collections from Fiji, and Burkill (1901) gives its overall distribution as "Fiji, Marquesas, and Sandwich Islands, and a common sea-side shrub in the tropics of the Old World." Again, it is most certainly the seashore varieties, not the typical form, that is being referred to here.

Raeuschel (1797) know the species only from "India orient."; Gills (1917) lists it from "S. Asia through Malaya and Japan and through New Guinea to N. Caledonia"; Darlington & Wylie (1956) describe it as from "Trop. Asia, Australia, & E. Africa". Uphof (1968) regarded it as native only in Malaya and Indonesia. Merrill (1923) says "along the seashore throughout the Philippines. In similar habitats, India to Mauritius and Japan, southward through Malaya to tropical Australia and Polynesia". Burkill (1901) says that it occurs in "Fiji and Samoa; eastward to the Marquesas Islands; Sandwich Islands; westward in the New Hebrides, New Caledonia, and Solomon Islands; and to Africa".

Voigt (1845) lists *Vitex trifolia* as cultivated in Calcutta in 1845; Kurz (1870) found it in cultivation on the Andaman Islands; Gamble (1878) lists it as in cultivation in Burma. Russell (1956) cites *U. S. Dept. Agr. Pl. Invent 190447* as taken from cultivated plants in Florida and Maryland. Loudon (1826) and Sweet (1830) maintain that it was introduced into English gardens from the "E. Indies" [probably an error for eastern India] in 1759, but Bean (1956) avers that it has been in cultivation in England since the year 1739.

The corollas are described as having been "lilac" in color on *Comanor 778*, "rich-mauve" on *Tanner 2960*, "lavender" on *Burch & Smith 4149* and *Fosberg 56425*, and described as "lavender to blue" by Datta & Majumdar (1966), "bright pale-purple" by Trimen (1895), "lavender-blue" by Patel (1968), and "purple inside, purplish outside and at the base inside on *Abedin 5080*."

A notation on the sheet indicates that pollen was taken for analysis from *Comanor* 778. Rau & Lee (1940) describe the pollen grains as 3-colpate, oblate, 17 x 26  $\mu$ , the exine granular and reticulate. Sobti & Singh (1961) report the chromosome number as 26; Sugiura (1936) reports it as 32, while Sharma & Mukhopadhyay (1963) report it as 34.

Masamune (1955) is of the opinion that the "*V. negundo*" of Matsumura (1912), Säkaguchi (1924), and Naito (1953) are actually *V. trifolia* L. He places *V. iriomotensis* Ohwi in the synonymy of typical *V. trifolia* and he records *V. trifolia* from Okinawa (Yontanza, Naha), Ishigaki (Kapaira), Taketomizima, Taiwan, Malaya, and Australia -- obviously again including the varieties.

Backer & Bakhuizen (1965) suggest that in Java *V. trifolia* L. hybridizes naturally with what they call *V. paniculata* Lam. [= *V. trifolia* var. *bicolor*] and they assert that in Java the plant is very aromatic, flowering throughout the year, ascending from 1 to 1100 feet altitude, and is found in periodically very much desiccating localities, teak forests, brushwoods and secondary forests, and also cultivated as a hedge plant.

Clarke (1885) describes what he calls *V. trifolia* as having "leaves simple and 3-foliolate, leaflets sessile obovate and obovate-oblong entire glabrate above beneath and panicles closely white-tomentose, corolla 1/3 -- 1/2 in., drupe 1/5 in. diam. black.....Panicles terminal, penultimate axillary peduncles often added.....Scattered throughout India, in the tropical and subtropical region, from the foot of the Himalaya to Ceylon and Malacca, nowhere common. -- Distrib. S. E. Asia to Japan, the Philippines and N. Australia. ....Perhaps commoner than supposed, being frequently unnoticed from its close general resemblance to the universal *V. negundo*."

Kurz (1877) regarded *V. agnus-castus* L. and *V. trifolia* L. as conspecific, adopting the former epithet.

Merrill (1917) comments that "The reduction of *Lagondium vulgare* to *Vitex trifolia* Linn. was first made by Linnaeus [1754, 1759, & 1763]....which is certainly the correct disposition of it. [The species] is very widely distributed along the seashore throughout the Indo-Malayan region."

Some errors in bibliographic literature should be noted: Foreman (1972) is sometimes erroneously cited as "1971", the title-page date; similarly, the Bean (1956) reference is sometimes incorrectly cited as "1951". Hallier (1918) cites the Miquel (1858) reference as "1856", but pages 705--960 were actually not issued until 1858. The Blume (1826) references is sometimes erroneously cited as "9: 812. 1825".

The illustration given by Pope (1968) as representing typical *V. trifolia* actually depicts var. *simplicifolia* and var. *subtrifida* only, and not typical *V. trifolia* at all. The illustration given by Burman (1737) appears to represent *V. leucoxydon* L. f., so it would appear that the *Vitex triflora odorata*, *sylvestris* J. Burm., previously regarded by me as a synonym of *V. trifolia*, actually should be regarded, instead, as a synonym of *V. leucoxydon*.

The "*Vitex trifolia*" of Mueller (1868), described as "crescit a fluvio Brisbani in Arnheimiam. Arbor 20' jam fruticis statu florens. Variat foliis digitate quinque-foliolatis", probably represents var. *bicolor* (Willd.) Mold. and/or *V. benthamiana* Domin.

Bolan (1935) reports that the fruit of *Vitex trifolia* is used as a cataplasma in the treatment of tumors in Malaya and India. Quisumbing (1951) says that the fruits are ground up and made into pills used in the treatment of breast cancer in China. Ebert (1907) says "Die Früchte finden arzneiliche Verwendung als Mittel gegen Kopfschmerz, Katarrh, Augenleiden, Fieber, Drüselgeschwulste, Hautkrankheiten und als Emmenagogum." Parham (1943) found the species used medicinally in Fiji. Sonohara (1952) reports its use as a windbreak, as well as medicinally in Okinawa. Gamble (1878) found it used to make hedges in Burma.

Smith (1871) notes that *V. trifolia* is "extensively used in India in native medical practice". Bruges (1908) found it "highly useful for medicine" in the Philippines, while Rageau (1957) says: "Le décoction des feuilles, aromatique, amère et nauséuse, est préconisée contre le rhumatisme aigu, les fièvres intermittentes. La plante serait résolutive des tumeurs et le fruit vermifuge, emménagogue ainsi que le racine."

According to Uphof (1968) the "Boiled leaves and twigs made into a paste are used by the natives for treating bruises. Added with Guava and leaves of Sembong, *Blumea balsamifera* DC., it is used to treat beri-beri. Leaves are recommended for dropsy. Fresh leaves are put on wounds." Heyne (1917) provides us with a long and detailed description of its economic uses in Indonesia.

Morton (1962) says: "These aromatic plants [*V. trifolia* and its var. *variegata*], commonly planted as hedges in South Florida, cause respiratory irritation, especially when being trimmed and afterward while the cuttings are still lying on the ground. Some people suffer not only asthma-like symptoms but also dizziness, headaches and nausea. Children sometimes chew the leaves but desist because of the burning taste. In the Far East, the leaves are placed in irrigation water in rice fields to protect the plants from pests, and dry, powdered leaves are used to repel insects from stored grain and clothes. The leaves are burned to drive away mosquitoes. The leaves and twigs contain cineol, 1-d-pinene, camphène, terpinyl acetate and a diterpene alcohol. The leaves and fruits have various medicinal uses, as poultices, in medicinal baths, etc. The fruit is regarded as a nervine, cephalic and emménagogue."

Crevost & Pételot (1934) tell us that "Ses petites graines, gris noirâtre, de la grosseur d'un grain de poivre, que l'on trouve chez tous les marchands de médicament, sont revêtues à la base du calice persistant dont on les débarrasse; après quoi on en fait une décoction contre les maux de tête et les maux d'yeux. On a attribué à ces graines des vertus multiples, mais leur usage est aujourd'hui assez limité [in Indochina]."

Willaman & Li (1970) describe a new alkaloid, vitricin, from the fruit of this species.

Diels (1913) cites Forrest 579 from China; Ridley (1911) cites

Keith s.n. from Thailand. Dop (1928) cites Lecomte & Finet 903 from Annam, Geoffroy 17 and Thorel 1590 & 2093 from Cambodia, Godefroy 781 and Pierre 330 & 380 from Cochinchina, Spire 235 & 318 from Laos, Balansa 3814, Bon 6165, and Simonds s.n. from Tonkin, and Kerr 7248 and Schomburgk s.n. from Thailand. Brown (1935) cites Cheeseman 15 from Rarotonga and Quayle 1281 from Nukuhiva in the Marquesas Islands.

Fletcher (1938) cites Haniff & Nur 3584, Keith s.n., Kerr 1248 & 4602, Lakshnakava 78, Marcan 1901 & 2109, Rabil 55, and Schmidt s.n. from Thailand. He gives the overall distribution as India (type), Sri Lanka, Burma, Indochina, Philippines, Hainan, China, Japan, and northern Australia, and notes that the species is also cultivated in Thailand.

Foreman (1972) cites Waterhouse/Yale 60 and Waterhouse 63-B from New Guinea. Gibbs (1917) cites Gibbs 6290 and Koch s.n. from Damar Island, New Guinea. Schumann (1898) cites Dahl 149 from Ralum. Merrill (1918) cites Merrill *Sp. Blanc.* 302 [as opposed to *Sp. Blanc.* 814 which is var. *simplicifolia*] which, he avers, "is common along the seashore throughout the Philippines".

Schumann & Lauterbach (1900) cite Bamler 1:13, Dahl 149, Hollrung 486, Lauterbach 166, and Warburg & Lewandowsky 48 from New Guinea. They comment that the species "Ist an den Seeküsten Südasiens bis Papuasien und Japan verbreitet, auch von British Neu-Guinea bekannt."

Collett & Hemsley (1890) cite an unnumbered Aplin collection from the Shan States of Burma. Drake del Castillo (1893) cites an unnumbered Le Bastard collection from the Marquesas Islands; Merrill (1908) cites Mearns 3176 from Batan in the Philippines, noting again that the species occurs "Throughout the Philippines" along the seashores. Guillaumin (1932) cites Kajewski 690 from Aneityum, as well as Kajewski 66 & 84 from Tanna, commenting that it is "Already found on Aneityum, Tanna, and Epi; also New Caledonia, Australia (Queensland, North Australia), Norfolk, Fiji, Tonga, Samoa, Cook, Marquesas, Caroline, Mariana and Bismark Islands, New Guinea, Malaysia, Hawaii." Unquestionably, he is here including all the infraspecific taxa!

Hallier (1918) cites: KALANTAN: Amdjah s.n., Winkler 3159. LOMBOK: Elbert 674 & 1875. SUMBAWA: Colfs 125, Elbert 3508 & 3825, Pretorius s.n., DeVriese s.n., Beccari 269, Daalen 223. FLORES: Elbert 4323, Gründler 4342. LUZON: Hallier 4230c, Perrott s.n., Vidal 850, Elmer 7877, Vanoverbergh 321. TIMOR: Zippelius 3726. NEW GUINEA: Koch A.20. MINDORO: Cuming 1493. He lists the species also from Mauritius, Réunion, India, Sri Lanka, Malacca, Thailand, Hainan, southern China, Korea, Andaman Islands, Java, Banda, northern Australia, Queensland, New Caledonia, Witie Islands, Tonga, Marquesas, Oahu, Sibuyan, Taiwan, Ryukyu Islands, and Japan.

Petzak & Rechinger (1967) cite from Persia: Popov 51/184, Shar. 1305-E. Afghanistan: Griffith 6057. Pakistan: Rechinger 29884. He gives the overall distribution as "Asia tropica et Afghanistan usque ad Sinam, Japoniam, insulae Philippines, Indonesia, Nova Guinea, Nova Caledonia, Hawaii, Australia, Africa, Mauritius,



Madagascar, Natal." Brown (1935) refers to it as "A littoral species distributed from eastern Polynesia westward to the Old World tropics".

Keys (1976) refers to the seed as bitter and pungent, containing an essential oil of 55 percent camphene, 20 percent limonene, and some pinene) and acetic acid. He reports its use as a sedative and analgesic - the dose being 5--10 gm. Kariyone (1967) found the fruits to contain vitricine,  $C_{17}H_{15}O_3N$ , mp. 237° (decomp.),  $[\alpha]_D^{25} + 108^\circ$  (CHCl<sub>3</sub>). Shinozaki (1921) isolated l-a-pinene, camphene, terpinyl acetate, and diterpene alcohol in a volatile oil. Schimmel (1894) reports finding cineol in the foliage. Willamin & Li (1970) isolated vitricine from the fruit. Steinmetz (1957) isolated an essential and an alkaloid, reporting the leaves employed in medicine as an alterative, tonic, diuretic, anodyne, febrifuge, demulcent, the fruit as a nervine, emmenagogue, and cephalic, and the roots as a local anodyne.

Masilungan & his associates (1964) found that an extract of the leaves gave positive anticancer results.

Burkill (1966) notes that "The leaves are much used medicinally, chiefly in poultices, and probably there is no complaint for which the people of Malaysia may not use them, sometimes with the addition of lime, sometimes with camphor, or vinegar, or pepper, or *Nigella* seed, and at times only with rice....The plant is also used internally....The leaves are employed in medicinal baths both in Malaya and the Dutch Indies. There is a little alkaloid in them.....Malays sometimes powder the leaves and put them into the rice-bin as they keep away insects, or among clothes to protect them.....The Malays use burning leaves to drive away mosquitoes and evil spirits. In Java the leaves are put in the water when rice-fields are irrigated in order to drive away pests."

Burkill & Haniff (1930) assert that "A decoction of the boiled root, or an infusion of the leaves may be drunk for fever after childbirth". Ridley (1897) reports it being used to treat consumption -- he says: "Grind the leaves with a little garlic, turmeric, and pepper and take the preparation in the form of pills." Heyne (1927) lists many uses, noting that a tincture or decoction of the leaves is of some value in treating intestinal complaints.

Maxwell (1906) reports its use for poulticing the swollen trunk of elephants. Rumpf (1886) avers that the branches may be hung in the house to emit a pleasant smell. In a popular folk-tale the stirring of rice with a spoon made of this wood "renews youth".

Shinozaki (1921) and Gildemeister (1931) maintain that the aroma given off by this plant is due to a volatile oil. They found that dry twigs yielded 0.11--0.2% of this oil and dry leaves yielded .28%. They assert that pinene and camphene are the chief constituents of this oil, with some cineol also present.

Petelot (;953) repeats most of the previously reported uses of this plant in Indochina:

Ramachandran Nair and his associates (1975) record that "adsorption chromatography on silica gel of the chloroform extract of dry leaves of *Vitex trifolia*.....has yielded two methylated flavones of rare occurrence. Based on chemical as well as UV, IR,



PMR and Mass spectral data, the major compound has been characterized as 5, 7-dihydroxyl-3, 3', 4', 6-tetra methoxyl flavone (3, 3', 4', 6'-tetra methyl quercetagenin) and the minor as artemetin (5-hydrox-3, 3', 4', 6, 7-penta methoxyl flavone) by direct comparison with authentic sample. The earlier observation regarding the variation of flavonoid pattern with reference to plant geography in *Vitex* is [thus] further supported."

Hartwell (1971) reports the bark and leaves used as a potion in the treatment of old cancers and glandular tumors in Nigeria and breast cancers in China -- for the latter use the leaves are ground up and made into pills.

Dymock and his associates (1893) assert that this plant is purported to have the same properties as *V. negundo* [this is not surprising!], but he says that "Two varieties are recognized: one with pale blue flowers (Svetapushpi), and the other with blue flowers (Pushpanlika). Among the Tamils [in India], one of these plants is supposed to be male and the other female, and for this reason they are usually combined together in their prescriptions. In the Nighantas, Nirgundi is described as cephalic, pungent, astringent, bitter and light; a remedy for colic, swellings, rheumatism, worms, leprosy, dyspepsia, phlegm, and boils. The leaves are generally used as a discutient fomentation in sprains, rheumatism, swelled testicles, contusions, &c. The root is thought to be a tonic, febrifuge, and expectorant, and the fruit nervine, cephalic, and emmenagogue. Mahometan physicians use these plants as substitutes for *Vitex agnus-castus*, the fruit of which is imported into India and sold in the bazara as Sambhálu-ke-bij." For more by this author on this and related taxa, see under var. *bicolor* in these notes.

Li (1979) describes the supposed magical properties of this and related taxa in this genus.

Additional (and variant) common and vernacular names reported for this species and not previously listed by me are: "achhi nagad", "bois nounou", "caryophyllon", "ching-taü", "dangla", "dholi nagdi", "dholi nagod", "Folia vitex trifoliae", "Fructus vitex trifoliae", "Fructus viticis", "galounie", "gapasgapas", "garyophyllon", "gatillier trifolié", "gendarasi", "gendavasi", "hand of Mary", "högâgii", "indrani", "karé-lakki", "kok pa pay", "kyoung-ban", "lagoendi oetan", "lagondie", "lagundie", "lagunding-dagat" [lagundi, *Vitex trifolia* + dagat, ocean], "lakki", "langghoendhi", "langoendi", "legoendi", "lemuning", "lenggundi", "lilas de Perse", "lingur", "lou sin wan", "man-ching", "man-ching-taü", "meean-milila", "mitsu-ba-hama-gô", "mituba-hamago", "nagod", "nichinda", "nigundi lingur", "niguri", "nikka", "nirgunda", "nirgundi", "nirnochi", "nir-nochi", "niru-vávili", "nishinda", "nislada", "nisinda", "nochchi", "nochi", "pajpati", "pani samalu", "panika sanbhalu", "pani-sanbhalu", "panj-angushte-abi", "pushpanlika", "quan âm biên", "Radix vitex trifoliae", "rala", "rara", "sambhálu", "seng fa che", "sephálika", "sindhula", "sindhuvára", "sudu-nika", "surasa", "svetapushpi", "ta king tse", "three-leaved chaste-tree", "three-leaved bench creeper", "three-leaved vitex", "thuốc ôn",

"thuóc kinh", "thúóc kinh", "thuõc ôn", "vanai", "vellai-nochi", "vettai-nochi", "vitex à feuilles ternées", and "vitex de tres hojas". It is almost certain that many, if not most, of these names apply to one of the infraspecific taxa, rather than to the typical form of this species.

The *Sohmer 8237* and *Sumithraarachchi DBS.462*, distributed as *V. trifolia*, actually are *V. altissima* L. f., while *Collector undesignated 15* is *V. capitata* Vahl; *Rechinger 29984* is *V. negundo* var. *trifoliolata* Mold.; *D. Anderson 2143*, *Banks & Solander s.n.* [Friendly Islands], *Boorman s.n.* [Tweed Heads], *Brass 25548*, *Carriek & Enoch JC.255*, *Castro & Melegrito 1636*, *Dietrich s.n.* [Prope Brisbane river], *Fairchild & Dorsett 499*, *Fosberg 36763*, *Garber 611*, *Guillaumin & Baumann-Bodenheim 11493*, *Lewandowski 48*, *McGregor 379*, *McKee 2000*, *Mueller-Dombois 68041901*, *H. E. Parks 20800 & 20857*, *Parks & Parks 22573*, *C. B. Robinson 304 & 2493*, *Theobald & Grupe 2320*, *J. B. Thompson 439*, *Vaupel 389*, *Villamil 284*, *Waas 637*, and *Wright s.n.* [Feejee Islands] & *s.n.* [Samoan Isls.] are *V. trifolia* var. *bicolor* (Willd.) Mold.; *H. E. Parks 16178* is *V. trifolia* var. *bicolor* f. *albiflora* (Kuntze) Mold.; *Cockburn SAN.68413*, *Koyama 7311*, *Stone 2721*, *Surapat 45*, and *Taam 1702* are *V. trifolia* var. *simplicifolia* Cham.; *Amano 7191*, *Buchholz 1536*, *Clemens 43494a*, *Correll & Correll 48992*, *Doty 11730*, *Doty & Newhouse s.n.*, *Elmer 7877*, *Forster 116*, *Fortune 90*, *Fosberg 11981*, *34926*, *36709*, *37304*, & *37681*, *Gillespie 4380*, *Guillaumin 8540*, *Helfer 6057*, *Herb. Mus. Paris s.n.* [Timor], *Herb. Schles. Bot. Tauschv. 113*, *Hu 12464*, *Lamoureux 2896*, *W. H. Lewis 7124*, *McKee 2401*, *E. D. Merrill 957*, *C. B. Robinson 2449*, *Rothduscher s.n.* [Manilla, 1879], *Sauer 3381*, *A. C. Smith 4559 & 6078*, *Sohmer s.n.* [St. Louis Heights], *Specht 42*, *Stokes 1*, *Taam 1702*, *J. H. Taylor 47*, *Van Royen & Sleumer 8249*, and *Whitford 674* are *V. trifolia* var. *subtrisecta* (Kuntze) Mold.; and *Stone 6922* is *V. siamica* F. N. Will.

Additional citations: BAHAMA ISLANDS: Grand Bahama: *Correll & Kral 42981a* (Ld). TANZANIA: Tanganyika: *Tanner R.T.2960* (Ba). SEYCHELLES ISLANDS: Mahe: *Sauer 3709* (Ws). MASCARENE ISLANDS: Mauritius: *Sauer 2811* (Ws). INDIA: East Punjab: *Thomson s.n.* [Panjab, 1-4000 ped.] (Mu--654). SRI LANKA: *Collector undetermined s.n.* [Kankasanturai, February 1890] (Pd); *Comanor 778* (N); *Davide 7530* (W--2803427); *F. R. Fosberg 56425* (N); *Thwaites C. P.1955* (Br, Pd); *Worthington 177* (K). BURMA: Upper Burma: *Huk s.n.* [25-7-1890] (Pd). PHILIPPINE ISLANDS: Palawan: *E. D. Merrill Sp. Blanc. 302* (N, W--903979). FIJI ISLANDS: Viti Levu: *Meebold 16492* (Mu). AUSTRALIA: New South Wales: *Meebold 3391* (Mu). SAMOAN ISLANDS: Manono: *Whistler W.4527* (W--2887919). Nu'utele: *Whistler W.4130* (W--2885723). CULTIVATED: Florida: *Burch & Smith 4149* (Ld). India: *Herb. Hort. Bot. Calcutt. s.n.* (Mu--3799). Malaya: *Soo 369* (Kl--1369). Pakistan: *Abedin 5080* (Kh). Sri Lanka: *Collector undetermined s.n.* [Oct. 22, 1914] (Pd). MOUNTED CLIPPINGS & ILLUSTRATIONS: Koord. & Valet., Atlas Baumart. Java 6: fig. 292. 1914 (W); *E. H. Walker, Fl. Okin. South. Ryuk. 893--894. 1976* (W).

*VITEX TRIFOLIA* var. *BICOLOR* (Willd.) Mold.

Additional & emended synonymy: *Vitex bicolor* Willd., Enum. Hort. Bot. Berol. 2: 660. 1809. *Vitex negundo* L. var. Cham. ex D. Dietr., Syn. Pl. 3: 611, in syn. 1843. *Vitex negundo* var. *bicolor* H. J. Lam, Engl. Bot. Jahrb. 59: 27. 1924. *Vitex ternifolia* Hort. ex Mold., Phytologia 6: 174, in syn. 1958. *Vitex negundo* var. *bicolor* Lam.[arck] ex Mold., Phytologia 17: 51, in syn. 1968. *Vitex negundo bicolor* H. J. Lam ex Mold., Fifth Summ. 2: 724, in syn. 1971. *Vitex trifolia* var. *bicolor* Mold. ex Zepernick, Baessl.-Arch., ser. 2, 8: 133, in syn. 1972. *Vitex trifolia* var. *bicolor* (Lam.) Mold., Phytologia 50: 167, in syn. 1982. *Vitex trifoliata* var. *bicolor* (Willd.) Whistler, in herb. *Vitex intermedia* Carrick & Enoch, in herb. [not *V. intermedia* Blanchet, 1942, nor Schau., 1940]. *Vitex negundo bicolor* (Willd.) H. J. Lam, in herb. *Vitex negundo* var. *bicolor* (Lam.) Mold., in herb. *Vitex negundo* var. *bicolor* (Lam.) Willd., in herb.

Additional & emended bibliography: Willd., Enum. Hort. Bot. Berol. 2: 660. 1809; Roth, Nov. Pl. Sp., imp. 1, 316. 1821; Sweet, Hort. Brit., ed. 1, 1: 323 (1826) and ed. 2, 416. 1830; Loud., Hort. Brit., ed. 1, 246 (1830) and ed. 2, 246. 1832; Decne., Nouv. Ann. Mus. Hist. Nat. Paris 3: 400. 1834; G. Don in Loud., Hort. Brit., ed. 3, 246. 1839; G. Don in Sweet, Hort. Brit., ed. 3, 551. 1839; D. Dietr., Syn. Pl. 3: 611. 1843; Schau. in A. DC., Prodr. 11: 683--684. 1847; Buek, Gen. Spec. Syn. Candoll. 3: 501. 1858; Bocq. in Baill., Rec. Obs. Bot. 3: 253. 1863; F. Muell., Fragm. 6: 15. 1868; Naves & Fern.-Villar in Blanco, Fl. Filip., ed. 3, 6: pl. 228. 1878; Fern.-Villar in Blanco, Fl. Filip., ed. 3, 4: 160. 1880; Dymock, Veg. Mat. Med. W. India 499--501 & 785. 1884; Nairne, Flow. Pl. West. India 246. 1894; Krämer, Samoa-Inseln 2: 119, 120, 379, & 384. 1903; H. Hallier, Meded. Rijks Herb. Leid. 37: 42--43. 1918; E. D. Merr., Enum. Philip. Flow. Pl. 3: 394 & 395. 1923; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 246. 1929; Fedde, Justs Bot. Jahresber. 47 (2): 423. 1929; Fedde & Schust., Justs Bot. Jahresber. 56 (2): 286. 1937; Ohwi, Act. Phytotax. Geobot. Kyoto 7: 29. 1938; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 576. 1941; Yuncker, Bern. P. Bishop Mus. Bull. 184: 60. 1945; Parsa, Fl. Iran 4 (1): 541. 1949; Corner, Wayside Trees, ed. 2, 708, 710, & 711. 1952; Sonohara, Tawada, & Amano, Fl. Okin. 132. 1952; O. Degener, Willdenowia 1: 148. 1953; Naito, Scient. Rep. Kagosh. 2: 60. 1953; Pételot, Pl. Méd. Cambod. Laos Vietn. 2: 248 (1954) and 4: 171. 1954; Masamune, Scient. Rep. Kanazawa Univ. 4: 49. 1955; Liu, Illustr. Nat. Introd. Lign. Pl. Taiwan 2: 1229. 1962; Mold., Phytologia 17: 49--55. 1968; Mold., Résumé Suppl. 16: 10, 12, & 29 (1968) and 17: 6. 1968; B. C. Stone, Micronesica 6: [Fl. Guam] 509. 1970; Sykes, N. Zeal. Dept. Sci. Indust. Res. Bull. 200: 206, 216, & 314. 1970; Mold., Fifth Summ. 1: 239, 240, 258, 259, 263, 264, 279, 282, 293, 303, 307, 312, 319, 320, 329, 331, 333, 334, 338--341, 343, 344, 349, 351, 352, & 375 (1971) and 2: 711, 712, 714, 719, 723--725, 728, 930, & 970. 1971; St. John & A. C. Sm., Pacif. Sci. 25: 341--342. 1971; Fosberg, Atoll Res. Bull. 160: 13. 1972; Zepernick, Baessl.-Arch., ser. 2, 8: 133--134, 152, 188, 205--207, 209, 263, & 306. 1972; Mold., Phytologia 23: 425 (1972) and 25: 233, 235, &

& 245. 1973; Altschul, *Drugs Foods* 246--247. 1973; Mold., *Phytologia* 28: 447 & 452. 1974; Roth, *Nov. Pl. Sp.*, imp. 2, 316. 1975; Mold., *Phytologia* 34: 266, 268, & 280. 1976; Stargardt, *Journ. Biogeogr.* 4: 225. 1976; E. H. Walker, *Fl. Okin. South. Ryuk.* 893--894, fig. 179. 1976; Fosberg, *Falanruw, & Sachet, Micronesica* 13: 30. 1977; Mold., *Phytologia* 36: 38. 1977; Fosberg, *Sachet, & Oliv.*, *Micronesica* 15: 239. 1979; Fosberg, *Otobed, Sachet, Oliver, Powell, & Canfield, Vasc. Pl. Palau* 38. 1980; Mold., *Phytol. Mem.* 2: 228, 229, 247, 248, 252, 253, 266, 269, 282, 294, 298, 303, 309--311, 319, 321, 323--325, 328--334, 338--343, 367, 460, & 595. 1980; Mold., *Phytologia* 45: 492 (1980), 48: 486, 487, & 490 (1981), and 50: 252, 254, & 267. 1982.

Recent collectors describe this plant as a small to large, diffuse, much-branched shrub, 0.5--4 m. tall, spreading and often forming thickets or several forming a single row on the beaches, or as a treelet or small, slender, much-branched tree, 5--10 m. tall; trunk (when a tree) to 12 cm. in diameter at breast height; stems (when a shrub) often horizontal, about 2 cm. in diameter; young branches tetragonal, ridged; outer bark light- or gray-brown, the under surface light-brown or green; inner bark cream-color or yellow-cream; wood cream- or straw-color to yellow; sap colorless; secondary branches bushy; leaves fragrantly aromatic; leaflets 3--5, grayish- to yellow-green or light-, mid-, or dark-green and dull or semiglossy above, pale- or gray-green to gray beneath, dry-textured; inflorescence terminal; flower-buds pale-green; flowers fragrant; corolla gamopetalous, with one lobe extended into a lip; fruit at first green or pale-green, turning pink, purple or black when ripe, spherical.

The corollas are said to have been "blue" on *Balگوو* 2305, *Burgess* 40403, *Canfield* 726, *Davidse* 7530, *Davidse & Sumithraarachchi* 9025, *MacDaniels* 2003 & 3022, *Meijer SAN.58806*, *Parks* 20800, *Riley* 52, and *Sumithraarachchi & Sumithraarachchi DBs.* 861, "bluish" on *Waas* 637, "pale-blue" on *Hallier* 3512b and *Mueller-Dombois* 68041901, "intense sage-blue" on *Hallier* 3512a, "bluish-purple" on *Sumithraarachchi & Jayasuriya DBs.* 232, "purple" on *Amaratunga* 569, *Brass* 28095, *Bryan* 972, *Cockburn* 68408, *Isles & Croft NGF.* 32225, *Larivita & Katik LAE.* 70526, *McKee* 2000, *Tan s.n.*, *Waas* 2137, and *Whistler* 619 & 1326, "light-purple" on *Whistler* 512, "violet" on *Baumann-Bodenheim* 5176, *Brass* 25548, *Philipson* 10362, and *Robinson* 305, "pale-violet" on *Carroll* 22, "mauve" on *Alston* 1327, "rich-mauve" on *Tanner* 2960, "lavender" on *Brass* 21928, *Falanruw* 3510, *Whistler* 1211, and *Yuncker* 15011, and "lilac" on *Fairchild & Dorsett* 499 and *Robinson* 304 & 2493. *Fairchild & Dorsett* refer to the plant as a "handsome large shrub with beautiful lilac flower clusters".

Recent collectors have encountered the plant in sandy soil with poor drainage, in coral sand, and on sandy flats, sand cays, and shingle ridges, on sandy seashores and strand, along brackish water coastlines, at the edges of lagoons, in seaside jungles, on coral rock and in coral quarries, rooting in permanent water on riverbanks, in coppices and open woodland in the littoral zone,

on open hillsides and stony schist slopes, and in coconut plantations and among native coconuts just back of the *Spinifex* zone, from sealevel to 800 m. altitude, flowering and fruiting in every month of the year. In Sri Lanka Mueller-Dombois found it on sandy beaches of sheltered bays with *Spinifex* mixed in the herb layer. Theobald & Grupe refer to it as "locally abundant" and Sumithraarachchi & Jayasuriya call it "a very common tree" there, while Fosberg found it "common on low berms of coral sand and gravel rock on low beach ridges covered by unevenly closed scrub forest". Brass reports it "common on narrow sand beaches on the inner side of the mangroves" and "frequent in the littoral strip" in New Guinea.

Burgess refers to it as "common at the edge of the shore on all turtle islands" in Sabah; Stoddart reports it "common" on the islands of the Great Barrier Reef. Tan describes it as a common shrub along the beaches of Sarawak. Fosberg calls it "dominant in thickets at the top of the beach" in Java. Canfield encountered it "in sandy soil with *Muntingia*, *Eugenia*, *Polyscias*, and *Plumeria*". Carroll reports that it "is said to have been present before European contacts" in the Caroline Islands. Falanruw refers to it as "small trees common along the shores and used as a hedge" on Truk. MacDaniels refers to it as "occasional" in New Caledonia and Riley calls it "occasional" on Guadalcanal. Bryan found it "in a pigpen" (!) on Tutuila.

Willdenow (1809) says of the type of this variety: "Habitat in India orientalis". C. B. Robinson 304 is said to be representative (according to Merrill) of the *Lagondium vulgare* of Rumpf usually placed in the synonymy of typical *V. trifolia* L.

Nairne (1894) and Parsa (1949) regard *V. bicolor* Willd. as typical *V. negundo*, but this is quite impossible. Naves & Fernandez-Villar (1878) regard it as a synonym of what they call "*V. leucoxylon* ? Blanco", which is the true *Vitex negundo* L.

Some collectors refer to the leaves of *V. trifolia* var. *bicolor* as "glaucous" beneath, but this is not strictly true as they are always densely gray-puberulent beneath.

The Ohwi (1938) reference in the bibliography (above) is sometimes erroneously cited as "8: 29".

Vernacular and common names reported by recent collectors and authors include "gasigi", "kaju labundé", "katree", "lagondi", "lala", "legundi", "lingúr", "namelega", "namulenga", "nieke", "nikki", "nirgundi", "nir-nochchi", "nisinda", "nochcho", "pani-ki-sambháld", "two-coloured chaste-tree", "yaeyama-hamago", and "yaeyama-hama-gô" [*yaeyama* is a generic vernacular name for *Vitex*].

The variety was introduced into cultivation in England, according to Sweet (1826), from the East Indies in 1810.

The Mueller-Dombois 68041901 collection, cited below, serves as voucher for ecologic studies and the Carroll 22 collection for ethnobotanic studies.

Fosberg and his associates (1979) list this variety from Guam, Maug, Pagan, Saipan, and Tinian in the Marianas Islands, Babeldaob, Ifaluk, Kapingamarangi, Kayangel, Koror, Kusaie, Lukunor, Moen,

Ngarakabesang, Nukuoro, Palau, Ponape, Satawan, Sonsoroi, Tobi, Truk, and Yap in the Caroline Islands, Abaiang in the Gilbert Islands, and Nauru island.

The juice of this plant is used in the Ryukyu Islands to repel mosquitoes. Altschul (1973) reports that its leaves are rubbed on the body and head to cure fevers or made into a poultice to place on abrasions, citing *Garber & Christophersen 611* and *Degener & Orton 13620* as authority. Yen reports that on Futuna island the leaves are used medicinally to treat toothache.

Zepernick (1972) asserts that this plant is used in the treatment of bone fractures: "Aerriebene Blätter der *Vitex trifolia* var. *bicolor* werden auf die Bruchstelle gelegt" in the Fiji Islands. In Samoa, he says, "Gegen Tuberkolose trinkt man Saft vom Stamm der *Vitex trifolia* var. *bicolor*" and "Gehirnkrankheiten.... Blattspresse der *Vitex trifolia* var. *bicolor* werden zerstoßen, in ein Stück Blattbasis der Kokospalme gewickelt, in Wasser gelegt und die Flüssigkeit in der Nase gestopft" and "Als fieber-senkendes und schweiztreibendes Mittel zerstoßt man die Blätter der *Vitex trifolia* var. *bicolor* und die Blattspresse der *Alphitonia zizyphoides*, flügt Wasser zu, seihet durch und trinkt die Flüssigkeit". In the same Samoan Islands, in the treatment of swellings "Blätter der *Vitex trifolia* var. *bicolor* und junge Blätter der *Alphitonia zizyphoides* werden zerstoßen, Wasser zugeflügt, durchgeseiht und die Flüssigkeit getrunken."

Lamoureux informs us that the plant is commonly cultivated as a hedge on Midway Island.

Dymock (1884) reports the leaves, roots, and fruit of what he calls "*Vitex bicolor* Willd." occur in native materia medica: "Under the names Nirgundi and Sindhuvara Sanskrit writers describe two species of *Vitex*, or possibly two varieties of *Vitex bicolor*. The properties of both appear to be considered identical. The leaves are generally used as a discutient fomentation in sprains, rheumatism, swelled testicles, contusions, &c. The root is thought to be tonic, febrifuge and expectorant, and the fruit nervine, cephalic and emmenagogue.

"Mahomedan writers under the Arabic name of Athlak and Persian Panjangusht describe what they call the Agnis of the Greeks, and identify it with the Sambhālu of India. The latter article as sold in the Bombay shops is certainly the fruit of a *Vitex*, but not that of *V. bicolor*, being less than half its size [probably the fruit of *V. agnus-castus* L.]" He avers that Mohamedan doctors in Pakistan commonly substitute the fruits of *V. trifolia* var. *bicolor* for those of *V. agnus-castus*.

Dymock continues his description of what he regards as *Vitex bicolor*: "A shrub growing in patches; branchlets, panicle, and underside of the leaves white, with a fine tomentum; leaves petioled, 3 to 5 foliolate; leaflets lanceolate, long acuminate, entire, or coarsely cut and crenate [this cannot apply to *bicolor*!]; panicle terminal, pyramidal; flowers light blue; berry black, the size of a pea. (Bombay Flora, p. 201). The habit of the shrub is variable; when growing near the sea it has almost always 3 foliolate entire leaves, the leaflets being attenuated

into the petioles. Inland, the shrub has a more delicate appearance; the petioles of the leaves are much longer; the leaflets from 3 to 5 in number are often serrated [this is the true *Vitex trifolia* L.]; the flowers do not vary. The serrated variety is preferred for medicinal purposes. and is called Kátree. The leaves of both varieties appear to me to be equally aromatic; the odour reminds one of the English Bogmyrtle (*Myrica gale*, Linn.); the taste is bitter and nauseous. The berry is very feebly aromatic." It seems clear that Dymock is describing the true *Vitex trifolia* L. as well as its var. *bicolor* (Willd.) Mold.

Fedde & Schuster (1927) cite *Volkens* 425 from the Caroline Islands, listing it also from Amboina. Hallier (1918) cites the following collections and maintaining *V. bicolor* Willd. as a valid species: TANGANYIKA: *Hildebrandt* 1254. SRI LANKA: *Oltmans* 62. INDIA: *Hohenacker* 703 and *Mokim s.n.* JAVA: *Blume s.n.*, *DeVriese s.n.*, *Junghuhn s.n.*, *Kuhl & Hasselt s.n.*, *Ploem s.n.*, *Raap* 386, *Richter s.n.*, and *Waita s.n.* SUMBAWA: *Elbert* 3729 & 4118 and *Gründler s.n.* [*Elbert* 3927]. FLORES: *Weber s.n.* TIMOR: *Zippelius s.n.* CELEBES: *Elbert* 2986 & 3337 and *Forsten s.n.* MUNAH: *Elbert* 2873. MINDANAO: *Elmer* 11999. BASILAN: *Tarrosa* 19553. PONAPE: *Hallier* 3512a & 3512b. AMBOINA: *Reinwardt s.n.* BANDA: *Collector undetermined s.n.* NEW GUINEA: *Hollrung* 486 and *Lewandowsky* 48. NEW CALEDONIA: *Deplanche* 84bis and *Vieillard* 3069. He comments that "Diese Art hat die sparrig dichasich verzweigten, erst an den äussersten Enden in Wickel übergehenden Rispenäste des *V. trifolia*, ja sogar noch mehr aus einander gezogene Blüthen und daher einen noch grösseren Querdurchmesser der Rispen, auch unterscheidet sie sich von ihm durch 3--5 Blüttchen, von denen die 1--3 mittleren deutlich gestielt sind, und anscheinend auch durch etwas kleinere Blüthen. Von *V. Negundo* L. aber scheint sie sicher ausser den Blüthenständen auch noch durch grössere Blumenkronen und Früchte und durch niemals gesägte Blätter der Blüthenzweige zu unterscheiden. Schauer und Miquel haben sie daher wohl mit Recht als eine besondere Art behandelt. Immerhin ist es wünschenswerth, dass Form, Grösse und Farbe der Blumerkronen an lebenden Pflanzen verglichen werden." He adds that probably the collections which he cited earlier from Yap, Truk, and Leleh as typical *Vitex trifolia* actually represent *V. bicolor*. I may add that his observations about this taxon, as compared with typical *Vitex trifolia* and *V. negundo*, are very astute and agree with my own findings. I differ only in regarding the present taxon as a variety, rather than a true species.

*Christophersen* (1935) cites *Garber* 611 from Tau, *Garber* 995 from Ofu, *Eames* 36 from Upolu, *Bower s.n.* and *Christophersen* 936 & 2849 from Savaii in the Samoan Islands and *Wilder* 48 as cultivated there. *Miquel* (1860) cites his no. 1107 from Banka.

*Fosberg* and his associates (1977) cite *Dickinson & Mersereau* 9 from Maug and *Falanruw* 3008 from Pagan in the Marianas Islands. *Walker* (1976) cites *A. Smith* 68 from Ishigaki and *Amano* 5932, *Hatusima* 23191, and *SRI* 6749 from Iriomote -- the last two of these said to have been taken from the type tree of *Vitex iriomotensis* Ohwi, a species which, by the way, *Masamune* (1955) errone-



ously places in the synonymy of typical *V. trifolia* L.

St. John & Smith (1971) record the variety from Futuna in the Horne Islands on the basis of *Yen 448*, referring to it as "A widespread taxon.....in the Pacific, usually near the sea." Seemann (1864) records it from Uvea on the basis of *Graeffe 20*. Fosberg (1972) lists it from Motutapu in the Raratongan Islands on the basis of *Philipson 10362*.

Stone (1970) describes *V. trifolia* var. *bicolor* as follows: "An erect branched shrub; leaves 3- occasionally 5- (or 7-) foliolate, the leaflets lanceolate, acuminate, the central one longest (to 11 cm), with petiolule to 1--2 cm long, other leaflets smaller and on shorter petiolules, all densely puberulent dorsally; petiole 2.5--6 cm long; branchlets 4-angled and puberulent; flowers in terminal panicles; on puberulent cymes; calyx about 3 mm long, grey-puberulent; corolla blue-violet, about 4 mm. long; puberulent; drupe black, 5--6 mm long, subglobose, 1-seeded.

"An E. African-Indo-Malayan-Pacific species; it is possibly native in Guam, but its occurrence is against this, and it is probably introduced, though no doubt long ago, as it was collected in Guam by Gaudichaud and by Lesson. The foliage is aromatic, and parts of the plant have medicinal uses."

Backer & Bakhuizen (1965), calling it *V. paniculata* Lam., describe it as follows: "Leaflets 3--5, the median one on a petiolule of 1/2 -- 2 cm length, ovate-oblong or oblong-lanceolate, very acutely acuminate, 3 1/2 -- 10 cm by 1 1/2 -- 3 1/2 cm, the 2 adjacent leaflets (in the 5-foliolate leaves) smaller or shorter petioluled; outermost leaflets (in 5-foliolate leaves) smallest, sessile or subsessile; petiole 2--6 cm. Panicles pyramidal-ovoid, lax, 6--20 cm long; cymes distinctly forked, 2--10 cm long (inclusive of 1/2 -- 4 cm peduncle),  $\infty$ -flowered, lax; calyx 1 1/2 -- 3 mm; corolla-tube 4--5 mm; median lobe of lower lip 3--4 mm by 2 1/2 --3 mm.....sandy beaches and adjacent localities, especially on older parts of beach-wall, rarely more inland....Very frequently confused with *V. negundo* L....Sometimes difficult to be distinguished from the preceding species [*V. trifolia* L.] with which it seems to hybridize." Merrill (1923) also notes that it occurs in the "Philippine and extra-Philippine range of the species and [is] scarcely distinguishable from it."

Sonohara and his associates (1952) refers to it as "A rare seashore shrub" on Iriomote and Ishigaki in the Ryukyu Islands. Yuncker (1959) cites *Forster s.n.*, *Moseley s.n.*, and *Yuncker 15011* from Tongatapu, *Yuncker 15801* from Nomuka, and *Crosby s.n.* from Vavau in the Tongan Islands, noting that it is "occasional throughout Tonga" and "From eastern Africa and India through Malaysia to Polynesia. Presumably the *V. trifolia* L. of Hemsley's and Burkill's lists." He describes it as a "Shrub or small tree up to 3 m. tall, twigs densely tomentose. Leaves opposite, mostly palmately five-compound, leaflets elliptic-lanceolate, acuminate, base acute, lateral leaflets smaller than the terminal one, up to 10 cm. long and 3 cm. wide, pinnately nerved, dark above, lower surface densely white-tomentose. Flowers about 5 mm. long, lilac or lavender, short-pedicellate, in large, branching, axillary or terminal,



tomentose, paniculate clusters."

Material of *V. trifolia* var. *bicolor* has been widely misidentified and distributed in herbaria as typical *V. trifolia* L. or *V. negundo* L. On the other hand, the Elmer 15236, Hohenacker 703, and Sachet 896, distributed as *V. trifolia* var. *bicolor*, seem better regarded as representing var. *subtrisecta* (Kuntze) Mold.

Additional citations: TANZANIA: Tanganyika: Tanner 2960 (N). SRI LANKA: Alston 1327 (Pd); Amaratunga 569 (Pd); Davidse 7530 (Ld); Davidse & Sumithraarachchi 9025 (Ld, W--2808699); F. R. Fosberg 36763 (W--2584960A), 56425 (N, W--2811423); Herb. Schmiedel s.n. (Mu); Mueller-Dombois 68041901 (Ac, N, Pd, W--2612107); N. D. Simpson 9688 (Pd); Sumithraarachchi & Jayasuriya DBS.232 (Ld, W--2803440); Sumithraarachchi & Sumithraarachchi DBS.861 (W--2805418); Theobald & Grupe 2320 (Pd, W--2602994); Waas 637 (W--2803415), 2137 (W--2877398); Worthington 5142 (K, K). THAILAND: Congdon 1005 (Ac). MALAYAN ISLANDS: Bumbon Besar: Balgooy 2305 (Ac, N). Langkawi: B. C. Stone 10962 (Kl--16411). PHILIPPINE ISLANDS: Luzon: Ahern 166 (W--445160), 223 (W--445199), 255 (W--445214), 814 [28] (W--445883); Borden, Herb. Philip. Forest. Bur. 2035 (Pd, W--625554); Cailipan, Herb. Philip. Forest. Bur. 25637 (W--1376034); E. D. Merrill 1106 (W--436080); R. Meyer, Herb. Philip. Forest. Bur. 2276 (W--439916); Whitford 853 (W--851805); R. S. Williams 185 (W--706849). Masbate: W. W. Clark, Herb. Philip. Forest. Bur. 2527 (W--852302). Mindanao: Ahern 671 [71] (W--445412, W--445849); Elmer 11999 (W--779705); Miranda, Herb. Philip. Forest. Bur. 17976 (W--902651); R. S. Williams 2978 (W--708201). Mindoro: J. V. Santos 5258 (W--2246546). MARIANAS ISLANDS: Guam: R. C. McGregor 379 (W--713072); P. H. Moore 726 (W--2903563); J. B. Thompson 439 (W--712873). Maug: Dickinson & Mersereau 9 (W--2784940). Pagan: Falanruw 3008 (W--2784839). Saipan: Holt 17-2 (W--2395496). Tinian: Konda 3 (Ba). PALAU ISLANDS: Kayangel: Canfield 726 (W--2881443). Yap: Falanruw 3362 (W--2881148). GREATER SUNDA ISLANDS: Banguay: Castro & Melegrito 1636 (W--1349668). Celebes: Kaudern 452 (N). Java: F. R. Fosberg 44519 (W--2638454). Sabah: Meijer SAN.58806 (Ld); Villamil 284 (W--1375169). Sarawak: Carrick & Enoch JC.255 (Kl--3240); Tan s.n. [S.A.R.28818] (Ft--11327). Selingan: Burgess 40403 (Ld); Cockburn 68408 (Ld). Sumatra: Fairchild & Dorsett 499 (W--1426529); Lütjeharms 4655 (W--1755651). LESSER SUNDA ISLANDS: Buton: C. B. Robinson 2493 (W--775442). MOLUCCA ISLANDS: Amboina: C. B. Robinson 304 (W--654622), 305 (W--654623). Soela: Bloembergen 4788 (N). CAROLINE ISLANDS: Lukunur: D. Anderson 2143 (N, W--2242705). Nukuoro: Carroll 22 (W--2684321). Truk: Falanruw 3510 (W--2992792). KAPINGAMARANGI ISLANDS: Touhou: Niering 659 (W--2585252A). Werua: Niering 596 (W--2585195A). NEW GUINEA: Territory New Guinea: Larivita & Katik LAE.70526 (Mu); Lewandowsky 48 (W--619629). Papua: Brass 21928 (W--2495523). NEW GUINEAN ISLANDS: Normanby: Brass 25548 (W--2408232). Sudest: Brass 28095 (W--2409040). BISMARK ARCHIPELAGO: New Britain: Isles & Croft NGF.32225 (Mu). SOLOMON ISLANDS: Guadalcanal: J. C. Riley 52 (Mi, N, W--1861961). NEW HEBRIDES: East Pentacost: MacDaniels 3022 (Ba). NEW CALEDONIAN ISLANDS: New Caledonia: Baumann-Bodenheim

5176 (N); *Deplanche 84bis* (Pd); *Guillaumin & Baumann-Bodenheim 11493* (N); *MacDaniels 2003* (Ba); *McKee 2000* (W--2187168); *J. H. Taylor 64* (Ba). FIJI ISLANDS: Vanua Levu: *A. C. Smith 6622* (N). Viti Levu: *MacDaniels 444* (Ba); *H. E. Parks 20800* (W--2192378), *20857* (W--2192388); *Wright s.n.* [Feejee Isls.] (W--74074). TONGAN ISLANDS: Nomuka: *Yuncker 15801* (W--2129462). Tongutapu: *Banks & Solander s.n.* [Friendly Islands] (W--1276792); *Yuncker 15011* (W--2129146). AUSTRALIA: New South Wales: *Boorman s.n.* [Tweed Heads] (W--915447). Queensland: *Dietrich s.n.* [prope Brisbane River] (W--205872). GREAT BARRIER REEF: East Hope: *Stoddart 4367* (W--2759491). Green: *Stoddart 4235* (W--2759917). Green Ant: *Stoddart 4322* (W--2759518). West Hope: *Stoddart 4411* (W--2744427). SAMOAN ISLANDS: Savaii: *Whistler W.1211* (W--2738403). Tau: *Whistler W.1326* (W--2728232). Tutuila: *E. H. Bryan Jr. 972* (N). Upolu: *Eames 36* (It); *Whistler W.152* (W--2746182), *W.619* (W--2738282). Island undetermined: *D. W. Garber 611* (W--1655736); *Vaupe1 389* (Mu, W--2127818); *Wright s.n.* [Samoan Isls.] (W--74075). COOK ISLANDS: Rarotonga: *Parks & Parks 22573* (W--1625237); *W. R. Philipson 10362* (W--2657879). CULTIVATED: Egypt: *Mahdi s.n.* [14/4/1964] (Gz, Gz). Midway Island: *Lamoureux 2174* (W--2659714). Java: *Herb. Hort. Bot. Jav. s.n.* (Pd). LOCALITY OF COLLECTION UNDETERMINED: *Collector undesignated 34* (Le), *69* (Le). MOUNTED CLIPPINGS: *Walker, Fl. Okin. South. Ryuk. 894.* 1976 (W).

*VITEX TRIFOLIA* var. *BICOLOR* f. *ALBIFLORA* (Kuntze) Mold., *Phytologia* 17: 53. 1968.

Additional bibliography: Mold., *Phytologia* 17: 52--54. 1968; Mold., *Résumé Suppl.* 16: 10, 12, & 29. 1968; Mold., *Fifth Summ.* 1: 279, 319, 339, & 344 (1971) and 2: 712 & 930. 1971; Mold., *Phytol. Mem.* 2: 266, 309, 329, 334, & 595. 1980; Mold., *Phytologia* 48: 490. 1981.

Adduru refers to this plant as a bush, 4 m. tall, flowering from May to June. His collection exhibits a few scattered teeth on some of the leaflets. Parks calls it a strand bush.

Material has been misidentified and distributed in some herbaria as *V. negundo* L.

Additional citations: PHILIPPINE ISLANDS: Luzon: *Adduru 173* (W--898696). TONGAN ISLANDS: Eua: *H. E. Parks 16178* (W--1550489).

*VITEX TRIFOLIA* var. *PURPUREA* Lord

Bibliography: Lord, *Shrubs Trees Austral. Gard.*, ed. 2, 232. 1964; Mold., *Résumé Suppl.* 15: 15. 1967; Mold., *Phytologia* 17: 54. 1968; Mold., *Fifth Summ.* 1: 375 (1971) and 2: 930. 1971; Lord, *Trees Shrubs Austr. Gard.*, ed. 5, 232. 1978; Mold., *Phytol. Mem.* 2: 368 & 595. 1980.

*VITEX TRIFOLIA* var. *SIMPLICIFOLIA* Cham.

Additional & emended synonymy: *Vitex trifolia* var. *unifoliolata* Schau. in A. DC., *Prodr.* 11: 683. 1847. *Vitex trifolia* var. *ovata* (Thunb.) Mak., *Bot. Mag. Tokyo* 17: 92. 1903. *Vitex routendifolia* L. apud Hatta, Kubo, & Watanabe, *List Med. Pl.* 15, sphalm. 1952. *Vitex*

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[to be continued]

## BOOK REVIEWS

Alma L. Moldenke

"INDEX KEWENSIS PLANTARUM PHANEROGAMARUM Supplementum Sextum Decimum: Nomina et Synonyma Omnium Familiarum et Graduum Infra familiarum ab Initio Anni MDCCCCLXXI ad Finem Anni MDCCCCLXXV Nonnulla Etiam Antea Editio Complectens" edited by Patrick Brenan and the Curators of the Herbarium of the Royal Botanic Garden at Kew, iv & 309 pp. Oxford University Press, Clarendon & New York, N. Y. 10016. 1981. \$129.00.

Probably every reader of PHYTOLOGIA has had some or considerable occasion to refer to the Index Kewensis. If connected with a large library and/or herbarium the recent arrival of this 16th supplement was hailed and probably Charles Darwin was offered heartfelt spoken or written thanks for his generosity and scientific acumen in having his estate provide the funds for starting and partly perpetuating this exceedingly valuable publication for the recording of all validly published names for higher plants and also to serve as a model for similar recording of the names published for other living things. I. K. Supplement XVI includes for the first time the names at all taxonomic ranks from family downwards. All literature references are cited in full, with the often confusing "l.c.", previously employed, finally dropped. Phrases relating to the validity of publication are in English except for the still commonly used nom. nov., nom. nud., and nom. illegit. Alas, the asterisk indicating an illustration has been omitted. The dagger is used for a re-entry of a corrected name.

"A Revised Handbook to the FLORA OF CEYLON" Volume III edited by M. D. Dassanayake & F. R. Fosberg, ix & 499 pp., 2 b/w tab., 2 photo. & 56 line draw. & pl. & 1 map, published for the Smithsonian Institution and the National Science Foundation by Amerind Publishing Co., Pvt. Ltd., New Delhi 110001. Available from U. S. Department of Commerce Nat. Tech. Info. Serv., Springfield, Virginia 22151. 1981. \$25.00.

It is the famous Trimen 5-volume flora that is being revised by visiting specialists. This third volume includes the *Ebenaceae* by Kostermans, *Gentianaceae*, *Lamiaceae*, *Menyanthaceae* and *Scrophulariaceae* by Cramer, *Gesneriaceae*, *Martyniaceae* and *Pedaliaceae* by Theobald and Grupe, *Lecythidaceae* and *Sonneratiaceae* by Macnae and Fosberg, *Moraceae* by Corner, *Pandanaceae* by Stone, *Rosaceae* by Tirvengadam, *Sabiaceae* by v. Beusekom, *Symplocaceae* by Nooteboom, and *Umbelliferae* by Krahulik and Theobald. The keys, descriptions, ecological notes, specimen citations of new and old materials and the illustrations are all well presented. The inside covers have maps showing the districts in Ceylon or present

day Sri Lanka.

"DOMESTICATED ANIMALS from Early Times" by Juliet Clutton-Brock, 210 pp., 25 color and 47 b/w photos. & 112 line draw. British Museum (Natural History), London, & University of Texas Press, Austin, Texas 78712. 1981. \$24.95.

Reading proved this study to be very well prepared and very interesting. "A unique and paradoxical feature of man is that he is a tropical, omnivorous primate whose exceptional success as a species began (after learning to make tools and manipulate fire) to accelerate only when he became a social hunter in a subarctic environment [which also]....enabled man to enfold other species of animals within his communities and to tame them and control their breeding to such an extent that many domesticated animals today bear little resemblance to their wild ancestors." Since the common domestic animals of the Old World were well established by Roman Empire times, the text goes only so far. Based on careful study of fossil and anthropological "digs" in and from the British Museum, the book discusses such man-made animals as dogs, sheep, goats, cattle, pigs, and horses, such exploited captives as cats, elephants, camels, llamas, reindeer and zebu, and such small mammals as rabbits and ferrets. The book is impressively illustrated and referenced.

"THE MATHEMATICAL EXPERIENCE" by Philip J. Davis & Reuben Hersh, xx & 440 pp., 35 b/w fig., 11 tab. & 62 vignette photos of mathematicians. Houghton Mifflin Company, Boston, Massachusetts 02107. 1981. \$9.95 paperbound.

This novel book provides a keenly interesting picture of the whole field of mathematics, which is more than the science of quantity and space (and its symbolism): it is one of the humanities (with a science-like quality) since it is intelligible only within the context of culture. The authors develop many mind-stretching ideas and points of view that should be of special interest for professional, teaching and advanced student mathematicians as well as for the inquisitive general reader.

"A FIELD GUIDE TO WESTERN BIRDS' NESTS of 520 Species found breeding in the United States West of the Mississippi River" by Hal H. Harrison, xxxii & 279 pp., 256 color & 161 b/w photo., 1 map & 2 sets endpaper draw. Houghton Mifflin Company, Boston, Massachusetts 02107. 1979. \$11.95.

Those many variously ornithologically oriented readers familiar with the author's 1975 "A Field Guide to Birds' Nests East of the Mississippi River" know what a treat is in store for them in the companion western guide. The photographs are many and superb.

The text giving breeding range, habitat, nest, eggs and notes reveals the author's years of observation and his thorough knowledge of the literature. For the ruby-throated hummingbird there are two documenting photographs of a "female alternately feeding 1 young in nest, incubating 2 eggs in 2nd nest 4 ft. (1.2 m) away. Both nests successfully fledged young."

"AUSTRALIAN FERNS AND FERN ALLIES" Second Edition by D. L. Jones & S. C. Clemesha, 232 pp., 60 color photo., 297 b/w fig. & 1 tab. A. H. & A. W. Reed Pty. Ltd., Sydney & Wellington 3, American Distribution by Charles E. Tuttle Co. Inc., Rutland, Vermont 05701. 1981. \$33.50.

In the new preface the authors mention that they have updated the nomenclature, emended distribution records, improved some of the multi-parted drawings and added 47 new species to a total of 358 species in 108 genera. The book begins with a chapter on general introduction on structure and life cycle, one on the cultivation, one on propagation and hybridization and one on the nature of the fern allies. There are no keys, but the universal page-flipping to clear-cut drawings and descriptions will suffice until a later edition appears. The color photographs are superb.

"NEW ZEALAND ADRIFT -- The Theory of Continental Drift in a New Zealand Setting" by Graeme R. Stevens, xxii & 442 pp., 8 Landsat color plates, 127 b/w. photo. & 248 fig. A. H. & A. W. Reed Ltd., Sydney 2084, Wellington 3 & U. S. distributor Charles E. Tuttle Company, Rutland, Vermont 05701. 1981. Second printing. \$37.25.

"This work is not a scientific treatise....It has been written for enjoyment [achieved!] and to meet the needs of the general reader [achieved] who is interested in how our earth has evolved, but who at the same time is not inclined to wade through the chapter and verse of the extensive, and often daunting, geological, geophysical and oceanographic literature." It admirably meets these goals with its "easy-speaking" helpfully explanatory clear print text and its copious, excellently prepared, large diagrams and pertinently selected photographs. The book intentionally lacks the format of a scientific treatise, but it does not lack scientific value. Shrink the print and illustrations, substitute scientific terminology for the expletive phrases, add the 'ifs', 'ands' and 'buts', and this fascinating story would be metamorphosed into a truly scientific treatise. The author must be a gifted teacher! He pays tribute to Wegener's Pangaea and early scientists' espousal of moving plates and continents rather than long land bridges to explain similar ancient fossils and modern plant and animal life and rock formations.



"THE GENERA OF AUSTRALIAN LICHENS (Lichenized Fungi)" by Roderick W. Rogers, iv & 124 pp., 4 b/w fig. University of Queensland Press, St. Lucia, London & Lawrence, Massachusetts 01843. 1981. \$24.25.

They are placed in Division *Eumycota*, Subdivision *Ascomycotina* with 8 orders, 52 families and 198 genera, Subdivision *Basidiomycotina* with only 1 order, 1 family and 2 genera, and Subdivision *Deuteromycotina* with 5 genera. There are 7 artificial keys to genera according to thallus type - fructicose, crustose, etc. - that lead to generic descriptions for morphology, chemistry, phycobiont, distribution and number of species reported. The text is very well organized and much literature is cited.

"PHYTOALEXINS" edited by John A. Bailey & John W. Mansfield, x & 334 pp., 11 b/w tab. & 71 fig. Halsted Press of John Wiley & Sons, New York, N. Y. 10158. 1982. \$75.95.

Just over a score of years ago the first such chemical was isolated from the garden pea fungal infected tissue "and the accumulation of phytoalexins in infected tissues has become the most intensively studied mechanism of disease resistance in plants...The early chapters emphasize the chemistry, biosynthesis and metabolism of these compounds, many of which are found only in diseased tissue;.....followed by chapters on the biological significance of phytoalexins....., their modes of antibiotic activity and their role in regulating host-parasite interactions. Elicitors of phytoalexin biosynthesis appear to offer scope as useful agents for disease control." This important book is planned "for research workers, university teachers and advanced undergraduates with an interest in plant pathology, plant biochemistry and chemistry."

"RATTLESNAKES" by J. Frank Dobie, 201 pp., University of Texas Press, Austin, Texas 78712. 1980. \$6.95 paperbound.

This collection of very interesting wild-life stories, legends and descriptions made its debut in 1965 from the presses of Little, Brown and Company. The present paperback replication should fascinate and educate many readers, young and old, with its naturally told accounts.

"THE GUADALUPE MOUNTAINS OF TEXAS" photographs and drawings by Michael Allender, text by Alan Tennant, 167 pp., 60 color photo. pl., 12 wildlife draw. University of Texas Press, Austin, Texas 78712. 1980. \$29.95 oversize.

This "winner of two Texas Institute of Letters awards" (best

designed, best non-fiction) shows scenery beautifully on a large or on a small scale for this southernmost tip of our Rocky Mountains. The matching text provides historical stories and site descriptions that enrich the illustrations. This book would be a great gift to give or to receive. It is certainly a conversation piece for the coffee table -- a joy for the night table!

"FERN AND FERN-ALLIES OF MEGHALAYA STATE, INDIA" by A. K. Baishya & R. R. Rao, v & 162 pp., 36 line draw. with b/w photo., 3 tab. & 2 maps. Scientific Publishers, Jodhpur, India. 1982. Rs.100 or U.S. \$20.00.

This state originally formed part of Assam hill country. Its pteridophyte population herein treated includes 244 species and 14 varieties in 82 genera and 27 families according to Holttum. Five years of university student augmented field work and herbarium study brought this total to almost half of that for all India. There is a well planned introduction, good illustrations and keys that should be suitably workable. There is a page of "errata et corrigenda" that sifts out a goody number of errors. But would it not have been much more professional to have delayed running off the presses until these and other corrections were incorporated into the text?

"McGraw-Hill ENCYCLOPEDIA OF SCIENCE & TECHNOLOGY An International Reference Work in Fifteen Volumes Including an Index" Fifth Edition edited by Sybil P. Parker, chief and staff, 12,700 pp., 15,250 illus. in color & b/w photo., draw., maps, charts, & diag. McGraw-Hill Book Company, New York, N. Y. 10020. 1982. \$850.00.

Started with the first edition in 1960 "this work continues to be an indispensable international reference tool for any interested reader of science and technology....Each article begins with a definition of the subject, followed by sufficient background material to give a frame of reference and permit the reader to move into the more detailed text of the article.....Most of the articles contain bibliographies citing useful sources." Here follows some of the impressive data: 315 new and 2,000 revised among the 7,700 articles, 3,500 contributors who have considerable standing in their respective fields, 50,000 cross references, 150,000 entry analytical and topical indexes, dual or SI units throughout, and annual yearbooks for subscribers. I liked what I read in the articles whose content was familiar to me. I also appreciated the helpful explanations in words and illustrations of some topics way out of my ken. This is the type and quality of reference source needed in all libraries.

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An international journal to expedite botanical and phytoecological publication

Vol. 51

16 August 1982

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road  
Plainfield, New Jersey 07060  
U.S.A.

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A DISJUNCT NEW SPECIES OF CLEOBULIA (LEGUMINOSAE)  
FROM MEXICO

Richard H. Maxwell

Indiana University Southeast Herbarium, 4201 Grant-  
line Road, PO Box 679, New Albany, Indiana 47150.  
Herbarium and Field Studies in the Leguminosae.  
Supported in part by a Grant-in-Aid of Research.

Years ago while attempting to delimit generic boundaries between Dioclea H.B.K. and closely related genera, I came across Hinton and Langlasse collections from Mexico that were determined mostly Dioclea. Although I have never determined any Cleobulia Mart. ex Benth. farther west than Pará, Brazil, I believe these collections should be placed in this genus.

I have determined Dioclea guianensis Benth., D. virgata (L.C. Rich.) Amshoff, D. wilsonii Standley, and D. megacarpa Rolfe in Mexico; but I maintain that Dioclea and Cleobulia, though closely related, are separate genera (Maxwell, 1977).

Hinton 14996 (LAM) includes a fairly mature fruit. The fruit is not directly attached to the rest of the specimen, but I don't feel the collection is a mixture. An analysis of the fruit characters, heretofore lacking, enables me to propose the new species and present my generic placement for scrutiny.

Cleobulia crassistyla R. H. Maxwell, sp. nov. (Fig. 1 & 2).

Frutex ca 3 m altus; folia trifoliata, stipulae non prodientes, lanceolatae; foliola ovata vel ovalia, 6.0-10.5 cm longa, 6.0-10.0 cm lata, stipellae setaceae; inflorescentiae erectae; tubercula sessilia, globosa, aggregata distale; flores rosei, vexillum patens; calyx lobis ca 1.5-2.0 mm longis; stamina 10, antherae uniformes, perfectae; pistillum geniculatum, ovarium 6-8-ovulatum, stigma terminale, obliquum; legumen oblongum, planum; semina ca 8, plana, oblonga vel reniformia, hilum lineare,  $\frac{1}{2}$  circumdans.

TYPE: MEXICO: Guerrero: Galeana District, Plato, 1000 m alt., in a pine forest, 12 December, 1939, Geo. B. Hinton 14996 (LAM holotype, NY, US isotypes). Flowering in November and December.

Woody shrub, 1-3 m tall; stems terete with short, canescent pubescence when young, becoming glabrescent. Leaves pinnately trifoliolate, the rachis and petiole deeply canaliculate, with sparse, appressed to ascending pubescence, the petiole 6.5-9.5 cm long, somewhat winged at the lateral petiolule insertions, the rachis 1.0-2.5 cm long; stipules non-produced, lanceolate, ca 4 mm long, glabrous, persistent. Leaflets papyraceous, ovate to oval, the lamina somewhat inequilateral, both surfaces reticulate, the upper surface, except the veins, glabrescent, the lower surface with stiff, appressed or slightly ascending canescent pubescence, the apices acute or abruptly acute, mucronate, the bases occasionally rounded, usually somewhat cordate or truncate, the lateral bases somewhat oblique, the primary lateral veins in ca 6 pairs, the terminal leaflets 7.5-10.5 cm long, 6.0-10.0 cm wide, the laterals smaller; stipels setaceous, ca 1.5 mm long, persistent. Inflorences terminal to 26 cm long, floriate  $1/3 - 1/2$  the length, erect, terminal or axillary, single, canescent to somewhat fulvous-ferruginous pubescent; tubercles sessile, globose, crowded distally, 4-6-flowered; bracts acuminate, ca 2 mm long; bracteoles triangular, ca 1 mm long, persistent; calyx tube 6-8 mm long, dark, sparsely puberulent outside and inside, all lobes blunt, ca 1.5 mm long, the upper entire or shallowly emarginate; flower petals persistent; standard spreading, pink, the lamina obovate, ca 8 mm long, 11.5-14.0 mm wide, ecallose, basally biauriculate, the claw ca 4 mm long; wings with the lamina oblanceolate, 8-12 mm long, ca 4 mm wide, the claw 3-4 mm long; keels with the lamina obliquely oblong, ca 8 mm long, ca 4 mm wide, the claw ca 4 mm long; stamens 10, the vexillary filament apparently free in the bud, fused at anthesis, glabrous, the anthers uniform, perfect; pistil with ca 90° geniculation, the ovary ca 6 mm long, white to fulvous villulose, 6-8-ovulate; style glabrous, stout; stigma terminal, oblique. Legume somewhat immature, oblong, coriaceous (?), flat, ca 7.5 cm long, ca 2 cm wide, with dense, appressed to ascending, canescent to fulvous pubescence; upper suture thickened, the lower margin swollen and with a small beak. Seeds (4?)-5-8, flat, oblong to somewhat reniform, the hilum linear, encircling nearly  $\frac{1}{2}$  the testa.

Specimens Cited: MEXICO: GUERRERO: Montes de Oca District, Vallecitos, 820 m alt., in an oak forest, Hinton 9900 (K, LAM, NY); Pasion, 500 m alt., in an oak forest, Hinton 10791 (K, NY, UC); Plato, 1000 m alt., in a pine forest, Hinton 14996 (LAM holotype, NY, US isotypes) GUERRERO & MICHOACAN: Cerro verde, region of oaks, 1200 m alt., E. Langlasse 583 (G, K).

This new species differs from relatively well known Cleobulia, such as C. multiflora Mart. ex Benth, and C. leiantha Benth., in possessing functional wings about as long as the keels, a pistil with an indurate swelling on the dorsal, distal end of the ovary, and its shrub habit. Other differences seem insignificant. The wing length character is significant since the dwarf wing character of all previously recognized Cleobulia species is heavily weighed in maintaining the separation of Cleobulia from Dioclea (Maxwell, 1977). The shrub habit, at least in open areas, is common to several Dioclea species and could be considered primitive compared to cipós, lianas, and vines. The functional longer wings could also be considered primitive compared to the reduced type common within the genus Cleobulia. The significance of the indurate swelling is unknown, but this results in the beak extending from the lower margin of the legume rather than from the upper as is more common in the flat, naviculate shaped legumes of many Dioclea.

Some legume and seed character similarities are found between Cleobulia crassistyla Maxwell and Cymbosema roseum Benth., a monotypic species found in Mexico. These similarities are not strong enough to warrant placement in Cymbosema (cf. Maxwell, 1970).

Similarities between the new species and other Cleobulia can be seen by comparing Figs. 1 and 2 with Fig. 3. Gynoecium similarities are especially strong. Other similarities, such as short pedicellate reddish flowers bunched on sessile, globose, distally crowded tubercles, the standards spreading rather than reflexed and the blunt calyx lobes about  $1/4$  the tube length, may be convergence due to hummingbird pollination syndrome (cf. Advances in Legume Systematics, 1981).

After studying the references cited, the relevant flora literature and herbarium specimens, I cannot place the new species with confidence in any existing genus within the Diocleinae other than Cleobulia.

I would like to thank the directors and curators of the herbaria cited for the opportunity to study their collections.

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Figure 1. Cleobulia crassistyla. A, inflorescence; B, leaf; C, terminal leaflet; D, stipule; E, fruit, dorsal side to the right; F, immature seed in fruit. All from Hinton 14996 (LAM, holotype).

Figure 2. Cleobulia crassistyla. A, flower aspect (mature); B, calyx open, inside; C, standard; D, keel; E, wing; F, androecium; G, disc and gynoecium. All from Hinton 14996 (LAM, holotype).

Figure 3. A, Cleobulia leiantha, flower aspect (mature), Silva & Souza 2232 (NY). B, C. diocleoides, keel and wing, Saint-Hilaire 1311 (P). C, C. leiantha, standard, keel, and wing, Silva & Souza 2232 (NY). D, C. multiflora standard, keel, and wing, Porto RB# 6995 (U). E, C. multiflora, vexillary stamen, Diogenes BHM# 22,456 (BHM). F, C. leiantha, androecium, Silva & Souza 2232 (NY). G, C. leiantha, vexillary stamen and gynoecium, Silva & Souza 2232 (NY) (from Maxwell, 1977).



Fig. 1.

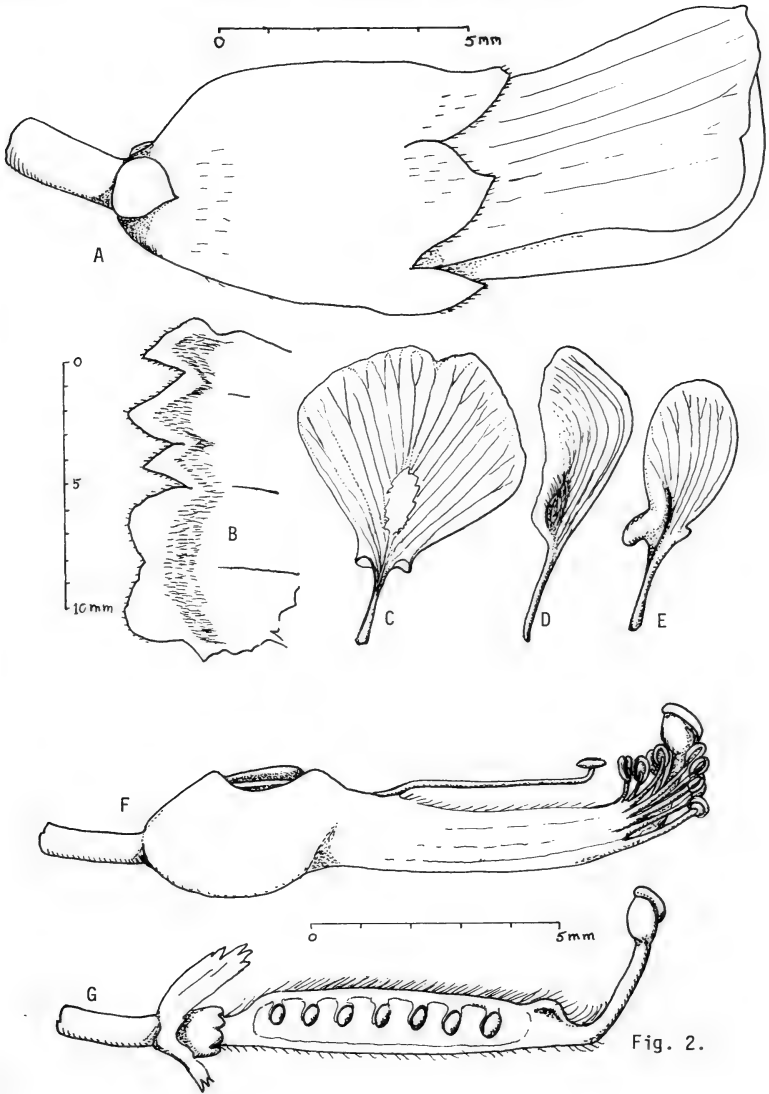


Fig. 2.

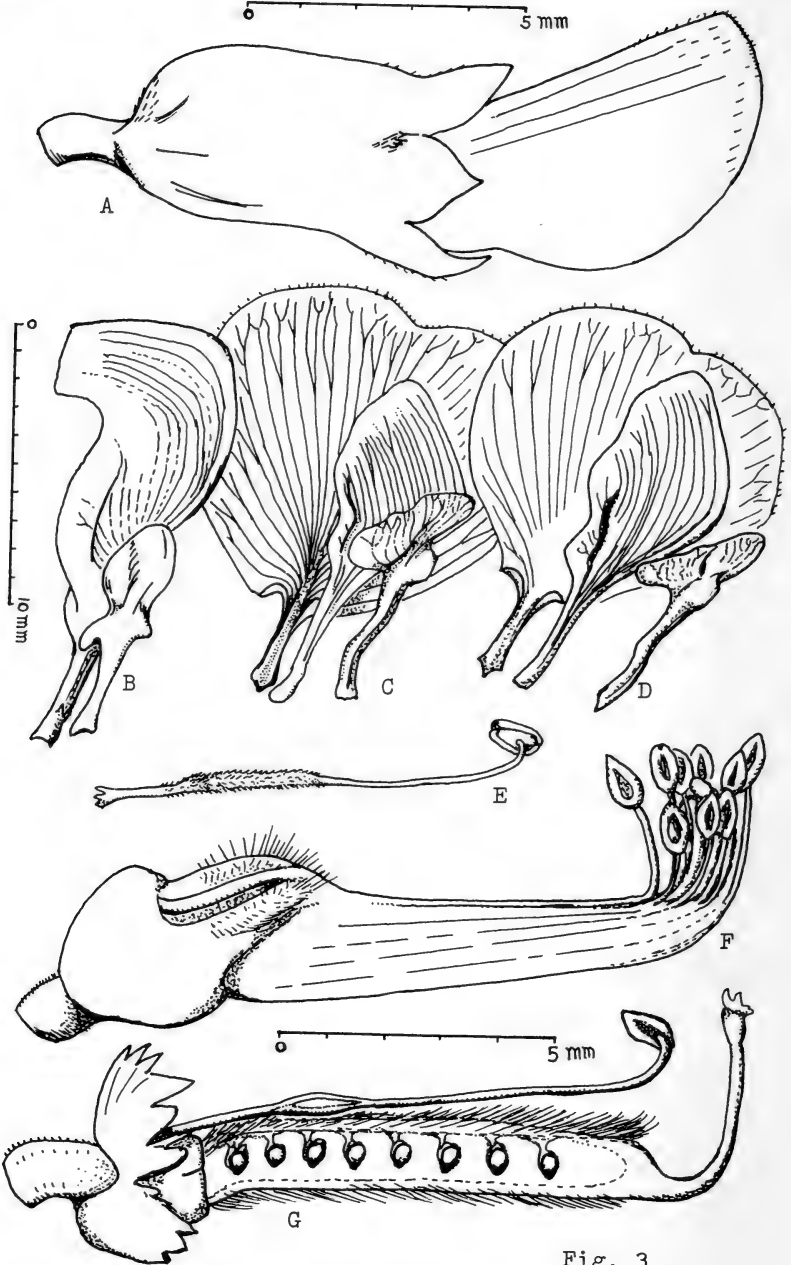


Fig. 3

NEW NAMES AND COMBINATIONS, PRINCIPALLY IN THE ROCKY MOUNTAIN  
FLORA--II

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In the course of preparation of my flora of the Western Slope of Colorado, a number of names need to be changed in conformity with my concepts of genus and subspecies. In some instances, it appears desirable to treat some related taxa from other areas in order to bring them in line with these concepts. The first paper in this series was published in *Phytologia* 33:105-106. 1976.

In this paper I propose a new generic name for the segregate genus Viorna (Ranunculaceae).

**ALSINANTHE MACRANTHA** (Rydb.) W. A. Weber, **comb. nov.** Alsino-opsis macrantha Rydb., *Bull. Torr. Bot. Club* 31:407. 1904.

**ANOTITES SEELYI** (Morton & Thompson) W. A. Weber, **comb. nov.** Silene seelyi Morton & Thompson, *Torreyana* 33:70. 1933.

**ASTRAGALUS BISULCATUS** (Hook.) A. Gray ssp. **HAYDENIANUS** (A. Gray) W. A. Weber, **comb. nov.** Astragalus haydenianus A. Gray ex Brandegee, *Bull. U. S. Geol. Surv.* 2(3):235. 1876.

**BOECHERA CRANDALLII** (Robinson) W. A. Weber, **comb. nov.** Arabis crandallii Robinson, *Bot. Gaz.* 28:135. 1899. Löve & Löve (1976) proposed the genus Boechera to accommodate species of Arabis having the chromosome base number  $x=7$ , the type species of Arabis (alpina) having  $x=8$ . Rollins (1977) certainly had the right to criticize the Love's for not pointing out morphological evidence to support their separation on cytogenetic grounds. But at the same time, the difference in basic chromosome number, especially when it continues to be borne out on examination of other species, does represent a divergent phylogenetic line, and the genetic barrier that it presents to interbreeding of the units is sufficient justification for thinking in terms of discrete genera. However, Rollins is not scientifically objective when he says that "their describing a new genus to accommodate perfectly ordinary species of Arabis has no merit and should not be followed." Posterity, rather than appeal to authority, should be allowed to decide the wisdom of this.

Rollins himself says earlier that "those species of North America most closely related to Arabis of Eurasia have the same basic chromosome number pattern, i.e.  $x=8$ , whereas those species with a somewhat different circle of close affinity [my italics]

are based on  $x=7$ ." Even a cursory examination of Arabis in the herbarium results in fairly easy separations: the loose slender root systems, large and numerous cauline leaves, most commonly toothed in Arabis, versus the short clustered caudices, small or absent and almost always entire cauline leaves of Boecheira. The often very dense indument of forked or stellate trichomes of Boecheira is not a characteristic feature of Arabis.

Even with Boecheira removed, Arabis in America remains a genus in need of additional fragmentation. One group in particular deserving attention is the purple-flowered species endemic in the ancient Siskiyou area of southwestern Oregon and northwestern California (cf. Rollins 1977). At present, however, I am confining transfers to those taxa in the Colorado flora.

**BOECHERA DEMISSA** (Greene) W. A. Weber, **comb. nov.** Arabis demissa Greene, Pl. Baker. 3:8. 1901.

**BOECHERA FENDLERI** (S. Wats.) W. A. Weber, **comb. nov.** Arabis holboellii var. fendleri S. Wats. in Gray, Syn. Fl. N. Am. 1:164. 1895.

**BOECHERA FENDLERI ssp. SPATIFOLIA** (Rydb.) W. A. Weber, **comb. nov.** Arabis spatifolia Rydb., Fl. Rocky Mts. 361. 1918.

**BOECHERA FERNALDIANA** (Rollins) W. A. Weber, **comb. nov.** Arabis fernaldiana Rollins, Rhodora 43:430. 1941.

**BOECHERA GUNNISONIANA** (Rollins) W. A. Weber, **comb. nov.** Arabis gunnisoniana Rollins, Rhodora 43:434. 1941.

**BOECHERA LEMMONII** (S. Wats.) W. A. Weber, **comb. nov.** Arabis lemmonii S. Wats., Proc. Amer. Acad. 22:467. 1887.

**BOECHERA LIGNIFERA** (A. Nels.) W. A. Weber, **comb. nov.** Arabis lignifera A. Nels., Bull. Torr. Bot. Club 24:123. 1899.

**BOECHERA OXYLOBULA** (Greene) W. A. Weber, **comb. nov.** Arabis oxylobula Greene, Pittonia 4:195. 1900.

**BOECHERA PENDULINA** (Greene) W. A. Weber, **comb. nov.** Arabis pendulina Graene, Lfl. Bot. Obs. Crit. 2:81. 1910.

**BOECHERA PERENNANS** (S. Wats.) W. A. Weber, **comb. nov.** Arabis perennans S. Wats., Proc. Amer. Acad. 22:467. 1887.

**BOECHERA PULCHRA** (Jones ex S. Wats.) W. A. Weber, **comb. nov.** Arabis pulchra Jones ex S. Wats., Proc. Amer. Acad. 22:468. 1887.

**BOECHERA PULCHRA** ssp. **PALLENS** (Jones) W. A. Weber, **comb. nov.** Arabis pulchra var. pallens Jones, Contrib. West. Bot. 14:42. 1912.

**BOECHERA SELBYI** (Rydb.) W. A. Weber, **comb. nov.** Arabis selbyi Rydb., Bull. Torr. Bot. Club 31:557. 1904.

**CERATOCHLOA WILLDENOWII** (Kunth) W. A. Weber, **comb. nov.** Bromus willdenowii Kunth, Revis. Gram. 1:134. 1829.

**CHLOROCREPIS ALBIFLORA** (Hook.) W. A. Weber, **comb. nov.** Hieracium albiflorum Hook., Fl. Bor.-Am. 1:298. 1934.

**CHLOROCREPIS FENDLERI** (Schultz-Bip.) W. A. Weber, **comb. nov.** Hieracium fendleri Schultz-Bip., Bonplandia 9:173. 1861; Heteropleura fendleri Rydb.

**CHLOROCREPIS TRISTIS** (Willd.) Love & Love ssp. **GRACILIS** (Hook.) W. A. Weber, **comb. nov.** Hieracium gracile Hook., Fl. Bor.-Amer. 1:298. 1834. The genus Chlorocrepis was proposed by Grisebach to include species usually placed in Hieracium, Subgenus Stenotheca. The species are characterized by having a single papus, and strongly dimorphic phyllaries (inner and outer ones of very different lengths). The achenes have the ribs anastomosing at the apex to form a thickened annular ring.

**CILIARIA AUSTROMONTANA** (Wiegand) W. A. Weber, **comb. nov.** Saxifraga austromontana Wiegand, Bull. Torrey Bot. Club 27:389. 1900. Even on morphological grounds, the genus Saxifraga is a highly unnatural assemblage. It is unfortunate that Haworth's proposals (Saxifrag. Enum. 1821) of segregate genera have been ignored. Hara (in Nakai & Honda, Nov. Fl. Jap. No. 3, Saxifragac. 59. 1939) recognized this genus and dealt with C. cherleroides, but the other North American representatives should be transferred.

**CILIARIA FUNSTONII** (Small) W. A. Weber, **comb. nov.** Saxifraga funstonii Small, N. Amer. Fl. 22:154. 1905.

**CILIARIA TRICUSPIDATA** (Retz) W. A. Weber, **comb. nov.** Saxifraga tricuspidata Retz, Prodr. Fl. Scand. ed. 2. 104. 1795.

**CILIARIA VESPERTINA** (Small) W. A. Weber, **comb. nov.** Saxifraga vespertina Small, N. Amer. Fl. 22:153. 1905.

**CLEMENTSIA SEMENOVII** (Regel & Herder) W. A. Weber, **comb. nov.** Umbilicus semenovii Regel & Herder, Bull. Soc. Nat. Mosc. 39:65. 1886. This is the Asiatic vicariat of the Rocky Mountain Clementsia rhodantha.

**CORIFLORA, gen. nov. Ranunculacearum.** Viorna sensu Small, Fl. S. E. U. S. p. 437-439. 1903, non Reichenb., 1837. Lectotype species: Clematis viorna L., Sp. Pl. p. 543. 1753.

I am indebted to Carl S. Keener for furnishing me with the complicated history of the name Viorna which shows why the name is untenable on the genus level for the leatherflowers. His reasoning is as follows:

"1. "Viorna" appeared first as a supraspecific name in Persoon's Synopsis Plantarum (2:98. 1806) in which he described "Viorna" as a subgenus under Atragene (two species were listed, which now pass as Clematis cirrhosa L.).

"2. "Viorna" appeared first as a genus in Reichenbach's Handbuch des natürlichen Pflanzensystems (277. 1837) in which he listed Viorna as a genus under his "Gruppe" Clematideae. Viorna was listed in this way: "Viorna Pers. (Cheiropsis DeC.)". Earlier, deCandolle had erected Cheiropsis as a section under Clematis. So far, one would have to conclude that if Viorna is recognized at the genus level, it would include only a few species, none of which occurs native to North America.

"3. In an admirable treatment of Les Clematidees", Spach recognized six genera: Atragene, Cheiropsis, Viticella, Viorna, Meclatis, and Clematis (see Histoire naturelle des vegetaux 7:257-284. 1839). Viorna sensu Spach received a thorough treatment, with two sections. Unfortunately, he refers to Reichenbach as the source of the genus ("Genre VIORNA. - Viorna Reichenb."). Unfortunately, Viorna as a genus already had nomenclatural status, but for species not included in Spach's Viorna [species of Viorna (Pers.) Reichenb. appear under Spach's genus Cheiropsis (DC.) Spach].

"I conclude, therefore, that Viorna at the genus level has been used for two different groups and that Spach's use of Viorna is illegitimate. So far as I know, there is no name at the genus rank for the American leatherflowers. Perhaps "Coriflora" (Lat., cori = leather + flos, flower) might do."

**CORIFLORA ADDISONII** (Britt. ex Vail) W. A. Weber, **comb. nov.** Clematis addisonii Britt. ex Vail, Mem. Torr. Bot. Club 2:28, footnote and pl. 3. 1890.

**CORIFLORA ALBICOMA** (Wherry) W. A. Weber, **comb. nov.** Clematis albicoma Wherry, J. Wash. Acad. Sci. 21:198, fig. 1. 1931.

**CORIFLORA BALDWINII** (T. & G.) W. A. Weber, **comb. nov.** Clematis baldwinii T. & G., Fl. N. Am. 1:8. 1838.



**CORIFLORA BEADLEI** (Small) W. A. Weber, **comb. nov.** Viorna beadlei Small, Man. Southeast. Fl. 527, 1504. 1933.

**CORIFLORA BIGELOVII** (Robinson ex A. Gray) W. A. Weber, **comb. nov.** Clematis pitcheri var. bigelovii Robinson ex A. Gray, Syn. Fl. N. Am. 1:6. 1895.

**CORIFLORA CRISPA** (L.) W. A. Weber, **comb. nov.** Clematis crispa L., Sp. Pl. 543. 1753.

**CORIFLORA FREMONTII** (James) W. A. Weber, **comb. nov.** Clematis ochroleuca var. fremontii James, J. Cincin. Soc. Nat. Hist. 6:120. 1883.

**CORIFLORA GATTINGERI** (Small) W. A. Weber, **comb. nov.** Clematis gattingeri Small, Bull. Torr. Bot. Club 24:209. 1897.

**CORIFLORA GLAUCOPHYLLA** (Small) W. A. Weber, **comb. nov.** Clematis glaucophylla Small, Bull. Torr. Bot. Club 24:337. 1897.

**CORIFLORA HIRSUTISSIMA** (Pursh) W. A. Weber, **comb. nov.** Clematis hirsutissima Pursh, Fl. Amer. Sept. 2:385. 1814.

**CORIFLORA INTEGRIFOLIA** (L.) W. A. Weber, **comb. nov.** Clematis integrifolia L., Sp. Pl. 544. 1753.

**CORIFLORA OCHROLEUCA** (Ait.) W. A. Weber, **comb. nov.** Clematis ochroleuca Ait., Hort. Kew. 2:260. 1789.

**CORIFLORA PALMERI** (Rose) W. A. Weber, **comb. nov.** Clematis palmeri Rose, Contr. U. S. Nat. Herb. 1:118. 1891.

**CORIFLORA PITCHERI** (T. & G.) W. A. Weber, **comb. nov.** Clematis pitcheri T. & G., Fl. N. Am. 1:10. 1838.

**CORIFLORA RETICULATA** (Walt.) W. A. Weber, **comb. nov.** Clematis reticulata Walt., Fl. Carol. 156. 1788.

**CORIFLORA SCOTTII** (Porter) W. A. Weber, **comb. nov.** Clematis scottii Porter, Synops. Fl. Colorado, p. 1. 1874.

**CORIFLORA TEXENSIS** (Buckl.) W. A. Weber, **comb. nov.** Clematis texensis Buckl., Proc. Acad. Nat. Sci. Phila. 13:448. 1862.

**CORIFLORA VERSICOLOR** (Small ex Britt.) W. A. Weber, **comb. nov.** Clematis versicolor Small ex Britt., Man. Fl. Northern States and Canada, 421. 1901.

**CORIFLORA VIORNA** (L.) W. A. Weber, **comb. nov.** Clematis viorna L., Sp. Pl. 543. 1753.

**CORIFLORA VITICAULIS** (Steele) W. A. Weber, **comb. nov.** Clematis viticaulis Steele, Contr. U. S. Nat. Herb. 13:364. 1911.

**CRITESION MURINUM** ssp. **GLAUCUM** (Steud.) W. A. Weber, **comb. nov.** Hordeum glaucum Steud., Syn. Pl. Gram. 1: 352. 1854.

**EUCEPHALUS PERELEGANS** (Nels. & Macbr.) W. A. Weber, **comb. nov.** Aster perelegans Nels. & Macbr., Bot. Gaz. 56:477. 1913.

**GASTROLYCHNIS KINGII** (S. Wats.) W. A. Weber, **comb. nov.** Lychnis kingii S. Wats., Proc. Amer. Acad. 12:247. 1877.

**GERANIUM VISCOSISSIMUM** F. & M. ssp. **NERVOSUM** (Rydb.) W. A. Weber, **comb. nov.** Geranium nervosum Rydb., Bull. Torr. Bot. Club 28:34. 1901.

**GILIASTRUM RIGIDULUM** (Benth.) Rydb. ssp. **ACEROSUM** (A. Gray) W. A. Weber, **comb. nov.** Gilia rigidula var. acerosa A. Gray, Proc. Amer. Acad. Arts Sci. 8:280. 1870.

**LIGULARIA PORTERI** (Greene) W. A. Weber, **comb. nov.** Senecio porteri Greene, Pittonia 3:186. 1897.

**LIGULARIA WEBSTERI** (Greenm.) W. A. Weber, **comb. nov.** Senecio websteri Greenm., Bot. Gaz. 53:511. 1912.

**NEGUNDO ACEROIDES** (L.) Moench ssp. **VIOLACEUS** (Kirchner) W. A. Weber, **comb. nov.** Acer negundo var. violaceum Kirchner in Petz & Kirchner, Arb. Musav. 190. 1908.

**OPUNTIA FRAGILIS** Haw. ssp. **BRACHYARTHRA** (Engelm. & Bigel.) W. A. Weber, **comb. nov.** Opuntia brachyarthra Engelm. & Bigel., Pacific R. R. Rep. 4(3): 47. 1857.

**OXYTROPIS LAMBERTII** Pursh ssp. **BIGELOVII** (A. Gray) W. A. Weber, **comb. nov.** Oxytropis lambertii var. bigelovii A. Gray, Proc. Amer. Acad. Arts Sci. 20: 7. 1884.

**PADUS VIRGINIANA** (L.) M. Roem. ssp. **MELANOCARPA** (A. Nels.) W. A. Weber, **comb. nov.** Cerasus demissa var. melanocarpa A. Nels., Bot. Gaz. 34:25. 1902.

**PINUS PONDEROSA** Laws. ssp. **SCOPULORUM** (S. Wats.) W. A. Weber, **comb. nov.** Pinus ponderosa var. scopulorum S. Wats., Geol. Surv. Calif., Bot. 2:126. 1880.

- POA CUSICKII** Vasey ssp. **EPILIS** (Scribn.) W. A. Weber, **comb. nov.** Poa epilis Scribn., U.S.D.A. Div. Agrost. Circ. 9:5. 1899.
- POA GLAUCA** M. Vahl ssp. **RUPICOLA** (Nash) W. A. Weber, **comb. nov.** Poa rupicola Nash, Mem. N. Y. Bot. Gard. 1:49. 1900.
- POA NEMORALIS** L. ssp. **INTERIOR** (Rydb.) W. A. Weber, **comb. nov.** Poa interior Rydb., Bull. Torr. Bot. Club 32:604. 1905.
- PSYCHROPHILA INTROLOBA** (F. Muell.) W. A. Weber, **comb. nov.** Caltha introloba F. Muell., Trans. Phil. Soc. Vict. 1:98. 1855.
- PSYCHROPHILA LEPTOSEPALA** (DC.) W. A. Weber, **comb. nov.** Caltha leptosepala DC., Syst. Veg. 1:310. 1818. A. P. deCandolle characterized the section *Psychrophila* of Caltha by drawing attention to the persistent sepals, the one-flowered leafless scape, the sagittate basal leaves with auriculate bases. To this can be added the white tepals with blue dorsal faces, and the ecology, which is probably always snowbed sites in mountains. Psychrophila is well distinct from Caltha on these counts, and with the addition of this species, demonstrates an ancient distribution running from the North American Cordillera to the southern tip of South America, over to the high mountains of Australia and New Zealand. Rafinesque recognized the genus in 1832 (his P. auriculata is synonymous with P. leptosepala).
- PSYCHROPHILA NOVAE-ZEALANDIAE** (Hook.f.) W. A. Weber, **comb. nov.** Caltha novae-zealandiae Hook. f., Fl. Nov. Zeal. 1:12. t.6. 1856.
- PSYCHROPHILA OBTUSA** (Cheesem.) W. A. Weber, **comb. nov.** Caltha obtusa Cheesem., Trans. Proc. N. Z. Acad. Inst. 3:312. 1870.
- RHUS AROMATICA** Ait. ssp. **TRILOBATA** f. **SIMPLICIFOLIA** (Greene) W. A. Weber, **comb. nov.** Rhus canadensis var. simplicifolia Greene, Bull. Torr. Bot. Club 17:13. 1890.
- RUDBECKIA LACINIATA** L. ssp. **AMPLA** (A. Nels.) W. A. Weber, **comb. nov.** Rudbeckia ampla A. Nels., Bull. Torrey Bot. Club 28:234. 1901. Jones (Madrono 14:132-133. 1957) argued that this should be regarded as a species distinct from R. laciniata and presented significant distinguishing details. Future research may confirm his opinion.
- STELLARIA LONGIPES** Goldie ssp. **STRICTA** (Rich.) W. A. Weber, **comb. nov.** Stellaria stricta Rich., App. 15. Franklin Journal, 2nd ed. 743. 1823.

**STELLARIA LONGIPES** Goldie ssp. **MONANTHA** (Hultén) W. A. Weber, **comb. nov.** *Stellaria monantha* Hultén, Bot. Notiser 1943:265. fig. 7e,f. 1943.

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ADDITIONS TO THE FLORA OF COLORADO--VIII

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The last number of this series was published in Brittonia 3: 325-331.

## NEW RECORDS FOR COLORADO

## INDIGENOUS TAXA

**ARTEMISIA PYGMAEA** A. Gray, Proc. Amer. Acad. 21:413. 1886 (CMP). RIO BLANCO CO.: just N of the White River on the Colorado-Utah border, NE 1/4 S15. T1N R 104W; barren shale knolls in *Artemisia tridentata* association, Uinta formation, 27 May 1981, L. M. & J. S. Shultz s.n. (COLO 352726).

**CAREX CRAWEI** Dewey, Amer. J. Sci. (2)2:246. 1846 (CYP). EL PASO CO.: crossing of Black Squirrel Creek on old road 7 mi N of Falcon toward Eastonville, in streamside meadow, periodically inundated, 21 July 1962, Weber & Willard 11548 (COLO). The site is well-known for the presence of midwestern prairie-woodland disjuncts.

**CAREX PAYSONIS** Clokey, Am. J. Sci. (5)3:89. 1922 (CYP). ROUTT CO.: mountain meadow on west slope of Rabbit Ears Pass, 9600 ft. alt., 26 June 1950, Penland 2360 (KHD). MESA CO.: Grand Mesa, T11S R96W S31, 10,000 ft. alt., lava cliff, 30 June 1981, Siplivinsky 1430 (COLO).

**CIRSIVM CHELLYENSE** Moore & Frankton, Can. J. Bot. 52:547. 1944. (CMP). MOFFAT CO.: Cross mountain Gorge, T6N, R97-98W, 1800 msm; steep-sided canyon of sedimentary bedrock; on talus

slopes, mostly from weathered limestone; sagebrush and grasses dominant, with scattered junipers, 19-20 Sept. 1978, Northcutt & Bunin (COLO 318787).

Previously known only from the type locality, in Canyon de Chelly, Arizona. The diagnostic features were not clearly given in the key. The deeply and narrowly pinnatifid glabrous leaves, small heads in a congested inflorescence subtended by small leaves reduced mostly to marginal spines, are diagnostic. The spines of the phyllaries on the holotype, which had a metric scale attached, do not appear to be as long as 10-20 mm.

DALEA MULTIFLORA (Nutt.) Shinnars, Field & Lab. 17:82. 1949 (LEG). KIT CARSON CO.: 9 mi E of Burlington on Hwy I-70, possibly introduced in seeding, 1 Sept. 1981, R. E. Brooks 15637 (COLO).

GILIA STENOTHYRSA A. GRAY, Proc. Amer. Acad. Arts Sci. 8:276. 1870 (PLM). MESA CO.: 5 mi NE of Grand Junction, 5500-6500 ft. alt., shadscale grassland, MCR-V Coal project, 29 May 1981, ft. alt., shadscale grassland, MCR-V Coal project, 29 May 1981, Western Resource Development Corp. 28 (COLO).

HEDYOTIS NIGRICANS (Lam.) Fosberg, Lloydia 4:287. 1941 (RUB). YUMA CO.: hills just S of Laird, 1981, McGregor (COLO); near S shore of Bonny Reservoir, 1150 msm; short-grass prairie with Artemisia filifolia as the dominant shrub; sandy soils with limestone outcrops; infrequent, on limestone, only one locality noted at heads of ravine SW of summer houses, 11 Aug. 1981, Wittmann 1844 (COLO).

HETERANTHERA DUBIA (Jacq.) McMill., Metasp. Minn. Valley 138. 1892 (PTD). YUMA CO.: along S shore of Bonny Reservoir, T5S R43W S19,21,22; shallow inlets and drying margins, 12 Aug 1981, Wittmann 1853 (COLO).

LYCOPODIUM DUBIUM Zoega, Fl. Isl. p. 11. 1772 (LYC). SUMMIT CO.: deep wet humus in forest, S side Monte Cristo Creek just N of Hoosier Pass, 11,000 ft. alt., 7 July 1951, Weber et al 6498; EAGLE CO.: 16 mi S of Eagle, drainage of E. Brush Creek, Adams Rib Recreational Area, 8,000-10,000 ft., 23 June 1977, Buckner (COLO 309718); GILPIN CO.: slopes of cirque, NE side of James Peak, 12,000 ft. alt., 4 July 1972, Komarkova (COLO 262361).

Lycopodium dubium is closely related to L. annotinum L., but has shorter appressed or ascending leaves with less distinctly toothed margins, (in L. annotinum the leaves are widely spreading or even somewhat reflexed). Over their circumpolar range, the two taxa often grow in the same areas without losing their identity. L. dubium, however, is more characteristic of the northern or alpine areas of the range.

*OXYTROPIS LAMBERTII* Pursh ssp. *LAMBERTII*. BA: near Turner Ranch ca. 13 mi E of Stonington, on sandy, gravelly knoll in Cimarron River Valley; colony of ca. 50 plants, 16 May 1981, McGregor 32264 (COLO); SEDGWICK CO.: vicinity of Ovid, 23 May 1951, Weber 6032 (COLO). The typical subspecies, characterized by longer, narrower leaflets, evidently is present only in the easternmost counties, and a gap separates these populations from the Rocky Mountain subspecies *bigelovii*.

PHYLA LANCEOLATA (Michx.) Greene, Pittonia 4:47. 1899 (VRB). YUMA CO.: Bonny Reservoir State Recreation Area, 1150 msm, T5S, R43W, Sec 21; common in boggy bottomlands under *Populus fremontii* at head of inlet, south shore near the marina, 29 Sept. 1981, Wittmann 1897 (COLO).

PRUNUS GRACILIS Engelm. & A. Gray, Boston J. Nat. Hist. 5:243. 1845 (ROS). BACA CO.: along Cimarron River, sandy bluffs near Kansas border, T34S, R45W, 18 May 1981, Colson & Wittmann 1638 (COLO).

TRIFOLIUM MUCRONATUM Willd. var. *ARIZONICUM* (Greene) Isely, Brittonia 32:57. 1980. MINERAL CO.: Wason, near Creede; frequent along a ditch in river terrace, 8600 ft. alt., 13 Aug. 1939, Belle K. Stewart 375 (COLO).

VIRGULUS X AMETHYSTINUS (Nutt.) Reveal & Kramer, Taxon 30:649. 1981 (CMP). DENVER CO.: City of Denver, 1916, Heustis s.n. (COLO 7032), !A. G. Jones.

#### ADVENTIVE TAXA

ALYSSUM MURALE Waldst. & Kit., Pl. Rar. Hung. 1:5. 1799 (CRU). BOULDER CO.: along the first 5 miles of Four Mile Canyon road W of Boulder, 5800-6000 ft. alt., well-established, spreading upward into dry *Pinus ponderosa* forest on S-facing slope; also established in at least one other location 4.2 mi NW of jct. Colo. 119, well away from the nearest dwelling, 27 June 1981, Wittmann 1713.

AMARANTHUS PALMERI S. Wats., Proc. Amer. Acad. 12:274. 1877 (AMA). BOULDER CO.: adventive and naturalized in vacant ground, Valmont Road and 55th St., E of Boulder, at the egg farm, 24 Sept. 1981, Weber 15980 (COLO).

ARCTIUM TOMENTOSUM Mill., Gard. Dict. (8), no. 3. 1768 (CMP). Denver: Berkeley, 16 July 1926, W. Heustis (COLO 6093); Denver: City Park, probably same collector, no date (COLO 6090). This species has the corymbiform inflorescence of *A. lappa*, the smaller heads of *A. minus*, and is characterized by having loose tomentum on the phyllaries.

*BOTHRIOCHLOA ISCHAEMUM* (L.) Keng var. *SONGARICA* (Rupr.)  
 Celar. & Harl., J. Linn. Soc. Lond. (Bot.) 57:758. 1958 (GRM).  
 CHEYENNE CO.: 0.5 mi E, 1 mi S of Cheyenne Wells, on roadbank, 2  
 Sept. 1981, R. E. Brooks 15881 (COLO). YUMA CO.: along US 36 near  
 Idalia, ca. 1200 msm., 13 Sept. 1980, Wittmann 1404 (COLO).

*CARAGANA AURANTIACA* Koehne, Deutsch. Dendrol. 340. 1893  
 (LEG). JEFFERSON CO.: valley of Geneva Creek between Grant and  
 Geneva Basin; two small populations above the road at the first  
 occurrence of *Pinus aristata*; nine plants growing in a small area  
 of about 1 sq. m. in the lower colony, and about the same number  
 above, ca. 2000 msm., 19 Sept. 1981, Weber, Skvortsov, Baitulin,  
Smirnov 15981 (COLO).

*CARYOPTERIS INCANA* Miq., Ann. Mus. Bot. Lugduno-Batavum  
 2:97.[1863?] (VRB) BOULDER CO.: SW corner of Valmont Road & 28th  
 St., volunteering in evergreen shrub plantings, 13 Sept. 1981, M.  
Lane 2956 (COLO).

*CHENOPODIUM BOSCIANUM* Moq., Chenop. Monogr. Enum. 21. 1840  
 (CHN). BOULDER CO.: adventive and naturalized in vacant ground,  
 19th and Goss Sts., Boulder. Plants almost 2 meters tall, green,  
 the branches ascending, inflorescence grayish, of small flowers,  
 the ultimate branchlets nodding, 24 Sept. 1981, Weber 15985  
 (COLO).

*CRYPISIS ALOPECUROIDES* (Piller & Mitterp) Schrad., Fl. Germ.  
 1:167. 1806 (GRM). JEFFERSON CO.: Denver: SE shore of Stanley  
 Reservoir near N Kipling St.; abundant on wet flats of receding  
 shoreline, 5,000 ft. alt., 5 Sept. 1980, R. G. Walter & J. Lormond  
s.n. (CS).

*EUCLIDIUM SYRIACUM* (L.) R. Br. in Ait., Hort. Kew., ed. II.  
 4:74. 1812 (CRU). MESA CO.: Grand Mesa Nat. For., old unpaved  
 forest road on N slope of plateau E of Mesa Creek, T11S, R96W,  
 Sec. 22, 8100 ft. alt., oak and aspen woods; abundant, 22 June  
 1982, Weber & Siplivinsky 1277 (COLO).

*FRANGULA ALNUS* (L.) Mill., Gard. Dict., ed. 8, no. 1. 1768  
 (RHM). BOULDER CO.: City of Boulder; along Boulder Creek between  
 19th Street and Folsom, 1620 msm; frequent in shade of Salix  
fragilis, 30 July 1981, Wittmann 1836 (COLO).

*HYSSOPUS OFFICINALIS* L., Sp. Pl. 569. 1753 (LAB). BOULDER  
 CO.: Hwy. 7 between Allenspark and Estes Park, drainage of N. St.  
 Vrain River; dry, S-facing slope, somewhat disturbed by road  
 above; weedy, with Thlaspi arvense, 25 Aug 1981, J. B. Posey 3908  
 (COLO).

*Loniceria morrowii* A. Gray, in Perry, Jap. Exped. 2:313. 1856 (CPR). BOULDER CO.: Skunk Canyon N of NCAR mesa, well-established, 14 June 1973, Lanham (COLO 269707). LA PLATA CO.: floodplain of Animas River at Durango, 21 June 1964, Herbert Owen 3, erroneously reported (Weber 1966) as *L. utahensis*. Commonly cultivated and now locally established in natural habitats.

*Salvia sclarea* L., Sp. Pl. 27. 1753 (LAB) BOULDER CO.: a persistent weed in a garden on Balsam Ave. E of 20th St, Boulder, 16 June 1981, Weber s.n. (COLO 352727).

*Silene czerei* Baumg., Enum. Stirp. Transs. 3:345. 1816. BOULDER CO.: A bad weed in Shapard Nursery, NW side of "Boulder, 5 Sept. 1951, Weber 7282 (COLO); abundant weed in meadow between Boulder Canyon and Sugarloaf, 6500 ft. alt., 10 July 1957, Weber 10575 (COLO). Similar to *Silene vulgaris*, but without the conspicuous network of anastomosing veins. The venation is present but the calyx is of uniform thickness and glaucous green, while in *S. vulgaris* the areolae form translucent windows between the veins, and the calyx is reddish-tinged.

*Silene gallica* L., Sp. Pl. 417. 1753 (CRY). "Englewood", 19 May 1930, Leslie Paull (COLO 4504).

#### SIGNIFICANT RANGE EXTENSIONS

*Braya humilis* (C. A. Mey.) Robinson ssp. *ventosa* Rollins. (CRU).

Previously known from a very small and vulnerable population on Hoosier Ridge, Summit-Park County, this most rare of Colorado plants is now known from a second station: Gunnison Co.: 1 mile E of Cumberland Pass, 12,250 ft. alt., on Mississippian limestone bedrock, in S-facing gully moist from melting snow cornice; associated with *Oxytropis viscida*, *Thalictrum alpinum* and *Cimicifuga prostrata*, 21 July 1981, Dixon 712. The collector, Philip Dixon, a plant ecologist from Gunnison, is to be congratulated on a very important discovery.



A NEW ROBINSONELLA (MALVACEAE) FROM HONDURAS

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On a trip to some caves with petroglyphs, a biology student, in an expedition of the Sociedad Hondureña de Exploraciones e Investigaciones, collected a plant at a roadside, and brought it back as part of the collection that he had to submit in his second course of systematic botany of the Biology Department at the National University of Honduras. Consulting Fryxell (1973), it seemed that the plant didn't fit any of the species treated by him. No plants were found either at the Herbarium of the Escuela Agrícola Panamericana (EAP) that would match the specimen in question. The plant seemed to be an undescribed taxon:

Robinsonella erasmi-sosae C. Nelson, sp. nov.

Arbor 5 m. Pedicelli et calyces dense stellato-puberuli. Petala alba, caerulea vel alba-caerulea, praeter unguem stellato-ciliatum glabra. Columna staminalis quasi ubique dense pubescens.

HOLOTYPUS: HONDURAS: Francisco Morazán: orilla del camino entre caserío La Bodega y cuevas con petroglifos Las Pintadas, 5 m de la quebrada afluyente del río Sauce, 2-3 Km SE. de Carretera del Sur a la altura del Km 22, pinares y encinos, bosque húmedo subtropical, 1500 m alt. 21 febrero 1982. Erasmo Sosa López 155 (UNAH 11390). Isotypi (EAP, MO).

COTYPUS: Type specimen, type locality, 30 abril 1982. Erasmo Sosa López 170 (UNAH 11391). Isocotypi: (EAP, MO).

Tree about 5 m tall. Leaves up to 13.2 cm long, and up to 6.4 cm wide, broadly ovate, cordate at base,

long acuminate at apex, at first denticulate then dentate, 7-pedatinerved; both surfaces at first densely stellate-puberulent with sessile hairs ca. 0.1-0.2 mm diam., soon glabrate with few sessile stellate hairs ca. 0.1 mm scattered throughout the surfaces; the nerves glabrous all the way on the upper surface, glabrous on the lower surface except for the pilosity at the base; petioles glabrous or sparsely stellate-puberulent with sessile hairs ca. 0.1 mm diam.; stipules filiform, caducous, stellate-puberulous, up to 6.5 mm long. Inflorescence short racemose with flowers binately disposed with short rachises giving the impression of being fasciculate, the rachises up to 6 mm long; pedicels 12-15 mm long, articulated towards the middle, densely stellate-puberulent; calyces 6-7 mm long, densely stellate puberulent, the lobes up to 4 mm long and up to 3 mm wide, slightly gibbous at base; petals 13-15 mm long, 7-10 mm wide, white or blue-white in the same inflorescence, when dry the petals blue, white or blue-white in the same inflorescence, obtrigular, asymmetric at apex, glabrous except for the stellate-ciliate claw; staminal column 5-7 mm long, stellate-puberulent almost to the apex; stamens ca. 30-40, filaments ca. 1-2 mm long. Styles ca. 10, glabrous, stigmata capitate. Fruits and seeds not seen.

The cotype is a sterile specimen of the same tree since, when in bloom, it's almost completely defoliated.

This species gives the impression of being a hybrid between Robinsonella pilosissima Fryxell and R. densiflora Fryxell. It differs from R. pilosissima by its pedicels and calyces with under-

lying stellate puberulence, and from *R. densiflora* by its pubescent staminal column, and the coloration and size of the petals.

This plant is extremely rare, and only one tree was found in the whole region; besides, the tree was badly damaged by machete cuts at the base of the trunk, and it might disappear from the type locality very soon.

This species is dedicated to Erasmo Sosa, the biology student at the National University of Honduras, a member of the Sociedad Hondureña de Exploraciones e Investigaciones in one of whose expeditions he collected the holotype.

#### RESUMEN

Se publica la especie nueva Robinsonella erasmii-sosae Nelson. Esta especie parece ser un híbrido entre Robinsonella pilosissima Fryxell y R. densiflora Fryxell. Se diferencia de R. pilosissima por sus pedicelos y cálices con pelos esteliformes, y de R. densiflora por su columna estaminal pubescente, y por la coloración y tamaño de los pétalos.

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NOTES ON THE GENUS *FARADAYA*

Harold N. Moldenke

It is now quite impractical, in view of the lack of time this late in life, to prepare the complete and detailed monograph which I intended to publish on this genus and which has been previously announced. However, it does seem worthwhile to place on record the bibliographic and herbarium notes assembled by my wife, Alma L. Moldenke, and myself over the past 52 years. This is the 77th genus treated by us in this continuing series of papers in this and a few other journals. The herbarium acronyms employed herein are the same as have been used in all of our previous papers in this series since 1930 and are most recently explained in full in *PHYTOLOGIA MEMOIRS* 2: 463--469 (1980) and *PHYTOLOGIA* 50: 268 (1982).

*FARADAYA* F. Muell., *Fragm. Phyt. Austr.* 5: 21. 1865.

Synonymy: *Terminalioides* Soland. ex Seem., *Fl. Vit.* 190, in syn. 1866. *Tetrathyranthus* A. Gray ex Benth. in Benth. & Hook. f., *Gen. Pl.* 2: 1156 [as "*Tetrathyranthi*"]. 1876; Mold., *Prelim. Alph. List Inv. Names* 43, in syn. 1940. *Faradaija* Wigman, *Teysmannia* 1: 488. 1890. *Schizopremna* Baill., *Hist. Pl.* 11: 119. 1891. *Farradaya* Muell. ex Mold., *Suppl. List Inv. Names* 3, in syn. 1941. *Faraday* F. Muell. ex Datta, *Handb. Syst. Bot.* 182, sphalm. 1965.

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Open wide-spreading trees or shrubs, erect or climbing, of decided bignoniaceous aspect, mostly glabrous throughout or the youngest parts more or less puberulent-pubescent or even tomentose; leaves simple, decussate-opposite to subopposite or verticillate in 3's, usually glabrous, mostly petiolate, exstipulate, deciduous; leaf-blades chartaceous or coriaceous, marginally entire, sometimes with basal glands or with stellate scales beneath, the venation rather prominent and distinctive, sometimes plinerved; inflorescence cymose, the cymes usually many-flowered, aggregated in terminal, often large, loosely corymbose panicles or sessile in the leaf-axils, rarely cauliflorous; flowers usually rather large and conspicuous; calyx gamosepalous, inferior, campanulate, mostly coriaceous, apically closed and apiculate when immature, but during anthesis unequally split into 2--4 short, valvate, often recurved lobes, the lobes at first coarctate-rostrate, sometimes each 2- or more-toothed; corolla gamopetalous, zygomorphic, rather large, usually white and showy, hypocrateriform or infundibular, the tube cylindric, straight, exerted, apically ampliate, the limb wide-spreading, 4- (or rarely 5-) fid, the lobes imbricate, subequal or the posterior one wider and apically entire or emarginate and the others smaller and subequal; stamens 4 (or rarely 5), either decidedly or else indistinctly didynamous or even not at all didynamous, 2 inserted in the upper part and 2 near the base of the corolla-tube or sometimes all subisometrous and all inserted near the apex, near the middle, or near the base of the tube, sometimes long-exserted; filaments either short and included or sometimes elongate, often hairy, es-

pecially basally; anthers ovate-oblong, the 2 thecae parallel; pistil single, compound, 2-carpellary; style sunken between the terminal ovary-lobes, capillary, elongate, glabrous; stigma subulate, shortly bifid or 2-toothed, sometimes infundibular; ovary superior, compound, composed of two 2-locular carpels, apically shortly to deeply 4-lobed, at first imperfectly, later completely 4-locular or by abortion 1--3-locular, the locules usually united only to about the middle, 1-ovulate; fruit drupaceous, 4-lobed and 4-locular or by abortion reduced to 1--3 large obovate pyrenes, the exocarp fleshy and succulent, the endocarp hard, 1--4-seeded, the fruit sometimes so deeply lobed as to simulate 2--4 nearly separate 1-seeded pyrenes; seed single in each locule and conforming to it in size and shape.

Type species: *Faradaya splendida* F. Muell.

This is a genus of about 23 species and infraspecific taxa native to Indonesia, Melanesia, and Polynesia, east to the Fiji and Samoan Islands and south to tropical Australia. Several species are cultivated for ornament, one of them very widely so, in tropical regions of both hemispheres and in greenhouses elsewhere. The genus was originally placed in the *Bignoniaceae*. The practically gynobasic style seems to indicate a close relationship to the *Lamiaceae*. Hooker (1891) says: "The genus is closely allied to *Vitex*, differing chiefly in the spathaceous two-lobed calyx and the lobed ovary.

Seemann (1865) reviews the history of the genus: "In the thirty-first number of his 'Fragmenta Australiae', Dr. F. Mueller defines a new genus, which, in honour of the illustrious Faraday, he names *Faradaya*, and of which only one species (*F. splendida*), discovered by Dallachy in woods at Rockingham Bay, was known to him. Dr. Mueller referred the genus to *Bignoniaceae*, and, on sending his printed description, accompanied it by a specimen of the plant, he was pleased to ask my opinion with regard to the stability of the genus. An examination convinced me that *Faradaya* was identical with a genus which for some time had engaged my attention, and about which I wrote, by the last mail, to Professor Asa Gray, as one of the persons interested in it. The genus I hold to be a sound one, but Dr. Mueller, usually so correct, was, in this instance, certainly wrong, in referring it to *Bignoniaceae*, with which the plant has nothing to do, it being a genuine member of the Natural Order *Verbenaceae*, closely related to *Clerodendron* and *Oxera*. Let me state the history of the genus. In 1862, I described in the tenth volume of the 'Bonplandia', p. 249, a *Clerodendron* from the Tongan or Friendly Islands, under the name of *C. Amicorum*. Shortly afterwards, Asa Gray, travelling over the same ground, also came across this species, and had already given it exactly the same name when the 'Bonplandia' reached him. On re-describing it in the Proceedings of the American Academy, vol. vi. p. 50, he added another species, *C. ovalifolium*, from the Viti Islands, and pointed out that both agreed in their 4-lobed, almost regular calyx and corolla, and 4 stamens, at the same time proposing the sectional name *Tetrathyranthus* for these two *Clerodendrons*.



At the beginning of this year an allied third species, collected by Mr. J. Storck in Viti, reached me, which also had a 4-lobed corolla and 4 stamens, but the calyx was almost invariably 2-lobed, the lower lobe frequently splitting into 2. This led to renewed examination. The calyx I found to be closed before anthesis and splitting or rather tearing irregularly into 4, 3, or 2 lobes, when the corolla is forcibly pushed through a very narrow aperture at the extreme end, indicated by four very minute points, one would hardly call them teeth, though they are in reality the teeth of the limb of the calyx. The splitting of the calyx is analogous to what we find in the genus *Tecoma* (as now circumscribed) and several genera of *Eubignoniaceae*; we have nothing like it in the genuine *Clerodendrons*, and, I think, there can be no doubt that this set of plants must constitute a separate genus. I meant to have taken this view of the case in dealing with them in my 'Flora of Viti', and to have adopted A. Gray's sectional name for the genus; but as I now find the species from Rockingham Bay to be a congener, and as a new name has actually been published, I shall adopt Mueller's name."

For many years, *Faradaya* was considered to be a genus of 1 or 2 species. Bentham (1876) considered it to have 2 species "quarum una typica Australiana panicula terminali, fructus carpello 2-pollicari [*F. splendida*]....altera ins. Viti incola congener videtur etsi inflorescentia densa ad nodos lateralis et fructus ignotus [*F. ovalifolia*] excl. tamen *F. amicorum*, quae *Clerodendri* seu *Tetrathyranthi* sp." *F. amicorum*, however, is now regarded as also a true *Faradaya* species

Baillon (1891) regarded *Faradaya* as a genus of 4 species native only to "Oceania"; Briquet (1895) recognized "4 or 5". Angely (1956) recognized 22 and Mukherjee & Chanda (1978) give 23 as the number.

Ewart & Rees (1912) aver that *Huxleya* Ewart is related to *Faradaya* but differs in having a 5- (instead of 2-) lobed calyx, a 5- (instead of 4-) lobed corolla, equal (instead of didynamous) stamens, and a 2- (rather than 4-) lobed ovary, as well as being only a foot-high upright herb (rather than woody climbers), having solitary flowers instead of their being in terminal panicles, and in having only small linear leaves. The genera are certainly very dissimilar and cannot possibly be confused. Beer & Lam (1936) point out that *Faradaya*, rather, has much the habit of *Archboldia* Beer & Lam. Junell (1934) compares it to the even more similar genus *Oxera* Labill, noting that "Abgesehen davon, dass der Fruchtknoten nicht so stark lobiert ist, gleicht diese Gattung *Oxera* in ihrem Fruchtknotenbau." He illustrates a cross-section of the ovary at the insertion of the ovules and notes "In dieser Höhe liegen keine Einkerbungen in der Medianlinie vor. Der freie Fruchtblatttrand, der auch bei dieser Art nur sehr kurz ist, besitzt gut ausgebildetes leitendes Gewebe, das man hinab bis zur Mikropyle verfolgen kann. Die Stellung der Samenanlagen ist dieselbe wie bei *Oxera*.....Der Nuzellus ist syndermal und tenuinuzellat."

The genus, as noted above, is named in honor of Michael Faraday (1791--1867), world famous English chemist and physicist.

Regarding Baillon's genus *Schizopremna* it may be noted that it was upheld by Briquet (1895) and Barkley (1965), but reduced by Van Steenis (1955) to synonymy under *Faradaya*, in which disposition Airy Shaw (1966) agrees. Junell (1934) says of it "Von dieser Gattung, die nur ein Art umfasst, stand mir kein Material zur Verfügung. Lam (1921) ist der Ansicht, dass Baillons lückenhafte Beschreibung darauf hindeutet, dass diese Pflanze entweder eine *Premna* ist, oder überhaupt nicht zu *Verbenaceae* gehört."

Van Steenis (1955) has given a fascinating account of how he finally determined the true identity of Baillon's plant: "In a recent plant-geographical study of the Lesser Sunda Islands by Mr C. Kalkman the genus *Schizopremna* Baill. (1892), only known from a very brief diagnosis as an endemic genus from Timor (1897), passed again my attention. After Baillon nobody seems to have made a renewed study of the type. No specimen seems to be present in the general larger herbaria, also not Paris where Baillon's original material should be preserved. Dr. Moldenke, who has examined an enormous number of sheets kindly informed me that he had never found a specimen.

"Thanks to the cooperation of Dr H. Sleumer, Dr J. Leandri and Mr J. H. Kern I received on loan, from Baillon's private herbarium, a tiny envelope containing one flower in the bud stage and a loose corolla of what is presumably the type, said to have been collected by Mr Jacquinet in Timor, and later the original sheet which was inserted in the Paris general herbarium as a *bis*-genus at the end of the family.

"The type material is only provided with buds and the specimen is rather poor. In scanning Malaysian verbenaceous collections no result was obtained. I came to the conclusion that my despair to locate identical material was due to an error of some sort. Mr Kern told me he had found at Paris a specimen of *Cyperus* labelled in exactly the same way: 'Coupang (Timor), M. Jacquinet'. This species is endemic in Melanesia and was certainly erroneously localized in Timor. He had also found out that the hand-writing on these labels is not that of Jacquinet himself.

"A search among the West Pacific *Verbenaceae* was crowned with success; an exactly matching specimen is Reinecke 173 from Samoa identified as *Faradaya amicornum* (Seem.) Seem., duplicates of which will be represented in various herbaria. At Leyden there is only one other specimen of this species viz Brass 2642 from the Solomon Islands. Furthermore there is a specimen from Opulo Island (Samoa) (Christophersen 188) labelled *F. powellii* Seem. If this is representative of Seemann's species indeed, I regard it conspecific with *F. amicornum* Seem.

"It appears that there is a possibility that the *Cyperus* and '*Schizopremna*' specimens mentioned above belong to a set of Jacquinet's specimens which by error have been wrongly localized in Timor; in all probability they have been collected in Samoa, Tonga, or some other island of Melanesia. Thus the name of Jacquinet has to be added to the list of names belonging to wrongly localized specimens I compiled in the Flora Malesiana (1950)."

It should also be mentioned here that Gibbs (1974) has reported

saponins as "probably present" in the genus *Faradaya*. Members of the genus are sometimes attacked by the parasitic rust fungus, *Phyllosticta faradayae*.

In the genetic bibliography (above) it may be worth pointing out that the Seemann's "Flora Vitiensis" reference is often cited as "1865-1873", but the plate that concerns us here was actually issued in 1866. The Schumann & Lauterbach (1900) reference is often cited erroneously as "1901". Fedde, in *Justs Bot. Jahresbericht*, vol. 47 (2), refers *Faradaya* to a page "45", but this appears to be a printer's error for page "245".

Baillon's work (1891) is cited as "1892" by Durand & Jackson (1906), but the part that concerns us here was actually published in June or July of 1891. Briquet's 1895 work is cited by them as "1894", the paper-cover date of the section, but according to Stafleu, *Taxonomic Literature*, p. 148 (1967) pages 97--224 were not issued until 1895. The Foreman (1972) work is erroneously dated "1971" on its title-page.

References to Bentham & Hooker's "Genera Plantarum" are usually cited as "Benth. & Hook. f.", but the section of this work on the *Verbenaceae* was actually authored by Bentham alone [cfr. "On the joint and separate work of the authors of Bentham and Hooker's *Genera Plantarum*" in *Journ. Linn. Soc. Lond. Bot.* 20: 304--308. 1883].

Van Royen (1960) cites his nos. 4518 & 4611, from New Guinea, as unidentified *Faradaya* species. Whitmore (1966) cites his nos. 2460 & 2781 also as representing an unidentified *Faradaya* which is an "occasional woody climber in lowlands" of the Solomon Islands and there bears the local name of "kwalo cho". It is probably that he is referring to either *F. amicorum* (Seem.) Seem. or *F. salomonensis* (Bakh.) Mold. Foreman (1972) cites *Kajewski 1685* as an unidentified species from Bougainville -- only *F. amicorum* is known to me from that island.

The Carr 15748, distributed as a *Faradaya* species, actually is *Gmelina dalrympleana* var. *schlechteri* (H. J. Lam) Mold.

Excluded species:

*Faradaya chrysoclada* K. Schum. in K. Schum. & Lauterb., *Nachtr.*

*Fl. Deutsch. Südsee* 370--371. 1905 = *Deplanchea tetraphylla* (R. Br.) Van Steenis, *Bignoniaceae*.

*FARADAYA ALBERTISII* F. Muell., *Descr. Notes Papuan Pl.*, imp. 1, 6: 46--47. 1875.

Bibliography: F. Muell., *Descr. Notes Papuan Pl.*, imp. 1, 6: 46--48. 1875; K. Schum. & Hollr., *Fl. Kais. Wilhelmsl.* 122. 1889; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 1, 170. 1902; Pulle in Lorentz, *Nov. Guin.*, ser. 1, 8 (1): 402 (1911) and ser. 1, 8 (2): 686. 1914; H. J. Lam, *Verbenac. Malay. Arch.* 229--231, 236, & 365. 1919; H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 71. 1921; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 2, 170. 1941; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 67 & 92. 1942; H. N. & A. L. Mold., *Pl. Life* 2: 48. 1948; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 149 & 185. 1949; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 3, 170. 1959; Mold., *Résumé* 201, 218, &

455, 1959; Sen & Naskar, Bull. Bot. Surv. India 7: 45. 1965; Mold., Résumé Suppl. 15: 15. 1967; Mold., Fifth Summ. 1: 336 & 363 (1971) and 2: 877. 1971; T. B. Muir, Muelleria 2: 166. 1972; F. Muell., Descr. Notes Papuan Pl., imp. 2, 6: 46--48. 1979; Mold., Phytol. Mem. 2: 326, 353, & 547. 1980.

A tall, climbing shrub or shrubby vine, to at least 3 m. tall, or perhaps sometimes a small tree, the young parts at first sparingly hairy, later glabrescent; stems to 2 cm. in diameter; leaves all decussate-opposite; petioles 1.5--5.5 cm. long, glabrous; leaf-blades thinly but firmly chartaceous to thick-chartaceous, lanceolate-ovate or narrowly ovate to elliptic, oblong, or ovate-oblong, 11--23 cm. long, 4.5--13 cm. wide, apically subabruptly and conspicuously long-acuminate, marginally entire, basally rounded or truncate, glabrous but not shiny on both surfaces, not lepidote beneath but often bearing a few, flat, orbicular glands especially near the base beneath; secondaries 6--10 per side, not especially conspicuous nor prominent on either surface or quite prominent beneath; veinlet reticulation often also conspicuous beneath; cymes axillary, shorter than the subtending leaves, to about 3.5 cm. long (excluding the flowers); primary and secondary peduncles abbreviated; pedicels very short; calyx rather long, mostly 1.6--1.7 cm. long during anthesis, glabrous, apically pointed in horn-like fashion in bud, cleft unilaterally to the middle when full grown, the 2 lobes semi-lanceolate and apically narrowly acuminate; corolla infundibular, white, externally glabrous, internally papillose-pilose near the stamen insertion, its tube 3--3.5 cm. long, much longer than the calyx, the lobes broadly ovate, 2 cm. long, 1.5 cm. wide, apically rounded; stamens distinctly didynamous, 2 inserted near the base and 2 at the middle of the corolla-tube; filaments of the longer pair 5--6 cm. and those of the shorter pair 4.5--5 cm. long, basally thickly short-pilose; anthers ellipsoid, basally bilobed; style slender, 6--6.5 cm. long, glabrous; stigma shortly bifid; ovary globular, 4-furrowed, externally densely hairy or thinly gray-velvety.

This species is based on an unnumbered collection made by Count Luigi Maria d'Albertis (1841--1901) -- in whose honor it is named -- on the Fly River in New Guinea. Mueller (1886) comments that "This species is closely akin to *F. splendida*; the petioles are however thicker, the leaves of a firmer texture with stronger nervation and venation and also with a longer and more pointed terminal protraction, and they are not shining; the stalks and stalklets of the flowers are much shorter, by which means the inflorescence becomes very contracted; the bud of the calyx is longer and acutely pointed; perhaps the fresh flowers and ripe fruits may exhibit other marks of discrimination. A comparison should still be instituted with *F. Papuana* from Andaj, described by the lamented Dr. Scheffer.....but therein the narrow acumination of the leaves is not alluded to, while according to Dr. Scheffer's description the petioles of his plant are longer, the flowers larger, and the stamens inserted lower on the corolla-tube. He records simultaneously the interesting observation,

that sometimes all four of the large distinct fruitlets become developed."

Lam (1919) cites *Römer 284* and *Versteeg 1075* from West Irian, but in his 1921 work he reduced the taxon to synonymy under *F. splendida* F. Muell. It has been collected in anthesis in May, August, September, and November. Sen & Naskar (1965) list it as cultivated in India. Lam describes the calyx as 2--2.5 cm. long, but it may be that it is the fruiting-calyx that he is describing. In his personal work copy of his 1919 work he has pencilled out the line in his description which reads "stamens didynamous, 2 being inserted near the base of the corolla-tube". Pullé (1911, 1914) cites the same Römer and Versteeg collections cited by Lam.

The collector of the type specimen of this species was a well-known Italian explorer in the Pacific region.

Citations: NEW GUINEA: Papua: *Albertis s.n.* (Mb--type, Ld--photo of type, N--photo of type). Territory of New Guinea: *Bauerlen s.n.* [Strickland River, 1885] (Mb); *M. S. Clemens 9316* (B). West Irian: *Djamhar 378* (Bz--72873); *Pleyte 478* (Bz--72870). CULTIVATED: Java: *Herb. Hort. Bot. Bogor. XV.F.9* (Bz--21034, Bz--21037, Bz--25568, Bz--26550, Bz, Er, Le--920.299-253, Le--922.64-391, N, N, Ut--52637), *XV.F.10* (Bz--26306, Bz, N), *XV.F.10a* (Bz), *XV.F.11* (Bz--26308, N), *XV.F.12* (Bz--26309, Bz--26310, Bz, Bz, N), *XV.F.12a* (Bz--26311, Bz--26551, Bz, Bz, N, N), *XV.F.20* (Bz--26324, Bz--26325, Bz, Ld, N, N, N); *Schiffner 2465* (Le--938.265-163, N).

*FARADAYA AMICORUM* (Seem.) Seem., Journ. Bot. Lond. 3: 258. 1865.

Synonymy: *Clerodendron amicum* Seem., Bonplandia 10: [249]--250. 1862. *Clerodendron (Tetrathyranthus) amicum* A. Gray, Proc. Amer. Acad. 6: 50. 1862. *Terminalioides Soland. ex Seem.*, Fl. Vit. 190, in syn. 1866. *Schizopremna timorensis* Baill., Hist. Pl. 11: 119. 1891. *Faradaya amicum* Seem. ex Van Steenis, Act. Bot. Neerl. 4: [477]. 1955. *Faradaya savavensis* Parks ex Mold., Fifth Summ. 2: 519, in syn. 1971. *Faradaya savauensis* Parks, in herb.

Bibliography: Barclay & Hinds, Hook. Journ. Bot. 2: 211. 1843; A. Gray, Proc. Amer. Acad. 6: 50. 1862; Seem., Bonplandia 10: [249]--250. 1862; Seem., Journ. Bot. Lond. 3: 257 & 258. 1865; Seem., Fl. Vit. 189--190 (1866) and 441. 1873; Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1154--1155. 1876; F. Muell., Descr. Notes Papuan Pl., imp. 1, 8: 48. 1886; Baill., Hist. Pl. 11: 92, 113, & 119--120. 1891; Drake del Castillo, Illustr. Fl. Ins. Mar. Pacif. 261. 1892; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 946. 1893; Hemsl., Journ. Linn. Soc. Lond. Bot. 30: 187 & 206. 1894; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 164, 166--167, & 173--174 (1895) and ed. 1, 4 (3a): 382 & 383. 1897; Reinecke, Engl. Bot. Jahrb. 25: 672. 1898; Burkill, Journ. Linn. Soc. Lond. Bot. 35: 50. 1901; Krämer, Samoa-Inseln 2: 118 & 373. 1903; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 432. 1904; Post & Kuntze, Lexicon 688. 1904; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 385. 1906; H. J. Lam, Verbenac. Malay. Arch. 92, 93, 124, 319, 365, & 368. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 27. 1921; Junell, Symb. Bot. Upsal. 1

(4): 84. 1934; Mold., Brittonia 1: 261. 1934; Bakh., Journ. Arnold Arb. 16: 71 & 472. 1935; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 385. 1941; Kanehira & Hatusima, Bot. Mag. Tokyo 56: 114. 1942; Mold., Alph. List Inv. Names 16. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 68, 69, & 92. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 946. 1946; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 149, 151, 185, & 195. 1949; Van Steenis, Act. Bot. Neerland. 4: [477]--478. 1955; Bremekamp, Biol. Abstr. 31: 221. 1957; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 385. 1959; Mold., Résumé 206, 207, 260, 343, 417, & 455. 1959; G. Taylor, Ind. Kew. Suppl. 12: 59. 1959; Yuncker, B. P. Bishop Mus. Bull. 220: 232--233. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 946. 1960; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 432. 1963; Whitmore, Guide Forests Brit. Solom. Isls. 141 & 181. 1966; Rouleau, Guide Ind. Kew., imp. 1, 169 & 353. 1970; Mold., Fifth Summ. 1: 343, 344, 351, & 439 (1971) and 2: 519, 619, 770, & 877. 1971; Foreman, Div. Bot. Dept. For. N. Guin. Bot. Bull. 5: 63. 1972; Zepernick, Baessl.-Arch., ser. 2, 8: 64, 183, 236, 244, 259, 298, & 300. 1972; Mold., Phytologia 25: 240 (1973) and 28: 448. 1974; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 44. 1978; F. Muell., Descr. Notes Papuan Pl., imp. 2, 8: 48. 1979; Mold., Phytol. Mem. 2: 330, 333, 342, 405, & 547. 1980.

A climbing vine or liana, climbing in tall trees, or sometimes a shrub, 2 m. tall and wide [*Meebold 8230*] or to 5 m. tall [*Barclay*], or even a "small tree, 2--4 m. tall" [*Parks 16185*]; branches subterete, at first tomentellous, finally glabrous; leaves decussate-opposite; petioles short, only 3--4 cm. long; leaf-blades coriaceous, broadly oval or ovate to elliptic-obovate or cuneate-obovate, obovate-oblong, or obovate, 20--28 cm. long, 7.5--15 cm. wide, apically abruptly short-acuminate, marginally entire, basally acute or attenuate into the petiole, glabrous on both surfaces, pinnately veined; inflorescence axillary and trichotomous or more usually terminal and corymbosely paniculate, at first tomentellous, finally glabrous; cymes corymbose-paniculate, many-flowered, canescent-puberulent; flowers large, tetramerous; calyx campanulate, coriaceous, 4-lobed or 4- or 5-fid, apically obtuse or almost rounded, the lobes ovate, apically very obtuse; corolla showy, white, its tube straight, subhypocrateriform or subinfundibular, at most 2.5 cm. long, about 4 times as long as the calyx, glabrous, the lobes 4, short, 3 times as long as the calyx, ovate, subequal, recurved, imbricate in bud; stamens 4, short, included or only slightly exerted; anthers ovate, the thecae parallel; pistil bicarpellary; style sunken in the apical ovary-lobes; stigma 2-toothed; ovary 4-celled, each carpel producing 2 cells, apically deeply 4-lobed, the cells united only to their middle, each 1-ovulate; immature fruit small, black, composed of up to 4, 1-seeded, woody nutlets.

Seemann (1862) designated no type for this species, but cited (1) *Barclay 3373* from Vavau, deposited at the British Museum, (2) *Harvey s.n.* from Vavau and Lefuka, in the Hooker Herbarium at Kew, and (3) *Wilkes, U. S. Expl. Exped. s.n.* from Samoa in the Bentham Herbarium at Kew. Of these, I feel that the first-mentioned should

be designated as the type. Seemann comments that "*C. Amicorum* ähnelt [*Clerodendron*] innerme, aber die Corolle ist nicht so schlank wie bei letzterer und der Kelch verschieden." Regarding the early history of the species he notes that "Schon im J. 1840 sammelte Hr. Barclay, der Sir E. Belcher als Botaniker auf seinen Reise um die Welt begleitete, auf den Tonga-Inseln eine neue *Clerodendron*-Art, die seltsamer weise in Bentham's Aufzählung der von Barclay und Hinds in der Südsee gesammelten Pflanzen....angelassen ist. Im J. 1855 sammelte Prof. W. H. Harvey zum zweiten Male in jener Inselgruppe, doch auch diese Exemplare sind bis jetzt noch nicht bestimmt. Im J. 1840 sammelten sie Botaniker der amerikanischen Expedition auf den Samoa- oder Schiffer-Inseln. Da die Pflanze zuerst auf den Tonga- oder Freundschafts-Inseln gefunden ward, so nenne ich sie *Clerodendron Amicorum*."

Gray (1862), apparently proposing a subgeneric name, *Tetrathyranthus*, to embrace this one species, notes that "The tetramerous flowers remind us of Labillardière's genus *Oxera*, of New Caledonia, but in all other particulars it is a *Clerodendron*. Since the above character was drawn up, Dr. Seemann has published the species as a new one, under the same name, comparing it with *C. innerme*, but without noticing the tetramerous character." The species was based by Gray on an unnumbered Wilkes, U. S. Exploring Expedition collection from Tutuilla, Samoan Islands.

Bentham (1876) recognized only two species of *Faradaya*: *F. splendida* F. Muell. from Australia and *F. ovalifolia* (A. Gray) Seem. He then says: "excl. tamen *F. amicorum*, quae *Clerodendri* seu *Tetrathyranthi* sp. [est]."

Some authors (e.g., Seemann) write the specific epithet of *F. amicorum* with an uppercase initial, a practice still continued for geographic and/or personal names in some quarters.

In regard to the supposed genus, *Schizopremna*, from Timor, Lam (1921) remarks that "Certainly Baillon's description of the genus is a very incomplete one, so that we can not decide, if the genus really is a good one, and thus is to be retained. There are no indications at all, that the plant is found back ever since [sic; = has ever been found since the original collection], and we must stipulate the possibility that it either belongs to *Premna*, or even not belongs to the *Verbenaceae* (it might be a *Labiata*). But whatever may, finally, be the decision is the matter, we may draw the attention to the apparent consimilarity with *Premna cauliflora* from Borneo -- described by Stapf in the *Transact. of the Linn. Soc.*, Ser. II, IV, 215, 1894 -- a species which, as we already mentioned on p. 124 of our 'Verb' [1919], in several points differs from the typical *Premna*." Junell (1934), also not having seen any material of the type collection, adds nothing.

It remained to Van Steenis (1955) finally to locate Baillon's type and to determine that it actually represents *Faradaya amicorum*, collected by Jacquinet, not on Timor as claimed by Baillon, but certainly either in the Samoan or Tongan Islands.

Collectors have encountered *Faradaya amicorum* in forests and forest margins, at 100--300 m. altitude, in flower in May and December,



and in fruit in June. Yuncker (1959) describes it as "climbing in trees in forests" and the edges of forests in Tonga and refers to "Hendry & Burkill's lists". Foreman (1972) cites *Schodde & Craven 3619* from Bougainville. Burkill (1901) lists it only from "Eva; Samoa". Seemann (1866) and Drake del Castillo (1892) cites unnumbered collections of Banks & Solander, Barclay, Harvey, and the United States Exploring Expedition from the Tongan Islands and another U. S. Exploring Expedition collection from the Samoan Islands.

Hemsley (1894) cites unnumbered collections of Banks & Solander, Barclay, Harvey, and Lister from the "Navigator Islands only". Zepernick (1972), listing the species from Samoa, Tonga, and Fiji, reports that in Samoa it is used medicinally in the treatment of childrens' fevers -- "Man zerstüsz Fröchte der *Fagraea* und gibt die Flüssigkeit dem Kinde zu trinken."

Yuncker (1959) asserts that it is "occasional in wooded areas throughout Tonga", citing *Banks & Solander s.n.* and *Yuncker 15242* from Tongatapu, *Lister s.n.* and *Yuncker 15368* from Eva, and *Barclay s.n.*, *Crosby s.n.*, and *Harvey s.n.* from Vavau.

Vernacular names reported for the species are "afa", "filitavati'o", and "mamalupe".

The *Faradaya amicorum* var. *salomonensis* of Bakhuizen is now known as *F. salomonensis* (Bakh.) Mold., which see.

Material of *Faradaya amicorum* has been misidentified and distributed in some herbaria as *F. powellii* Seem., *F. savaiiensis* Rech., and *Clerodendron* sp. On the other hand, the *Parks 16137* & *16216*, distributed as *F. amicorum*, actually represent *F. lehuntei* (Horne) A. C. Sm., *Setchell 64* & *539* are *F. powellii* Seem., and A. C. Smith *1717* is *F. vitiensis* (A. Gray) Seem.

Citations: TONGAN ISLANDS: Eua: *H. E. Parks 16185* (Ca--297197), *16337* (Ca--297354, W--1527035); *Yuncker 15368* (B. Ss, W--2128395, Yu). Tongatapu: *Yuncker 15242* (Bi, Ld, W--2128367, Yu). SAMOAN ISLANDS: Matantu: *Vaupel 363* (Mu). Tau: *Garber 671* (Bi, N. W--1655716). Tutuila: *Herb. A. Gray s.n.* [Samoa] (Pa); *Kuntze 23011* (N, N); *Meebold 8230* (Mu, Mu), *16485* (Mu); *Wilkes, U. S. Expl. Exped. s.n.* [Samoa Isl.] (N, T). Upolu: *Reinecke 173* (Bi, Bz--21021).

*FARADAYA DIMORPHA* Pulle in Lorentz, Nov. Guin., ser. 1, 8 (2): 686. 1912.

Synonymy: *Faradaya* prob. *ternifolia* F. v. Müll. ex Pulle, Nov. Guin., ser. 1, 8 (1): 402. 1911. *Faradaya dimorpha* var. *opposita* H. J. Lam, Verbenac. Malay. Arch. 233. 1919. *Faradaya dimorpha* var. *ternata* H. J. Lam, Verbenac. Malay. Arch. 233. 1919.

Bibliography: Pulle in Lorentz, Nov. Guin., ser. 1, 8 (1): 402 (1911) and ser. 1, 8 (2): 686. 1912; Fedde & Schust., Justs Bot. Jahresber. 40 (2): 335. 1915; H. J. Lam, Verbenac. Malay. Arch. 229, 232--234, & 365. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 71 & 72. 1921; Prain, Ind. Kew. Suppl. 5, imp. 1, 105. 1921; H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 94. 1924; Mold., Alph. List Inv. Names 24. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 67 & 92 (1942) and ed. 2, 149 & 185. 1949; Mold., Résumé 199, 201, 218, 294, & 455. 1959; Mold., Fifth Summ. 1: 332,



336, 338, & 363 (1971) and 2: 518 & 878. 1971; Mold., Phytol. Mem. 2: 322, 326, 328, 353, & 547. 1980.

A small glabrous tree, large climbing shrub, or liana; branchlets obscurely tetragonal, glabrous; leaves decussate-opposite or ternate; petioles 0.4--3.6 cm. long, striate, glabrous; leaf-blades chartaceous to subcoriaceous, ovate or ovate-oblong to ovate-lanceolate or oblong-lanceolate, 9--20 cm. long, 2.5--11.5 cm. wide, apically abruptly or gradually acuminate, marginally entire, basally obtuse or rounded to subcordate and trinerved, glabrous and shiny on both surfaces, often with up to 10 glands in the axils of the lowest pair of secondaries; secondaries 4--7 pairs; vein and veinlet reticulation prominent on both surfaces, the 2 basal secondaries ascend to parallel the leaf-margins but remain about 7 mm. distant from them; cymes axillary and shorter than the subtending leaves or crowded to form a large terminal panicle, long-pedunculate, many-flowered, obscurely trichotomous; peduncles 3--6 cm. long, flattened, glabrous; panicle to 9 cm. long and 14 cm. wide, with large foliaceous bracts that diminish in size towards its apex; pedicels 5--7 mm. long, glabrous; flowers showy, fragrant, with a sweet-sourish carnation or honeysuckle scent; calyx (in bud) subobtusely cleft to the middle to form 2 or 3 apically subobtusely and apiculate lobes, 9--13 mm. long, externally glabrous but with some large glands; corolla white or creamy-white [or perhaps red (?)], waxy. infundibular, about 3 cm. long, glabrous, its tube 1.4--1.5 cm. long, externally glabrous, the 4 lobes 1--1.3 cm. long, dorsally glabrous or sparsely pilose, the 2 larger lobes about 18 mm. wide and apically emarginate, the 2 smaller ones suborbicular and apically obtuse, only 14 mm. wide; stamens inserted in the throat of the corolla-tube, 4--5 cm. long; filaments glabrous, long-exserted; anthers ovate, thick, 2.5 mm. long; pollen-grains extraordinarily large (about 150  $\mu$ ); style 5--6.5 cm. long; stigma somewhat ampliate; ovary tetragonal, 4-furrowed, somewhat 4-lobed during anthesis, externally densely yellow-hirsute; fruit a very large, deeply 4-lobed drupe or with the parts almost separate and free, each 1-seeded, woody, 4--5.5 cm. long, sometimes slit on the ventral side, sometimes externally sparsely pilose.

This species is based on *Von Römer 146* from "am Noord-Fluss in der Ebene" in West Irian, New Guinea, collected in flower and fruit on September 7, 1909. Pulle (1914) comments that "Die Art kommt am meisten überein mit *F. parviflora* Warb., unterscheidet sich aber u.a. durch den spitzen Kelch und die viel grösseren Blüten."

Lam (1919) comments that "We are not sure about the fact, whether ternate and opposite leaves occur on the same tree. If this should not be the matter [=case] -- which could not be affirmed by the examination of the specimina seen -- this should be a legitimate reason for founding 2 varieties: a var. ♂ *opposita* and a var. ♀ *ternata*. So Pulle's observation, that the leaves of the ternate form should, in shape and in dimension, be different from that of the opposite form, should agree with this supposition." Although Lam's argument is in awkward and labored English,

his argument is a valid one which, however, he later settled, at least to his own satisfaction, for, in his 1921 work, he comments that "We discovered (in specimens, cultivated in the Botanical Garden of Buitenzorg), that opposite and ternate leaves occur on the same plant. There is, therefore, no reason for making 2 varieties." He cites in the two works from New Guinea Römer 146 & Versteeg 1045 with certainty, and, with a question, also Moszkowski 180, 183, 432. In his 1924 work he cites with certainty Moszkowski 432 and Weinland 180 & 143 -- the two latter probably the same collections which he attributed to Moszkowski in the earlier work.

Collectors have found this plant growing in primary and secondary forests and along riverbanks in rainforests, at sealevel to 1750 m. altitude, in flower in March and May and from September to December. Van Royen found it climbing on *Inocarpus fagiferus* in periodically flooded swampy areas behind low coastal dunes. The corollas are described as having been "white" on Aet & Idjan 833, Brass 8069, Buwalda 5888, and Van Royen 3124 and as "creamy-white" on Otero s.n.

Material of *F. dimorpha* has been misidentified and distributed in some herbaria as *F. parviflora* Warb. and as *Apocynaceae*.

Citations: MOLUCCA ISLANDS: Ceram: Buwalda 5888 (Bz--72960); Kornassi 886 (Bz--21013, Bz--21014, Le--924.324-507, N). Mysore: Teijsmann s.n. [Waigama] (Bz--21017, Bz--21018). NEW GUINEA: Papua: Brass 8069 (Le--938.187-368); Hartmann s.n. (Mb). West Irian: Eyma 5100 (Bz--72619), III (A, Bz--72609), IV (Bz--72610, Er); Gyldenstolpe s.n. (S); Moszkowski 29 (B); Römer 146 (Bz--21015--isotype, Bz--25569--isotype, Le--926.340-232--type, Ld--photo of isotype, N--photo of isotype); Van Leeuwen 9948 (Bz--72673, Bz--72699), 10991 (Bz--72671); Van Royen 3124 (Ca--1341507); Versteeg 1045 (Bz--21016, Le--910.205-2251, N, Ut--13811). NEW GUINEAN ISLANDS: Japen: Aet & Idjan 833 (Bz--72746). CULTIVATED: Puerto Rico: Otero s.n. [3/25/36] (N), s.n. [May 1937] (N). Queensland: C. T. White 2362 (Bz--21040).

FARADAYA DIMORPHA var. CAULIFLORA Mold., Phytologia 4: 53. 1952.

Bibliography: Mold., Phytologia 4: 53. 1952; Mold., Résumé 201 & 455. 1959; Mold., Fifth Summ. 1: 336 (1971) and 2: 878. 1971; Mold., Phytol. Mem. 2: 326 & 547. 1980.

This variety differs from the typical form of the species in having its inflorescences cauliflorous rather than axillary and terminal.

It is based on Brass 7427 from Oroville Camp, 30 miles above D'Albertis Junction on the Fly River, Papua, collected in August of 1936 and deposited in the Rijksherbarium at Leiden. The collector describes the plant as a large canopy liana with cauliflorous inflorescences and white malodorous flowers [corollas]. Thus far it is known to me only from the type collection.

Citations: NEW GUINEA: Papua: Brass 7427 (Ld--photo of type, Le--938.187-383--type, N--isotype, N--photo of type).

*FARADAYA HAHLII* Rech., Feddes Repert. Spec. Nov. 11: 185. 1912.

Bibliography: K. Rech., Feddes Repert. Spec. Nov. 11: 185. 1912; Fedde & Schust., Justs Bot. Jahresber. 40 (2): 335. 1915; Prain, Ind. Kew. Suppl. 5, imp. 1, 105. 1921; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 68 & 92 (1942) and ed. 2, 150 & 185. 1949; Mold., Résumé 204 & 455. 1959; Prain, Ind. Kew. Suppl. 5, imp. 2, 105. 1960; Mold., Fifth Summ. 1: 339 (1971) and 2: 878. 1971; Mold., Phytol. Mem. 2: 329 & 547. 1980.

A scandent glabrous shrub; leaves decussate-opposite; petioles 4--6 cm. long; leaf-blades ovate, 15--20 cm. long, 8--10 cm. wide, apically acuminate, marginally entire, basally rounded, glabrous on both surfaces, the venation prominent; inflorescence terminal, corymbose, many-flowered, congested, the flowers medium in size (for this genus), slightly fragrant; bracts small, subulate or subdilated; pedicels scarcely 1 cm. long; calyx before anthesis globose or ovoid-globose, apically obtuse, afterwards dehiscing into 2 acuminate segments 4--6 mm. long; corolla white, about 2.5 cm. long in all, the tube 10--12 mm. long, the lobes forming a cup 10 mm. long and wide; stamens inserted in the throat of the corolla-tube; filaments about 3 cm. long, long-exserted, glabrous; ovary externally subtomentose; drupe single.

This poorly known species is based on *K. Rechinger* 3927 from Kabakavi, New Britain, and presumably is deposited in the Vienna herbarium. Thus far the species is known only from the original collection.

*FARADAYA LEHUNTEI* (Horne) A. C. Sm., Allertonia 1: 412--413. 1978.

Synonymy: *Clerodendron le huntiei* Horne, Year Fiji 259, nom. nud. 1881. *Clerodendron lehuntei* Horne ex J. G. Baker, Journ. Linn. Soc. Lond. Bot. 20: 369. 1883. *Faradaya neo-ebudica* Guillaum., Journ. Arnold Arb. 13: 28. 1932. *Clerodendrum lehuntei* Horne ex Mold., Known Geogr. Distrib. Verbenac., ed. 1, 68 & 90. 1942. *Faradaya vitiensis* var. *puberulenta* Mold., Phytologia 3: 60--61. 1949. *Faradaya neo-ebudica* var. *puberulenta* (Mold.) Mold., Phytologia 4: 53. 1952. *Clerodendrum lehuntei* "Horne ex Baker" apud Parham, Pl. Fiji Isls., ed. 1, 213. 1964. *Faradaya neo-ebudica* var. *neo-ebudica* [Guillaum.] ex Parham, Pl. Fiji Isls, ed. 1, 213. 1964. *Clerodendrum lehuntii* Horne ex Mold., Fifth Summ. 343. 1971. *Faradaya neo-ebudica* var. *puberulenta* Mold. apud A. C. Sm., Allertonia 1: 412, in syn. 1978.

Bibliography: Horne, Year Fiji 259. 1881; J. G. Baker, Journ. Linn. Soc. Lond. Bot. 20: 369. 1883; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561. 1893; Guillaum., Journ. Arnold Arb., 13: 28. 1932; A. W. Hill, Ind. Kew. Suppl. 9: 115. 1938; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 572. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 68, 90, & 92. 1942; H. N. & A. L. Mold., Pl. Life 2: 68. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 150, 151, 182, & 185. 1949; Mold., Phytologia 3: 60--61 (1949) and 4: 53. 1952; Mold., Résumé 205, 206, 218, 284, 451, & 455. 1959; Mold., Résumé Suppl. 4: 9. 1962; Mold. in Menninger, Flow. Vines 334. 1970; Mold., Fifth Summ. 1: 341, 343, & 344 (1971) and 2: 519, 868, & 878. 1971; "R. J. G.", Biol.

Abstr. 66: 4918. 1978; A. C. Sm., *Allertonia* 1: 412--413. 1978; Mold., *Phytol. Mem.* 2: 330, 333, 334, 353, 392, & 547. 1980; Mold., *Phytologia* 51: 396. 1982.

A tall scandent shrub; bark fulvous; youngest parts of the branches densely flavescent-puberulent, older parts glabrous; leaves decussate-opposite; petioles 1--4 cm. long; leaf-blades subcoriaceous, broadly or very broadly ovate to obovate, 7.5--14 cm. long, 5--11 cm. wide, apically very shortly and abruptly acuminate to obtuse or subrounded, marginally entire, basally cuneate or deltoid, at least when immature densely flavescent-puberulent, eventually glabrous on both surfaces; secondaries 4--6 pairs, merely prominent beneath; veinlet reticulateon prominent beneath; inflorescence axillary and terminal, 5--7 cm. long, densely cymose, in centrifugally dichotomous-corymbose panicles, sparsely puberulent; bracts lanceolate, about 10 mm. long and 3 mm. wide, basally long-attenuate, rufous-puberulent on both surfaces; peduncles densely flavescent-puberulent, angled; pedicels erect, the central one 10--14 mm. long, the others 7 mm. long, rufous or flavescent-puberulent; flowers very numerous; calyx in bud closed, about 4 mm. long and 6 mm. wide, coriaceous, externally sparsely puberulent, with a short campanulate tube, later splitting into 4 subequal, ovate, apically obtuse valves about 8 mm. long; corolla white, erect, 1.4 cm. long, the tube infundibular, 3 mm. wide at the middle, the lobes subequal, ovate, 3--4 mm. long, apically obtuse, or the exterior lobe largest, marginally entire, the intermediate one slightly smaller, marginally entire, the 2 interior ones smallest, marginally suberose, 1/3 as long as the tube; stamens 4, subequal, inserted in the throat or at the middle of the corolla-tube, shortly exserted; filaments 1.8 cm. long, glabrous; anthers (in bud) elliptic, inflexed, later oblong, 4 mm. long, versatile, the thecae parallel; style surpassing the anthers; ovary apically shortly 4-lobed, 4-celled, each cell 1-ovulate; stigma bifid; ovules high-laterally inserted.

This species is based on *Horne 1002*, collected in the village of Waidrada [Waindrandra], near Nadrau [Nandrau] in Nandronga & Navosa province in the interior of Viti Levu, Fiji Islands, in August, 1878, and deposited in the Kew herbarium. Smith (1978) asserts that no such village now exists and its exact location in Horne's day cannot now be determined.

The species is named in honor of Sir Ruthven LeHunt (1852--1925), government commissioner for a portion of the interior of Viti Levu. He gave much assistance to Horne on the latter's collecting expedition in Fiji. Later he became governor of South Australia; still later of Trinidad and Tobago.

Smith (1978) asserts that the type collection of *F. neobudica* var. *puberulenta* "is essentially identical" with the type collection of *Clerodendron lehuntei* and therefore must be reduced to synonymy.

Collectors describe *F. lehuntei* as a high-climbing liana, a "small scandent tree growing on other trees" [Bryan 341] or "twisting around and over the branches of rainforest trees".

[to be continued]

A NEW VARIETY OF THE COLOMBIAN TUBER-BEARING SOLANUM GARCIA-BARRIGAE

by C. Ochoa, Head, Taxonomy Department. International Potato Center, P. O. Box 5969, Lima, Peru.

In Biota 11(90): 221-223, 1978, I presented a new wild tuber-bearing Solanum dedicated in honor of the well known Colombian botanist Dr. Hernando Garcia Barriga. Now, I am describing a variety of this species collected by Dr. José Gutiérrezcasas and Dr. R. Romero Castañeda in the Valley of Donachui River, Sierra Nevada de Santa Marta, Colombia

SOLANUM GARCIA-BARRIGAE var. DONACHUI Ochoa var. nov.

Herbaceum, tuberiferum. Plantae parvae 15-20 cm altae, erectae. Caules simplici ad basim 2-3 mm crassi, pili albis brevibus obsiti, alati, alae perangustae, rectae, internodia 10-20 mm longa. Stolones 25-30 cm, etiam plus longi, 1.5-2.5 mm crassi, tubera parva 1-2 cm longa, rotunda ad ovalia, alba. Folia imparipinnata, parva, lata, 4.5-8.3 cm x 3.5-7.0 cm, pauce dissecta, 2-3 juga, foliolis interjectis deficientibus; petioli brevi, 12-15 mm longi, supra tamquam raquis pilosi. Foliola elliptico-lanceolata, apice acuta vel obtusa, pilosa, subtus densioribus, pilis brevibus dense obtecti. Foliolum terminale lateralibus majus atque latius, late ellipticum 3.3-4.2 cm x 1.4-2.4 cm, apice acutus vel subacuminatus, basi breviter cuneatum. Foliorum basaliu foliola terminalia suborbiculata vel orbiculata, apice obtusa, 2.5-3.1 cm x 2.3-2.8 cm. Foliola lateralia primi jugis 2.0-3.4 cm x 0.9-1.7 cm basi rotundata vel paulum asymmetrica, sessilia vel subsessilia. Foliola secundi jugis 1.0-2.8 cm x 0.7-1.4 cm. Foliola 3 jugis, num cuando adsunt visibiliter minora, 4-8 mm x 3-5 mm. Foliola substipulacea dense pilosa, elliptico-lanceolata usque ad subfalcata, asymmetrica, apice obtusa, 3-5 x 2-3 mm. Inflorescentia terminalis, cymosa, 3-4 flora, pedunculus 3 cm longus, 1 mm crassus, sparse pilosus, eodem modo quo calyx et pedicelli. Pedicelli paulo subtus medium articulati. Calyx 3.5-4 mm longus, lobi elliptico-lanceolati, apice acuti vel apiculati. Corolla rotacea, parva, alba, 15 mm diam; acuminata brevia, apice pilosissima, antherae parvae, late lanceolatae, 3.5 mm longae. Stylus 6.0 mm longus, breviter exsertus, stigma parvum, capitatum; ovarium longum, conicum. Fructus longi, conici.

Herbaceus, tuber-bearing. Plants small, 15-20 cm in height, erect; stem simple, 2-3 mm thick towards the base, pilose, hairs very short and white; stem winged, wings very narrow and straight, internodes 10-20 mm in length; stolons 25-30 cm or more in length 1.5-2.5 mm thick; tubers small, 1-2 cm long round to ovate, white. Leaves odd-pinnate, small, rather wide, 4.5-8.3 x 3.5-7.0 cm somewhat dissected, 3-5 folioles without interjected leaflets; short petiole, 12-15 mm long,

pilose above like on the rachis. Foliolae elliptic-lanceolate apex acute to obtuse, pilose above, much more dense and shortly pilose below. Terminal foliole larger and more widely elliptic-lanceolate than the lateral ones, 3.3-4.2 x 1.4-2.4 cm, apex acute to subacuminate, base shortly cuneate; terminal folioles of the basal leaves sub-orbiculate to orbiculate, apex obtuse, 2.5-3.1 x 2.3-2.8 cm. Lateral folioles of the first superior pair 2.0-3.4 x 0.9-1.7 cm, base rounded or slightly asymmetric, sessile or subsessile. Foliolae of the second pair 1.0-2.8 x 0.7-1.4 cm. Foliolae of the third pair when present, much smaller than the two previous pairs, 4.8 x 3.5 mm. Pseudostipular leaves densely pilose asymmetrically elliptic-lanceolate to subfalcate, apex obtuse, 3.5 x 2.3 mm. Inflorescence terminal, cymose, 3-4 flowers; peduncle 3 cm long, 1 mm thick, sparsely pilose as the pedicels and calyx; pedicels articulated below the middle of its length. Calyx 3.5-4.0 mm long, lobules elliptic-lanceolate apex acute or apiculate; corolla rotate, white, small, 15 mm of diameter, acumens short with its apex very pilose; anthers small, widely lanceolate, 3.5 mm long; style short, 6 mm long, shortly exerted; stigma small, capitate, ovary long conical. Fruit long conical.

COLOMBIA: Magdalena, Sierra Nevada de Santa Marta, southeastern slopes, basin of Donachui River: Meollaca (or Meuyaca) paramo bushy prairies and thickest, 3260-3320 m alt. Coll.: J. Cuatrecasas and R. Romero Castañeda 24473, September 28, 1959.

Holotype: US.

Revisional treatment of the Mexican species of Seymeria (Schrophulariaceae). B. L. Turner, Dept. Botany, Univ. of Texas, Austin 78712

#### Abstract

The Mexican species of Seymeria, a genus of annual and perennial herbs restricted to the southeastern United States and adjacent Mexico, is treated taxonomically. The only previous account of the genus was that of Pennell (1925) who recognized 22 species, 19 of these largely confined to Mexico. I recognize only 15 species in the genus: 3 largely confined to the United States and 12 mostly confined to Mexico. Ten of the species recognized by Pennell have been reduced to synonymy and three new specific taxa have been erected (S. falcata Turner; S. pennellii Turner; and S. tamaulipana Turner). Distributional maps for the Mexican species have been presented along with a nearly complete account of the synonymy and typification for each.

The genus Seymeria was treated in its entirety by the late F. W. Pennell (as Afzelia) in 1925. He recognized 22 species in the genus, all but three of these, S. cassioides (Walt.) Blake, S. texana (Gray) Standl., and S. pectiuata Pursh largely confined to Mexico.

My interest in the group has been purely fortuitous, resulting largely from the decision of a graduate student at the University of Texas, Austin, Mr. John Williams to opt out of a Ph.D. program. To become familiar with his thesis problem he borrowed specimens from GH, PH and US. Before leaving the University Mr. Williams annotated material from the eastern United States but left untouched the 20 "species" recognized by Pennell as occurring in western Texas and adjacent Mexico. Before returning the material to the institutions concerned I felt some compulsion to attempt to tidy up the nomenclature concerned and provide meaningful annotations for the remaining material. It soon became obvious that this was not an easy task, but it proved interesting and I persevered, borrowing material from UC during the latter stages of the study.

My interest in scrophi is minimal and is likely to remain so. Thus, I do not contemplate undertaking the considerable field work that will be needed to provide a definitive treatment to the genus. Suffice to say, it is sorely needed. Consequently my treatment here, hoping some younger, stronger soul, will be stimulated to occupy their time with this fascinating group.

Clearly Pennell was intrigued with the taxon, entitling his research on the genus as "a taxonomic study in evolution."

Considering the limited material available to Pennell and the prevailing concepts of that day, his treatment is admirable, at least as to effort. That he never completed a subsequent revisionary treatment is curious, since he spent considerable effort in Mexico collecting the species, some of them quite fragmentary (out of season) and presumably mostly identified according to his 1925 key. Perhaps it was this reliance on the "past" that precluded any new evaluation: surely he would have to sink many of his originally proposed species as new knowledge of populational variability was revealed.

In any case, I have not been able to use his 1925 treatment with any consistent degree of success and have felt it necessary to start from scratch in the treatment presented here. I am aware that much additional work is needed and only hope that the hypothetical taxa created here serve as a guide to yet some better, more experimental, account.

I am grateful to Dr. M. C. Johnston for the Latin diagnoses.

#### Convenient Key to Mexican Species of *Seymeria*

1. Perennials with branched root systems (not known for *S. deflexa*, which is keyed an annual) 2
1. Annuals with simple tap roots 5
  2. Corollas glabrous externally 3
  2. Corollas always with at least a few hairs or sessile glands externally 4
3. Calyx lobes 2-3 times as long as the cup; leaves deeply bipinnatisect . . . . . 5. *S. pennellii*
3. Calyx lobes 1-2 times as long as the cup; leaves merely lobed or remotely pinnatisect . . . 3. *S. tamaulipana*
4. Corolla 6-9 mm long; flowering pedicels mostly 5-12 mm long . . . . . 1. *S. virgata*
4. Corolla 10-16 mm long; flowering pedicels mostly 10-16 mm long . . . . . 2. *S. decurva*
5. Capsule glabrous 6
5. Capsule variously pubescent or atomiferous-glandular 7
6. Calyx tube 1.0-1.5 mm long; corolla 6-7(8) mm long; capsules mostly symmetric . . 6. *S. integrifolia*



6. Calyx tube 1.5-3.0 mm long; corolla 7-9 mm long; capsules mostly asymmetric (semi-falcate)  
 . . . . . 7. *S. falcata*
7. Capsule with sessile capitate glands (appearing glandular-atomiferous); foliage deeply bipinnatisect, glabrous or nearly so . . . . . 8. *S. laciniata*
7. Capsule variously pubescent but not with sessile glands; foliage various, but rarely both bipinnatisect and glabrous 8
8. Corolla glabrous externally 9
8. Corolla with at least a few hairs or glandular-trichomes externally 11
9. Leaves not pinnatisect, variously irregularly serrate or lobed, the lobes 2-5 mm broad . . 4. *S. deflexa*
9. Leaves deeply pinnatisect, the lobes linear, 1 mm or less broad 10
10. Calyx, pedicels and (usually) foliage beset with short, stipitate trichomes only; leaves mostly pinnatisect . . . . . 9. *S. scabra*
10. Calyx, pedicels and foliage beset with multiseptate, glandular-trichomes, these usually interspersed with non-glandular hairs; leaves mostly bipinnatisect . . . . . 10. *S. coahuilana*
11. Corollas 6-7(8) mm long, very sparsely pubescent, the lobes narrow, twice as long as wide; capsules mostly 7-8 mm long . . . . . 11. *S. sinaloana*
11. Corollas (7)8-12 mm long, prominently pubescent (rarely not so), the lobes broad, scarcely as long as broad; capsules mostly 8-12 mm long . . . 12. *S. bipinnatisecta*
1. *Seymeria virgata* (H.B.K.) Benth. ex DC., Prod. 10:511. 1846.  
*Gerardia virgata* H.B.K., Nov. Gen. Spec. 2:344. 1818.  
 TYPE: MEXICO. Guanajuato: Villalpando, between Guanajuato and Santa Rosa, Sep 1818, Humboldt & Bonpland s.n. (holotype P).
- Azelia virgata* (H.B.K.) Ktze., Rev. Gen. 1:457. 1891.  
*Azelia ramosissima* Pennell, Proc. Acad. Phila. 77: 357. 1925.  
 TYPE: MEXICO. Jalisco: W of Bolanos, 16 Sep 1897, J. N. Rose 3708. (holotype US!; isotype PH!).  
*Seymeria ramosissima* (Pennell) Standley, Field Mus. Pub. Bot. 11:175. 1936.

DESCRIPTION: About the same as that rendered by Pennell except that I would include in this the somewhat larger-flowered (9-10 mm long) plants with less pubescent staminal filaments from Jalisco which Pennell segregated as S. ramosissima.

DISTRIBUTION (Fig. 1): Northcentral Mexico in mountainous areas from 1900-2700 m in mostly open calcareous or gypseous soils dominated by dense stands of oak, pine and various chaparral-type shrubs. Flowering: Jul-Oct.

Selected significant collections since Pennell's treatment: COAHUILA: Cerro San Pedro, ca. 50 m from summit on W side (24°44'30"N x 100°45'W), 22-23 Jul 1977, Wells & Nesom 133 (LL).

Seymeria virgata is an exceedingly variable taxon, especially in leaf shape which varies from nearly entire (Turner & Davies A-29, TEX) to deeply pinnatifid or dissected (Rzedowski 4353, TEX). It is very similar to S. decurva, but the latter has much larger flowers. Since these two taxa are largely allopatric, S. virgata occupying mostly calcareous or gypseous soils of northcentral Mexico and S. decurva occupying mostly igneous soils of central Mexico, I have maintained the taxa as species. Additional field work might show that the taxa intergrade over the region of contact; indeed the type of S. latiflora (cf. S. decurva) from near San Luis Potosi may be such an individual. Occasional hybrids between S. virgata and S. decurva might also be expected in this region.

In the area of Galeana, Nuevo Leon, Seymeria virgata and S. tamaulipana occur in close proximity, the latter being a largely allopatric element to the east of the former. Occasional hybrids might occur between these, although mixed collections from the same site have not been noted in the present study.

2. Seymeria decurva Benth. ex DC., Prod. 10:512. 1846.

TYPE: MEXICO. Mexico State (?): w/o locality, 1830, G. J. Graham s.n. (G).

Gerardia virgata Benth., Comp. Bot. Mag. 1:205. 1835. non G. virgata H.B.K.

Seymeria pinnatifida Hems1., Biol. Cent. Amer. Bot. 2:458. 1882. MEXICO. Hidalgo: Zimapan, 1827, Coulter 1281 (holotype K; isotype GH!).

Azelia pinnatifida (Hems1.) Ktze., Rev. Gen. 1:457. 1891.

Azelia decurva (Benth. ex DC.) Ktze., Rev. Gen. 1:457. 1891.

Afzelia madagascariensis Ktze., Rev. Gen. 1:  
457. 1891. (as noted by Pennell, the type, said to be from  
Madagascar, is surely erroneous).

Afzelia latiflora Pennell, Proc. Acad. Phila.  
77:355. 1925. TYPE: MEXICO. San Luis Potosi: region of  
San Luis Potosi, (July) 1878, Parry & Palmer 683. (holo-  
type, PH; isotype US!).

Afzelia laxa Pennell, Proc. Acad. Phila. 77: 355.  
1925. TYPE: MEXICO. w/o locality, 1848-49, Gregg 410.  
(holotype GH!).

Afzelia stricta Pennell, Proc. Acad. Phila. 77:  
358. 1925. TYPE: MEXICO. Puebla: Coxcatlan. Sep 1909,  
C. A. Purpus 4164. (holotype US!; isotypes PH!; UC!).

Seymeria latiflora (Pennell) Standley, Field Mus.  
Pub. Bot. 11:175. 1936.

Seymeria laxa (Pennell) Standley, Field Mus. Pub.  
Bot. 11:175. 1936.

Seymeria stricta (Pennell) Standley, Field Mus.  
Pub. Bot. 11:175. 1936.

DESCRIPTION: About as rendered by Pennell, but  
including the variation attributed to the several novel-  
ties concocted by him and listed in the above synonymy.

DISTRIBUTION (Fig. 1): Central Mexico mostly in  
igneous soils from southernmost Coahuila to Oaxaca where  
it occurs at mid-elevations in oak and juniper woodlands.  
Flowering Jul-Oct.

Additional significant collections since Pennell's  
treatment include the following: COAHUILA. 24 km NW of  
Fraile (25°3'Nx101°18'W), 2900 m, 15 Jul 1941, Stanford et  
al. 404 (GH, UC). OAXACA. vicinity of San Luis  
Tliltlanapa, "Cerro Verde", Jul 1908, C. A. Purpus 3264  
(UC).

As treated here Seymeria decurva is a wide-ranging,  
highly variable, species which is largely confined to  
igneous soils of southcentral Mexico. It is most closely  
related to S. virgata, a largely allopatric taxon of north-  
central Mexico which is mostly confined to calcareous or  
gypseous soils. The latter has generally smaller corollas  
(6-10 mm) and perhaps a more robust habit, to judge from  
dried material.

Of the segregates proposed by Pennell, Seymeria  
stricta from the Tehuacan area of Puebla state is perhaps  
the most distinctive, possessing relatively small, narrow  
corollas, and a rather consistent retrose pubescence on  
the pedicels and with spreading hairs in the calyx sinuses.  
Additional field work in this area may show the populations  
concerned to be worthy of recognition; if not at the  
species level, perhaps at the varietal level. Recent

collection in this area by Smith et al. (3826, GH, US) note the plants concerned to occur in pine-oak forests from 2000-2500 m.

Seymeria laxa is based upon a Gregg specimen (410); however, Pennell cited one additional sheet (Coulter 1280) which was apparently collected in the state of Hidalgo (Zimapan) to judge from Coulter 1281, the type of S. pinnatifida. I was unable to distinguish the admittedly sparse material of either of these taxa from that of S. decurva.

Seymeria decurva normally has pinnatisect leaves, but individuals with merely lobed leaves, approaching those of S. tamaulipana are found in northeastern Hidalgo (e.g., Moore 1872, GH).

3. Seymeria tamaulipana B. L. Turner, sp. nov.

TYPE: MEXICO. Tamaulipas: Sierra de Tamaulipas, region of Rancho Las Yucas, ca. 40 km NNW of Aldama, (ca. 23°14'Nx98°10'W), "EL Pinoso," in pine-oak forest. 14 Oct 1957, Robert L. Dressler 2409. (holotype GH!; isotype UC!).

S. virgata accends sed corollis glabris, capsulis fere glabris, foliis integris vel remote pinnatisectis.

Perennial herb up to 1 m tall. Stems glabrate, minutely puberulous, or puberulous intermixed with short glandular trichomes. Leaves highly variable, linear-lanceolate and entire to ovate and irregularly lobed, to remotely and deeply once-pinnatisect. "Flowers yellow, basally reddish without" (Dressler 1972); pedicels mostly 6-12 mm long, glabrate to puberulous, or puberulent intermixed with short glandular trichomes. Calyx 5-6 mm long, sparsely puberulent throughout or puberulent intermixed with short glandular trichomes; lobes 5, entire, 1.5-2.5 mm long. Corolla 8-10 mm long, deflexed in the manner of S. virgata, glabrous externally; tube 1.0-1.5 mm long, the throat abruptly flaring, 6-8 mm long, 7-10 mm across; lobes shorter than the throat, broadly rounded and ciliate, the posterior pair united for 4/5 their length, densely pubescent internally just below the notch. Stamens 4-5 mm long; filaments 1.5-2.2 mm long, broadened and densely long-pubescent for ca 4/5 their length; anthers glabrous, 2.5-3.1 mm long, opening throughout their length. Style relatively stout, up to 7 mm long, with well-developed stigmatic knob. Capsule symmetrical, broadly ovate, 8-10 mm long, glabrous or with a few scattered stipitate glands on the lower portion; seeds brown, ca 1.3 mm long, testa reticulate, extending into

pronounced thin wings.

DISTRIBUTION (Fig. 1): Oak-pine forests and lower stream sides in northcentral Mexico mostly along the slopes of the Sierra Madre Oriental. Flowering: Jul-Nov.

Additional specimens examined: NUEVO LEON. Dist. Linares: below Ebanito, 890 m, 1 Nov 1979, Hinton 17706 (TEX). TAMAULIPAS. Sierra de San Carlos, vicinity of Marmolejo, Pica del Diablo, 12 Aug 1930, Bartlett 10920 (US); Sierra de Tamaulipas, ca. 40 km NNW of Aldama, highest point in Sierra, W of Las Yucas in low oak scrub, 23 Jul 1957, Dressler 1972 (GH); between Hermosa and Miquihuana, 23 Jul 1949, Stanford et al. 2689 (GH, PH); Cerro Pena Nevada, ca. 12 km NE San Antonio, Jul 1977, Wells & Nesom 312 (LL).

*Seymeria tamaulipana* is clearly related to *S. decurva* and *S. virgata*, differing from both in possessing glabrous corollas and essentially glabrous fruits (rarely a few trichomes). In addition the leaves of *S. tamaulipana* are distinctly less pinnatisect and mostly without glandular trichomes.

The type of *S. tamaulipana* has a few trichomes along the base of the immature capsules as well as glandular trichomes on the calyx and pedicels. Pubescence is apparently quite variable within the vicinity of the type locality since Dressler 1972 has nearly glabrous capsules and only a few glandular trichomes on the calyx and pedicels. To the northwest the populations become essentially glandular and the fruits are glabrous throughout (e.g., Hinton 17706, TEX).

The leaves of *S. tamaulipana* are especially variable as noted in the description. Pennell, by annotations, identified some of the specimens cited above as either *S. decurva* or *S. latiflora*, although he noted the Bartlett collection (10920) as perhaps being an undescribed species.

Finally, it should be noted that two specimens (one sterile and the other in fruit from the previous growing season; Pennell 17728 and 17522 respectively, both at GH) from the state of San Luis Potosi might represent this species (to judge from their linear, entire, glabrous leaves), but the material is inadequate for specific identification.

4. *Seymeria deflexa* Eastw., Proc. Amer. Acad. Arts Sci. 44: 607. 1909.

TYPE: MEXICO. Neuvo Leon: limestone ledges above Monterrey, 3000 ft, 19 Sep 1907, C. G. Pringle 10398. (holotype GH!; isotypes LL!. PH!, TEX!, US!)

*Afzelia deflexa* (Eastw.) Pennell, Proc. Acad. Phil. 77:365. 1925.

DESCRIPTION: as rendered by Pennell (1925) except that the plant appears to be perennial, to judge from the fact that the stems from several of the cited specimens are decidedly suffrutescent. None of the collections has roots. Mature fruits are, as yet, unknown.

DISTRIBUTION (Fig. 1): Known only from the type locality and vicinity where it occurs in limestone soils on the lower slopes of the eastern-facing Sierra Madre Oriental. Flowering: Jul-Sep.

SPECIMENS EXAMINED: NUEVO LEON. Monterrey, 15 Jul 1933, C. J. & M. T. Mueller 126 (TEX); above Olinala below "M" pinnacles, Monterrey, Sep 1960, Smith M409 (TEX).

Pennell positioned the species in the annual groups, section *Pectinatae*, as the sole member of the subsection *Deflexae*. Fruit, seed characters and glabrous corollas appear to align the species with *A. bipinnatisecta* of the annual subsection *Bipinnatisectae*. As noted above, the species is possibly perennial.

5. *Seymeria pennellii* B. L. Turner, sp. nov.

*S. decurva* accedens sed valde distincta corollis extus glabris tenuibus fere erectis, intus infra fissuram dorsalem glabris, lobis calycis elongatis 7--9 mm longis (versus 3--6 mm).

TYPE: MEXICO. Durango: Metates, N of Cuava, rich slopes in pineland, 2600-2700 m, 29-30 Aug 1934, F. W. Pennell 18433. (holotype US!; isotypes GH!, UC!).

*Seymeria pennellii*, because of its deeply bipinnatisect leaves, superficially resembles *S. bipinnatisecta* but the perennial habit and completely dehiscent anthers seemingly place the taxon with the perennials of Pennell's Section *Virgatae*. Nevertheless relationships with the annual species, especially *S. laciniata* and *S. falcata*, seem to be real and it would appear, on cladistic grounds, that the latter taxa arose out of prototypes not too dissimilar from *S. pennellii*.

The species is named for the late Dr. Pennell whose interest and contributions to the Scrophulariaceae are well known. It is noteworthy, perhaps, that Pennell collected the type material in 1934, some 9 years after his germinal study. He identified these as *S. ramosissima* (which I have relegated to synonymy under *S. virgata*). The plant will not key in his original treatment and differs in so many characters from the other members of the *Virgatae* group that one must assume that Pennell provided a provisional name only perhaps recognizing the need to revise the genus. Unfortunately (or fortunately) he never

got around to the task.

Within the annual groups, *S. pennellii* would clearly be placed next to *S. laciniata* of Pennell's monotypic subsection *Laciniata*, which is characterized, in part by being glabrous below the dorsal lobes, the latter united for 3/5-4/5 their lengths, characters which also hold for *S. pennellii*.

6. *Seymeria integrifolia* Greenm., Proc. Amer. Acad. Arts Sci. 39:89. 1903.

TYPE: MEXICO. Jalisco: rocky hills near Guadalajara, 13 May 1901, C. G. Pringle 9660 (holotype, GH!).

*Afzelia integrifolia* (Greenm.) Pennell, Proc. Acad. Phila. 77:361. 1925.

*Afzelia madrensis* Pennell, Proc. Acad. Phila. 77:362. 1925. TYPE: MEXICO. Nayarit (?): northeast of Tepic, 1849, Seemann 2106 (holotype K; isotype GH!; isotype fragment, PH!). According to Seemann's account in the Botany of the Voyage of the Herald, he travelled from Mazatlan to the City of Durango, then southward through Nayarit to near Tepic. He presumably collected his 2106 in the mountainous areas northeast of the latter city. The only other known collection of *Seymeria* on this inland trip was that of *S. bipinnatisecta* (No. 2102) which was collected in Durango, presumably near El Salto.

*Seymeria madrensis* (Pennell) Standl., Field Mus. Publ. Bot. 11:175. 1936.

DESCRIPTION: as provided by Pennell except that the characters which he used to distinguish between *S. madrensis* and *S. integrifolia* should be included within the range of the latter. In short the only significant character mentioned appears to be that of leaf dissection, *S. integrifolia* being distinguished by its nearly entire leaves. However, this is a very inconstant feature and is found to vary in almost every species of *Seymeria* for which there is a range of material available. Further, the type of *S. integrifolia* and specimens cited by Pennell are mostly taken from the uppermost stems; the lower, primary leaves are notably absent. In any case, I cannot distinguish among the collections cited by Pennell in these taxa.

DISTRIBUTION (Fig. 2): Known only from Jalisco and adjacent Nayarit where it reportedly occurs in dry rocky soils. Flowering: May-Dec. There have been no recent collections of the taxon but additional plants are sure to become known as the area east of Tepic becomes better explored.

Seymeria integrifolia is probably closest to S. falcata. This is especially apparant in fruit structure, for both possess glabrous fruits; indeed collections of S. integrifolia (Pringle 8767, US) from the mountains above Etzatlan possess more or less falcate capsules; the flowers however are smaller on longer pedicels and the racemes are more elongate and open.

7. Seymeria falcata B. L. Turner, sp. nov.

S. scabra Gray accedens sed capsulis subfalcatis vel falcatis glabris, calycibus nonglandulosis, laciniis foliorum paucioribus, caulibus glabris vel tantum puberulis.

Annual or short-lived perennial up to 60 cm tall. Stems minutely puberulous in two lines or glabrate, much-branched from a well-developed tap-root. Leaves entire, tri-lobed, multi-lobed to irregularly pinnate, especially below, minutely white-scabrid to glabrate. Flowers yellow or "dull yellow with purplish throat" (Chiang et al. 8919); pedicels 6-10 mm long, glabrous to uncinately-hispid. Calyx 5-6 mm long, decidedly ribbed, glabrous to uncinately-hispid, with 5, linear-lanceolate lobes 3-4 mm long. Corolla somewhat reflexed at maturity, 7-9 mm long, glabrous externally, tube 3-5 mm long; dorsal lobes ciliate, 4-5 mm long, moderately pubescent below just beneath the cleft; lateral lobes ciliate, broadly ovate to oval, 3.5-4.0 mm long; ventral lobes ciliate, ovate to oval, 3-4 mm long. Stamens 4.0-4.5 mm long; filaments 1.5-2.0 mm long, broadened below for ca. 1/2 their length and pubescent with long hairs, the remainder glabrous; anthers glabrous, 2.0-2.5 mm long, opening by terminal poricidal slits for 1/4-5/6 their length. Style slender, 5-7 mm long. Capsule weakly to decidedly falcate, shiny, glabrous, 8-10 mm long; seeds ca. 1 mm long, brownish, pitted, wingless.

TYPE: MEXICO. Coahuila: Head of Canon Ybarra, high central parts of the Sierra del Pino, ca. 2.5 km NW of La Noria, 29 Aug 1941, R. M. Stewart 1256 (holotype GH; isotype TEX).

The species is comprised of two regional intergrading varieties (cf. Fig. 2) as noted below.

Calyces glabrous or nearly so; mid-stem leaves mostly simple to trilobed. . . . . var. falcata

Calyces prominently uncinately-hispid; mid-stem leaves mostly pinnate to bipinnate . . . . . var. uncinata

Seymeria falcata var. falcata.

In addition to the type collection, cited above, the



following specimens may be noted:

Coahuila: SW flank of Sierra del Carmen, 15 Sep 1972, Chiang et al. 9267 (TEX); 9277c (TEX). Western base of Picacho del Fuste, northeasterly from Tanque Vaionetta, 23-25 Aug 1941, Johnston 8356 (GH); SW end of the Sierra del la Fragua, 1-2 km N of Puerto Colorado, 2 Sep 1941, Johnston 8744 (GH, LL); Canon de Ybarra, NW end of Sierra del Pino, 22-23 Sep 1941, Stewart 1801 (GH); vicinity of La Noria, Sierra del Pino. 20-26 Aug 1940, Johnston & Muller 670 (TEX)

*Seymeria falcata* var *uncinata* B. L. Turner, var. nov.

A var. *falcata* calycibus pedicellisque prominente uncinato-hispidis, foliis profusius pinnatisectis differt.

TYPE: MEXICO. Chihuahua: Vicinity of the playas (small shelf-like valleys with meadows), just below the high ridge-crests at the NE end of the Sierra del Diablo, 30 Jul 1941, R. M. Stewart 987 (holotype GH; isotype TEX!, UC!).

Additional Specimens Examined: CHIHUAHUA: Sierra de Chupaderos, ENE of Jimenez, 1750-2145 m, 26 Aug 1972, Chiang et al. 8919 (TEX); 4 km SSW of Cerro cel Gringo, Sierra Diablo, 1800-2050 m, 30 Aug 1972, Chiang et al. 9012 (TEX), COAHUILA: Canon de Hidalgo, Sierra Mojada, above San Salvador Mine, near Esmeralda, "below great cliffs, fairly common on hillside", 4 Aug 1941, Stewart 1055 (GH, TEX).

*Seymeria falcata* is clearly related to *S. scabra* and is partially sympatric with that species (Fig. 2). In habit it much resembles the widespread, perennial, *S. virgata*; indeed, its origins might be from ancestral prototypes of the latter, as suggested by its virgate habit, pubescence of the inner dorsal petals and somewhat deflexed, tubular-companulate flowers. *S. falcata* is also closely related to *S. integrifolia* of Jalisco which has relatively small glabrous capsules as does *S. falcata*, but those of the former are not falcate.

The two varieties are relatively easily distinguished by the key characters given, the var. *uncinata* having a more southwestern distribution, presumably occurring in somewhat more mesic sites, to judge from label data ("near water in small canyon, fairly common", Stewart 987, TEX). The var. *falcata* is said to occur in "massive bedded limestone" on steep slopes associated with *Agave*, *Hechtia*, *Yucca*, *Vauquelinia*, etc. (Chiang et al. 9277c, TEX).

Occasional near intermediates between var *falcata* and *uncinata* occur, the most notable being Johnston 8744 (cited under var *falcata*), which has sparsely uncinata-hispid

calyces and relatively non-pinnatisect leaves. No doubt additional collecting in this poorly known region will reveal yet other intermediates and perhaps occasional hybrids with S. scabra, as noted under the discussion of that taxon.

8. Seymeria laciniata (Mart. & Gal.) Standley  
Gerardia laciniata Mart. & Gal., Bull. Acad. Brux. 12: 26. 1845. TYPE: MEXICO. Oaxaca: Mountains of northern Oaxaca, w/o date, H. Galleotti 1070 (holotype, BRLU; isotype K).  
Dasytoma laciniata (Mart. & Gal.) Walp., Report. 6: 649. 1847.  
Afzelia laciniata (Mart. & Gal.) Pennell, Proc. Acad. Phila. 77: 359. 1925.  
 DESCRIPTION: essentially that provided by Pennell (1925).  
 DISTRIBUTION AND HABITAT (Fig. 2): Mountainous regions of south-central Mexico from Mexico State, Guerrero and Oaxaca, 950-2600 m, occurring in pine-oak woodlands mostly on or along dry ridges in relatively barren gravelly soils. Flowering: Sep-Dec.  
 REPRESENTATIVE SPECIMENS: In addition to those cited by Pennell (1925), all from Oaxaca, the following should be recorded: GUERRERO. Mina: Yesceros. 27 Nov 1939, Hinton et al. 14908 (TEX, US); MEXICO STATE. Temascaltepec: Ocotepc, 12 Oct 1932, Hinton 2915 (GH, US); Cajones, 3 Sep 1933, Hinton 3479 (GH, US).  
 The species is readily recognized by its finely dissected nearly glabrous foliage, capsules with nearly sessile glandular trichomes and externally glabrous petals. Corolla size is quite variable, as noted by Pennell in his description, varying from 8-12 mm long.  
 Pennell positioned the species among the annual series as the only taxon within his Section Cassioides, subsection Laciniata, largely because of its anthers which dehisce throughout their length. If one ignores the phyletic weight placed on anther dehiscence, S. laciniata is readily positioned in his subsection Scabra next to S. integrifolia.
9. Seymeria scabra Gray, in Torr., Bot. Mex Bound. Surv. 118. 1859. TYPE. TEXAS. Jeff Davis Co.: hillsides along Limpio Creek, (26 Aug 1849), Wright 448. (holotype, GH! isotype UC!)  
Afzelia scabra (Gray) Ktze., Rev. Gen. 1:457. 1891.

DESCRIPTION: largely as rendered by Pennell but more recent collections show a greater range in corolla tube length, 2.5-3.0 (4.0) mm, and anther cell length, 2.5-2.8 mm. It should also be noted, that the capsules are often semi-falcate in shape, approaching those of *S. falcata*.

DISTRIBUTION (Fig. 2): North-central Mexico, adjacent Texas and probably southern-most New Mexico, mostly on exposed calcareous and gypseous soils in semi-desert habitats dominated by a wide range of xerophytic shrubs such as *Yucca*, *Dasyllirion*, *Agave*, *Nolina*, *Acacia*, *Eysenhardtia*, etc. Flowering: Aug-Oct.

Since Pennell's study the following significant range extensions should be noted. MEXICO. Nuevo Leon: ca. 15 m SW El Barrial, 1620 m, 24 Sep 1979, Hinton et al. 17653 (TEX) ca. 15 m SW of Galeana, 16 Jul 1934, C. H. & M. T. Mueller 1073 (TEX); same locality, 23 Jul 1934, C. H. & M. T. Mueller 1190 (TEX); ca. 15 airline mi NW of Monterrey, Parque de Portrero on pink gypsum hills, 23 Oct 1970, Turner & Crutchfield 6264 (TEX); ca. 12 mi NW of Galeana, 20 Aug 1979, Turner & Davies A-31 (TEX).

Pennell positioned the species next to *Seymeria madrensis* (*S. integrifolia* in the present treatment) in his subsection *Scabrae*, to which it is undoubtedly related. It is, however, somewhat closer to its sympatric congener, *S. falcata*, newly described above.

Occasional hybridization between *S. scabra* and *S. falcata* must occur upon occasion since they are sympatric, in part, and at least one collection of *S. scabra* (Stewart 2535, GH) possessing nearly glabrate, somewhat falcate capsules, suggests gene flow from *S. falcata*.

10. *Seymeria coahuilana* (Pennell) Standley, Field Mus. Publ. Bot. 11:176. 1936.

*Afzelia coahuilana* Pennell, Proc. Acad. Phila. 77:366. 1925. TYPE: MEXICO. Coahuila: 21 mi SE of Monclova, Caracol Mts., Aug 1860, E. Palmer 989. (holotype GH!; isotype PH!).

DESCRIPTION: as given by Pennell (1925).

DISTRIBUTION (Fig. 2): Known only by relatively few collections from the area about Monclova where it reportedly occurs in canons and higher montane habitats. Flowering: Jul-Sep.

Representative Specimens: In addition to the several collections made by Palmer between 1860 and

1880 (at various times but all in the vicinity of Monclova and all numbered as 989), a single subsequent collection has been made: Sierra de La Gloria, SE of Monclova, Jul 1939, E. G. Marsh 1910 (GH, TEX).

This taxon is quite similar to Seymeria bipinnatisecta but differs in having glabrous corollas or nearly so (externally) and possessing narrow corolla lobes. In addition the capsule is only very sparsely pubescent with short, glandular trichomes. S. scabra also possesses a glabrous corolla with narrow lobes and a sparsely pubescent capsule. This suggests that S. coahuilana is of hybrid origin from such parentage. If so, however, it is probably of an ancestral nature since Palmers early collections are matched by the Marsh collection of 1939 (cited above) made in or near the type locality. The latter, however, has a few hairs on the corolla tube. So far as known, neither putative parent occurs with S. coahuilana, at least these were not collected by either Palmer or Marsh.

It is also possible that S. coahuilana is nothing more than an isolated populational variant of the widespread S. bipinnatisecta, since nearly glabrous, narrow corolla lobes of the latter occur in western Chihuahua. Sparsely pubescent, but broader, corolla lobes also occur in the higher montane populations of S. bipinnatisecta in southernmost Coahuila. I suspect that the populational variability of S. bipinnatisecta is sufficiently large so as to encompass S. coahuilana; I retain the taxon here out of respect of this ignorance.

11. Seymeria sinaloana (Pennell) Standley, Field Mus. Publ. Bot. 11: 176. 1936.

TYPE. MEXICO. Sinaloa: Cerro Colorado, vicinity of Culiacan, 2 Nov 1904, T. S. Brandegee s. n. (holotype US; isotype UC!; fragment PH!).

DESCRIPTION: essentially that rendered by Pennell (1925).

DISTRIBUTION (Fig. 3): Upper Pacific slopes of the Sierra Madre from southern Sonora and Chihuahua to adjacent Sinaloa, mostly in igneous soils on slopes and ridges in open pine forests from 1000-1600 m. Flowering: Aug-Oct.

REPRESENTATIVE SPECIMENS: MEXICO. Chihuahua: Sierra Canelo, Rio Mayo, 8 Oct 1955, Gentry 2014 (GH, PH, UC); Los Cascarones, Rio Mayo, 11 Sep 1936, Gentry 2664 (GH, UC, US). SINALOA: Cerro de la Sandia, NE of Panuco, 29-30 Aug 1935, Pennell 20080 (GH, US). SONORA: Ridge S of Arroyo Gochico, E of San Bernardo, 1050-1150 m, 5-9 Aug 1935, Pennell 19549 (GH, UC, US); Cerro Saguarivo, E of San Bernardo, 7-8 Aug 1935, Pennell 19581 (UC).

Seymeria sinaloana is a weakly differentiated

peripheral element split out of *S. bipinnatisecta*. It is, however, readily recognized by its small corollas, small anthers and smaller, sparsely pubescent capsules. Pennell, by annotations, identified his Sonoran collections (cited above) as *S. tenuisecta* (19549) and *S. sp. nov.* (19581). The former name was originally applied to individuals with larger corollas and prominently glandular foliar pubescence from southwestern Chihuahua. I include such populations in *S. bipinnatisecta*. However, pubescence glandularity varies considerably in both *S. bipinnatisecta* and *S. sinaloana*, thus Pennell presumably identified most of the Gentry collections (cited above) as *S. chihuahuana* because of their "minutely pubescent to nearly glabrous" leaves, a character used in Pennell's key to species. In short, Pennell was clearly confused as to the specific parameters which characterize *S. sinaloana*, having identified the approximately six collections known to him (all from the same general region; cf. Fig. 3) as four species (*S. chihuahuana*; *S. sinaloana*; *S. tenuisecta*; and *S. sp. nov.*); I include all of these specimens in *S. sinaloana*. Additional field work and experimental studied with the *S. sinaloana* - *S. bipinnatisecta* complex is clearly needed.

12. *Seymeria bipinnatisecta* Seem., Bot. Voy. Herald 323. 1857.

TYPE. MEXICO. Durango [?]: "N.W. of Mexico", Dec 1849 [?], Seemann "2102". (holotype K, according to Pennell, 1925).

Seemann, according to the account of his trip to NW Mexico (Bot. Voy. Herald, pp. 257-261), left Mazatlan in November 1849 on his route to Durango. He most likely collected type material at or near El Salto some 50 km W of Durango city. He did not proceed past the latter locality but rather collected thereafter to the SW of that site, venturing nearly to Tepic before returning to Durango via a somewhat different route, then hence to Mazatlan.

*Afzelia bipinnatisecta* (Seemann) Ktze., Rev. Gen. 1: 457. 1891.

*Afzelia havardii* Pennell, Proc. Acad. Nat. Sci. Phila. 72: 507. 1921. TYPE: UNITED STATES. Texas: Maverick Co.: Eagle Pass, 1882, Havard s. n. (holotype, PH!).

*Seymeria havardii* (Pennell) Standl., Field Mus. Pub. Bot. 11: 175. 1936.

*Afzelia chihuahuana* Pennell, Proc. Acad. Nat. Sci. Phila. 77: 367. 1925. TYPE: MEXICO. Chihuahua: Cumbre, SW Chihuahua, Oct 1885, Palmer 325. (holotype GH!; isotypes widespread; cf. Pennell, 1925). Probably near Guasarachic (cf. McVaugh, 1956).

*Seymeria chihuahuana* (Pennell) Standl., Field Mus. Pub. Bot. 11: 175. 1936.

Afzelia glandulosa Pennell, Proc. Acad. Nat. Sci. Phila. 77: 369. 1925. TYPE: MEXICO. Chihuahua: near Chuichupa, 16 Sep 1899, Townsend & Barber 429 (holotype GH!; isotypes widespread; cf. Pennell, 1925).

Seymeria glandulosa (Pennell), Standl. Field Mus. Pub. Bot. 11: 175. 1936.

Afzelia tenuisecta Pennell, Proc. Acad. Nat. Sci. Phila. 77: 370. 1925. TYPE: MEXICO. Chihuahua: base of Mt. Mohinora, 8 mi from Guadalupe y Calvo, 2100-2500 m, 23-31 Aug 1898, E. W. Nelson 4854. (holotype US!).

Seymeria tenuisecta (Pennell) Standl., Field Mus. Pub. Bot. 11: 175. 1936.

DESCRIPTION: About the same as that rendered by Pennell, including the variation for each of the above synonyms. Careful comparisons among these, as well as among the specimens upon which they are based, strongly suggest that only a single widespread specific taxon is involved.

DISTRIBUTION (Fig. 3): Northcentral Mexico from Sonora to Coahuila (where it just crosses the Rio Grande into Texas) and southward into Sinaloa and Durango, occurring in both igneous and calcareous soils from 900 to 2500 m. Flowering: Jul-Dec.

Seymeria bipinnatisecta is a widely distributed, highly variable species. In and about the type locality (El Salto, W of Durango) populations possess somewhat larger, more pinnatisect leaves, larger sepals, longer pedicels and generally shorter, more viscid, glandular trichomes than do the more eastern populations. These characters, however, vary singly and in combination across the range of the species.

Pennell (1925) created, or recognized as species, all four of the synonyms listed above, placing these together (as species 16 through 20) in his key. He distinguished S. bipinnatisecta from S. chihuahuana and S. havardii primarily by the size of capsules (8-9 mm in the former; 9-11 mm in the latter pair). This in spite of his statement that the fruit of S. bipinnatisecta was "not seen mature". In fact, recent collections from near the type locality show that the capsules of S. bipinnatisecta vary from 9-12 mm in length. Pennell distinguished S. bipinnatisecta from both S. glandulosa and S. tenuisecta by the longer pedicels, somewhat larger corollas and larger leaves of the former. But subsequent collections show that these characters vary considerably, both within and between populations.

The most distinct populations of S. bipinnatisecta, as treated here, are perhaps those of northern Coahuila which have longer multiseptate glandular trichomes and somewhat smaller corollas than is typical for the taxon.

These populations mostly occupy relatively xeric, calcareous soils dominated by such genera as Agave, Nolina, Rhus and Juniperus. The name S. havardii has been applied to these populations. However, such populations appear to grade into populations possessing larger corollas and less pronounced trichomes. The latter occur in more montane habitats (Pinus and Abies dominated zones), especially in the Sierra del Carmen of northern Coahuila and in yet other ranges of southern Coahuila. These more montane populations have not received a name but they resemble greatly populations from the igneous regions of western Chihuahua and eastern Durango which have been referred to as either S. tenuisecta or S. glandulosa. Considering the sporadic and seemingly erratic variation found from mountain chain to mountain chain throughout this broad region it makes little sense to attempt an infraspecific classification, at least without more extensive field and experimental studies.

No doubt the small flowered, sparsely pubescent, Seymeria sinaloana, of the Pacific coast slopes of the Sierra Madre is that taxon most closely related to S. bipinnatisecta and could as readily been treated as a varietal or subspecific unit within the latter. I have opted to retain this at the specific level since it is readily distinguished by a combination of floral characters and occupies a relatively distinct geographical region.

#### Literature Cited

Pennell, F. W. 1925. The genus Azelia: a taxonomic study in evolution. Proc. Acad. Nat. Sci. Phila. 77:335-373.

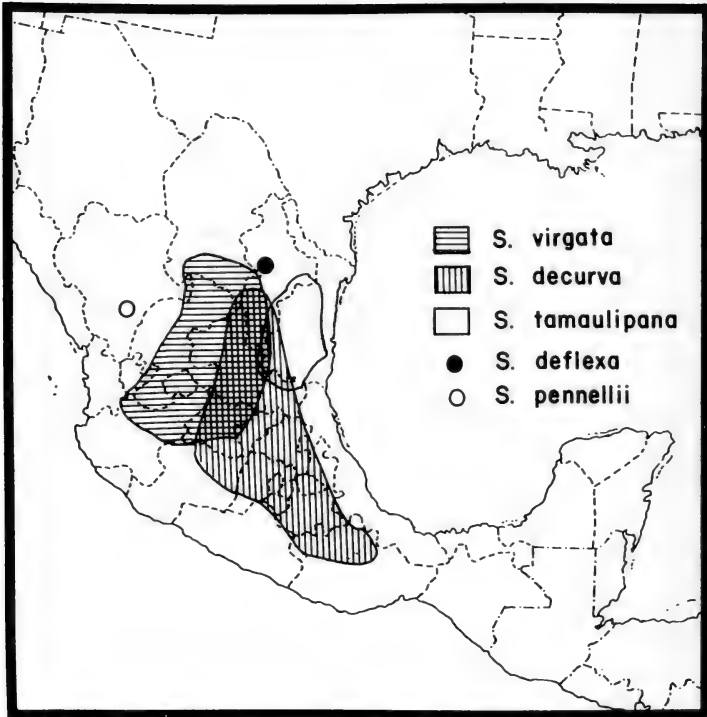


Fig. 1. Distribution of perennial species of Seymeria.



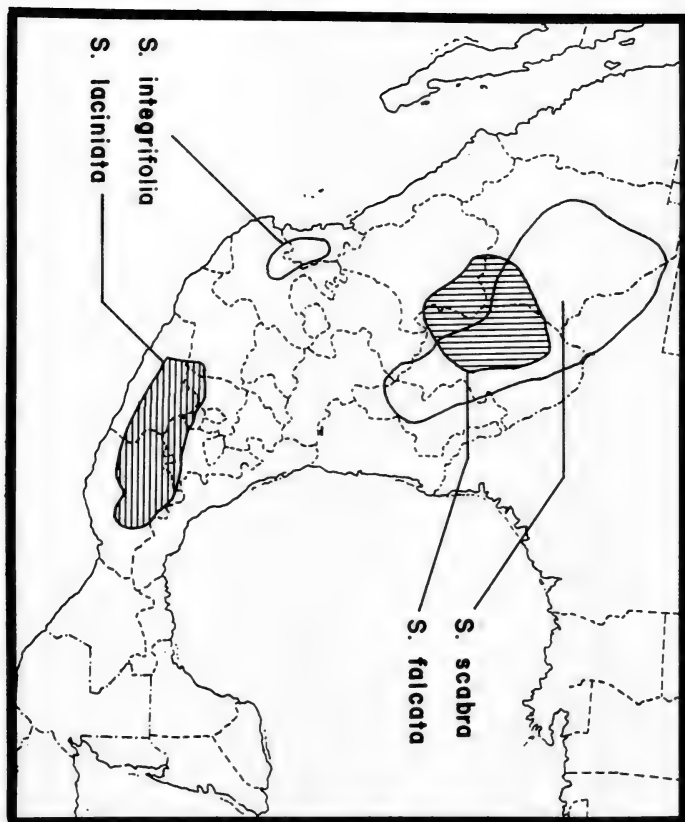


Fig. 2. Distribution of annual species of Mexican Seymeria.

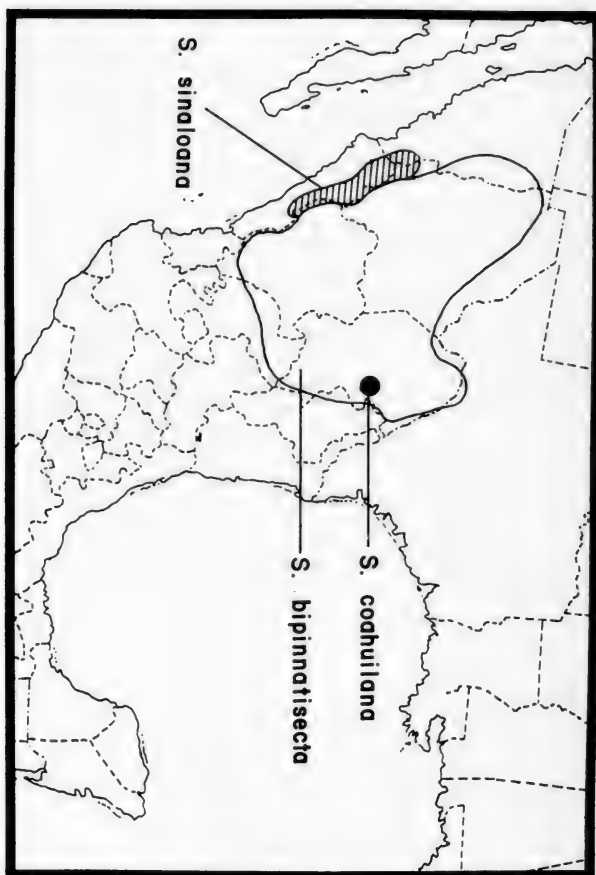


Fig. 3. Distribution of annual species of Mexican Seymeria.

Contribution to the Lichen Flora of Venezuela, IV

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The following list has been on material collected by the author in the North-West Region of Venezuela mainly from the Andes.

The material was examined at the Smithsonian Institution Washington, D.C. during the spring of 1977 and 1980.

All the specimens are new citations for the area. Although some of them were cited previously by Vareschi (1973) for the Central Region of Venezuela.

The specimens collected by the author and studied by Esslinger (1980) and Yoshimura (1979) are also included.

This collection is kept at the Herbarium MERF.

Coccocardia palmicola (Spreng.) L. Arvidss. & D. Gall. As C. parmelioides (H.K.) Trev. in López-Figueiras 1981.

Leurocaulon arbuscula (Nyl.) Nylander

Estado Táchira: Betania, parte alta del valle de Tamá, López-Figueiras 25793.

Lobaria crenulata (Hook) Vainio

Estado Mérida: Taludes de la vía a El Morro, López-Figueiras 12345, 12377.

La Carbonera, vía Mérida-La Azulita, M. Hale & López-Figueiras 44210.

El Maciegal, cuenca del río La Pedregosa, cercanías de Mérida, López-Figueiras & Ruiz-Terán 9849.

Estado Táchira: Vía Zumbador-Michelen, López-Figueiras & M. Kogh 9502, 9520.

Páramo El Zumbador (Páramo de los Colorados), López-Figueiras & M. Keogh 9451.

Vía La Grita above Hotel de la Montaña, M. Hale & López-Figueiras 42533.

Lobaria exornata (Zahlbr.) Yoshim.

Estado Mérida: San Jacinto, cercanías de Mérida, M. Hale 42290.

El Delgadito-Vía Pregoneros, M. Hale 42384.

Oropogon atranorinum Esslinger

Estado Mérida: Páramo de Las Coloradas, M. Hale & López-Figueiras 44411.

Oropogon lopezii Esslinger

Estado Trujillo: Páramo de Cendé, López-Figueiras 14014.

Parmotrema arnoldii (DR) Hale

Estado Mérida: Sierra del Norte o de La Culata, Páramo de Los Conejos, cercanías del Indio Dormido, López-Figueiras 24126, 24155.

Páramo de Aricagua, López-Figueiras 12829, 12856, 12870.

Estado Trujillo: Finca Guirigay-Rio Burate, López-Figueiras 11031, 11058.

Páramo de Cendé, López-Figueiras 13005.

Parmotrema commensuratum (Hale) Hale

Estado Lara: Sierra Portuguesa, Parque Nacional "Yacambú", López-Figueiras 15780.

Fundo "Buenos Aires", cercanías de Humocar Alto, López-Figueiras & M. Hale 19572.

Estado Falcón: Sierra San Luis, alrededores de Uria, vía Las Negritas Curimagua, López-Figueiras 19272.

Estado Mérida: Sierra Nevada de Mérida, quebrada de Fafoy, cercanías del Carrizal, López-Figueiras & M. Hale 20272, 20273.

Bosque La Carbonera, vía Mérida-La Azulita, López-Figueiras & Ruiz-Te-rán 9867.

Sierra del Norte o de La Culata, Páramo de Los Conejos, El Salaito, López-Figueiras 24409.

Estado Táchira: cercanías de Cordero, a lo largo de la carretera, vía San Cristóbal-Alto del Zumbador, López-Figueiras 24789.

Estado Trujillo: La Morita, cercanías de Tuñame, López-Figueiras 12044

Parmotrema concurrens Hale

Estado Mérida: Alrededores de El Morro, López-Figueiras 12929.

Parmotrema conformatum (Vainio) Hale. As Parmelia conformata in Vareschi 1973

Estado Lara: En los Potreritos, un sector del Páramo de Los Nepes, junto a las Porqueras, cercanías de Barbacoas, López-Figueiras 17156.

Estado Mérida: Bosque La Carbonera, vía Mérida-La Azulita, López-Figueiras & M. Keogh 12401.

Potrereros de San Rafael, Páramo de Las Coloradas, M. Hale & López-Figueiras 44320.

La Carbonera, vía Mérida-La Azulita, M. Hale & López-Figueiras 44176, 44209, 44221.

Parmotrema delicatulum (Vainio) Hale. As Parmelia radians in Vareschi 1973.

Estado Lara: Sierra de Barbacoas, Páramo de Los Nepes, Sector de Los Potreritos, López-Figueiras & R. Smith 16527, 16530.

Sierra de Barbacoas, entre Barbacoas y San Pedro, López-Figueiras 18990, 19083.

Estado Mérida: La Loma del Arbol, vía La Trampa, M. Hale 42220.

Quebrada del Molino, vía La Trampa, M. Hale 42233.

La Mucuy, M. Hale 43011, 43039, 43042.

Estado Táchira: Carretera vieja Rubio-San Cristóbal, M. Hale & López-Figueiras 45080, 45081.

Parmotrema dominicanum (Vainio) Hale

Estado Lara: Sierra Ziruma o Empalado, Los Cogollales, cercanías de Cerro Azul, López-Figueiras & R. Wingfield 21520.

Estado Mérida: El Salado, entre La Azulita y La Carbonera, M. Hale 42750.

Parmotrema eborinum (Hale) Hale

Estado Lara: Sierra de Barbacoas y San Pedro, López-Figueiras 19079, 19081.

Sierra de Baragua, más allá de Altagracia-Pedernal, López-Figueiras & R. Smith 20900.

Sierra Matatere, entre el caserío Los Caimitos (hacia Matatere) y Aguada Grande, López-Figueiras & R. Smith 20996.

Sierra Portuguesa, en Loma de León, cercanías de Barquisimeto, López-Figueiras & R. Smith 21225.

Sierra de Ziruma (Serranía de Jirajara o Empalado) en el Cerrón, López-Figueiras 20837.

Estado Mérida: Alrededores de El Morro, López-Figueiras 12931.

El Maciegal, cuenca del río Pedregosa, cercanías de Mérida, López-Figueiras 10567.

San Jacinto, M. Hale 42250, 42253, 42284.

Estado Trujillo: Entre Puente Villegas y Cerro Gordo, cercanías de Carache, López-Figueiras 16953A.

Carretera vieja Trujillo-La Cristalina-Boconó, López-Figueiras & M. Keogh 11224, 11227, 11228, 11229, 11251.

Parmotrema flavescens (Kremph) Hale

Estado Lara: Sierra de Barbacoas, en los Potreritos, un sector del Páramo de Los Nepes, junto a las Porqueras, cercanías de Barbacoas, López-Figueiras 17134.

Sierra de Barbacoas, entre la Quebrada del Vino y Barbacoas, López-Figueiras & R. Smith 16538.

Estado Mérida: El Maciegal, cuenca del río La Pedregosa, cercanías de Mérida, López-Figueiras 10585, 10604, 10610.

Llano de la Era, cercanías de Santo Domingo, López-Figueiras 12296.

El Moral, vía Guaraque-Mesa Quintero, López-Figueiras & H. Rodríguez 22878.

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Parmotrema fractum (Hale) Hale

Estado Mérida: Potrereros de San Rafael, páramo de Las Coloradas M. Hale & López-Figueiras 44274, 44351.

Estado Táchira: Alrededores de Betania, parte alta del Valle de Tamá López-Figueiras 10060.

Parmotrema grayanum (Hue) Hale

Estado Mérida: El Maciegal, cuenca del río La Pedregosa, cercanías de Mérida, López-Figueiras 10589, 10622, 10664C.

Arriba de Tovar, entre esta población y la carretera al Páramo de Mañío, en la vía Tovar-Zea, López-Figueiras 24696.

La Mucuy, M. Hale 43023, 43047.

Estado Lara: Sierra de Barbacoas, entre la quebrada del Vino y Barbacoas, López-Figueiras & R. Smith 16543.

En el camino entre el fundo "Buenos Aires" y Humocar Alto, López-Figueiras & M. Hale 19621.

Sierra de Ziruma (Serranía Jirajara o Empalado), en el Cerrón, López-Figueiras & R. Smith 20854.

Sierra de Baragua, alrededores de La Cumbre, vía Baragua-Carora, López-Figueiras & R. Smith 31924.

Parmotrema hababianum (Gyeln.) Hale

Estado Falcón: Sierra Ziruma o Empalado, Cerro Socopo, López-Figueiras & R. Winfield 22562.

Estado Mérida: El Maciegal, cuenca del río La Pedregosa, cercanías de Mérida, López-Figueiras & Ruíz-Terán 9888B.

Parmotrema haitiense (Hale) Hale

Estado Lara: Sierra Ziruma o Empalado, Los Cogollales, cercanías de Cerro Azul, López-Figueiras & R. Wingfield 21548.

Sierra de Barbacoas, a lo largo de la vía entre las Porqueras y Las Palmas, López-Figueiras 22200.

Estado Mérida: Predios de la Facultad de Ingeniería, ULA, López-Figueiras 9035C.

Estanquillo de la Trampa, vía La Trampa, M. Hale 42296, 42298, 42303.

Sierra Nevada de Mérida, quebrada de Pafoy, cercanías de El Carrizal, López-Figueiras & M. Hale 20242.

Parmotrema leucosemothetum (Hue) Hale. As Parmelia leucosemotheta Hue in Vareschi 1973.

Estado Falcón: Sierra de San Luis, alrededores de Uria, vía Las Negritas-Curimagua, López-Figueiras 19272C.

Estado Mérida: Sierra Nevada de Mérida, Páramo de Gavidia, cercanías de Mucuchíes, López-Figueiras & M. Keogh 20584, 20632.

Taludes de la carretera La Mitisús-Barinitas, entre La Mitisús y Las Mesas, López-Figueiras 12438.

Parmotrema mellissii (Dodge) Hale

Estado Falcón: Sierra de San Luis, alrededores de Uria, vía Las Negritas-Curimagua, López-Figueiras 12293, 12298.

Sierra de San Luis, alrededores del Parador Turístico, Curimagua, López-Figueiras 19319.

Estado Lara: Sierra Portuguesa, Parque Nacional "Yacambú", López Figueiras & R. Smith 15970.

Sierra Portuguesa, cerro El Zamuro, cercanías de Villa Nueva, carretera Guárico-Villa Nueva, López-Figueiras & M. Hale 19861.

Estado Mérida: Sierra Nevada de Mérida, quebrada de Fafoy, cercanías del Carrizal, López-Figueiras & M. Hale 20175.

Potreros de San Rafael, páramo de Las Coloradas, M. Hale & López Figueiras 44293,44348,44361.

Estado Táchira: Pico El Cobre, un sector del Páramo de Tamá, López Figueiras & Ruiz-Terán 9960.

Estado Trujillo: La Fila, cumbres del Páramo de Cendé, López-Figueiras 13108.

A lo largo de la carretera Carache-La Palma-Agua de Obispo, López Figueiras 13424.

Parmotrema peralbidum (Hale) Hale

Estado Falcón: Al otro lado del Paramito, en la carretera Coro-Guaibacoa-Semeruco, López-Figueiras 21858.

Estado Lara: Sabanas El Altar-Yaritagua, proximidades de un puente sobre el río Turbio, López-Figueiras & R. Smith 16452.

Sierra Portuguesa, Parque Nacional "Yacambú", López-Figueiras 15719.

Estado Táchira: Betania, parte alta del Valle de Tamá, López-Figueiras 26169.

Páramo El Rosal, vía La Grita-San José de Bolívar, M. Hale & López Figueiras 45501.

Base del Cobre Chiquito, Valle del Páramo de Tamá, M. Hale & López Figueiras 45613,45659.

Parmotrema perlatum (Huds.) Hale

Estado Lara: Serranía Matatere, entre el caserío Los Caimitos (hacia Matatere) y Aguada Grande, López-Figueiras & R. Smith 20999.

Sabanas El Altar-Yaritagua, proximidades de un puente sobre el río Turbio, López-Figueiras & R. Smith 16462.

Estado Mérida: El Maciegal, cuenca del río La Pedregosa, cercanías de Mérida, López-Figueiras 10714.

Parmotrema rampoddense (Nylander) Hale

Estado Lara: Sierra de Barbacoas entre Barbacoas y San Pedro, López Figueiras 19026.

Sierra Portuguesa, en Villa Nuevita, vía Guarico-Villa Nueva, López Figueiras & M. Hale 19714.

Alrededores del Manzano, vía Barquisimeto-Río Claro, López-Figueiras 16179A.

Estado Mérida: Sierra Nevada de Mérida, quebrada de Fayoy, cercanías del Carrizal, López-Figueiras & M. Hale 20246.

Mérida-Teleférico. Along path La Aguada-La Montaña, Sipman & López Figueiras 1162 .

Parmotrema simulans (Hale) Hale

Estado Mérida: Monte Zorra, proximidades de la Hechicera, cercanías de Mérida, López-Figueiras 16184.

Entre Morro Negro y el Munzal, al sureste de Mesa Quintero, López-Figueiras & H. Rodriguez 23354.

Parmotrema stuppeum (Hale) Hale

Estado Mérida: Sierra Nevada de Mérida, Páramo de Gavidia, cercanías de Mucuchíes, López-Figueiras & M. Keogh 20548.

El Maciegal, cuenca del rio La Pedregosa, cercanías de Mérida, López Figueiras & Ruiz-Terán 9900A.

Estado Táchira: Carretera vieja Rubio-San Cristóbal, M. Hale & López Figueiras 45088.

Estado Trujillo: Páramo de Tuñame, hacia Las Mesitas, López-Figueiras 12160,12174.

Parmotrema viridiflavum (Hale) Hale

Estado Mérida: Bosque La Carbonera, vía Mérida-La Azulita, López-Figueiras & M. Keogh 9213A.

La Carbonera, vía Mérida-La Azulita, M. Hale & López-Figueiras 44213, 44235,44238.

Estado Táchira: Vertiente Occidental del Pico Banderas, Páramo de Tamá, M. Hale & López-Figueiras 45388,45402.

Base del Cobre Chiquito, un sector del Páramo de Tamá, M. Hale & López-Figueiras 45572,45624.

Thamnomia vermicularis Ach. ex Schaer. As Th. andicola Nyl. in Vareschi 1973.

Estado Mérida: Páramo de Los Granates, alrededores del Alto del Morato, López-Figueiras 15163.

En dos Quebradas un sector del páramo de Piñango, López-Figueiras & Ruiz-Terán 13997.

Páramo de Gurigay, alrededores del Arenal, López-Figueiras 15277.

Páramo de Mucuchíes, alrededores de la Torre de TV, Hale & López-Figueiras 44577,44595.

Estado Táchira: Páramo El Batallón, López-Figueiras & M. Keogh 10214.

Estado Trujillo: Teta de Niquitao, un sector del Páramo de Cabimbú, López-Figueiras 12003.

Acknowledgements

I would like to acknowledged with gratitude the kindness help of Dr Mason E. Hale Jr. and the people of the Department of Botany at the Smithsonian Institution. The author is indebted to L. Arvidsson and H. Sipman for their advice in this work. Special thanks are due to Robert Smith and Robert Wingfield for their kind help during our field work in Lara and Falcon States respectively. The author also gratefully acknowledges



financial support from CONICIT (grant S1-26-BIO-SI: 0981) and from the C.D.C.H.T. ULA (Grant FA-43-81).

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## BOOK REVIEWS

Alma L. Moldenke

"GARDENING WITH NATIVE PLANTS OF THE PACIFIC NORTHWEST" by Arthur R. Kruckeberg, x + 252 pp., 32 color & 145 b/w photo, 3 tab. & 1 map. University of Washington Press, Seattle, Washington 98105. 1982. \$24.95.

It is indeed true that the "use of native plants as living ornamentals in our built environment (cities, suburbia, rural communities) is a logical extension of our concern for preserving some of the Northwest's natural features. This book's prime audience is the gardening public....., others who traffic in plants..., landscape architects, professional gardeners", and such other specialists. Over 250 kinds of native ornamental trees, shrubs and herbaceous perennials are described for distinguishing features, photographed or drawn along with scientific classification, garden uses and propagation notes.

"Simon and Schuster's GUIDE TO MUSHROOMS" by Giovanni Pacioni, U. S. Editor Gary Lincoff, 512 pp., over 400 color photos, over 1,200 color fig., Simon & Schuster, New York, N. Y. 10020. 1981. \$9.95, paperbound, \$22.95 clothbound.

This is an excellent recent addition to the many attractive and useful field guides among Simon and Schuster's Fireside Books. It was first published in Italy in 1980 under the title "Funghi". Its geographical range includes both Europe and North America. After an interesting and helpful introduction and analytical key to five main groups, the left hand page gives text for two forms with scientific name, its etymology, description, edibility, habitat, season, notes and symbols for spore color, degree of edibility or poison, and type or place of mycelial growth. For *Gyromitra* (syn. *Helvella*) *infula* a fork appears on the plate with a stamp-over of "Caution" explained in the text by "Eaten in Europe, but not recommended in North America because not enough is known about this species and its look-alikes". The right hand page has two exquisitely clear color photographs, one for each "mushroom" treated. Wonderful pictures, wonderfully well printed for such a reasonable price!

"ECOLOGICAL GENETICS: The Interface" edited by Peter F. Brussard, x & 247 pp. & 39 b/w fig. Springer-Verlag, Berlin, Heidelberg & New York, N. Y. 10010. 1978. \$23.90.

This disciplines-bridging book is composed of a dozen papers presented to the Society for the Study of Evolution's symposium since "much of our current understanding of the dynamics of evolutionary processes has come from syntheses of ecological and genetic information [especially] since the recent discovery of abundant markers in the form of protein polymorphisms". There are 2 papers on basic theory, 2 on biochemistry and adaptation and 3 on *Drosophila* in the lab and the field (Hawaii, Sonoran Desert, etc.). Ecological parameters and speciation are reported in field crickets, ecological genetics in snails, hypoxia differences among Andean dwelling Indians, Mestizos and Caucasians and also genetic demography of certain plant populations. This is a worthwhile publication.

"THE COUSTEAU ALMANAC - An Inventory of Life in our Water Planet" by Jacques-Yves Cousteau and the Staff of the Cousteau Society; Mose Richards, editor-in-chief, xxi & 838 pp., 162 b/w photo., 127 draw., 46 tab. & 114 maps. Dolphin Books of Doubleday & Co., Garden City, New York 11530. 1981. \$15.95.

This book "about the entire world" is crammed full of well illustrated, effectively explained, carefully garnered facts from reliable, if not always original, sources. The table of contents is fully detailed, as is the index, so that hunting for specific information is made easy and even easier and more rewarding in detail by considerable cross-referencing. Page 115 shows an excellent map of the world's oceans on our water planet. Page 91 explains the value and problems of agroforestry. Page 63 starts an ecological world tour aboard the Calypso. Page 97 begins a global census according to many topics. Page 73 shows what man can do to save the treasures of this earth for ourselves and the generations to come.

"DARWINISM AND HUMAN AFFAIRS" by Richard D. Alexander, xxiv & 317 pp., 12 fig. University of Washington Press, Seattle, Washington 98105. 1980. \$14.95 clothbound, \$9.95 paperbound.

These continually worthwhile Jessie and John Danz lectures "review and extend our understanding of the relationship between the processes of organic evolution and the structure, variations and significance of human behavior....Regularity of learning situations or environmental consistency is the link between genetic instructions and cultural instructions....Free will is not incompatible with the notion of an evolved tendency to maximize inclusive fitness....Evolution has more to say about why people do what they do than any other theory". There is so much more in this book, often worth rereading.

"BUMBLEBEE ECONOMICS" by Bernd Heinrich, ix & 249 pp., 82 b/w fig. & photo. & 3 endplates of 60 specimens in color. Harvard University Press, Cambridge, Massachusetts 02138. 1979. \$17.50.

The author's aim "is to explore biological energy costs and payoffs, using the bumblebee as a model. The physiological and behavioral bases of the energy economy of the bumblebee are traced to their wider ecological implications". These social insects living predominantly in regions of low temperature owe their success mostly to their remarkable thermoregulatory capacities, of foraging activity and colony economy. "An investigation of the energetics of the bumblebee reveals that no one way is always best: the bees make compromises that promote long-term success and they vary their strategy to stay in tune with constantly changing conditions." This book can be enjoyed as casual reading or it can be studied by entomologists, botanists, ecologists, physiologists, etc. with careful perusal of the charts and tables that validate the author's ideas.

"THE MATERIAL BASIS OF EVOLUTION" by Richard Goldschmidt. Introduction by Stephen Jay Gould; xliii & 436 pp, 83 b/w fig. & photo., 3 maps & 10 tab. Yale University Press, Yale Station, New Haven, Connecticut 06520. 1982. \$35.00 cloth-bound, \$12.95 paperbound.

This controversial book first appeared in 1940 and was based on eight Silliman lectures delivered in December 1939 at Yale. Gould's lengthy and well developed introduction explains the controversy (which I missed on reading way back then) and how he "resupplied an essential ingredient that strict Darwinism had expunged from evolutionary theory: the idea that evolution works through a hierarchy of distinct levels with important independent properties". He considers the book "an enduring document, however flawed". With the general and specific increase in discussion and reading about the "what" and "how" of evolution, it is fortunate that this book is now reprinted in both an inexpensive paper binding (especially for advanced biology students and aware teachers) as well as a regular form. The two main topics developed are microevolution and macroevolution.

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# PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 51

7 September 1982

No. 7

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Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road  
Plainfield, New Jersey 07060  
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BOTANICAL GARDEN



SUPPLEMENTARY NOTES ON THE AMERICAN SPECIES

OF STRYCHNOS. XXI

B. A. KRUKOFF

Consulting Botanist of Merck Sharp & Dohme Research Laboratories, N.J., and Honorary Curator of New York Botanical Garden.

Since the latest paper of this series was published 72 new collections were examined. The newly examined collections added to our knowledge of several species and extensions of range noted for 10. (3. colombiensis, 28. solimoesana, 30. lobelioides, 31. peckii (2 new records), 52. erichsonii, 39. guianensis, 57. fulvotomentosa, 69. poepigii, 70. tarapotensis). One species, S. tseasnum from the basin of Rio Santiago, Amazonas, Peru was described as a new. S. solimoesana described on a sterile material in 1942 was finally found in flower for the first time.

I. Sectio Strychnos - T: S. nux-vomica L.

3. Strychnos colombiensis Krukoff & Barneby, Mem. N.Y. Bot. Gard. 12 (1): 21. 1965.

Venezuela: Tachira: slopes of Cerro de Cuite, J. Steyermark 119747.

This is the first record of the species from Venezuela.

5. Strychnos romeu-belenii Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20 (1): 22. 1969.

Brazil: Bahia: R. M. Harley 22095 (K).

6. Strychnos rondelietoides Spruce ex Benth. Jour. Linn. Soc. 1: 104. 1856.

Peru: Loreto: Rio Nanay, varzea, Al. Gentry 28960.

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

Panama: Colon: T. Antonio 3375 (MO); Darien: W. Hahn 205 (MO). Venezuela: Falcon: R. Liesner 8445 (MO); Zulia: Mara: J. Steyermark 122693 (MO), 122840 (MO), 122950 (MO); Yaracuy: R. Liesner 9678 (MO); Miranda: R. Liesner 5 (MO); Tachira: Steyermark, 119760, 120435 (MO); Barinas: R. Liesner 9482.

25. Strychnos pseudo-quina A. St. Hilaire, Mem. Mus. Paris 9; 340. 1822.

Brazil: Mato Grosso: campo cerrado, M.G.Silva 4512; Distrito Federal: J. A. Ratter 3190 (K); São Paulo: M. Moreiro de Souza s. n. (27/1-1968).

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

Peru: prov. Maynas, caseria Alianza, Rio Tamshyaeu, Aug. 1, 1980: A. Gentry et.al. 29253 (NY).

This species was described from sterile material collected in Brazil, Amazonas, munic. São Paulo de Olivença, basin of creek Belem, near Colombian border. (Krukoff 9066-NY-holotype).

Of many collections made during the last 40 years, only one had old flowers. The present collection is not only the first from Peru, but also the first that has flowers in good condition. Description of flowers by Rupert Barneby follows:

Calyx 2.5--3mm, the lobes lance-acuminate, thinly pilosulous with ascending hairs; corolla pink when fresh, the cylindrical tube slightly narrowed distally 8.5 mm long, finely papillose and in upper 2/3 pilosulous both within and without, the ovate-elliptic lobes  $\pm$  2.5--2.8 x 1.3mm, barbellate ventrally in proximal 1/3; anthers sessiloid at the sinuses, ovate in outline 0.8 x 0.4 mm, glabrous, muticous; style  $\pm$  9--9.5 mm, pilosulous in upper 2/3, the capitate stigma glabrous, exserted  $\pm$  1 mm from corolla-tube.

Of the species of sect. Strychnos with axillary inflorescences, only S. pseudoquina has corolla tube similarly papillose without, and a pilose style. However S. pseudoquina is confined to Central Brazil and adjacent Paraguay and is completely different from S. solimoesana in vegetative characters.

- 29a. Strychnos tseasnum Krukoff and Barneby sp.nov.

Inter omnes sectionis suae species foliis elongatim ovatis basi subcordatis infra secus nervos principales pilosulis fructusque parvi 2--3.5 cm diam pericarpio tenui  $\pm$  0.3 mm crasso notabilis, corolla ignota affinitatis dubiae sed pro tempore juxta S. froesii et S. lobelioidem ponenda.

Arborescent vines 2--4 m, the young branchlets and veins of lower leaf-surface pilosulous with straight erect brownish hairs  $\pm$  0.3 mm, otherwise glabrous or almost so. Leaves subsessile elongately ovate-acuminate from shallowly cordate base, 10-18 x 4--6.5 cm, the thinly chartaceous blades 5--7 plinerved from point of insertion, the outermost pair of veins short, the innermost pair produced almost to apex, all deeply impressed ventrally and correspondingly prominent dorsally, the secondary veinlets subhorizontally transverse. Inflorescences axillary and terminal to hornotinous branchlets few-flowered, the primary and secondary axes together less than 1 cm, the pedicels of



fertilized flowers becoming  $\pm 1.5$  mm long and thick; calyx 0.7--0.8 mm, the deltate-ovate lobes minutely ciliolate; corolla unknown; style 3-5.5 mm glabrous. Fruit 2--3.5 cm diam, orange, when dried, the sublustrous brown pericarp firmly chartaceous fragile  $\pm 0.3$  mm thick; seeds olivaceous 17-19 x 10--11 mm.

Along trails in virgin monte, 180--200 m, known only from the vicinity of Caterpiza, valley of Rio Santiago, prov. Bagua, Amazonas, Peru. Collected in fruit in November, February, and March.

PERU: Amazonas: Bagua: Caterpiza and vicinity (77° 40' W, 3° 50' S), 12.XI. 1979, V. Huashikat 1229 (Holotype, NY; isotype, MO); 25.II.1980, S. Tunqui 944 (MO,NY); 26.III.1980, S. Tunqui 1112 (MO,NY).

This species is distinguished from all American Strychnos by its elongately ovate-acuminate leaves shallowly cordate at base and further from the known members of sect. Strychnos that have mostly axillary inflorescences by the dorsally pilosulous primary venation of the leaf-blades and the small fruits with fragile shell about 0.3 mm thick. In absence of the corolla its close relationships in sect. Strychnos cannot be determined; and it placed provisionally between S. froesii Ducke and S. lobelioides Krukoff and Barneby. The epithet is the vernacular name, recorded by both Huashikat and Tunqui.

30. Strychnos lobelioides Krukoff and Barneby, Mem. N.Y. Bot. Gard. 12 (1); 44, fig. 2. 1965.

Peru: Amazonas: Rio Santiago, Victor Huashikat 1229.

This is the first record of the species from Peru.

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

Venezuela: Amazonas: eleven kms. northeast of San Carlos de Rio Negro, R. Liesner 3960; Yaracuy: San Felipe, J. Steyermark 123763. Peru: Amazonas: Huashikat 396 (MO). Brazil: Para: Paracominas: T. Plowman 9493.

This is the first record of the species from Yaracuy, and Peru.

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

Venezuela: territ. Fed. Amaz.: R. Liesner 8889 (MO). Peru: Loreto: Maynas; Al. Gentry 29251 (MO), Filomeno Encarnacion 958; Amazonas: Rio Santiago, Huashikat 1938. Brazil: Mato Grosso: Rio Juruena, M.C.Silva 3259. Colombia: Amazonas: C. Sastre 2283.

This is the first record of this species from Mato Grosso.

- 32a. Strychnos croatii Krukoff & Barneby, *Phytologia* 33:313. 1976.

Panama: Panama: slopes of Cerro Jefe, T. Antonio 3428;  
 Darien: headwater of Rio Tabuelita, W. C. D'Arcy 14595.

33. Strychnos gardneri A. DeCandolle in De.Candolle, *Prodr.* 9:14. 1845.

Brazil: Minas Geraes: Rio do Cipo, G. Hatschbach 30032.

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

Venezuela: Apure: D. Davidse 16817 (MO); terr. Fed.  
 Amazonas: Paul Berry 2263, Rio Cataniapo, J. Steyermark 122144 (MO).

38. Strychnos darienensis Seemann, *Bot. Voy. Herald* 166. 1854.

Peru: Loreto: Maynas, A. Gentry 25786 (MO), Josephine Jones 9721, Filomeno Encarnacion 974. Brazil: Para: Rio Trombetas, C. A. Cid 1527.

- 38a. Strychnos ecuadoriensis Krukoff & Barneby, *Phytologia* 39: 276. 1978.

Ecuador: Napo: T. B. Croat 50323.

II. Sectio Rouhamon (Aubl.) Progel in *Mart. Flora Bras.* 6 (1): 275. 1868.

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

Venezuela: Tachira: J. Steyermark 119054; Sucre: J. Steyermark 120778; territ. Fed. Amazonas: M. Farinas 680, D. Davidse 16995 (MO). Brazil: Pará: Acará, D. C. Daly D890, Rio Mapuera, C. A. Cid 1150.

This is the first record of this species from Tachira.

III. Sectio Breviflorae Progel in *Mart. Fl. Bras.* 6 (1): 277. 1868. Subsectio Breviflorae.

55. Strychnos rubiginosa A. DeCandolle in DeCandolle *Prodr.* 9: 16. 1845.

Brazil: Mato Grosso: Chapada dos Guimaraes, C. M. Christenson 1174.

56. *Strychnos parvifolia* A. DeCandolle in DeCandolle. Prodr. 9:16.1845.

Brazil: Para: Tucuruí, T. Plowman 9656; Conceição do Araguaia, T. Plowman 8793, 9006; Goiás: G. Hatschbach 39055.

57. *Strychnos fulvotomentosa* Gilg. in Engler, Bot. Jahr. 25 (Beibl. 60): 40. 1898.

Brazil: Parana: G. Hatschbach 40202.

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

Brazil: Rio Grande do Sul: B. Rambo 39469. Argentina: Misines: J. E. Montes 7118 (K), Angel L. Cabrera 28635.

Subsectio *Eriospermae* Krukoff and Barneby, Mem.N.Y.Bot. Gard. 20: 68. 1969.

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

Nicaragua: Depto de Rio San Juan, Neill & Vincelli 3508 (MO).

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

Brazil: Parana: mun. Cerro Azul, G. Hatschbach 39989.

65. *Strychnos mattogrossensis* S. Moore, Trans. Linn. Soc. II. 4: 392. 1895.

Peru:Loreto:Maynas, C. Diaz 1200 (MO).

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

Venezuela: Zulia: Colon, G. Davidse 18654. Peru: Loreto: Josephine Jones 9556.

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

Brazil: Mato Grosso: J. M. Pires 17227. Peru:Loreto:Maynas, Al Gentry 18348; San Martin: Jose Schunke 13495; Amazonas: Rio Santiago, S. Tunqui 188, 254, 645, 952, V. Huashikat 365 (MO), 1162 (MO), 2037 (MO).

This is the new record of the species from Mato Grosso.

71. *Strychnos schunkei* Krukoff & Barneby, Phytologia 25:53.1972.

Peru: Loreto: Maynas, Al Gentry et.al. 28050.

Bibliography

In order to conserve space, I am citing here only the papers which are not cited in Supplement VII-XIX.

1. Krukoff, B. A., Supplementary notes on the American species of Strychnos XX. *Phytologia* 50: 73-77. 1982.

List of Exsiccatae

The first list of Exsiccatae covering papers on *Strychnos*, including Supplement XI, was published in *Lloydia* 35 (3): 262-270. 1972, the second covering Supplements XII, XIII, and XIV in *Phytologia* 33: 319-322. 1976, the third covering Supplements XV and XVI in *Phytologia* 39: 281-282. 1978, the fourth list covering Supplement XVII in *Phytologia* 41: 237-238. 1979, the fifth list covering Supplement XVIII in *Phytologia* 44: 9. 1979, the sixth list covering Supplement XIX in *Phytologia* 46: 65-77. 1980, the seventh list covering Supplement XX in *Phytologia* 50: 73-79. 1982. The present list covers Supplement XXI. Only numbered collections and those of which the dates of collection are recorded have been listed. Collections identified with doubt are not listed. If a collector gathered his collection together with others, only his name is cited in this list. Collections with Prance's numbers are cited under Prance.

Antonio, T., 3375 (12), 3428 (32a).

Berry, Paul, 2263 (35).

Cabrera, Angel L., 28635 (59).

Christenson, C. M., 1174 (55).

Cid, C. A., 1150 (39), 1527 (38).

Croat, Th. A., 50323 (38a).

Daly, D. C., D890 (39).

D'Arcy, W.C., 14595 (32a).

Davidse, G., 16817 (35), 16995 (39), 18654 (69).

Diaz, C., 1200 (65).

Encarnacion, Filomeno, 958 (32), 974 (38).

Farinos, M., 680 (39).

Gentry, Al, 18348 (70), 25786 (38), 28050 (71), 28960 (6),  
29251 (32), 29253 (28).

Hahn, W., 205 (12).

Harley, R. M., 22095 (5).

Hatschbach, G., 30032 (33), 39055 (56), 39989 (64), 40202 (57),

Huashikat, V., 365 (70), 396 (31), 1162 (70), 1229 (29a), 1938  
(32), 2037 (70).

Jones, Josephine, 9556 (69), 9721 (38).

Liesner, R., 3960 (31), 8445 (12), 8889 (32), 9170 (12), 9482 (12), 9678 (12).

Neill, David, 3508 (63).

Montes, J. E., 7118 (K) (59).

Moreiro de Souza s.n. (27/1-1981) (25).

Pires, J. M., 17227 (70).

Plowman, T., 8793 (56), 9006 (56), 9493 (31), 9656 (56).

Rambo, B., 39469 (59).

Ratter, J. A., 3190 (25).

Schunke, Jose, 13495 (10)

Silva, M. G., 3259 (32), 4512 (25).

Steyermark, J. A., 119054 (39), 119747 (3), 119760 (12), 120435 (12), 120778 (39), 122144 (35), 122693 (12), 122840 (12), 122950 (12), 123763 (31).

Tunqui, Santiago, 188 (70), 254 (70), 645 (70), 944 (29a), 952 (70), 1112 (29a).

NOTES ON THE SPECIES OF ERYTHRINA XIX.

B. A. Krukoff

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Since the last paper of this series was published, 282 new collections were examined and are cited herein, including 18 extensions of ranges. No novelties are described. The especially important cited specimens are of plants growing in two Botanical Gardens in Hawaii, which are under genetic studies by David Neill. They are cited under "Hawaii: cult., Neill, D."

In this paper I am also suggesting taxonomical chemical and/or genetic studies appropriate to certain species which are insufficiently known either because they are poorly collected or for other reasons.

1. Erythrina fusca Loureiro, Fl. Cochinch. 427. 1790, based on Gelala aquatica Rumphius, Herb. Amb. 2: 235. tab. 78. 1750.

Venezuela: Sucre: distr. Benítez, J. Steyermark 121223 (MO). Brazil: Pará: M. G. Silva 3084. Ecuador: Azoques, C. H. Dodson 9176 (MO); Babahoya (MO), Mary Fallen 683 (MO). Comoro Islands, Mayotte, Lorance 2817 (MO). Cuba: Angela Leifa s/n (June 1982), (cult.). Jamaica: R. W. Read 1789 (US) (cult.). Hawaii: cult., D. Neill 5279 (Waimea 74s99; Krukoff 1972/14.)

This is the first record of this species from Sucre.

It is important to check genetically and chemically on this species as it occurs in the New and the Old World; also on a form of this species from the Carolines, Solomon Islands, Samoa and New Caledonia with sublobate leaflets especially pronounced in seedlings. The only other Erythrina which has sublobate leaflets is a form of the unrelated E. suberosa which occurs in Circars, India. It may be a good subspecies.

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

Paraguay: Paraguari: M. M. Arbo 1746 (MO). Argentina: Buenos Aires: James Solomon 4015 (MO). Bolivia: Cochabamba: St. G. Beck 4017. Mexico: Michoacán: Morelia, H. M. Hernandez M. 100 (cult.). Nicaragua: Matagalpa: cult., Antonio Molina R. 31614 (F). Hawaii: cult., D. Neill 5271 (Waimea 75p30), 5276 (Waimea 74p840) (used in hybridiz.)

As this species has been in cultivation for a very long time, it has numerous cultivars, etc.

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

Brazil: Brazilia, E. P. Heringer 7250, 7293, 7297. Hawaii: cult., D. Neill 5277 (Waimea 74s870) (used in hybridiz.)

The syntypes of this species are from Formosa (Guaycule), Argentina, and Paraguay, whereas the type locality of E. verna is Rio de Janeiro. Dr. E. P. Heringer in a letter to me tells that they are easily separated in the field. According to him, "E. dominguezii has orange flowers and E. verna has red ones. E. dominguezii has a dense corky bark; and found in gallery forests and cerrados, whereas E. verna is a large tree of the high forest. The greatest difference between these two species are in the stems; E. dominguezii has a dense corky bark, whereas E. verna has smooth usually greenish bark."

Both trees are leafless when in flower, and this complicates the situation. Several collections taken over a period of years by Dr. A. C. Schulz from Choco, Argentina are very uniform and so are the specimens of Dr. Heringer from Brasilia, and they doubtless, which we now know, are E. dominguezii. The same may be said concerning collections from Rio de Janeiro, São Paulo, etc. The ranges of these two entities appear to overlap in Bolivia. (see under "E. flammea") and in Central Brazil.

It is important to collect specimens in flower and in leaf from the same tree of each of these two entities and study them taxonomically, genetically, and chemically.

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

Ecuador: Napo: Holguer Lugo S. 2218 (MO).

Poorly collected species largely from Subandean South America; leafless when in flower.

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

Brazil: Reserva Ecol. do Roncador, E. P. Heringer 69 (MO); Acre: S. R. Lowrie 573 (corolla scarlet); Rio Grande do Sul: J. Eugenio Leite 2837 (F).

For discussion of this species see under E. dominguezii.

7. Erythrina poeppigiana (Walpers) O. F. Cook, U.S.D.A. Div. Bot. Bull. 25: 57. 1901..

Erythrina poeppigiana (Walpers) O. F. Cook, forma redmondii, Steyermark and Lasser, Phytologia 48 (4): 286. 1981.

, Peru: San Martin: J. Schunke-V. 8231 (MO). Ecuador: Los Rios: C. H. Dodson 8865 (MO); prov. Pastaza, Holguer Lugo S. 4176 (MO), 4231 (MO), 4391 (MO), 4453 (MO), 4509 (MO). Santo Domingo: cult., M. Mexia 9688, T. Zanoni 10530, 12101, 21313.

Costa Rica: Heredia: cult., D. Neill 5092, G. S. Hartshorn 1084 (F). Venezuela: Caracas: cult., L. E. Skog 1206; Miranda: Los Chorros, Avenida principal Caracas en frente de la Escuela Hev-roica, alt. 900 m, 9 March, 1981, Parker Redmond s.n. (holotype of the form, VEN).

These are the first records of this species from prov. Los Ríos, and Pastaza, Ecuador.

The new form was described from a cultivated plant on a single character - yellow flowers, which is completely unreliable in this genus. We have well over two dozen of species which once in a while in wild populations have white, yellow, pink, pale, or other colors - E. variegata, E. tahitensis, E. caffra, E. berteroaana, E. speciosa, E. herbacea ssp. herbacea, etc. They are probably mutants and this is now under study by David Neill, under the guidance of Dr. Peter Raven, in Hawaii. In a recent letter to me David Neill wrote "The local wild population of E. tahitensis in Hawaii may include trees with orange, yellow, white, and greenish flowers all within a few hectares."

8. Erythrina suberosa Roxburgh, Hort. Beng. 53, nomen 1814; Fl. Ind. 3: 253. 1832.

Hawaii: cult., D. Neill 5273 (Waimea 75s960), (used in hybridiz.).

10. Erythrina stricta Roxburgh, Hort. Beng. 53, nomen 1814; Fl. Ind. 3: 251. 1832.

Burma: J. Keenan 1119 (K). Thailand: C. Phengklai 3121 (K).

11. Erythrina resupinata Roxburgh, Hort. Beng. 53, nomen 1814; Pl. Coromandel 3:15, pl. 220. 1819.

In Queensland Garden 13: 10-11, August 1975, is a paper by G. S. Srivastava on Erythrina resupinata. This is probably a most comprehensive paper on this species. It gives in detail it's distribution in India in Uttar Pradesh and in Bihar State. It also describes in detail tree stages of its cycle of growth and flowering. This species is dormant during the winter months, and it flowers and produces fruits usually from February to April, at which time it has no leaves. The vegetative stage begins about one month after maturing of seeds.

12. Erythrina arborescens Roxburgh, Hort. Beng. 53, nomen 1814; Pl. Coromandel 3: 14, pl. 219. 1819.

India: K. Haridasan s.n. (July 10, 1981).

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



India: A. V. N. Rao s.n. (December 7, 1981); Yercaud: T. Saldanha s.n.

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

Mexico: Morelos: M. Sousa 9808.

14b. *Erythrina oaxacana* (Krukoff) Krukoff Annal. Miss. Bot. Gard. 66: 426. 1979.

Mexico: Oaxaca; Tlacolula, Mario Sousa 9702, 9714.

14c. *Erythrina batolobium* Barneby and Krukoff, Allertonia 3: 7. 1982.

Mexico: Guerrero: O. Tellez 727 (Mexu), M. T. German 964 (MO), M. Sousa 3140 (Mexu); Michoacán: H. M. Hernández 4; Oaxaca: M. Sousa 5811 (Mexu).

These are the first records of this species for Michoacán and Oaxaca.

15. *Erythrina edulis* Triana in M. Micheli, J. Bot. (Morot.) 6: 145. 1892.

Peru: S. S. Tillet 673-316 (US); Huanuco: J. Schunke 8313. Madre de Dios: Al. Gentry 27385. Ecuador: Tungurahua: Holguer Lugo S. 1772 (MO), 1904 (MO); Azuay: H. G. Barclay 8342, G. Harling 8537 (MO); Cotopaxi: G. Harling 9096 (MO); Napo: H. Balslev 10324; Tungurahua: Al Gentry 28758.

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

H. Balslev 8342 is grading into *E. aff. edulis*.

15a. *Erythrina aff. edulis* Triana, see Annal. Miss. Bot. Gard. 66: 428. 1979.

Colombia: Choco: A. Gentry 24176.

15b. *Erythrina megistophylla* Diels, Biblioth. Bot. 116: 96. 1937.

Ecuador: Azoques: C. H. Dodson 8887.

16. *Erythrina speciosa* Andrews, Bot. Repos. 7: pl. 443. 1806.

U.S.A.: California: cult. J. Bauml. 702 (HNT). Costa Rica: Puntarenas: cult., D. Neill 5098. Brazil: Bahia: André M. de Carvalho 348 (cult.).

18. *Erythrina schimpffii* Diels, Biblioth. Bot. 116: 96. 1937.

Ecuador: El Oro: Linda Albert de Escobar 1202, C. H. Dodson

8934 (MO) (inflourescences from the base of trunk). Azoques:  
C. H. Dodson 9177 (MO); Guayas: A. S. Hitchcock 20418 (A).

These are the first records of this species for the provinces El Oro and Azoques.

Flower on older branches from lower part of trunk (A. C. Hitchcock 20418); flower borne on old wood (Linda Albert de Escobar 1202).

19. Erythrina montana Rose and Standley, Contr. U.S. Natl. Herb. 20: 179. 1919.

Mexico: Durango: W. L. Wagner 3972 (MO); Michoacan: H. M. Hernández 105; Guerrero: H. M. Hernández 106.

This is the first record of this species for Michoacan.

20. Erythrina leptorhiza Alph. DeCandolle, Prodr. 2: 413. 1825.

Mexico: Michoacan: H. M. Hernández 99, caretera Mexico-Oaxtepec H. M. Hernández 37.

- 21a. Erythrina sousae Krukoff and Barneby, Annal. Miss. Bot. Gard. 66: 432. 1979.

Mexico: Oaxaca/Chiapas: MacDougall s.n. (May 1967), Oaxaca: distr. Juquilla, M. Sousa 10534, 10536.

- 22a. Erythrina herbacea L. subsp. herbacea.

Erythrina herbacea L. Sp. Pl. 706. 1753. sens., str.

U.S.A.: Florida, Merrit Island: A. S. Rhoads 8391 (MO).

Hawaii: cult.; D. Neill 5278 (Waimea 76s187).

- 22b. Erythrina herbacea L. subsp. nigrorosea Krukoff and Barneby, Phytologia 25(1): 6. 1972.

Mexico: Veracruz: G. Castilleja 52, 54.

23. Erythrina standleyana Krukoff Brittonia 3: 301. 1939.

Belize: near Belmopan, O. Tellez et. al. 5655 (UNAM).

Hawaii: cult.: D. Neill 5230 (Waimea 76c261), 5265 (Waimea 76s1056) (used in hybridiz.).

24. Erythrina flabelliformis Kearney, Trans. New York Acad. Sci. 14: 32. 1894.

U.S.A.: Arizona: L. C. Higgins 12892.

25. *Erythrina coralloides* Alph. DeCandolle Prod. 2: 413. 1825.  
 Mexico: Veracruz: R. Ortega 1277 (F), H. Hernández 38; Oaxaca: M. Sousa 9877. Hawaii: cult., J. Bauml 699. U.S.A.: California: cult., Robert Gustafson 2508(?).  
 Hawaii: cult., D. Neill 5240 (PTBG 700145), 5264 (Waimea 74c1451; Krukoff 1970-133), 5187 (Waimea 76c260).
27. *Erythrina pudica* Krukoff and Barneby, Phytologia 27: 114. 1973.  
 Mexico: Chiapas: C. D. Johnson 1048/79.
- 28a. *Erythrina lanata* Rose subsp. *lanata*.  
*Erythrina lanata* Rose., U.S.D.A. N. Amer. Fauna 14: 81. 1899.  
 Mexico: Oaxaca: M. Sousa 10751.
- 28b. *Erythrina lanata* Rose subsp. *occidentalis* (Standley) Krukoff and Barneby, Phytologia 27: 117. 1973.  
 Mexico: Sinaloa; Kinnach 699 (HNT).
- 28c. *Erythrina lanata* subsp. *calvescens* Krukoff Annal. Miss. Bot. Gard. 66:434. 1979.  
 Mexico: Oaxaca: Tuxtepec, M. Sousa 9489; Veracruz: Roberto V. Ortega 0. 287 (MEXU).
29. *Erythrina goldmanii* Standley, Contr. U.S. Nat. Herb. 20: 181. 1919.  
 Mexico: Oaxaca: M. Sousa 9882.
30. *Erythrina caribaea* Krukoff and Barneby, Phytologia 25: 9. 1972.  
 Mexico: Veracruz: Las Tuxtles, O. Tellez 3557 (UNAM).
31. *Erythrina folkersii* Krukoff and Moldenke, Phytologia 1: 286. 1938.  
 Belize: Boutin 5147 (MO), J. D. Dwyer 15118.  
 Hawaii: D. Neill 5243 (PTBG 700010; Krukoff 1969-109) (used in hybridiz.)
34. *Erythrina cochleata* Standley, Contr. U.S. Nat. Herb. 20: 179. 1919.

Costa Rica: Heredia: D. Neill 5015, 5101, 5102.

This is the first record of this species from Heredia.

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

Mexico: Veracruz: G. Castilleja 46, 47, 48, 49, 50, 51, 65;  
Chiapas: T. Croat 47662 (MO).

Hawaii: cult., D. Neill 5246 (PTBG 700007; Krukoff 1969-68),  
5262 (Waimea 74s861; Krukoff 1973-16), 5263 (Waimea 74s876;  
Krukoff 1969-68.)

39. Erythrina williamsii Krukoff and Barneby, Phytologia 22 (4):  
266. 1971.

Guatemala: Alto Verapaz: J. D. Smith 1793.

Hawaii: cult., D. Neill 5245 (PTBG 750418; Krukoff, no colln.  
number.)

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

Nicaragua: Matagalpa: cordillera Darienensis, 1100-1400 m,  
D. Neill 5050, 5051, 5052, 5054, 5055, Stevens 10046. Costa Rica:  
Heredia: D. Neill 5090. Panama: Chiriqui: P. Hammel 7146 (MO),  
Ch. von Hagen 2125, J. P. Folsom 4022 (MO), 4023 (MO).

It would be important to compare genetically and chemically  
the populations of this species that occur in Panama with Costa  
Rica and Nicaragua.

42. Erythrina macrophylla Alph. DeCandolle, Prodr. 2: 411. 1825.

Guatemala: Sacatepequez: San Lucas to Antigua, Joel Meji-  
canos s.n. (May 2, 1982); Quetzaltenango: Zunil, Betty White  
39 (F).

Hawaii: cult., D. Neill 5231 (Waimea 74s97; Krukoff 1972-10),  
5232 (Waimea 75s1136; Krukoff 1975-4) (Used in hybridiz.), 5239  
(PTBG 700012; Krukoff 1929-167), 5249 (PTBG 730706; Krukoff 1973-  
15), 5260 (Waimea 74s858; Krukoff 1973-15).

43. Erythrina guatemalensis Krukoff, Amer. Jour. Bot. 28: 688.  
1941.

Hawaii: cult., D. Neill 5242 (PTBG 750419; Krukoff colln  
number not recorded) (used in hybridiz.), 5257 (Waimea 74s874;  
Krukoff 1974-2) (used in hybridiz.), 5258 (Waimea 74s103; Krukoff  
1969-220) (used in hybridiz.)

44. *Erythrina globocalyx* Porsch & Cufodontis, Arch. Bot. Sist. Fitog. & Genet. 10: 35, pl. 1. 1934.

Costa Rica: San José: D. Neill 5008, 5010, 5140 (between San Isidro and Las Nubes), D. Neill 5011, 5033, 5142, 5143 (Las Nubes, + 1800 m); Heredia: D. Neill 5093, 5094 (lower montane forest, + 1900 m).

This is the first record of this species from the province of Heredia.

45. *Erythrina steyermarkii* Krukoff and Barneby in Mem. NY Bot. Gard. 20: 175. 1970.

Nicaragua: Zelaya: W. D. Stevens 12229, Lewis E. Long 160 (F).

47. *Erythrina berenices* Krukoff & Barneby, Phytologia 27: 120. 1973.

Mexico: Veracruz: Las Vigas, 2250 m, G. Castilleja 58.

48. *Erythrina huehuetenangensis* Krukoff & Barneby, Mem. N.Y. Bot. Gard. 20(2): 172. 1970.

Guatemala: Alta Verapaz, vic. San Juan Chamelco: Michael R. Wilson 40841 (F).

This is the first collection of this species outside of the municipality of Barillas.

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

Nicaragua: Jinotega: D. Neill 330 (MO). Costa Rica: Alajuela: W. D. Stevens 13767 (MO); Guanacaste: T. Croat 47095 (MO); Puntarenas: V. J. Dryer 947 (MO). Panama: Coclé: T. Antonio 3607 (MO).

This is the first record of this species from Coclé.

I suggest of using for genetic work on this species the specimens from Honduras.

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

Costa Rica: Puntarenas: D. Neill 5099. Panama: Colon: T. Antonio 4513 (MO), Kenneth Sytsma 1671 (MO); Canal Zone: Kenneth Sytsma 1932 (MO).

Hawaii: cult., D. Neill 5261 (Waimea 76c263).

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

Santo Domingo: T. Zanoni 10831, 11869, Alain Liogier 9011-15. Mexico: Oaxaca: O. Tellez 401 (MO); Chiapas: H. Sanchez-Mejorada 656 (HNT), T. Croat 47481 (MO). Guatemala: Petén, near Poptun, Krukoff 1970-58. Nicaragua: Managua: Stevens 2911; Boaco: M. Araquistain 1031 (MO); Jinotega: M. Araquistain 1559 (MO); Madriz: W. D. Stevens 16412 (MO). Costa Rica: Heredia: D. Neill 5091, 5095, 5097. Panama: Jim Folsom 3957.

These are the first records of this species for the Depts. of Oaxaca and Madriz.

I suggest using for genetic work specimens grown from seeds from Panama.

54. Erythrina rubrinervia H. B. K., Nov. Gen. & Sp. 6: 434. 1824.

Panama: Darien: R. Hartman 12062 (MO), Venezuela: Tachira: J. Steyermark 118206 (MO). Colombia: Choco: E. Forero 6822.

Hawaii: cult., D. Neill 5247 (PTBG 711193; Krukoff s.n.), 5270 (Waimea 74p325; Krukoff s.n.)

I suggest using for genetic work specimens raised from seeds collected by me in Colombia.

These are the first records of the species for Choco.

56. Erythrina salviiflora Krukoff & Barneby, Phytologia 25: 14. 1972.

Guatemala: Solola: finca Montequina, Joel Mejicanos s.n. (May 2, 1982); Suchitepequez: Waimea 74s 863 (Krukoff 1969/58); 74s895 (ident. Krukoff May/Sept. 1979), 75s1138.

Hawaii: cult., D. Neill 5237 (PTBG 721346; Krukoff 1969-58).

I was unable to compare in the field E. salviiflora of Guatemala with its relative E. rubrinervia which I collected only in Colombia. It would be important to compare them taxonomically, genetically and chemically seen on the photograph in Symposium # 4 the lower mature flowers of E. salviiflora decline toward the rachis.

58. Erythrina gibbosa Cufodontis, Arch. Bot. Sist. Fitog. & Genet. 10: 34. 1934.

Nicaragua: Zelaya: W. D. Stevens 4798 (MO). Costa Rica: Alajuela: D. Neill 5028; Puntarenas, D. Neill 5100, D. Janzen 10627 (MO).

59. *Erythrina amazonica* Krukoff, Brittonia 3: 270. 1939.

Brazil: Maranhão: D. C. Daly D321, N. A. Rosa 2464.

Poorly collected and poorly known species. It may eventually be split in at least two subspecies.

Hawaii: cult., D. Neill 5259 (Waimea 76s449; N. T. Silva 4239) (used in hybridiz.)

61. *Erythrina peruviana* Krukoff, Brittonia 3: 262. 1939.

Peru: Amazonas: Rio Santiago, F. D. Dominguez 12 (MO), 155 (MO).

This is the first record of this species for Amazonas.

62. *Erythrina mitis* Jacquin, Hort. Schoenb. 2: 47. 1797.

Venezuela: Miranda: J. A. Steyermark 125486, R. Liesner 9191; Yaracuy: R. Liesner 10138.

63. *Erythrina pallida* Britton & Rose, Bull. Torrey Bot. Club 48: 332. 1922.

Trinidad: Hayden Als s.n. (Tree A), s.n. (Tree B), s.n. (Tree C), s.n. (Caura). Venezuela: Miranda: R. Liesner 9148 (MO).

It would be important to check taxonomically (especially seeds), genetically and chemically this species with *E. mitis*.

- 64b. *Erythrina corallodendrum* var. *bicolor* Krukoff, Brittonia 3: 275. 1939.

Dominica: R. L. Wilbur 8243, C. A. Shillingford 149.

- 64c. *Erythrina corallodendrum* var. *connata* Krukoff, Brittonia 3: 276. 1939.

Virgin Island: St. Croix, J. Intema 166.

67. *Erythrina leptopoda* Urban & Ekman, Ark. Bot. 20A (5): 14. 1926.

Santo Domingo: M. Mexia 8875, Alain Liogier 24366, 26597, T. Zanoni 13349.

70. *Erythrina oliviae* Krukoff, Phytologia 19 (3): 128. 1969.

Mexico: Puebla: M. Sousa 9803; Chiapas: M. Sousa 11829 (MEXU).

This is the first record of this species from Chiapas.

72. Erythrina lysistemon Hutchinson, Bull. Misc. Inform. 1933: 422. 1933.

Zimbabwe: G. Pope 1027 (MO), Th. Muller s.n. (April 22, 1982).

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

S. Africa: E. Cape: A. Jacot Guillarmod 8900. Zimbabwe: cult., coll. undesign. s.n. (June 1979).

Hawaii: Neill 5248 (PTBG 740187) (used in hybridiz.), 5274 (Waimea 74pl382) (cult.).

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

S. Africa: Transvaal: F. A. Rogers 14514 (K).

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

S. Africa: Queenstown. G. B. Whitehead s.n. (1979). U.S.: Cal, cult., Fred Meyer 1974/ s.n. (as to leaves; seeds do not belong here).

78. Erythrina vogelii Hooker f., Niger Flora 307. 1849.

Nigeria: J. D. Chapman 3957.

It would be important to check genetically and chemically on this species and on its close relative, E. senegalensis.

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

S. W. Africa: W. Giess s.n. (15/4-78).

86. Erythrina livingstoniana Baker, Oliver Fl. Trop. Africa 2: 182. 1871.

Zimbabwe: G. Pope 1511 (MO). S. Saunders s.n. (June 1979). Malawi: A. Kitchin s.n. (Sept. 1981).

88. Erythrina addisoniae Hutchinson & Dalziel, Bull. Misc. Inform. 1929: 17. 1929.

Ghana: A. A. Enti 195A.

93. Erythrina sigmoidea Hua, Bull. Mus. Hist. Nat. (Paris) 3: 327. 1897.

Nigeria: J. Lowe 3358 (K). Hawaii: cult., P.T.B.G. s.n. (F. Flynn 121).



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

South Africa: Natal: D. J. McDonald 254 (K).

Hawaii: cult., D. Neill 5254 (PTBG 721349), 5255 (PTBG 750281), 5256 (PTBG 750281), 5250 (PTBG 750281).

95. *Erythrina abyssinica* Lamarck, Encycl. Bot. 2: 392. 1788; ex. Alph. DeCandolle, Prodr. 2: 413. 1825. Gillet Kew Bull. 15: 426. 1962.

East Africa: A. Peter 33045, 49809 (MO), 49974 (MO).

Ethiopia: Shoa: Awash National Park, J. J. F. E. de Wilde 6347 (MO). Burundi: M. Reekmans 8049 (K); Kenya: Meyerhoff 121 M (K). Uganda: P. Rwaburindore s.n. (Dec. 4, 1981), 362 (MO).

Hawaii: cult., D. Neill 5234 (PTBG 770034 (used in hybridiz.)), 5251 (PTBG 740193; Fanshaw s.n. 11-2-72), 5252 (PTBG 731006)

It is important to check genetically and chemically on this polymorphic species, some specimens which have long linear or linear-caudate calyx-teeth and other specimens which have stoutly obovate or spatulate calyces.

In Journal Natural Products (45: 23. 1982) are listed chemical constituents of this species (presumably isolated from seeds).

96. *Erythrina variegata* L. Herb. Amboin. 10. 1754; Ameen. Acad. 4: 122. 1759, based on *Gelala alba* Rumphius, Herb. Amboin. 2: 234, tab. 77. 1750.

Kew: (cult.), Kew 404.62, 462.67. British Museum: M. E. Walsh 2250. Hawaii: cult., Foster Garden #A. Santo Domingo: cult., Alain Liogier 22412, M. Mejia 10993, S. Pelaez 357, T. Zanon 10808, 10823, 11344, 11345, 11516A, Angela Leifa s.n. (June 1982). Jamaica: R. W. Read 1822 (US). Tanzania: Mafia Island, Greenway 5051 (K), 5321 (K). Zanzibar: Last s.n. (K), Greenway 1374 (K). Madagascar: Hildebrand 3127 (BM); Western Indian Ocean, West Island, Aldabra Atoll, F. R. Fosberg 49516 (US), C. Rhyne 896 (US), D. R. Stoddart 942 (US). Celebes: W. Kaudern s.n. (Sept. 1981). Micronesia: Panapa, M. V. C. Fal-anruw 3238 (US).

Hawaii: cult., D. Neill 5218 (Waimea 74s892) (used in hybridiz.), 5253 (PTBG - no number) (used as pollen donor in hybridiz.).

97. *Erythrina tahitensis* Nadeau, Enum. Pl. Tahiti 80. 1873.

Hawaii: cult., D. Neill 5272 (Waimea 76e88).

99. Erythrina vespertilio Bentham in Mitch. Jour. Trop. Austr. 218. 1848.

Australia: Northern Territory: J. R. Maconochie 2301 (MO). ("biloba form"); Queensland: Bird Island, Stoddart, D. R. 5090 (L) (Island form).

102. Erythrina velutina Willdenow in Ges. Naturf. Freunde Berlin Neue Schriften 3: 426. 1801.

Venezuela: between Piritu and Barcelona, J. Steyermark 115493 (MO).

Hawaii: cult., D. Neill 5238 (PTBG 720492).

It would be important to check taxonomically on the form aurantiaca (when more abundant material of this form is available) and E. grisebachii genetically and chemically. It may well be that with new evidences both will be reduced to synonymy.

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

Hawaii: cult., D. Neill 5241 (PTBG 730308), 5280 (Waimea 74s857) (used in hybridiz.)

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

U.S.A.: California: cult., J. Bauml 707 (HNT).

Hawaii: cult., D. Neill 5233.

## Bibliography

(In order to conserve space, I am citing here only the papers which are not cited in previous Supplements).

1. Krukoff, B. A. Notes on the species of Erythrina XIV. *Phytologia* 44: 19-32. 1979.
2. Krukoff, B. A. Notes on the species of Erythrina XV. *Phytologia* 46: 88-93. 1980.
3. Barneby, R. and Krukoff, B. A. Notes on the species of Erythrina XVI. *Allertonia* 3: 7-9. 1982.
4. Krukoff, B. A. Notes on the species of Erythrina XVII. *Phytologia* 50: 112-129. 1982.
5. Krukoff, B. A. Notes on the species of Erythrina XVIII. *Allertonia* 3: 121-138. 1982.

In addition to the above cited papers, in *Allertonia* are published 11 more papers by various authors on Erythrina.

List of Exsiccatae

The first list of Exsiccatae was published in Supplement #13 (Phytologia 41: 256-300. 1979); it covers all papers up to and including Supplement #11; the second list in Supplement # 14 (Phytologia 44: 28-32. 1979) and it covers Supplements #12 and 13; the third list in Supplement # 15 (Phytologia 46: 92-93. 1980) and it covers Supplement # 15. The Fourth list covers Supplement # 17. The present list covers the present paper.

The first figure in Exsiccatae after the collector's name is the collection number of the specimen, and the figure in parenthesis is the number of species as they are arranged in conspectus of the species of the genus Erythrina (Lloydia 37 (3): 332-459. 1974) and the Supplements VII-XVIII.

Only numbered collections and those of which the dates of collections are recorded have been listed. If a collector gathered his collection together with others, only his is cited in this list. Collections with Dr. Prance's numbers are cited under Prance.

Antonio, T., 3607 (49), 4513 (50).  
Araquistain, M., 1031 (53), 1559 (53).  
Arbo, M. M., 1746 (2).

Barclay, H. G., 8342 (15).  
Bauml, J., 699 (25), 702 (16), 707 (X7).  
Boutin, 5147 (31).

Castilleja, G., 46 (36), 47 (36), 48 (36), 49 (36), 50 (36),  
51 (36), 52 (22b), 54 (22b), 58 (47), 65 (36).  
Chapman, J. D., 3957 (78), 4659 (K) (93).  
Coll. undsgn., s.n., Kew 404.62 (96), s.n. (June 1979) (73).  
Croat, T., 47095 (49), 47481 (53), 47662 (36).

Daly, D. C., D321 (59).  
Dodson, C. H., 8865 (7), 8934 (18), 9176 (1), 9177 (18).  
Dominguez, F. P., 12 (61), 155 (61).  
Dryer, V. J., 947 (49).  
Dwyer, J. D., 15118 (31).

Enti, A. A., 195A (88).

Falanruw, M. V. C., 3238 (96).  
Fallen, Mary, 683 (1).  
Folsom, Jim, 3957 (53), 4022 (41), 4023 (41).  
Forero, E., 6872 (54).  
Foster Garden, #A (cult.) (96).  
Fosberg, F. R., 49516 (96).

- German, M. T., 964 (14c).  
Giess, W., s.n., 15/4/78 (85).  
Greenway, 1374 (96), 5051 (96), 5321 (96).  
Guillarmod, A. Jacot, 8200 (73).  
Gustafson, Robert, 2508 (25 ?).
- von Hagen, 2125 (41).  
Hammel 7146 (41).  
Haridasan, K., s.n., (July 10, 1981), (12)  
Harling, G., 8537 (15), 9096 (15).  
Hartman, Ron 12062 (54).  
Hayden, Als, s.n. (Tree A) (63), s.n. (Tree B) (63), s.n. (Tree C) (63), s.n. (Caura Valley) (63).  
Heringer, A. E. S., 69 (1/7/1979) (6).  
Heringer, E. P., 7250 (4), 7293 (4), 7297 (4).  
Hernandez, H. M., 4 (14c), 99 (20), 100 (2), 105 (19).  
Higgins, L. C., 12892 (24).  
Hildebrandt, 3127 (96).  
Holguer, L. S., 1772 (15), 1904 (15), 2218 (5), 4176 (7), 4231 (7), 4391 (7), 4453 (7), 4509 (7).
- Intema, J., 166 (64c).
- Janzen, D., 10627 (58).
- Kaudern, W., s.n. (Sept.1981)(96).  
Keenan, J., 1119 (K) (10).  
Kew, 462.67 (96).  
Kinnach, 699 (28b).  
Kitchin, s.n., (Sept. 1981) (86).  
Krukoff, B. A., 1970-58 (53).
- Last, s.n. (96).  
Leifa, Angela, s.n. (June 1982) (96).  
Liesner, R., 9148 (63), 9191 (62), 10138 (62).  
Liogier, A., 9011-15 (53), 21313 (7), 22412 (96), 24366 (67), 26597 (67).  
Long, Lewis E., 160 (45).  
Lorence, 2817 (1).  
Lowe, 3358 (K) (93).  
Lowrie, S. P., 573 (6).
- McClintock, E., s.n. (Jan. 28, 1980).  
McDonald, D. J., 254 (94).  
MacDougall, T., s.n. (May 1967) (21a).  
Maconochie, J. R., 2501 (99).  
Marshall, s.n. (29/1-30) (96).  
Mejia, M., 8875 (67), 9688 (7), 10993 (96).  
Mejicanos, J., s.n. (May 2, 1982) (42), s.n. (May 2, 1982) (56).  
Meyer, F., s.n. (1974) (75 as to leaves-seeds do not belong here).  
Meyerhoff, 121M (95).  
Miller, Th., s.n. (April 22, 1982) (72).

Neill, David, 330 (49), 5008 (44), 5010 (44), 5011 (44), 5015 (34), 5028 (58), 5033 (44), 5050 (41), 5051 (41), 5052 (41), 5054 (41), 5055 (41), 5090 (41), 5091 (53), 5092 (7), 5093 (44), 5094 (44), 5095 (53), 5097 (53), 5098 (16), 5099 (50), 5100 (58), 5101 (34), 5102 (34), 5140 (44), 5142 (44), 5143 (44).

Hawaii: cult., Neill, D.

5187 (25), 5218 (96), 5230 (23), 5231 (42), 5232 (42), 5233 (X7), 5234 (95), 5237 (56), 5238 (102), 5239 (42), 5240 (25), 5241 (106), 5242 (42), 5243 (31), 5245 (39), 5246 (36), 5247 (54), 5248 (73), 5249 (42), 5250 (74), 5251 (95), 5252 (95), 5253 (96), 5254 (94), 5255 (94), 5256 (94), 5257 (43), 5258 (43), 5259 (59), 5260 (42), 5261 (50), 5262 (36), 5263 (36), 5264 (25), 5265 (23), 5270 (54), 5271 (2), 5272 (97), 5273 (8), 5274 (73), 5277 (4), 5278 (22a), 5279 (1), 5280 (106).

Pacific Tropical Botanical Garden, (T. Flynn 121) (93).

Pelaez, S., 357 (96).

Peter, A., 33045 (95), 49809 (95), 49974 (95).

Phengkklai, C., 3121 (10).

Pope, G., 1027 (72), 1511 (86).

Rao, A. V. N., s.n. (Dec. 7, 1981) (13).

Read, R. W., 1822 (96).

Reekmans, M., 8049 (95).

Rhoads, A. S., 8391 (22a).

Rhyne, C., 896 (96).

Rogers, F. A. 14514 (74).

Rosa, N. A., 2464 (59).

Rwaburindore, P., 362 (95), s.n., (Dec. 4, 1981) (95).

Sanchez-Mejorada, H., 656 (53).

Saunders, S., s.n. (86).

Schunke, J. V. 8231 (7), 8313 (15).

Shillingford, C. A., 149 (64b).

Silva, M. G., 3084 (1).

Skog, L. E., 1206 (7).

Solomon, J., 4015 (2).

Sousa, Mario, 3140 (14c), 5811 (14c), 9489 (28c), 9702 (14b), 9714 (14b), 9803 (70), 9808 (14), 11829 (70).

Stevens, W., 2911 (53), 4798 (58), 10046 (41), 12229 (45), 13767 (49), 16412 (53).

Steyermark, J., 115493 (102), 118206 (54), 121223 (1), 125486 (62).

Stoddart, D. R., 942 (96), 5090 (99).

Sytsma, K., 1671 (50), 1932 (50).

Tellez, O., 401 (53), 727 (14c).

Wagner, W. L., 3972 (19).

- Waimea Arboretum, 74s863 (56), 74s895 (56), 75s1138 (56).  
Walsh, M. E., 2250 (96).  
White, Betty, 39 (42).  
Whitehead, G. B., s.n. (1979) (75).  
Wilbur, R. L., 8243 (64b).  
deWilde, J., 6347 (95).  
Wilson, M. R., 40841 (48).
- Zanoni, T., 10530 (7), 10808 (96), 10823 (96), 10831 (53),  
11344 (96), 11345 (96), 11516A (96), 11869 (53), 12101  
(7), 13349 (67).

SUPPLEMENTARY NOTES ON AMERICAN MENISPERMACEAE XVIII

NEOTROPICAL TRICLISIEAE AND ANOMOSPERMEAE

B. A. Krukoff<sup>1</sup> and R. C. Barneby<sup>2</sup>

Since the latest paper of this series was published 67 new collections were examined. The newly examined collections added to our knowledge of several species and extensions of range noted for six species and two subspecies (Curarea toxicofera, Sciadotenia toxifera, Abuta grisebachii, Abuta imene (two new records), Abuta brevifolia, Anomospermum chlorantum ssp. confusum, Anomospermum reticulatum ssp. reticulatum, and Orthomene schomburgkii). No new species were described.

I. Chondrodendron Ruiz & Pavon, Syst. Veg. 261.1798.

1. Chondrodendron tomentosum Ruiz & Pavon, Syst. Veg. 261.1798.

Peru: not far from Pastasa River, D. Zoebel 30.

3. Chondrodendron microphyllum (Eichler) Moldenke in Krukoff & Moldenke, Brittonia 3: 11. 1938.

Brazil: Bahia: Scott Mori 12753, L. A. Mattos Silva 504.

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

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

Venezuela: upper Orinoco, M. Gaillard s.n. (1887). Peru: Loreto: Camilo Diaz 1187, Al. Gentry 28944, not far from Pastaza River, D. Zoebel 25. Brazil: Acre: S. R. Lowrie 595 (K).

This is the first record of the species from Venezuela.

3. Curarea tecunorum Barneby & Krukoff, Mem. N.Y. Bot. Gard. 22(2): 12. 1971.

Peru: Loreto: Camilo Diaz 1238 (near Iquitos), 1291 (MO) (Alto Amazonas), 1044 (MO) (Maynas), 1493 (MO) (Maynas); Amazonas: Rio Santiago, V. Huashikat 2167 (MO), J. A. Leveau 131 (MO); Madre de Dios: Tambopata, P. J. Barfour 5687 (MO), few miles from Pastasa River, D. Zoebel 33 (7/VII- 1977).

1 Consulting Botanist of Merck, Sharp & Dohme Research Laboratories, N.J. and Honorary Curator of New York Botanical Garden.

2 Curator of New York Botanical Garden.



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

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

Peru: Loreto: Alto Amazonas, Rio Pastasa, near Ecuadorian border, Al. Gentry 29624; Amazonas: Rio Santiago, V. Huashikat 927 (MO); Madre de Dios, Tambopata, P. J. Barfour 5517 (MO).

This is the first record of this species from Amazonas, Peru.

6. Sciadotenia eichleriana Moldenke in Krukoff & Moldenke, Brittonia 3: 28. 1938.

Peru: Loreto: Ucayali, prov. Coronel Portillo, Christopher Froehner 156.

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

Brazil: Acre, C. A. Cid 3033.

IV. Abuta Barrere ex Aublet, Pl. Guian. 1: 618. Pl. 250. 1775.

1. Abuta rufescens Aublet, Hist. Pl. Guian. 1. 618. pl. 250. 1775.

Venezuela: terr. Fed. Amaz.: Rio Cataniapo, J. A. Steyermark 122433 (MO).

4. Abuta grisebachii Triana & Planchon, Ann. Sci. Nat. IV, 17: 47. 1862.

Brazil: Territ. Roraima: W. C. Steward 227.

This is the first record of this species from Roraima.

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

Peru: Loreto: Maynas, Al. Gentry 29033 (MO).

13. Abuta imene (Martius) Eichler, Flora 47: 389. 1864.

Venezuela: Bolivar: El Dorado, Couret 247 (US). Brazil: Amazonas: Rio Uatuma', C. A. Cid 98, 324.

The specimens from Bolivar, Venezuela, and Amazonas, Brazil are the first records of this species from these areas.

20. Abuta brevifolia Krukoff & Moldenke, Bull. Torrey Club 69 (2): 160. 1942.

Brazil: Amazonas: Rio Uatuma', C. A. Cid 427.

This is the first collection of the species from the basin of Rio Uatuma'.

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

Brazil: Para': C. A. Cid 1094, 1104, 1162, 1542 (all from munic. Oriximina), 1628 (Rio Trombetas), 1883 and 2175 (mun. Oriximina), 2352 (Rio Paru'), 2381 (mun. Oriximina), T. Plowman 8691 and 9076 (Conceicao do Araguaia), 9691 and 9780 (Tucuruí); Roraima: W. C. Steward 109. Peru: Loreto: Camilo Diaz 1233, Manuel Rimachi Y. 3020; Amazonas: Valle del Rio Santiago, Santiago Tunqui 263 (MO) 401, 427, 438, 486, 609, Victor Huashikat 284 (MO), 1428 (MO), Fröhner 249 (MO).

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

- 4b. Anomospermum chloranthum Diels spp. confusum Krukoff & Barneby, Mem. N.Y. Bot. Garden 22(2): 69. 1971.

French Guiana: de Granville 3663. Brazil: Rondonia: J. L. Zarucchi 2776.

This is the first record of this ssp. from French Guiana.

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

Brazil: Para': munic. Oriximina, C. A. Cid 1402, 1770; Amazonas: Rio Japura: Rodrigues 1394. Peru: Loreto: Maynas, Camilo Diaz 1530.

This is the first record of this species from Loreto, Peru.

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

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

Surinam: H. S. Irwin 57614 (Maguire number). French Guiana: Service Forestier 7829. Brazil: Para': T. Plowman 8858; Amazonas: Rio Purus, G. T. Prance 2562 (MO), Rio Uatuma', C. A. Cid 342, 660. Peru: Loreto: near Iquitos, Josephine Jones 9513 (MO), Yarayacu: K. R. Robertson 99 (MO).

This is the first record of the species from the basin of Rio Uatuma'.

Bibliography

In order to conserve space, we are citing only the papers which are not cited in Supplements VII - XVI}.

1. Krukoff, B. A. Supplementary notes on American Menispermaceae XVII. *Phytologia* 50: 80-111. 1982.

List of Exsiccatae

The first list of Exsiccatae covering papers on Menispermaceae including Supplement VIII was published in *Mem. NY Bot. Gard.* 22: 1-89. 1971, the second list covering Supplements IX, X, and XI in *Phytologia* 33: 337-340. 1976, the third covering Supplements XII and XIII in *Phytologia* 39: 292-293. 1978, the fourth list covering Supplement XIV in *Phytologia* 41: 254-255. 1979, the fifth list covering Supplement XV in *Phytologia* 44: 17-18. 1979, the sixth list covering Supplements XVI in *Phytologia* 46: 78-87. 1980, and the seventh list covering Supplement XVII in *Phytologia* 50: 80-111. 1982. This list covers Supplement XVIII. The number in parenthesis corresponds with the species - number of this and other papers (Supplements XIII to XV). Only numbered collections and those of which the dates of collection are recorded have been listed. If a collector gathered his collection together with others, only his name is cited in this list. Collections with Dr. Prance's numbers are cited under Prance.

Barbour, P. J., 5519 (S-2), 5687 (CU-3).

Cid, C. A., 98 (A-13), 324 (A-13), 342 (O-1), 427 (A-20), 660 (O-1), 1094 (A-27), 1104 (A-27), 1162 (A-27), 1402 (AN-5a), 1542 (A-27), 1628 (A-27), 1770 (AN-5a), 1883 (A-27), 2175 (A-27), 2352 (A-27), 2381 (A-27), 3033 (S-9).

Couret, 247 (A-37).

Diaz, Camilo, 1044 (CU-3), 1233 (A-27), 1238 (CU-3), 1291 (CU-3), 1493 (CU-3), 1530 (AN-5a).

Service Forestier, 7829 (O-1).

Fröehner, C., 156 (S-6), 249 (A-27).

Gaillard, M., s.n. (1887) (CU-1).

Gentry, Al, 28944 (CU-1), 29033 (A-9), 29624 (S-2), de Granville, 3663 (AN-4b).

Huashikat, V., 284 (A-27), 927 (S-2), 1428 (A-27), 2167 (CU-3).

- Irwin, H. S., 57614 (O-1).
- Jones, Josephine 9513 (O-1).
- Leveau, J. A., 131 (CU-3).
- Lowrie, S. R., 595 (CU-1).
- Mori, Scott, 12753 (CH-3).
- Plowman, T., 8691 (A-27), 8858 (O-1), 9070 (A-27), 9691 (A-27),  
9780 (A-27).
- Prance, G. T., 2562 (O-1).
- Rimachi Y, Manuel, 3020 (A-27).
- Robertson, K. R., 99 (O-1).
- Rodrigues, 1394 (AN-5a).
- Mattos Silva, L. A., 504 (CH-3).
- Steward, W. C., 109 (A-27), 227 (A-4).
- Steyermark, J. A., 122433 (A-1).
- Tunqui, Santiago, 263 (A-27), 401 (A-27), 427 (A-27), 438 (A-27),  
486 (A-27), 609 (A-27).
- Zarucchi, J. L., 2776 (AN-4b).
- Zoehl, D., 25 (4/VII-1977) (CU-1), 30 (6/VII-1977) (CH-1), 33  
(7/VII-1977)(CH-3).

Taxonomía y distribución  
de las gramíneas de México II.  
Nuevas especies de zacates.

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Tristachya contrerasi Guzmán sp. nov.

Gramen perenne, robusta, circa 2 metralis alta; vaginae papiloso-pilosae; ligula ciliata, 1-1.5 mm longa; cum dorsus copiosus pilosus; spicula 1.6-1.7 cm longa; gluma prima papiloso-pilosa; gluma secunda pilosae; arista circa 2 cm longa. Typus R. Guzmán M. 4899.

Plantas perennes de tallos glabros, amacollados, simples o ramificados hacia los nudos inferiores, de 4 - 5 mm de diámetro por 2 m de alto; nudos comprimidos, glabros, de color café claro; vainas basales sin hojas, rápido desintegrándose, las subsecuentes de márgenes sobrepuestos, papiloso pubescentes cerca del collar, los pelos de cerca de 5 mm de largo; lígula una pestaña de pelos blancos de 1 - 1.5 mm de largo, opacada por un mechón de pelos blancos en el dorso, los pelos de 1 - 2 cm de largo; hojas planas, pilosas en la superficie adaxial, de 1 cm o menos de ancho, por 40 - 60 cm de largo; panícula largamente exerta, de 40 - 60 cm de largo, compuesta de un eje escabroso y numerosas ramas flexuosas, éstas desnudas en la base; espiguillas de 1.6 - 1.7 cm de largo excluyendo las aristas, largamente pediceladas, los pedicelos mucho más largos que el tamaño de la espiguilla; primera gluma papiloso-pubescente, las papilas conspicuas de color púrpura; 2a. gluma pilosa; lema fértil de 8.5 - 9 mm de largo por 1 mm de ancho, villosa hacia la base, pilosa hacia la porción central y hacia el ápice, rematando en 2 dientes acuminados de 2 mm de largo, aristas de cerca de 2 cm de largo, 1 - 2 veces geniculadas,

escabrosas, la porción proximal a la lema enrollada, la porción distal de color pálido de 8.5 - 11 mm de largo.

Tipo en el Herbario de COTECOCA\*, colectado en la parte alta de las montañas al E de Puente de Camotlán municipio de San Sebastián, Jalisco, México, en laderas rocosas con vegetación de encinar, 23 de septiembre de 1981, R. Guzmán M. 4899. Holotipo en IBUG.

Tristachya contrerasi está algo relacionada a T. chrysonthrix, de Brasil y Argentina, de la que se distingue por las dimensiones de la espiguilla, considerablemente más cortas. De las especies mexicanas puede separarse de acuerdo a los caracteres de la siguiente clave:

1. Primera gluma papiloso-pilosa, las papilas conspicuas de color púrpura.
  2. Espiguillas de 1.6 - 1.7 cm de largo; 2a. gluma pilosa; arista de 2 cm de largo. T. contrerasi.
  2. Espiguillas de 3 - 3.5 cm de largo; 2a. gluma glabra; aristas de 5.5 cm de largo. T. papilosa.
1. Primera gluma glabra, escabrosa o ciliolada hacia el ápice, no papilosa.
  3. Espiguillas de 3 - 3.5 cm de largo; aristas de 4 - 7 cm de largo. T. avenacea.
  3. Espiguillas de 2 cm o menos de largo; aristas de 1 - 3.5 cm de largo.
    4. Hojas de 3 - 4 mm de ancho; aristas de 3.2 - 3.5 cm de largo; dientes de la lema de 1 mm de largo. T. angustifolia.
    4. Hojas de 5 - 10 mm de ancho; aristas de 1.5 - 2.5 cm de largo; dientes de la lema de más de 1 mm de largo. T. laxa.

\* Comisión Técnico Consultiva para la Determinación Regional de Coeficientes de Agostadero, las siglas no se han registrado en la Asociación Internacional de Taxonomía.

Tristachya contrerasi se ha nombrado en honor del Ing. Sergio H. Contreras R., como un perenne reconocimiento a su desinteresada labor en favor del conocimiento de las gramíneas mexicanas.

Tristachya papilosa Guzmán sp. nov.

Gramen perenne, robusta, 1 - 2 metralis alta; vaginae glabrae; lígula ciliata, 0.3 mm longa; spicula 3 - 3.5 cm longa; gluma prima papiloso-pilosa; gluma secunda glabrae; arista circa 6.5 cm longa. Typus A. Castro S. 47.

Plantas perennes de tallos glabros, amacollados, simples, de 1 - 2 m de alto; nudos comprimidos, glabros, de color café claro; vainas de márgenes sobrepuestos, papiloso-pilosas hacia el collar; lígula una pestaña diminuta de pelos suaves, de 0.3 mm de largo, pilosa en el dorso; hojas planas, glabras en ambas superficies, con los márgenes escabrosos, de 5 mm de ancho por 40 cm de largo; panícula de 15 - 20 cm de largo, con las ramas fuertemente ascendentes, contraídas hacia el eje, las ramas floríferas en la base; espiguillas de 3 - 3.5 cm de largo, excluyendo las aristas, sobre pedicelos rígidos de 0.5 - 4 cm de largo; primera gluma papiloso-pubescente; 2a. gluma glabra; lema fértil de 10 - 10.1 mm de largo por 1.5 mm de ancho, villosa hacia la base y la corona, pilosa hacia la porción central y el ápice, rematando en 2 dientes acuminados de 2 - 2.5 mm de largo; aristas planas, con la porción proximal a la lema enrollada, de 6.5 cm de largo.

Tipo en el Herbario de COTECOCA, colectado 3 km al SW de la Estanzuela (Las Carboneras), municipio de Santa Ma. del Oro, Nayarit, México, en suelo rojo arcillo arenoso con vegetación de encinar, 21 de octubre de 1980, Arturo Castro S. 47. Holotipo en IBUG.

Similar a Tristachya contrerasi, T. papilosa se distingue por lo glabro del follaje, la lígula más pequeña, las dimensiones generales de la espiguilla, considerablemente más cortas, con la

2a. gluma glabra, y las ramas de la inflorescencia, floríferas en la base.

Paspalum tolucensis Guzmán sp. nov.

Gramen perenne, *Paspalum laeve* Nash similis, spiculis brevioribus (2.2 - 2.6 vs 2.5 - 3 mm), angustioribus (1.1 - 1.7 vs 2 - 2.4 mm); vaginae et laminae glabrae; habitatione frigidus et humedior. Typus R. Guzmán 4024.

Plantas perennes, de rizomas cortos verticales, de tallos erectos, glabros, solitarios o varios en cada sistema radicular, de 15 - 35 cm de alto; nudos 1 - 2, glabros, de color café claro u obscuro; vainas más cortas o largas que el tamaño de los entrenudos, de márgenes libres o sobrepuestos hacia la base, glabras o con los márgenes ciliados; lígula una membrana triangular de borde entero, de 1.3 - 2.3 mm de largo, con una pestaña de pelos blancos detrás de ella; hojas planas, lanceolado linear, glabras en ambas superficies, a veces con los márgenes esparcidamente ciliados hacia la base, de 2 - 15 cm de largo por 4 - 8 mm de ancho; inflorescencia cortamente exerta de las vainas superiores al madurar, compuesta de 1 - 3, más comúnmente 2 racimos ascendentes o ligeramente divergentes, de 1 - 2.5 cm de largo; raquis de 0.6 - 1.3 mm de ancho, piloso en las axilas; espiguillas solitarias, cortamente pediceladas, glabras, abovadas, de 2.2 - 2.6 mm de largo por 1.1 - 1.7 mm de ancho; 2a. gluma y lema estéril más largas que el fruto, glabras, firmes, arrugadas y asimétricas al desecarse, 3-nervadas; fruto estramíneo de cerca del tamaño de la espiguilla, liso y brillante.

Tipo en el Herbario de COTECOCA, colectado entre Sultepec y la Puerta extremo S del Nevado de Toluca, México, a 2,600 m de altitud en bosque de pino con humedad y vegetación herbácea abundante. Primero de agosto de 1981, R. Guzmán M. 4024. Holotipo en IBUG.



Paspalum luxurians Guzmán & L. Rico sp. nov.

Gramen perenne, 2.2 m alta, P. nelsoni Chase similis; vaginae de culmorum inferum hirsutae, non papillosae, rhachide sine cilium; spiculis longioribus (3 - 3.4 vs 2.1 - 2.3 mm) latioribus (1.6 - 1.7 vs 1.3 mm). Typus R. Guzmán 283.

Plantas perennes, de 2 - 2.2 m de alto, en grandes macollos con la base endurecida, de tallos erectos simples, glabros; nudos glabros, de color obscuro, más o menos comprimidos; vainas inferiores de márgenes sobrepuestos, hirsutas, más largas que los entrenudos, las superiores glabras o con los márgenes ciliados, pilosas en los internervios; lígula una membrana firme de color café y borde lacerado, de 1.5 mm de largo, con una pestaña de pelos blancos y suaves hacia la base, los pelos 6 - 7 mm de largo; hojas planas, firmes, de márgenes serrulados, pilosas en ambas superficies, de 40 - 50 cm de largo por 1 - 1.5 cm de ancho; panícula de 35 cm de largo; compuesta de 21 racimos ascendentes o divergentes, los inferiores de 8.5 - 9 cm de largo; eje de la panícula redondeado en la mitad inferior, anguloso y de márgenes serrulados en la superior; raquis de color morado de 1.5 mm de ancho, con los márgenes antrorsamente escabrosos, con un mechón de pelos en las axilas; espiguillas en pares sobre pedicelos firmes, el pedicelo anguloso de márgenes escabrosos, las espiguillas de 3 - 3.4 mm de largo por 1.6 - 1.7 mm de ancho, abovado elípticas, subagudas; 2a. gluma y lema estéril iguales en tamaño, más largas que el fruto, de color amarillento o bronce, la gluma 5-nervada, suavemente pilosa, la lema 3-nervada, espaciadamente pilosa; fruto estramíneo de cerca del tamaño de la espiguilla, diminutamente papiloso estriado.

Tipo en el Herbario del Instituto de Botánica de la Universidad de Guadalajara (IBUG), colectado a 8 kilómetros de Unión de Tula, por la carretera a Barra de Navidad, Jalisco, México, 14 de agosto de 1976, a lo largo de un arroyo, R. Guzmán 283. Paratipo en el Herbario de COTECOCA, 4.8 kilómetros al S de Unión de Tula, por la carretera a Barra de Navidad, estanques permanentes en suelos grises arcillosos con matorral de Acacia farnesiana, 19 de junio de 1981 R. Guzmán M. 1206.

El fruto pálido y la lema estéril 3-nervada relacionan más a P. luxurians con P. nelsoni, del que se distingue por las vainas inferiores que son hirsutas, no papilosas, las espiguillas más grandes, el margen de la 2a. gluma no ciliado y el raquis escabroso, con ausencia de cilios.

Paspalum trichoides Guzmán sp. nov.

Gramen perenne, de 100 - 125 cm alta, erecti, nodos dense pubescentae vel glabrae; vaginae compressae, inferior sine laminae; laminae planae, pubescentae vel glabrae supra usque ad 30 cm longae; rhachidi 0.8 - 1.2 mm latis; spiculis 3.3 - 3.5 mm longis, 1.5 mm latis; gluma secunda et lemmatis sterilis 3 nervatae, pallidae, papiloso-pilosae, Typus E.W. Nelson 2734a.

Plantas perennes de 100 - 125 cm de alto; amacolladas, de pocos a varios tallos, los tallos simples; nudos comprimidos de color obscuro, pubescentes o glabros; vainas vasales sin hojas, glabras, las de los renuevos densamente pubescentes, las subsecuentes más cortas que el tamaño de los entrenudos, glabras, de márgenes sobrepuestos; hojas agregadas hacia la base, planas, ascendentes o divergentes, de 5 - 30 cm de largo por 3 - 15 mm de ancho, pubescentes o glabras en ambas superficies; panícula compuesta de 3 - 8 racimos sedosos, éstos de 2.5 - 7 cm de largo; raquis de 0.8 - 1.2 mm de ancho, de márgenes escabrosos, piloso en las axilas; espiguillas en pares o con la espiguilla primaria abortiva, de 3.3 - 3.5 mm de largo por 1.5 mm de ancho; 2a. gluma y lema estéril 3-nervadas, pálidas, papiloso-pilosas, la gluma ligeramente más corta que el fruto; fruto pálido, liso y brillante.

Tipo en el Herbario Nacional de los Estados Unidos colectado "in vicinity of San Juan Guichicovi Oaxaca, México. Altitude 1450 to 1500 ft. No. 2734a E. W. Nelson. June 21 to 24, 1895". Dos colecciones más procedentes de Oaxaca, Tlaxiaco, en bosque de pino (A.A. Beetle M-5251) 24 de junio de 1980 y ocho kilómetros de Putla, rumbo a Pinotepa Nacional, 26 de junio de 1980 (A. A. Beetle 4834) conforman con exactitud el tipo.

Paspalum trichoides está más relacionado a P. haughtii de Colombia (Swallen 1967: 371), del que se distingue por el color pálido de las espiguillas, el número menor de nervaduras (5 en P. haughtii), y por la pubescencia menos conspicua de la 2a. gluma y lema estéril.

El espécimen tomado como tipo fue referido por Nash (1912) y Hitchcock (1913) a P. erianthum, y por Chase (1929) a P. sanguineolentum. Hasta la actualidad, ninguna de las especies anteriores han sido encontradas en Norte América. Paspalum sanguineolentum posee espiguillas con 6 nervaduras en la 2a. gluma y lema estéril simétricamente dispuestas y P. erianthum es una especie en el follaje densamente pubescente (material auténtico de ambas especies examinado en US).

Paspalum setaceum Michx. var. dispar Guzmán var. nov.

Gramen perenne, haec a varietate typiceae similis, sed fructus papillosus. Typus R. Merrill King 187.

Plantas perennes, amacolladas, de tallos erectos, delgados, de 60 cm de alto; vainas de márgenes hialinos, libres o sobrepuestos; lígula una membrana de forma triangular, de color ámbar, de 2 mm de largo, con un mechón de pelos blancos en el dorso hacia la base; hojas lanceoladas, subinvolutas, con el ápice largamente acuminado, glabras en la superficie abaxial y pilosas en la superficie adaxial, de 9 - 24 cm de largo por 2 - 3 mm de ancho; inflorescencia terminal y axilar, compuesta de 2 - 3 racimos de 5.5 - 9 cm de largo; raquis de 1 mm de ancho, escabroso en los márgenes; espiguillas en pares de forma oval, de 2.1 - 2.4 mm de largo por 1.3 mm de ancho; 2a. gluma y lema estéril similares en tamaño y textura, glabras, 3-nervadas, con manchas de color morado; fruto en el ápice expuesto, de 2.2 - 2.4 mm de largo por 1.1 - 1.3 mm de ancho, de color estramíneo, papiloso estriado.

Tipo en el Herbario del Instituto de Biología de la Universidad Nacional Autónoma de México, colectado "Low-lyin hills near the Pacific Ocean, 2 kilometers east of Salina Cruz; vegetation mainly of thorny leguminous shrubs and cacti growing in open field in sandy loan, in

association with other grasses. State of Oaxaca, México, Robert Merrill King No. 187, 25 June 1958.

La variedad hoy descrita fácilmente se reconoce del resto de variedades del complejo de P. setaceum por el fruto papiloso estriado, carácter ausente en las demás afinidades. Las variedades mexicanas de esta especie reconocidas por Banks (1966), pueden separarse con la siguiente clave:

1. Fruto liso y brillante .
2. Hojas conspicuamente pubescentes o puberulentas en ambas superficies; márgenes de las hojas papiloso ciliados.
3. Espiguillas elípticas, de 1.4 - 1.8 mm de largo; lígula de 2 - 3 mm de largo.
  - P. setaceum var. setaceum.
3. Espiguillas suborbiculares, de 2.1 - 2.2 mm de largo; lígula de 1 mm de largo.
  - P. setaceum var. stramineum.
2. Hojas glabras de márgenes ciliados, no papilosos.
  - P. setaceum var. ciliatifolium.
1. Fruto papiloso estriado.
  - P. setaceum var. dispar.

Aristida jaliscana Guzmán y Jaramillo sp. nov.

Gramen perenne, 70 - 105 cm alta internodiis inferioris, glabrae vel sparsae pilosae; vaginae eae culmorum internodiis longioribus, pilosae adpersae vel glabrae; laminae 25 - 30 cm longae, 3 mm latae subtus et supra sparsae pilosae; gluma prima et gluma secunda sparsim lanata, subaequans, cirter 9 - 11 mm longa; lemmatis 11 - 13 mm longis; arista medium eae aristae lateralae longioribus. Typus J. Muñoz A. y F.J. Avila M. s.n.

Plantas perennes de (60-) 70 - 105 cm de alto, en macollos de pocos tallos; los tallos erectos, simples y glabros; nudos más o menos comprimidos, vainas glabras o casi glabras hacia su base, gradualmente más pilosas hacia la garganta, con un mechón de pelos blancos en el collar; lígula una pestaña diminuta de pelos rígidos, con unos cuantos pelos largos esparcidos a lo largo, los pelos más abundantes por detrás de ella; hojas subinvolutas, largamente acuminadas, las inferiores de (14-) 25 - 30 cm de largo por 3 mm de ancho, pilosas, con pelos contortos en ambas superficies, más abundantemente en la base, escabrosas en su

parte distal; inflorescencia angosta con las ramas apretadas hacia el eje, de 1 cm de ancho por 20 - 30 cm de largo, de color obscuro o rojizo; los ejes escabrosos con unos cuantos pelos diseminados cerca de las ramas inferiores de la inflorescencia; glumas subiguales o la primera ligeramente más corta, de 9 - 11 mm de largo, cortamente aristadas de un ápice bífido, con la quilla escabrosa, esparcidamente pilosas con pelos largos de color blanco; lema de 11 - 13 (-14) mm de largo de la base al ápice, la columna de 2.5 - 4 (-5) mm de largo, retorcida; aristas 3, igualmente divergentes, la central ligeramente más larga que las laterales, de 9 - 12 (-14) mm de largo.

Tipo en el Herbario de COTECOCA colectado cerca del arroyo de Los Sabinos y cerro El Muerto, entre San Juan de Potrereros y Atolinga, municipio de Chimaltitán, Jalisco, México, en bosque de pino y encino, 26 de septiembre de 1981. J. J. Muñoz A. y F. J. Avila M. s.n. Holotipo en IBUG. Un espécimen en US (Griffiths 8131) anotado por Hitchcock (1924: 567) como "... slightly lanate on the culms and sheaths...", parece pertenecer a esta especie. Un tercer espécimen en IBUG, de la Brecha al Rio de Agua Caliente, Sierra de la Venta, municipio de Zapopan, Jal., en bosque perturbado de Pinus oocarpa, P. michoacana var. cornuta y Quercus resinosa (S. Carvajal H. y J. Bravo 573) conforma el tipo con exactitud.

Similar a Aristida scribneriana Hitchc., A. jaliscana se distingue por el follaje glabro, casi glabro o escabroso, las vainas glabras, pilosas hacia la garganta, con la superficie de estas dos estructuras no opacada por el tomento, y con las glumas y la columna notablemente más largas.

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El autor agradece al Dr. Thomas R. Soerstrom del Smithsonian Institute, el préstamo de especímenes de Paspalum y el acceso para consulta de material inédito de la Sra. Agnes Chase, relacionado con este género y al Ing. Arturo Castro S. Jefe de la Brigada de Nayarit de COTECOCA, por la colección de numerosas gramíneas y por la compañía en los trabajos de campo por esa Entidad.

PLANTAE MESOAMERICANAE NOVAE

.IV.\*

by Luis D. Gómez P.  
Museo Nacional, San José, Costa Rica

The publication of my note on *Zamia* L. (*Phytologia* 50:401-404, 1982) has unearthed a number of specimens from Panama, among which *Zamia obliqua* A. Br. was present. Thus, the key to the Costa Rica-Panama species must be modified as follows:

- 2.- Margins of leaflets entire or with a few apical teeth...3
- 2.- Margins of leaflets serrate-denticulate at least in the apical third ...6
- 6.- Leaflets almost plicate, obovate, wider at the middle. The petiole and often the rachis, spiny *Z. skinneri*
- 6.- Leaflets always flat, elliptical, the base much constricted as to become a 2-3 cm petiole with an abaxial, annular flap just below where it flares into lamina, the apex acute. *Z. obliqua*

*Zamia obliqua* A. Br., Monatsber. Akad. Wiss. Berlin 1875:376. (*Z. manicata* Linden ex Regel, Gartenfl. 27:8. 1878). Superficially resembling *Z. skinneri* but differs from it in the globose-conical, usually hypogaeous trunk, the long pedunculate strobili, the long ( up to 35 cm) elliptical leaflets which are strongly denticulate.

Materials examined:

Provincia Panama- Cerro Campana, 2000', P.H.Allen 4523 (MO). Provincia Darién- Between Pinogana and Yavisa, 15 m, P.H.Allen 248 (MO); Vicinity of Paya, Stern et al 183; 4.5 km South of El Real, Mori & Kallunki 5427 (MO, NY); about 10 miles South of El Real on Rio Pirre, Duke 5432 (MO); 1-3 miles North of Paya, Duke & Kirkbride 14000(3), (MO); South slope of Cerro Tacarcuna, 700-1000 m, Gentry & Mori 13909, (MO); headwaters of Rio Chico, PH.Allen 4554 (MO).

*Zamia chigua* Seemann has been found in Panama. A collection from the Darién is growing in the special greenhouses of the Missouri Botanical Gardens.

\* Partially funded by grants from CONICIT, NSF and The Tinker Found.

PLANTAE MESOAMERICANAE NOVAE, V.\*

by Luis D. Gómez P. & Jorge Gómez- L.  
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*Blechnum* (*Eublechnum*) *lellingeranum* L.D.Gomez sp. nov. Herba parva, rupicola, caudice reducto stolones emittens, paleis ferrugineis integris vel sparse dentatis dense oblecto; stipitibus 10-30 mm longis, rufescentis, teretes; fronde sterile 40-50 mm longa, 0.8-1.3 cm lata, utroque angustata, lanceolata, integra; fronde fertile longe lanceolata, acuminata, pinnata, 5.6-10 cm longa, 0.6-1 cm lata, pinnis basalibus 2, ellipticis, integris, quasi sessiles. Sori plerumque costam proximi.

HOLOTYPUS. In scopulis udis muscosis, prope rima Camaron loco dicto Coton, 1300 m.s.m. provinciam Puntarenas, Gomez 18139 (CR). ISOTYPUS US. PARATYPI. MO, F.

Of the *Blechnum lanceola* alliance it differs from it in its much reduced dimensions, the non-decurrent terminal pinnae, the discreet, sterile pair of basal pinnae of the fertile frond which are shortly petioled and always free from the rachis. In *B. lanceola* Sw. the fertile frond is entire or at most has adnate, basal lobes. In 1896 H. Christ (Bull. Soc. bot. roy. Belg. 35:123) named a collection by Pittier (3546) as *B. lanceola* Sw. var. *trifoliatum* Hk. & Baker, and annotated the specimen as follows: "Serait-ce une variété ou un état jeune de *B. longifolium*?" . In 1901 (Prim. Fl. Cost. 3(1):23) he incorrectly reduced the same collection and another specimen to *B. longifolium* Willd., a synonym of *B. fraxineum* whose young plants resemble the species here described. This remarkable miniature is named in honor of David B. Lellinger of the U.S. National Herbarium, whose devoted study of tropical pteridophytes has yielded much new knowledge and whose expert advise is always available to friends.

*Blechnum* (*Lomaria*) *microlomaria* L. D. Gomez sp. nov. *Lomaria pusilla*, caudice 20-50 mm longo, erecto, 10-15 mm crasso, stolonifero, paleis nicotianeis integris, lanceolatis, acutis vestito; stipitibus 10-(21.7)-43 mm longis, 1 mm crassis, fasciculatis, sulcatis, brunneovinosis; fronde sterile 90-(139)-225 mm longa, 14-(22)-31 mm lata, utroque gradualiter angustata, anguste-elliptica, submembranosa, pinnatisecta' pinnis adnatis 11-23-jugatis, proximis (primum visum lobulata), medialibus 10-19 mm longis, 5.5-8 mm latis, integris, obtusis, basalibus 4-9-jugis reductis, apicalibus oblongis, obtusis, 10-30 mm longis, 5-6 mm latis; venis 5-7-jugatis, liberis, conspicuis, basalibus e medio plerumque furcatis; fronde fertile 200 mm longa, 15-20 mm lata, stipite 250 mm alta; pinnata, frondis paribus (15) oppositis vel suboppositis inter se 35-50 mm remotis infimis remo-

\* Partially financed by CONICIT and The Tinker Foundation.



tioribus, pinnis medialibus 10-13 mm longis, 1.5-2 mm latis, revolutis, non cuspidatis. Indusium integrum.

HOLOTYPE. Planta ad saxa vulcanica fontes fluvii Mancaron supra 2000 m s.m. V. Barva provinciam Heredia lecta, Gomez 18158, CR. ISOTYPI. MO, US, F.

Of the group of *B. (Lomaria) lehmannii* Hieron., it resembles *B. stoloniferum* (Fourn.) Mett. ex C. Chr. of Mexico and northern Guatemala and *B. mexiae* Copel. of Brasil. From the former it differs by its smaller dimensions, color of stipes and rachises, its fewer and conspicuous veins, its pinnate fertile frond with almost filiform segments the basal ones almost vestigial. In *B. mexiae* the segments are more distant and, as in *B. stoloniferum*, the rhizome is creeping and much longer. Large populations of this small lomarioid have been found in the type locality.

*Lindsaea (Lindsaea, Decrescentes) venustissima* L. D. Gomez, sp. nov. Herba. Folia bipinnata, petiolo stramineo facie abaxiali tereti; lamina herbacea, laetevirens subtus glaucescens, pinnulis anguste lanceolatis, longitudine latitudine 9-10-ies superante, apice protractus; soris continuis, indusio integro marginem non attingente.

HOLOTYPE. Forest and forest remnant to 12 km NW of Santa Fe, Province of Veraguas, Panama, W.G.D'Arcy 10300 (MO).

Fronds up to 1 m tall. Lamina bipinnate, 35-40 cm long, 25-30 cm wide, deltoid in outline, with 2-3-or more pinnae to a side and a conform terminal one. Pinnae alternate, distant, ascending, stalked, widest in lower third, abruptly narrowed at base, gradually tapering to apex. Pinnules 20-25 to a side, shortly petiolulate (1.5-2 mm), ascending, 4.5-5 cm long, 4-5 mm wide. Inner margin straight  $\pm$  parallel to rachis, lower base cuneate, upper base rectangular, upper margin shallowly concave-straight, outer margins both soriferous almost to apex which is bluntly rounded. Veins immersed, 1-forked, main vein nearly straight. Lowermost 1-2-pairs of pinnules very reduced, dimidiate, terminal segment oblong, 1-2-lobed, sterile. Indusium thick-membranose, not reaching margin. Spores (19.5)20(21.5) $\mu$ m, citrine, tetrahedric.

A near relative of *L. taeniata* Kramer, endemic to Colombia. *L. taeniata* is also bipinnate but with only 1-2 pinnae/side, subopposite, only slightly narrowed at base and abruptly narrowed in apical third, the pinnules are sessile, subfalcate or perpendicular to rachis; the terminal segment is narrowly lanceolate, subhastate-lobed, up to 3.5 cm long, often caudate obtuse. The indusium is pale, delicate and the spores average 22 $\mu$ m, almost hyaline.

*Tectaria neotropica* L. D. Gomez, sp. nov. Herba rhizomate repens, paleaceum, paleis clathratis, ferrugineis, lanceolatis, acuminatis, vestito. Petioli atropurpurei, gracili, 15-20 cm longi paleis iis rhizomatis aequalibus sparse praediti. Lamina herbacea, deltoidea, inferne 2-pinnatisecta superne pinnatisecta. Rachis costaeque utrinque dense pilosis, pilis articulatis, 6-cellulatis, hyalinis. Venae liberae. Sori indusiati, indusia reniformia, eroso-ciliati, hyalini. Sporangia longe stipitata annulo e cullulis ca. 13 composito. Sporae brunneae bilaterales, 31 X 21 $\mu$ m, echinatae.

*HOLOTYPE*. Trail from Rio San Juan to Rio Tife Falls; elev. 1200 - 2500 ft. Fern on rock face in deep shade, wet forest, Province of Coclé, Panama B. Hammel 3348, CR. *ISOTYPUS*. MO. *PARATYPI*. Road from El Llano to Carti, 13.9 km N of Panamerican Highway, border of Panama and San Blas Provinces, 300-400 m. Folsom et al. 6174, CR, MO.

It is distinguished from all other continental species of the genus by its free veins, a character which brings it close to the formerly *Camptodium pedatum* from which it differs by its herbaceous texture, articulate hairs and echinate spores. At first I thought this plant represented a new species of *Adenoderris* but the lack of laminar viscosity and unicellular marginal hairs prevented that allocation. The new species is somewhat intermediate between *Ctenitis* and *Tectaria* and would fit in the generic concept *Ctenitopsis*, erected by Ching for oriental tectarids, except for its erose-ciliate indusia.

In 1953 E. B. Copeland erected the generic name *Hyalotricha* (American Fern J. 43:12-13) to place an unusual polypodioid described by H. Christ as *Polypodium anetioides* (Bull. Soc. bot. Genève 2.1:219. 1909). In 1949, R.W.G. Dennis described a new genus of inoperculate discomycetes (Helotiales, Hyaloscyphaceae) as *Hyalotricha* (Mycological Papers, C.M.I. 32:75) which, under provision of the Code, makes Copeland's name untenable. The name *Hyalotrichopteris* *nom. nov.*, based on Copeland's generic description (loc. cit.) and the combination *Hyalotrichopteris anetioides* (Christ) L. D. Gómez *comb. nov.* are here proposed. The fern is known from Costa Rica and Nicaragua, where it has been recently collected in Jinotega, between Las Camelias and La Salvadora, Stevens & Grijalva 15350, MO, CR.

*Danaea crispa* Reichb.f., was supposedly endemic to Costa Rica. A collection from Panama, Province of Coclé, El Copé (B. Hammel 986) corresponds to this peculiar species whose geographical distribution is thus enlarged. *Danaea wendlandii* has imparipinnate fronds, the pinnae have serrate margins and are non-crispate.

*Echinodorus botanicorum* L. D. Gómez & Gómez-L., *sp. nov.*, species insignis habitus eleocharidis suis; a speciebus generis Nobis notis bene distincta.

Planta aquatica, emersa, lactescens, rhizoma breve, folia radicalia. Folia usque ad 60 cm longa; petiolus 50-55 cm longus, 4-6 mm crassus, subteretes vel obscure trigonus; lamina petiolo breviorissima, 5-9 cm longa, 4-6 mm lata, angustissime lanceolata, apice acuta, basi sensim in petiolum decurrens, 3-5-parallelonervia, tumida, laeviter sulcata; lineae marginisque pellucida. Inflorescentia folia aequantia vel paulo longiora; spicata, 4-6-verticillata, verticilli distanti, pauciflori; bracteae subliberae, lanceolatae, acutae, marginatae; flores maiusculi, sepala virides, albomarginata, late ovata, coriacea; petala alba, tenues, magna, sepalis circa duobus longiora, quam sepalis duplo vel ca. triplo ampliora; stamina 12, filamenta linearia, antherae oblongae. Fructus subsphaerici, diam. 12-15 mm, fructiculi compressi, rostrati, 3-6-obscure costati, uni glandula ornati.

In stagnis viam ad oppidum Buenos Aires ca. 400 m s.m. provinciam Puntarenas incolat. Omnibus botanicorum Florae Mesoamericanae speciem hanc novam cordialiter dicamur. HOLOTYPE. L.D.Gomez 18131, CR. ISOTYPI. MO, K, F (legit. Barringer & Gomez). PARATYPI. M. Bermudez 741 USJ.

*Rhynchospora Andresii* Gomez-Laurito, sp. nov. Species facile cognoscenda ob culmus 180-250 cm altus; folia culmorum parum breviora, tricostrata, longitudinaliter profunde sulcata, 2.5-3 cm lata, flaccida' inflorescentia interrupta, 90-150 cm longa; achaenia facie porcata. Subg. Diplostyleae.

Planta caespitosa, rhizoma crassum, lignescens; culmus nodosus, 180-250 cm altus, trigonus, ca. 8 mm crassus, scabrus, internodiis 22-30 cm longis; folia plura radicalia, laminae culmorum parum breviora, 2.5-3 cm latae, herbaceae, flaccidae, multinervosae, tricostratae, medio longitudinaliter profunde l-sulcatae, marginibus scabrellis, apicem acuminatae; vaginae ca. 22 cm longae, orae fimbriatae, fuscae; bracteae folia similis, corymbus longe superantes, versus apicem abbreviatae; inflorescentia in parte superior culmorum, 90-150 cm longa, interrupta, 9-11-corymbosae; pedunculis exsertis, 2-5 cm longis, complanatis, marginibus scabris; corymbis lateralis 3-5 cm longis, 10-12 cm latis; corymbis terminalis abbreviatis, 2-3 cm longis, 6-8 cm latis; axis scabris; ramis ad apicem scabris; bracteolae linear-lanceolatae, 2-5 cm longae, evaginantes, marginibus scabris; spiculae solitariae vel 2-3-fasciculatae, ovoideae vel anguste ovoideo-ellipsoideae, 2-2.5 mm longae, ca. 1.3 mm latae, fuscae, l-nucigera; 3 glumae inferiores vacuae, inaequales, 1.2-1.8 mm longae; glumae nucigerae ovatae, apice obtusae, aliquando emarginatae, 2 mm longae, 1.5 mm latae, l-nerviae, fuscae, membranaceae, margine scariosae, hyalinae; stamina 3, filamenta plana, antherae 1.5 mm longae; stylus filiformis, profunde bifidus; stylopodium anguste conicum, 0.7-1 mm longum; achaenium 1.5 mm longum, 1.3-1.5 mm latum, ovatum vel late-ovatum, biconvexum, tumidum, facie porcatum, puncticulatum, castaneum vel fuscum, nitens; setae hypogynae 5-6, graciles, porphyreis, subaequalibus, 1.5-1.7 mm longibus.

HOLOTYPE. Orillas del Rio Sanguijuela, Parque Nacional Braulio Carrillo, Prov. San Jose, ca. 900 m s.m., Gomez-Laurito 8426 CR. ISOTYPI. F. PARATYPI. Gomez-Laurito 6452, 6451, 6544 CR.- ETYMOLGIA. Speciem pulchram novam c. Andreas f. primum onomasticum commemoro.

Erratum. In the Latin description of *Rhynchospora oreoboloidea* (Phytologia, 50(7):459-460, 1982) some words were left out: ; culmus intra folia absconditus, teretibus, rigidulus, sulcatus, foliatus; folia plura radicales, etc.; stylopodium anguste conicum, 0.5 mm longum, pallidum; achaenium oblongum, 2-2.3 mm longum, 1 mm crassum, etc..

*Centropogon* (*Centropogon*) *nubicola* Gomez-L. & L.D.Gomez, sp. nov. Antherae 2 inferiores apice appendice triangulari munitae. Ab affinis C. granuloseus et C. congestus corollis candidis roseo-suffusis, glabris in corymbis, praeclare distinguitur.

Herba glabra, verisimiliter ramis elongatis vel scandentibus; folia

*alterna*, herbacea, viridia, elliptica, 13-17 cm longa, 6-7.5 cm lata, margine subcrenata distante serrata, apice abrupte acuminata, ad basim cuneata, petiolum brevissime decurrens, utrimque glabra; flores in corymbo (inflorescentia prima visa umbellata, axis vix 2 cm long.), 5-12-floribus, bracteato; bracteae subpanduratae, membranosae, asperiter nervosae, acutae, 1.5 cm longae, 4-6 mm latae, margine erosociliatae; pedicelli 1.2-2 cm longi, scabri, minutissime et sprasim ciliati, angustissime alati, alis hyalinis, basi minute bibracteolati; bracteolae fere 3 mm longae, falcatae vel quasi retroflexae; hypanthium depresso-globosum, glabrum; sepala deltoidea;  $\pm$  5 mm longa, margine minutissime denticulata, erecta, sinus inter ea acuti; corolla 4-5.5 cm longa, candida versus basim rubella; lobi lanceolati, acuminati, 2 superiores 3.5-5 mm longi, protracti plus minusve incurvati, quasi cornuti' filamenta in tubum  $\pm$  4 cm longum, angustum, glabrum connata; antherarum tubus 5-7 mm longus, versus apicis paucis pilis longiusculis, albidis, praeditus, in commissuris connectivis profuse griseo-sericeis; fructus  $\pm$  1 cm diametro; semina 0.8 mm longa, 0.6-0.7 mm lata, rotundato-inflata, fuscato-ferruginea, nitida, reticulato-foveolata.

*HOLOTYPE*. Cerro Nubes, Volcan Miravalles, 1600 m s.m., Provincia de Alajuela. R. G. Campos in Gomez-L. 8860, CR. *PARATYPI*. *ibidem*, I. A. Chacon 74, CR, USJ.

Of all the Central American species of Centropogon subgenus Centropogon, its closest relative seem to be C. granulosus Presl from which it differs by its lack of granulation, color of the corolla, corymbose inflorescence, number of flowers, the indument of the anthers. Occasionally, it presents a solitary flower one or two nodes below the terminal inflorescence. Although the branches are scandent and somewhat pendent, the flowers are up-turned to facilitate access of the pollinators which we presume are hummingbirds. Isidro Chacón (pers. comm.) reported many individuals of Panterpe insignis in the vicinity of these plants, but Gary F. Stiles reports it to be another hummingbird, Phaetornis guy.

CONTRIBUTION TO THE LICHEN FLORA OF BRAZIL X.  
Lichens from Guaiba, Rio Grande do Sul State.

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In a recent date (April 1982) the authors collected lichens in the City of Guaiba in the Municipality of the same name. Considering its proximity to the City of Porto Alegre it is to suppose that there could have been made several collections in this locality during the First Regnell Expedition (Malme 1897). However this name has been scarcely reported in the literature.

This Municipality has an increasing urban development and many industries and factories have been established here during the last years. Owing to this fact there is a good reason to assume that there will be a change of condition in its flora in a near future. Thus, the authors thought it could be of interest to make known the results obtained in spite of the scanty number of the studied specimens.

The zone visited is known as "Florida" and it is located within the urbanized area of the Guaiba City. With the exception of collections G/19, G/20 and G/21 all the lichen species gathered were found growing on cultivated trees on street sidewalks or in gardens.

The collected samples were distributed into two series alike, one of which has been deposited in ICN and the other in the senior author's private herbarium.

For each species we have indicated the previous records

for the Municipalities which integrate the so-called Great Porto Alegre. Unfortunately in the literature at our disposal only records for the Municipalities of Canoas, Porto Alegre, Sao Leopoldo and Viamao could be found. If the species is not recorded for the Great Porto Alegre, considerations about the State range are made.

Coccocarpia palmicola (Spreng.) Arvidss. & D. Gall.

On Jacaranda acutifolia at street sidewalk, G/8 pro parte. This genus is known in the Great Porto Alegre by a single collection of Coccocarpia pellita var. smaragdina from the Sao Leopoldo Municipality (Malme 1926).

Dirinaria applanata (Fée) Awasthi.

On Jacaranda acutifolia at street sidewalk, G/6. Already known from the Municipalities of Porto Alegre (Awasthi 1975) and Viamao (Osorio 1981).

Heterodermia diademata (Tayl.) Awasthi.

On Jacaranda acutifolia at street sidewalk, G/4, G/10; on trunk of Phytolacca dioica, G/20. Already reported from the Municipality of Porto Alegre (Lynge 1924 as Anaptychia; Osorio, Aguiar & Homrich 1981) and Viamao (Osorio 1981).

Heterodermia magellanica (Zahlbr.) Swinsc. & Krog.

On trunk of Thuja in an abandoned field, G/12a. First report for Rio Grande do Sul State.

Heterodermia propagulifera (Vain.) Dey.

On Jacaranda acutifolia at street sidewalk, G/5. First report for Rio Grande do Sul State.

Iopadium leucoxanthum (Spreng.) Zahlbr.

On trunk of Thuja in an abandoned field, G/12b. Recorded by Malme (1940) for the Municipalities of Canoas, Porto Alegre and Sao Leopoldo.

Normandina pulchella (Borr.) Nyl.

On Jacaranda acutifolia at street sidewalk, G/8 pro parte. Formerly known only from the Municipality of Torres (Osorio & Fleig 1982).

Parmelina consors (Nyl.) Hale

On Jacaranda acutifolia at street sidewalk, G/9. Recorded from Rio Grande do Sul State from the localities of Encruzilhada do Sul (Osorio & Homrich 1978), Montenegro (Osorio, Aguiar & Citadini 1980), and Santa Maria (Lynge 1913/14).

Parmotrema reticulatum (Tayl.) Choisy.

On Melia azedarach at street sidewalk, G/18b. In the Great Porto Alegre already known from the Municipality of Viamao ( Osorio 1981 ).

Parmotrema tinctorum (Nyl.) Hale.

On Jacaranda acutifolia at street sidewalk, G/3, G/7; on trunk of Pinus in an abandoned field, G/13; on trunk of Thuja in an abandoned field, G/11, G/14. All the specimens collected exhibited an excellent growth and those developed on coniferous trees covered several quadrat decimeters despite its occurrence within an urbanized area. In a former paper the authors (Osorio & Fleig 1982) called the attention about the lack of this species in the large collection made by G. Malme during the First Ragnell Expedition (Lyngé 1913/14). The large plantation of exotic trees (Eucalyptus, Melia and Coniferae) are one of the reasons for the authors in the above mentioned paper to give a tentative explanation to the present large distribution of this species in the State. The here reported observations add new contributions to this hypothesis.

Phaeographina caesiopruinosa (Fée) Müll. Arg.

On Melia azedarach in a garden, G/17. Formerly known from the Municipalities of Canoas (Redinger 1935) and Porto Alegre ( Redinger 1935; Osorio, Aguiar & Homrich 1981.

Phaeographis lobata (Eschw.) Müll. Arg.

On Melia azedarach in a garden, G/16. In Rio Grande do Sul State this species is known only from the Municipality of Torres in the northeastern corner of the State (Osorio & Fleig 1982).

Phaeographis medusiformis (Krempelh.) Müll. Arg.

On Melia azedarach in a garden, G/18a. Formerly known from the Municipalities of Cachoeira do Sul (Redinger 1935a) and Torres (Osorio & Fleig 1982).

Physcia alipolia (Ehrh.) Hampe

On trunk of Phyrolacca dioica, G/21. In the State only known from the Municipality of Montenegro (Osorio, Aguiar & Citadini 1980).

Pseudoparmelia carneopruinata (Zahlbr.) Hale.

On Jacaranda acutifolia at street sidewalk, G/2. Formerly recorded from Montenegro (Osorio, Aguiar & Citadini 1980) and Torres (Osorio & Fleig 1982).

Pyxine endoleuca (Müll. Arg.) Vain.

On trunk of Phytolacca dioica, G/9. First record for Rio Grande do Sul State.

Trypethelium ochroleucum Nyl.

On Melia azedarach in a garden G/15. Already reported from Canoas and Sao Leopoldo (Malme 1925) and Viamao (Osorio 1981).

## SUMMARY

Seventeen lichen species collected in Guaiba City are listed. Heterodermia magellanica, H. propagulifera and Pyxine endoleuca are recorded for Rio Grande do Sul State for the first time. Seven other species are added to the known flora of the Great Porto Alegre.

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#### Publication dates

- Volume 50, Number 6 -- April 23, 1982  
 Volume 50, Number 7 -- May 17, 1982  
 Volume 51, Number 1 -- May 13, 1982  
 Volume 51, Number 2 -- June 4, 1982  
 Volume 51, Number 3 -- June 10, 1982  
 Volume 51, Number 4 -- July 13, 1982  
 Volume 51, Number 5 -- July 30, 1982

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