SERIES OF REVISIONS OF APOCYNACEAE
PART XXIV

A REVISION OF THE TRIBE AMBELANIEAE (APOCYNACEAE-PLUMERIOIDEAE)

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INTRODUCTION

The present paper is a monographic revision of the six genera and seventeen species comprising the wholly neotropical tribe Ambelanieae, with two of the genera described herein as new. The genera of Ambelanieae with the number of species in each are: *Ambelania* Aublet (3), *Mucoa* Zarucchi (2), *Spongiosperma* Zarucchi (6), *Molongum* Pichon (3), *Rhigospira* Miers (1), and *Neocouma* Pierre (2). In addition to the two new genera, two new species are described and nine new combinations are made. This revision is based upon the study of specimens from more than fifty herbaria, and upon field studies made by the author in Colombia and Brazil on eight species in five of the six genera.

TAXONOMIC HISTORY

The first description and illustration of a species belonging to the tribe Ambelanieae appeared in AUBLET (1775), *Histoire des plantes de la Guiane françoise* under 'Pentandria, Monogynia' of the Linnaean sexual system. The species, *Ambelania acida*, was based on a collection made in the vicinity of Cayenne during Aublet's residence in the French colony (1762–64). The name *Ambelania*, as with most of Aublet's generic names, was formed by the Latinization of one of the local Galibi names for the plant, 'Ambelani'.

Until 1860, *Ambelania* included *A. acida* as the only species. Five new species and one variety from Brazil, and one species from French Guiana, were added by MUELLER (1860a, 1860b). These species were: *Ambelania cuneata, A. macrophylla, A. quadrangularis, A. tenuiflora* with var. *tenuiramea*, and *A. sagotii*. MUELLER (1860a) also made the combination *A. laxa*, based on *Tabernaemontana laxa* Bentham.

MIERS (1878) described a new species, *A. cucumerina*, which is shown in the present work to consist of material of two distinct species – *Ambelania acida* and *Spongiosperma macrophyllum*. MIERS excluded two of MUELLER's species from *Ambelania* (*A. quadrangularis* and *A. macrophylla*), placing them in his new genus *Rhigospira* (*R. quadrangularis* and *R. venulosa*, respectively). *Rhigospira* was included by MIERS in the tribe Tabernaemontaneae, and included seven species previously treated by MUELLER (1860a) under *Tabernaemontana* sect. *Stenocephalium* and under *Ambelania*. Four of the species of *Rhigospira* recognized by MIERS are referable to *Macoubea*, and the remaining three represent species of *Neocouma, Spongiosperma*, and *Rhigospira* sensu stricto.

Rhigospira was not accepted by several subsequent reviewers of the Apocynaceae. BAILLON (1891) in *Histoire des Plantes* and SCHUMANN (1895) in Engler and Prantl, *Die Natürlichen Pflanzenfamilien* included the genus, along with numerous other generic segregates, in synonymy under *Tabernaemontana*. SCHUMANN listed *Ambelania* as containing six species, yet he named only *A. acida, A. laxa*, and *A. macrophylla*.

PIERRE (1898) described *Neocouma*, based on *Tabernaemontana ternstroemiacea* Muell.-Arg.

HUBER (1902) described *Ambelania grandiflora* with the common name 'Molongó' from near Belém at the mouth of the Amazon River. In the protologue, he compared the new species to *A. macrophylla* from the upper Rio Negro.

In 1910, GLAZIOU noted *Ambelania camporum* [nomen nudum] in his list of plants from central Brazil. MONACHINO (1945) questioned its determination and placement in *Ambelania*, and PICHON (1948) listed it as referable to *Secondatia densiflora* A. De Candolle.

In the 1930's, several new species in *Ambelania* and *Neocouma* were described from Amazonian Brazil. MARKGRAF (1932b) described *Neocouma duckei*, the second species in that genus. This species was later transferred to *Ambelania* by MONACHINO (1945) under the new name *A. markgrafiana*, since the binomial *A. duckei* was already in use. Two additional species of *Ambelania* were described by MARKGRAF (1935): *A. zschokkeiformis* and *A. duckei*, both from central Amazonia. In the current revision, they are placed in the genera *Molongum* and *Ambelania* respectively.

MARKGRAF (1941) provided a brief review of *Ambelania*, dividing the genus into two sections based on inflorescence position. He also made the new combination '*Ambelania lucida* (Humb. & Bonpl.) Mgf.', a species which had been included in '*Lacmellia*' by MIERS (1878).

MONACHINO (1945) included eleven species in his 'Revision of *Ambelania*, inclusive of *Neocouma*', proposing four sections: 'Acidae', 'Neocoumae', 'Quadrangulariae', and 'Laxae'. Since these sections were not accompanied by Latin diagnoses, they were not validly published.

PICHON (1948) proposed a new tribe, Ambelanieae ('Ambélaniées') with two subtribes (Ambelaniinae and Macoubeinae) to include five American genera. The five genera were: *Ambelania, Molongum, Rhigospira, Neocouma,* and *Macoubea*. PICHON considered *Ambelania* to consist of three species in two sections, 'Euambelania' and 'Neocoumopsis'. These names are not validly published. 'Euambelania' contained two species, *A. acida* and *A. duckei*, with *A. cucumerina* treated as a synonym of *A. acida*. 'Neocoumopsis' consisted of only one species, *A. markgrafiana*. *Molongum* Pichon was described as a new genus, equivalent to '*Ambelania* sect. Laxae' of MONACHINO (1945), with the type species designated as *M. laxum*. Pichon divided the genus into three sections (*Trichosiphon, Coilanthera,* and *Oligoon*) with a total of six species. The section *Trichosiphon* serves as the basis for the genus *Spongiosperma*, described herein. PICHON (1948) also emended the genus *Rhigospira* to include a single species, *R. quadrangularis*, and retained *Neocouma* as a monotypic genus.

ROBERT WOODSON, in SCHULTES (1951), described *Ambelania lopezii* from the Colombian-Brazilian border; *A. lopezii* is here placed in synonymy under *Spongiosperma macrophyllum* (basionym: *Ambelania macrophylla*).

MONACHINO (1958) described *Ambelania oleifolia* (as '*oleaefolia*') from Venezuela, and in 1961 added a new variety, *A. 'oleaefolia'* var. *riparia*. Both of these taxa are treated herein as distinct species of *Spongiosperma*.

In 1971, MARKGRAF described two new species of *Ambelania* from Venezuela and Brazil. *Ambelania longiloba* was described from the vicinity of Manaus (MARKGRAF in PRANCE, 1971b), and *A. lanceolata* from the Orinoco basin of Venezuela (MARKGRAF, 1971). Both of these new species are referable to *Spongiosperma* in the present treatment.

Ambelania pantchenkoana Markgraf was described in 1975 from the Venezuela-Brazil border, and is referable to the genus *Mucoa*. *Ambelania parviflora*, placed herein as the second known species of *Neocouma*, was further added by MARKGRAF in 1983.

In 1975, BOITEAU and SASTRE discussed the systematic position of *Macoubea*, removing it from the tribe Ambelanieae; it had been placed by PICHON (1948) in its own subtribe. The new tribe Macoubeae was described and placed with four additional tribes in the subfamily Tabernaemontanoideae. BOITEAU, ALLORGE, and SASTRE (1978) validated the tribal name Ambelanieae, attributing it to PICHON. With the exception of the removal of *Macoubea* from the Ambelanieae, they accepted the treatment by PICHON (1948) recognizing four genera: *Ambelania, Molongum, Rhigospira*, and *Neocouma*.

MORPHOLOGY AND ANATOMY

Habit

The seventeen known species in the Ambelanieae consist of woody shrubs to small or medium-sized trees which under normal conditions have a single erect trunk. *Spongiosperma oleifolium*, endemic to the base of Cerro Yapacana in Venezuela, is the most diminutive species, with fertile collections gathered from individuals less than 0.5 m in height. the tallest individual reported is a collection of *Rhigospira quadrangularis* (*Berlin 3519*) from the Peruvian Amazon which measured 30 m. Most species in the tribe have individuals which rarely attain a height of over 15 m. In addition to *R. quadrangularis* only three other species, *Ambelania acida, Mucoa duckei*, and *Neocouma ternstroemiacea*, are known from individuals greater than 15 m tall.

Trees of *Ambelania, Mucoa, Rhigospira*, and *Neocouma* are known only from *terra firma* forest where they usually form part of the lower story below the canopy. Trees and shrubs of *Spongiosperma* and *Molongum* are found in riparian habitats, with *M. lucidum* known from both riparian and savanna areas of the upper Rio Negro.

Local conditions affect the habit of the trees within the constraint of the individual growth pattern for the species. Availability of sufficient light and nutrients, and the degree of crowding from adjacent trees all affect the eventual habit of the tree. Those species of *terra firma* forest have branches restricted to the upper portion of the tree and have a straight bole. The sharply ascending branches (due to the crowding of other trees) may become horizontal and the branchlets pendulous when laden with mature fruit. Individuals of riparian or savanna habitats (i.e., species of *Spongiosperma* and *Molongum*) are more irregu-

larly branched, although the basic architectural plan is one of dichotomous branching following a terminal inflorescence. Riparian trees of *Molongum* have trunks which may be swollen at the base.

The architecture of *Molongum lucidum*, which has terminal inflorescences, appears to fit Scarrone's Model. According to this model, there is a rhythmically active orthotropic terminal meristem with the trunk bearing branches in tiers; these orthotropic branches are then sympodially branched due to terminal flowering (HALLÉ, OLDEMAN & TOMLINSON, 1978). Some individuals of *M. lucidum* which I observed personally in the Colombian Vaupés (e.g. *Zarucchi 2139, 2483*) appear to adhere more closely to Leeuwenberg's Model, in which the apical meristem of the main trunk is aborted early in development, producing dichotomously branching modules, the growth of which is terminated by inflorescences. HALLÉ (1978) has shown that a species which corresponds to Leeuwenberg's Model when grown in open areas may follow Scarrone's Model when grown in the shade. In this case the difference between the two architectural models is determined by the early abortion or continued activity of the apical meristem respectively. Since the change from Scarrone's Model to Leeuwenberg's Model involves primarily the abortion of the apical meristem (which may happen at any time, even by the accidental destruction of the growing apex), the latter model may be considered as derived from the former.

The normal growth of *Rhigospira quadrangularis*, which is encountered in *terra firma* forest and not in open areas, fits Scarrone's Model. Individuals of *Spongiosperma*, like those of *Molongum* and *Rhigospira*, have terminal inflorescences which cause the vegetative apex to become dichotomously branched. Depending on other factors, as discussed above for *M. lucidum*, either Scarrone's Model or Leeuwenberg's Model would apply to trees of *Spongiosperma*.

In *Ambelania* and *Mucoa* the inflorescences are axillary. In *Mucoa* the inflorescences develop in a manner similar to that found in *Couma* of the Carisseae, one of the many similarities which suggested the anagrammatic name of *Mucoa* for the new genus described in the following pages: the inflorescences are axillary to and develop simultaneously with the terminal vegetative axis. In *Couma* the leaves and branches occur normally in whorls of three or four. According to HALLÉ, OLDEMAN and TOMLINSON (1978), *Couma guianensis* represents Rauh's Model. Rauh's Model is characterized by a monopodial trunk which grows rhythmically, thus producing tiers of branches; the trunk and branches are morphologically identical. Inflorescences are always axillary and do not affect the shoot system. This model may also be represented by *Mucoa*, according to my own observations of a mature tree of *M. duckei* (*Zarucchi et al. 1852*) 15 m tall.

Bark

The bark of *Rhigospira quadrangularis* and *Spongiosperma macrophyllum* is thin and white to greyish white. In *Mucoa duckei* the bark is rather thick (ca. 8 mm), brownish grey when fresh turning to chocolate brown when dried, and exudes a moderate amount of white latex which is not sticky. In some of the

other species of the tribe, including *R. quadrangularis* and *S. macrophyllum*, the latex is abundant and sticky.

Bark samples of *Mucoa duckei* show short (1–2 cm) longitudinal fissures which appear as eruptions from below the surface. The bark of *Rhigospira quadrangularis*, however, is covered with numerous fine cracks oriented transversely, as well as irregular wavy vertical connecting fissures.

The bark of *Molongum lucidum* is grey, relatively thin, and has a flaking appearance, especially on older trunks.

Wood

Detailed information on wood structure of representative species of Ambelanieae is presented in Table 1.

In the first reported study of the wood structure of the tribe, WEBBER (1945) considered the minute structure of *Molongum laxum* (under the name *Ambelania*) based on a single voucher specimen, *Ducke 163*, from the upper Rio Negro of Brazil. She noted the extreme lightness of the wood, referring to the notes published by BENTHAM (1841), and attributed this character to the thin-walled cells which make up the wood. RECORD and HESS (1943) reported that the wood has a weight of 9 pounds per cubic foot, and WEBBER (1945) mentioned its possible usefulness where lightweight woods are desired.

The wood structure of *Molongum laxum* is diffuse-porous, with inconspicuous growth rings. The dominant cell types in the wood are imperforate tracheary elements. The pores are minute to medium-sized, and in most woods examined, their frequency of occurrence ranged from solitary pores to radial multiples of several pores. Radial multiples of ten or more pores are common in species of *Molongum*. The vessels in wood of *M. laxum* are difficult to distinguish from other cell types because of similarities in cell diameter and wall thickness. The vessel element perforations are simple with wide rims at the ends or at some distance from the ends of the vessel element. The perforations are horizontal to oblique in orientation, and more than two perforations per vessel element may be present. Wall pitting is minute and distinctly bordered, with no spiral thickenings. The parenchyma is generally apotracheal-diffuse with few scattered cells seen in cross-section, although in several cases, short wavy tangential bands of cells (metatracheal parenchyma) may be present. The wood fibers are not septate, and no crystals have been observed in the wood. Rays are uniseriate, biseriate, rarely triseriate, and heterogeneous. Square and upright cells normally occur at the ends of the rays. Radial channels are encounted in wood samples, which RECORD and HESS (1943) and WEBBER (1945) attributed to distintegrated leaf traces.

Stems and Nodes

The stems of plants in the Ambelanieae are usually terete although some are laterally compressed; in the case of *Rhigospira* the young stems are sharply quadrangular. The young stems in *Molongum* are the thinnest in the tribe, being only about 2 mm in diameter; plants of *Neocouma* have the thickest stems, measuring

TABLE 1. Summary of Wood Characteristics and Measurements for Representative Species in the Ambelanieae.

	Mucoa duckei	*Spongiosperma macrophyllum*	*Molongum laxum*[a]	*Molongum lucidum*	*Rhigospira quadrangularis*
Growth rings	Indistinct	Indistinct	Barely visible	Indistinct to slightly visible	Indistinct
Pore arrangement	Diffuse-porous	Diffuse-porous	Diffuse-porous	Diffuse-porous	Diffuse-porous
Organization of vessel elements	1–3(–4), usually in pairs, scattered	1–3(–5), usually in pairs or triplets, scattered	2–12, usually 2–7, scattered	1–10(–15), usually 4–7, scattered	1–3, usually in pairs, scattered
Average vessel density (range) [N = 10] [per mm²]	8.3 ± 2.1 (5.1–11.1)	16.8 ± 1.9 (13.7–20.7)	20 (8–37)	30.8 ± 4.3 (23.9–36.8)	8.8 ± 2.4 (6.0–13.7)
Average radial vessel diameter (range) [N = 25] (μm)	122 ± 26.2 (56–161)	95.7 ± 19.1 (49.6–124)	mostly 60–70 (33–89)	79 ± 20 (43–118)	119 ± 22.1 (74–155)
Average vessel element length (range) (μm) [N = 25]	660 ± 223 (308–1078)	832 ± 227 (493–1263)	mostly 500–600 (385–855)	578 ± 130 (370–785)	973 ± 205 (585–1355)
Parenchyma organization	Apotracheal-diffuse and in irregular, wavy tangential bands	Apotracheal-diffuse, scattered, scanty	Metatracheal, in bands one cell wide	Apotracheal-diffuse, scattered, sparse	Apotracheal, sometimes forming wavy tangential lines
Rays	Heterogeneous, usually biseriate	Heterogeneous, uniseriate or biseriate	Heterogeneous, uniseriate or biseriate, rarely triseriate	Heterogeneous, uniseriate or biseriate	Heterogeneous, biseriate or sometimes triseriate
Average ray density (range) [N = 10] (per mm)	11.8 ± 1.9 (10–16)	8.9 ± 2.1 (6–12)	(7–11)	[b]	10.5 ± 1.8 (8–14)
Average ray height (range) [N = 25] (μm)	832 ± 216 (459–1500)	591 ± 190 (236–1017)	(35–450)	[b]	617 ± 244 (248–1128)

[a] Information based on Webber (1945) where the sample sizes for the various statistics are not given.
[b] Measurements not made due to poor condition of material.

more than 1 cm in diameter in many specimens. In most species the terete stems of the internodal regions become compressed when approaching a node from below. The direction of compression below the node is perpendicular to the plane of the opposite leaves at the node. In many cases the young stems have conspicuous longitudinal grooves which run along opposite sides of the compressed portion of the stem. These grooves are very apparent in elongating vegetative shoots of *Mucoa duckei*; in this instance the groove is so deep that the young stem appears as two fused terete stems. The leaf arrangement along the stem is decussate and the direction of compression of the stem above the node is always perpendicular to the foliar plane at the previous node.

The young stems of *Rhigospira* provide a clear vegetative character for identification. These angled stems are green and square or rectangular in cross-section; with age and secondary growth they become brownish grey and terete.

Species in the Ambelanieae have decussate leaves with unilacunar, single trace nodes; the trace departs the stele at or just below the level of the leaf attachment to the stem. The traces are simple and continuous, lack rib traces, and are usually U-shaped at the nodal gap. Upon entering the petiole the trace forms a closed siphonostele which remains in that form in the lower portion of the petiole until it once again forms a U-shaped trace that enters the midrib of the blade.

One special feature of the nodes of the Ambelanieae is the presence of an interpetiolar line which may be confused with a stipular scar. Due to such a confusion *Molongum lucidum* was first assigned to the rubiaceous *Psychotria*. This interpetiolar line or ridge is a thin band of tissue which connects the petiole bases of the opposite leaves and may contain conspicuous or hidden glands capable of producing a resinous exudate. These glands give the flowers and inflorescences of *Ambelania* and *Mucoa* (the two genera in the tribe with axillary inflorescences) a sticky and resinous appearance. In *Rhigospira* the dried exudate protects the terminal bud from damage, presumably from insect herbivores. The petioles at the point of attachment contain many flattened glands which are tightly appressed in the axils and are visible even on older leaves. The glands of *Mucoa* are clavate and produce a resinous exudate which not only protects the developing vegetative shoot but also the simultaneously elongating inflorescence axes.

The leaf axils of *Neocouma ternstroemiacea* contain a single small saucer-shaped gland on the adaxial surface of the petiole. *Couma* in the Carisseae has a similar type of gland in the same position.

Leaves

The leaves of all members of the Ambelanieae are decussate and uniformly spaced with discrete internodal regions along the ultimate branches of the shrub or tree. Leaf shapes may be lanceolate, elliptic, ovate, oblong, or obovate, and they may range from about 5 to over 40 cm in length. Leaves on sterile branches or older leaves some distance from the inflorescence usually far exceed these limits in size. The leaf bases and apices are also highly variable.

The petiole ranges from less than 5 mm to more than 40 mm in length and

is usually conspicuously canaliculate, especially near the point of attachment to the stem. Glands are frequently present in large numbers and are packed together tightly in the leaf axils.

Following the terminology proposed by HICKEY (1979) for the architecture of dicotyledonous leaves, all plants of the Ambelanieae have camptodromous leaves, as the secondary veins do not terminate at the leaf margin. Illustrations of cleared leaves from six representative species, one from each of the six genera in the tribe, are presented in Photographs 1 and 2. Fine structure of the leaf venation (at 15 × or 30 ×) is also presented for the same leaf samples. All genera except *Rhigospira* have brochidodromous-type venation. In many cases the leaf margin is or becomes revolute upon drying and may somewhat obscure the connecting intramarginal vein. The leaf architecture of *Rhigospira* is eucamptodromous. In *Rhigospira* the secondaries are connected to the superadjacent secondaries by a number of cross veins; see Photograph 2C. The leaf venation of nearly all species of the tribe is closely reticulate, although leaves in individuals of *Molongum zschokkeiforme* have a rather open and irregular reticulation.

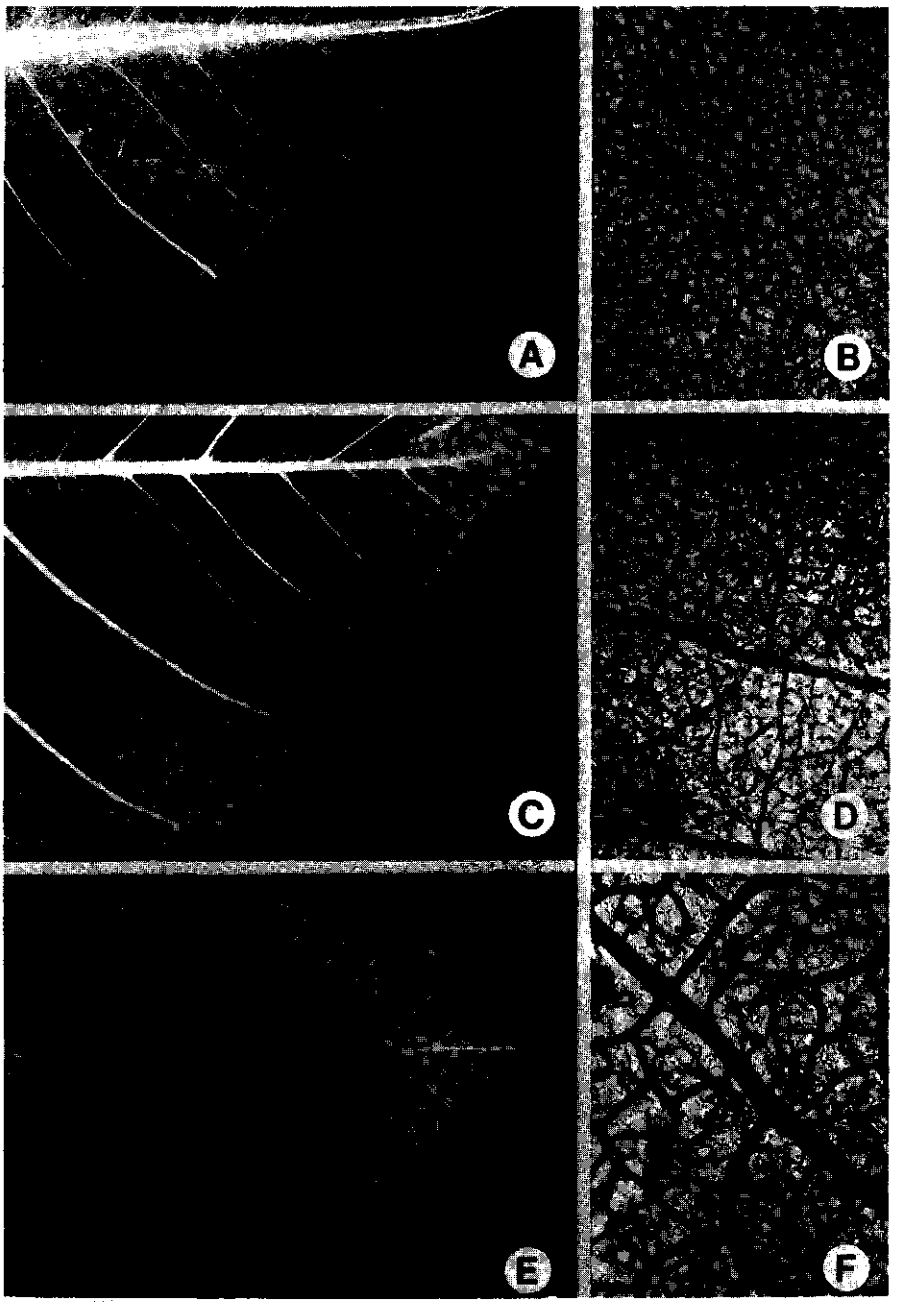
The thick leaves of *Neocouma ternstroemiacea* not only have a fine reticulation of interwoven veins and veinlets but also contain sclerenchymous cells within the leaf tissue. The sclereids of *Neocouma* were first observed and mentioned in the generic protologue by PIERRE (1898); Photograph 2F shows a 30 × magnified section of cleared leaf tissue from *Fróes 475* which illustrates the very compact arrangement of the vascular system with sclereids. The three known species of *Ambelania* also contain sclereids in the leaf tissue. In both *Ambelania* and *Neocouma* branched and unbranched filiform sclereids are present, sometimes with one to several short spicule-like processes. In *A. duckei* (and other species of *Ambelania*) unbranched sclereids predominate, whereas in the observed samples of *Neocouma* both branched and unbranched sclereids occurred in approximately equal numbers.

Inflorescence

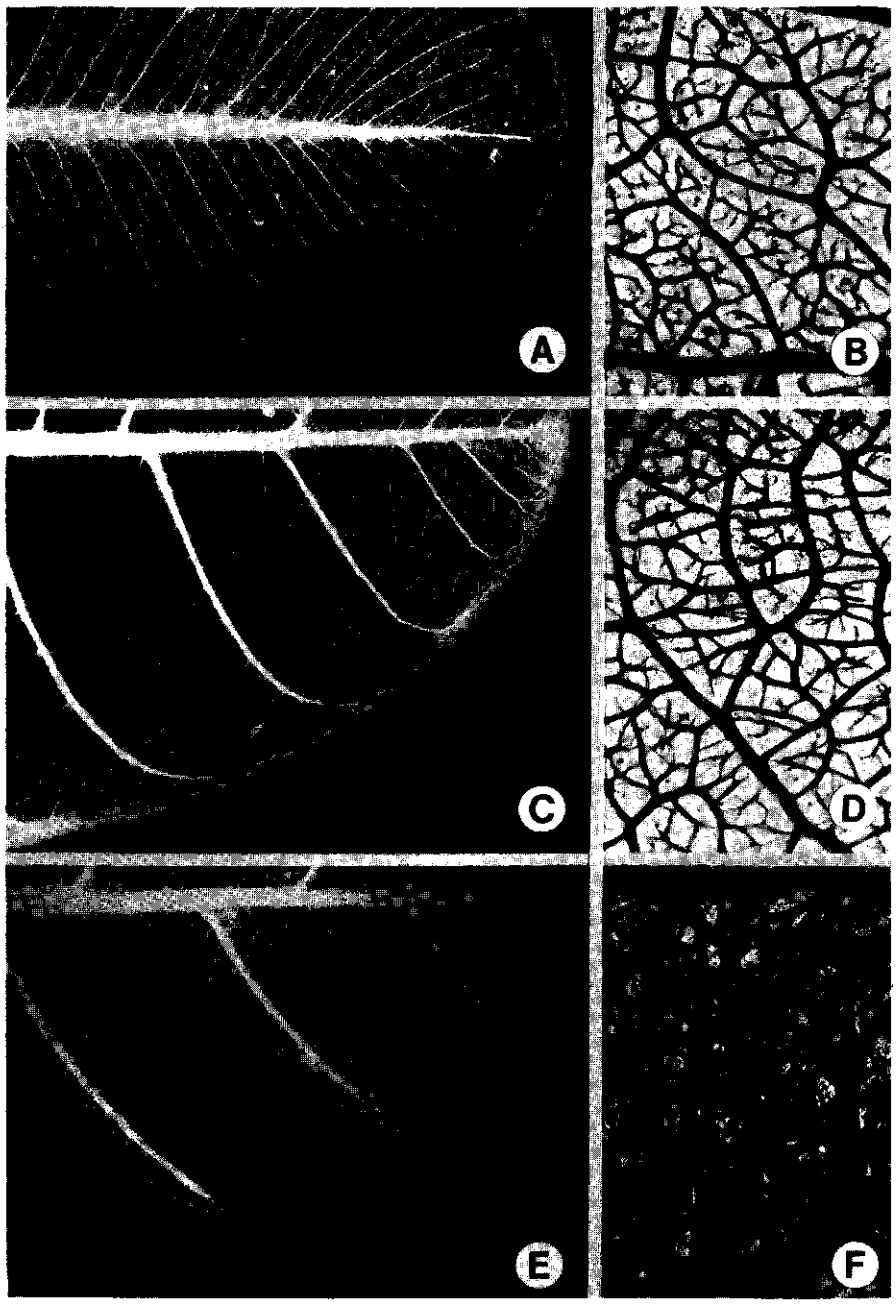
The inflorescence typically found in the tribe Ambelanieae is a many-flowered, axillary or terminal cyme. According to WOODSON (1935), in his study of inflorescence types within the Apocynaceae, such a dichasial cyme represents the 'primitive' type of inflorescence for the family. In the Ambelanieae the inflorescences may be open and lax, or compact.

The inflorescences contain usually small and scale-like bracts and bracteoles. In *Neocouma ternstroemiacea*, however, the bracts are large, foliaceous and calycine, growing up to 1 cm in length. The common peduncle may be either severely reduced, in *Ambelania* and *Mucoa*, or rather long, usually over 5 cm in *Rhigospira quadrangularis*, *Molongum laxum*, and *M. lucidum*.

The axillary inflorescences of *Ambelania* are few-flowered, with rarely more than eight flowers and buds visible at any one time. The peduncle is reduced or absent. In *Ambelania*, the inflorescences are usually borne several nodes from the growing apex of the stem, and they may continue to produce flowers well after the subtending leaves have fallen.



PHOT. 1. Cleared and Stained Leaves of Representative Species of *Ambelania* , *Mucoa*, and *Spongiosperma*. A–B. *Ambelania acida* (Fróes 1956); C–D *Mucoa duckei* (Zarucchi et al. 1852); E–F. *Spongiosperma riparium* (Schultes & López 10132). (A, C, E. 1.5 ×; B, D. 15 ×; F. 30 ×).



PHOT. 2. Cleared and Stained Leaves of Representative Species of *Mologum, Rhigospira* , and *Neocouma.* A–B. *Molongum lucidum* (Zarucchi 2139); C–D. *Rhigospira quadrangularis* (Zarucchi 1570); E–F. *Neocouma ternstroemiacea* (Fróes 475). (A, C, E. 1.5 ×; B, D. 15 ×; F. 30 ×).

In *Mucoa* the development of the axillary inflorescences is simultaneous with the elongation of the terminal vegetative shoot. The peduncle is reduced or absent, and the total number of flowers within an individual inflorescence (two per node, one in each of the opposite leaf axils) is much smaller than in *Ambelania*.

The major branching in the inflorescence reflects the decussate phyllotaxy of the vegetative portions of the plants. These major branches within the inflorescence are opposite and subtended by bracts. Subsequent branching which might occur along the primary inflorescence axis, such as in *Molongum* and *Rhigospira*, are perpendicular to the plane of the first pair of branches. Lateral branches within an inflorescence are also determinate; the terminal flowers of the branches open only after the terminal flower on the main axis of the inflorescence.

The flowers and inflorescence axes in individuals of *Ambelania* and *Mucoa* may have a sticky, resinous appearance due to the exudate produced by the glands in the leaf axils. The other four genera in the tribe do not exhibit this resinous appearance or property even though they too have axillary glands.

Spongiosperma, Molongum, Rhigospira, and *Neocouma* have strictly terminal inflorescences which usually bear many white flowers. In the case of *Neocouma*, terminal inflorescences may occur at the apex of short side branches. In *Spongiosperma* and *Neocouma* the inflorescence is compact, with the flowers radiating from a point atop the peduncle. The compact aspect of these inflorescences is due to the relatively short lateral branches and pedicels.

The pedicels in individuals of the Ambelanieae measure usually less than 1 cm in length and contain two small scale-like bracteoles. Within each bracteole is a bud capable of producing several additional flowers from the bracteoles on its own pedicel. The bracteoles may occur at any point along the pedicel, but in most cases they are located near the middle. In this manner those flowers which develop later tend to overtop the earlier flowers from the bracteoles of which they have developed. In congested inflorescences not only are there few inflorescence branchlets, but also the pedicels are relatively short and/or the bracteoles are located primarily at the base of the pedicels.

Flowers

PICHON (1948) used two floral characters to differentiate this tribe from the other berry-fruited genera in the tribe Carisseae: the ring of tissue at the base of the clavuncle and the caudate anthers.

The flowers of the Ambelanieae are pedicellate with a cup-shaped, five-lobed calyx containing usually a variable number of glandular structures at the base within. The flowers are pentamerous, with the salverform corolla ranging from white to orange and frequently fragrant. The five corolla lobes are contorted in bud and twisted to the left at anthesis. The epipetalous stamens are inserted in the lower part of the corolla tube, with the filaments adnate to the tube. The anther cells open by slits, and have apices composed of sterile tissue. The gynoecium includes a syncarpous superior ovary with axile placentation. The ovules are numerous and are attached to the placental septum. Several different modes

of development can occur giving rise either to a one- or two-celled fruit. The clavuncle is borne at the top of the style and positioned near the middle of the corolla tube, at the same level as the stamens but not affixed to them. The clavuncle has a ring of tissue at the base, sometimes flange-like, and is usually five-angled at the apex.

Flower size varies from those in *Molongum*, with the corolla tube less than 1 cm in length, to those in *Spongiosperma*, with the tube surpassing 3 cm.

Calyx

The calyx consists of five sepals which are connate near the base, completely glabrous, and tightly clasped to the base of the corolla tube. The sepals vary in length from about 1 to 14 mm in length and are quincuncially imbricate. In some cases the sepals may vary slightly in size within a single calyx.

The smallest calices occur in species of *Molongum* and in *Rhigospira quadrangularis*, where they may be as small as 1 mm in length. The largest sepals by far are found in *Neocouma ternstroemiacea*, where they measure up to 14 mm long and 7 mm wide. The calyx is persistent through mature fruit in all species of the tribe except for *N. ternstroemiacea*, where they are caducous early in fruit development. The sepals do not enlarge appreciably during fruit development, even though they may become thickened and slightly or markedly distended by the expansion of the fruit and attached pedicel. In the fruit of *Rhigospira* the sepals become hidden or barely perceptible at the articulation between the pedicel and the fruit. The pedicel undergoes a non-uniform increase in diameter along its length; the end attached to the fruit expands more, thus giving the fruit pedicel the shape of a frustum or truncated cone.

Corolla

The corolla is sympetalous, with five lobes contorted in bud, and is salverform with a narrow tube, very constricted at the orifice, swelling near or below the middle of the tube where the epipetalous stamens are inserted. The corolla is usually white or cream-colored, but may be yellow or somewhat orange in *Molongum*.

The smallest flowers are found in *Molongum*, where the corolla tube may be shorter than 4 mm, and the largest flowers are those of *Spongiosperma*, with corolla tubes up to 30 mm in length.

Pubescence occurs generally only within the corolla tube in the area between the insertion of the stamens and the small orifice. The portions of the adaxial surface of the corolla lobe adjacent to the opening may also by slightly to densely pilose. In *Molongum*, however, the flowers are completely glabrous.

The corolla lobes are twisted in bud. After anthesis the corolla lobes become reflexed; because of the overlap of the lobes where they are attached to the tube, the lobes appear to spiral to the left when viewed from above.

Androecium

The five anthers with their filaments are adnate to the corolla tube at or slight-

ly below the middle of the tube. The position of the stamens is evident from an external view, due to the slight to marked dilatation of the tube at that point. The anthers are lanceolate with auriculate to sagittate bases, sessile or subsessile, from about 2 to 10 mm in length. The stamens are positioned at the same level within the flower as the clavuncle, but they are not attached to this organ by an exudate as is the case in some other members of the Apocynaceae.

The introrse anthers are attached to the filaments near the base, and dehisce by two longitudinal slits. The apical portion of the anther is caudate and consists of sterile tissue. In most of the genera, the suprastaminal part of the corolla tube is pilose, with some hairs found at the point of attachment of the anther to the filament/corolla tube.

Gynoecium

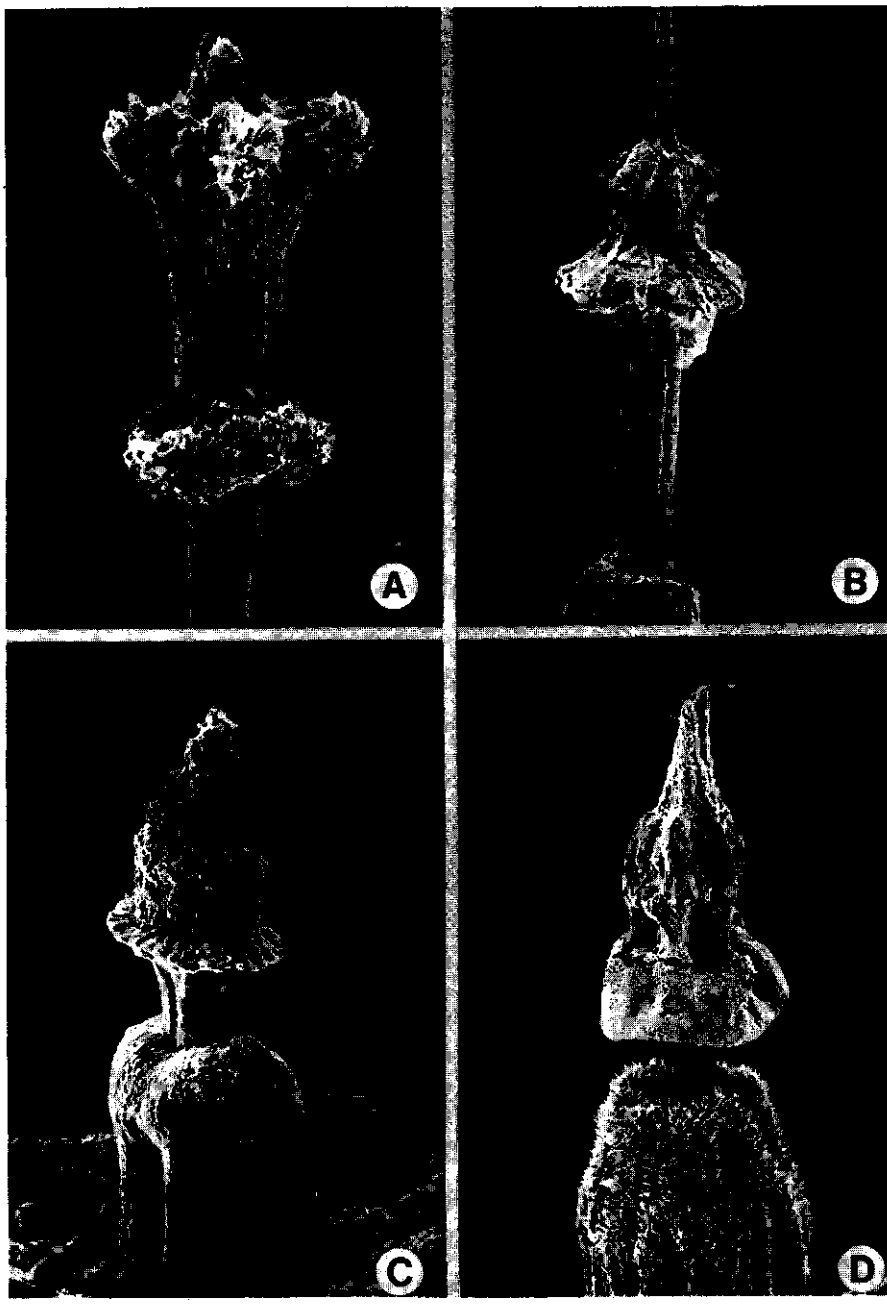
The ovary is syncarpous, glabrous, superior, bicarpellate, and bilocular with the placentation axile. The ovary is from 1 to 5 mm in height, conical, cylindrical, or ovoid in shape, and with the apex pointed, rounded, or truncate. The ovules are numerous in each of the two locules. The terminal style is from less than 1 mm to almost 10 mm in length, and surmounted by the clavuncle.

In all six genera of the tribe, the clavuncle has a thickened ring of tissue at its base, a structure which both MONACHINO (1945, 1946) and PICHON (1948) used to distinguish species contained in the Ambelanieae from members of the Carisseae. Illustrations of the clavuncle for representative species in *Spongiosperma, Molongum,* and *Rhigospira* using the scannning electron microscope are presented in Photograph 3, with an illustration of a highly similar clavuncle of *Macoubea.* The thickened ring of tissue at the base may be simple and slightly undulate as in *Spongiosperma* or flange-like as in *Rhigospira* and *Molongum.* The distal portion of the clavuncle is usually 5-lobed or 5-angled, sometimes with short, dense hairs on the lobes (see Photograph 3A). The placement of the clavuncle in relation to the anthers is such that the basal thickening of the clavuncle is at the level of anther attachment.

Fruit

The fruit in the Ambelanieae is a berry. The baccae vary in structure and appearance among the six genera, yet in all cases one finds a syncarpous, indehiscent fruit which develops from a bilocular ovary with axile placentation. Fruit variation within the individual genera is not significant. Characteristics which are useful in distinguishing the genera are: the nature of the pericarp, the number and arrangement of the seeds, the presence and type of pulp, and the one- or two-celled mature fruit.

Variation in the structure of the pericarp is extensive. It can be thick and leathery as in *Ambelania* and *Spongiosperma,* relatively thin and delicate as in species of *Molongum,* or hard and somewhat bony with a granular consistency as in *Mucoa, Rhigospira,* and *Neocouma.* The hard, granular surface of the fruit in *Mucoa* and *Rhigospira* is several millimeters thick, whereas in *Neocouma* it is crustaceous, about 1 mm thick, and somewhat brittle.



PHOT. 3. Scanning Electron Micrographs of Gynoecia of: A. *Spongiosperma macrophyllum* (Zarucchi 2435, 37.5 ×); B. *Molongum lucidum* (Zarucchi 2139, 40 X); C. *Rhigospira quadrangularis* (Zarucchi 2428, 37.5 ×); D. *Macoubea sprucei* (Zarucchi et al. 2554, 32 ×).

The baccae of *Ambelania* (sensu stricto) mature so that the partition between the two fused carpels of the syncarpous ovary remains intact and develops into a fleshy dissepiment on which many seeds are attached by fleshy funicles. *Ambelania* is unique in that the two cells remain as open cavities into which the developing seeds project. In the other cases where the septum apparently remains intact (*Mucoa* and *Molongum*), the seeds are completely embedded in the fruit pulp, and are oriented more or less in the same direction. In *Spongiosperma* the dissepiment tears during fruit maturation, leaving a one-celled fruit; the spongy seeds are attached to the fruit wall by low fleshy projections into the cavity from regions adjacent to the remnants of the septum. The seeds are packed tightly into the cavity. In *Spongiosperma*, as in *Mucoa*, the seeds are numerous (usually more than 50 per fruit) and are acropetally imbricate. The seeds in *Molongum* are few (usually 2 to 4) and their orientation is either acropetally appressed or imbricate, depending on the number of developed seeds. In *Rhigospira* they occur embedded in the fruit pulp and apparently lack any particular orientation. This may be presumed to occur in *Neocouma* as well, although only dried fruits of *Neocouma* have been available for study. Mature fruits of *R. quadrangularis* usually have 30–60 seeds whereas in *N. ternstroemiacea* the number is about 15–20.

In some collections of *Rhigospira quadrangularis* small, apparently parthenocarpic fruits without seeds are known. These aberrant fruits reach only 2–3 cm in length, are ovoid with an acute apex, and have a scarred surface.

Fruit shape varies appreciably in the several genera of the tribe. The fruits in *Ambelania* are lanceovoid or ellipsoid to ovoid or globose. In cross-section they may be round, broadly elliptic due to being slightly compressed, or pentagonal. The dried fruits of *Ambelania acida* usually have five prominent ribs running longitudinally. The fruit of *A. duckei* is ovoid with a pointed apex and numerous low, rounded ribs running the length of the fruit. In *Mucoa*, globose and ellipsoid fruits occur. In *Spongiosperma*, they are fusiform, ellipsoid, oblong, ovoid, or globose. The few-seeded fruits of *Molongum* are ellipsoid to lanceovoid. *Rhigospira* fruits may become stipitate at the base when mature and are ellipsoid to obovoid. *Neocouma* has ellipsoid or globose fruits. The size of fruit ranges from about 1 cm in *Molongum* to the large and elongate fruits of *Ambelania* which may reach 15 cm or more in length.

At maturity, fruit in most species is yellow or yellowish green. Both the exocarp and the pulp of *Mucoa duckei* are orange.

Seeds

Seeds are oblong, elliptic, or ovate in outline with the ventral surface usually compressed and the dorsal face rounded or angular. The seed coat ranges from smooth and shiny as in *Ambelania* to a tortuous, spongy and pitted surface in *Spongiosperma*. The seeds measure from about 5 mm in length in *Molongum* to 16 mm in *Neocouma ternstroemiacea*.

In the Ambelanieae the embryo is almost as long as the seed and is straight and embedded in an oily endosperm close to the usually planar ventral surface

of the seed. PICHON (1948) used the small (1–1.5 mm in length), flat, ovate to circular cotyledons as one of the key characters to separate the Ambelanieae from the Carisseae. In the Ambelanieae the straight, cylindrical radicle is at least three times as long as the cotyledons, whereas in the Carisseae, the cotyledons are equal to or longer than the radicle. The hilum is located on the ventral surface, positioned approximately over the center of the radicle, about one-third the distance from the base of the seed. The circular or broadly elliptic hilum is slightly depressed or flush with the surface of the testa in all genera except *Spongiosperma*, where there is a swelling of the spongy testa into a toroid shape around the hilum. On the ventral surface of the seeds, there is a very low, narrow, rounded ridge running from the hilum to the cotyledonal end of the seed; it is most pronounced in species of *Spongiosperma*.

Seedlings

Seedling development has been observed in *Spongiosperma grandiflorum* by the author and reported in *Ambelania acida* by BOITEAU, ALLORGE, and SASTRE (1978). In both cases the germination was epigeal; the shoot apex and cotyledons were borne upwards by the elongation of the hypocotyl.

GEOGRAPHIC DISTRIBUTION

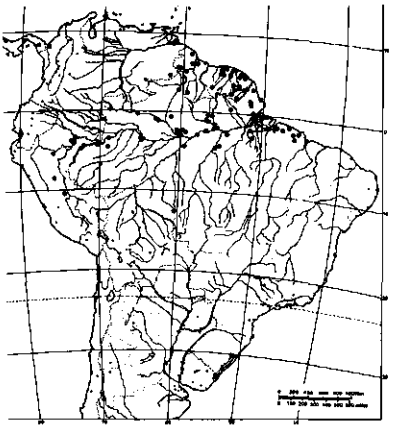
Members of the tribe Ambelanieae are restricted to northern South America with only *Rhigospira* known from west of the Andes cordillera. Generic distributions of six genera are illustrated in Maps 1–6. Distributions of individual species are illustrated in the Systematic Treatment.

CYTOLOGY

The author obtained the first approximate chromosome counts for the tribe Ambelanieae. These meiotic counts, taken from pollen mother cells, are as follows:

Species	*Voucher*	*Count*
Spongiosperma macrophyllum	*Zarucchi 2504*	n = ca. 22
Molongum lucidum	*Zarucchi 2483*	n = ca. 11
Rhigospira quadrangularis	*Zarucchi 2428*	n = ca. 11

Map 1
Ambelania

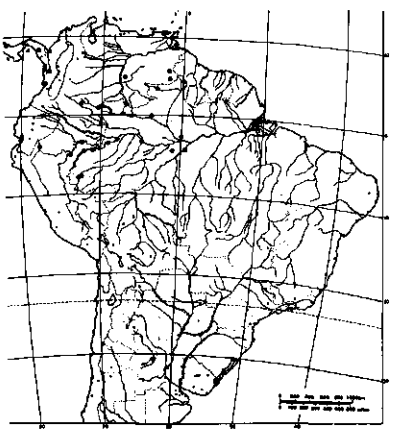


Map 2
Mucoa

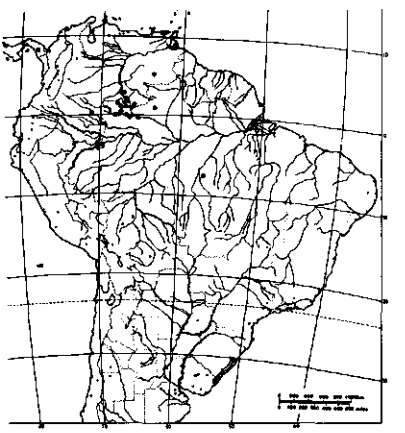
Map 3
Spongiosperma

Map 4
Molongum

Map 5
Rhigospira



Map 6
Neocouma



Maps 1 – 6. Known generic distributions for the Ambelanicae 1) *Ambelania* Aublet; 2) *Mucoa* Zarucchi; 3) *Spongiosperma* Zarucchi; 4) *Molongum* Pichion; 5) *Rhigospira* Miers; 6) *Neocouma* Pierre.

PALYNOLOGY

Pollen characteristics for representative species of Ambelanieae are summarized in Table 2, and illustrated in Photographs 4 and 5.

The pollen of species in the Ambelanieae show differences not only among the several genera but also within the samples studied. Most of the pollen samples contained grains with a variable number of apertures, ranging from three to five, sometimes within the same sample. All of the species examined had medium-sized grains (25–50 μm in diameter), colporate, globose-oblate in equatorial view, and polygonal in polar view.

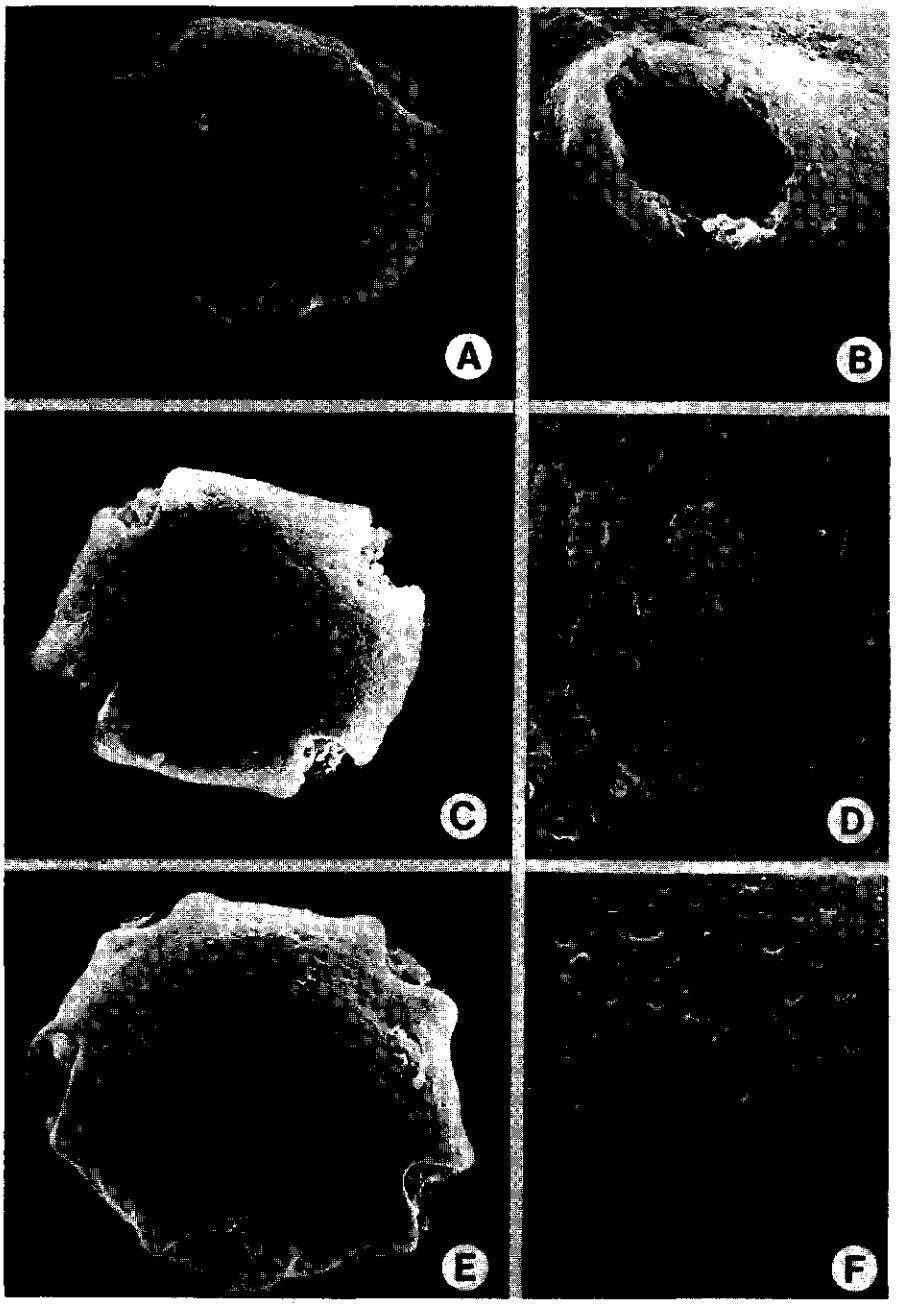
In the Ambelanieae the colpi are relatively short and extend usually no more than one-third of the distance to either pole of the grain. The apertures in most species sampled are surrounded by an annulus or thickening of the pollen wall layers. These may be quite conspicuous, as in *Mucoa* and *Spongiosperma*, making the grains appear polygonal in polar view. The pores within the colpi are conspicuous and up to ca. 5–6 μm in diameter. The pollen grains of all of the genera except *Neocouma* have a pitted surface. These foveae are usually scattered and of varying densities. Pollen of *Neocouma* have a rugulate surface. Pollen of all members of the tribe lack tectal processes.

TABLE 2. Summary of Pollen Data for Representative Species in the Ambelanieae.

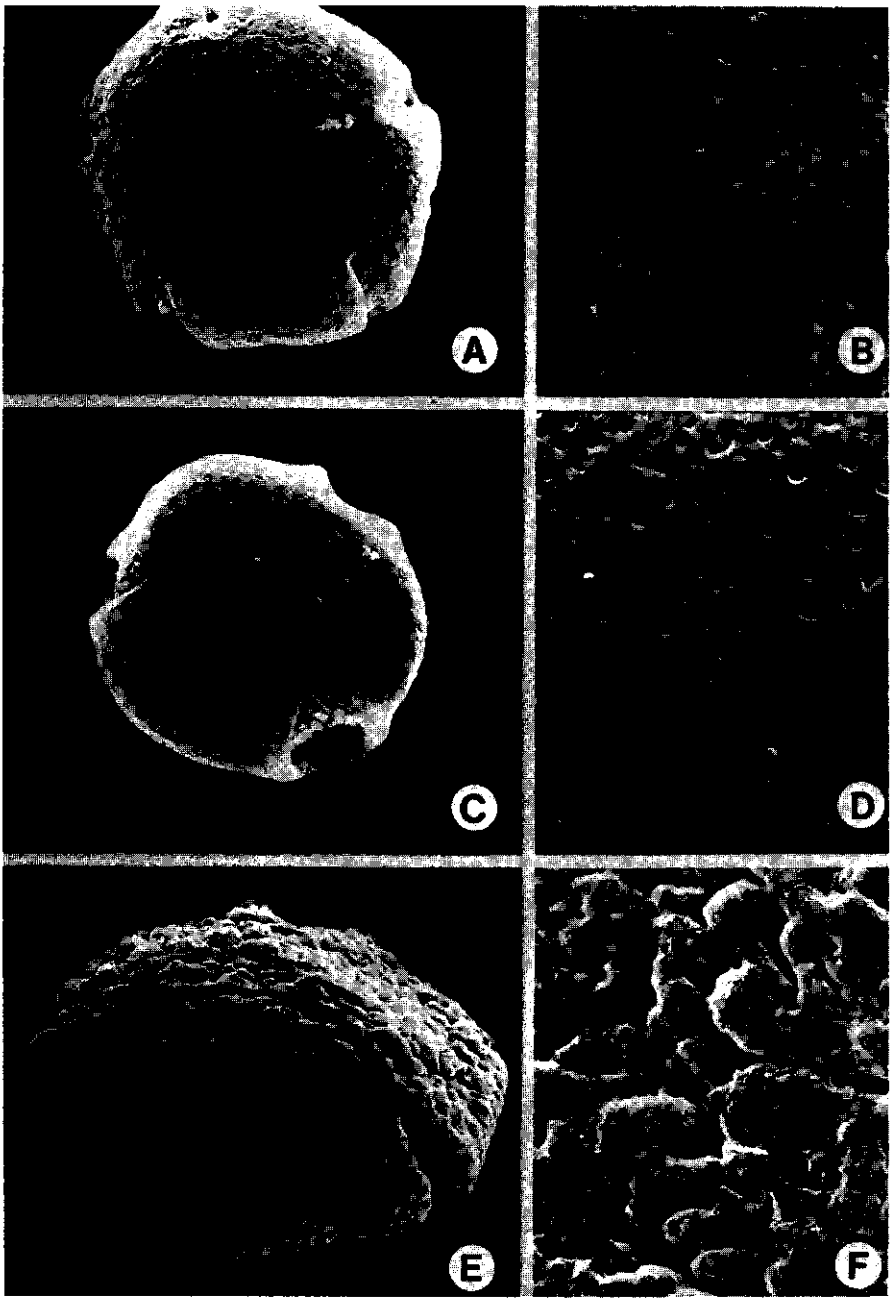
Species/Voucher (Origin)	Pollen Size (μm)[a]	Aperture	Ektexine Morpholog
Ambelania acida[b] *Irwin et al. 55676* (Surinam)	30.6–(33.9 ± 1.8)–36.7	3(–4)-colporate	foveolate
Mucoa duckei[b] *Cuatrecasas 7129* (Colombia-Vaupés)	32.9–(37.7 ± 2.3)–42.7 [N = 50]	(3–)4(–5)-colporate	foveolate
Spongiosperma grandiflorum *Pires & Black 553* (Brazil-Pará)	37.8–(44.3 ± 3.6)–52.4	4–5-colporate	foveolate
Spongiosperma macrophyllum[b] *Zarucchi & Balick 1763* (Colombia-Vaupés)	39.0–(44.7 ± 3.0)–50.0	(4–)5-colporate	foveolate
Spongiosperma riparium *Schultes & López 10132* (Colombia-Guainía)	36.6–(40.4 ± 1.6)–43.9	4–5-colporate	foveolate
Molongum laxum[b] *Ducke 44* (Brazil-Amazonas)	32.9–(36.8 ± 2.5)–41.5	(4–)5-colporate	foveolate
Molongum lucidum[b] *Zarucchi 2139* (Colombia-Vaupés)	39.0–(43.0 ± 2.5)–48.8	3(–4)-colporate	foveolate
Rhigospira quadrangularis[b]			
Maas et al. P12717 (Brazil-Acre)	29.3–(33.1 ± 1.8)–36.7	3-colporate	foveolate
Zarucchi 2428 (Colombia-Vaupés)	26.8–(30.4 ± 2.0)–35.4	3-colporate	foveolate
Neocouma ternstroemiacea[b] *Ducke 220* (Brazil-Amazonas)	43.9–(48.3 ± 2.5)–53.6 [N = 50]	3(–4)-colporate	rugulate

[a] The size represents the equatorial diameter of 25 (or 50, if so noted) pollen grains mounted in glycerine jell using light microscopy; the size range, mean, and standard deviation are given to the nearest 0.1 μm for eac sample.

[b] Illustrated by SEM micrographs in the present work.



PHOT. 4. Representative Pollen Grains of: A–B. *Ambelania acida* (Irwin et al. 55676; A. 1500 ×, B. 3750 ×); C–D. *Mucoa duckei* (Cuatrecasas 7129; C. 1500 ×, D. 7500 ×); E–F. *Spongiosperma macrophyllum* (Zarucchi & Balick 1763; E. 1500 ×, F. 7500 ×).



PHOT. 5. Representative Pollen Grains of: A–B. *Molongum laxum* (Ducke 44; A. 1500 ×, B. 7500 ×); C–D. *Rhigospira quadrangularis* (Maas et al. P12717; C. 1500 ×, D. 7500 ×); E–F. *Neocouma ternstroemiacea* (Ducke 220; E. 1500 ×, F. 7500 ×).

The primarily tetra- and pentacoloporate structure of the pollen grains found in *Molongum* and *Spongiosperma* indicates that these two genera are more closely related to each other than to any of the four other genera of the Ambelanieae. *Ambelania, Rhigospira* and *Neocouma* all have primarily tricolporate grains, yet the structures of the colpi, ora, and exine make each genus distinct from the others. The pollen of *Mucoa*, like that of *Molongum* and *Spongiosperma*, possesses a variable number of apertures (4 ± 1), a characteristic which supports its removal from *Ambelania* (sensu stricto). The regulate pollen surface structure of *Neocouma* gives evidence of its distinction from the other genera of the tribe.

AMBELANIEAE Pichon ex Boiteau, Allorge & Sastre, Adansonia, sér. 2, 18 (2): 276. 1978.

Ambelanieae Pichon, Mém. Mus. Natl. Hist. Nat. 24: 165. 1948 sub 'Ambélaniées', nom. nud.; Wagenitz in Melchior, A. Engler's Syllabus Pflanzenfam. 412. 1964, nom. nud.

Small lactescent shrubs or small or medium-sized trees up to 30 m tall; stems terete to subterete or sharply quadrangular. Nodes unilacunar with a single vascular trace; interpetiolar line or ridge conspicuous, appearing as a stipule-like scar with glands found usually in abundance and producing a resinous exudate within and in axils of younger leaves. *Leaves* decussate, short to long petiolate, glabrous, subcoriaceous to thick-coriaceous, sclereids either present or absent, venation camptodromous, margins entire or crenulate and usually distinctly revolute. Inflorescences terminal or axillary, few- to many-flowered; peduncle very short to long, to ca 6 cm; bracts and bracteoles small and scale-like to large and calycine, pedicels bibracteolate. *Flowers* pentamerous; calyx lobes quincuncially imbricate, basally connate and either with or without glands within, persistent or caducous, 1–14 mm long, glabrous or ciliate only at apex. Corolla sympetalous, actinomorphic, salverform, white or cream to golden yellow or orange, tube narrow, pilose or glabrous within; lobes glabrous or pilose only at base and adjacent to corolla orifice, convolute and overlapping to left in bud, becoming reflexed at anthesis, equalling or much shorter than tube. *Stamens* 5, epipetalous, included; filaments adnate to corolla tube; anthers introrse, basifixed, bilocular, sessile or subsessile, basal lobes auriculate or sagittate, apically caudate, opening by longitudinal slits; pollen medium-sized, 3- to 5-colporate, exine foveolate or rugulate. *Ovary* glabrous, syncarpous, superior, bilocular, placentation axile with many ovules in each locule, basally nectariferous without, 1–5 mm long. *Style* terete, glabrous, short to long, surmounted by a relatively large stigmoid head or clavuncle. Clavuncle apically 5-lobed and basally with a thickened ring or flange of tissue, glabrous or with short, dense pubescence on apical lobes; stigmoid lobes 2, short and blunt to long and terete, sometimes joined for most of their length. *Fruit* a few- to many-seeded, one- or two-celled berry with seeds either embedded in a fluffy or stringy, aromatic pulp, or projecting into an open cavity, attached by fleshy funicles; pericarp either leathery or indur-

ated with a granular texture; fruit surface smooth to verrucose, sometimes with longitudinal ribs, glands frequently conspicuous. *Seeds* generally plano-convex and oblong, elliptic, or ovate in outline, 5–16 mm long; testa smooth, shiny to dull, minutely reticulate or nearly so, to tortuous, spongy, pitted. *Embryo* straight, almost equal to seed in length, embedded in an oily endosperm; cotyledons small, plane, thin, ovate or circular; radicle cylindrical, terete, 3–8 times as long as cotyledons. Germination epigeal. $X = 11$.

Type genus. *Ambelania* Aublet, Hist. Pl. Guian. 1: 265–268, *pl. 104*. 1775.

Genera. *Ambelania* Aublet, *Mucoa* Zarucchi, *Spongiosperma* Zarucchi, *Molongum* Pichon, *Rhigospira* Miers, and *Neocouma* Pierre.

The tribe Ambelanieae was first described by PICHON (1948), comprising the genera *Ambelania, Molongum, Rhigospira, Neocouma* and *Macoubea*, which he separated from the Carisseae. He treated these five genera in two subtribes: Ambelaniinae, with four genera, and Macoubeinae, with only *Macoubea*. These tribal and subtribal names lacked Latin diagnoses, and were therefore illegitimately published (*nomina nuda*). Few botanists accepted the taxonomic judgments of PICHON regarding these genera and other aspects of apocynaceous classification; his untimely death in 1953 may have contributed to this disregard.

The name Ambelanieae has been published according to the International Rules, in comparative studies of the Tabernaemontanoideae and the Plumerioideae by BOITEAU & SASTRE (1975) and BOITEAU, ALLORGE & SASTRE (1978). These two articles deal principally with the circumscription of the Tabernaemontanoideae, into which they place *Macoubea* in its own tribe; four additional tribes are recognized in the subfamily. In the second paper, BOITEAU *et al.* (1978) discuss characters which distinguish the Ambelanieae (Plumerioideae), as represented by *Ambelania* and *Rhigospira*, from the Macoubeeae (Tabernaemontanoideae), as represented by *Macoubea*. The Latin diagnosis for Ambelanieae points out the following characters: 'Semina arillo destituta. Fructus carnosus bilocularis sine strate indurato. Stamina sine textura movente sed caudis rudimentariis instructa.' This description, however, is incomplete, and does not fully describe the variation found within the tribe. The fruit is either bilocular, with a fleshy dissepiment, or unilocular, wherein the septum tears during fruit maturation (e.g. *Spongiosperma*). The pericarp is indurated, with a granular consistency, in several of the genera. Furthermore, the anthers are apically caudate and the clavuncle has a basal ring or flange of tissue. These latter characters were noted by PICHON (1948) as being diagnostic for separating the Ambelanieae from the related tribe Carisseae.

KEY TO THE GENERA OF AMBELANIEAE

1. Inflorescences axillary 2
   Inflorescences terminal 3
2. Sepals eglandular at base within; young stems terete to subterete; leaves with tertiary veins obscure above, lamina with many filiform sclereids; inflores-

cences usually developing several nodes from stem apex; fruit ovoid to elongate, sometimes ribbed, pericarp leathery; seeds projecting into open cells attached by fleshy funicles. . . . . 1. **Ambelania**

Sepals multiglandular in several series at base within; young stems compressed; leaves with tertiary veins visible above, lamina without filiform sclereids; inflorescences developing axillary to and simultaneously with terminal vegetative shoots; fruit globose to ellipsoid, lacking ribs, pericarp indurated with a granular composition; seeds embedded in a stringy pulp . . . . 2. **Mucoa**

3. Young stems sharply quadrangular; leaf venation eucamptodromous; sepals eglandular at base within; corolla lobes less than one-half length of tube; fruit pedicel frustumic . . . . . 5. **Rhigospira**

Young stems terete or subterete; leaf venation brochidodromous; sepals with few to many glands at base within; corolla lobes two-thirds to much greater than length of tube; fruit pedicel cylindrical 4

4. Corolla tube completely glabrous within, short, 3–9 mm; fruit few-seeded, with thin pericarp, seeds embedded in white, fluffy pulp . . 4. **Molongum**

Corolla tube pilose within, short to long, 3.5–30 mm; fruit few- to many-seeded with thick and leathery or crustaceous pericarp 5

5. Bracteoles not calycine, borne usually on lower portion of pedicels; calyx with basal glands in single series within; corolla tube 10–30 mm long; leaves with lateral veins 15–35 per side; fruit one-celled, many-seeded; seeds not embedded in pulp, attached to fruit wall by low fleshy funicles . . . . . .3. **Spongiosperma**

Bracteoles calycine, at or above middle of pedicels; calyx with basal glands in several series within; corolla tube 3.5–12 mm long; leaves with lateral veins 7–13 per side; fruit two-celled, few- to many-seeded; seeds embedded in pulp. . . . . 6. **Neocouma**

1. **Ambelania** Aublet, Hist. Pl. Guian. 1: 265–268, *pl. 104.* 1775; Jussieu, Gen. Pl. 148. 1789; Lamarck, Tabl. Encycl. 1: 125–126, *t. 169.* 1791; Roemer & Schultes, Syst. Veg. 4: 545. 1819; G. Don, Gen. Hist. Dichlam. Pl. 4: 102. 1837 as '*Ambellania*'; Endlicher, Gen. Pl. 578. 1838; Meisner, Pl. Vasc. Gen. 262 [pars prior], 171 [pars altera]. 1840; Oken, Allg. Naturgesch. 3(2): 1049. 1841; A. De Candolle, Prodr. 8: 328. 1844; J. S. Presl, Všeob. Rostlin. 2: 1065. 1846; Mueller-Argoviensis in Martius, Fl. Bras. 6(1): 15–18, *pl. 3–4.* 1860; Bentham in Bentham & Hooker, Gen. Pl. 2: 694. 1876; Miers, Apocyn. S. Amer. 13–14, *pl. 1B.* 1878 as '*Ambellania*'; Baillon, Hist. Pl. 10: 172–173. 1891[1889]; Schumann in Engler & Prantl, Nat. Pflanzenfam. 4(2): 123–124. 1895; Markgraf in Pulle, Fl. Surinam 4(1): 5–7. 1932; Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941; Monachino, Lloydia 8(2): 109–130. 1945; 9(4): 302. 1946; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 166–167, *pl. IV – 11–13, 21–23, 32–34.* 1948; Lemée, Fl. Guy. Franç. 3: 296. 1953; Macbride, Fl. Peru, Publ. Field Mus. Nat. Hist., Bot. Ser. 13 (5/1): 373–374. 1959; Schultes, J. Ethnopharm. 1: 166–167. 1979.
Willughbeja Scopoli ex Schreber in Linné, Gen. Pl., ed. 8, 1: 162. 1789; J. F.

Gmelin, in Linnaeus, Syst. Nat., ed. 13, 2(1): 434. 1791 as '*Willughbeia*' (non Roxb.); Dietrich, Synopsis Plantarum 1: 714. 1839 as '*Willughbeia*' (non Roxb.). *Bentheca* Necker, Elementa Botanica 2: 54. 1790 non *Benteca* ('*Benteka*') Adanson.

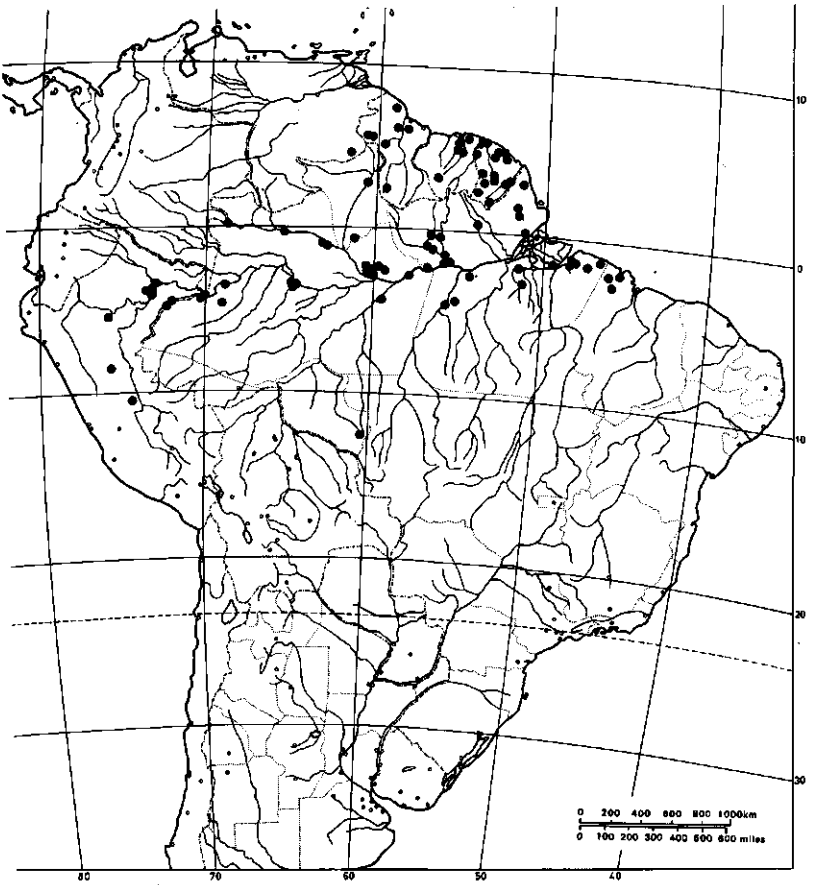
Small to medium-sized tree up to 25 m tall, lactescent, with young stems terete or subterete; interpetiolar line or ridge conspicuous, glandular within, becoming resinous with exudate. *Leaves* decussate, petiolate, glabrous, coriaceous to stiff-coriaceous, venation brochidodromous, margins entire and revolute, blade decurrent on canaliculate petiole; midrib plane to deeply impressed above, raised to very prominent below; lateral veins inconspicuous and plane to deeply impressed above, plane to prominent below, especially near base of blade; tertiary veins inconspicuous; foliar filiform sclereids abundant; small resin-producing glands in leaf axils. *Inflorescences* axillary, cymose, few- to many-flowered; peduncles mostly reduced; bracts ovate, small. *Flowers* subsessile to short pedicellate; bracteoles small, ovate, near base of pedicel; calyx lobes 5, persistent, quincuncially imbricate, basally lacking glands within; sepals free nearly to base, eciliate, ovate, apically rounded to obtuse; corolla sympetalous, actinomorphic, salverform, white to yellowish, thick; tube narrow, straight, somewhat long, with suprastaminal region pilose, becoming dense near orifice, dilated at insertion of stamens; corolla lobes 5, convolute in bud, overlapping to left, becoming reflexed at anthesis, approximating tube in length. *Stamens* 5, inserted near middle of tube; anthers lanceolate, subsessile, basally sagittate, apically caudate. *Ovary* superior, conical-ovoid, glabrous, apically acute, bicarpellate, placentation axile with ovules numerous in each locule; style terete, short; clavuncle cylindrical to ovoid or ellipsoid, with basal ring of tissue pentagonal in cross-section, apically five-angled, star-shaped in cross-section, glabrous; stigmoid lobes terete, thin, either subequal to or longer than clavuncle. *Fruit* a many-seeded, two-celled berry, broadly ovoid to lanceovoid with seeds attached to thick dissepiment by fleshy funicles, projecting into two open cavities; pericarp leathery, thick, surface smooth or with low to prominent ribs. *Seeds* plano-convex, somewhat naviculate, elliptic to ovate in outline; testa shiny to dull, reticulate to very low and inconspicuously rugulose; hilum small, ovate to circular. *Embryo* almost as long as seed, with small, thin, plane, ovate cotyledons; radicle straight, terete, about 5–8 times as long as cotyledons.

Type species. *Ambelania acida* Aublet, Hist. Pl. Guian. 1: 265–268, *pl. 104.* 1775.

Etymology. From the native Galibi name for the tree, 'Ambelani'.

Distribution. Widespread in Venezuela, the Guianas (Guyana, Surinam, French Guiana) and Amazonia of Brazil, Colombia, and Peru; Map 1.

AUBLET (1775) described *Ambelania* under 'Pentandria, Monogynia' of the Linnaean sexual system, with the single species *A. acida* based on a collection



MAP 1. *Ambelania*

which he made in French Guiana. In the protologue, AUBLET presented a long discussion not only of the plant's appearance and salient structures, but also of its use by local people in the French colony. He said that the fruit is acidic and edible when decorticated; the cortex acts as a purgative.

Ambelania and *Mucoa* are easily separated from the four remaining genera in the Ambelanieae by their axillary inflorescences and usually reduced peduncles. Characters which are used in the generic key allow one to distinguish *Ambelania* from *Mucoa*, even when only sterile material is available. Some of the most interesting characteristics of *Ambelania* are the foliar filiform sclereids, the two-celled fruit with open cavities, and the seeds which project into these cavities and are attached to the fruit wall by fleshy funicles.

All known collections of *Ambelania* come from *terra firma* forest, including individuals of the three species treated in the present work.

KEY TO THE SPECIES OF *AMBELANIA*

1. Fruits ovoid, 8–12(–15) cm long, 6–9(–10) cm in diameter, with blunt apical point; mature flower buds 17–20 mm long; leaves narrowing toward base (Peru; Rondônia and region of Manaus, Amazonas, Brazil) . . . . . 1–2. **A. duckei**

   Fruits elongate, narrowly elliptic to ovoid or lanceovoid, 4–12 cm long and 2–4 cm in diameter; mature flower buds 24–27 mm long; leaves not narrowing toward base 2

2. Leaf midrib plane to impressed above, raised below; lateral veins 15–25 per side; inflorescences few- to many-flowered (Widespread in Guianas, Eastern and Central Amazonia). . . . . 1–1. **A. acida**

   Leaf midrib deeply impressed above, especially near base of blade, above and very prominent below; lateral veins 9–13(–16) per side; inflorescences few-flowered (Western Amazonia of Brazil, Colombia & Peru) . . . . . 1–3. **A. occidentalis**

1–1. **Ambelania acida** Aublet, Hist. Pl. Guian. 1: 265–268, pl. 104. 1775; Lamarck, Tabl. Encycl. 1: 125–126, t. 169. 1791; Roemer & Schultes, Syst. Veg. 4: 545. 1819; Descourtilz, Fl. Méd. Antilles 7: 123–126, pl. 480. 1829; G. Don, Gen. Hist. Dichlam. Pl. 4: 102. 1837 as '*Ambellania*;' A. De Candolle, Prodr. 8: 328. 1844; J. S. Presl, Wšeob. Rostlin. 2: 1065. 1846; Schumann in Engler & Prantl, Nat. Pflanzenfam. 4(2): 124. 1895; Pulle, Rec. Trav. Bot. Néerl. 6: 285. 1909; Markgraf in Pulle, Fl. Surinam 4(1): 6–7. 1932; Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941; Monachino, Lloydia 8(2): 117–119. 1945; 9(4): 302. 1946; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 166–167, pl. IV – 11, 21, 32. 1948; Lemée, Fl. Guy. Franç. 3: 296. 1953.

Type: French Guiana: 'In sylvis Caiennae & Guianae.' Sep 1762–1764 (fl fr), *Aublet* sn (BM, holotype; isotypes: LINN-Smith Herb., P-Rousseau Herb.). Homotypic synonyms: *Willughbeja acida* (Aublet) G. F. Gmelin, Systema Naturae 2(1): 434. 1791; Willdenow, Linné Sp. Plant., ed. 4, 1: 1231. 1797; Smith in Rees, Cyclopaedia Vol. 38. 1819; Sprengel in Linnaeus, Syst. Veg., ed. 16, 1: 672. 1825 as '*Willughbeia*;' Dietrich, Synopsis Plantarum 1: 714. 1839 as '*Willughbeia*.' *Willughbeia acida* (Aublet) Oken, Allg. Naturgesch. 3(2): 1049. 1841.

Heterotypic synonyms: *Ambelania sagotii* Mueller-Argoviensis, Linnaea 30: 389–390. 1860 as '*A. sagoti*;' Markgraf in Pulle, Fl. Surinam 4(1): 7. 1932; Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941. Types: French Guiana: Acarouany, 1854 (fl fr), *Sagot* 393 (W, lectotype; isotypes: BM, BR, G [F photo 26844; F, GH, NY, US], K, MPU, P, S, U), and French Guiana: Cayenne. 1819–1821 (fl), *Poiteau* sn (paratypes: G, K, LE, W).

Ambelania tenuiflora Mueller-Argoviensis in Martius, Flora Brasiliensis 6(1): 16–17, pl. 3. 1860; Huber, Bol. Mus. Paraense Hist. Nat. 3: 444. 1902; Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941. Types: Brazil: 'in sylvis primaevis prov. Paraensis,' Sep [no year] (fl), *Martius* sn (lectotype: M; isotype: L).

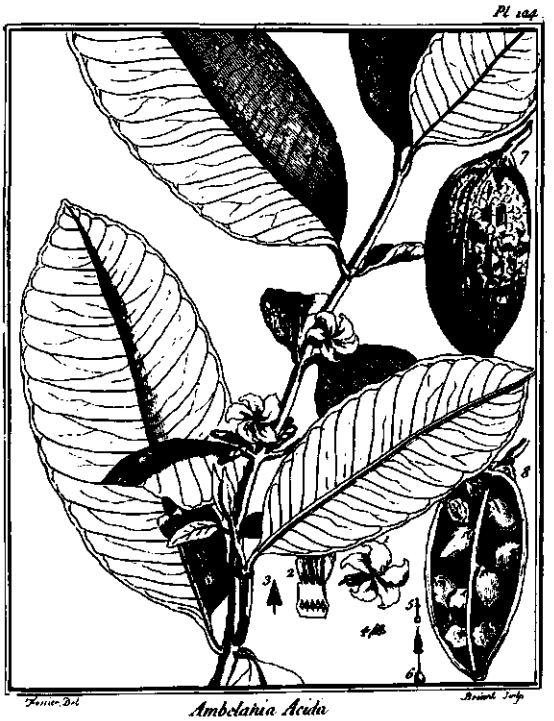


FIG. 1. Reproduction of Original Illustration of *Ambelania acida* Aublet from his *Histoire des plantes de la Guiane françoise* (1775): 1. corolla; 2. open corolla showing stamens; 3. separate stamen; 4. calyx; 5. gynoecium; 6. ovary, stigma, style; 7. fruit; 8. open fruit, partition, and seeds.

Brazil: Amazonas: 'in campis ad Villam Novam da Rainha s. Topinambarana prov. do Alto Amazonas,' Sep-Oct [no year] (fl), *Martius* sn (M, lectotype; isotype: L). Brazil: Amazonas: Borba, Aug 1828 (fl), *Riedel* 1368 (paratypes: LE [2 sheets, one as sn]).

Ambelania tenuiflora var. *tenuiramea* Mueller-Argoviensis in Martius, Flora Brasiliensis 6(1): 17. 1860. Type: Brazil: Amazonas: Ega [= Tefé], Sep 1831 (fl fr), *Poeppig* 2604 (W [F photo 34363; F, GH, NY, US], holotype; isotypes: F 872668, LE, NY, P).

Ambelania cucumerina Miers, Apocyn. S. Amer. 13–14, pl. 1B. 1878 as '*Ambellania*' in part; Monachino, Lloydia 8(2): 120–122. 1945. Type: Brazil: Amazonas: Barra [= Manaus], Mar 1851 (fr only), *Spruce* sn (K, in Museums Spirit Collection, lectotype [here chosen]). The syntype, *Spruce* 2483 (K – Hook., cited as '2413' by Miers) is an isotype of *Ambelania macrophylla* [= *Spongiosperma macrophyllum*].

Small to medium-sized tree up to 25 m tall with leaf-bearing branches 2.5–5 mm in diameter. *Leaf blades* elliptic to narrowly ovate (10–)12–20(–25) ×

3.5–8(–9) cm, glabrous, coriaceous to stiff-coriaceous, with (11–)15–25 pairs of lateral veins; bases rounded to subacute and decurrent on petiole; apices rounded to subacute becoming remotely acuminate; margins entire, revolute; midrib plane to impressed above, raised below; lateral veins plane to slightly impressed above, slightly raised below. *Petioles* 7–15(–18) mm long, canaliculate. *Inflorescences* axillary, cymose, (2–)4–15(–50)-flowered with older inflorescences developing a large mass of clustered pedicels, with only several flowers expanded at any one time; peduncles reduced, up to 8 mm long; bracts and bracteoles ovate, small, ca 1 × 0.8–1 mm; pedicels 1–3 mm long. *Flowers*: mature bud 24–27 mm long; sepals ovate, 1.8–2.8 × 1.5–2 mm, apically acute and rounded. Corolla white to yellow with tube 10–12(–15) mm long; lobes narrowly elliptic to lanceolate, 10–12 × 2–3 mm. *Stamens* inserted 4–5 mm from base of corolla tube; anthers 2.5–3 mm long, subsessile with filament 0.2–0.4 mm long, basally sagittate, apically caudate with acumen 0.2–0.3 mm long. *Ovary* conical-ovoid, 1.8–2 mm long; style 1–2 mm long; clavuncle 0.6–0.7 mm long; stigmoid lobes 0.8–1.8 mm long. *Fruit* narrowly ellipsoid to ovoid, 4–8(–12) cm long, 2–4 cm in diameter, round to elliptic or pentagonal in cross-section, apically and basally rounded to subacute. Seeds numerous, plano-convex, elliptic to ovate in outline, 8–11 × 5–7 × 2–3 mm.

Etymology. Latin *acida* = acid, in reference to the edible, acidic fruit.

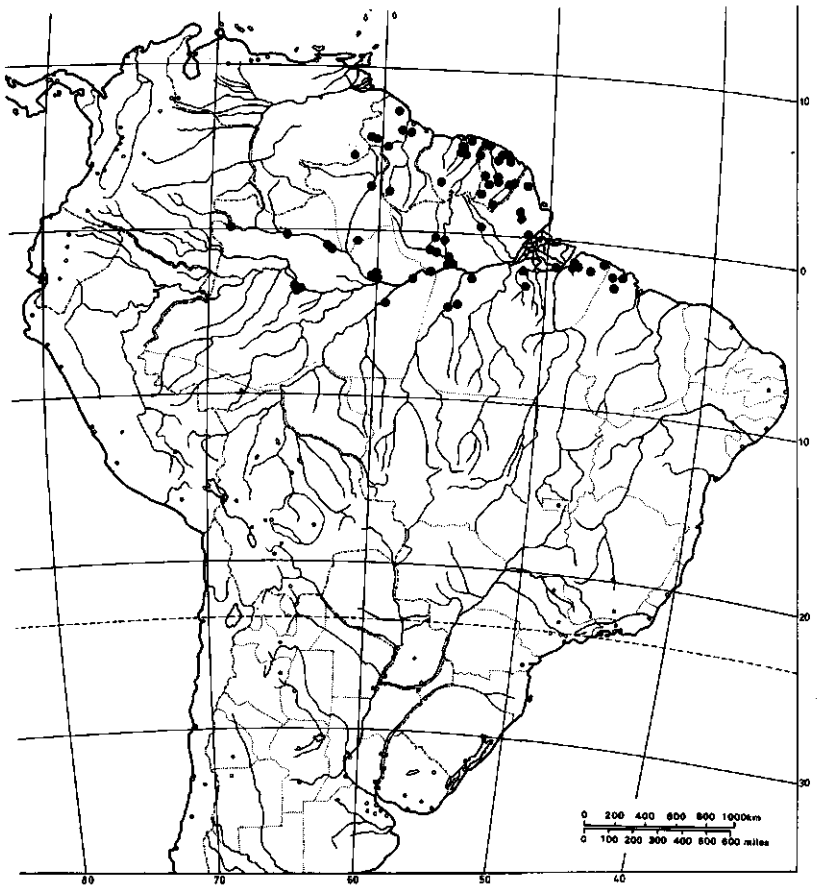
Distribution. Widely distributed from southeastern Venezuela and the Guianas south to the Rio Maracassumé in Brazilian Maranhão and in eastern and central Amazonia; Map 7.

Specimens examined:

VENEZUELA. Bolívar: 0–4 km N of El Pauji on trail to Uaipaur, 4° 30′ N, 61° 35′ W, alt 800–900 m, 4 Nov 1985 (fr), *Liesner 19460* (MO).

GUYANA. Waramuri Mission, Moruka River, Pomeroon District, 23–27 Oct 1922 (fl), *Cruz 3068* (NY); Kaieteur Falls, Potaro River, 23 Oct-3 Nov 1923 (fr), *Cruz 4423* (F, GH, MO, NY, US); Mazaruni Station, 30 Jul 1940 (fl fr), *Forest Dept. Br. Guiana 3265 [F529]* (K, NY); Waranama, intermediate savannas Berbice River, 16 Jun 1958 (fr), *Harrison 1147* (K); 108/109 miles on Cattle Trail, Liroppa Creek, Essequibo River, 5 Jul 1920 (fr), *Hohenkerk 68A* (K); Demerara River, May 1888 (fl), *Jenman 4929* (K); Hyde Park, Sep 1924 (fr), *Persaud 150* (K, NY); Demerara River, Bootooba, Sand Hill, May 1923 (fr), *Persaud 277* (F); Essequibo River, Moraballi Creek, near Bartica, alt near sea-level, 16 Oct 1929 (fl buds, fr.), *Sandwith 465* (K, NY, RB, U), 30 Oct 1929 (fl), *Sandwith 537* (K, LE, NY, P, RB, S, U, US); basin of Kuyuwini River (Essequibo tributary), ca 150 miles from mouth, 21–26 Nov 1937 (fl, yng fr), *A. C. Smith 2581* (A, F, G, K, MAD, MO, NY, P, S, U, US); Upper Mazaruni River Basin, Partang River, Merume Mountains, trail along SE side of Merume Mtn., alt 1140 m, 5 Jul 1960 (fl fr), *Tillett et al. 44822* (VEN); Upper Mazaruni River Basin, Mt. Ayanganna, forest below talus of cliffs along NE side, alt 700–800 m, 4 & 17 Aug 1960 (fl fr), *Tillett et al. 45033* (VEN).

SURINAM. Forest Reserve Zanderij I, tree no. 51, 1 Dec 1915 (st), *Boschwezen 1556* (U), 23 Apr 1920 (fr), *Boschwezen 4660* (U); Forest Reserve Sectie 0, tree no. 536, 5 May 1916 (fr), *Boschwezen 1882* (U); Forest Reserve Wahamiri, tree no. 1653, 28 Oct 1919 (fl), *Boschwezen 4441* (BR, U), 17 Feb 1920 (fl, yng fr), *Boschwezen 4552* (BR, RB, U), 3 Jul 1920 (fr), *Boschwezen 4713* (NY, U); Forest Reserve Kaboerie, tree no. 686, 6 Nov 1920 (fl), *Boschwezen 4907* (BR, L, NY, U, US), 28 Jul 1922 (fr), *Boschwezen 5932* (RB, US); Forest Reserve Brownsberg, tree no. 1176, 12 Oct 1923 (fl), *Boschwezen 6295* (K), 17 Apr 1925 (fr), *Boschwezen 6863* (U); Wilhelmina Gebergte, 3.5



MAP 7. *Ambelania acida* Aublet.

km SSE of Juliana Top, 11.5 km N of Lucie River, alt 450 m, 8 Aug 1963 (fr), *Irwin et al. 54587* (NY); Wilhelmina Gebergte, 2 km below confluence of Oost River, alt 225 m, 13 Sep 1963 (fl), *Irwin et al. 55676* (COL, F, GH, K, NY, S, U, US, VEN); Cottica River, mouth of the Patamacca River, 10 Aug 1933 (fr), *Lanjouw 416* (U); S of road from Afobakka to Brownsweg at a pt. 8 km from Afobakka, 24 Feb 1965 (fl buds), *Lems 5253* (NA); Forests of Zanderij, 31 May 1916 (fr), *Samuels sn* (US); Sectie 0, Nov 1944 (fl), *Stahel 265* (GH, IAN, K, MAD, NY, S, U, WAG, WIS); Zanderij I, May 1945 (fr), *Stahel 265a* (DS, GH, IAN, K, MAD, NY, U, UC, WAG, WIS); fluv. Marowyne, Aug 1904 (fr), *Versteeg 626* (RB, U); without specific locality, no date (fl), *Hostmann 1317* (G, K), no date (fl) *Weigelt sn* (W).

FRENCH GUIANA. Camp Lorrain Chantier de la SOFOG terrain sain, plateau, 8 Jun 1953 (fr), *BAFOG 25M* (P, U); Crique Balaté, 25 Jan 1951 (fr), *BAFOG 5169* (P); Crique Sparouine Rive droite (Maroni), 26 Mar 1952 (yng fr), *BAFOG 6137* (P); Fleuve Ouaqui = Grigel, 4 Jul 1973 (fr), *Granville B.4882* (P); Haut Oyapock, Parcelle Zidock Paul, Itusâsây tap 1, 10 Feb 1975 (fr), *Grenand 750* (P); SE of Saül, 3° 37′ N., 53° 12′ W., alt 200 m, 11 Feb 1978 (st), *Leeuwenberg 11779* (NY); Cayenne, no date (fl), *Martin sn* (K); Bords de la Rivière du Maroni, 1861 (fr), *Mélinon 14* (P); Montfinery, May 1840 (st), *Mélinon 82* (P); Mana, no date (fl buds), Mélinon sn (P); Route

du Gallion, après, pont sur tour de l'île, Feb 1975 (yng fr), *Moretti 133* (P); Piste de St Elie, 16 Jun 1976 (fr), *Moretti 481* (P); Saül, Monts La Fumée, 3° 37′ N., 53° 12′ W., alt 200–400 m, *Mori et al. 15105* (MO); Cacao, env. 60 km S de Cayenne, 11 Jun 1965 (fr), *Oldeman 1351A* (P); Grand circuit Montagne Pelée, au km 1,400, 18 Aug 1971 (fr), *Oldeman B.4025* (P); Saül, sur le circuit de la montagne Grand Fossé, au km 0.900, 28 Oct 1971 (st), *Oldeman B.4161* (P); Haute Approuague, dans le layon de la crique Parépou, 10 Oct 1968 (fl), *Oldeman T-205* (P); St. Laurent du Maroni, Sep 1910 (fl), *Santini 4170* (L); Haut Maroni (Itany), Antecum-Pata (Malavate) rivière Marouini, 24 Apr 1975 (fr), *Sastre et al. 3931* (MO, P); Fleuve Maroni Oukoume Mont Foret, entre Maripasoula et Antecum-Pata (Malavate), 25 Apr 1975 (fr), *Sastre et al. 3955* (MO, P, WAG); Rivière Inini, afluent du Moyen-Maroni (Lawa) en amont de Maripasoula, 26 Apr 1975 (fr), *Sastre et al. 3972* (MO, P); Fleuve Maroni, crique Charvein, 5 May 1975 (fr), *Sastre et al. 4164* (MO, P); Village Bellevue, 8 km d'Iracoubo vers St. Laurent, 13 May 1975 (st), *Sastre et al. 4192* (MO, P); Fleuve Oyapock Saut Maripa, 6 Mar 1976 (fr), *Sastre 4341* (P); Sinnamary, route de Ste. Elie, camp no. 2, 14 Jul 1977 (fl fr), *Sastre 5449* (P); Godebert, no date (fr), *Wachenheim 0.17* (P), no date (old fl), *Wachenheim 202* (P), no date (fl), *Wachenheim 403* (P); without specific locality, 1802 (fl, yng fr), *Gabriel sn* (F, G), no date (fr), *Herb. Maire sn* (P), no date (yng fr), *Leprieur sn* (P), no date (fr), *Herb. L. C. Richard sn* (P).

Brazil. Amapá: Oiapoque, campo de aviação, 29 Sep 1949 (fl), *Black 49-8192* (IAN, P); Rio Jari, Cachoeira Mucurú, 0° 32′ N, 53° 8′ W, alt ca 140 m, 20 Aug 1961 (fl buds, yng fr), *Egler & Irwin 46545* (IAN, K, MG, NY, S, US); Oiapoque, 30 Jan 1950 (fr), *Fróes 25720* (IAN); Cunani, 14 Oct 1895 (fl), *Huber MG 1044a* (MG); Rio Oiapoque, ca 2.5 km SE of Clevelandia, 3° 48′ N, 51° 53′ W, 8 Oct 1960 (st), *Irwin et al. 48654* (G, NY); Rio Araguari, 1° 40′ N, 51° 56′ W, alt 135 m, 29 Aug 1961 (fl), *Pires et al. 50572* (F, IAN, K, MG, NY, S, US); Rio Araguari, Camp 13, 1° 45′ N, 52° W, 9 Oct 1961 (fl), *Pires et al. 51643* (IAN, MG, NY); Estrada de Cutias-Macapá, 16 Jul 1980 (fr), *Rabelo 516* (NY); Contagem entre Porto Platon e Serra do Navio, 10 Oct-15 Dec 1976 (st), *Rosa 1218* (MG). Amazonas: Tefé, 21 Apr 1970 (fr), *Albuquerque & Lima 345* (INPA), 29 Sep 1904 (fl), *Ducke MG 6829* (BM, G, MG), 11 Jul 1973 (fr), *Lleras et al. P16600* (F, INPA, MG, NY, Z), 28 Nov 1959 (fr), *W. Rodrigues & Coêlho 1425* (INPA), 5 Jan 1961 (fr), *W. Rodrigues 2059* (INPA); Manaus, Est. Manaus-Itacoatiara, km 12, 14 Jul 1967 (fr), *Cezário & Vieira INPA 20612* (INPA); Manaus, km 10 da BR-17, Campos Sales, 30 Aug 1954 (fl), *Chagas INPA 1* (F, INPA, MO); Manaus, Reserva Florestal Ducke, 14 Mar 1957 (fl), *L. Coêlho INPA 5157* (INPA, MG, UB), 11 Aug 1976 (st), *A. Oliviera INPA 60537* (INPA), 19 Jul 1963 (fl buds), *W. Rodrigues 5380* (INPA), 8 Apr 1965 (fl), *W. Rodrigues & Monteiro 6893* (GH, INPA), 11 Sep 1979 (fl buds), *Zarucchi et al. 2534* (GH, INPA, NY); along the Rio Negro between Manaus and São Gabriel, Acânga, 1° 10′ S, 62° 30′ W, 27 Jun 1979 (fr), *Alencar et al. 92* (NY); Mun. de Tefé, Rio Solimões, margem direita, Estrada do Dendê, 18 Oct 1982 (fl buds), *Amaral et al. 121* (MO); Mun. de Alvarães, Rio Solimões, margen direita, Lago de Alvarães, 3° 13′ S, 64° 50′ W, 29 Nov 1982 (fr), *Amaral et al. 659* (MO); km 139 da estrada Manaus-Itacoatiara, 22 Jun 1972 (fr), *L. Coêlho & Miranda INPA 36021* (GH, INPA); Rio Negro, Barcellos, 11 Jun 1905 (fr), *Ducke MG 7156* (MG); Rio Madeira, Borba, 5 Jul 1936 (fl), *Ducke 212* (A, F, K, MO, NY, S, US); São Paulo de Olivença, 18 Apr 1945 (fl fr), *Fróes 20751* (IAN, K, NY, US); Tapuruquara, 8 Apr 1947 (fl), *Fróes 22113* (IAN, NY); Rio Demeni, Posto Indigena Genipapo, 17 Oct 1952 (fl), *Fróes & Addison 28989* (IAN); Manaus, Agricultural Experiment Station, alt 25 m, 13 Oct 1929 (fl), *Killip & Smith 30007* (NY, US); Barro Alto, Paraná do Ramos, 16 Mar 1924 (fl fr), *J. G. Kuhlmann RB 21875* (RB, S, U, US); Environs de Manaus, 1906 (fl), *Labroy sn* (P); Paraná Autaz-Mirim, Local Jucá, 25 Mar 1973 (fr), *Loureiro et al. INPA 37638* (GH, INPA); Est. Torquato Tapajós, km 182, proximo ao igarapé do Péreu, 4 Apr 1975 (fr), *Loureiro et al. INPA 48424* (INPA); AM-1, km 139, 16 Jun 1972 (fr), *Monteiro & Lima 141* (GH, INPA), 16 Jun 1972 (old fr), *Monteiro & Lima 144* (INPA); km 65–70 da Rodovia Manaus-Itacoatiara, 21 Oct 1963 (fr), *R. Oliveira 2736* (IAN, UB); Manaus and vicinity, Tarumã road, 18 km N of Manaus, 14 Mar 1967 (fr), *Prance et al. 4628* (F, GH, INPA, K, MG, NY, S, U, US); Estrada Manaus-Caracaraí, km 39, Reserva Experimental de Silvicultura Tropical, 8 Sep 1977 (fl), *Ribamar & Ramos 140* (INPA); Vila Iauareté, margem do Rio Uaupés, fronteira Brasil-Colômbia, 21 May 1975 (fr), *Ribeiro 997* (IAN, MG); Manaus, km 9 da BR-17, Ig. do Buião, 2 Oct 1959 (fr), *W. Rodrigues & Coêlho 1333* (INPA, MO), 5 Oct 1962 (fl fr), *W. Rodrigues & Chagas 4684* (GH, INPA), 14 May 1963 (fr), *W. Rodrigues & Chagas 5200* (INPA); Manaus, Ig.

do Bindú, 5 May 1961 (st), *W. Rodrigues & Chagas 2402* (F); Manaus, Est. do Ig. do Passarinho, 23 Apr 1962 (fr), *W. Rodrigues & Chagas 4402* (INPA); Est. Manaus-Itacoatiara, km 30, 2 Sep 1970 (fl), *W. Rodrigues 8931* (GH, INPA); Manaus, Ponta Negra, Hotel Tropical, árv. no. 91, 19 Jul 1977 (fl), *W. Rodrigues 9967* (INPA); Rio Negro, Rio Jauaperi, Estirão Tacuera, 18 Feb 1977 (fr), *Santos 76* (MG, NY); vicinity of Manaus, Cachoeira Baixa de Tarumã, 11–14 Apr 1972 (fr), *Schultes & Rodrigues 26136A* (ECON, GH, INPA); Rio Negro, Manáos, Aug 1900 (fl), *Ule 5177* (G, HBG, K, L, MG); Manaus and vicinity, Rosa de Maio, 12 Sep 1979 (st), *Zarucchi & Coêlho 2538* (GH, INPA, NY); Mun. de Borba, lower Rio Canumã, 2 km N of Vila de Canumã, Lat. 4° 02′ S, Long. 59° 03′ W, 29 Jun 1983 (fr), *Zarucchi et al. 2903* (INPA, NY, US). Maranhão: Estrada da Feitoria, assu region, 23 Apr 1933 (fl), *Fróes 34* (US); Maracassumé River region, Estrada da Feitoria, 20 Oct 1932 (fl, yng fr), *Fróes 1956* (A, BM, F, G, K, MICH, MO, NY, P, S, US); Rio Maracassumé, Jul 1958 (fr), *Fróes 34386* (IAN); Rio Alto Turiaçu, Nova Esperança, 2° 55′ S, 45° 45′ W, alt 0–100 m, 29 Nov 1978 (fr), *Jangoux & Bahia 41* (NY); Maracassumé, Oct 1932 (st), *Moses 55* (BM); Turiaçu km 6 da BR-106, Maracaçumé Santa Helena, fazenda Maracaçumé Agro Industrial, 28 Nov 1978 (yng fr), *Rosa & Vilar 2710* (F, NY). Pará: Belém, grounds of IAN [= IPEAN & EMBRAPA], 30 Oct 1942 (fl, yng fr), *Archer 7766* (IAN, NY, US), 18 Dec 1942 (fr), *Archer 8009* (IAN, MO, US), 2 Jan 1943 (fr), *Archer 8106* (F, IAN, K), 8 Feb 1943 (fr), *Archer 8234* (IAN, MO), 15 Feb 1952 (fr), *Black 52-14159* (GH, IAN, INPA), 10 Jan 1950 (fl fr), *T. Guedes 246* (IAN, MO), 27 Dec 1962 (fr), *E. Oliveira 2367* (IAN), 19 Jan 1947 (fl fr), *Pires & Black 1269* (MO), 1 Nov 1960 (yng fr), *Pires 48899* (K, NY, US), 7 Apr 1977 (fr), *Rosa 1757* (MG, NY), Dec 1965 (fl), *Schubert 2206* (IAN, US); Ruropolis Presidente Medici, 55° 04′ W, 4° 00′ S, alt 200 m, 6 Feb 1976 (fr), *Bamps 5324* (BR, K, NY, U); Mun. Igarapé-Açú, casa de campo do Sr. Natan, 12 Dec 1978 (fl buds, fr), *Bastos et al. 134* (MG, NY, WAG); Rio Trombetas, km 109, access road from Cachoeira Porteira to Perimetral do Norte, 27 May 1974 (fr), *Campbell et al. P22293* (INPA, NY, US, Z); Rio Trombetas, 3 km S of Cachoeira Porteira, 8 Jun 1974 (fr), *Campbell et al. P22573* (INPA, NY, Z); Benevides, estrada p/ Mosqueiro, 10 Feb 1966 (fr), *Cavalcante & Elias 1447* (MG); Mun. de Oriximiná a 200 m da estrada da cachoeira Porteira, paralelo ao Rio Trombetas km 6, 18 Jun 1980 (fr), *Cid & Ramos 1056* (NY); Belém, Murutucú, 30 May 1902 (st), *Ducke MG 2640* (MG); Obidos, 11 Jan 1905 (fr), *Ducke MG 6959* (MG, RB); Faro, Castanhalda da Bôa Vista, 1 Feb 1910 (fr), *Ducke MG 10629* (G, MG); Rio Cuminá, mattas a E do Lago Salgado, 30 Aug 1910 (fl), *Ducke MG 10899* (BM, G, MG, RB, US); Obidos, Uchyzal grande, 29 Sep 1915 (fl), *Ducke MG 15760* (MG); Rio Trombetas, Lago do Moura, 25 Oct 1919 (fl), *Ducke RB 11397* (RB); Rio Tapajoz, Villa Braga, 23 Sep 1922 (fl), *Ducke RB 17458* (RB); matta da Pirelli, 12 Mar 1966 (fr), *Elias de Paula 216* (MG); Rio Capim, 28 Mar 1949 (fr), *Fróes & Pires 24171* (IAN, MO); Castanhal, Colonia 3 de Outubro, 8 Dec 1949 (fl), *Fróes 24886* (IAN, INPA, MO, UC); Currupirú, localidade Gato, 22 Aug 1954 (fl), *Fróes 31046* (MO); Região do Anapú, Rio Flexal, Portel, 23 Jul 1956 (fr), *Fróes 32901* (IAN); Belém, Marco, 20 Oct 1896 (fl), *Huber MG 642* (MG); Belém, estrada do Quinze, 20 Oct 1981 (fl), *Monteiro INPA 99007* (INPA); Estrada de Ferro de Bragança, Marituba, Belém, 4 Mar 1965 (fr), *E. Oliveira 3248* (IAN); Mosqueiro, 11 Mar 1971 (st), *E. Oliveira 5501* (IAN); Belém, 29 Nov 1945 (fl fr), *Pires & Black 732* (GH, IAN); FAO, no date (st), *Pires 7408* (IAN); vicinity of Belém, Sep-Oct 1961 (st), *Pires 51874* (NY, UB, US); W bank of Rio Pacaja, opposite Ilha de Breu, 14 Oct 1965 (fr), *Prance et al. 1622* (NY); 14 Oct 1965 (fl), *Prance et al. 1624* (F, IAN, K, NY, S, US); Road BR-22, Capanema to Maranhão, vicinity of Cachoeira, km 96, 27 Oct 1965 (fl), *Prance & Pennington 1717* (F, GH, IAN, K, NY, S, US); km 873 Cuiabá-Santarém, Serra do Cachimbo, 6 Nov 1977 (fr), *Prance et al. 24941* (MG); Ilha do Marajó, Curralinho, 28 Sep 1971 (fl), *Ribeiro 169* (IAN); Igarapé-assú, 11 Feb 1903 (fr), *R. S. Rodrigues MG 3377* (MG); Plantation de Paricatuba, route de Belém-Mosqueiro, 11 Mar 1968 (fl buds, fr), *Sastre & Sastre 94* (IAN, P, U); Acará, Jacaraquara, Tapera, 21 Feb 1966 (fr), *M. Silva 540* (MG); Oriximina, beira estrada para Obidos, 26 Aug 1968 (fl fr), *M. Silva 1735* (MG); Santarém, km 35 da estrada do Palhão, 29 Aug 1969 (fl fr), *M. Silva & Souza 2438* (F, K, MG, NY, S, U, US, Z); Belém, Bosque Municipal, 18 Jan 1948 (fr), *N. T. Silva 70* (IAN); without precise locality, 1915 (fr), *Curran 9* (US). Roraima: Boa Vista-Caracaraí road (BR 174), 68 km S of Boa Vista, 3 Jan 1969 (fr), *Prance et al. 9532* (INPA, K, MG, NY, US); Rio Branco, margem estrada do Paraná do Marará, 4 Mar 1977 (fr), *Santos 147* (MG, NY). Without precise locality: no date (st), *A. R. Ferreira sn* (P); 'Quinta

da Boa Vista, São Christovão, Rio-Jan., Jan-Feb (fl), *Glaziou 14078"* (C) [probably a pirated collection; see discussion below].

Local names. GUYANA. Machieraro (*Jenman 4929*), Makurero (Arawak language, *Hohenkerk 68A*), Makuriro (*Forest Dept. Br. Guiana 3265* [*F529*], Makurriro (*Sandwith 465, 537*), Wild Cucumber (*Persaud 277*). SURINAM. Bat batti (*Lanjouw 416*), Batibati (*Stahel 265*), Makoriro (*Stahel 265a*), Wokorira (*Stahel 265*). FRENCH GUIANA. Akusiwalapulu (Wayampi language, *Grenand 750, Sastre 4341*), Ambalani (Galibi language, *Sastre et al. 4164*), Ambelani (Galibi language, *Aublet sn*), Graine biche (Créole language, *Oldeman 1351A*), Mapa (*BAFOG 25M, 5169, 6137, Sastre et al. 3955, 3972*), Papaya biche (Créole language, *Granville B.4882, Oldeman T-205*), Paraveris (Galibi language, *Aublet sn*), Quienbiendent (Créole language, *Aublet sn*), Taki-taki (*Sastre et al. 3972*). BRAZIL. Molongó sem espinho (*E. Oliveira 2367*), Pau de colher (*R. Oliveira 2736*), Pepino (*Ducke MG 15760, Pires 51874, W. Rodrigues & Chagas 4684, Schultes & Rodrigues 26136A, N. T. Silva 70, Zarucchi et al. 2534*), Pepino bravo (*A. Oliveira INPA 60537, W. Rodrigues & Coêlho 1425, Rosa 1218, 1757, M. Silva & Sousa 2438*), Pepino do mato [Pipino, and other spelling variants] (*Albuquerque & Lima 345, Archer 7766, 8009, 8106, Ducke MG 2640, MG 6959, MG 10629, RB 11397, RB 17458, 212, Elias 216, Fróes 1956, Loureiro et al. INPA 37638, Monteiro INPA 99007, Moses 55, E. Oliveira 3248, Rabelo 516, W. Rodrigues & Coêlho 1333, W. Rodrigues 2059, W. Rodrigues & Chagas 2402, 5200, M. Silva 540, Zarucchi & Coêlho 2538, Zarucchi et al. 2903*), Pepino doce (*Amaral et al. 659, W. Rodrigues & Chagas 4402*), Pepino verde (*Cid & Ramos 1056*), Pipim (*Archer 8234*), Pipino (*Prance & Pennington 1717*).

Individuals of *Ambelania acida* are known from widespread areas from the Guianas south to the Brazilian state of Maranhão and westward into the Amazon basin as far as Tefé. They are small to medium-sized trees of the lower story of *terra firma* forest, and individuals of the species occur apparently in low frequency throughout its geographic range. The species is morphologically variable, so that the study of only a few collections might lead one to interpret them as representing two or more species. The differences, however, in characters such as leaf shape, branch thickness, floral size, and fruit shape, are apparently not correlated with each other. Some difficulty exists in the interpretation of specimens of *A. acida*, as well as for other species in this tribe that have large fleshy berries for fruits. Most fruiting collections have one or a few obviously immature fruits. This bias in collecting, which is probably due to the fruits' size, abundance of thick and sticky latex, and difficulty of preservation, poses problems for the interpretation of dried carpological material. The availability of alcohol-preserved fruits and personal field studies aided greatly in the present study.

One of the collections cited above, *Glaziou 14078*, was cited previously by GLAZIOU (1910) as representing *Ambelania macrophylla*. This specimen contains erroneous collection data, claiming to have been collected in the vicinity of Rio

de Janeiro. WURDACK (1970) has discussed the incorrect information sometimes associated with Glaziou-numbered specimens. Another Glaziou specimen (No. 14081) is cited under *Spongiosperma macrophyllum* in the present work, and may actually represent a pirated specimen of Spruce 2483, the type collection of the basionym: *Ambelania macrophylla*. Additional confusion between these two presently-recognized taxa (*Ambelania acida* and *Spongiosperma macrophyllum*) was caused by *Ambelania cucumerina* Miers (1878), since the species description was based on elements of both species. *Ambelania cucumerina* Miers is here lectotypified by the spirit-preserved fruits in the Kew Museums collection. The paratype (Kew-Hooker sheet of Spruce 2483; some fragments of this specimen are also attached to the BM duplicate with the pencilled notation 'Ambellania cucumerina' in Miers' hand) is also an isolectotype of *Ambelania macrophylla*; see discussion under *Spongiosperma macrophyllum*.

1–2. **Ambelania duckei** Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 12: 296–297. 1935; 15: 620. 1941; Monachino, Lloydia 8(2): 119–120. 1945; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 167, pl. IV – 12, 22, 33. 1948.

Type: Brazil: Amazonas: Manáos, Estrada do Aleixo, 2 Nov 1929 (fl fr), *Ducke* RB 22422 (B, holotype, lost; isotypes: INPA 16429, RB *nv*).

Small tree up to 10 m tall with leaf-bearing branches 3–6 mm in diameter. *Leaf blades* elliptic to narrowly ovate or obovate, usually narrowing near base, (7–)10–20(–22) × (3–)4–8 cm, glabrous, coriaceous, becoming yellowish to orange when dry, with 13–20 pairs of lateral veins; bases rounded to obtuse, slightly decurrent on petiole; apices obtuse to subacute becoming remotely acuminate; margins entire, revolute; midrib slightly impressed above, raised below; lateral veins mostly inconspicuous, usually not raised. Petioles 7–15 mm long, canaliculate. *Inflorescences* axillary, cymose, (2–)5–10(–25)-flowered, with only a few flowers expanded at any one time and forming pedicellular masses at nodes; peduncles reduced, up to 5 mm long; bracts and bracteoles ovate, small, ca 1 × 0.8–1 mm; pedicels 2–4 mm long. *Flowers*: mature bud 17–20 mm long; sepals ovate, 1.5–2 × 1.4–2 mm, apically rounded to obtuse. Corolla yellowish with tube 9–12 mm long; lobes narrowly ovate to lanceolate, 8–10 × 2.5–3.5 mm. *Stamens* inserted ca 3.5 mm from base of corolla tube; anthers 3 mm long, subsessile with filament ca 0.3 mm long, basally sagittate, apically caudate with acumen 0.5–0.6 mm long. *Ovary* conical-ovoid, 1.1–1.4 mm long; style 1 mm long; clavuncle 0.6–0.7 mm long; stigmoid lobes 1.2 mm long. *Fruit* ovoid, 8–12(–15) cm long, 6–9(–10) cm in diameter, somewhat compressed laterally, apically pointed, blunt. *Seeds* numerous, plano-convex, elliptic to ovate in outline, 10–12 × 6–7 × 2–2.5 mm.

Etymology. Named in honor of ADOLPHO DUCKE (1876–1959), collector of the type specimen and student of the Amazon flora.

FIG. 2. *Ambelania duckei* Markgraf: 1. branch, $\frac{1}{2}$ ×; 2. older branch with inflorescences, $\frac{1}{2}$ ×; 3. opened flower , 3 ×; 4. fruit with quarter-section removed showing seeds, $\frac{3}{4}$ ×. (1. Mathias & Taylor 5116; 2–3. Ducke 451; 4. Zarucchi et al. 2533, alc. mat.).

MAP 8. *Ambelania duckei* Markgraf.

Distribution. Known from eastern Peru (Loreto, Pasco) and Brazil (Amazonas near Manaus, Rondônia); Map 8.

Specimens examined:

BRAZIL. Amazonas: Manaus and vicinity, Reserva Florestal Ducke, 19 Aug 1968 (fl, yng fr), *Aluisio 93* (GH, INPA), 17 Apr 1962 (fr), *W. Rodrigues & Chagas 4398* (INPA), 11 Jun 1964 (fr), *W. Rodrigues & Loureiro 5903* (GH, INPA), 11 Sep 1979 (fr), *Zarucchi et al. 2531* (GH, INPA, NY), *2533* (GH, INPA, NY); Manaus, margem do Igarapé do Bindú, 11 Feb 1955 (fr), *Chagas INPA 801* (INPA); Estrada Manaus-Caracaraí, variante da BR-174 a Manaus-Itacoatiara, 22 Dec 1976 (st), *D. Coêlho & Mourão 875* (INPA); Manaus, BR-17, km 21, 28 Dec 1955 (fr), *L. Coêlho & Mello INPA 3227* (INPA, MG); Manaus, Rio Tarumá, 15 Mar 1936 (fl fr), *Ducke RB 35153* (G, INPA, K, P, S, U, US), *451* (A, F, K, MO, NY, RB, S, US [frag]), 1 Oct 1941 (fl fr), *Ducke 451 (IIa Col.)* (IAN, MG); basin of Rio Negro, without precise locality, 19 Apr 1941 (st), *Frões 12004/5* (A, F, MICH, NY, US); Manaus, Estrada do Aleixo, 26 Mar 1947 (fl), *Frões 22046* (IAN, NY); Estrada Manaus-Itacoatiara, km 150, 14 May 1972 (fr), *Loureiro et al. INPA 35786* (INPA);

Manaus, terreno do SIDERAMA, 5 May 1973 (fr), *Loureiro et al. INPA 38014* (INPA); Manaus, Ig. do Mariano, 31 Jul 1956 (fr), *Mello INPA 4015* (INPA, MG, MO, U); km 28 do Rodôvia Manaus-Itacoatiara, 30 Oct 1963 (fr), *E. Oliveira 2829* (IAN); Manaus-Itacoatiara Highway, Reserva Walter Egler, km 65, 14 Nov 1966 (fr), *Prance et al. 3173* (INPA, NY); Est. Manaus-Caracaraí, km 23, 6 Nov 1959 (fl fr), *W. Rodrigues & Côelho 1361* (INPA); Manaus, Ig. do Bindú, 20 Apr 1961 (fr), *W. Rodrigues & Chagas 2403* (INPA); Manaus, Estrada do Forquilha, 5 Jul 1962 (fr), *W. Rodrigues & Chagas 4528* (INPA); Manaus, Ponte da Bolívia, 18 Oct 1955 (st), *W. Rodrigues INPA 2159* (INPA); Manaus, Jardim Tarumãzinho, 11 Feb 1977 (fr), *M. Silva et al. 2081* (INPA). Rondônia: 4 km de Vilhena, 12° 45′ S., 60° 10′ W, 30 Oct 1979 (fl fr), *Vieira et al. 798* (MO, NY, US).

PERU. Loreto. Río Aguatía, W bank 8–10 km below Aguatía, 2 Jul 1960 (fr), *Mathias & Taylor 5116* (F, LA, MO, US). Pasco: Prov. Oxapampa, Cabeza de Mono, Río Iscozacin, 10 km SW of Iscozacin, Palcazu Valley, 10° 20′ S., 75° 18′ W., alt 320 m, 8 Jun 1983 (st), *Gentry et al. 41656* (MO), 8 Jun 1983 (fr only), *Gentry et al. 41693* (MO), 13 Jun 1983 (st), *Gentry et al. 41976* (MO).

Local names. BRAZIL. Pepino (*W. Rodrigues & Chagas 4528*), Pepino do mato [da mata] (*D. Coêlho & Mourão 875, W. Rodrigues & Coêlho 1361, W. Rodrigues & Chagas 2403, 4398*), Pepino bravo (*W. Rodrigues & Loureiro 5903*), Pepino verde (*D. Coêlho & Mourão 875, Zarucchi et al. 2531, 2533*), Pepino verde da mata (*Chagas INPA 801, L. Coêlho & Mello INPA 3227*). PERU. Auca-sanango (*Mathias & Taylor 5116*).

Ambelania duckei was described by MARKGRAF in 1935, based on a single collection by ADOLPHO DUCKE from the vicinity of Manaus in central Amazonia. In the Manaus region, *Ambelania duckei* is sympatric with *A. acida*, and is distinguished easily by its large ovoid fruit. It is an understory tree up to 10 m tall; I found it growing within a short distance of a small blackwater stream, well shaded, and in sandy soil on *terra firma*.

In the protologue, MARKGRAF (1935) compared this species with *Ambelania tenuiflora* (= *A. acida*), also found in the vicinity of Manaus, observing that the septum which divides the fruit into two cells tears during fruit maturation in *A. duckei*, yet remains intact in the other species. My own studies of *Ambelania*, especially *A. duckei* in the field near Manaus, contradict this observation, showing that the fruit dissepiment remains intact in all species of *Ambelania*. Many seeds are attached to this central partition by fleshy funicles, and project into the open cells. Another interesting feature of this species is that the leaves generally turn yellowish to pale orange when dried.

According to MARKGRAF (pers. comm.), the holotype of *Ambelania duckei, Ducke RB 22422*, at Berlin, was lost during World War II. It is probable that a duplicate of that collection is deposited in the herbarium of the Jardin Botanico in Rio de Janeiro (RB), but it was not seen among material provided on loan from that institution. If it does exist, it should be designated as the lectotype for the species.

1–3. **Ambelania occidentalis** Zarucchi, sp. nov.

Type: Peru: Loreto: Mishuyacu, near Iquitos, alt 100 m, forest, Oct-Nov 1929 (fl), *Klug* 613 (US 1455612, holotype; isotypes: F 629963, NY).

Plantae *Ambelaniae acidae* et *A. duckei* affinis sed differt foliis ellipticis, anguste ovatis, basi rotundatis vel obtusis, nervo mediano supra valde impresso, subtus basim versus prominente; inflorescentiis brevoribus compactis pauciflorisis; fructu in ambitu anguste ovato vel lanceolate ovato, 7–12 cm longo, 2.5–4 cm in diametro.

Small tree up to 10 m tall with leaf-bearing branches 2–3.5 mm in diameter. *Leaf blades* elliptic to narrowly ovate, (11–)14–22(–25) × (4.5–)6–9(–10.5) cm, glabrous, coriaceous to stiff-coriaceous, sometimes becoming yellowish when dry, with 9–13(–16) pairs of lateral veins; bases broadly rounded to obtuse and decurrent on petiole; apices acute becoming remotely acuminate; margins entire, revolute; midrib deeply impressed, especially near base of blade, above and very prominent below; lateral veins inconspicuous or slightly raised to deeply impressed near base of blade above, slightly raised to prominent near base of blade below. *Petioles* 12–18(–23) mm long, canaliculate. *Inflorescences* axillary, cymose, (1–)2–5-flowered; peduncles reduced, up to 2 mm long; bracts and bracteoles ovate, small, ca 1 × 0.6–0.8 mm; pedicels 2–4 mm long. *Flowers*: mature bud 25 mm long; sepals ovate, 1.8–2 × 1.3–1.6 mm, apically rounded to obtuse. Corolla white with tube 9–10 long; lobes elliptic to narrowly ovate, 13–15 × 4–5 mm. *Stamens* inserted ca 3 mm from base of corolla tube; anthers 3–3.5 mm long, subsessile with filament ca 0.4 mm long, basally sagittate, apically caudate with acumen 0.5 mm long. *Ovary* conical-ovoid, 2–2.5 mm long; style 2 mm long; clavuncle 0.7 mm long; stigmoid lobes 0.5 mm long. *Fruit* narrowly ovoid or ellipsoid to lanceovoid, 7–12 cm long, 2.5–4 cm in diameter, somewhat compressed laterally, apically rounded, basally rounded to truncate. *Seeds* numerous, plano-convex, elliptic to ovate in outline, 9–11 × 5.5–7 × 3–3.5 mm.

Etymology. Latin *occidentalis* = of the west, in reference to the geographic distribution of the species in western Amazonia.

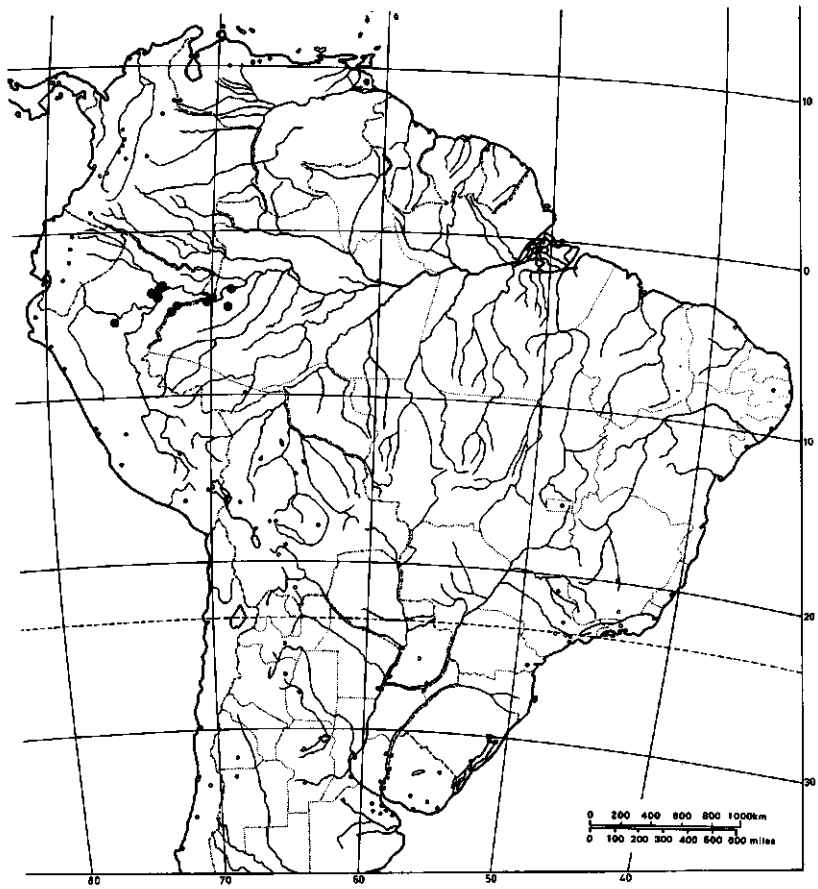
Distribution. Known from western Amazonia in the vicinity of the common border of Colombia, Brazil, and Peru. Collected from forest on *terra firma*; see Map 9.

Specimens examined:

BRAZIL. Amazonas: São Paulo de Olivença, 21 Jan 1949 (fr), *Fróes 23949* (IAN); Mun. São Paulo de Olivença, near Palmares, 11 Sep-26 Oct 1936 (fr), *Krukoff 8135* (NY); Tabatinga, 30 Nov 1945 (fr), *Pires & Black 958* (IAN); Rio Mutum, 11 Nov 1975 (fr), *Rosa & Coêlho 538* (IAN); vicinity of Leticia (Colombia), Brazil side, near El Marco, alt 200 m, 7 Sep 1963 (fr), *Soejarto 582* (COL, ECON, K, US).

COLOMBIA. Amazonas: Río Amazonas, vicinity of Leticia, 29 Aug-12 Sep 1966 (fr), *Schultes et al. 24074* (ECON); La Victoria on the Amazon River [as 'Peru' on label], 2 Sep 1929 (fr), *Ll. Williams 3017* (F).

PERU. Loreto: University arboretum on Río Nanay, 7 Aug 1972 (fr), *Croat 18866* (MO, NY, P, U, Z); Puerto Almendra SW of Iquitos on Río Nanay, 9 Aug 1972 (fr), *Croat 19042* (MO), 12 Oct 1976 (fr), *Revilla 1463* (MO), 29 Nov 1976 (fr), *Revilla 1965* (MO); Prov. Maynas, Mishana, Río Nanay, halfway between Iquitos and Santa María de Nanay, alt ca 140 m, 14 Aug 1978 (fr), *Díaz et al. 386* (MO), 30 May 1978 (fr), *Gentry et al. 22359* (MO), 25 Feb 1981 (fr), *Gentry et*



MAP 9. *Ambelania occidentalis* Zarucchi.

al. 31719 (MO, USF), 1979 (fr), *Ramirez 75* (MO); Mishuyacu, near Iquitos, alt 100 m, Oct-Nov 1929 (fr), *Klug 21* (NY, US); Río Javarí behind Angamo Garrison, 4 Aug 1973 (fr), *Lleras et al. P17156* (INPA, NY); Maynas, Dtto. Alto Nanay, Río Nanay, Quebrada de Anguilla, 28 Mar 1978 (fr), *Rimachi 3482* (F, NY); Maynas, Estación Biologica Callicebus-Mishana-Río Nanay, 2 horas río arriba de Iquitos, 3° 55′ S., 73° 35′ W., alt ca 130 m, 25 Oct 1980 (fl fr), *Vásquez et al. 616* (MO, US).

Local names. PERU. Cuchara huayo (*Vásquez et al. 616*), Masho micuna (*Rimachi 3482*).

Ambelania occidentalis is here described as a new species based upon twenty collections from western Amazonia of Brazil, Colombia, and Peru. It is separated readily from the other two species in *Ambelania* by the fruit shape and by the leaves which have the midvein deeply impressed above and very prominent below.

Excluded Species of *Ambelania*

Ambelania edulis (Roxb.) J. Presl, Wšeob. Rostlin. 2: 1065. 1846 = *Willughbeia edulis* Roxb. (Apocynaceae) according to MERRILL (1950).

Ambelania cuneata Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 17. 1860 = *Molongum lucidum* (Humboldt, Bonpland & Kunth) Zarucchi.

Ambelania laxa (Bentham) Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 17, *t. 4*. 1860 [based on *Tabernaemontana laxa* Bentham, J. Bot. (Hooker) 3: 244. 1841] = *Molongum laxum* (Bentham) Pichon, Mém. Mus. Natl. Hist. Nat. 24: 168. 1948.

Ambelania macrophylla Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 18. 1860 as '*macroyhylla*' = *Spongiosperma macrophyllum* (Muell.-Arg.) Zarucchi.

Ambelania quadrangularis Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 18. 1860 = *Rhigospira quadrangularis* (Muell.-Arg.) Miers, Apocynaceae South America 68, *pl. 10A*. 1878.

Ambelania grandiflora Huber, Bol. Mus. Paraense Hist. Nat. 3: 444. 1902 = *Spongiosperma grandiflorum* (Huber) Zarucchi.

Ambelania camporum Glaziou, Bull. Soc. Bot. France, sér. 4 (mém. 3e), 10: 449. 1910 = *Secondatia densiflora* A. DC. (Apocynaceae), according to PICHON (1948).

Ambelania zschokkeiformis Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 12: 295–296. 1935 = *Molongum zschokkeiforme* (Markgraf) Pichon, Mém. Mus. Natl. Hist. Nat. 24: 169. 1948.

Ambelania lucida (Humboldt, Bonpland & Kunth) Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941 [based on *Tabernaemontana lucida* Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. 7: 162 (folio), 209 (quarto). 1825] = *Molongum lucidum* (Humboldt, Bonpland & Kunth) Zarucchi.

Ambelania markgrafiana Monachino, Lloydia 8(2): 122. 1945 [name based on *Neocouma duckei* Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 11: 337. 1932] = *Mucoa duckei* (Markgraf) Zarucchi.

Ambelania ternstroemiacea (Muell.-Arg.) Monachino, Lloydia 8(2): 123. 1945 [based on *Tabernaemontana ternstroemiacea* Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 88. 1860] = *Neocouma ternstroemiacea* (Muell.-Arg.) Pierre, Bull. Mens. Soc. Linn. Paris, sér. 2, 5: 33–34. 1898.

Ambelania lopezii Woodson in Schultes, Bot. Mus. Leafl. 15(2): 76. 1951 = *Spongiosperma macrophyllum* (Muell.-Arg.) Zarucchi.

Ambelania oleifolia Monachino, Mem. New York Bot. Gard. 10(1): 117–119, *fig. 14a-d*. 1958 as '*oleaefolia*' = *Spongiosperma oleifolium* (Monachino) Zarucchi.

Ambelania oleifolia Monachino var. *riparia* Monachino, Mem. New York Bot. Gard. 10(4): 59. 1961 as '*oleaefolia*' = *Spongiosperma riparium* (Monachino) Zarucchi. This variety of *Ambelania oleifolia*, as described by MONACHINO (1961), contains two taxa: *Spongiosperma oleifolium* and *S. riparium*. For a complete explanation, see the discussion under *Spongiosperma oleifolium*.

Ambelania longiloba Markgraf in Prance, Brittonia 23(4): 441. 1971 = *Spongiosperma longilobum* (Markgraf) Zarucchi.

Ambelania lanceolata Markgraf, Acta Bot. Venez. 6: 74. 1971 [1972] = *Spongiosperma oleifolium* (Markgraf) Zarucchi.
Ambelania patchenkoana Markgraf, Acta Bot. Venez. 10: 247–249, *fig. 1.* 1975 = *Mucoa pantchenkoana* (Markgraf) Zarucchi.
Ambelania parviflora Markgraf, Ernstia 19: 4–5. 1983 = *Neocouma parviflora* (Markgraf) Zarucchi.

2. **Mucoa** Zarucchi, gen. nov. (Apocynaceae; Plumerioideae; Ambelanieae).
Ambelania sect. *Neocoumae* Monachino subsect. *Markgrafianae* Monachino, Lloydia 8(2): 113–114. 1945, nom. nud.
Ambelania sect. *Neocoumopsis* Pichon, Mém. Mus. Natl. Hist. Nat. 24: 167, *pl. IV - 13, 23, 34.* 1948, nom. illeg.

Rami juniores compressi, vetustiores teretes, in foliorum axillis multiglandulosi. Nervi tertiarii laminae foliorum supra manifesti, sclerenchymis filiformis destituti. Inflorescentia cymosa, cymis axillaribus surculis vegetativis simul crescentibus. Sepala intus basi multiglandulosa. Antherae sessiles. Baccae globosae vel ellipsoideae, pericarpio indurato granuloso. Semina pulpa fibrosa circumdata.

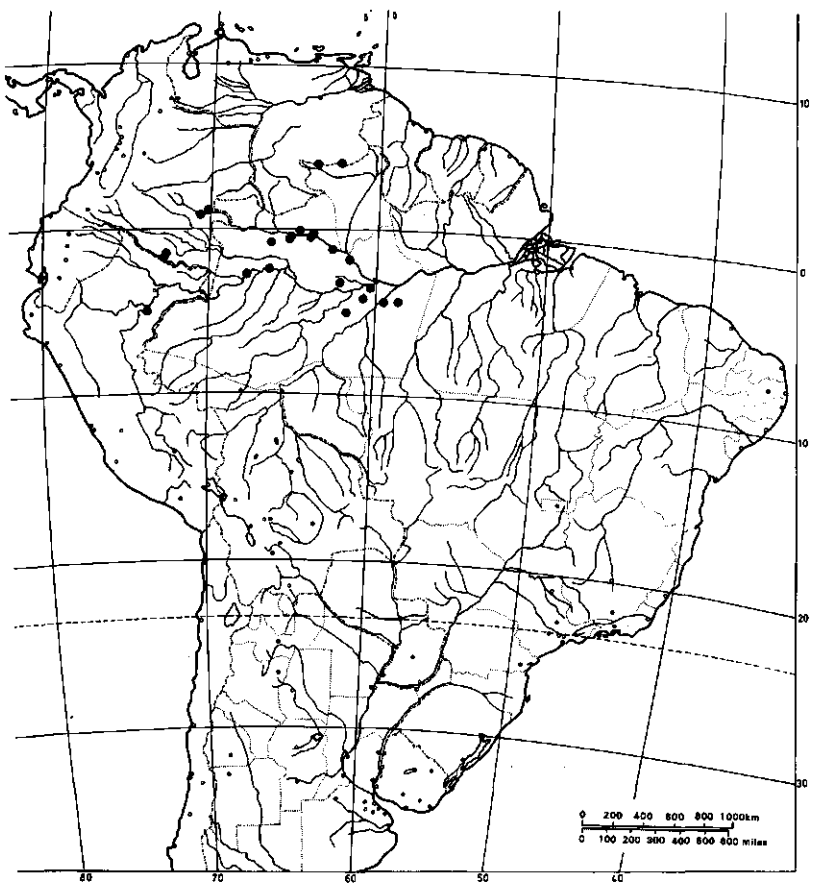
Small to medium-sized tree up to 15 m tall, lactescent, with young stems compressed, becoming terete with age; interpetiolar line or ridge conspicuous, glandular within, becoming resinous with exudate. *Leaves* opposite, decussate, petiolate, glabrous, coriaceous to thick-coriaceous, venation brochidodromous, margins entire and revolute, blade decurrent on canaliculate petiole; midrib slightly raised to impressed above, slightly raised to very prominent below; lateral veins slightly raised to impressed above, raised below; tertiary veins visible above; foliar filiform sclereids absent; small resin-producing glands numerous in leaf axils. *Inflorescences* axillary, developing simultaneously with terminal vegetative shoot, cymose, few- to many-flowered; peduncles mostly reduced; bracts ovate. *Flowers* subsessile to short pedicellate; bracteoles small, ovate, near base of pedicel; calyx lobes 5, persistent, quincuncially imbricate, basally with many small glands in several series within; sepals free nearly to base, eciliate, ovate, apically rounded; corolla sympetalous, actinomorphic, salverform, white or yellow to orange, thick; tube narrow, straight, either short or somewhat long, with suprastaminal region pilose, becoming dense near orifice, dilated at point of insertion of stamens; corolla lobes 5, convolute in bud, overlapping to left, becoming reflexed at anthesis, usually approximating tube in length. *Stamens* 5, inserted just below middle of tube; anthers lanceolate, sessile, basally auriculate, apically caudate. *Ovary* superior, ovoid to conical-ovoid, glabrous, apically acute to attenuate, bicarpellate, placentation axile with ovules numerous in each locule; style terete; clavuncle cylindrical to globose, with basal ring of tissue, apically five-lobed, star-shaped in cross-section, glabrous; stigmoid lobes terete, thin, either subequal to or longer than clavuncle. *Fruit* a many-seeded, two-celled

berry, globose or ellipsoid, with seeds completely embedded in a stringy, aromatic pulp and acropetally imbricate on central placentas; pericarp indurated with a granular composition, surface smooth to verrucose. *Seeds* plano-convex, naviculate, ovate to elliptic in outline; testa shiny, finely reticulate; hilum small, ovate to elliptic. *Embryo* almost as long as seed, with small, thin, plane, ovate cotyledons; radicle straight, terete, about 4–7 times as long as cotyledons.

Type species. *Mucoa duckei* (Markgraf) Zarucchi (based on *Neocouma duckei* Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 11: 337. 1932), here chosen.

Etymology. An anagram of *Couma* of the apocynaceous tribe Carisseae, a genus which shares many characters with the one here described.

Distribution. Central and western Amazonia of Brazil (Amazonas, Roraima), Peru (Loreto), Colombia (Amazonas, Guaviare, Vaupés), and Venezuela (Amazonas, Bolívar); Map 2.



MAP 2. *Mucoa*

The new genus *Mucoa*, as here circumscribed, consists of two species from central and western Amazonia. In 1948, PICHON described *Ambelania* sect. *Neocoumopsis* [nom. illeg.] with a single species, *A. markgrafiana*. This species, first described by MARKGRAF in 1932 as *Neocouma duckei* and later transferred to *Ambelania* (*A. markgrafiana*, not *A. duckei*) by MONACHINO (1945), is discussed in detail under *M. duckei*, see below.

The distinction between *Ambelania* and *Mucoa* is clear, based on gross morphological features and on several less conspicuous characteristics such as the absence of foliar filiform sclereids and the nature of the calyx lobes, which are multiglandular at the base within. The trees of *M. duckei* and *M. pantchenkoana* are found in *terra firma* forest, and, based on specimen records and personal observations, are of rather rare occurrence.

KEY TO THE SPECIES OF *MUCOA*

1. Petioles long, (12–)16–36(–42) mm long; inflorescences 5– to 12(–20)-flowered, corolla yellow to orange with tube 12–15 mm long; fruit globose; leaf blades elliptic to narrowly ovate or obovate, (14–)18–25(–30) × 7–14(–17) cm (Widespread in lowlands of Western and North Central Amazonia of Brazil, Colombia & Peru) . . . . . .2–1. **M. duckei**

   Petioles short, 2–4 mm long; inflorescences 3- to 5-flowered, corolla white with tube 8–10 mm long; fruit (immature) broadly ellipsoid; leaf blades elliptic to obovate, 10–16 × 4.5–8 cm (Higher elevations along Venezuela-Brazil border) . . . . . 2–2. **M. pantchenkoana**

2–1. **Mucoa duckei** (Markgraf) Zarucchi, **comb. nov.**

Basionym: *Neocouma duckei* Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 11: 337. 1932.

Type: Brazil: Amazonas: Fontebôa, 5 Sep 1929 (fl), *Ducke* RB 22418 (B, holotype, lost; RB, lectotype [here chosen]; isotypes: K, P [F photo 38761; GH, US], S, U, US 1574340). Homotypic symonym: *Ambelania markgrafiana* Monachino, Lloydia 8(2): 122–123. 1945; 9(4): 302. 1946; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 167, pl. IV – 13, 23, 34. 1948; Schultes, Bot. Mus. Leafl. 13(10): 308–309, pl. 37. 1949; Macbride, Fl. Peru, Publ. Field Mus. Nat. Hist., Bot. Ser. 13(5/1): 373–374. 1959.

Small to medium-sized tree up to 15 m tall with leaf-bearing branches 4–7 mm in diameter, young stems compressed with two longitudinal grooves, becoming terete with age. *Leaf blades* elliptic to narrowly ovate or obovate, (14–)18–25(–30) × 7–14(–17) cm, glabrous, coriaceous to thick-coriaceous, with 14–20 pairs of lateral veins; bases obtuse to rounded, decurrent on petiole; apices rounded to obtuse, usually mucronate; margins entire, revolute; midrib plane

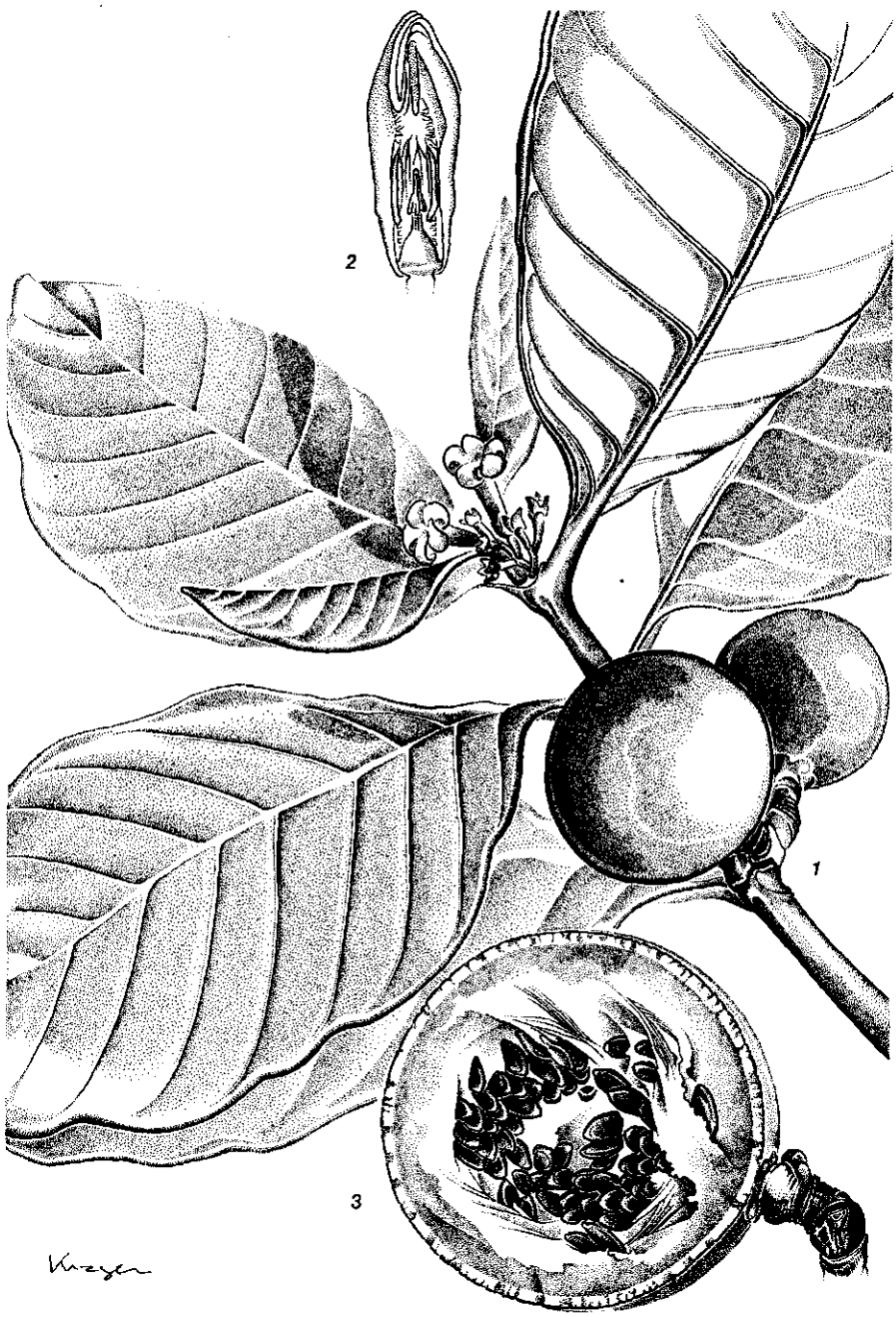


FIG. 3. *Mucoa duckei* (Markgraf) Zarucchi: 1. flowering and fruiting branch, $\frac{1}{2}\times$; 2. young flower in section, 3 ×; 3. sectioned fruit, $\frac{3}{4}\times$. (1–3. Zarucchi et al. 1852, incl. alc. mat.).

becoming impressed near base of blade above, very prominent below; lateral veins raised above and below. *Petioles* (12–)16–36(–42) mm long, canaliculate. *Inflorescences* axillary, cymose, 5–12(–20)-flowered; peduncles completely reduced or up to 8 mm long; bracts broadly ovate, 2–3 × 1.5 mm; pedicels 2–5(–8) mm long; bracteoles ovate, small, ca 0.8–1 × 0.7–0.9 mm. *Flowers*: mature bud 20–25 mm long; sepals broadly ovate, 2–3 × 2–2.8 mm, apically rounded. Corolla yellow to orange with tube 12–15 mm long; lobes elliptic, 8–11 × 3–4 mm. *Stamens* inserted ca 4 mm from base of corolla tube; anthers 3.5–4 mm long, sessile, basally auriculate, apically caudate with acumen 0.4–0.5 mm long. *Ovary* conical-ovoid, 2–3 mm long, style 1.8–3 mm long; clavuncle 0.8–1 mm long; stigmoid lobes 1.3–1.8 mm long, thin, terete, fused for most of their length. *Fruit* globose, 5–8(–10) cm in diameter. *Seeds* numerous, ca 50–70, plano-convex, ovate to elliptic in outline, 9–12 × 5–6.5 × 2.5–3.5 mm.

Etymology. Named in honor of ADOLPHO DUCKE (1876–1959), collector of the type specimen and student of the Amazon flora.

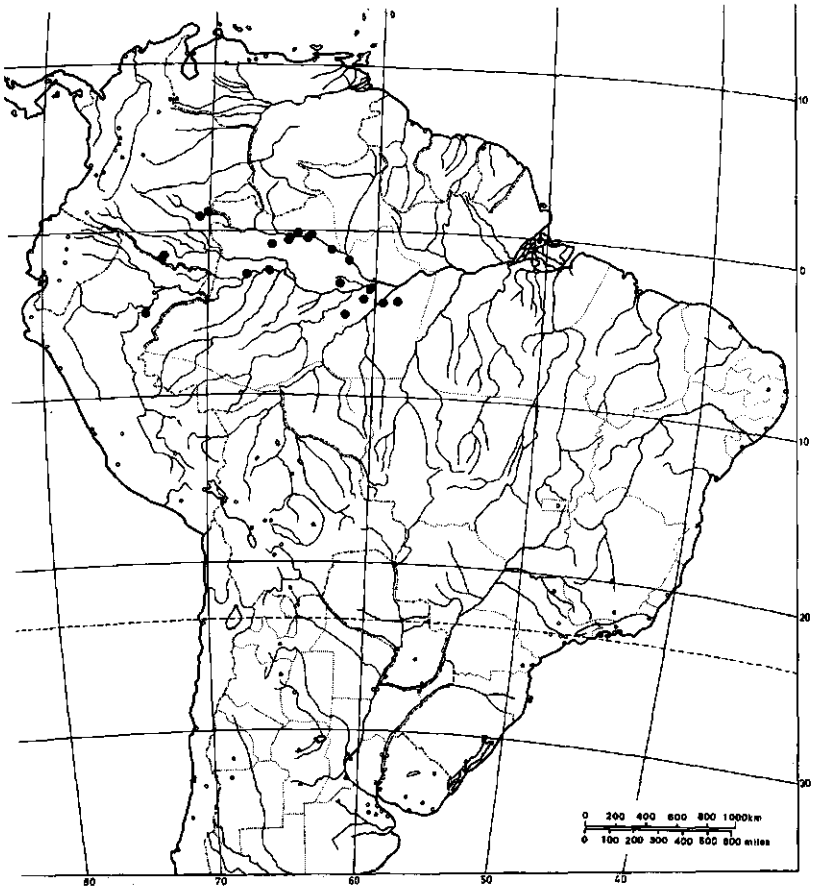
Distribution. Widespread in western and north central Amazonia of Brazil, Colombia, and Peru; expected to occur in adjacent areas of Venezuela; Map 10.

Specimens examined:

COLOMBIA. Amazonas: Trocha entre El Encanto y La Chorrera, alt ca 180 m, 31 May-2 Jun 1942 (fr), *Schultes 3877* (ECON); Río Caraparaná entre las bocas y El Encanto, alt ca 150 m, 22–28 May 1942 (fr), *Schultes 3877a* (ECON). Vaupés: Margenes del Río Vaupés en Pucarón, alt 240 m, 2 Oct 1939 (fl fr), *Cuatrecasas 7129* (COL, F, US); Mitú and vicinity, along Río Vaupés between Río Yí and Río Kubiyú, 17 Jul 1976 (fl fr), *Zarucchi et al. 1852* (COL, ECON, GH, MO, US, USF).

PERU. Loreto: Prov. Requena, Dist. Sapuena, Jenaro Herrera, árbol no. 540, alt 120 m, 30 May 1974 (st), *Abadie 19T* (IAN); Jenaro Herrera, margen derecha Río Ucayali, 24 May 1982 (fr), *Encarnación 26158* (MO, US); Jenaro Herrera, arboretum, 7 Dec 1977 (fr), *Gentry et al. 21215* (MO); Jenaro Herrera, tree no. R-114 PP, alt 120 m, 15 Oct 1973 (fl buds, yng fr), *Noriega sn* (COL, F, NY).

BRAZIL. Amazonas: Lago do Castanho-Mirim, estrada da Petrobrás, 27 Jun 1973 (fl buds, fr), *Albuquerque et al. 917* (INPA); along Rio Negro between Manaus and São Gabriel, Acânga, 1° 10′ S., 62° 30′ W., 27 Jun 1979 (fr), *Alencar et al. 84* (INPA, MO); Rio Tea, afluente do Rio Negro, 12 Jun 1976 (fr), *L. Coêlho 457* (INPA); Rio Madeira, Borba, 4 Jul 1936 (fl fr), *Ducke RB 30103* (G, K, P, RB, S, U, US), *320* (MAD, NY); basin of Rio Solimões, Mun. São Paulo de Olivença, Rio Tonantins, Tauriman, 9 Aug 1941 (fl), *Fróes 280* (F, G, K, MO, NY, S, US, WIS), *282* (F, G, GH, K, MO, NY, P, S, US); basin of Rio Negro, Mun. São Gabriel, Macubeta on Rio Marié, 27 Jan 1941 (fr), *Fróes 548* (G, NY, S, WIS); Mun. São Gabriel, Lago do Dodona, basin of Uenuichy River, 24 Mar 1942 (st), *Fróes 825* (NY, US); Fonte Bôa, 5 Apr 1945 (fr), *Fróes 20651* (IAN, K, NY, US); Rio Negro, Tapuruquara, 8 Apr 1947 (fl fr), *Fróes 22121* (COL, IAN, NY, RB, U, VEN); Rio Negro, Preto, Maboaby, 8 Nov 1947 (yng fr), *Fróes 22786* (IAN, NY, RB, U); Rio Negro, Estirão do Cordo, Ig. Jahú, Airão, 14 Jun 1948 (yng fr), *Fróes 23247* (IAN, RB, SP, VEN); Rio Capitarí, Mun. de Codajás, 3 Sep 1950 (fr), *Fróes 26552* (IAN); Igarapé Dararrá, Cachoeira do Aracu – Ponto 13 – SA-20-VA, 3 Jun 1976 (fr), *Marinho 405* (IAN); Rio Marié, Ponto 2 – SA-19-XA, 17 Jun 1976 (fr), *Marinho 572* (IAN); basin of Rio Negro, N of Rio Negro 2 km above Tapuruquara, 18 Oct 1971 (old fl, fr), *Prance et al. 15390* (F, INPA, K, M, NY, P, S, U, US); Manaus-Pôrto Velho Highway, km 253, 19 Mar 1974 (fl buds), *Prance et al. 20734* (F, INPA, NY, Z); Estrada Manaus-Pôrto Velho, trecho entre os Rios Castanho e Tupana, 17 Jul 1972 (fl fr), *M. F. da Silva*



MAP 10. *Mucoa duckei* (Markgraf) Zarucchi.

et al. 804 (INPA); basin of Rio Negro, without specific locality, 16 Aug 1941 (fl buds), *Stout 700* (US); Mun. de Axinim, Rio Abacaxis, along Petrobras road from Igarapé Axinim, Lat. 4° 15′ S, Long. 58° 43′ W, 7 Jul 1983 (fr), *Zarucchi et al. 2973* (INPA, NY, US); without specific locality, 1 Jun 1945 (fr), *Fróes 21010* (IAN, NY).

Local names. COLOMBIA. Dú-kô-gay (Huitoto language, *Schultes 3877*), Juansoco (*Schultes 3877*), Palo de leche (*Schultes 3877*). PERU. Yahuar caspi (*Abadie 19T*), Yahuar huayo (*Noriega sn*). BRAZIL. Amaparana (*Fróes 20651*), Jacquitaque (*Fróes 280, 282*), Parva-papo do Terra firma (*Fróes 548*), Sorva de Cutia (*Stout 700*), Sorvarana (*Fróes 21010*).

The species upon which *Mucoa duckei* is based was described by MARKGRAF in 1932 as the second species in the genus *Neocouma*, which itself was described by PIERRE (1898). MARKGRAF named the new species in honor of its collector,

ADOLPHO DUCKE, and included a short discussion of the relationships between the two species then accepted in the genus. Although he did contrast the two species using several characters, he did not indicate that his new species had axillary inflorescences whereas *N. ternstroemiacea* had terminal inflorescences. Dried specimens of both species have a similar appearance when in sterile condition.

MONACHINO (1945) transferred *Neocouma duckei* to *Ambelania* in his revision of *Ambelania* (sensu lato), but since the name *A. duckei* was already in use (MARKGRAF, 1935), Monachino provided the name *A. markgrafiana*. MONACHINO treated *A. markgrafiana* and *A. ternstroemiacea* as closely related species in the genus. In contrast, PICHON (1948) stressed the distinction between these two species, treating them in separate genera in his tribe 'Ambelaniées.' *Ambelania markgrafiana* was treated as the only member of *Ambelania* sect. *Neocoumopsis*; however, this section was not validly published.

The holotype of *Neocouma duckei* was lost during World War II (MARKGRAF, pers. comm.) and therefore the lectotype of *Ducke RB 22418* from the herbarium of the Jardin Botanico in Rio de Janeiro (RB) has been chosen.

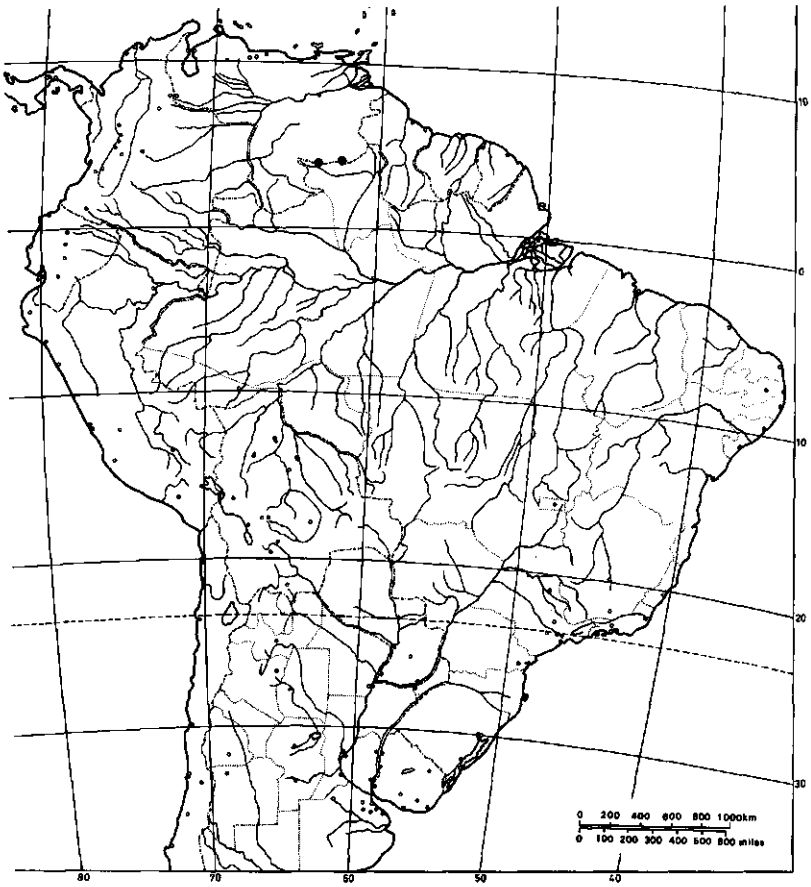
Mucoa duckei is a rather poorly collected species in light of its widespread distribution; see Map 10. Individuals reach up to about 15 m tall and are found within the lower story on *terra firma*. *Mucoa duckei* is separated easily from the only other species in the genus, *M. pantchenkoana*, by its long petioles, globose fruits, and many-flowered inflorescences.

2–2. **Mucoa pantchenkoana** (Markgraf) Zarucchi, **comb. nov.**

Basionym: *Ambelania pantchenkoana* Markgraf, Acta Bot. Venez. 10: 247–249, fig. 1. 1975.

Type: Venezuela: Bolívar: Sierra Pakaraima, Cabeceras del Río Paragua (Agua-pira), a lo largo de la frontera Venezolana-Brasilera, frontera No. 15, 3° 40′ N., 63° 00′ W., alt 1400 m, 4–5 May 1973 (fl fr), *Steyermark* 107227 (Z, holotype; isotypes: MO 2729215, NY, VEN 95284).

Small tree up to 6 m tall with leaf-bearing branches 3–8 mm in diameter, young stems compressed becoming terete with age. *Leaf blades* elliptic to obovate, 10–16 × 4.5–8 cm, glabrous, coriaceous to thick-coriaceous, with 12–20 pairs of lateral veins; bases rounded to obtuse, decurrent on petiole; apices rounded; margins entire, revolute; midrib slightly raised above and below; lateral veins slightly impressed above, slightly raised below. Petioles 2–4 mm long, canaliculate. *Inflorescences* axillary, cymose, 3–5-flowered; peduncles completely reduced, up to 5 mm long; bracts ovate, small, ca 2 × 1.2 mm; pedicels 3–6 mm long; bracteoles ovate, small, ca 1.2 × 1 mm, near base of pedicel. *Flowers* up to 17–20 mm long; sepals ovate, 1.5–2 × 1.2–1.5 mm, apically rounded. Corolla white with tube 8–10 mm long; lobes narrowly obovate, 8–11 × 3–4 mm. *Stamens* inserted ca 3 mm from base of corolla tube; anthers 3.5–4 mm long, sessile,



MAP 11. *Mucoa pantchenkoana* (Markgraf) Zarucchi.

basally auriculate, apically caudate with acumen ca 0.3 mm long. *Ovary* ovoid, ca 1.5 mm long; style 1 mm long; clavuncle 0.7 mm long; stigmoid lobes short, ca 0.5 mm long. *Fruit* (immature) broadly ellipsoid, 6 cm long, 4.5 in diameter. *Seeds* numerous, plano-convex, ovate to elliptic in outline, 9–11 × 5.5–6 × 2–2.5 mm.

Etymology. Named in honor of GEORGES PANTCHENKO, longtime explorer of the Venezuela-Brazil frontier, who assisted in securing the collection of the type material.

Distribution. Known only from along the Venezuelan Bolívar and Brazilian Roraima border; Map 11.

Specimens examined:

VENEZUELA. Bolívar: Distrito Heres, Cerro Marutani, a lo largo del Río Carla, afluente de las cabeceras del Río Paragua, 3° 50′ N., 62° 15′ W., downstream from camp, alt 1200 m, 12 Jan 1981 (fl fr), *Steyermark et al. 123913* (MO, VEN); SW of camp following Río Carla, alt 1000–1050 m, 14 Jan 1981 (fl), *Steyermark et al. 124064* (MO, VEN).

No local names are recorded for this species.

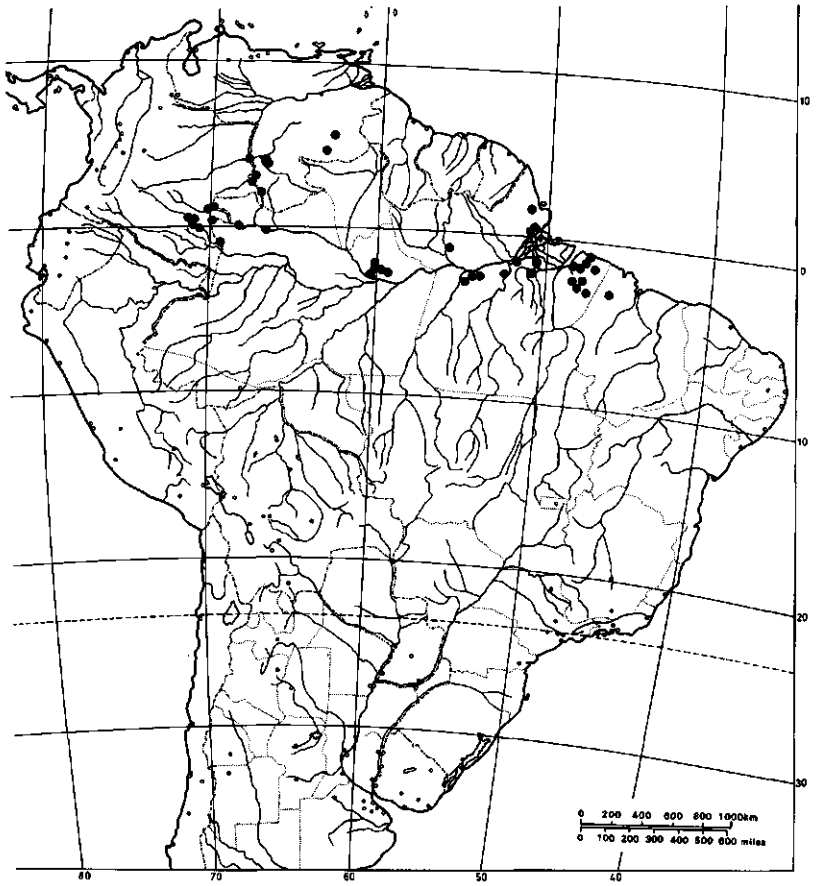
Mucoa pantchenkoana is known only from three collections. One of the collection localities, on the Venezuela-Brazil border at 1400 m, is the highest known elevation recorded for a tree classified in the Ambelanieae. *Mucoa pantchenkoana* is distinguished easily from *M. duckei* by the characters listed in the key.

In describing *Ambelania pantchenkoana*, MARKGRAF (1975) stated that its affinity was with *A. duckei* of the region near Manaus. Although there may be a superficial resemblance to this species, *M. pantchenkoana* is most closely related to *M. duckei*, primarily on the basis of its reproductive structures.

3. **Spongiosperma** Zarucchi, **gen. nov.** (Apocynaceae; Plumerioideae; Ambelanieae).

Basionym: *Molongum* sect. *Trichosiphon* Pichon, Mém. Mus. Natl. Hist. Nat. 24: 168, *pl. IV – 14, 24, 35.* 1948. Type species. *Molongum macrophyllum* (Mueller-Argoviensis) Pichon.

Shrubs or small trees up to 6 m tall, lactescent, with stems terete or subterete and with conspicuous interpetiolar line or ridge. *Leaves* decussate, petiolate, glabrous, thin- to thick-coriaceous, venation brochidodromous, margins entire and revolute; midrib generally impressed above and prominent below, especially at base; lateral veins many, joining to form an intramarginal vein; petioles canaliculate. *Inflorescences* terminal, cymose, congested or lax, few- to many-flowered; peduncles short to long; bracts and bracteoles small, ovate to deltoid, with two bracteoles borne usually on lower portion of pedicels. *Flowers* large, calyx lobes 5, persistent, subequal, quincuncially imbricate, outer lobes smaller, apically obtuse, inner lobes larger, apically rounded, basally with many small glands within. Corolla sympetalous, actinomorphic, salverform, white, thick; tube narrow, straight or slightly curved, long, with suprastaminal region pilose, becoming dense near orifice, dilated at point of insertion of stamens; lobes 5, convolute in bud, overlapping to left, becoming reflexed at anthesis, usually approximating tube in length. *Stamens* 5, inserted below middle of tube; anthers lanceolate, sessile, basally sagittate, apically caudate. *Ovary* superior, conical, bicarpellate, placentation axile with ovules numerous in each locule; style terete, short to long; clavuncle obconical to cylindrical, with ring of slightly undulate tissue basally, 5-lobed apically with very short, dense pubescence on lobes; stigmoid lobes short, blunt. *Fruit* a many-seeded, one-celled berry, with seeds acropetally imbricate and not embedded in pulp; seeds attached to fruit wall by low fleshy funicles on two opposite regions adjacent to remnants of torn dissepiment; pericarp



MAP 3. *Spongiosperma*

thick, leathery. *Seeds* irregularly plano-convex, generally elliptic to ovate in outline, margins erose; testa covered with irregular protuberances; surface spongelike in texture and finely pitted; hilum small, surrounded by a toroid, slightly raised structure. *Embryo* almost as long as seed, with small, thin, plane, ovate or circular cotyledons; radicle straight, terete, about 4–8 times as long as cotyledons.

Type species. *Spongiosperma macrophyllum* (Mueller-Argoviensis) Zarucchi (based on *Ambelania macrophylla* Mueller-Argoviensis in Martius, Flora Brasiliensis 6(1): 18. 1860, as '*A. macroyhylla*').

Etymology. Greek *spongios* = sponge, *sperma* = seed; referring to the appearance of the seeds.

Distribution. Eastern, central, and northwestern Amazonia of Brazil

(Amapá, Amazonas, Maranhão, Pará), Colombia (Guainía, Vaupés), and Venezuela (Amazonas); also upper Río Orinoco region in Venezuela (Amazonas, Bolívar); Map 3.

Spongiosperma includes six species of small trees of riparian habitats from widespread areas of Amazonia. MONACHINO (1945) treated the two then-known species as species of *Ambelania*; PICHON (1948) treated them in *Molongum* sect. *Trichosiphon*. MONACHINO (1945) pointed out a relationship between the species pairs *Ambelania macrophylla--A. grandiflora* [= *Spongiosperma* spp.] and *A. laxa--A. cuneata* [= *Molongum* spp.], and also suggested that *A. zschokkeiformis* [= *Molongum*] may be related to this latter pair. PICHON (1948), in his description of *Molongum*, treated the genus as consisting of three sections: *Trichosiphon, Coilanthera*, and *Oligoon*; section *Trichosiphon* included *M. macrophyllum* and *A. grandiflora* [= *Spongiosperma* spp.], the latter species listed without making the actual combination in *Molongum*, probably since PICHON did not actually see material of it. It is obvious that both MONACHINO and PICHON were hampered in their efforts by the lack of available fruiting material. On the basis of distinct fruit types, among other characters, I have elevated Pichon's section *Trichosiphon* to generic status. The name *Trichosiphon* has been used previously at the generic level by SCHOTT and ENDLICHER, for a genus now treated as a synonym of *Sterculia* L. (Sterculiaceae); the new generic name *Spongiosperma* has therefore been created.

KEY TO THE SPECIES OF *SPONGIOSPERMA*

1. Flowers with corolla tube 10–13 mm long, lobes 13–16 × 4–6 mm; fruits fusiform to narrowly ellipsoid (Region of Manaus, Amazonas, Brazil) . . . . . 3–3. **S. longilobum**
   Flowers with corolla tube 18–30 mm long, lobes 20–40 × 7–15 mm; fruits narrowly ovoid, ellipsoid, obovoid, or globose 2
2. Leaves with 30–35 pairs of lateral veins; fruits globose (Northwestern Amazonia) . . . . . 3–4 **S. macrophyllum**
   Leaves with less than 30 pairs of lateral veins; fruits not globose 3
3. Petiole 2.5–4.0 mm long; leaf bases subcordate, rarely rounded, not decurrent on petiole (Upper Río Paragua, Bolívar, Venezuela) 3–1. **S. cataractarum**
   Petiole greater than 4 mm long; leaf bases rounded to obtuse and usually decurrent on petiole. 4
4. Leaves large, 8–19 × 3–8 cm with apices acute and ultimately short acuminate; inflorescences 7- to 18-flowered (Eastern Amazonia). . . . . 3-2. **S. grandiflorum**
   Leaves small, 3–8.5(–12) × 0.7–4(–4.5) cm with apices rounded, obtuse, or subacute; inflorescences 3- to 9-flowered 5
5. Leaves narrowly elliptic, elliptic, to lanceolate, 3–8(–12) × 0.7–3(–4.5) cm; anthers 4.5–5 mm long (vicinity of Cerro Yapacana, Amazonas, Venezuela) . . . . . 3–5. **S. oleifolium**

Leaves obovate to oblong-elliptic, 6.5–8.5 × 2.5–4 cm; anthers 6–6.5 mm long (Río Guainía along Colombia-Venezuela frontier) . 3–6. **S. riparium**

3–1. **Spongiosperma cataractarum** Zarucchi, **sp. nov.**

Type: Venezuela: Bolívar: Isla del Río Hacha, ca 600 m subiendo el río desde el Salto Hacha; region de Canaima, ca 6° 15′ N. – 62° 47′ W., alt 200–500 m, 15 Feb 1964 (fl fr), *Agostini* 227 (US 2438548, holotype; isotypes: MY 25109, NY [3 sheets], VEN 58416 & 58417).

Plantae *Spongiospermati longilobo* et *S. macrophyllo* affinis, sed foliis oblongo-ellipticis vel oblongo-ovatis, apice subacutis, obtusis vel rotundatis, basi subcordatis vel raro rotundatis; petiolo 2.5–4 mm longo; inflorescentiis congestis, 6–14-floris, pedunculo 10–16 mm longo, pedicello 9–12 mm longo; floribus albis, 40–50 mm longis, tubo 18–21 mm longo, lobis 25–33 mm longis 8–10 mm latis, fructibus anguste ovoideis usque ad 5.5 cm longis, 2 cm in diametro differt.

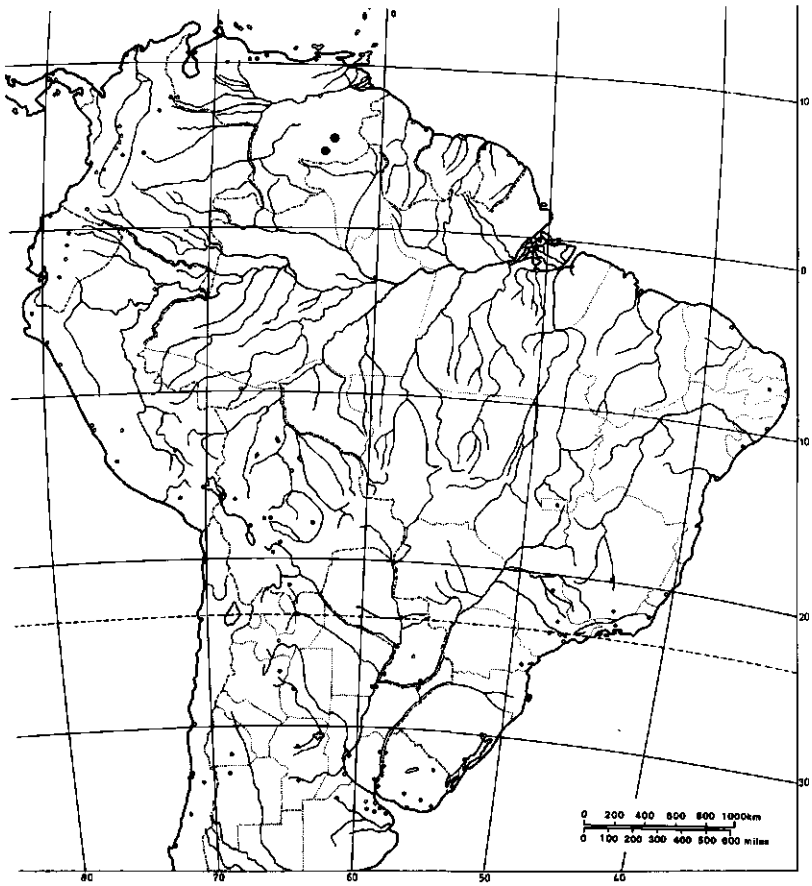
Small tree up to 4 m tall with leaf-bearing branches 2–4 mm in diameter. *Leaf blades* elliptic to oblong-ovate, 9–14.5 × 4–5.5 cm, glabrous, coriaceous to somewhat thick-coriaceous, with 15–23 pairs of lateral veins; bases subcordate or rarely rounded; apices obtuse to subacute, ultimately rounded; margins entire, revolute; midrib plane to impressed above, especially near base of blade, and prominent below; lateral veins plane or slightly raised both above and below. *Petioles* 2.5–4 mm long, canaliculate. *Inflorescences* terminal, cymose, congested, 6–14-flowered; peduncles 10–16 mm long; bracts ovate to deltoid, 2.5–3 × 1.5 mm; pedicels 9–12 mm long; bracteoles broadly ovate, ca 1 × 1.5 mm, usually near base of pedicels. *Flowers*: mature bud 40–50 mm long; sepals ovate, 3–4 × 2.5–3.5 mm, apically rounded. Corolla white with tube 18–21 mm long, lobes elliptic to oblanceolate, 25–33 × 8–10 mm. *Stamens* inserted 8–9 mm from base of corolla tube; anthers 7 mm long, sessile, basally sagittate, apically caudate with acumen 0.8–1 mm long. *Ovary* conical, 2–3 mm long; style 3.5–4 mm long; clavuncle ca 1.3 mm long; stigmoid lobes short, 0.2–0.3 mm, blunt. *Fruit* narrowly ovoid to 5.5 cm long and 2 cm in diameter, apically pointed. *Seeds* numerous, irregularly plano-convex, 8.5–10 × 4–5 × 2.5–3 mm.

Etymology. Latin *cataractarum* = of the cataracts, in reference to the localities where this species has been collected.

Distribution. Known only from two localities on the upper Río Paragua (tributary of the Río Orinoco), Bolívar, Venezuela; Map 12.

Specimens examined:

VENEZUELA. Bolívar: Dtto. Piar, alrededores del Campamento Canaima, selva de galería del Río Carrao, 4 May 1979 (fl), *Benitez de Rojas 2555* (MY, VEN); Salto Ichún, Alto [Río] Paragua, alt 380 m, 1 Mar 1958 (fl fr), *Cardona 2852* (MY, NY, VEN) Río Carroní, Canaima am Ufer des Río Carrao, alt 400 m, 16 Mar 1958 (fl), *Mägdefrau 539* (M, NY [frag, as *sn*]), *Vareschi & Mägdefrau*



MAP 12. *Spongiosperma cataractarum* Zarucchi.

6901 (VEN); am Río Moroco, Nebenfluss des Río Carao, bei Camp Ucaima, bei Canaima, alt 560–580 m, 2 Apr 1969 (fl), *Oberwinkler et al. 15405* (M); Sierra Ichún, cercancias del Salto María Espuma (Salto Ichún) del Río Ichún, base de la Sierra de Ichún, tributario del Río Paragua, Lat. 4° 46′ N., Long. 63° 18′ W., alt 500 m, 28 Dec 1961 (fl), *Steyermark 90307* (MO, NY, VEN); Canaima, Jun 1962 (fl), *Tejera & Braun 9* (NY, US, VEN), *sn* (NY), 9 Nov 1963 (fl), *Trujillo 6013* (MY).

Local name. VENEZUELA. Naranja brava (*Agostini 227*).

Spongiosperma cataractarum is perhaps most closely related to *S. longilobum* of the Manaus region, from which it differs in the following characters: the leaf bases are usually subcordate, not rounded; the blades do not narrow toward the base; the leaf apices are more blunt; the petioles are generally shorter; the flowers are larger and fewer per inflorescence; and the fruit is narrowly ovoid rather than fusiform to narrowly elliptic. Some collections of *S. cataractarum*

were previously determined as *Ambelania lopezii* (a synonym of *S. macrophyllum*) due to the superficial resemblance to this species as well as to *S. longilobum*. Fruiting material of these species, however, offers clear distinctions.

3–2. **Spongiosperma grandiflorum** (Huber) Zarucchi, **comb. nov.**

Basionym: *Ambelania grandiflora* Huber, Bol. Mus. Paraense Hist. Nat. 3: 444. 1902; Ducke, Arch. Jard. Bot. Rio de Janeiro 3: 240. 1922; Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941; Monachino, Lloydia 8(2): 128–129. 1945; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 168. 1948 [sub *Molongum* sect. *Trichosiphon*].

Type: Brazil: Pará: Aramá, 26 Feb 1900 (fl), *J. Huber* MG 1836 (MG, lectotype, here chosen [F photo sn; F 602773 with frag]; isotypes: BM, G [F photo 26842; F, GH, MO, NY, US]). Homotypic synonym: *Molongum grandiflorum* (Huber) Lemée, Fl. Guy. Franç. 3: 297. 1953 [comb. illeg.].

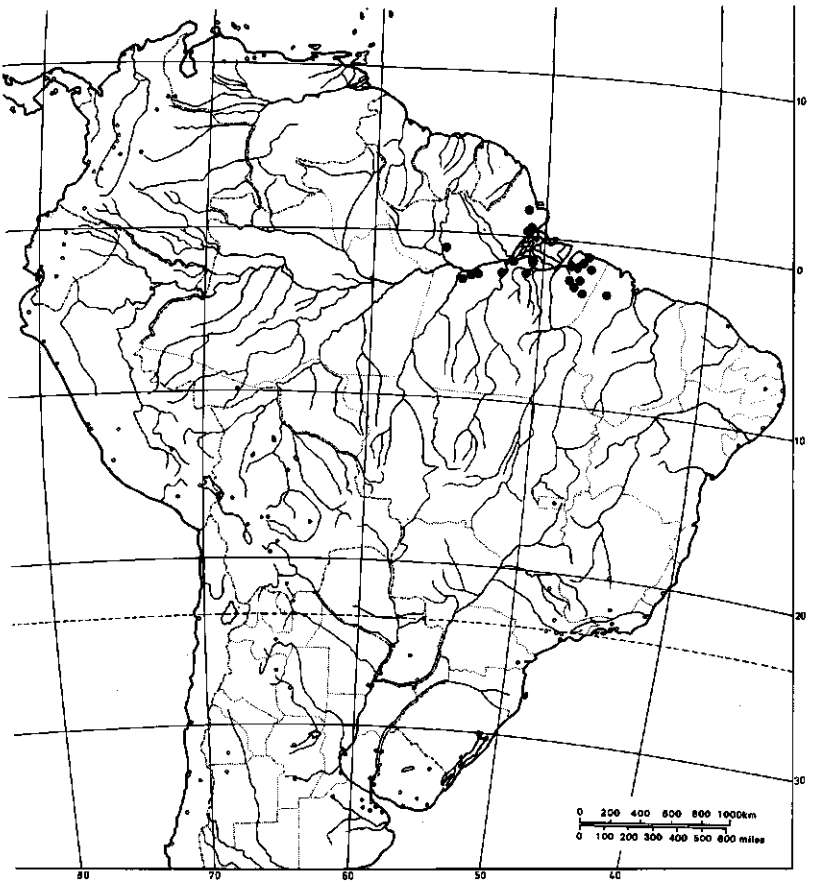
Small tree up to 6 m tall with leaf-bearing branches 3–4 mm in diameter. *Leaf blades* elliptic to narrowly ovate, 8–19 × 3–8 cm, glabrous, coriaceous, with 17–23 pairs of lateral veins; bases rounded to obtuse; apices acute, ultimately shortly acuminate; margins entire, revolute; midrib impressed above, especially near base of blade, and prominent below; lateral veins plane or slightly impressed above, slightly raised below. *Petioles* 6–12 mm long, canaliculate. *Inflorescences* terminal, cymose, congested, 7–18-flowered; peduncles 10–26 mm long; bracts ovate to deltoid, 3 × 2.5 mm; pedicels 9–14(–15) mm long; bracteoles deltoid, 1.8–2.3 × 1.3 mm, on basal third of pedicel. *Flowers*: mature bud ca 48–60 mm long; sepals broadly elliptic to ovate, 4.5 – 6 × 3–4 mm, apically obtuse to rounded. Corolla white with tube 20–30 mm long, lobes elliptic to narrowly obovate, 30–40 × 10–15 mm. *Stamens* inserted 9–11 mm from base of corolla tube; anthers 8–9 mm long, sessile, basally sagittate, 1.1–1.4 mm long, apically caudate with acumen ca 1 mm long. *Ovary* conical, 4–5 mm long; style 6–9 mm long; clavuncle 1.5–2 mm long; stigmoid lobes short, blunt, ca 0.3–0.4 mm long. *Fruit* ellipsoid, 6–7 cm long and 3–3.5 cm in diameter, apically rounded. *Seeds* numerous, irregularly plano-convex, ca 10–12 × 4–5 × 1.5–2.5 mm.

Etymology. Latin *grandiflorum* = large-flowered, in reference to the large size of the corolla.

Distribution. Known only from eastern Amazonia, in Territorio Amapá, Maranhão, and Pará, Brazil; Map 13.

Specimens examined:

BRAZIL. Amapá: Coastal Region, Lago Cujubim, 1° 45′ N – 50° 58′ W, 10 Aug 1962 (fl, yng fr), *Pires & Cavalcante 52450* (IAN, K, NY, US); Vai-quemquer-Pacui-Mac., 20 Jul 1980 (fl yng fr), *Rabelo 585* (NY); Est. S. Joaquim-Pacui-Mcp., 22 Jul 1980 (fl yng fr), *Rabelo 616* (NY). Pará: Belém, Jardin Botanico do Museu Goeldi, cult, 3 Sep 1942 (fl fr), *Archer 7625* (IAN, NY), 12 Dec 1942 (fl fr), *Archer 7958* (IAN); Rio Acará, between Tomé-Açu & Acará, 3 Jun 1969 (fr), *Austin*



Map 13. *Spongiosperma grandiflorum* (Huber) Zarucchi.

& Cavalcante 4112 (MO), 3 Jun 1969 (fl fr), *Cavalcante & Austin 2239/4112* (MG); Mun. de Igarapé-Açu, casa de campo do Sr. Natan, 11 Dec 1978 (fl fr), *Bastos et al. 112* (F, MG); Região do Ariramba, margem direita do Rio Jamaracaru, 5 Jun 1957 (fl), *Black et al. 57–19873* (IAN); Belém, Museu Goeldi, árv. 428, cult, 7 Apr 1958 (fl), *Cavalcante 359* (MG); Mun. Acará, Fazenda Borba Gato, near Rio Acará, 30 km W of Tomé-Açu--Paragominas road, ca 2° 40′ S, 48° 35′ W, 8 Nov 1980 (fl), *Daly D887* (NY); Mun. de Bragança, 7 km E of Bragança along road to Augusto Correa, ca 1° 03′ S, 46° 40′ W, alt 25 m, 7 Apr 1980 (fl fr), *Davidse et al. 17977* (F, MO, NY, US); Mun. Belém, Lagoa Agua Preta (Utinga), 29 Jun 1935 (fl), *Drouet 1949* (F, GH, MICH, MO, US); Região do Alto Ariramba, Caramagal na campina rana, 20 Dec 1906 (fr), *Ducke MG 8002* (MG); Região Alto Ariramba, campina do [Rio] Jaramacarú, 4 Dec 1910 (fl fr), *Ducke MG 11357* (BM, G, MG, RB, US), 8 Jul 1980 (fl yng fr), *Martinelli et al. 6922* (INPA); Belém, Lago da Agua Preta, 29 Oct 1914 (fl fr), *Ducke MG 15519* (BM, MG), Feb 1926 (fl fr), *Ducke RB 15820* (K, RB, S, U, US); Belém, Catú, 21 May 1943 (fl), *Ducke 1254* (IAN, K, MG, MO, NY, UC, US); Trombetas, Jaramacarú, 6 Jun 1957 (fl fr), *Egler 478* (INPA, MG); Belém, terreno do Utinga, 5 Jul 1966 (fl), *Elias de Paula 207* (MG, NY), 15 Dec 1944 (fl), *Fróes 20775* (IAN, NY, US); Lago Cuçarí, região do Planalto de Santarém, 13 Apr 1955 (fl fr), *Fróes 31727* (IAN, SP); Cabeceiras do Rio Uruará,

Mun. de Prainha, May 1955 (fl fr), *Fróes 31875* (IAN, SP); Rio Una, região do Planalto de Santarém, 30 Jul 1955 (fl), *Fróes 32014* (IAN, UB); Rio Jacaru, Mun. de Porto de Móz, 17 Sep 1955 (fl), *Fróes 32074* (IAN); Região do Anapú, Rio Pracajaí, Portel, 14 Sep 1956 (fl fr), *Fróes 32737* (IAN, MO); Região do Rio Mojú, Rio Cairarí, 25 Mar 1957 (fl fr), *Fróes 33138* (IAN); Belém, IPEAN grounds, 7 Dec 1974 (fl), *Gentry & Pinheira 13129* (INPA, MO); Rio Capim, Approizi, 18 Jun 1897 (fl), *J. Huber MG 769* (G, MG); Bragança, Dec 1899 (fl), *J. Huber MG 1725* (MG); Rodovia Belém-Brasília, km 97, 12 Oct 1959 (fl), *M. Kuhlmann & Jimbo 346* (IAN, SP, US); Dist. Acará, Thomé Assú, up Rio Acará 1/2 km, alt 45 m, 27 Jul 1931 (fl), *Mexia 5982a* (MO, UC); Santa Izabel (Belém-Bragança), 27 Aug 1908 (fr), *MG 9577* (MG, RB), 28 Sep 1908 (fl), *MG 9683* (BM, G, MG); Tomé Açu, margens do R. Acará, 2 Jan 1978 (fl fr), *Nascimento 397* (MG, WAG); km 203 da Rodovia Belém-Brasília, 24 May 1960 (fl), *E. Oliveira 813* (IAN); Belém, Estrada Tavares Bastos, 7 Apr 1970 (fl), *E. Oliveira 5186* (IAN); BR-010 Belém-Brasília, Faz. Maravilha, Rio Ipixuna, 8 Feb 1973 (fl), *E. Oliveira 6055* (IAN); Belém, Utinga, 1 Dec 1969 (fl fr), *M. Pinheiro 15* (MG); Belém, Agua Preta, 7 Nov 1945 (fl), *Pires & Black 553* (GH, IAN, P, RB, US); Belém, 7 Nov 1945 (fl fr), *Pires & Black 567* (IAN); Belém, beira do Utinga, 10 Apr 1947 (fl), *Pires & Black 1471* (IAN, NY, P, RB); Belém, Catú, Dec 1952 (fl), *Pires 4421* (IAN), 26 Oct 1953 (fr), *Pires 4549* (IAN, NY); Rio Guamá, acima de Ourém, Jul 1953 (fl), *Pires & Silva 4612* (IAN, US); Belém, Igapó do Catú, 3 Oct 1966 (fr), *Pires & Silva 10260* (IAN); Belém, IPEAN, 5 Sep 1967 (st), *Pires & Silva 10846* (IAN); Belém, IPEAN, Igapó do Catú, 10 Apr 1968 (fl), *Pires & Silva 11683* (IAN), 24 Apr 1968 (fl), *Pires & Silva 11694* (IAN); Belém, Bôa Vista, Campina do Guajará, margem esquerda da Rio Guamá, 23 May 1968 (fl), *Pires & Silva 11745* (IAN); Belém, grounds of IAN, 1 Nov 1960 (fl), *Pires 48894* (K, NY, P, US); vicinity of Belém, Sep-Oct 1961 (st), *Pires 51875* (NY, UB, US); Mun. Benevides, 30 km ENE of Belém, 24 Jan 1980 (fl fr), *Plowman et al. 8092* (ECON-Prod. Coll. 8550, GH, NY, US); Belém, terreno da EMBRAPA, próximo ao Mocambo, 23 Apr 1979 (fl), *M. Ramos 02* (GH, MG, NY); Igarapé-assú, 10 Feb 1903 (fl), *R. S. Rodrigues MG 3367* (MG), 14 Feb 1903 (fr), *R. S. Rodrigues MG 3396* (G, MG); Ananindeua, Maguari, 15 Apr 1975 (fl fr), *M. Silva 2709* (MG); Sta. Izabel, Caraparú, 25 Apr 1977 (fr), *M. Silva 3390* (MG), 25 Apr 1977 (fl), *M. Silva 3407* (MG, MO, NY); Mun. de Acará, beira do Rio Acará, 23 Oct 1979 (fl fr), *M. Silva & Pinheiro 5078* (NY); Tomé-Açú, margen do Rio Acará, estrada para a fazenda Borba Gato, 2 Nov 1979 (fr), *M. Silva & Pinheiro 5125* (NY); Belém, Estrada do Cafezal do IAN, 5 Jan 1948 (fl fr), *N. T. Silva 120* (IAN, NY, RB); Gurupá, igarapé Jacopi, 8 Feb 1979 (fl), *N. T. Silva & Rosário 5058* (MG, NY). Maranhão: km 55 da BR 316, a 10 km de Araguanã, 8 Dec 1978 (fr), *Rosa & Vilar 2887* (F, NY).

Local names. BRAZIL. Açucena d'agua (*Ducke RB 15820*), Angelica do Igapó (*Huber MG 769, Pires 48894*), Angelica-igapó (*Pires 51875*), Molongó (*Huber MG 1836, Rabelo 585, 616*), Pepino (*Nascimento 397*), Pepino do mato (*Archer 7625*), Tajarana (*R. S. Rodrigues MG 3396*).

Spongiosperma grandiflorum is the most thoroughly collected species of *Spongiosperma*, with the majority of the collections coming from the immediate vicinity of Belém in eastern Amazonia. This species shows a close resemblance to *S. macrophyllum* of the northwest Amazon basin, a similarity which was noted by HUBER (1902) when describing *Ambelania grandiflora*. *Ambelania grandiflora* Huber was included by PICHON (1948) in his *Molongum* sect. *Trichosiphon*, but he did not make the combination in *Molongum* apparently since he had not seen an actual specimen of this species. Several years later, LEMÉE (1953) made an illegitimate combination in *Molongum* (attributing the combination to PICHON) since he did not provide a clear and complete bibliographic reference to the basionym.

The large, white, showy, fragrant flowers indicate that species of *Spongiosper-*

ma may be of horticultural interest. *Spongiosperma grandiflorum* has been cultivated on the grounds of the Museu Goeldi in Belém (Cavalcante, pers. comm.), where it has flowered and set fruit (*Archer 7625, 7958*, and *Cavalcante 359*).

Unlike *Spongiosperma macrophyllum* and other species in the genus, *S. grandiflorum* is not recorded by collectors as growing in large populations, but rather as individuals of somewhat rare occurrence. Some collections made by DUCKE, from the western extent of the species range in the Rio Trombetas drainage, are reported to occur in *campinarana* (low tree forest on sandy soil). Habitat and environmental factors affect the morphological expression of this species, as well as that of other species in the tribe. For example, the leaves of some specimens from the Rio Trombetas region, primarily at Ariramba, bear slightly smaller and thicker leaves than collections made from riparian habitats. This has also been noted in specimens of *S. oleifolium* of the middle Río Orinoco basin of Venezuela.

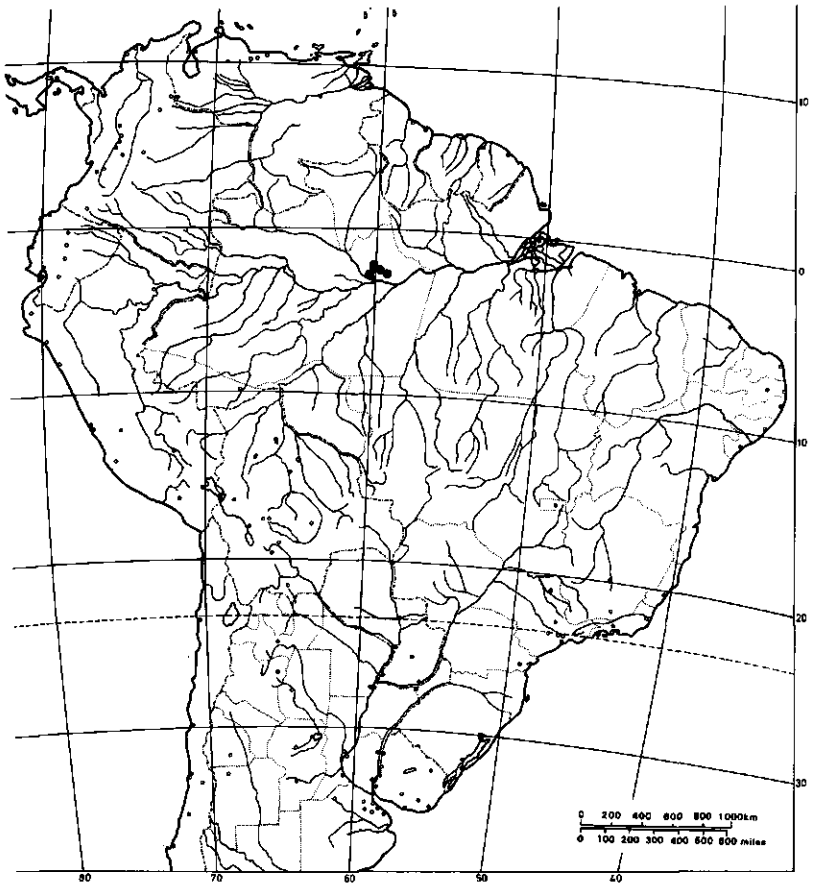
Various characters distinguish *Spongiosperma grandiflorum* from *S. macrophyllum*. It has fewer pairs of lateral veins, the leaf apex is more blunt, the petioles are longer, the flowers are fewer per inflorescence, and the fruit is ellipsoid instead of globose.

3–3. **Spongiosperma longilobum** (Markgraf) Zarucchi, **comb. nov.**

Basionym: *Ambelania longiloba* Markgraf in Prance, Brittonia 23(4): 441. 1971.

Type: Brazil: Amazonas: Manaus, km 74 da Estrada Manaus-Itacoatiara, Rio Preto, 25 Jul 1966 (fl), *Duarte* [*& L. Coêlho*] 9845 (Z, holotype; isotypes: HB *nv*, INPA 17580 [4 sheets]).

Small tree up to 5 m tall with leaf-bearing branches 2.5–5 mm in diameter. *Leaf blades* oblong-elliptic to lanceolate, 10–14(–19) × 4.5–6(–6.5) cm, glabrous, coriaceous, with 15–22 pairs of lateral veins; bases rounded or somewhat subcordate with blade narrowed toward the base; apices acute or shortly acuminate; margins entire, slightly revolute; midrib impressed above, especially near base of blade, and prominent below; lateral veins slightly raised both above and below. *Petioles* 3–5.5(–8) mm long, canaliculate. *Inflorescences* terminal, cymose, congested, 12–25-flowered; peduncles 5–15(–23) mm long; bracts ovate to deltoid, ca 1.5 × 1 mm; pedicels 3–6 mm long; bracteoles small, deltoid, ca 1 × 0.8 mm, on basal third of pedicel. *Flowers*: mature bud 22–28 mm long; sepals ovate, 3 × 2.5–3 mm, apically obtuse to rounded. Corolla white with tube 10–13 mm long, lobes narrowly ovate, 13–16 × 4–6 mm. *Stamens* inserted 4–5 mm from base of corolla tube; anthers 5–5.5 mm long, sessile, basally sagittate, 0.6 mm long, apically caudate with acumen 0.4–0.5 mm long. *Ovary* conical, 3–4 mm long; style 1.5–2 mm long; clavuncle ca 1.2 mm long; stigmoid lobes short, 0.25 mm, blunt. *Fruit* fusiform to narrowly elliptic, up to 6–9 cm long and 1.5–2 cm in diameter, apically and basally pointed. *Seeds* numerous, irregu-



MAP 14. *Spongiosperma longilobum* (Markgraf) Zarucchi.

larly plano-convex, ca 7–10 × 3.5–5 × 2–2–2.5 mm.

Etymology. Latin *longilobum* = long-lobed, in reference to the size of the corolla lobes.

Distribution. Known only from the vicinity of Manaus, Amazonas, Brazil, west of the Rio Negro and north of the Rio Amazonas, where it is found frequently along blackwater streams; Map 14.

Specimens examined:

BRAZIL. Amazonas: Estrada Manaus-Caracaraí, km 61, Reserva Biólogica de Campina, 3 May 1973 (fl fr), *Albuquerque et al. 657* (GH, INPA); estrada Manaus-Caracaraí, km 60, Estação Experimental de Silvicultura Tropical, 16 Aug 1973 (fl fr), *Albuquerque & Coêlho INPA 99868* (INPA); Rio Urubú, Iracema waterfall and nearby stream, 6 Aug 1979 (fl), *Calderon et al. 2941* (INPA,

MO, US); Manaus, Rio Preto, km 78 estrada Manaus-Itacoatiara, 14 Jan 1966 (fl fr), *L. Coêlho INPA 16782* (ECON, INPA); Rio Urubú, Cachoeira Lindoya, 26 Sep 1941 (fl), *Ducke 798* (F, IAN, MG, MO, NY, RB, US); Manaus, beira do Rio Tarumã, 8 Aug 1949 (fl), *Fróes 24948* (IAN); Rio Urubú, cachoeira Lindoia, 26 Sep 1949 (fl), *Fróes 25410* (IAN); SEPLAC, km 60 on Manaus-Caracarai Road (BR 174), 1 Dec 1974 (fr), *Gentry 12991* (INPA, MG, MO, NY); Manaus-Itacoatiara Highway, Rio Preto, km 80, 14 Nov 1966 (fl fr), *Prance et al. 3162* (INPA, K, MG, NY, US); banks of Rio Urubú between Cachoeira Iracema and Manaus-Itacoatiara Road, 8 Jun 1968 (fl), *Prance et al. 5075* [Paratype collection of *Ambelania longiloba* Markgraf] (INPA, K, NY, US); Rio Cuieras, above mouth of Rio Brancinho, 11 Sep 1973 (fl fr), *Prance et al. 17734* (INPA, MG, NY, Z); Estrada Manaus-Itacoatiara, km 90, Rio Preto, 19 Jul 1961 (fl fr), *W. Rodrigues & Lima 2192* (INPA); Rio Branquinho, afluente do Cuieiras, 28 Nov 1962 (fr), *W. Rodrigues & Coêlho 4904* (INPA); Manaus-Caracaraí Road (BR-174), Igarapé at km 46, 14 Sep 1979 (fl fr), *Zarucchi et al. 2541* (GH, INPA, NY); 18 Jun 1983 (fl buds, yng fr), *Zarucchi et al. 2839* (INPA, NY, US); 9 Aug 1983 (st), *Zarucchi et al. 3243* (INPA, NY, US).

Local names. BRAZIL. Jasmin d'agua (*Duarte* [*& L. Coêlho*] *9845*), Molongó (*W. Rodrigues & Coêlho 4904*).

The first reference to *Spongiosperma longilobum* was by ADOLPHO DUCKE (1944) in his 'Flora do rio Urubu,' where he cited a collection (*Ducke 798*) from the Cachoeira Lindoya under *Ambelania macrophylla*. This latter species was then known only from the type collection, made by RICHARD SPRUCE along the lower Rio Uaupés in Brazil.

MARKGRAF cited the type collection of *Ambelania longiloba* as having been collected by A. P. DUARTE in 1966. The isotype at INPA in Manaus lists a second collector, Sr. LUIS COÊLHO, a longtime member of the INPA botanical staff.

Spongiosperma longilobum is distinguished from other species in the genus by its narrowed, rounded or rarely subcordate leaf bases, its smaller flowers and floral contents, and its long fusiform or narrowly ellipsoid fruits.

3–4. **Spongiosperma macrophyllum** (Muell.-Arg.) Zarucchi, **comb. nov.**

Basionym: *Ambelania macrophylla* Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 18. 1860 as '*A. macroyhylla*'; Schumann in Engler & Prantl, Nat. Pflanzenfam. 4(2): 124. 1895; Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941; Monachino, Lloydia 8(2): 127–128. 1945; 9(4): 302. 1946.

Type: Brazil: Amazonas: 'Prope Panuré ad Rio Uaupés,' Sep 1852 (fl [fr]), *Spruce* 2483 (BR, lectotype [here chosen]; isotypes: BM [in part], CGE, K-Benth., K-Hook., P [F photo 38763; GH, US], W). Homotypic synonyms: *Hancornia macrophylla* Spruce ex Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 18. 1860, nom. nud. in synon. *Rhigospira venulosa* Miers, Apoc. S. Am. 68–69. 1878. *Ambelania cucumerina* Miers, Apoc. S. Am. 13–14, pl. 1B. 1878 as '*Ambellania*', pro parte (= K-Hook. sheet, cited as '2413'), non lectotypus [= *Ambelania acida*]. *Molongum macrophyllum* (Muell.-Arg.) Pichon, Mém. Mus. Natl. Nat. 24: 168, pl. IV – 14, 24, 35. 1948.

Heterotypic synonym: *Ambelania lopezii* Woodson in Schultes, Bot. Mus. Leafl. 15(2): 76. 1951; Schultes, Bot. Mus. Leafl. 22 (10): 347, pl. 80. 1970; J.

FIG. 4. *Spongiosperma macrophyllum* (Muell.-Arg.) Zarucchi: 1: flowering branch, $\frac{1}{2}\times$; 2. opened flower, 1 ×; 3. sectioned fruit, $\frac{3}{4}\times$; 4. seeds, 3 ×.(1. Schultes & Cabrera 19516; 2. Zarucchi 2435, alc. mat.; 3–4. Zarucchi 2434, alc. mat.).

Ethnopharm. 1: 166. 1979, synon. nov. Type: Colombia: Vaupés [as 'Caquetá']: Río Taraíra [border with Amazonas, Brazil], at second rapids, 8–11 Jul 1948 (fl), *Schultes & López* 10204 (MO 1579973, holotype; isotypes: IAN 60209, P, US 1997073 [NY photo ns 5576; NY]).

Small tree up to 6 m tall with leaf-bearing branches 3–5 mm in diameter. *Leaf blades* elliptic to narrowly ovate or obovate, 12–18(–22) × 4–7(–8) cm, glabrous, thin-coriaceous, with ca 30–35 pairs of lateral veins; bases rounded to rarely subcordate; apices acute, distally acuminate with acumen 10–15 mm long; margins entire, revolute; midrib plane to slightly impressed above, becoming deeply impressed at base of blade, prominent below; lateral veins plane above, slightly raised below. Petioles 5–8 mm long, canaliculate. *Inflorescences* terminal, cymose, very congested, 10–25(–35)-flowered; peduncles (9–)12–20(–32) mm long; bracts deltoid, 2.5–3.5 × 2–2.5 mm; pedicels 3–6(–7) mm long; bracteoles ovate to deltoid, 1.8–2.5 × 1.5–2 mm, usually on basal third of pedicel. *Flowers*: mature bud 55–65 mm long; sepals ovate to oblong 3–4 × 3–4 mm, apically rounded to obtuse. Corolla white with tube 22–25 mm long, lobes narrowly obovate, 35–40 × 12–14 mm. *Stamens* inserted 8–10 mm from base of corolla tube; anthers 7–8 mm long, sessile, basally sagittate, apically caudate with acumen ca 1 mm long. *Ovary* conical, 3–4 mm long; style 5–8 mm long; clavuncle 1.6–1.8 mm long; stigmoid lobes short, ca 0.3 mm long, blunt. *Fruit* globose or slightly compressed, apically very slightly pointed. *Seeds* numerous, up to 80, irregularly plano-convex, 12–15 × 5–7.5 × 2–3.5 mm.

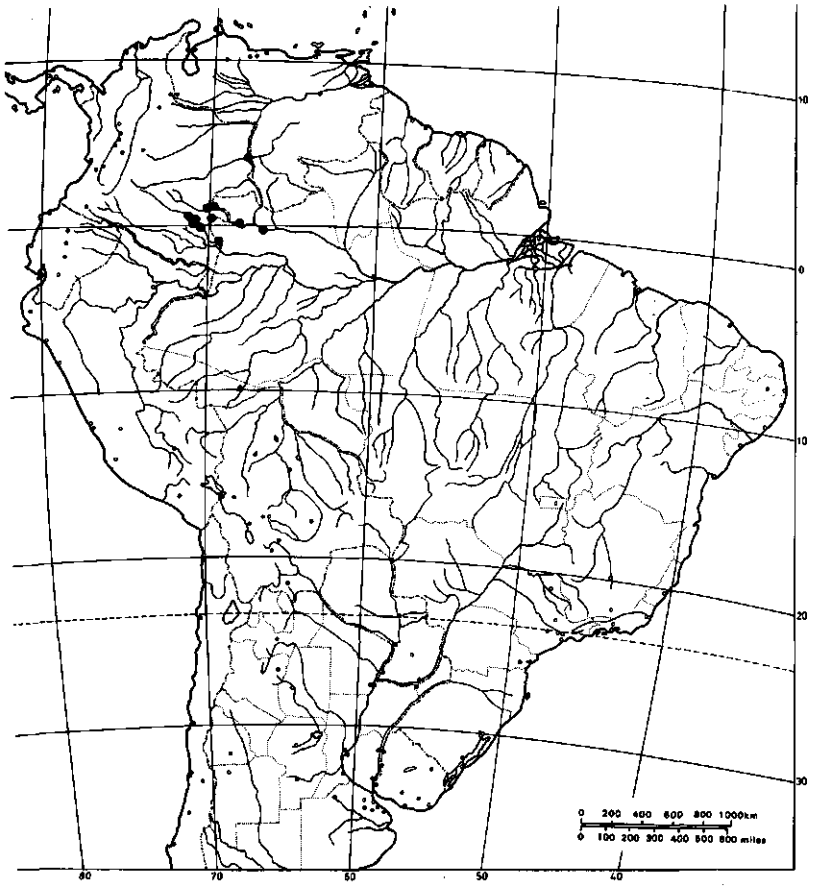
Etymology. Greek *macrophyllum* = large-leaved.

Distribution. Known from seasonally inundated blackwater streams in northwestern Amazonia of Venezuela, Colombia, and Brazil; Map 15.

Specimens examined:

COLOMBIA. Amazonas-Vaupés: Río Apaporis, Raudal Yayacopí (La Playa) and vicinity, alt ca 800 ft, 18 Aug 1952 (fl), *Schultes & Cabrera 16968* (BM, GH, NY, US). Vaupés: Río Piraparaná, environs of Catholic mission of San Miguel, 23 Oct 1976 (fl fr), *Davis 135* (COL, GH); orilla derecha del Río Vaupés, Raudal Macucú, 14 Nov 1952 (fr), *Romero-Castañeda 3493* (COL); Piracuara, 27 Nov 1952 (fl), *Romero-Castañeda 3752* (COL, NY); entre Wacaricuara y el varador al Río Yí, 9–12 Dec 1952 (fr), *Romero-Castañeda 3917* (COL); Río Kananarí, Cachivera Palito, alt ca 250 m, 25 Jul 1951 (fl), *Schultes & Cabrera 13175* (BM, C, GH, LE, US); Río Piraparaná, middle course, 1 Sep 1952 (fl), *Schultes & Cabrera 17135* (BM, COL, GH, MO, US); Río Piraparaná, Caño Oo-moóña, 3 Sep 1952 (fl), *Schultes & Cabrera 17154* (COL, GH, US); Río Piraparaná, Caño Teemeeña, 6 Sep 1952 (fl), *Schultes & Cabrera 17245* (BM, COL, GH, MO, US); Río Vaupés between Mitú and Javareté, Tipiaca, Igarapé Murutinga, 14–24 May 1953 (fl), *Schultes & Cabrera 19290* (US); Río Paca (tributary of Río Papurí), Wacaricuara and vicinity, alt ca 650 ft, 1–3 Jun 1953 (fl), *Schultes & Cabrera 19516* (GH, MO, US); Mitú and vicinity, along stream near base of Cerro de Mitú, 26 Jun 1976 (fl fr), *Zarucchi & Balick 1763* (COL, GH, MO, US), 29 Aug 1976 (fl), *Zarucchi 1903* (COL, ECON, GH, INPA, VEN), 6 Jul 1979 (fl fr), *Zarucchi 2434* (COL, GH, MO, WAG), *2435* (COL, GH, MO, USF), 21 Jul 1979 (fl fr), *Zarucchi 2504* (COL, GH, MO, USF).

VENEZUELA. Amazonas: Río Orinoco, Caño Cupavén (right bank of Orinoco opposite mouth of Río Atabapo), alt 125–150 m, 4 Aug 1959 (fl), *Wurdack & Adderley 43749* (F, G, GH, NY, RB, S, US, VEN).



MAP 15. *Spongiosperma macrophyllum* (Mueller-Argoviensis) Zarucchi.

BRAZIL. Amazonas: along Rio Curicuriari and Igarapé Cariua to Cachoeira Piraiauara, 0° 20′ S, 66° 55′ W, 12 Jul 1979 (fl fr), *Alencar et al. 632* (NY); Rio Papurí near Mello Franco, 31 Aug 1943 (fl), *Allen 3090* (COL). 'Minas: Gandarela dans le campo, 24 Feb 1884 (fl), *Glaziou 14081*' (P) (probably a pirated specimen of *Spruce 2483*).

Local names. COLOMBIA. Hia-WAHO-ka-kɨ (Kubeo language, *Zarucchi 2504*), Palo bálsamo (*Zarucchi 2434, 2435*), Wý-gaw-ñö-mee-kö (Makuna language, *Schultes & Cabrera 16968*).

This species was first collected by RICHARD SPRUCE on the upper Rio Negro in September 1852 where he considered it to represent an undescribed species of *Hancornia* (*H. macrophylla*). Subsequently during his journey, Spruce made another collection which he questionably equated to the earlier gathering. MUELLER (1860a) placed Spruce's field identifications under their respective spe-

cies in *Ambelania*, as '*A. macroyhylla*' and *A. quadrangularis*. Because of the apparent confusion with the use of the specific epithet *macrophylla*, MIERS (1878) proposed the epithet *venulosa* for the species that MUELLER had described as '*A. macroyhylla*,' and placed it with *A. quadrangularis* in his genus *Rhigospira*.

Several of the duplicate specimens of Spruce's type collection of *Spongiosperma macrophyllum* contain extra or conflicting information. The Bentham sheet at Kew has a small drawing of the fruit attached to the sheet, but no preserved fruit has been located. The duplicate specimen at the British Museum (Natural History) [BM] contains not only dried fragments of *S. macrophyllum* but also six packets of analyzed floral and fruit fragments and the pencilled annotation '*Ambellania cucumerina*, Spruce 2413' attached at the upper left hand corner. The handwriting on the packet is that of JOHN MIERS, and the packet was probably attached to the BM sheet after his death. The fragments in the packet correspond to '*Ambellania cucumerina* Miers' – a mixture of two elements. The floral fragments were most likely removed from the Hooker sheet at Kew (incorrectly cited as '2413'); this duplicate has only detached inflorescences accompanying the vegetative shoots. The fruit fragments are from a gathering made in the vicinity of Barra [Manaus] by SPRUCE and sent by him to Kew where they currently form part of the Museums collection. In the present work, these spirit-preserved fruits are designated the lectotype for *Ambelania cucumerina* Miers and placed in synonymy under *A. acida*.

Ambelania lopezii Woodson (in SCHULTES [1951]) is here placed in synonymy under *Spongiosperma macrophyllum*. The protologue for *A. lopezii* includes a discussion of its relationship with *A. grandiflora* [= *Spongiosperma*] from eastern Amazonia. This latter species was described by HUBER (1902), who contrasted it with *A. macrophylla*; the connection between *A. lopezii* and *A. macrophylla* was not made by WOODSON. Several subsequent articles by SCHULTES (1970, 1979) discuss the use of *S. macrophyllum* (under *A. lopezii*) as both an arrow poison and a fish poison.

3–5. **Spongiosperma oleifolium** (Monachino) Zarucchi, **comb. nov.**

Basionym: *Ambelania oleifolia* Monachino, Mem. New York Bot. Gard. 10(1): 117–119, fig. 14a-d as '*A. oleaefolia*'.

Type: Venezuela: Amazonas: alto Río Orinoco, at edge of Savanna No. 3, NW base of Cerro Yapacaná, alt 150 m, 17 Mar 1953 (fl), *Maguire & Wurdack* 34512 (NY, holotype; isotypes: F 1490247 [F photo 51090; F], G, GH, IAN 96061, K, RB 101908, S, UC 275969, US 2253278, VEN 42160, W).

Heterotypic synonym: *Ambelania lanceolata* Markgraf, Acta Bot. Venez. 6: 74. 1971 [1972], synon. nov. Type: Venezuela: Amazonas: Cerro Yapacana, entre el Campamento Base y la sabana grande, Lat. 3° 45′ N., Long. 66° 45′ W., alt 125 m, 7 May 1970 (fl fr), *Steyermark & Bunting* 103265 (*Z nv*, holotype; isotypes: M, US 2622451, VEN 85074 & 85075).

Shrub or small tree up to 5 m tall with leaf-bearing branches 2–4 mm in diameter. *Leaf blades* narrowly elliptic, elliptic, to lanceolate, 3–8(–12) × 0.7–3(–4.5) cm, glabrous, stiff-coriaceous, with 20–28 pairs of lateral veins; bases rounded to obtuse and decurrent on petiole; apices rounded to subacute; margins entire, revolute; midrib plane above, prominulous to prominent near base of leaf below; lateral veins barely visible on either surface. Petioles 4–8(–11) mm long, canaliculate. *Inflorescences* terminal, cymose, lax, 3–6(–7)-flowered; peduncles 8–15 mm long; bracts ovate to deltoid, ca 1 × 0.8 mm; pedicels 5–9(–15) mm long; bracteoles small, ovate to deltoid, ca 0.6 × 0.5 mm, usually at base of pedicel. *Flowers*: mature bud ca 40–50(–60) mm long; sepals ovate, 2–3 × 1.5–2.5 mm, apically rounded to obtuse. Corolla white with tube ca 20–28 mm long, lobes elliptic to oblanceolate, ca 20–30(–35) × 8–11 mm. *Stamens* inserted 5–6 mm from base of corolla tube, anthers 4.5–5 mm long, sessile, basally sagittate, apically caudate with acumen ca 0.3–0.6 mm long. *Ovary* conical, 1.7–2.5 mm long; style 2–2.5 mm long; clavuncle ca 0.8 mm long; stigmoid lobes short, ca 0.2 mm long, blunt. *Fruit* obovoid, to 5 cm long and 2.5 cm in diameter, apically rounded. *Seeds* numerous, generally plano-convex, 5–8 × 3.5–5 × 1.5–2 mm.

Etymology. The epithet refers to the similarity of the leaves to those in *Olea*, the common olive tree.

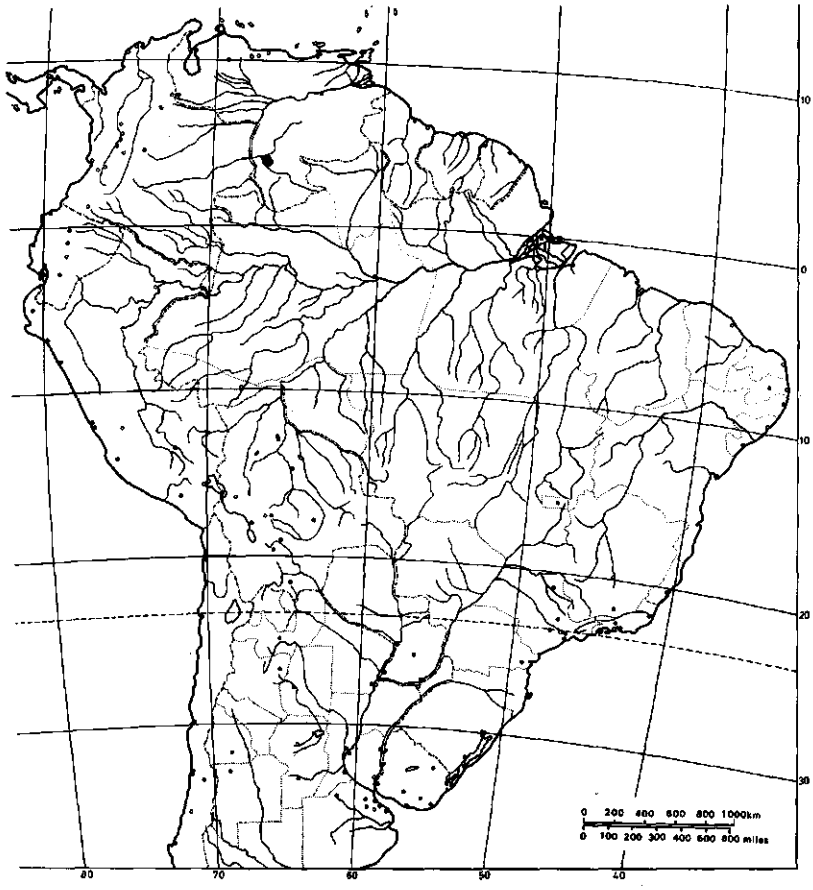
Distribution. Known only from the vicinity of Cerro Yapacana, Amazonas, Venezuela; Map 16.

Specimens examined:

VENEZUELA. Amazonas: Depto. Atabapo, area between the western base of Cerro Yapacana and the headwaters of Caño Cotúa, Savanna III, 3° 38′ N, 66° 52′ W, alt ca 100 m, 6 May 1979 (fl fr), *Davidse et al. 17223* (MO), 6 May 1979 (fl), *Davidse et al. 17258* (MO), 3 Jun 1978 (fl fr), *O. Huber 2034* (MO, VEN), 10 Dec 1978 (fl fr), *O. Huber & Tillett 2995* (VEN); I sabana entre el Caño Cotúa y el Cerro Yapacana, 3° 40′ N, 66° 50′ W, alt 100 m, 25 May 1978 (fl), *O. Huber 1796* (VEN); pequeña sabana ubicada entre la punta 0 del Cerro Yapacana y el Caño Yagua al S., 3° 36′ N, 67° 47′ W, alt ca 100 m, 24 Aug 1978 (v yng fr), *O. Huber 2538* (VEN), 24 Aug 1978 (fl), *O. Huber 2541* (VEN); a unos 10 km al N del sector NE del Cerro Yapacana, 3° 44′ N, 66° 48′ W, alt ca 100 m, 28 Feb 1980 (fr), *O. Huber 4807* (VEN); Río Orinoco, Cerro Yapacana, savanna at base, alt 175 m, 31 Dec 1950 (fl fr), *Maguire et al. 30474* (NY); Cerro Yapacana, Savanna No. 3, 1 Jan 1951 (fl fr), *Maguire et al. 30553* (NY); NW base of Cerro Yapacana, Savanna No. 2, alt 150 m, 17 Mar 1953 (fl fr), *Maguire & Wurdack 34504* (NY, US, VEN); NW base of Cerro Yapacana, edge of Savanna No. 3, alt 125 m, 16 Sep 1957 (fl), *Maguire et al. 41494* (M, NY, US), 16 Sep 1957 (fr), *Maguire et al. 41507* (LE, M, NY, US, VEN); savanna along Río Cotua W of campsite on laguna section, near base of Cerro Yapacana, alt 75 m, 8 May 1970 (fl), *Steyermark & Bunting 103268* (MO); Caño Yapacana, 25 Jan 1958 (fl), *Vareschi & Mägdefrau 6602a* (VEN); along Caño Yapacana, alt 125 m, 17 Jun 1959 (fl fr), *Wurdack & Adderley 43021* (MO, NY, P, US, VEN).

No local names are reported for this species.

In the original description of *Ambelania oleifolia* var. *riparia*, MONACHINO (1961) cited two collections. I interpret these as representing two distinct species, *Spongiosperma riparium* and *S. oleifolium*. With the additional material from



MAP 16. *Spongiosperma oleifolium* (Monachino) Zarucchi.

the Río Guainía on the Colombia-Venezuela border (*Schultes & López 10132*), the distinction between these two closely related species is made apparent. Much confusion has persisted in regard to these species, as the *Schultes & López* collection was identified originally as *Ambelania lopezii* [= *S. macrophyllum*].

The paratype collection for *Ambelania oleifolia* var. *riparia, Wurdack & Adderley 43021*, was collected along the Caño Yapacana. This stream flows from the savanna area where the collections of *A. oleifolia* cited by MONACHINO (1958) were gathered. It appears that the collections cited in the protologue by MONACHINO (1958) for *A. oleifolia* may represent depauperate individuals which reflect the rigors of the local environmental conditions by their smaller leaves and diminished stature.

Another recently described species by MARKGRAF (1971), *Ambelania lanceolata*, is also here considered as representing *Spongiosperma oleifolium* and so is placed in synonymy.

Spongiosperma oleifolium is distinguished from *S. riparium* and other species of *Spongiosperma* by its fewer flowers, longer pedicels, and small obovoid fruit. Further field studies are needed in order to clarify the relationships between the morphology exhibited by *S. oleifolium* and related species and the various environmental, especially edaphic, factors which affect their appearance.

3–6. **Spongiosperma riparium** (Monachino) Zarucchi, **comb. & stat. nov.**

Basionym: *Ambelania oleifolia* Monachino var. *riparia* Monachino, Mem. New York Bot. Gard. 10(4): 59. 1961 [as '*A. oleaefolia*'] pro parte, as to type collection only.

Type: Venezuela: Amazonas: along Caño Pimichín between Río Guainía and Pimichín, alt 130–140 m, 2 Jul 1959 (fl yng fr), *Wurdack & Adderley* 43279 (NY, holotype; isotypes: F 1589355, GH, IAN 114667, K, LE, MICH, MO 1782971, NY, P, RB 115008, UC 221540, US 2373308, VEN 52814).

Small tree up to 6 m tall with leaf-bearing branches 2–3 mm in diameter. *Leaf blades* obovate to oblong-elliptic, 6.5–8.5 × 2.5–4 cm, glabrous, thick-coriaceous, with ca 20–25 pairs of lateral veins; bases rounded to subacute and decurrent on petioles; apices obtuse or rounded; margins entire, revolute; midrib impressed above, especially near base of blade, prominent to quite prominent below; lateral veins plane and difficult to distinguish above and below. Petioles 6–9 mm, canaliculate, slightly winged. *Inflorescences* terminal, cymose, 6–9-flowered; peduncles 6–9(–11) mm long; bracts ovate to deltoid, ca 1.5 × 1.2 mm; pedicels 3–6(–7)mm long; bracteoles small, ovate to deltoid, ca 0.7 × 0.5 mm, near base of pedicel. *Flowers*: mature bud 45–55 mm long; sepals ovate, 3–4 × 2.5–3 mm, apically obtuse to rounded. Corolla white with tube 18–20 mm long, lobes elliptic to oblanceolate, 25–30 × 7–10 mm. *Stamens* inserted 6 mm from base of corolla tube; anthers 6–6.5 mm long, sessile, basally sagittate, apically caudate with acumen 0.6–0.8 mm long. *Ovary* conical, 2–3.5 mm long; style 2–3 mm long; clavuncle 1.6 mm long; stigmoid lobes short, ca 0.2 mm long, blunt. Mature *fruits* and seeds unknown.

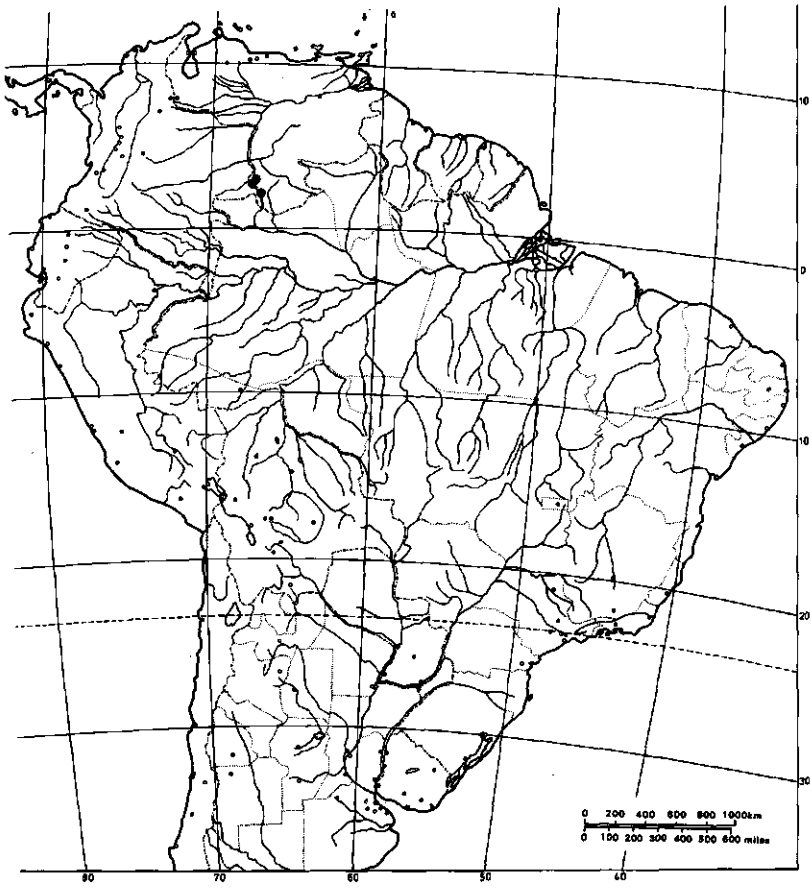
Etymology. The epithet *riparium* refers to the habitat in which the species was collected, along the banks of rivers or streams.

Distribution. Known only from four collections made in the Río Guainía drainage along the Colombia-Venezuela border; Map 17.

Specimens examined:

COLOMBIA. Guainía: Río Guainía below San Antonio, Caño del Loro, Jun 1948 (fl), *Schultes & López 10132* (COL, GH, MO).

VENEZUELA. Amazonas: Depto. Casiquiare, alrededores de Yavita (Río Temi) y cerca de la carreterra Yavita-Pimichín hasta el km 5 hacia Pimichín, en orilla inundata del Río Temi, alt 125–140 m, 6–19 Jul 1969 (fl), *Bunting et al. 4038* (MY); Caño Pimichín entre Pimichín y la desembocadura, alt ca 128 m, 6–19 Jun 1969 (fl), *Bunting et al. 4066* (MY).



MAP 17. *Spongiosperma riparium* (Monachino) Zarucchi.

Local name. Molongó (*Schultes & López 10132*).

See the above discussion under *Spongiosperma oleifolium* in regard to its taxonomic confusion with *S. riparium*.

Spongiosperma riparium is distinguished from most of the other species in the genus by its smaller, thick-coriaceous leaves, characters which it shares with *S. oleifolium*. It can be separated easily from *S. oleifolium*, however, by its shorter pedicels and greater number of flowers. *Spongiosperma riparium* is not known with mature fruit.

4. **Molongum** Pichon, Mém. Mus. Natl. Hist. Nat. 24: 167–169, *pl. IV – 14–17, 24–27, 35–38*. 1948 pro parte.

Ambelania sect. *Terminales* Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941 pro parte, nom. nud.

Ambelania sect. *Laxae* Monachino, Lloydia 8(2): 114. 1945 pro parte, nom. nud.

Molongum sect. *Coilanthera* Pichon, Mém. Mus. Natl. Hist. Nat. 24: 168, *pl. IV – 15, 25, 36*. 1948.

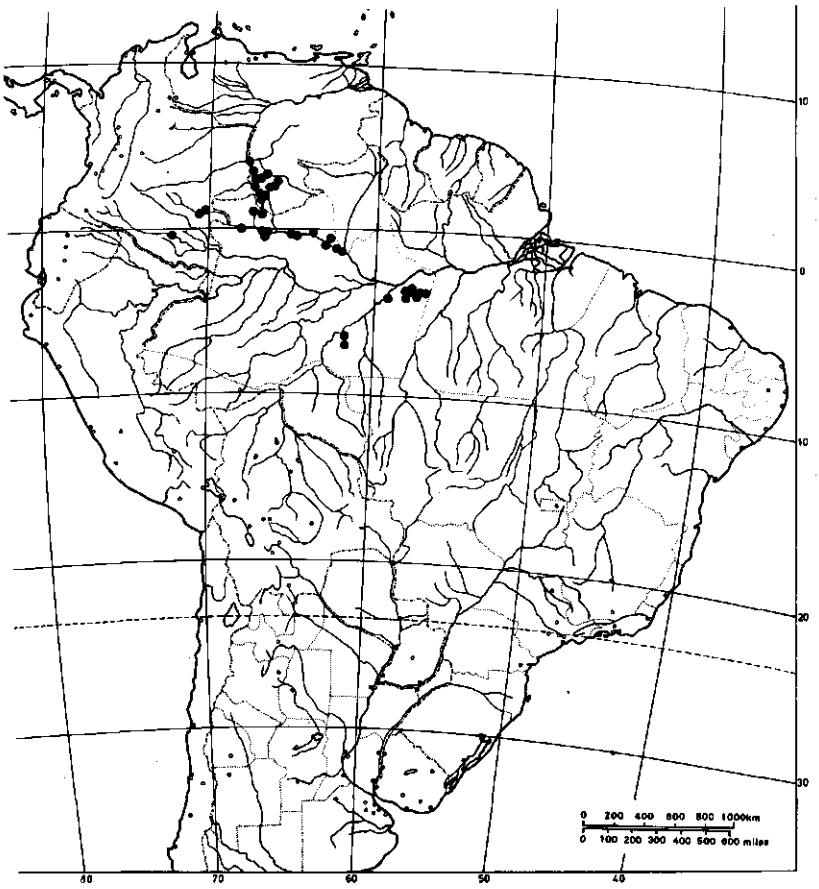
Molongum sect. *Oligoon* Pichon, Mém. Mus. Natl. Hist. Nat. 24: 168–169, *pl. IV – 16–17, 26–27, 37–38*. 1948.

Spreading shrub or small tree up to 12 m tall, lactescent, with stems terete or subterete, nodes somewhat swollen; interpetiolar line or ridge conspicuous. *Leaves* decussate, petiolate, glabrous, subcoriaceous to thick-coriaceous, venation brochidodromous, margins entire and revolute, blade decurrent on part or most of canaliculate petiole; midrib plane to impressed above, prominent below. *Inflorescences* terminal, cymose, congested to lax and spreading, few- to many-flowered; peduncles elongate; bracts deltoid to ovate. *Flowers* subsessile to pedicellate, few to many; bracteoles deltoid to ovate, usually near base of pedicel; calyx lobes 5, persistent, quincuncially imbricate, basally with several small glands within; sepals free nearly to base, ovate, rounded to obtuse, eciliate at apex. Corolla sympetalous, actinomorphic, salverform, white to yellow, thick; tube narrow, straight, short, glabrous within, slightly dilatated at point of insertion of stamens; lobes 5, convolute in bud, overlapping to left, becoming reflexed at anthesis, narrowly ovate to obovate, slightly longer than tube. *Stamens* 5, inserted near middle of tube; anthers lanceolate, small, sessile, basally auriculate, apically caudate. *Ovary* superior, ovoid or cylindrical, glabrous, apically rounded, obtuse, or truncate, bicarpellate, placentation axile with ovules numerous in each locule; style terete; clavuncle cylindrical or ovoid, with basal flange, five-lobed apically, star-shaped in cross-section, glabrous; stigmoid lobes terete, thin, one-third to subequal to length of clavuncle. *Fruit* few-seeded, two-celled berry, narrowly ellipsoid to lanceovoid, with seeds embedded in a fluffy, white pulp; pericarp thin, fleshy, smooth, glandular. *Seeds* plano- to concavo-convex, ovate to elliptic in outline, testa muriculate and very finely reticulate; hilum small, usually broadly ovate or circular. *Embryo* almost as long as seed, with small, thin, plane, ovate cotyledons; radicle straight, terete, about 4–7 times as long as cotyledons.

Type species. *Molongum laxum* (Bentham) Pichon, Mém. Mus. Natl. Hist. Nat. 24: 168, *pl. IV – 15, 25, 36*. 1948 (based on *Tabernaemontana laxa* Bentham, J. Bot. [Hooker] 3: 244. 1841).

Etymology. From the local Brazilian name, 'Molongó.'

Distribution. Central and northwestern Amazonia of Brazil (Amazonas), Colombia (Guainía, Vaupés), and Venezuela (Amazonas) and the adjacent areas of the upper Río Orinoco in Venezuela; Map 4.



MAP 4. *Molongum*

Molongum was described by PICHON (1948) to encompass six species in three sections: *Trichosiphon, Coilanthera,* and *Oligoon.* In this present work, sect. *Trichosiphon* is removed from *Molongum* and treated as the distinct yet closely related genus *Spongiosperma.* PICHON was hampered in his study by the lack of available fruiting material, which I have found to provide some of the more obvious differences useful in separating the two genera. *Molongum* is distinguished from *Spongiosperma* by such characters as the relatively short corolla tube which is glabrous within, the thin pericarp which encloses few, rather than many seeds, and the seeds which are attached to a central septum and embedded in a fluffy white pulp, instead of projecting into a single open cell attached by low fleshy funicles.

The three species of *Molongum* are found growing along rivers or streams in Amazonia and the upper Río Orinoco tributaries, with *M. lucidum* known

also from lowland savanna regions of eastern Colombia, Venezuela, and Brazil. All three species have very lightweight wood which is reportedly used by native peoples as a substitute for cork.

KEY TO THE SPECIES OF *MOLONGUM*

1. Corolla tube 3–4.5 mm long, lobes obovate, 5 × 3 mm; flower pedicels 2–3.5 mm long; leaves subcoriaceous to thin-coriaceous, margins entire to crenulate, with 9–16 pairs of lateral veins; petioles 9–15(–28) mm long (Lower Rio Madeira region, Amazonas, Brazil) . . . . . 4–3. **M. zschokkeiforme**

   Corolla tube 5–9 mm long, lobes oblong-elliptic to narrowly ovate, 7–12 × 3.5–4 mm; flower pedicels 4–14 mm long; leaves coriaceous to thick-coriaceous, margins entire, with 15–25 pairs of lateral veins; petioles (3–)5–12 mm long 2

2. Leaf blades elliptic, rarely narrowly ovate or obovate, base rounded to obtuse, apex obtuse to acute, sometimes shortly mucronate; corolla tube 7–9 mm long, lobes oblong-elliptic to narrowly ovate, 10–12 × 3.5–4 mm (Northwestern Amazonia) . . . . . 4–1. **M. laxum**

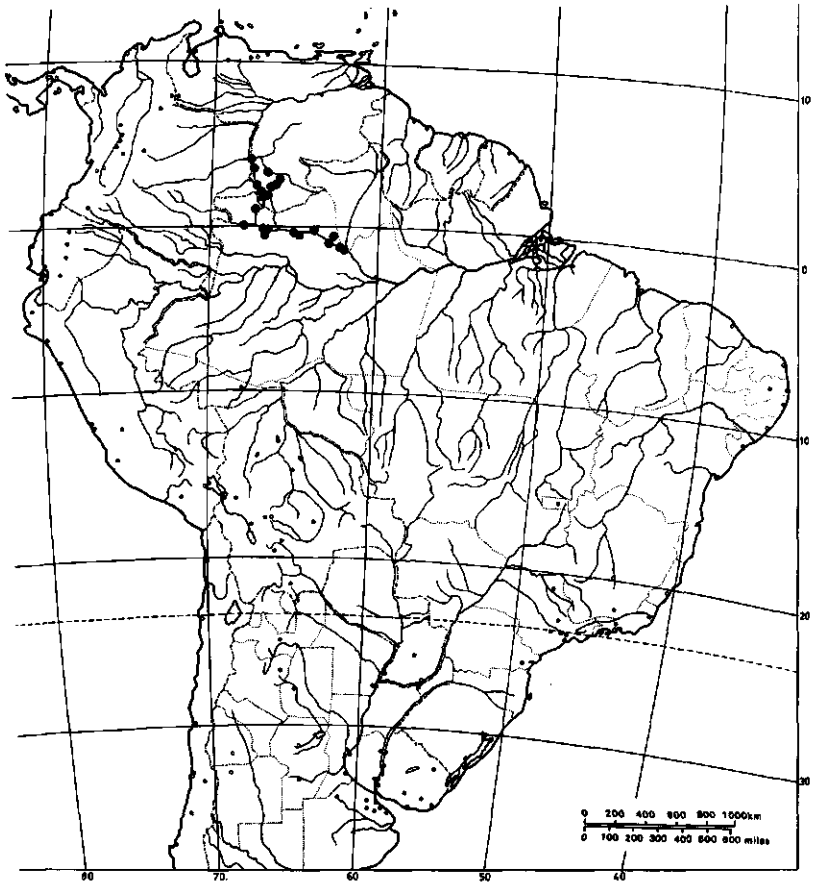
   Leaf blades obovate to oblanceolate, base broadly to sharply cuneate, apex rounded to obtuse; corolla tube 5–7 mm long; lobes oblong-elliptic, 7–8 × 4 mm (Northwestern Amazonia) . . . . . 4–2. **M. lucidum**

4–1. **Molongum laxum** (Bentham) Pichon, Mém. Mus. Natl. Hist. Nat. 24: 168, pl. IV – 15, 25, 36. 1948.

Basionym: *Tabernaemontana laxa* Bentham, J. Bot. (Hooker) 3: 244. 1841.

Type: Brazil: Amazonas: On the Rio Negro, no date [probably collected near Barcelos, May 1839] (fl), *Schomburgk* 919 (K, lectotype [here designated]; isotypes, BM, CGE, E-GL, F 870259, FI-W, G, G-DC, K, L, NY, OXF, P, US 702978, W). Homotypic synonyms: *Hancornia laxa* (Bentham) A. De Candolle, Prodr. 8: 326. 1844. *Ambelania laxa* (Bentham) Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 17, pl. 4. 1860; Schumann in Engler & Prantl, Nat. Pflanzenfam. 4(2): 124. 1895; Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941; Monachino, Lloydia 8(2): 126–127. 1945; 9(4): 302. 1946.

Small tree up to 8 m tall with leaf-bearing branches 2–3 mm in diameter. *Leaf blades* elliptic, rarely narrowly ovate or obovate, (4–)5–10 × (1.5–)2–4 cm, glabrous, coriaceous, with ca 15–25 pairs of lateral veins; bases rounded to obtuse, slightly decurrent on upper portion of petiole; apices obtuse to acute, sometimes shortly mucronate; margins entire, revolute; midrib plane to impressed above, especially near base of blade, prominent below; lateral veins plane on both surfaces, barely perceptible. *Petioles* (3–)5–7(–10) mm, canaliculate. *Inflorescences* terminal, cymose, usually lax and spreading, (5–)8–24(–35)-flow-



MAP 18. *Molongum laxum* (Bentham) Pichon.

ered; peduncles (18–)25–60 mm long; bracts ovate to deltoid, 2–3.5 × 1.5–2 mm; pedicels 4–6(–8) mm long; bracteoles ovate, ca 1.5 × 1 mm. *Flowers*: mature bud 16–20 mm long; sepals ovate, 1.8–2.5 × 1.7–2.5 mm, apically rounded or obtuse. Corolla white or cream with tube 7–9 mm long, completely glabrous within; lobes oblong-elliptic to narrowly ovate, 10–12 × 3.5–4 mm. *Stamens* inserted 3.5–4 mm from base of corolla tube; anthers 3–3.5 mm long, sessile, basally auriculate, apically caudate with acumen 0.3–0.4 mm long. *Ovary* ovoid, apically obtuse, 1.5–2 mm long; style 1.2–2 mm long; clavuncle 0.7–0.9 mm long; stigmoid lobes thin, terete, 0.3–0.5 mm long. *Fruit* narrowly ellipsoid to lanceoid, 2.5–5(–8) cm long, apically acute or obtuse, basally obtuse or rounded. *Seeds* few, 2–5(–8), plano- to concavo-convex, ca 5–6 × 3–4 × 2 mm.

Etymology. The epithet *laxum* refers to the open or loose arrangement of the flowers in the inflorescence.

Distribution. Known from the middle to upper Rio Negro in Brazil and

Colombia, and the adjacent area of the upper Río Orinoco in Venezuela; Map 18.

Specimens examined:

COLOMBIA. Guainía: Caño Bocachico, en el Río Negro, alt 75 m, 28 Oct 1977 (fl), *Espina et al. 274* (COL); 0.5 km N of Boca de Casiquiare (where Ríos Negro, Guainía & Casiquiare join), 1–2 km W of Río Guainía along caño, 1° 57′ N, 67° 08′ W, alt 120 m, 5 Feb 1980 (fl), *Liesner & Clark 9119* (MO, VEN); Río Atabapo, just above Cacagual, alt 130 m, 19 Nov 1953 (fl), *Maguire et al. 36267* (COL, MICH, NY, S).

VENEZUELA. Amazonas: Depto. Atabapo, Caño Yagua, medio (afluente derecho del Río Orinoco), 3° 36′ N., 66° 35′ W., alt ca 100 m, 27 May 1981 (fl fr), *Cerda sn* (VEN); Depto. Atabapo, southeastern bank of the middle part of Caño Yagua at Cucurital de Yagua, 3° 36′ N., 66° 34′ W., alt ca 120 m, 8 May 1979 (fl fr), *Davidse et al. 17335* (MO); Río Casiquiare, without precise locality, Jan-Feb 1969 (fl fr), *Fariñas et al. 644* (NY, VEN); Río Casiquiare, dentro de la laguna Baciba, Jan-Feb 1969 (fl), *Fariñas et al. 686* (NY, VEN); Depto. Río Negro, pequeña sabana en la ribera izquierda (Sur) del bajo Río Siapa, poco distante de su desembocadura en el Río Casiquiare, 2° 05′ N., 66° 25′ W., alt ca 125 m, 7 Feb 1981 (fl), *O. Huber & Medina 5819* (VEN); Río Paciba, Lago Paciba, alt 130 m, 3 Apr 1953 (fl fr), *Maguire & Wurdack 34798* (NY, US); along Río Paciba between Lago Paciba and Río Casiquiare, alt 130 m, 4 Apr 1953 (fl fr), *Maguire & Wurdack 34866* (GH, IAN, K, MO, NY, P, RB, UC, W); Río Guainía, along river between Río Negro and Comunidad, alt 100 m, 12 Apr 1953 (fl), *Maguire & Wurdack 35547* (F, NY); Río Yatua near Laja Catipan, alt 100–140 m, 6 Feb 1954 (fl fr), *Maguire & Wurdack 37528* (G, LE, NY), 11 Jan 1958 (fl), *Maguire et al. 42627* (NY, RB, VEN); Río Casiquiare, Caño de Agua Negra (Milla 38), 17 Apr 1968 (fl), *Medina 250* (VEN); Río Orinoco, Caño Cariche, 27 Apr 1968 (fl fr), *Medina 419* (VEN); Caño Cupavén, cerca de San Fernando de Atabapo, alt 100 m, 2 May 1968 (fl), *Medina 492* (VEN); 14 Apr 1978 (fr), *Morillo et al. 7580* (MY, VEN); Depts. Atabapo & Casiquiare, a lo largo del Río Atacavi, del Caño Caname y del Río Atabapo entre los 3° 05′ y 3° 50′ N., y entre 66° 50′ y 67° 30′ W., alt ca 100 m, 10–24 Nov 1980 (fl), *Piñate & Mondolfi 1044* (VEN); ad flumina Casiquiari, Vasiva et Pacimoni, Jan 1854 (fl fr), *Spruce 2445bis* (BM, BP, BR, C, CGE, F, K, NY, P, S, W); Río Pacimoni, arriba de la desembocadura del Río Pacimoni con el Río Casiquiare, 1° 50′ N, 66° 30′ W, alt 100 m, 8 Apr 1970 (fl), *Steyermark & Bunting 102453* (COL, M, MO, S, US, VEN, W); Bajo Río Atabapo, Isla Sapo, alt 124 m, 19 Jan 1942 (fl), *Ll. Williams 13856* (F, G, US, VEN [in part]); Río Guainía, Santa Rita, alt 100 m, 17 Mar 1942 (fl), *Ll. Williams 14799* (F, G, VEN); Río Guainía, Caño San Miguel, alt 127 m, 25 Mar 1942 (fl fr), *Ll. Williams 14874* (F, MO, MY, US, VEN).

BRAZIL. Amazonas: along Rio Curicuriari and Igarapé Cariua to Cachoeira Piraiauara, 0° 20′ S., 66° 55′ W., 12 Jul 1979 (fl), *Alencar et al. 594* (NY); Mun. São Gabriel da Cachoeira, margem direita do Rio Negro, Rio Curicuriari, 3 Dec 1978 (fl), *Damião* [= *Mota*] *2967* (COL, INPA); Rio Negro, Rio Curicuriary, 29 Nov 1929 (fl fr), *Ducke RB 22420* (G, K, P, RB, S, U, US), 4 Oct 1935 (fl), *Ducke 44* (A, F, K, MO, NY, S, US), 24 Oct 1932 (fl), *Ducke 163* (A, F, MAD); Rio Curicuriary, acima do Cach. Cajú, 22 Feb 1936, *Ducke RB 30123* (INPA, RB); Acará, Ig. Cubaté (trib. of Rio Içana), 4 Jan 1942 (fl fr), *Fróes 491h* (G, GH, NY, UC, US); Rio Negro, Enuixy, Lago do Dondona, 18 May 1947 (fl fr), *Fróes 22367* (IAN, NY, RB, U, US, VEN); Rio Negro, Padauiry, Tapera, 1 Nov 1947 (fl fr), *Fróes 22692* (IAN), 1 Nov 1947 (fl), *Fróes 22695* (IAN, NY, RB, U, US, VEN); Rio Negro, Upper Jurubaxi River, 4 Jul 1948 (fl fr), *Fróes 23304* (IAN, RB, VEN); Rio Negro, Barcelos, 15 Apr 1952 (fl fr), *Fróes 28265* (IAN, NY); Itaubal, Rio Aracá, sub-afl. do Rio Negro, 4 Nov 1952 (fl), *Fróes & Addison 29258* (IAN, NY, UB, Z); baixo Rio Negro, Rio Jufarí, Prosperando, 26 Sep 1975 (fl), *Kubitzki 75–84* (HBG, INPA); Rio Negro, Lago do Atãana, below Barcelos, 10 Oct 1978 (fl fr), *Madison et al. 6131* (F, INPA, NY); Rio Urubaxi, Ponto 16, SA-20-VC, 5 Jun 1976 (fl fr), *Marinho 424* (IAN); São Gabriel, margem esquerda do Rio Negro, Lago Atãana, 10 Oct 1978 (fl fr), *Nascimento 590* (MG, NY); Rio Negro, Rio Curicuriari, 26 Oct 1978 (fl), *Nascimento 774* (MG, NY); Rio Xeriuni, Proj. RADAM, Ponto 07A, SA-20-XA, 15 Apr 1974 (fl fr), *Pires et al. 13923* (IAN, INPA, MG, Z); Rio Curicuriari, at base of Serra Cujubí, 22 Jan 1948 (fl), *Schultes & López 9637B* (MO); Prope Panuré ad Rio Uaupés, Sep 1852 (fl fr), *Spruce*

2445 (AWH, BM, BR, CGE, E, F, G, GH, GOET, K, LD, LE, MPU, NY, OXF, P, W). Without definite locality: no date (fl), *A. R. Ferreira 243* (LISU, P [lacking collector and collection number]).

Local names. COLOMBIA. Volla (*Maguire et al. 36267*). VENEZUELA. Boya (*Morillo et al. 7580*), Guacamari (Kuripako language, *Ll. Williams 14799*), Palo de Balso (*Spruce 2445bis*), Palo de boya (*Cerda sn, Medina 250, 492, Piñate & Mondolfi 1044, Maguire et al. 42627, Ll. Williams 14874*), Palo de boya blanco (*Ll. Williams 13856, 14799*). BRAZIL. Molongó (*Ducke RB 22420, 44, 163, Fróes 491h*).

Molongum laxum is a riparian tree found in the upper Rio Negro region and adjacent areas of the upper Río Orinoco. It was first described by BENTHAM (1841) under *Tabernaemontana*, based on a collection by SCHOMBURGK from along the Rio Negro near Barcelos. Other references (SCHOMBURGK, 1848; MONACHINO, 1945) list the type locality incorrectly as the Rio Cotinga on the upper Rio Branco of Brazil. ALPHONSE DE CANDOLLE (1844) placed this species in *Hancornia*.

MUELLER (1860a) transferred *Tabernaemontana laxa* to *Ambelania*, citing two additional gatherings by Richard Spruce under this species. These two collections, from Panuré [= Ipanoré] in present-day Brazil and from the Río Casiquiare 'Vasiva et Pacimoni' in Venezuela, which were both cited under *Spruce 2445* by MUELLER, are listed herein as *2445* and *2445bis*, respectively.

The earliest known collection of this species was made in 1784 by A. R. FERREIRA in Brazilian Amazonia (received on loan from the Lisbon herbarium [LISU]); according to Ferreira's itinerary listed by PRANCE (1971a) the collection was made in the upper Rio Negro area.

Molongum laxum occurs along river margins in periodically inundated areas, and it is frequently found in large gregarious stands. *Molongum laxum* is more closely related to *M. lucidum* than to *M. zschokkeiforme*; it is easily distinguished from these two species by characters such as the larger flowers and the leaf apex, which is obtuse to acute, often mucronate.

4–2. **Molongum lucidum** (Humboldt, Bonpland & Kunth) Zarucchi, **comb. nov.**

Basionym: *Tabernaemontana* ? *lucida* Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. 7: 162 [folio], 209 [quarto]. 1825; Kunth, Synop. Pl. 4: 229. 1825 [1826]; G. Don, Gen. Hist. Dicham. Pl. 4: 92. 1837; A. De Candolle, Prodr. 8: 377. 1844.

Type: Venezuela: Amazonas: 'Crecit in aquis fluminis Pimichin (Missiones del Atabapo),' May [ca 5 May 1800] (fl fr), *Humboldt & Bonpland* 990 (P-H&B [IDC Microfiche 6209. 75: II. 2. -- F photo 38732; GH, US], holotype; probable isotype [as *sn*]: B-WILLD 5189, first sheet, *nv* [microfiche in MO]). Homotypic symonyms: *Lacmellea lucida* (Humboldt, Bonpland & Kunth) Miers, Apocyn. S. Amer. 14–15. 1878 as '*Lacmellia*'. *Ambelania lucida* (Humboldt, Bonpland

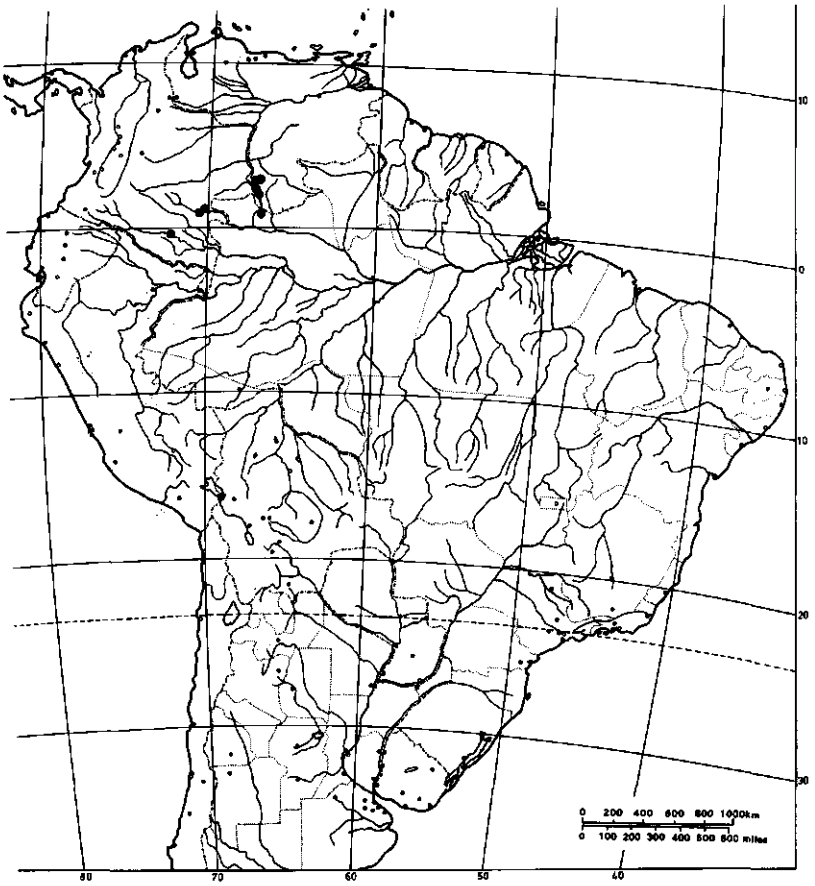
& Kunth) Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 169. 1948 sub *Molongum* sect. *Oligoon*.

Heterotypic synonyms: *Psychotria lucida* Willdenow ex Roemer & Schultes, Syst. Veg. 5: 189. 1819 (?Dec) [based on unnumbered duplicate specimen of *Tabernaemontana lucida* Humboldt, Bonpland & Kunth in B-WILLD], nom. illeg., non Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. 3: 282 [folio], 361 [quarto], pl. 283. 1819 [21 Nov]. *Ambelania cuneata* Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 17. 1860; Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941; Monachino, Lloydia 8(2): 125–126. 1945; Schultes, Bot. Mus. Leafl. 14(5): 135. 1950; J. Ethnopharm. 1: 166. 1979, synon. nov. Type: Venezuela: Amazonas: 'Ad fluminis Guainía vel Río Negro supra ostium fluminis Casiquiari,' Jun 1854 (fl fr), *Spruce* 3528 (BR, lectotype [here chosen]; isotypes: AWH, BM, CGE, E, F 1539900, G [F photo 26841; GH, MO, NY, US], GH, GOET, K, LD, LE, NY, OXF, P, W [as *sn*]). Homotypic synonym: *Molongum cuneatum* (Muell.-Arg.) Pichon, Mém. Mus. Natl. Hist. Nat. 24: 169, pl. IV – 17, 26, 38. 1948.

Spreading shrub or small tree up to 12 m tall with leaf-bearing branches 1.5–3 mm in diameter. *Leaf blades* obovate to oblanceolate, (3–)4–6.5(–9) × (1.1–)1.4–3(–4) cm, glabrous, coriaceous to thick-coriaceous, with 16–24 pairs of lateral veins; bases broadly to sharply cuneate and decurrent on most of petiole; apices rounded to obtuse, sometimes retuse; margins entire, revolute; midrib plane or slightly impressed above, prominent below; lateral veins very slightly raised above and below. Petiole (4–)7–12 mm long, canaliculate. *Inflorescences* terminal, cymose, congested to somewhat lax, (4–)15–40(–55)-flowered; peduncles 15–45(–60) mm long; bracts deltoid, 2–3 × 1.2–1.8 mm; pedicels (4–)6–12(–14) mm long; bracteoles ovate, small, ca 0.7–0.8 mm. *Flowers*: mature bud ca 13–14 mm long; sepals ovate, 1–1.8 × 1.3–2 mm, apically rounded. Corolla white or cream with tube 5–7 mm long, completely glabrous within; lobes oblong-elliptic, 7–8 × 4 mm. *Stamens* inserted 2.5–3 mm from base of corolla tube; anthers 2.5–3.3 mm long, sessile, basally auriculate, apically caudate with acumen 0.3–0.5 mm long. *Ovary* ovoid, apically rounded, ca 1.5 mm long; style 1.4–1.7 mm long; clavuncle 0.7–1 mm long; stigmoid lobes thin, terete, 0.7–0.9 mm long. *Fruit* ellipsoid to narrowly ellipsoid, 1.5–3(–5) cm long, apically and basally rounded. *Seeds* few, 2–4(–8), plano- to concavo-convex, 5.5–6.5 × 3.5–4 × 2–2.5 mm.

Etymology. Latin *lucidum* = shiny, in reference to the appearance of the adaxial leaf surface.

Distribution. Known from northwestern Amazonia in eastern Colombia, southern Venezuela, and adjacent regions of Brazil; Map 19.



MAP 19. *Molongum lucidum* (Humboldt, Bonpland & Kunth) Zarucchi.

Specimens examined:

COLOMBIA. Amazonas: Río Caquetá, alrededores de Araracuara, Aeropuerto Araracuara, 10–22 Nov 1982 (fl fr), *Idrobo et al. 11467* (COL). Vaupés: Río Cuduyarí, Yapobodá, 23 Jan 1944 (fl), *Allen 3271* (US); Río Kubiyú, Cerro de Cañendá (Sabanas), alt 380–680 m, 2–4 Nov 1952 (fl), *García-Barriga 15068, 15075* (COL); Río Vaupés, Caño Pacú, 6 Mar 1944 (fl fr), *Schultes 5815* (COL, MO); Río Kubiyú, Cerro Kañendá, savannahs ca 15 mi upstream from mouth, alt ca 800–900 ft, 19 Nov 1952 (fl), *Schultes & Cabrera 18346* (A, US); Mitú and vicinity, along lower Río Kubiyú, 31 Mar 1975 (fl fr), *Zarucchi et al. 1137* (COL, GH, MO, US), 15 Apr 1975 (fr), *Zarucchi 1210* (COL, GH, MO, US), 25 Sep 1976 (fl), *Zarucchi 2139* (COL, ECON, GH, INPA, MO, US, USF, WAG), 13 Jul 1979 (fl fr), *Zarucchi 2455* (COL, GH, MO), 15 Jul 1979 (st), *Zarucchi 2480* (COL, GH, MO), 16 Jul 1979 (st), *Zarucchi 2482* (COL, GH, MO, WAG), 16 Jul 1979 (fl fr), *Zarucchi 2483* (COL, GH, MO).

VENEZUELA. Amazonas: Río Guainía, along Caño Pimichín, below Pimichín, alt 125–135 m, 14 Apr 1953 (fl), *Maguire & Wurdack 35664* (NY); Río Guainía, in sabanita 1 km W of La Ceiba, Caño San Miguel 2 km above Limoncito, alt 120–140 m, 14 Oct 1957 (fl), *Maguire et al. 41898* (NY, US, VEN); Río Guainía, Maroa, alt 127 m, 11 Feb 1942 (fl fr), *Ll. Williams 14288* (F, G,

MY, US); Río Guainía, Playa Blanca, alt 127 m, 24 Feb 1942 (fl fr), *Ll. Williams 14454* (F, G, MO, MY, NY, U, US).

BRAZIL. Amazonas: Rio Negro, S. Felipe, km 2 da Perimetral Norte, 21 May 1975 (fl), *N. T. Silva 3858* (IAN).

Local names. COLOMBIA. A-BI-ta-ki (Kubeo language, *Zarucchi 2455*), Mi-mi-WAHO-ka-ki (Kubeo language, *Zarucchi 2480, 2482, 2483*).

The species accepted here as *Molongum lucidum* was first described by ROEMER and SCHULTES (1819) as *Psychotria lucida* (Rubiaceae), based on an unnumbered Humboldt and Bonpland collection deposited in the Willdenow Herbarium at Berlin. This name was a later homonym of an actual rubiaceous plant, *P. lucida* Humboldt, Bonpland and Kunth, the description of which also appeared in late 1819 (21 November). According to MCVAUGH (1955) and STAFLEU and COWAN (1979), the names published by Humboldt, Bonpland and Kunth in Vol. 3 (fascicle 12) of the *Nova Genera et Species Plantarum* have priority over the competing names which appear in ROEMER and SCHULTES (1819). HUMBOLDT, BONPLAND and KUNTH (1825), also in the *Nova Genera et Species Plantarum* (Vol. 7), described '*Tabernaemontana* ? *lucida*', based presumably on a duplicate of the same Humboldt and Bonpland collection. The type specimen is deposited in the separate Humboldt and Bonpland Herbarium at Paris. Later taxonomic treatments continued to place *M. lucidum* questionably under *Tabernaemontana* (e.g., G. DON, 1837, and A. DE CANDOLLE, 1844).

MUELLER (1860a) did not account for *Tabernaemontana lucida* in the Apocynaceae for the *Flora Brasiliensis*. Instead he described *Ambelania cuneata* [= *Molongum lucidum*] based on Spruce 3528, from the Río Guainía of the upper Rio Negro basin. MIERS (1878), in his work on South American Apocynaceae, placed *T. lucida* in *Lacmellea* ('*Lacmellia*'). MARKGRAF (1941), in his revision of *Lacmellea* and review of *Ambelania*, made the new combination *A. lucida*. MONACHINO (1945) did not consider *A. lucida;* he was apparently unaware of MARKGRAF's 1941 article due to hostilities during World War II. PICHON (1948) listed *A. lucida* within *Molongum* sect. *Oligoon* along with *M. cuneatum* and *M. zschokkeiforme*, but did not make the combination in the genus.

Molongum lucidum is a rather variable species distributed in the northwestern Amazon, and is known from both savanna and riparian habitats. Specimens of *M. lucidum* are distinguished easily from *M. laxum*, partly on the basis of the broad to narrow cuneate leaf bases.

Individuals of *Molongum lucidum* are able to sucker from the base, enabling them to survive fire and other forms of destruction in normally inhospitable environments. Those collections made from along streams may actually be individuals which have grown from seeds dispersed from the savanna habitats.

4–3. **Molongum zschokkeiforme** (Markgraf) Pichon, Mém. Mus. Natl. Hist. Nat. 24: 169, pl. IV – 16, 27, 37. 1948.

FIG. 5. *Molongum zschokkeiforme* (Markgraf) Pichon: 1. flowering branch, $\frac{1}{2}\times$; 2. opened flower, 3 ×; 3. fruits, $\frac{3}{4}\times$; 4. habit. (1. Schultes & Cordeiro 6514; 2. Zarucchi et al. 2937, alc. mat.; 3. Zarucchi et al. 2902, alc. mat.; 4. Zarucchi et al. 2902, from slide).

Basionym: *Ambelania zschokkeiformis* Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 12: 295–296. 1935; 15: 620. 1941; Monachino, Lloydia 8(2): 125. 1945; 9(4): 302. 1946; Schultes, Bot. Mus. Leafl. 14(5): 135–136, pl. 30. 1950.

Type: Brazil: Amazonas: Maués, ad ripas inundatas Rio Moraes, 4 Oct 1929 (fl fr), *Ducke RB 22421* (B, holotype, lost; isotypes: G, K, P, ?RB *nv*, S, U, US 1743767).

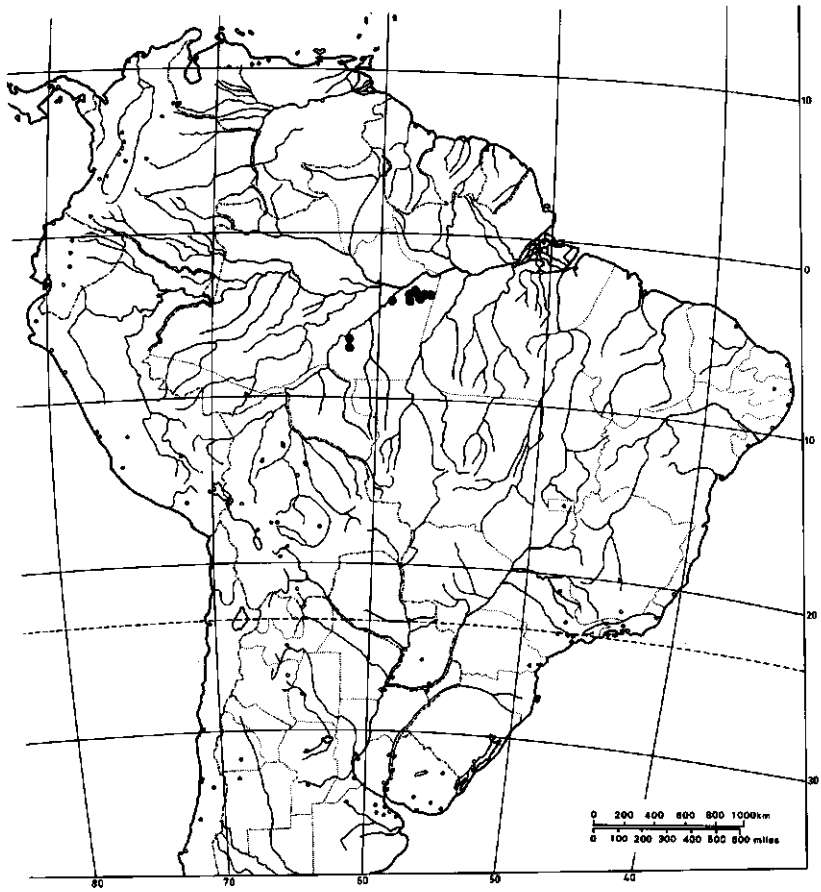
Small tree up to 5 m tall with leaf-bearing branches 1.5–3 mm in diameter. *Leaf blades* lanceolate or ovate to elliptic, 5.5–10(–12) × 1.3–3.5(–5) cm, glabrous, subcoriaceous to thin-coriaceous, with 9–16 pairs of lateral veins; bases rounded and decurrent on upper portion of petiole; apices acute, rarely obtuse, distally rounded; margins entire or crenulate, revolute; midrib impressed above, especially near base of blade, prominent below; lateral veins slightly raised above and below. Petioles 9–15(–28) mm long, shallowly canaliculate. *Inflorescences* terminal, cymose, congested, 10–28(–45)-flowered; peduncles 9–16(–26) mm long; bracts deltoid, 2.5–3 × 1.2–1.5 mm; pedicels 2–3.5 mm; bracteoles deltoid to ovate, ca 1.5 × 1 mm near base of pedicel. *Flowers*: mature bud ca 9 mm long; sepals ovate, 1.5–2 × 1.4–1.6 mm, apically rounded. Corolla white or cream with tube 3–4.5 mm long, completely glabrous within; lobes obovate, 5 × 3 mm. *Stamens* inserted ca 2 mm from base of corolla tube; anthers 2–2.5 mm long, sessile, basally auriculate, apically caudate with acumen 0.3–0.5 mm long. *Ovary* cylindrical to ovoid, apically truncate, 1.1–1.3 mm long; style 0.3–0.6 mm long; clavuncle 0.8–1 mm long; stigmoid lobes terete, 0.2–0.3 mm long. *Fruit* narrowly ellipsoid or lanceovoid, 2–4(–6.5) cm long and 0.6–1 cm in diameter, apically obtuse, basally rounded. *Seeds* few, 2–5(–7), plano- to concavo-convex, ca 6 × 3.5 × 2 mm.

Etymology. The epithet *zschokkeiforme* refers to the similarity in leaf shape between this species and *Zschokkea*, a generic synonym of *Lacmellea* (Apocynaceae – Carisseae).

Distribution. Known from tributaries of the middle to lower Rio Madeira and eastward in Amazonas, Brazil; Map 20.

Specimens examined:

Brazil. Amazonas: Região do Rio Madeira, Rio Canumã, 25 Oct 1957 (fl), *Fróes 33675* (COL, IAN), 5 Nov 1957 (fl fr), *Fróes 33738* (IAN, MO, NY); basin of Rio Madeira, on shore of lake near River Marmellos, 29 Nov 1933 (fr), *Krukoff 5822* (A, K, NY, S, US); Mun. de Barreirnha, igarapé-açú do Rio Andirá, 25 Mar 1974 (fl fr), *Mello 11/74* (INPA); Rio Maués, Mun. de Maués, no date (fl), *W. Rodrigues & L. Coêlho 6779* (GH, INPA); Rio Marmellos, Igarapé Pote, 6 Aug 1945 (fl), *Schultes & Cordeiro 6514* (GH, IAN, K, MO, US); Rio Madeira, Rio Marmellos, near mouth, 12 Aug 1945 (fl), *Schultes & Cordeiro 6533* (GH, IAN, MO); Rio Marmellos, Aug 1948 (fl), *Schultes & López 10310* (GH, IAN, K, MO, US); Mun. de Borba, lower Rio Canumã, E bank of river ca 2 km S of Vila of Canumã, Lat. 4° 04′ S, Long. 59° 05′ W, 27 Jun 1983 (fl fr), *Zarucchi et al. 2879* (INPA, NY, US); Mun. de Borba, lower Rio Canumã, W bank of river ca 1 km S of Vila of Canumã, Lat. 4° 03′ S, Long. 59° 06′ W, 28 Jun 1983 (fl fr), *Zarucchi et al. 2902* (INPA, NY, US); Mun. de Axinim, basin of Rio Abacaxis, lower Rio Marimari, ca 2 km below mouth of Rio Paca, Lat. 4° 07′ S, Long. 58° 58′ W, 2 Jul 1983 (fl fr), *Zarucchi et al. 2937* (INPA, NY,



MAP 20. *Molongum zschokkeiforme* (Markgraf) Pichon.

US); Mun. de Axinim, along Rio Abacaxis ca 4 km below mouth of Igarapé Surubim, Lat. 4° 29′ S, Long. 58° 28′ W, 4 Jul 1983 (fl), *Zarucchi et al. 2952* (INPA, NY, US); Mun. de Maués, basin of Rio Maués, lower Rio Parauari, ca 3 km N of Mucajá, Lat. 3° 52′ S, Long. 57° 30′ W, 18 Jul 1983 (fl), *Zarucchi et al. 3071* (INPA, NY, US); Mun. de Maués, basin of Rio Apoquitaua, lower Rio Pacoval, Lat. 3° 48′ S, Long. 58° 04′ W, 26 Jul 1983 (fl), *Zarucchi et al. 3180* (INPA, NY, US); Mun. de Maués, Rio Apoquitaua, Lat. 3° 59′ S, Long. 57° 54′ W, 27 Jul 1983 (fl), *Zarucchi et al. 3208* (INPA, NY, US); Mun. de Maués, Rio Apoquitaua just above confluence with Rio Pacoval, Lat. 3° 47′ S, Long. 57° 59′ W, 27 Jul 1983 (fl), *Zarucchi et al. 3217* (INPA, NY, US).

Local names. BRAZIL. Boia (*Schultes & Cordeiro 6514, 6533*), Molongó (*W. Rodrigues & L. Coêlho 6779, Zarucchi et al. 2879, 2902, 2937, 2952, 3217*), Molongó do Igapó (*Mello 11/74*).

Molongum zschokkeiforme was described under *Ambelania* by MARKGRAF in

1935 based on a collection by ADOLPHO DUCKE from central Amazonia at Maués. The species is known only from the lower Rio Madeira, its southeastern tributaries, and the various *paranas* connecting the Rio Madeira to the Rio Amazonas.

In the protologue for the species, MARKGRAF compared *Ambelania zschokkeiformis* with the illustration of *A. acida* (AUBLET, 1775), distinguishing *A. zschokkeiformis* by its shorter corolla tube. MONACHINO (1945), in his treatment of *Ambelania* in the wide sense, indicated that a close relationship existed between *A. zschokkeiformis* and *A. laxa*, based on their terminal inflorescences (versus axillary inflorescences in *A. acida*), and their similar habitat in inundated areas. SCHULTES (1950) provided further data on *A. zschokkeiformis*, based on his several gatherings made on the Rio Marmellos, a tributary of the Rio Madeira. He described them as gregarious trees, usually with the trunk thickened at the base, growing on sand bars along the river. In this article, SCHULTES provided a habit and habitat photograph of the trees, which are almost completely submerged for part of the year.

PICHON (1948) placed *Ambelania zschokkeiformis* in his new genus *Molongum*, sect. *Oligoon*, along with *M. cuneatum* [= *M. lucidum*] and *A. lucida* [= *M. lucidum*]. *Molongum zschokkeiforme* is distinguished from the other two species of *Molongum* by its smaller flowers, shorter flower pedicels, thinner leaves which sometimes have a crenulate margin, and generally longer petioles.

The holotype of *Ambelania zschokkeiformis* was destroyed during World War II (MARKGRAF, pers. comm.), necessitating the selection of a lectotype. A duplicate of the type collection, *Ducke RB 22421*, has not been seen from the Jardim Botanico in Rio de Janeiro (RB); therefore, a lectotype has not been chosen.

Excluded Species of *Molongum*

Molongum macrophyllum (Muell.-Arg.) Pichon, Mém. Mus. Natl. Hist. Nat. 24: 168, *pl. IV – 14, 24, 35.* 1948 = *Spongiosperma macrophyllum* (Muell.-Arg.) Zarucchi.

Molongum grandiflorum (Huber) Lemée, Fl. Guy, Franç. 3: 297. 1953 [comb. illeg.] = *Spongiosperma grandiflorum* (Huber) Zarucchi.

5. **Rhigospira** Miers, Apocyn. S. Amer. 67–71, *pl. 10A.* 1978 pro parte; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 169, *pl. IV – 18, 28, 39.* 1948.

Rigospira O. Kuntze in Post & O. Kuntze, Lexicon 1904, orth. mut.

Ambelania sect. *Terminales* Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941 pro parte, nom. nud.

Ambelania sect. *Quadrangulariae* Monachino, Lloydia 8(2): 114. 1945, nom. nud.

Small or medium-sized tree up to 30 m tall, lactescent, with young stems sharply quadrangular becoming terete with age and secondary growth; interpetiolar line or ridge conspicuous, containing many small, resin-producing glands within

leaf axils on long, canaliculate petiole. *Leaves* decussate, petiolate, glabrous, stiff-coriaceous, venation eucamptodromous, margins entire and revolute; apices obtuse, mucronate; bases variable, acute to subcordate, slightly or markedly decurrent on petiole; midrib plane or slightly raised and striate above, prominent below; lateral veins slightly raised above and below; tertiary veins slightly raised above. *Inflorescences* terminal, cymose, lax and well-branched, many-flowered; peduncles long, secondary inflorescence axes almost as long as peduncle; axes terete to subterete; bracts ovate to deltoid; bracteoles deltoid, usually on lower half of pedicel; pedicels terete, expanding unequally becoming frustumic with mature fruit. *Flowers* long, calyx lobes 5, persistent, quincuncially imbricate, basally lacking glands within; sepals free nearly to base, eciliate, ovate, apically rounded to obtuse. Corolla sympetalous, actinomorphic, salverform, white, thick; tube narrow, straight, long, sparingly pilose from insertion of stamens to orifice; lobes 5, convolute in bud, overlapping to left, becoming reflexed at anthesis, less than one-half length of tube. *Stamens* 5, inserted near base of tube; anthers lanceolate, subsessile with filaments short, basally auriculate, apically caudate. *Ovary* superior, cylindrical, glabrous, apically truncate, bicarpellate, placentation axile with ovules numerous in each locule; style terete, short; clavuncle cylindrical with basal flange, five-lobed apically, star-shaped in cross-section, glabrous; stigmoid lobes terete, thin, approximating length of clavuncle. *Fruit* many-seeded, one-celled berry, ellipsoid to obovoid, occasionally stipitate, with seeds embedded in a crisp, red or maroon, acidic, edible pulp; pericarp indurated with a granular composition, surface smooth, glandular, becoming rough, muriculate when dry. *Seeds* plano-convex, naviculate, ovate to oblong in outline with prominent dorsal ridge; testa irregularly reticulate; hilum small, ovate to circular. *Embryo* almost as long as seed, with small, thin, plane, broadly ovate cotyledons; radicle straight, terete, about 5–7 times as long as cotyledons.

Type species. *Rhigospira quadrangularis* (Mueller-Argoviensis) Miers, Apocyn. S. Amer. 68, *pl. 10A.* 1878 (based on *Ambelania quadrangularis* Mueller-Argoviensis in Martius, Flora Brasiliensis 6(1): 18. 1860); the genus was typified by Pichon (1948) by the exclusion of the other six species of Miers.

Etymology. Greek ριγόω (*rigesco* in Latin) = to become rigid, spiral = σπεῖρα (*spira* in Latin) which according to MIERS (1878) 'refers to the rigidly pyramidal form of the border of the corolla in aestivation.'

Distribution. Central and western Amazonia of Brazil (Acre, Amazonas, Roraima), Peru (Amazonas, Loreto), Colombia (Amazonas, Guaviare, Vaupés), and Venezuela (Amazonas), upper Rio Orinoco drainage in Venezuela (Amazonas, Bolívar); also the Pacific coast of Colombia (Chocó, Valle); Map 5 or 21.

Rhigospira was described by MIERS (1878) to encompass seven species of Amazonian trees which had previously been treated under *Ambelania* and *Tabernaemontana* sect. *Stenocephalium* by MUELLER (1860a) in Martius' *Flora Brasilien-*

sis. This present work considers *Rhigospira*, as circumscribed by MIERS, to represent species in *Spongiosperma, Neocouma, Macoubea*, and the emended *Rhigospira*. Four of Miers' species of *Rhigospira* are referable to *Macoubea*, which is now treated as part of the subfamily Tabernaemontanoideae (BOITEAU & SASTRE, 1975; BOITEAU, ALLORGE, & SASTRE 1978); references to these species are provided at the end of this section under 'Excluded Species of *Rhigospira*.'

Rhigospira was not accepted by several subsequent reviewers of the Apocynaceae (BAILLON, 1891; SCHUMANN, 1895), who placed it in synonymy under *Tabernaemontana*. MONACHINO (1945) mentioned *Rhigospira* in his treatment of *Ambelania* but did not recognize it as a valid genus.

PICHON (1948) accepted *Rhigospira* as a monotypic genus, which he lectotypified by the exclusion of the other six species. The genus is readily distinguished even with sterile specimens, as indicated in the discussion under *R. quadrangularis*, and it is also the only genus in the Ambelanieae for which collections have been gathered west of the Andean cordillera.

5–1. **Rhigospira quadrangularis** (Muell.-Arg.) Miers, Apocyn. S. Am. 68, pl. 10A. 1878; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 169, pl. IV – 18, 28, 39. 1948.

Basionym: *Ambelania quadrangularis* Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 18. 1860; Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 15: 620. 1941; Monachino, Lloydia 8(2): 124. 1945; 9(4): 302. 1946; Macbride, Fl. Peru, Publ. Field Mus. Nat. Hist., Bot. Ser. 13(5/1): 374. 1959.

Type: Venezuela: Amazonas: 'Prope San Carlos ad Río Negro, ad basio Cocuí,' Jul 1853 (fl), *Spruce* 3026 (BR, lectotype [here chosen]; isotypes: AWH, BM, CGE, E, F 1539870, G [F photo 26843; F, GH, MO, NY, US], GH, GOET, K, LD, LE, NY, OXF, P, W). Homotypic symonym: '*Hancornia*? *macrophylla* Spruce' ex Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 18. 1860, nom. nud. in synon. under *A. quadrangularis*.

Small or medium-sized tree up to 30 m tall with leaf-bearing branches sharply quadrangular, 3–8 mm in diameter. *Leaf blades* oblong-elliptic to narrowly obovate, 8–22 × 4.5–8 cm, glabrous, stiff-coriaceous, with 11–18 pairs of lateral veins; bases narrowed, obtuse to rounded, rarely subcordate or subacute, slightly decurrent on petiole; apices obtuse, mucronate; margins entire, revolute; midrib plane or slightly raised and striate above, prominent below; lateral veins slightly raised above and below; tertiary veins conspicuous and slightly raised above. *Petioles* 12–30 mm long, canaliculate, with many glands in leaf axil. *Inflorescences* terminal, cymose, well-branched, lax, usually 60–90-flowered; peduncles 25–50(–60) mm long; bracts ovate to deltoid, 3–3.5 × 2–3.5 mm; pedicels 4–8 mm long; bracteoles deltoid, ca 1.5 × 1 mm, usually on lower half of pedicel. *Flowers*: mature bud 23–28 mm long; sepals ovate, 1.2–2 × 1.3–1.8 mm, apically rounded to obtuse. Corolla white with tube 11–15 mm long, sparingly pilose from insertion of stamens to orifice; lobes oblong-elliptic, 10–11 × 3.5–4 mm,

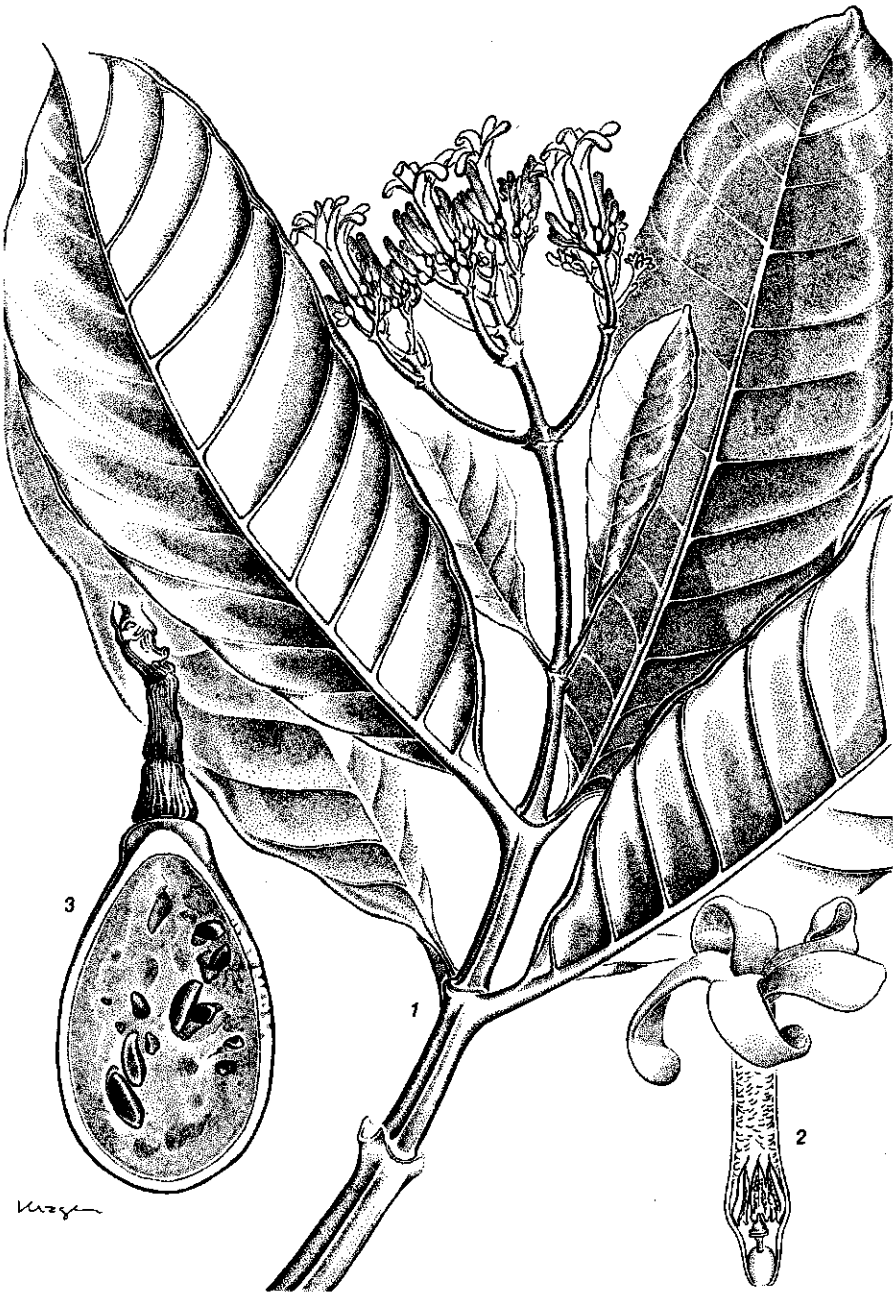
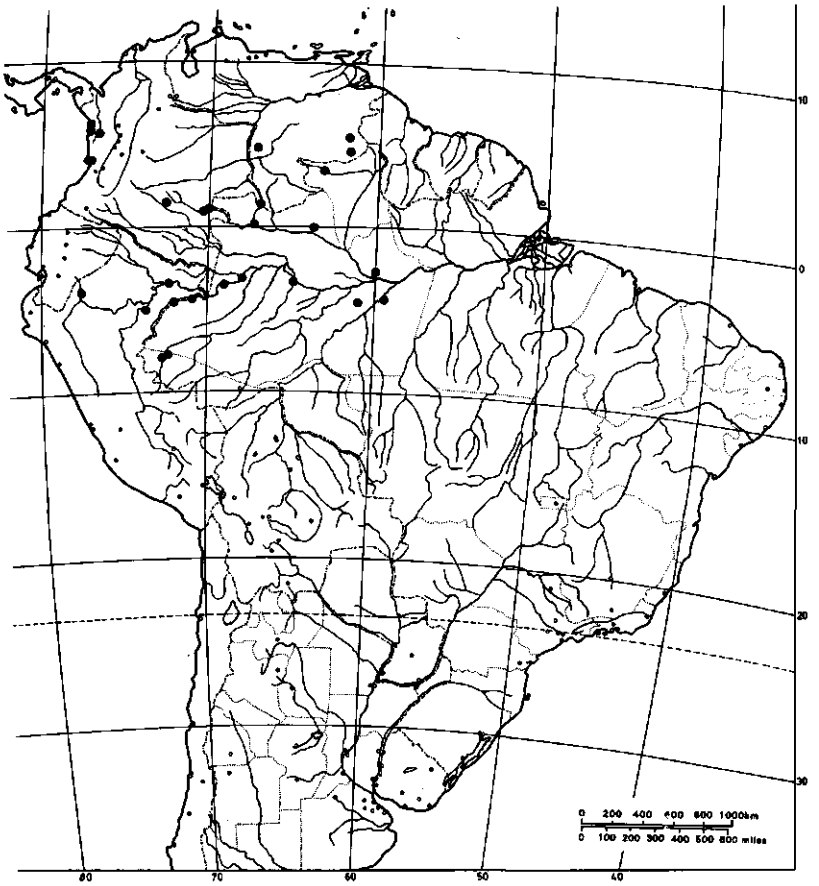


FIG. 6. *Rhigospira quadrangularis* (Muell.-Arg.) Miers: 1. flowering branch, $\frac{1}{2}$ ×; 2. opened flower, 3 ×; 3. sectioned fruit, $\frac{3}{4}$ ×. (1–2. Zarucchi 2428, alc. mat. & slides; ; 3. Zarucchi 1570, alc. mat. & slides).



MAP 21. *Rhigospira quadrangularis* (Mueller-Argoviensis) Miers.

reflexed. *Stamens* inserted 2.5–3 mm from base of corolla tube; anthers 3 mm long, subsessile, filaments ca 0.3 mm long; bases auriculate, 0.3 mm long; apically caudate with acumen 0.4–0.5 mm long. *Ovary* cylindrical, 1.2–1.4 mm long; style 0.5–0.7 mm long; clavuncle 0.5–0.6 mm long; stigmoid lobes thin and terete, 0.5–0.7 mm long. *Fruit* ellipsoid to obovoid, 8–10 cm long and 4–7 cm in diameter; apically rounded to obtuse, with larger fruits usually stipitate. *Seeds* numerous, usually 30–60, embedded in a red or maroon pulp, plano-convex, 9.5–11.5 × 4–5 × 2–3 mm; surface finely and irregularly reticulate.

Etymology. The epithet *quadrangularis* refers to the sharply four-angled young stems of the plants.

Distribution. Known from widespread localities in western Colombia, central and western Amazonia of Brazil, Colombia, and Peru; also collected in the region of the upper Río Orinoco of Amazonas and Bolívar, Venezuela; Map 21.

Specimens examined:

COLOMBIA. Chocó: Río Atrato, Samurindó, alt ca 80 m, 1 Apr 1958 (fr), *Cuatrecasas & Llano 24100* (MO, US); woods E of beach ca 1 mile N of Juarin, alt 10–100 m, 24 May 1967 (yng fr), *Duke 11499* (ECON, NY, OS); Mun. de Quibdó, carretera Quibdó-Guayabal, 11 May 1985 (fr), *Moreno et al. 002* (MO); Mun. de Bahía Solano, Cgto. El Valle, colinas detrás del pueblo, alt 35 m, 4 Oct 1983 (fr), *Sanchez & Rendón 601* (MEDEL). Guaviare (as 'Vaupés'): Path between Ríos Itilla and Macaya, alt ca 900 ft, 1–7 Apr 1943 (fr), *Schultes 5357* (COL, ECON, K, US). Valle: Bajo Calima, ca 10 km due N of Buenaventura, Carton de Colombia concession, transect 1, 3° 56′ N., 77° 08′ W., alt ca 50 m, 6 Dec 1981 (st), *Gentry 35386* (COL, MO); Bajo Calima, Concesión Pulpapel/Buenaventura, 3° 55′ N, 77° W, alt ca 100 m, 30 Nov 1984 (fr), *Monsalve 594* (MO), 26 Feb 1985 (fl fr), *Monsalve 702* (MO). Vaupés: Mitú and vicinity, along road from town, 15 May 1976 (fr), *Zarucchi 1570* (COL, ECON, GH, MO, US, USF), 22 Jun 1976 (fl buds, fr), *Zarucchi & Balick 1711* (COL, GH, MO, US, USF), 5 Jul 1976 (fl), *Zarucchi et al. 1812* (COL, GH, MO, US, USF), 4 Jul 1979 (fl), *Zarucchi 2428* (COL, GH), *2431* (COL, GH, USF), *2432* (COL, GH, WAG), 22 Jul 1979 (fl), *Zarucchi 2509* (COL, GH, MO); along Río Vaupés between Río Paranápichuna and Rapids of Mandí, 19 Jul 1979 (fl), *Zarucchi 2497* (COL, GH, MO, WAG), *2500* (COL, GH, MO, USF, WAG).

VENEZUELA. Amazonas: Reserva Forestal El Sipapo, bosque a la margen derecha Río Sipapo, May 1971 (yng fr), *Blanco 1192* (NY, US, VEN). Bolívar: Río Chizco, Uriman, alt 450–500 m, Sep 1953 (st), *Bernardi 920* (NY); región de los Ríos Icabaru, Hacha, y cordillera sin nombre, alt 450–850 m, 2 Jan 1956 (yng fr), *Bernardi 2738* (NY, VEN); selvas Río Curutu, alto [Río] Paragua, alt 550 m, Apr 1948 (fr), *Cardona 2487* (MO, US, VEN); Chimantá Massif, lower NW slopes of Abácapa-tepuí, vicinity of camp 1 along Río Abácapa, alt 420 m, 30–31 Mar 1953 (fr), *Steyermark 74748* (F, MY, NY, US, VEN); Chimantá Massif, lower SW-facing forested slopes of Chimantá-tepuí (Torono-tepuí), at extreme S end on N side of Río Tirica (left-hand branch), alt 1000 m, 14 May 1953 (fr), *Steyermark 75361* (F, NY, VEN).

PERU. Amazonas: Río Santiago, 2 km bajo de La Poza, alt 180 m, 16 Aug 1979 (fr), *Asunción 162* (GH, MO); Mobil Oil Co. trail, 3 km from La Poza, E bank of the Santiago River, alt 180 m, 6 Aug 1979 (fr), *Berlin 3519* (GH, MO, USF); Río Santiago, 2 km átras de la comunidad Caterpiza, banda este de Caterpiza, alt 180 m, 15 Oct 1979 (fr), *Huashikat 942* (MO). Loreto: Prov. Requena, Dtto. Sapuena, Jenaro Herrera, alt 120 m, árbol no. 97, 20 Jun 1974 (fl), *Abadie 25T* (IAN, Z); Jenaro Herrera, Arboretum, 5 Feb 1974 (fr), *Díaz 47A* (G), árbol no. 2/47, 15 Jun 1974 (fl fr), *Díaz 58A* (G, IAN); Prov. Maynas, Caserio de Huanta, Río Orosa, alt ca 120 m, 31 Aug 1978 (fr), *Díaz et al. 477* (F, GH, MO); Prov. Loreto, Río Tigre, Campamento Petrolero San Jacinto, 2° 15′ S, 75° 50′ W, alt ca 200 m, 16 Sep 1979 (fr), *Díaz & Jaramillo 1471* (MO); Jenaro Herrera, margen derecha Río Ucayali, 24 May 1982 (fl buds), *Encarnación 26154* (MO, US); Jenaro Herrera, tree number R-114 PP, 15 Oct 1973 (fr), *Noriega sn* (US); Jenaro Herrera, 4° 50′ S, 73° 45′ W, alt ca 170 m, 10 Dec 1980 (fr), *Vásquez & Jaramillo 1029* (MO, US), 1 Jul 1981 (yng fr), *Vásquez et al. 2056* (MO).

BRAZIL. Acre: Cruzeiro do Sul, Estrada Alemanha, 6 May 1971 (fl fr), *Maas et al. P12717* (C, COL, F, G, INPA, M, MG, MO, NY, P, S, U, US), 4 Nov 1966 (fr), *Prance et al. 3013* (F, INPA, K, MG, NY, S, US), 13 Apr 1971 (fr), *Prance et al. 11807* (F, INPA, K, MG, NY, S, U, US); próximo do Aeroporto de Cruzeiro do Sul, 8 Feb 1976 (fr), *Marinho 33* (IAN), 6 Feb 1976 (fr), *Monteiro & Damião [Mota] 142* (INPA), 8 Mar 1976 (fr), *J. Ramos & Mota 344* (INPA); vicinity of Serra da Moa, 22 Apr 1971 (fl buds, fr), *Prance et al. 12242* (F, INPA, K, M, NY, U, US), *12267* (F, INPA, K, M, MG, NY, P, S, U, US); Rio Moa, 8 km above Cachoeira Grande, 27 Apr 1971 (fl buds, fr), *Prance et al. 12565* (F, GH, INPA, K, M, MG, NY, S, U, US). Amazonas: Rio Solimões, São Paulo de Olivença, 20 Aug 1929 (fl), *Ducke RB 22419* (K, P, RB, S, U, US); Rio Madeira, Borba, 24 Apr 1937 (fl), *Ducke RB 35159* (G, K, P, RB, S, U), *471* (A, F, K, MO, NY, S, US); Manaus, Reserva Florestal Ducke, 26 Feb 1957 (fl fr), *E. Ferreira 57–17* (IAN, INPA, MG, MO), 9 Apr 1962 (fr), *W. Rodrigues & Chagas 3583* (INPA), 18 May 1962 (fl fr), *W. Rodrigues & Coêlho 4453* (INPA), 13 May 1964 (yng fr), *W. Rodrigues & Loureiro 5814* (INPA), 11 Mar 1966 (fr), *W. Rodrigues & Coêlho 7559* (INPA); Rio Solimões, Vargem Grande, 31 Jul 1941 (st), *Fróes 12153/63* (A, F, MICH, NY, US); Rio Negro, Foz do Caiary, 12 Oct 1945 (fr), *Fróes 21149* (F, IAN, K, NY, TEX, US); Rio Negro, Padauiry, mata do Tucano, 14 Oct 1947 (fl), *Fróes 22595*

(IAN, NY, RB, SP, U, US, VEN); Rio Negro, Preto, Matupiry, 14 Nov 1947 (fl fr), *Fróes 22853* (IAN); Rio Tefé, Muquentáua, 10 Jun 1950 (fr), *Fróes 26196* (IAN, NY, UC); Rio Javari behind Palmeiras Army Post, 72° 49′ W, 5° 8′ S, 31 Jul 1973 (fl fr), *Lleras et al. P16964* (INPA, MG, NY, Z), 1 Aug 1973 (fl fr), *Lleras et al. P16985* (INPA, NY); Manaus-Pôrto Velho Highway (BR-319), behind road camp at km 240, 22 Nov 1973 (fl buds, fr), *Lleras et al. P19615* (INPA, MG, NY, US, Z); Rio Javari, 7 hrs above Paumari, 16 Oct 1976 (fr), *Prance et al. 23837* (INPA, MG, NY, WAG); Upper Rio Negro, without precise locality, 1907–1908 (fr), *Weiss & Schmidt 54* (NY). Roraima: vicinity of Uaicá airstrip, Rio Uraricoeira, 3° 33′ N, 63° 11′ W, 1 Mar 1971 (fr), *Prance et al. 10804* (COL, F, INPA, K MG, NY, S, U, US, VEN).

Local names. COLOMBIA. Caimo morado (*Schultes 5357*), Guayabilla (*Monsalve 594*), Guayabilla de monte (*Monsalve 702*), Juansoco de Danta (*Zarucchi 2497, 2500*), Mi-mi-WAHO-ka-ki (Kubeo language, *Zarucchi 2509*), Palo de leche (*Schultes 5357*). VENEZUELA. Aratani-yek (Arekuna language, *Bernardi 920*), Guayaba de monte (*Bernardi 2738*). PERU. Yahuar caspi (*Abadie 25T*), Yahuar huayo (*Díaz 47A, Noriega sn*), Yahuar huayo colorado (*Díaz 58A*), Yapúkait (Huambisa language, *Berlin 3519, Huashikat 942*). BRAZIL. Goiaba d'anta (*Ducke RB 22419*).

Rhigospira quadrangularis is a widespread species found growing on *terra firma* with individual trees reported up to 30 m tall. It is separated easily from all other described species of Ambelanieae by its sharply four-angled young branches. Other distinguishing characters include the elongate, many-flowered, and lax inflorescences and the large, ellipsoid to obovoid, often stipitate, fruit with a granular, indurated pericarp. *Rhigospira quadrangularis* exhibits additional interesting characters such as the numerous glands in the leaf axils, the glands on the surface of the fruit, the red to maroon, crisp, acidic fruit pulp, and the eucamptodromous leaf venation. Foliage characteristics vary widely within the species, with leaves gathered from the same tree varying markedly in size and in the shape of the leaf base.

The first collection of *Rhigospira quadrangularis* was made by RICHARD SPRUCE near the base of Serra Cocuí, on the present-day border of Venezuela and Brazil along the Rio Negro. In the field, SPRUCE questionably attached the name '*Hancornia macrophylla*' to the specimens, a new species which he had early encountered and provisionally named on the Rio Uaupés. MUELLER (1860a) included Spruce's questioned determination in synonymy under *Ambelania quadrangularis* and placed *H. macrophylla* under *A. macrophylla*. Further discussion may be found under *Spongiosperma macrophyllum*.

MIERS (1878) placed *Ambelania quadrangularis* as one of seven species in his new genus *Rhigospira* and accompanied it with a line drawing based on Spruce's collection. Subsequent workers did not accept Miers' genus and treated *Rhigospira quadrangularis* under *Ambelania*. In 1948, however, PICHON accepted *Rhigospira* with one species; *R. quadrangularis* therefore became the generic type by the exclusion of the other six species.

Excluded Species of *Rhigospira*

Rhigospira paucifolia (Spruce ex Muell.-Arg.) Miers, Apocynaceae South

America 69. 1878 = *Macoubea sprucei* (Muell.-Arg.) Markgraf var. *paucifolia* (Spruce ex Muell.-Arg.) Monachino.

Rhigospira reticulata (A. DC.) Miers, Apocynaceae South America 69–70. 1878 = *Macoubea guianensis* Aublet.

Rhigospira sinuosa Miers, Apocynaceae South America 70. 1878 = *Macoubea sprucei* (Muell.-Arg.) Markgraf var. *paucifolia* (Spruce ex Muell.-Arg.) Monachino.

Rhigospira sprucei (Muell.-Arg.) Miers, Apocynaceae South America 70. 1878 = *Macoubea sprucei* (Muell.-Arg.) Markgraf.

Rhigospira ternstroemiacea (Muell.-Arg.) Miers, Apocynaceae South America 71. 1878 = *Neocouma ternstroemiacea* (Muell.-Arg.) Pierre.

Rhigospira venulosa Miers, Apocynaceae South America 68–69. 1878 = *Spongiosperma macrophyllum* (Muell.-Arg.) Zarucchi.

6. **Neocouma** Pierre, Bull. Soc. Mens. Soc. Linn. Paris, sér. 2, 5: 33. 1898; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 169–170, *pl. IV – 19, 29, 40*. 1948.

Neocuma O. Kuntze in Post & O. Kuntze, Lexicon 386. 1904, orth. mut.

Ambelania sect. *Neocoumae* Monachino subsect. *Ternstroemiaceae* Monachino, Lloydia 8(2): 113. 1945, nom. nud.

Small or medium-sized trees up to 25 m tall, lactescent, with stems terete or subterete, covered with large petiole scars and with conspicuous interpetiolar line or ridge. *Leaves* with small saucer- or flap-shaped gland in leaf axil, decussate, petiolate, glabrous, coriaceous to thick-coriaceous, sclereids either present or absent, venation brochidodromous, margins entire and revolute, blade decurrent on short or long, canaliculate petiole; midrib somewhat prominent or slightly impressed above, prominent below; lateral veins slightly raised or impressed above, slightly raised below; tertiary veins conspicuous on both surfaces. *Inflorescences* terminal, cymose, congested, many-flowered; peduncles elongate; bracts and bracteoles calycine, small, deltoid to ovate, or large, ovate to elliptic; bracteoles located at or above middle of pedicels. *Flowers* either small or large; calyx lobes 5, caducous or apparently persistent, quincuncially imbricate, basally with many small glands in several series within; sepals free nearly to base, ovate to elliptic, apically rounded to acute, either entire or finely ciliate at apex. Corolla sympetalous, actinomorphic, salverform, white, thick; tube narrow, straight, either short or long, pilose within from below insertion of stamens, where tube is dilated, up to the orifice; lobes 5, convolute in bud, overlapping to left, becoming reflexed at anthesis. *Stamens* 5, inserted near middle of tube; anthers lanceolate, sessile, basally auriculate or sagittate, apically caudate. *Ovary* superior, ovoid, glabrous, apically rounded or truncate, bicarpellate, placentation axile with ovules numerous in each locule; style terete, short or long; clavuncle cylindrical or globose, with basal flange, five-lobed apically, star-shaped in cross-section, glabrous; stigmoid lobes terete, thin, equal to or less than length of clavuncle. *Fruit* few- to many-seeded, two-celled berry, ellipsoid or globose

becoming stipitate, with seeds embedded in a somewhat stringy pulp; pericarp crustaceous, thin, surface verrucose. *Seeds* plano-convex or unequally compressed, ovate to elliptic in outline; testa covered with low, irregular protuberances and irregularly pitted; hilum small, ovate to circular. *Embryo* almost as long as seed, with small, thin, plane, ovate or circular cotyledons; radicle straight, terete, about 3–5 times as long as cotyledons.

Type species. *Neocouma ternstroemiacea* (Mueller-Argoviensis) Pierre, Bull. Mens. Soc. Linn. Paris, sér. 2, 5: 33–34. 1898 (based on *Tabernaemontana ternstroemiacea* Mueller-Argoviensis in Martius, Flora Brasiliensis 6(1): 88. 1860).

Neocouma was described in 1898 by PIERRE to encompass a single species, *N. ternstroemiacea*, which had been first described by MUELLER (1860a) as '*Tabernaemontana*? *ternstroemiacea*'. This species description was based on a collection made by RICHARD SPRUCE from the upper Rio Negro in 1853. MIERS (1878) placed Mueller's species in *Rhigospira*, although he noted that several characters which he listed 'might lead to a supposition of its being the type of a distinct genus.' PIERRE (1898) introduced the genus with a discussion of its apparent similarities to *Couma* (Carisseae). In his description of *N. ternstroemiacea* he commented upon the presence of foliar sclereids.

A second species, *Neocouma duckei*, was added to the genus by MARKGRAF in 1932, based on a collection by ADOLPHO DUCKE from Fontebôa, Amazonas, Brazil. In the present treatment it is placed in the new genus *Mucoa*.

MONACHINO (1945) treated *Neocouma* as a subsection of *Ambelania*, a genus which he accepted in the wide sense, and nearly equivalent to the tribe Ambelanieae as here interpreted. PICHON (1948) considered *Neocouma* as a monotypic genus easily separable from *Ambelania*, *Molongum*, and *Rhigospira*.

In the present treatment, two species of *Neocouma* are recognized, *N. ternstroemiacea* and *N. parviflora*.

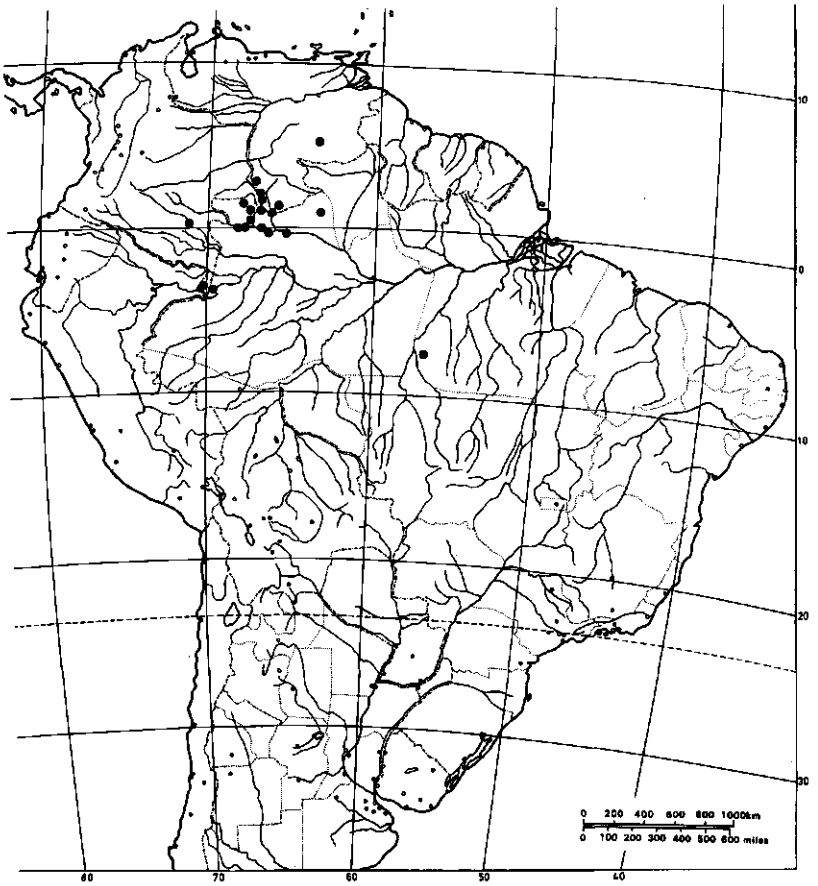
Etymology. The generic name is a modification of *Couma*, a member of the apocynaceous tribe Carisseae.

Distribution. Northwest Amazonia in Venezuela (Amazonas, Bolívar), Colombia (Amazonas, Vaupés), and Brazil (Amazonas, Pará); Map 6.

KEY TO THE SPECIES OF *NEOCOUMA*

1. Petiole short, 1–2 mm long; leaf blades elliptic to ovate with retuse to rounded apex; bracteoles small, 2.5–3 × 3–4 mm; corolla tube short, 3.5–4 mm long; fruits stipitate (Amazonas & Bolívar, Venezuela and Serra Aracá, Amazonas, Brazil) . . . . . 6–1. **N. parviflora**

   Petiole elongate, 6–30 mm long; leaf blades elliptic with rounded to obtuse apex; bracteoles large, 12–14 × 5.5–7 mm; corolla tube 10–12 mm long; fruits not stipitate (Northwestern and Western Amazonia, and Western Pará, Brazil) . . . . . 6–2. **N. ternstroemiacea**



MAP 6 *Neocouma*

6–1. **Neocouma parviflora** (Markgraf) Zarucchi, **comb. nov.**

Basionym: *Ambelania parviflora* Markgraf, Ernstia 19: 4–5. 1983 [30 Jul].

Type: Venezuela: Amazonas: Depto. Río Negro, en la vertiente oriental del Macizo Aracamuni, Lat. 01° 32′ N., Long. 65° 48′ W., alt ca 750 m, 10 Feb 1981 (fl fr), *O. Huber & Medina* 5928 (Z *nv*, holotype; isotypes: NY, VEN 165823).

Small tree 5 m tall with leaf-bearing branches 3–7 mm in diameter. *Leaf blades* elliptic to obovate, 9–14.5 × 5–8.5 cm, glabrous, coriaceous, with 9–13 pairs of lateral veins; bases obtuse or rounded, decurrent on the short petiole; apices retuse or rounded; margins entire, revolute; midrib slightly impressed above, prominent below; lateral veins impressed above, slightly raised below; tertiary veins conspicuous above, slightly raised below; light brown spots on abaxial

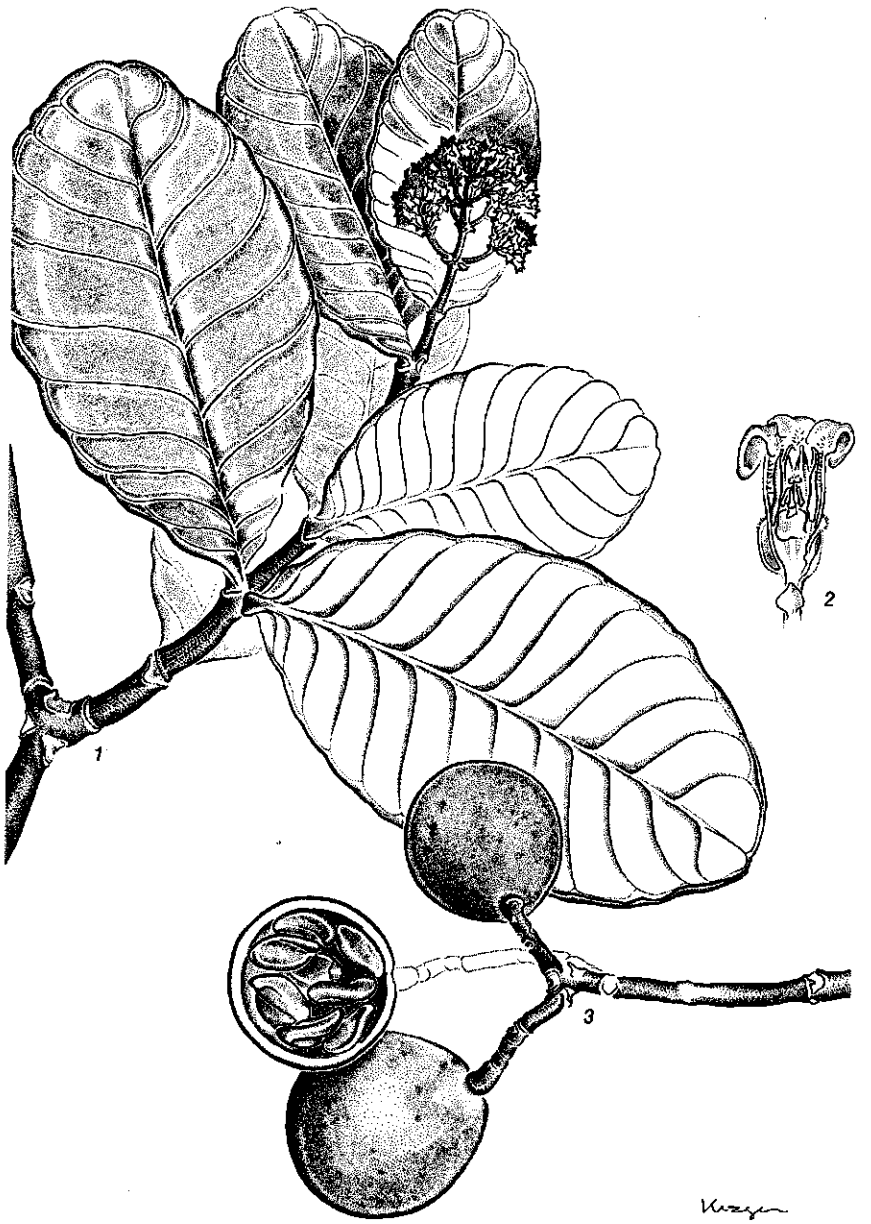
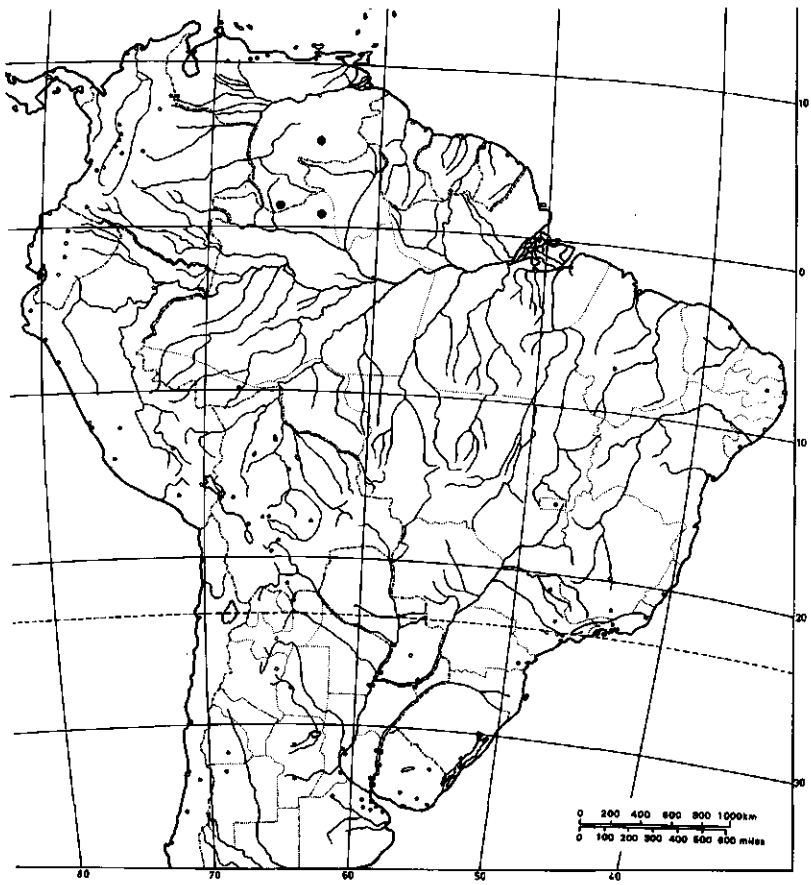


FIG. 7. *Neocouma parviflora* (Markgraf) Zarucchi: 1. flowering branch, $\frac{1}{2}\times$; 2. opened flower, 3 ×; 3. fruits, $\frac{3}{4}\times$. (1–3. O. Huber & Medina 5928).

surface. *Petioles* 1–2 mm long, winged, shallowly canaliculate. *Inflorescences* terminal, cymose, ca 25–30-flowered; peduncles 15–36 mm long; bracts possibly caducous [not seen]; pedicels 8–15 mm long; bracteoles deltoid to ovate, calycine, 2.5–3 × 3–4 mm, apically acute, located near middle of pedicels. *Flowers*: mature bud 4–5 mm long; sepals ovate, 2–2.3 × 1.5–2 mm, apically obtuse to subacute, finely ciliate only at apex. Corolla tube 3.5–4 mm long, sparingly pilose from just below insertion of stamens to orifice within; lobes deltoid, 2.8 × 2 mm, reflexed. *Stamens* inserted 2 mm from base of corolla tube; anthers lanceolate, 2.5–3 mm long, sessile, basally auriculate, spreading, lobes 0.4 mm long, apically caudate with acumen 0.4–0.5 mm long. *Ovary* ovoid, ca 1 mm long, apically truncate; style 0.3–0.4 mm long; clavuncle cylindrical with a basal flange, apically five-lobed, ca 0.7 mm long; stigmoid lobes terete, thin, ca 0.25 mm long.



MAP 22. *Neocouma parviflora* (Markgraf) Zarucchi.

Fruit (immature) globose to 22 mm in diameter, larger fruits somewhat stipitate; pericarp crustaceous, ca 1 mm thick, with 8–10 seeds embedded in a stringy pulp; surface verrucose. *Seeds* plano-convex, elliptic to ovate in outline, 11–12.5 × 6–7 × 3–4 mm, surface finely pitted, with irregular protuberances.

Etymology. Latin *parviflora* = small-flowered, in reference to the relatively small corolla size.

Distribution. Known from Venezuela (Amazonas, Bolívar) and Brazil (Serra Aracá, Amazonas); Map 22.

Specimens examined:

VENEZUELA. Bolívar: cumbre del Cerro Guaiquinima, a lo largo del afluente del Río Carapo, 1 km río arriba del Salto Szezerbanari, 5° 44′ 4″ N, 63° 41′ 8″ W, parte SE del cerro, alt 730–750 m, 23–24 May 1978 (fr), *Steyermark et al. 117386* (VEN).

BRAZIL. Amazonas: Serra Aracá, alt 1000 m, 11 Feb 1975 (fl fr), *Pires 15048* (IAN 145484); margens de um riacho da Serra Aracá, 1 Feb 1978 (fl fr), *Rosa & Lira 2350* (MG, NY).

No local names are recorded for this species.

Neocouma parviflora is a species markedly different from *N. ternstroemiacea*. Characters which differentiate *N. parviflora* include the short petiole, elliptic to ovate leaf blades with retuse to rounded apices, small bracteoles, the short corolla tube, and stipitate fruits.

The species is known only from four gatherings at above 1000 m elevation, including on the Serra Aracá, an isolated mountain. The substrate of this serra is related to that of the main Guiana highland region, several hundred kilometers to the north, where the other collections have been made. MAGUIRE (1979) included the Serra Aracá as one of several isolated mountains in northern Amazonia worthy of intense floristic study. Additional populations of *Neocouma parviflora* are expected from neighboring isolated mountains.

6–2. **Neocouma ternstroemiacea** (Muell.-Arg.) Pierre, Bull. Mens. Soc. Linn. Paris, sér. 2, 5: 33–34. 1898; Pichon, Mém. Mus. Natl. Hist. Nat. 24: 169–170, pl. IV – 19, 29, 40. 1948.

Basionym: *Tabernaemontana ternstroemiacea* Muell.-Arg. in Martius, Flora Brasiliensis 6(1): 88. 1860.

Type: Venezuela: Amazonas: 'Prope San Carlos ad Rio Negro,' Aug 1853 (fl), *Spruce* 3035 (BR, lectotype [here chosen]; isotypes: B, lost [F photo 4380; F, GH, MO, US, VEN], BM, C, CGE, E, F 998981, G, GH, GOET, K, LD, NY, OXF, P). Homotypic synonyms: *Rhigospira ternstroemiacea* (Muell.-Arg.) Miers, Apocyn. S. Am. 71. 1878. *Ambelania ternstroemiacea* (Muell.-Arg.) Monachino, Lloydia 8(2): 123–124. 1945.

Medium-sized tree up to 25 m tall with leaf-bearing branches 6–12(–15) mm in diameter. *Leaf blades* elliptic, 15–30 × 8–16 cm, glabrous, coriaceous to thick-coriaceous, with (7–)10–13 pairs of lateral veins; bases obtuse to rounded, decurrent on petiole; apices rounded to obtuse, sometimes shortly mucronate; margins entire, revolute; midrib somewhat prominent above, becoming slightly impressed near base of blade, prominent below; lateral veins slightly raised above and below; tertiary veins conspicuous on both surfaces; numerous light brown spots scattered on abaxial surface. *Petioles* (6–)11–24(–30) mm long, winged, canaliculate. *Inflorescences* terminal, cymose, congested, (6–)10–23-flowered; peduncles 11–30(–42) mm long; bracts ovate to elliptic, calycine, 11–14 × 5.5–7 mm; pedicels 4–7 mm long; bracteoles ovate to elliptic, calycine, 12–14 × 5.5–7 mm, located above middle of pedicel. *Flowers* large, mature bud 35–40 mm long; sepals ovate to elliptic, 12–14 × 6–7 mm, apex rounded to acute, eciliate. Corolla white with tube 10–12 mm, pilose below insertion of stamens within; lobes oblong-elliptic, 20–28 × 7–12 mm, reflexed. *Stamens* inserted ca 4 mm from base of corolla tube; anthers lanceolate, 4–5 mm long, sessile, basally auriculate with lobes ca 0.5 mm long, apically caudate with acumen ca 0.6 mm long. *Ovary* ovoid, ca 2 mm long, apically rounded; style up to 4 mm long; clavuncle 0.5–0.7 mm long; stigmoid lobes terete, thin, ca 0.6–0.7 mm long. *Fruit* ellipsoid, to ca 3.5 cm long and 2 cm in diameter; pericarp crustaceous, granular in texture, ca 1 mm thick, with (8–)15–20 seeds embedded in a stringy pulp; surface verrucose. *Seeds* unequally compressed laterally, depressed trullate in cross-section, ovate to elliptic in outline, 14.5–16 × 7–8 × 4–5 mm; surface finely pitted, with irregular protuberances.

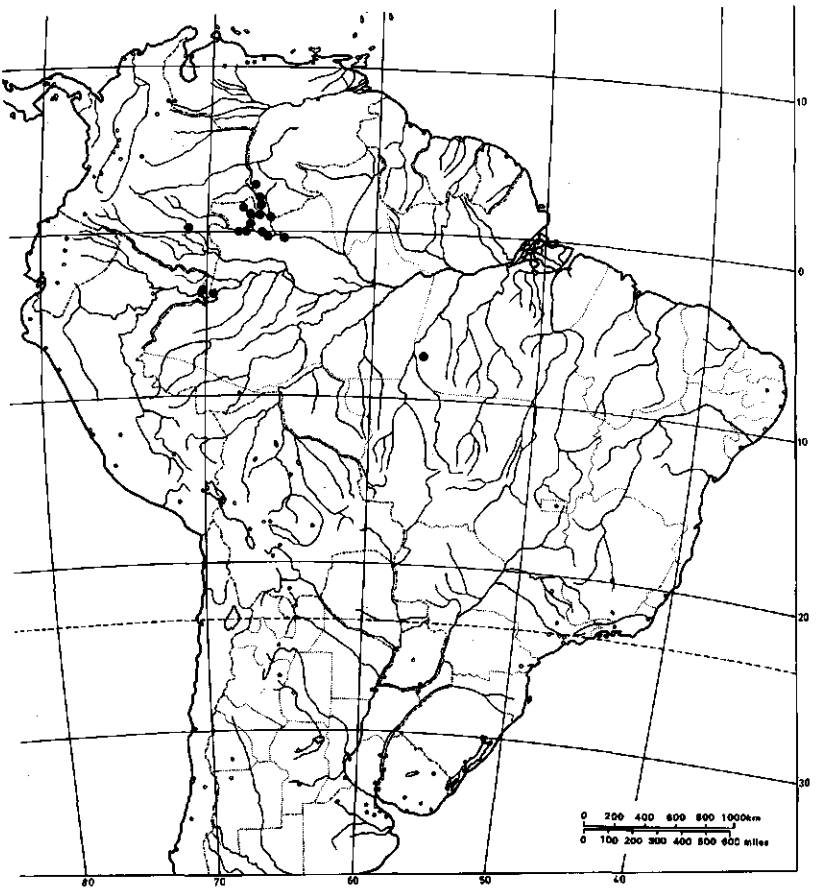
Etymology. The epithet *ternstroemiacea* refers to the similarity in appearance of the calyx to that found in ternstroemias (Theaceae).

Distribution. Known from northwestern Amazonia in Brazil, Colombia, and Venezuela; also collected in western Pará, Brazil; Map 23.

Specimens examined:

COLOMBIA. Amazonas: Trapecio amazónico, interior regions of trapecio between Amazon and Putumayo watersheds, alt above 100 m, Sep 1946 (st), *Schultes 8111* (NY, UC). Amazonas-Vaupés: Río Apaporis, Raudal de Jirijirimo, 7 Aug 1951 (fl, yng fr), *Schultes & Cabrera 13462* (COL, F, GH, P [as *sn*], WIS).

VENEZUELA. Amazonas: San Carlos de Río Negro, in forest along airstrip, alt 115 m, 19 Sep 1975 (fl), *Berry 1475* (VEN); MAB – near San Carlos de Rio Negro, Sep 1975 (fl fr), *Brünig VEN 109* (VEN); San Carlos de Río Negro, 4.3 km NNE on Solano road, ca 1° 56′ N, 67° 03′ W, alt 119 m, 21 Dec 1978 (fl), *Clark & Maquirino 6903* (MO, NY); 9.2 km NNE of San Carlos on Solano road, near conuco of Juan Moreno, alt 119 m, 1 Jan 1979 (fl), *Clark 6921* (NY); Depto. Río Negro, .5 to 1.5 km SE of Cerro de La Neblina Base Camp on the Río Mawarinuma, 0° 50′ N, 66° 10′ W, alt 140 m, 21 Feb 1984 (st), *Liesner 16154* (MO); Río Guainía, Caño San Miguel 2 km above Limoncito, sabanita 1 km W of La Ceiba, alt 120–140 m, 14 Oct 1957 (fl), *Maguire et al. 41893* (NY); carretera San Carlos-Solano, 2–6 km SW de Solano, alt 100 m, 25 Apr 1974 (fl yng fr), *Morillo et al. 3944* (VEN); en camino de San Carlos de Río Negro hacia Solano, alt 120 m, 27 Oct 1970 (fl), *Rutkis 221* (VEN); Cerro de la Neblina, vecinidades del campamento base a lo largo del Río Mawarinuma afluente del Río Baria, 0° 50′ N, 66° 10′ W, alt 110–130 m, 8–10 Jan 1984 (fl buds), *Steyermark & Luteyn 129741* (MO, VEN).



MAP 23. *Neocouma ternstroemiacia* (Mueller-Argoviensis) Pierre.

BRAZIL. Amazonas: Rio Negro, Camanáos, 30 Nov 1929 (fl), *Ducke RB 22417* (K, P, RB, S, U, US); Rio Negro, Cucuhy, 22 Sep 1935 (fl), *Ducke RB 35156* (RB), *220* (MAD, NY); basin of Rio Negro, Mun. São Gabriel, Ca-te-Espera, 14 Nov 1941 (old fl, fr), *Fróes 368* (F, G, MO, NY, S), 14 Nov 1941 (fl), *Fróes 369* (F, G, NY, S); Mun. São Gabriel, Yuco, Rio Xié, 5 Dec 1941 (fl), *Fróes 416* (F, G, GH, NY, S, WIS), 6 Dec 1941 (st), *Fróes 425* (G, NY), 9 Dec 1941 (fl), *Fróes 431* (G, NY, S, US); Mun. São Gabriel, Santa Ana on Rio Içana, 18 Dec 1941 (fl), *Fróes 443* (G, NY), 18 Dec 1941 (yng fr), *Fróes 444* (NY); Mun. São Gabriel, Acara, Ig. Cubaté (trib. of Rio Içana), 2 Jan 1942 (fl fr), *Fróes 471* (G, NY, S, US), 2 Jan 1942 (fl, yng fr), *Fróes 475* (F, G, GH, NY, S, US); Mun. São Gabriel, Vaupés, Corocoró, 12 Jan 1942 (fr), *Fróes 499* (G, NY, WIS), 12 Jan 1942 (yng fr), *Fróes 502* (G, NY, SP), 12 Jan 1942 (fr), *Fróes 503* (G, NY, US); Mun. São Gabriel, Macubeta on Rio Marié, 26 Jan 1942 (fl buds), *Fróes 539* (F, G, NY, S, WIS), 26 Jan 1942 (st), *Fróes 540* (G, NY, US, WIS), *541* (NY); Mun. São Gabriel, Bela Vista, Basin of Vaupés River, 9 May 1942 (fl), *Fróes 882* (G, NY, US); Rio Caiary, matas adjacentes á Serra de Tunuhy, 13 Nov 1945 (fl), *Fróes 21387* (F, IAN, K, NY, US); Rio Negro, Preto, Matupiry, 12 Nov 1947 (fl), *Fróes 22834* (IAN, NY, RB, SP, U, US); Rio Solimões, N do Igarapé Belém, next [to] Colombia border, 21 Dec 1948 (fr), *Fróes 23793* (IAN, MO), 21 Dec 1948 (old fl), *Fróes 23794B* (IAN); margem esquerda do Rio Negro, Tapuruquara-mirim, Rio Marié, 16 Oct 1978 (fl), *Nascimento 648* (NY);

alto Rio Negro, Panuré, 7 Jun 1962 (fr), *Pires & Silva 7940* (IAN, UB). Pará: Missão Cururú, 11 May 1977 (fr), *Rosa & Santos 1901* (MG, NY).

Local names. VENEZUELA. Pendare amargo (*Clark & Maquirino 6903*), Yayucuri (*Rutkis 221*). BRAZIL. Gogo de Guariba (*Fróes 368, 369, 416, 425, 431, 471, 475, 499, 502, 503*), Parva-papo (*Fróes 539, 540, 541*), Sorva da catinga (*Ducke RB 35156, 220*), Sorva papo (*Fróes 882*), Uarina Gogo (*Fróes 443, 444*).

Neocouma ternstroemiacea was first described by MUELLER (1860a) as a questionable species in *Tabernaemontana*, based upon a collection by RICHARD SPRUCE made in 1853 near San Carlos on the upper Rio Negro. MIERS (1878) transferred the species to *Rhigospira*, including it with elements presently attributable to *Neocouma, Spongiosperma, Rhigospira*, and *Macoubea*. PIERRE (1898) created the genus *Neocouma* to accommodate *N. ternstroemiacea* as its only species. The second collection of this species was not made until 1929, when ADOLPHO DUCKE collected it at Camanaós on the upper Rio Negro. MARKGRAF (1932b) referred to this collection in his discussion of *N. duckei*, which is treated here under *Mucoa duckei*.

The majority of the specimens of *Neocouma ternstroemiacea* available for study were made by RICARDO DE LEMOS FRÓES in the course of his work in the 1940s on Amazonian chicle-producing tree species. In recent years, collections have been made in a wide variety of localities in western Amazonia, including the Río Apaporis at Raudal Jirijirimo and the Trapecio amazónico of Colombia. One recent collection, made in western Pará on the Rio Cururu, is an unexpected disjunction which reflects the close similarity between this region of the Rio Tapajós/Serra da Cachimbo and the *catinga* regions of the upper Rio Negro.

Excluded Species of *Neocouma*

Neocouma duckei Markgraf, Notizbl. Bot. Gart. Berlin-Dahlem 11: 337. 1932 = *Mucoa duckei* (Markgraf) Zarucchi.

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INDEX OF LOCAL NAMES

Parva-papo do Terra firma	*Mucoa duckei*
Pau de colher	*Ambelania acida*
Pendare amargo	*Neocouma ternstroemiacea*
Pepino	*Ambelania acida*, *A. duckei*, *Spongiosperma grandiflorum*
Pepino bravo	*Ambelania acida*, *A. duckei*
Pepino do mato [Pipino, and other spelling variants]	*Ambelania acida*, *A. duckei*, *Spongiosperma grandiflorum*
Pepino doce	*Ambelania acida*
Pepino verde	*Ambelania acida*, *A. duckei*
Pepino verde da mata	*Ambelania duckei*
Pipim	*Ambelania acida*
Pipino	*Ambelania acida*
Quienbiendent (Creole language)	*Ambelania acida*
Sorva da catinga	*Neocouma ternstroemiacea*
Sorva de Cutia	*Mucoa duckei*
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Tajarana	*Spongiosperma grandiflorum*
Taki-taki	*Ambelania acida*
Uarina Gogo	*Neocouma ternstroemiacea*
Volla	*Molongum laxum*
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Wild Cucumber	*Ambelania acida*
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Yahuar caspi	*Mucoa duckei*, *Rhigospira quadrangularis*
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Yahuar huayo colorado	*Rhigospira quadrangularis*
Yapukait (Huambisa language)	*Rhigospira quadrangularis*
Yayucuri	*Neocouma ternstroemiacea*

NUMERICAL LIST OF SPECIES OF THE AMBELANIEAE (APOCYNACEAE)

Ambelania Aublet
1–1. *Ambelania acida* Aublet
1–2. *Ambelania duckei* Markgraf
1–3. *Ambelania occidentalis* Zarucchi

Mucoa Zarucchi
2–1. *Mucoa duckei* (Markgraf) Zarucchi
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Spongiosperma Zarucchi
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3–2. *Spongiosperma grandiflorum* (Huber) Zarucchi
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3–4. *Spongiosperma macrophyllum* (Mueller-Argoviensis) Zarucchi
3–5. *Spongiosperma oleifolium* (Monachino) Zarucchi
3–6. *Spongiosperma riparium* (Monachino) Zarucchi

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4–2. *Molongum lucidum* (Humboldt, Bonpland & Kunth) Zarucchi
4–3. *Molongum zschokkeiforme* (Markgraf) Pichon

Rhigospira Miers
5–1. *Rhigospira quadrangularis* (Mueller-Argoviensis) Miers

Neocouma Pierre
6–1. *Neocouma parviflora* (Markgraf) Zarucchi
6–2. *Neocouma ternstroemiacea* (Mueller-Argoviensis) Pierre

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