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THE INDIGENOUS PALM FLORA OF "LAS GAVIOTAS," COLOMBIA, INCLUDING OBSERVATIONS ON LOCAL NAMES AND USES

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This flora describes the palms found in the gallery forests of "Las Gaviotas," Colombia, located in the Comisaria del Vichada. The region is of interest for three major reasons. Firstly, its plants are typical of the Orinoco drainage area of the Colombian Llanos, which serves as a bridge between the Amazonian and Orinoco floras. Secondly, the actual site of "Las Gaviotas" is an experimental center for, among other things, developing technologies for colonization of the Llanos. Lastly, the palms play an important role in the everyday lives of the Guahibo Indians inhabiting this territory. This ethnobotanical usage has been discussed in detail in another paper (Balick, 1980a).

A number of other palm species are found in gallery forests and open savannas of the vast Llanos region of Colombia and Venezuela. The present work is, therefore, intended as a basis for comparative studies, as well as a foundation upon which further botanical studies may be carried out.

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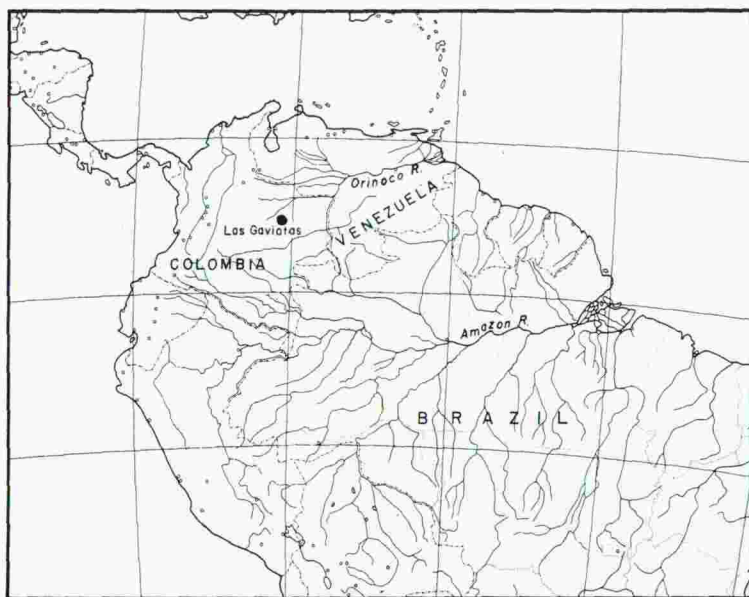


Fig. 1. Location of "Las Gaviotas."

The Centro de Desarrollo Integrado "Las Gaviotas" contains 2,491 hectares of land, embracing the characteristic savanna and gallery forest biota. The savanna is primarily composed of grasses, interspersed with a few islands of low-growing trees. This geobotanical formation, called "Llanos" in Spanish, covers over 480,000 square kilometers in both Colombia and Venezuela (Blydenstein, 1967). Gallery forests that border the rivers and streams traversing the savanna range from dense to fairly open stands of shrubs, lianas, and taller trees. The settlement is between 4° and 5° latitude north and 70° and 71° longitude west, at an altitude of 167 meters above sea level. Rainfall averages 2,700 mm, annually, unevenly distributed and concentrated between June and August. The average annual temperature is 27°C with a maximum of 32°C recorded in March and April and a minimum of 22°C during the rainy season, June–August. Detailed studies of the soil morphology and composition have

been recently published by Benavides et al. (1975). From the viewpoint of agriculture, the soil is poor in the savanna and somewhat richer in the gallery forest. Local agriculture is usually confined to cleared sections of gallery forest, close to running water.

Some of the most striking elements of the "Las Gaviotas" gallery forest are its palms, which in many areas are the major elements of vegetation. In growth form they range from vines (*Desmoncus*) to small or medium-sized understory components (*Geonoma*, *Syagrus*, *Astrocaryum*) and large-trunked trees (*Mauritia*, *Jessenia*). Furthermore, in certain moist areas are found pure stands of *Jessenia bataua* and *Mauritia flexuosa*. Recent work by de Granville (1974) in French Guiana has shown that it is the specialized root structure of certain palms, specifically the occurrence of pneumatodes, that enables them to survive and flourish under conditions of seasonal or permanent inundation.

The taxonomic identity of palms is often problematical, especially of those found in remote areas. Their great bulk and often spiny nature discourage the botanist from collecting and studying these organisms, unless he or she is specifically prepared for this task and willing to forego general collecting. Thus, type and other comparative herbarium material is often quite poor and limited in nature, making proper identification difficult. In the "Las Gaviotas" region there are several palm species of uncertain taxonomic affinities, particularly in the genera *Astrocaryum*, *Bactris*, and *Desmoncus*. I have taken a conservative taxonomic position on these, feeling that specific determinations must wait until complete monographic treatments are undertaken of these genera throughout their entire range.

The indigenous palms inhabiting the gallery forests of "Las Gaviotas" can be distinguished through the use of the following key.

KEY TO THE INDIGENOUS PALM FLORA OF "LAS GAVIOTAS",
ORINOQUIA, COLOMBIA

1. Leaves palmate; inflorescence producing scaly fruits 1. *Mauritia flexuosa*

1. Leaves pinnate or entire; inflorescence with fruits lacking scales.
2. Liana; pinnae in the upper portion of the leaf modified into retrorse spines; leaf sheaths spiny. 2. *Desmoncus* sp.
2. Erect trees or shrubs; pinnae in the upper portion of the leaf not modified into spines; leaf sheaths spiny or smooth.
3. Trunk and leaf sheaths spiny at maturity, or if plant acaulescent, petiole and rachis covered with spines.
4. Trunk diameter 1–2.5 cm; lower surface of pinnae green. 3. *Bactris* aff. *maraja*
4. Trunk diameter 4–5 cm or lacking entirely; lower surface of pinnae silver or scurfy-whitish.
5. Leaves to 2.25 m long, with pinnae regularly arranged along the rachis; trunk developed 4. *Astrocaryum* aff. *munbaca*
5. Leaves to 5 m long, with pinnae irregularly arranged along the rachis in separated groups of 2–3(4); trunk not developed 5. *Astrocaryum acaule*
3. Trunk and leaf sheaths smooth at maturity.
6. Stilt roots present, these containing spines. 6. *Socratea exorrhiza*
6. Stilt roots absent, trunk firmly inserted into the ground.
7. Inflorescence a hippuriform panicle, shaped like horse's tail.
8. Underside of pinnae covered with sickle-shaped trichomes 7. *Jessenia bataua*
8. Underside of leaves without trichomes, often with a waxy bloom that wears away with age.
9. Trunk solitary; leaves ca 4.25 m long, pinnae 80–90 per side; rachis 0.7–1.0 m long 8. *Oenocarpus bacaba*
9. Trunks solitary to few and clustered; leaves ca 2.25 m long, pinnae 55–60 per side; rachis 0.4–0.5 m long 9. *Oenocarpus mapora*
7. Inflorescence not a hippuriform panicle.
10. Pinnae clustered.
11. Inflorescences differentiated into two kinds on the same plants, one androgynous with pistillate and staminate flowers at the base of the rachis but only pistillate distally, and the other entirely staminate; trunk greater than 15 cm in diameter 10. *Maximiliana maripa*
11. Inflorescences of one kind on any plant, each containing staminate and pistillate flowers; trunk no greater than 10 cm in diameter 11. *Syagrus inajai*
10. Pinnae regularly arranged or undivided laterally.
12. Tall palm with many regularly inserted, pendulous, one-ribbed pinnae 12. *Euterpe precatoria*

12. Undergrowth palm with pinnae few, often several-ribbed and spreading 13. *Geonoma deversa*

DESCRIPTIONS

Descriptions have been compiled from field observations and collections, in combination with the following references where needed, to achieve further clarity and a greater understanding of the variation possible in a particular species: Balick (1980b), Dugand (1976), Glassman (1970), Macbride (1960), Wessels Boer (1965, 1968, 1972).

1. *Mauritia flexuosa* L.f. Suppl. Pl. 454, 1782.

Tall, solitary, dioecious palms to more than 25 m; trunk 30–40 cm in diameter, with leaf scars apparent. Leaves costapalmate, to 4 m or longer from sheath to tip; segments many, 1–2 m long; dead leaves persisting but finally falling from the coma with time. Panicles several per tree; peduncle 0.6–1 m long; second order branches 30 or more, each to 1 m long; flowers in short, bracteate spikes. Fruits ellipsoid, subglobose, ca 5 × 3–4 cm, covered with scales and turning orange-red when ripe, each fruit weighing ca 26 grams; mesocarp pulpy, bright orange in color; endocarp stony; endosperm white, homogenous, solid.

DISTRIBUTION: Colombia, Venezuela, Trinidad, the Guianas, Perú, Brazil, Bolivia.

Mauritia flexuosa is common in swampy, seasonally inundated or moist areas of the Llanos. It is social in habit, occurring in stands of almost uncountable numbers. The huge populations of this palm with their columnar trunks form a breathtaking sight, which Wallace (1853) described as "... a vast natural temple which does not yield in grandeur and sublimity to those of Palmyra or Athens."

The Llaneros believe that the abundance of these palms in wet areas is due to the ability of the leaves to attract the water vapor from the air and "concentrate" it at the base of the tree, as Humboldt (1852) mentioned, "... for this reason water is constantly found at its foot, when dug for to a certain depth."

During a trip to "Las Gaviotas," in 1978, I was unable to locate plants bearing either flowers or fruits. While *Mauritia flexuosa*, in this region at least, is thought to flower and fruit

heavily only every other year, the total absence of sexual material leads me to believe that the heat from the abnormally frequent savannah fires around "Las Gaviotas" during the previous year had killed most of the developing inflorescences. Accordingly, the botanical description has been excerpted from the literature and may not exactly conform to the Llanos population.

There are probably only a few good species in this genus, excluding those formerly considered as *Mauritiella*, a genus recently put into synonymy with *Mauritia* (Balick, 1981). The true identity of this particular population is uncertain. Dugand (1940) cited it as *M. flexuosa*, and in a later posthumous edition revised by Reed (Dugand, 1976), called the Vichada population *M. minor* Burret. Dahlgren (1936) listed *M. minor* from Florencia, Caquetá, but as the Llanos population is in the Orinoco drainage, it is geographically closer to the vast stands of *M. flexuosa* found in Venezuela (Wessels Boer, 1972). In his study of the palms of Surinam, Wessels Boer (1965) treated the two species as one under the name *M. flexuosa*. The supposed differences between them are principally in structure of the fruit, which can vary a great deal even within one population. This genus, so important from an economic and ecological standpoint, is in great need of revision. Many more field observations and collections of *Mauritia* must be made throughout its wide distribution in tropical South America and Trinidad.

COMMON NAMES: "Moriche" (Spanish); "Inójo" (Guahibo).

USES: The leaves are used for thatch and provide a fiber for weaving. The Guahibo prepare a fermented drink from the fruits. Rafts for fishing are constructed from the dried petioles. Shortly after the trunks of old trees fall, they become infested with weevil larvae which are collected and eaten.

2. *Desmoncus* sp.

Vining palm to 10 m or more; trunk ca 2.5 cm in diameter, flexible, covered with straight, dark brown spines to 2.5 cm long that are triangular in cross section and bulbous at base. Leaves distichously arranged, to 1 m long or more, pinnate; terminal pinnae modified into paired hooks with swollen bases clasping supporting vegetation; rachis with scattered, dark brown curved spines, ca 1 mm long with bulbous bases; pinnae ca 22-32 per leaf, irregularly

arranged, 20-25 × 2.5-3.0 cm, with a prominent midrib. Panicle ca 30 cm long, bearing two bracts, the inner ca 35 × 5 cm, spined. Flowers and fruits unknown.

DISTRIBUTION (of *Desmoncus*): Mexico, Belize, Guatemala, Costa Rica, Panama, Colombia, Venezuela, Trinidad, the Guayanas, Brazil, Bolivia.

This vining palm is common in seasonally inundated areas of the gallery forests as well as along the banks of streams. The stems are supported by the surrounding vegetation and often difficult to separate for collection. As neither fruits nor flowers have been collected and no other material from the same location is available, a specific determination is impossible at present. The species of this genus of bactroid palms are in any case difficult to identify due to the phenotypic diversity mentioned by Wessels Boer (1965). Organs such as the leaf and bract exhibit a startling plasticity, those of one species varying greatly under different conditions of light and water, or with age. Dugand noted four species of *Desmoncus* in his 1940 treatment of the palms of Colombia: *D. horridus* Splitg. ex Mart., *D. leutzburgii* Burret, *D. setosus* Mart., and *D. tenerrimus* (Mart. ex Drude) Mart. ex Burret. Three species were added in his 1976 revision: *D. myriacanthos* Dugand, *D. riparius* Spruce, and *D. vacivus* Bailey.

This genus of palms is certainly in desperate need of taxonomic revision. The climbing habit and extreme plasticity of the organs make *Desmoncus* a challenging candidate for a comprehensive monographic study.

COMMON NAMES: "Enredadera" (Spanish); "Camuvé" (Guahibo).

USES: Not known to be used in this area, but in other parts of the Amazon Valley it is used to make basket frames.

3. *Bactris* aff. *maraja* Martius, Hist. Nat. Palm. 2:93, t. 71, fig. 1. 1826.

Trunks 4 m tall, growing in groups of ca 15 together, 2-2.5 cm in diameter and covered with flattened white, black tipped spines 1-4.5 cm long. Leaves ca 5 per stem, pinnate; sheath 32 cm long; petiole 36 cm long; rachis ca 1.20 m long with 42-45 linear-oblongate, sigmoid, acuminate pinnae ca 28-30 × 6 cm, irregularly grouped and inserted at various angles to the plane of the leaf; spines prominent on sheath and petiole, these creamy white, flattened, with

black bases and tips 10–20 × 2–3 mm, with few on rachis. Inflorescence bearing two subequal bracts, the outer one a prophyll 25 cm long, papery and lacking spines, the inner a peduncular bract, brown, 30 × 2 cm, covered with many flattened black to white spines to 5 mm long; axis ca 15 × 7 mm with ca 12 rachillae, each ca 13 cm long. Staminate flowers yellowish. Fruits dark purple when ripe, flattened-globose, 1.5 cm in diameter, with a 2 mm long stigmatic residue at the apex.

DISTRIBUTION (*B. maraja*): Colombia, Guyana, Surinam, Perú, Brazil, Bolivia.

This palm is identified only provisionally as *B. maraja*, owing to the confused taxonomy of this poorly known genus. According to Moore (pers. comm.) it appears to key out in Drude's treatment in *Flora Brasiliensis* (1882) to either *B. chloracantha* Poepp. or *B. pallidispina* Mart. Macbride's description (1960) of *B. chloracantha* notes a stem "... 8 cm in diameter, more or less aculeate with straw-colored, subterete spines..." and leaf segments with setulose margins. The palm in question, as noted in the above description, has a much smaller stem diameter, both light- and dark-colored, flattened spines, and smooth leaf margins. Wessels Boer's (1965) description of *B. pallidispina* (which he reduced to synonymy under *B. maraja*) fits this palm, except again for the ciliate margins of the pinnae. Martius (1847) published a plate of *B. pallidispina* along with descriptions of that species and of *B. maraja*. From these descriptions, my material from "Las Gaviotas" agrees very closely with *B. maraja*. The type specimen, *Poeppig 2107*, appears of little value in clarifying the determination, as the photo shows it to consist of young leaves and an immature fruiting panicle. However, from the photo it can be seen that the perianth of *B. chloracantha*, which persists in fruit, is mucronate, in this apparently differing from the "Las Gaviotas" material which lacks the sharp point. I am unsure if this structure is stable or variable in the bactroid alliance.

Wallace (1853) described fruit of *B. maraja* as having "... a thin pulp of an agreeable sub-acid flavour—a peculiarity not found in the fruit of any other American palm that I am acquainted with." This taste is characteristic of the palm in the Llanos. However, according to Moore (pers. comm.), a subacid flavor is probably characteristic of fruits of several species of

Bactris, such as those sold in season in the market of Iquitos, Peru.

COMMON NAMES: "Espina" (Spanish); "Xaneeboto" (Gua-hibo).

USES: The fruits are edible and used to quench thirst.

4. *Astrocaryum* aff. *munbaca* Martius, Hist. Nat. Palm. 2:74, 1824.

Trunk 5 m tall, 5 cm in diameter, armed with rings of flattened black spines 4–6 cm long. Leaves pinnate; sheath ca 18 cm long; petiole ca 74 cm long; rachis ca 1.4 cm long, all with flattened spines; 19 pinnae per side, more or less oppositely arranged; apical pinnae 60 × 1.5 cm; middle pinnae 50–70 × 4 cm; basal pinnae 50 × 2.5 cm, dark green, glossy above, scurfy-whitish on underside. Panicle 60 cm long; peduncle covered with black spines to 1 mm long; peduncular bract 68 cm long by 8 cm in circumference, densely covered with dark spines 5–6 mm in length; rachis bearing more than 100 rachillae with a single pistillate flower at base of each. Pistillate flowers ca 8 mm long. Fruits obovate, long-rostrate at apex, ca 3 cm long, excluding the rostrum (1 cm long), brownish-red at maturity.

DISTRIBUTION (of *A. munbaca*): Brazil, Colombia, Surinam, Venezuela.

A small population of this plant was found growing under semi-open canopy in gallery forest, on firm ground. Because of the lack of flowers or fruits, its identification cannot be certain, although it appears to be comparable with *Astrocaryum munbaca*. Schultes (1951) cited the first Colombian collection of this plant from the Río Caraparaná in the Vaupés and noted that the fruits are edible. I have been unable to locate additional material of this species from Colombia. Perhaps this collection represents a link between the flora of the Northwest Amazon and that of the Orinoco drainage in Colombia. The species is found in Venezuela, in T. F. Amazonas.

COMMON NAMES: "Cubarillo" (Spanish); "Xaneeboto" (Gua-hibo).

USES: While no uses are reported for this region, the fruits are consumed in the Amazon Valley.

5. *Astrocaryum acaule* Martius, Hist. Nat. Palm. 2:78, t. 24, 63, fig. 5. 1824.

Trunkless palm, 3 m tall. Leaves pinnate; petiole ca 1 m long; rachis ca 1.75 m long, both petiole and rachis covered with scurfy brown scales and dark brown, flattened, dentate, downward-pointing spines; pinnae 146–180 per side, inserted singly or in groups of 1–4, at various angles to the plane of the leaf, apical segments of a more regular arrangement; basal pinnae 50×1 cm; middle pinnae 55×1.5 – 2.0 cm; apical pinnae 75×7.5 cm; pinnae light green above, silvery on underside; midrib edged with thin spines 2 mm long. Panicle axillary, ca 1.10 m long, bearing a peduncular bract, light brown, covered with flattened, dark brown spines ca 2 cm long; bract bending in center with age, forming a hood over the fruits; peduncle ca 75 cm long, spined, rachis 20 cm long with many rachillae ca 10 cm long. Flowers not seen. Fruits ovoid, apically beaked, 3.0 – 3.5×2.0 – 2.5 cm, orange when ripe.

DISTRIBUTION: Colombia, Venezuela, Brazil.

Wallace (1853) noted this palm as common in the dry catinga forests of the upper Rio Negro. In his opinion, "... it has altogether a rather repulsive and inelegant appearance." However, in the Llanos, forest vegetation of any type is most welcome, and thus I am unable to concur with his feelings about this plant. Rather the opposite in fact, the acaulescent habit and "hooded" inflorescence make *A. acaule* one of the more unusual and even beautiful species in the genus.

COMMON NAMES: "Espina" (Spanish); Matavicúli" (Gua-hibo).

USES: The Guahibo collect the ripe seeds of this species and use them to cap the silipu, or snuff tubes. After the epicarp and mesocarp are removed, the endocarp is pierced longitudinally and attached to one end of the tube to be inserted against the nostrils.

6. *Socratea exorrhiza* (Martius) Wendland, Bonplandia 8:103, 1860.

Trunk 15–20 m tall, ca 12 cm in diameter, occasionally swollen at middle, with stilt roots covered with spines 5 mm long. Leaves pinnate, ca 7 per coma, with clasping sheaths forming a crownshaft; sheath 1.2 m long; petiole 25×2.5 cm; rachis 1.9–2.0 m long; pinnae ca 16 per side inserted irregularly along the entire length of the rachis, dark green above, light green below, lacinate, divided into numerous wedge-shaped, dentate segments, middle pinnae ca 90×23 cm; apical pinnae 35×7 cm. Inflorescences 1–4 per stem, ripening below the crownshaft; bracts ca 7; primary axis 29 cm long by 2 cm wide at base of first bract scar, reflexed into the shape of an inverted "U" upon maturation; rachillae 10, each ca 45 cm long. Flowers not seen, (presumably) unisexual. Fruits ellipsoid, 2.75 – 3.0×2.0 – 2.25 cm, orange-yellow when ripe, with a small apical or slightly excentric stigmatic residue.

DISTRIBUTION: Colombia, Venezuela, Guyana, Surinam, Ecuador, Brazil, Bolivia.

This is a common palm, forming large populations in inundated areas of the gallery forests. It is somewhat unusual to find the stems swollen, a characteristic more commonly ascribed to *Iriartea ventricosa* Martius.

COMMON NAMES: "Araco:" (Spanish); "Misibóto" (Gua-hibo).

USES: The trunk of this species is split and used for roof cross-bars, walls, and corrals. Older palms are sometimes cut to make bows.

7. *Jessenia bataua* (Martius) Burret, Notizbl. 10: 302. 1928.

Trunk solitary, 15–25 m tall, 15–25 cm in diameter, smooth, free of fibrous covering at maturity, often with a mass of slender roots at base. Leaves pinnate, sheath ca 1 m long, olive green, lined on the upper edges with a mat of brown fibers and dark brown, erect spines to 1 m long; petiole ca 1 m long, rachis 4–6 m long; pinnae ca 193–212, regularly arranged in a single plane, opposite or subequal, glossy green above, whitish-gray below, covered with small, sickle shaped to peltate scales; basal pinnae 0.6 – 1.5 m $\times$ 2.5 – 2.75 cm; middle pinnae 1.0 – 1.7 m $\times$ 6 – 11 cm; apical pinnae 15 – 70×1.5 – 3.5 cm. Panicle bearing 2 bracts; the outer a prophyll ca 70 cm long, the inner a peduncular bract to 2–2.25 m long by 15 cm wide at center, tapering to a slender point and opening along its entire length; hippuriform (shaped like a horse's tail), 1–4 per tree visible at any one time; primary axis variable in size often 30–40 cm long by 7.5–8.5 cm wide at the base of the bract scar; rachillae ca 169–212, to 1 m long, pendulous, creamy-white at anthesis, changing to scurfy red in fruit; flowers borne in triads of 1 inner pistillate and 2 outer staminate on the proximal $1/3$ – $1/4$ of the rachillae, distal to which are found only staminate flowers, rachillae attenuate towards apex. Staminate flowers 5–6 mm long, sepals 3, petals 3, stamens 8–16, filaments awl-shaped. Fruits ovoid, variable in size and shape, 2.4–2.9 cm long, each weighing to 12 gms or more, purple-black when ripe; endosperm ruminant.

DISTRIBUTION: Colombia, Venezuela, Guyana, Surinam, French Guiana, Ecuador, Perú, Brazil.

Jessenia bataua is one of the more important palms of the gallery forests, both from an ecological and an economic standpoint. It is found either scattered in upland sites or in almost pure stands in lower, inundated areas. Depending on the habitat, plants can vary greatly in trunk diameter and inflorescence structure (e.g., number of rachillae, diameter of peduncle, and fruit yield). Panicle dimensions and overall number depend also

on the health and age of the individual tree. The stem of young palms is covered with a mat of brown, thread-like fibers and stiff brown spines, these falling off by the time of first fruiting. Afterwards the trunk is smooth and slick, impeding efforts to climb it. Thus the tree is often felled to harvest the fruits, and is in danger of extinction in some areas.

COMMON NAMES: "Seje" (Spanish); "Oxáe," "Pevítsa," "Ataíto" (Guahibo).

USES: The rich fruits are processed to yield an oil similar in appearance and taste to olive oil. A milklike beverage is produced from the ripe fruits and is an important source of protein (Balick & Gershoff, 1981). Bows and arrow points are also made from the wood of older palms.

8. *Oenocarpus bacaba* Martius, Hist. Nat. Palm. 2:24, t. 26, fig 1-2. 1823.

Trunk solitary, 9-15 (20) m tall, 11-15 cm in diameter, smooth at maturity, often with a mass of slender roots at base. Leaves pinnate; sheath 70 cm long, 35 cm in circumference, green, edged on the upper portion with small brown fibers; petiole 70 cm long by 4 cm wide at base; rachis ca 3.5 m long, covered with red-brown scales, especially evident in young leaves; pinnae 86-90 per side, inserted irregularly in groups of 1-5 and at various angles to the rachis; basal pinnae 0.7-1.2 m $\times$ 1.5-4.0 cm, middle pinnae 0.9-1.6 m $\times$ 3-7 cm, apical pinnae 30-70 $\times$ 1.5-2.25 cm, green above with whitish-waxy bloom beneath. Panicle bearing 2 bracts, the outer a prophyll 55 cm long by 20 cm wide at center, the inner a peduncular bract, 0.8-2.0 m $\times$ ca 10 cm long, tapering to a point; primary axis variable in size, ca 20 cm long, 4.5 cm wide at base of bract scar; rachillae ca 110, 0.7-1.0 m long, attenuate, creamy-white in flower, scurfy-red in fruit; flowers borne in triads of 1 inner pistillate and 2 outer staminate on the proximal 3/4 of the rachilla, distal 1/4 of rachilla bearing staminate flowers only. Staminate flowers with 3 sepals, 3 petals, and 6 stamens. Fruits subglobose, 1.75-2.5 $\times$ 1.25-2.0 cm, endosperm homogenous; epicarp dark purple when ripe.

DISTRIBUTION: Colombia, Venezuela, Guyana, Surinam, French Guiana, Perú, Brazil.

Oenocarpus bacaba is a social palm found in association with *Jessenia bataua*, but fruiting at an earlier time. This species is quite variable, and often intergrades into apparent hybrids with *O. mapora*. Panicles vary greatly in size, apparently depending on habitat and on age of the tree. Wessels Boer (1972) assigned varietal status to the small-, medium- and large-fruited forms in Venezuela, with which I cannot concur.

COMMON NAMES: "Seje pequeño" (Spanish); "Cupéri" (Guahibo).

USES: Both oil and a milklike beverage, similar to that of *Jessenia bataua*, are produced from the ripe fruits.

9. *Oenocarpus mapora* Karsten, Linnaea 28: 274 t. 55. 1857.

Trunks solitary to caespitose, 8-14 m tall, 10 cm in diameter, when young covered with brown, strawlike fibers, becoming clean and smooth at maturity. Leaves pinnate; sheath ca 50 cm long by 22 cm in circumference, olive green; petiole 10 $\times$ 3 cm; rachis ca 2.25 m long, covered with red-brown scale; pinnae 54-69 per side, regularly or irregularly inserted along the rachis, some in groups of 2 and at an angle to the plane of the leaf; basal pinnae 55-75 $\times$ 2.0-3.5 cm, middle pinnae 0.6-1.0 m $\times$ 3.5-5.5 cm, apical pinnae 20-33 $\times$ 1.25-2.75 cm, all glossy green above, underside with a waxy bloom. Panicle bearing 2 bracts, the outer a prophyll 25-45 cm long, the inner a peduncular bract 50-85 cm long; primary axis variable in size and shape, ca 13-19 cm long by 2.75 cm wide at base of bract scar, emerging white, changing to scurfy-red in fruit; rachillae ca 75-80, ca 40-50 cm $\times$ 2-3 mm; flowers borne in triads of 1 pistillate surrounded by 2 staminate on proximal 1/5 to 1/3 of the rachilla, on distal section only staminate flowers present. Staminate flowers with sepals 3, petals 3, stamens 6. Fruits subglobose, 1.75-2.5 $\times$ 1.5-2.0 cm, purple-black when ripe; endosperm homogenous.

DISTRIBUTION: Costa Rica, Panama, Colombia, Venezuela, Ecuador, Perú, Brazil, Bolivia.

This palm, which is widespread in the Amazon Valley, is either caespitose or solitary in habit. Local people claim that the palms, which are highly valued for their oily fruit, flower three years after planting. Because of its slight stature, the trunk is easily climbed and is not cut for harvesting. The variation in pinna insertion in the same population, either regular or irregular, is quite striking.

COMMON NAMES: "Seje pequeño," (Spanish); "Macopáji" (Guahibo).

USES: A milklike beverage, similar to that derived from *Jessenia bataua*, is made from the ripe fruits, which are also occasionally used for oil production. The slender, straight stems are used for gates and in construction.

10. *Maximiliana maripa* (Corrêa da Serra) Drude, Mart. Fl. Brazil. 3: 452, t. 104. 1881.

Trunk solitary, to 10 m high or more, 30 cm in diameter, smooth with obscure leaf scars, leaf bases below crown temporarily persistent. Leaves ca 23–25 per tree, pinnate with ca 140–260 pinnae in groups of 4–9 and inserted at various angles to the rachis (excepting at the apex); sheath ca. 1 m long; petiole ca 3 m long; rachis ca 7 m long; basal pinnae ca 70–90 × 1.7–2.5 cm; middle pinnae 95–105 × 4.5–5.0 cm; apical pinnae 40–52 × 1–1.7 cm. Panicle bearing an inner bract ca 1.5 × 0.5 m, brown, outer surface ridged and disintegrating somewhat upon maturity of fruiting panicle; panicle ca 1.5 m long with many rachillae; flowers unisexual, pistillate ca 8 or more congested at the base of rachillae ca 20 cm long. Pistillate flowers ca 5 mm long; 3 sepals, 1/3 as long as the petals; 3 petals, ca 1/5–1/2 as long as the stamens; stamens 6. Fruits 5–8 cm long, ovoid-oblong with a prominent beak, half enclosed by a brown-lepidote, glabrescent cupule formed by persistent perianth; exocarp fibrous; mesocarp pulpy, yellow; endocarp hard, mostly 1-seeded but some 2–3 carpellate; endosperm white, homogenous, solid.

DISTRIBUTION: Colombia, Guyana, Trinidad, French Guiana, Perú, Brazil.

This is another palm that is social in habit, although not usually found in as pure a stand as some of the others. The most recent treatment of *Maximiliana* by Glassman (1978 a, b) combines all previously described species into one, *M. maripa*.

COMMON NAMES: “Inajá” (Spanish); “Naxáribó” (Guahibo).

USES: The endosperm of the ripe, toasted fruit is an important source of food for the Guahibo. The oil-rich mesocarp is mixed with water and consumed as a beverage. Newly emerging leaves of low growing trees are harvested and used to weave mats and pack baskets. In addition, the seeds of *M. maripa*, with the epicarp and mesocarp removed are used to cap the end of snuff tubes.

11. *Syagrus inajai* (Spruce) Beccari, L'Agric. Colon. 10: 467. 1916.

Trunk 10 m tall, 7.5 cm in diameter, smooth, often slightly irregularly swollen. Leaves ca 12 per coma, pinnate; sheath 20 cm; long; petiole 50 cm long; rachis 1.6 cm long, triangular in cross-section and scurfy-brown abaxially; pinnae 140–146, inserted singly or in groups of 2–4 per side and at various angles to the plane of the leaf; basal pinnae ca 44–1 cm; central pinnae ca 45 × 3–3.5 cm; apical pinnae ca 26 × 1.3 cm; midveins prominent and transverse commissures evident between secondary veins. Panicle bearing two bracts, the inner one peduncular ca 1.10 m long, brown, ridged, opening along its length and persistent; primary axis ca 75 cm long, brown-scaly; rachillae 23–25, each 30 cm or longer; flowers borne in triads of two staminate and one pistillate. Staminate flowers ca 12 mm long. Fruits ca 4 × 3 cm, including

cupule, oblong with a small, apical stigmatic residue, turning yellow when ripe; endosperm homogenous.

DISTRIBUTION: Colombia, French Guiana, Brazil.

In the Llanos, *Syagrus inajai* is often found in quantity along the margins of the gallery forests where it grades into the savanna, and also as an understorey palm inside the gallery forests.

COMMON NAMES: “Churúbay” (Spanish); “Oróboto” (Guahibo).

USES: The wood is used in construction of houses, for fencing corrals, and occasionally in bow making. Hunting traps and blinds are placed near these palms for capture of “Lapa” (*Agouti* sp.) and “Peccari” (*Tayassu* sp.) in search of the fruits.

12. *Euterpe precatoria* Martius, Palmet. Orbign. 10, t. 8, t. 18a, fig. 2. 1847.

Trunk solitary, to 20 m tall, 15 cm in diameter, smooth. Leaves 12–15, pinnate; sheaths forming a crownshaft ca 1.15 m long striped with green and yellow; petiole ca 25 × 3 cm, golden-yellow; rachis ca 2.6 m long; pinnae ca 88 per side; more or less oppositely arranged at regular intervals, drooping on older individuals; basal pinnae 60 × 0.5 cm; middle pinnae 90 × 1.6 cm; apical pinnae 75 × 1.5 cm. Panicle bearing 2 subequal bracts, the inner ca 90 cm long, primary axis 45 cm long by 4.5 cm wide at bract scar, rachillae white-tomentose, ca 88, 50 × 70 cm long; flowers borne in triads of 1 pistillate surrounded by 2 staminate on proximal 4/5 of the rachilla, on distal 1/5 only staminate flowers present. Staminate flowers pink at anthesis. Fruits oblique-globose, ca 1 cm in diameter, ripening dark purple, stigmatic residue subapical; endosperm homogenous.

DISTRIBUTION: Colombia, Venezuela, Trinidad, Guyana, Surinam, Perú, Brazil, Bolivia.

Euterpe precatoria is a member of a widespread Neotropical genus of about 50 species. It is social in habit, sometimes forming almost pure stands, especially in swampy areas.

COMMON NAMES: “Manáco” (Spanish); “Manacáy” (Guahibo).

USES: The leaves are used for thatch and the trunk for corrals. The palmito is edible and delicious.

13. *Geonoma deversa* (Poiteau) Kunth, Enum. Pl., 3: 231. 1841.

Trunk 1–2 m tall, 1.25 cm in diameter, prominently ringed; internodes 1–2.5 cm long. Leaves ca 8 per stem; sheath 6–7 cm long and fibrous marginally; petiole 7–10 cm long; rachis 30 cm long; blade divided into 3 or more opposite pairs of segments, dark green above, light green below, each ca 25 cm long and of variable width. Inflorescence in bud bearing two light brown, scale-covered bracts; panicle 20–30 cm long with 5–8 rachillae, green in flower turning red upon fruiting; flowers borne in triads of two staminate and one pistillate and set in pits. Fruits round, 4–5 mm in diameter, turning from green to black when ripe.

DISTRIBUTION: Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guyana, Surinam, French Guiana, Ecuador, Perú, Bolivia, Brazil.

In his revision of the geonomoid palms, Wessels Boer (1968) considered *G. deversa* to be the species of widest range, able to withstand many diverse ecological conditions. This species varies greatly in height and general vigor, depending on the availability of water and richness of the soil.

COMMON NAME: "Vávava" (Guahibo)

USES: Children make training bows from the stems. The pliable but strong stem also serves as a frame for fishing nets.

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PLATE 16

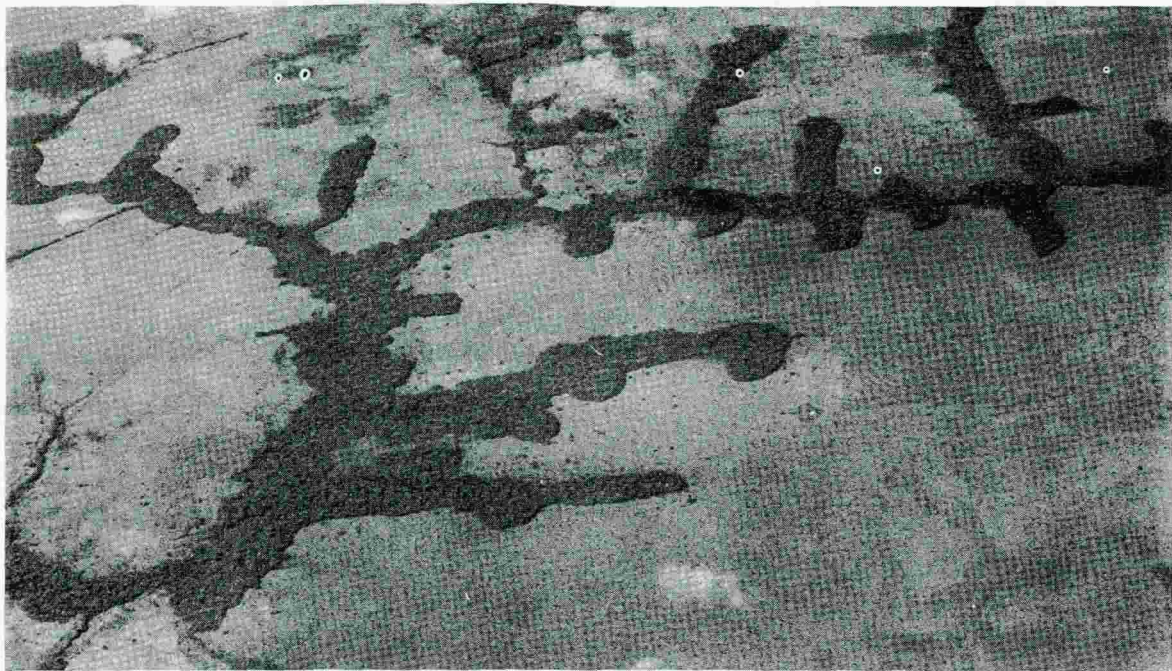


Plate 16. Aerial view of gallery forest formation along the rivers that traverse the open savannas in this region.

PLATE 17



Plate 17. Close-up aerial view of gallery forest composition.

PLATE 18



Plate 18. Young plants of *Mauritia flexuosa* growing in a seasonally inundated section of the savanna.

PLATE 19



Plate 19. Adult plants of *Mauritia flexuosa* growing in the gallery forest, where their presence is indicative of a moist area.

PLATE 20



Plate 20. *Desmoncus* sp. growing in one of the permanent streams of the gallery forest.

PLATE 21



Plate 21. Specimens of *Bactris* affin. *maraja* removed from the gallery forest understorey.

PLATE 22

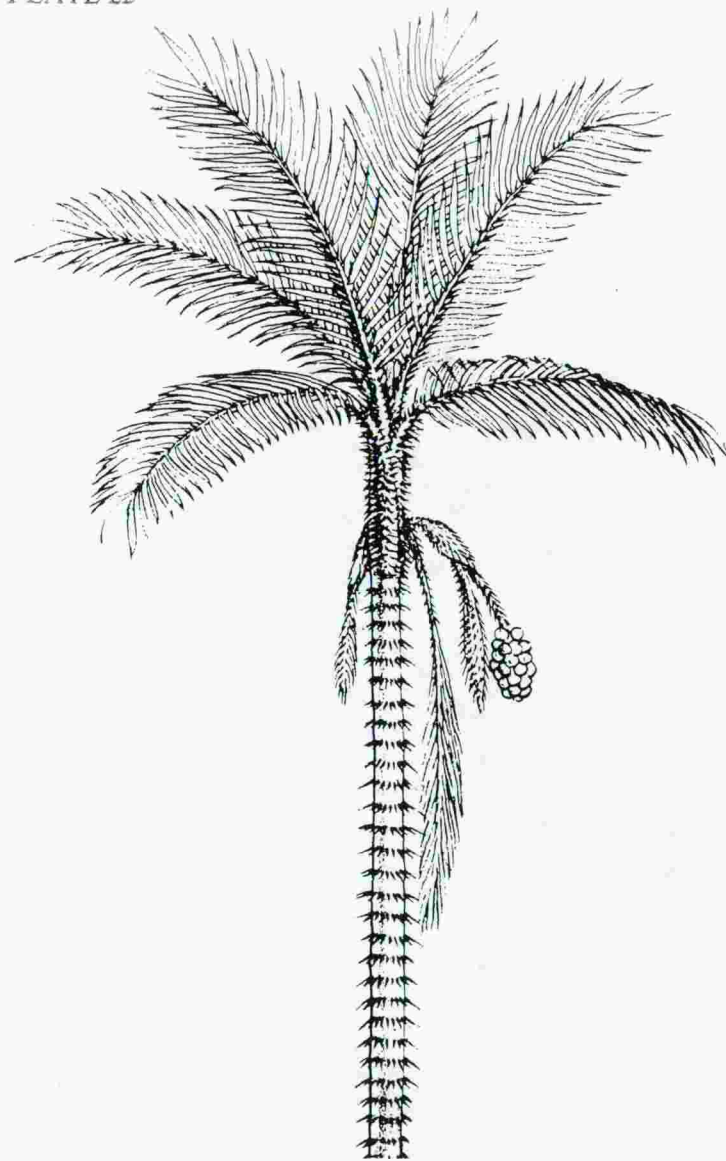


Plate 22. *Astrocaryum munbaca*, a low growing but stemmed member of this genus. Reproduced from Wallace (1853) where it is referred to as *A. gynacanthum* Mart.

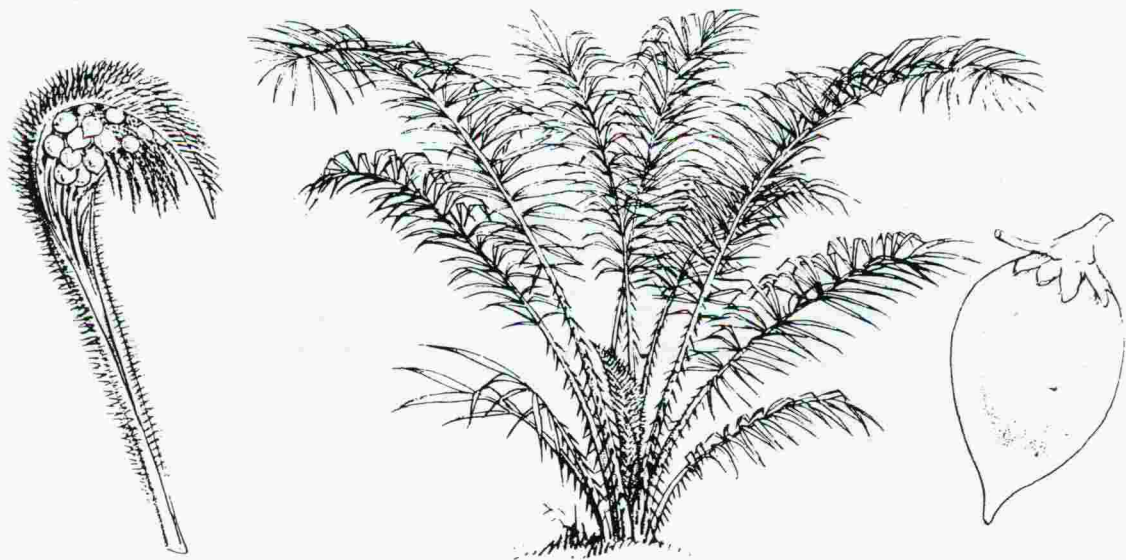


Plate 23. *Astrocaryum acaule*, a stemless palm, found in drier areas of the gallery forest, also reproduced from Wallace (1853).

PLATE 24



Plate 24. *Socratea exorrhiza* growing in an open area of gallery forest.

PLATE 25



Plate 25. *Jessenia bataua*, here occurring as a solitary specimen having been protected near a stream, but usually found in dense stands in seasonally inundated areas.

PLATE 26



Plate 26. *Oenocarpus bacaba*, usually found in drier sites, here among young second-growth vegetation.

PLATE 27



Plate 27. *Oenecarpus mapora*, occurring either in a caespitose or solitary habit. Here the caespitose form is shown, preserved in an agricultural field cleared of gallery forest for maize and cassava cultivation.

PLATE 28

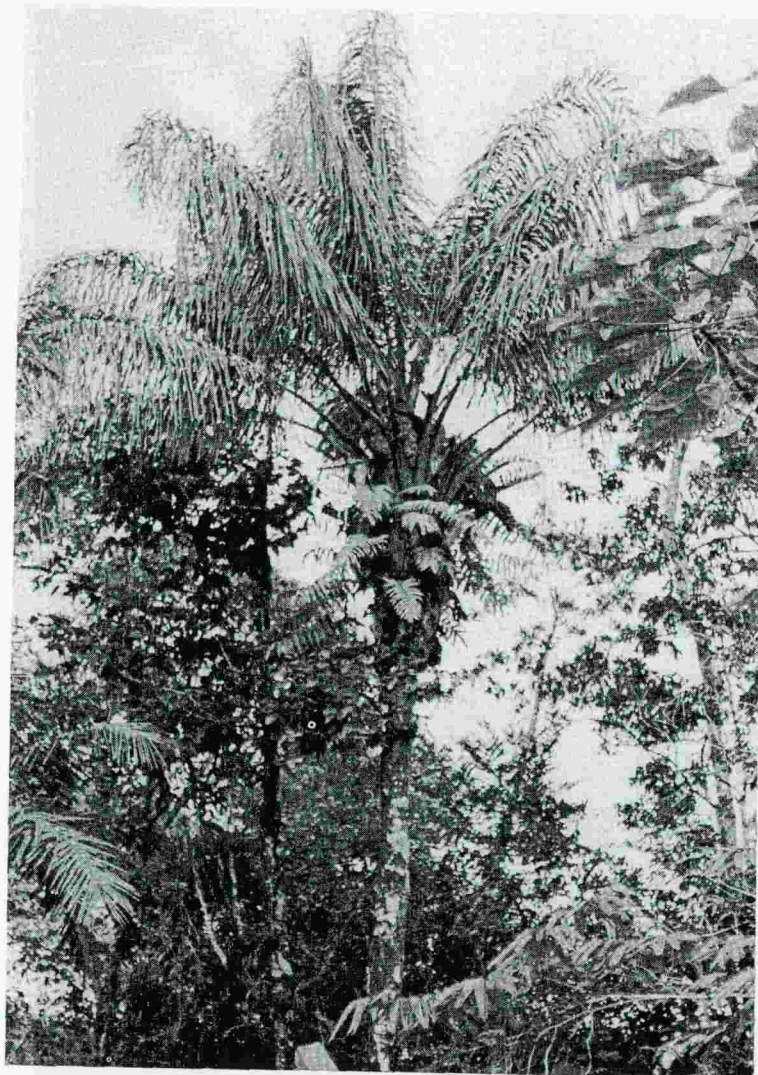


Plate 28. *Maximiliana maripa* growing along the margins of the gallery forest.

PLATE 29

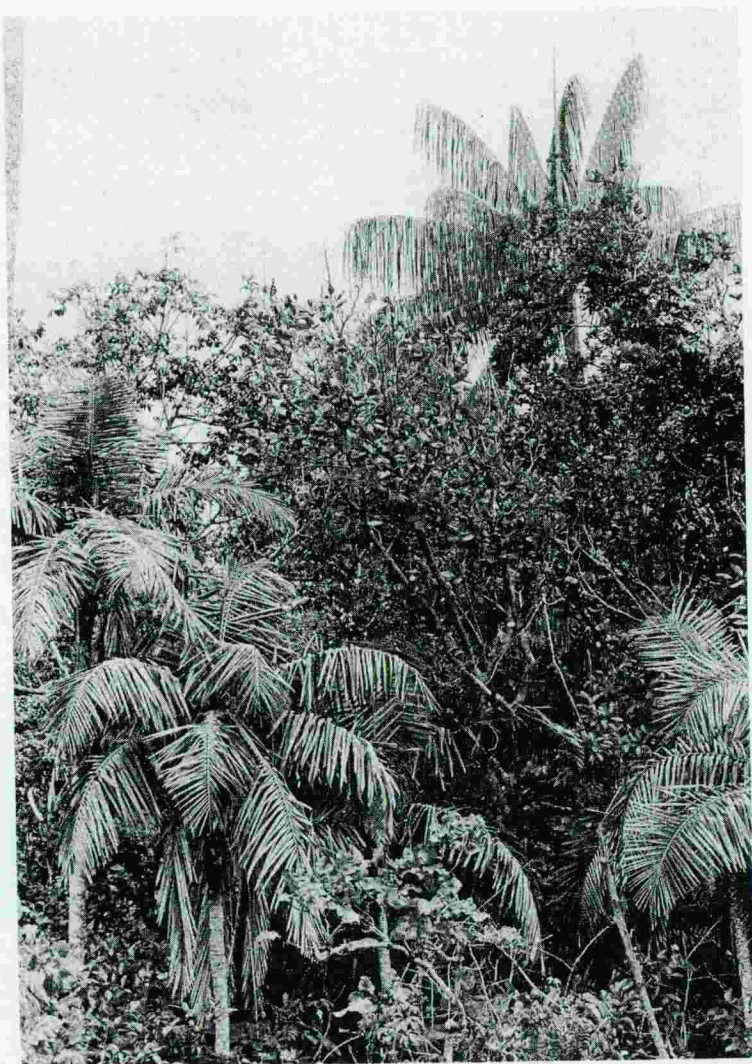


Plate 29. *Syagrus inajai*, common in the transition zone between gallery forest and savanna, and frequently also seen scattered in areas of pure savanna close to the gallery forest. Solitary palm in the upper right hand corner is *Euterpe precatoria*.

PLATE 30



Plate 30. *Euterpe precatoria*, found scattered throughout the gallery forest, and forming small groups of individuals in moist areas.

PLATE 31

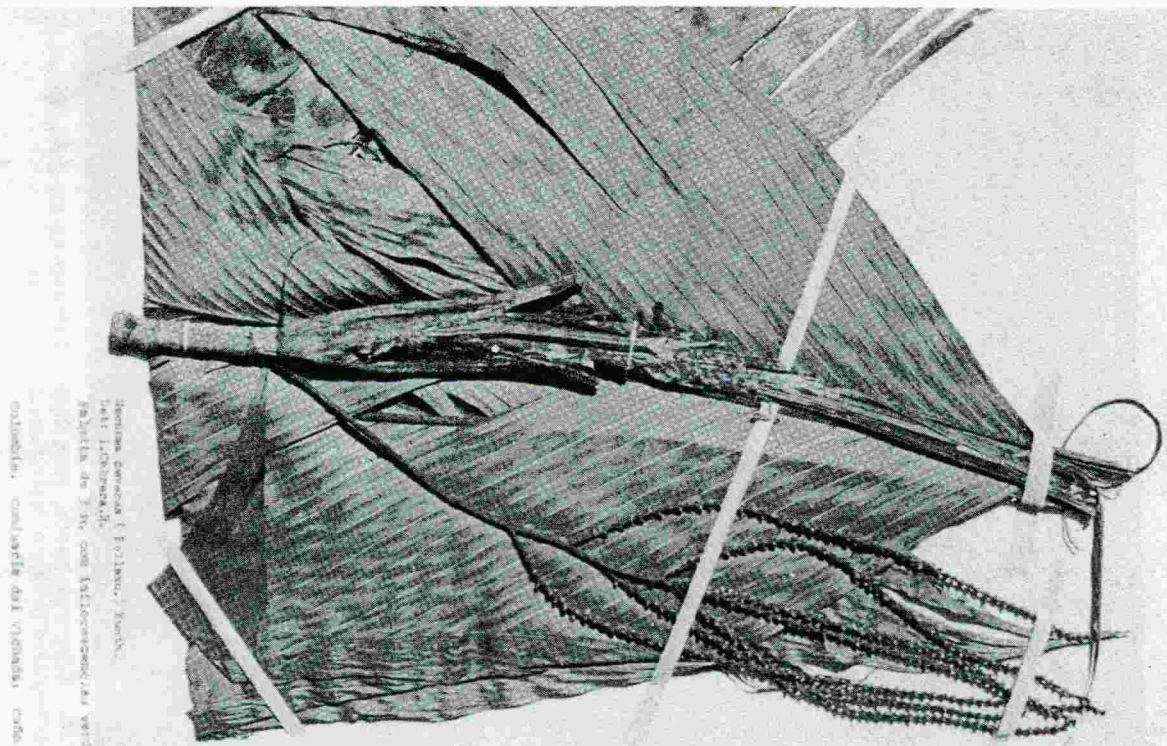


Plate 31. *Geonoma deversa*, the smallest palm in the "Las Gaviotas" area. Shown here is I. Cabrera R. no. 2406.