

Many Middle American palms that are too small or rare to be of even local importance—such as some kinds of *Chamaedorea* and *Reinhardtia*, for example—make handsome indoor or tropical garden subjects, and it may be said in general that the future of most tropical American palms seems to lie more nearly in that direction than in any prospect of wholesale utilization by industry. As a matter of interest the most popular house palm in the United States

today is *Chamaedorea elegans* (usually passing in the trade incorrectly as *Neanthe bella*), a Mexican and Central American species. Less than 50 species can be called at all common, and some of these occur in sufficiently isolated localities to escape the attention of all but the most determined traveller, prepared to endure not a little discomfort for the pleasure of seeing some of Nature's masterpieces in the wild.

## Rain Forest Palms of Golfo Dulce

PAUL H. ALLEN

[Editorial Note: One of Paul Allen's major publications is his illustrated volume, *The Rain Forests of Golfo Dulce*, published in 1956 by the University of Florida Press. This book describes intimately the prominent arboreal species of a Costa Rican rain forest near which the Allens lived during five years residence at Palmar, on the Golfo Dulce. All the conspicuous palms of the forest are treated in this book. They are not separated out but rather appear in appropriate alphabetical position among the other genera of trees. It seems proper to excerpt the various scattered paragraphs on the rain forest palms and to bring them together as a single coherent account for students of this group. For this purpose the original key to the palms is included as well as all the accounts of the palms, which follow the key in alphabetical sequence. Thanks are due Lewis F. Haines, Director of the University of Florida Press, for permission to reproduce these paragraphs as well as the descriptive phrases of Archie Carr, who provided the jacket commentary for the original publication. Dr. Carr has this to say about the tropical rain forest, which serves as the habitat for so many palms—W.H.H.]

"Ask a naturalist to name the world's most varied and productive and colorful and generally exciting environment and he is almost sure to come up with the tropical rain forest. He might waver a bit between the rain forest and the coral reef; but make him stick to the land and it will be the rain forest every time.

"The pull of the tropics for cold-zone folk is a curious and complicated thing. It is a sort of romantic aura, distilled from all sorts of associations and dreams; but back of the hankering you always come to the jungle, the broad-leaved evergreen forest. It was the jungle that stirred the old boys—Darwin, Wallace, Humboldt, Bates—who first told the world the real story of the tropics; and if you go down and find a piece of undisturbed jungle and walk around in it, this will be the thing that stands out in *your* mind when you go home.

"If you go to the rain forest after just the feel of it, you will not be disappointed. But if you go as a botanist anxious to know the plants that build it, and determined to behave as you behave on field trips back home, the jungle will drive you crazy. It is hard to find the rain forest in the botany manuals. It is hard to put it into a plant press. It can be done, but it takes years.



39. *Geonoma congesta* and *Asterogyne Martiana* (foreground) in forest at Esquinas, Costa Rica.  
Photo P. Allen.

"Paul Allen offers a clever and original and effective plan for softening the face of the jungle—for getting acquainted with it in the short time that the usual visitor has at his disposal.

"As a representative sample of the unspoiled tropics, Mr. Allen chose the wonderful forests of Golfo Dulce. Golfo Dulce is a bay of the Pacific, let into the southernmost tip of Costa Rica, alongside the Panama frontier. Peculiar local conditions give the area about the bay some 200 inches of rain a year, which is three or four times the average for the rest of the Pacific side. Some of the best bananas in the world grow there, and there are some patches of rain forest that rival any in Central America.

"But the Golfo Dulce rain forests are no mere local oddity. They are a superb expression of a widespread phenomenon—the great broad-leaved evergreen forest that rims the whole wet side of tropical America and reaches spectacular culmination in the ocean of trees that fills the basin of the Amazon. It is a phase of this marvel that Allen's book is about—an outlier that somehow stole across to the Pacific side, into the warm wet Golfo Dulce country, and burgeoned there to form a forest of almost unsurpassed richness.

"Up to now, botanizing in the American rain forest has frustrated the casual visitor because he is used to identifying plants by their flowers and fruits. In the rain forest he wanders about among the towering columns with all the identifiable structures out of reach and all the familiar procedures denied him. The flowers are too high, or they come out at another season, or only during unusual weather—or they last only a few days, or even only a few hours. Any of these things may be true of the fruits too, and besides that the monkeys eat them as fast as they ripen. The botanist either goes home in a pet or hires a gang of Indians and starts cutting down trees to get their flowers.

"Well, Paul Allen shows you how to know the forest without cutting down the trees. Refusing to be hog-tied by the rules of traditional botany, he shows how much you can learn from such features as the stature of a tree, or the conformation of the trunk and base, or the kind of bark or sap, or the kind of place it is growing in—or even whether it does such odd things as shelter ants in hollow twigs or thorns. By making the most of every clue available, as the Indian woodmen do, Paul Allen gives you a way to keep your layman's wonder at the rain forest and still come away feeling that you know something about its structure."

### Key to the Palms of Golfo Dulce

1. Plants armed with spines.
2. Leaves fan-shaped ..... *Cryosophila Guagara*
2. Leaves pinnate, or entire.
3. Individual leaflets conspicuously wedge-shaped, broadest at the apex. Lower trunk with conspicuous prickly stilt roots.
4. Stilt roots in mature specimens as high as a man. Stamens more than 50. Seeds with an apical embryo ..... *Socratea durissima*
4. Stilt roots in mature specimens about 2-3 ft. high. Stamens about 14. Seeds with a lateral embryo ..... *Iriartea gigantea*
3. Individual leaflets never wedge-shaped or broadest at the apex.
4. Trunks solitary.
5. Trunks very short and massive, often reclining. Spines confined to the margins of the base of the frond ..... *Corozo oleifera*
5. Trunks of varying diameter but never short, massive, or reclining. Spines abundant on the trunk and other parts.
6. Trunks more than 8" in diameter. Fruits globose, greenish yellow. *Acrocomia vinifera*
6. Trunks about 6" or less in diameter. Fruits not globose or greenish yellow



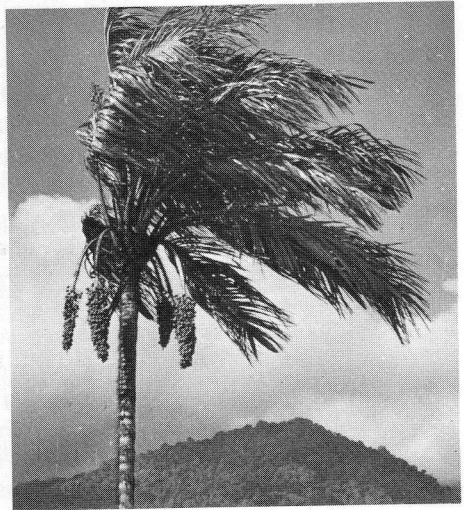
7. Fruits intensely spiny, in short compact clusters. Pinnae often in broad, confluent blocks ..... *Astrocaryum alatum*
7. Fruits never spiny, in long pendulous clusters. Pinnae never in broad confluent blocks ..... *Astrocaryum Standleyanum*
4. Trunks multiple.
5. Fronds entire, with a bifid apex.
6. Fronds more than 6 ft long. Common palms of swampy forests at sea level ..... *Bactris militaris*
6. Fronds less than 3 ft. long. Rare palms of forested ridges at 1,500-2,000 ft. .... *Bactris* sp. — Allen 6765
5. Fronds pinnatisect.
6. Spines conspicuously pale tan in color, winged or flattened throughout most of their length ..... *Bactris diviscupula*
6. Spines not pale tan or conspicuously flattened.
7. Fruits about  $\frac{1}{2}$ " in diameter, red in color at maturity. Spathes densely woolly but not armed with spines on the expanded portion ..... *Bactris Baileyana*
7. Fruits about 1" in diameter, deep purple at maturity. Spathes intensely spiny on the expanded portion ..... *Bactris balanoidea*
1. Plants not armed with spines.
2. Fronds entire, bifid at the apex ..... *Asterogyne Martiana*
2. Fronds pinnatisect.
3. Individual leaflets wedge-shaped, broadest at the apex. Lower trunk with stilt roots.
4. Stilt roots in mature specimens usually more than 6 ft. in height. Stamens more than 50. Seeds with an apical embryo ..... *Socratea durissima*
4. Stilt roots in mature specimens about 2-3 ft. high, often absent in young plants. Stamens about 14. Seeds with a lateral embryo ..... *Iriartea gigantea*
3. Individual leaflets never wedge-shaped or broadest at the apex.
4. Trunks multiple.
5. Fruits covered with overlapping scales. A species usually found in nearly pure stands in coastal swamps. .... *Raphia taedigera*
5. Fruits not scaly. Plants not found in swamps nor in pure stands.
6. Staminate and pistillate flowers produced on separate scapes ..... *Chamaedorea Woodsoniana*
6. Staminate and pistillate flowers produced on the same scape.
7. Spadix broomlike, the slender, rodlike basal part much longer than the terminal cluster of flowering or fruiting strands ..... *Synechanthus angustifolius*
7. Spadix not broomlike, the basal part much shorter than the flowering or fruiting strands.
8. Flowers produced in deep pits in the rachis.
9. Canes about 2" in diameter. Fruits about  $\frac{1}{2}$ " in diameter ..... *Geonoma congesta*
9. Canes less than  $\frac{1}{2}$ " in diameter. Fruits about  $\frac{1}{4}$ " in diameter ..... *Geonoma* sp. — Allen 6750
8. Flowers not immersed in pits in the rachis.
9. Trunks 4-6" in diameter. Scapes large with many pendulous strands 1 ft. or more in length ..... *Oenocarpus panamanus*
9. Trunks less than 2" in diameter. Scapes small, the strands less than 1 ft. long ..... *Hyospathe Lehmannii*
4. Trunks solitary
5. Trunks very short and massive, often reclining. Fruits produced in large, very compact clusters which are deeply seated in the axils of the fronds ..... *Corozo oleifera*
5. Trunks not massive or reclining. Fruits not in compact clusters in the frond axils.
6. Plants large, usually 30-65 ft. or more in height.
7. Fruits usually more than 6" in diameter. Cultivated or naturalized on sea beaches ..... *Cocos nucifera*
7. Fruits less than 2" in diameter.
8. Strands of the rachis about 1" in diameter and octagonal in cross section. Flowers produced in deep pits. Fruits almond-shaped ..... *Welfia Georgii*
8. Strands of the rachis much less than 1" in diameter and never octagonal in cross section. Fruits not almond-shaped.
9. Trunks slender, usually less than 6" in diameter. Fruits globose, about  $\frac{1}{2}$ " in diameter ..... *Euterpe panamanus*
9. Trunks massive, to about 12-18" in diameter. Fruits ellipsoidal, conspicuously beaked at the apex ..... *Scheelea rostrata*
6. Plants usually less than 20 ft. in height.



7. Plants dwarf, to about 8 ft. to the tips of the fronds, the trunk usually less than 1 ft. in height.
8. Spadix spicate, undivided. Staminate and pistillate flowers both present on the scape ..... *Neonicholsonia Watsonii*
8. Spadix branched. Staminate and pistillate flowers produced on separate scapes. .... *Chamaedorea* sp. — Allen 6742
7. Plants with trunks more than 3 ft. in height.
8. Staminate and pistillate flowers produced on separate scapes.
9. Scapes erect. Plants found in wet forests at sea level ..... *Chamaedorea* sp. — Allen 6262
9. Scapes pendulous. Plants found on forested ridges at 1,800-2,000 ft.
10. Fruits obovoid, less than  $\frac{1}{2}$ " long ..... *Chamaedorea* sp. — Moore 6527
10. Fruits oblong, more than  $\frac{5}{8}$ " long ..... *Chamaedorea Wendlandiana*
8. Staminate and pistillate flowers produced on the same scape.
9. Flowers borne in pits on the rachis. Fruits dark purple or black ..... *Geonoma binervia*
9. Flowers not borne in pits. Fruits yellow, orange, or red ..... *Synechanthus angustifolius*



40. *Asterogyne Martiana*, Esquinas forest Costa Rica. Photo P. Allen.



41. *Astrocaryum Standleyanum*, Palmar Norte, Costa Rica. Photo P. Allen.

ACROCOMIA VINIFERA Oerst.—*Coyol* (Local and general).

Single-trunked, rather stout, intensely spiny palms, with drooping, pinnate fronds, the spiny bases of which are usually long persistent. The large panicles of flowers, as yellow as ripening wheat, appear late in the dry season and are followed by elongate clusters of dark yellowish-green, smooth, globose fruits which average a little more than 1" in diameter. The inner kernel has the flavor of coconut and is often eaten in Honduras. A refreshing cider-like wine is often made by fermenting the whitish sap obtained from deep rectangular incisions in the crown of the felled trunks. The trees are often left standing in pastures and the fruits are much relished by cattle. Locally common in dry, open situations, sometimes forming nearly pure stands near Rey Curre and Potrero Grande.

ASTEROGYNE MARTIANA Wendl.

Single-trunked, unarmed palms which average about 6-8 ft. in height and about 2" in trunk diameter, the lower 2-4 ft. of the stem usually more or less repent. The

attractive fronds are completely undivided and bifid at the apex, and are sometimes used locally for thatch. The fragrant white flowers are produced on clusters of 3-6 simple spikes which radiate from the end of a slender arching scape. They normally appear in late January or early February, and are followed in March by small fruits which are at first red, but become dark purple or black at maturity. Frequent in climax forests throughout the area. A handsome species, well worthy of cultivation for ornament.—Esquinas Forest, 200 ft., *Allen 5596, 5826, & 6752* & *H. E. Moore 6535*—Forested hills near Palmar Norte, 1,500 ft., *Moore 6530 & Allen 6744*.

#### ASTROCARYUM — KEY

1. Fruits orange, unarmed, in conspicuous pendulous clusters ..... *Astrocaryum Standleyanum*  
 1. Fruits not orange, densely armed with spines ..... *Astrocaryum alatum*

ASTROCARYUM ALATUM Loomis — *Coquillo* (Panama).

Small, intensely spiny, single-trunked palms which average 12-25 ft. in height. On close examination the slender trunk is found to be without spines, but is usually more or less covered by the spiny persistent bases of the fronds. The leaves are pinnate, with many of the pinnae fused together in broad confluent blocks, the midribs and bases being covered with a truly formidable armature of long, flattened lustrous-brown spines. The compact clusters of spiny, beaked fruits are erect or pendulous, and are protected by a spiny spathe. They are usually in fruit in our area from October until late March. The prominently ringed trunks of mature specimens are unbelievably hard, and the black wood might be used for canes, fishing rods, or archery bows. A very common species, usually found in wet lowland forests, particularly near Tinoco and Jalaca.—Tinoco station, sea level, *Allen 6612*.

ASTROCARYUM STANDLEYANUM L. H. Bailey—*Pejibaye* (Local)—*Black palm* (Canal Zone, Chiriquí, and Bocas del Toro)—*Chunga* or *Chonta* (Panama).

Tall, handsome palms, common to areas of climax forest, the individual specimens varying from about 40-65 ft. in height. The solitary black trunks are usually about 6-8" in diameter, and are armed with broad bands of long, flat spines which are highly flammable. The fronds are pinnate and spinose, particularly near the base. The terminal bud, or "palmito," can be eaten. The fruits are produced from March to about June in long, pendulous, bright-orange, attractive clusters. Individual fruits are unarmed, and the rather scanty pulp surrounding the large seed is sweet and edible. The hard black wood is used for canes, fishing rods, ornamental boxes, inlaying, archery bows, and other similar purposes, and might be suitable for golf clubs.—Hills near Palmar Norte, 200-600 ft., *Allen 6662 & 6771*.

#### BACTRIS—KEY

1. Fronds undivided, bifid at the apex.  
 2. Fronds more than 6 ft. in length. Plants confined to swampy forest at sea level. *Bactris militaris*  
 2. Fronds about 2 ft. long. Plants confined to forested ridges at 1,500-2,000 ft. ....  
 ..... *Bactris* sp.—*Allen 6765*
1. Fronds pinnate, never bifid at the apex.  
 2. Spathe conspicuously armed with needle-like spines.  
 3. Spines conspicuously flattened, pale yellow in color, usually tipped with brown .....  
 ..... *Bactris divisicipula*  
 3. Spines not conspicuously flattened, dark brown or black in color ..... *Bactris balañoidea*  
 2. Spathe densely woolly, but never armed with spines ..... *Bactris Baileyana*  
 BACTRIS BAILEYANA H. E. Moore—*Hoja de duende* or *Huiscoyol* (Local).

Common spiny palms, with pinnate fronds and multiple trunks about 15 ft. in height. The short, broad spathes have a pale-brown, woolly covering, unique in our area in being unmixed with spines. The small, nearly globose fruits are red at

maturity, and are usually found in October. A widespread and characteristic species of the forested ridges, to about 2,000 ft. in elevation.—Esquinas Forest, 200 ft., *Moore 6556 & Allen 6606*.

*BACTRIS BALANOIDEA* (Oerst.) Wendl.—*Huiscoyol* (Local).

Slender, intensely spiny palms, with multiple trunks and pinnate fronds, which form open colonies 10 to about 30 ft. in diameter, the interval between the canes being about 1-3 ft., depending upon the situation. The relatively large, dark-purple or brownish-purple fruits mature during March and April. They are frequently eaten locally, and have a pleasant, acidulous taste.—Palmar Norte, 100 ft., *Allen 6739*—Hills near Palmar, 200 ft., *Moore 6543 & Allen 6756*.

*BACTRIS DIVISICUPULA* Bailey.

Slender palms, with 3 or 4 canes 12-18 ft. in height, terminating in 6-8 mature pinnate fronds, all parts of the plant conspicuously armed with white or pale-yellow, usually brown-tipped and flattened spines. Spathes tawny brown in color, also with many short, flat spines. Fruits about  $\frac{1}{2}$ " in diameter, the apex abruptly beaked; dark purple at maturity.—Forested hills above Palmar Norte, 1,200-1,500 ft., *Moore 6531 & Allen 6746*.

*BACTRIS MILITARIS* H. E. Moore

A very striking, multiple-stemmed species, mature specimens of which average about 15 ft. in height. The large, arching fronds are completely undivided, a very unusual condition in this genus. The canes are slender, and armed with very long, black, needle-like spines. The small white flowers are produced from late April until early July and the attractive red fruits mature from about mid-August until November.—Very common in wet, lowland forests near Tinoco Station and Sierpe, *Allen 5276, 6264 & 6296*.

*BACTRIS* sp.

Spiny, stoloniferous palms, with 3-6 slender canes 6-10 ft. in height and about  $\frac{1}{2}$ " in diameter, each with about 4-5 live, bifid, undivided fronds which may be either spiny or unarmed on the same plant.—Frequent in forested hills above Palmar Norte at 2,000-2,500 ft., *Allen 6765*.

### CHAMAEDOREA—KEY

1. Plants dwarf, the trunks usually less than 1 ft. in height ..... *Chamaedorea* sp. — *Allen 6742*
1. Plants of varying size, but with trunks at least 3 ft. in height
2. Trunks multiple, to about 35 ft. .... *Chamaedorea Woodsoniana*
2. Trunks solitary.
3. Scapes erect. Wet forests at sea level ..... *Chamaedorea* sp. *Allen 6262*
3. Scapes, pendulous. Forested ridges at 1,800-2,000 ft.
4. Fruits obovoid, less than  $\frac{1}{2}$ " long ..... *Chamaedorea* sp. — *Moore 6527*
4. Fruits oblong, more than  $\frac{1}{2}$ " long ..... *Chamaedorea Wendlandiana*

*CHAMAEDOREA WENDLANDIANA* (Oerst) Hemsl.

Single-trunked, pinnate-leaved palms 10-20 ft. in height, with green, conspicuously ringed, unarmed canes, the lower portion often somewhat repent, with many adventitious roots. Inflorescences branching, pendulous, with a rather fleshy green rachis.—Forested hills above Palmar Norte, 2,000-2,500 ft., *Moore 6547 & Allen 6761*.

*CHAMAEDOREA WOODSONIANA* Bailey.

Slender, unarmed, pinnate-leaved palms with multiple trunks, 15-35 ft. in height. Scapes elongate, pendulous and branching, with a bright-orange rachis and black, globose fruits about  $\frac{3}{8}$ " in diameter.—Forested hills above Palmar Norte, 2,000-2,500 ft., *Moore 6549 & Allen 6762*.





42. *Bactris militaris*, Tinoco station, Costa Rica. Photo P. Allen.



43. *Cryosophila Guagara*. Photo P. Allen.

#### CHAMAEDOREA sp.

Dwarf, single-stemmed palms, 6-7 ft. in height, the trunk usually about 1 ft. or less in height, with 8-10 pinnate fronds. The plants bear a considerable superficial resemblance to those of *Neonicholsonia*, but may be immediately separated by the branching rather than spicate inflorescence.—Locally common on steep forested ridges above Palmar Norte at about 1,800 ft., *Moore 6525 & Allen 6742*.

#### CHAMAEDOREA sp.

Single-trunked palms, to about 8 ft. in height and 1" in trunk diameter, the stem erect, green and ringed, bearing 5-6 spreading, pinnate fronds which typically have about 11 pairs of caudate-acuminate pinnae. Inflorescences about 3, either inter- or infra-foliaceous, the erect spadix having spreading, light-green rachillae and yellowish flowers.—Forest near Tinoco, sea level, *Moore 6533 & Allen 6262*.

#### CHAMAEDOREA sp.

Slender, single-stemmed palms, to about 12 ft. in height, with a few dark-green, pinnate fronds. The spadix in young fruit is pendulous, with orange rachillae and green, obovoid fruits about  $\frac{2}{5}$ " long and  $\frac{1}{3}$ " in diameter.—Rather infrequent in the forested hills above Palmar Norte at about 1,800 ft. elevation, *Moore 6527*.

#### COCOS NUCIFERA L.—Coco, Cocotero, Coconut, or Pipa (Local and general).

Coconut palms are the dominant element along sandy beaches in the entire Golfo Dulce region, forming small picturesque groves or, particularly from the delta of the Río Coto to Banco Point, stretching out in a thin line for miles in front of the darker, broad-leaved vegetation. The trees have every appearance of being wild and are universally believed to be so by the local inhabitants, since they regenerate spontaneously without the aid of man, often far from any present habitation. In view of the recent revival of controversy as to the origin of the coconut it is perhaps of some interest that Burica Point was particularly mentioned by Oviedo as early as 1526 as having large and thriving stands, evidently much resembling those which are found today.

COROZO OLEIFERA (HBK) L. H. Bailey—*Corozo* (Local and general)—*Tuskra* (?) (Boruca)—*Coquito* or *Palmiche* (Nicoya)—*Corozo colorado* or *Corocito* (Panama).

Common palms, with massive, often more or less prostrate trunks and very large pinnate fronds, the basal portions of which are armed with short, stout spines which represent modified pinnae. The yellow or reddish-orange fruits average about 1" in length, and are very densely crowded on the large, sessile, axillary panicles. The fleshy pericarp is utilized in some places, notably in the Perlas Islands of Panama Bay, for the extraction of an edible oil. The species is related to the African Oil Palm, and is superficially similar to it in appearance. Frequent in wet pastures and swampy forest throughout the area.—Pastures near Palmar, *Allen* 6768.

CRYOSOPHILA GUAGARA Allen—*Guagara* (Local).

Slender, single-trunked, fan-leaved palms, 12-20 ft. in height, the trunks armed throughout with extensive branching root spines. Mature plants with 12-15 live fronds, the flabellate blades averaging about 5 ft. in diameter, the dark, glossy-green upper surface contrasting strongly with the silvery-white lower side. The fronds are strongly bifid, with a deep central cleft which divides the blade to within about 1" of the short, broadly triangular hastula. The inflorescences are elongate and pendulous, and are covered throughout their length with 25 to about 40 broad, papery, yellowish bracts. The flowers are produced on short, branching panicles, which are spirally arranged on the main axis of the inflorescence. Fruiting clusters are commonly seen without bracts, which tend to fall before the globose, waxy fruits mature. A very striking species, immediately separable from all others in the genus by the elongate pendulous inflorescences which are covered to the apex by the conspicuous bracts. Common in the lowland forests throughout the area, the fanlike fronds being much used for thatch.—Forests near the Tinoco Station, sea level, *Allen* 6602.

EUTERPE PANAMENSIS Burret.

Slender, unarmed, single-trunked palms 30-65 ft. in height, with attractive crowns of pinnate fronds. Common on the crests of forested hills between Palmar and Boruca at 2,500-4,000 ft. The inflorescences are borne directly below the crownshaft, the deep-purple or black, globose fruits averaging about  $\frac{3}{8}$ " in diameter.—Hills above Palmar Norte, 2,500 ft. *Moore* 6553 & *Allen* 6766.

#### GEONOMA — KEY

- |  |  |
|--|--|
| 1. Trunks solitary .....   | <i>Geonoma binervia</i>                |
| 1. Trunks multiple.  |  |
| 2. Fruits about $\frac{1}{2}$ " in diameter. Canes more than 1" thick .....              | <i>Geonoma congesta</i>                |
| 2. Fruits about $\frac{1}{8}$ " in diameter. Canes less than $\frac{1}{2}$ " thick ..... | <i>Geonoma</i> sp. — <i>Allen</i> 6750 |

GEONOMA BINERVIA Oerst. — *Surtuba* (Costa Rica).

Slender, single-trunked palms, to about 15 ft. in height, with relatively large, irregularly pinnatisect fronds and twice-branched, pendulous, reddish or reddish-brown inflorescences.—Occasional in the forested hills above Palmar Norte, mostly at 1,500-2,500 ft., *Moore* 6523, 6542 & 6546 & *Allen* 6758.

GEONOMA CONGESTA Wendl. ex Spruce—*Caña de danta* (Local).

Handsome, erect, unarmed palms, with up to about 12-15 canes which average  $2\frac{1}{2}$ " in diameter, each bearing at its apex 10-12 pinnate, bifid fronds, the lateral pinnae usually fused into a few broad, confluent blocks, but sometimes much narrower. There are commonly 3-5 branching scapes borne just below the leafy crown, the small black fruits maturing in late March. The canes are sometimes used for

house walls, and the fronds for thatch, which may be expected to last for approximately two years, according to report. A very common species of the clay hillsides in the Esquinas Forest at low elevations.—*Allen 6039, 6748, & 6753.*

*GEONOMA* sp.

Slender, stoloniferous palms with 3-5 canes about 6-10 ft. in height and  $\frac{3}{8}$ " in diameter, each with 6-7 bifid, pinnate fronds, usually composed of 3 pairs of very broad pinnae. Inflorescences 1 or 2 branching scapes about 7" long, borne below the crown of leaves. The black, nearly globose fruits are about  $\frac{1}{8}$ " in diameter.—*Esquinas Forest, 200 ft., Moore 6538 & Allen 6750.*

*HYOSPATHE LEHMANNII* Burret.

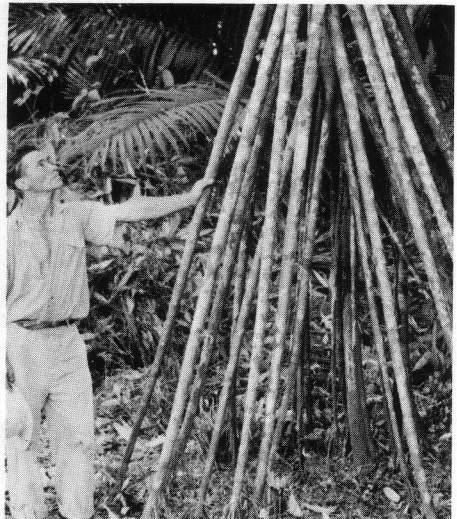
Unarmed, strongly stoloniferous, pinnate-leaved palms, with up to 20-25 slender green canes 1-2" in diameter and 9-15 ft. in height. Spathes 2, the flowers pinkish in bud. Fruiting spadices borne below the crown of leaves, with seeds about  $\frac{3}{8}$ " long and  $\frac{3}{16}$ " wide.—Locally common in the forested hills above Palmar Norte at about 2,500 ft. in elevation. *Moore 6544 & Allen 6764.*

*IRIARTEA GIGANTEA* Wendl. ex Burret—*Stilt palm* (Local and general)—*Chonta negra* (Boruca).

Strikingly handsome, single-trunked, unarmed palms, 30-90 ft. in height, with low, compact clusters of stilt roots which seldom exceed 3-4 ft. in height and which may be completely lacking in juvenile specimens. Individual pinnae strongly wedge-shaped and broadest near the apex, those of juvenile fronds being all on one plane, while in mature plants they are produced in 2 ranks which are at about a 30° angle with one another on the rachis, giving the fronds a tousled appearance. The slender, pendulous, unopened spathes are hornlike in appearance and are borne on the trunk just below the crownshaft. The pale-yellow flowers are produced on elongate strands, those of the staminate form with about 14 stamens. The fruits are globose, about 1" in diameter, with a lateral embryo. The wood in old specimens is black and exceedingly hard, like that of *Astrocaryum Standleyanum*. The trees occur as isolated speci-



44. Stilt roots of *Iriartea gigantea* (*Allen 6763*). Photo P. Allen.



45. Stilt roots of *Socratea durissima*. Photo P. Allen.





46. *Iriartea gigantea* (Allen 6763) in Costa Rica. Photo P. Allen.

mens or in magnificent groves along the forest trail from Palmar Norte to Buenos Aires at about 2,500 ft. elevation.—Moore 6524 & 6555 Allen 6745 & 6763.



47. *Oenocarpus panamanus*, hills near Palmar, Costa Rica (Allen 6680). Photo P. Allen.

*NEONICHOLSONIA WATSONII* Dammer.

Dwarf, single-stemmed, unarmed palms with about 8 pinnate fronds, the plants averaging about 8-9 ft. in height to the tips of the terminal leaflets. The erect or arching undivided spicate inflorescences about equal the fronds in length. Very common in climax forests throughout the area.—Coto Junction, 50 ft., Allen 6659.

*OENOCARPUS PANAMANUS* Bailey—*Maquenque* (Local and Panama).

Handsome, multiple-trunked, unarmed palms, 20-65 ft. in height, with 8-10 arch-

ing pinnate fronds, the well-developed, often somewhat bulging crownshaft dark blackish purple in color. The smooth, almost bamboo-like individual canes are conspicuously ringed and average 4-6" in diameter. The 2-4 inflorescences are borne well below the crownshaft and are at first covered by 2 cylindric spathes which are deciduous. The short, woody, nearly horizontal spadix has a great number of slender, pendulous, wine-red strands which bear the small white flowers and hard black or dark-purple, plumlike fruits. Frequent in hillside forests throughout the area.—Hills near Palmar, 100 ft., *Moore 6541 & Allen 6680*.

*RAPHIA TAEDIGERA MARTIUS* — *Yolillo* or *Palma real* (Local — *Holillo* or *Jolillo* (Bluefields, Nicaragua).

Robust palms, typically with 3-5 trunks, which may vary in height from about 30 to 65 ft., and covered by the overlapping bases of the 8-10 enormous pinnate fronds, which may be up to 40 ft. in length. Each side of the stout rachis bears some 95 pinnae, whose midribs and margins are armed with short, sharp spines. The small flowers are produced in 3-5 very large, arching, or commonly pendulous inflorescences which originate in the axils of the upper fronds. These scapes may vary in length from 8 to about 16 ft., and lack a true spathe, but are enveloped throughout in a great number of persistent, spirally fused, papery bracts, each inverted cone enclosing a miniature cleft spathe and a distichous panicle of flowers. The handsome fruits are oblong or ellipsoidal, about 2-2½" in length, with a short, sharp terminal beak, the whole entirely covered with closely overlapping brownish-orange glossy scales. Individual plants apparently flower and fruit throughout the year, the mature canes dying after they have exhausted their inflorescences, being replaced by basal suckers. The species forms vast unbroken stands thousands of acres in extent back of Jalaca Farm and near the Laguna de Sierpe, this however being the only known occurrence of the genus on the Pacific coast of Central America. These tremendous stands would undoubtedly be exploited in the Asiatic tropics for sugar by tapping the immature inflorescences, but nothing of the sort has ever been attempted in our hemisphere. The stout frond rachises have been used for banana prop poles in the Limón Division of the United Fruit Company. — Swamps near Jalaca, sea level, *Allen 6276*.

*SCHEELEA ROSTRATA* (Oerst.) Burret — *Palma real* or *Manaca* (Local and Panama).

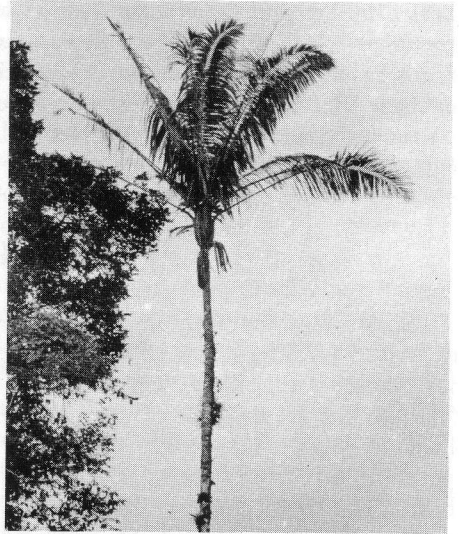
Slender or robust, single trunked palms, 30-75 ft. in height, with very large, arching, pinnate fronds. The species is frequent in forests throughout the area, ascending the hills between Palmar and Boruca to about 2,500 ft., but sometimes forms groves of considerable extent in open pastures, particularly near Puerto Cortés. The large pendulous inflorescences are protected by a broad, corrugated boat-shaped spathe, and may bear (1) all staminate flowers, (2) all pistillate flowers, or (3) both, in which case the larger pistillate flowers are at the base of the individual strands, the terminal  $\frac{3}{4}$  of which bear the crowded smaller staminate form. The yellow, ellipsoidal fruits have a prominent beak at the apex, and are indistinguishable from those of the *Scheelea* palms of Panama, so that it seems probable that *S. zonensis* may be referable here. The fronds of this species are used to a considerable extent locally for thatch. — Pastures near Palmar Norte, 50 ft., *Allen 6661* — Pastures near Puerto Cortés, 25 ft., *Moore 6540 & Allen 6754*.

*SOCRATEA DURISSIMA* (Oerst.) Wendl. — *Palmito* (Local) — *Stilt palm* (Local





48. *Scheelea rostrata*, Costa Rica. Photo P. Allen.



49. *Welfia Georgii*, Costa Rica. Photo P. Allen.

and general) — *Chonta* or *Palmilera* (Boruca) — *Maquenque* or *Palmito* (Costa Rica) — *Jira* (Panama).

Slender, single-trunked palms, 40-60 ft. in height, with very prominently developed prickly stilt roots which reach 6-8 ft. in height in mature specimens. Trunk unarmed, bearing 6-8 pinnate fronds, and with a cylindrical, somewhat glaucous crownshaft about 4½ ft. long. Individual leaflets narrowly wedge-shaped, broadest near the apex, usually split longitudinally in 3 or 4 segments, the leaflets borne at an ascending angle with the rachis. Inflorescences usually 1 or 2, produced from the trunk below the crownshaft. Spathes apparently 6. Flowers white, with more than 50 pale yellow stamens. Seeds ellipsoidal, with an apical embryo. The palm cabbage from this species is edible, but somewhat bitter and considered inferior to that obtained from *Welfia Georgii*. Very common and widely distributed throughout the area. — Esquinas Forest, 200 ft., Allen 6611 & 6715 — Tinoco Station, 50 ft. Moore, 6532 & Allen 6747.

#### SYNECHANTHUS ANGUSTIFOLIUS Wendl.

Slender, unarmed palms, with solitary or rarely multiple trunks to about 8-12 feet in height, the canes with about 5 pinnate fronds. The elongate, erect or arching, broomlike spadices are produced either from among or from below the fronds, and bear globose or ellipsoidal fruits which are orange or red at maturity. — Locally common in the Esquinas Forest, 200 ft., Moore 6537 & Allen 6677 & 6751 — Forested hills above Palmar Norte, 2,000 ft. Allen 6760.

WELFIA GEORGII Wendl. ex Burret — *Palmito*, *Palma conga*, or *Palma real* (Local) — *Palma conga* or *Palma real* (Panama).

Single-trunked, unarmed palms, 50-65 ft. in height, with large, pinnate fronds, the newest member in the center of the crown a rich, conspicuous reddish brown, contrasting very handsomely with the dark-green older foliage. Inflorescences are usually 1 or 2 relatively short pendulous spathes and spadices which are produced

below the bases of the fronds. The white flowers are borne in deep pits in the thick rachillae, which are octagonal in cross section, and are followed by the almond-like fruits, which are dark purple at maturity. The crown yields a sweet, edible palm cabbage, but each utilized means a specimen destroyed. Common in climax forest, particularly in the Esquinas District. — Esquinas Forest, 250 ft., *Allen 6346 & 6770 & H. E. Moore 6557.*

## Oviedo, on "Cocos"

[Editorial Note: Gonzalo Fernandez de Oviedo y Valdes (1478-1557), Oviedo for short, was official chronicler of "The Indies" at the time of the Columbian voyages. He spent thirty-four years in different parts of the Caribbean. The first volume of his comprehensive "Historia General y Natural de las Indias" appeared in 1535. In it are descriptions of the West Indian (including Middle America) fauna and flora, illustrated by his own sketches. Several pages in volume 1 (pages 335-337 of an Oviedo edition, published in Madrid in 1851) describe a palm "called cocos," which is the basis of some of the controversy regarding the original nativity of the coconut palm (see *Principes* 7:54-69. 1963). Dr. E. D. Merrill, late Director of the Arnold Arboretum and an authority on the origins of cultivated plants, was much interested in this subject and knowing of Paul Allen's intimate knowledge of Central America and its native palms, asked him to comment on the Oviedo account. Allen responded in a letter dated December 27, 1952. Oviedo's description and the pertinent parts of Paul Allen's letter are of sufficient interest to be published here. The translation of Oviedo from the sixteenth century Spanish has been kindly made by Gil Cuatrecasas, whose notes as a translator are bracketed within the text. W.H.H.]

"There are other palm trees whose

fruit are called cocos, this being a genus of large palm trees, and whose leaf is of the same kind as that of the date palms, except that they differ in the base of the leaves [*laciniæ*], for the leaves [*laciniæ*] of coco trees originate in the rachis in the same way as the fingers of both hands when they are intertwined and in a like manner the leaves [*laciniæ*] are spread further. These palm or coco trees are tall, and there are many of them in the coast of the South seas, in the province of the chieftain Chimán, and many more in what they call Borica, and many more than in both these places in an island of the southern gulf which is a hundred or more leagues off the coast of Peru: this island, according to what I learned from the pilot Corso, who has been there, is two hundred and thirty leagues from Panama and a hundred and thirty leagues from the port of Possession of Nicaragua. These trees or palm trees put forth a fruit which is called coco, which is like this (Plate 3.<sup>1</sup>, fig. 15.<sup>2</sup>). Altogether, such as it is on the tree, it has a much greater bulk than a man's head; and from the outside of the bark to the middle part, which is the fruit, it is surrounded and covered by many skins which are like that burlap with which the palmitos [*Chamaerops humilis*] of land of Andalucia (I say of land that are not palmitos of tall palm trees) are covered; and from such burlap and skins in the Orient the Indians