



PRINCIPES

Journal of The Palm Society

January, 1974
Vol. 18, No. 1

THE PALM SOCIETY

A non-profit corporation primarily engaged in the study of the palm family in all its aspects throughout the world. Membership is open to all persons interested in the family. Dues commence at \$10.00 per annum payable in January but may be increased if an individual member so wishes. Requests for information about membership or for general information about the Society should be addressed to the Executive Secretary.

PRESIDENT: Mr. Kenneth C. Foster, 18002 Yorba Linda Blvd., Yorba Linda, California 92686.

VICE PRESIDENT: Dr. U. A. Young, 505 Royal Palm Way, Tampa, Florida 33609.

SECRETARY: Mrs. Lucita H. Wait, 7229 S. W. 54th Avenue, Miami, Florida 33143.

EXECUTIVE SECRETARY: Mrs. Theodore C. Buhler, 1320 S. Venetian Way, Miami, Florida 33139.

TREASURER: Mr. Brian T. Gaine, 6395 S. W. 96th Street, Miami, Florida 33156.

DIRECTORS: 1970-74, Mr. Kenneth C. Foster, California; Dr. Jerome P. Keuper, Florida; Mr. Wallace E. Manis, Thailand; Dr. Harold E. Moore, Jr., New York; Dr. John Popenoe, Florida; Mr. Toshihiko Satake, Japan; Mrs. Lucita H. Wait, Florida; Madame Ganna Walska, California. 1972-76, Mr. David Barry, Jr., California; Mr. Morgan Evans, Florida; Mr. Myron Kinnach, California; Mr. Otto Martens, Virginia; Mr. Billings McArthur, Florida; Mr. Dent Smith, Florida; Dr. U. A. Young, Florida.

PRINCIPES

JOURNAL OF THE PALM SOCIETY

EDITOR: Harold E. Moore, Jr., 467 Mann Library, Ithaca, N.Y. 14850

EDITORIAL BOARD: David Barry, Jr., Walter H. Hodge, Eugene D. Kitzke, Harold F. Loomis, Nixon Smiley, Dent Smith, P. Barry Tomlinson.

Manuscript for PRINCIPES, including legends for figures and photographs, must be typed double-spaced on one side of 8½ × 11 bond paper and addressed to the Editor for receipt not later than 45 days before date of publication. Authors of one page or more of print will receive six copies of the issue in which their article appears. Additional copies or reprints can be furnished only at cost and by advance arrangement.

Contents for January

Palms and Religion in the Northwest Amazon	
Richard Evans Schultes	3
Variegated Pinangas	
John Dransfield	22
Experiments in Palm Growing in East Tennessee	
Joel F. Lubar	25
Regular Features	
The Editor's Corner	21
Palm Literature	21
Seed Bank	21
Palm Questions and Answers	30
Palm Briefs	32
News of the Society	34
Letters	35

Cover Picture

The staminate flowers of *Arenga undulatifolia* are handsome in black and white, but when seen in color are a study in maroon, orange, and yellow. Photo from a color transparency of a plant cultivated at the former Atkins Botanic Garden of Harvard University, Soledad, Cienfuegos, Cuba (Moore 6094, BH).

PRINCIPES

JOURNAL OF THE PALM SOCIETY

An illustrated quarterly devoted to information about palms and published in January, April, July and October by The Palm Society, Inc.

Subscription price is \$6.00 per year to libraries and institutions. Membership dues of \$10.00 per year include a subscription to the Journal. Single copies are \$1.50 each. The business office is located at **1320 S. Venetian Way, Miami, Florida 33139**. Changes of address, undeliverable copies, orders for subscriptions, and membership dues are to be sent to the business office.

Second class postage paid at Miami, Florida and at additional mailing offices.

Mailed at Lawrence, Kansas
April 12, 1974

Palms and Religion in the Northwest Amazon

RICHARD EVANS SCHULTES*

Botanical Museum, Harvard University, Cambridge, Mass. 02138

The palms have justly been termed the "Princes of the Plant Kingdom." This place of royalty is due undoubtedly to the grandness and majesty of many of the species.

There can be no doubt, however, that the palms also occupy a position of primacy as economic plants: they are a prime source of man's food; in fact, one of the twelve plants basic to human nutrition is a palm—the well known coconut palm. Literally hundreds of species give man edible fruits; many yield nutritious oils; several provide starch and sugar. The betel palm is a strong stimulant used by millions of people in Asia. Valuable varnishes, such as "dragon's blood," as well as gums come from the palms. Sundry strong fibers are among the most outstanding useful products of the family. Fats and oils for the soap and cosmetic industries are derived from many species. The palms yield hard waxes. And three genera are the source of vegetable ivory from which buttons and similar objects are fashioned. Palms supply a diversity of other economic products such as thatches, mats and rattans, musical instruments, folk medicines, poisons and alcoholic beverages.

Even though it has not been so conspicuous and easily recognized, the role

of palms in religion may perhaps be more fascinating to ponder than the very many practical uses in daily life to which the palms contribute. The significance of the "Princes of the Plant Kingdom" is found not only in the great religions of the world but even more so where it enters into primitive religions in aboriginal societies.

Palms are important in Christianity, Judaism, Mohammedanism, Hinduism, Buddhism, and other major religions. We need only to recall the role of the date palm, *Phoenix dactylifera*, in the Near East. The ancient Greeks dedicated it to Apollo, god of manly beauty, youth, poetry, music and wisdom. It was the sacred tree of the Arabs, revered by all peoples in Asia Minor since antiquity, and it later became the symbol of Islam. The writings of the classical period compared the date palm to the sun. In Islamic tradition, Mohammed created the palm tree himself, commanding it to spring forth from the earth. Among the Jews, it epitomized grace and elegance and became symbolic of Jerusalem, the religious center of Judaism. The use of palm leaves in processions dates back at least to the restoration of the temple by Judas Maccabaeus, and the custom persists among the Jews at the Feast of the Tabernacle and among the Christians on Palm Sunday.

Sacred writing on leaves of the palmyra palm (*Borassus flabellifer*) and of the talipot palm (*Corypha umbraculifera*) began, according to Hindu tradi-

* Presented as part of a symposium entitled "The Natural History and Utilization of Palms" at the annual meeting of the Society for Economic Botany, Ithaca, N. Y., June 14, 1973.

tion, with the author Panniny-rishee, who lived about 4300 years ago. The holiness of these palm leaves in India is attested still by their use in making the gigantic processional constructions for sacred rituals.

I am convinced that when we have delved fully into the ethnobotanical lore of primitive societies, we shall find that the palms are deeply rooted in many magico-religious beliefs and practices in the tropics. Initial and superficial observations among Indians of the Amazon basin indicate that this is indeed true of South America and most certainly merits further and basic investigation.

The many Indian tribes inhabiting the northwest Amazon have a rather vague religion with no gods but a host of anthropomorphic beings or spirits—usually forest monsters—many of them represented by animals and often by plants. Most of these spirits are supernatural ancestor-beings with extraordinary powers, able to act against or in conjunction with other evil forces. There is no real worship, but the medicine men—and sometimes even ordinary men—approach them through magic and ceremony to communicate with them in order to get results of a real and practical nature: to cure or cause illness, to ensure success in warfare, or to safeguard a harvest, for example.

It is customary for us to think only of the hallucinogenic narcotics, which are thought to put man into communication with the spirit world, as the sacred plants *par excellence*. Probably they do represent to the native the most important plants in which supernatural forces reside or which are incarnations of the spirits. It is true that these drugs, with their unearthly power to change the body and mind in such bizarre ways, are looked upon as residences of spirits

or divinities, as sacred mediators between man and the gods. But there are also many plants with no psychoactive effects whatsoever that enter into religious beliefs or symbolism or into magical rites, and which, consequently, are directly or tangentially connected with the powers that rule the affairs of men.

Some of these plants are palms. Why should palms be so closely associated in the mind of the Amazon natives with the supernatural? This question, of course, cannot yet be answered, but I hope that the few brief and superficial notes that follow may encourage ethnologists to delve more deeply into the problem. I shall discuss only a few of these curious associations with the supernatural world which, either from my own ethnobotanical observations or from the literature, we know to exist among the natives of the northwest Amazon. There are undoubtedly very many more. It is noteworthy that oftentimes food plants—including many palms—are associated with supernatural beings.

The extraordinary palm *Jessenia bataua*, known in the Colombian Amazon as *seje* or *milpesos*, in Brazil as *pataúá*, yields an unbelievable abundance of edible, oil-rich drupaceous fruits eagerly sought by all Indians during the season of harvest. The Makunas of the Piraparaná River look upon *Jessenia bataua* as a generalized incarnation of the spirits of female ancestors who continue to feed the living with the milk of their breasts, the palm fruit.

It was the "Daughter of the Sun" who first taught the Desanos of the Vaupés River to eat the fruit of two palms: *më-ë*, *Socratea exorrhiza* and *nyumú*, *Oenocarpus bacaba*. To this day, they are sought after and preferred in tribal festivals over all other wild fruits of the forest.

Perhaps one of the most interesting



1. Staminate inflorescence and spathe of *Parascheelea anchistropetala*, Cerro Circasia, Vaupés, Colombia.



2. Indian loading bundles of fibers from *Leopoldinia piassaba* for transport to a trading post, Río Guainía, Vaupés, Colombia.

beliefs that I have met concerning palms pertains to the anomalous *Parascheelea anchistropetala* (Fig. 1) of the Colombian Vaupés which has a gigantic, basal, woody spathe hooding very fragrant inflorescences. The Kubeo Indians are convinced that this spathe houses tiny spirit men who hide in it during the day but who venture forth at night. Since these miniature beings represent the souls of children of medicine men

of the past, they have inherited certain of the malevolent powers of their fathers and may use them when occasion arises. Consequently, Kubeos who want to camp out on their trips will carefully avoid the comfortable, lightly forested sandy area of Circasia, the type locality where this palm abounds, preferring to camp in less habitable dense forests nearby where the plant does not grow.

A rather similar belief linking palms



3. Large communal Makuna house or *maloca*, Río Piraparaná, Vaupés, Colombia. The roof is thatched with leaves of *Lepidocaryum tenue*. The tall palms around the *maloca* are specimens of *Bactris gasipaes*.

with forest spirits exists among the Kuripako Indians of the Guainía River, an area representing the northern limit of the curious *Leopoldinia piassaba*. This twenty- to thirty-foot tree grows in abundance in inhospitable swamps along so-called black water rivers in the Rio Negro basin of Brazil, Colombia, and Venezuela. Called *piassaba* in Brazil, *chiquichiqui* in Venezuela, it is the source of an unusual coarse brown fiber formed by the frayed and rotting petioles, an article of commerce exported from the area and useful for manufacturing ropes, cables and brooms (Fig. 2). *Piassaba* gatherers are often bitten by poisonous snakes that infest the thick clumps of hanging fiber—a danger which probably underlies in part the natives' belief that the evil spirit, the

curupira, inhabits *piassaba* groves and wanders around at night. The Indians have a mortal fear of encountering this shaggy-haired monster—such a fear that they never remain in *piassaba* groves at night and, even during the day, they never work alone but in groups of six or more.

The connection between palms and forest spirits is ever present in the minds of the Indians of the northwest Amazon. Although most Indians in the Rio Negro basin consider the leaves of the diminutive palm *Lepidocaryum tenue* the best thatch for their *malocas* (Fig. 3), they often employ other materials of shorter durability, even in regions where this palm abounds. The reason for their occasional reluctance to gather *Lepidocaryum* lies in the elaborate rituals by



4. Trunk of *Astrocaryum vulgare*, Río Apaporis, Vaupés, Colombia.

the witch doctor which are necessary before the young men go into the gloomy parts of the jungle to disturb the palm. These rituals are performed to prevent the *curupira* from harming those who gather the thatch, for in the forests where *Lepidocaryum tenue* grows, the *curupira*, usually a huge monster, customarily makes himself small, only a few feet in height, and often assumes the form of the palm itself.

Witoto medicine men believe that the heavy spines on the trunk (Fig. 4) of the *chambira* palm, *Astrocaryum vul-*

gare, are the favorite and most potent darts shot into the human body by malevolent spirits to cause sickness and misfortune. When the medicine men must treat a disease or unfortunate happening caused by these spines, they often have to fast on the previous day, drinking only a beverage prepared from the fruits of the *miriti* palm, *Mauritia flexuosa*, which is said to permit the medicine man's magic to counteract the evil wrought by the darts.

The *chambira* palm (Fig. 5) yields the strongest fiber known in the Ama-



5. Crown of *Astrocaryum vulgare*, Río Apaporis, Vaupés, Colombia.

zon, employed in making hammocks, fish nets, bow strings and the like (Fig. 6). The Yukuna Indians of the Miritiparaná River believe that this tree represents a spirit that came with the first people—a dwarf who taught the art of weaving—and that he turned into an *Astrocaryum* tree in order to continue living with the Yukunas.

Another palm with deep magico-religious significance in the northwestern Amazon is *Socratea exorrhiza*, *paxiúba*

(in Brazil) or *buxpú* of the Tukanoan Indians of the Vaupés. This palm of sixty feet in height has the soft pithy center of the trunk encased in a very tough, hard exterior which is easily split and employed for floors of elevated houses and similar uses (Fig. 7). The trunks are utilized in the manufacture of the sacred trumpets or *yuruparis* that figure so prominently in the adolescent ritual for boys on the Vaupés River. The British botanist Richard Spruce,



6. Indian stripping fiber of *chambira* from leaf segments of *Astrocaryum vulgare*, Río Apaporis, Vaupés, Colombia.

who explored the northwest Amazon one hundred and twenty years ago, sent specimens of these trumpets to Kew, where they still may be seen in the Economic Museum. He remarked: "The . . . instruments are portions of the trunk of the Paxiúba . . . with a square hole near the upper extremity. When about to be used, this end is nearly closed by a piece of clay, and a piece of Uaruma-leaf [*Cecropia* sp.] is tied on above the square hole, so as to form a monster flageolet. The smaller ones consist of a tube of Paxiúba, wrapped in a long strip of the tough bark of the Jebarú (a Caesalpineous tree, with handsome red monopetalous flowers, apparently the *Parivoa grandiflora*. . .), which de-

scends in widening folds to some distance below the tube, thus forming a sort of trumpet, which is simply blown into at the upper end." The trumpets are always played in pairs: a male and a female instrument.

Alfred Russel Wallace, who travelled in the Vaupés River at the same time, commented in greater detail about these holy palm instruments: "One evening, there was a *caxiré*-drinking; and a little before dark a sound as of trombones and bassoons was heard coming on the river towards the village, and presently appeared eight Indians, each playing on a great bassoon-looking instrument. They had four pairs, of different sizes, and produced a wild and pleasing sound:



7. Wall of Barasana *maloca* made of the outer trunk of *Socratea exorrhiza*, Río Kuduyarí, Vaupés, Colombia.

They blew them all together, tolerably in concert, to a simple tune . . . In the evening, I went to the malocca, and found two old men playing on the largest of the instruments; they waved them about in a singular manner, vertically and sideways, accompanied by corresponding distortions of the body, and played a long while in a regular tune, accompanying each other very correctly. From the moment the music was first heard, not a female, old or young, was to be seen; for it is one of the strangest superstitions of the Uaupés Indians, that they consider it so dangerous for a woman ever to see one of these instruments, that having done so is punished with death, generally by poison; even

should the view be perfectly accidental, or should there be only a suspicion that the proscribed articles have been seen, no mercy is shown; and it is said that fathers have been the executioners of their own daughters, and husbands of their wives, when such has been the case."

Wallace's report dates from the early 1850's, but the absolute sacredness of the *yuruparí* horns still is as unbroken as it was then. There have recently been reported the deaths of women following the *Yuruparí* Ceremony, with the suspicion that they were due to inadvertent viewing of one of these trumpets. The instrument, when not in use, is kept hidden buried in the mud along a river



8. *Mauritiella cataractarum*, Río Piraparaná, Vaupés, Colombia.

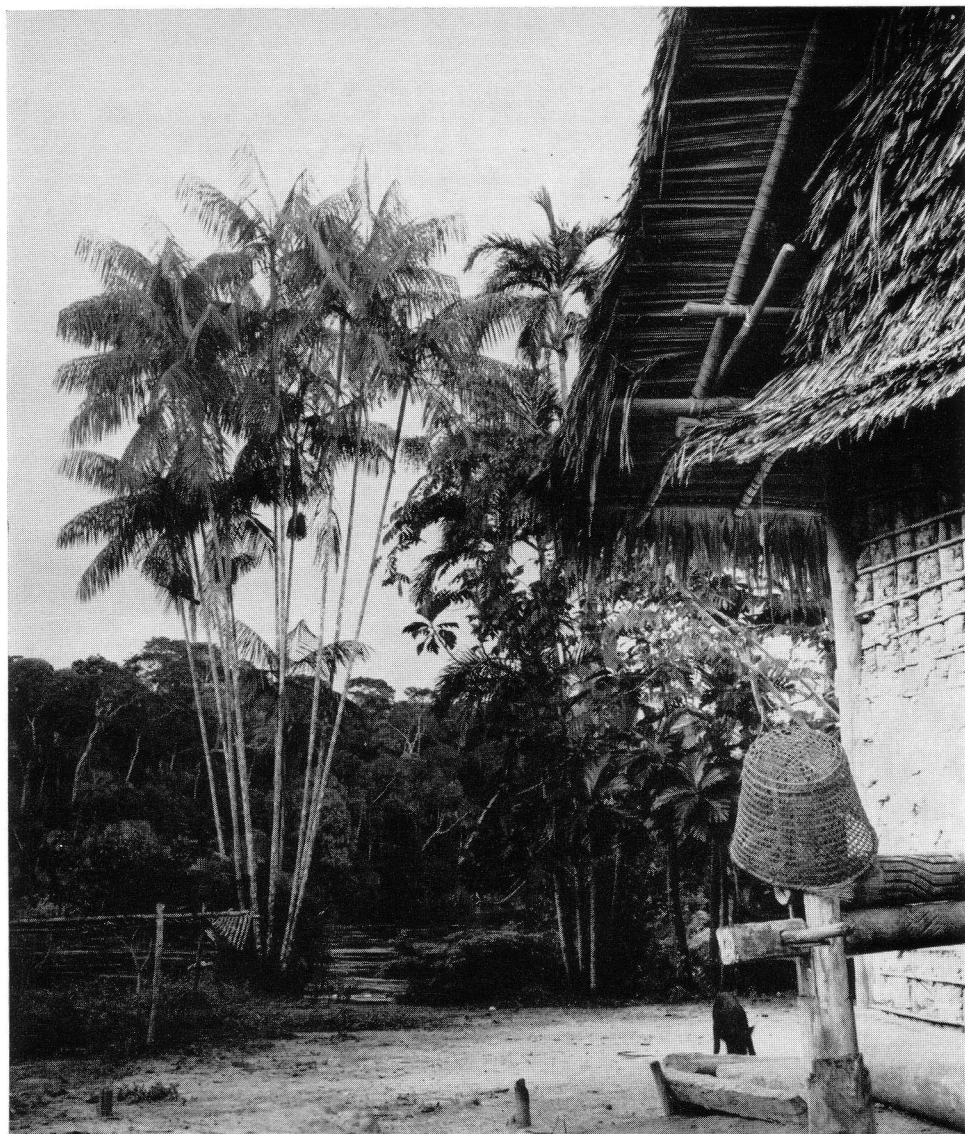
bank in order to keep it from female eyes.

The low buzzing and humming sounds of the *yuruparí* horn are voices warning of dangers from incest and that preach the conservation of sexual energy.

Along the Apaporis River, by the side of the many rapids and waterfalls, thrive thick clumps of delicately swaying *Mauritiella cataractarum* trees (Fig. 8). The crowns are graceful and, as one looks up through the leaves from a canoe, resemble gigantic spider webs. Legend among the Makuna Indians says that localities where this palm is abundant represent places where the "Spirit of

the Sun" threw fishing nets (the spider web) from the sky over the land to force the first Makunas to settle and build their malocas. It is curiously true that most Makuna settlements are found near rapids. The Makuna name of the tree, *bö-pö-ma*, means "tree of the spider web," because of this mythological association.

The majestic *Maximiliana maritima* or *inajá* has gigantic leaves and an unusually large, woody spathe. The Indians may use the spathe for carrying fruits and tapioca meal or even for heating water for cooking meat. The Kuripako Indians of the Guainía River



9. A cluster of *Euterpe*, Río Guainía, Vaupés, Colombia.

believe that the *curupira*, the evil spirit of the forest, oftentimes with feet that point backwards and which thus confound hunters with reverse footprints, may often utilize the spathe of *inajá* as a canoe.

Among the Kubeos of the Kuduyarí River, *inajá* has a very different signifi-

cance in their magic practices. They believe that the sprinkling on the body by a medicine man of a decoction of the flacourtiaceous *Mayna toxica*, which is known in Kubeo as *dee-yaw-ka*, will cause slow death, a wasting away of the body. The only antidote for this supernaturally powerful poison is dust-



10. The pupunha palm (*Bactris gasipaes*) planted around a rubber tapper's house, Río Vaupés, Vaupés, Colombia. The trees in the right foreground are rubber (*Hevea guianensis*).

ing with ashes prepared from the leaves of the *inajá* palm.

In the training and indoctrination of Desano *payés* or medicine men on the Vaupés River, splinters of the *macana* palm, *Bactris* (*Pyrenoglyphis*) sp., play an important role. After ritualistic bathing, painting of the body, use of narcotics and other necessary ceremony, the elder *payés* transmit their super-

natural power to young initiants by putting a number of splinters of *macana* on the pupil's forearm and pressing them firmly with the magic quartz crystal, pretending to introduce them into the flesh. These splinters are the magic darts by means of which medicine men can send sickness and death to all who have broken the moral code or to far off enemies.

The *assaí* or *guasáí*, *Euterpe oleracea* and *E. precatória* (Fig. 9), represents palms dear to the heart of all Amazonian people. A flavorful brownish drink is prepared from the bluish-black fruits, and nowadays, in the cities of the Brazilian Amazon, one of the most esteemed ice creams is *assaí*. This drink is often-times allowed to ferment to provide Indians with a *chicha*. The palm is a graceful tree, sometimes one hundred feet in height, growing often in dense stands along banks just at the edge of the highest water level. According to the Witoto and Bora Indians on the Igaraparaná River, *assaí*, known as *milpesillos* by Colombians, was the gift of the spirit or god of rain, for which reason it is taken as a drink in ceremonies celebrated during the rainy season. There are very intricate associations of this palm with the Witoto spirit world, but I was unable to learn much about the connections beyond an appreciation of the sense of the deference with which these Indians treat the tree and the products of its fruits.

Many tribes of the western Amazon employ the nutritious fruits of *Bactris gasipaes* (*Guilielma gasipaes*) (Fig. 10) in religious rituals and festivals. This palm, a cultigen not known in the wild state, is found in a great variety of races differing in habit, in fruit, and in many morphological characteristics.

The Boras and Witotos, who live on the Karaparaná and Igaraparaná Rivers in Colombia, have masked dances celebrating with religious overtones the harvest of this palm, known in English as the peach palm.

Kubeo Indians on the Kuduyarí River in the Colombian Vaupés have associated the peach palm, *Bactris gasipaes*—known in the region as *cachipay* in Spanish or *pupunha* in Portuguese—with mourning the dead. Their weeping

or mourning ceremony, called *oyne*, is held nearly a year after the death during the season of harvest of the peach palm fruit. There is a belief that the soul of the departed individual harvests sufficient fruit of the palm during this *oyne* to prepare enough of the nutritious meal from them for all eternity. At one point in the ceremony, the men attack the roof of the house by pelting it with fruit of the peach palm to frighten the women with the noise, but this aspect of the ceremony seems actually to represent an offering to the women and has its origin undoubtedly in fertility symbolism. During the Kubeo ancestral whipping ceremony, the fruit is thought to be showered down upon the roofs by ancestral spirits.

Perhaps the most elaborate ritual that I have witnessed in the northwest Amazon is the *Kai-ya-ree* Festival of the Yukunas who live on the Miritiparaná River in Colombia: a dance of several days' duration during early April when the *pupunha* palm is in full fruit. The basic drink of the festival is fermented *chicha* or beer of the *pupunha* fruit, and cakes made of the meal of the fruit pulp of this palm are consumed along with tapioca bread.

There are many legends connected with this dance. The most interesting one which I heard and noted down implies an association between the palm *Bactris gasipaes* and the euphorbiaceous forest tree *Micrandra spruceana*. This tree, known in Yukuna as *yě'-cha*, is related to the *Hevea* rubber tree. Its seeds, when boiled to remove the poison, are edible, and its fruit is egg-shaped, in size and shape rather similar to the fruit of the palm. Both of these trees are associated in Yukuna mythology with the boa constrictor: both the land boa and the anaconda. While the dance is concerned mainly with the *yě'-cha*

tree, the connection with the peach palm is significant.

There are many legends concerned with this dance. They are extraordinarily complicated and related to the mythological origin of the Yukuna people. The *pupunha* palm, is associated with the land boa, an animal closely allied to origin myths of the tribe, the the *yé'-cha* with the anaconda. Just as the pulp of the *pupunha* palm fruit has an oil-rich edible pulp, so the oil-rich starchy endosperm of the seeds of the *Micrandra*, once boiled to remove a poisonous glycoside, are highly nutritious and provide the main food for another dance celebrating the origin and evolution of the tribe.

The *Kai-ya-ree* Festival basically celebrates the harvest of the *pupunha* palm which was given to the first Yukuna people by the "Sister of the Sun" as one of their major cultivated foods. The festival, however, actually commemorates the evolution of this little known tribe and, because of the central importance of the palm, assumes deep significance when we consider the association of palms with mythology and religion in the northwest Amazon.

In view of the importance of the *Kai-ya-ree* Festival and of the *pupunha* palm, it may be of value to append a detailed consideration of the ceremony and of these people which, to the best of my knowledge, has not hitherto been published. The following notes are taken from my field notes written in the Miritiparaná River in 1951.

The Yukunas dwell in the unmeasured forests of the upper reaches of the Miritiparaná River. So little known that they are not mentioned in our latest anthropological handbooks, this Arawak-speaking tribe, once large and warlike, now numbers probably fewer than 400 individuals. Yet they are a proud and good

race and have kept their ancient tribal ceremonies and legends remarkably intact. Of the tribes with which I lived during my twelve years in the Amazon, I found the Yukunas perhaps the most virile and congenial. Together with them live a few remaining members of the dying Matapies; and on neighboring rivers we find the home of the remnants of the related Tanimukas.

Every year, these peoples come together for several tribal dance ceremonies, but the major one seems to be the *Kai-ya-ree*. Held after the harvest of the *pupunha* or peach palm fruit (*Bactris gasipaes*), the *Kai-ya-ree* occurs usually during the first week of April, the rainiest part of the wet season.

The dance, to which normally come upwards of 150 Indians, takes place in the typical huge, round, peaked-gabled houses or *malocas*. These communal houses, the home of six or seven families, fairly bulge with the throng, even though most of them measure from seventy to ninety feet in diameter. Preparations for the festival begin months before and are in charge of the head of the house in which it will be held. The intensive preparations, however, are carried out during the three weeks immediately before the dance. Every available man and older boy goes out to hunt deer and tapir and to fish. The meat and fish are smoked so that they will keep for the throng that will come to the dance. The younger children must cut down the racemes of fruit from the *pupunha* palms which are planted in a circle around each *maloca*, at once an adornment and a source of nutritious food. *Pupunha* bears abundantly, and its large peach-like orange or reddish fruits, rich in an oily meal, may be prepared in a number of ways. When boiled or roasted, they are especially delicious; and some

natives prepare from them a dry meal which is kept for use throughout the year.

For the *Kai-ya-ree*, however, the womenfolk grind the mealy portion of the *pupunha* fruit, knead it into water and bury the mass for several weeks in the wet ground, firmly packed in baskets. This meal, slightly fermented, is dug up just before the gathering of the tribe and from it are made dugout canoe-loads of *chicha*, a thick, nutritious beer. This is the mainstay of the festival, and no Indian will venture to start for his own *maloca* until every drop of the vast supply of *chicha* has been consumed. It falls also to the women to prepare huge basketfuls of fresh *fariña*, a dry meal from the *yuca* or tapioca plant (*Manihot esculenta*), and just before and during the dance *casabe* cakes are baked from this *fariña*. No guest at the *Kai-ya-ree* ever goes hungry.

The older men who do not go out hunting prepare the large supplies of coca and tobacco snuff, the two narcotics employed in all Yukuna tribal get-togethers. Leaves stripped from the coca bush (*Erythroxylon coca*) are toasted on a hot clay plate and are pounded to a powder in a huge, hollowed trunk. Next, leaves from the *guarumo* tree (*Cecropia* spp.) are burned and the ashes are mixed, half and half, with the coca powder. The resulting greyish-green powder is then finely sifted through a pounded bark cloth. It is used constantly throughout the dance and in vast amounts: packed up and around the gums, it slowly dissolves and passes to the stomach, affording the user a feeling of euphoria. Tobacco is not smoked during the *Kai-ya-ree*, but great gourdfuls of snuff are made. The older men dry and pulverize finely the tenderest leaves of tobacco (*Nicotiana tabacum*) and mix

with the powder equal amounts of the leaf ashes of the yam (*Dioscorea* spp.); the resulting snuff is a greyish-white powder which is administered in teaspoonful doses through hollow bird-bone snuffing tubes. The Yukunas are excessive snuffers, just as they are extraordinary consumers of coca. It is an honor to be offered a snuffing by a friend who fills the tube with snuff, inserts one end in his mouth, the other end in the recipient's nostril, and gives a strong but quick puff.

The "owner" of the *Kai-ya-ree*—he in whose *maloca* the dance will be held—sends out emissaries about a fortnight before convocation. They travel by canoe and afoot through the thickest jungle. From all around come the Yukunas, Matapies, and Tanimukas—sometimes from five or six days' distance—loaded down with hammocks, babies, dogs, and oftentimes other domestic animals. They do not arrive immediately at the owner's *maloca* but stop in houses within a day's walk from it. When the owner is ready, he sounds the two hollowed tree trunks or signal drums, beating out the message that all is in readiness. So keen is the Indian's ear that he can hear these thumped messages and understand them at a distance of some six or eight hours' hard walk through the forest and even at greater distances along the rivers and streams. All then converge, and it is a festive time indeed. Each arrival must be welcomed by the chief of the dance with the age-old monotonous chant of half an hour that recites all the happenings of the year just passed. And the bowl of coca is passed freely around, while snuffing goes on continually.

The *Kai-ya-ree* begins at about midnight and lasts until dawn two and one-half days later. Dancing is never interrupted, various groups taking part, while



11. Devil mask, made of pitch from a species of *Symphonia* or from *Moronobia*, for part of the *Kai-ya-ree* Dance celebrating the harvest of fruits of the *pupunha* palm, *Bactris gasipaes*, among the Yukuna Indians, Río Miritiparaná, Amazonas, Colombia.

others eat, sleep or hold tribal conferences. The *Kai-ya-ree* is actually a long series of individual dances, each one dedicated to an animal. As the dances are seriously ceremonial in nature, only the men take part. The purpose of the dance is to honor or placate animal spirits or the forces of good and evil. Each dance has its own intricate step, its own special vocal music sung by the dancers themselves; no instruments are employed. Many of the dances are beautiful in the extreme, often mimicking a characteristic movement of the animal being honored. Some of the songs, chantlike and mostly in minor key, would be worthy of musical study for their deeply religious seriousness.

No less absorbingly interesting is the great variety of masks prepared annually for this festival. But I should describe the dress before I detail some of the masks. Each dancer wears, throughout the ceremony, a dress of two parts: a shirt with full-length sleeves of a coarse brown cloth hammered from the inner bark of the *llanchama* tree (*Olmecodia aspera*); an ankle-length skirt prepared from strips of the inner bark of an annonaceous tree. When this bark skirt is freshly made, it is rolled tightly and its lowermost six or eight inches are immersed in a watery arcillaceous clay common in swales in this most moist of regions. A chemical reaction between the clay and some constituent in the bark must take place, for the immersed portion is indelibly dyed black. The long flexible strips of bark in this "grass skirt" swirl in some of the faster dances and add much to the grace and beauty of the steps. A bracelet of empty seeds (*Cayaponia kathamaphora*) is wound around one ankle to provide a castanet-like noise marking out the rhythm of the dance steps.

The masks are truly ingenious (Fig. 11). All but two are elaborated with

pitch from the *brea* tree (*Symphonia* spp. and *Moronobea* spp.) spread upon a head-covering hood of *llanchama* bark cloth. These pitch masks are all black with yellow and white designs painted on the pitch with earth paints. The pitch, when extracted from the trees, is yellowish, but it must be boiled for several hours to assume a consistency which will permit it to harden quickly to a brittle, nonsticky substance, and it is during this cooking process that it becomes black. The two masks which are not of pitch are fabricated from balsa wood which is painted.

The *Kai-ya-ree* begins with a kind of main theme-dance, the *Cha-vee-nai-yo*, which is repeated sundry times throughout the two and one-half days of the whole ceremony. Sixteen men in four groups wind in and out around each other, working up to a pitch of extreme intricacy and finally ending on a note of such simplicity—a straight line—that the very contrast is startling.

To the Yukunas, there are many animal spirits that influence human affairs, but there are two forces—spirits, if you will—which they place above all the others in potency. Although the Yukunas, I found, were rather vague about these two omnipotent forces and their definition, it is clear that one, which we might for simplification call the "Spirit of Good," is somehow embodied in and associated with light and the sun. The other they hold to be connected with darkness, night, and evil; this we could term the "Spirit of Evil," realizing in so doing that we are guilty of gross oversimplification. Both of these great spirits are in constant struggle, and, since the Yukunas are caught between them, they must honor and glorify the one and assuage and placate the other. The *Cha-vee-nai-yo* placates the "Spirit of Evil."

The mask for the *Cha-vee-nai-yo* dance

is weird: a human face fashioned of blackened pitch painted with yellow and white geometric designs, with eye-holes through which the dancer peers, a wedge-shaped wooden nose and a leering, toothless mouth. The eerie sight of so many hideously unreal devil masks and the weirdly monotonous minor chant with its far-off, hollow sound, as it is sung through the mask and hood, had an almost hypnotic effect upon me as I watched the dance. And, as I took part in this dance and joined in the chant myself, it was not hard for me to imagine that such an unearthly ritual must be placating some unearthly force. The chant is short, but the dancers repeat it untold times, thus heightening its effectiveness with the Indians:

Cha-vee-nai-yo

Cha-vee-nai-yo-o

Hey-hey-hey-ya, hey, hey, hey

Ya-wee-nai-yo

Ya-wee-nai-yo

Ya-wee-nai-yo

Ya-wee-nai-yo

Ee-ya-ree-ya ka-ba-a

Ee-ya-ka

Cha-vee-nai-yo-o

Hey-hey-hey

Ee-ya-ka

Cha-vee-nai-yo-o

Hey-hey-hey-ya-hey-hey-hey

Then follows in a rigidly set order the dances in honor of sundry animals. The young boys, those from eight to twelve years of age, dressed in the typical shirt and skirt but with the head covered with a hammered bark hood upon which the facial features of a monkey have been delineated, begin with the Monkey Dance. It is a quick, lithe dance mimicking the nervous jumping of monkeys from branch to branch; and the boys carry leafy branches which they wave rhythmically while chanting in high-pitched voices, very suggestive

of the chattering of monkeys in the tree tops.

There are too many animal dances for me to detail them all, and indeed, it would require a detailed study to outline the content and meaning of the whole *Kai-ya-ree*. Some, however, either because the Indians performed them exceedingly well or because they seemed to me to have more grace and beauty, stand out in my mind as more important than others. The Jaguar Dance, with characteristic stealthy half steps interrupted on occasion with pounces and a whining, snarling catlike chant, is performed by only the nimblest and most experienced of dancers. The mask is a superb creation: a replica in black pitch of a jaguar head, replete with eyes flashing with tiny pieces of mirror, whiskers, and a snarling mouth set with wooden teeth.

The Tapir Dance, slow and lumbering, has a fanciful tapir-head mask, and the Anteater Dance mask stands out among all the others because of its realistic, long, curved snout. In the Deer Dance, the movements are graceful and rapid in the extreme, consisting mostly of intricately interweaving in a running, darting step performed with an unbelievable mimicry of the deer's nervous and frightened manner. A low, sustained buzzing chant accompanies the Wild Bee Dance, and a similar song honors another insect in the Wasp Dance; the masks for both are most ingeniously fashioned with tufts of tree cotton or kapok to simulate the hairiness of the insect. The most unexpected beauty attends the Dance of the Bats, the masks for which are strikingly representative of the bat and the chants for which are squeaky and shrill to mimic the bat's voice.

Bactris gasipaes and its fruit are somehow intricately associated in mythology with all of the dances in the *Kai-*

ya-ree Festival and with the evolution of the Yukuna people. Much deeper studies by competent anthropologists will be needed to piece together the complicated whole, but this superficial

sketch will serve to indicate at least one good example of how deep is the association of palms with origin myths and belief in the supernatural in the northwest Amazon.

THE EDITOR'S CORNER

Dr. Schultes' article on preceding pages was read by Dr. T. Lockwood for Dr. Schultes during the course of a day-long symposium on "The Natural History and Utilization of Palms" held in Ithaca, N. Y. as part of the annual meeting of the Society for Economic Botany on June 14, 1973. Each session included four papers.

Those of the morning were "Palms—Variations on Simple Themes" by Harold E. Moore, Jr., adapted from "The Major Groups of Palms and Their Distribution" which appeared in *Gentes Herbarum* 11: 27–141, 1973, and as a separately paged reprint; "Protection of Flowers in Palms" by Natalie W. Uhl, based on "The Protection of Pollen and Ovules in Palms" published in *Principes* 17: 111–149, 1973; "Some Aspects of Pollination Biology in Palms" by Frederick B. Essig, elaborated from his articles "Pollination in Some New Guinea Palms" in *Principes* 17: 75–83, 1973, and "Observations on Pollination in *Bactris*" in *Principes* 15: 20–24, 35, 1971; and "Response of Palms to the Environment" by Robert W. Read, to appear in a future issue of *PRINCIPES*.

The afternoon program included four papers which also are to appear in the pages of *PRINCIPES*. These were "Palms in the Everyday Life of Indonesia" by John Dransfield; "Palms and Religion in the Northwest Amazon" by Richard E. Schultes, published herein; "The Oil Palms" by Walter H. Hodge; and "Commercial Palm Products Other Than Oils" by Dennis V. Johnson and Eugene D. Kitzke.

PALM LITERATURE

POPENOE, PAUL. 1973. The Date Palm. 247 pp., Field Research Projects, Box 585, Coconut Grove, Florida 33133. \$16.00 paperback, \$20.00 clothbound.

This monograph was completed in 1924, but remained unpublished for nearly 50 years. The book is divided into two parts: Part I, the history, cultivation, and uses of the date palm; Part II, varieties of the date palm. A foreword, preface, introduction, bibliography, and two appendices complete the work. Although not brought up to date, the text is still eminently useful.

SEED BANK

"The Palm Society Seed Bank is continuing to work for you. Presently we have a tremendous opportunity to sponsor two expeditions for seed of rare palms. We need your financial support to get seed.

"The first expedition, with the help of Fred Essig who is monographing the genus *Ptychosperma*, will strive to obtain rare New Guinea palms, including *Ptychosperma waitianum* and several species new to science.

"The second expedition, through our botanist contact in Cameroun, Equatorial West Africa, is expected to yield seed of the beautiful, petite *Podococcus barteri* with its wedge-shaped leaflets.

"If you are interested, send your donations to the Seed Bank, 7229 SW 54th Avenue, Miami, Florida 33143 and indicate the expeditions from which you would like to receive seed. The seed will be divided among the donors."

Variegated Pinangas

JOHN DRANSFIELD

Herbarium Bogoriense, Bogor, Indonesia

There are over 100 species in the genus *Pinanga* and yet perhaps only seven can be said to be in regular cultivation—*P. kuhlii*, *P. coronata*, *P. insignis*, *P. patula*, *P. disticha*, *P. maculata*, and *P. javana*. This neglect of the genus is quite unjustified as many of the species rival species of *Chamaedorea* in charm, and were it not for the restricted distribution of many *Pinanga* species and their usually low seed output, they might be more widespread in cultivation. In the last three years, while I have been working in the Kebun Raya Bogor, one of the Garden's assistants, Didin Saerudin, and I have collected about 30 different species of the genus and these we are beginning to plant out in the Gardens as they become big enough. All have some horticultural merit, but four species are of outstanding potential in having variegated foliage.

Variegated palms, in which parts of the leaves are without chlorophyll, occur occasionally—I have observed a variegated *Caryota mitis* in a Jakarta garden and sometimes one can find completely achlorophyllous seedlings—though, of course, these ultimately die. To me, the variegated *Caryota* is something of a monstrosity and is not particularly beautiful. The variegation in *Pinanga* is of quite a different nature, being a subtle marbling of light green, dark green, chocolate, and, in young leaves, pink. I have not observed such marbling in any other palm genus. *Pinanga maculata*, a name probably applied to a number of species, has this

marbling. Likewise, *Pinanga kuhlii* can show variegation but it is normally only in scattered individuals and is hardly intense. It is, in fact, not unusual to find faintly mottled *Pinanga* leaves in the forest.

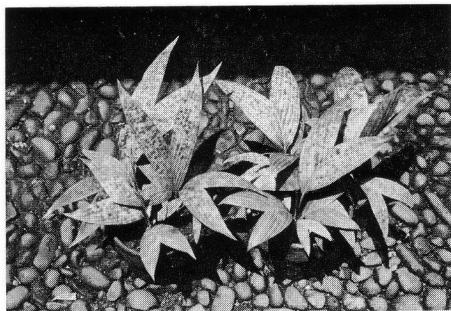
However, in 1971 in Aceh in the far north of Sumatra at 500 meters (1640 feet) altitude, I found a superb variegated *Pinanga*. The leaves are mottled rich dark green and almost chocolate in the centre of the mottles, on a pale blue-green background. In the emerging leaves, the petioles are crimson and the mottling chocolate on a dull pink background. The colouration of the seedlings and the juvenile plants is enough to justify its inclusion in any palm collection; but added to this, the mature plants with their four to five very broad leaflets also show variegation, though not of the intensity of the juveniles. The clustering stems of this species are two to three meters (nearly 10 feet) tall and the suckers show the beautiful intense variegation of seedlings and juveniles. We searched for fruit, and though immature fruit were abundant we were apparently too early in the year for ripe fruit. Thus we had to be content with transplanting seedlings; about 35 survived the week-long journey back to Bogor and after theft have dwindled to 27 robust, fast-growing, jealously guarded plants. Since 1971, I have found this *Pinanga* near Sungei Penuh, near Bukittingii and recently, much nearer Medan, at Bohorok, and I now feel sure that this species is *Pinanga densiflora* Becc., originally de-



1. *Pinanga densiflora* seedling in Aceh, Sumatra.

scribed from the Padang area by Becari as being solitary, but noted by Burret as probably being clustered. Certainly the inflorescence, with its spirally arranged fruit, fits Beccari's original description. This species, like so many *Pinanga* species, is very variable—for example, populations from Bohorok have short stems and vary narrow leaflets, those from Sungei Penuh are taller but still narrow-leafleted, and those from near Bukittinggi are three to four meters tall with broader leaflets. Without doubt, the form from Aceh is the most beautiful; when time and funds permit, another effort will be made to collect ripe fruit.

In October 1972, in the Meratus Mountains of South Kalimantan (Indonesian Borneo), I found another variegated *Pinanga*. It was abundant in humid Hill Dipterocarp Forest at about 600 meters altitude growing on steep hillslopes, and with this species we had much more luck than with *Pinanga densiflora*—we were able to collect about 1,500 seed from five ripe infructescences. These have been distributed to the Seed Bank and the Royal Horticultural Society under the collection number *Dransfield 2837*. Since sending these seed I have found that this species is almost certainly



2. *Pinanga densiflora* seedlings in Bogor one year after transplanting.

Burret's *Pseudopinanga aristata*, originally collected on Gunung Kinabalu by the Clemens. The genus *Pseudopinanga* is probably not distinct from *Pinanga*, but rather than make a premature name change, *Dransfield 2837* had better be called *Pinanga* sp. aff. *Pseudopinanga aristata* Burret. This species, like *P. densiflora*, is clustering but clumps usually consist of only one upright stem, with a few suckers at the base. The stem is stilt-rooted and rarely exceeds two meters; the crownshaft is pale green, and the leaves to one meter or more in length with four to seven broad sigmoid leaflets mottled mid-green and dark green above, and paler below. The infructescence has three to seven pendulous rachillae densely covered in whitish woolly hairs and bearing tiny scarlet fruit in abundance; before the fruit ripens it is normally canary-yellow in colour. The young plants and suckers display the strongest variegation, and the leaves at emergence are tinged a beautiful purplish colour.

I have recently observed two other variegated *Pinanga* species in North Sumatra near Bohorok. One of these is a low, slender, thicket-forming *Pinanga* rather reminiscent of Malayan *P. paradoxa* and probably referable to *P. pulchella* Burret, originally collected from near the Petani Waterfall (Air



3. *Pinanga* species (aff. *Pseudopinanga aristata*) with suckers at the base of a mature tree.

Terjun Sikulikep), Berastagi. Certainly, collections I made at Bohorok are virtually the same as collections I made at Burret's type locality. Stems of this species are red-brown and about 1.5 cm. ($\frac{3}{8}$ inch) in diameter, up to one and a half meters tall, flopping over and suckering at the base. There are about six to seven leaves in the crown; leaves are to 75 cm. long and bear five to six pairs of rather distant, pointed leaflets marbled yellowish-green and dark green. Colouration is most intense in young leaves. The fruits are velvety black borne on crimson rachillae. Like so many *Pinanga* species, this is a poor fruit cropper; nevertheless, I obtained about 50 ripe seed, a few of which have been distributed to the Seed Bank and the Bailey Hortorium under the collection number *Dransfield 3299*.

The fourth variegated species is an intensely mottled form of the widespread *Pinanga disticha* which was extremely common at Bohorok. Unfortunately, I was unable to obtain seed and have had to be content with transplanting a few seedlings.



4. *Pinanga pulchella* at Bohorok, North Sumatra.

The abundance of intensely variegated *Pinanga* leaves in the forest at Bohorok suggests that soil conditions may be partly responsible for the development of colouration. The collections of *Pinanga densiflora* now established for two years in Bogor do not show quite the intensity of colouration as in the wild—they are potted in a rich compost made from humus and rotted stable manure. We must try transplanting them to a poorer medium more akin to that found in the forest to see if the colouration will become more intense.

Experiments in Palm Growing in East Tennessee

JOEL F. LUBAR, PH.D.

University of Tennessee, Knoxville, Tennessee

Each year we discover instances of palms being grown further and further from their native habitat. It has now been clearly established that Mediterranean fan palms (*Chamaerops humilis*) are grown on the coast of Ireland, and even in Edinburgh, Scotland occasional palms are found. *Trachycarpus fortunei* has been grown successfully out of doors both in Kew Gardens near London, England and in British Columbia, Canada. Of course, Ireland, Scotland, England, and British Columbia all have relatively mild winter climates, although the summers are extremely cool.

During the past six years I have been experimenting with several species of palms in Tennessee (Knoxville). Previously a report that was published by Mr. Charles C. Cole of Quebeck, Tennessee (PRINCIPES Volume 17, No. 1, Jan. 1973) discussed his experiments in palm growing which were most dramatic. Before discussing the results of this project let me first describe in some detail the climate of the Knoxville, Tennessee region.

Knoxville, Tennessee lies in the intermountain valley between the Cumberland Mountains and the Smoky Mountains. We are relatively protected for this inland location from extreme variations in winter temperature so that unlike the midwest or more northerly states, where there are severe sudden drops in temperature following cold fronts, we experience a more gradual fall in temperature even when a very

large mass of cold air has passed. This is primarily due to the shielding effect of the Cumberland Mountains. Nevertheless, we do experience some very severe winters. We average approximately 9 inches of snowfall each year. However, there have been several winters during the past 30 years in which the snowfall surpassed 25 inches. Unlike locations along the eastern Carolinas and in Georgia we rarely if ever experience damaging ice storms. Snow falls are generally light and rarely, about once every five years, is there a single snowfall over six inches in depth. During the past 100 years the coldest official recorded temperature in the Knoxville area was -16°F . Generally the temperature reaches an absolute minimum of 0°F or below approximately once every 5 years. However, there have been long periods ranging as much as 15 years in which zero temperatures were not reached; but occasionally zero temperatures have occurred several years in succession. We are technically listed in agricultural climate zone 7 and lie close to the junction of zones 7a and 7b. Depending on microclimate, certain parts of Knoxville are in 7b and others in 7a. This is due primarily to differences in elevation and closeness to the Tennessee river.

The weather during the past 6 years has been particularly noteworthy as it provided an acid test for palm growing. During the year of 1969-1970 there was a severe freeze beginning on January

6 and lasting to the 12th. Then there were 123 hours of continuous temperatures below 32°F and on two days, (January 8-9) the minimum temperature was -1°F and the maximum +11°F on the 8th, and on the 9th the minimum was -3°F and the maximum +12°F. In addition there were winds of 15 miles an hour. During the latter part of that January a second freeze occurred in which the minimum was 0°F and on the next day the maximum was only 19°F. A third freeze occurred in February of that same year with a minimum of -1°F. During the following year, 1970-71, a freeze occurred in which there were 32 hours of below 32°F weather. The low for that year was +3°F. During 1971-72, after a very abnormally warm December in which the average monthly temperature was 9° above normal, a severe January freeze brought the temperature down to 1°F. This freeze lasted for 60 consecutive hours. During 1972 there were long stretches of cold weather with a minimum low temperature of 10°F. During 1972-73 we had an unusual April freeze in which a low temperature of 28°F was recorded on April 10, doing considerable damage to leaves of many trees that had already fully opened. On May 18 an all time low of 38°F was recorded.

With respect to snowfall, in the winter of 69-70 there were more than 25 inches of snow. In the winter of 70-71 snowfall was light, however there was a 3-inch snow during the first week of April. During the winter of 71-72 there was a 6-inch snow fall on March 25, and during 72-73 there was an 8½-inch snow on March 7 and ½ inch of snow on March 21. One of the unusual fortunate aspects of Knoxville weather is that there is a very gradual fall in temperatures which begins in October and lasts

through December. The date of the first average freeze is November 1. Temperatures below +15°F rarely occur before mid-December or early January. Severe long freezes occur between the end of January and the middle of February. The average date of the last freeze* is April 1.

The average growing season here is only about 220 days. In a normal winter there are approximately 60 nights in which the temperature falls below freezing. Often there are several days each winter in which the maximum temperature does not even reach 32°F. In total then, Knoxville offers a very unlikely place for the growing of palms.

My own property is located in a very excellent microclimate. It is on the side of a very large hill at approximately 1100 feet above sea level. We are located halfway up the ridge. We are shielded by the ridge from the prevailing southwest, west and northwest winds so that the severe winds accompanying cold fronts are seen whistling through the trees on top of the ridge with relatively little movement in our location. Nevertheless we do have severe frost pockets and the absolute minimum temperature on my property is often the same as the officially recorded minimum temperature. I keep a very accurate temperature watch using maximum-minimum thermometers and several electronic thermometers located in different parts of the property.

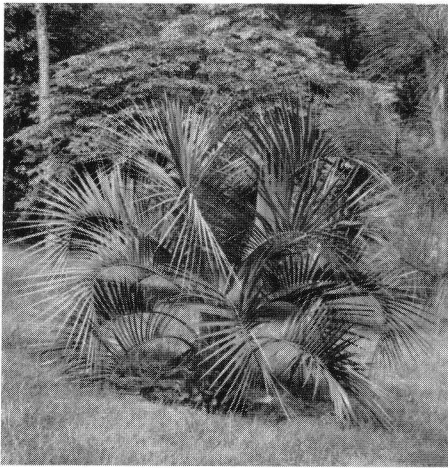
The palm species that I have worked with are *Trachycarpus fortunei*, *Sabal minor*, *Rhapidophyllum hystrix*, *Nannorrhops ritchiana* and *Butia capitata*. Due to our extremely heavy annual rainfall (50 inches) and extraordinarily rich soil, palms grow quite fast in Knoxville. The following are some conclusions that I have reached as a result of six years of experimentation.



1. Author's largest *Trachycarpus fortunei* grown without protection except for the use of a heat lamp on rare occasions. This palm has withstood -6°F and many prolonged freezes.

First, the statement often seen in the palm literature that *Trachycarpus fortunei* is the hardiest palm in the world is *not* true for Tennessee. Probably *Rhapidophyllum hystrix* is the hardiest palm followed very closely by *Sabal minor*. I cannot yet make any statement about the hardiness of *Nannorrhops* since these seeds were only procured last year and still have a full winter ahead of them. Furthermore, these plants are extremely small seedlings at the present time. The largest *Trachycarpus* is planted in a gravel-mulched bed of rich earth next to the house. During the six years that I have had this palm it has grown from a seedling obtained in a one-gallon container to a large palm as pictured in Figure 1 now with fronds almost eight feet above ground. It has already more than four feet of trunk. This palm in the literature is listed as slow growing. This

again is not true for our location. In a good summer when there is plentiful moisture, *Trachycarpus* often develops 20 complete fronds. I keep all of my palms heavily fertilized using a "palm special" mixture which can be obtained from Sears in Florida. This fertilizer contains liberal amounts of manganese sulfate. Fertilization is done twice a year: once in April and again in late June or early July. During the time that I have grown this and several other *Trachycarpus* specimens I have noted that *Trachycarpus* can withstand at least $+10^{\circ}\text{F}$ without any visible damage. With low temperatures the frond segments tend to fold up but no splitting occurs until the temperature drops below $+5^{\circ}\text{F}$. At this point leaf splitting will occur on some of the outer leaves. At 0°F almost all of the leaves are severely damaged except for the central few and the bud is still protected. At -6°F I have lost one small *Trachycarpus*,



2. *Butia capitata* grown for four winters with protection. Specimen shown now has large fronds over six feet high. The tree in the background is the umbrella form of the chinaberry.

but the larger one survived. After the severe winter of 1970-71 I installed two heat lamps several feet above the large *Trachycarpus* for emergency use but these only give approximately 5° of protection for the upper fronds. This maneuver provides a microclimate about the same as Atlanta, Georgia, which averages approximately 5° warmer than Knoxville in winter. This is enough to pull this *Trachycarpus* through without any severe damage when the temperature goes to zero or below. This year the lights have been removed and the palm is on its own. Overall then, in Knoxville *Trachycarpus* should be grown very close to a house or wall and a minimum of protection may be needed. Perhaps with careful selection of seedlings harder specimens might be found which will do better in a more exposed location.

As for *Butia capitata* it too grows very rapidly in Knoxville. The one pictured in Figure 2, was obtained 3 years ago. *Butia* cannot be grown without protection. In winter I erect a sim-

ple plastic framework over this palm and heat lamps, which can be activated through a thermostat, are placed under the framework. I have tested this particular palm's cold tolerance and found that at temperatures below 15°F damage sets in rapidly. Probably temperatures of zero would kill it. During the winter of 70-71 Columbia, South Carolina experienced an 8° above zero reading with two successive daytime highs during that particular January cold spell of less than 32°F. Many butias were killed but quite a few survived even with only the central bud intact. Nevertheless, since *Butia* is a slow-growing palm it is not hard to protect and it is so beautiful that it is worth the effort.

Rhapidophyllum hystrix is the palm of choice for Knoxville, Tennessee. My specimens were obtained through the generous help of Mr. William Manley of Atlanta, Georgia, who suggested I contact Southern States Nursery in MacClenny, Florida. These people have been very kind in providing at a low cost a small number of excellent needle palms. *Rhapidophyllum* is slow-growing, but since it is a suckering palm it puts out many fronds each year. It probably would take 10 years or more for this palm to become really gigantic. In Knoxville it starts growing very slowly in the month of March and begins to grow rapidly in late May, June, July and August. It slows down considerably by October. I have planted this palm as shown in Figure 3 in a completely open location with no protection whatsoever. This palm is completely hardy. It experiences no damage at any temperature thus far experienced in Knoxville including 6° below zero. In fact it is far hardier than many of the native Tennessee plants and broad leaf evergreens planted here. From the reports of Mr. Cole and also Mr. Paxson



3. *Rhapsidophyllum* and to the right a small *Sabal minor*. Neither palm has ever been winter-protected and neither has shown any cold damage.

who lives in northern Arkansas it is probably true that *Rhapsidophyllum* can withstand -10°F and perhaps even colder temperatures for short periods of time. I have complete confidence that this palm could be grown anywhere along the Eastern Seaboard up to New York City or Boston and perhaps inland to Roanoke, Virginia or in Louisville and Lexington, Kentucky. The latter viewpoint has been corroborated by Dr. J. Popenoe in a recent publication (1973). Furthermore, *Rhapsidophyllum* is not bothered by snow, whereas snow can weigh down and damage the fronds of *Trachycarpus*. *Trachycarpus* should have snow brushed off the fronds for this reason. *Rhapsidophyllum* sheds snow more readily.

Sabal minor is virtually unobtainable in any nursery. I don't know of any specimens that can be purchased. Mine were gathered from the wild in South Carolina where they can be seen grow-

ing in forests within 40 miles of Greenville. This palm has also been described by Mr. Manley as growing in the wild only 75 miles south of Atlanta, Georgia. *Sabal minor* is extremely slow-growing but it has several interesting properties. First, seeds of *Sabal minor* planted in the ground in Knoxville not only survive our winters, but then after a period of one or two years germinate. Seedlings grow to a size of three or four inches the first season and have been completely winter hardy. Thus far my *Sabal minor*, of which I now have many growing in the woods and various open spots on the property, have up to seven fronds and have experienced temperatures of 0°F . There is no significant damage at this temperature. The most that can be seen is some minor burn on the tip of some of the old fronds. This would lead me to estimate that the palm is probably hardy to around 5° below zero. Certainly it could be

grown in Knoxville, perhaps in a somewhat protected location without any special care whatsoever.

I have not tried *Sabal palmetto* since this palm has been known to freeze out in Atlanta, Georgia and occasionally they are damaged in Columbia, South Carolina. There is a large specimen of *Sabal palmetto* grown from a seedling located only 40 miles from the mountains of South Carolina in the town of Laurens, South Carolina. Perhaps genetically selected specimens could survive in Knoxville once they had achieved a large size. But even if placed in a very protected location *Sabal palmetto* would undoubtedly experience a great deal of damage in many of our winters.

Other plants that I have tried along with palms and which do extremely well and will grow to maturity in Knoxville include both southern live oak and *Quercus acuta*, the Japanese live oak.

Slash pines also do very well here and I have grown two species of *Eucalyptus*, *Eucalyptus niphophila* and *Eucalyptus gunni*, both of which seem to be adapted to this climate.

Currently at least one of the nurseries in Knoxville has taken a serious interest in my experimentation with my palms and other exotic subtropical plants and hopefully will consider supplying needle palms for interested buyers in the area. Every effort should be made to propagate and further test *Rhapidophyllum*. This palm is very showy and if obtained in the larger sizes could provide a striking addition to temperate and even many northern gardens.

LITERATURE CITED

- POPENOE, J. The hardiest palms, *Fairchild Tropical Garden Bulletin*, 28(2), April, 1973.

PALM QUESTIONS AND ANSWERS

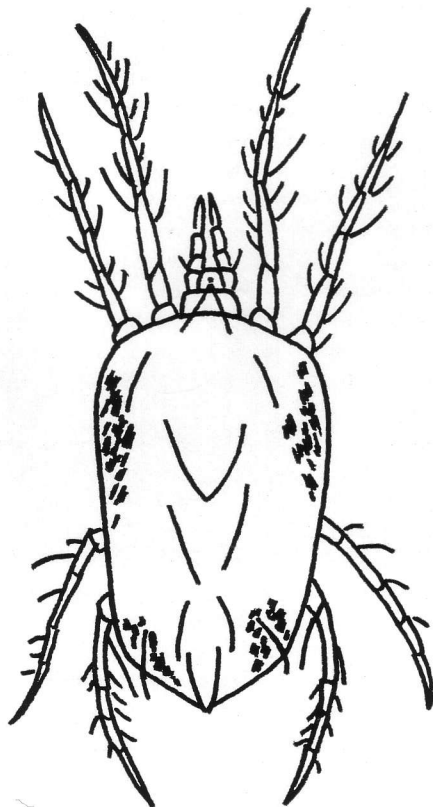
- Q. I have recently lost several palm seedlings. They were covered with small spider webs. What killed these and how can I prevent this in the future?
- A. Your problem is spider mites or "red spiders" which are among the most common pests which attack palms. They are more closely related to spiders and ticks than to insects and thus require special miticides to control them. Remember they are not insects and in general cannot be controlled with regular insecticides.

Most seedling palms, like blades of grass, are especially susceptible to these mites, being very small and tender. The mites have needlelike piercing mouth parts which they use to puncture and suck the sap from

the leaves and tender parts of the stem, causing them to become discolored, often stippled yellow, gray or brownish in appearance. This injury weakens the seedlings and heavy infestations may kill the young plants.

Certain palms, such as *Pigafetta*, are especially tender in the seedling stage and are highly susceptible to spider mites. Older plants, once established in the ground in South Florida, appear not to be as susceptible. Palm seedlings grown under glass, whether in Florida, California, northern cities in the United States or the true tropics, are often highly susceptible to spider mite injury.

Most spider mites spin, on the undersurface of the leaves, a fine silken web containing their eggs and are most damaging in hot, dry



weather, when a life cycle (from egg laying to adult) can be completed in as short a time as seven days with many overlapping gen-

erations per year. In Florida, populations are high in April and May and also again in October.

Home gardeners often do not realize mites are present until the damage is severe, because these pests are so small and because they are usually more numerous on the underside of the leaves.

One of the most important aids in successful mite control is to begin treatment before damage becomes severe. Inspect your plants frequently with the aid of a magnifying glass and treat promptly when damage becomes evident, using an effective miticide. Two applications five to seven days apart are required for satisfactory control. Be especially careful to spray underneath the leaves. Continue to inspect your plants throughout the year and apply a miticide when needed followed by a second application five to seven days later.

It is a good practice to water or irrigate your plants one to two days before applying the miticide (or applying any pesticide). Some materials injure plants when there is a shortage of water. Be sure to read

Table 1. List of miticides.

MITICIDE	AMOUNT Per gallon of water
Chlorobenzilate 25% WP	1 teaspoon
Kelthane 18½ EC	2 teaspoons
Kelthane 18½ WP	2 tablespoons
Kelthane 35% WP	1 tablespoon
Tedion 25% WP	1 tablespoon
Ethion 25% EC plus	2 teaspoons ethion plus
summer oil emulsion	2 tablespoons oil emulsion
Malathion 50-75% EC plus	2 teaspoons malathion plus
summer oil emulsion	2 tablespoons oil emulsion

Dimethoate and Meta-Systox-R will give some control of mites if applied before populations become heavy. Apply according to directions on the container label.

the manufacturer's label carefully and follow the directions.

A general list of miticides is presented below along with a highly magnified illustration of a common spider mite. Wettable powders (WP) are usually safer than emulsifiable concentrates (EC). A spreader-sticker used with the miticide will result in better coverage on waxy palm leaves and thus better control of the spider mites.

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended, and no endorsement by the Cooperative Extension Service is intended.

DEARMAND HULL

*Extension Agent—Ornamentals,
Palm Beach County, Florida
531 North Military Trail,
West Palm Beach, Florida 33406*

PALM BRIEFS

Commercial Propagation Of Two Little Known Ornamental Palms

Two attractive feather palms, *Hedyscepe canterburyana* and *Lepidorrhachis mooreana*, have been known for about 100 years, often listed as *Kentia canterburyana* and *Kentia mooreana*, the latter also as *Clinostigma mooreanum*. Both are arecids, and there is only one species in each of the two genera. Endemic to the higher elevations of the extinct volcanoes Mt. Lidgbird and Mt. Gower of Lord Howe Island, they are palms of subtropical climate, the island being situated between Australia and New Zealand in the South Pacific, just below the 30th parallel of the Southern Hemisphere.



1. *Hedyscepe canterburyana* on Lord Howe Island.

Together with *Howea forsteriana* and *H. belmoreana* they are the only palms native on the island and are exclusively endemic to this little island. *Hedyscepe* and *Lepidorrhachis* differ from *Howea* mainly in having crownshafts which are missing in *Howea*.

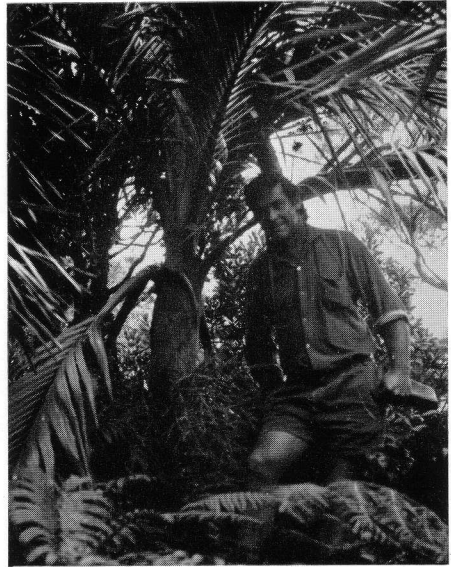
Seed of *Hedyscepe* is large, about two inches long; seed of *Lepidorrhachis* is small, about one-fourth inch round. Harvested by hand, carried by backpack off the mountains because of their near inaccessibility, the seeds are shipped by steamer to Sydney, Australia, to be repacked in wooden boxes with decomposing fibrous banyan tree compost from the island as packing medium, 2000 *Hedyscepe* seeds per two-bushel box. After arrival by boat and fumigation under auspices of the USDA Division of Entomology and Plant Quarantine the seeds are planted into 6 ft. × 24 ft. sterilized electric hotbeds, soil temperature regulated to 75° F. Propagation medium consists of 50% Canadian peat (fine

grade), 50% Perlite #2, well mixed with a penetrant (water-in).

The much smaller seeds of *Lepidorrhachis* are shipped by airmail and reach us within a few days. Should any of the seeds show signs of dryness, which they normally don't, they would be soaked in water for 24 hours. Only in the last three years have we been able to secure *Lepidorrhachis* seeds in commercial quantities, firstly because of generally low demand, secondly because the seed clusters continuously have been subject to rat damage on the island, so heavy at times that no crop was harvested at all. The seed bunches now are being protected by wire cages. Propagation of *Lepidorrhachis* takes the same procedure as *Hedyscepe*.

Time of germination is very uneven, beginning scarcely after four months, heaviest after six to seven months. First potting of seedlings is after seven to eight months, second potting after 12 months. The remaining unsprouted seeds then are lifted out, put through a water test, floaters discarded, balance replanted into hotbeds for further germination which might take as long as another year. Germinating seedlings too small for transplant are carefully put back under glass also. This troublesome, lengthy method is used because of the scarcity as well as the cost of seeds (payable in Australian dollars).

Total germination percentage varies greatly with quality of seeds; 50-60% is considered good; lesser percentages are often experienced. We strive and experiment for better germination, of course, as we have seen test charts at the commissioner's office on Lord Howe Island showing 85-90% germination. As of today, apparently, we have not equalled the climatic growing conditions as they exist in the native habitat.



2. *Lepidorrhachis mooreana* grows on the summit of Mt. Gower, Lord Howe Island. Max Shick provides scale.

The young seedlings of *Lepidorrhachis* are potted into 2½-inch rose clay pots. We have gone back from plastics to clay for better soil aeration, avoidance of root rot, rhizoctonia and water-mold. Seedlings of *Hedyscepe* are too large for size 2½ and require 4-inch pots. They are by far the best root-builders of the four palms of Lord Howe Island, with strong main, almost tap roots as well as a heavy ball of fibrous roots. The sturdy monocotyledonous spikes developing into first leaves are representative of the heavy, almost leathery quality of the leaves and are indicative of the strong later growth of the palm which, however, remains graceful and of moderate height.

Potting mix: four parts sandy loam, two parts forest humus, two parts Nitrohumus or black peat plus a trace amount of slow-release fertilizer.

By gradual repotting the young

palms are brought to salable size after five to six years, large ones as many as nine to 10 years, a time and capital investment which is warranted only by high desirability, a steady demand from exacting customers in the decorating and landscaping profession.

Hedyscepe has proven its value in coastal areas of southern California as a distinguished, graceful, medium-sized palm with a silvery crown shaft on a thin-ringed trunk.

Lepidorrhachis is of high promise of like qualities, but miniature, a dwarf 'kentia,' although not a *Kentia* nor a *Howea* at all. Both species are considered to be cold hardier than the howeas. In total there does not seem to be much external difficulty propagating these two extraordinary, lovely debutantes, except for one single factor: PATIENCE.

OTTO MARTENS
Goleta, California

NEWS OF THE SOCIETY

The Biennial Meeting Miami, Florida, U.S.A. June 22, 23 & 24, 1974

Fairchild Tropical Garden with its wealth of palms will be the scene of this meeting. Members will be arriving on Saturday and are invited to a Welcoming-Reception being given by the South Florida members. Registration will be Sunday forenoon at the Garden where the Biennial Meeting will take place at 1:30 p.m. After the business meeting and election of officers and directors, a panel will discuss palm seed germination and the growing of seedlings. Panelists are Nat DeLeon, originator of the Seed Bank, Stanley Kiem, Superintendent of Fairchild Tropical Garden, Otto Martens, retired nurseryman and former Palm Society President, Bill Mowry and John Turner, enthusiastic and suc-

cessful amateur growers, and Dr. U. A. Young who has grown many thousands of seedlings after having collected the seeds himself. After the Banquet that evening, Dr. H. E. Moore, Jr. will address the gathering on "Palms and Islands".

On Monday tours are planned of the world-famous Jennings Estate with its magnificent mature palms, Nat DeLeon's garden containing not only palms but also orchids and bromeliads, Paul Drummond's palm garden in a native "hammock", and John Turner's atrium with its plantings of rare palms and other exotics. That evening members will gather on the bayfront of the Buhler's garden for a box supper and program of slides.

Tuesday some may elect to fly to Nassau to see the Langlois palm collection. Others will take a bus trip along the legendary Florida Keys to Key West, visit one of the outstanding attractions in Miami such as the Parrot Jungle with its beautifully landscaped plantings under the care of Nat DeLeon, or go to the Seaquarium, Orchid Jungle, etc.

Wednesday some hardy souls will take off for Colombia to explore some of its jungles, to photograph native palms and, hopefully, to collect seeds.

All in all, this Biennial promises a wealth of palm experiences and we look forward to seeing you there.

New Treasurer

Brian T. Gaine was elected Treasurer of The Palm Society in April upon the transfer of former Treasurer W. E. Manis from Miami to Thailand. Brian was born in New York in 1940 but moved to Miami with his family in 1952. He attended a local high school, then the University of Miami, graduating with a degree in Law in 1964. Admitted to the Florida Bar in 1965 he now prac-

tices law with his father. His wife, the former Lynn Rioux of Evanston, Illinois, was a stewardess with National Airlines. They enjoyed the privileges of traveling accorded airline employees, even having flown to Thailand from where they returned with some special types of sprouted coconuts which they carefully carried home in their arms. Traveling is no longer as easy since they now have a one-and-a-half-year-old daughter.

Brian started collecting palms about four years ago and has some 20-30 species. Though his first love was palms, he started to gather orchids into a sizeable collection while waiting for his palms to grow. Now he is finding that many of his orchids like to grow on palm trunks and he is delighted to be able to combine his interests. He is an avid rare plant collector so his collections will continue to grow. He is Chairman of the prestigious International Orchid Show to be held in Miami February 22, 23 and 24, where he will feature many rare and beautiful palms in the central theme, thus exposing ever more people to the Princes of the Plant World.

Hybridization

An observation recently made by Nat DeLeon who started the Palm Society Seed Bank, indicated that *Coccothrinax* must be added to the genera whose species can interbreed if planted near each other under cultivation. Therefore, when seeds come from botanic or other gardens having a fairly large palm collection, one cannot be sure plants produced from seed of the following genera will come true:

Caryota, *Chamaedorea*, *Coccothrinax*, cultivars of *Cocos nucifera*, *Dictyosperma*, *Latania*, *Phoenix*, *Ptychosperma*. It is also suspected of other genera as, for instance, *Washingtonia*.

Hardest Palms

A sequel to *The Hardest Palms* reprint, as described in *Principes* 17: 108 is now available. For an additional 25¢ those who have already sent for the first reprint can now get the second. Those who wish both reprints may make payment of 75¢ in US coins or stamps, to the office of The Palm Society, 1320 S. Venetian Way, Miami, FL 33139, USA. Foreign members can add this amount to money sent to the Seed Bank or to next year's dues.

* * *

The Palm Society is growing at a gratifying rate. We now have 810 members on our mailing list! We welcome the many new members and hope to see many of them at the Biennial.

* * *

Notice has been received of the death at Palm Beach, Florida, in January of Mrs. James C. McCurrach, a member of The Palm Society and widow of James C. McCurrach who wrote *Palms of the World* to satisfy his need for a single source book on palms.

* * *

Mrs. Spero J. Yianilos of 7727 Look-out Drive, La Jolla, California 92037, has written concerning a fossil fan palm leaf four feet wide and eight feet long from the Green River Formation of southwest Wyoming that is for sale. Anyone interested in purchasing this unusual and valuable piece should contact Mrs. Yianilos direct.

T. B. BUHLER

LETTERS

20.000—RIO DE JANEIRO, GB
MUSEU NACIONAL—ZC.08
QUINTA DA BOA VISTA, BRASIL

I am sending photos of two very in-

teresting and unusual individuals of *Cocos nucifera*. They live on a beach



named Pitibú, State of Paraíba, north-eastern Brasil, among many others of normal shape. As you can see, one has the stem with a graceful curve and the other has the stem divided in many branches. Perhaps they will be useful for PRINCIPES as curiosities.

LUIZ EMYGDIO DE MELLO FILHO



STATEMENT OF OWNERSHIP, MANAGEMENT, AND CIRCULATION OF PRINCIPES, JOURNAL OF THE PALM SOCIETY, REQUIRED BY ACT OF 23 OCTOBER 1962: SECTION 4369, TITLE 39, UNITED STATES CODE, FILED 11 SEPTEMBER 1967.

PRINCIPES, JOURNAL OF THE PALM SOCIETY is published quarterly at 1320 S. Venetian Way, Miami, Florida 33139. General Business Offices: 1320 S. Venetian Way, Miami, Florida 33139. Publisher: The Palm Society, 1320 S. Venetian Way, Miami, Florida 33139. Editor: Dr. H. E. Moore, Jr., Cornell University, Ithaca, N. Y. 14850. Managing Editor: None. Owner: The Palm Society, 1320 S. Venetian Way, Miami, Florida 33139.

The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of the total amount of bonds, mortgages, or other securities are: None.

CIRCULATION:	Average number of each issue during preceding 12 months	Actual number of copies of single issue published nearest to filing date
A. Total no. of copies printed	1125	1100
B. Paid Circulation		
1. Sales through dealers and carriers, street vendors and countersales	0	0
2. Mail Subscriptions	767	799
C. Total paid circulation	767	799
D. Free Distribution by mail, carrier or other means		
1. Samples, complimentary, and other free copies	2	2
2. Copies distributed to news agents, but not sold	0	0
E. Total distribution (Sum of C and D)	769	801
F. Office use, left-over, unaccounted, spoiled after printing	356	299
G. Total (Sum of E & F-should equal net press run shown in A)	1125	1100

I certify that the statements made by me above are correct and complete. Signed, Mrs. Theodore C. Buhler, Executive Secretary.