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Cover Picture

The crown of *Jubaea chilensis* is framed against the sky in California. Photo by Ken Foster.

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The Use of Palms by the Barí Indians of the Maracaibo Basin

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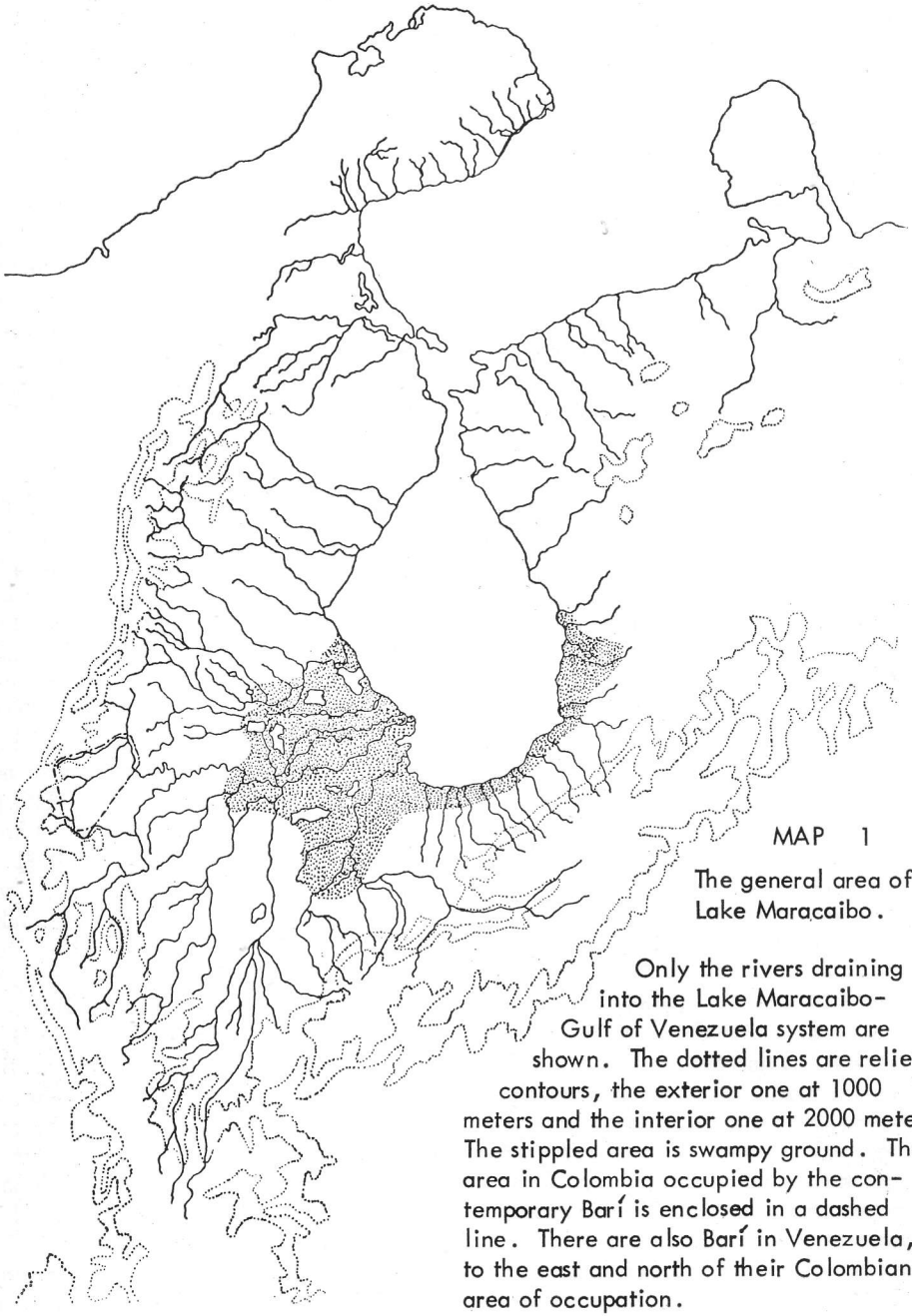
The Barí are a small tribe of slash-and-burn cultivators who inhabit the tropical rain forests of the southwesternmost lobe of the Maracaibo basin. I did anthropological fieldwork with the Barí between January 1970 and December 1972. Their homeland, sometimes called Motilonia in reference to the Spanish name for the Barí, *Motilones*, is bisected by the border between Colombia and Venezuela. The location of the area is shown on Map 1, and rainfall data are given in Graph 1. The average yearly temperature is about 27 degrees Centigrade, and the monthly fluctuation from this mean is only about a degree. Altitude ranges from 25 meters above sea level to an upper limit (within the general area of Motilonia) of over 2000 meters. Nevertheless, as will be pointed out below, the Barí do not establish permanent occupations above 600 meters.

These people cultivate sweet manioc (*Manihot esculenta*) as their major crop; bananas (four cultivars of *Musa*) are of secondary importance. Minor crops include avocados, pineapples, sweet potatoes, yams, sugarcane, peppers, and (perhaps a recent introduction) squash. Cotton is also cultivated.

This high carbohydrate garden is supplemented by fish, mostly *Prochilodus reticulatus*, the *bocachico*, in order to yield a diet adequate in protein during most of the year. Wild game is also hunted, and as will be seen below, there is yet another source of protein to which the Motilones can have recourse when hunting and fishing fail. In addition to cultivated crops, the Barí make extensive use of the wild vegetable products that can be obtained from the rain forests of their environment.

Of all the flora of the forest, palms are probably the most significant family for the Barí. The following genera are listed as occurring in the Zulia region of the southwest Maracaibo basin (just across the Venezuelan border from Colombian Motilonia) by the Venezuelan Ministerio de Agricultura y Cria (Veillon 1961: Cuadro 5): *Euterpe*, *Jessenia*, *Manicaria*, *Maximiliana*, *Sabal*, and *Scheelea*. In the Colombian section of the region are also noted (Morelo 1971: 16) *Oenocarpus* and (Rochels and Rincón 1971: 51–2) *Copernicia*, as well as (Neglia and Hernandez 1971:1:62) *Socratea* and *Aïphanes*. To this list we can add *Geonoma* (cf. Braun 1968:54), and probably a good many others. Some of these others were important enough to the Barí that I made an effort to photograph them but did not collect botanical specimens. These additional palms were tentatively identified by Dr. Robert Read of the Smithsonian Institution, who cautioned that my photographs were not sufficient to make an unequivocal identification in all cases. Nevertheless, he offered two additional genera, *Bactris* and *Astrocaryum*. The total list of 15 genera from a single family (some of them like *Geonoma*, containing dozens of different species) gives some idea of the floristic richness of the vegetation of Motilonia. Such is especially the case when it is recognized



MAP 1

The general area of Lake Maracaibo.

Only the rivers draining into the Lake Maracaibo-Gulf of Venezuela system are shown. The dotted lines are relief contours, the exterior one at 1000 meters and the interior one at 2000 meters. The stippled area is swampy ground. The area in Colombia occupied by the contemporary Barí is enclosed in a dashed line. There are also Barí in Venezuela, to the east and north of their Colombian area of occupation.

that the region has barely been studied, and that of the palms alone there are probably several more genera waiting to be found.

Dugand (1961:138–40) reports some interesting observations concerning the altitudinal tolerances of various palms. Of those that concern us here, *Jessenia*, *Oenocarpus*, and *Bactris* "thrive most abundantly below 2000 feet," or are "usually lowland-inhabiting genera," while *Astrocaryum* is restricted to these lower altitudes. Only *Euterpe* and *Geonoma* have really wide altitudinal ranges, and *Scheelea*, while it may reach above 4800 feet, has its main realm in "the ferest and open woodlands of the lower zone." It is thus plain that the only zone in which the association of palms that are most important to and most heavily exploited by the Motilones can be found in abundance is the lowland tropical forest, below 2000 feet (approximately 600 meters), which is also the upper altitudinal limit of Motilón dwellings. (I am not suggesting that Barí and palms are coextensive because of the total reliance of the former on the latter. There are a number of reasons for the unwillingness of the Barí to go over 600 meters for any prolonged stay. What is significant here is that 600 meters is a boundary for so many living creatures.)

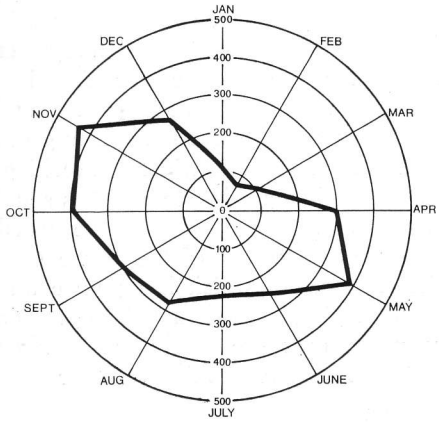
Be that as it may, it happens that palms are extraordinarily important to the Barí, and a healthy percentage of the genera just enumerated is actually used by them in one way or another. A summary of the ways in which a particular species is utilized will help to orient the discussion of the species itself.

The leaves of *Geonoma* are used to thatch houses. All species of the genus used by the Barí are small, understory palms. When young they are stemless and appear to be nothing more than a few small, pinnate leaves springing up from the ground. The pinnae are wide with respect to the size of the whole leaf—a typical leaf might be about 30 centimeters long by 30 centimeters wide with pinnae six or eight centimeters in width—and do not taper or fold together as they approach the rachis. In addition, the entire leafstalk, both petiole and rachis, is flexible enough when green to be bent double without breaking. *Geonoma* thus yields a leaf that is small enough and flexible enough to be folded into the latticework of the frame of a Barí house, but which has pinnae that lie flat and are broad enough to provide complete coverage of an area when several leaves are folded together in a bunch.

Braun (1968:8–9) observes that it is probably the abundance of *Geonoma* palms, rather than their other properties, that accounts for their popularity as roofing material. (The Waika Indians of the Orinoco basin also thatch their houses with *Geonoma*, yet, "the leaves of *Geonoma* species are by no means very durable.") It is the fact that they may be acquired in great numbers that makes them desirable. Braun estimates that 100,000 *Geonoma* leaves are needed to thatch a Barí communal house. While I was in the field, a photojournalist, Peter Frey, observed and photographed the construction of a large communal house across the river from the mission at Iquiacarora. He took notes not only on the quantity of materials used in construction but also on the time the women spent in fetching the leaves. From his figures it is possible to derive an estimate for the number of leaves used in the house and for the size of the area from which the leaves were collected.

Frey computed that far in excess of 100,000 leaves were used in the construction of the house. He observed that the women who were collecting the leaves were never gone for more than two hours in gathering their materials. Moreover, they did not cross the river which was only a few hundred meters

Graph I. Rainfall in Motilonia (millimeters)

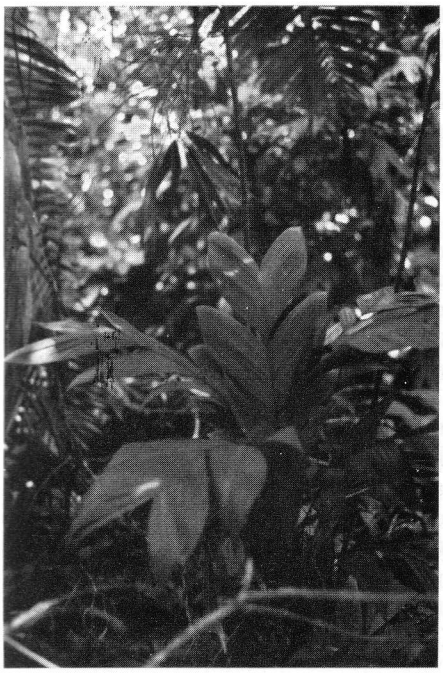


away from the house. The area in which they were collecting, then, was at most a semicircle whose radius was, at a generous estimate for the amount of ground covered in an hour on jungle trails, five kilometers. Most of the *Geonoma* that are picked for use in house thatching have only a half dozen or so leaves. Thus, even for Braun's lower estimate of 100,000 leaves per house, there must have been over 400 *Geonoma* plants per square kilometer to provide the necessary material.

However, Frey figured that more than 750,000 leaves went into the thatch of the house he was observing, and that is the house to which the collecting radius estimates pertain. Frey's figure is probably quite correct for the house he watched being built. Therefore, a more probable estimate for the number of *Geonoma* palms is 3,000 per square kilometer. While this figure must include a large number of different species, it is still impressive for a single genus to achieve such abundance in the highly diverse tropical rain forest. A more qualitative idea of the ubiquity of *Geonoma* spp. can be gained from the fact that the Barí word for *Geonoma, soaira,* is also the generic word for "leaf."

Another palm genus that is common, though by no means so omnipresent as *Geonoma,* is *Bactris.* The species used by the Barí is cluster stemmed and relatively small for a palm tree, having stems three or four centimeters in diameter and four or five meters tall. The stems are lavishly decorated with vicious spines that make backing into a *Bactris* an experience that never grows dim. The spines are sometimes used opportunistically as toothpicks, and the sweet fruits are occasionally eaten, but it is the stems that are the major useful product. From their iron hard and very springy wood are made the small bows that the Barí use for all sorts of small animal hunting—from vermin like snakes to small birds and various kinds of fish. One particular species, *Bactris major,* is known from near the Barí area (Braun 1968:38), and it is probably this species that accounts for most of the members of the genus used by them. *Bactris* apparently grows quite fast. I once saw a clump of *Bactris* among the second growth invading a Barí field that was in exceptionally bad need of weeding. They were a good four meters tall, yet, judging from the rest of the successional flora in the field, they were not more than a few years old.

Still another palm used for its wood is the large *Astrocaryum.* The species used by the Barí is tall and solitary, and shares the characteristic of the genus of having spines every bit as nasty as those of *Bactris.* The wood of the particular *Astrocaryum* species used by the Barí is the material of the large bows used for serious hunting (large birds and mammals), of the long spears used for fishing, and of the arrow points for the bird and barbed arrows. Because so many barbed arrows are made during the course of a year, for use as ceremonial trade items as well as weapons, a great deal more *Astrocaryum* wood is used by the Barí than



1. A species of *Geonoma* in the forest of Motilonia.

Bactris wood. My impression is that this disparity is not entirely compensated for by the greater size of the *Astrocaryum* tree. That is, there is a heavier exploitation of *Astrocaryum* than *Bactris*, in terms of numbers of individuals cut down per year. On the one occasion that I observed the felling of an *Astrocaryum* for wood, some of the faintly sweet "pith" in the center of the split trunk was removed for munching on, as something somewhere between a snack and a piece of chewing gum. As far as I am able to determine, *Astrocaryum* is widely used by indigenous groups in South America for fiber—taken from the leaves—but has not been reported as a source of bow wood (Perez Arbelaez 1956:567–8; Dugand 1961:142; Braun 1968:32; Dugand 1972:65). A Barí man once told me that his bowstring was made from *Astrocaryum*, although at the time I believed he was speaking loosely about the whole bow, and just happened to be touching the string. Another fiber is used much more commonly for bowstrings, that taken from the leaves of *Aechmea magdalenae*, a relative of the pineapple. Finally, Motilón large bows may be made occasionally from some of the larger, solitary members of the genus *Bactris*, which are well known among other indigenous groups for this use, and which may be similar enough for the purposes of the Barí that they are lumped together under the same word used to identify *Astrocaryum*.

I was told by the Barí that the canelike leafstalks (petiole plus rachis), which are split open, scraped free of inner pith, and used in segments one-half to one centimeter wide to weave mats, come from immature *Oenocarpus* trees, which we shall consider below as an important food source. However, when these leafstalks are picked, the tree from which they come is so immature that there is nothing to be seen of it but clusters of leaves coming out of the ground, making reliable identification impossible. Given the Barí's sometime practice of oversimplifying their explanations, I prefer to suggest the possibility that *Oenocarpus* also provides mat-making materials, rather than state this as a fact.

Moving now to palms exploited primarily as sources of food, we can take up these species in order of least to most important. As a preliminary matter, it is interesting that heart of palm, which can be obtained from many species, is sometimes eaten by the Barí, but always as a by-product of another activity. They are well aware that the embryonic leaf tissue is edible and in fact tasty, but I never observed them to cut down a palm tree simply for the purpose of getting heart of palm. However, if in the course of clearing ground for a field they had to chop down a young palm with a heart of reasonable

2. A felled specimen of the *Oenocarpus* used by the Barí.

size and accessibility, they would hack it out and bring it home for dinner.

With respect to palms exploited for their edible fruits, one general problem is the interface of ripening time with actual consumption. Tropical plants in general are less than synchronous in their flowering and fruiting cycles, and individuals may respond to influences, such as parasite cycles, that are far less uniform than whatever seasonality may be present. In addition to the problem of the spread around the mean fruiting time exhibited by different trees, there is the allied problem of the length of time the fruit stays on the tree. Aside from edaphic factors, which may affect the speed of ripening, there is the whole question of what other animals besides man may harvest a particular fruit crop. Compounding the above caveats is the fact that the availability of more favored resources may cause the Barí to ignore a particular palm fruit even though it is available.

All of this is to say that although my field notes are quite specific as to when the group of Barí that I was living with did eat a particular palm fruit, the fact that the group did *not* eat those fruits at some other time does not mean very much. They might have been locally unavailable due to some factor (microclimatic differences, a local concentration of seed predators, early overexploitation by the Barí, etc.) that did not influence their availability only a few hours walk away, or they might have been present but unused due to an abundance of more preferred foods. To determine the relationship of consumption to actual broad-area availability would require broad regional data on ripening times that I simply do not have. Therefore, the following statements as to the times of major consumption of a particular palm fruit must not be taken to indicate a seasonal round in the production of the fruit itself. Such statements refer only to the behavior of the Barí, and, since I was never with more than one group of Barí at a time, are subject to sampling error insofar as they represent the flora of the region as a whole.

One genus of palm exploited for its edible fruit is *Scheelea*. As in the case of heart of palm, the only time I observed the consumption of *Scheelea* fruit was in connection with the clearing of land, and the tree was probably felled for other reasons than the acquisition of its fruits. These were nearly or quite ripe at the time (mid-March) and were cracked open for the oily seeds inside, which had a subtle taste, a bit like fresh coconut. They were evidently considered quite a delicacy. It is possible that the frond ribs used for small vermin-shooting arrows, which are taken from the fronds of a stemless, enormously long-

fronded palm, come from immature *Scheelea*, which develops extremely long leaves while in the juvenile, stemless state (Braun 1968:82).

Considerably more important as a foodstuff is a palm which was identified by Dr. Read as being either *Euterpe* sp. or *Prestoea* sp. I have been able to find reference to only one species, *Euterpe karsteniana*, known from the general area of Motilonia (Wessels Boer 1970: 333). The plant exploited by the Barí may well be this one, or it may be another *Euterpe*, as yet not reported from the southwestern Maracaibo basin. *Euterpe karsteniana* is a reasonable guess judging from the description in the literature and from what I know of the plant from having eaten it. This thin but fairly tall palm with a single spineless stem is exploited by the Barí for its fruits, which are dark blue and about a centimeter in diameter. They can be eaten uncooked. One pops a handful into the mouth and chews away until the oily inner layer of pericarp—the mesocarp—has been gnawed and sucked away. Then the seed and remaining skin are spit out, leaving a blue-stained mouth. In addition to fat, it is likely that the pericarp contains some protein. The major time of consumption for these fruits seems to be from February through June, although I recorded some eaten in other months.

The probable *Euterpe* fits naturally into a group with two other palm fruits, both as regards their phylogenetic position and their place in the Barí diet.

The first of these two is the fruit of a palm of the genus *Oenocarpus*. The species in question is a spineless cluster-stemmed palm that produces bunches of purplish-black fruits about the size and shape of cocktail olives, ovoids about one and one-half by two centimeters. There appears to be only one species known from either Colombia or Venezuela that fits with my notes about this tree and Dr. Read's assurance that is an *Oenocarpus*. That species is *O. mapora*, which is known from the vicinity of Motilonia (Dugand 1940:50; Wessels Boer 1970:326).

These fruits must be cooked very slightly before eating. Putting them in a pot with water and barely bringing the water to boil is sufficient. The skin is too crumbly to pop them in the mouth and chew the pericarp—trying that procedure fills the mouth with crumbs of inedible outer rind (exocarp) as well as inner, pulpy mesocarp. The proper technique is to ease the whole pericarp off the nut in two or three large pieces, then scrape the mesocarp from the exocarp with the thumbnail. The pasty pulp that collects on the nail tastes slightly like Brazil nuts. It is high in fat and very probably similar in protein content to the next species treated below, which is even more important in the diet. I recorded the consumption of *Oenocarpus* fruits in all the months from October through April, inclusive, with the exception of December.

The last and most important of the group of three related palm fruits under discussion comes from a tree of the genus *Jessenia*. The tree is a large (10 to perhaps 20 meters tall) solitary and spineless palm. The fruits are purple-black ovoids about the size of jumbo olives, three to four centimeters long by about two centimeters in diameter. They are prepared and eaten in the same way as the *Oenocarpus* fruits discussed above, except that they require a bit more cooking. *Jessenia repanda* is mentioned by Dugand (1940:50; 1944:450–1), as being known from the Catatumbo basin. He hints that it may be conspecific with *J. polycarpa*, a much better known and more widely distributed species. As was the case with all the other species of palm for which specific

names were presented, the identification is by no means beyond doubt. According to Dr. Read, however, the tree is almost certainly of this genus. To a greater degree than either of the other two palm fruits under discussion here, these jessenias provide a substantial meal. As would be expected from their greater size, the pulp layer of the pericarp is considerably thicker as well as greater in surface area, and one can actually get full on a meal of *Jessenia* fruits and manioc. I have recorded the consumption of these fruits in the months from February to October, inclusive, with the exception of May and July. A dietary contribution of *Jessenia* that has to do with a nonfruit product of the tree is discussed below.

It is a common occurrence, when a hunting expedition is on its way home empty- or light-handed (or on the rare occasions when a fishing expedition is in the same lamentable situation) for it to stop for a moment on the trail and send a boy or young man up an *Oenocarpus* or *Jessenia* (more rarely a *Euterpe*) tree to pluck a bunch of fruit. The hunting party seldom has to go more than a few meters from the trail to find a suitable tree. These palms, then, from Barí point of view, provide an easily accessible and rather dependable substitute for meat. The question of the quantity and quality of this substitute of course arises.

In discussing the value of this meat substitute, I am forced to rely on the rather numerous but very spotty citations in the literature. Nevertheless, because my notes deal more with the amount and manner of fruit consumption by the Barí than with the amount and manner of fruit production by the trees in question, this step is unavoidable.

In the most recent revision of palm classification, Moore (1973) groups *Jessenia*, *Oenocarpus*, *Prestoea*, and *Euterpe* together into a single alliance having only two other members. An alliance is the smallest supergeneric unit that Moore recognizes, and it is reasonable to posit that statements true for one genus may also apply, in a limited way, to the other genera in question. The alimentary possibilities of both *Jessenia* and *Oenocarpus* have received some attention in the literature, in that they are exploited on a small scale by Colombian and Venezuelan homesteaders for the oil that can be extracted from the fruits and for the beer that can be made from infusions of the pericarp. (The most common Spanish names given the two genera seem to be *seje* and *milpesos*, which refer to *Jessenia* and *Oenocarpus* respectively, according to Dugand (1972:57); but which apply to either genus indiscriminately according to Perez Arbelaez (1956:575, 577).)

Dealing first with quantitative aspects of the dietary contributions of these palms, Dugand (1972:52ff), in discussing *Jessenia polycarpa*, claims a fruit production of an average of two bunches of fruit per tree per year, each bunch weighing in the neighborhood of 15 kilograms. Now, the largest quantity of *Jessenia* fruits I ever observed one Barí hearth group to bring home was only eight kilograms, and the average weight brought into the home was only about four kilograms. Since the Barí are never profligate with food once they have decided to use it, I am certain that no part of the fruit bunch was discarded before bringing it home. The discrepancy between my figures and Dugand's can be resolved in a number of ways: Dugand's figures may refer to cultivated palms, which could be expected to yield more heavily than untended ones; Dugand specifies that he is speaking of *Jessenia polycarpa*, while the *Jessenia* used by

the Barí may well be *J. repanda* (assuming the two are not conspecific) with a smaller fruit production, or even some third species; the Barí may well harvest the fruit before it is fully developed in the sense of commercial agriculture.

I have been unable to find any figures in the literature for fruit production of *Oenocarpus* or *Euterpe*. My own figures indicate an average weight per bunch of about three kilograms for *Oenocarpus* fruits and about two kilograms for *Euterpe*. (I must caution again that these figures are based on what reached the house and not what grew on the tree. It is possible that the *Euterpe* figure in particular represents the fruit bunches of several trees, since it is the custom to remove *Euterpe* fruits from the rachis and pack them in a basket before bringing them home.)

Beyond Dugand's assertion that *Jessenia* will produce two bunches of fruits per year I have little information on the frequency of fruiting of individual trees. As we have already seen, either *Jessenia* or *Oenocarpus* (the two really important fruits) is available for at least eight months of the year in at least some localities of Motilonia, and it is quite possible that they are available during months for which I have no record of their consumption. Adding *Euterpe* to the list adds the month of May to the calendar of availability, giving the trio a yearly range of nine months of 12. Bannister (1970) found that a Puerto Rican palm, which she called *Euterpe globosa*[1], had peak flowering and fruiting seasons, but that some individuals were in fruit at all times of the year. A similar pattern exhibited by all the palms of the "*Jessenia* trio" would explain the lengthy but patchy consumption records I recovered from the Barí.

[1] I am indebted to Dr. Read for pointing out that the correct name for this palm is *Prestoea montana*; cf. Moore (1963:145, 159).

The discussion of the food value of the individual fruits will center on *Jessenia*, that being the only genus for which either my own data or the data available in the literature are even minimally adequate. As a rough basis of comparison, the *Oenocarpus* fruits weigh about half as much as the *Jessenia*, and the small *Euterpe* fruits probably weigh no more than one-eighth as much as *Jessenia*. As to the nutritional quality of these other fruits, one can only guess that it may be somewhat comparable to that of *Jessenia*.

A fresh *Jessenia* fruit (of the variety consumed by the Barí; Dugand's cultivated *J. polycarpa* fruits are apparently somewhat smaller) weighs about 17 grams. Of this weight, about two and three-fourths grams (roughly 15%) is the edible portion of the pericarp—the pulpy and somewhat fibrous mesocarp. Combining figures given for *J. polycarpa* by Dugand (1972:52ff.) and chemical analyses of the *Jessenia* exploited by the Barí kindly provided by Dr. Maryann Hoskins of New Mexico State University (personal communication) and Brian Weiss of UCLA (personal communication), we can arrive at a rough figure for the nutrative composition of the edible mesocarp. Briefly, and emphasizing that we are dealing with approximations, the composition is as follows. About one-third of the mesocarp is water. Of the remaining two-thirds dry weight, about 70% is crude fiber, about 18% is fat, and about 8% is protein. The remaining 4% may be carbohydrate, or may be experimental error and/or the incompatability of the methods or species used by the various sources: Dugand for fat, Weiss for fiber, and Hoskins for protein.

Even these rough figures make clear the importance of palm fruits in the Barí diet. Going back to our initial figure for an average single harvest of about four

kilograms of *Jessenia* by a single hearth unit, we can follow out the dietary contribution made by this bunch of fruit by tracing out the various percentages given above. The four kilograms of fruit will provide about 600 grams of edible material. Of this material, 200 grams will be water, 280 grams will be crude fiber, 72 grams will be fat, and 32 grams will be protein. For comparison, 32 grams of protein is slightly more than is contained in five large eggs. (Five eggs weigh, incidentally, about 250 grams, so in order to obtain an amount of protein equivalent to what the eggs yield, it is necessary to consume more than twice that weight of palm fruit mesocarp.) One's attention is naturally drawn to the protein content of the palm fruits, since protein deficiencies are a topic of daily discussion. We should not overlook their fat content, which may be every bit as important in a diet, such as that of the Barí, that may be seasonally lacking in animal fat.

The dietary value of *Jessenia* is thus well established, for even if the nutritive breakdown given above should err on the side of making the protein content twice as high as it actually is, the fruits still provide a high protein dietary input. Insofar as *Oenocarpus* is concerned I can only repeat that on taxonomic grounds it is likely to be somewhat comparable to *Jessenia*, and that by inspection (i.e., the sense of taste) and commerce (it is used to produce oil) it also has a high fat content. *Euterpe* remains problematic, although the taxonomic argument holds for it too, and it is also used (Dugand 1972:57) to make a sort of beer. There are no figures available for the amino acid balance of the protein component of any of these fruits; so the quality of this protein in human nutrition remains an open question.

Some aspects of the ecology of these three trees are interesting and provide an insight into the adjustment the Barí have made with their natural surroundings. Dugand (1972:62) mentions that the fruits of all three of the species we have been considering immediately above—in addition to those of *Bactris* and *Astrocaryum*, which were treated at the beginning of this article—are favored food for practically all the herbivorous jungle mammals, especially the collared and the white-lipped peccaries. Naturally these animals help disperse the seeds in their droppings. A number of bird species, particularly parrots, toucans, and guans, are also very partial to the fruits of the *Jessenia* trio. The Barí hunt these birds for food, and they also hunt peccaries and other animals that feed on palm fruits such as monkeys and large rodents. They are thus in competition with their prey animals for palm fruits. The competition is not without its advantages, for in times of scarcity of the fruits, both the Barí and the animals are likely to converge on the same trees, thus simplifying the location of game. Thus, the fact that the *Oenocarpus* and *Jessenia* seeds collected by the Barí are killed by boiling works to their advantage, for the fewer trees there are, the more likely it is that animals and man will come to the same tree at the same time. As I mentioned in passing above, the trees of the *Jessenia* trio are extremely numerous and there is no question of the Barí exterminating them or even making them rare. A little judicious limitation of their propagation, however, may well aid in putting more animal meat on the table.

Another Barí practice that also limits the number of palm trees (only *Jessenia* in this case) but exchanges that limitation for animal protein is the following: It is a common practice to cut down *Jessenia* trees and leave the logs lying

in the forest. In two or three months the whole trunk is infested with the edible larvae of the palm weevil, *Rhynchophorus palmarum*, which usually attacks only the crown of the tree. (This weevil was kindly identified for me by Mrs. Rose Ella Warner-Spilman through the courtesy of Dr. Paul J. Spangler of the Smithsonian Institution, from an adult specimen.) Several hundred grams of larvae can be extracted from a single trunk, which is split open with an ax. In my field notes I have recorded an expedition to collect these grubs. We visited seven tree trunks in the space of an hour and a quarter. The first and fifth trees had a few grubs, and the seventh was plentifully supplied. Two of the trees had already been opened and some of their *Rhynchophorus* removed. All of the trees had at one time hosted grubs, as attested by the honeycombing of their interior, and in the four cases in which no larvae were presently resident, they had presumably matured and the adults flown away. An idea of the abundance of *Jessenia* is given by the distance we walked to get from one log to another: 20 meters between the first tree and the second; 200 meters from there to the third; then 100 meters; 50 meters; 300 meters; and 100 meters. From the seventh there were visible several more live *Jessenia* with green fruit. We brought home about 250 grams of weevil grubs, and had consumed a considerable fraction of that quantity while in the process of extracting them from the tree trunks.

Only *Jessenia* is used as a "grub farm" in this way by the Barí, despite the fact that *R. palmarum* will infest at least the crown of a great many other kinds of palms. This fact lends a good deal more credence to the arguments having to do with the advantage gained in reducing the abundance of this particular tree.

In sum, as well as furnishing the Barí with indispensible raw materials like bow wood and matting material, the palms of Motilonia also furnish a protein resource which "buffers" any vagaries in the supply of meat. While the total amount of palm fruit and grubs eaten is far less than the amount of, say, fish consumed, the availability of the palm protein at times when alternatives are in short supply probably means that the Barí are able to support a larger population year-round than would be the case if they had to rely exclusively on the somewhat seasonal fish catch and the unreliable hunt.

Acknowledgments

The fieldwork during which these observations were made was supported by The Ford Foundation, the Society of the Sigma Xi, The Explorer's Club, the Smithsonian Institution Urgent Anthropology Fund, and the University of New Mexico.

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NEWS OF THE SOCIETY

The following comes from member Dillwyn Paxson in Arkansas about *Rhapidophyllum hystrix*: "My needle palms (four large) came through a very cold winter where we had much snow and ice and long-lasting cold, with at least 20°F below zero. It appears that there may be some seeds for the Seed Bank in December 1977 or January 1978." Unfortunately, this palm grows very slowly in its early years so waiting for seeds to produce plants large enough to set out may be a matter of five years at least and perhaps more. Who knows how far north it may grow?

News from California

On Sunday, April 17, the Southern California Chapter of The Palm Society held a meeting at the home of Jim Wright, newly elected Chairman. Over 50 people attended a very enjoyable potluck dinner. Jim has an interesting garden with many mature palms, including fruiting *Rhopalostylis sapida* and a *Neodypsis decaryi* (not many of these in California). $80 was raised on a raffle, the winners taking home a beautiful *Rhapis excelsa* donated by Rudy LaSogga and a *Hedyscepe canterburyana* donated by Pauleen Sullivan. Secretary Lois Rossten reported the above and added that the Chapter had a booth at the "Spring Extravaganza" of the Los Angeles County Arboretum in Arcardia. Plants were taken to the exhibit and promotional material distributed regarding the society.

The July 23rd meeting was held at the homes of Lois Rossten and Frank Ketchum. Approximately 85 people attended. The side-by-side gardens offered a variety of palms, cycads, and cactus for everyone. A potluck lunch was followed by a raffle and an auction.

News from Florida

A report by member Mrs. Laurel Bird of the Miami Chapter follows, concerning the recent meeting. "It was an exotic summer evening, that Saturday, July 30, 1977, when the Miami Chapter of The Palm Society met. It was hot in Miami but the bayfront yard of Mr. and Mrs. T. C. Buhler was cooled by a delightful southeast breeze blowing off the water. The 60 some members came not only from the local area but from many parts of Florida and even beyond for a dish-to-pass supper and to hear a talk by Dr. Harold E. Moore, Jr. Dr. Moore captivated his audience with tales about the people and plants of Surinam, in northern South America, from which he recently returned. Also, unhappily, he spoke of a new disease

(Continued on page 178)

The Species of Trachycarpus

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In compiling a handbook on subtropical palms, the author has found that plants of *Trachycarpus* are frequently misnamed. The most widely grown species, *T. fortunei*, is usually identified correctly, but the names of other species are often misapplied in the popular literature, in nursery catalogs, and in gardens. The most authoritative monograph of the genus is that of Beccari (Asiatic palms—Corypheae, in Annals of the Royal Botanic Garden, Calcutta, 13: 272–286. 1933). The general inaccessibility of this work and his earlier paper on the genus (in Webbia 1: 41–68. 1905) has been responsible for most of the confusion.

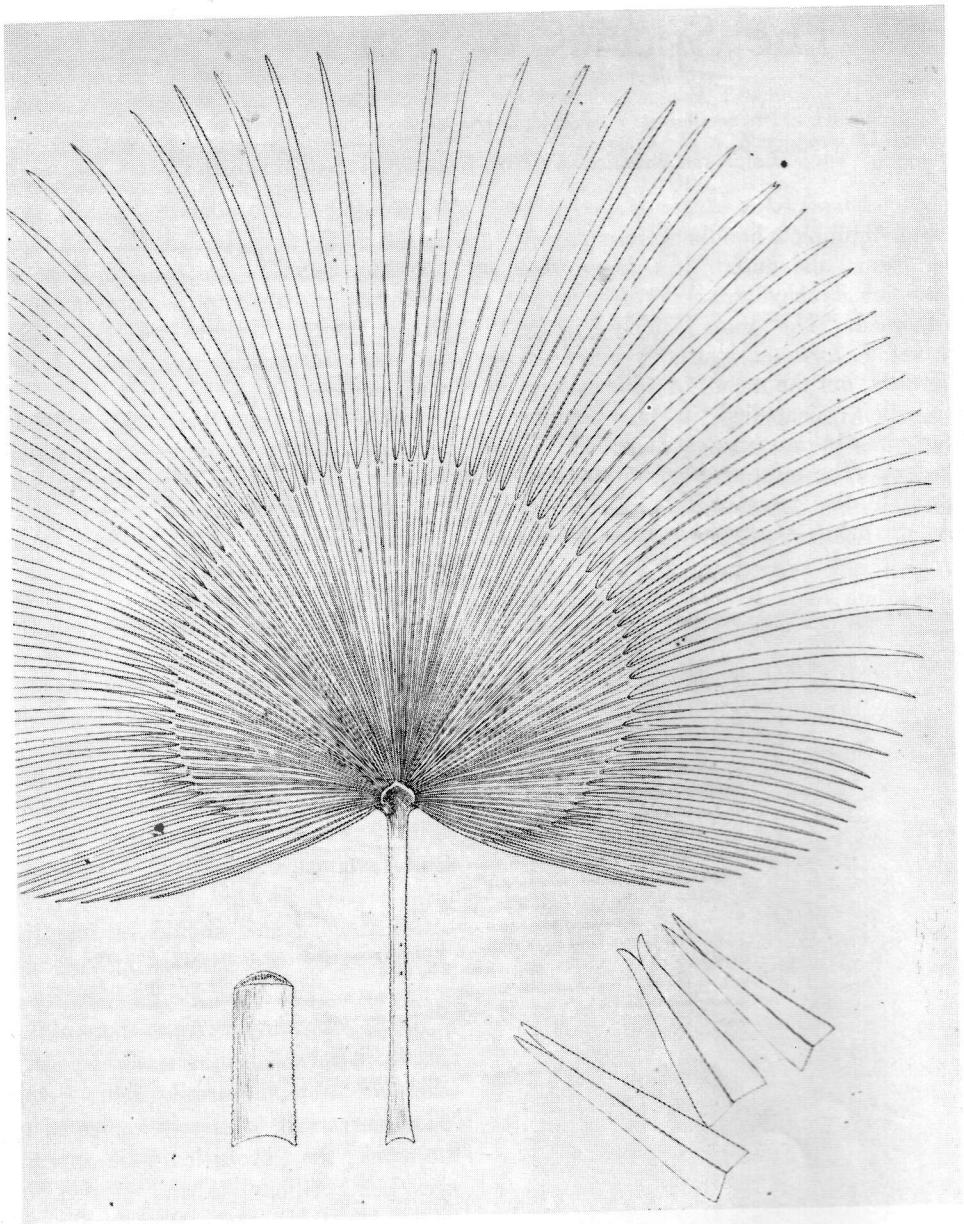
1. *Trachycarpus caespitosus*, reproduced from Bull. Soc. Tosc. Ortic. 40: 165. 1915.

Although little of significance has been published on *Trachycarpus* since these works appeared, their age implies that new knowledge and present taxonomic standards would modify some of Beccari's conclusions. In particular, *Trachycarpus wagneranus* and *T. caespitosus* seem so closely allied to *T. fortunei* that they might better be reduced to varieties or cultivars of that species. The author would welcome any data that would clarify the status or variability of any of the species and would especially like to hear of plants of those that appear not to be in cultivation: *T. nanus*, *T. takil*, and *T. caespitosus*.

Cultivated plants should be identifiable by means of the following key and notes, as well as from the reproductions of the only known figures of three of the species. Characters most useful in identification are: the trunk fibers being loosely arranged or closely appressed to the trunk; the fibrous leaf-base appendages being ribbonlike and pendent or triangular and erect; the depth and equality of division in each leaf; and the shape of the fruit and seed.

A. Depth of leaf division regular, leaf bases soon deciduous; fruit ovoid-oblong, seed longitudinally grooved on one side. ..... *T. martianus*

AA. Depth of leaf division irregular, leaf-bases long persistent on trunk; fruit globose-reniform, seed lacking longitudinal groove.



2. *Trachycarpus martianus* leaf, from Griffith, Palms of British India 1850.

B. Trunk not, or barely, emerging above ground. ..... *T. nanus*
BB. Trunk present above ground.
C. Trunks multiple. ..... *T. caespitosus*
CC. Trunk single.

D. Leaf-blade 40–45 cm long, thick and leathery. ..... *T. wagneranus*
DD. Leaf-blade 50–85 cm long, stiff but thinner.
E. Trunk fibers loose and ruffled; leaf base appendages ribbonlike, recurving; leaves divided more than halfway. ..... *T. fortunei*
EE. Trunk fibers closely appressed to trunk; leaf base appendages triangular, erect; leaves divided to about the middle. ..... *T. takil*

Trachycarpus caespitosus
Becc. ex Roster
T. fortunei var. *surculosa* Henry ?

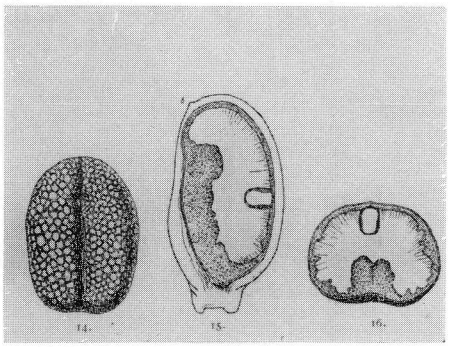
This species is still not recorded from the wild, having been described from plants in J. Harrison Wright's garden in Riverside, California, and in Lafayette Park in Los Angeles. It is the only multitrunked species, with small and rigid leaves as in *T. wagneranus*, of which it may be only a variant. Figure 1 is the only published photo. The species is rare in cultivation, the original plants in California no longer existing. John Dransfield informs me that gardens in England contain several multitrunked plants of *Trachycarpus* that may prove to be this species.

Trachycarpus fortunei
(Hook.) H. Wendl.

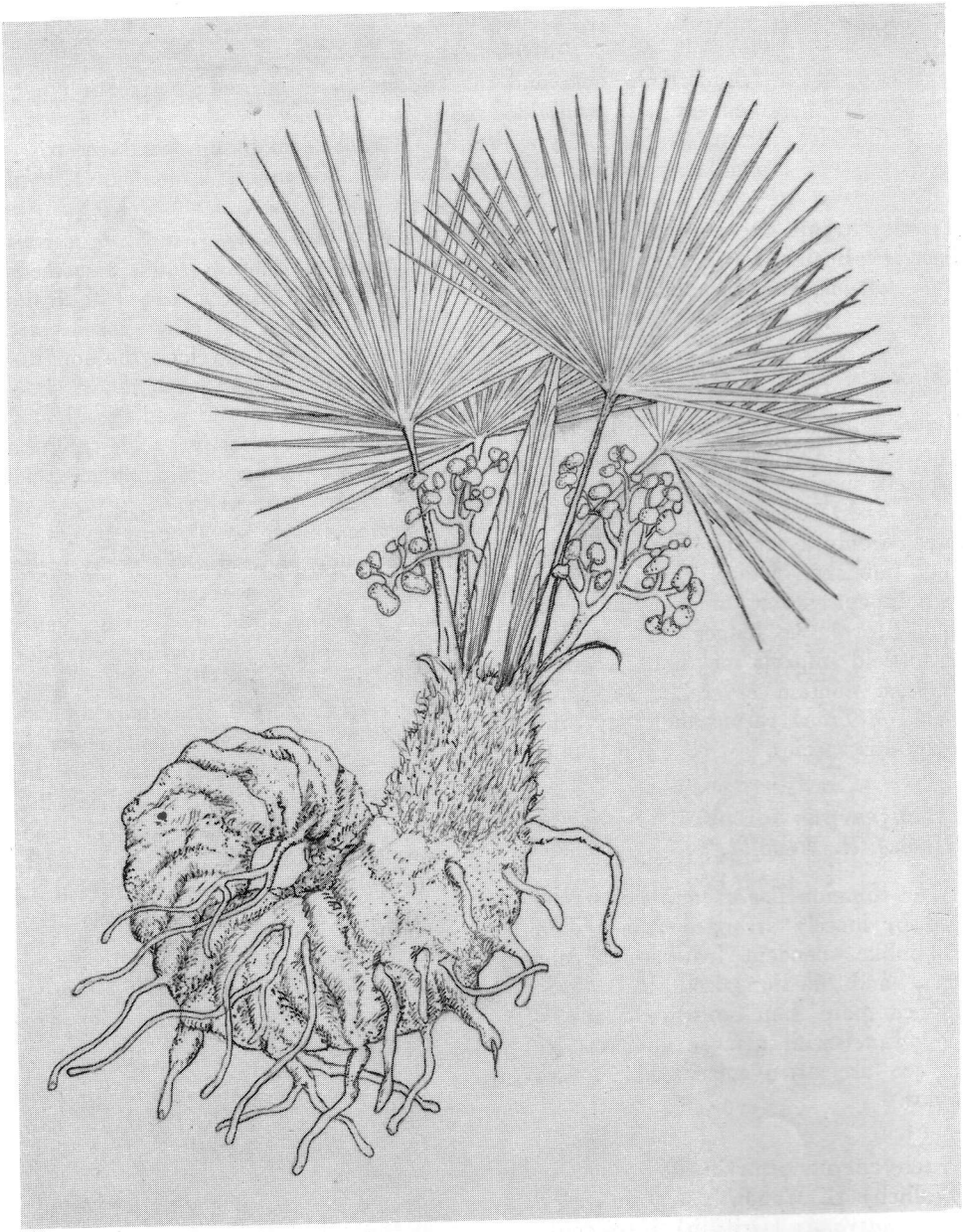
The common *T. fortunei* is characterized by loosely arranged trunk fibers, ribbonlike, pendent leaf-base appendages, and medium-sized leaf blades divided more than halfway. Plants of *T. fortunei* with a more glaucous leaf surface are often misnamed *T. martianus*.

Trachycarpus martianus
(Wallich) H. Wendl.
T. khasyanus (Griffith) H. Wendl.

One of the most distinct species, *T. martianus* has a trunk retaining the leaf bases only within a meter or so of the crown, fibers appressed rather closely to the trunk, broadly triangular leaf-base appendages, leaves that are divided very evenly halfway and with a glaucous undersurface, oblong fruits, and seeds with a longitudinal groove (the fruits and seeds of all the other species are globose-reniform and lack the longitudinal groove). Figures 2 and 3 show the distinctive leaf and seed. Cultivated plants of true *T. martianus* are rare, the name usually being applied to an especially glaucous form of *T. fortunei*, as illustrated in the well-known books by Hertrich and McCurrach. *Trachycarpus martianus* is a handsome species with a wide range in India and Burma, yet it seems not to have appeared in cultivation in the U.S.A. until the late 1960's, when seeds were imported by Deigaard Nurseries from G. Ghose, a seed dealer in India. Several attractive plants of this importation are growing at the Huntington Botanical Gardens; in 1977 seeds were set on one plant with pollen of *T. fortunei* and these have confirmed its identity as *T. martianus*. On the other



3. *Trachycarpus martianus*, seed from rapheal side (14), fruit in vertical section (15), and seed in cross section (16), all × ca. 1¾, from Beccari, Webbia 1: 67. 1905.

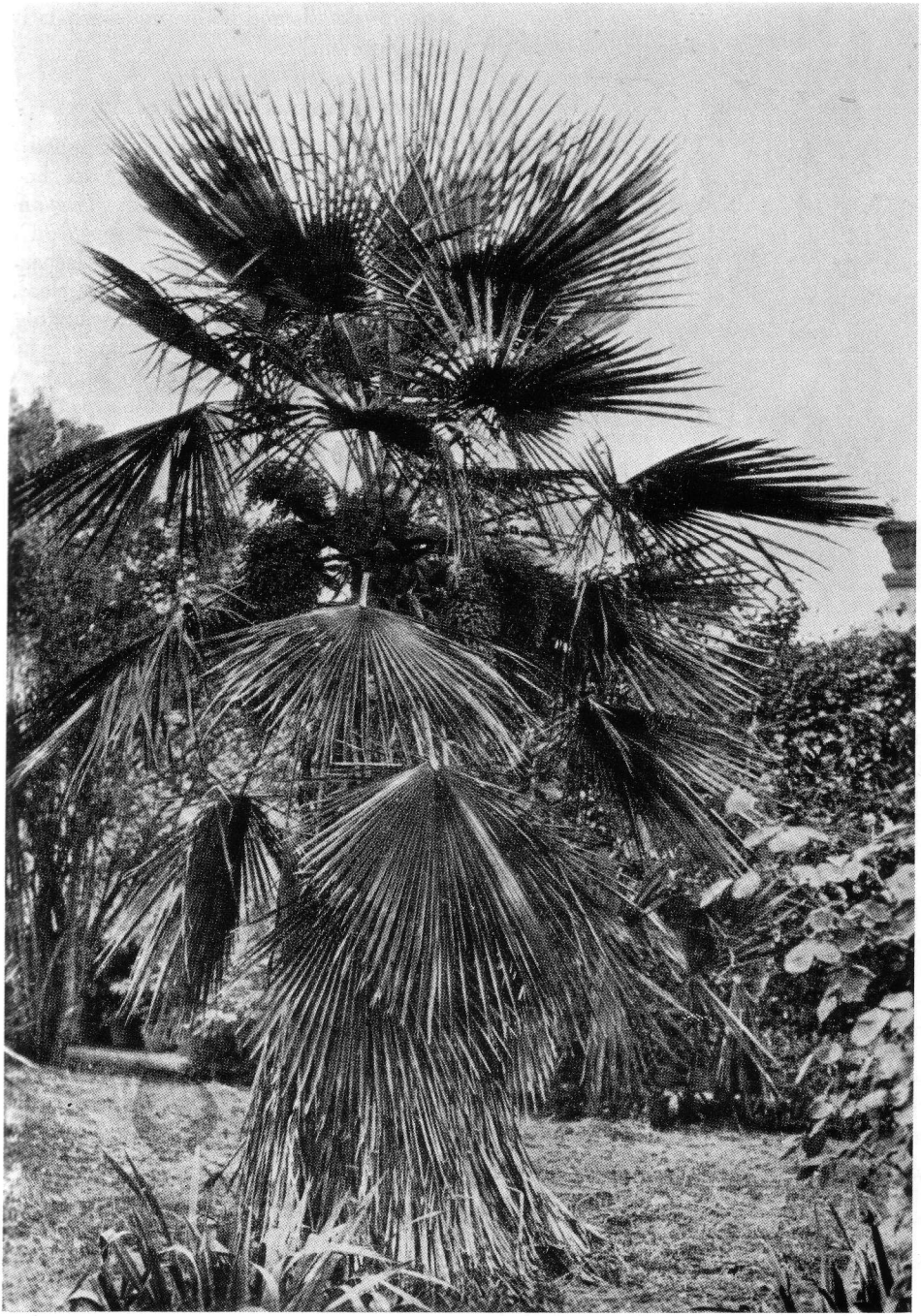


4. *Trachycarpus dracocephalus*, probably synonymous with *T. nanus*, redrawn by Lisa Pumpelly from a Xerox copy of plate LII in Acta Phytotax. Sin. 3. 1955.

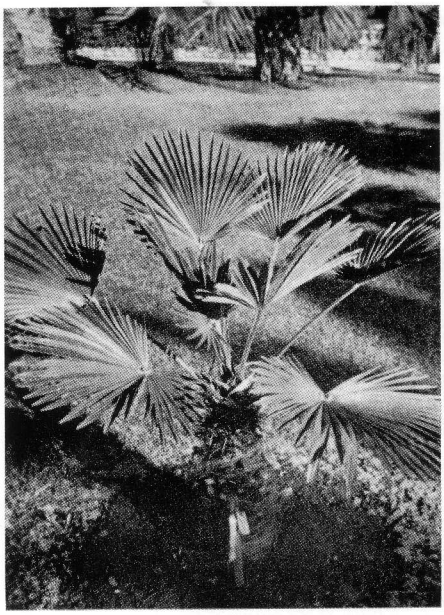
hand, seeds supposedly of this species were recently available from a foreign seed dealer but they lack the longitudinal groove.

Trachycarpus nanus Becc.

The name *T. nanus* is ordinarily applied to the more dwarfed clones of *T. wagneranus*. However, true *T. nanus*



5. The type plant of *Trachycarpus takil*, from Kew Bull. 1912: facing p. 291. 1912.



6. *Trachycarpus wagneranus*, from Hertrich, Palms and cycads 93, 1951 (as *T. takil*).

has no appreciable aboveground stem. It is common in Yunnan, China, but has never been brought into cultivation nor has a photo or figure of it been published. A similar species is *T. dracocephalus* Ching & Hsu, with a rhizome that grows horizontally below the soil surface; its only published illustration has been redrawn as Figure 4. This species is probably a synonym of *T. nanus*, for the descriptions agree in major details and both species are native to Yunnan.

Trachycarpus takil Becc.

The name *T. takil* is often applied to plants of *T. wagneranus*—they are, however, very different species. The only published photo of *T. takil* is shown in Figure 5, showing a plant in Beccari's garden in Florence, Italy. It has closely appressed trunk fibers, short, triangular, erect leaf-base appendages, large leaves divided rather unevenly to about the middle, and reniform fruits. Unfortunately it is rare in cultivation and no plants of this species seem to be grown in the United States.

Trachycarpus wagneranus Hort. ex Roster

This is the common species usually misnamed *T. takil* or *T. nanus*, with small, very rigid, leathery leaves divided irregularly to below the middle, loose trunk fibers, and ribbonlike, pendent leaf-base appendages. It is known only from cultivation. Figure 6 is of a young plant; with time the trunk may reach seven meters or more in height. The leaves are variable as to size and the trunk fibers more appressed in some clones. It is separable from *T. fortunei* mainly by its smaller, more rigid leaves and may only be a variant of that species.

Palm-Collecting Adventures in Asia

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III. Singapore and Taiwan

Our flight from Bali to Singapore on 23 September 1975 touched down briefly in Jakarta, then went on to what may well be one of the world's most bustling small islands. New construction, replacing old dilapidation and for expansion, has taken over but landscaping hasn't been neglected. Many avenues are palm-lined and the landscape is far from barren. We were impressed with what we had seen flying in, and after settling into the Shangri-La Hotel, near Orchard Road and not far from the Singapore Botanic Gardens, we were ready to resume our quest for palms. For some species, such as *Ptychosperma macarthurii*, we only had to explore the hotel's beautifully landscaped grounds. These palms were fruiting, and we were welcomed into the hotel's small nursery which was well stocked with palm seedlings and other plants.

That evening we called Mr. Daren Ng Heow Keng, a member of The Palm Society. We had not previously corresponded with Daren Ng but Eric Taylor, who had accompanied us earlier in Malaysia and previously resided in Singapore, had written him of our plans.

Daren Ng, busy as he is as Managing Director of Dow Flora (Singapore) Pte. Ltd., met us early next morning and drove us to his several establishments in the city and to his 10–acre farm and nursery several miles into the island. Phyllis prevailed on Daren to pose before we left (Fig. 1). His outlets are rife with exotic plants and his outlying nursery had thousands of palm seedlings under cultivation.

Daren is much devoted to palms and has cultivated some unique specimens, such as the variegated *Licuala grandis* in Figure 2. He also has variegated *Rhapis* species. We couldn't carry back these exotics but his helpfulness will assure acquisition later on.

That evening we joined Daren and friends for good food and entertainment at "Paradise" on Singapore's water front, returning to our lodging via Mt. Faber, where one can see the lights of Singapore, as well as palms, and perhaps lovers, casting shadows.

Next day early we were inside Singapore's well-known botanic gardens. We were delighted to meet there with Miss S. Y. Geh, who has been so helpful in correspondence with Lucita Wait and De-Armand Hull in The Palm Society's Seed Bank activities. Miss Geh kindly supplied us with a map of the gardens though no catalog of plants was available, and we went on to see the palm collection.

The gardens are kept beautifully groomed, so much so that each fallen leaf and seed is methodically swept up and whisked away before the would-be seed collector can recover anything on the ground. Arrangements can be made for obtaining palm seeds, and Miss Geh sent us some cherished ones after we left Singapore, but collecting on the grounds apparently is not encouraged.

Singapore Botanic Gardens have been noted for an avenue of *Cyrtostachys*, which we admired, and we viewed other

1. Mr. Daren Ng and the author in Singapore.

palms near the herbarium, including *Hyophorbe lagenicaulis*, *Corypha*, and a *Lodoicea maldivica*. Also a *Metroxylon solomonense* had fruited. Farther along we saw a splendid *Bentinckia nicobarica* towering behind *Acoelorrhaphe wrightii*. Then the rains came! We escaped the deluge by ducking into the succulent house where we spent an hour hovering impatiently around the cacti and peering beyond them into the rain-drenched palms outside. This proved to be a mere introduction to the rains that came every day, for we didn't yet know how wet we soon were to be.

Since our earlier failure to collect viable seeds of *Johannesteijsmannia* at Bako National Park in Sarawak, we had looked forward to another attempt in Johore, the southernmost state of West Malaysia. Here the palm is abundant in certain areas which fan out from

2. A variegated *Licuala grandis* in nursery of Dow Flora (Singapore) Pte. Ltd.

Mersing, on the east coast of Johore, 100 miles north of Singapore. To get there one crosses a causeway connecting Singapore with mainland Malaysia, pausing briefly for immigration clearance, then driving through Johore Bahru, past the Sultan's palace, and on.

Daren Ng called for us early morning 26 September, and after a car-servicing pause we headed for Mersing under cloud-laden skies. The road led through rubber and oil palm plantations that often extended for several miles. Interestingly enough, we observed frequently that oil palm (*Elaeis guineensis*) seedlings had been planted between the neat, straight rows of producing rubber trees. We were told that this is a trend, that oil palms are becoming more profitable than rubber trees.

3. Countless leaves of *Johannesteijsmannia altifrons* completely cover this structure in jungle near Mersing, Johore, W. Malaysia.

4. Phyllis and *Johannesteijsmannia* in the rain-drenched jungle near Mersing.

The clouds still threatened when we arrived at a rest stop midway to Mersing, where we refreshed ourselves with, of all unexpected things, a chocolate milk-shake. After more than a month in Southeast Asia we hadn't previously encountered this state-side item. While the stop was brief, it was also a rendezvous with Mr. Ah Boon, a friend of Daren Ng, who accompanied us on to Mersing and guided us into an area abounding with *Johannesteijsmannia altifrons*.

We tarried briefly in Mersing, then drove west a short distance, then left off the main highway on a logging road that had been cut into the jungle. The loggers built a good firm road which we pursued for perhaps five miles before encountering bad ruts and obstructions. No sign of the "Joey" palm yet. Then we angled off, still driving on what looked like a promising fork in the road. It was soon blocked by fallen trees and debris. Backtracking, we went on to a small clearing in the forest where we found the clue that assures the proximity of *Johannesteijsmannia*. It was a large shed, presumably erected for earlier logging operations, as we had seen no one nor any signs of habitation. The shed was completely thatched with hundreds of the palm's diamond-shaped leaves (Fig. 3).

5. *Areca aliceae*, Singapore Botanic Gardens.

Driving on, perhaps a half mile, we began to see the palms. We abandoned the car about the same time the clouds decided to let loose and started into the bush in a drenching rain. The farther we went the more "Joeys" we found, both on the slopes and in ravines. Rain fell harder and wetter as we searched for seeds without much success. Nevertheless, the palms were a beautiful sight (Fig. 4). After an hour of probing we were thoroughly soaked, muddy, a bit exasperated, yet undaunted. The result was just slightly better than nil;

6. Palms along the walk in Taipei Garden.

7. Palms distract attention from beautiful lily pond in Taipei Garden.

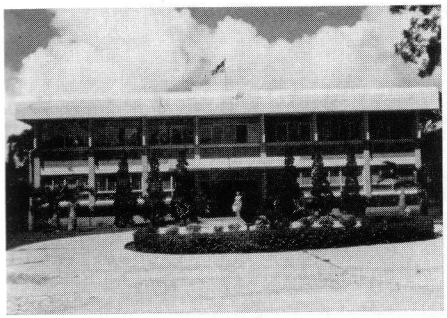
a few immature fruit stalks and small seedlings.

Our considered judgment at this stage was, and still is, that (1) Palm Society members who want this palm will have to have patience because it is unlikely that substantial quantities of seed can be obtained for distribution, and (2) members who venture to collect it might be more successful in January or February —but viable seeds are a will-o-the-wisp.

We headed back to Singapore, pausing again at the midway rest stop, where in soaked attire we indulged in hot tea, then on with one of Daren Ng's staff assistants at the wheel, while Daren stayed overnight in the area to assemble some plants for his nurseries. Darkness as well as the rains accompanied us back to the Shangri-La and we wondered what crossed the desk clerk's mind as we sloshed across the immaculate lobby to the elevator in our bedraggled garb.

Next day we returned to Singapore Botanic Gardens, pausing on the way to mail an accumulation of seeds. But the rains arrived when we did and after more than an hour under a shelter we gave up and cabbed to the Tiger Balm House of Jade for a brief view of the relics, hence on down Orchard Road for a look at some of Singapore's shopping attractions.

Back to the gardens next morning, the rains held off despite threatening skies so we were able to finish our exploration there. Although it isn't easy to select one's favorite palm in large botanic gardens, we usually do it and here we admired *Areca aliceae.* This clustering small palm, with beautiful red fruits, is a fine ornamental (Fig. 5). Not far away was a splendid *Arenga undulatifolia,* and our interest was aroused by an *Elaeis guineensis* var. *idolatrica.* Near the main entrance, along the outer boundary of the gardens, was a fine



8. Headquarters, Kenting Tropical Botanic Garden, Taiwan.

stand of *Actinorhytis calapparia* which we had collected earlier at Sibolangit in Sumatra. Some of these tall, slender-trunked palms rose out of the ground within two to four feet of each other, an effect we thought of experimenting with back in Jamaica. And the gardens have the magnificent *Rhopaloblaste ceramica* (see *Principes* 14: 73; also, *Principes* 9: 103–107 for more on the gardens).

The same day, our last in Singapore, we cabbed to Elizabeth Walk and the reconstructed areas of the water front, dropping in on the renowned old Raffles Hotel to admire its palm court and relax with a Singapore sling, skillfully concocted at the Raffles' famed long bar. Daren Ng rejoined us at our hotel that evening for farewells, bringing along some coveted seeds, such as durian, which we hope to establish in Jamaica. Again we were indebted to a member of The Palm Society who had been so very helpful.

We boarded China Airline's early flight on 29 September for Taipei, via Hong Kong—the final leg of our quest. Despite a language problem our metered-taxi driver soon delivered us to the Grand Hotel, the new edition of which looks down on the Tamsui River and dominates the Taipei skyline. We arrived in Taipei with no prior palm-collecting arrangements, although Daren Ng had

9. Part of Kenting Garden's fine collection of *Archontophoenix alexandrae.*

written a preceding note from Singapore and we were armed with The Palm Society's latest roster of membership in Taiwan.

After a brief and futile struggle next morning with Taipei's copious telephone directory, in Chinese, we asked the multilingual desk clerk to write a note in Chinese directing a driver to take us to the Taipei Botanical Gardens. The note was effective and we arrived, albeit at the wrong entrance. But we saw palms towering not far away and weren't at all discouraged as we sought out the headquarters of the Taiwan Forestry Research Institute, which has jurisdiction over the garden.

Without prior arrangement, it was no surprise to us that the Director, Mr. Liu, a Palm Society member, was out on a teaching mission at the University. But Mr. Fan-Shi Kung of the office was most considerate and proceeded to furnish us copies of the Taipei garden's plant cata-

log, served tea, and arranged a guide to get us started in the garden. He also introduced us to Mr. Lu, another member of The Palm Society.

The Taipei Botanical Garden dates back to circa 1905. Its genesis was a private Japanese garden started before the turn of the century. The grounds are exceedingly well groomed, easy to get around in, and not vast, being in the heart of the city. It doesn't have a wide collection of palms as major gardens compare but it has some 60 species of mature ones, most of them splendid specimens (see the avenue in Fig. 6). All the plots are enclosed with iron fencing, which sometimes interferes with photography but no doubt protects the plantings. Palms dominate the garden, even drawing away one's attention from such allures as Victoria lily pads (Fig. 7). With the Tropic of Cancer bisecting the island, Taipei in the north is subtropical but the typhoon—not cold temperature—is the main weather hazard for palms there.

After exploring the garden, to which we returned later, we checked back at headquarters to be advised that Mr. Ta-Wei Hu, of the research institute and a member of The Palm Society, expected to return from a field trip and join us later in the afternoon at the Taiwan Rose Center, which was on our agenda for the day.

Lest one be misled, we had not at this juncture been converted to roses from devotion to palms. But we wanted to meet Mr. C. S. Chang, President of the Taiwan Horticultural Co. Ltd., and a most congenial member of The Palm Society. Daren Ng had written him from Singapore of our visit to Taiwan, and he most graciously took the time to greet us at his branch center in Taipei, where Mr. Hu joined us, although his main headquarters are 100 miles south in Yuanlin. His enterprise embraces palm cultivation as well as extensive development and export of roses. We were most grateful for Mr. Chang's courtesies, and left the Rose Center late afternoon hoping that our future paths might cross.

That evening we were guests of friends from the United States who introduced us to the Mongolian barbecue in Taipei. Our reaction, having nothing to do with palm collecting, was that one most assuredly can assemble a great many foods in the raw state and have them integrated into a barbecued entity! One day we enjoyed a visit to the National Palace Museum with its priceless collection of Chinese art treasures. Royal palm specimens stand sentinel at the lower entrance. We explored the friendly and exotic shopping areas in downtown Taipei. One evening Mr. Ta-Wei Hu and his wife joined us for dinner of splendid Cantonese cuisine at Ruby's Restaurant, where we put finishing touches on our trip planned to the southernmost tip of the island.

Taiwan's principal botanic attraction, relatively unpublicized, is the Kenting (Heng Chung) Tropical Botanical Garden, situated on foothills facing the Formosa Strait in the south. Established in 1901, the gardens consist of 45 acres, and forest reserves of 450 acres. To drive there, or go by train from Taipei took more time than we had allowed so we made arrangements to fly as near as possible, Kaohsiung, then arrange taxi accomodation from that airport for the 75 mile drive to the garden.

We had made flight reservations, Mr. Hu had called the gardens regarding our arrival, and we carried several notes written in Chinese. Our plane left Taipei at 7:30 A.M., 2 October for Kaohsiung where the Chinese notes and a helpful China Airline's attendant soon had us in agreement with our taxi driver, who completely devoted himself to us and the day's mission. In fact, before the day

finished our driver not only became an informed admirer of palms but also was addicted to seed collection!

The picturesque drive from Kaohsiung, some of it along interesting coastal areas, and through palm cultivations including stretches of highway lined with coconut palms, and others, terminated at the garden's spacious parking area. It was not far to the garden's headquarters (Fig. 8) which housed laboratory facilities as well as other space for personnel of the Taiwan Forestry Research Institute.

We could see some of the collection of palms as we went through an outer gate toward the headquarters building. We were surprised at the very outset to see *Hyophorbe verschaffeltii* stretching far along a main avenue through the garden. The garden's published plant list designates these trees as *Mascarena verschaffeltii.* Before leaving Kenting we saw more of these palms than we had observed on an earlier visit to Mauritius, the main source of seed of the species.

Entering the headquarters we proffered one of our Chinese introductory notes, and were courteously welcomed and ushered upstairs to a laboratory where we met Mr. Feng-Chi Ho, Forester at the garden. He also is a member of The Palm Society and for some time has been doing research relating to palms. After showing us some of his seed specimens and progress on his current project, he guided us on a tour of the garden's palms. In one area we saw *Corypha*, both *C. umbraculifera* and *C. elata*, planted rather close together on each side of the walk.

Kenting Garden has one of the most beautiful stands of *Archontophoenix alexandrae* we have seen anywhere in cultivation (see Fig. 9). Some of the garden's collection (over 70 mature species) rise up in areas that might be bushed of undergrowth more frequently, although the tall grass in these places certainly didn't obscure beauty of the palms. The garden is situated on a steep hillside overlooking the sea with splendid vistas. Considerable area is devoted to nurseries, with ample space provided for palm culture.

Sandwiched in with our rather hurried, yet most enjoyable, palm hunt in Kenting Garden was a pause for lunch hosted by Mr. Ho, who certainly made our trip to the garden a memorable event. The garden's environs have a new modern hotel facility, a branch of which is on down the slopes at the beach, so that one with more time at his disposal might well enjoy a longer sojourn at Kenting. The garden deserves much more exploration than we gave it. Our last moments there were devoted to seed collecting, and by that time our very helpful driver from Kaohsiung, lack of English notwithstanding, had committed himself to the search.

Our after-dark return to Taipei ended our palm-collecting agenda in Asia. But our adventures trailed into the next day, part of which involved more packaging and mailing of seeds, a very pleasant exercise with the helpful attendant at the P.O. substation in the recesses of the Grand Hotel, and on into 4 October, the date for our departure home.

Early in the last day Mr. Hu, who had been so helpful to us in Taiwan, picked us up for a scenic drive to Yuashung Park, near Taipei, where we admired ornamental palms and many other landscape treasures. We visited the splendid White Cloud Orchid Farm, with its vast shelters, and were permitted a glimpse inside the laboratories where orchids begin life in a test tube. At the China Pottery Arts Co. works we observed and admired the creativity of young, dedicated artists. Mr. Hu took us to his home

in Taipei for a magnificent luncheon which had been prepared for us by Mrs. Hu.

Time had run out, and we just made our 5:30 P.M. flight on China Airlines which took us back to Los Angeles; hence with a connecting flight to Miami we returned to Montego Bay.

Seeds and letters continue to arrive in Jamaica, and we are replete with fond memories of the Palm Society members and all the helpful people who made our trip successful. We hope, another day, it will be possible to reciprocate their kindnesses when they venture to the welcoming mat in our hemisphere.

PALM QUESTIONS AND ANSWERS

Q. The new leaves appearing on my large royal palm are yellow and gradually turning brown while the old leaves on the plant appear perfectly green. What is wrong with my tree?

A. This past year has seen a heavy infestation of the royal palm bug in the South Florida area. This royal palm bug is known only from Cuba and Florida. It has been collected as far north in Florida as Vero Beach and Bradenton and its range in the state is probably coexistent with the range of the royal palm, which thus far is the only known host of this insect, although other species of royal palms may be affected.

The palm bugs are found primarily on the newly opened leaves of *Roystonea*, doing their greatest damage by feeding on the leaflets that have most recently broken away from the tightly folded emerging leaf. The damage to the leaflet first appears as small yellow spots and as the leaflets become older they gradually turn brown.

The royal palm bug has usually been classified as a minor pest of royal palms, but on occasion high populations can destroy magnificent, mature specimen royals. For some reason high populations developed in 1921, 1957, and 1976. Local park superintendents in the South Florida area have reported that normally the summer rains beginning in May would tend to eliminate the populations of this insect and thus the need for spraying.

Occasionally it is more economical to replace a specimen than it is to hire the necessary equipment to do the spraying of large specimens. Heavy populations of the insect nevertheless can kill individual mature royal palms.

According to Dr. Don Short, Extension Entomologist, University of Florida, the royal palm bug seriously damaged royal palms in Dade, Broward, Palm Beach, Collier, Lee and Hendry counties during 1975 and 1976. Dr. Jim Reinert, Assistant Professor, Entomology, Agricultural Research Center, Ft. Lauderdale, found severe bronzing of nearly 200 trees examined in the Ft. Lauderdale area.

Dr. Reinert conducted experiments and found one application of two pints 25 percent Meta-Systox-R per 100 gallons of water to be an effective control. It was advised that a spreader-sticker should be added to the insecticide and that the entire canopy and especially the bud must be sprayed.

REFERENCE

Plant Pathology Circular #46, March 1966, Florida Department of Agriculture, Division of Plant Industry.

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Aspects of the Morphology of Jubaeopsis caffra Becc.

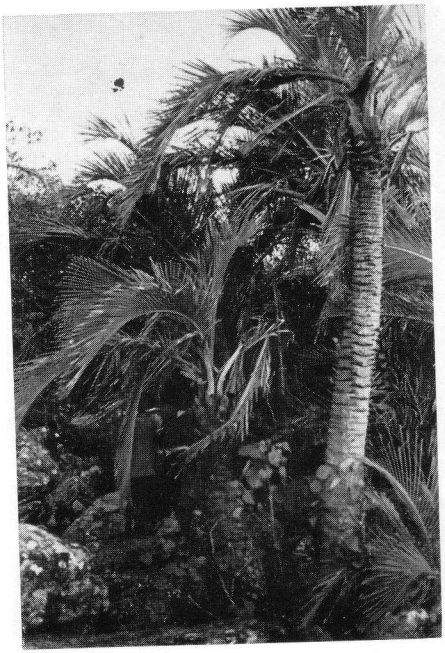
B. L. Robertson
Department of Botany, University of Port Elizabeth, South Africa

The general morphology of palms is very divergent, with numerous variations in plant size, shape, and structure occurring (Tomlinson, 1961). Just as divergent are the currently morphological descriptions of *Jubaeopsis caffra*. McCurrach (1960) simply describes *Jubaeopsis* as being similar to *Jubaea*. Wicht (1967, 1969) states that it is many-stemmed while Hertrich (1970) describes *Jubaeopsis* as being single-stemmed.

Apart from these contradictory reports, very little else has been published about the morphology of *Jubaeopsis* and consequently a study of the habit, branching, phyllotaxy and leaf morphology was undertaken. Most of the material used in this investigation was obtained from the groves along the Msikaba and Mtentu estuaries in Transkei, but use was also made of a 43-year-old cultivated tree in St. George's Park, Port Elizabeth.

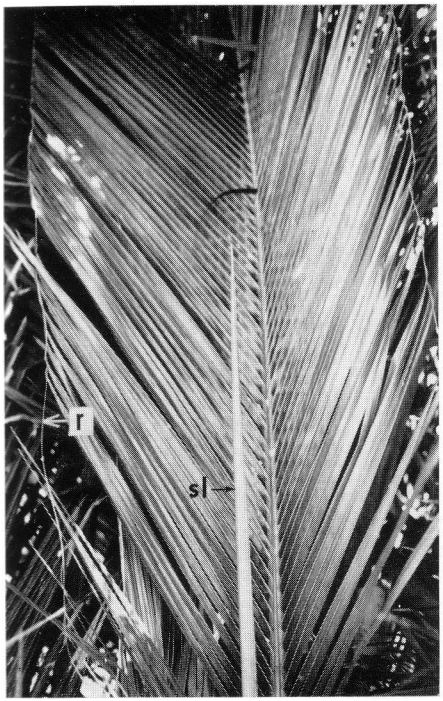
1. A 43-year-old cultivated *Jubaeopsis caffra* growing in St. George's Park, Port Elizabeth, South Africa.

2. Four stems of the cespitose *J. caffra* in St. George's Park, Port Elizabeth.

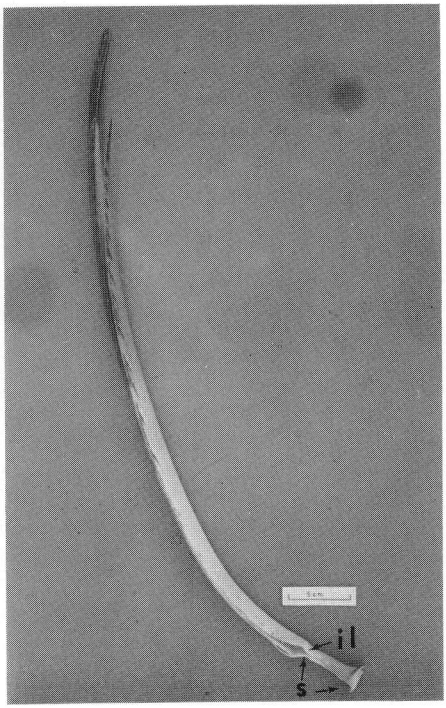


3. An erect, windblown, "left-handed" *Jubaeopsis caffra* growing on the north bank of the Mtentu River in Pondoland.

4. Branching in the distal portion of the stem.



5. A newly expanded leaf of *J. caffra* in which the marginal strips or reins are still attached to the apices of the leaflets (r, reins; sl, spear leaf).



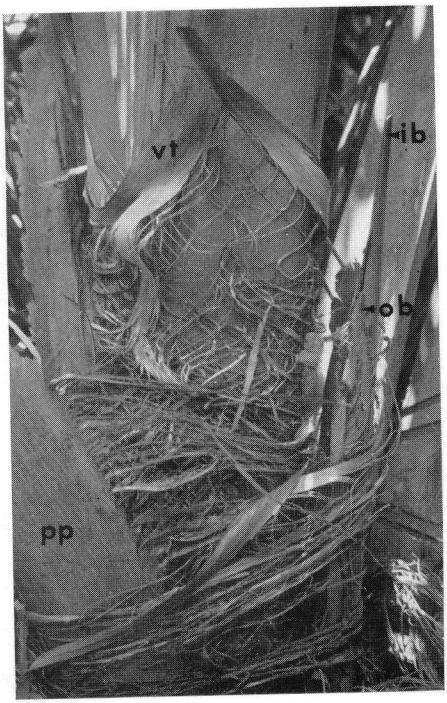
6. The spear leaf of a young sucker. Note the absence of a true petiole (il, insertion point of first leaflets; s, leaf sheath).

Habit and Branching

The tree growing in St. George's Park was 60 cm high at the time of planting and had a single stem (Long, 1950). It is not clear from Long's report whether the leaves were 60 cm long or whether in fact the trunk was this length. During the past 43 years, this single-stemmed tree has developed into a tree consisting of 15 stems, 12 of which are erect trunks, while the other three are still in their juvenile, subterranean state. This tree is characteristic of a typical cespitose growth habit (Fig. 1). The majority of trees in the groves at Msikaba and Mtentu also exhibit this type of habit.

The axillary buds in the basal portion of the trunk, particularly on the conical subterranean section, are very precocious and give rise to numerous suckers (Fig. 2). This is contrary to a report by Barry (1957) who reports that the development of multiple trunks in this species is not by the formation of offshoots from the trunk at ground level, but by divisions high in the crown of the tree. The findings of this study also conflict with McCurrach's (1960) description of *Jubaeopsis* because while this species is cespitose, *Jubaea* is columnar (Tomlinson, 1961). Further, while the trunk of *Jubaea* is often very tall and is probably the thickest of all palms, *Jubaeopsis* is only a medium-sized tree with the trunk attaining a height of seven or eight meters and a diameter of 24 to 30 cm. Both erect and reclining (especially in very old trees) stems occur.

7. The leaf sheath in which the ventral tissues have torn from the pseudopetiole margins to form a ventral flap or tongue (pp, pseudopetiole; t, torn edges of pseudopetiole; vt, ventral tongue).

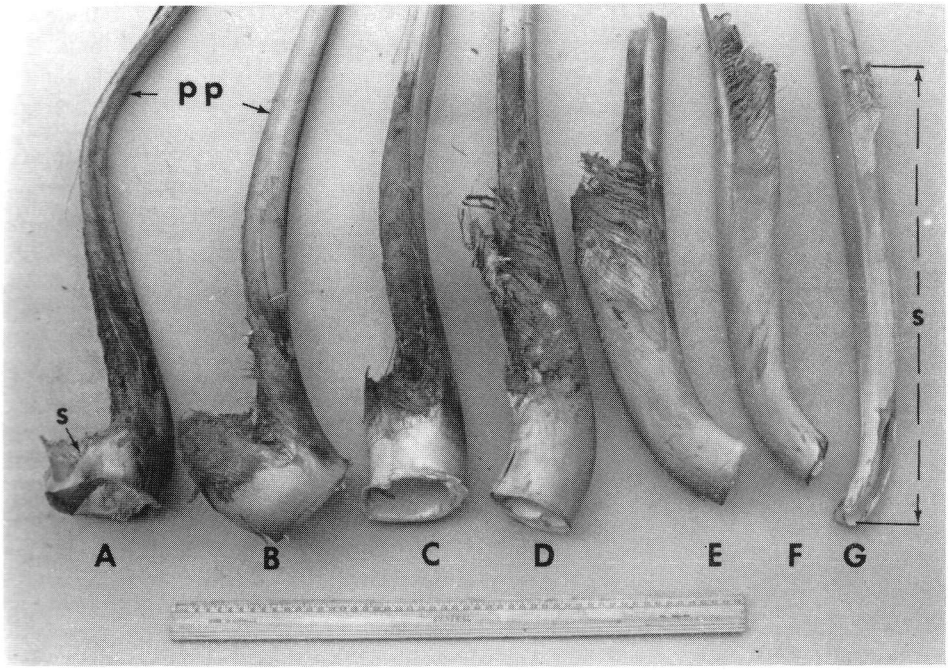


8. Disintegration of the tissues of the ventral tongue. Also evident is an emergent inflorescence which is still enveloped in two bracts. (ib, inner bract around inflorescence; ob, outer bract (prophyll); pp, pseudopetiole; vt, ventral tongue.)

Normally the leaf bases are abscised quite cleanly leaving a relatively clean trunk (Figs. 3, 4). However, particularly where trees are exposed to the wind, the rachis breaks at the base of the lamina and consequently the leaf bases (sheath plus pseudopetiole) are not cleanly abscised, but remain attached to the stem, giving the tree an untidy appearance. (The stems shown in Figure 2 are not typical of this species as the tree grows in a park and the dead leaves are sawn off prior to their being naturally abscised.)

Apart from the fact that the basal section of the stem of *J. caffra* gives rise to branches in the form of axillary suckers, the distal or aerial stem section also branches (Fig. 4). This branching is apparently neither a freak occurrence nor the result of injury, but is fairly common in *Jubaeopsis*. From Figure 4, the type of branching appears to be very similar to that found in *Hyphaene*. In this latter genus, and in *Nannorrhops* and *Nypa*, the branching is dichotomous (Tomlinson & Moore, 1966). Whether or not it is true dichotomy in *Jubaeopsis* though, remains to be established. Unfortunately an anatomical investigation of this aspect would involve the destruction of too many trees and has consequently not been undertaken.

The inflorescence develops from an axillary bud and is therefore borne laterally. This confirms the conclusions of Beccari (1913) in this respect. Each



9. Leaf bases dissected from a young *J. caffra* sucker. A, oldest open leaf (brown and dying); F, youngest open leaf; G, spear leaf; B–E, intermediate expanded leaves. (pp, pseudopetiole; s, leaf sheath.)

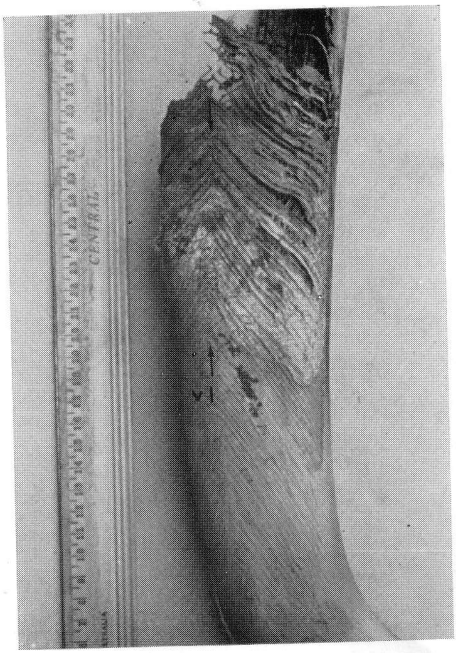
leaf subtends an axillary bud and the inflorescences are borne in the same sequence in which the leaves are formed. Any given adult stem will usually be bearing two or three inflorescences or spadices in various stages of development. Such interfoliar inflorescences together with a cespitose growth habit is considered relatively primitive in palms generally (Moore & Uhl, 1973).

Leaf Morphology

The alternate leaves are arranged in five vertical rows around the stem with a 144° angle of divergence i.e. a phyllotactic fraction of two-fifths. In many palm species the leaf rows are not truly vertical but are sloped or slanted and form a secondary spiral around the trunk (Davis, 1971). In *Jubaeopsis* however, the rows are usually completely vertical with slanted leaf rows only occurring in exceptional cases (Fig. 3).

Generally speaking, the leaves of *J. caffra* are similar to those of other cocosoid palms. They are paripinnate, slightly curved and are approximately six meters long and between 0.6 and 1.0 m wide. Distribution of the reduplicate pinnae is regular (Fig. 5) except at the apex of the lamina. The leaflets, which are all inserted in the same plane on the sides of the rachis, are all equally wide and each has only a single main rib.

As in most other cocosoid palms (Tomlinson, 1962) *J. caffra* has no true petiole. In the spear leaf the sheath extends up to the point at which the lowest pinnae are inserted on the rachis (Fig. 6). As this leaf grows, the thin ventral section of the sheath is distally separated from the thick, woody dorsal portion



10. The fibrous ventral tissues of the leaf sheath. Note the ventral line (vl).

and forms a dry, fibrous "tongue" or ventral flap (Fig. 7). This ventral flap disintegrates as the diameter of the stem increases (Fig. 8) until eventually only the persistent woody dorsal portion of the sheath remains (Fig. 9). This latter structure looks and functions like a true petiole, but is in fact a pseudopetiole.

While the ventral tissues in the leaf sheath of *J. caffra* are conspicuously fibrous (Figs. 8, 10) they are not totally persistent and undergo continual degeneration and decomposition so that in the mature leaf, only a narrow proximal band of ventral tissue remains (Fig. 9A, B). It thus seems as if the type of sheath that occurs here is intermediate between the *Phoenix* type and *Cocos* type (Tomlinson, 1962). However, the actual construction of the ventral tissue is very similar to that of *Cocos* (Tomlinson, 1964) in that it is comprised of three basic fibrous and vascular bundle systems, viz. warp, weft, and filling.

The warp and weft constitute the two main systems of parallel bundles with the abaxial bundles being the warp while the weft is formed by the adaxial ones. Contrary to the condition in *Cocos* though (Tomlinson, 1964), the warp and weft in *Jubaeopsis* are equally thick. The filling, as in *Cocos*, is composed of strands that are very much thinner than those of the other two systems.

Along the ventral line of the sheath there is an interchange of warp and weft strands (Fig. 10). At this point the abaxial strands of the warp of one-half of the leaf base pass under those of the other half and continue to the opposite margin of the pseudopetiole as weft strands. The functional efficiency of this type of foliar structure is very high (Tomlinson, 1964).

Acknowledgements

This study was supported financially by grants from the University of Port Elizabeth and the C.S.I.R.

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PALM BRIEFS

Date Breeding in Thailand

Some seedlings of *Phoenix dactylifera*, the date palm, produce completely sweet fruit in various localities in Thailand. This is considered to be a clear indication of success in growing dates in Thailand. Such fruit can be eaten fresh, preserved in syrup, or variously processed. There is no competition from imported dates because imported dates are taxed more than one dollar U.S. per kilogram.

Phoenix species have 18 gametic chromosomes and cross with each other. Species from the humid hot climates such as *P. reclinata*, *P. pusilla*, *P. zeylanica*, *P. paludosa*, *P. hanceana*, *P. acaulis*, *P. loureirii*, and *P. sylvestris* will be crossed with *P. dactylifera* in a breeding program sponsored by the Ministry of Agriculture and Cooperative of Thailand through a *Phoenix* development group, which includes two members of The Palm Society, Mr. Pittha Bunnag and myself. The Institut Français de Recherches Fruitières Outre-Mer (I.F.A.C.) is also interested. It will send viable seeds of *Phoenix reclinata* and *P. dactylifera* and will provide technical and genetic information.

Phoenix reclinata, which grows wild in humid hot regions of Africa, should have the greatest potential for variability and adaptability and should be the most important species for crossing with *P. dactylifera*. It produces soft, sweet, and agreeable-tasting fruit 20 mm in length, and it ranges through the largest number of bioclimatic conditions in the wild state. The resulting hybrid seedlings should produce maximum variation in fruit characters in the F_2 and later generations. Selections of better adapted hybrids that produce good quality fruit can be made for further breeding.

Other date cultivars that should be valuable for date breeding in Thailand are some from Kolokani, Mali, where the annual rainfall is 1,074 mm and excellent fruit ripens in April, the dry month there. A similar potential may be found in dates from Salala on the Oman coast of the Arabian Sea, where the monsoon dumps heavy rains so that coconut palms are now cultivated in great numbers and nearly supplant the date palms. Dry dates such as 'Karut' from Iran, 'Barakawi' from Sudan, and 'Thoory' from Algeria should be useful. 'Tadala' from Algeria is thought by P. Munier to be a false date, a hybrid between *P. dactylifera* and certain other species. It is more rain resistant than 'Halawy,' 'Medjool,' 'Thoory,' and 'Khadrawy.'

It is hoped that there will occur a parallel in the quality of dates in humid regions comparable to the high quality from arid desert regions, though in a new form of fruit character. Any further interesting progress will be reported in PRINCIPES. Viable seed or offshoots of interesting *Phoenix* hybrids developed in the program will be available to members of The Palm Society and to those who contribute seeds or any assistance.

Members who are interested may forward seeds to Dr. Siribongse Boon-Long, Inspector General, Ministry of Agriculture and Cooperative, Rajadamnern Avenue, Bangkok, Thailand. Viable seeds of *Phoenix reclinata* are now urgently needed and will be greatly

appreciated. We hope that members will assist in this program of fruit development.

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LETTERS

Coconut Industry Board
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The Editor, Principes

Dear Sir:

Palm Climbing

In the October, 1976, issue of PRINCIPES, Anthony B. Anderson described how you and he overcame the problem of climbing tall palms that have smooth and slippery trunks (In Search of Wax Palms, *Principes 20:* 127–135, 1976). This is a recurrent problem for anyone working with palms and even when a skilled local climber can be found it is galling to the scientist, who may have travelled thousands of miles, to have the last fifty feet of the journey left to a willing, but technically untrained, assistant. Resort to pole-spikes or an axe are unacceptable when a palm has to be climbed repeatedly. Members of The Palm Society and readers of PRINCIPES who have experienced this problem may wish to consider the following method, worked out for coconut breeding, which should be of general application.

At first glance the problem appears to be one of getting a toe-hold on a stem devoid of branches and which, with the exception of palms that retain their leaf bases, has a smooth or only slightly ridged trunk. Professor Corner, in his *Natural History of Palms*, gives an entertaining account of a variety of original methods and mentions a palm bicycle. Unfortunately, the development of that never got off the ground. Another type of tree bicycle, manufactured by H. Schneebeli, Zurich, Switzerland and known as the 'Baumvelo,' has been available to forestry workers for many years. This consists of two metal stirrups each having an adjustable, stainless-steel band which encircles the trunk. The climber has a safety belt and can climb up, down or around with confidence. The 'Baumvelo' weighs about 20 lbs and can be readily carried from palm to palm by one man and from site to site in a car (or even on a bicycle).

However, the problem of palm climbing is not solved simply by being able to ascend the trunk. Unlike the forestry cone-collector, who can "park" the tree bicycle at the first convenient branch and, releasing the feet from the stirrups, continue to climb freely, the palm climber may meet the inflorescences at some distance below the crown or, worse still, be confronted with bunch upon bunch of fruit. With coconut the fruit can be a formidable barrier and it is as well to be prepared before reaching the top of the trunk. The first step in preparation is to exchange the leather safety belt for a complete body harness, such as the 'Savall' made by Barrow/Hepburn, London, England. This is not only lighter and more comfortable to wear but it gives better support in the event of a fall and it provides extra D-rings on the chest and on the back. The second step before climbing is to attach a "sky-hook" to one of these D-rings.

The hook is not a piece of manufactured equipment and the Mark I version was made from a 5-foot length of ½ inch (i.d.) galvanized water pipe bent to shape. (If anyone reading this letter is experienced in designing or working with the kind of light but strong metals from which safety equipment is made their advice or assistance in making an improved Mark II would be welcomed.) The hook is permanently attached to the harness with a short length of safety line and on reaching the top of the trunk it is

slipped over and around a suitable leaf base high in the crown (for coconut this is the leaf with the youngest inflorescence). The climbers' weight is supported leaving the hands free for any manipulations. For instance, the coconut breeder wishing to reach the young inflorescence releases one end of the safety line which was used around the trunk during the ascent and attaches it to the long arm of the hook. The other end of the line is then attached to the lower of the two stirrups, the feet are released and the climber works his way into the crown. This procedure is carried out in reverse before beginning the descent and it should be noted that the climber is secured *at all times* by one or other of the safety lines. Similarly, the foot straps of the stirrups are released only after the line is attached and the line is not removed until the feet are once more strapped in. The safety line is then looped around the trunk and the climber clips onto it before removing the hook from around the leaf base. To see the tree bicycle rattle gently to the ground is amusing; the sight of the climber in uncontrolled descent is not.

The ropes and fittings, such as the 'Karabinier' clips which are used to make quick but safe connections between the climber's harness and his equipment and the knots and splices involved are identical to those used by rock climbers and the same safety rules should be applied. Equipment should be inspected regularly and checked before beginning to climb. Experience should be gained before attempting any really high climbs and the climber should be accompanied by someone on the ground who can also use the equipment. Climbing in wet weather should be avoided, if possible, and so should old and diseased palms. A safety helmet is desirable and industrial safety goggles prevent irritating debris from getting in the eyes when clearing dry leaves and bunches hanging against the trunk.

To those who have been able, since childhood, to scramble bare-footed up a palm trunk, carrying all the equipment they need—a knife—between their teeth, the sight of all this paraphernalia for the first time may be a source of amusement. For the rest of us, exposed to the dubious benefits of a civilization that would replace every flight of stairs with an elevator, the ability to do our work *in situ* should allow us to accept this role of entertainer with good grace.

Yours sincerely,
H. C. HARRIES

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Hilo, Hawaii 96720

The Editor, Principes

In July the Hawaii Palm Society had an adventure, thanks to Alfred Tong. Besides being a palm enthusiast Alfred is also a hiker, and he often walks along the shore. Alfred had also read an article by Otto and Isa Degener about tree molds of *Pritchardia* palms. So he had the understanding to realize that what he saw as he was walking along the shore were *Pritchardia* tree molds. It was this discovery that he shared with us.

Tree molds are formed by hot lava being cooled enough by relatively cool trees that the impression of the tree trunk is left in the lava before the tree itself is destroyed. They are not uncommon in Hawaii but they are usually tree molds of the ohia trees. The Degeners wrote about *Pritchardia* tree molds found in the Volcanoes National Park near Wahaula on the shore, and also *Pritchardia* tree molds found outside the park in Ka'u. The Degeners said these were *Pritchardia* palms and not coconut palms because the trunks were slender and not flaring at the bottom, but mainly because there were no leaf scars. Instead

the tree molds showed a surface of rectangular checks, rather like a tire print.

The *Pritchardia* palms are the native Hawaiian palms, and locally are known as loulu palms. The coconut palms are quite common but they are not native to Hawaii. There are several species of *Pritchardia* palms but all species are scarce and getting scarcer. They are not reproducing in the wild, and also they are dying of old age and being destroyed. They are being planted in both public places and private gardens, but they are still scarce.

On the day of our field trip we went first to the Wahaula Visitors' Center and from there walked southwest along the shore about a mile to where we came upon the prostrate tree molds in the pahoehoe (smooth) lava. Once we knew what we were looking for, they were easy to spot. They were slender and trough-like, and had smooth or rectangular checked surfaces. We returned to the Visitors' Center by way of the road and some of the sharp-eyed group even found some there along the road.

After lunch and a side trip on the nature trail of the Visitors' Center we drove back the way we had come for about two or three miles and parked just on the side of the road. In true Hawaiian style we walked right past the KAPU, NO TRESPASSING signs to the shore, and then along the shore for about ¼ mile. Unfortunately it was high tide and quite a high tide at that, so we found that we could not continue along the shore trail unless we swam, so we detoured through a hou thicket. A hou thicket may not be as bad as a mangrove swamp but it has its own special difficulties. But we followed Alfred, all the while wondering if he really knew where he was going. We went over, under, and through the deserted vilage of Punaluu, and we did arrive on the other side of the cove. And there they were—the *Pritchardia* tree molds.

The first one we saw we paced at 35 ft, and we were quite impressed. But then we found one we estimated to be 40 ft. They were quite numerous, and they were all prostrate. The longest one we found was paced at 60 ft. These were all right on the lava at the shoreline, right out in the open. We did not look for any in the vegetation. In fact, we didn't dally too long for the tide was still rising.

We followed Alfred out with confidence for by now we knew Alfred knew what he was doing. We all felt that we had seen something special, and it whetted our appetite to try to find the *Pritchardia* tree molds that the Degeners wrote about in Ka'u.

JANE ROBINSON

PALM LITERATURE

LANGLOIS, ARTHUR C. Supplement to Palms of the World is being advertised by University Presses of Florida, 15 N.W. 15th Street, Gainesville, FL 32603 for publication in late summer at $25.00 a copy if orders are prepaid. Florida residents must add 4 percent sales tax.

CLASSIFIED

(Continued from page 154)

similar to lethal yellowing that is infecting the palms of that country as

well as the Guianas, Venezuela and Trinidad.

In addition to leaving with full senses and stomachs, the members took with them nine newly potted *Heterospathe elata* seedlings. These are to be nurtured and grown for future sale by the chapter as a fund raising event and a means of dispersing more palms in our area which is becoming palm-scared due to lethal yellowing. We wish to thank Teddie Buhler for these seedlings and for a night to remember."

News from Texas

From the Houston Area Chapter we hear that they had an evening meeting in March at the Houston Garden Center. Alton Marshall and Jerry Rome were asked to head a spring project of cleaning and maintaining the palm trees at the Houston Arboretum. Future meeting plans were discussed and how to attract new people into the Chapter. Publicity suggestions were to get onto the Garden Calendar in the *Houston Home and Garden* and to contact the various newspapers and radio stations, all of which furnish free gardening and entertainment publicity.

President Jim Cain announced that at each meeting a single species of palm will be presented in detail. A "show and tell" section also may be held at which members would be requested to bring a palm of interest. Then a program on cold damage from the severe winter was conducted by Jim Cain and Alton Marshall.

On May 12, 1977, a meeting was held at the home of Alton Marshall. A brief synopsis of the Spring Day Project at the Houston Arboretum on April 23 was given. It was a pleasant and successful day with a large group participating. Alton Marshall had donated a *Phoenix roebelenii*, a *Rhapidophyllum hystrix*, an *Acoelorrhaphe wrightii*, and an *Arecastrum romanzoffianum*, all of which were planted.

The May program was given by Bob Maurice who had recently been appointed by the Chamber of Commerce to head a committee to sponsor a program of improving the aesthetic beauty of the city environment. The committee is proposing that thousands of free palm seedlings be distributed to interested organizations and individuals who would be responsible for potting and caring for the seedlings until they are mature enough to survive on their own. At such time the caretakers would be responsible for planting the young palms on any property owned by the city that would be inaccessible to mowers and other destructive maintenance equipment. All seedlings would be of types cold-hardy to the Houston area and would therefore add beauty to the city for years to come. The biggest problem at the moment is to acquire seedlings and Mr. Maurice asked for help from The Palm Society's Houston Chapter. The members were enthusiastic over the idea.

Again a discussion was held on the cold damage suffered in the Houston area due to the excessively cold winter.

It is heartening to hear of the various projects undertaken by our Chapters. It is surprising the impact that can be produced by a small number of determined people, so those of us in climates where palms can grow outdoors should do what we can to help beautify our area.

TEDDIE BUHLER

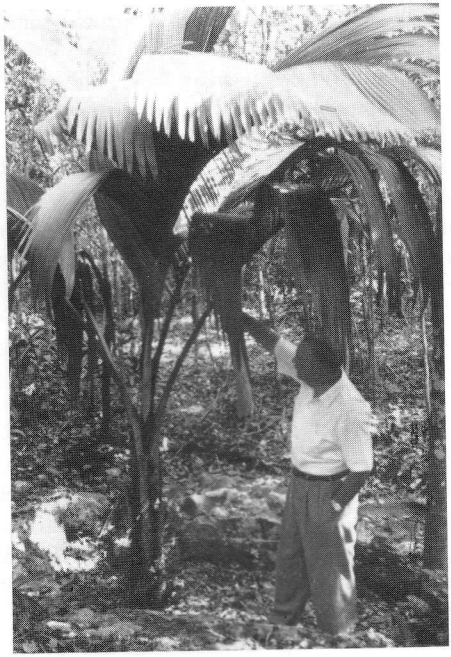
Arthur C. Langlois 1902–1977

The Palm Society lost a charter member and devoted student of palms when Mr. Arthur C. Langlois died on August 4, 1977 at his home, "The Retreat," in Nassau, Bahama Islands after a long illness. Before suffering a stroke three years ago, he had completed the manuscript for a "Supplement to Palms of the World" that is being published this year (see Palm Literature). This book was the result of a hobby of long standing devoted to the study and collection of rare palms that he and his wife Margaret ("Wumpsie"), who survives him, grew with loving care in sink holes of the limestone that underlies their garden.

Mr. Langlois was born June 13, 1902 on Jersey, Channel Islands, but from 1922 onward made his home in Nassau, where he had stopped enroute to British Guiana (now Guyana) and found it to his liking. Joining the Bahama civil service in 1922, he worked first as a wireless operator in the Out Islands but was later transferred to New Providence on the harbor deepening scheme. Subsequently he joined the Public Works, where he was associated with the Water Department. His work in supplying Nassau with water during World War II was recognized when he was made a Member of the British Empire (MBE). He retired in 1965 after 40 years of service in the Bahamas Government.

Mr. Langlois was a member and trustee of Trinity Methodist Church, where he taught Sunday School for many years. He also served as an officer of the British and Foreign Bible Society.

Mr. and Mrs. Langlois followed their interest in palms to many parts of the world—British Honduras (see *Principes* 1: 48–53, 1957), Costa Rica, Madagascar, New Hebrides, New Caledonia, Fiji, Western Samoa, and Trinidad. Many of the specimens they collected to document the plants they studied were sent to the late L. H. Bailey or later to the writer at the L. H. Bailey Hortorium, where they are preserved in the herbarium.



1. Mr. A. C. Langlois in his garden at Nassau. Photo by Dent Smith.

Mr. and Mrs. Langlois were responsible for growing to maturity some of the handsome palms collected by the late David Fairchild on the voyage of the Cheng Ho. *Siphokentia beguinii*, *Drymophloeus oliviformis*, a striking *Pinanga*, and the beautiful *Areca langloisiana* were among them. *Euterpe langloisii* from Trinidad also commemorates Mr. Langlois and *Schippia concolor* was introduced by them.

Many members of The Palm Society have had the privilege of visiting The Retreat and I count my visits among the rich experiences of a professional life spent with palms. The enthusiasm, knowledge, and growing ability exhibited by Mr. and Mrs. Langlois have been and will continue to be an inspiration to many of us.

HAROLD E. MOORE, JR.

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Figures in *Italic* indicate pages with photographs or other illustrations